



Opinion Dominion

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Thursday, October 22, 2015

Another go at the economics of climate change

Expect to hear a lot about this study just out from some Berkeley researchers. The headline from the Washington Post:

Sweeping study claims that rising temperatures will sharply cut economic productivity

The claim is simple, but interesting:

Culling together economic and temperature data for over 100 wealthy and poorer countries alike over 50 years, the researchers assert that the optimum temperature for human productivity is seems to be around 13 degrees Celsius or roughly 55 degrees Fahrenheit, as an annual average for a particular place. Once things get a lot hotter than that, the researchers add, economic productivity declines “strongly.”

“The relationship is globally generalizable, unchanged since 1960, and apparent for agricultural and non-agricultural activity in both rich and poor countries,” write the authors, led by Marshall Burke of Stanford’s Department of Earth System Science, who call their study “the first evidence that economic activity in all regions is coupled to the global climate.” Burke published the study with Solomon Hsiang and Edward Miguel, economists at the University of California, Berkeley.

If the findings are correct, they add, that means that unmitigated global warming could lead to a more than 20 percent decline in incomes around the world, compared with a world that does not feature climate change. And this would also mean growing global inequality, since poorer countries will be hit by worse temperature increases — simply because “hot, poor countries will probably suffer the largest reduction in growth.” Indeed, some already wealthier countries with cold weather, like Canada or Sweden, will benefit greatly based on the study, moving closer to the climatic optimum.

But things start to sound a bit more shaky here:

Assuming this relationship between temperature and productivity is correct, that naturally leads to deep questions about its cause. The researchers locate them in two chief places: agriculture and people. In relation to rising temperature, Burke says, “We see that agricultural productivity declines, labor productivity declines, kids do worse on tests, and we see more violence.”

Yes, not sure I’d be entirely confident of the heat and violence connection, but if we go over to the university press release on this study, there is more reason to question the accuracy of the new study:

Unmitigated climate change is likely to reduce the income of an average person on Earth by roughly 23 percent in 2100, according to estimates contained in research published today in the journal *Nature* that is co-authored by two University of California, Berkeley professors.

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So far, so disastrous. But look:

The *Nature* paper focuses on effects of climate change via temperature, and **does not include impacts via other consequences of climate change such as hurricanes or sea level rise**. Detailed results and figures for each country are available for [download online](#).

Or, I might add, rainfall pattern changes, or ocean acidification and potential large scale changes to the food cycle there. How the heck can you be confident of projections if you cannot be certain how many poor countries may be destined to longer droughts and/or more frequent ones, followed by larger floods? And what about poor coastal countries where local fish is an important food source?

So, I think there are grounds to argue that this study is another example that accurate predictions of the economic consequences of global warming decades into the future are pretty much guesswork. But at least it notes that the uncertainty is no grounds for complacency, as techo-optimist libertarian types seem to think.

And it does support one thing that I reckon common sense suggests: the poor nations will suffer disproportionately from climate change; and even if some pro-development-at-any-climate-cost proponents had their way and we had every poor country building coal burning power plants as fast as they could, they are not going to develop their way economically fast enough to outpace the damage from climate change. They're not going to be able to aircondition their agricultural sectors, after all; nor are they all going to be manufacturing centres, or financial hubs making a living from mobile money.

Back to how bad some of the study's projections are (from the University link above):

They find climate change is likely to have global costs generally 2.5-100 times larger than predicted by current leading models. The team's best estimate is that climate change will reduce global economic production by 23 percent in 2100.

"Historically, people have considered a 20 percent decline in global Gross Domestic Product to be a black swan: a low-probability catastrophe," Hsiang warned. "We're finding it's more like the middle-of-the-road forecast."

Half of the simulation projections suggest larger losses. The hottest countries in the world are hardest hit: in less optimistic scenarios, the authors estimate that 43 percent of countries are likely to be poorer in 2100 than today due to climate change, despite incorporating standard projections of technological progress and other advances.

Richard Tol is already bleating about this, I see. Given that I consider him a discredited jerk, I'm not surprised, but it will still be interesting to read more coverage about this.

Update: here's the abstract from *Nature* in full:

Growing evidence demonstrates that climatic conditions can have a profound impact on the functioning of modern human societies^{1, 2}, but effects on economic activity appear inconsistent. Fundamental productive elements of modern economies, such as workers and crops, exhibit highly non-linear responses to local temperature even in wealthy countries^{3, 4}. In contrast, aggregate macroeconomic productivity of entire wealthy countries is reported not to respond to temperature⁵, while poor countries respond only linearly^{5, 6}. Resolving this conflict between micro and macro observations is critical to understanding the role of wealth in coupled human–natural systems^{7, 8} and to anticipating the global impact of climate change^{9, 10}. Here we unify these seemingly contradictory results by accounting for non-linearity at the macro scale. We show that overall economic productivity is non-linear in temperature for all countries, with productivity peaking at an annual average temperature of 13 °C and declining strongly at higher temperatures. The relationship is globally generalizable, unchanged since 1960, and apparent for agricultural and non-agricultural activity in both rich and poor countries. These results provide the first evidence that economic activity in all regions is coupled to the global climate and establish a new empirical foundation for modelling economic loss in response to climate change^{11, 12}, with important implications. If future adaptation mimics past adaptation, unmitigated warming is expected to reshape the global economy by reducing average global incomes roughly 23% by 2100 and widening global income inequality, relative to scenarios without climate change. In contrast to prior estimates, expected global losses are approximately linear in global mean temperature, with median losses many times larger than leading models indicate.

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