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COMMENTARY

Optimal climate policy is a utopia: from quantitative to qualitative cost-benefit analysis

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Abstract

The dominance of quantitative cost-benefit analysis (CBA) and optimality concepts in the economic analysis of climate policy is criticised. Among others, it is argued to be based in a misplaced interpretation of policy for a complex climate–economy system as being analogous to individual inter-temporal welfare optimisation. The transfer of quantitative CBA and optimality concepts reflects an overly ambitious approach that does more harm than good. An alternative approach is to focus the attention on extreme events, structural change and complexity. It is argued that a qualitative rather than a quantitative CBA that takes account of these aspects can support the adoption of a minimax regret approach or precautionary principle in climate policy. This means: implement stringent GHG reduction policies as soon as possible.

Keywords: Catastrophes; Complexity; Extreme events; Growth theory; History; Issue linking; Minimax regret; Precautionary principle; Uncertainty

JEL classification: D81; O11; Q25; Q27; Q43

1. Introduction

The economic analysis of climate policy is dominated by the technique of quantitative cost-benefit analysis (CBA) and the notion of 'optimal policy', elaborated with optimal growth theory.[1] This article presents a fundamental critique of these approaches. The intention is not to denounce all current research on climate policy instruments. For example, the evaluation of taxes, permits and joint implementation on the basis of cost-effectiveness, given a fixed reduction objective, is certainly fruitful. It will be argued, however, that an overall quantitative CBA evaluation and comparison of policy options that aim to reach distinct reduction percentages, as well as a choice of optimal climate policy based on models of optimal growth, are overly ambitious.

The best that can then be hoped for is a qualitative empirical analysis, in particular a qualitative trade-off

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[1] Some models in this vein, which have played a prominent role in the IPCC and international policy debates, are DICE (Nordhaus, 1991), RICE (Nordhaus and Yang, 1996), CETA (Peck and Teisberg, 1992), MERGE (Manne and Richels, 1992) and FUND (Tol et al., 1995). Kelly and Kolstad (1999) offer a short overview.

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of costs and benefits—i.e. a sort of qualitative CBA. This is consistent with what common sense tell us, namely that in the face of extreme uncertainty quantitative analysis has difficulty to outperform qualitative analysis, because quantitative information is either lacking or unreliable. The latter is characteristic of potential climatic change during the next hundred years.

This reasoning may seem disappointing to, and is in fact strongly opposed by, economists who think that a complete quantified analysis is the only worthwhile method in the economic analysis of climate issues. It is indeed very tempting to employ all the traditional formal tools available to economists in dealing with what is perhaps the most complex issue of humanity—climate change. Fortunately, the alternative approach presented here turns out to provide both very concrete and far-reaching implications for climate policy. Perhaps this is comforting to those that are skeptical of qualitative analysis.

The structure of this paper is as follows. Section 2 identifies four fundamental problems associated with applying quantitative CBA to climate change and policy. Section 3 discusses additional problems associated with the application of optimal growth theory to climate change. Section 4 pays particular attention to the meaning of a combination of extreme uncertainty and potential climate catastrophes for economic modelling and analysis. Section 5 presents an alternative approach to climate economics, based on taking into account extreme events, complexity and structural change via a qualitative CBA, and examines its policy implications. Section 6 concludes.

2. Quantitative cost-benefit analysis of climate policy scenarios: fundamental problems

Undertaking a quantitative CBA of the enhanced greenhouse effect and the risk of climate change faces four fundamental problems.

First, in order to undertake such a CBA, a concrete change, scenario or project needs to be defined. This can cover a reduction of greenhouse gas (GHG) emissions, a climate change, or a combination of these alternative futures. Since the benefits of climate policy are the avoided costs of climate change, regardless of the scenario, the potential climate change needs to be known. However, there is considerable uncertainty about each phase of the cause–effect chain: GHG emissions; effects on climate; ecological and hydrological consequences; social-economic responses; and impacts on human health and world-wide welfare distribution. Trying to take a middle way, by valuing an intermediate scenario with partial reduction, makes the exercise only more difficult, because costs and benefits will be related to the economic consequences of both reduction measures and climate change. Current studies are incomplete in that they omit an assessment of the costs of adaptation, and limit themselves to reduction and damage costs (Metz et al., 2001).[2] Furthermore, extreme and irreversible events are not taken into account or unsatisfactorily: extremely low or high temperatures; an extreme sea level rise; a reversal of the Gulf Stream; a tidal wave due to large ice floes on Greenland and Antarctica breaking off into the ocean; 'runaway carbon dynamics' caused by positive feedback mechanisms in the biosphere; and changes in climate subsystems such as the 'El Niño Southern Oscillation' (Easterling et al., 2000; Reilly et al., 2001). The omission of these is incomprehensible given that the ultimate reason for studying climate change is a concern for extreme events. Or, in any case, the studies that have not taken into account the extreme events should not be taken all too seriously, and the respective researchers/authors should be modest about the policy implications of their analyses (see also Azar and Lindgren, 2003, Section 3).

Second, the consequences of any climate policy, and its derived costs and benefits, have not yet occurred, and are therefore hypothetical. Assessment of damage costs is based on many assumptions and much guessing. Moreover, the quality and range of cost estimates is much lower for developing than developed countries. The most influential cost estimates included in the Intergovernmental Panel on Climate Change (IPCC) report of 1995, although presented as if based on a range of studies, lean to a

[2] Some damage cost estimates cover the cost of (incomplete) adaptation, but more often than not it is assumed that adaptation will be cost-free (Tol et al., 1998).