

What Does Economics Have to Do With Weather Forecasting?

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Economics and Social Science is Essential to:

1. Set priorities and allocate resources
2. Understand user needs and identify effective ways of meeting those needs
3. Raise program performance
4. Maximize societal benefits through recognizing system as well as individual impacts
5. Prepare for and adapt to changing conditions and needs
6. Demonstrate the value of programs to stakeholders

What Is Economics?

- Formal definition:
 - Economics deals with the allocation of scarce resources among various and competing ends
- How:
 - By providing concepts and tools for measurement and analysis
 - As a behavioral science, considering incentives and responses to them

What Can Economics Contribute?

- Understanding markets and customer behavior
 - Demand analysis
 - Information theory
- Measuring benefits and costs of weather information and services
 - Cost analysis
 - Benefit analysis
 - Distribution of benefits and costs
- Micro vs. macro analysis

Demand Analysis

- Information as a factor of production
 - Business demand derived from demand for the products of the business
- Consumer demand for management of personal business and lifestyles
- Government demand based on interest in commerce, population needs and health and safety

Information Theory

- The rate of return to investment in acquiring information depends on the direct cost of the information to the user and the costs and time involved in search for more or better information
- Network economies are multiplied benefits that become possible when participants interact
 - Benefits increase exponentially with the number of participants in a network (Metcalfe's Law)

Cost Analysis

- Average and marginal (incremental) cost
- Economies of scale *and* scope
 - Program cooperation and integration
- Use of resources vs. budgeted numbers

Benefit Analysis

- Forms of benefits include value of time and value of life and health
- Understanding the value chain
- Private *and* societal benefits and costs
- Present discounted values of benefits and costs
 - Benefit/cost ratios and net present values
 - Risk and sensitivity analysis

Learning from What We Do

- “The Number” vs. analysis for decision-making
- Revealed preference – what people and organizations actually do
- It may be possible to standardize some components
 - Value of life and health; value of time
 - Risk perception
- Need for expected outputs and outcomes against which results can be evaluated
 - Comparisons over time and across programs
 - Relating results to changes in programs, technology, distribution, etc. to see what is working
- Institutionalizing analytic process

Focusing on New Frontiers

- Geographic detail and special models
- More types of weather, water and climate phenomena and their interactions
- International
- Climate change
 - Winners and losers
 - Macro and micro

Some Local Impact and Valuation Measures

Impact and Value Measurement		
Subject	Possible Indicator	Value Measure
Traffic delays	Number of vehicles affected Average length of delay	Economic value of time lost from work and non-work
School closings	Number of schools closed Number of students	Cost per pupil per day
Accidents	Number of accidents Number of deaths	Cost of medical care Lost income and tax revenue Economic value of a lost life
Business interruption	Number and duration of closings	Loss of sales Labor and other costs
Property damage	Number of buildings damaged Extent of damage	Cost of replacement or repair

Employment Status of Katrina Evacuees after One Year (nos. in thous.)

Employment status in July 2006	Total of next 2 columns	Residence in July 2006	
		Same as Aug. 2005	Different than Aug. 2005
Civilian noninstitutional population age 16 & over (P)	1,149	673	476
Civilian labor force (LF)	682	403	278
participation rate (LF/P)	59.3%	59.9%	58.5%
Employed (E)	600	386	214
employment rate (E/P)	52.2	57.3	45.0
Unemployed (U)	81	17	64
unemployment rate (U/LF)	11.9%	4.2%	23.0%
Not in labor force (P-LF)	468	270	198

The Sterling Warning Area High Impact Weather Study: Rationale

- Studies of impacts of weather on the economy and society typically have dealt with particular types of weather with uncoordinated geographic and sector coverage
- With many decisions occurring locally, there is a need for more systematic efforts to determine community and regional impacts and ways of improving outcomes
 - Such efforts can document the contribution of improved weather forecasts to reducing adverse impacts and help assess the kinds of improvements in forecasts and dissemination that would be most beneficial
 - If studies can be done on a comparable basis for a number of localities, there are likely to be increased opportunities for one community to learn from the experience of others

The Sterling Warning Area High Impact Weather Study: Features

- Societal impacts of high impact weather events and their relationship to forecast performance
 - In the 50 county Sterling Warning Area that covers Washington, DC, Virginia and part of Baltimore over the last 5 years
- The study examines:
 - Links between weather events and societal costs for community sectors
 - To be based on data from a survey of first responders and participants in the local warning network
 - Along with information on weather characteristics
 - NWS performance during high impact events
- Recommendations will be developed for NWS improvements to minimize effects of high impact weather events *in the area*



NOAA Sources of Economic Studies

- *Economic Statistics for NOAA, April 2006*. Contains summaries of many studies. Available at www.economics.noaa.gov
- www.economics.noaa.gov See Library for many downloadable studies
- *Integrating Socioeconomic Analysis Into Decision-Making: Briefing book on Weather, Water and Climate*, for Social Science Workshop for Boulder Offices, NOAA Office of Program Planning and Integration, September 30, 2004. Includes discussions of methods and applications.
 - Pages 103-144 contain a summary of benefit estimates
 - Available as background paper for THOPRPEX meeting <http://www.sip.ucar.edu/thorpex/pdf/presentations/Leveson.pdf>

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