



Regulating Knowledge Monopolies: The Case of the IPCC

Richard S.J. Tol^{a,b,c,d}

Abstract. The Intergovernmental Panel on Climate Change has a monopoly on the provision of climate policy advice at the international level and a strong market position in national policy advice. This may have been the intention of the founders of the IPCC. I argue that the IPCC has a natural monopoly, as a new entrant would have to invest time and effort over a longer period to perhaps match the reputation, trust, goodwill, and network of the IPCC. The IPCC is a not-for-profit organization, and it is run by nominal volunteers; it therefore cannot engage in the price-gouging that is typical of monopolies. However, the IPCC has certainly taken up tasks outside its mandate; the IPCC has been accused of haughtiness; innovation is slow; quality may have declined; and the IPCC may have used its power to hinder competitors. There are all things that monopolies tend to do, against the public interest. The IPCC would perform better if it were regulated by an independent body which audits the IPCC procedures and assesses its performance; if outside organizations would be allowed to bid for the production of reports and the provision of services under the IPCC brand; and if policy makers would encourage potential competitors to the IPCC.

Key words: Climate change, IPCC, natural monopoly, regulation, policy advice

Corresponding Author: Richard.Tol@ersri.ie

^a Economic and Social Research Institute, Dublin, Ireland

^b Institute for Environmental Economics, Vrije Universiteit, Amsterdam, The Netherlands

^c Department of Spatial Economics, Vrije Universiteit, Amsterdam, The Netherlands

^d Department of Economics, Trinity College, Dublin, Ireland

ESRI working papers represent un-refereed work-in-progress by researchers who are solely responsible for the content and any views expressed therein. Any comments on these papers will be welcome and should be sent to the author(s) by email. Papers may be downloaded for personal use only.

Regulating Knowledge Monopolies: The Case of the IPCC

1. Introduction

The Intergovernmental Panel on Climate Change (IPCC) is a runaway success. From humble beginnings in the late 1980s, it is now seen by many national and subnational governments as the ultimate authority on scientific matters on climate change (Agrawala 1998a;Agrawala 1998b;Hulme and Mahony 2010;Nishioka 2008;Oppenheimer et al. 2007;Rothman et al. 2009). The IPCC was awarded the Nobel Peace Prize 2007. However, there has been criticism of the IPCC from November 2009 onwards (Hulme 2010;Kintisch 2010;McKittrick 2010;Nature 2010;New Scientist 2010;Rosenthal 2010;Schiermeier 2010;The Economist 2010c;Wynne 2010), the sharpness of which dwarfs earlier critique. This is to a large extent because of political opposition to climate policy,¹ but I argue below that there are design flaws in the IPCC as well. I also offer remedies.

Climate change succeeded acidification. Many academics and policy makers who used to work on acidification moved to climate change when acidification was “solved”. Some argue that the negotiations on acidifying substances did not succeed until after all parties had accepted a common, scientific understanding of the problem. International acidification policy is indeed informed by a single body of technocratic advice² – a knowledge monopoly (Castells and Funtowicz 1997;Gough et al. 1998;Hordijk 1991;Hordijk 1995;Hordijk and Kroeze 1997). The formation of the IPCC was at least partly inspired by this example.

Note that there is no reason to assume that knowledge monopolies are desirable. The nature of the policy advice on acidification was in turn inspired by the ideal of social planning as advocated by such leading economists as (Tinbergen 1952;Tinbergen 1954) – whose ideas are now seen as naïve by some (Nove 1983) and repugnant by others (Friedman and Friedman 1980). Harry Truman’s wish for a one-handed economist is now understood to be mistaken (Economist 2003). The notion of a dispassionate scientist passing objective advice to a

¹ Because greenhouse gas emission reduction is often (yet incorrectly) couched in terms of scientific necessity, opponents are led to attack the science and the scientific institutions. The debate was particularly vehement in the United Kingdom as the three main parties all called for stringent emission reduction, and the opposition was therefore unconstrained by (the prospect of) the responsibilities of government.

² The RAINS model, hosted at the International Institute for Applied Systems Analysis (Alcamo et al. 1990).

benevolent policy maker has been thoroughly discredited (Funtowicz and Ravetz 1994;Pielke, Jr. 2007).

Few would argue that the IPCC is a secret world government in waiting. The IPCC has set itself the more modest goal of standardizing the academic knowledge on which climate policy is based across the world.³ This may be a mistaken goal. International negotiations succeed if all parties think they are better off (Barrett 1994;Carraro and Siniscalco 1998). There is no reason to believe that negotiations are easier if all parties share the same knowledge – in fact, the opposite may be true (Kamada and Kominers 2010;Ulph and Maddison 1997).

However, this paper is not about whether the IPCC was a mistake. The IPCC exists and it will not cease to do so in the foreseeable future. This paper is about how to regulate the IPCC. There are a number of earlier papers on this, mostly from people who are against climate policy (Alexander 2007;Dawson 2008;Dawson 2009;Henderson 2007;Henderson 2009;Peiser 2007;Zillman 2007) with a few exceptions (Solomon and Manning 2008;Terradas and Penuelas 2008).⁴ In Section 2, I argue that the IPCC has a natural monopoly – regardless of the intentions of its founders, there can be only one IPCC-like organization. In Section 3, I discuss some of the problems typically found in monopolistic markets, in this case the market for climate policy advice. In Section 4, I present solutions. Section 5 concludes.

2. The IPCC as a natural monopoly

Natural monopolies occur when there are substantial economies of scale or scope, or when the costs of fixed capital are large (Baumol et al. 1982;Sharkey 1982). Railroads and electricity distribution networks are examples of the latter. The costs of laying tracks and cables are so high that it does not pay off to have two or three competing networks. One network is the maximum the consumer is willing to pay for, and a monopoly is the result. Economies of scale or scope are another reason for natural monopolies to form. Waste collection is an example. It is far cheaper to collect all rubbish in a street with a single truck than to let one truck serve some houses and another truck the remaining ones. Waste is therefore best collected by a monopoly.

³ <http://www.ipcc.ch/organization/organization.htm>

⁴ There is a substantial discussion on the much narrower topic of communication of uncertainty in IPCC reports (Berg and Tschirhart 1988;Budescu et al. 2009;Moss and Schneider 2000;Risbey and Kandlikar 2007).

Strictly speaking, a monopoly is natural if the costs of having multiple providers are larger than the benefits of competition. As there are little data available, I cannot prove that the IPCC has a natural monopoly. Nonetheless, the IPCC shares some of the characteristics of a natural monopoly. There is large fixed cost of setting up a global organization to assess the literature on climate change to inform national and international policy. This cost is neither physical (e.g., water pipes) nor financial (e.g., equity), but rather in terms of reputation, trust and goodwill, and in terms of networks and institutional knowledge. It took the IPCC years to build up its current position. A new entrant in the market of climate policy advice would need a similar investment in quality and relationships before it can begin to compete with the IPCC.

The IPCC is also favoured by network economies. The IPCC relies on more-or-less voluntary contributions of the academics who serve as its authors. These authors are rewarded with prestige, networking opportunities, access to decision makers, and influence.⁵ As the incumbent, the IPCC offers plenty of each. A new entrant would offer little. The IPCC is thus a natural monopsony on the input market for expertise.⁶ As the IPCC ultimately derives its status as a policy advisor from the reputation of its contributors, this natural monopsony implies a natural monopoly.

Therefore, the IPCC has something that is akin to a *natural* monopoly.

3. Typical problems of monopolies

In the standard model, monopolies restrict supply to drive up the price and extract supernormal profits. Monopoly rents are readily detectable, and thus targeted by regulators. Regulated monopolies therefore often have excessive costs (e.g., large number of staff, high wages) or cross-subsidize another part of the same company – financed through the abuse of monopoly power. Monopolies may also reduce the quality of their product or service, while offering it at the same price. Monopolies also tend to innovate less – as there is no competition to stay ahead of. Such practices are harder to detect (Baumol et al. 1982; Sharkey 1982).

⁵ IPCC authorship also offers opportunities to travel and earn per diems, which is particularly valuable to scholars from developing countries.

⁶ Alternatively, one could see the IPCC as a club, and authorship as a club good. As the IPCC is the only significant club, this does not affect the reasoning below.

The root of the problem is that monopolies act in the interest of the company only, and that they can get away with it. Competitive firms too only consider their own bottom line – but they have to deliver good value to their clients lest they walk away. Customers of monopolies cannot switch to a different supplier (by definition), and monopolies therefore do not need to heed their wishes to the same extent as a competitive firm does.

The IPCC is a knowledge monopoly, and it shares some of the characteristics of the behaviour of a typical monopolist. Obviously, the IPCC does not charge for its services, and therefore is not engaged in price gouging. The IPCC does not employ many people either, nor can it splash out on fancy offices. Authors and officials have used the IPCC to advance their own careers, but that would have happened in any case.

However, the IPCC does use its brand to branch out into areas outside its core mandate. While the IPCC was set-up to assess the research on climate change, it has also engaged in primary research on scenario building (Nakicenovic and Swart 2001), standard setting (Schimel et al. 1996), monitoring,⁷ and research funding.⁸ The IPCC is not particularly well-suited for these activities, and one may argue that it would have failed in these tasks had it not been for a cross-subsidy in kind (goodwill, reputation, trust).

The IPCC has moved into the territory of academia (e.g., MIT), UN agencies (e.g., UNEP) and Bretton Woods institutions (e.g., World Bank) with regard to scenario building; of the Subsidiary Body on Scientific and Technical Advice and the Secretariat of the UN Framework Convention on Climate Change with regard to standards and monitoring; and of public, private, and multilateral research financiers and capacity builders with regard to research funding.

The IPCC has used its monopoly power to branch out into scenario building. The resulting scenarios have been severely criticized (Castles and Henderson 2003a; Castles and Henderson 2003b; Girod et al. 2009; Gruebler et al. 2004; O'Neill et al. 2008; O'Neill and Nakicenovic 2008; Pielke, Jr. et al. 2008), but AR4 glossed over the problems (Fisher et al. 2007). As complaints by referees were ignored, this can only be characterized as a deliberate misrepresentation of the literature – a violation of the IPCC mandate. Arguably, the IPCC used its role as an assessor of the literature to protect its role as a builder of scenarios.

⁷ <http://www.ipcc-nggip.iges.or.jp/>

⁸ http://www.ipcc.ch/ipcc-scholarship-programme/ipcc_scholarshipprogramme.html

The IPCC scenarios are more widely used than any of the alternatives. This is true for the climatological literature, the impact literature, and the emission reduction literature. This is partly because standardization of scenarios enables comparison of results; and partly because the IPCC reports are more likely to refer to papers that use IPCC scenarios. A rational researcher would therefore use the dominant scenarios – that is, those of the IPCC. The scenarios run with the large-scale climate models are coordinated with the IPCC. Therefore, the IPCC has used its monopoly position in the market for assessment to establish a dominant position in the market for scenarios.

One may also argue that the quality of the IPCC reports has declined over time, another characteristic of a monopoly. This is hard to measure. AR4 certainly received far more negative attention than AR3 – but that may also be because expectations have risen or the political climate has hardened. And parts of AR2 were strongly criticized too, on the “discernible human influence on global climate” (Edwards and Schneider 2001;Lindzen 1997) and on the monetary value of mortality risks (Bruce 1996;Courtney 1996;Grubb 1996;Pearce 1995a;Pearce 1995b;Pearce 1995c). The response of the IPCC to (alleged) errors in its emissions scenarios and the AR4, and to (alleged) conflicts of interest can be described as haughty (The Economist 2003a;The Economist 2003b;The Economist 2010a;The Economist 2010b), which may be inspired by the knowledge that the IPCC has captive clients.

The IPCC has not innovated much. An author of AR1 would instantly recognize the methods, procedures, and structure of AR4. Things have changed, of course, but at the margin. This is perhaps the strongest sign that the IPCC is a monopoly. Since AR1, our understanding of the climate problem has changed dramatically. New technologies have emerged that drastically change the way people interact (e.g., blogs) and knowledge is disseminated and created (e.g., wikis) – while the internet brought access to unprecedented amounts of information. Yet, the IPCC still works with small teams of authors who fly to faraway cities to draft a chapter. Once finished, the chapter is fixed (Nature 2010). IPCC reports are the received wisdom flowing unidirectionally from the experts to the lay people (Beck 2010). The IPCC has largely avoided meta-analytical techniques, although the literature has grown fast since AR1 (Kuik et al. 2009;Parmesan and Yohe 2003;Root et al. 2003;Tavoni and Tol 2010;van den Bergh et al. 1997). For some IPCC chapters in AR4, none of the authors seemed to have had access to

specialized academic databases and search tools.⁹ The IPCC has made little use of tools for online collaboration and communication, nor of transparency-enhancing software (e.g., automated versioning of documents).

4. Regulating knowledge monopolies

It is often best to break up monopolies. However, this is not the case for natural monopolies. Natural monopolies should be regulated (Beck 2010; Berg and Tschirhart 1988; Train 1991; Waterson 1988). In Section 2, I argue (but cannot prove) that the IPCC has a natural monopoly. If so, the IPCC should be regulated rather than broken up.

Appropriate regulation of monopolies begins with the questions which part of the production and distribution process is a natural monopoly and why. In electricity, the network is a natural monopoly – but power generation and distribution and even network maintenance are contestable markets. Transaction costs may (have) justify (justified) vertical integration (in times past) (Tirole 2000), but are not necessarily offset by the welfare losses of a monopoly that is more extensive than needed.

There are three types of regulations that have been used to mitigate the negative effects of monopolies – that is, the regulator makes sure that the monopolist does not abuse its power. First, the conduct of monopolies is often tightly regulated. Price controls are a classic example.

Second, if there cannot be competition *in* the market, there can be competition *for* the market. Concessions for waste collection in a particular area or rail services on a certain line can be sold to the highest bidder. Concessions are temporary monopolies. If the company that won the concession does not perform well, another company takes over after a few years.

Third, monopolies are in principle threatened by new entrants. This argument is often made with regard to dominant ICT companies: a smart kid in a garage can revolutionize the sector. The regulator can therefore keep a monopolist in check by lowering the barriers to entry and by threatening to switch supplier.¹⁰

These types of regulations can be applied to the IPCC as well.

⁹ For example, (Barker et al. 2007) find only one peer-reviewed paper on the impact of climate policy on employment while (Patuelli et al. 2005) find 94 papers.

¹⁰ This would not be a credible threat in the case of a natural monopoly and a benevolent regulator. It can be an effective threat if the monopolist is unsure about the true intentions of the regulator and the naturalness of the monopoly is debatable, as in the case of the IPCC.

The IPCC has abused its monopoly on assessment to establish a firm grip on the field of long-term scenario building, and has done a poor job (see above). The IPCC should withdraw from scenario development.¹¹

With regard to standard setting, the IPCC has not been particularly forceful in pointing out the difficulties with global warming potentials (Godal 2003; O'Neill 2000; Shine et al. 2005; Smith 2003). While the IPCC is not responsible for the decision (2/CP.3) of the Conference of the Parties¹² to use the global warming potentials of AR2, the IPCC should loudly protest against this in AR5 – in fact, it should have protested in AR3 and AR4.

I am not aware of any issues with the IPCC's involvement in monitoring. The IPCC scholarship programme is brand new, but there is a risk that IPCC scholars will get preferential treatment in the selection of IPCC authors. It would therefore be better if the IPCC outsourced this to another organization.

Conduct regulation can help to improve outcomes in natural monopoly markets. At present, the IPCC is governed as follows.¹³ IPCC Members meet once a year in a General Assembly. This is the meeting of the clients and sponsors of the IPCC, and its ultimate governing body. Day-to-day affairs are delegated to the IPCC Bureau, which combines the roles of an executive, a policy-maker, and an auditor.¹⁴ The Bureau has three key advantages over the General Assembly: The Bureau has privileged access to information about the IPCC; Bureau members spend considerably more time and effort on the IPCC than do General Assembly members; and Bureau members therefore have more at stake than do General Assembly members. The Bureau therefore has *de facto* the upper hand over the General Assembly, the *de jure* governing body.

This situation is not unique. National parliaments face the same problem in all aspects of regulation. Non-executive members of company boards are in the same situation. The standard solution is the creation of a regulatory agency, whose mandate is to check whether industry stays within the rules and, occasionally, whether the rules induce the desired outcome. Auditors fulfill

¹¹ The Integrated Assessment Modeling Consortium, <http://www.iamconsortium.org/>, is a front organization of the IPCC, at least if it comes to scenario development.

¹² <http://unfccc.int/resource/docs/cop3/07a01.pdf>

¹³ <http://www.ipcc.ch/organization/organization.htm>

¹⁴ The governance of the IPCC would be much improved if the IPCC Chair and Working Group Chairs would be removed from the IPCC Bureau to form a true executive; and the IPCC Bureau would be reformed as an independent board under a strong chair.

this role in corporations. At present, such auditing of the IPCC is done through a number of *ad hoc* activities,¹⁵ but this should be regularized.

The regulatory agency should audit the procedural aspects of the IPCC. However, it should also assess the performance of the IPCC, drawing on the experience with evaluating the performance of university departments. It could consider such issues as the selection of the IPCC authors.¹⁶ Are they really top experts in their fields (controlling for geographical representation)? It could randomly select (parts of) IPCC chapters and see whether they truly reflect the balance of the literature – e.g., by comparison with recent survey articles. It should compare the outlines of IPCC report to the issues discussed in the literature, checking whether the IPCC gives undue weight to certain topics while ignoring other ones. It could monitor the impact of IPCC reports, both on the academic literature and on national and international policies.

As debates within the IPCC are often highly specialized and hard to follow for outsiders, the regulatory agency should make a particular effort to facilitate and protect potential whistleblowers.

The regulatory agency could be a body of the IPCC General Assembly, a joint venture of the mother organizations of the IPCC (the World Meteorological Organization and the United Nations Environment Programme), a permanent committee of the InterAcademy Council, or part of a newly established World Environment Organization. In the last cases, this regulatory agency could also supervise other international policy assessments. Care would need to be taken that the regulators are sufficiently independent.

At present, the people who control the IPCC are regularly replaced. One could therefore argue that there is already competition for the market. This is not the case, however. Competition for the market requires that there is competitive bidding between rival entities – and that the concession is awarded to the offer with the best price/quality characteristics. The changing of the IPCC guard is done in backroom deals. In the future, there could be competitive bidding for the working group chairs and technical support units, as well as for the IPCC board. National governments have considerable domestic experience with this, and there are precedents at the international level as well: the Olympic Games and the FIFA World Cup.

¹⁵ For example, the review by the InterAcademy Council: <http://reviewipcc.interacademycouncil.net/>

¹⁶ Note that the IPCC authors are nominated by governments. In a number of instances, governments have nominated people to the IPCC for their political colour rather than their expertise. The nomination process should be audited too, and the IPCC should have the right to appoint non-nominated authors too.

A more radical alternative is the following. Rich IPCC members could pay an annual contribution, from which the technical support units are paid. Staff would be international, and less beholden to one particular sponsor government. The OECD, World Bank, and IMF operate in this manner.

Competition for the market could be extended further. If someone feels that there is a product missing from the range on offer by the IPCC, then that person should be allowed to bid for the use of the IPCC brand on such a report. Obviously, the report should meet the IPCC quality standards and comply with IPCC procedures. Currently, something similar is done through the IPCC Special Reports, but these originate from within the IPCC. There is no reason why the IPCC should not consider proposals for Special Reports from outside. In fact, allowing this would keep the authors and organizers of “regular” IPCC reports on their toes.

The prospect of competition, rather than competition itself, would also keep the IPCC on its toes. Unfortunately, this is not really an option. The international academies lack the resources, the mandate, and probably the ambition. Domestically, the national academies would be the logical choice to write a second opinion – but only the US National Academies¹⁷ may have the resources to organize an assessment at the scale of the IPCC. Any national assessment would suffer from a lack of legitimacy in other countries – cf. the cool reception of the Stern Review (Stern et al. 2006) outside Europe.¹⁸ Nevertheless, national assessments should be made widely available, e.g., by translation from Russian and Chinese to English.

While it would be hard for a single organization to compete with the entirety of the IPCC, competition on specific aspects is much easier. The World Meteorological Organization could review atmospheric science (WMO 2006), the World Health Organization the health impacts of climate change (McMichael et al. 2003;WHO 1990). The World Bank and the OECD could review the emission reduction policies and their costs (Bosi et al. 2010;Dellink et al. 2010), while national institutions could assess the impacts of climate change (Karl, Melillo, and Peterson 2009; BACC Author Team 2008). While such activities are ongoing, they often draw on the same people as the IPCC and are frequently not even intended to be independent.

The private sector would have the means, but the parties that would have the keenest interest to organize and finance an alternative assessment would suffer from a lack of trust for that very

¹⁷ <http://dels-old.nas.edu/climatechange/>

¹⁸ This may also be explained by the poor quality of the Stern Review (Arrow 2007;Mendelsohn 2006;Nordhaus 2007;Weitzman 2007).

reason.¹⁹ Publishers would be the exception. The IPCC reports have been a commercial success too, and competitors to its house publisher have no doubt been eyeing the same market. And there has indeed been somewhat of a proliferation of IPCC-like publications.²⁰ However, no full-blown alternative has been published (or is planned), but this may well happen should the IPCC lose more of its credibility. Climate policy makers should encourage these developments, but few if any do.

Self-organization is the third, potential new entrant that could threaten the IPCC's monopoly. Wikipedia is the best known example, and it already covers all the topics that the IPCC does. Wikipedia, however, lacks focus and it does not have the credibility and legitimacy of the IPCC. Many of the climate entries on Wikipedia are of low quality and balance is sometimes difficult to discern.²¹ There have been attempts to create quality-controlled alternatives to Wikipedia aimed at academic audiences,²² but these have not taken off – which is not to say that they could not. Any new wiki struggles with critical mass: Why would anyone contribute to something so small? For a climate wiki, this problem is easily overcome: Wikify AR4 and a few good textbooks. This would create critical mass. For the sake of competition, this should be supported. By way of experiment, this should be done by an IPCC-controlled wiki, a quality-controlled wiki (e.g., Scholarpedia), and an open wiki (e.g., Wikipedia).

5. Discussion and conclusion

The Intergovernmental Panel on Climate Change has a monopoly on the provision of climate policy advice at the international level and a strong market position in national policy advice. There is reason to believe that this was the intention of the founders of the IPCC; one can also make the case that the IPCC has a natural monopoly. A new entrant would have to make a considerable investment in time and effort over a number of years to try and match the reputation, trust, goodwill, and network of the IPCC. The IPCC is a not-for-profit organization

¹⁹ A poor example is the Non-governmental International Panel on Climate Change <http://www.nipccreport.org/>, while the Copenhagen Consensus on Climate is of higher repute (Lomborg 2010)

²⁰ For example, the Wiley Interdisciplinary Review on Climate Change <http://wires.wiley.com/WileyCDA/WiresJournal/wisId-WCC.html>, the Encyclopedia of Earth <http://www.eoearth.org/> and the Encyclopedia of Life Support Systems <http://www.eolss.net>

²¹ This is based on a reading of Wikipedia entries in areas of or adjacent to my expertise. Wikipedia has better quality with regard to mathematics and economics than for climate change. I have given up editing Wikipedia on issues relating to climate change.

²² See for example <http://www.scholarpedia.org/> and <http://www.scitopics.com/>

run by nominal volunteers and therefore cannot engage in the price-gouging that is typical of monopolies. However, the IPCC has certainly extended its remit; many have accused the IPCC of haughtiness; innovation is slow; quality may have declined; and the IPCC may have used its power to hinder competitors – all things that monopolies tend to do, and none of which is in the public interest. The IPCC would perform better if it were regulated by an independent body which audits the IPCC procedures and assesses its performance; if outside organizations would be allowed to bid for the production of IPCC reports and the provision of IPCC services; and if would-be competitors to the IPCC would be encouraged.

This paper is based on the concept that the IPCC is a supplier in the market for policy advice. Non-economists may well have a different perspective on the interface between science and policy and on the role of organizations like the IPCC in that process. It would be interesting to see whether that would lead to similar conclusions on the need and nature of IPCC reform.

(PBL 2010) reviewed the contents of parts of AR4. It also recommends some procedural changes to the IPCC, particularly more staff to check drafts and a public log of errors. (Shapiro et al. 2010) review the procedural aspects of the IPCC. They recommend that an IPCC executive should be created (see footnote 14), that the position of review editors should be strengthened, that the IPCC should put more effort into communications, and that the organization should become more transparent. While this would indeed improve the IPCC, these recommendations fall short of those derived here.

Acknowledgements

This paper draws on my experiences as an IPCC author since 1994. I am grateful to Douglas Arent, Brian Fisher, Paul Gorecki, Nigel Lawson, Sean Lyons and Hans von Storch for useful comments and discussion.

References

Alcamo, J., R.Shaw, and L.Hordijk (eds.) (1990), *The RAINS Model of Acidification: Science and Strategies in Europe* Kluwer, Dordrecht.

Nakicenovic, N. and R.J.Swart (eds.) (2001), *IPCC Special Report on Emissions Scenarios* Cambridge University Press, Cambridge.

McMichael, A.J., D.H.Campbell-Lendrum, C.F.Corvalán, K.L.Ebi, A.K.Githeko, J.D.Scheraga, and A.Woodward (eds.) (2003), *Climate change and human health - Risks and responses* World Health Organization, Geneva.

(2009), *Global Climate Change Impacts in the United States* ,Cambridge University Press, Cambridge.

Lomborg, B. (ed.) (2010), *Smart Solutions to Climate Change -- Comparing Costs and Benefits* Cambridge University Press, Cambridge.

Agrawala, S. (1998a), 'Context and Early Origins of the Intergovernmental Panel on Climate Change', *Climatic Change*, **39**, 605-620.

Agrawala, S. (1998b), 'Structural and Process History of the Intergovernmental Panel on Climate Change', *Climatic Change*, **39**, 621-642.

Alexander, W.J.R. (2007), 'The IPCC: Structure, processes and politics climate change - The failure of science', *Energy and Environment*, **18**, (7-8), pp. 1073-1077.

Arrow, K.J. (2007), 'Global Climate Change: A Challenge to Policy', *Economists' Voice* (June), 1-5.

BACC Author Team (2008), *Assessment of Climate Change for the Baltic Sea Basin* Springer, Berlin.

Barker, T., I.Bashmakov, A.Alharthi, M.Amann, L.Cifuentes, J.Drexhage, M.Duan, O.Edenhofer, B.P.Flannery, M.J.Grubb, M.Hoogwijk, F.I.Ibitoye, C.J.Jepma, W.A.Pizer, and K.Yamaji (2007), 'Mitigation from a Cross-Sectoral Perspective', in *Climate Change 2007: Mitigation -- Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, B. Metz et al. (eds.), Cambridge University Press, Cambridge, pp. 619-690.

Barrett, S. (1994), 'Self-Enforcing International Environmental Agreements', *Oxford Economic Papers*, **46**, 878-894.

Baumol, W.J., J.C.Panzar, and R.D.Willig (1982), *Contestable Markets and the Theory of Industry Structure* Harcourt Brace Jovanovich, New York.

Beck, S. Moving beyond the linear model of expertise? IPCC and the test of adaptation. Regional Environmental Change . 2010.

Ref Type: In Press

Berg, S. and J.Tschirhart (1988), *Natural Monopoly Regulation: Principles and Practice* Cambridge University Press, Cambridge.

Bosi, M., D.Scott, and F.Spors (2010), *10 Years of Experience in Carbon Finance: Insights from Working with the Kyoto Mechanisms*, Working Paper **55484** ,World Bank, Washington, D.C.

- Bruce, J.P. (1996), 'Purpose and Function of IPCC', *Nature*, **379**, 108-109.
- Budescu, D.V., S.Broomell, and H.H.Por (2009), 'Improving communication of uncertainty in the reports of the intergovernmental panel on climate change', *Psychological Science*, **20**, (3), pp. 299-308.
- Carraro, C. and D.Siniscalco (1998), 'International Environmental Agreements: Incentives and Political Economy', *European Economic Review*, **42**, 561-572.
- Castells, N. and S.Funtowicz (1997), 'Use of scientific inputs for environmental policy-making: The RAINS model and the sulfur protocols', *International Journal of Environment and Pollution*, **7**, (4), pp. 512-525.
- Castles, I. and D.Henderson (2003a), 'Economics, Emission Scenarios and the Work of the IPCC', *Energy & Environment*, **14**, (4), 415-435.
- Castles, I. and D.Henderson (2003b), 'The IPCC Emission Scenarios: An Economic-Statistical Critique', *Energy & Environment*, **14**, (2-3), 159-185.
- Courtney, R.S. (1996), 'Purpose and Function of IPCC', *Nature*, **379**, 109.
- Dawson, G. (2008), 'The economic science fiction of climate change: A free-market perspective on the Stern Review and the IPCC', *Economic Affairs*, **28**, (4), pp. 42-47.
- Dawson, G. (2009), 'Privatising climate policy', *Economic Affairs*, **29**, (3), pp. 57-62.
- Dellink, R.B., G.Briner, and C.Clapp (2010), *Costs, Revenues and Effectiveness of the Copenhagen Accord Pledges for 2020*, Environment Working Paper (2010)8, Organization for Economic Cooperation and Development, Paris.
- Economist (13-10-2003), 'The One-Handed Economist', *The Economist*.
- Edwards, P.N. and S.H.Schneider (2001), 'Self-Governance and Peer Review in Science-for-Policy: The Case of the IPCC Second Assessment Report', in *Changing the Atmosphere: Expert Knowledge and Environmental Governance*, C.A. Miller and P.N. Edwards (eds.), MIT Press, Cambridge, pp. 219-246.
- Fisher, B.S., N.Nakicenovic, K.H.Alfen, J.Corfee-Morlot, F.C.de la Chesnaye, J.-C.Hourcade, K.Jiang, M.Kainuma, E.L.la Rovere, A.Matysek, A.Rana, K.Riahi, R.G.Richels, S.Rose, D.P.van Vuuren, and R.F.Warren (2007), 'Issues Related to Mitigation in the Long-Term Context', in *Climate Change 2007: Mitigation -- Contribution of Working Group 3 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, B. Metz et al. (eds.), Cambridge University Press, Cambridge, pp. 169-250.
- Friedman, M. and R.D.Friedman (1980), *Free to Choose* Harcourt, San Diego.
- Funtowicz, S.O. and J.R.Ravetz (1994), 'Uncertainty, Complexity and Post-Normal Science', *Environmental Toxicology and Chemistry*, **13**, (12), 1881-1885.

- Girod, B., A.Wiek, H.Mieg, and M.Hulme (2009), 'The evolution of the IPCC's emissions scenarios', *Environmental Science and Policy*, **12**, (2), pp. 103-118.
- Godal, O. (2003), 'The IPCC's Assessment of Multidisciplinary Issues: The Case of Greenhouse Gas Indices', *Climatic Change*, **58**, (3), 243-249.
- Gough, C., N.Castells-Cabre, and S.O.Funtowicz (1998), 'Integrated Assessment: An Emerging Methodology for Complex Issues', *Environmental Modeling and Assessment*, **3**, 19-29.
- Grubb, M.J. (1996), 'Purpose and Function of IPCC', *Nature*, **379**, 108.
- Gruebler, A., N.Nakicenovic, J.Alcamo, G.Davis, J.Fenhann, B.Hare, S.Mori, B.Pepper, H.M.Pitcher, K.Riahi, H.-H.Rogner, E.Lebre la Rovere, A.Sankovski, M.E.Schlesinger, P.R.Shukla, R.J.Swart, N.Victor, and T.Y.Jung (2004), 'Emissions Scenarios: A Final Response', *Energy & Environment*, **15**, (1), 11-24.
- Henderson, D. (2007), 'Unwarranted trust: A critique of the IPCC process', *Energy and Environment*, **18**, (7-8), pp. 909-928.
- Henderson, D. (2009), 'Climate change issues: A dissenting voice', *Economic Affairs*, **29**, (3), pp. 87-88.
- Hordijk, L. (1991), 'Use of the RAINS Model in Acid Rains Negotiations in Europe', *Environmental Science and Technology*, **25**, (4), 596-603.
- Hordijk, L. (1995), 'Integrated Assessment Models as a Basis for Air Pollution Negotiations', *Water, Air, and Soil Pollution*, **85**, 249-260.
- Hordijk, L. and C.Kroeze (1997), 'Integrated Assessment Models for Acid Rain', *European Journal of Operational Research*, **102**, 405-417.
- Hulme, M. (21-7-2010), 'The IPCC on Trial: Experimentation Continues', EnvironmentalResearchWeb.
- Hulme, M. and M.Mahony (2010), 'Climate Change: What Do We Know About the IPCC?', *Progress in Physical Geography*.
- Kamada, Y. and S.D.Kominers (2010), 'Information can wreck cooperation: A counterpoint to Kandori (1992)', *Economics Letters*, **107**, (2), pp. 112-114.
- Kintisch, E. (2010), 'IPCC seeks 'broader community engagement' to correct errors', *Science*, **327**, (5967), pp. 768-769.
- Kuik, O.J., L.Brandner, and R.S.J.Tol (2009), 'Marginal abatement costs of greenhouse gas emissions: A meta-analysis', *Energy Policy*, **37**, (4), pp. 1395-1403.
- Lindzen, R.S. (1997), *Statement Concerning Global Warming*, Senate Committee on Environment and Public Works, Washington, D.C.

- McKittrick, R. (27-8-2010), 'Fix the IPCC Process', *Financial Post*.
- Mendelsohn, R.O. (2006), 'A Critique of the Stern Report', *Regulation* (Winter 2006-2007), 42-46.
- Moss, R.H. and S.H.Schneider (2000), 'Towards Consistent Assessment and Reporting of Uncertainties in the IPCC TAR', in *Cross-Cutting Issues in the IPCC Third Assessment Report*, R.K. Pachauri and T. Taniguchi (eds.), Global Industrial and Social Progress Research Institute, Tokyo.
- Nature (2010), 'IPCC: Cherish it, tweak it or scrap it?', *Nature*, **463**, (7282), pp. 730-732.
- New Scientist (2010), 'Let the sunlight in on climate change', *New Scientist*, **205**, (2745), p. 5.
- Nishioka, S. (2008), 'How did science and IPCC lead policy?', *Atomos*, **50**, (9), pp. 557-561.
- Nordhaus, W.D. (2007), 'A Review of the Stern Review on the Economics of Climate Change', *Journal of Economic Literature*, **45**, (3), 686-702.
- Nove, A. (1983), *The Economics of Feasible Socialism* Unwin Hyman, Boston.
- O'Neill, B. and N.Nakicenovic (2008), 'Learning from global emissions scenarios', *Environmental Research Letters*, **3**, (4).
- O'Neill, B., S.Pulver, S.Vandever, and Y.Garb (2008), 'Where next with global environmental scenarios?', *Environmental Research Letters*, **3**, (4).
- O'Neill, B.C. (2000), 'The jury is still out on global warming potentials', *Climatic Change*, **44**, 427-443.
- Oppenheimer, M., B.C.O'Neill, M.Webster, and S.Agrawala (2007), 'Climate change: The limits of consensus', *Science*, **317**, (5844), pp. 1505-1506.
- Parmesan, C. and G.W.Yohe (2003), 'A globally coherent fingerprint of climate change impacts across natural systems', *Nature*, **421**, 37-41.
- Patuelli, R., P.Nijkamp, and E.Pels (2005), 'Environmental tax reform and the double dividend: A meta-analytical performance assessment', *Ecological Economics*, **55**, (4), pp. 564-583.
- PBL (2010), *Assessing an IPCC Assessment -- An Analysis of Statements on Projected Regional Impacts in the 2007 Report*, Netherlands Environmental Assessment Agency, The Hague.
- Pearce, D.W. (18-12-1995a), 'Valuing Climate Change', *Chemistry & Industry*, 1024.
- Pearce, F. (1995b), 'Global Row over Value of Human Life', *New Scientist*, **August 19**, 7.
- Pearce, F. (1995c), 'Price of Life Sends Temperatures Soaring', *New Scientist*, **April 1**, 5.
- Peiser, B. (2007), 'IPCC: The Only Game in Town?', *Energy and Environment*, **18**, (7-8).

Pielke, R.A., Jr. (2007), *The Honest Broker -- Making Sense of Science in Policy and Politics* Cambridge University Press, Cambridge.

Pielke, R.A., Jr., T.M.L.Wigley, and C.Green (2008), 'Dangerous Assumptions', *Nature*, **452**, 531-532.

Risbey, J.S. and M.Kandlikar (2007), 'Expressions of likelihood and confidence in the IPCC uncertainty assessment process', *Climatic Change*, **85**, (1-2), pp. 19-31.

Root, T.L., J.T.Price, K.R.Hall, S.H.Schneider, C.Rosenzweig, and J.A.Pounds (2003), 'Fingerprints of global warming on wild animals and plants', *Nature*, **421**, (6918), pp. 57-60.

Rosenthal, E. (8-2-2010), 'Skeptics Find Fault with UN Climate Panel', New York Times.

Rothman, D.S., C.van Bers, J.Bakkes, and C.Pahl-Wostl (2009), 'How to make global assessments more effective: lessons from the assessment community', *Current Opinion in Environmental Sustainability*, **1**, (2), pp. 214-218.

Schiermeier, Q. (2010), 'IPCC flooded by criticism', *Nature*, **463**, (7281), pp. 596-597.

Schimel, D., D.Alves, I.Enting, M.Heimann, F.Joos, M.Raynaud, R.Derwent, D.Ehhalt, P.Fraser, E.Sanhueza, X.Zhou, P.Jonas, R.Charlson, H.Rodhe, S.Sadasivan, K.P.Shine, Y.Fouquart, V.Ramaswamy, S.Solomon, J.Srinivasan, D.L.Albritton, I.S.A.Isaksen, M.Lal, and D.J.Wuebbles (1996), 'Radiative Forcing of Climate Change', in *Climate Change 1995: The Science of Climate Change -- Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change*, 1 edn, J.T. Houghton et al. (eds.), Cambridge University Press, Cambridge, pp. 65-131.

Shapiro, H.T., R.Diab, C.H.de Brito Cruz, M.L.Cropper, J.Fang, L.O.Fresco, S.Manabe, G.Mehta, M.Molina, P.Williams, E.-L.Winacker, and A.H.Zakri (2010), *Climate Change Assessments -- Review of the Processes and Procedures of the IPCC*, Amsterdam, InterAcademy Council.

Sharkey, W. (1982), *The Theory of Natural Monopoly* Cambridge University Press, Cambridge.

Shine, K.P., J.S.Fuglestvedt, K.Hailemariam, and N.Stuber (2005), 'Alternatives to the global warming potential for comparing climate impacts of emissions of greenhouse gases', *Climatic Change*, **68**, 281-302.

Smith, S.J. (2003), 'The Evaluation of Greenhouse Gas Indices -- An Editorial Comment', *Climatic Change*, **58**, 261-265.

Solomon, S. and M.Manning (2008), 'The IPCC must maintain its rigor', *Science*, **319**, (5869), p. 1457.

Stern, N.H., S.Peters, V.Bakhski, A.Bowen, C.Cameron, S.Catovsky, D.Crane, S.Cruickshank, S.Dietz, N.Edmondson, S.-L.Garbett, L.Hamid, G.Hoffman, D.Ingram, B.Jones, N.Patmore,

- H.Radcliffe, R.Sathiyarajah, M.Stock, C.Taylor, T.Vernon, H.Wanjie, and D.Zenghelis (2006), *Stern Review: The Economics of Climate Change* Cambridge University Press, Cambridge.
- Tavoni, M. and R.S.J.Tol (2010), 'Counting only the hits? The risk of underestimating the costs of stringent climate policy: A letter', *Climatic Change*, **100**, (3), pp. 769-778.
- Terradas, J. and J.Penuelas (2008), 'Climate change policy: IPCC consensus is not enough', *Ambio*, **37**, (4), pp. 321-322.
- The Economist (6-11-2003a), 'Hot Potato Revisited: A Lack-of-Progress Report on the IPCC', The Economist.
- The Economist (13-2-2003b), 'Hot Potato: The IPCC Had Better Check its Calculations', The Economist.
- The Economist (4-2-2010a), 'A Time for Introspection', The Economist.
- The Economist (8-7-2010b), 'Flawed Scientists', The Economist.
- The Economist (8-7-2010c), 'Science behind Closed Doors', The Economist.
- Tinbergen, J. (1952), *On the Theory of Economic Policy* North Holland, Amsterdam.
- Tinbergen, J. (1954), *Centralization and Decentralization in Economic Policy* North Holland, Amsterdam.
- Tirole, J. (2000), *The Theory of Industrial Organization*, 11th printing edn, MIT Press, Cambridge, MA.
- Train, K.E. (1991), *Optimal Regulation: The Economic Theory of Natural Monopoly* MIT Press, Cambridge.
- Ulph, A.M. and D.J.Maddison (1997), 'Uncertainty, Learning and International Environmental Policy Coordination', *Environmental and Resource Economics*, **9**, 451-466.
- van den Bergh, J.C.J.M., K.J.Button, P.Nijkamp, and G.C.Pepping (1997), *Meta-Analysis in Environmental Economics* Kluwer Academic Publishers, Dordrecht.
- Waterson, M. (1988), *Regulation of the Firm and Natural Monopoly* Blackwell, New York.
- Weitzman, M.L. (2007), 'A Review of the Stern Review on the Economics of Climate Change', *Journal of Economic Literature*, **45**, (3), 703-724.
- WHO (1990), *Potential Health Effects of Climatic Change* World Health Organization, Geneva.
- WMO (2006), *Summary Statement on Tropical Cyclones and Climate Change*, World Meteorological Organization, Geneva.

Wynne, B. (2010), 'Strange weather, again: Climate science as political art', *Theory, Culture and Society*, **27**, (2), pp. 289-305.

Zillman, J.W. (2007), 'Some observations on the IPCC assessment process 1988-2007', *Energy and Environment*, **18**, (7-8), pp. 869-891.

Year	Number	Title/Author(s) ESRI Authors/Co-authors <i>Italicised</i>
2010		
	349	The Impact of Tax Reform on New Car Purchases in Ireland <i>Hugh Hennessy and Richard S.J. Tol</i>
	348	Climate Policy under Fat-Tailed Risk: An Application of FUND <i>David Anthoff and Richard S.J. Tol</i>
	347	Corporate Expenditure on Environmental Protection <i>Stefanie A. Haller and Liam Murphy</i>
	346	Female Labour Supply and Divorce: New Evidence from Ireland Olivier Bargain, Libertad González, <i>Claire Keane</i> and Berkay Özcan
	345	A Statistical Profiling Model of Long-Term Unemployment Risk in Ireland <i>Philip J. O'Connell, Seamus McGuinness, Elish Kelly</i>
	344	The Economic Crisis, Public Sector Pay, and the Income Distribution <i>Tim Callan, Brian Nolan (UCD) and John Walsh</i>
	343	Estimating the Impact of Access Conditions on Service Quality in Post <i>Gregory Swinand, Conor O'Toole and Seán Lyons</i>
	342	The Impact of Climate Policy on Private Car Ownership in Ireland <i>Hugh Hennessy and Richard S.J. Tol</i>
	341	National Determinants of Vegetarianism <i>Eimear Leahy, Seán Lyons and Richard S.J. Tol</i>
	340	An Estimate of the Number of Vegetarians in the World <i>Eimear Leahy, Seán Lyons and Richard S.J. Tol</i>
	339	International Migration in Ireland, 2009 <i>Philip J O'Connell and Corona Joyce</i>

- 338 The Euro Through the Looking-Glass:
Perceived Inflation Following the 2002 Currency
Changeover
Pete Lunn and David Duffy
- 337 Returning to the Question of a Wage Premium for
Returning Migrants
Alan Barrett and Jean Goggin
- 2009** 336 What Determines the Location Choice of Multinational
Firms in the ICT Sector?
Iulia Siedschlag, Xiaoheng Zhang, Donal Smith
- 335 Cost-benefit analysis of the introduction of weight-based
charges for domestic waste – West Cork’s experience
Sue Scott and Dorothy Watson
- 334 The Likely Economic Impact of Increasing Investment in
Wind on the Island of Ireland
*Conor Devitt, Seán Diffney, John Fitz Gerald, Seán Lyons
and Laura Malaguzzi Valeri*
- 333 Estimating Historical Landfill Quantities to Predict Methane
Emissions
Seán Lyons, Liam Murphy and Richard S.J. Tol
- 332 International Climate Policy and Regional Welfare Weights
Daiju Narita, *Richard S. J. Tol, and David Anthoff*
- 331 A Hedonic Analysis of the Value of Parks and
Green Spaces in the Dublin Area
Karen Mayor, Seán Lyons, David Duffy and Richard S.J. Tol
- 330 Measuring International Technology Spillovers and
Progress Towards the European Research Area
Iulia Siedschlag
- 329 Climate Policy and Corporate Behaviour
*Nicola Commins, Seán Lyons, Marc Schiffbauer, and
Richard S.J. Tol*
- 328 The Association Between Income Inequality and Mental
Health: Social Cohesion or Social Infrastructure
Richard Layte and Bertrand Maitre

- 327 A Computational Theory of Exchange:
Willingness to pay, willingness to accept and the
endowment effect
Pete Lunn and Mary Lunn
- 326 Fiscal Policy for Recovery
John Fitz Gerald
- 325 The EU 20/20/2020 Targets: An Overview of the EMF22
Assessment
Christoph Böhringer, Thomas F. Rutherford, and *Richard
S.J. Tol*
- 324 Counting Only the Hits? The Risk of Underestimating the
Costs of Stringent Climate Policy
Massimo Tavoni, *Richard S.J. Tol*
- 323 International Cooperation on Climate Change Adaptation
from an Economic Perspective
Kelly C. de Bruin, Rob B. Dellink and *Richard S.J. Tol*
- 322 What Role for Property Taxes in Ireland?
T. Callan, C. Keane and *J.R. Walsh*
- 321 The Public-Private Sector Pay Gap in Ireland: What Lies
Beneath?
Elish Kelly, Seamus McGuinness, Philip O'Connell
- 320 A Code of Practice for Grocery Goods Undertakings and An
Ombudsman: How to Do a Lot of Harm by Trying to Do a
Little Good
Paul K Gorecki
- 319 Negative Equity in the Irish Housing Market
David Duffy
- 318 Estimating the Impact of Immigration on Wages in Ireland
Alan Barrett, Adele Bergin and *Elish Kelly*
- 317 Assessing the Impact of Wage Bargaining and Worker
Preferences on the Gender Pay Gap in Ireland Using the
National Employment Survey 2003
Seamus McGuinness, Elish Kelly, Philip O'Connell, Tim

Callan

- 316 Mismatch in the Graduate Labour Market Among Immigrants and Second-Generation Ethnic Minority Groups
Delma Byrne and Seamus McGuinness
- 315 Managing Housing Bubbles in Regional Economies under EMU: Ireland and Spain
Thomas Conefrey and John Fitz Gerald
- 314 Job Mismatches and Labour Market Outcomes
Kostas Mavromaras, *Seamus McGuinness*, Nigel O'Leary, Peter Sloane and Yin King Fok
- 313 Immigrants and Employer-provided Training
Alan Barrett, Séamus McGuinness, Martin O'Brien and *Philip O'Connell*
- 312 Did the Celtic Tiger Decrease Socio-Economic Differentials in Perinatal Mortality in Ireland?
Richard Layte and Barbara Clyne
- 311 Exploring International Differences in Rates of Return to Education: Evidence from EU SILC
Maria A. Davia, *Seamus McGuinness* and *Philip, J. O'Connell*
- 310 Car Ownership and Mode of Transport to Work in Ireland
Nicola Commins and Anne Nolan
- 309 Recent Trends in the Caesarean Section Rate in Ireland 1999-2006
Aoife Brick and Richard Layte
- 308 Price Inflation and Income Distribution
Anne Jennings, Seán Lyons and Richard S.J. Tol
- 307 Overskilling Dynamics and Education Pathways
Kostas Mavromaras, *Seamus McGuinness*, Yin King Fok
- 306 What Determines the Attractiveness of the European Union to the Location of R&D Multinational Firms?
Iulia Siedschlag, Donal Smith, Camelia Turcu, Xiaoheng Zhang

- 305 Do Foreign Mergers and Acquisitions Boost Firm Productivity?
Marc Schiffbauer, Iulia Siedschlag, Frances Ruane
- 304 Inclusion or Diversion in Higher Education in the Republic of Ireland?
Delma Byrne
- 303 Welfare Regime and Social Class Variation in Poverty and Economic Vulnerability in Europe: An Analysis of EU-SILC
Christopher T. Whelan and *Bertrand Maître*
- 302 Understanding the Socio-Economic Distribution and Consequences of Patterns of Multiple Deprivation: An Application of Self-Organising Maps
Christopher T. Whelan, Mario Lucchini, Maurizio Pisati and *Bertrand Maître*
- 301 Estimating the Impact of Metro North
Edgar Morgenroth
- 300 Explaining Structural Change in Cardiovascular Mortality in Ireland 1995-2005: A Time Series Analysis
Richard Layte, Sinead O'Hara and Kathleen Bennett
- 299 EU Climate Change Policy 2013-2020: Using the Clean Development Mechanism More Effectively
Paul K Gorecki, Seán Lyons and *Richard S.J. Tol*
- 298 Irish Public Capital Spending in a Recession
Edgar Morgenroth
- 297 Exporting and Ownership Contributions to Irish Manufacturing Productivity Growth
Anne Marie Gleeson, *Frances Ruane*
- 296 Eligibility for Free Primary Care and Avoidable Hospitalisations in Ireland
Anne Nolan
- 295 Managing Household Waste in Ireland: Behavioural Parameters and Policy Options
John Curtis, Seán Lyons and *Abigail O'Callaghan-Platt*

- 294 Labour Market Mismatch Among UK Graduates;
An Analysis Using REFLEX Data
Seamus McGuinness and Peter J. Sloane
- 293 Towards Regional Environmental Accounts for Ireland
Richard S.J. Tol , Nicola Commins, Niamh Crilly, Sean Lyons and Edgar Morgenroth
- 292 EU Climate Change Policy 2013-2020: Thoughts on
Property Rights and Market Choices
Paul K. Gorecki, Sean Lyons and Richard S.J. Tol
- 291 Measuring House Price Change
David Duffy
- 290 Intra-and Extra-Union Flexibility in Meeting the European
Union's Emission Reduction Targets
Richard S.J. Tol
- 289 The Determinants and Effects of Training at Work:
Bringing the Workplace Back In
Philip J. O'Connell and Delma Byrne
- 288 Climate Feedbacks on the Terrestrial Biosphere and the
Economics of Climate Policy: An Application of *FUND*
Richard S.J. Tol
- 287 The Behaviour of the Irish Economy: Insights from the
HERMES macro-economic model
Adele Bergin, Thomas Conefrey, John FitzGerald and Ide Kearney
- 286 Mapping Patterns of Multiple Deprivation Using
Self-Organising Maps: An Application to EU-SILC Data for
Ireland
Maurizio Pisati, Christopher T. Whelan, Mario Lucchini and Bertrand Maitre
- 285 The Feasibility of Low Concentration Targets:
An Application of *FUND*
Richard S.J. Tol
- 284 Policy Options to Reduce Ireland's GHG Emissions

- Instrument choice: the pros and cons of alternative policy instruments
Thomas Legge and *Sue Scott*
- 283 Accounting for Taste: An Examination of Socioeconomic Gradients in Attendance at Arts Events
Pete Lunn and Elish Kelly
- 282 The Economic Impact of Ocean Acidification on Coral Reefs
Luke M. Brander, Katrin Rehdanz, *Richard S.J. Tol*, and Pieter J.H. van Beukering
- 281 Assessing the impact of biodiversity on tourism flows: A model for tourist behaviour and its policy implications
Giulia Macagno, Maria Loureiro, Paulo A.L.D. Nunes and *Richard S.J. Tol*
- 280 Advertising to boost energy efficiency: the Power of One campaign and natural gas consumption
Seán Diffney, Seán Lyons and Laura Malaguzzi Valeri
- 279 International Transmission of Business Cycles Between Ireland and its Trading Partners
Jean Goggin and Iulia Siedschlag
- 278 Optimal Global Dynamic Carbon Taxation
David Anthoff
- 277 Energy Use and Appliance Ownership in Ireland
Eimear Leahy and Seán Lyons
- 276 Discounting for Climate Change
David Anthoff, Richard S.J. Tol and Gary W. Yohe
- 275 Projecting the Future Numbers of Migrant Workers in the Health and Social Care Sectors in Ireland
Alan Barrett and Anna Rust
- 274 Economic Costs of Extratropical Storms under Climate Change: An application of FUND
Daiju Narita, *Richard S.J. Tol, David Anthoff*
- 273 The Macro-Economic Impact of Changing the Rate of Corporation Tax

Thomas Conefrey and John D. Fitz Gerald

2008

- 272 The Games We Used to Play
An Application of Survival Analysis to the Sporting Life-course
Pete Lunn
- 271 Exploring the Economic Geography of Ireland
Edgar Morgenroth
- 270 Benchmarking, Social Partnership and Higher Remuneration: Wage Settling Institutions and the Public-Private Sector Wage Gap in Ireland
Elish Kelly, Seamus McGuinness, Philip O'Connell
- 269 A Dynamic Analysis of Household Car Ownership in Ireland
Anne Nolan
- 268 The Determinants of Mode of Transport to Work in the Greater Dublin Area
Nicola Commins and Anne Nolan
- 267 Resonances from *Economic Development* for Current Economic Policymaking
Frances Ruane
- 266 The Impact of Wage Bargaining Regime on Firm-Level Competitiveness and Wage Inequality: The Case of Ireland
Seamus McGuinness, Elish Kelly and Philip O'Connell
- 265 Poverty in Ireland in Comparative European Perspective
Christopher T. Whelan and Bertrand Maitre
- 264 A Hedonic Analysis of the Value of Rail Transport in the Greater Dublin Area

Karen Mayor, Seán Lyons, David Duffy and Richard S.J. Tol
- 263 Comparing Poverty Indicators in an Enlarged EU
Christopher T. Whelan and Bertrand Maitre
- 262 Fuel Poverty in Ireland: Extent, Affected Groups and Policy Issues

Sue Scott, Seán Lyons, Claire Keane, Donal McCarthy and Richard S.J. Tol

- 261 The Misperception of Inflation by Irish Consumers
David Duffy and Pete Lunn
- 260 The Direct Impact of Climate Change on Regional Labour Productivity
Tord Kjellstrom, R Sari Kovats, Simon J. Lloyd, Tom Holt,
Richard S.J. Tol
- 259 Damage Costs of Climate Change through Intensification of Tropical Cyclone Activities: An Application of FUND
Daiju Narita, *Richard S. J. Tol* and *David Anthoff*
- 258 Are Over-educated People Insiders or Outsiders? A Case of Job Search Methods and Over-education in UK
Aleksander Kucel, *Delma Byrne*
- 257 Metrics for Aggregating the Climate Effect of Different Emissions: A Unifying Framework
Richard S.J. Tol, Terje K. Berntsen, Brian C. O'Neill, Jan S. Fuglestvedt, Keith P. Shine, Yves Balkanski and Laszlo Makra
- 256 Intra-Union Flexibility of Non-ETS Emission Reduction Obligations in the European Union
Richard S.J. Tol
- 255 The Economic Impact of Climate Change
Richard S.J. Tol
- 254 Measuring International Inequity Aversion
Richard S.J. Tol
- 253 Using a Census to Assess the Reliability of a National Household Survey for Migration Research: The Case of Ireland
Alan Barrett and Elish Kelly
- 252 Risk Aversion, Time Preference, and the Social Cost of Carbon
David Anthoff, Richard S.J. Tol and Gary W. Yohe

- 251 The Impact of a Carbon Tax on Economic Growth and Carbon Dioxide Emissions in Ireland
Thomas Conefrey, John D. Fitz Gerald, Laura Malaguzzi Valeri and Richard S.J. Tol
- 250 The Distributional Implications of a Carbon Tax in Ireland
Tim Callan, Sean Lyons, Susan Scott, Richard S.J. Tol and Stefano Verde
- 249 Measuring Material Deprivation in the Enlarged EU
Christopher T. Whelan, Brian Nolan and Bertrand Maitre
- 248 Marginal Abatement Costs on Carbon-Dioxide Emissions: A Meta-Analysis
Onno Kuik, Luke Brander and *Richard S.J. Tol*
- 247 Incorporating GHG Emission Costs in the Economic Appraisal of Projects Supported by State Development Agencies
Richard S.J. Tol and Seán Lyons
- 246 A Carbon Tax for Ireland
Richard S.J. Tol, Tim Callan, Thomas Conefrey, John D. Fitz Gerald, Seán Lyons, Laura Malaguzzi Valeri and Susan Scott
- 245 Non-cash Benefits and the Distribution of Economic Welfare
Tim Callan and Claire Keane
- 244 Scenarios of Carbon Dioxide Emissions from Aviation
Karen Mayor and Richard S.J. Tol
- 243 The Effect of the Euro on Export Patterns: Empirical Evidence from Industry Data
Gavin Murphy and Iulia Siedschlag
- 242 The Economic Returns to Field of Study and Competencies Among Higher Education Graduates in Ireland
Elish Kelly, Philip O'Connell and Emer Smyth
- 241 European Climate Policy and Aviation Emissions
Karen Mayor and Richard S.J. Tol

- 240 Aviation and the Environment in the Context of the EU-US Open Skies Agreement
Karen Mayor and Richard S.J. Tol
- 239 Yuppie Kvetch? Work-life Conflict and Social Class in Western Europe
Frances McGinnity and Emma Calvert
- 238 Immigrants and Welfare Programmes: Exploring the Interactions between Immigrant Characteristics, Immigrant Welfare Dependence and Welfare Policy
Alan Barrett and Yvonne McCarthy
- 237 How Local is Hospital Treatment? An Exploratory Analysis of Public/Private Variation in Location of Treatment in Irish Acute Public Hospitals
Jacqueline O'Reilly and Miriam M. Wiley
- 236 The Immigrant Earnings Disadvantage Across the Earnings and Skills Distributions: The Case of Immigrants from the EU's New Member States in Ireland
Alan Barrett, Seamus McGuinness and Martin O'Brien
- 235 Europeanisation of Inequality and European Reference Groups
Christopher T. Whelan and Bertrand Maitre
- 234 Managing Capital Flows: Experiences from Central and Eastern Europe
Jürgen von Hagen and Iulia Siedschlag
- 233 ICT Diffusion, Innovation Systems, Globalisation and Regional Economic Dynamics: Theory and Empirical Evidence
Charlie Karlsson, Gunther Maier, Michaela Trippl, Iulia Siedschlag, Robert Owen and Gavin Murphy
- 232 Welfare and Competition Effects of Electricity Interconnection between Great Britain and Ireland
Laura Malaguzzi Valeri
- 231 Is FDI into China Crowding Out the FDI into the European Union?

- Laura Resmini and *Iulia Siedschlag*
- 230 Estimating the Economic Cost of Disability in Ireland
John Cullinan, Brenda Gannon and *Seán Lyons*
- 229 Controlling the Cost of Controlling the Climate: The Irish Government's Climate Change Strategy
Colm McCarthy, *Sue Scott*
- 228 The Impact of Climate Change on the Balanced-Growth-Equivalent: An Application of *FUND*
David Anthoff, Richard S.J. Tol
- 227 Changing Returns to Education During a Boom? The Case of Ireland
Seamus McGuinness, Frances McGinnity, Philip O'Connell
- 226 'New' and 'Old' Social Risks: Life Cycle and Social Class Perspectives on Social Exclusion in Ireland
Christopher T. Whelan and Bertrand Maitre
- 225 The Climate Preferences of Irish Tourists by Purpose of Travel
Seán Lyons, Karen Mayor and Richard S.J. Tol
- 224 A Hirsch Measure for the Quality of Research Supervision, and an Illustration with Trade Economists
Frances P. Ruane and Richard S.J. Tol
- 223 Environmental Accounts for the Republic of Ireland: 1990-2005
Seán Lyons, Karen Mayor and Richard S.J. Tol
- 2007** 222 Assessing Vulnerability of Selected Sectors under Environmental Tax Reform: The issue of pricing power
J. Fitz Gerald, M. Keeney and S. Scott
- 221 Climate Policy Versus Development Aid
Richard S.J. Tol
- 220 Exports and Productivity – Comparable Evidence for 14 Countries
The International Study Group on Exports and Productivity

- 219 Energy-Using Appliances and Energy-Saving Features: Determinants of Ownership in Ireland
Joe O'Doherty, *Seán Lyons* and *Richard S.J. Tol*
- 218 The Public/Private Mix in Irish Acute Public Hospitals: Trends and Implications
Jacqueline O'Reilly and *Miriam M. Wiley*
- 217 Regret About the Timing of First Sexual Intercourse: The Role of Age and Context
Richard Layte, *Hannah McGee*
- 216 Determinants of Water Connection Type and Ownership of Water-Using Appliances in Ireland
Joe O'Doherty, *Seán Lyons* and *Richard S.J. Tol*
- 215 Unemployment – Stage or Stigma?
Being Unemployed During an Economic Boom
Emer Smyth
- 214 The Value of Lost Load
Richard S.J. Tol
- 213 Adolescents' Educational Attainment and School Experiences in Contemporary Ireland
Merike Darmody, *Selina McCoy*, *Emer Smyth*
- 212 Acting Up or Opting Out? Truancy in Irish Secondary Schools
Merike Darmody, *Emer Smyth* and *Selina McCoy*
- 211 Where do MNEs Expand Production: Location Choices of the Pharmaceutical Industry in Europe after 1992
Frances P. Ruane, *Xiaoheng Zhang*
- 210 Holiday Destinations: Understanding the Travel Choices of Irish Tourists
Seán Lyons, *Karen Mayor* and *Richard S.J. Tol*
- 209 The Effectiveness of Competition Policy and the Price-Cost Margin: Evidence from Panel Data
Patrick McCloughan, *Seán Lyons* and *William Batt*
- 208 Tax Structure and Female Labour Market Participation:

Evidence from Ireland
Tim Callan, A. Van Soest, J.R. Walsh