



This is the print version of the [Skeptical Science](#) article '[Adapting to global warming is cheaper than preventing it](#)', which can be found at [cheap](#).

What's cheaper, mitigation or adaptation?

What The Science Says:

While preventing global warming is relatively cheap, economists can't even accurately estimate the accelerating costs of climate damages if we continue with business-as-usual.

Climate Myth: Adapting to global warming is cheaper than preventing it

"If we don't do anything, the damages caused by climate change will cost less than 2 per cent of GDP in about 2070. Yet the cost of doing something will likely be higher than 6 per cent of GDP" ([Bjorn Lomborg](#))

Some in the media have incorrectly argued that the IPCC reports conclude it's cheaper to adapt than avoid climate change. This error stems from the fact that [the second report says](#) about the costs of climate damages,

"the incomplete estimates of global annual economic losses for additional temperature increases of $\sim 2^{\circ}\text{C}$ are between 0.2 and 2.0% of income ... Losses are more likely than not to be greater, rather than smaller, than this range ... Losses accelerate with greater warming, but few quantitative estimates have been completed for additional warming around 3°C or above."

[The third report](#) then said about the costs of avoiding global warming,

"mitigation scenarios that reach atmospheric concentrations of about 450ppm CO₂eq by 2100 entail losses in global consumption—not including benefits of reduced climate change as well as cobenefits and adverse side-effects of mitigation ... [that] correspond to an annualized reduction of consumption growth by 0.04 to 0.14 (median: 0.06) percentage points over the century relative to annualized consumption growth in the baseline that is between 1.6% and 3% per year."

The challenge is that these two numbers aren't directly comparable. One deals with annual global economic losses, while the other is expressed as a slightly slowed global consumption growth. While these numbers can be put in terms of their net impact on economic growth, the next problem is that the first is not a proper estimate of the costs of climate damages. The IPCC was only able to estimate the costs of climate damages for another 2°C warming, but limiting global warming to another 2°C will require substantial mitigation efforts.

Thus this estimate only tells us the costs of global warming in a scenario where we also act to significantly reduce greenhouse gas emissions. As the second report notes, economists can't even accurately estimate the costs of climate damages in a business-as-usual scenario with global warming well above an additional 3°C . So how do we determine the economically optimal path?

Sorting Out the Numbers with Chris Hope

To answer this question, I spoke with Cambridge climate economist [Chris Hope](#), who told me that if the goal is to figure out the economically optimal amount of global warming mitigation, the IPCC reports "*don't take us far down this road*." To do this comparison properly, the benefits of reduced climate damages and the costs of reduced greenhouse gas emissions in various scenarios need to be compared. That's the sort of estimate Integrated Assessment Models like [Hope's PAGE](#) were set up to make.

According to Hope's model, the economically optimal peak atmospheric carbon dioxide concentration is around 500 ppm, with a peak global surface warming of about 3°C above pre-industrial temperatures (about 2°C warmer than present). In his book [The Climate Casino](#), Yale economist William Nordhaus notes that he has arrived at a similar conclusion in his modeling research.

To limit global warming to that level would require major efforts to reduce greenhouse gas emissions, but as the IPCC report on mitigation noted, that would only slow the global economic growth rate from about 2.3% per year to about 2.24% per year. According to these economic models, this slowed economic growth rate would be more than offset by the savings from avoiding climate damages above 3°C global warming.

Although the IPCC didn't make this comparison, these economic modeling results are consistent with its reports. As shown in the quote above, the second report was only able to estimate the costs of climate damages for an additional 2°C of global warming, and noted that beyond that point, the costs accelerate to a point where they become very difficult to estimate. [Nordhaus has similarly noted](#),

"In reality, estimates of damage functions are virtually non-existent for temperature increases above 3°C."

Note that these estimates also only take economic factors into account, and don't account for other social, cultural, or ethical concerns like species extinctions or human suffering and deaths.



Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a [college textbook on climate change](#) and the book [Climate Change Denial: Heads in the Sand](#). Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.



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