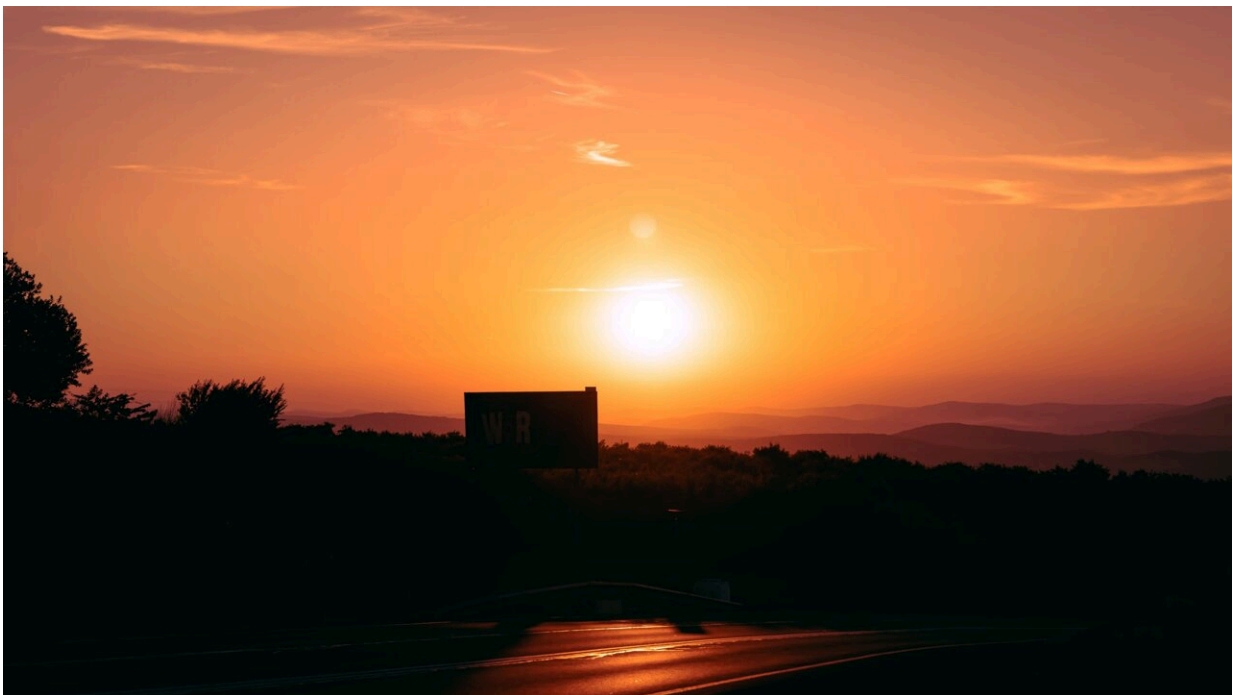


# How record-setting heat waves around the world could punish economies already reeling from inflation

July 20 2022, by Derek Lemoine

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Hundreds of millions of people struggled to keep cool amid a sweltering summer heat wave as cities across the [U.S.](#) and [mainland Europe](#) experienced [record-high temperatures](#). In the [U.K.](#), thermometers topped 104 Fahrenheit (40 degrees Celsius) on July 19, 2022, the highest

ever recorded.

While all this broiling heat is surely punishing on a personal level, it also has significant impacts on the broader economy.

As an [economist who has studied](#) the [effects of weather and climate change](#), I have examined a large body of work that links heat to economic outcomes. Here are four ways extreme heat hurts the economy.

## 1. Growth takes a hit

Research has found that extreme heat can directly hurt economic growth.

For example, a 2018 study found that the economies of U.S. states [tend to grow at a slower pace](#) during relatively hot summers. The data shows that annual economic growth falls 0.15 to 0.25 percentage points for every 1 degree Fahrenheit (0.56 C) that a state's average summer temperature is above normal.

Laborers in weather-exposed industries such as construction [work fewer hours](#) when it's hotter. But higher summer temperatures also reduce growth in many industries that tend to involve indoor work, including retail, services and finance. Workers are less productive when it's hotter out.

## 2. Crop yields drop

Agriculture is obviously exposed to weather: After all, crops grow outdoors.

While temperatures up to around 85 F to 90 F (29–32 C) can benefit crop growth, [yields fall sharply](#) when thermostats rise further. Some of the crops that can be hit hard by extreme heat include corn, soybeans and cotton. These reductions in yields could be costly for U.S. agriculture.

For example, a recent study I conducted found that an additional 2 degrees C (3.6 F) of global warming [would eliminate profits](#) from an average acre of farmland in the eastern U.S.

A prominent example of this was the [collapse of the Russian wheat harvest](#) in response to the country's 2010 [heat wave](#), which raised wheat prices throughout the world.

### **3. Energy use soars**

Of course, when it's hot, [energy use goes up](#) as [people and businesses run their air conditioners](#) and other cooling equipment at full blast.

A [2011 study found](#) that just one extra day with temperatures above 90 F (32 C) increases annual household [energy use](#) by 0.4%. [More recent research](#) shows that energy use increases the most in places that tend to be hotter, probably because more households have air conditioning.

This increase in electricity use on hot days stresses electric grids right when people depend on them most, as seen in [California](#) and [Texas](#) during past heat waves. Blackouts can be quite costly for the economy, as inventories of food and other goods can spoil and many businesses either have to run generators or shut down. For instance, the 2019 California blackouts [cost an estimated US\\$10 billion](#).

### **4. Education and earnings suffer**

A long-term impact of increasingly hotter weather involves how it affects children's ability to learn—and thus their future earnings.

Research has shown that hot weather during the school year reduces [test scores](#). [Math scores decrease more and more](#) as the temperature rises beyond 70 F (21 C). Reading scores are more resistant to high temperatures, which this research claims is consistent with how different regions of the brain respond to heat.

One study suggested that students in schools that lack air conditioning [learn 1% less](#) for every 1 degree Fahrenheit (0.56 C) increase in the [school year's](#) average temperature. It also found that minority students are especially affected by hotter school years, as their schools are more likely to lack air conditioning.

Lost learning results in [lower lifetime earnings](#) and [hurts future economic growth](#).

The impact of extreme heat on development, in fact, begins before we're even born. [Research has found](#) that adults who were exposed to [extreme heat](#) as fetuses [earn less during their lifetimes](#). Each extra day with average temperature above 90 F (32 C) reduces earnings 30 years later [by 0.1%](#).

## **Air conditioning can help—to a point**

Air conditioning can offset some of these effects.

For example, studies have found that having a working air conditioner means [fewer people die](#), [student learning isn't compromised](#) and [extreme heat outside during pregnancy doesn't hurt fetuses](#).

Not everyone has [air conditioners](#), however, especially in states such as

[Oregon](#) and countries such as the [U.K.](#) that have more temperate climates but have nonetheless recently experienced unusually extreme temperatures. And many people [can't afford](#) to own or operate them. Survey data from 2017 found that [around half of homes in the U.S. Pacific Northwest](#) lacked air conditioning. And [about 42% of U.S. classrooms](#) lack an air conditioner.

While heat waves are shown to [induce more households](#) to install air conditioning, it's hardly a panacea. By 2100, higher use of air conditioning could [increase residential energy consumption by 83% globally](#). If that energy comes from [fossil fuels](#), it could end up amplifying the heat waves that are causing the higher demand in the first place.

And in the U.S. South, where [air conditioning](#) is omnipresent, hotter-than-usual summers still [take the greatest toll](#) on states' economic growth.

In other words, as temperatures rise, economies will continue to suffer.

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