How Would Americans Allocate Anti-Terrorism Spending? Findings from a National Survey of Attitudes about Terrorism

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America's perspective on terrorism changed forever on September 11, 2001. That day's tragic events brought enormous personal losses to the victims and their families and substantial economic losses to industries and communities directly affected. But even though most households were spared catastrophic personal losses, all Americans were affected. We all lost some of our sense of security and confidence in the future. The attacks on the World Trade Center and Washington, D.C. made it vividly apparent America had entered a new era and that our behavior and our expectations must adjust accordingly.

Now, more than five years after al Qaeda's action, the possibility of further terrorism has been factored into everyday life. The events of 9/11, the subsequent bombings in Bali, Madrid, and London, and the exposure of other terrorist plots have made increased security in public buildings, airports, and commercial centers an accepted part of twenty-first century living.

Americans recognize that another terrorist attack is probable and they are willing to pay to support efforts to limit its likelihood of success. In fiscal 2002 federal spending for homeland security was $21 billion. By fiscal 2006 federal homeland security spending had grown to $55 billion, an increase of more than 161 percent.[1] About two percent of all federal spending now is devoted to homeland security.[2]

Services like homeland security are core responsibilities of a national government. One strategic goal of the Department of Homeland Security is to "safeguard our people and their freedoms, critical infrastructure, property and the economy of our nation from acts of terrorism…."[3] To achieve that goal policy makers must provide adequate funding for programs designed to reduce the probability of a successful terrorist attack as well as those designed to limit the damage from any attack, should one occur. But determining the appropriate level of spending and specifying how and where it should be spent remains a challenge.

Identifying how much should be spent to protect against terrorism is an important task. If too little is allocated, the nation will be put unduly at risk, while if too much is spent consumption of goods and services valued more highly by the public will be foregone. Normally economists trust market forces to determine the proper level of spending for particular goods and services. But the market result will not be optimal for services like homeland security and national defense.[4]

Those activities are textbook examples of a class of goods and services economists term "pure public goods." What makes these goods different from most is that individuals who fail to pay cannot be prevented from benefiting from the service provided. Once we as a nation decide on the level of protection against terrorism we desire, everyone receives that level of protection. No one can be prevented from receiving the benefits of the anti-terrorism programs undertaken. That means there is no incentive for anyone to accurately report how much they value the service in question. In fact, were we to take a "quasi-market-based approach" and fund the provision of homeland security by levying a tax equal to each individual's indicated willingness to pay for the service, understating one's

true preference and becoming a free (or reduced fare) rider would be to each individual's financial benefit. This possibility for free riding causes market-based expressions of consumer preferences to understate the true value of homeland security programs to society. Consequently, too little protection will be provided unless the public sector intervenes.

Since any market-based decision on the allocation of resources to anti-terrorist programs will clearly be sub-optimal, the amount to be budgeted for that activity must be determined subjectively through the political process. Through this process explicit estimates of measurable benefits from homeland security spending are combined with policy makers' perceptions of other, impossible-to-measure, economic and personal losses that would accompany a terrorist attack. The budgetary process then weighs the value of preventing all the prospective costs to society, including non-monetary losses such as the loss of personal freedoms and changes in lifestyle, against other needs for funds and subjective perceptions of taxpayers' willingness to pay to support homeland security. That subjective assessment of relative costs and benefits is the basis for the final decision on the amount of public sector resources to be used for homeland security.

Budget decisions are not made in a vacuum. Studies providing estimates of the value of a life and estimates of reconstruction costs offer some guidance on the benefits of preventing a particular type of terrorist attack.[5] But those analyses are incomplete and significantly understate the full cost of terrorism since the losses we seek to prevent extend well beyond the direct physical and economic damages caused by a terrorist attack. Indirect effects – the short-term national economic losses and longer-term reductions in productivity attributable to the re-direction of resources away from the actual production of goods and services to the provision of additional security – must also be included.

Those indirect losses occur throughout the entire country. They are not limited to localities directly affected by the attack, and they almost certainly exceed the direct losses from the attack even after losses in lifetime income for those killed or injured are included. Thomas Stinson estimates that the short-term indirect loss in economic output coming from a terrorist attack in the United States could easily exceed $190 billion and he notes the ongoing productivity losses caused by the allocation of additional resources to security activity would greatly exceed the short-term losses in GDP.[6] Those losses are nearly five times greater than the $40 billion of direct economic losses economists at the New York Federal Reserve Bank estimate for the New York metropolitan area from the 9/11 attacks.[7]

Much of the longer-term, indirect economic damage from a terrorist attack will depend on its effect on the behavior of consumers and business managers following the attack. That is, how household spending and business investment are affected. Here, the relative psychological impacts of different forms of terrorism will be an important determinant of the indirect loss that ultimately occurs. The public fears some types of terrorism more than others and the psychological and emotional impacts of those types of attacks will be greater. Greater psychological and emotional damages will almost certainly lead to larger shocks to consumer and business confidence. Those shocks, in turn, will lead to larger reductions in national economic output. Since the severity of the indirect national economic impacts will be strongly correlated with the psychological and emotional impacts of the terrorist act, programs designed to protect against the threats the public sees as most serious should be emphasized. Funding for programs to protect against and recover from those acts should reflect their higher priority.

Anticipating how consumers and producers will respond to a future terrorist incident is difficult. But policy set by implicitly assuming that all terrorist activity produces similar indirect economic damage is likely to misallocate the resources available for protection against terrorism. Knowledge of technical parameters, such as the relative cost of providing a particular level of security for a particular type of target, is vital to efficient allocation of scarce public resources. But policy makers also need information on the public's relative concern about different types of terrorist activities as they set the nation's anti-terrorism budget.

I. STUDY DESIGN

This paper reports results from a large survey of U.S. residents' attitudes and concerns about terrorism in the United States. The survey, funded by the National Center for Food Protection and Defense,[8] was conducted over the Internet by TNS-NFO[9] during the first week of August in 2005. Responses were obtained from 4,260 U.S. residents over the age of sixteen. The responses were weighted by age, race and ethnic origin, sex, income, and geographic region to reflect the characteristics of the national population. Respondents were asked to assess the likelihood of six different types of attacks and about the degree of physical, economic, and psychological and emotional damage each type of act would inflict on the country and on them personally. The separate terrorist acts covered by the survey were another aircraft hijacking, an incident involving another form of public transportation, destruction of a national monument, deliberate contamination of the food supply, disruption of the power grid, and release of a chemical or biological agent in a public area. [10]

To provide a further indication of the relative concern U.S. residents attach to different types of terrorist attacks, respondents also were asked how they believed anti-terrorist spending should be allocated among potential types of targets. The exact wording of that question was "For every $100 that you think should be spent to protect the country from terrorism, how would you divide it across the following types of attack? Enter a dollar amount for each. The amounts must sum to $100." The order of the choices given – another attack using a passenger aircraft, an attack on other public transportation, destruction of a national monument, deliberate chemical or biological contamination of a common food product, disruption of the electrical power grid, the release of a chemical or biological agent in a crowded public area, and "other" – was randomized across respondents except that the "other transportation" category always followed the questions on another attack using aircraft and "other" was always the last option.

Asking respondents to divide $100 among protection against specific types of terrorist attacks rather than using a more traditional contingent valuation, willingness-to-pay approach, has the advantage of being readily understood and simple to respond to. It yields a preference ranking, indeed a percentage measure, for the allocation of finite resources. The form of the question was decided on following focus group studies to determine how readily consumers can rank and price the value of reducing the risk of various types of terrorism.

The question does not specify $100 as the total amount of spending, but rather asks "of each $100 that should be spent to protect the country from terrorism." Similarly, the $100 was not specified as public or private sector spending. Clearly some of the spending to protect against terrorism will be done by the private sector. If we make the plausible

assumption that individuals unfamiliar with specific production technologies for reducing the probability of various types of terrorist attacks assume that the marginal reduction in the likelihood of a terrorist attack from an additional dollar spent is equal for each of the various types of attacks, the percentage allocations obtained provide a measure of the relative intensity or level of public concern over different types of terrorism. Under those assumptions the percentage allocations can also be used to provide a crude estimate of the amount the public believes should be spent to protect those types of targets from terrorist activity by comparing against the known level of spending to protect the air transportation system.

II. RESULTS

A. The Likelihood of Another Terrorist Attack

Nearly 98 percent of U.S. residents over age sixteen believed there will be another terrorist attack during their lifetime.[11] Trains or subways were thought to be the most likely target, with 96 percent indicating they expected an attack on that portion of the nation's transportation system during their lifetime (Table 1). Differences in the expectation of an attack were small, but statistically significant at the 95 percent level between all pairs of targets except for between the power grid and airplanes, food and the power grid, and food and national monuments.

It is possible that public concern over terrorism, particularly incidents on trains and subways, was temporarily heightened by the July 2005 subway bombings in London, England. As a partial check on any potential response bias caused by the London incidents, the proportion of the population who believed there would be a terrorist attack on a target other than a subway or railway system was also computed. After excluding other public transportation targets, 96 percent of U.S. residents still expected at least one more terrorist act in their lifetime, and most expect more than one.

Table 1: Percentage of United States Residents Expecting Another Terrorist Attack During Their Lifetime, by Type of Attack, August, 2005.

TYPE OF ATTACK (Target)	Percent
Public transportation	96
Release of a chemical or biologic agent in a crowded public area	86
Passenger aircraft	78
Disruption of the power grid	78
Deliberate chemical or biological contamination of a common food product	77
Destruction of a national monument	76

Indeed, 55 percent of the public expected at least one of each type of incident covered by the survey to occur during their lifetime. Nearly 86 percent believed a chemical or

biological agent will be released in their lifetime, and attacks on the power grid, the food supply, and national monuments were each expected by at least 76 percent of U.S. residents. Despite the high degree of public visibility given to efforts to make air travel secure from terrorism, 78 percent of the population over the age of sixteen believed there will be another aircraft hijacking incident.

Most also believed further terrorist attacks will occur in the relatively near future. At least one act of terrorism within four years of August 2005 was expected by 95 percent of the public (Table 2). Again, while differences in the perceived probabilities of attacks within four years were relatively small, differences between pairs of terrorist acts were all statistically significant except for those between release of a chemical or biological agent in a public area and disruption of the power grid. After possible attacks on trains or subways were excluded, nearly 81 percent of the public expected at least one terrorist incident during the next four years. An attack on the food system was thought least likely, but still 44 percent of U.S. residents expected a terrorist attempt to introduce a toxin into the food supply chain within four years.

Table 2: Percentage of U.S. Residents Expecting a Terrorist Attack within the Next Four Years, by Type of Attack, August 2005

ATTACK TARGET	Percent
Public Transportation	84
Passenger aircraft	53
Release of a chemical or biologic agent in a crowded public area	51
Disruption of the power grid	51
Destruction of a national monument	49
Deliberate chemical or biological contamination of a common food	44

B. Relative Impact of Alternative Terrorist Incidents

Respondents were asked to rate the impact of different types of terrorist events on America and on them personally. Then they were asked how the nation's anti-terrorism budget should be divided to protect against different types of terrorist attacks. The average percentages of the anti-terrorism budget assigned to protecting against each type of attack are shown in Table 3.

Despite their belief that other types of terrorism were more likely in the near future, the public believed the implications of an attack on the food system sufficiently serious that a greater percentage of anti-terrorism spending should be allocated to protecting the food supply than to defending any other potential target among the choices offered (Table 3).

On average, U.S. residents believed that more than 19 percent of the resources that should be spent to protect against terrorism should be spent to defend the food supply chain. Protecting against release of a chemical or biological agent in a public area was also seen as a high priority, receiving almost the same percentage allocation of anti-terrorism spending as was thought appropriate for protecting the nation's food supply chain.

Table 3: Percentage of Anti-terrorism Spending United States Residents Believe Should Be Allocated to Protecting against Particular Types of Terrorist Attacks, by Type of Terrorist Attack, August 2005.

Attack Target	Percent	Percent of Aircraft Spending
Deliberate chemical or biological contamination of a common food	19.13	113.3
Release of a chemical or biologic agent in a crowded public area	18.90	112.0
Public Transportation	17.06	101.1
Passenger aircraft	16.88	100.0
Disruption of the power grid	14.97	88.7
Destruction of a national monument	8.16	48.3
Other	4.91	29.1

This survey finds the public believed that about 17 percent of the anti-terrorism budget should be spent to secure subways and railways and just less than 17 percent to protect airline transportation. Preventing disruption of the power grid was allocated 15 percent of the anti-terrorism budget while 8 percent would go to preventing destruction or damage to a national monument and 5 percent to preventing other forms of terrorism.

The percentage allocations chosen for spending to protect against each different type of attack were all significantly different from zero. Differences between the public's allocations for activities to protect the food supply chain or to protect against potential chemical and biological attacks and the percentage of the anti-terrorism budget that should go for protecting air transportation were statistically significant at the 95 percent level.

When the percentage allocations of the homeland security budget indicated by the public were converted to spending levels as a percentage of the amount believed appropriate to provide secure air transportation, U.S. residents indicated they would allocate 13.3 percent more for protecting the food supply than for protecting airline travel. Preventing a chemical or biological attack was given 12 percent more, and protecting other transportation activities 1 percent more than preventing an aircraft hijacking.

C. Demographic Differences in Anti-terrorist Spending

Although the degree of personal concern about particular forms of terrorism varied considerably across respondents, for the most part differences in demographic characteristics did not appear to be strongly related to the way individuals believed the anti-terrorism budget should be allocated. Responses to the question asking how anti-terrorism spending should be allocated are summarized in Appendix A by sex, race and ethnic origin, age, education, income and geographic region. For ease in comparisons all spending allocations were normalized against the national average allocation thought appropriate to protect against future aircraft hijackings as identified in this survey. Results are reported as a percentage of the average national allocation for protecting air travel.

Differences in the percentages of the anti-terrorism budget that particular cohorts believed should be allocated to protecting the airways generally were small. For most,

allocations were within two or three percent of the national average. There were, however, substantial differences for African-Americans and Hispanics. On average African-Americans allocated 115 percent of the national average to protect air travel, and Hispanics allocated 110 percent. Individuals over the age of sixty-five devoted the least of any group to preventing terrorist hijackings, 93 percent of the U.S. average.

There was broad and very uniform agreement that less should be spent to protect national monuments than to protect any of the other potential targets listed in the survey. With few exceptions U.S. residents – no matter their age, education, race, or income – believed that protecting our national treasures should receive only about one-half as much funding as that used to secure air travel. Individuals with annual incomes of $20,000 or less and Hispanics allocated the most to protecting monuments, just over 58 percent of the amount spent to secure air travel. Individuals age sixty-five or over would spend the least, less than 43 percent as much as the national average thought appropriate to protect air travelers. Most groups allocated an amount equal to roughly 50 percent of the resources devoted to protecting against another terrorist attack using aircraft. Non-Hispanic whites would allocate 48 percent as much; blacks, only 42 percent as much.

The public also would allocate fewer resources to protecting the nation's power grid from disruption by terrorists than to preventing air hijackings. On average U.S. residents believed about 89 percent of the amount spent to protect air travel should be spent to secure the power grid.

Here, however, variations among cohorts were wider. Those over the age of sixty-five allocated nearly two percent more to protecting the electrical power system than the national average for protecting air travel, and those in the East North Central Region and the Mountain states allocated just 1 percent less than for protecting air travel. Those under the age of forty allocated only 79 percent as much as for air security, and blacks and Hispanics respectively spent 74 percent and 72 percent as much.

On average, the public believed slightly more should be spent to protect the commuter and rail transportation networks from terrorist attacks than to secure civilian air traffic. But again, there were significant differences in the amounts particular cohorts believed appropriate. Some assigned a very high priority to protecting subways and railways from terrorism, while others believed protecting commuter rail deserves significantly less funding than does protecting air travel.

Individuals in the public transportation-dependent Mid-Atlantic and New England states allocated nine percent and eight percent more respectively to protecting other transportation networks than to securing the airways. Those in the West South Central States would spend 93 percent as much. College graduates allocated more than six percent more for protecting subways and railways, while those with a high school degree or less would spend only 96 percent as much as they would to protect air travel. Individuals with household incomes greater than $60,000 would spend more to protect the commuter transportation network than to protect air travel, while those with incomes less than $60,000 would spend less.

There also was broad agreement that protecting the food supply chain and preventing the release of a chemical or biological agent in a public area were the anti-terrorist activities deserving the most funding. The public allocated about 13.3 percent more for food protection and 12 percent more for protecting against release of a chemical or biological agent than they did to protecting against another 9/11-style attack using hijacked aircraft. Again, distinct differences appeared across racial and ethnic groups. Non-

Hispanic whites allocated nearly 16 percent more to protecting the food supply and 11 percent more to protecting against a chemical or biological attack than to securing air travel. While the increment over spending to protect air travel was smaller for African Americans and Hispanics, they still devoted more of the anti-terrorism budget to protecting the food system and preventing release of chemical or biological agents than to protecting the airways. The spending ratios for defense of the food system increase with age; those for protecting against a chemical or biological attack decrease with age. There was no distinct pattern with respect to income for either food protection or protection against chemical or biologic agents.

D. Changes in Relative Concern after Additional Information on the Potential Severity of Food Terrorism Incidents Is Provided

Once respondents had made an initial distribution of funds for defending against possible terrorist activities, a scenario describing the progression of events following a potential food terrorism incident was introduced.[12]

> Emergency room visits and hospital admissions suddenly increase in the region where you live. A food-borne toxin is suspected to be the cause. The number of individuals affected continues to grow over the next several days and some of those hospitalized die. Similar patterns are seen in other metropolitan areas within the region. The number of fatalities associated with this problem grows. State and national agencies struggle to identify the source of the problem. Ten days after the first report a statement is issued by a government agency saying that there has been a deliberate attempt to contaminate the food system. By comparing the pattern of affected consumers and the distribution of various types of food products a single commonly used food product has been identified as the source. It is estimated that more than 50,000 units of the contaminated product have already been purchased. Consumers are instructed to bring all unused product to central collection sites for disposal. Ultimately the death toll from this incident reaches 1,500.

After reading the above scenario respondents were again asked to allocate resources to combat terrorism. Differences between the naïve and post-scenario results are shown in Table 4.

Table 4: United States Residents' Percentage Allocation of Anti-terrorism Budget, by Target of Attack, Naïve and Post Scenario Allocations, August 2005.

Attack Target	Percent (Naïve)	Percent (Post-Scenario)	Change Up (down)
Deliberate chemical or biological contamination of a common food	19.13	22.88	3.75
Release of a chemical or biologic agent in a crowded public area	18.90	18.77	(0.13)
Public transportation	17.06	16.39	(0.67)
Passenger aircraft	16.88	15.48	(1.40)
Disruption of the power grid	14.97	14.41	(0.56)
Destruction of a national monument	8.16	7.84	(0.32)
Other	4.91	4.24	(0.67)

As anticipated, the proportion of anti-terrorism spending that respondents believed should go to protect the food supply system increased substantially. Post-scenario responses called for programs protecting the food system to receive nearly 23 percent of all anti-terrorism spending, 3.75 percentage points more than before respondents were informed of the potential consequences of an act of food terrorism. Protecting against release of a chemical or biological agent in a crowded public area remained the second highest priority and the proportion of the anti-terrorist budget that should be devoted to that mission remained almost constant, falling by just over 0.1 percentage points.

The proportion of resources believed appropriate to protect against another airline hijacking fell by the largest amount, down 1.4 percentage points from the average of earlier responses. Allocations to protecting other transportation systems, national monuments, the power grid, and other targets also fell, but by smaller amounts. All allocations in the post-scenario responses were significantly different from the airline allocation, and the allocations for each potential terrorist target changed significantly from the naïve responses except the allocation for preventing the release of a chemical or biological agent in a crowded public area.

Women, African Americans, and individuals with a high school education or less increased the proportion of spending they believed should be devoted to protecting the food supply the most after being given additional information (Appendix Table A). African Americans and individuals residing in the East and West South Central States reduced the proportion of spending they believed should go to secure the airways by more than the national average, while men and college graduates reduced their allocation for that activity by less than the national average. There were relatively small differences in the changes in resources that were thought appropriate for the other anti-terrorist activities.

III. POLICY IMPLICATIONS AND CONCLUSIONS

Our survey results indicate the public would devote larger percentages of the nation's anti-terrorism spending to preventing deliberate contamination of food items and to protecting against release of toxic chemical or biologic agents than to preventing other types of terrorist attacks. A comparison of the public's allocation of anti-terrorism spending with the actual distribution of federal homeland security spending indicates current spending allocations do not match the public's expressed preferences.

We do not argue that decisions on the size and internal allocation of the nation's homeland security budget should be made on the basis of a public opinion poll. Determining how much should be allocated to protect against particular types of terrorism is a complex, multi-dimensional problem and the cost of achieving a pre-set level of security from terrorism will depend on technical factors specific to the target and the type of attack. The level of security the public demands for each type of target also will depend on the cost of providing various levels of security. Clearly, if sufficient security can be provided at a low cost there is no need to spend additional amounts to protect a particular target, even if the public, lacking knowledge of technical factors affecting the cost of providing security, would allocate a higher percentage of homeland security spending to protecting that objective.

We do argue that, given limited information on the public's demand for protection against various types of terrorism, these survey results provide an indication of the intensity of the public's preferences for protection against certain forms of terrorism.

Those preferences are important and need to be considered by policy makers since the indirect economic losses associated with a terrorist attack will almost certainly be greater if the attack is one that plays more heavily on the public's fears. For example, survey responses indicate the indirect economic impact of deliberate contamination of a common food product will be greater than the impact of disruption of the power grid. Comparing how federal spending for homeland security is currently allocated with how the public would allocate it provides a crude measure of how well homeland security is being targeted to address the areas of greatest public concern.

Enacted and supplemental appropriations for homeland security by all federal agencies totaled $55 billion in fiscal 2006 (Table 5). That total was spread across the budgets of thirty-three federal agencies in support of six national strategy missions. After removing spending by the Department of Defense, non-defense homeland security budget authority was $38 billion.[13] Four departments – Homeland Security, Health and Human Services, Justice, and Energy – accounted for nearly 90 percent of the non-defense federal homeland security budget in fiscal 2006.

Table 5: Homeland Security Funding by National Strategy Mission, 2006 Fiscal Year Budget Authority, $ Millions.

Mission	Enacted 2006 ($ Millions)	Percent of Total
Intelligence and Warning	$428	0.8
Border and Transportation Security	18,508	33.6
Domestic Counterterrorism	4,566	8.5
Protecting Critical Infrastructure and Key Assets	17,852	32.4
Defending Against Catastrophic Threats	8,640	15.6
Emergency Preparedness and Response	4,940	8.9
Other	112	0.2
Total Budget Authority	$55,046	100

Source: *Analytical Perspectives*, *Budget of the United States Government, Fiscal Year 2007,* 21.

Thirty-four percent of total federal spending for the broader homeland security program goes to support the border and transportation security missions and 32 percent to protecting critical infrastructure and key assets. More than 62 percent of the funding for that mission goes through the Defense Department budget. Protecting against catastrophic threats, the program area that includes protecting against chemical, biological, radiological, and nuclear threats, as well as safeguarding the food system, was allocated $8.6 billion in fiscal 2006.

In comparison, federal spending specifically directed to protecting civil aviation from terrorism was expected to total about $6.4 billion in fiscal 2006, 11 percent of all federal homeland security spending.[14] The $6.4 billion is the total amount spent by the public and private sectors for civil aviation security. The Aviation and Transportation Security Act specifically notes that protecting civil aviation is a matter of national security and therefore the responsibility of the federal government.[15] The Transportation Security Administration (TSA) is specifically charged with responsibility for protecting civil aviation and TSA funds

all airport passenger and baggage screening activities as well as technology development and purchases.[16] About 36 percent of TSA's 2006 expected spending came from passenger and air carrier security fees transferred to the agency; the remainder, from general fund appropriations.

The survey indicates the current distribution of resources between air carrier security and protection against catastrophic attacks does not reflect Americans' relative concerns about those particular types of attacks. Total federal funding for programs protecting against all types of catastrophic attacks totaled $8.6 billion in fiscal 2006, only 34 percent more than was allocated to protecting the airways from terrorism. Yet this survey indicates U.S. residents would spend 113 percent of the amount spent to protect the airways just to prevent deliberate contamination of the food supply and an additional 112 percent of the amount spent to protect against aircraft hijackings to prevent the release of toxic chemical or biological agents in a public area.

Put another way, the survey indicates that U.S. residents believe that for every $1 spent to protect against a terrorist attack using hijacked aircraft $1.13 should be spent to protect America's food system[17] and an additional $1.12 should be spent to protect against an attack using a chemical or biological weapon. The current ratio of federal spending for programs protecting against all types of catastrophic terrorist incidents to that for protecting aircraft falls well short of meeting that standard, even when activities protecting against all other types of catastrophic attacks including radiological or nuclear incidents are ignored.[18]

It is true that it may be more expensive to provide a given level of security for air travelers. It is also true that the federal budget is not the only source of spending to protect the food supply or to protect against release of toxic chemical or biologic agents as it is for securing the airways. The private sector should be expected to assume some of the responsibility for protection against the deliberate food contamination and the release of toxic agents in public areas, and it does.

Although there are no comprehensive estimates of private spending to secure the food chain, reports documenting spending on food safety offer an indication of the amount spent by the private sector and state and local government for a similar, but less complex task.[19] Combined spending by the USDA's Food Safety and Inspection Service, the FDA, and state agricultural and health departments was estimated to total $1.3 billion in 1999.[20] Private meat and poultry processors are estimated to have spent about $380 million annually and made $570 million in long-term investments between 1996 and 2000 to comply with USDA's 1996 Pathogen Reduction/Hazard Analysis Critical Control Point (PR/HACCP) regulation.[21] That same survey found the U.S. meat and poultry industry made an additional $360 million in food safety investments during that period for items not required by the PR/HACCP rule.

But even after taking potential private sector spending into account, the ratio of funding to protect against catastrophic incidents to that for protecting against aircraft hijackings appears low. USDA's share of the $8.6 billion budgeted government-wide in fiscal 2006 for the national mission of defending against catastrophic threats was $238 million.[22]

Ultimately, the test for homeland security budget policy is whether the resources needed to provide the level of protection demanded by the public are available. As with all public budget decisions, balancing expected outcomes with costs is the key, even though these particular decisions are particularly difficult because they involve determining the level of spending needed to protect against low probability events with catastrophically high costs.

Results from this survey raise the question of whether the current ratio of spending to protect against further terrorist attacks using hijacked aircraft to spending to protect against deliberate contamination of the food supply and intentional release of a toxic agent in a public area are consistent with the value the public places on protection against those types of terrorist attacks.

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Appendix A

Desired Allocation of Anti-Terrorist Spending as a Percentage of Spending to Protect Aircraft, by Type of Event and Socio-economic Characteristics, Naive and Post-Scenario Results

NAIVE

Types of Attacks	All	Gender		Race		
		Male	Female	White, Non-Hispanic	African American	Hispanic
Food	113.3	109.3	115.2	115.5	106.3	105.9
Chemical-Biological	112.0	111.8	112.0	111.2	112.5	113.7
Other Transportation	101.1	102.1	100.5	100.5	105.5	103.8
Aircraft	100.0	95.7	102.1	97.3	114.9	109.5
Power Grid	88.7	89.4	88.3	92.9	74.5	71.6
Monument	48.3	46.9	49.1	47.4	47.9	55.5
Other	29.1	37.2	25.2	27.7	30.9	32.4

POST-SCENARIO

Types of Attacks	All	Gender		Race		
		Male	Female	White, Non-Hispanic	African American	Hispanic
Food	147.8	134.1	154.3	149.7	145.5	137.7
Chemical-Biological	121.3	121.6	121.1	120.2	120.3	126.0
Other Transportation	105.9	109.1	104.3	106.3	105.7	104.7
Aircraft	100.0	98.6	100.6	98.4	109.4	107.5
Power Grid	93.1	96.1	91.6	95.9	83.2	80.9
Monument	50.6	50.6	50.7	49.2	51.2	58.8
Other	27.4	35.9	23.3	26.2	30.7	30.5

NAIVE

Types of Attacks	All	Age			Education		
		<40	40 to 64	65+	High School or Less	Some College	College Graduate
Food	113.3	110.4	114.6	117.0	113.0	113.6	113.2
Chemical-Biological	112.0	115.2	110.6	107.3	110.2	112.0	112.7
Other Transportation	101.1	99.0	102.4	101.5	95.6	99.2	106.4
Aircraft	100.0	105.5	97.5	93.5	103.5	102.1	95.6
Power Grid	88.7	79.0	92.7	101.7	89.3	86.2	91.2
Monument	48.3	52.7	46.5	42.7	51.2	49.6	45.1
Other	29.1	30.6	28.1	28.7	29.6	29.6	28.3

POST-SCENARIO

Types of Attacks	All	Age			Education		
		<40	40 to 64	65+	High School or Less	Some College	College Graduate
Food	147.8	145.0	149.2	150.0	155.7	149.2	141.7
Chemical-Biological	121.3	123.1	120.4	119.2	116.8	121.2	123.8
Other Transportation	105.9	103.4	107.9	103.7	98.7	104.7	111.4
Aircraft	100.0	104.7	98.0	94.1	101.7	100.9	97.9
Power Grid	93.1	85.7	95.6	105.6	91.5	91.5	95.8
Monument	50.6	56.4	48.1	44.3	54.1	51.4	47.7
Other	27.4	27.8	26.7	29.2	27.4	27.2	27.6

NAIVE

Types of Attacks	All	Income					
		<$20,000	$20,000-$39,999	$40,000-$59,999	$60,000-$79,999	$80,000-$99,999	>$99,999
Food	113.3	110.2	119.3	114.0	109.2	117.1	116.5
Chemical-Biological	112.0	109.1	111.0	115.2	109.4	113.3	112.4
Other Transportation	101.1	92.0	90.8	95.0	109.1	104.4	105.6
Aircraft	100.0	102.5	97.7	98.3	103.1	101.5	97.5
Power Grid	88.7	85.5	91.4	88.7	89.1	84.5	89.5
Monument	48.3	52.2	52.5	49.2	46.7	47.4	48.9
Other	29.1	40.9	29.7	32.0	25.7	24.1	22.1

POST-SCENARIO

Types of Attacks	All	Income					
		<$20,000	$20,000-$39,999	$40,000-$59,999	$60,000-$79,999	$80,000-$99,999	>$99,999
Food	147.8	141.8	156.1	150.8	141.8	149.9	150.5
Chemical-Biological	121.3	116.8	116.7	123.5	121.3	122.7	121.6
Other Transportation	105.9	100.0	97.9	98.1	111.1	109.6	112.4
Aircraft	100.0	104.3	97.5	97.7	100.8	102.3	99.8
Power Grid	93.1	92.1	96.0	91.0	96.0	89.5	92.4
Monument	50.6	58.9	54.7	51.4	50.3	50.4	50.5
Other	27.4	32.2	27.1	33.7	24.8	21.6	18.7

NAIVE

Types of Attacks	All	Geographic Regions								
		New England	Mid Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Food	113.3	114.4	108.9	115.5	119.4	109.9	120.8	114.2	107.6	114.9
Chemical-Biological	112.0	110.1	111.2	110.8	110.5	113.2	111.3	111.3	106.8	116.6
Other Transportation	101.1	107.8	109.1	96.0	97.3	103.1	97.1	92.8	103.4	102.7
Aircraft	100.0	103.1	98.9	95.5	101.3	101.5	104.7	101.3	95.3	
Power Grid	88.7	82.2	88.0	98.6	90.8	87.8	82.9	87.6	98.2	80.1
Monument	48.3	48.7	48.2	46.6	45.6	47.7	47.8	50.8	50.6	49.6
Other	29.1	26.1	28.1	29.4	27.5	29.2	27.8	34.1	30.6	27.4

POST-SCENARIO

Types of Attacks	All	Geographic Regions								
		New England	Mid Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Food	147.8	149.8	142.2	149.7	152.9	142.6	158.7	150.8	139.5	151.5
Chemical-Biological	121.3	121.1	120.7	121.3	122.9	122.0	114.3	120.2	118.5	124.8
Other Transportation	105.9	111.3	114.0	101.4	99.4	109.7	104.3	100.3	105.6	104.4
Aircraft	100.0	102.8	101.9	95.8	100.8	101.7	101.0	96.1	97.7	102.6
Power Grid	93.1	85.5	93.2	101.3	94.7	91.5	88.8	96.4	98.1	85.1
Monument	50.6	51.6	50.3	50.1	46.7	50.5	50.2	51.4	54.7	51.5
Other	27.4	24.1	23.8	26.4	28.6	28.1	28.6	30.9	32.0	26.2

[1] This total covers the homeland security funding and activities of all federal agencies, not just the programs funded through the Department of Homeland Security (DHS). Costs of some activities of agencies within DHS are not included. The budget allocation going to support Coast Guard Search and Rescue activity, for example, is not included in the total funding for homeland security activities. U.S. Office of Management and Budget, *Analytical Perspectives*, *Budget of the United States Government, Fiscal Year 2006* (Washington, DC: Government Printing Office, 2006), 37-52.

[2]Although no estimates of increases in private sector spending and in state and local government spending for security are available, similar growth rates would be expected.

[3]U.S. Department of Homeland Security, *Performance Budget Overview, Congressional Budget Justification* (Washington, DC, 2006), 17.

[4]Robert E Litan and Peter Orzag, "A Complicated Intersection: Public Action to Protect Private Property," *Brookings Review* 20, no. 3 (2002): 20-23.

[5] See F. Kuchler and E. Golan, "Where Should the Money Go? Aligning Policies with Preferences," *Amber Waves* 4, no. 3 (June 2006): 31-37 for an example of the use of use value of life information to provide information on the benefits from food safety.

[6]Thomas F. Stinson, "The National Economic Impacts of a Food Terrorism Event – Initial Estimates of Indirect Costs," in *The Economic Costs and Consequences of Terrorism*, eds. Harry W. Richardson, Peter Gordon and James E. Moore II (Cheltenham, UK: Edward Elgar Publishers, 2006).

[7]Jason Bram, James Orr, and Carol Rapaport, "Measuring the Effects of the September 11 Attack on New York City," *Economic Policy Review* 8, no. 2 (2002): 5-20.

[8]The National Center for Food Protection and Defense was established and funded by the Department of Homeland Security in July 2004. It is located at the University of Minnesota.

[9] TNS NFO (formerly NFO World Group) is a leading provider of panel-based market research in the US. It collects data on consumer behavior, brand performance, and campaign effectiveness by mail and telephone surveys of about 500,000 households. It also collects data online from more than one million other homes. In return for their participation, panelists received points they could add to points accumulated from other studies conducted by TNS-NFO to redeem for prizes.

[10]The actual questions used are available from the authors on request. It was thought that concerns over a possible dirty bomb attack would heavily dominate all other terrorist acts so no questions about how serious that type of act would be were included in the survey. There was also no attempt to elicit a response on spending to prevent a dirty bomb attack, although an open-ended "other" category was listed. Only 1.5 percent listed nuclear weapons in the other category.

[11]Standard errors for these estimates are less than 0.8 percent.

[12]In focus groups conducted prior to the survey there was some confusion about how serious a food terrorism event might be. Some individuals thought it to be very serious with a large number of fatalities while others believed that food terrorism would produce nausea and other flu-like symptoms, but no fatalities. Removing some of the ambiguity associated with the likely impact of a terrorist attack on the nations food system was expected to produce a more consistent set of spending allocation decisions.

[13]U.S. Office of Management and Budget (OMB), *Analytical Perspectives*, *Budget of the United States Government, Fiscal Year 2006* (Washington, DC: Government Printing Office, 2006), 37-52.

[14] Specifically, estimated outlays for the aviation security program are $5.162 billion; for the federal air marshal program, $0.679 billion; for transportation security support, $0.488 billion, and for the Office of Transportation Threat Assessment and Credentialing, $0.92 billion. U.S. Office of Management and Budget, *The Budget for Fiscal Year 2007, Appendix, Department of Homeland Security* (Washington, DC: Government Printing Office, 2007), 484-87.

[15]Section 101 specifically directs the TSA to provide for the screening of "all passengers and property, including United States mail, cargo, carry-on and checked baggage, and other articles that will be carried aboard a passenger aircraft." While there may be some costs absorbed by the airlines with respect to screening for private charter flights, the vast majority of the costs of providing security for civilian air traffic are covered within the TSA budget.

[16] They also are used to support privatized passenger and baggage screener contracts, airport managerial and support activities, air cargo screening operations, operational testing, and activities to improve flight deck and aircrew safety.

[17] This spending would be in addition to spending currently being undertaken for food safety, or the protection of consumers against naturally occurring contaminants, or inadvertent contamination. Later in the questionnaire the difference between food safety (protecting against a naturally occurring contaminant) and food defense (protecting against the intentional introduction of a toxin) was noted. When respondents were asked how spending should be divided between food safety and food defense, they indicated a slight tilt toward food safety, with 53 percent of combined food safety and food defense going to food safety activity and 47 percent to food defense.

[18]The 2007 Budget indicates a small amount ($93 million) of spending under the protecting critical infrastructure mission went to protect the food supply chain

[19] Food safety activity is directed toward detecting natural or accidental contamination of food products. Food defense is directed toward protecting against deliberate contamination of the food supply. While there are some complementarities between the two activities, they are not substitutes since food defense is directed toward protecting against and detecting toxins that would not normally occur in food products.

[20] U.S. General Accounting Office, *Food Safety: Overview of Federal and State Expenditures,* GAO-01-177 (Washington, DC: Government Printing Office, 2001), 83.

[21] M. Ollinger, D. Moore and R. Chandran, *Meat and Poultry Plants' Food Safety Investments: Survey Findings,* Technical Bulletin No. (TB1911), (Washington, DC: USDA, 2004), 48.

[22] OMB, *Analytical Perspectives*.