



The Role of Public and Private Mitigation for Homeland Security Policy: Status Report

V. Kerry Smith

W. P. Carey Professor of Economics
Arizona State University

Carol Mansfield

Senior Economist
RTI International

DHS University Network Summit
Washington, D.C.
March 17, 2009

General Research Question

- How should we model and measure the benefits of Homeland Security policies?
 - National Defense – the textbook example of a pure public good
 - Amount of “security from terrorism” available with any level of public expenditures difficult to quantify in a convincing way – high level of uncertainty
 - Security is composite of public actions **and** private actions
- Need new methods for characterizing consequences and economic impact for policy analysis in DHS

Objectives of Current Project

- Investigate public policies that induce ***complementary*** actions by private citizens to increase the resilience of specific infrastructure systems
- Explore the willingness of individuals to take action
 - How do trade-offs change with characteristics of respondent and the public policy?
- Ideally create data that can be used to parameterize economic models of the welfare effects of DHS policies

Theory and Intuition

- Treat “*services provided by infrastructure*” or “*the assurance that normal activities will continue with minimal risk of disruption*” as **public good**
- Terrorist acts or natural disasters impact the level or reliability of these services
- Policy challenge is to develop methods to reduce the prospects of disruption and increase resilience
- Use Bockstael and McConnell’s [2007] characterization of defensive expenditures as starting point

Defining Resilience using Production Functions

- Production process for economic output (Z)
 - consider roles of private actions as substitutes for security-related policies
 - private (x) and public actions (q) inputs to this production process
- Homeland security policies provide non-market services (q)
 - no market exists “units of security”
- If public homeland security policy services “decline”, can you substitute private actions and minimize impact on Z ?

$$Z = f(x, q)$$

Defensive Expenditures and Hicksian Welfare Measures

- Defensive Expenditures (DE) under certainty
 - **Perfect Substitution:** cost of x (DE) perfect substitute for q , Z remains constant
 - DE measure Hicksian losses due to changes in public security “services”
 - Case of “perfect” resilience – output (Z) unchanged
 - **Imperfect Substitution**
 - actual defensive expenditures (ADE)
 - allow output to adjust in response to increased costs of “producing” Z as q changes and need to add x
 - includes income and substitute effects
- Cost of x (private action) provides bounds on welfare measure
- $DE > \text{Hicksian Losses} > ADE$

Implications for Policy

- DHS policy can aim at increasing security (q) two ways
 - Government expenditures to increase q
 - Government expenditures to create technology or plans that promote private goods (x) that mitigate the loss of q , help keep output stable
- Develop a theoretical model to measure the homeland security consequences (economic welfare) based on this logic
- Develop surveys that provide data for this model



Survey Research

- Research on valuing the benefits of homeland security policies
 - Willingness to pay to reduce risk or severity of threat (resilience)
- Individuals use a variety of strategies to cope with risks
 - averting behaviors to reduce the probability that an event occurs
 - mitigate the risk to reduce the severity of the event if it occurs
- Success of homeland security policies can depend on
 - willingness of individuals to adopt averting or mitigating behaviors

Plans for Reducing Risk of Food-Borne Illness

- *ex ante* private plan – a home test kit for food borne contaminants;
- *ex ante* plan to reduce risk by hiring more FDA inspectors;
- *ex post* option that offers a medicine that reduces the severity of the illness once it is contracted.
- Current situation

- This plan would use the tax revenues from the increase in your taxes of [\$50.00/\$35.00] to
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 - Have to buy [test kit/medication] ahead of time and have on hand
 - [Kit, medication, inspectors] for food borne illnesses caused by the most common food borne bacteria and pathogens in fresh fruits and vegetables and meat
 - After 1 year **[test kit materials/medication]** expires
 - Provided monthly and annual costs in survey
 - Wanted annual costs for all 3 plans

	Test Kit	Medication	Inspectors
Risk of FBI	1%, 5%, 10%	27% (current risk)	1%, 5%, 10%
Severity (hours)	48 hrs.	3, 12, 24 hrs.	48 hrs.
Extra cooking time	10, 5 minutes	0	0

Survey Administration

- Web-based survey administered by Knowledge Networks (KN)
 - KN's internet panel recruited from RDD frame
 - KN provides free internet access for responding to surveys
 - Households without internet access provided with a Web TV device

Survey Administration, con't

- 2,242 invited to take the survey (age 18+)
- 1,606 responded (72% of those invited)
- We included test for this selection effect (recruiting selection effect found not to influence tradeoffs measured with KN surveys)
- 801 assigned to food safety survey with current situation option

Sample Characteristics

	Mean	Std. Dev.
Household income	\$54,000	\$42,593
Age	48	17
Female	53%	.50
White	75%	.43
Highschool grad	33%	.47
Experienced food borne illness	57%	.47
Self or friend hospitalized	21%	.41
Primary shopper	66%	.47
Concerned about Avian Flu	45%	.50

Annual Willingness to Pay for Plans and Outcome of Plans

Test Kit	\$211 (1.99)
Inspectors	\$164 (2.21)
Medication	-\$133 (1.47)
Opportunity Cost of Time (for time in all meals in a year)	\$22.5 (1.47)

Discussion

- Respondents preferred plans that reduced ex ante risk rather than ex post reduced severity
- Can WTP estimates from one context be used for security threats?
 - asked if increase support for plan if source was terrorist threat
 - more support among the respondents with the highest WTP
 - would imply higher WTP to avoid cases of food borne illness when terrorism is source

WTP for Food Safety if Source is Terrorism

	Terrorism Threat Makes Support Greater	Terrorism Threat Not Change Support
Test Kit	\$277	\$195
Medicine	\$167	\$124
Inspectors	\$255	\$217

Discussion

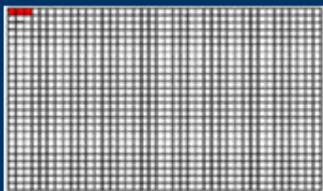
- Private actions potentially play an important part in resilience
- Government policy can complement or substitute for private action
- Research on
 - Activities that most effectively promote resilience AND are acceptable to the public
 - Economic value (welfare measures) for plans and associated homeland security benefits for regulatory analysis
 - Equations and data for economy-wide models (CGE models)



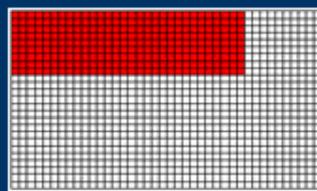
Additional Information

Attributes and Levels

	Test Kit	Medication	Inspectors
Extra cost	\$5, 10, 40	\$5, 10, 40	0
Tax increase	\$35,50	\$35,50	\$35,50



Box D



Box A

Does Box D show a situation with a higher risk of getting sick or a lower risk than Box A above (which displays the current risk of 27%)?

Select one answer only

- Box D shows a higher risk of getting sick
- Box D shows a lower risk of getting sick

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Risk Quiz Results

- 10 refused
- 94 answered incorrectly (6%)
- 1,502 answered correctly (94%)

Remember that the plans will require an increase in your taxes and possibly an additional cost specific to the plan, as displayed in the table below.

In previous similar surveys people often responded to a survey in one way but if they actually faced the decision they acted differently. It is particularly common to find that people are more willing to say they will pay for something or vote for something and then with an actual choice they do not. One reason for these differences is that these people have not fully considered the impact an extra cost would have on the family budget.

When you answer this question, please think about the cost of the plans, including the increase in your taxes.

	Current Situation	Hire more inspectors	Purchase medicine
Annual risk of food borne illness	27% 270 in 1000 people get sick each year	1% 10 in 1,000 people get sick each year	27% 270 in 1,000 people get sick each year
Average amount of time you will be sick	48 hours	48 hours	24 hours
Extra time needed to prepare food	No added time	No added time	No added time
Cost	No added cost	No added cost	\$5 per year or about \$0.42 per month
Annual increase in income taxes	No added cost	\$35.00	\$35.00
Your vote	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Coefficients on Attribute Levels

