

# Weather and Society: The Contribution of Economics

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# Weather-related Research by Economists

- The Value of Forecasts
- Analysis of Impacts (Casualties, Damages)
- Vulnerability (Insurance, Disaster Relief, Location Decisions)
- Mitigation: Evaluation and Incentives
- Recovery from Extreme Events

# What Is Economics

A social science – we study interactions between individuals and firms, most often but not exclusively through markets

Seek to understand patterns of behavior based on individual decisions (consumers, firms, resource owners)

Assume that individuals are calculating and self-interested (mostly at least)

# Tools of Economic Analysis

- Decision Theoretic Models
- Equilibrium Models
- Empirical (Regression) Analysis
- Contingent Valuation (Survey) Method

# The Value of a Forecast

- A type of information; extensive literature in economics on the value of information
- The value of information flows from the action(s) taken upon receipt of the information
- Must find the affected action to attempt to value weather forecasts or climate information

# Approaches to Valuing Forecasts

- Optimal decision making based on forecast
  - Prescriptive Studies
- Market effects of forecasts – when forecasts affect decisions of many
- Descriptive studies of how forecasts actually used
- Contingent Valuation studies of willingness-to-pay for forecast

# Value of Forecasts: Example

Erik Craft, “The Value of Weather Information for Nineteenth Century Great Lakes Shipping,”  
*American Economic Review*, 1998

Examined value of storm forecasts issued by Weather Bureau for the Great Lakes, 1870-1888, based on ship and cargo losses and shipping rates; found that the rate of return to society on the investment was 60%

Used the effect of closing half the storm warning stations in 1883 due to budget cut to help identify the impact of the warnings

# Analysis of Impacts

- Analyze determinants of casualties, damages or costs from weather
- Empirical analysis generally
- Knowledge about factors affecting societal impacts is crucial to determine how meteorology can reduce impacts in future

# Impacts Analysis: Example

Paul Fronstin and Alphonse Holtmann, “The Determinants of Residential Property Damage Caused by Hurricane Andrew,” *Southern Economic Journal*, 1994

Regression analysis of amount of damage to neighborhoods in Hurricane Andrew, 1992

Document that newer neighborhoods suffered higher damage, provides evidence on the poor enforcement of South Florida building code

# Analysis of Vulnerability

- Why do people place themselves at-risk for extreme weather?
- Misperception of risk: expected utility vs. prospect theory
- Role of insurance transferring, reducing risk
- Potential shifting of costs of living in high risk areas (subsidies, disaster relief)

# Evaluation of Mitigation

- Typically empirical studies
- Prospective studies: attempt to determine value ahead of time
- Retrospective studies: attempt to determine effectiveness once in place
- Challenge for researchers is determining the appropriate counterfactual

# Recovery from Extreme Events

- Typically empirical studies
- Challenge again is appropriate counterfactual
- Time series studies (before and after comparison)
- Cross sectional studies (compare affected areas with control areas)

# WAS-IS: How to Change the Culture?

Value from weather and climate information comes from actions taken

What will people do with this forecast?

Value creation is a two-way street, need to interact with “customers”

Have to think creatively to document value of weather and climate information: measurable outcomes