

Harvard economist: Climate cost-benefit analyses are “unusually misleading,” warns colleagues “we may be deluding ourselves and others”
Climate Progress, January 29, 2009

Harvard economist [Martin Weitzman](#) published an important analysis last year in which he explained why conventional economic analyses of climate change are “arbitrarily inaccurate.”

The first draft of the paper had said the vast majority of such analyses should carry the following label:

WARNING: to be used ONLY for cost-benefit analysis of non-extreme climate change possibilities. NOT INTENDED to cover welfare evaluation of extreme tail possibilities, for which a complete accounting might produce ARBITRARILY DIFFERENT welfare outcomes.

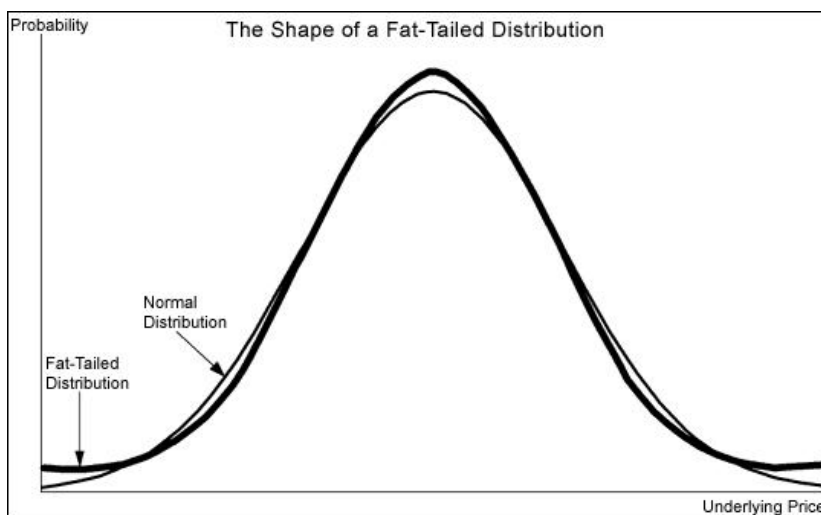
The final version, “[On Modeling and Interpreting the Economics of Catastrophic Climate Change](#),” eliminated that disclaimer, but replaced it with a longer statement that is equally devastating (see below).

Weitzman’s bottom line: If you don’t factor in plausible extreme-impact scenarios — and the vast majority of economic analyses don’t (this means you, [William Nordhaus](#), and you, too, [Richard Tol](#)) — your analysis is worse than useless. It is delusional. Pretty strong stuff for a Harvard economist!

The extreme or [fat tail](#) of the damage function (click on figure at right) represents what Weitzman calls “rare climate disasters,” although as we’ll see, **they aren’t rare at all**, they are near certain with business-as-usual emissions. For Weitzman, disaster is a temperature change of > 6°C (11°F) in a century, as he explains in an earlier paper on the [Stern Review](#) on the economics of climate change:

[With roughly 3% IPCC-4 probability, we will consume a terra incognita biosphere within a hundred years whose mass species extinctions, radical alterations of natural environments, and other](#)

[extreme outdoor consequences of a different planet will have been triggered by a geologically-instantaneous temperature change that is significantly larger than what separates us now from past ice ages.](#)



Weitzman says the IPCC Fourth Assessment gives the probability of such an “extreme” temperature change as 3%, and that “to ignore or suppress the significance of rare tail disasters is to ignore or suppress what economic theory is telling us loudly and clearly is potentially the most important part of the analysis” — **more important than the discount rate.**

For me, what is especially important about Weitzman’s analysis is that the science is now crystal clear that **there is far greater chance than 3% chance we will have a total warming of 6°C in a century or so if we don’t reverse emissions trends soon.**

Indeed, there is a very high chance we will see above 5.5°C warming or more this century according to the prestigious Hadley Center (see “[Hadley Center: Catastrophic 5.5-7°C warming by 2100 on current emissions path](#)”). Same for the normally staid and conservative International Energy Agency, which noted in its most recent *World Energy*, “[Without a change in policy, the world is on a path for a rise in global temperature of up to 6°C.](#)”

In fact, a close reading of the 2007 IPCC report makes clear that absent a very strong and immediate emissions reduction effort, we are aiming right at 1000 ppm or higher — which is a 5°C warming or higher this century — as I explained in my recent [Nature online article](#).

[Note: Let me be clear that 550 ppm to 750 ppm or a 3°C to 4°C total warming from preindustrial levels -- which takes us to the same temperature the planet had the last time sea levels were 80 to 250 feet higher -- would be an unmitigated catastrophe for the planet -- that is [Hansen's point](#). In any case, if we get that warm, the [defrosting of the permafrost](#) and or one (or more) of the myriad other amplifying feedbacks will probably take us to 6°C warming within a few decades (see [Study: Water-vapor feedback is "strong and positive," so we face "warming of several degrees Celsius"](#)).]

Weitzman does not seem to understand this, in part because, like most economists who work on climate, it does not appear that he spends much time actually talking to leading climate scientists or reading the recent climate science literature very closely. His acknowledgments don't indicate that he sent his paper to very many leading climate scientists. But then again, this failure of understanding by smart people who have taken what I would consider to be a moderate interest in the current state of understanding of climate science is not entirely their fault:

The failure to explain that business-as-usual greenhouse gas emissions leads to 5°C or higher total warming and thus catastrophe — indeed, most likely an [irreversible 1,000-year catastrophe](#) — may be the greatest single messaging failure of the scientific community (and science media).

The proper damage function is thus not fat-tailed — it is completely open-ended, like an S-curve. That is especially true because of the irreversibility issue. If we don't keep concentrations below a threshold like 450 ppm (or lower), we face the prospect of essentially incalculably large damages that might well get worse and worse for centuries.

What exactly is the cost of sea level in 2100 of 5 feet rising thereafter 10 inches or more a decade (potentially reaching 20 inches a decade or higher) until the planet is ice free in several centuries and sea levels are 250 feet higher? That is certainly a plausible scenario on our current emissions path. Indeed, once again, I'd call it business as usual. If any of you economists out there have a plausible net present value of the cost of that outcome, I'd love to see it. Same for one third of the planet becoming a permanent desert and large parts of the ocean becoming hot, acidic dead zones.

That is why essentially every cost-benefit analysis on climate in the literature is wrong and useless and hence very dangerous if taken serious by policymakers.

Weitzman's paper replaced the blunt disclaimer above with this conclusion:

Perhaps in the end the climate-change economist can help most by not presenting a cost-benefit estimate for what is inherently a fat-tailed situation with potentially unlimited downside exposure **as if it is accurate and objective** —and perhaps not even presenting the analysis as if it is an approximation to something that is accurate and objective —but instead by stressing somewhat more openly the fact that such an estimate might conceivably be **arbitrarily inaccurate** depending upon what is subjectively assumed about the high-temperature damages function along with assumptions about the fatness of the tails and/or where they have been cut off.

In short, *cost-benefit analyses (CBAs) are garbage in garbage out (GIGO), or perhaps, mainstream economics in, garbage out (MEIGO).*

Weitzman continues by explaining the uselessness of conventional “Integrated Assessment Model”'s (IAMs) in the face of his central analytical point, which he calls the Dismal Theorem or DT (first emphasis below in original):

Even just acknowledging more openly the incredible magnitude of the deep structural uncertainties that are involved in climate-change analysis and explaining better to policy makers that the artificial crispness conveyed by conventional IAM-based CBAs here is **especially and unusually misleading** compared with more-ordinary non-climate-change CBA situations might go a long way towards elevating the level of public discourse concerning what to do about global warming. All of this is naturally unsatisfying and not what economists are used to doing, but **in rare situations like climate change where DT applies we may be deluding ourselves and others with misplaced concreteness** if we think that we are able to deliver anything much more precise than this with even the biggest and most-detailed climate-change IAMs as currently constructed and deployed.

Yes, that is what mainstream economists are doing by peddling their standard cost-benefit analyses to the public, the media, and policymakers — deluding themselves and others.

ADDENDUM: Weitzman's paper is certainly hard for any non-economist to follow. His discussion of the Stern Review, however, covers many of the same points and is, I think, accessible to anyone who took an economics class or two in college, especially if first you read John Quiggin ([here](#) and [here](#)). It is worth noting that while Weitzman is critical of how Stern chose the key discount rate parameters, he still thinks that Stern is mostly right for the “wrong reasons” — because the “the implications of large consequences with small probabilities” — like the many scenarios of catastrophic climate change (ice sheet instability, tundra melting) — matter more than the choice of discount rate.

That said, the mainstream economic policy think tank — Resources for the Future (RFF) — wrote a major report, “[An Even Serner Review](#),” that concluded, “**we find no strong objections to the discounting assumptions adopted in the Stern Review**” ([a point I have made, also, based on Quiggin](#)). It also concluded Stern could have used “[rising relative prices](#)” from future scarcity to get the same result. The RFF report pointed out:

If we were to combine the low discount rates in the Stern Review with rising relative prices, the conclusions would favor even higher levels of abatement. **This would in fact lead us to consider some of the levels of carbon content that Stern deems unrealistic, that is, aiming for a target of less than 450 ppm CO2 equivalents.**

Now what I would like to see is a cost-benefit analysis combining a moderate discount rate with RFF's rising relative prices AND Weitzman's "extreme climate change possibilities."

I'm sure that such a comprehensive economic analysis would vindicate Stern again and drive us toward a target of 450 ppm or lower — which means we must peak in global emissions by 2020. The time to act is now. Real economics demands it.

Next stops, Tol and Nordhaus.