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ANN ARBOR — When the [National Weather Service](#) data indicates the temperature reached 75 degrees on a given day, can you believe it?

Researchers from the [University of Michigan](#) found that the government agency's data became more accurate in the 24 cities where the Chicago Mercantile Exchange began selling weather derivative contracts.

The contracts offer industries dependent on good weather, such as farming and retail, a hedge against weather-related financial risk. The financial markets began offering them in 1999 and base the settlements on daily temperature data measured by the Weather Service's weather stations at airports.

[Amiyatosh Purnanandam](#), a finance professor at [U-M's Ross School of Business](#), and [Daniel Weagley](#), a doctoral candidate at Ross, studied the weather service data both before and after the contracts went on the market in the cities where they were sold along with cities where they were not offered.

NWS stations report weather data based on the readings of weather stations typically located at the city's main airport. Since these readings are taken in a field setting, sometime they are erroneous due to calibration error, poor maintenance, or external interferences. After some time delay, the agency issues corrected or cleaned temperature value after correcting for these errors in the raw data.

Several private agencies also carefully look at this data to come up with the cleaned temperature value. The researchers computed the difference between raw and cleaned temperature values and considered the difference as the measurement error.

They compared the measurement error rate of a weather station before and after the

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More than \$3 trillion of the U.S. economy is estimated to be associated with weather-sensitive industries such as energy, construction, food processing, retail and transportation.

“Our results are some of the first pieces of evidence that financial markets can produce better real outcomes even in the absence of any explicit incentive and monitoring mechanism in place,” Purnanandam said.

So why does the weather service performance improve without explicit incentives?

Purnanandam and Weagley found two reasons: the possibility of reputation loss and the avoidance of future disputes and lawsuits.

As the weather-service-reported-temperature numbers become reference points for the settlement of a large volume of financial contracts, discrepancies in these numbers are more likely to create reputation damages for the agency.

“The resulting visibility and market scrutiny works as a disciplining device for the weather service by motivating them to minimize measurement errors,” Weagley said.

Unlike corporate managers whose incentives are either directly or indirectly tied to the firm's stock performance, there is no monetary incentive for the Weather Service.

It's proof, the researchers say, that the financial markets change behavior.

“The financial market is impacting the way these agencies are working and making decisions in the field,” Purnanandam said.

The study is [available online](#).

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