Study: Hotter days in US mean less cold cash

December 15 2014, bySeth Borenstein

In this July 25, 2014, file photo, a roofer works under the midday sun in Gilbert, Ariz. Hotter days mean less cold cash for Americans, according to a new study matching 40 years of temperatures to economics. Days that averaged about 77 degrees ended up reducing people's income by about $5 a day, when compared to days that were about 20 degrees cooler. A county's average economic productivity decreases by nearly 1 percent for every degree Fahrenheit that the average daily temperature is above 59, says a new National Bureau of Economic Research working paper released Monday, Dec. 15, 2014. (AP Photo/File)

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Days that averaged about 77 degrees ended up reducing people's income by about $5 a day when compared with days that were about 20 degrees cooler. A county's average economic productivity decreases by nearly 1 percent for every degree Fahrenheit that the average daily temperature is above 59, says a National Bureau of Economic Research working paper released Monday.

And, the study's authors predict, if the world continues on its current path of greenhouse gas emissions, even warmer temperatures later this century will squeeze the U.S. economy by tens of billions of dollars each year.

This is not from storms, drought or other weather disasters—just the sweat of daily heat.

The paper by a pair of economists at the University of Illinois and University of California, Berkeley, has not yet been peer-reviewed but is part of work done for the nonpartisan economics research center that is widely cited for determining when the country is in and out of recessions. In comments from other researchers, the new study was criticized for its methods and conclusions by some economists and policy experts but praised by others as groundbreaking.

The study tries to find common ground between the hard physical science of meteorology and the softer science of economics. In doing so, the researchers used new complex statistical techniques crunching more than 76,000 data points, including daily temperatures and yearly economic data in counties across America, said co-author Solomon Hsiang of the University of California, Berkeley.

The numbers were clear, the researchers said.

"Hot temperatures are very bad for the economy," said study co-author

Tatyana Deryugina, a professor of finance at the University of Illinois.

This has been seen in other studies in hotter, less developed areas such as India. But scientists and economists often assumed it wouldn't be the case for richer countries with air conditioning, like the United States, said Hsiang, who teaches public policy. But America's economy doesn't adapt as experts thought, said Hsiang, who examined all U.S. counties' daily temperature and yearly economic data going back to 1970.

Hsiang said the "sweet spot" where productivity is maximized—a daily average temperature between 54 and 59 degrees—at first seemed cooler than expected, but that's an average 24-hour temperature. Daily highs can be 11 degrees warmer and lows 11 degrees cooler. So these are days when the afternoon is around 70.

While most people work indoors in climate-controlled settings they still go outside a lot, and hot weather elevates body temperature for a while, affecting how people work, Hsiang said.

"These are little things that add up," Hsiang said. "It's not like a hurricane. ... This is more like a story of deaths by a thousand cuts."

Carnegie Institute scientist Chris Field, who heads a United Nations climate change science panel that looks at the effects of global warming, praised the study as "creative and powerful."

"It may take some time for the community to reflect on the methods to decide if they are as effective as they seem, but my first impression is that this study provides unique insights into the big-picture consequences of temperature variation for income," Field said.

University of Sussex economist Richard Tol criticized the study, saying that people tend to work harder and make up productivity losses in

following days. He said not taking this into account makes the authors overestimate the heat effects.

But if the losses were made up within days, the way the economic data is annualized, the study authors wouldn't have noticed any difference because they would have equaled out, Hsiang said. Further, he said, more analysis showed that there was a "make up" effect but it was in the year after a hot year and only accounted for half the losses.

Doug Handler, chief North American economist of IHS Economics, said it is hard enough to measure economic productivity accurately on annual basis, let alone come up with precise daily numbers that correlate to temperatures. He said, "the margin of error in the published statistics is too great to allow for a believable micro-assessment of this type."

John Sterman, a management professor at Massachusetts Institute of Technology, and John Reilly, an energy economist who heads MIT's Joint Program on the Science and Policy of Global Change, both said the paper's analysis made sense to them. Reilly said other economists will want to test and evaluate the data themselves.

The study uses 44 climate computer simulations to project temperatures near the end of the century rising by about 9 degrees on average. That, it says, will reduce the nation's economic growth by 0.12 percentage points a year. Reilly said that may sound small, but it is trillions of dollars over a century.

More information: The National Bureau of Economic Research: www.nber.org/