

PRESENTED BY TEXAS TECH UNIVERSITY

TAMEST **NATURAL HAZARDS SUMMIT**

*Responding
to and
Mitigating
the Impacts*

LUBBOCK, TEXAS

05.16.2022

#NATURALHAZARDSSUMMIT

Panel: Climate Change, Drought, and Economics of Warning

MODERATOR



**KISHOR MEHTA,
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SPEAKERS



**KATHARINE
HAYHOE, PH.D.**

**Paul Whitfield Horn
Distinguished
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**KEN RAINWATER,
PH.D.**

**Professor
Texas Tech
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**KEVIN SIMMONS,
PH.D.**

**Professor Emeritus
of Economics
Austin College**

Firm Behavior in the Face of Severe Weather: Deterministic and Probabilistic Warning Systems

Seth Howard

Alison Boehmer

Austin College

PI's: Kevin M. Simmons, Ph.D. (**Austin College**) Kim Klockow-McClain, Ph.D. (**CIMMS/NSSL**)

TAMEST NATURAL HAZARDS

Responding to and Mitigating the Impacts

SUMMIT

Presented by:
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Research Background:

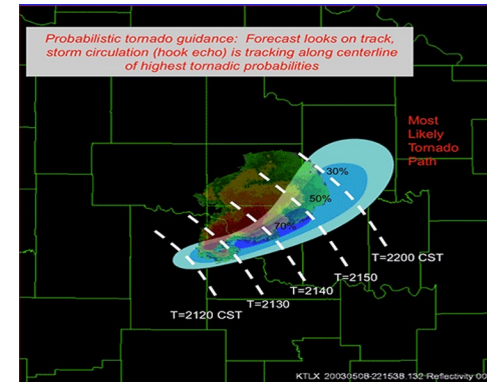
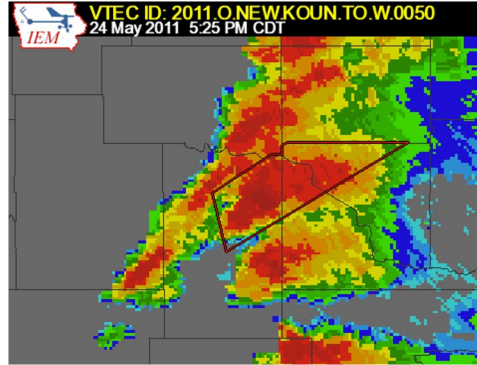
Weather Research and Forecasting Innovation Act of 2017, H.R. 353

SEC. 103. TORNADO WARNING IMPROVEMENT AND EXTENSION PROGRAM.

In General.--The Under Secretary, in collaboration with the United States weather industry and academic partners, shall establish a tornado warning improvement and extension program.

Goal.--The goal of such program shall be to **reduce the loss of life and economic losses from tornadoes** through the development and extension of accurate, effective, and timely tornado forecasts, predictions, and warnings, including the prediction of tornadoes beyond 1 hour in advance.

TWIEP Concept – Business Decisions



Research questions:

1. How do businesses respond to NWS warnings now?
2. How might they respond to the TWIEP information?
3. What are the economic implications of a change in business behavior?

Measuring Revealed Firm Behavior

Probabilistic and Deterministic Warning Scenarios/Questions

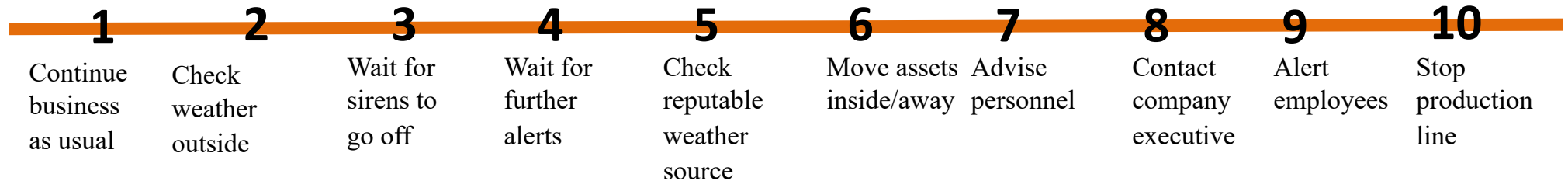
1. Firms did not know the actions were a scale when selecting actions.
2. The order of the Behavior Scale was randomized in the survey.
3. Allowed opportunity to compare different warning scenarios to each other.

10 response choices

- Focus group established “values” associated
- Not Industry Specific Actions

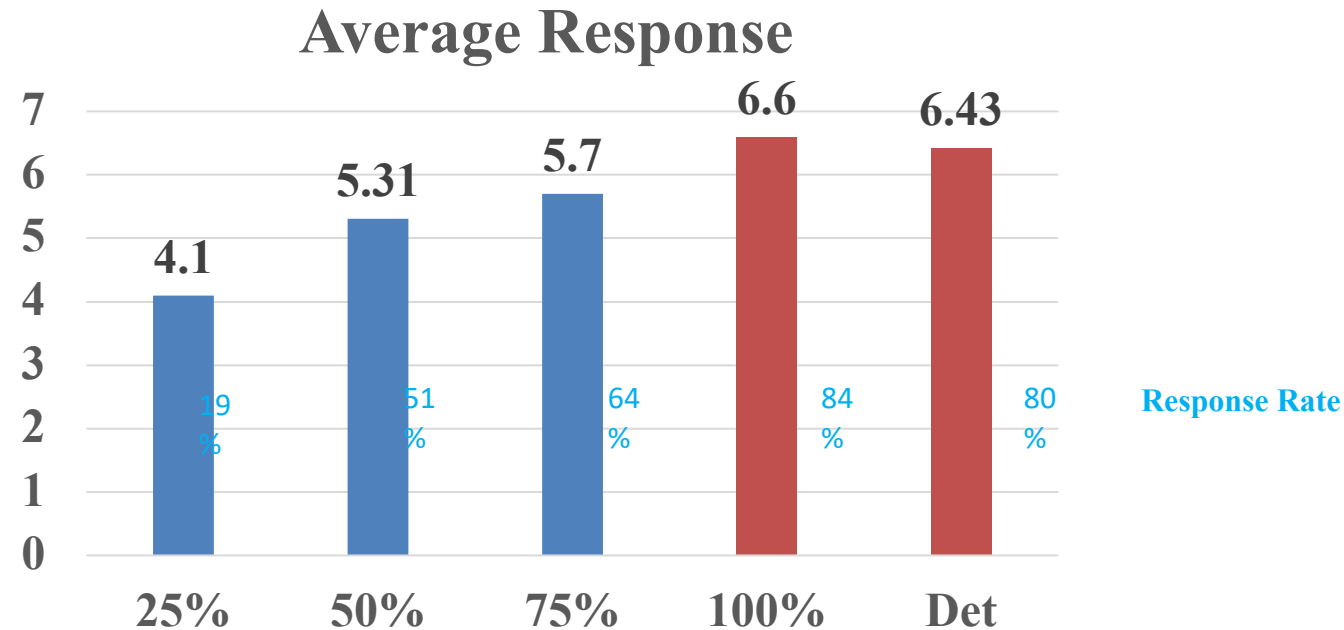
PASSIVE

ACTIVE

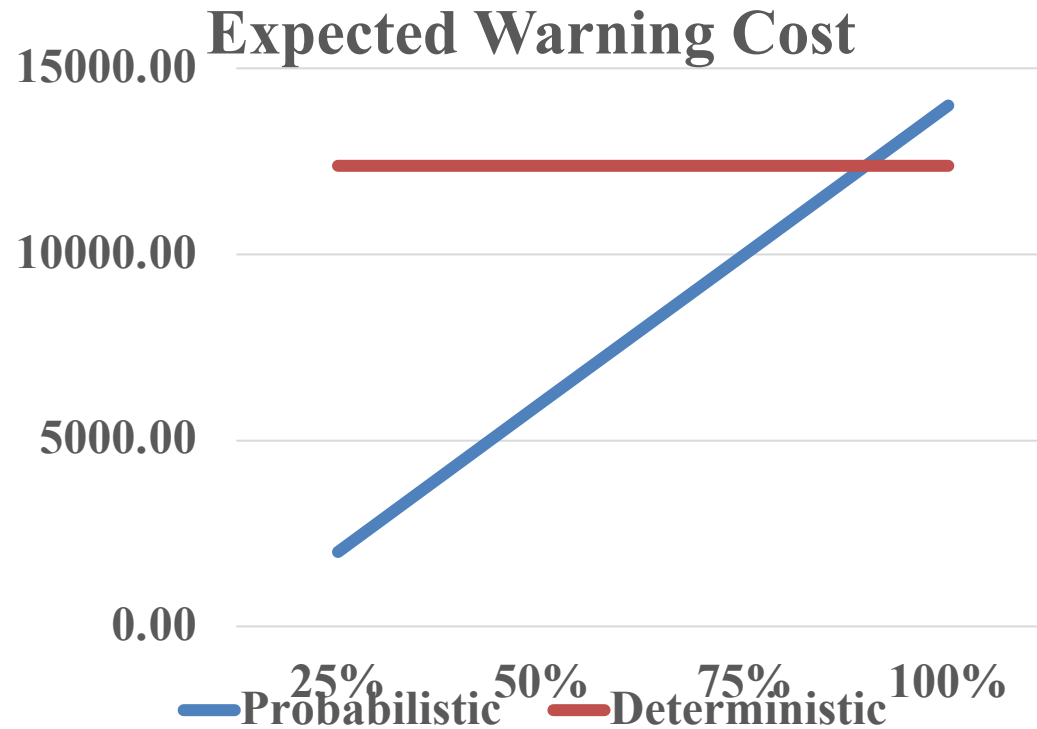


Firms' Responses

Average Response: Each firm chose 5 responses to the warning not knowing the ranking of those actions from the behavior scale. Here is the average value of those actions for each warning type with response rates to the side of each warning bar.



Economic Impact

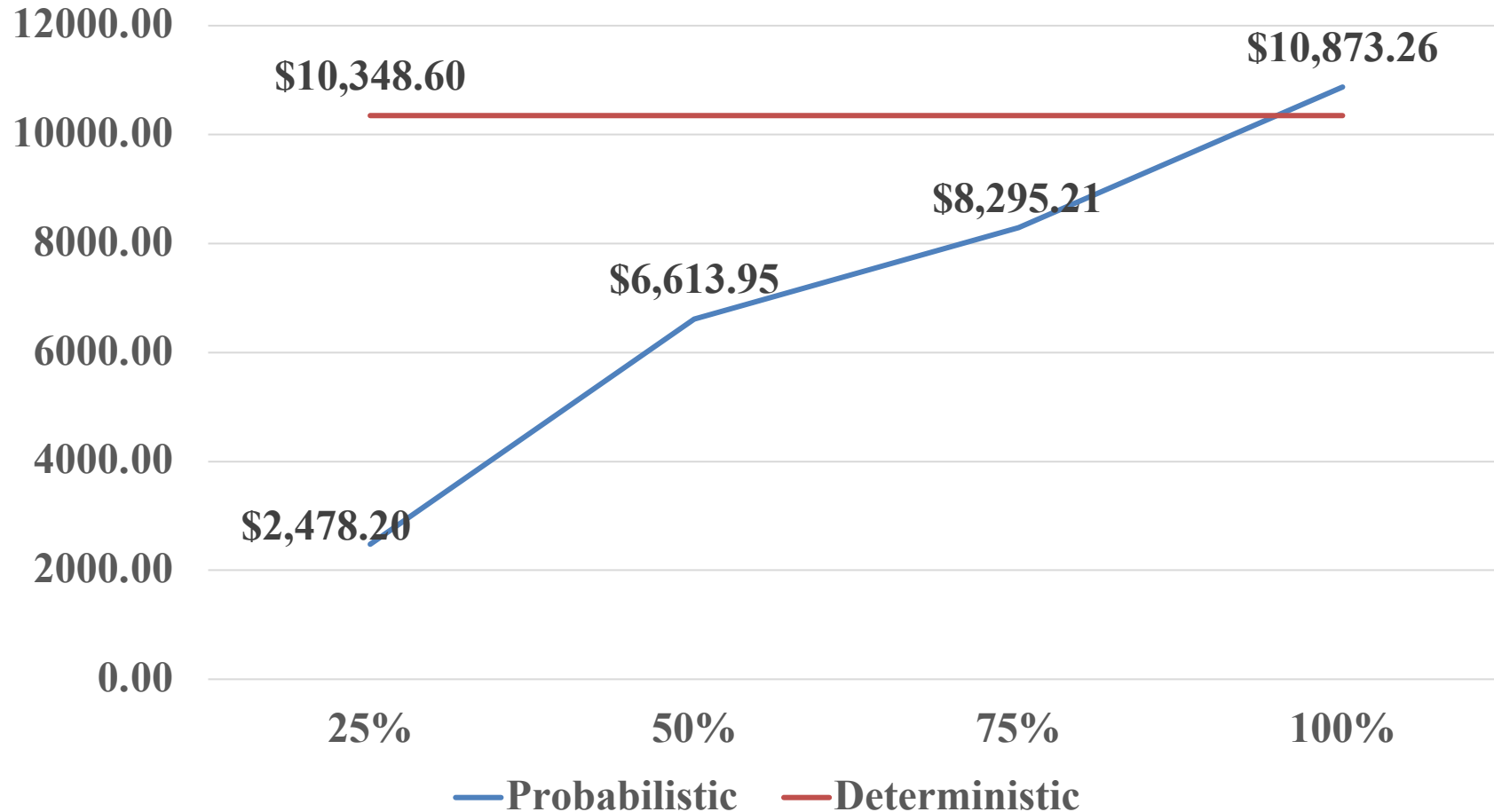


Will the new probabilistic warning system provide savings compared to the current deterministic warning system?

Elements of Cost-Loss Analysis

- Response Cost
- Preventable Loss
- Response Rate
- Strike Rate
- Warning Cost
- Per Firm Per Warning Savings
- Annualized Savings

Expected Warning Cost Comparison



Estimated Annual Savings

- Current savings are per firm per warning
- For annualized savings we need total number of firms under warning every year
- We gathered data from the top 21 tornado states
- Projected life savings: \$88 Billion

Description	Value
Warnings Per Year	2,063
Avg. Square Miles per Warning	275
Firms per Square Mile	2.89
Average Affected Firms per Year	1,639,569

