

**Testimony of Professor Lisa Heinzerling  
Concerning the Nomination of John D. Graham to be Administrator of the  
Office of Information and Regulatory Affairs, Office of Management and Budget**

**I. Introduction**

My name is Lisa Heinzerling. I am a Professor of Law at the Georgetown University Law Center. I am a graduate of the University of Chicago Law School, where I served as editor-in-chief of the University of Chicago Law Review. After law school I clerked for Judge Richard Posner on the U.S. Court of Appeals for the Seventh Circuit and then for Justice William Brennan on the U.S. Supreme Court. I was an Assistant Attorney General in the Environmental Protection Division of the Massachusetts Attorney General's Office for several years before coming to Georgetown. I have also taught at the Harvard and Yale law schools. My expertise is in environmental and administrative law. My published articles in the field of risk regulation include, among others, *Environmentalists and Pragmatists*, 113 Harv. L. Rev. 1421 (2000) (book review); *The Rights of Statistical People*, 24 Harv. Envir. L. Rev. 189 (2000); *Discounting Life*, 108 Yale L.J. 1911 (1999); *Discounting Our Future*, 34 Wyo. Land & Water L. Rev. 39 (1999); *Regulatory Costs of Mythic Proportions*, 107 Yale L.J. 1981 (1998); and *Political Science*, 62 U. Chi. L. Rev. 449 (1995) (reviewing Stephen Breyer, *Breaking the Vicious Circle*).

John Graham's work has had a large influence on debates over health, safety, and environmental regulation. In particular, Dr. Graham's claims regarding the costs of federal regulation and the life-saving potential of a rearrangement of our regulatory priorities have been widely circulated and widely accepted by other scholars, elected representatives, and the interested public. These claims are, however, exceedingly problematic, for three basic reasons: they misrepresent the output of the current regulatory system; ignore many of the benefits of federal regulation; and rest on controversial moral judgments about whose life is worth saving.

In this testimony, I first describe Graham's research on regulatory costs and on the implications of these costs for life-saving results. I then describe how Dr. Graham himself has perpetuated and encouraged a misinterpretation of his own data, one that wrongly concludes that these data show that federal regulations result in the "statistical murder" (to borrow Graham's phrase) of 60,000 Americans every year. I also explain how Dr. Graham's research ignores many benefits of regulation, particularly environmental regulation, and how this research slights our collective future. I conclude by suggesting that Dr. Graham's misuse of his own data in the service of an anti-regulatory agenda makes him an unsatisfactory choice to lead the Office of Information and Regulatory Affairs.

**II. Graham's Research on Life-Saving Costs:  
"Five-Hundred Life-Saving Interventions and Their Cost-Effectiveness"**

In research supervised by Dr. Graham, graduate student Tammy O. Tengs and several co-authors analyzed the costs of 587 life-saving measures.<sup>(1)</sup> These measures fall into three broad categories: fatal injury reduction, toxin control, and medicine. The specific measures included under the heading of fatal injury reduction encompass such things as airplane safety, automobile safety, and fire prevention. The category of toxin control includes measures to control arsenic, asbestos, benzene, radiation, and other hazardous substances. Finally, the category of medicine includes a wide variety of preventive and curative measures ranging from vaccinations to advice about quitting smoking.<sup>(2)</sup> Graham and Tengs' reported criterion for the inclusion of a life-saving intervention in this study was the availability of quantitative data on the intervention's costs and benefits.<sup>(3)</sup>

In evaluating this study and in evaluating Dr. Graham's subsequent uses of it, it is important to understand several basic features of the study. These include the study's inclusion of many life-saving measures that have never been undertaken; the inclusion of both regulatory and non-regulatory life-saving measures; the duplication of measures on the list; the use of life-years saved as the sole metric by which to judge these measures; and the use of the technique of discounting future life-saving. I discuss each of these features of Graham's methodology in turn.

*The Inclusion of Unimplemented Life-Saving Measures.* The "Five-Hundred Life-Saving Interventions" study includes many life-saving measures that have never been undertaken by anyone. As Graham and his co-authors acknowledge, their study includes life-saving measures "that are fully implemented, those that are only partially implemented, and those that are implemented not at all."<sup>(4)</sup>

In fact, a very large number of the toxin controls studied by Graham and Tengs were never implemented by any agency, frequently for the very reason that their costs were thought to exceed their benefits. An equally large number of these controls were never even proposed by any agency. Indeed, although nine of the ten most expensive life-saving interventions in the entire study involved toxin control, *not one* of those nine interventions was ever implemented by a regulatory agency.<sup>(5)</sup> The most expensive intervention on Graham and Tengs' list - the control of chloroform from paper mills, purportedly costing \$99 billion per year of life saved - was never even proposed.<sup>(6)</sup>

*The Inclusion of Both Regulatory and Non-Regulatory Life-Saving Measures.* This study also includes both regulatory and non-regulatory life-saving measures. Many of these measures would be undertaken, if at all, by individuals acting in their private capacities, such as doctors advising patients about quitting smoking<sup>(7)</sup> or 35-year-old men undertaking an exercise regimen.<sup>(8)</sup> Many other measures would entail government intervention. Indeed, the category of toxin control consists almost entirely of measures that might be (but in many cases have not been) undertaken by the government.

There is, of course, nothing inherently wrong with including both regulatory and non-regulatory life-saving programs in such a study. As will become clear, however, one must be careful to attribute life-saving costs to their appropriate source, and not to blame the regulatory system for any costs and misallocations found in the private sector.

*The Duplication of Life-Saving Measures on Graham and Tengs' List.* Graham and Tengs' study does not in fact look at 587 *different* interventions. In numerous cases, Graham and Tengs examined the very same life-saving measure, but from the perspective of different analysts. These analysts obviously had very different views about the costs and effectiveness of the very same life-saving measures. For example, Graham and Tengs report two estimates of the cost per life-year saved of a ban on urea-formaldehyde form insulation in homes; one estimate puts the cost at \$11,000 per life-year saved, and another at \$220,000 per life-year saved.<sup>(9)</sup> To take another example, Graham and Tengs also offer two estimates of the costs of controlling arsenic emissions at glass plants; one estimate is \$2.3 million per life-year saved, the other is \$51 million per life-year saved.<sup>(10)</sup> Graham and Tengs provide no guidance as to how one might choose between these strikingly different perspectives on the costs of the very same life-saving measures. They also do not face up to the strange consequence of their duplication of life-saving measures: one might conclude that we could save a large amount of money in arsenic control simply by adopting the views of the \$2 million analyst rather than the \$51 million analyst!

*Life-Years Saved as the Measure of Effectiveness.* In estimating the costs of these 587 life-saving measures, Graham and his research team used two significant and

controversial analytical techniques. First, they defined the only relevant regulatory benefit to be the saving of *years of life*, or *life-years*.<sup>(11)</sup> Put simply, this means that, in the view of Graham and his co-authors, a measure that saves the lives of the elderly is not as good as one saving the lives of the middle-aged, and likewise, a measure saving the lives of the middle-aged is not as good as one saving the lives of the young. It also means that benefits like the prevention of nonfatal illnesses and the protection of ecosystems are not taken into account in Graham and his co-authors' analysis.

*Discounting Future Life-Saving Benefits.* Second, in calculating the benefits of life-saving measures, Graham and his co-authors employed an analytical technique known as "discounting." Specifically, they reduced all future life-saving benefits by 5 percent per year. Equations available in appendices to their study seem to indicate that Graham and his co-authors performed this calculation in the following way. Suppose, for example, that a particular measure would save the life of a 35-year-old, thus saving 42 life-years if one assumes that this person's life expectancy is 77 years. Graham and his co-authors discounted all of the years of life saved by such an intervention by 5 percent per year, *from the year in which the year of life would otherwise have been lived*. This means that Graham and his co-authors would have discounted the last year saved by the hypothetical intervention over a period of 42 years. As a result, the last year of life saved would be reduced in their analysis to one-eighth (1/8) of a year. This large reduction in future benefits is the inexorable result of discounting, a process akin to compound interest in reverse.

*Conclusions of the Study.* After applying these analytical techniques, Graham, Tengs, and their co-authors found that the costs per year of life saved varied widely across interventions and often reached very high levels. Graham and Tengs also found that toxin control was the most costly, in general, of the categories of life-saving interventions they considered. Specifically, they found that the costs of toxin control ranged from equal to or less than zero (meaning that some interventions saved more money than they cost) to as high as \$99 billion for every year of life saved. As noted, however, many of the toxin controls considered by Graham and Tengs were never implemented, and many were never even proposed by a regulatory agency.

### **III. Graham's Research on Opportunity Costs: "The Opportunity Costs of Haphazard Social Investments in Life-Saving"**

In a study building upon their "Five-Hundred Life-Saving Interventions" study, Graham and Tengs set out "to assess the opportunity costs of our present pattern of social investment in life-saving."<sup>(12)</sup> In other words, what, they purported to ask, do we give up in addressing life-threatening risks the way we now do?

This second study considered a subset of the 587 interventions included in the "Five-Hundred Life-Saving Interventions" study. Because, this time around, Graham and Tengs required that data on costs and effectiveness be national in scope, the number of interventions included in the second study dropped from 587 to 185.<sup>(13)</sup> Ninety of these interventions (almost half of all those included in the study) were toxin control measures that were under the jurisdiction of the Environmental Protection Agency (or would have been, if they had ever been proposed).<sup>(14)</sup>

*Inclusion of Unimplemented Measures.* Of the ninety environmental measures included in the second study (representing almost half of all the measures considered), only eleven were ever implemented by the relevant agency, EPA. In other words, **seventy-nine** of the environmental measures included in this study were **never implemented**. Most of these were rejected (or never even proposed) by EPA itself.<sup>(15)</sup> Twenty-one of the

environmental measures were part of EPA's nationwide ban on asbestos products, which was overturned in a single, controversial judicial decision.<sup>(16)</sup>

In this study, Graham and Tengs assert that they considered the extent to which the interventions they discuss have been implemented. They write:

For each intervention, we supplemented cost-effectiveness data with two measures of the degree to which that intervention was implemented. For the subset of interventions where a "go/no-go" decision was made (for example, laws, regulations, or uniform building codes), we collected binary data on the implementation decision ( $B_{ijk}$ ). Because some degree of implementation can exist even in the presence of a "no-go" decision or can be absent even with a "go" decision, however, we also collected data on "percent implementation" ( $P_{ijk}$ ). We defined that measure as the percent of people in the target population who received the life-saving intervention as of 1992.<sup>(17)</sup>

Graham and Tengs then explain that, to gather information on "percent implementation," they consulted two independent experts. In estimating how many women over age twenty receive annual cervical cancer screening, for example, they consulted two experts in cervical cancer.<sup>(18)</sup>

Unfortunately, however, Graham and Tengs do not give any information as to which measures they considered implemented, which unimplemented, and which partially implemented. From the quoted passage above, it appears that as to government regulations, they assumed that the regulations were either fully implemented or not implemented at all (they assumed, in their words, a "go/no-go" decision). However, careful review of their study and related research indicates that, as to at least some and perhaps many of the unimplemented toxin controls, they wrongly treated such interventions as having been undertaken.

In order to show the "percent implementation" they assumed for the interventions in their study, Graham and Tengs provided a chart containing black squares that represent the interventions. These squares are plotted on the chart as a function of both their percent implementation and their cost per year of life saved. Although the chart is somewhat hard to read, the chart seems to indicate that Graham and Tengs assumed "zero percent implementation" for only about ten or so of the 185 life-saving interventions they considered.<sup>(19)</sup>

However, as noted, of the ninety EPA measures considered by Graham and Tengs, only eleven were ever implemented by EPA; seventy-nine were never implemented, and many of these were never even proposed. If Graham and Tengs had considered this virtually complete lack of implementation of the environmental measures included in their study, their chart showing the "percent implementation" of the interventions in their study would have included seventy-nine environmental regulations alone. Yet, as just discussed, that chart shows only about ten or so "zero percent implementation" interventions.<sup>(20)</sup> Thus, despite what they say, it appears that Graham and Tengs did not taken into account the non-implemented status of most of the toxin controls in their analysis.

Given Graham and Tengs' very limited description of the precise assumptions underlying their analysis, it is impossible to know how many of the unimplemented environmental measures in Graham and Tengs' study were treated, wrongly, by the authors as having been implemented.<sup>(21)</sup> At least based on the chart showing the "percent implementation" assumed for different measures, it appears that a large percentage of the seventy-nine unimplemented environmental measures were mistakenly treated by Graham and Tengs

as having been implemented. Moreover, based on information provided in related research, it is clear that Graham and Tengs assumed that EPA's nationwide ban on asbestos was fully implemented - which, as noted above, it was not.<sup>(22)</sup>

Is it possible that Graham and Tengs assumed that, even absent government regulation, firms were undertaking the environmentally protective measures discussed in their study, and that therefore the study accurately reflects life-saving costs even if those costs cannot be attributed to regulation? In that case, however, it would be extremely important to make clear that the costs were private costs borne voluntarily by firms, not regulatory costs. In addition, it is highly unlikely that a firm would voluntarily undertake toxin controls that cost as much money as Graham says they cost. Most economists would argue that a firm would undertake such controls only if they could save money by doing so, yet the cost figures cited by Graham hardly show money-saving potential. Furthermore, one of the signature features of environmental problems is that the person or firm that invests in solving them cannot capture all or even most of the benefits of doing so, as environmental problems involve "public goods" enjoyed by all. The implication of this "public goods" analysis is that profit-maximizing firms will not undertake large-scale environmentally protective measures on their own initiative. All in all, without a good deal of empirical information about voluntary toxin control undertaken by firms (information not apparent in any of Graham's research discussed here), it would be unreasonable to assume that such voluntary behavior occurs and that it costs what Graham says toxin control costs. In sum, it seems highly unlikely (because it would be so implausible) that Graham and Tengs would have assumed that firms were undertaking the toxin controls they identify on their own initiative.

*Inclusion of Regulatory and Non-regulatory Measures.* The "Opportunity Costs" study again included both regulatory and non-regulatory measures. This time around, however, the vast majority were (or would have been, if they had ever been undertaken) regulatory measures. Only fifteen of the life-saving measures included in this study were medical interventions. Yet the majority of the life-saving benefits found by Graham and Tengs came from the medical category.<sup>(23)</sup> Again, although there is nothing wrong in principle with studying both regulatory and non-regulatory measures, one must be careful to avoid attributing the costs and misallocations of private decisions to governmental actors. As I shall explain in Part IV, this is precisely what has happened with respect to Graham's research.

*Duplication of Life-Saving Measures.* In this study, too, many life-saving measures appear more than once even though only one such measure would ever be undertaken or even proposed. Arsenic emission controls at glass plants appear twice on the list; arsenic emission controls at primary copper smelters appear three times; benzene emission controls at chemical manufacturing process vents appear twice; benzene controls at bulk gasoline plants, and at bulk gasoline terminals, both appear twice, benzene controls at elemental phosphorous plants appear a stunning five times; radionuclide controls at coal-fired industrial, and utility, boilers appear thrice and twice, respectively.<sup>(24)</sup> I can conceive of no explanation for these duplications. Moreover, given the limited description of this study provided by Graham and Tengs, it is impossible to determine what role these duplications played in Graham and Tengs' results. The most that can be said is that *if* Graham and Tengs assumed that resources could be saved simply by choosing one expert's views over another, this would be a large mistake.

*Limited Set of Life-Saving Measures.* As I will explain in Part IV of this testimony, many people, including Graham himself, have used the "Opportunity Costs" study to launch a large-scale attack on environmentally protective programs. Not only does this attack ignore the fact that the vast majority of the environmental measures included in this study were never implemented; it also ignores the extremely limited scope of Graham and

Tengs' analysis insofar as it applies to environmental measures. Although ninety of the 185 measures in the "Opportunity Costs" study were environmental measures - thus, superficially, suggesting a rather comprehensive look at environmental regulation - fifty (over one-half) of these measures were (or would have been, if they had ever been adopted) implemented under just one provision of one environmental statute - section 112 of the Clean Air Act, dealing with hazardous air pollutants. Moreover, Graham and Tengs' analysis applies to measures undertaken (or, mostly, *not* undertaken) under an earlier version of section 112 *which no longer exists*.<sup>(25)</sup> Fully twenty-one of the environmental measures were part of EPA's nationwide ban on asbestos, undertaken under section 6(a) of the Toxic Substances Control Act.<sup>(26)</sup> That ban was overturned in court ten years ago,<sup>(27)</sup> and since then EPA has not banned a single substance under section 6. To sum up, then, out of ninety environmental measures considered by Graham and Tengs, **eighty-one** were undertaken (or not undertaken) under statutory provisions that are either formally or effectively defunct, and have been so for at least a decade. Therefore, to the extent one attempts to develop a critique of environmental protection based on this study, one's critique will be directed at the past rather than the present.

*Life-Years and Discounting.* In this second study, Graham and Tengs again used the analytical techniques they had used in the first study: they measured the effectiveness of interventions solely according to how many years of human life they saved, and they discounted future years of life by 5 percent per year.<sup>(28)</sup>

*Conclusions of the Study.* Graham and Tengs' conclusions are now famous: they found that if resources were directed to the most cost-effective of the interventions they considered, we could save 60,200 more lives every year with the same amount of money, or, alternatively, we could save \$31.1 billion and save the same number of lives.<sup>(29)</sup>

Again, however, careful attention to the study's precise findings is necessary in order to understand the study's implications. The vast majority of lives saved through Graham and Tengs' proposed reallocation of life-saving resources occurred in the categories of fatal injury reduction and medicine; over half of the life-saving potential was found in the medical category alone.<sup>(30)</sup> Only about five percent of the life-saving benefits found by Graham and Tengs came from the category of toxin control.<sup>(31)</sup> Even more strikingly, less than two percent of the total life-saving benefits found by Graham and Tengs could be obtained by reallocating EPA's regulatory resources.<sup>(32)</sup>

According to Graham's own logic, then, one would have expected him, after this study, to have concentrated his efforts on reforming, *first*, health-care expenditures (in particular, one would expect him to be in the vanguard of efforts to limit tobacco use), *second*, expenditures on fatal injury reduction, and, *only as a distant third*, toxin controls. Moreover, one would have expected EPA's operations to be of relatively little concern to Dr. Graham, given the quite small contribution even a major overhaul of this agency's priorities could make to overall life-saving results, according to his research. This is not, however, how Dr. Graham has allocated his own resources. Indeed, as I next explain, he has used his research on life-saving costs in arguing for a major restructuring of our regulatory system. And he has reserved a special disfavor for environmentally protective programs.

#### IV. How Graham's Research Has Been Misused

Many observers have misinterpreted Graham's research. Most prominently, they have cited the "Opportunity Costs" study as if it shows that *government regulation* results in the "statistical murder" (to use Graham's phrase) of 60,000 Americans every year. This misinterpretation appears frequently in the academic, political, and popular literature on

risk regulation. This Committee, for example, has been told more than once that Graham's research shows that a rearrangement of *regulatory* priorities would save 60,000 lives per year.<sup>(33)</sup> The misrepresentations of Graham's data began, in fact, simultaneously with their initial publication: in the introduction to the book in which the "Opportunity Costs" study appears, Robert Hahn claims that the study by Graham and Tengs "compiles new data on hundreds of *regulatory interventions* and estimates their costs and life-saving benefits." This study, Hahn continues, "assesses the opportunity costs of the current activity and determines an 'optimal portfolio' of *regulatory activity* that could save more lives at less cost."<sup>(34)</sup> The ink was not even dry on Graham and Teng's study, in other words, before it was being misused as an indictment of government regulation.

Of course it is possible that Graham himself is not aware of others' misrepresentations of his research. Thus, in this section I explain how *Graham himself* has misrepresented the implications of his own research. These misrepresentations fall into two general categories. First, Graham has marketed his research as if it revealed government regulation to be the primary culprit in the misallocation of life-saving resources. Second, he has misstated the regulatory costs found by his studies.

*Attributing Resource Misallocations to Regulation.* In congressional testimony, Dr. Graham has used the research just described as a basis for calling the present allocation of life-saving resources "statistical murder."<sup>(35)</sup> Dr. Graham has told this Committee that his research demonstrates that federal regulation is in serious need of reform. In testifying in favor of "regulatory reform" bills several years ago, Dr. Graham stated:

For the past fifteen years, I have studied the decision making of federal agencies responsible for protecting public health, safety, and the environment. These agencies include, for example, the Consumer Product Safety Commission, the Environmental Protection Agency, the Food and Drug Administration, the National Highway Traffic Safety Administration, the Occupational Safety and Health Administration, and the Nuclear Regulatory Commission. Although each of these agencies serve[s] a vital public function, I have found that the decisions of these agencies are not always based on a good understanding of science, engineering, and economics. As a result, *our regulatory system* is far less effective and efficient than it could and should be. One of my previous doctoral students at [the Harvard Center for Risk Analysis], Professor Tammy Tengs of the University of California at Irvine, found in her doctoral dissertation that lifesaving investments in the United States are often inefficient. Based on a sample of 200 policies, she estimated that a reallocation of lifesaving resources to cost-effective programs could save 60,000 more lives per year than we are currently saving, at no increased cost to taxpayers or the private sector! In short, a *smarter regulatory system* can provide the public with more protection against hazards at less cost than we are achieving today.<sup>(36)</sup>

Similarly, last summer, Dr. Graham joined a group of economists in signing onto a brief filed in the United States Supreme Court in a case challenging the constitutionality of the federal Clean Air Act. In that brief, Dr. Graham and his co-signatories urged the Court to interpret the Clean Air Act to require cost-benefit analysis of national air quality standards. They premised their argument on the perceived failings of current health, safety, and environmental regulation. As they put it:

Both the *direct benefits and costs of environmental, health, and safety regulations* are substantial—estimated to be several hundred billion dollars annually. If *these resources* were better allocated with the objective of reducing human health risk, scholars have predicted that tens of thousands more lives could be saved each year.<sup>(37)</sup>

In his academic work, moreover, Graham has used the research conducted with Dr. Tengs to launch a large-scale attack on regulatory programs that protect health, safety, and the environment. Calling the "public's general reaction to health, safety, and environmental dangers" a "syndrome of paranoia and neglect," Graham has chosen to focus his disapproval on regulatory agencies rather than, say, the medical professionals whose apparent failure to offer smoking cessation advice to their patients results in a good deal of lost opportunity for life-saving.<sup>(38)</sup> For example, he has contended that the data he has compiled with Dr. Tengs "call for reconsideration of the toxin-control budgets of agencies such as EPA and OSHA."<sup>(39)</sup>

Thus, in testimony, Supreme Court briefing, and academic writing, Graham himself has misused his "Opportunity Costs" study. He has suggested that this study supports the conclusion that the current regulatory system squanders the opportunity to save tens of thousands of additional lives every year. This conclusion does not follow from Graham's research. As noted, most of the life-saving potential found in Graham's research comes from reallocating expenditures in the field of medicine, not from reallocating resources used by, say, the Environmental Protection Agency or the Occupational Safety and Health Administration. It is a myth that federal regulation "statistically murders" 60,000 Americans every year, yet not only has John Graham apparently done nothing to correct the widespread impression that his own research supports this claim; he has also actively promoted this misinterpretation of his own data.

*Inaccurate Statements About Regulatory Costs.* As I have said, there is nothing inherently wrong with including both regulatory and non-regulatory programs in studies such as those done by Graham. There is also nothing inherently wrong with including in such studies programs that have not been implemented; indeed, part of the point of such research is to examine how things might change if we changed our priorities. Yet there *is* something wrong with treating unimplemented programs as *if they were implemented*. Graham has misused his own research in this fashion as well.

For example, as noted above, the most expensive intervention in the "Five-Hundred Life-Saving Interventions" study - the control of chloroform from paper mills, weighing in at \$99 billion per year of life saved - was never even proposed.<sup>(40)</sup> Yet Graham has cited this measure as an "EPA standard for chloroform emissions" and has stated that it "imposes over \$99 billion in costs for each year of life added."<sup>(41)</sup> But the "standard" was never proposed, and hence the costs never "impose[d]."

In addition, in treating unimplemented environmental measures as if they were implemented, Graham and Tengs' "Opportunity Costs" study greatly inflates the apparent costs of environmental regulation. Again, it is impossible to determine the magnitude of this inflation based on the public record, but given the available evidence as described in Part III of this testimony, it appears to be very large.

*Summary of Misuses of Graham's Research.* In short, Dr. Graham has misused his own research. For example, in signing onto the economists' brief in this Term's Clean Air Act case in the Supreme Court, he endorsed the conclusion that "tens of thousands of lives" could be saved if resources now spent on regulation were redirected.<sup>(42)</sup> He has also used his research to critique the regulatory system in testimony given to this Committee. Yet Graham's own research does not simply look at regulation. Indeed, the majority of the lives saved through Graham and Tengs' rearrangement of priorities were saved in the field of medicine, not in regulatory fields such as environmental law.<sup>(43)</sup> To suggest, as Dr. Graham has, that the figure of 60,000 additional lives saved comes from a rearrangement of *regulatory* priorities is deeply misleading.

Dr. Graham has also misrepresented the actual costs of regulation by referring to measures never even proposed by the government as government "standards." In addition, the "Opportunity Costs" study explicitly states that it takes implementation status into account in assessing costs and effectiveness. However, as I have described, it clearly does not do this with respect to many of the environmental measures considered in the study. How large this error is, and how large an effect it had on Dr. Graham's overall conclusions, is impossible to determine based on available information.

One last point bears mentioning here. Although Graham and Tengs devote considerable energy to arguing, in general terms, that we should reallocate our life-saving resources, they actually provide no concrete examples in their "Opportunity Costs" study of what we should be doing instead of what we are now doing. Only by studying Tengs's unpublished PhD. dissertation, written under Graham's supervision, can one learn which life-saving interventions these researchers favor. I will limit my observations here to toxin control.

As it turns out, most of the toxin controls that Graham and Tengs found to be cost-effective have already been implemented. A handful of apparently cost-effective interventions regarding asbestos and benzene were not implemented, but these rules together would have saved a total of only twenty-four (24) lives - nowhere close to the 60,000 lives cited in the Graham and Tengs study. The only large life-saving opportunity in the area of toxin control that is identified by Graham and Tengs is radon remediation in homes, as encouraged by government funding of low cost loans, tax write-offs, or other financial incentives.<sup>(44)</sup> In effect, then, what Graham is really arguing for is a wholesale shift of EPA's responsibilities from the regulation of pollution of the air, water, and land through mandatory controls on polluters to the encouragement of residential radon remediation - which typically involves simply caulking basements - through loans and tax incentives. Nowhere does Graham face up to the shrinking, indeed trivialization, of environmental law that his proposals would entail.

### **V. How Graham's Research Ignores Many Benefits of Health, Safety, and Environmental Protection**

An important limitation of Graham's studies is that they assume that the only benefit of environmental protection is to prevent fatal illnesses in humans. Thus these studies ignore many significant benefits of environmental programs. Most obviously, their fixation on fatal illnesses ignores nonfatal harms to human health. Most lethal substances also cause nonfatal health effects. Toxic chemicals can, for example, cause respiratory, neurological, reproductive, hematological, and other health-impairing disorders. Not all of these disorders are fatal, yet they are nevertheless unpleasant and costly byproducts of toxic pollution. In addition, environmental toxins can cause harms to ecosystems, harms which simply do not show up in Graham's limited analysis.

Graham's analysis not only excludes the many benefits of health, safety, and environmental regulation that do not involve life-saving; it also excludes life-saving benefits themselves if these cannot be quantified. This often means that, in the context of toxin control, any life-saving benefits other than the prevention of cancer are ignored because cancer prevention is often the only life-saving benefit that can be quantified.<sup>(45)</sup>

To be sure, Graham acknowledges that his analysis does not capture all of the benefits of life-saving programs. But it is worth keeping in mind that his focus on quantified life-years saved ignores some of the most important benefits of the programs in question.

### **VI. Whose Life Is Worth Saving?**

The final problem with Graham's studies on regulatory costs involves the studies' assumptions about whose life is worth saving. Graham's studies do not assume that all human lives endangered by human action are equally valuable. On the contrary, these studies assume that it is better to save the lives of the young than the lives of the old, and they operationalize this assumption by focusing on the number of life-years, and not the number of lives, saved by an intervention. Graham also assumes that lives saved in the future are worth less than lives saved today, and he operationalizes this assumption by applying a 5 percent discount rate to future life-saving. Both of these analytical devices have a large negative effect on assessments of environmental programs in particular, and both are very controversial.

Absent these assumptions, the cost-benefit ratios of the life-saving measures evaluated by Graham and Tengs, especially those involving toxin control, would have been very different. As noted, typically the only quantifiable benefit of toxic substances control is the prevention of cancer. Since cancer is a disease primarily of old age, and since it has a long latency period, the practices of looking at life-years saved and of discounting future benefits produce results that systematically disfavor toxin control.

Discounting, in particular, can have a profound effect on the perceived present-day benefits of actions whose purpose is to prevent future harm. If discounted over a long enough period, even the benefits of preventing catastrophes become trivial. Graham's 5 percent discount rate, for example, means that the death of one billion people 500 years from now is less important than the death of one person today. The logic of discounting also means that saving the lives of your children in the future is worth less than saving your own life in the present. Discounting also systematically downgrades the importance of actions taken to prevent long-latency diseases and long-term ecological harm. Yet these long-term aspirations are among the major aims of the kinds of programs that have fared so poorly in analyses of costs per life saved, especially environmental programs.

It is not difficult to grasp the issues inherent in the question whether to evaluate life-saving programs according to the life-years, or according to the lives, they save. The question turns, essentially, on whether one views older people as equally worthy of protecting from the hazards of, say, air pollution as younger people. It seems to me that our society's norms of equality argue strongly against offering less protection to people based simply on age.

Discounting is more complicated. In discounting, one reduces a benefit one expects to receive in the future by a fixed rate that is designed to capture, in essence, the costs of waiting for the benefit. In the financial context, discounting future sums of money reflects the fact that money received in the future is worth less than money received today because if one receives money today, one can invest it and produce even more money for the future. One might also be impatient to receive the money now. In the life-saving context, discounting is a far more problematic and controversial concept than it is in the financial context. The controversy over the discounting of life-saving benefits is complex, but there are three basic reasons why discounting is problematic in this setting.

First, lives do not compound the way money does. You cannot put a life - or a life-year, for that matter - in the bank and earn money on it. Although one could argue that lives do indeed "compound" through human births, no serious scholar in the literature on discounting advances this as an argument in favor of discounting future life-saving.

Second, it is inaccurate to suggest that a human life, or life-year, lost in the future is somehow not a "whole" life or life-year. If a person dies 30 years from now due to cancer caused by exposure to arsenic, a whole life is lost. Yet at a discount rate of 5 percent,

analysts like Graham would deem a regulation saving that person's life to have saved less than one-quarter of a life. But human lives do not come in fractions.

Finally, although many people who advocate discounting purport to do so on the basis of people's preferences, it would surprise me to learn that most members of the public agree with the idea, implicit in discounting at a 5 percent rate, that lives saved in the future are essentially trivial compared with lives saved today. Indeed, one could make a very plausible argument that the existence and widespread popularity of dozens of federal statutes ensuring a high level of environmental protection belie the claim, implicit in discounting, that the future matters relatively little to the ordinary person. Closer to home, most parents, I think, are at least as concerned about their children's future, and as anxious to make it good, as they are concerned about their own present well-being. Discounting ignores - indeed, it discourages - this fundamental human impulse.

## VII. Conclusion

Perhaps the most famous empirical claim in John Graham's research - indeed, one of the most famous claims in all of the literature on risk regulation - is that we could save 60,000 more lives per year if we reallocated our life-saving resources. Graham's empirical research has frequently been misinterpreted as supporting a claim that we are "statistically murdering" approximately 60,000 Americans every year through foolish government regulations. At least some of the life-saving potential Graham has found, however, is based on elimination of government regulations that were never implemented. Most of this life-saving potential, moreover, has nothing to do with government regulations, but instead comes from a rearranging of priorities in non-regulatory situations such as the advice doctors give to patients about quitting smoking.

John Graham has, from all appearances, done nothing to correct the widespread misinterpretation of his own research. Indeed, Graham has frequently encouraged this misinterpretation - by telling the Supreme Court that 60,000 lives could be saved if resources now spent on regulation were spent more wisely;<sup>(46)</sup> by publishing articles that refer to unimplemented, indeed unproposed, environmental measures as if they were implemented;<sup>(47)</sup> and by testifying that bills that would have substantially changed environmentally protective programs in this country were a good idea because without such reform we could be rightly accused of "statistical murder."<sup>(48)</sup> These are not someone else's misrepresentations of Graham's data; they are Graham's misrepresentations.

The Administrator of the Office of Information and Regulatory Affairs is charged with overseeing a vast array of proposed health, safety, and environmental regulations. The person given this responsibility should not come to the job with a preconceived, cynical notion that whatever a regulatory agency puts before him or her must be a bad idea. Nor should he or she bring to the job any tendency to make the regulatory system look worse than it deserves. Because I believe that John Graham's written record fails him on both these counts, I believe he is an unsatisfactory choice to lead this office.

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1. Tammy O. Tengs, Miriam E. Adams, Joseph S. Pliskin, Dana Gelb Safran, Joanna E. Siegel, Milton C. Weinstein, and John D. Graham, *Five-Hundred Life-Saving Interventions and Their Cost-Effectiveness*, 15 Risk Analysis 369 (1995) (hereinafter *Five-Hundred Life-Saving Interventions*).

2. For a list of the interventions analyzed in this study, see *id.* at 373-384.
3. Tengs, *et al.*, *Five-Hundred Life-Saving Interventions*, at 370. Numerous scholars have observed that quantitative estimates of the benefits of health and environmental regulation, in particular, are frequently too low. See, e.g., Thomas O. McGarity, *A Cost-Benefit State*, 50 *Admin. L. Rev.* 7, 27-29 (1998).
4. *Id.* at 372 (emphasis added).
5. See Tammy O. Tengs, *Optimizing Societal Investments in the Prevention of Premature Death*, A Thesis Submitted to the Faculty of the Harvard School of Public Health in Partial Fulfillment of the Requirements for the Degree of Doctor of Science in the field of Health Policy and Management, at p. 25, Table 8 (Boston, Mass., June, 1994) (hereinafter Tengs, *Optimizing Societal Investments*)(showing "Ten Most Expensive Interventions"). In order to determine which regulatory interventions on Graham and Tengs' list were implemented (or even proposed) by the relevant regulatory agency, one must consult the original studies providing the costs and effectiveness data on which Graham and Tengs relied. For references to these studies, see Tengs, *et al.*, *Five-Hundred Life-Saving Interventions*, at 385-390.
6. Ralph A. Luken, *Toxic Pollutants, in Efficiency in Environmental Regulation: A Benefit-Cost Analysis of Alternative Approaches*, at 249 (Kluwer Academic Publishers 1990) (referring to chapter as study of "potential regulations") (hereinafter Luken, *Toxic Pollutants*).
7. Tengs, *et al.*, *Five-Hundred Life-Saving Interventions*, at 384, Appendix A.
8. *Id.* at p. 380, Appendix A.
9. *Id.* at p. 377, Appendix A.
10. *Id.* at p. 375, Appendix A.
11. *Id.* at 370.
12. Tammy O. Tengs and John D. Graham, *The Opportunity Costs of Haphazard Social Investments in Life-Saving*, in *Risks, Costs, and Lives Saved: Getting Better Results from Regulation*, at 168 (Robert W. Hahn, ed., Oxford University Press and AEI Press 1996) (hereinafter Tengs & Graham, *Opportunity Costs*).
13. *Id.* at 169.
14. I obtained a complete list of the interventions considered in this study from Tammy Tengs. This list indicates that ninety of the interventions were environmental measures. See also Tengs, *Optimizing Societal Investments*, at 150, Appendix Q (indicating that ninety interventions based on "EPA Regulation" were considered in the dissertation which formed the basis of Tengs and Graham's "Opportunity Costs" study).
15. For example, ten of the ninety environmental measures included in the study are bans on certain asbestos products. As the study on which Graham and Tengs relied for their data on the costs and effectiveness of these measures clearly states, however, these products were not in fact banned by EPA. See George L. Van Houtven and Maureen L. Cropper, *When Is a Life Too Costly to Save?*, Policy Research Working

Paper 1260, Environment, Infrastructure, and Agriculture Division, Policy Research Department, World Bank, at (unnumbered) p. 23, Table 1 (March 1994).

16. See *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201 (5<sup>th</sup> Cir. 1991) (overturning EPA's nationwide ban on asbestos products in part because the court disagreed with the agency's cost-benefit analysis).

17. Tengs & Graham, *Opportunity Costs*, at 169-170.

18. *Id.* at 170.

19. *Id.* at 173, Figure 8-1.

20. *Id.*

21. For sake of completeness, I note that I have tried to obtain more information about these studies' assumptions about the extent of implementation of the relevant interventions by contacting both Dr. Graham and Dr. Tengs. Thus far I have not received a response to these inquiries.

22. See Tammy O. Tengs, *Dying Too Soon: How Cost-Effectiveness Analysis Can Save Lives*, National Center for Policy Analysis Report No. 204, at p. 6, Table II (May 1997) (showing assumption of "100%" implementation of invalidated asbestos rule).

23. Tengs, *Optimizing Societal Investments*, at pp. 144-146, Appendices K-M (showing life-saving benefits across categories of medicine, fatal injury reduction, and toxin control).

24. Again, I obtained a complete list of the life-saving measures included in the "Opportunity Costs" study from Tammy Tengs.

25. Section 112, 42 U.S.C. 7412, was completely revised in the 1990 Amendments to the Clean Air Act.

26. 15 U.S.C. 2605(a).

27. *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201 (5<sup>th</sup> Cir. 1991).

28. Tengs & Graham, *Opportunity Costs*, at 169.

29. *Id.* at 172-173.

30. Tengs, *Optimizing Societal Investments*, at pp. 144-146, Appendices K-M (showing life-years saved in separate categories of fatal injury reduction, medicine, and toxin control).

31. *Id.*, at p. 146, Appendix M.

32. *Id.*, at 150, Appendix Q.

33. See, e.g., Joint Testimony, Robert W. Hahn and Robert E. Litan, The American Enterprise Institute and The Brookings Institution, Before the Senate Committee on

Governmental Affairs (Feb. 24, 1998) (testifying on S. 981, the Regulatory Improvement Act of 1998).

34. Robert W. Hahn, Introduction, in *Risks, Costs, and Lives Saved*, at 3 (Oxford University and AEI Press 1996) (emphasis added).

35. Risk Assessment and Cost Benefit Analysis: Hearings Before the Comm. on Science, United States House of Representatives, 104th Cong., 1st Sess. 1124 (1995) (written testimony of John D. Graham).

36. Testimony of John D. Graham, Ph.D., Director, Center for Risk Analysis, Harvard School of Public Health, Before the Committee on Governmental Affairs, United States Senate (April 21, 1999) (testimony on S. 746, the Regulatory Improvement Act of 1999); see also *Risk Assessment and Cost/Benefit Analysis for New Regulations: Joint Hearings Before the Subcomm. on Commerce, Trade, and Hazardous Materials and the Subcomm. on Health and Environment of the Comm. on Commerce, 104th Cong., 1st Sess. 307 (1995) (written testimony of John D. Graham) (identical quotation).*

37. Brief *Amici Curiae* of AEI-Brookings Joint Center for Regulatory Studies, *et al.*, in *American Trucking Ass'ns. v. Whitman*, No. 99-1426, at 1-2 (U.S. Supreme Court 2000) (citing Tengs & Graham, *Opportunity Costs*) (emphasis added).

38. John D. Graham, *Making Sense of Risk: An Agenda for Congress*, in *Risks, Costs, and Lives Saved*, at 183-207 (Robert W. Hahn, ed., Oxford University and AEI Press 1996).

39. John D. Graham, *Comparing Opportunities to Reduce Health Risks: Toxin Control, Medicine and Injury Prevention*, National Center for Policy Analysis Report No. 192 (June 1995), available at <http://www.ncpa.org/studies/s192/s192.html>.

40. Luken, *Toxic Pollutants*, at 249.

41. John D. Graham, *How to Save 60,000 Lives*, Electric Edison Institute (1995).

42. Brief *Amici Curiae* of AEI-Brookings Joint Center for Regulatory Studies, *et al.*, in *American Trucking Ass'ns. v. Whitman*, No. 99-1426, at 1-2 (U.S. Supreme Court 2000).

43. Tengs, *Optimizing Societal Investments*, at pp. 144-146, Appendices K-M (showing life-years saved in the categories of medicine, fatal injury reduction, and toxin control).

44. See Kenneth L. Mossman & Marissa A. Sollitto, *Regulatory Control of Indoor Rn*, 60 *Health Phys.* 169 (1991).

45. One reason why it is easier to quantify risk of cancer than other risks to human health is that there exists a clear end point; the subject under study - either a human or a laboratory animal - either does or does not develop a tumor. With respect to other kinds of effects on human health, however, such as impairments of cognitive development and reproductive capacity, the relevant end point is not so obvious.

46. Brief *Amici Curiae* of AEI-Brookings Joint Center for Regulatory Studies, *et al.*, in *American Trucking Ass'ns. v. Whitman*, No. 99-1426, at 1-2 (U.S. Supreme Court 2000) (citing Tengs & Graham, *Opportunity Costs*).

47. John D. Graham, *How to Save 60,000 Lives*, Electric Edison Institute (1995).

48. Risk Assessment and Cost Benefit Analysis: Hearings Before the Comm. on Science, United States House of Representatives, 104th Cong., 1st Sess. 1124 (1995) (written testimony of John D. Graham).

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