

The economics of immense risk, urgent action and radical change: towards new approaches to the economics of climate change

Stern et al. 2022

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ABSTRACT

Designing policy for climate change requires analyses which integrate the interrelationship between the economy and the environment. We argue that, despite their dominance in the economics literature and influence in public discussion and policymaking, the methodology employed by Integrated Assessment Models (IAMs) rests on flawed foundations, which become particularly relevant in relation to the realities of the immense risks and challenges of climate change, and the radical changes in our economies that a sound and effective response require. We identify a set of critical methodological problems with the IAMs which limit their usefulness and discuss the analytic foundations of an alternative approach that is more capable of providing insights into how best to manage the transition to net-zero emissions.

ARTICLE HISTORY

Received 11 December 2020
Accepted 7 February 2022


KEYWORDS


Climate change; extreme risk; market imperfections; climate policy; integrated assessment; social welfare

1. Introduction: our basic methodological arguments

Two critical questions confront the world today in response to the immense challenges of climate change. First, how aggressive should it be in combatting climate change – what should our targets be? Second, how best to achieve those targets – how will our economy have to change and what are the best instruments for inducing those changes? The international community has reached a broad consensus in answering both questions: In the Paris agreement of 2015, there was a commitment (Article 2) to limit warming to ‘well below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 degrees Celsius ...’. An increasing number of countries have established a target of net carbon neutrality by 2050, broadly consistent with that view.¹ There is a shared understanding that this will involve fundamental structural change in our economies, including in the major systems of energy, transport, cities, and land. And there is a broad consensus to use a wide variety of measures, including carbon pricing, programmes for green investments, programmes for system design or reform (e.g. of cities or power grids), interventions in capital markets, and standards and regulations, as reflected in the Stern-Stiglitz Commission’s Report (2017), IEA (2021) and IMF (2021).

This consensus stands at odds with a major stream of thought within the economics profession. Much of the economics of climate change has centred on Integrated Assessment Models (IAMs). Using standard IAMs, with their choice of calibration, has led some prominent economists to conclude that ‘societal optimisation’ entails accepting an increase in temperature of around 3.5–4 degrees Celsius (Nordhaus, 2018a), an increase seen as catastrophic by many, especially climate scientists:

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 Supplemental data for this article can be accessed at <https://doi.org/10.1080/1350178X.2022.2040740>.

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Need to revisit Integrated Assessment Models

- Integrated Assessment Models (IAMs; e.g. Nordhaus 2018) form basis for economic appraisal of climate policies
 - Societal optimisation entails 3-4°C increase
 - Carbon pricing of 50 USD will fix climate problem w/o further instruments
 - Models focus too strong on intertemporal trade-offs (e.g. evaluate environmental benefit in future vs. sacrifices today)
- Influence on policymaking is (too) strong
 - wrong appraisal of policies
 - missing diversity of approaches and astray from climate debates (e.g. guardrails)

Three categories of criticism

1. IAMs cannot address:

- i. the assumption of deep uncertainty → outcomes (with associated probabilities) cannot be fully described
- ii. the failure to deal with *extreme* risk
- iii. the failure to take into account the endogeneity of preferences

2. IAMs need update:

- i. intragenerational distribution, vested interests and political economy
- ii. damage functions (functional forms and parameters in cost functions)

3. Normative assumptions are flawed - Governments cannot handle it all:

- i. multiple and major market failures, transition risks, entailing dislocation and adjustment costs
- ii. complex major systems – where a narrow focus on marginal analysis fails
- iii. technological change

Proposed solutions

- Model plurality to provide better guidance on climate target and related policies (no „single grand model“)
- Key puzzle pieces are models that focus on deep uncertainty and extreme risk to identify points of non-linearity and avoid worst outcome → guardrail approach
 - IAM: Economic models should focus on policy delivery taking climate target (1.5°/2°C) as political constraint
 - Stochastic optimisation models to better depict risk
 - Different models/approaches to address different aspects (some specific, other more general) to complement & corroborate each other
 - Better underlying descriptive models (e.g. more realistic behaviour modelling of individuals and firms)
- Institutional economics to collect various approaches

“Contrary to [...] standard IAMs, we cannot expect the transformation of the whole economy [...] to be delivered by prices alone or even by two policy instruments [...]. Change will require coordination of a kind beyond that typically provided by prices. It would thus be wrong to assume [...] that markets on their own would manage the necessary transformations efficiently.”

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Thank you very much