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Study finds global effect of temperature on productivity

A recent study published Wednesday in the journal *Nature* shows that there is a strong functional relationship between a region's average recorded temperature and economic productivity — further warning of the damage climate warming would do to our economy.

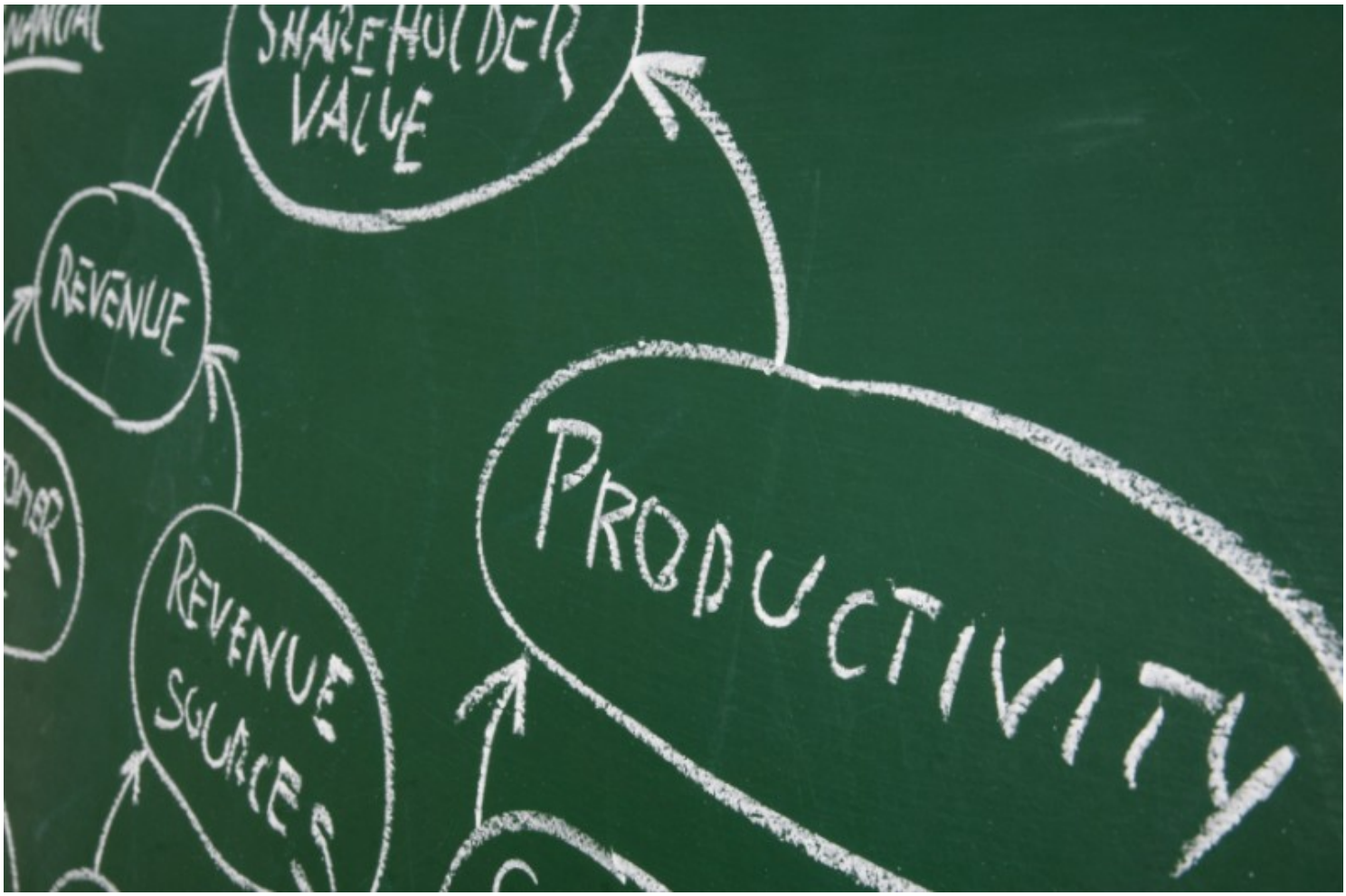

Image via linkedin

The study compiled 50 years' worth of economic data and temperature readings from over 100 countries and found a strong correlation between these two: regardless of a country's wealth levels, human productivity seems to be highest for annual temperature values of around 13 degrees Celsius (55 Fahrenheit). In areas where the mean temperature value is higher than this, economic productivity declines "strongly," the authors conclude.

> "The relationship is globally generalizable, unchanged since 1960, and apparent for agricultural and non-agricultural activity in both rich and poor countries," the study, led by Marshall Burke of Stanford's Department of Earth System Science, notes. Solomon Hsiang and Edward Miguel, economists at the University of California, Berkeley, also participated in the study.
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> "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," they conclude.

Their findings means that unmitigated global warming could lead directly a more than 20 percent decline in incomes the world round, and increase economic inequality: Poorer, hotter countries will feel the effects worse than their colder, richer counterparts — "hot, poor countries will probably suffer the largest reduction in growth," the authors note, also suggesting that countries such as Canada or Sweden will actually benefit

from the change, as they move closer to the optimum mean value of 13 degrees.

> "If you're in a country where the average temperature is cooler than 13 degrees C, a little bit of warming could actually be beneficial," says Burke. "On the other hand, if you're already at 13 degrees C, a little extra warming is going to hurt you."

Countries that fare considerably better are located in currently cold places — adding weight to the idea that northern countries will benefit from climate change. On top of easier shipping, resource exploitation, and tourism, there could be a productivity boost due to more favorable temperatures. Many tropical countries, in contrast, suffer economic damages in this scenario — getting hotter than they already are.

> "Warming may amplify global inequality because hot, poor countries will probably suffer the largest reduction in growth," the study concludes.
>
> "The cross-country implications of the analysis is eye-opening," said Rick Larrick, a professor at Duke's Fuqua School of Business, after reviewing the study for the Washington Post. "Climate change is not just an environmental issue but geopolitical issue."

He also claims that while short term temperature swings might cause economic hardships, the study fails to take into account economic adaptation to a long term temperature increase.

> "Using year-to-year changes is a good proxy for long term temperature changes, but countries may not be prepared to invest in mitigation on such a short cycle (it is unanticipated and temporary); in the presence of ongoing climate change, however, countries might be forward looking in terms of investing in mitigation," he said by email for Washington Post.

But on what factors exactly is this relationship based on? The authors consider agriculture and human behaviour to be the main causes:

> "We see that agricultural productivity declines, labor productivity declines, kids do worse on tests, and we see more violence."

The paper draws on a historical analysis of 166 countries over 50 years, looking at GDP per capita and corellating them to the temperature fluctuations that these countries experienced. They only compared each country "to itself in years when it is exposed to warmer- versus cooler-than-average temperatures due to naturally occurring stochastic atmospheric changes," to eliminate factors such as national wealth or culture.

> "An economy observed during a cool year is the 'control' for that same society observed during a warmer 'treatment' year," the authors write.

After identifying the temperature-productivity relationship, the authors created estimates for the effect it will have in the future, if steps are not taken to stem global warming:

> "In 2100, we estimate that unmitigated climate change will make 77% of countries poorer in per capita terms than they would be without climate change."

Previous work done by the three researchers showed that increasing temperatures lead to increased violence, and Hsiang found a relationship between warmer climate and poorer math test scores.

> "We find that math performance declines linearly above 21C (70F), with the effect statistically significant beyond 26C (79F)," that previous paper reported.

Other research confirms that global warming will reduce wheat yields, among other detrimental effects on agricultural production.

But, even considering this large body of research is consistent with the new study, the paper is not without its critics. University of Sussex economist Richard Tol considers it "hugely problematic" in an email to the Washington Post.

> "They extrapolate from modest warming between 1960 and 2015 to massive warming between 2015 and 2100," he objected, among a number of other technical criticisms.

In an accompanying commentary on the paper, also in Nature, economist Thomas Sterner of the University of Gothenburg, Sweden was less critical but noted that the work will have to withstand academic scrutiny.

> "The conclusion that temperature-associated costs will be higher than previously calculated will cause a stir, and should have stark repercussions for policy," wrote Sterner. "The authors take great care to check the robustness of their findings but there will, no doubt, be attempts to look for other data and approaches, which may give different results."

Another question that arises from the study is to what extent technology can overcome the adverse effects of warmer temperatures:

> "Air conditioning absolutely can help, but the data suggests that it does not fully insulate you from the effects of temperature," says Burke. "We do not find that technological advances or the accumulation of wealth and experience since 1960 has altered the relationship between productivity and temperature."

It remains to be seen if the scientific comunity's review of the paper is favorable or not.

David Thomson • 4 hours ago

Another faulty study. They did not consider the cost of energy as related to productivity output. When energy prices rise, productivity falls. If you want to counteract the effects of natural climate change, don't impose unnecessary burdens on the energy sector. Release the restrictions on coal. Allow energy to be purchased cheaply so that people can run their air conditioners and stay comfortable.

It is quite evident from the facts that high concentrations of CO2 in the atmosphere do not equate to a rise in temperatures. The current gradual rise in global temperatures remains consistent with the more or less consistent thawing of the planet since the last ice advance. If anything, increased CO2 results in more biomass, which means more trees and plants, which means more natural temperature modulation.

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