RANKING REGULATORY INVESTMENTS IN PUBLIC HEALTH

24. RANKING REGULATORY INVESTMENTS IN PUBLIC HEALTH [1]

An essential role of government is to protect citizens from risks to human health, safety and the environment. Since the nation does not possess enough resources to eliminate all risks, an important performance goal for government is to deploy risk-management resources in a way that achieves the greatest public health improvement for the resources available—that is the most "cost-effective" allocation of risk-management resources. In this chapter, we demonstrate how cost-effectiveness ratios can be used to compare the payoffs from different regulatory investments in public health. We also discuss the promise and limitations of the use of cost-effectiveness analysis to inform decisions at regulatory agencies.

Using Cost-Effectiveness Ratios to Construct League Tables

A widely used tool for ranking purposes is the "league table," first used by the English to rank their soccer teams by point standings and later to rank their schools by student achievement scores. More recently, league tables have been used to rank programs, technologies, regulations and therapies aimed at saving lives and improving public health. There is a significant academic literature on the use of league tables in public health that began in the 1960s and continues to grow. OMB believes that government and the public can benefit from the insights generated by league tables.

The OMB first published a league table with the Budget in 1992. In this table, 50 risk-reducing regulations were ranked using cost per life saved as the measure of investment performance. The information in that table was based on analyses by Federal agencies and others in the 1970s and 1980s. The monetary resources required to save one "statistical" life ranged from several hundred thousand dollars to billions of dollars.

In Table 24–1 below, OMB presents a league table of 10 risk-reducing regulations based on information developed by three Federal agencies (DOT, OSHA, and EPA) in the 1995 to 2000 period. Our purpose in presenting this table is to illustrate how cost-effectiveness analysis of public health has changed over the last decade and what technical and policy issues are raised by presentation of league tables. [2]

Table 24–1. COST PER LIFE-YEAR SAVED FOR TEN SELECTED REGULATIONS

Regulation	Health or Safety	Net Costs ($2001)	Life-years saved	Cost per life-year saved ($2001)
Petroleum Refining NESHAP (EPA)	Health	<0	<10 per year	<0
Powered Industrial Truck Operating Training (OSHA)	Safety	<0	146 per year	<0
Head Impact Protection (DOT)	Safety	$390 to $516 million per year	8,360 to 10,007 per year	$50,00 to $53,000
Reflective Devices for Heavy Trucks (DOT)	Safety	$65 million (PV)	946 (PV)	$69,000
Child Restraints (DOT)	Safety	$54 to $112 million per year	370 to 515 per year	$105,000 to $331,000
Rail Roadway Workers (DOT) [a]	Safety	$227 million (PV)	434 (PV)	$523,000
Interim Enhanced Surface Water Treatment (EPA) [b]	Health	<0 to $95 million per year	140 to 640 per year	<0 to $679,000
NOx SIP Call (EPA) [c]	Health	$1265 million in 2007	1590 to 3390 per year	$373,000 to $714,000
Methylene Chloride (OSHA) [d]	Health	$112 million per year	96 per year	$1.16 million
Stage I Disinfection By-Products (EPA) [e]	Health	<0 to $764 million per year	0 to 5130 per year	<0 to infinite

Note: Net costs were calculated by subtracting from compliance costs an estimate of any non-fatality benefits such as a reduction in injuries or morbidity. PV = Present Value.

[a] The estimate does not include possible increased capacity of rail lines and improved worker morale.

[b] The estimate doe not include reduced risks from the pathogens (in addition to cryptosporidiosis) and avoided costs of averting behavior from a well-publicized outbreak.

[c] The estimate does not include a variety of potential benefit categories including possible reductions in ozone-related mortality, acute and chronic respiratory damage, nitrogen deposition in estuarine and coastal waters, damage to ecosystems and vegetation.

[d] The estimate does not include a variety of potential adverse health effects including: cancers resulting from dermal contact, central nervous system effects, and eye, nose, etc. irritation.

[e] The estimate does not include possible reductions in colon and rectal cancer and possible reductions in adverse reproductive and developmental effects.

[1] This chapter is prepared pursuant to Section 624 of the Treasury and General Government Appropriations Act, 2001, also known as the "Regulatory Right to Know Act," Public Law 106–554 (Dec. 21, 2000).

[2] The technical details that support the information presented in Table 24–1, including ratios based on a "lives saved" metric, can be found at *www.whitehouse.gov/omb* under regulatory policy or upon request.

These ten rules, which are a non-random sample of risk-related rulemakings, were selected because the regulatory analyses provided sufficient information to prepare a cost-effectiveness ratio. Many agency rules, even those with a primary purpose of protecting public health, do not provide adequate information to construct a cost-effectiveness ratio. The estimates presented in the table are based on data and estimates provided by the agencies. Where the agencies did not provide estimates of life-years saved, we calculated life-years using standard assumptions about age and life expectancies. Each of the ten rules was reviewed by OMB under Executive Order 12866; five address health issues and five address safety issues.

Interestingly, the tendency for safety rules to be more cost-effective than health rules (see Table 24–1) is consistent with the insights from the early league tables published more than a decade ago. The table also illustrates a finding not evident from the earlier league tables. The range of cost-effectiveness estimates for specific rules varies substantially. For example, the cost per life-year saved for EPA's disinfection by-products rule ranges from less than zero to infinite. The table suggests that we need to do a better job at both refining estimates of the cost-effectiveness of regulatory proposals and setting priorities for the use of the nation's limited resources to protect citizens from health, safety, and environmental risks.[3]

Which Rules Should Be Compared?

In constructing a league table, many issues arise about which rules to include. League tables are most useful if based on information about potential or proposed rules, since the decision makers can consider reallocating resources to those rulemaking opportunities that rank the highest in cost-effectiveness. The challenge is ensuring that league tables are generated early enough in the decision making process to inform regulatory priorities.

When league tables include only recently adopted (final) rules, the utility for policy makers is reduced. Once the agency has adopted a rule, it is difficult to reverse course based on a ranking reported in a league table. Moreover, it may be infeasible for an agency to adopt "more" of a final rule that ranks highly in a league table. Nonetheless, league tables of adopted rules can provide insight into their relative payoffs, which can provide a rough perspective to evaluate future rules.

An intra-agency league table compares only those rules within the jurisdiction of a particular agency. This type of table is appropriate in certain budgetary contexts where only matters in the jurisdiction of a specific agency are subject to comparison, ranking, and decision making. An inter-agency league table, such as Table 24–1, is more useful for synoptic purposes or for decision making by governmental entities with inter-agency responsibility (e.g., appropriations committees and OMB).

Identifying a Performance Measure

Early league tables in the public health field used the number of lives saved (premature deaths averted) as the metric of effectiveness. This metric has been criticized on the grounds that lives are never really saved, only extended. The expected number of life-years saved was developed as an alternative and continues to be used in the academic literature. "Life-years" gives relatively more credit to rules that reduce mortality rates early in the lifespan and less weight to rules that reduce mortality rates late in the lifespan. Although it is sometimes argued that "life-years" discriminates against the elderly, there are strong arguments that "life-years" is a better measure than "lives" of the effectiveness of regulatory alternatives.

Which Costs Should be Counted?

If one were only concerned about impacts on the Federal budget, then the only regulatory costs that would be counted would be those incurred (or saved) by a Federal agency. To reflect the full effect of a regulation, all costs to society—whether Federal, State, or private costs—should be counted when cost-effectiveness ratios are computed. This "societal perspective" on cost estimation is already embraced in OMB guidance and is widely practiced by Federal agencies and academic analysts.

Rulemakings may also yield cost savings (e.g., energy savings associated with using new technologies). It is generally accepted that the numerator in the cost-effectiveness ratio presented in a league table should be based on net costs, defined as the total cost incurred in meeting the requirements minus any cost savings. Similarly, the denominator of the ratio should reflect net life-years saved if the rule has both beneficial and adverse impacts on public health, such as the side effects of a vaccine.

Should Future Costs and Health Effectiveness be Discounted to Their Present Value?

Analysts generally agree that future costs and health effects should be discounted at the same rate, but there is a range of opinion about the appropriate rate of discount (e.g., 3 to 7 percent). If future health savings were discounted at a lower rate than future costs, then it can be shown that it always makes sense to delay adoption of a cost-effective rule. We have generally used 7 percent in our calculations, but following EPA's practice we have used a 5 percent discount rate in calculating life-years for EPA rules.

Limitations of League Tables

Generally, league tables are most helpful for comparing a set of government actions with the same primary outcome (e.g., a reduction in premature mortality risk or acres of wetlands saved). Where an action yields a variety of beneficial outcomes, the comparison be-

[3] OMB set forth its program to improve regulatory outcomes in *Making Sense of Regulation: 2001 Report to Congress on the Costs and Benefits of Regulations and Unfunded Mandates on State, Local, and Tribal Entities* (OMB 2001) available on our website at *www.whitehouse.gov/obm/inforeg/costbenefitreport.pdf* or upon request.

comes more problematic because these multiple benefits all need to be considered. Where the agency analysis provides a monetary estimate for these other benefit categories, we have subtracted the value of these benefits from the aggregate cost estimate to yield a net cost estimate. In some cases, the resulting net cost estimate for the rule is negative—that is, the other (non-mortality) benefits exceed the cost of the rule. Where the agency analysis fails to provide estimates for key benefit categories, the cost-effectiveness ratio may be overstated substantially, and thus, the regulatory action may be a more attractive candidate than suggested by the league table. For rules that have significant ecological as well as public health benefits, it is not clear how to construct a league table. Ecological benefits deserve serious consideration, but it is infeasible to express them in the same units as public health benefits. Finally, in some cases, the mortality reduction benefits may be largely ancillary to the overall effect of the rule, and the opportunity for realizing cost-effective improvements in risk reduction may be limited because the risk reduction gains are relatively small.

One of the most common ancillary benefits of life-saving rules is a reduction in morbidity—i.e., the number of cases of nonfatal illness or injury. To account for such benefits, OMB is considering the use of new effectiveness measures that combine information on mortality and morbidity. Two such measures are already in widespread use in the academic literature. The "quality-adjusted life-year" (QALY) measure rates each year of life on a 0 to 1.0 scale based on an expert panel or patient assessment of the quality of life associated with different health states. The QALY measure is widely used in the medical literature in both the USA and Europe and has recently been recommended for use by an expert panel assembled by the U.S. Department of Health and Human Services. A close cousin to the QALY, the disability-adjusted life-year (DALY) measure, is widely used in the developing world and has been promoted by the World Health Organization and the World Bank. While the QALY measure values equally all healthy years of life, the DALY measure gives the greatest weight to healthy life-years in the prime of life, since these years—whether through work or child rearing—make a major contribution to societal production.

Strictly speaking, ranking regulatory investments based on cost-effectiveness ratios focuses on economic efficiency. Decision makers may desire (or be required) to consider other values as well (e.g., various notions of fairness and equity). There is no accepted approach to incorporating equity considerations into a league table. However, there is broad consensus that a qualitative description of equity and fairness concerns should be presented to regulators in a rulemaking process and such considerations are clearly authorized for consideration under E.O. 12866.

Taking Steps Toward Cost-Effectiveness in the Regulatory Process

OMB is in the process of taking modest steps toward greater use of cost-effectiveness and league tables in decision making. First, OMB has issued government-wide guidelines on information quality that will promote greater transparency and consistency in agency analyses of health and safety risks. The development of league tables as an analytical construct depends on achieving a degree of analytical consistency across agency evaluation of health and safety risks. Second, OMB has committed to update periodically its guidelines for regulatory analysis, which are used when OMB reviews agency rulemakings. OMB intends to use guideline revision as a vehicle to consider the analytic measures of effectiveness and performance used by agencies and the informational burdens associated with moving toward greater analytic consistency in agency practices. This multi-year process will involve analysts from multiple agencies and will include opportunities for public comment and peer review.

While this approach has been more fully developed in the public health and medical literature, it can be applied to other types of programs. One of the key challenges in extending this analysis into other areas, of course, is developing a suitable measure of the effectiveness of disparate programs directed toward enhancing other aspects of the nation's welfare (e.g., recreational opportunities). OMB encourages agencies to develop objective measures of program effectiveness that can facilitate cost-effectiveness analysis.