Intergenerational tradeoffs are intrinsic to climate-change policy. They arise because, while the costs of climate-change mitigation are immediate, its essential benefits are likely to be felt only far into the future. Given this asymmetry, it is not clear how the present generation should craft its long-term environmental policy. Indeed, what welfare measure should it employ in the comparison of different intertemporal consumption paths? That is to say, on what formal basis should it decide that one consumption path is “better” than another?

A common thread running through much of climate-change economics is a reliance on expected discounted utility as a means of addressing these questions. In the standard model, a given consumption path is deemed socially optimal if it maximizes a discounted sum of intergenerational levels of utility over the set of feasible alternatives. A discounted-utilitarian moral position is thus adopted, seemingly without much reflection or argument. Despite a sizable theoretical literature on intergenerational equity and alternative social welfare measures—some of which even appears in environmental economics field journals—applied theorists, empiricists, and practitioners alike have been steadfast in their commitment to the conventional utilitarian framework.

For clarity, let us briefly summarize the basic features of the utilitarian approach. Successive generations are viewed as one single, infinitely-lived, economic agent. This agent assesses the utility of a stream of generational levels of well-being on the basis of its net present value. To perform the necessary calculations, the utility of future generations is discounted according to a pure rate of time preference that is deduced in one of two ways. The first, and by far most common, is to infer its value from the application of the Ramsey equation to observable market data, in particular: (a) the marginal productivity of capital net of depreciation; (b) the consumption growth rate; and (c) the elasticity of marginal utility. Alternatively, the Stern Report justifies its own discount rate, which is significantly lower than that of other researchers, on an exogenous probability that future generations may simply not exist to enjoy future consumption.

Given a choice of discount rate, an optimal consumption path is defined as the solution of a dynamic optimization problem that maximizes the discounted sum of generational utilities subject to a set of natural and economic constraints. Crucially, such a path can be computed efficiently using standard dynamic optimization techniques, even when the underlying structure of the problem is considerably complex. Of particular interest to my colleagues at FEEM are endogenous technical change and strategic behaviour, two complicated interrelated issues that have been successfully incorporated into a large multi-regional integrated assessment model.

As one would expect, the value of the discount rate plays a singular role in the determination of optimal consumption paths. It thus comes as a great disappointment that there is wide, and often passionate, disagreement on its precise value. Nonetheless, and despite occasionally heated quarrels, the underlying utilitarian ethic is never in dispute and the debate simply evolves around what the “correct” pure rate of time preference is.

Discounted utilitarianism has solid theoretical underpinnings and tractable mathematical structure. But is it up to the task of being the ultimate arbiter of climate-change policy?
In a series of recent papers, Humberto Llavador, John Roemer, and Joaquim Silvestre ([4], [5], [7]), hereafter referred to as LRS, offer a provocative perspective on the above question and make, what is in my view, a compelling contribution to the field of climate-change economics.

In contrast to the detached style of academic writing, LRS passionately and unequivocally reject the discounted utilitarian model. They argue (convincingly) that, since the time of a person’s birth is arbitrary, valuing one generation’s utility more than another’s is morally indefensible. As an alternative, LRS advocate for the adoption of a Rawlsian normative criterion that chooses the consumption path that maximizes the minimum utility across all generations (their framework also allows for exogenously-specified sustainable growth in utility). ¹

The basis of LRS’s argument rests on the contention that a normative criterion should only reflect our ethical judgments, not economic and natural “facts about the world.” The latter are essential components of the decision-making process, but only insofar as they describe the set of feasible consumption alternatives, not the elemental moral posture that guides our ranking of the members of this set. It is important to be clear on this point: LRS do not advocate for a starry-eyed decision-making framework divorced from basic economic reality. Instead, they argue for a proper “division of labor”: let the facts about the world determine the set of possible alternatives, and the ethics shape the principle that guides our way of choosing among them [7].

A concrete example would be helpful. Suppose there are two generations and the first is endowed with a capital stock of 100 trees. Suppose, further, that trees grow naturally at a rate of 10% per year so that a year from now these 100 trees will have grown to 110 at zero cost. The above statement regarding the return to natural (tree) capital is, in LRS’s terminology, a “fact about the world.” In the utilitarian worldview, that fact will be reflected in the choice of a social welfare function that assigns strictly less weight to the utility of the second generation. In the LRS framework, the welfare of both generations will be weighted equally and the growth rate of trees will matter in the decision-making process only insofar as it helps determine the range of possible consumption paths to choose from.

Why do I find LRS’s work so compelling? On the one hand, the introduction of a different normative criterion in the context of climate change is not in itself all that noteworthy, given the wealth of theoretical papers on sustainability and intergenerational equity. Rather, the essence of LRS’s contribution lies in their ability to actually apply their Rawlsian framework to the --truly beastly-- large-scale optimization problems that arise in climate change economics. ² Requiring both theoretical insight [4] and practical ingenuity [5], this is a formidable achievement. LRS’ success proves that the adoption of an ethically compelling normative criterion need not necessarily come at the expense of computational tractability. Inasmuch as our discipline’s commitment to discounted utilitarianism is motivated by reasons of methodological convenience, this is a major, deeply satisfying result.

¹ LRS further depart from the standard framework in their choice of generational utility functions. In contrast to the overwhelming majority (totality?) of the literature, LRS explicitly model leisure, environmental quality, and knowledge as arguments of the utility function, alongside consumption. This choice carries important implications for their analysis, and deserves a post in its own right. The interested reader is encouraged to take a close look at [5].

² This statement comes with important caveats. In contrast to [6], LRS do not optimize over emissions trajectories. Rather, they fix an emissions path that (according to prevailing climate science) stabilizes greenhouse-gas concentrations at 450ppm, and subsequently optimize over consumption and different kinds of investment. Their rationale in doing so is that the science of climate change is still very much in flux, too much so to discern a systematic relationship between emissions, concentrations, and temperature increase [5,9]. As someone who has personally grappled with the implications of deep uncertainty in the context of climate change [1], I tend to agree with LRS and am more or less comfortable with the idea of treating emissions exogenously. Still, the fact remains, and should be mentioned, that there is considerable doubt whether LRS’ analysis could carry over to a context in which emissions are determined endogenously in much the same way as [6]. A related critique along these lines could also be levelled on the basis of LRS’s lack of more sophisticated technical change dynamics [3].
All that said, what is my ultimate point, my “message” as it were? How should these papers influence, in practical terms, the applied field of climate-change economics? Would LRS’s analysis extend to more complex modeling frameworks? Can those of us not thrilled with discounted utilitarianism declare the thorny Nordhaus-Stern debate irrelevant? To be entirely honest, I am not very clear on the answers to these questions, not least because I am not a modeler myself. All I can say is that researchers who are uneasy with the discounted utilitarian framework are well-served to take a close look at LRS’s work. The insights derived there may prove inspiring and, more importantly, useful.

References