In their *Sustainability for a Warming Planet*, economists Humberto Llavador and Joaquim Silvestre, along with the political scientist and economist John Roemer, elaborate an egalitarian alternative to the dominant discounted-utilitarian approaches to the economics of climate change. These latter approaches model multiple generations over the timescales relevant to climate change decision-making as a series of agents whose welfare can be aggregated, or as a single agent or “long-lived consumer.” The economic problem of climate change becomes one of maximizing future-discounted social welfare or smoothing consumption over time. Llavador et al. call their alternative approach *sustenabilitarian*, after the ‘weak sustainability’ of Robert Solow. On this anthropocentric conception of sustainability, future generations have the right to at least the same level of economic welfare as the current generation. This is usually contrasted with various notions of ‘strong sustainability,’ on which specific environmental goods ought to be conserved for future generations. Their economic problem of climate change becomes one of sustainability or sustainable growth: given a plausible emissions reduction path as a constraint, what is the highest feasible level of economic welfare that can be guaranteed to future generations, or what rate of growth can be feasibly sustained indefinitely?

While the book’s main contribution is its economic analysis of sustainable growth, the mathematical details are likely only accessible to a minority of readers of this journal. While many of the proofs, computations, and other details are relegated to appendices, the main text is also highly formal in the style of contemporary economic theory. However, the authors almost always provide clear informal interpretations and summaries of their formal models and results, and provide less technically-inclined readers with helpful suggestions about which sections in the main text to skip. Below I attempt to summarize their methodological approach and main results, especially their implications for policy. But the book also contains interesting applications of familiar egalitarian ethical arguments to economic methodology, a relatively accessible critical evaluation of the climate economics literature, and a proposal for a politically feasible emissions reduction deal between the global North and the global South. So the book’s arguments should be of interest to environmental philosophers and interdisciplinary scholars of climate change as well as economists. After summarizing the book’s chapters, I offer some modest criticisms and a brief commentary on the scope and limits of economic modeling of climate change decisions.

In the first chapter, Llavador et al. introduce the problem of intergenerational ethics put in terms of economic maximization: what would an anthropocentric ethical economic planner maximize over multi-generational timescales? According to the tradition of discounted utilitarianism, the planner ought to maximize aggregate, future-discounted utility. Future utilities are discounted for various reasons:
uncertainty, mere partiality towards the present or “pure time preference,” the possibility that an indefinite stream of future utilities could swamp present utilities (future generations as “utility monsters”), etc. According to the authors’ approach inspired by luck egalitarianism, “the date at which a person is born is arbitrary from a moral point of view,” (p. 35) since this is merely a matter of luck, so discounting future generations’ welfare cannot be morally justified.

They also reject discounted utilitarianism on familiar egalitarian grounds: utilitarianism does not take the distribution of utilities directly into account. According to their sustainabilitarian view, each generation has an equal right to a level of welfare at least as good as all other generations. This strong egalitarian norm (they call this “pure sustainability”) would imply an equal level of welfare across all generations. If the current generation could make itself slightly worse off to make the next generation better off, it would be violating this egalitarian norm. Conversely if the current generation enriched itself at the cost of future generations’ welfare, it would be violating this norm. But the authors go on to claim that each generation need not enforce this right, and furthermore people tend to value human economic development or growth in welfare. That is, each generation may prefer slightly lower welfare in order to enrich its descendants, and their descendants, etc. This leads the authors to endorse a notion of growth sustainability, where the economy grows at some fixed rate that can be sustained indefinitely given resource constraints. Reviewing the economic literature on sustainability at the end of Chapter 1, the authors emphasize that their notion of weak sustainability merely implies “nonnegativity of the sum of investments in all kinds of capital, including human, natural, renewable, and exhaustible,” (p. 61) where these kinds of capital are in principle substitutable.

In Chapter 2 the authors present a simplified theoretical model of an economy that produces commodities for consumption and education, where utility is a function of consumption and “educated leisure.” This contrasts with many economists' methodologies where education is merely instrumental to production/consumption. The purpose of this model is to introduce the reader to their optimization approach and prove theorems that make optimization more tractable. In general, they ask what is the pattern of resource use (in the simplified model, resources devoted to education vs. commodity production, etc.) over time that maximizes the level of welfare that can be guaranteed to all generations (pure sustainability) or allows for a positive rate of growth compatible with preferences for human development (growth sustainability). Their main results here are that optimal pure sustainable paths converge to stationary states (that is, in the long run the model economy converges to a state where all variables remain the same), making optimization easier by allowing them to look only at such states, and that sustainable growth requires maintaining productivity in the educational sector.

With these preliminaries out of the way, Chapter 3, “Sustainability in a Warming World,” presents their more complex theoretical model of an economy, where utility is a function of consumption, education, knowledge (produced by educated labor),
and “an undegraded biosphere, which is valuable to humans for its direct impact...on physical and mental health.” (p. 129) More specifically, their utility function takes the total stock of carbon in the atmosphere as an indicator of environmental quality. Crucially, they take the IPCC’s Representative Concentration Pathway RCP2.6 as a constraint on their optimization: their model assumes that GHG concentrations will follow this trajectory. This precautionary pathway is one where expected temperature change does not exceed 2 degrees C and radiative forcing peaks midcentury and then declines by 2100. They calibrate their model to US data and explore optimal patterns of resource allocation for pure sustainability and growth sustainability for multiple generations, finding that the first generation’s sacrifice to guarantee sustainable growth is “tiny for reasonable growth rates.” (p. 147) For example, according to their model, to sustain 1% growth indefinitely along the RCP2.6, the utility of first generation loses only 0.7% of its utility relative to the level guaranteed by pure sustainability.

Chapter 4, “The ‘Climate-Change Economics’ Literature: Nordhaus and Stern,” criticizes in more detail the discounted-utilitarian approaches of economists William Nordhaus and Nicholas Stern. Along with many others, they argue on egalitarian grounds against Nordhaus’s use of market interest rates to derive his relatively high discount rate, which is arguably the factor most responsible for his recommendation that significant emissions reductions can wait until late this century. They also criticize Nordhaus’s model for making technological change exogenous (in their model, knowledge-production for green technologies is endogenous to the resource allocation exercise), as well as for using a relatively conservative “damage function” that maps warming to economic damages. In my view the most important difference between Llavador et al. and the discounted utilitarians (other than their rejection of utilitarianism) is that whereas the utilitarians use their models to determine the path of optimal emissions (or to test certain paths according to a cost-benefit criterion), Llavador et al. “adopt an ‘off the shelf’ path for GHG emissions and concentrations proposed by the scientific community,” (p. 205)—namely RCP2.6—as an a priori constraint and ask how to allocate resources to achieve sustainable growth along that path.

Chapter 5, “Sustainability in a Warming, Two-Region World” elaborates their idea for a “focal point” bargaining solution to the problem of allocating emissions between the global North and the global South. Their solution uses the US and China as illustrative examples, arguing that any allocation that delayed the date of convergence in per capita welfare between the two, relative to business-as-usual, would be reasonably rejected by China. Thus they propose as a necessary condition on a bargain that it maintain the date of convergence. They optimistically claim that, using this future-oriented ahistorical criterion, “[the] problem would be reduced to one about which international teams of economists could haggle.” (p. 212) The most important result in this chapter is that sustainable growth cannot exceed 1.1% per year, but an optimal path has both regions growing 1% per year after convergence in roughly 70 years. During convergence, Northern growth must be limited to roughly 1% and Southern growth limited to roughly 2.5% to be consistent with
climate constraints. This is politically significant, since growth targets set by
governments in both regions tend to be at least twice as high. Additionally, their
optimal paths require the North to devote more than it is currently to physical
capital and the South to devote less, and both the North and the South to increase
production of knowledge and investment in education. Finally, Chapter 6 extends
their model to include the possibility of climate catastrophe, showing that the level
of carbon in the atmosphere in optimal sustainable paths is kept very low if
catastrophic hazard increases quickly in carbon concentration.

I note two criticisms to which the authors are sensitive but that warrant comment in
an environmental ethics and policy context. First a note on sustainable growth. The
authors make methodological progress by including, along with consumption,
environmental quality as well as education and knowledge as direct arguments to
their utility function. But environmental quality only includes the carbon budget.
They note that “other natural constraints with respect to land and water may well
apply,” (p. 163) and it is easy to imagine how such additional constraints might
dramatically change their results, at the very least possibly disallowing sustainable
growth in consumption. Even putting aside the possibility that we ought to advocate
some version of strong sustainability, this means that the development path they
advocate is possibly too economically ambitious to be compatible with weak
sustainability if further environmental resource constraints were included.

Secondly, their argument for the ahistorical approach to allocating emissions that
preserves business-as-usual convergence is based on political feasibility, not justice.
But the significant injustice of this approach, allowing the countries historically
responsible for the problem of climate change to evade burdens proportional to this
responsibility, is never acknowledged to be itself a significant political obstacle.
Redistributive solutions that would hasten the date of convergence are not
considered. This is for pragmatic, political reasons, since the authors’ stated luck
egalitarianism would in principle recommend global redistribution in the current
 generation. After all, whether one was born in a rich nation in the global North or a
poor nation in the global South is a matter of luck.

Finally, it is worth reflecting on the epistemic status of economic models in general
and their proper role in climate policy. Consider the authors’ exercise of modeling
an entire economy for the purposes of planning optimal (sustainability)
resource allocation between physical capital, labor, knowledge production, etc.
within environmental and economic constraints across generations. Put aside the
question, “who is this technocratic economic planner?” It is easy to muster
skepticism about what conclusions (policy-wise or not) can reliably be drawn from
an idealized model of such a complex system. On the other hand, many of the
authors’ qualitative policy-relevant conclusions are probably right, for example that
growth cannot be sustained at high levels following RCP2.6, or that the global North
should invest more heavily in knowledge-production and physical infrastructure.
Focusing on climate economics models in the tradition of Nordhaus, Pindyck (2013)
argued that these modelers can “obtain almost any desired result because key
inputs can be chosen arbitrarily” (p. 870). One of Pindyck’s examples is the shape of
the damages function. As Llavador et al. show in their final chapter, their model can also be made to be sensitive to admittedly subjective assumptions about catastrophic hazards. But as many have argued, insuring ourselves against catastrophe is a strong justification for aggressive climate action now. Despite recent political setbacks to global climate policy, hopefully with the help and encouragement of economists like Llavador et al. we will take such action, figuring out the economics along the way, before it is too late.

References


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