Where Should the Money Go?

Aligning Policies With Preferences

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- Budget constraints force policymakers to choose which programs to fund, even when human health and safety are at risk.

- New Federal guidelines emphasize tallying health outcomes to help decide among programs.

- Benefit estimates based on money measures of risk preferences provide better guidance on programs most highly valued by society.

Homeland security, avian flu, floods, health care, hunger, obesity—the list of life-and-death issues competing for government funding is long and seems to be growing. Policymakers are increasingly faced with allocating scarce funds among critical programs. Should more funding go to safer airports or safer food? Nutrition programs or kidney machines? Flood relief or avian flu control?

Though there are no rules for making these types of decisions, economic principles can help. The principle of weighing costs and benefits can help policymakers determine which programs will save the most lives or lead to the largest improvements in health and well-being. But there are a variety of ways to tally costs and benefits. Analyses using health-based benefit measures—the type of benefit measure newly required by the Office of Management and Budget (OMB) for all economically significant rules—provide information on health outcomes. Analyses using money to estimate health-risk preferences provide policymakers with information on the types of risk reduction most highly valued by society. Only by recognizing that preferences for risk reduction vary across risks can we make sense of how to best spend scarce funds.

Analysts Need a Standard Benefit Measure To Compare Diverse Outcomes

The first step in determining which regulations to fund is to devise a method to compare diverse health outcomes. The list of health risks regulated by the government is long and varied, as is the list of government agencies responsible for their administration. The Department of Transportation, the Department of Labor, the Environmental Protection Agency, the Department of Homeland Security, the Department of Agriculture, the Consumer Products Safety Commission, and the Food and Drug Administration (FDA) are among the Federal agencies responsible for programs affecting life and health. These agencies all manage risks associated with a daunting variety of health outcomes, ranging from mild illnesses to death. Foodborne pathogens alone pose risks that include kidney failure, arthritis, paralysis, and death.

A comparison of health risks is further complicated by the fact that the affected population may also vary. Some hazards, like foodborne pathogens, pose greater risks to children and the elderly. Others, such as workplace chemicals and machinery, are hazards mainly for working-age adults. While it is difficult to compare the value of preventing diverse health outcomes, such as renal disease and paralysis, it is even more difficult to make these comparisons when diseases afflict children and adults at different rates.

To overcome the problem of comparing diverse health outcomes in diverse populations, analysts must translate improvements in health and well-being into a common unit of measurement. Some use health as the unit of measurement, others choose money. Either unit of measurement entails difficult philosophical choices about what to value and methodological challenges about how to

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assign values. Analyses based on one unit are not necessarily comparable to those based on the other.

Health-Based Measures Provide Information on Health Preferences

The most common approach for translating diverse health outcomes into a standard health measure uses health- or quality-adjusted life years (QALYs). The QALY approach translates health outcomes to healthy-time equivalencies using a health index that accounts for changes in both length and quality of life. To calculate QALYs, analysts use individual assessments of health outcomes arrayed on a 0-1 scale, with 0 indicating death and 1 indicating robust good health.

QALYs, and other nonmonetary health-based benefit estimates, can be used to provide a ranking of potential program benefits, with programs saving the highest number of QALYs ranked highest. A ranking of health outcomes by itself, however, does not usually provide enough information to inform policy decisions. Policymakers must also have information on the costs of programs to determine which policies are the most cost effective—yielding the greatest increase in

Numerous Federal agencies manage programs affecting health.

health per dollar. The need for economic balancing is inevitable in a world of constrained resources. It is impossible to protect everyone from every threat to their health and safety.

If costs are not considered when allocating funds among health or life-saving programs, programs that save lives at great expense may be funded before inexpensive programs that save just as many. If funding is allocated efficiently, the amount of money spent to save one life or prevent a particular adverse health outcome should be similar across programs. If funding is allocated inefficiently, the amount varies and more lives could have been saved and health better protected. All things being equal, programs with the highest number of lives saved per dollar or the highest QALY per dollar cost ratio should be funded before those with lower cost-effectiveness ratios.

Health-based cost-effectiveness analysis is a relatively new step in the Federal regulatory process. In 2003, OMB began requiring that Federal agencies provide this type of cost-effectiveness analysis for all economically significant rules. This new requirement, bolstered by the 2006 guidance document developed by the National Academy of Sciences' Institute of Medicine, has focused Federal efforts on cost-effectiveness analysis.

A ranking of policies by health-based cost effectiveness is invaluable for helping policymakers allocate funding among safety programs, but such a ranking does not tell whether any program is worth the price. For example, a cost-effectiveness ranking may indicate that a $1 million

VALUING HEALTH
FOR REGULATORY COST-EFFECTIVENESS ANALYSIS
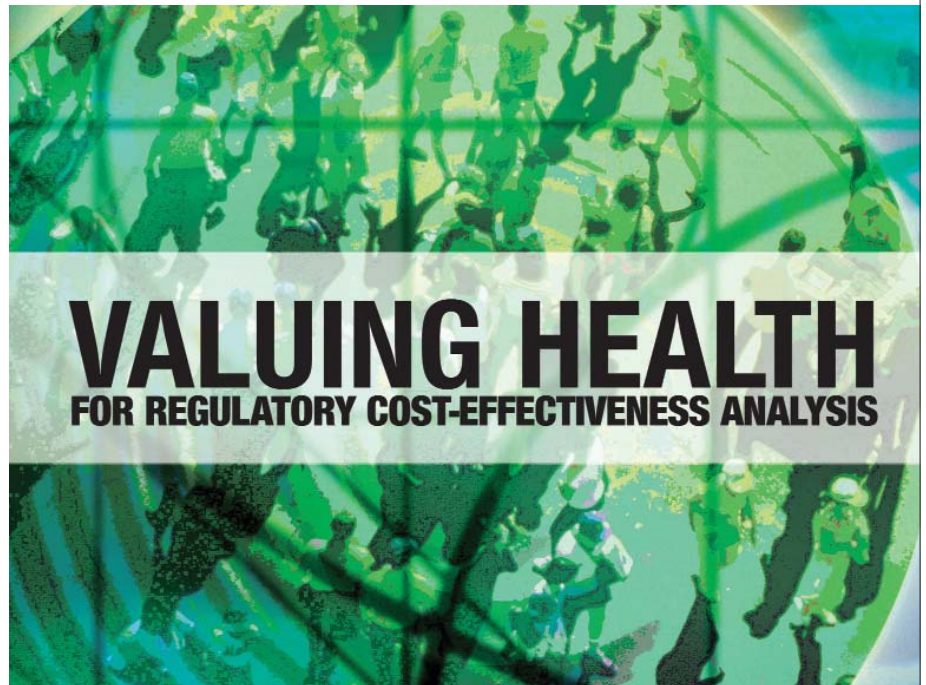
In 2006, the Institute of Medicine published guidelines for measuring program benefits in terms of health outcomes per dollar spent.

kidney dialysis machine that saves 10 lives is a better buy than a $2 million nutrition program that saves 10 lives, but it does not indicate whether either program is worth the cost. Analysts must turn to dollar-based benefit estimates for this type of information.

Money-Based Measures Provide Information on a Wide Range of Preferences...

Analysts' first attempt at assigning money values to diverse health outcomes relied on the actual expenses incurred because of illness or premature death. This approach, known as the cost-of-illness (COI) approach, became common in health policy 40 years ago. With COI, economists tally the dollars spent on medical expenses and income forgone as a result of illnesses, accidents, or premature deaths. COI estimates provide an ex-post accounting of the economic impact of illness. Such an accounting is the basis of liability or tort law. When courts set compensation for wrongful death or injury, compensation is usually limited to lost earnings.

Until the early 1980s, most government agencies calculated benefits from health and safety regulations as the reduction in COI due to the regulation. ERS has estimated the medical and productivity costs (nonfatal) for Shiga-toxin producing *E. coli* strain O157 (STEC O157) infections at $38.7 million. Like health-based benefit measures, COI-based benefit measures can provide a cost-effectiveness ranking of

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policies. All things being equal, programs with the highest COI averted per dollar cost should be funded before those with lower ratios. In addition, because COI is measured in dollars, it also provides policymakers with information on whether programs are worth the cost. Only when analysts use dollars to measure both costs and benefits are they able to calculate net benefits—the value of a program minus the value of goods and labor services that have to be used to carry out the program. Negative net benefits indicate that the program is not worthwhile, even if it is ranked higher than every other program. In short, the goods and labor services that would be used to secure the benefits are more valuable elsewhere.

A money measure also allows analysts to compare values and consider tradeoffs among all goods and services.

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For example, the net benefits of a nutrition program could be compared with those of a college scholarship program. QALYs do not provide a straightforward means for making comparisons with non-health goods and services.

...Including Risk Preferences

COI was a major innovation in health policy analysis as it highlighted the notion that human capital has value just like physical and financial capital do, and COI offered a way to quantify those values. However, the approach tends to place rela-

tively low values on the lives of children and the elderly because they are not wage earners. The COI approach offers no way to account for pain and suffering. Nor does COI measure individuals' preferences for risk reduction, the major function of government health and safety programs.

More recently, the willingness-to-pay (WTP) approach has been used to translate projected risk reduction into money values. With WTP, economists measure the resources (dollars) individuals are willing and able to give up for a reduction in the probability of encountering a certain hazard. WTP attempts to measure the value individuals place on preventing risks to life and health.

The WTP method rests on the observation that individuals can and do make tradeoffs between health and other goods and services. Even though individuals may place an infinite value on their own lives (and the lives of those they hold dear), they do not feel similarly about small changes in risk. Individuals routinely and voluntarily accept many small risks in exchange for finite benefits. For example, driving a little faster than surrounding traffic may raise the risk of injury but could result in reaching a destination sooner. Or, a person might enjoy attending a popular movie at a crowded theater, recognizing that the activity raises the risk of contracting a contagious disease. WTP estimates are an ex-ante measure of the value individuals place on reducing the risk of a particular injury, illness, or death.

The WTP approach, unlike any other, targets funding toward the type of risk reduction most highly valued by individu-

> If funding for health and safety programs is prioritized without any regard to preferences, then deaths due to skiing would be ranked equal to those due to childhood leukemia.

PhotoSpin

Economists widely recognize the value of accurate WTP for policy guidance, and WTP is now commonly used to estimate the benefit side of cost-benefit analyses.

als. There are profound differences in the ways that individuals value reductions in different risks. Some risks rank quite low when preferences are considered. For example, skiing carries a risk of injury and death, but very few skiers (or nonskiers) would welcome a government program that banned skiing on the basis of risk. Saccharin may carry a cancer risk, but we know that consumers are willing to accept the risk for the benefit of a noncaloric sweetener. In the late 1970s, FDA attempted to ban saccharin on the basis of potential cancer cases, but consideration of consumer preferences led Congress to stop FDA's action.

Other risks rank quite high when preferences are considered. For example, potential exposure to cancer-causing pollutants may alarm many individuals, even when risks are identical to those of saccharin. Researchers have found, for example, that a significant proportion of the population values reductions in cancer risk much more highly than reductions in the risk of automobile fatality.

If funding is prioritized without any regard to consumer preferences, on the basis of either non-monetized health outcomes or COI, then deaths due to skiing would be ranked equal to those due to childhood leukemia. WTP benefit estimates provide policymakers with information on the value of reducing specific risks, not just health outcomes. Though QALYs may also indicate individual preferences toward pain and suffering, they only measure preferences over health outcomes, not over source or type of risk.

Money-Based Measures for Food Safety in Short Supply

Economists widely recognize the value of accurate WTP measures for policy guidance, and WTP is now commonly used to estimate the benefit side of cost-benefit analyses. For data reasons, many Federal agencies have adopted the practice of using

an estimate derived from compensating wage studies to estimate a variety of WTP values. Compensating wage studies calculate the amount of money workers must be paid to leave them indifferent between jobs that entail different likelihoods of fatal injuries. Estimates of a "value of a statistical life" from compensating wage studies range from around $3 million to $7 million (in 1990 dollars). ERS has estimated the WTP to avoid fatal foodborne *E. coli* (STEC O157) illnesses at $392.8 million (2005 dollars).

The practice of using a single value derived from compensating wage studies to estimate WTP values flies in the face of empirical evidence. For food safety risks, this practice could potentially lead to large

measurement errors because both the population most vulnerable to foodborne risk and the characteristics of foodborne risk are quite different from those in most compensating wage studies.

Those most vulnerable to complications from foodborne illness are infants, the elderly, and the immunocompromised—not the working-age males at the heart of the compensating wage studies. Empirical evidence suggests that people have different risk preferences with respect to these vulnerable groups. In investigating risk preferences toward household chemicals, insecticides, and cleaning products, researchers found a WTP to reduce risks to children 2.3 times

The value of preventing premature deaths from *E. coli* swamps the cost-of-illness estimates

	$ million (2005)
Cost-of-illness (COI) approach:	
Medical care	
Medications	0.5
Office visits	2.2
Emergency room visits	2.7
Hospitalization	21.2
Chronic medical conditions	6.8
Lost productivity (nonfatal)	5.3
Total	38.7
Willingness-to-pay (WTP) approach:	
Value of preventing premature deaths	392.8

Source: Calculated by USDA, Economic Research Service using CDC 1999 incidence estimates.

Estimating Benefits Is a Research Problem, Not an Accounting Issue

The biggest practical problem in estimating the dollar value of a food safety rule or regulation is the lack of a market for reducing food safety risks. If food were marketed by risk levels (say, probabilities of inducing cancer) and consumers treated advertised risk levels as they do other objectively measurable product characteristics (weight or volume), valuing food safety would be easy. Product prices could be statistically associated with risk levels, yielding consumers' risk-dollar tradeoff. That is, consumer purchases would demonstrate the dollar value they attach to particular types of risk reduction.

Unfortunately, there is no obvious dollar value to assign to the major benefits of food safety programs—a reduction in the risks of foodborne illnesses—and there is no price that can be tabulated from commercial transactions. Although individuals do take actions that might reduce these risks, those actions do not leave a behavioral trail that is easy for analysts to follow.

ERS is trying two approaches to find out how much individuals value lower risk of illness due to foodborne pathogens. Through cooperative research with Harvard University's Center for Risk Analysis and the University of Wyoming, two surveys have been administered to consumers through the Internet.

Eyewire

A contingent valuation survey, conducted in summer 2004, asked respondents about their behavior and what they would be willing to pay for greater safety. It described symptoms of gastrointestinal illness and then presented respondents with information on duration of symptoms and the likelihood of death. Respondents were asked how much they were willing to pay for foods (chicken, hamburger, and deli meats) with lower risk of foodborne illness. Respondents provided similar information about risks incurred by children so that researchers could assess the importance of protecting children.

A second survey examined actual food purchases and how purchases changed when information about safety changed. This survey, conducted in summer 2005, provided respondents with information about the likelihood of foodborne illnesses and asked them about the foods they consume and their food safety practices. Analysts will use the respondents' grocery store receipts to link food choices with the food safety information provided. This will allow researchers to infer values consumers place on reduced risk, recognizing that values vary with individual ability to self-protect and individual risk preferences.

ImageSource

Rubberball
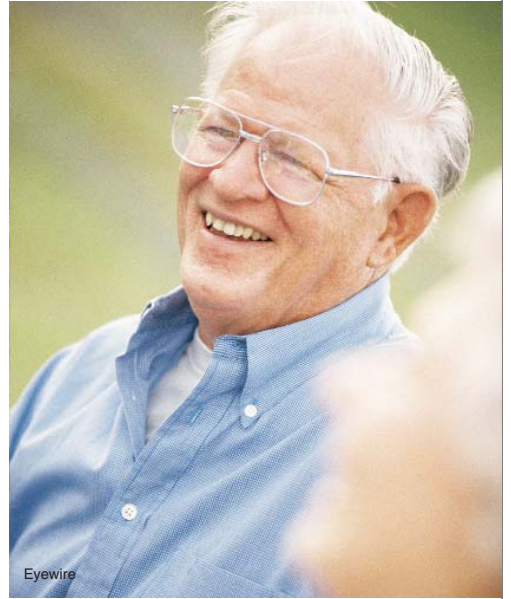
Eyewire

The population most vulnerable to complications from foodborne illnesses—young children, the elderly, and the immunocompromised— is quite different from the population of working-age males on which current willingness-to-pay estimates are based.

higher than for adults. Cost estimates for foodborne illnesses that primarily affect children will therefore probably underestimate the value of risk reductions if they use compensating wage estimates.

People may also be less willing to accept involuntary risk, such as most foodborne risks, than risk that is voluntarily assumed. As a result, studies that measure response to voluntary risk, such as compensating wage studies, probably underestimate society's aversion to risk that is not contracted for, such as most foodborne risks. Other factors, such as the possibility of defensive behavior (for example, cooking hamburger longer) and whether the risk produces consequences in the near or distant future, may also influence the value of the risk reduction.

To improve measures of WTP for safer foods, ERS has funded two empirical investigations into consumers' attitudes about food risks (see box, "Estimating Benefits Is a Research Problem, Not an Accounting Issue"). Only with additional studies targeted specifically toward food safety risks will analysts be able to estimate relevant demands for food safety risk reduction throughout the population.

Better estimates of WTP over a wider range of risks will also help Federal analysts better comply with OMB's longstanding requirement to compare dollar estimates of policy benefits with anticipated policy costs. Cost-benefit analysis is still required for all economically significant rules—OMB's recent requirement of health-based cost-effectiveness analysis did nothing to change this. Cost-effectiveness analysis based on health outcomes provides valuable information to policymakers. However, only cost-benefit analysis using money-based measures of risk preferences provides information on the types of risk-reduction programs most highly valued by society. ᐱᐱ

This article is drawn from . . .

Assigning Values to Life: Comparing Methods for Valuing Health Risks, by Fred Kuchler and Elise Golan, AER-784, USDA, Economic Research Service, November 1999, available at: www.ers.usda.gov/publications/aer784/

Valuing the Health Benefits of Food Safety: A Proceedings, compiled by Fred Kuchler, MP-1570, USDA, Economic Research Service, April 2001, available at: www.ers.usda.gov/publications/ mp1570/

You may also be interested in . . .

ERS' Foodborne Illness Cost Calculator, available at: www.ers.usda.gov/data/ foodborneillness/

Valuing Health for Regulatory Cost-Effectiveness Analysis, by Wilhelmine Miller, Lisa A. Robinson, and Robert S. Lawrence (eds.), Committee to Evaluate Measures of Health Benefits for Environmental, Health, and Safety Regulation, Institute of Medicine (Washington, DC: The National Academies Press), 2006.