

*Risk and Sustainable Management  
Group*

*Schools of Economics and Political Science,  
University of Queensland*

**ANNUAL REPORT 2009**



The Coorong, Murray Mouth, February 2010

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## Foreword

Risk and uncertainty are central to economic activity of all kinds. The importance of risk has rarely been more evident than in the global financial crisis that began in 2007 and continues to shake the global economy. The crisis represented a massive failure of the risk management institutions of the modern economy, and particularly those of global financial markets. In responding to the crisis, the Risk and Sustainable Management Group addressed both macroeconomic issues and the implications for the sustainability of policy responses to environmental issues. In addition to showing up the failings of economic institutions, the global financial crisis reflected the failure of a number of economic ideas that had played a crucial role in policy thinking throughout the era of market liberalism that began in the 1990s.

During the economic turmoil of 2009, the issues of climate change and the Murray–Darling Basin remained at the forefront of public attention. As in previous years, the Group has made a substantial contribution to public debate, as well as to academic research on these issues. In addition to the policy debate, the breaking of the long drought in much of South-Eastern Australia has created new policy options and changed the terms in which much of the discussion is framed. The Group has responded to these developments with new research initiatives, including new ways of representing uncertainty and variability.

Amid many uncertainties, it seems clear that the problems of climate change and water policy will continue to present policymakers, and the Australian public, with difficult decisions for many years to come. The research undertaken by the Group is devoted to providing some of the information needed to make those decisions wise and sustainable.

### **Acknowledgements**

The University of Queensland has provided a very supportive environment for research. The assistance of the Schools of Economics and of Political Science and International Studies, the Faculties of Business, Economics and Law and of Social and Behavioral Sciences, the Office of Research and Postgraduate Studies and the Vice-Chancellor has been particularly valuable.

Above all, the Group thanks the Australian Research Council and the Australian government for the generous financial support given to the research reported here.

## Highlights of 2009

- The RSMG model of irrigated agriculture in the Basin continued to provide a vital input to public policy and economic analysis. This was reflected in a number of conference papers and journal articles, and in work done for government bodies including the Government of South Australia and the Murray–Darling Basin authority.
- Professor Quiggin received invitations as a plenary speaker at major conferences including the conference of the International Association of Agricultural Economists, held in Beijing, and for the Annual Economic and Social Policy Public Lecture at the University of Wollongong
- In response to the Global Financial Crisis, Professor Quiggin wrote a number of papers and reports on the implications for risk and uncertainty, climate change and economic theory in general. This work led to an invitation from Princeton University Press to write a book aimed at a general audience, discussing economic ideas that have been refuted (or supported) by the experience of the crisis. The book, entitled *Zombie Economics: How Dead Ideas Still Walk Among Us*, is due to be published in the United States on October 31, 2010, and released in Australia shortly thereafter.



Drip Irrigation, Tatura

# The Risk and Sustainable Management Group

## **Establishment**

The Risk and Sustainable Management Group (RSMG) was formally established in May 2004, as a joint initiative of the School of Economics and the School of Political Science and International Studies at the University of Queensland. Funding has been provided by the Australian Research Council and the University of Queensland.

Work towards the establishment of the Group began in August 2003, when Professor John Quiggin took up an Australian Research Council Federation Fellowship to work on the project 'Sustainable reform of the Murray–Darling system: property rights, uncertainty and institutions'.

In 2008, Professor Quiggin began a second Federation Fellowship for the project 'Climate change: adaptation and resilience in the face of uncertainty'. The Fellowship will run until the end of 2012.

## **Aims**

The central aim of the Risk and Sustainable Management Group is to use recent developments in the analysis of property rights and the theory of choice and production under uncertainty to provide a rigorous basis for the use of the precautionary principle in the management of complex economic–ecological systems. These developments will be applied to the design, modelling and evaluation of policies designed to promote ecologically, economically, and socially sustainable reform of the Murray–Darling system in the presence of climate change.

More generally, the aim of the Group is to show how the latest advances in economic theory can help to illuminate the major issues in the Australian public debate, from the role of government and the market to the assessment of standards of living, and to bridge the gap between economics and other social sciences.

## Staff



### **John Quiggin: Federation Fellow**

John Quiggin is a Federation Fellow in Economics and Political Science at the University of Queensland. Professor Quiggin is prominent both as a research economist and as a commentator on Australian economic policy. Among over 1000 publications, he has published five books and more than 300 journal articles and book chapters in fields including environmental economics, risk analysis, production economics, and the theory of economic growth. He has also written on policy topics including unemployment policy, microeconomic reform, privatisation, competitive tendering and the management of the Murray–Darling Basin.



### **David Adamson: Research Officer**

David Adamson takes primary responsibility for the coding and maintenance of the Excel version of the Murray–Darling Model. His areas of expertise include: cost–benefit analysis of research and development programs; impact assessment of agricultural pest management issues; quarantine risk analysis; and MS Excel model development. He is currently enrolled in a PhD program.



### **Liam Wagner: Post Doctoral Research Fellow**

Liam Wagner joined the Group as a Postdoctoral Research Fellow in September 2007. Dr Wagner was awarded his PhD in mathematics from the University of Queensland in May 2008. He has previously worked as a trader/analyst in the energy industry, providing advice on risk management and emissions trading, while also trading for an Open Cycle Gas Turbine power station. His current research interests include: maintenance of the GAMS version of the Murray–Darling Basin model; analysis of the National Emissions Trading Scheme; and modelling the impact of climate change on the Snowy Hydro Scheme.



### **Peggy Schrobback: Research Assistant**

Peggy joined the team in November 2007 with a background in agricultural and resource project management in developing countries. Her main focus in our group is the modelling of land and water allocations to irrigated agriculture production systems in the Murray-Darling Basin using different software tools. She recently investigated the effect of increased land allocations to forestry within the Basin and its impact on downstream water availability and socio-economic resilience. Peggy is currently working on improving the simulations of the salt loads carried within the Murray and Darling River systems. Peggy is also interested in investigating the risks and uncertainties of environmental change to medium and small scale food production industries. She is involved in a project that aims to model the economic impact of changing chemical condition of our oceans on marine-based aquaculture production systems.



### **Sarah Chambers: Research Assistant**

Sarah Chambers joined the team in January, 2008. She is a graduate of the University of Queensland, with honours in natural resource economics and political science. Her experience includes applied benefit-cost and risk analysis of sustainable agricultural practices in both Australia and internationally. Her previous work includes research at CIMMYT in North America, and policy analysis at the Queensland Department of Primary industries. Her current research interests include: bio-economic modelling of environmental and economic tradeoffs in the MDB, and using the state contingent approach to compare productivity of agricultural technologies.

### **Nancy Wallace: Research Assistant**

Nancy Wallace provides editorial and bibliographic services, document management, research administration and reporting.



## Research outcomes

To meet its objectives, the work of the Group has been divided into four programs:

- Murray–Darling Basin Program
- Risk and Uncertainty Program
- Australian Public Policy Program
- Climate Change Program

Each program encompasses a number of research projects.



*Chowilla Flood Plain, February 2010*

# Murray–Darling Basin Program

## Objectives

The aim of this program is to apply new developments in economic theory to the design, modelling and evaluation of policies designed to promote ecologically, economically, and socially sustainable reform of the Murray–Darling Basin.

The Group's simulation model of land and water allocation in the Murray–Darling Basin has remained a central focus of our research. The model was applied to:

- \* analyze the impact of restrictions on trade irrigation water;
- \* examine the interaction between irrigated agriculture and the expansion of forestry for carbon sequestration; and
- \* model the allocation of water for environmental flows.

Developments included more detailed modelling at the sub-catchment scale and integration of model output with regional computable general equilibrium models. Additional work has focused on explicit inclusion of flow variability at the catchment scale.

The Program produced two journal articles, in the *Australian Journal of Agricultural and Resource Economics* and the *Australian Journal of Entomology*, three working papers and five conference papers in 2009.

# Risk and Uncertainty Program

## Objectives

The aim of this project is to develop fundamentally new approaches to the theory of risk and uncertainty and its role in the design and management of complex projects and policy initiatives. The results will be applied to the issues of sustainable management of the Murray–Darling Basin and to analyses of Australian public policy, as described under those programs.

## Project: Unforeseen contingencies

The main objectives of theoretical research in the project were to develop models capable of representing choice under uncertainty in the presence of unforeseen contingencies, and to apply these models to improve understanding of the ‘precautionary principle’. Substantial progress has been made, particularly in understanding the interaction between inductive and deductive reasoning.

Work in this project has been undertaken jointly with Professor Simon Grant of Rice University, Texas, and Jeff Kline and Professor Flavio Menezes of the University of Queensland. The project produced a journal article in the *International Journal of Industrial Organization* four conference papers and three working papers in 2009.

## Project: State-contingent production

This project continues a long-standing collaboration with Professor Robert G. Chambers of the University of Maryland, College Park and Professor Chris O'Donnell of the University of Queensland. The central idea is to represent production under uncertainty using the representation of uncertain outputs as state-contingent production bundles, as first proposed by Arrow and Debreu in their Nobel prize-winning general equilibrium model. This approach can be integrated with modern methods of production theory, such as the application of duality theory. The current focus is on empirical estimation on the integration of production and finance theory and on applications to comparisons of efficiency.

The project produced two journal articles, in the *Journal of Mathematical Economics* and *The Geneva Risk and Insurance Review* in 2009.



# Australian Public Policy Program

## Objectives

The aim of this program is to show how the latest advances in economic theory can help to illuminate the major issues in the Australian public debate, from the role of government and the market to the assessment of standards of living. The project will also help to bridge the gap between economics and other social sciences.

### **Project: Risk and public policy**

Risk plays a central role in public policy today. The central role of risk has become evident in the course of the global financial crisis. The global financial crisis reflected the failure of a number of economic ideas that had played a crucial role in policy thinking throughout the era of market liberalism that began in the 1990s. Criticism of these ideas undertaken as part of the research activity of the Group led Princeton University Press to offer Professor John Quiggin a book contract. The resulting manuscript was completed during 2009 and will be published in 2010 under the title *Zombie Economics: How Dead Ideas Still Walk among Us*.

In addition to this manuscript, the project produced two book chapters, a journal article, three working papers and four conference papers in 2009.

### **Project: Innovation in the information economy**

This project addresses the changing nature of innovation in an economy in which the role of knowledge and information has been transformed by new technologies in computing and telecommunications, most notably the Internet. Work on the project this year yielded a substantially improved understanding of the role of transactions costs in determining the optimal pricing policy for public information. The rise of the Internet has reduced search costs, but transactions costs of purchases remain substantial. As a result, free distribution of information is socially optimal in most cases.

The project produced a working paper and three conference papers in 2009. In addition, Professor Quiggin maintained his role as one of Australia's leading academic and political bloggers, and extended involvement in the use of social networking systems such as Facebook and Twitter to disseminate research and policy ideas.

# Climate Change Program

## **Objectives**

The aim of this program is to analyse issues related to mitigation of, and adaption to, climate change. A fundamental premise of our research is that mitigation and adaptation are not competing alternatives but are necessary complements. In the absence of effective mitigation, climate change will be so rapid and extensive that adaptation will be impossible. On the other hand, even with a substantial mitigation effort, significant climate change is inevitable, and adaption will therefore be necessary.

### **Project: Impacts and adaptation**

This project is concerned with modelling impacts of climate change in Australia, and the possibilities for adaptation, with a particular focus on the Great Barrier Reef and the Murray–Darling Basin. The project produced a journal article and three conference papers. The Group continued work on the impact of climate change on coral reefs and aquaculture, in collaboration with Ove Hoegh-Guldberg (UQ) and Terry Hughes (JCU).

### **Project: Climate change: theory and policy**

This project is concerned with theoretical and policy aspects of climate change, including issues such as the choice of discount rates and the design of emissions trading schemes. The project produced a journal article , a book chapter, several conference papers and a variety of submissions and reports in 2009.

## Communication

An important object of the Group has been to make current research widely available as rapidly as possible. In addition to journal articles and conference papers, a variety of methods have been used to reach the broadest possible audience.

### Web Site

A website has been developed at:

<http://www.uq.edu.au/rsmg>.

It provides reprints of journal articles and working papers, annual reports, information on staff activities and useful links.

### Working Papers

A working paper series has been established for each of the Programs listed above, and registered with RePeC, the main online repository for working papers in economics. More than fifty working papers are now available. A complete set of papers is available at:

<http://www.uq.edu.au/rsmg/publications-rsmg>.

The Group has also been active in public presentations, conferences, research seminars and contributions to print and electronic media.

### Public Inquiries

It is important that research should be relevant to public policy. Members of the Group regularly make submissions to Parliamentary and other public inquiries. Although informed by research, views expressed in such submissions are those of the individual concerned.

### Media

Professor Quiggin is a regular contributor to the *Australian Financial Review* and frequently writes on topics related to the work of the Group. In addition, he regularly provides comments on policy issues for radio, television, magazines and online publications.

## List of publications

### Book chapters

- Bell, S. and Quiggin, J. (2009), 'Unemployment policy: unemployment, underemployment and labour market insecurity' in McClelland, A. and Smyth, P. (eds) *Social Policy in Australia: Understanding for Action* (2nd edn), Oxford University Press, Melbourne, pp. 145–157.
- Gruen, N. and Quiggin, J. (2009), 'Boiling frogs and black swans: How resilient is our economy — and how could we improve its resilience?', in Cork, S. (ed.), *Brighter Prospects: Enhancing the Resilience of Australia*, Australia21 Shaping the Future, Canberra, pp. 41–46.
- Quiggin, J. (2009), 'Climate change and intergenerational equity' in Moss, J. (ed.), *Climate Change and Social Justice*, MUP Social Justice Series, Melbourne University Press, Carlton, Victoria, pp. 67–81.

### Refereed journal articles

- Adamson, D., Mallawaarachchi, T. and Quiggin, J. (2009), 'Declining inflows and more frequent droughts in the Murray–Darling Basin: climate change, impacts and adaption', *Australian Journal of Agricultural and Resource Economics*, 53(3), 345–366.
- Chambers, R. G., and Quiggin, J. (2009), 'Separability of stochastic production decisions from producer risk preferences in the presence of financial markets', *Journal of Mathematical Economics*, 45(11), 730–737.
- Menezes, F., and Quiggin, J. (2009), 'Markets for influence', *International Journal of Industrial Organization*, (in press, corrected proof, available online 21 October 2009).
- Menezes, F., Quiggin, J. and Wagner, L. (2009), 'Grandfathering and greenhouse: the role of compensation and adjustment assistance in the introduction of a Carbon Emissions Trading Scheme for Australia', *Economic Papers*, 28 (2), 89–92.
- Quiggin, J. (2009), 'Six refuted doctrines', *Economic Papers*, 28(3), 238–247. (in press).
- Quiggin, J. and Chambers, R. G. (2009), 'Bargaining power and efficiency in insurance contracts', *The Geneva Risk and Insurance Review*, 34, 47–73.
- Zalucki, M.P., Adamson, D. and Furlong, M.J. (2009), 'The future of IPM: whither or wither?', *The Australian Journal of Entomology*, 48, 85–96.

### **Non-refereed journal articles**

- Quiggin, J. (2009), 'Innovation policy', Australian R & D Review: Linking Australian Science, Technology and Business, December.

### **Working papers**

#### **Murray–Darling Program**

##### **[ISSN: 1832-4266]**

- Chambers, S. and Adamson, D. (2009), 'Environmental Flows and Agricultural Production in the Murray Darling Basin', Risk and Sustainable Management Group Murray-Darling Basin Program Working Paper M09\_1, University of Queensland.
- Schrobback, P., Adamson, D. and Quiggin, J. (2009), 'Turning Water into Carbon: Carbon sequestration vs. water flow in the Murray–Darling Basin', Risk and Sustainable Management Group Murray-Darling Basin Program Working Paper M09\_2, University of Queensland.
- Quiggin, J., Adamson, D., Chambers, S. and Schrobback, P. (2009), 'Climate change, mitigation and adaptation: the case of the Murray–Darling Basin in Australia', Risk and Sustainable Management Group Murray-Darling Basin Program Working Paper M09\_3, University of Queensland.

#### **Risk and Uncertainty Program [ISSN: 1832-4258]**

- Grant, S. and Quiggin, J. (2009), 'Inductive reasoning about unawareness', Risk and Sustainable Management Group Risk and Uncertainty Program Working Paper R09\_1, University of Queensland.
- Menezes, F. and Quiggin, J. (2009), 'Markets for Influence', Risk and Sustainable Management Group Risk and Uncertainty Program Working Paper R09\_2, University of Queensland.
- Grant, S., Kline, J. and Quiggin, J. (2009), 'A Matter of Interpretation: Bargaining over Ambiguous Contracts', Risk and Sustainable Management Group Risk and Uncertainty Program Working Paper R09\_3, University of Queensland.

#### **Australian Public Policy Program [ISSN: 1832-424X]**

- Quiggin, J. (2009), 'Risk Shifts in Australia: Implications of the Financial Crisis', Risk and Sustainable Management Group Australian Public Policy Program Working Paper P09\_1, University of Queensland.

- Quiggin, J. (2009), 'Six refuted doctrines', Risk and Sustainable Management Group Australian Public Policy Program Working Paper P09\_2, University of Queensland.
- Quiggin, J. (2009), 'An agenda for social democracy', Risk and Sustainable Management Group Australian Public Policy Program Working Paper P09\_3, University of Queensland.
- Quiggin, J. (2009), 'The value of public sector information for cultural institutions', Risk and Sustainable Management Group Australian Public Policy Program Working Paper P09\_4, University of Queensland.

#### **Climate Change Program [ISSN: 1835-7245]**

- Quiggin, J. (2009), 'Agriculture and global climate stabilization: a public good analysis', Risk and Sustainable Management Group Climate Change Program Working Paper C09\_1, University of Queensland.

#### **Discussion Papers**

- Quiggin, John (2009), 'An agenda for social democracy', *Perspectives* No. 1, The Whitlam Institute, University of Western Sydney, Sydney.

#### **Conference papers**

- Menezes, F., Quiggin, J. and Wagner, L. (2009), 'Grandfathering and greenhouse: the role of compensation and adjustment assistance in the introduction of an emissions trading scheme for Australia', Paper presented at the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society, Cairns, 11 February.
- Adamson, D., Mallawaarachchi, T. and Quiggin, J. (2009), 'Modelling uncertain states of nature', Paper presented at the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society, Canberra, 12 February.
- Quiggin, J. and Hughes, T. (2009), 'Climate change: can the Great Barrier Reef be saved?', Paper presented at the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society, Canberra, 12 February.
- Adamson, D. (2009), 'Modelling uncertain states of nature', Paper presented at the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society, Cairns, 13 February.
- Schrobback, P., Adamson, D. and Quiggin, J. (2009), 'Turning water into carbon: water flow versus carbon sequestration in the Murray–Darling Basin', Paper presented at the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society, Cairns, 13 February.

- Quiggin, J. (2009), Presentation of a keynote speech at conference on 'Evidence, Science and Public Policy' sponsored by the School of Philosophical and Historical Inquiry, Sydney Centre for the Foundations of Science, University of Sydney, Sydney, Australia and the Tilburg Center for Logic and Philosophy of Science, Tilburg University, The Netherlands, 26–28 March 2009.
- Quiggin, J. (2009), 'The big picture: sustainability, challenges, opportunities and imperatives', Paper presented at the 69th Annual Branch Conference of Environmental Health Australia, Sunshine Coast, 25 May 2009.
- Wagner, L., Liebman, A., and Foster, J. (2009), 'Examining the future of nature gas usage in the Australian National Electricity Market', Paper presented at the 32<sup>nd</sup> International Conference of the International Energy Economics Association, San Francisco, 21–24 June.
- Quiggin, J. and Menezes, F. (2009), 'Markets for influence', Paper presented at ESAM09: Econometric Society Australasian Meeting, Canberra, 9 July.
- Grant, S., Kline, J. and Quiggin, J. (2009), 'A matter of interpretation: bargaining over ambiguous contracts', Paper presented at ESAM09: Econometric Society Australasian Meeting, Canberra, 10 July.
- Adamson, D. (2009), 'Modelling regional irrigation impacts of climate change ', Paper presented to the 21st Conference of the Pacific Regional Science Conference Organisation (PRSCO ) on 'Global Challenges — Regional Responses', Gold Coast, 19–22 July.
- Quiggin, J. (2009), 'Cultivating an online community and the value for students' Presentation (via video link) at the GLAM-WIKI Conference on 'Galleries, libraries, archives, museums (GLAM) and Wikimedia: finding the common ground' , Canberra, 6 August.
- Quiggin, J. (2009), 'Agriculture and global climate stabilisation', Invited speaker at a plenary session on 'Global Public Goods and 21st Century Agriculture' at the 27th International Conference of Agricultural Economists (IAAE) on 'The New Landscape of Global Agriculture', Beijing, China, 19 August.
- Quiggin, J. (2009), 'A matter of interpretation: bargaining over ambiguous contracts', Paper presented at the Logic, Game Theory, and Social Choice 6 Conference, University of Tsukuba, Tsukuba, Japan, 26 August.
- Froome, C. and Wagner, L. (2009), 'Designing solar feed-in tariffs for Australia: lessons learnt from Europe?', Paper presented at the 10th IAAE European Conference, Vienna, 7–10 September.



- Wagner, L., Liebman, A., Froome, C, and Foster, J. (2009), 'Forecasting the long term emissions intensity factor for electricity markets: an Australian case study', Paper presented at the 10th IAEE European Conference, Vienna, 7–10 September.
- Quiggin, J. (2009), 'The Australian economic landscape: how the financial services industry is faring', Keynote presentation at the 2009 AATCU (Association of Australian Teachers' Credit Unions) Conference on 'Building Resilience', Brisbane, 12 September.
- Quiggin, J. (2009), 'Ambiguity, the precautionary principle and climate change' Paper presented to a Conference on 'Ambiguity, Uncertainty and Climate Change' sponsored by the Climate and Energy Policy Institute, UC Berkeley Law School, University of California, Berkeley, 17 September.
- Quiggin, J. (2009), 'After the crisis', Paper presented to the 38th Australian Conference of Economists, Adelaide, 29 September.

#### **Unpublished Presentations**

- Quiggin, J. (2009), 'Will the Carbon Pollution Reduction Scheme drive a clean energy revolution?', iGrid Intelligent Grid Forum on 'Distributed Energy: Reducing Greenhouse Emissions Now', sponsored by Ergon Energy and Energex, Brisbane, 7 April.
- Quiggin, J. (2009), 'Climate change, the new driver of innovation, technology, markets and economic growth: market and policy responses', function jointly sponsored by the Economic Society of Australia and Economic Development Australia as part of Brisbane City Council's CitySmart Innovation Festival, 3 June.
- Adamson, D. (2009), 'TPP and agriculture', TPP TransPacific Partnership) Colloquium, Auckland, New Zealand, 22–23 June.
- Quiggin, J. (2009), 'Climate change and the global financial crisis', (by video conference), Victorian Branch of the Australian Agricultural and Resource Economics Society, Melbourne, 23 June.
- Quiggin, J. (2009), 'Unemployment: the coming crisis', by videoconference to the panel 'Global Financial Crisis: employment and recovery for working Australians' at the ACTU Jobs Summit on 'Pathways to Recovery', Sydney, 20 July.
- Quiggin, J. (2009), 'Climate change and the Global Financial Crisis', 2009 Annual Economic and Social Policy Public Lecture, University of Wollongong, Wollongong, 23 July.



- Quiggin, J. (2009), 'New times, new approaches: exploring Australia's economic options', Session 3 of 'Getting to Grips with the Economy', a public information series presented by the Whitlam Institute and the School of Economics and Finance, University of Western Sydney, Sydney, 23 July.
- Quiggin, J. (2009), 'Climate change and coral reefs: adaptation, offsets and resilience', session on 'People and economies' at the Brisbane Symposium on 'Securing Coral Reef Futures: linking ecosystems, societies and economies', ARC Centre of Excellence, Coral Reef Studies, Brisbane, 7 August.
- Adamson, D. (2009), 'SPS the safe sex of trade', 2009 Fulbright Symposia on 'The US–Australia Free Trade Agreement: the last five years, the next five years', Canberra, 25 August.
- Adamson, D. and Mallawaarachchi, T. (2009), 'RSMG Murray–Darling Water Allocation Model: an update on developments and future directions', ABARE–BRS Seminar Series, Canberra, 9 September.
- Quiggin, J. (2009), 'The interaction between urban and rural water use', CEDA (Committee for the Economic Development of Australia) Trustee Discussion Forum on 'A Water Strategy for Australia', Brisbane, 10 September.
- Adamson, D. (2009) 'From apples to zoonosis: unpeeling the myopia of analysis', 2009 AARES Annual Symposium on 'Invasive Species and Biosecurity', Australian Agricultural and Resource Economics Society, Canberra, 10–11 September.
- Quiggin, J. (2009), 'Beyond the economic crisis: alternatives to market liberalism', Public Lecture, Don Dunstan Foundation, Adelaide, 29 September.
- Quiggin, J. (2009), 'Will the current proposed ETS (Emissions Trading Scheme) be effective?', Emissions Trading Forum hosted by the UQ Greens, University of Queensland, Brisbane, 13 October.
- Quiggin, J. (2009), 'The United Nations Framework Convention on Climate Change', UQ Young Scholars Program, Office of Prospective Students and Scholarships, University of Queensland, Brisbane, 2 December.
- Quiggin, J. (2009), Presentation on 'Energy water and sustainable cities' to the 2nd U21 International Multidisciplinary Conference for Graduate Research Students, Sustainable Cities for the Future, Brisbane, 4 December.

## Seminars

- Quiggin, J. (2009), 'Carbon dioxide emission targets', Federal Treasury secretariat for Australia's Future Tax System Review, Canberra, 7 July.

- Quiggin, J. (2009), 'A matter of interpretation: bargaining over ambiguous contracts', Department of Economics, National University of Singapore, Singapore, 31 August.

### **Workshops/summits**

- Quiggin, J. (2009), 'Responsible markets', Participation (via videoconference) in a workshop at a conference on 'Crunch Time: Australia's Policy Future' sponsored by a collaboration of Australia's independent progressive think tanks, Sydney, 22 April.
- Quiggin, J. (2009), 'Are PPPs finished, or are we just getting started?', Presentation to the 9th Annual National PPP Summit on 'Analysing the evolution of the Australian Public Private Partnership model amidst the tightened global credit market', Brisbane, 11 June.
- Quiggin, J. (2009), 'Unemployment: the coming crisis', Paper presented (by videoconference) to the panel 'Global Financial Crisis: Employment and recovery for working Australians' at the ACTU Jobs Summit called 'Pathways to Recovery', Sydney, 20 July.
- Quiggin, J. (2009), 'Rank-dependent utility and recent developments', Presentation of a lecture to PhD Lectures and Workshop on 'Risk and Uncertainty in Economic Models', Department of Economics, University of Verona, Verona, 21 September.
- Quiggin, J. (2009), 'From expected value to unknown unknowns: economic models of choice under uncertainty', Presentation to a Workshop on 'Risk and Uncertainty in Economic Models', Department of Economics, University of Verona, Verona, 23 September.
- Adamson, D. (2009), 'Climate impacts and irrigation investment in the Murray-Darling Basin', Presentation to an Early Career Economics Workshop (E-Crew), Bathurst, 3–4 November.
- Schrobback, P., Adamson, D. and Quiggin, J. (2009), 'Economic Impact of ocean acidification and increased sea temperature on Australia's Sydney Rock Oyster Industry', Presentation to the Environmental and Resource Economics Early-Career Researcher Workshop, Charles Sturt University, Bathurst, 3–4 November.
- Quiggin, J. (2009), 'Financial markets after the crisis' Presentation (via videoconference) to a workshop on 'Re-embedding the Market: Crisis and Reinvention?' hosted by the University of Melbourne and Harvard University, 4 December.

### **Reports**

- Adamson, D. (2009), 'One-Health CRC's Evaluation Framework: an introduction to research management', Risk and Sustainable Management Group, University of Queensland, Brisbane.
- Quiggin, J., Adamson, D., Chambers, S. and Schrobback, P. (2009), Water Trade in the Murray–Darling Basin: Report on consultancy output: Modelling Effects of Trade Restrictions, Report prepared for the South Australian Government, Risk and Sustainable Management Group, University of Queensland, Brisbane.
- Wagner, L.D. (2009), The Effects of Large Scale Deployment of Distributed Generation on the National Electricity Market. Commissioned by the CSIRO Energy Transformed Flagship, Risk and Sustainable Management Group, University of Queensland, Brisbane.

#### **Submissions to government inquiries/taskforces**

- Chambers, S. (2009), Submission by the Risk and Sustainable Management Group, University of Queensland to the Inquiry by the Productivity Commission into 'Market Mechanisms for Recovering Water in the Murray–Darling Basin', Australian Government, Canberra.
- Froome, C., and Wagner, L. (2009), 'Designing Feed-in Tariffs for Solar PV in Queensland', Office of Clean Energy, Department of Mines and Energy, Queensland Government, 6th February.
- Quiggin, J. (2009), Presentation of evidence to a Public Hearing of the Senate Select Committee on Climate Policy, Parliament of Australia, Department of Parliamentary Services, Brisbane, 28 April.
- Quiggin, J. (2009) 'The end of quasi-guarantees and the case for a narrow banking model of prudential regulation', Submission to the Senate Economics Committee Inquiry into the Bank Funding Guarantees, Canberra, 20 July.
- Quiggin, J. (2009) 'Brief responses to the Terms of Reference', Submission to the House of Representatives Standing Committee on Economics Inquiry into 'Raising the Level of Productivity Growth in the Australian economy', Canberra, 19 November.
- Quiggin, J. (2009), Presentation of evidence (via teleconference) to the House of Representatives Standing Committee on Economics Inquiry into 'Raising the Level of Productivity Growth in the Australian Economy', 19 November.

## Community service, outreach and media

*Entries in this section are for Professor John Quiggin, except where otherwise noted.*

- Presented the after dinner speech at the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society, 12 February 2009.
- Presented a seminar on 'Carbon taxes versus emissions trading' at a Lunchtime Seminar Series, Department of Main Roads, Brisbane, 13 March 2009.
- Presentation on 'The current global financial and economic crisis' to the Ethnic communities Council of Queensland, Brisbane, 18 March 2009.
- Panellist on session entitled 'Lessons learned for the future' at the Australian Financial Review's National Infrastructure Conference on 'Building and investing in the future', Sydney, 2 April 2009.
- Presentation at The Great Debate on 'Is the government the best risk manager?' hosted by the University of Queensland Economics Alumni, Brisbane, 5 May 2009.
- Attended Budget Lockup for Crikey.com, Federal Budget, Canberra, 12 May 2009.
- Presentation of a Keynote speech on 'Painting a picture of Australia's and Queensland's economy, the jobs market and the impact on graduates and alumni in the next couple of years' at the UQ Careers Breakfast, Brisbane, 14 May 2009.
- Met with the Queensland Council of Unions to discuss the impact on unions of the forthcoming Queensland budget, 14 May 2009.
- Attended a meeting of the Global Change Institute Working Group, University of Queensland, Brisbane, 26 May 2009.
- Special Guest Speaker at the launch of Ben McNeil's *The Clean Industrial Revolution*, Brisbane, 11 June 2009.
- Panellist for session on 'Should there be a tax on fatty foods?', Community Consensus Conference called 'Come Chew the Fat' hosted by the School of Journalism and Communication, University of Queensland, Brisbane, 13 June 2009.
- Participated in a special UQ School of Economics postBudget lunch to explore the implications of the Queensland Budget for business and individuals, UQ Club, University of Queensland, Brisbane, 17 June 2009.
- Participated (via teleconference) in the CEDA Water Strategy Panel, Committee for the Economic Development of Australia (CEDA), Melbourne, 19 June 2009.
- Presentation on the modelling work of the Risk and Sustainable Management Group to a workshop for Bernadette Welch, Federal Department of Climate Change, Brisbane, 9 September.
- Participated in a Panel on 'Directions for climate policy decisions' at a Conference on Ambiguity, Uncertainty and Climate Change sponsored by the

Climate and Energy Policy Institute, UC Berkeley Law School, University of California, Berkeley, 18 September 2009.

- David Adamson and Sarah Chambers attended a Science Exchange program on plant biosecurity at the Sunshine Coast, 23 September 2009.
- Participated in a Panel Discussion on 'Key Challenges for Australian Economic Managers' at a Business Symposium sponsored by the Economic Society of Australia (South Australia) and the South Australian Centre for Economic Studies, Adelaide, 1 October 2009.
- Presentation of opening address and panelist at a Workshop on 'Measuring Agricultural Productivity', Centre for Efficiency and Productivity Analysis, School of Economics, University of Queensland, Brisbane, 2 October 2009.
- Attended a meeting of the Global Change Institute Working Group, University of Queensland, Brisbane, 8 October 2009.
- Participation (via teleconference) in a discussion hosted by the Federation of Australian Scientific and Technological Societies and the Australian National University about linking climate science expertise and Great Barrier Reef expertise, 16 October.
- Participation (via teleconference) in the CEDA Water Strategy Panel, Melbourne, 30 October.
- Presentation on 'Banking after the crisis: Do we need a peoples's bank?' at a 'Politics in the Pub' session, Gaelic Club, Sydney, 6 November.
- Participated in a panel discussion on 'Best practice energy market regulation – what does it look like and how do we get there?' at the National Consumer Roundtable on Energy, Brisbane, 11 November.
- Participated in press conferences, interviews and discussions with politicians in Canberra as part of the Federation of Australian Scientific and Technological Societies (FASTS) Great Barrier Reef Climate Change Alliance, 16–17 November.
- Presentation on 'Water reform' to The Board of SunWater, Brisbane, 19 November.
- Panelist at a CEDA (Committee for the Economic Development of Australia) SEQ Transport Infrastructure Forum # 3: Infrastructure Financing and Development: Road, Rail, Tunnels — 2010 and Beyond', Brisbane, 23 November.
- Participated in the Australia Unlimited 2010 Roundtable discussion hosted by The Global Foundation and addressed by the Federal Treasurer Wayne Swan, Brisbane, 10 December.

#### **Guest lectures:**

- 'The challenge of banking reform', POLS7107 Globalisation, International Political Economy and Development, School of Political Science and International Studies, University of Queensland, Brisbane, 20 April 2009.
- 'Economics of Higher Education', ECON1120 Economics of Social Issues, School of Economics, University of Queensland, Brisbane, 6 May 2009.
- 'Market-based policy instruments', POLS7101 Dynamics of Governance, School of Political Science and International Studies, University of Queensland, Brisbane, 12 October 2009.

### **Book Reviews**

- Quiggin, J. (2009), 'The economy: the American puzzle', Review of Richard Wilkinson and Kate Pickett's *The Spirit Level: Why More Equal Societies Almost Always Do Better*, Inside Story, <http://inside.org.au/the-american-puzzle/>.

### **Australian Financial Review articles**

- 'Obama must be bold', 15 January 2009, p. 46.
- 'Bank on change, but not here', 29 January 2009, p. 54.
- 'America bushwhacked', 31 January 2008, p. 62.
- 'Life's a risky business', 12 February 2009, p. 66.
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- 'Spending cuts all wrong', 12 March 2009, p. 62.
- 'Much rests on rescue plan', 26 March 2009, p. 58.
- 'No more do little and delay', 23 April 2009, p. 62.
- 'World shift a test for Labor', 7 May 2009, p. 62.
- 'The only way out for Bligh', 21 May 2009, p. 58.
- 'Debt no problem, for now', 3 June 2009, p. 62.
- 'Blame shifts to the states', 4 June 2009, p. 58.
- 'Rich will have to pay piper', 18 June 2009, p. 62.
- 'Carbon action gathers global pace', 2 July 2009, p. 63
- 'We can learn from crisis', 16 July 2009, p. 62.
- 'A problem of oversupply', 30 July 2009, p. 62.
- 'Gap is one of credibility', 13 August 2009, p. 58.
- 'China starts to come clean', 27 August 2009, p. 62.

- 'Review green tokenism', 10 September 2009, p. 58.
- 'Gross versus net worth', 24 September 2009, p. 62.
- 'Early vote risky but correct', 8 October 2009, p. 58. (previous column)
- 'Rudd should go for double dissolution', 13 October 2009, p. 63.
- 'Right road, wrong pricing', 22 October 2009, p. 70.
- 'Privatisation debunked', 5 November 2009, p. 66.
- 'Urgent action required', 19 November 2009, p. 62.
- 'Libs left with Chinese model', 3 December 2009, p. 62.

### **Media interviews**

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- ABC Radio National (AM): 'Victorian electricity price deregulation', 1 January 2009.
- ABC Radio (PM): 'Four day working week', 13 January 2009.
- *Campus Review* (Sydney): 'Implications of the current financial crisis for how we teach economics', 14 January 2009.
- ABC Radio (Queensland Country Hour): 'The financial crisis and the rural economy', 21 January 2009.
- Radio 4ZZZ Brisbane: 'Nationalism and patriotism', 22 January 2009.
- ABC Radio (Bundaberg): 'The financial crisis in Asia', 23 January 2009.
- *Economist*: 'Water and the economy, 29 January 2009'.
- *Business Review Weekly*: 'The future of global capitalism', 30 January 2009.
- *Australian Financial Review*: 'The fiscal stimulus and climate change in Australia', 30 January 2009.
- ABC Radio 612 (Brisbane): 'Australian government stimulus package', 3 February 2009.
- ABC Radio (World Today): 'The impact of low interest rates on savers', 3 February 2009.
- ABC Radio (Rockhampton): 'Australian economic stimulus package', 3 February 2009.
- Channel 7: 'Public works projects in the Great Depression', 3 February 2009.



- ABC Radio (Sydney): 'Australian economic stimulus package', 3 February 2009.
- ABC Radio (Bundaberg): 'Australian economic stimulus package', 4 February 2009.
- *Courier Mail*: 'Freight rail', 23 February 2009.
- *Australian Financial Review*: 'Queensland election', 23 February 2009.
- *Sydney Morning Herald*: 'Queensland election', 24 February 2009.
- ABC Radio National: 'BrisConnections', 24 February 2009.
- *The Australian*: 'Emissions trading scheme', 24 February 2009.
- ABC Radio (Rockhampton): 'Australian GDP numbers', 5 March 2009.
- ABC Radio (Hobart): 'World Bank forecast for the global economy', 9 March 2009.
- *Sydney Morning Herald*: 'Queensland economy: Boom and bust?', 9 March 2009.
- ABC Radio Brisbane: 'Possible measures for the Federal budget', 1 April 2009.
- *Courier Mail*: 'US emissions targets', 1 April 2009.
- Sky News: 'After the global financial crisis', 7 April 2009.
- 4ZZZ: 'Interest rates', 7 April 2009.
- *New Scientist*: 'Job market outlook for scientists', 7 April 2009.
- ABC News Radio: 'Rudd's Broadband Plan', 8 April 2009.
- ABC (PM): 'Inflation and interest rates', 22 April 2009.
- *Australian Financial Review*: 'Federal Budget', 22 April 2009.
- Community Radio 4ZZZ: 'Do we need a surface navy?', 23 April 2009.
- ABC Radio (Toowoomba): 'The Federal government's stimulus package', 24 April 2009.
- SBS: 'Whitlam Institute paper on Australia's economic options', 27 April 2009.
- *Courier Mail*: 'The economic impact of swine flu', 30 April 2009.
- ABC Radio (PM): 'The economic impact of swine flu', 30 April 2009.
- Bloomberg (Tokyo): 'Economic impact of H1N1 flu, AKA "swine flu"', 4 May 2009.
- ABC Radio (Sydney): 'Federal debt', 6 May 2009.
- ABC Radio (Rockhampton): 'Federal budget', 6 May 2009.



- *Canberra Times*: 'Federal budget', 6 May 2009.
- ABC Radio National News: 'Unemployment figures', 7 May 2009.
- Crikey.com: 'Unemployment', 7 May 2009.
- ABC Radio (Queensland): 'Federal budget', 10 May 2009.
- Radio 4EB FM (Community Ethnic Radio): 'Consumer confidence', 21 May 2009.
- Channel 7: 'Privatisation', 24 May 2009.
- ABC Radio (Toowoomba): 'Privatisation of Queensland assets', 25 May 2009.
- ABC Radio (Cairns): 'Privatisation of Queensland assets', 25 May 2009.
- ABC Radio (Brisbane): 'Privatisation of Queensland assets', 25 May 2009.
- ABC Radio (Toowoong): 'Gold standard', 29 May 2009.
- *Courier Mail* : 'Privatisation', 29 May 2009.
- *Brisbane Times*: 'Sell-off of Queensland assets', 2 June 2009.
- Radio 4BC: 'Sell-off of Queensland assets', 2 June 2009.
- ABC TV (7.30 Report): 'Sell-off of Queensland assets', 2 June 2009.
- *Sydney Morning Herald*: 'Queensland privatisation', 3 June 2009.
- ABC Radio (Brisbane 612): 'Queensland privatisation', 3 June 2009.
- ABC Radio (Rockhampton): 'Queensland privatisation', 3 June 2009.
- Channel 7 TV: 'Seven News Flashback: preparation of the Queensland budget', 10 June 2009.
- *Sun Herald*: 'Privatisation of Queensland ports', 10 June 2009.
- Channel 10 TV: 'Queensland budget', 12 June 2009.
- ABC Radio (Rockhampton): 'Queensland budget', 15 June 2009.
- ABC Radio (Cairns): 'Queensland budget', 16 June 2009.
- ABC Radio (Townsville): 'Queensland budget', 16 June 2009.
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- ABC Radio (Brisbane Drive Time): 'Queensland budget', 16 June 2009.
- ABC Radio (Gold Coast): 'Queensland budget', 17 June 2009.
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- Radio New Zealand 'Free Trade Agreements' 23 June 2009, interview with David Adamson

- News Limited: 'Asset sales and jobs in Queensland', 25 June 2009.
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- Radio 2CR (Sydney): 'Ozcar scheme', 26 June 2009.
- ABC Radio (Sydney): 'Global warming', 6 July 2009.
- ABC Science Online News: 'Carbon dioxide emission targets', 7 July 2009.
- ABC TV (LateNight Live): 'Trade and climate change', 7 July 2009.
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- Channel 10 TV: 'Call for a financial system inquiry', 8 July 2009.
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- ABC Radio 702 (Sydney): 'Bendigo Bank staff reductions', 16 July 2009.
- *Sydney Morning Herald*: 'Jobs', 17 July 2009.
- ABC News Radio: 'Jobs stimulus package', 20 July 2009.
- ABC Radio (Toowoomba): 'Interest rates', 28 July 2009.
- ABC News Radio: 'Success fees for lobbyists', 30 July 2009.
- ABC Radio (Brisbane): 'Success fees', 30 July 2009.
- ABC Radio (S E NSW): 'Lotteries', 10 September 2009.
- ABC Lateline (Business): 'NSW privatisations: lotteries and electricity and energy assets', 10 September 2009.
- ABC Radio (North Coast): 'Lottery privatisation and NSW electricity privatisation', 10 September 2009.
- *Australian Financial Review*: 'Australian manufacturing industry policy', 28 September 2009.
- ABC Radio National (PM): 'The reversal of the economic standing of Labor and the Liberals', 29 September 2009.
- ABC Radio Brisbane (Drive Time): 'Final Federal budget outcome: Better than expected?', 29 September 2009.
- *QUT News*: 'Interest rates', 6 October 2009.
- Crikey.com: 'Interest rates', 7 October 2009.
- ABC Radio (PM): 'Unemployment', 8 October 2009.
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- ABC News Radio: 'Penny Wong, China and climate change', 14 October 2009.
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- The Wire: Community Radio and Current Affairs: 'Opposition amendments to the Carbon Pollution Reduction Scheme', 19 October 2009.
- *Sun Herald*: 'Queensland privatisation', 22 October 2009.
- *Courier Mail*: 'Privatisation of Queensland assets', 26 October 2009.
- ABC Radio (Steve Austin): 'Car races', 26 October 2009.
- ABC Radio (Southern Queensland): 'How a rising Australian dollar can affect the economy', 28 October 2009.
- ABC TV (7.30 Report): 'Privatisation in Queensland', 2 November 2009.
- *Courier Mail*, 'Queensland asset sales', 2 November 2009.
- Radio Adelaide: 'Inflation targeting and unemployment', 3 November 2009.
- The Wire: Community Radio and Current Affairs: 'Inflation targeting and unemployment', 3 November 2009.
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- *Australian Financial Review*, 'The IMF Report on asset price bubbles', 16 November 2009.
- The Wire, Community Radio and Current Affairs, 'FASTS Great Barrier Reef Climate Change Alliance: Emissions cuts and the Great Barrier Reef', 17 November 2009.
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- *Telegraph* (UK), 'FASTS Great Barrier Reef Climate Change Alliance: Emissions cuts and the Great Barrier Reef', 17 November 2009.
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- Channel 10 News, 'Queensland asset sales', 24 November 2009.
- Channel 7 News, 'Queensland asset sales', 24 November 2009.
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- *Sydney Morning Herald*, 'Queensland asset sales', 24 November 2009.
- ABC Coast FM, 'Queensland asset sales', 24 November 2009.
- Radio 4BC (Brisbane), 'Queensland asset sales', 25 November 2009.
- *Northern Star* (Lismore), 'The emissions trading scheme and household budgets', 25 November 2009.
- *Environmental Standards*, 'Water policy in Queensland', 26 November 2009.
- *Australian Financial Review*, 'Queensland asset sales', 27 November 2009.
- Channel 10 News, 'Inflation and interest rates', 30 November 2009.
- *Sunday Mail*, 'Emission Trading Scheme', 3 December 2009.
- Radio NZ, 'Failure of the 1980s economic reforms', 4 December 2009.
- *Sydney Morning Herald*, 'Queensland asset sales', 8 December 2009.
- ABC World Today, 'Queensland asset sales', 9 December 2009.
- *Courier Mail*, 'Queensland asset sales', 9 December 2009.
- ABC Radio (Mackay): 'Copenhagen climate change meeting', 15 December 2009.
- Radio 4BC (Brisbane): 'The report by the Institute of Public Affairs on the Queensland economy', 17 December 2009.
- ABC Radio (World Today): 'NSW electricity privatisation', 18 December 2009.
- Radio 4BC (Brisbane): 'The Australian economy', 21 December 2009.
- ABC Radio (Tropical North): 'Outcome of Copenhagen and its effect on our region', 21 December 2009.

## Research Grant: Federation Fellowship FF0776177

### **Climate change: adaptation and resilience in the face of uncertainty**

#### **Project Objectives**

The aim of the project is to analyse options for adaptation to climate change in Australia, and in particular, the role and management of uncertainty. The focus will be on crucial, highly vulnerable natural assets, particularly the Murray–Darling Basin and the Great Barrier Reef. The central theoretical objective will be an improved understanding of the concepts of resilience and adaptive management and their application to the problems of adaptation to, and mitigation of, climate change. The project will yield policy recommendations for the design of property rights and emissions trading systems.

#### **Progress for 2009**

The fundamental theoretical goal of the project has been achieved with the completion of the paper ‘Inductive Reasoning about Awareness’, now under review at *Games and Economic Behavior*. In this paper, joint with Simon Grant, we provide a formal representation of inductive reasoning in the context of a dynamic game with awareness. We show that, given differential awareness over time and between players, individuals can derive inductive support for propositions expressing their own unawareness.

The RSMG Murray model has been rebuilt as planned, and catchments disaggregated to allow analysis of finer-scale policy issues. One example is the allocation of water to environmental ‘icon’ sites. Another is the impact of restriction on transfers of water rights between irrigation districts imposed by the Victorian government, and related restrictions imposed by NSW. Consistent with other research on this topics, we found that these restrictions are damaging to farmers as a group, and to the environment, and that the supposed social disruption associated with removing these restrictions would be minimal.

The model has also been applied to questions of climate change policy such as interaction between carbon credits, tree planting and water demand. An invited paper on this topic has been submitted to the *Canadian Journal of Agricultural Economics*.

## ARC Linkage Project LP0883650

### **Assessing the impacts of proposed carbon trading and tax schemes on the Australian economy: the electricity industry and the overall economy**

#### **Project Summary**

Because of growing international concerns about global warming, Australia is considering both carbon taxation and tradeable quota schemes. In this project we seek to address two key research questions: First, what are the likely medium and long term impacts of different carbon abatement policies on electricity supply and demand and how will the power generation industry respond? Second, what are the likely medium and long term impacts upon the economy, and its industries and regions, more generally? Currently, research on these questions remains very limited so we expect to produce findings of international significance.

#### **Progress for 2009**

The research plan and objectives for the period centred on:

- (1) Fast tracking the development of the Agent-based National Electricity Model to allow the modelling of the impact of carbon abatement policies on the National electricity industry;
- (2) Undertaking data collection and commencing estimation of econometric relationships for the National Inter-Industry Econometric Model which will be used to assess the impact of carbon abatement policies upon the national economy more generally. We are ahead of schedule in relation to the first objective mentioned above relating to the development of the Agent-based National Electricity Model. Specifically, the Agent-based model currently is a national model linking the five state markets that currently comprise the National Electricity Market (NEM) which include QLD, NSW, VIC, SA and TAS. Within this overall structure, the five states have been disaggregated into 53 regions containing specific nodes in which generators and electricity load demand centre are located. Overall, the model contains 53 regional nodes and demand centres, 288 generators (both thermal and hydro) and 78 transmission pathways linking the regional nodes to each other. Included in these transmission pathways are several Interconnectors that link the different state markets to each other. The model broadly traces the major (220KV-500KV) transmission pathways in the NEM and permits the modelling of both inter-regional and interstate.

From the perspective of assessing the impact of carbon abatement policies on the electricity industry, the agent based model has the following notable features:

(a) The variable cost concept underpinning the model solution includes carbon costs as well as conventional fuel and operation and maintenance costs. Thus, national, state and regional electricity prices will automatically capture the impact of carbon prices through their impact on generator and system wide variable costs and optimal dispatch patterns of generators when combined with the incidence of transmission branch congestion. This will allow the investigation of the least-cost 'pass-through' of carbon prices and costs to regional, state and national wholesale and retail electricity prices.

(b) The model incorporates the 'carbon footprint' of existing generation based technologies. It can therefore directly model the success of carbon abatement policies by calculating the reduction in actual carbon emission from baseline 'business-as-usual' (i.e. no carbon mitigation) scenarios within the national electricity industry.

Some carbon price modelling scenarios encompassing the complete national 53 node model have been run and model parameters are currently being fine tuned to better reflect actual constraints confronting wholesale market participants in the NEM. Apart from some fine tuning, the model is now at a level of development where key carbon abatement policy scenarios can be fully investigated and the results from this research can be submitted to appropriate academic journals. In relation to the second research objective mentioned above relating to the development of the National Inter-Industry Econometric Model, progress here has been somewhat slower because more research effort was initially given to fast tracking of the development of the agent based electricity model as demonstrated above. Notwithstanding this observation, however, extensive data collection has been undertaken and some econometric estimation has been undertaken of both sectoral relationships – i.e. household consumption expenditure, and macroeconomic relations such as national and sectoral income and capital accounts. Work has also commenced more recently on developing the IO accounts for the model and continued development of these sectoral relationships will be undertaken to more fully capture the IO based inter-industry linkages. Much more research effort will be given to the development and running of the National IM model in this coming year now that the agent based electricity model is largely developed.



# ARC Discovery Project DP0877836

## **State-contingent analysis of productivity, efficiency and innovation.**

### **Project Summary**

A major problem in productivity analysis is the need to distinguish outcomes that reflect genuine changes in productive performance from those that reflect stochastic shocks, such as interruptions to production or short-term fluctuations in demand. Failure to make this distinction is a serious shortcoming of standard approaches to productivity measurement. We aim to implement an alternative state-contingent approach that explicitly recognises the way uncertainty affects producer choices. The state-contingent approach is consistent with the broader economic literature on general equilibrium and finance, and is expected to yield much improved estimates of productivity growth, rates of innovation and changes in efficiency.

### **Project Objectives**

The overall objective of the project is to develop integrated theoretical and empirical models representing multi-output state-contingent production sets as Arrow–Debreu technologies.

### **Progress for 2009**

The project has proceeded largely as planned:

- Bayesian methodology has been developed for estimating state-allocable technologies when only realized outputs, realized states of nature and input prices are known. However, at this stage, the methodology is only applicable to single-input single-output Cobb-Douglas technologies when the number of states of nature is small.
- a paper entitled “Uncertainty and Technical Efficiency in Finnish Agriculture” (by Nauges, O'Donnell and Quiggin) was submitted to the European Review of Agricultural Economics (ERAЕ) (the editor has invited a resubmission).
- a paper entitled “Measuring and Decomposing Agricultural Productivity and Profitability Change” has been conditionally accepted for publication in the Australian Journal of Agricultural and Resource Economics (AJARE).
- a paper entitled “An Aggregate Price-Quantity Framework for Measuring and Decomposing Productivity and Profitability Change” was submitted to the Journal of Productivity Analysis (the editor has invited a resubmission).



