



The Perryman Group

# The High Cost of Heat July 2023

Texas has obviously experienced a heat wave of historic proportions in the summer of 2023. The higher-than-normal temperatures have created health issues for many residents and impacted quality of life for millions of people. Not surprisingly, the effects do not stop there.

As with any extreme weather event, excessive heat affects the economy in dynamic and complex ways. Substantial losses occur as a result of lower agricultural yields and an overall decline in productivity across multiple industries. Even morbidity and mortality increase in the face of record heat. However, these losses are partially offset by gains in other sectors, such as increases in utility consumption.

In order to provide a perspective on the economic impact of this summer's heat wave as well as the potential effects of a long-term trend toward hotter summers, baseline forecasts from The Perryman Group's US Multi-Regional Econometric Model were merged with an extensive analysis of economic responses to average temperature changes over several decades in all 50 states. This process allowed for detailed modeling over a comprehensive set of several hundred industries.

Assuming the pattern thus far this summer persists through August, with average daily temperatures about 2.6 degrees above the long-term average in the state, the net loss to the Texas economy

## The Estimated Economic Impact of the 2023 Heat Wave

Effect on Texas Gross Product

Industries with Largest Losses	
Real Estate	-\$1.981 billion
Insurance Carriers and Related Activities	-\$1.786 billion
Wholesale Trade	-\$1.014 billion
Industries with Largest Gains	
Utilities	+\$461.6 million
Funds, Trusts, and Other Financial Vehicles	+\$183.5 million
Petroleum and Coal Products Manufacturing	+\$103.5 million
<b>OVERALL NET EFFECT</b>	<b>-\$9.552 BILLION</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: See page 3 for additional detail on methods and assumptions used.

will be an estimated \$9.55 billion in real gross product (a reduction in growth of about 0.47%). The greatest relative losses are found in agriculture (more than 5.7%), with the largest absolute losses among major sectors observed in the financial sector (\$3.91 billion) due to losses such as crop insurance and services (\$2.11 billion) because of reductions in professional and business services. Though dwarfed by the losses, some industries see gains during extreme heat. For example, utilities providing power

for cooling experience higher revenues. The demand for some types of manufactured goods made in Texas also rises. The major source of the losses is ultimately attributable to declines in productivity.

Long-term impacts assuming average summer temperatures one degree above the historical average through 2050 were also estimated. In such a scenario, the effects would compound over time, with losses to the Texas economy of some \$396.38 billion in real gross

product in 2050. Such a scenario puts Texas gross product growth about 9.24% below the baseline scenario. Once again, the effects vary greatly across industries, with agricultural output suffering substantial declines.

Extreme weather events such as heat waves cost the economy billions. Over a long period of time, persistent temperature increases will have even larger and more profound economic consequences.

## The Estimated Economic Impact as of 2050 of an Average One Degree Increase in Summer Temperature in Texas

Effect on Texas Gross Product

### Industries with Largest Losses

Real Estate	-\$37.173 billion
Insurance Carriers and Related Activities	-\$35.191 billion
Oil and Gas Extraction	-\$23.845 billion

### Industries with Largest Gains

Utilities	+\$7.429 billion
Petroleum and Coal Products Manufacturing	+\$3.033 billion
Computer and Electronic Product Manufacturing	+\$2.899 billion

### OVERALL NET EFFECT

**-\$396.382 BILLION**

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Assumes an average one degree increase in summer temperatures during the 2023-2050 period. See page 3 for additional detail on methods and assumptions used.

## METHODOLOGY

Available data regarding the reactions of industries across the country to variations in summer temperatures over several decades were studied and utilized in conjunction with baseline forecasts from The Perryman Group's US Multi-Regional Econometric Model. This process allowed robust estimation of the economic effects of excessive heat across a broad spectrum of industries. The model was developed by Dr. M. Ray Perryman, founder and president of the firm, and has been in use for more than 40 years (with updates and refinements) and

provides detailed 400-sector projections. Real gross product (or output) is production of goods and services lost in the area as a result of the extreme heat; this measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures. Effects of long-term elevation in temperatures are presented as the amount by which 2050 gross product (in constant 2012 dollars as it is customarily measured) would be reduced compared to baseline projections.

## THE PERRYMAN GROUP



**The Perryman Group is a focused team of analysts who know how to address complex economic information tasks and present our findings effectively.**

Our in-house professionals bring expertise in **economics, finance, statistics, mathematics, real estate, valuation, systems analysis, engineering, technical communications, and marketing.** Dr. Ray Perryman, President and CEO, has 40 years of experience in developing systems, analyzing complex problems, and communicating effectively. We have considerable pride in what we do. Our enthusiasm is both unbridled and contagious; every day brings a new opportunity for us to tackle a different problem or create a product or service specifically tailored to our clients.

### OUR SERVICES

#### IMPACT ASSESSMENT

We have developed and continually maintain an extensive set of economic impact evaluation models that can be applied in a variety of contexts.

#### EXPERT TESTIMONY

We help clients analyze and communicate complex information in common-sense terms through comprehensive, objective analyses and clear, concise expert reports and presentations.

#### FORECASTING

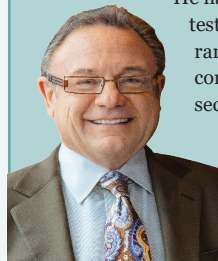
We are at the cutting edge of econometrics and other advanced statistical methods and have provided innovative approaches for many complex applications.

#### SPEECHES

Dr. Perryman addresses dozens of audiences throughout the world every year, catering to a wide variety of events.

### M. RAY PERRYMAN, PH.D.

Dr. Perryman is the President and CEO of the Perryman Group and Distinguished Professor of Economic Theory and Method at the International Institute for Advanced Studies. Over the past 40 years, Dr. Perryman has helped recruit corporations providing tens of thousands of jobs through economic development work, resolved billion-dollar legal issues, and revamped public policy through impact assessments and other studies. His firm has measured economic impacts for corporate locations and expansions involving billions in investments, and his economic forecasts are used by corporations and government agencies alike.



He has provided economic analysis and expert testimony for civil litigation across a wide range of practice areas including antitrust and competition, intellectual property disputes, securities, and commercial and complex litigation. His work combines strong expertise in economic damages calculation, asset valuation, market analysis, and statistical methods and econometrics.

@PerrymanGroup

www.perrymangroup.com

/PerrymanGroup

info@perrymangroup.com

/in/ray-perryman

1.800.749.8705

For more information on **subscriptions, economic forecasts,** or any of our **other corporate services,** call **1.800.749.8705.**