Higher-Order Uncertainty and the Methodology of Climate Economics

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0. Introduction

In economics, climate change is often treated as an *investment problem*; the amount that we should invest today to avoid future costs of climate change is a function of M:

$$M = \text{discount rate} \ \times \ \frac{\text{expected change in utility of future consumption}}{\text{change in utility of present consumption}}$$

Weitzman (2007, 2009a,b, 2012, 2013) argues that uncertainty causes the expected change in utility of future consumption to dominate the other terms; in his formal model, uncertainty drives M to infinity.

> Weitzman's arguments engendered an extensive debate in economics (see Millner 2013), but have received little philosophical attention (c.f. Frank 2019; Hartzell-Nichols 2017).

Thesis: despite appearances, this debate is about how to make climate policy in the face of *higher-order uncertainty.*

1. Weitzman's argument

Assume a *decreasing marginal return on consumption*: as consumption goes to zero, the utility of even a little extra consumption goes to infinity.

> This assumption is mathematically unproblematic so long as zero / infinitesmal consumption scenarios have zero / infinitesmal probability.
>
> If a zero-consumption scenario has a small but non-zero probability, however, then both the expected utility of future consumption and M itself go to infinity.

Weitzman argues that we should assign non-zero probability to zero-consumption scenarios in the context of climate change (= our probability distributions should be "fat-tailed"). Why?

- (P1) A 10°C temperature change would lead to global economic collapse.
- (P2) We're uncertain about the true probability of a 10°C temperature change.
- (P3) If (P2), our expected utility calculations should account for our uncertainty regarding the true probability of a 10°C temperature change.
- (P4) "Accounting" for our uncertainty regarding the true probability of a 10°C temperature change entails assigning a non-zero probability to a 10°C temperature change.
- (P5) Global economic collapse is properly understood as a zero-consumption scenario.
- ∴ (C) We should assign non-zero probability to a zero-consumption scenario.

(Note: my (P4) represents what is essentially technical result articulating what it means to "account" for uncertainty about probabilities.)

2. Nordhaus contra Weitzman

Nordhaus (2011, 2012) is one of the main critics of Weitzman's approach. In his alternative approach (Nordhaus 2007, 2013), he assigns zero probability to zero-consumption scenarios.

Empirical disagreement regarding (P1)/(P2)?

> Nordhaus *assumes* that "there are no genuinely catastrophic outcomes that would wipe out the human species or destroy the fabric of human civilization" (Nordhaus 2007, 33).
>
> **But**: Nordhaus doesn't think we *know* that these scenarios have zero probability; and Weitzman doesn't think that we know the probability is non-zero.

Epistemic disagreement regarding (P3)?

> Familiar question in the epistemic literature: what should we believe when faced with *higher-order uncertainty*, or uncertainty about which beliefs we should adopt?
>
> Weitzman, like (e.g.) Christensen (2010), advocates building our higher-order evaluation into our first-order evaluation. Nordhaus, like (e.g.) Lasonen-Aarnio (2014), advocates keeping the two separate and adopting the "best guess" first-order evaluation.
>
> **But**: Weitzman and Nordhaus aren't concerned with rationality or ideal agents.

Practical methodological disagreement regarding (P3)?

> Weitzman (2007, 719, 2009a, 7) is explicit that his view is specific to climate change: climate science is sufficient to establish the existence of mechanisms that would lead to catastrophe, but it doesn't tell us how likely it is that those mechanisms fire.
>
> Nordhaus (2007, 32–33) motivates his approach by arguing that these uncertainties are better handled by "committees" than by an individual modeler.

3. Open questions for climate ethics

Weitzman's work deserves more attention from philosophers. Some open questions:

First: what are the implications for the debate about discounting? Calculating expected utilities involves methodological choices that (may) affect which discounting policies are reasonable.

> See, e.g., Gollier and Weitzman (2010).

Second: what are the consequences if Weitzman is right? Are there any specific climate policies (or frameworks) that his approach would recommend?

> See, e.g., Yohe (2003).

Third: what are the alternatives to the views laid out by Weitzman and Nordhaus?

References

Christensen, David (2010). Rational Reflection. *Philosophical Perspective* 24: 121–40.

Frank, David M. (2019). Ethics of the Scientist qua Policy Advisor: Inductive Risk, Uncertainty, and Catastrophe in Climate Economics. *Synthese* 196: 3123–38.

Gollier, Christian and Martin L. Weitzman (2010). How Should the Distant Future be Discounted when Discount Rates are Uncertain? *Economics Letters* 107.3: 350–53.

Hartzell-Nichols, Lauren (2017). *A Climate of Risk: Precautionary Principles, Catastrophes, and Climate Change*. New York: Rutledge.

Lasonen-Aarnio, Maria (2014). Higher-Order Evidence and the Limits of Defeat. *Philosophy and Phenomenological Research* 88.2: 314–45.

Millner, Anthony (2013). On Welfare Frameworks and Catastrophic Climate Risks. *Journal of Environmental Economics and Management* 65.2: 310–25.

Nordhaus, William D. (2007). *A Question of Balance: Weighing the Options on Global Warming Policies*. New Haven: Yale University Press.

— (2011). The Economics of Tail Events with an Application to Climate Change. *Review of Environmental Economics and Policy* 5.2: 240–57.

— (2012). Economic Policy in the Face of Severe Tail Events. *Journal of Public Economic Theory* 14.2: 197–219.

— (2013). *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World*. New Haven: Yale University Press.

Weitzman, Martin L. (2007). A Review of *The Stern Review on the Economics of Climate Change*. *Review of Economics and Statistics* 45: 703–24.

— (2009a). Additive Damages, Fat-tailed Climate Dynamics, and Uncertain Discounting. *Economics: The Open-Access, Open-Assessment E-Journal* 3: 1–29.

— (2009b). On Modeling and Interpreting the Economics of Catastrophic Climate Change. *Review of Economics and Statistics* 91.1: 1–19.

— (2012). GHG Targets as Insurance Against Catastrophic Climate Damages. *Journal of Public Economic Theory* 14.2: 221–44.

— (2013). Tail-Hedge Discounting and the Social Cost of Carbon. *Journal of Economic Literature* 51.3: 873–82.

Yohe, Gary W. (2003). More Trouble for Cost-Benefit Analysis. *Climatic Change* 56: 235–44.