

# **Economists and Climate Science: A Critique**

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*The attached text is due to appear in the coming issue (Volume 10 Number 1) of World Economics. Meanwhile it can be quoted and commented on. This opening page provides a table of contents.*

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## **Economists and Climate Science: A Critique**

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### **Theme and targets**

In this paper I question the characteristic treatment of climate change issues by fellow-economists, as seen in recent articles, books and reports. The focus of the paper, however, is not on economics. My main theme is what I see as the uncritical and over-presumptive way in which these various sources have dealt with the scientific aspects of the subject.

Although I also refer to other illustrative cases, the chief specific targets of criticism are six recent and influential publications. Three of these are by leading and widely respected individual authors. They are:

- William Nordhaus's book, *A Question of Balance* (Nordhaus, 2008);
- Martin Weitzman's article entitled 'On Modeling and Interpreting the Economics of Catastrophic Climate Change' (Weitzman, 2009); and.
- Dieter Helm's article entitled 'Climate-Change Policy: Why Has So Little Been Achieved?' (Helm, 2008).

Alongside this trio I place two prominent large-scale officially-sponsored though independent reviews:

- The 700-page Stern Review, *The Economics of Climate Change*, by Nicholas (now Lord) Stern and others, commissioned by the British government and published in 2007; and
- The 600-page *Garnaut Climate Change Review*, authored by Ross Garnaut, commissioned by the state and territorial governments of Australia with the later participation of the Commonwealth government, and published in 2008.

Last on the list is the special chapter on climate change issues that formed part of the April 2008 issue of the IMF's twice-yearly flagship publication, *World Economic Outlook*.<sup>1</sup>

It is an unusual procedure for an economist to criticise what fellow-economists have said, or failed to say, about a subject area which is neither his nor theirs. I therefore begin by setting the issues that I raise in the wider context of the current climate change debate.

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<sup>1</sup> I have commented on the Stern Review in Byatt *et al.* 2006, as a joint author, and in Henderson 2007a; on the IMF's involvement in Henderson 2007b and 2008a; and on the Draft Report of the Garnaut Review in Henderson 2008b. At various points below I have drawn on these pieces without specific attribution.

## Background and context

### A spectrum of opinions

In relation to climate change issues, there exists a widely shared diagnosis and prescription, a body of *received opinion* shared by the great majority of governments and by many of their citizens. The core of received opinion, briefly summarised, is that warming caused by human activities, through rising emissions of (so-called) ‘greenhouse gases’, has already become the main influence on global surface temperatures; that global warming can be expected to proceed further, unless effective measures are put in place to prevent this; that such a general unconstrained rise in global temperatures would increasingly carry with it serious risks, with the possibility of developments that could be classed as catastrophic; and that in consequence further prompt, sustained and world-wide governmental action is called for to limit the extent of warming and deal with its possible consequences. The action would chiefly take the form of ‘mitigation’ – that is, of measures to curb emissions of greenhouse gases in general and CO<sub>2</sub> in particular.

Predictably, received opinion is not universally shared. Both diagnosis and prescription remain subject to challenge by a varied collection of doubters, sceptics, questioners, critics, nonconformists, non-subscribers – in a word, *dissenters*. Against them, and greatly outnumbering them, are arrayed what I term the *upholders* of received opinion.

Within both groups, again predictably, there are different schools of thought: a whole spectrum of opinions can be identified. At one end, there are what may be termed *strong* or *full-blown* upholders, the dark greens so to speak. Prominent among these are Lord Stern and his co-authors: the Stern Review takes the position (p. xv) that prospective warming ‘is a serious global threat’ and ‘demands an urgent global response’. At the other end of the spectrum, strong dissenters – the dark blues - argue that such warming, if indeed its extent can be shown to be significant, is not a cause for alarm or concern: hence mitigation measures should be eschewed - or discontinued, where they are now in place. In between these two far removed positions, there are upholders and dissenters who hold more *limited* or *qualified* beliefs; and in the middle there is sometimes common ground, so that the basic dividing line can become blurred.<sup>2</sup>

Each of the various subject areas involved, including economics, has its own distinctive spectrum. More of this below.

### A consensus and its basis

Received opinion is reflected in an *official policy consensus*. With few exceptions, governments across the world are committed to the view that anthropogenic global

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<sup>2</sup> One could alternatively use the terms ‘radical’ and ‘moderate’ to distinguish the extremes from the intermediate positions; but the latter term has too favourable a connotation, so that more neutral language seems better. Of course, the above fourfold classification is no more than a first rough approximation. There are many schools of thought and shades of opinion.

warming (from now on, AGW) constitutes a serious problem which requires official action at both national and international level.

This official consensus is not new. Climate change issues have been on the international agenda for 20 years or more, and it is now practically 17 years since governments decided, collectively and almost unanimously, that determined steps should be taken to deal with what they agreed was a major problem. The decisive collective commitment was made in 1992, through the United Nations Framework Convention on Climate Change. The Convention specifies, using language that goes back to a 1990 Ministerial Declaration, that its ‘ultimate objective’ is:

‘to achieve ... stabilization of greenhouse gas emissions in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system’.

That agreed objective remains in place today.

Since 1992, many governments have acted, through what is now a wide range of measures and programmes, to curb emissions of CO<sub>2</sub>. On the international scene, through the Kyoto Protocol, ‘Annex I’ countries have undertaken to meet specific targets for emissions reductions, and at the coming major international gathering in Copenhagen (December 2009) the governments of the world will be considering what further measures, possibly involving developing countries also, might extend or replace the Protocol after its present commitment period expires in 2012.

In taking this course, governments have met with widespread public approval. Within the political domain, there has been virtually unanimous cross-party agreement. Beyond it, strong support has come from media commentators, representative scientific bodies including the Royal Society, environmental advocacy groups (the ‘NGOs’), and, increasingly, large business enterprises. Further, and as noted below, there is considerable support for the official consensus position among economists.

What was it that persuaded governments across the world, almost two decades ago, to take the possible dangers of AGW so seriously, and what is it that has caused them to maintain and even intensify their concerns, with a good deal of public support? I think the answer is straightforward. From the start the main influence was, as it still is, the scientific advice provided through what I call the *official advisory process*.

That advice can and does come from many sources; but the main single channel for it, indeed the only channel of advice for governments *collectively*, has been the series of massive and wide-ranging Assessment Reports produced by the Intergovernmental Panel on Climate Change (IPCC). The most recent of these, referred to for short as AR4, was completed and published in the course of 2007. It chiefly comprises the lengthy separate volumes brought out by each of the Panel’s three Working Groups: WGI deals with issues of climate science, WGII with the prospective impacts of possible global warming, and WGIII with mitigation measures. The various documents that make up AR4 come to around 3,000 pages, and some 2,500 experts – authors, contributors and reviewers – were directly involved in preparing them. I refer to these persons as the *expert network*. Although the two are often confused, the network is quite distinct from the Panel.

The three post-1992 Assessment Reports, including AR4, have served to confirm and reinforce the agreed position that governments arrived at when they adopted the Framework Convention.

The IPCC does not itself undertake or commission research. The Assessment Reports review and draw on already published work, so that the Panel's contribution forms only one element in the advisory process. All the same, the IPCC is influential and important in its own right. Its reports carry substantial weight, with public opinion as well as its member governments, because of their wide-ranging coverage of the issues and their extensive and ordered expert participation. In 2007 the Panel's work received further and conspicuous recognition through the award of the Nobel Peace Prize, which it shared with Al Gore.

Through its three working groups, the IPCC covers the whole range of topics relating to climate change, including economic aspects. However, what has chiefly carried weight throughout has been its presentation of climate science in the reports from WGI. For example, the citation for the Nobel award focuses on the way in which the Panel 'has created an ever-broader informed consensus about the connection between human activities and global warming'. Through the whole series of Assessment Reports, the reality of this connection has been taken, by governments and public opinion alike, as the IPCC's central message.

Support for this message, and praise for the IPCC's work, have come from scientists outside the field of climate science and from leading scientific academies across the world. It is often claimed that there now exists a world-wide scientific consensus on climate change issues. For reasons that I will come to, such language leaves me uneasy. Nevertheless, I think it is correct to say that alongside the official policy consensus (which *is* a reality), and providing much of its rationale and support, there exists a body of what can be termed *prevailing scientific opinion*.

To sum up: the core of received opinion, and its point of departure, is that scientific research, as reflected in the WGI reports, has provided increasingly firm and convincing evidence of the reality and the serious potential threat of AGW. That belief forms the basis for the official policy consensus and the widespread unofficial support for it.

### **A divided profession (1)**

In relation to climate change issues, economists as usual are far from being of one mind. However, I believe that a clear majority of those who hold views on the subject broadly subscribe to received opinion. Evidence for this can be seen, for example, in both the Stern and Garnaut reviews; in the list of those economists (including four Nobel prizewinners) whose endorsements of the Stern Review are printed there (pp. ii-iii); in a public statement of December 2005 by 25 leading American academics; and in a similar statement of May 2007 signed by 271 university economists in Australia. All the six authors and sources listed above, and criticised below, count as upholders, as also do various international agencies besides the IMF that have economic concerns and expertise, including the World Bank and the OECD.

Some of the current differences within the profession relate to already familiar issues which arise in other areas of policy. A leading instance, and an important one in this context where distant possibilities are in question, is the choice of an appropriate rate of interest for discounting projected future costs and benefits. Thus for example, among our authors, both Nordhaus and Helm have questioned the low rate of interest that the Stern Review argued for; and by implication their criticisms apply also to the Garnaut Report, which here as elsewhere takes much the same line as Stern. On another key issue, Helm has argued (p. 228) that ‘the costs of mitigating climate change are likely to be significantly higher than in the Stern Report’. Again, Weitzman has posed a fundamental question of how far the characteristic economists’ approach to questions of public policy, through the application of cost-benefit analysis, is appropriate to a situation in which there exists (p. 2) ‘a non-negligible probability of worldwide catastrophe’, while Nordhaus (pp. 146-7 of his book, and in Nordhaus 2009) has shown himself unconvinced by the argument and its implications.<sup>3</sup>

While the differences just referred to are among upholders, there are also conflicting views within the dissenters’ camp – in particular, between those who accept and those who reject the case for mitigation policies. On both sides of the dividing line, the resulting professional exchanges, though they often draw on arguments and evidence from other disciplines, generally take place within the recognised bounds of economic discourse. By contrast, the dividing line itself is of a different kind: it falls outside the accepted limits of our subject. The division between upholders and dissenters concerns the choice of a point of departure; and this choice depends on a judgement as to what conclusions it is appropriate to draw from arguments and evidence that are scientific rather than economic. Received opinion among economists, as within most governments, takes as a basis for further analysis what it sees as firmly grounded scientific evidence and conclusions.

In the sections that now follow I give reasons for questioning this majority assessment. I have come to think that the present generally accepted treatment of scientific aspects by economists, as exemplified in the various sources that I quote below, is characterised by over-presumption, inadvertence, and misplaced trust, and, in consequence, by an unbalanced treatment of policy choices in which a key aspect is passed over.

## **Over-presumption.**

### **Misusing language**

In all the six main sources treated here, as in many other places, the term ‘climate change’ is persistently misused. Here are some representative instances:

- Nordhaus (p. 4): ‘... alternative options for dealing with climate change’.
- Weitzman (p. 9): ‘... nightmare implications of climate change’.
- Helm (p. 220): ‘... the urgency of the climate change problem’.
- Stern (p. 65): ‘Climate change threatens the basic elements of life for people around the world’.

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<sup>3</sup> The contention that cost-benefit analysis is not relevant to an evaluation of the extreme possibilities raised by AGW was put forward in 1992 by the philosopher John Broome, in a study entitled *Counting the Cost of Global Warming*.

- Garnaut (p.xviii): ‘Climate change is a diabolical policy problem’.
- IMF (p. 133): ‘Climate change is a potentially catastrophic global externality’.

By way of reinforcing the point, here are some further specimens from other influential sources:

- Adair (Lord) Turner, Chair of the Committee on Climate Change, in a press statement of 1 December 2008: ‘Climate change poses a grave threat to human welfare, the environment and the economy’.<sup>4</sup>
- Amartya Sen, in the Stern Review (p. ii): ‘The stark prospects of climate change...’
- The *Financial Times*, in a leading article of 27 January 2009: ‘... all countries need to fight climate change’.
- The OECD Secretariat, as the opening statement in a document of October 2008 specially prepared for ministers: ‘Climate change is confronting us with the fierce urgency of “now”’.

In all these cases, as in countless others of their kind, what the authors are actually referring to is not climate change but AGW: they write as though the two could now be taken to be the same. This is grossly misleading. Climate change can occur, has occurred, and may well be occurring now, independently of human activity. In recognition of this elementary fact, the IPCC defines ‘climate change’ and ‘climate variability’ with reference to (1) ‘natural internal processes within the climate system’, and (2) ‘external forcing’, which may be either natural (e.g., solar) or anthropogenic in origin. It thus draws a clear distinction, which should be observed in all serious discussion, between climate change and AGW.<sup>5</sup>

### Going too far

In this widespread misuse of language there is typically a strong element of overstatement, not to mention drama. Thus in all but the first of the above quotations it is taken as beyond question, because emerging from ‘the science’, (1) that AGW is now the dominant influence on climate change, so that for practical purposes the terms are interchangeable, and (2) that in consequence enormous and unprecedented risks have incontrovertibly emerged. To me, it seems unnecessary and imprudent for economists to arrive at such confident and sweeping conclusions on matters that fall outside their subject. Further, it is going too far to claim, or take for granted, that the two above propositions mirror agreed and conclusive expert findings. As I see it, there are three reasons for taking a more qualified point of departure.

Reason No. 1 is the extent of continuing and pervasive uncertainty – and, as some would argue, sheer lack of knowledge – in relation to the climate system. In this whole disputed subject area, a proposition which all can agree on is that the system is one of extraordinary complexity which is far from being well understood. One expert witness to that effect is John Zillman, formerly a leading member of the IPCC’s

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<sup>4</sup> The Committee on Climate Change is a small high-level advisory body established by the British government. Alongside Lord Turner, it includes three professional economists among its members.

<sup>5</sup> The reference here is to the glossary (pp. 941-54) appended to the last (AR4) report from WGI. Garnaut (p. 27) claims that his report ‘uses the IPCC definition’, but I could see no sign of such compliance in his text. It is true that the Framework Convention defines ‘climate change’ with reference only to the impact of AGW, but authors rarely seek to justify their language by referring to this unfortunate usage.

managing Bureau (and a staunch upholder still). In a paper published in 2005 he writes (p. 3) that:

‘uncertainty pervades almost every aspect of our understanding of the climate system ...The uncertainties surrounding climate (and especially climate change) are not limited to what will happen in the future but span the complete spectrum of our knowledge of past climate, and our understanding of the mechanisms of present climate, to our ability to predict future climate’.

In an earlier (2004) paper Zillman refers to “‘the large, and still largely unpredictable, natural variability of climate on timescales from decades to centuries’.

This emphasis on prevailing uncertainties forms a recurring theme of the instructive report prepared for the National Research Council of the US, in response to a request from President Bush, by a high-level Committee on the Science of Climate Change (CSCC). The report was published in 2001. On my count, it lists at various points twelve distinct aspects of uncertainty. All of these appear as significant, and some as fundamental. It is true that more recently the 2007 WGI report refers to ways in which uncertainties have been reduced, but my layman’s impression is that the picture as presented by Zillman and the NRC committee has changed but little; and indeed, commentators on the WGI report (Green *et al.*) have made the point (p. 3) that ‘the terms “uncertain” and “uncertainties” appear more than 1,300 times’ in the text.

Against this background, it is misleading to speak in general terms of ‘the science’, in a way which suggests that there are now no significant doubts, queries or gaps. Indeed, the CSCC report specifically cautions, in the context of the IPCC’s work, against ‘[giving] an impression that the science of global warming is “settled”, even though many uncertainties still remain’ (p.22). Some if not all of the committee members might endorse the position taken last year in a personal statement by a leading British climate scientist (and upholder), Mike Hulme, who referred there to ‘the limits and fragility of climate science’.

Reason No. 2 for due caution is that, just as with their economic counterparts, there exists a broad spectrum of views among scientific upholders: given the range and depth of uncertainties, this is only to be expected. Some of the differences relate to what can be said with confidence about the arguably dominant influence and resulting dangers of AGW. The point can be illustrated with reference to the two widely accepted propositions referred to above.

As to the hypothesis that AGW can now be taken to be the principal influence on climate change, here are two contrasting views from leading American scientists both of whom can be classed as upholders:

- James Hansen, Director of the Goddard Institute for Space Studies, has taken the position (2007) that ‘Humans now control global climate’ and (2008b) that ‘the human-made increase of atmospheric carbon dioxide (CO<sub>2</sub>), from the pre-industrial 280 parts per million (ppm) to today’s 385 ppm, has already raised the CO<sub>2</sub> amount into the dangerous range’.
- Carl Wunsch, a professor of oceanography at MIT, in a personal statement put out (2007) by the Royal Society writes, first, that ‘We know that [the climate] is capable of remarkable changes without human intervention’, and later in the text,

that ‘...at bottom, it is very difficult to separate human induced change from natural change, certainly not with the confidence we all seek’.<sup>6</sup>

As to the view that risks of catastrophe have now beyond question emerged, Hansen (2008a) is indeed of the opinion that ‘the climate system is dangerously close to tipping points that could have disastrous consequences...’, so that (2008b) ‘our planet itself is in peril’. On the other hand, Mike Hulme, in an earlier (2006) statement than the one quoted above, spoke of ‘a discourse of catastrophe [which] is a political and rhetorical device’, and identified references to ‘irreversible tipping in the Earth’s climate’ as one instance of this ‘discourse’. He took the view that ‘To state that climate change will be “catastrophic” hides a cascade of value-laden assumptions which do not emerge from empirical or theoretical science’.

This is not to say that Hansen and those who think like him are necessarily wrong on either count. The point is simply that within prevailing scientific opinion there are, not surprisingly, differences about the past, present and prospective behaviour of the climate system and, within that system-, the current and prospective impact of AGW.

Reason No 3 is to be found in the continuing evidence of dissenting or non-subscribing views within the scientific world. Recent evidence on this subject is to be found, in convenient form, in the newly-revised (December 2008) version of a document prepared by the office of the Republican ranking member of the Environment and Public Works Committee of the US Senate. This report is a kind of nonconformist anthology: it presents, through summary direct quotation, the recently-expressed views of some 650 variously qualified professionals, all of whom question one or more aspects of prevailing views on climate change.<sup>7</sup> Features of the document worth noting are:

- A widely shared judgement is that, since ‘the causes of climate change are many, various and very incompletely understood’,<sup>8</sup> it is difficult, if not impossible, to isolate the effects of human activity.
- Many of those quoted hold the view that natural influences on the climate, as opposed to the consequences of human activity, continue to predominate.
- Expressions of doubt or dissent have come from experts in related areas, such as geology and physics, and indeed meteorology, as well as climate science.
- On my count, close to 100 American meteorologists are quoted. This lends weight to the view expressed by one of them (Cohen, p. 37 of the first version), who has written: ‘I do not agree with all the IPCC’s conclusions and know through peer discussions that the idea of a consensus in the meteorological community is false’.

The existence of informed scientific dissent is barely recognised in the various sources referred to here.

To sum up: given the huge complexity of the climate system and the large gaps in present knowledge, the unsurprising existence of a range of views among the scientific upholders, and the extent of professional doubts and dissent, generalised

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<sup>6</sup> It should be added that Wunsch goes on to say that ‘It is probably true that most scientists would assign a very high probability that human-induced change is already strongly present in the climate system...’

<sup>7</sup> I have to declare an interest here, since I am one of the authors cited – though not in relation to scientific aspects.

<sup>8</sup> This form of words is taken from a presentation by an Australian scientist, Robert Carter.

references to a ‘scientific consensus’ are out of place. It is likewise inappropriate to refer, as Helm does (pp. 214, 223 and 224) to what ‘scientists say’, ‘scientists tell us’ and ‘scientists advise’, as though there were no scientific non-subscribers and no serious differences of opinion on the upholders’ side of the fence. Received opinion among economists is apt to view ‘the science’ as monolithic and firmly established, when in fact it is neither.

Against this background, the following statements appear as too unqualified:

- Nordhaus (p. xi): ‘global warming will cast a shadow over the world for decades.’
- Stern Review (p. xviii): ‘Climate change [*sic*] is the greatest market failure the world has ever seen’.
- Garnaut (p. 592): ‘We know that the possibilities from climate change [*sic*] include shocks far more severe than others in the past that have exceeded society’s capacity to cope...’
- IMF (p. 133): ‘The damage from climate change [*sic*] and its costs are irreversible’
- Weitzman (p. 27): ‘What we *do* know about climate science and extreme tail probabilities is that planet Earth hovers in an unstable trigger-prone “whipsaw” earth-atmosphere system [Hansen et al, *Phil. Trans. R. Soc.* 2007, pp. 1925-54], [and that] chaotic dynamic responses to geologically instantaneous GHG shocks are quite possible...’

To these may be added, as a further instance from the official world:

- The International Energy Agency, in its latest (2008) *World Energy Outlook* (p. 37): ‘Preventing catastrophic and irreversible damage to the global climate ultimately requires a major decarbonisation of the world energy sources’

All the above assertions, and others like them, present as established truth what are in fact no more than arguable propositions which have found some expert support. They should all have been couched in conditional terms. Weitzman’s supporting reference implies, wrongly, that Hansen’s view of the world is beyond challenge. Neither Weitzman nor Garnaut is justified in using the term ‘know’.

Over-confidence in diagnosis has its parallel in prescription. It is widely presumed, including by the sources considered here, that the climate, as represented by global average surface temperatures, can be reliably tuned and equilibrated through judicious control of emissions. However, the causal relationships involved represent hypotheses, some would say conjectures, rather than established truth.

The tendency of many economists to take over-confident positions in relation to scientific matters has gone together with, and partly results from, a failure to take due note of evidence that the official advisory process is neither objective nor authoritative.

## **Inadvertence and misplaced trust**

### **Disregarding evidence**

Over the past 20 years governments everywhere, and a great many outsiders too, have put their trust in the official advisory process as a whole and the IPCC process in particular: this is true also of majority opinion among economists. I have come to

believe that this widespread trust is unwarranted. The evidence that has led me to form this view is almost wholly disregarded in the sources referred to here, largely I think through inadvertence.

In what follows I focus mainly on the IPCC process, though it is the entire official advisory process that has to be put in question. What is at issue here is not, as suggested by Stern Review authors, a matter of ‘procedures’ only, as distinct from substance. In so far as the established advisory process which the world relies on is not professionally up to the mark, the basis and rationale of the official policy consensus are put in question.

In July 2005 the House of Lords Select Committee on Economic Affairs, in a unanimous report, expressed (p. 6) ‘concerns about the objectivity of the IPCC process’. The report was dismissed by Her Majesty’s Government, and it finds no place among the 1100 or so references in the Stern Review. However, both before and since its publication, critics have drawn attention, in my opinion with good reason, to flaws in the conduct of the IPCC process.

As noted above, it is the reports from the Panel’s Working Group I, on climate science, that have especially carried weight and shaped received opinion. It is the more significant, therefore, that the most telling criticisms of the IPCC process have related to scientific aspects, as treated in key chapters of the past two WGI reports.<sup>9</sup> The main heads of criticism have been:

- Over-reliance on peer review procedures which do not serve as a guarantee of quality and do not ensure due disclosure of sources, data, and procedures followed in the treatment of data.
- Serious failures of due disclosure and archiving in relation to studies which the IPCC has drawn on.
- Basic errors in the handling of data, through failure to consult or involve trained statisticians.
- Failure to take due account of relevant published work and evidence.
- Failure to take due note of comments from dissenting critics who took part in the preparation of the AR4 WGI report.
- Resisting the disclosure of pertinent documents, despite the formal instruction of member governments that the Panel’s proceedings should be ‘open and transparent’. And last but not least
- Failure on the part of the Panel and the IPCC directing circle to acknowledge and remedy the above deficiencies.

Exposure of these flaws in the process has come from a number of independent commentators, and in particular from two Canadian authors, Stephen McIntyre and Ross McKittrick: both separately and in joint presentations, they have made an

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<sup>9</sup> Helm says (p. 217) that ‘dissent [from IPCC conclusions] has been more heavily focused on the economics and policy aspects and less on the pure science’. This is not correct, and it shows a lack of acquaintance with the sources to be mentioned below (though in a passing footnote reference he mentions the Select Committee report).

outstanding contribution to public debate.<sup>10</sup> Their attention was initially focused on the climate reconstruction presented in the influential and much-publicised ‘hockey-stick’ study, which was prominently featured in the IPCC’s Third Assessment Report of 2001 and thereafter. Their criticisms eventually prompted parallel initiatives by two committees of the US House of Representatives. Both committees set up high-level inquiries into the subject – one from an expert group appointed by the National Research Council, and the other from a team of statisticians led by Edward Wegman, then chair of the US National Academy of Science Committee on Applied and Theoretical Statistics. Both inquiries reported in July 2006. The outcome fully bears out the McIntyre-McKitrick critique, and the Wegman report is severe in its judgement on the studies involved.

Other aspects of the work for WGI have also been subject to expert challenge. One such aspect concerns the instrument-based series for global average surface temperature which the Working Group and other official sources have relied on: the estimated temperature anomalies appear as subject to doubt because of imperfections in coverage and reliability, questionable statistical procedures, and non-climatic influences for which full allowance may not have been made. Again, the conduct of the drafting process for key chapters of the WGI report for AR4 has been called in question. Under both these latter headings also, issues of non-disclosure have been raised, and critics have had to resort to freedom of information legislation to gain access to material which should from the start have been in the public domain.

This whole array of criticisms, and their history, are set out in two recent and notable published papers. The first, by David Holland, is entitled ‘Bias and Concealment in the IPCC Process’, while the second is by Ross McKitrick.<sup>11</sup> Both papers, with full supporting evidence, put in question, first, the claims to authority of arguments which have been at the core of the IPCC’s treatment of the scientific evidence; second, the objectivity and neutrality of leading WGI authors and reviewers; and third, any presumption that in these proceedings the peer review process provides an effective guard against bias on the part of those authors and reviewers. McKitrick’s verdict on the drafting process for that report, in which he and McIntyre participated as invited reviewers, is

‘...that the core writing team ... shares a single point of view, that its members are alert and predisposed to evidence that confirms that point of view, and that they are unreceptive or openly hostile to evidence that contradicts it’ (p. 99) .

The evidence just cited points to ‘the need for comprehensive audit of the quality of the science-based information on climate risk that is currently being used by governments to set public policy’ (Holland *et al.* 2007, p. 143). The possibility that such a need might exist is not recognised in any of the sources considered here.

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<sup>10</sup> McKitrick’s website, <http://ross.mckitrick.googlepages.com/>, provides an annotated set of references, some of which are included in the list of references appended to this paper. McIntyre’s blog, [climateaudit.org](http://climateaudit.org), is a notable continuing source of analysis, commentary and debate.

<sup>11</sup> Holland’s paper is in *Energy and Environment*, Vol. 18, No. 7&8, 2007, while McKitrick’s piece forms a chapter in a book called *The Global Warming Debate: Science, Economics and Policy*, published in 2008 by the American Institute for Economic Research. The general problem of disclosure failure in academic work, which goes well beyond climate science, forms the subject of a recent well documented and disturbing essay by McCullough and McKitrick (2009).

## Overlooking bias

What the critics have uncovered suggests a strong element of bias in some areas of climate science and among those in charge of the WGI draft. I believe that the problem goes wider, and that a chronic and pervasive bias characterises the official advisory process as a whole.

To avoid bias and over-presumption would in fact have required a conscious and determined effort on the part of governments and the officials involved. It is true that the IPCC as such has been formally instructed by its member governments, in the 'principles governing IPCC work,' that its reports 'should be neutral with respect to policy'. But the Panel members themselves, as also the senior officials they report to, are not and cannot be neutral: as government servants, they are committed, inevitably and rightly, to the official policy consensus. They stand by the objective set out in the Framework Convention and the resulting policy decisions. That is the context within which the three successive IPCC Assessment Reports prepared since 1992 have been put together by the expert network and reviewed by the Panel and its member governments. The fact is that departments and agencies which are not and cannot be 'policy-neutral' are deeply involved, from start to finish, in the preparation of the Reports.

To be sure, those departments and agencies could still have made it a prime concern to ensure that the IPCC reporting process which they control remained open, balanced and policy-neutral. As I read the history, however, this has not happened. From the earliest days, members of the IPCC managing Bureau and the directing circle they form part of, like the environmental policy milieu in general, have been characterised by what Clive Crook, writing in the *Financial Times* (2 August 2006), has termed 'pre-commitment to the urgency of the climate cause'.

By way of illustration, here are three public statements made by top officials in February 2007, following the publication of the draft AR4 WGI report:

- Dr R. K. Pachauri, Chair of the IPCC: 'I hope this report will shock people [and] governments into taking more serious action'.
- Achim Steiner, the Director-General of the United Nations Environmental Programme: 'in the light of the report's findings, it would be "irresponsible" to resist or seek to delay actions on mandatory emissions cuts'.<sup>12</sup>
- Yvo de Boer, Executive Secretary of the Framework Convention: 'the findings leave no doubt as to the dangers that mankind is facing and must be acted on without delay'.

These are strong assertions. All three speakers went beyond the actual WGI text, to draw their own personal conclusions as to the implications for policy. While they were fully entitled to form and air such opinions, their statements were not just summaries of 'the science', nor of course were they 'policy-neutral'.

In speaking out as they did, these officials were conforming to an established pattern. Like their various predecessors in office, they are committed persons; and had this not

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<sup>12</sup> This and the following quotation are from the *Financial Times*, 3 February 2007.

been the case, and known to be the case, *they would not have attained their leading positions within the environmental policy milieu*. They would not have sought their respective posts, nor would they have been seen by UN agencies and member governments as eligible to hold them, had they not been identified as holding strongly the view that human activities are putting the planet at risk. The advisory process is run today, as it has been from the start, by true believers. Not surprisingly, the same commitment is to be found among leading members of the IPCC expert network, with results such as have been noted above.

It is not just the IPCC process that is in question here. The basic problem of unwarranted trust goes further: it extends to the chronically biased treatment of climate change issues by responsible departments and agencies which the Panel reports to, and in nationally-based organisations which they finance.

It is not only in official circles, within the environmental policy milieu, that this ingrained bias is to be found. Elements within the international scientific establishment appear as strongly committed, rather than neutral and objective, in relation to climate change issues. One aspect of this strong commitment has been a readiness to condemn any form of questioning or dissent as ‘undermining the science’. Again, non-subscribers have been portrayed, though with no actual evidence cited, as members of ‘an active and well-funded “denial lobby”’.<sup>13</sup>

So far as my reading goes, these features of the handling of climate change issues have passed unnoticed in the sources considered here. The various authors take the established official process of inquiry and assessment as given, trustworthy and professionally watertight: hence they accept its ‘consensus’ results. In their analysis, and in the conclusions they draw for policy, there is no trace, hint, vestige or glimmer of awareness that that process could be seriously flawed, in ways that put many of its results in question. The published evidence to that effect goes unrecognised in their work.

### **Sanctioning a culture of conformity**

As things now are, the dominance of received opinion across the whole range of official advisory bodies, and in professional circles generally, appears assured. Policy and research alike are almost entirely in the hands of bodies that can be seen as firmly committed. The case of the UK is illustrative. Here the list of those involved in the advisory and policy process, and spending public money accordingly, includes the new Department of Energy and Climate Change, the Department of the Environment, the Ministry of Defence, the Office of Climate Change, the Committee on Climate Change, the Meteorological Office, the Hadley Centre, the Tyndall Centre, the National Environment Research Council, the Energy Research Centre, the Carbon Trust, the Environment Agency, and the Sustainable Development Commission. I do not offer the above list as conclusive, and indeed, on present evidence, Her Majesty’s Treasury should be included in it.

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<sup>13</sup> The words quoted are those of Robert (Lord) May, a recent President of the Royal Society, in an article published (6 April 2007) in the *Times Literary Supplement*. The argument of this paragraph is spelled out, with supporting evidence, in Henderson (2007a), pp. 206-7 and 219-24

In all these official bodies, as also in the growing number of privately-supported research centres that have been set up in Britain to work on issues relating to climate change, a common way of thinking prevails. I doubt whether among them there is today, or could ever be given present attitudes and presumptions, even a handful of professional staff members who could be identified as even mild dissenters or non-subscribers: there is no place for such minority thoughts, and no point in voicing them. Her Majesty's Government, with full support from opposition parties and a good deal of unofficial backing, have created and financed a dominant culture of conformity.<sup>14</sup> Most other OECD member governments, and the European Commission, have taken much the same path.

This state of affairs gives ground for concern. There is an obvious risk that official decisions on research and development support will be chronically slanted towards confirming and reinforcing received opinion. In this context, one may note a recent statement by Robert Watson, a former Chair of the IPCC, who is now Chief Scientist of the relevant British government departments and doubtless a strong influence on the content of a large and growing research budget, that 'Sceptics who disseminate misinformation and argue that there is no need to address this urgent issue are placing the planet at risk' (*The Guardian*, 21 July 2008). A related danger is that scientists across a range of relevant disciplines will increasingly be subject to what a leading climate scientist, Richard Lindzen, has referred to in a recent (2008) paper as 'pressures to inhibit inquiry and problem solving'. In this paper he provides disturbing evidence that such pressures, which take various forms, are now an established feature of the world of climate science.

Both the culture of conformity and the risks that it creates go unrecognised in the sources considered here. One such risk is that economists themselves will increasingly form part of the culture.

### **A failure of due diligence**

It is a striking feature of the climate change debate that telling criticisms of the advisory process and some of its key findings have come from a number of independent outsiders, with apparently no counterparts in the official world where moreover their work seems to have been disregarded. Such an incurious and dismissive official stance is understandable, though hardly to be commended, in environmental departments and agencies. But in the case of the central economic departments of state – treasuries, ministries of economics and finance, and in the US, the Council of Economic Advisers – it is harder to account for or condone. This is an area of policy in which the economic stakes, and the possible costs of mistaken policies, could be very high (more on this below). Hence a responsibility falls on those departments of state to make informed assessments of their own, and not simply to take on trust and in full the received opinions of the environmental policy milieu and its chosen instruments – even when those opinions are endorsed from the outside by eminent scientists and scientific bodies.

I am myself a former Treasury official; and much later, as Head of what was then the Economics and Statistics Department in the OECD Secretariat, I had close dealings

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<sup>14</sup> I took the phrase from a recent lecture by Aynsley Kellow, an Australian political scientist (Kellow 2008).

over a number of years with economics and finance ministries in OECD member countries. I have been surprised by the failure of these ministries to go more deeply into the evidence bearing on climate change issues, their uncritical acceptance of the results of a process of inquiry which is so obviously biased and flawed, and their lack of attention to the criticisms of that process that have been voiced by independent outsiders – criticisms which, as I think, they ought to have been making themselves. A similar lack of resource has characterised the Research Department of the IMF and the Economics Department of the OECD, both of which work in close conjunction with treasuries and finance ministries.

There is here a conspicuous failure of due diligence.

### **A missing dimension**

The combined influence of over-presumption, inadvertence and misplaced trust is reflected in a treatment of policy issues, in economists' writings and more generally, which has an important missing dimension.

First under this heading, a word of background.

### **The twin aspects of risk**

Received opinion takes it as now established that serious risks and dangers may or will arise from AGW unless emissions are decisively curbed. Mitigation policies are widely viewed as a wise precaution, a prudent form of insurance against losses or disasters. But such policies are not costless; and the more ambitious they are, in terms of both scale and timing, the higher the prospective costs. Hence risk has twin aspects, and policy choice requires a trade-off.

Of course, the costs arising from mitigation policies are highly uncertain: a range of estimates can be found, some of them reassuring. For the purposes of my argument, however, it is only necessary to make the point that, just as the consequences of AGW *could* be grave, so also *could* those arising from stringent mitigation. Some considerations here are:

- The scale and timing of emissions reductions proposed by even limited upholders, and already announced by some governments, would involve huge adjustments to economic systems. In particular, the effective 'decarbonisation' of transport, buildings, power generation and energy-intensive manufacturing could prove a costly undertaking. More radical measures, as advocated by strong upholders, would carry greater risks of the same kind.
- Costs are affected by the choice of mitigation measures that governments make. Economists have rightly emphasised the case for a uniform 'carbon price', as distinct from the array of specific subsidies, tax incentives, mandatory targets, prohibitions and regulations which Martin Wolf, in his *Financial Times* column (16 March 2007) has aptly termed 'a host of interventionist gimmickry'. On present evidence, as noted in two of the studies referred to here, the prospects for policy packages that will keep costs in check are not good: Nordhaus writes (p. 18) that 'all the policies that have been implemented to date fail ... tests of ... efficiency', while Helm (p.225) points to the prevalence of 'government failure, regulatory capture, and ... rent-seeking behaviour'.

- It is not only through their material impact that far-reaching mitigation programmes may have worrying consequences. There is an obvious danger that they will give rise to intrusive restrictions on both freedom of action and freedom of expression: signs of both are already apparent. This danger has been underlined by the President of the Czech Republic, Vaclav Klaus, in a recent book entitled *Blue Planet in Green Shackles* and sub-titled *What Is Endangered: Climate or Freedom?*, and it forms the theme of a recent (2008) paper by Alan Peacock.
- The measures that could give rise to these serious risks might prove in the event to have served no useful purpose, since it is not to be ruled out that, in the light of further evidence and experience, AGW will cease to appear as a threat.
- Bearing in mind the above points, there is ‘a non-negligible probability’ (to take over Weitzman’s language in relation to climate disaster) that, to quote Nigel Lawson in his recent book (p. 88), ‘mitigation policies [could] turn out to be the greatest misuse of resources the world has ever known’.

Against this background, and in the light of arguments made above, a case emerges for an additional form of precautionary action, of a kind that so far has been largely overlooked by governments and commentators, including the sources considered here. The action would be directed towards broadening and tightening up the official process of inquiry, including the IPCC process, with a view to creating a more secure basis for policy decisions. Although it is by no means only the scientific aspects that are in question here, these deserve pride of place.

### **Extending due precaution**

The following are instances of the kinds of action that could be taken. They are partly overlapping, and are listed in increasing order of difficulty and complexity.

*Disclosure failures.* Standards of archiving and disclosure in climate science should be brought into line with what leading journals in some other areas have come to prescribe. Thus for example the *American Economic Review* now requires of articles submitted, as a precondition of publication, that data and computer code, in sufficient detail to permit replication, should be archived on the journal’s website. Governments should insist on full and true disclosure of sources, data and statistical procedures, as a precondition for taking published work into account in preparing the Assessment Reports; and a proviso to that effect should be written into the IPCC’s terms of reference.

*Handling of statistical issues.* Edward Wegman, the statistician already referred to, in the course of an appearance in July 2006 before one of the aforementioned Congressional committees, observed that:

‘The atmospheric science community, while heavily using statistical methods, is remarkably disconnected from the mainstream community of statisticians in a way, for example, that is not true of the medical and pharmaceutical communities’.

This too is a situation which governments could remedy if they chose.

*The Assessment Reports.* Governments should see to it that the IPCC process actually conforms to their formal written instruction that it should be objective, open and

transparent. Under this heading, Holland (2007, p. 982) provides a well-considered list of specific proposals.

*Temperature data and trends.* The evidence relating to the past and current behaviour of surface temperatures has been held in question in ways that should form the basis of further and continuing independent expert inquiry. In this connection, Holland (2007, p. 978) makes the point that ‘no independent verification of the surface records used by the IPCC has been carried out’, nor has ‘full access to the computer code and data’ been provided.

*Auditing disaster scenarios.* Some economists have been influenced by the article of Martin Weitzman already quoted. Thus Martin Wolf, in his *Financial Times* column, writes (8 July 2008):

‘I find the arguments sufficiently cogent to justify action. Above all, I find persuasive the argument of [Weitzman] that it is worth paying a great deal to eliminate the risk of catastrophe’.

If however ‘paying a great deal’ is in question, it is pertinent to ask what has caused Weitzman to form such confident views about the possibility of catastrophe. Part of the answer is to be found in his reference (p. 5) to ‘A grand total of twenty-two peer-reviewed studies of climate sensitivity published in reputable scientific journals’. But as I understand it, there are other such studies, not referred to by Weitzman, which have yielded substantially lower estimates of climate sensitivity. Further and more fundamentally, it may be that Weitzman here, like Stern before him according to some of the critics of the Stern Review, has fallen into ‘credulous acceptance of hypothetical, model-based explanations of the causality of climate phenomena’ (Carter *et al.*, 2006, p. 193). Climate models, such as those which largely underpin the studies that Weitzman refers to, are dealing with an extraordinarily complex system which is not at all well understood: Richard Lindzen (1992) has described them as ‘experimental tools whose relation to the real world is questionable.’ Before relying on them as the basis for a costly world-wide exercise in social engineering designed (to quote a leading IPCC source) ‘to reshape human activities on an unprecedented scale’,<sup>15</sup> it would seem prudent for governments to ensure that they are systematically reviewed and evaluated by independent experts drawn from other areas. Engineering could well be one such area.

*Pluralism and diversity.* Given the combination of dual risks, continuing pervasive uncertainty, and the dominance of received opinion with its resulting pressures to conform, there is a case for deliberately broadening the basis of research and inquiry, including through other channels than the IPCC process - even if that process is reformed on the lines suggested above. Governments should make formal provision for eliciting a wider range of sources, opinions and expertise. So far from playing down differences of view in the interest of arriving at agreed texts, contrasting informed assessments should be commissioned, funded and published. The whole notion of aiming at a scientific consensus, rather than ensuring that rival informed views are given full expression, appears as open to doubt. The greater the perceived risks of extreme consequences, the more important it is to ensure that the advisory process is searching, thorough and inclusive, a result which mere numbers do not guarantee.

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<sup>15</sup> The phrase is taken from an article by a former Vice-Chair of the IPCC, Mohan Munasinghe (2008).

In designing and giving effect to the various measures of reform that are called for, the central economic departments of state should be closely involved.

The combined costs of all the above actions would not bulk large in relation to existing and prospective programmes of research and inquiry into climate science. In relation to the prospective costs of serious mitigation policies they are trivial. What is involved is no more than ‘an “insurance policy” of spending a small amount to ensure adequate standards in the science’ (Carter *et al.*, 2007, p.177). Given what is at stake, to proceed on these lines appears as common prudence.

To argue the above case, for systematic independent audit and more balanced inquiry, is not to prejudge the results of these. Such a recommendation is non-presumptive: it does not entail rejection of either the official policy consensus or action to curb emissions. Since this point is not always grasped, it is worth defining more clearly the dividing line that I referred to earlier, between upholders and dissenters.

### **A divided profession (2)**

In this connection, Garnaut in particular gives a misleading picture of professional differences. In the introduction to his Report (p. xvii), he says that, with the exception only of ‘a small number of climate scientists of professional repute’, dissenters cannot rightly be described as ‘sceptics’, since they ‘hold strongly to the belief that the mainstream science is wrong’. This assertion has no basis, as I noted in evidence to his inquiry. There is a well recognised difference, which Garnaut seems to have forgotten, between being an atheist and being an agnostic; and so far as my knowledge goes, it is the latter position that lay dissenters have typically chosen to adopt. Personally, and unlike some full-blown dissenters, I have never thought, said or written that ‘the mainstream science is wrong’. Among other dissenting economists, Nigel Lawson, in the book already referred to, takes as his starting-point (p. 5) only that ‘the science of global warming is far from settled’, while noting that there is ‘a majority view ... which can loosely be called the conventional wisdom’.

On the same page of his Report, Garnaut argues that ‘the outsider to climate science has no rational choice but to accept that, on a balance of probabilities, the mainstream science is right’. But this is not a coherent position. If probabilities and not certainties are in question, then it is not irrational but appropriate to view the ‘mainstream’ arguments and conclusions, not as final or ‘right’, but rather as a collection of hypotheses which, even though they have widespread scientific backing, remain subject to further inquiry and testing. It is also reasonable to ask how far such testing is actually going on.

In their 2007 Summit Declaration, the leaders of the G8 countries referred, in a section on climate change, to ‘the scientific knowledge as represented in the recent IPCC reports...’ Had I been a pre-Summit Sherpa, involved in the drafting of the Declaration, I would have argued strongly, though doubtless in vain, for changing ‘scientific knowledge’ to ‘the weight of scientific opinion’. To take such a position does not involve either denying the existence or rejecting the arguments of prevailing scientific opinion.

As to policy, upholders are apt to believe, or simply presume, that dissenters necessarily favour ‘inaction’ or ‘delay’, in disregard of prevailing scientific opinion and the established policy consensus. Again, this is not correct: the true dividing line lies elsewhere. Personally, though again in contrast to some strong dissenters, I do not hold that in present circumstances action to curb emissions is unwarranted. Prevailing scientific opinion has to be given weight, as also does the related and widespread public concern at the possibility that, through rising CO<sub>2</sub> concentrations, ‘we are meddling with very intricate processes that maintain benign conditions at the surface of this planet’ (Philander, 2005, p. 26). Recognising the over-presumptions and endemic bias of the advisory process for what they are does not entail saying that the official policy consensus should be ignored, rejected or overturned. In any case, the world is not starting from scratch. Governments everywhere have signed up to the Framework Convention and continued to adhere to it; and many of them have taken action, entered into commitments and created expectations accordingly. They have done so on considered expert advice which they themselves commissioned and reviewed, with strong public support and in the belief that they were acting rightly. All this cannot just be set aside overnight.

Given this whole history and the present state of affairs, I am personally inclined to favour the widespread adoption of a carbon tax (or charge), provided it can be made to work, is kept revenue-neutral, and provides a basis for winding down existing forms of the costly ‘interventionist gimmickry’ referred to above.

Since the more limited dissenters do not start from the premise that prevailing scientific opinion is wrong, and do not necessarily reject the idea of action to curb emissions, one may ask how their position differs from that of more limited upholders such as William Nordhaus: where is the true dividing line to be drawn? The answer emerges from what has been said above, and comes under three related headings.

First, and to repeat, upholders take as a point of departure that the current influence of AGW on climate, and the dangers that it could hold for the future, have been established beyond reasonable doubt. Limited dissenters hold that this is going too far: for the time being at any rate, they remain agnostic.

Second, dissenters in general view the policy prescriptions of even limited upholders as over-confident. They do not take it as established that emissions control holds the key to regulating climate, and they question whether enough is known about the relationships involved, and the ways in which these could change, for governments to decide today on lines of action, and even supposedly binding targets, that are seen as holding good into the indefinite future. Where so much remains uncertain, unsettled or unknown, policies should be evolutionary and adaptive. If for example carbon taxes are brought in, both the appropriate rate and the case for their continuance should depend on unfolding evidence and events, thoroughly and objectively

assessed.<sup>16</sup>

Limited dissenters hold that both the diagnosis and the prescription of the Framework Convention should be viewed, not as embodying final truth, but as working assumptions which should remain open to continued and rigorous testing and possible reconsideration.

Third, and for me especially telling though rarely taken into account, there is the missing dimension. Because of their uncritical and underinformed view of the official advisory process, and disregard of its critics, upholders have not only taken positions that appear as over-presumptive: they have overlooked the need to strengthen the basis for policy. Governments should take prompt action to ensure that the evolution of policies is linked to a process of inquiry, review and advice which is more open, thorough, balanced and objective than is now the case. Such action would constitute a low-cost form of due precaution, with potentially high returns. The upholders have not caught on to this fact.

### **An alternative framework**

To conclude. Among economists today, both within and outside official circles, it is widely believed, or just presumed, first, that prevailing scientific opinion as to the reality and threat of AGW can no longer be seriously questioned, and second, that the established official advisory process from which that opinion chiefly emerges is objective and authoritative. This is not the right point of departure. In the handling of climate change issues generally, by economists among many others, an alternative framework is needed – less presumptive, more inclusive, more professionally watertight, and more attuned to the huge uncertainties that remain. A leading task of policy, currently unrecognised as such by many economists, should be to establish such a framework and procedures that give effect to it. Until the case for precautionary action on these lines is more widely recognised within the profession, the contribution of economists to the climate change debate will fall well short of what it could be.

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<sup>16</sup> Ross McKittrick has proposed (*Financial Post*, 12 June 2007, and in other places) that a carbon tax should be based on ‘the mean tropical tropospheric temperature anomaly, assessed per tonne of carbon dioxide, updated annually’. The logic of this is that ‘if greenhouse gases are driving climate change, there will be a unique fingerprint in the form of a strong warming trend in the tropical troposphere ... Climate changes due to solar variability or other natural factors will not yield this pattern: only sustained greenhouse warming will do it.’ This idea for a state-contingent tax rate seems well worth looking into.