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A Response to Lisa Heinzerling's Article "Five-Hundred Life-Saving Interventions and Their Misuse in the Debate Over Regulatory Reform"

Editors,

I am writing in response to Lisa Heinzerling's article "Five-Hundred Life-Saving Interventions and Their Misuse in the Debate Over Regulatory Reform,"¹ published in the Spring 2002 issue of *Risk: Health, Safety & Environment*. Dr. Heinzerling comments on two papers that my colleagues and I, affiliated with the Harvard Center for Risk Analysis, produced as part of research funded by the National Science Foundation over a decade ago. The first is the article "Five-Hundred Lifesaving Interventions and Their Cost-Effectiveness," published in the journal *Risk Analysis* in 1995. In this article we described the cost per year of lives saved of 587 interventions that reduce the risk of premature death. The second article is "The Opportunity Costs of Haphazard Societal Investments in Lifesaving" published in *Risks, Costs, and Lives Saved: Getting Better Results from Regulation* (R.W. Hahn ed., Oxford U. Press 1996). In this chapter, we demonstrated that by reallocating resources from interventions that are less cost-effective to those that are more cost-effective, additional lives could be saved for the same money. Dr. Heinzerling opines that these papers have "had a large influence on debates over health, safety, and environmental regulation." She then offers four criticisms of the papers and their subsequent public interpretation. I address each of her concerns.

First, Dr. Heinzerling notes that our papers "include many life-saving measures that have never been undertaken by anyone." Although she implies that this is a flaw in our work, it is not. There are smokers who do not receive cessation advice from their doctor, women who do not get annual cervical cancer screening, and patients needing heart transplants who lack insurance. It is nevertheless helpful to understand the cost-effectiveness of these lifesaving measures. In fact, in the quest to guide resource allocation decisions, it seems more useful to study the cost-effectiveness of interventions that are not implemented, or only partially implemented, than those where the decision has already been made.

1. Lisa Heinzerling, *Five-Hundred Life-Saving Interventions and Their Misuse in the Debate Over Regulatory Reform*, 13 *Risk: Health, Safety & Environment* 151 (2002).

Dr. Heinzerling is especially critical of our estimates of the implementation of toxin control interventions saying, "for at least 59 of the 90 environmental measures considered the authors assumed that the measures were at least partially implemented even though no agency ever required this."² The result, she fears, is that in the "Opportunity Cost" paper we hypothetically reallocated resources by taking "money from places where it was not being spent in order to produce artificial life-saving or money-saving opportunities elsewhere."³ In reaching this conclusion, Dr. Heinzerling makes the mistake of assuming that our assessment of the "implementation" of a toxin control "intervention" is defined by the presence of a regulation.

Yet our research defines intervention more broadly than regulation. We measured the extent to which a toxin control intervention (e.g., best pollution-control technology at paper mills) was implemented by firms in a specific industrial setting, regardless of whether the intervention was compelled by regulation. Our estimates of the effectiveness and cost of specific interventions were often derived from formal regulatory impact analyses where numerous interventions were analyzed by an agency. We then obtained implementation estimates for each of those interventions, regardless of whether they were ultimately required by regulation. Our method of obtaining estimates of the extent of implementation, expert elicitation, is not without its problems. However, our basic research design does not depend on accurate assessments of whether a regulation has been adopted and/or upheld in the courts. Dr. Heinzerling expresses disbelief that toxin control interventions might be implemented to some extent without the compulsion of a regulation. Yet it is well known that companies vary enormously in their approach to toxin-control issues: some act to control toxin emissions well before federal rules are adopted, some await information about the specifics of a federal rule before they act, and some even wait for concrete enforcement actions before they make investments in toxin control. Contrary to Heinzerling's implication, there is nothing in economic theory that predicts that all firms in an unregulated industry will approach toxin control decision-making in an identical manner.

We estimated that 60,000 lives saved could be saved at no additional cost by reallocating resources from less cost-effective to more cost-effective interventions. This estimate was based on the 187 interventions that we analyzed, that subset of the 587 interventions for which total annual cost and lifesaving information was available. If we had access to data for a larger number of interventions, the 60,000 figure would neces-

2. *Id.* at 159 (2002).

3. *Id.*

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sarily have been larger. We have no way of knowing whether the 187 analyzed interventions are representative of the universe of lifesaving interventions. However, in fairness to our work, we note that at the time of publication the coverage of 187 interventions was the largest of any study in the literature. While we may quibble about the exact size of the lifesaving efficiency loss, it is obvious on the face of it that reallocating resources from less cost-effective to more cost-effective interventions could save more lives for the same monetary investment.

In her second concern, Dr. Heinzerling suggests that our research is narrow because we do not consider the reallocation of resources spent on the B-2 bomber, leaf blowers, and cable television, or government subsidies to the mining, logging, ranching and farming industries. She is correct that we did not look at the reallocation across the entire U.S. economy. Such an ambitious effort would have been unwise from a scientific perspective, and thus her concern hardly seems a viable criticism. Our inclusion criteria were such that we included only lifesaving interventions, and only those select interventions for which we could find published cost and effectiveness data. As a matter of policy advocacy, Dr. Heinzerling is entitled to suggest that defense dollars should be reallocated to environmental protection. Yet such a belief is not relevant to the validity of our research design or the interpretation of our results.

Third, Dr. Heinzerling notes that our research ignores many of the non-lifesaving benefits of regulation. She reminds us of what others have pointed out before her, that because cancer deaths are easier to count, they are often the only health outcome considered in economic analyses of toxin control. Because the original authors of the analyses we reviewed did not include these other effects, we too may be missing any respiratory, neurological, reproductive, and hematological risks caused by environmental toxins. She implies, correctly, that environmental regulation would look much more cost-effective if reductions in these health problems were included on the benefit side of the cost-benefit equation. However, it is also true that if we had included the non-fatal injuries in addition to fatal injuries averted by some interventions, then transportation risk reduction, occupational injury control, and consumer product safety would also look a lot more cost-effective. In a similar vein, if we had included the morbidity and quality of life implications of disease, in addition to mortality consequences, this would make medical treatments and population screening look a lot more cost-effective as well. Thus, it is not immediately obvious that, relative to alternative ways of promoting health, environmental regulation would look considerably more cost-effective if we had considered non-lifesaving health impacts.

Fourth, Dr. Heinzerling suggests that we “do not assume that all human lives endangered by human action are equally valuable.”⁴ Here, she criticizes our use of “years of life saved” as our measure of the lifesaving potential of each intervention, and suggests that this implies that an intervention “that saves the lives of the elderly is not as good as one that saves the lives of the young.” Dr. Heinzerling apparently prefers the measure “lives saved” to “years of life saved” as a way of measuring effectiveness. On the Harvard project we collected data on both. Due to space limitations, the “Five-hundred” paper presents only estimates of cost/life-year saved but, as Dr. Heinzerling is aware, the “Opportunity Cost” paper presents both: 60,200 lives saved or 636,000 years of life saved at no additional cost.

With that said, most cost-effectiveness analysts would disagree with Dr. Heinzerling about the wisdom of using “lives saved” as a measure of effectiveness. This is because lives are never really “saved.” We all have to go sometime – it's a just question of when; we can't prevent death – all we can do is affect its timing. Given this, surely we prefer to live a longer life than a shorter life, hence “years of life” captures this innate preference. Further, in our papers we do not favor the elderly over the young as Dr. Heinzerling suggests, treating their lives as less valuable. In our research, an intervention that extends the life of an elderly person by five years would be treated the same as one that extends the life of a young person by five years. Of course, preventing the premature death of someone who will go on to live many years would be treated as preferable to preventing the death of someone who will live only a few more years. Our intent, however, is to value more life-years over fewer life-years. We practiced indifference about whose life is being extended.

Note also that it may not make sense to think of the young and the old as different groups of people in the sense that men and women, or blacks and whites, are different. The young will become old. Thus, preventing the death of a young person allows that person the opportunity to reach old age, benefiting both young and old over the life span.

Dr. Heinzerling is also critical of our inclusion of time preference even though most economic analysts believe that discounting is prudent and essential. Indeed, the U.S. Panel on Cost-effectiveness in Health and Medicine⁵ issued a series of recommendations on standards for rigorous cost-effectiveness analysis, calling for the discounting of both cost and effectiveness in economic analyses. Failing to discount effectiveness would mean that we would be indifferent between saving lives now or in

4. *Id.* at 164.

5. Marthe R. Gold et al., *Cost-Effectiveness in Health & Medicine* (Oxford U. Press 1996).

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the future. Both would seem equally valuable. The inevitable conclusion is thus that we might as well put off risk-reduction policies for two years, or ten years, or 100 years, or forever. It is the failure to discount lives (or life-years), not the use of discounting, that leads to this perverse (and anti-environmental) conclusion. The incorporation of time preference recognizes that, all things being equal, we prefer to save lives today over saving them tomorrow, thus postponing intervention is unwise.

In the years since the Harvard Lifesaving papers were published, we have noticed that it is quite common for scholars to latch on to discounting as the culprit behind high cost-effectiveness ratios for toxin control interventions and Dr. Heinzerling, like those before her, seems to have made this assumption as well. To be sure, discounting does affect the cost-effectiveness ratio. But the more important factor is that the potential risk reduction of some toxin control interventions (e.g., banning asbestos in vehicle clutch facings) is just plain small to begin with. It is not unusual for a measure to avert one case of cancer every decade, for example. Contrast that with what is known about the health gains from eating five fruits and vegetables a day, quitting smoking, or screening or colorectal cancer, and you can easily see why the cost-effectiveness of toxin control is often unfavorable in comparison.

Finally, Dr. Heinzerling suggests that my co-author, John D. Graham, perpetuated and encouraged the misinterpretation of the results of these papers "in the service of an anti-regulatory agenda."⁶ Heinzerling's concerns about Dr. Graham's public statements were thoroughly considered during his confirmation process before the U.S. Senate Committee on Governmental Affairs. Indeed, Dr. Graham was forthright in answering all questions about his twenty years of writing and speaking on issues of public health, safety and environmental regulation. Interested readers can consult the full hearing record at "Nominations of Angela B. Styles, Stephen A. Perry, and John D. Graham," Hearing Before the Committee on Governmental Affairs, United States Senate, 107th Congress, First Session, May 17, 2001. Further, for an objective journalistic account of Dr. Graham's first year at OMB, I recommend that readers consult "The new ruler of rulemaking," Congressional Quarterly Weekly Report, February 23, 2002, vol. 60 (8), pp. 520-526.

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6. Heinzerling, *supra* n. 1, at 153.

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