

Does climate change affect economic growth?

Appeared in the National Post, June 23, 2021



It has long been observed that global poverty tends to be concentrated in hot tropical regions. But persistent poverty in African and South American countries has political and historical roots, especially their embrace of Soviet-backed communism in the 20th century. In places where economic reforms were adopted (South Asia, for example), growth took off and they quickly converged on the west despite having tropical climates. So the connection to climate may be coincidental.

But in recent years a strand of economic literature has argued that warming not only negatively affects the level of economic activity, but also the rate of income growth. This matters because when conducting an analysis over a 100-year time span, small changes in the growth rate can compound over a century and result in large total changes.

A 2012 study (<https://www.aeaweb.org/articles?id=10.1257/mac.4.3.66>) led by Melissa Dell of Harvard University presented evidence that warming had insignificant effects on income growth in rich countries but in poor countries the effect was negative and statistically significant. Another team used this result in a policy model to argue the Social Cost of Carbon was at least 10 times higher than previously thought.

This was followed up by several studies led by economists Marshall Burke of Stanford and Solomon Hsiang (<https://www.nber.org/papers/w20750>) of Berkeley who reported evidence that warming had significant negative effects on wealthy and poor countries alike. Suddenly a picture emerged that warming is much more harmful than we thought, so it should be full steam ahead on aggressive climate policy. Global policymakers have embraced this belief, in part at the urging of the 2018 UN Intergovernmental Panel on Climate Change Special Report on 1.5 degrees warming which highlighted this new research.

But other research has come out that tells a different story. One of the challenges in climate economics is that climate data are collected on a grid cell basis (organized in latitude-longitude boxes) while economic data is collected at the national level. To match them up the Dell group averaged the climate data up to the national level. There are different ways of doing the averaging, however, and the results are sensitive to the chosen method. Other teams have begun trying to build economic

data sets at the local and regional level so the averaging step can be omitted. One group (<https://www.sciencedirect.com/science/article/pii/S0301479718306649>) from Northern Arizona University used gridcell-level economic data from around the world and found, like Dell, that temperature had no warming effect on growth in rich countries, but they found it has also a positive effect in poor countries up to an average temperature of about 17.5 degrees, which is above the sample average temperature of 14.4 degrees.

Then a team from Germany (<https://doi.org/10.1093/epolic/eiab007>) developed a regional economic data base that lets them account for what economists call “country fixed effects”, namely unobservable historical and institutional factors specific to each country that are unrelated to, in this case, the climate variables. When they apply this method the climate effects on growth and output vanish for rich and poor countries alike.

More recently a group led by Richard Newell of Resources for the Future (<https://doi.org/10.1016/j.jeem.2021.102445>) raised the issue that the econometric modelling can be done many different ways. Given the same data set there are lots of decisions to make, such as how many lagged effects to include, whether to use linear or nonlinear equations and whether to use time trends. Altogether they counted 800 different ways the same data could be analysed, and they wondered if the results depend on the model choice. They obtained the data set used by the Burke team and used the same country-level averaging method employed by Dell’s team. Then they ran a meta-analysis in which they evaluated all the possible models and evaluated at how well each one fit the data, to identify the best-performing models to reach their conclusions.

Dozens of different models all fit the data about equally well, and they could not rule out that the best ones do not include any role for temperature in economic growth. There was some evidence that warming is good for growth up to 13.4 degrees Celsius, but the positive and negative effects were not statistically significant. Across the entire range of temperatures in the sample there was no significant influence of climate on either output or growth. Under the highest-warming scenario the Burke team had projected a 49 per cent global GDP loss from climate change by 2100, but Newell found the model variant that fits their data best implied a slight global GDP gain. The best growth models as a group project an effect on GDP by 2100 ranging from -84 per cent to +359 per cent with the central estimates very close to zero; in other words the effects are too imprecise to say much of anything for certain.

Now we come up against the challenge that policymakers seem to find it easier to deal with gloomy certainty than optimistic uncertainty. In the blink of an eye a handful of studies in a new research area had become the canonical truth, based on which governments swung into a much more aggressive climate policy stance. But as time has advanced, new data sets, and even reanalysis of the old data sets, has called those results into question and has shown that temperature (and precipitation) changes likely have insignificant effects on GDP and growth, and the effects are as likely to be positive as they are to be negative. This does not mean there aren’t specific regions and specific industries within those regions (such as agriculture in tropical countries) where there are potential losses especially if the countries don’t adapt. But for the world as a whole, there is no robust evidence that even the worst-case warming scenarios would cause overall economic losses.

It now falls to advisory groups like the IPCC to tell this to world leaders, before they enact any more disastrous climate policies that will do all the harm (and more) that the evidence says climate change itself will not do.

Author:



(<https://www.fraserinstitute.org/profile/ross-mckitrick>)

Ross McKittrick (<https://www.fraserinstitute.org/profile/ross-mckitrick>)

Professor of Economics, University of Guelph
