1998

Risk Assessment, Resource Allocation, and Fairness: Evidence from Law Students

Cass R. Sunstein

Christopher E. Houston

Recommended Citation

Risk Assessment, Resource Allocation, and Fairness: Evidence from Law Students

Christopher E. Houston and Cass R. Sunstein

Articles, discussions, and research about risk assessment and resource allocation often refer to observed differences between laypersons and "experts."[1] Experts are said to assess risk and to allocate resources with the goal of maximizing the expected number of lives saved; laypersons are said to depart from this goal, partly because they make frequent errors, and also because they give weight to qualitative variables that make for distinctions among quantitatively identical risks. Ordinary people, it is said, care about whether risks are equitably distributed, voluntarily incurred, controllable, or faced by future generations; they depart from the expert's focus on lives saved.[2]

No one knows whether lawyers demonstrate "expert" patterns of risk assessment and resource allocation; it might seem intuitive to think that they do, especially, perhaps, if they have been trained with an emphasis on the economic analysis of law. Whether expert or not, the patterns of assessment and allocation that lawyers exhibit likely have great influence in the modern state, for lawyers tend to dominate arenas of governmental decision-making. There is an ample literature on risk assessment, well worth consulting in connection with an Administrative Law course;[3] but that literature says little about how lawyers and public officials respond to risk.

We attempted to study these patterns partly to learn something about how law students and hence lawyers are likely to think. But there is a pedagogical issue as well. In Administrative Law, students must learn a good deal about regulatory policy, and in order to do that, they should have some sense of the need to allocate resources among different risks. Why do some risks receive so

Christopher E. Houston is an associate with Ropes & Gray in Boston. Cass R. Sunstein is Karl N. Llewellyn Distinguished Service Professor of Law at the University of Chicago.

1. For general discussion of experts, ordinary people, and risk assessment, see Richard H. Pildes & Cass R. Sunstein, Reinventing the Regulatory State, 62 U. Chi. L. Rev. 1 (1995).

2. A helpful discussion is Howard Margolis, Dealing with Risk: Why the Public and the Experts Disagree on Environmental Issues (Chicago, 1996).

3. See Baruch Fischhoff et al., Acceptable Risk (New York, 1981), and the summaries in Stephen G. Breyer et al., Administrative Law and Regulatory Policy, 4th ed., 310–14 (New York, 1998); Robert V. Percival et al., Environmental Regulation: Law, Science, and Policy, 2d ed., 513–19 (Boston, 1996).

much attention, and why are other risks so often neglected?[4] This is a pressing question in both administrative and environmental law. It is therefore useful to think of ways to direct students to consider regulatory priority-setting, preferably in such a way as to encourage their active discussion of these issues from early on in the course.

To understand the risk assessment and resource allocation patterns of lawyers (and also to evaluate whether those patterns are "expert" or otherwise), we administered two surveys at the University of Chicago Law School.[5] The University of Chicago is a particularly apt school at which to determine whether lawyers—or, more accurately, future lawyers—are more like laypersons or like experts in their risk assessment and resource allocation, because the school has a well-known and long-standing reputation in the economic analysis of law. This paper discusses these surveys and results obtained from them.

We administered the first survey in January 1997 to 118 second- and third-year law students taking Administrative Law. The second survey was given in January 1998 to 94 second- and third-year law students taking Administrative Law. We administered both surveys on the first day of class, so that the results would not be tainted by information conveyed and discussed in class, especially about risk assessment and resource allocation. We analyze the surveys, and we present the results below, in three sections: the first section discusses resource allocation, the second discusses risk assessment, and the third discusses fairness. Our principal findings are as follows.

- Law students act like ordinary people rather than experts in the particular sense that they care about variables other than number of lives saved. When they are given information beyond the number of lives saved, equity becomes more important to them; and to achieve equitable resource allocation, they are willing to sacrifice the total number of lives saved. But the total number of lives saved is the predominant factor in resource allocation, and there is a ceiling on the extent to which other considerations will prompt them to allocate resources more equitably, like ordinary people, and less like experts.

- Law students seem to behave more like experts when assessing risk levels themselves; that is, their assessments are not substantially incongruent with expert assessments, or at least not as incongruent as the assessments of laypersons. When asked to establish funding priorities, however, law students do go far beyond expert assessments of risk alone. Specifically, they incorporate considerations such as voluntariness, alternative possibilities for addressing the risk apart from government funding, breadth of effect, and effects on children and other innocent parties; they are responsive to the

---

4. This is the principal question in Stephen Breyer, Breaking the Vicious Circle (Cambridge, Mass., 1993).
5. The survey instruments are available from the authors.

concerns of ordinary people, even when those concerns are not matched or justified by expert assessments.

• Law students, at least at the University of Chicago, are very different from ordinary people in their judgments about the relation between markets and fairness. Ordinary people think that certain market-driven behavior is unfair, but law students disagree sharply. Law students also offer interesting and highly distinctive judgments about price increases with risk to important products, and with respect to both subsidies and price regulation. (It would be extremely interesting to find out whether this is a consequence of being the sort of person who chooses law school, or of law school itself, or of the University of Chicago Law School.)

Resource Allocation Among Risks and Programs

The 1997 Preliminary Survey

We designed the 1997 preliminary survey to test the extent to which number of lives saved, or perhaps some other goals, would play a role in law students' resource alllocation decisions. The most straightforward finding was that the number of lives saved is far from the sole consideration for purposes of allocating money. On the contrary, law students are willing to save fewer lives in return for the achievement of other social goals. The most relevant question posited that the respondent was "entrusted with the task of allocating $100 million among a number of possible regulatory activities." Then the survey listed the following six programs.

A. Spend all $100 million on AIDS education, prevention, and treatment, with estimated annual savings of 120 lives.

B. Spend $50 million on enforcement activity relating to toxic air pollutants, with estimated annual savings of 10 lives.

C. Spend $50 million on safety inspections of nuclear power plants, which would carry an estimated annual savings of no lives but would satisfy many members of the public who are concerned about nuclear power plant safety and are demanding greater attention to these safety risks.

D. Spend $25 million on heightened security measures at airports, which would carry an estimated annual savings of only 0.5 lives but would respond to greater public demand for airport security following recent highly publicized accidents.

E. Spend $100 million on a vigorous antismoking campaign involving education, restrictions on sales to minors, and higher tobacco taxes, with estimated annual savings of 200 lives.

F. Spend $50 million on preventing lead ingestion by children in the inner city, with estimated annual savings of 50 lives.

The survey item then posited that the respondent's advisers had narrowed the policy options for allocating the $100 million to the following.

1. Adopt program A (AIDS) in its entirety, saving 120 lives annually.
2. Adopt program E (smoking) in its entirety, saving 200 lives annually.
3. Spend $50 million on program A (AIDS) and $50 million on program E (smoking), for a total savings of 160 lives annually.

4. Spend $20 million on program A (AIDS), $25 million on program E (smoking), $25 million on program B (toxic air pollutants), $20 million on program D (airport security), and $10 million on program C (nuclear power plants), for a total savings of 79.5 lives annually.
5. Spend $50 million on program F (lead ingestion) and $50 million on program E (smoking), for a total savings of 150 lives annually.
6. Spend $50 million on program F (lead ingestion) and $50 million on program A (AIDS), for a total savings of 110 lives annually.

For all but the first two allocations (for which calculation of lives saved was obvious from the program description), the number of lives saved annually was provided. The dependent measure for this survey item was threefold: respondents were asked to indicate, of those six allocations, which was their most-preferred allocation, which their second-most-preferred allocation, and which their least-preferred. Table 1 displays the frequencies with which each allocation was chosen in these dependent measures.

Table 1: Resource Allocation Distributions (1997 Preliminary Survey)						
			Allocation Policy			
	1	*2*	*3*	*4*	*5*	*6*
Number of lives saved	*120*	*200*	*160*	*79.5*	*150*	*110*
Number of programs	*1*	*1*	*2*	*5*	*2*	*2*
First choice	1	25	24	22	32	14
Second choice	7	7	42	17	20	24
(First or second choice)	8	32	66	39	52	38
Least-preferred choice	23	15	7	51	16	6

Had the respondents attended only to the number of lives saved by a particular allocation, they would have overwhelmingly favored allocation 2, spending all of the money on antismoking measures and saving 200 lives annually. While this allocation did receive 25 first-place votes, there were even more first-place votes for allocation 5, splitting the money between smoking and lead ingestion but saving 50 fewer lives annually. In addition, allocation 2 was second-to-last in number of combined first-place and second-place votes; the allocation receiving most combined first-place and second-place votes was allocation 3, splitting the money between two programs and saving 160 lives annually. Allocation 4, which split the money among five different programs was near average in receiving first-place and second-place votes, but more interesting was its receiving far and away the most last-place votes. Finally, while spending money on AIDS was chosen often when it was joined with other programs, spending money on AIDS alone received the least number of first-place and second-place votes and the second-highest number of last-place votes.

These initial results, as well as other rough exploratory analyses of the data, led to the following hypotheses.

• The number of lives saved might be a substantial factor in the respondent's choice of allocation, but it was not the exclusive factor and might not have been even a dominant factor. (For

example, one very rough exploratory analysis indicated that as little as 2.5 percent of the variance in response to these measures might have been explicable by the number of lives saved under each allocation.)

- Addressing only one problem might be less preferable in itself than addressing two problems; but addressing five problems and possibly spreading the money too diffusely might be least preferable.

- AIDS seemed somewhat important but only in conjunction with some other program; spending money on AIDS alone was least popular as a first or second choice.

These hypotheses, if true, are quite interesting. They suggest that law students (and perhaps lawyers) differ greatly from experts insofar as they do not focus on the numbers alone. They also suggest that law students like to spread money among a variety of programs—but that there are limits on the extent to which they like to spread. (One reason for this limit might be cognitive difficulty in assessing more complex allocations; another reason might be a sense that, if resources are spread too diffusely among programs, no program will achieve any material benefit.) Finally, they suggest a reluctance to devote resources to AIDS alone. This possible reluctance might stem from distributional concerns; it might also stem from a belief that AIDS is in some sense a product of voluntary activity that could be negligent or worse. (One might think that smoking would similarly be considered a voluntary activity. But many people might perceive smoking as less voluntary and at least partially caused by manipulative efforts of the tobacco industry. Recent research on the effectiveness of antismoking campaigns points to the strength of such perceptions: the most effective campaigns seem to be those urging their targets not to be manipulated by the tobacco industry.[6])

The 1998 Survey

The 1998 survey sought to test and refine the hypotheses generated by the preliminary 1997 survey, as well as several additional hypotheses about resource allocation among risks and regulatory programs. In the relevant portion of the 1998 survey, respondents were again asked to allocate $100 million among nine programs or regions, as described below. In this survey, however, they were free to allocate the $100 million among the programs or regions in any proportions they wished, rather than being limited to fixed allocations provided for them. Moreover, there was no minimum or maximum allocation for any one program nor any requirement to fund a minimum or maximum number of programs. The resource allocation portion of the 1998 survey required the most complex analysis and interpretation, in part because there were five variant conditions for this portion of the survey. The underlying rationale for these varying conditions (and for this portion of the survey

---

6. See Lisa K. Goldman & Stanton A. Glantz, Evaluation of Antismoking Advertising Campaigns, 279 JAMA 772 (1998).

generally) was that we wanted to assess the extent to which various types of information would affect the respondents' allocations.

Our basic findings were that the law students behaved like experts to this extent: the number of lives saved was the predominant factor in their allocations. But even with no information other than the number of lives saved, respondents sacrificed some lives saved in the interest of breadth or equity. And when information of any sort was added to the number of lives saved, breadth and equity became even more prominent, although the effect of additional information was limited and the number of lives saved seemed always to remain the predominant factor. Finally, the 1998 survey also yielded insight about the effects of special interest groups, regarding allocation for AIDS, and regarding the intriguing possibility that people make their allocations by establishing the highest and lowest priorities and then leaving what is left to the middle (rather than, for instance, making allocations in serial order of priority).

In one condition (the program-basic condition), we briefly described the nine programs and, for each program, projected the number of lives to be saved annually, as follows.

1. AIDS research, education, prevention, and treatment (projected to save 12.0 lives annually per $10 million spent).
2. Cancer research, education, prevention, and treatment (projected to save 12.0 lives annually per $10 million spent).
3. Enforcement activity directed at toxic air pollutants (projected to save 5.0 lives annually per $10 million spent).
4. Prevention of lead ingestion by children in schools and other buildings (projected to save 6.0 lives annually per $10 million spent).
5. Removal of asbestos from school buildings (projected to save 2.0 lives annually per $10 million spent).
6. Increased safety inspections of nuclear power plants (projected to save 0.0 lives annually per $10 million spent).
7. Increased safety inspections of airlines (projected to save 0.5 lives annually per $10 million spent).
8. Aggressive antismoking campaign involving advertisements, education, restrictions on sales to minors, and higher taxes on tobacco products (projected to save 16.0 lives annually per $10 million spent).
9. Wide-reaching fitness and nutrition campaign involving advertisements, education, and various wellness programs and incentive programs (projected to save 16.0 lives annually per $10 million spent).

A second condition (the program-enhanced condition) sought to determine the extent to which certain specific factors other than the number of lives saved and the nature of the risk would affect allocation patterns. These additional factors included political accountability, distributional effects, and public opinion. In this condition, respondents received the same information described above, but for some of the programs, there was additional information, as follows.

- The description of program 1 (AIDS) added that "AIDS-related spending was a visible part of your party's most recent campaign."

- Program 4 was described as preventing lead ingestion by children in *inner-city* schools and buildings.
- Program 5 was described as the removal of asbestos from *all* school buildings.
- The description of program 6 (nuclear power plant inspections) added that "some members of the public are increasingly concerned with nuclear power plant safety and are assertively demanding greater attention to these potentially catastrophic risks."
- The description of program 7 (airline inspections) added that "recent highly publicized incidents have focused public attention on airline safety."
- The description of program 8 added that the program was strongly opposed by the tobacco industry and farmers.
- The descriptions of programs 2, 3, and 9 (cancer/toxic air pollutants/fitness and nutrition) were left unchanged.

A third condition (the program-minimal condition) identified the programs simply as Program 1, Program 2, etc., and offered no information other than the number of lives saved annually per $10 million spent. The purpose of this was twofold: first, to establish a baseline allocation absent any information but lives saved, to which we could compare the allocations generated where additional information was given; and second, to verify that the respondents were willing and able to allocate like experts, at least when lives saved was the only information provided.

Although these three conditions were presumed to elucidate the effects of various types of information, we wanted to isolate further the effects of the supplemental information in the program-enhanced condition, independently of the particular program to which such information was attached. For example, perhaps being a visible part of one's party's campaign might have some effect on allocations for AIDS but not for other programs. But there were too many permutations to test each piece of supplemental information with each program, and besides, it could be that our programs were not broad enough. Accordingly, we sought to assess whether the supplemental information would have any effects completely apart from the nature of a program, and we did this by creating two additional conditions, in which the fund recipients were not "programs" but "regions." In these fourth and fifth conditions, the survey posited:

> A new government program is to be implemented. For purposes of analyzing the program's effects and distributing funds for the program, the country has been divided into nine regions of approximately equal population. With regard to the number of lives saved, the program has different effects in different regions. The other effects of the program do not differ substantially among regions. Assume that you are responsible for allocating $100 million among the different regions.

One of these two "region" conditions (the region-minimal condition) merely provided the number of lives that the program was projected to save

annually (per $10 million spent) in that particular region. This condition was analogous (and nearly identical) to the program-minimal condition, which offered only such information for "programs," and the numbers of lives saved for the regions matched those for the programs.

In addition to this same information about numbers of lives saved, the other "region" condition (the region-enhanced) added supplemental information as similar as possible to that which was added in the program-enhanced condition, as follows.

- For region 1, the description of the number of lives saved added that "this region was a key supporter of your party's most recent campaign."
- For region 4, the lives saved were noted to be "mostly lives of inner-city children."
- For region 5, the lives saved were noted to be "mostly lives of schoolchildren."
- For region 6, the description of the number of lives saved added that "some members of the public are increasingly concerned that this region might suffer catastrophic loss of lives without the program."
- For region 7, the description of the number of lives saved added that "recent highly publicized incidents have focused public attention on this region's problems."
- For region 8, the description of the number of lives saved added that "implementing the program in this region is strongly opposed by two powerful special-interest groups."
- For regions 2, 3, and 9, the descriptions of the number of lives saved were left unchanged and not enhanced by supplemental information.

The 1998 Survey Results

General Patterns: Efficiency Versus Equity in Resource Allocation

Respondents adhering to expert judgments would generally allocate their $100 million so as to maximize the number of lives saved annually; in that sense, they should strive for maximum efficiency.[7] Efficiency in this sense would entail allocating all of the money to program 8, to program 9, or to both in any proportion, yielding a total of 160 lives saved annually. But far from a majority of the respondents allocated their funds in the maximally efficient manner; on the contrary, only 23 respondents (24.5%) did so. *Clearly, then, factors other than maximizing number of lives saved affected the vast majority of the*

---

7. We do not mean efficiency in a technical sense, which would be based on willingness to pay, a criterion that would generate something other than maximizing lives saved. See Valuing Health for Policy: An Economic Approach, eds. George Tolley et al. (Chicago, 1994).

allocations chosen—and the purpose of this survey was indeed to discern what some of those factors might be.[8]

One potential factor was apparent in the preliminary 1997 survey (and discussed briefly above): namely, people might prefer not to put all of their allocation in one basket, as it were, but instead to spread the wealth among recipients. A possible explanation for this preference is that people are hedging against the risk that any one program might fail to meet its projections for lives saved; as one allocates funds to other programs, one is better assured that at least one of those programs will meet expectations. This explanation is analogous to the explanation for asset allocation and diversification in investment portfolios. But this explanation seems less than compelling: the survey simply asserted projections of lives saved, without delving into probabilities of saving more or fewer lives than projected. We are not inclined to believe that so many respondents considered such matters and hedged accordingly.

Instead, *fairness* or *equity* is probably a better explanation for the tendency to spread the wealth among more programs than just the one or two that would maximize efficiency. If only one or two programs receive the $100 million, then all who would benefit from the other programs are effectively shut out; those whose lives might be saved by the less-than-maximally-efficient programs enjoy no heightened prospect at all. By contrast, if the money is allocated among more programs, the total benefit may not be as high, but perhaps respondents believe that more people—or more diverse people—will enjoy some incremental benefit of an increased probability that their lives will be saved.[9]

We operationalized these two factors, efficiency and equity, via summary statistics derived from each respondent's allocation among programs. The simple proxy for efficiency was the total number of lives saved annually under the respondent's allocation of the whole $100 million; we will refer to this variable as *total lives.* For each program, we calculated the actual lives saved as follows:

(millions allocated) x (lives saved per $10 million) / $10 million.

We then summed the actual lives saved for each program to get the *total lives.* Under maximum efficiency, where the entire $100 million was allocated,

8. One adjustment to the results was necessary to conduct the analyses described below. Specifically, for eight of the respondents, allocations to the various programs did not add to $100 million. For at least five and possibly more of these respondents, this was likely due to mere miscalculation. It is possible, though, that some respondents allocated less than $100 million deliberately, as a sort of statement about the propriety of government spending and supporting limits thereon. Although we would be interested in whether attitudes toward government spending might affect allocations to some programs or regions vis-à-vis others, the propriety of government spending in general did not concern us here. We were concerned with what people would "buy" with every $100 million spent, not with whether they thought $100 million was too much to spend or whether they preferred to save some of that $100 million. Accordingly, where a respondent's allocations did not sum to $100 million, we either increased or decreased all of the allocations proportionately to make them do so.

9. For the sake of grammatical simplicity, the word "program" will generally refer to both programs and regions, although where a distinction between programs and regions is required, it will be made clear, and the word "program" in the name of a survey condition will remain significantly distinct.

to program 8, program 9, or both, *total lives* would equal 160. Lower figures would indicate decreased efficiency.

We operationalized equity via two statistics. The first equity statistic, designed to test breadth (a very possible proxy for equity), was simply the number of programs to which a respondent allocated any money at all; this variable we call *total programs.* Respondents concerned solely with efficiency (at least as we consider it here, as lives saved) would allocate money to only one or two programs (namely, program 8 and/or program 9). As the respondent allocated money to more programs, breadth (or, here, equity) would increase, and efficiency would decrease.

The second statistical proxy for equity, *equity variance,* is subtler and more precise but also more complex than the *total programs* variable described above. Under what might seem to be a perfectly equitable allocation of equal amounts to all nine programs, each program would receive $11.1 million, which is exactly equal to the mean allocation (i.e., $100 million divided by 9, insofar as all respondents allocated $100 million among nine programs). As allocation patterns deviate from this perfectly equitable pattern, the actual allocations for specific programs will, on average, also deviate from the mean allocation of $11.1 million. On this basis, *equity variance* equaled the total summed variances of each program's allocation from the mean allocation of $11.1 million per program. That is, for each program, we subtracted the actual allocation from the mean allocation of $11.1 million and squared that difference. Then, for each respondent, we added all nine squared differences and, finally, computed the square root of that sum total; *equity variance* refers to the resulting figure.

That *equity variance* offers some measure of a respondent's breadth in allocation can again be seen as follows. If a respondent allocated the $100 million among all nine programs equally, the allocation for each program would equal the mean allocation, and *equity variance* would equal zero; from this baseline, as the respondent increases allocations to some programs and decreases allocations to other programs (perhaps even to zero), allocations for programs will deviate more and more from the mean allocation (of $11.1 million per program), and *equity variance* will increase accordingly.

Table 2 presents by condition the means for *total lives, equity variance,* and *total programs.* Efficiency (as measured by *total lives*) was highest in the program-minimal and region-minimal conditions (with 140.42 and 145.89 total lives saved, respectively), and there was no significant difference between these two conditions (which we will refer to jointly as the minimal conditions). This result is not surprising, because in these conditions respondents had no information except the number of lives saved, and that factor should have been predominant in their allocations.

The more interesting finding is that the means for *total lives* in the program-basic (116.54), program-enhanced (115.28), and region-enhanced (118.73) conditions were significantly lower than the means for the two minimal conditions (using a Student-Newman-Keuls test, or SNK, at $p < .05$)—but they were not significantly different from one another. In other words, when

information about the number of lives saved by a program was accompanied by *any* additional information, *total lives* (representing efficiency) decreased significantly, but it did not matter whether that additional information was basic program description alone (as in the program-basic condition), supplemental information alone (as in the region-enhanced condition), or both (as in the program-enhanced condition): *total lives* was essentially the same regardless.

Table 2: Efficiency Versus Equity in Resource Allocation (1998 Survey)								
	All conditions	*Program-minimal*	*Program-basic*	*Program-enhanced*	*Region-minimal*	*Region-enhanced*	*Minimal conditions*	*Nonminimal conditions*
Total lives	126.0	140.4	116.5	115.1	145.9	118.7	142.2	116.7
Equity variance	12.5	15.7	11.2	9.1	16.2	11.7	15.8	10.6
Total programs	5.8	4.0	6.4	7.2	4.0	7.0	4.0	7.0

We obtained complementary results for *total programs* and *equity variance*, the two measures of equity, or breadth, of allocation. The *total programs* to which respondents allocated any funds at all was lowest (which meant that breadth was lowest) in the two minimal conditions (averaging 3.96 programs in the program-minimal condition and 4.00 programs in the region-minimal condition); and *total programs* was highest (which meant that breadth was highest) in the three nonminimal conditions (averaging 6.37 programs in the program-basic condition, 7.18 in the program-enhanced, and 7.00 in the region-enhanced). The two minimal conditions were significantly lower in *total programs* than the three nonminimal conditions (using SNK at $p < .05$). But the two minimal conditions were not significantly different from each other, nor were the nonminimal conditions significantly different from one another.

Similarly, *equity variance* was highest (which meant that the allocations were furthest from perfect breadth or equality among all nine programs) in the two minimal conditions; and *equity variance* was lowest (which meant that the allocations were closest to perfect breadth or equality) in the three nonminimal conditions. Of the three nonminimal conditions, however, only the program-enhanced condition was significantly lower than the two minimal conditions (using SNK at $p < .05$). As with *total programs*, the two minimal conditions were not significantly different from each other in *equity variance*, nor were the three nonminimal conditions significantly different from one another on this variable.

Because the program-basic and program-enhanced conditions showed no significant differences in *total lives, equity variance*, or *total programs* (as assessed via planned contrasts), we combined these two conditions in order to conduct additional analyses using a two-factor model in which one factor was program versus region (i.e., whether allocations were to programs or to regions) and the other factor was minimal versus nonminimal (i.e., whether or not respondents received *any* information beyond number of lives saved). For *total lives, equity variance*, and *total programs* alike, whether respondents received

minimal-versus-nonminimal information was a significant factor ($p < .001$ for each variable). But whether respondents allocated funds to programs versus regions was not a significant factor, nor was there a significant interaction between the two factors.

Finally, one additional finding about these three variables was that they correlated rather consistently with our construction of the efficiency-versus-equity tradeoff. *Total lives* (or efficiency) was positively correlated ($r = .822$) with *equity variance* (for which zero indicated perfect equity and higher numbers indicated less equity) and negatively correlated ($r = -.804$) with *total programs* (for which lower numbers indicated less equity and higher numbers indicated more equity); both correlations were significant at $p < .001$. There was also a significant negative correlation between *equity variance* and *total programs* ($r = -.897$, $p < .001$); this we also expected because higher *equity variance* and lower *total programs* both indicate less equity, while lower *equity variance* and higher *total programs* both indicate more equity.

In sum, the resource allocation portion of the 1998 survey indicated the following.

- Respondents were capable of appreciating lives saved and generally acted more like experts when no other information was offered.

- But even when they had no information beyond lives saved and so should have acted most like experts, they allocated money on average to four of the nine programs, sacrificing some fifteen to twenty lives vis-à-vis the most efficient allocation. This indicated that there is at least a baseline reluctance to concentrate resources too much and/or a baseline interest in equity (i.e., in breadth, fairness, or sharing the wealth).

- Moreover, when any information, regardless of its nature, was offered in addition to lives saved, respondents acted even less like experts and shifted more towards breadth and equity in their allocations, sacrificing on average about twenty-five more lives.

Specific Programs

Table 3 presents the mean allocations (overall and broken down by condition) for each program. It lists the programs in order of their mean allocations for all conditions combined. With each mean allocation we include in parentheses the program's ranking for that particular column. Each listing briefly references the program description and supplemental information, although each piece of such information would be applicable to only some of the various conditions.

For all programs except program 5 (lead—inner-city children), specific allocations were significantly different among conditions. As with the broader measures discussed above, no specific program showed a significant difference (in a planned contrast) between the program-basic and program-enhanced conditions. Accordingly, as with those broader measures, we col-

lapsed these conditions to conduct a two-factor analysis with minimal-versus-nonminimal as one factor and program-versus-region as the other. Because the minimal-versus-nonminimal factor was significant for all but one program (where the factor was still marginally significant), Table 3 also presents separate mean allocations for the combined minimal conditions (i.e., program-minimal and region-minimal) versus the combined nonminimal conditions (i.e., program-basic, program-enhanced, and region-enhanced).

Table 3: Resource Allocations to Specific Programs (1998 Survey)

Program	All conditions	Program-minimal	Program-basic	Program-enhanced	Region-minimal	Region-enhanced	Minimal conditions	Nonminimal conditions
9: Fitness (no supplemental information)	31.4 (1)	36.0 (2)	30.3 (1)	24.2 (1)	39.6 (1-tie)	30.3 (1)	37.2 (2)	28.0 (1)
8: Antismoking— interest-group opposition	24.4 (2)	36.4 (1)	13.6 (4)	18.7 (2)	39.6 (1-tie)	17.7 (3)	37.5 (1)	16.8 (2)
1: AIDS— campaign issue/support	12.3 (3)	7.7 (4)	14.0 (3)	13.4 (4)	6.7 (3)	18.3 (2)	7.4 (4)	15.2 (3)
2: Cancer (no supplemental information)	12.2 (4)	8.2 (3)	16.5 (2)	17.5 (3)	6.7 (3)	10.0 (4)	7.7 (3)	14.8 (4)
4: Lead ingestion— inner-city children	6.7 (5)	5.6 (5)	8.1 (5)	8.2 (5)	2.7 (5)	7.3 (5)	4.7 (5)	7.9 (5)
3: Air pollutants (no supplemental information)	5.2 (6)	3.7 (6)	7.7 (6)	6.7 (6)	1.9 (7)	4.8 (7)	3.1 (6)	6.4 (6)
5: Asbestos removal— all schoolchildren	3.5 (7)	1.3 (7)	3.9 (7)	4.6 (7)	2.1 (6)	5.3 (6)	1.5 (7)	4.6 (7)
7: Airline inspections— publicized incidents	2.6 (8)	1.0 (8)	3.1 (8)	4.1 (8)	0.5 (8)	3.9 (8)	0.8 (8)	3.7 (8)
6: Nuclear power plants— catastrophe concerns	1.7 (9)	0.2 (9)	2.7 (9)	2.6 (9)	0.1 (9)	2.5 (9)	0.2 (9)	2.6 (9)

Ceiling effects and the dominance of lives saved. As we have noted, for no program was there any significant difference between the program-basic, program-enhanced, and region-enhanced conditions. This finding suggests that the potential effects of information beyond the number of lives saved have limits and that, accordingly, the effects of different types of information are not additive once those limits are reached. If we were not surprised that some limit precludes additive effects of information other than number of lives saved, we were surprised that this ceiling was so low. For example, we would have expected the supplemental information presented alone (i.e., in the region-enhanced condition) to produce a significant difference from program description presented alone (i.e., in the program-basic condition) for at least one of the nine programs, but we never got this result. (To be sure, there were some potential trends in this direction, but none that was significant or even marginally so.)

This ceiling on the effects of information beyond number of lives saved points to the relative dominance of lives saved in respondents' allocation. The relative rankings, both overall and across specific conditions and combinations, make it even clearer that the number of lives saved was the dominant

factor in the allocations. That dominance is most pronounced in the minimal conditions, of course, where (as predicted) efficiency was highest in the absence of mitigating alternative information. But even though additional information (whether program description, supplemental information, or both) caused a decrease in efficiency and broader allocation, the relative rankings of the various programs remained relatively consistent with the number of lives saved under the programs.

Fitness, smoking, and special-interest groups. The program receiving the highest allocation overall was program 9 (fitness—no supplemental information), projected to save 16.0 lives per $10 million spent; program 8 (antismoking—interest-group opposition), also projected to save 16.0 lives per $10 million, received the second-highest allocation overall. In the minimal conditions, these programs received virtually identical allocations, but when information was added to the number of lives saved, program 8 allocations decreased more than twice as much as the program 9 allocations (as we discuss in more detail below). Indeed, a within-subjects analysis of the relative allocations between programs 8 and 9 showed a significant difference between those allocations in general, and the magnitude of the difference varied significantly both by condition and on the minimal-versus-nonminimal factor.

The relative allocation between programs 8 and 9 was not affected by any interaction between the minimal-versus-nonminimal factor and the program-versus-region factor. As we have said, this points to a ceiling on the effects of any information added to the number of lives saved. But one set of trends is worth mentioning: namely, from the baseline established in the program-minimal condition, allocations for program 8 in the program-basic condition (i.e., for an antismoking program) decreased an average of $5 million more than did the allocations for program 8 in the program-enhanced condition (i.e., where the antismoking program description was supplemented by the note that the program was strongly opposed by the tobacco industry and farmers). At the same time, comparing the region-minimal and region-enhanced conditions, both program 8 and program 9 were exactly equal in the region-minimal condition, but program 8 dropped much more than program 9 in the region-enhanced condition, where the only difference between the two programs was program 8's being strongly opposed by powerful special-interest groups.

Although the difference for program 8 between the program-basic and program-enhanced conditions was not significant, it was not far from significance and might become so if we used more powerful measures (and/or more respondents). If valid, what the trend indicates is that the tobacco industry might hurt itself with its public opposition to antismoking programs: the antismoking program received higher allocations when the industry's opposition was mentioned. In other words, it might sometimes be strategic and prudent for the tobacco industry to stifle its public opposition to (or support for) programs with which it is concerned. Conversely, as we have said, supporters of antismoking programs likely help their cause by highlighting the tobacco industry's opposition to them.

Notwithstanding this specific observation, special-interest groups in general do not seem to hurt their own causes, even when their support or opposition is salient; in the region-enhanced condition, the mere fact of special-interest opposition to program 8 reduced allocations to levels far below those in otherwise-identical program 9 (just as the special-interest opposition would like). Even when the special-interest group is the tobacco industry (i.e., in the program-enhanced condition), allocations were substantially lower for program 8 than for program 9; they just were not as low as they were when the interest group was not identified as being the tobacco industry.

AIDS, cancer, and political campaigns. Program 1 (AIDS—campaign issue/support), projected to save 12.0 lives per $10 million spent, received the third-highest mean allocation overall, while program 2 (cancer—no supplemental information), with an identical projection of lives saved, received an almost identical fourth-highest allocation. Indeed, within-subjects analyses of the relative allocations between program 1 and program 2 showed no significant differences between those allocations in general. The relative allocations between the two programs did vary significantly both by condition and on the minimal-versus-nonminimal factor; generally, allocations for both programs increased about equally when information was added to the number of lives saved. But there was also a marginally significant interaction effect between the minimal-versus-nonminimal factor and the program-versus-region factor. From the baseline in region-minimal, allocations for program 1 in the region-enhanced condition increased more than allocations for program 2. This makes sense because only program 1 added supplemental information in the region-enhanced condition; any increase in program 2's allocation in that condition would have been due to its interdependence with the other programs, since its description was no different. By contrast, from the baseline in program-minimal, allocations for program 1 in the program-basic and program-enhanced conditions increased less than the allocations for program 2. And program 1's allocation in the program-enhanced condition was lower (albeit not significantly) than in the region-enhanced condition.

These findings yield a few possible explanations. The slight difference in program 1 allocations between the program-enhanced and the region-enhanced conditions might simply suggest that the slight difference in the supplemental information was relevant. In the program-enhanced condition, AIDS was described as "a visible part of your party's campaign," whereas in the region-enhanced condition, the region was described as "a key supporter of your party's most recent campaign"; and perhaps the latter, denoting explicit support rather than mere visibility (which was unclear as to effect or valence), commanded greater attention and influence on the allocation. But from the baseline in the program-minimal condition, AIDS-program allocations went up less than cancer-program allocations in the program-basic condition, and AIDS allocations went down a little when the campaign-visibility information was added, while cancer allocations went even higher in the program-enhanced condition (albeit likely due to interdependence, as no supplemental information was added for program 2). Since the number of lives saved was

equal between the two programs, it might be that respondents preferred cancer in the nonminimal program conditions because it affects more people; this interpretation would cohere with the preference for breadth and equity. Another explanation might be that these patterns reflect some sort of back-lash against AIDS programs. But if the alleged backlash is purportedly due to AIDS' not affecting so many people, then the explanation is simply the complement of the breadth- or equity-based explanation for the relatively higher allocations for cancer programs. And while the decrease in AIDS allocation in the program-enhanced condition (where its campaign visibility is salient) might further support a backlash theory, that decrease was rather small and not significant, and it might simply have reflected the interdependence of the AIDS program and other programs with supplemental information.

Nuclear power plants and airline safety. Program 6 (nuclear power plants—catastrophe concerns), projected to save zero lives per $10 million spent, received the lowest mean allocation overall; program 7 (airline inspections—publicized incidents), projected to save only 0.5 lives per $10 million spent, received the second-lowest allocation. As with other programs, the minimal-versus-nonminimal factor was significant: allocations for both programs increased when program descriptions and/or supplemental information was added to the number of lives saved. Notwithstanding that significance, however, even when additional information was given, programs 6 and 7 still received the lowest and second-lowest allocations, respectively; this consistency further highlights the dominance of lives saved in determining allocations.

Lead, air pollution, and asbestos. Program 4 (lead ingestion—inner-city children), projected to save 6.0 lives per $10 million spent, received the fifth-highest mean allocation overall; program 3 (air pollution—no supplemental information), projected to save 5.0 lives per $10 million spent, received the sixth-highest overall allocation; and program 5 (asbestos removal—all school-children), projected to save 3.0 lives per $10 million spent, received the seventh-highest overall allocation. Within-subjects analyses yielded a significant pattern of differences in the allocations among programs 3, 4, and 5. In addition, allocations for these programs as a group varied significantly by condition and on the minimal-versus-nonminimal factor. (By themselves, program 3 and program 5 varied significantly by condition and on the minimal-versus-nonminimal factor; program 4 did not vary significantly by condition and reached only marginal significance on the minimal-versus-nonminimal factor.) But the relative pattern of allocations among the three programs did not vary significantly by condition or on the minimal-versus-nonminimal factor; generally, allocations for both programs increased about equally when information was added to the number of lives saved.

Unlike any of the interprogram patterns discussed above, the relative pattern of allocations among these three programs varied significantly on the program-versus-region factor. Essentially, program 3 received higher allocations than program 5 in the program conditions but not in the region

conditions (where program 3 received allocations that were very slightly but not significantly lower). The superiority of program 3 in the program conditions is consistent with the dominance of lives saved and might also reflect persisting concern about air pollution, while concern about asbestos seems to have waned in the past few years (especially as we have recognized the exorbitant expense but limited benefit of asbestos removal). By contrast, the relative equality of these two programs in the region condition might derive from the salience of program 5's benefiting all schoolchildren (and thus appealing to breadth or equity concerns), especially since program 3 has no supplemental information added.

Notwithstanding the results above, the most interesting observation about programs 3, 4, and 5 might be that their results are rather uninteresting. Program 4 is one salient example; it was the only program for which allocations did not vary significantly across the five conditions, and it was the only program for which the minimal-versus-nonminimal factor was only marginally significant. Program 3 (which added no supplemental information in the enhanced conditions) offers another example. The allocation for this program in the program-basic condition approximates the midpoint of allocations for that program in the two region conditions. This might indicate that there are perceived variations in the program's allocations; with no supplemental information, the two region conditions should have approximated the program-basic condition for allocations to this program, so the variance in the region conditions is more likely due to the program's interdependence with other programs than anything else.

These "uninteresting" results suggest that the allocation process might be one of deciding on the extremes and thinking much less about the middle. Here, that would mean the respondents might typically have decided which programs should clearly get the highest and lowest allocations and then how much those programs should receive; the remaining programs in the middle then split up the pot, in rough proportion to the number of lives saved. If this observation is valid generally, it suggests that the most fertile opportunities for influencing allocations lie where the program is very high or very low on the priority list. By contrast, allocation for programs of moderate priority might be destined to take the relatively constant amount left over after the higher and lower priorities have been addressed. But this hypothesis is tentative and requires further inquiry.

Summary and concluding remarks. In sum, the most basic trend observed in this portion of the survey was that, given minimal information, respondents come closest to maximal efficiency in the sense that lives saved dominates everything else. But when given any sort of additional information (whether program descriptions, supplemental information, or both), respondents sacrifice efficiency in favor of greater breadth or equity. In making this tradeoff, though, respondents generally achieve the breadth without disturbing the relative priority of the various programs; there may be less difference in allocation from first to second and so on to last, but first and second and so on to last retain their relative levels of priority. And there seems to be a ceiling on

the effects of additional information, so that additional information affects allocations only to a certain point; beyond this point, further information seems to have no effect on allocations.

The question is, where efficiency suffers, which programs bear those losses in efficiency? Because the programs with highest allocations under more efficiency-oriented conditions have more to give, it should be expected that they would bear such losses and that portions of their allocations would be redirected to programs lower in efficiency. Indeed, this is exactly what happened here. When information of any sort was added to the number of lives saved, the two programs with highest allocations in the minimal conditions suffered losses, while all other programs received higher allocations. Even the programs ranked third and fourth in the minimal conditions approximately doubled their allocations in the nonminimal conditions. This result seems to mitigate the predominance of lives saved in determining allocation, suggesting that such efficiency is something of a spartan luxury that must be abandoned when additional information and complexity detract from spartan simplicity.

Also relevant to this issue of what programs bear the losses in efficiency is the marked disparity between how much program 8's allocations decreased in the nonminimal conditions and how relatively little program 9's allocations decreased. That finding points to two conclusions, either or both of which may be valid (even if subject to the ceiling on effects of information added to lives saved) and worthy of further research. One is that government's launching an antismoking campaign raises issues of autonomy, paternalism, and propriety that the government's launching of a pro-fitness campaign does not. The second, consistent with public choice theory, is that, for all the criticism of special-interest groups that one often encounters (even from those whom they seek to influence), their support or opposition can substantially affect resource allocation and hinder efficiency.

Risk Assessment

The 1997 Preliminary Survey

There is considerable debate not only about differences between experts and ordinary people on the importance of maximizing lives saved, but also about the particular kinds of risks that experts and ordinary people deem important. Consider, for example, the following table:[10]

---

10. See Breyer, *supra* note 4, at 21 (derived from Environmental Protection Agency, *Unfinished Business: A Comparative Assessment of Environmental Problems* (Washington, 1987) and national public opinion polls by the Roper Organization in December 1987 and January 1988).

Table 4: Rating Health Risks

	Public	EPA experts
Hazardous waste sites	1	Medium to low
Exposure to worksite chemicals	2	High
Industrial pollution of waterways	3	Low
Nuclear accident radiation	4	Not ranked
Radioactive waste	5	Not ranked
Chemical leaks from underground storage tanks	6	Medium to low
Pesticides	7	High
Pollution from industrial accidents	8	Medium to low
Water pollution from farm runoff	9	Medium
Tap water contamination	10	High
Industrial air pollution	11	High
Ozone layer destruction	12	High
Coastal water contamination	13	Low
Sewage-plant water pollution	14	Medium to low
Vehicle exhaust	15	High
Oil spills	16	Medium to low
Acid rain	17	High
Water pollution from urban runoff	18	Medium
Damaged wetlands	19	Low
Genetic alteration	20	Low
Nonhazardous waste sites	21	Medium to low
Greenhouse effect	22	Low
Indoor air pollution	23	High
X-ray radiation	24	Not ranked
Indoor radon	25	High
Microwave oven radiation	26	Not ranked

In the risk assessment portion of the 1997 preliminary survey, respondents were given the following instruction:

> The federal, state, and local governments of the United States expend resources on a wide range of issues that present environmental health and safety risks. As a guide to setting government priorities, how important do you consider each of the following risks? Listed below are 24 risks. Please assign each risk to one of three categories (high, medium, or low importance), indicating its seriousness compared with the other risks listed there. Please be sure to assign exactly eight (8) risks (one-third of the total) to each of the three categories.

Surveys were scored by assigning to each risk 3 points if in the "high" category, 2 if in the "medium," and 1 if in the "low." The last two columns of Table 5 display the mean scores and ordinal rankings of our twenty-four risk factors (which were somewhat different from the twenty-six risks of Table 4). More than they answered the question whether law students are more like experts or like laypersons, these results pointed out certain ambiguities and

other issues in risk assessment that would need to be addressed and refined with the followup survey.

For example, on the basis of certain variance patterns and comments from some respondents, we believed that answers to the question "How important is each risk, as a guide to setting government priorities?" were somewhat ambiguous. Specifically, we could not be sure how much the answers were determined by the respondent's assessment of the risk itself, independent from government expenditure, versus how much the answers were determined by the respondent's opinion as to the propriety and/or utility of government expenditure on the risk, independent of the risk itself. For example, the risk of cigarette smoking (to smokers themselves) showed the highest variance, and its distribution was U-shaped. Presuming that the respondents did not include adherents to the then-current Bob Dole claim that smoking was not so harmful or addictive, we assumed that the risk itself should have been ranked uniformly high, but instead we found that it was often ranked medium or even low, because some respondents believed it improper or ineffective for government to spend resources against cigarette smoking.

Another source of potential ambiguity in these results was that respondents might have interpreted or defined the term "risk" in various ways. Some might have interpreted it in technical terms, as the magnitude of harm multiplied by the probability of harm, but others might have given greater weight to one or the other of those factors. Moreover, some respondents might have factored in other characteristics of the risk, such as its being particularly grisly, unforeseeable, inequitable, and so forth (as described, for example, by Slovic and his colleagues[11]). Again, these variations in definition of "risk" might have affected the results, and certain comments by respondents indicated that this was a real possibility. Accordingly, the 1998 survey was designed with an eye toward reducing these ambiguities and focusing the results and their interpretation.

The 1998 Survey

The 1998 survey improved upon the preliminary survey by dividing respondents into two conditions for the risk assessment portion, using a different response format, and offering a guideline definition of risk. For both conditions, the question began with the guideline definition:

> The level of risk associated with an event or condition is a product of both the magnitude of harm resulting from the event or condition and the probability that the event or condition will occur. The federal, state, and local governments of the United States expend resources against a wide range of environmental, health, and safety risks.

Then, in one condition (the risk level condition), respondents were given the following instruction:

> Listed below are 24 risks. You have been asked to evaluate the level of risk that each presents. Accordingly, please rank all of the risks from 1 to 24, indicating the level of each risk compared to all the others (1 = highest level of risk on the list, 2 = second-highest level of risk on the list, and so on, to 24 = lowest

11. See the general outline and treatment in Paul Slovic et al., Regulation of Risk: A Psychological Perspective, *in* Regulatory Policy and the Social Sciences, ed. Roger G. Noll, 241 (Berkeley, 1985).

level of risk on the list). IMPORTANT: You must use each rank from 1 to 24, and there can be no ties between risks.

In the second condition (the funding priority condition), respondents were instead given this instruction:

> Listed below are 24 risks. Assume that the government has allotted limited funds that will be used to combat eight of the risks listed below. Because these funds are limited, you have been asked to evaluate where they would be best spent. Accordingly, please rank all of the risks from 1 to 24, indicating the spending priority that each risk should receive compared to all the others (1 = highest spending priority on the list, 2 = second-highest spending priority on the list, and so on, to 24 = lowest spending priority on the list). IMPORTANT: You must use each rank from 1 to 24, and there can be no ties between risks.

The 1998 Survey Results

Table 5 presents the ordinal ranking and mean score for each risk both overall and by condition. (In addition, as noted above, this table includes the ordinal ranking and mean score for each risk as assessed by the 1997 preliminary survey, which used a different response format and scale.)

Table 5: Risk Assessment (1998 Survey and 1997 Preliminary Survey)

Risk	Overall (1998 survey)		Risk level condition		Funding priority condition		1997 preliminary survey	
	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean
Poverty	1	4.25	1	4.66	1	3.92	2	2.77
Violent crime (excluding terrorism)	2	5.54	2	6.02	2	5.17	1	2.79
Infectious diseases (excluding AIDS)	3	7.72	4	·7.13	3	8.17	5	2.42
**Automobile accidents	4	8.93	3	6.71	8	10.64	8	2.31
Particulate air pollution	5	9.37	6	9.71	5	9.11	6	2.40
Firearms	6	9.84	8	10.51	6	9.32	7	2.33
**Hazardous waste	7	10.04	12	11.34	4	9.04	3	2.59
*Poor diet/nutrition	8	10.26	5	8.59	10	11.55	20	1.64
Pollution of surface waters	9	10.36	11	11.17	7	9.74	4	2.47
AIDS	10	11.06	10	10.78	9	11.28	10	2.19
*Occupational injury and illness	11	11.75	7	10.49	14	12.72	12	2.07
Loss of wildlife habitats	12	12.87	13 (tie)	13.73	12	12.21	9	2.19
*Stratospheric ozone depletion	13	12.90	15	14.05	11	12.02	11	2.10
*Pesticide residue on foods	14	13.84	17 (tie)	14.49	13	12.53	19	1.65
Secondhand cigarette smoke	15	13.57	13 (tie)	13.73	17	13.45	18	1.66
Global warming/ greenhouse effect	16	13.68	16	14.41	15	13.11	14	1.92
**Cigarette smoking (risk to smokers)	17	13.82	9	10.61	20	16.30	13	2.04
**Terrorism	18	14.96	21	17.15	16	13.26	15	1.75
**Nuclear power	19	15.37	20	16.83	18	14.25	17	1.70
Pesticide exposure to farm worker	20	15.47	19	15.15	19	15.72	16	1.74
**Indoor air pollution	21	15.98	17 (tie)	14.49	22	·17.13	21	1.47
Airline accidents	22	17.11	22	17.49	21	16.81	22	1.42
Electromagnetic fields	23	19.40	23	19.12	23	19.62	23	1.27
Meteors or comets colliding with earth	24	22.38	24	21.98	24.	22.70	24	1.09

** $p < .05$ * $p < .10$

Differences Between Conditions

We conducted Mann-Whitney U-tests on each risk to determine whether the assessment of that risk differed between the risk level condition and the funding priority condition. (The Mann-Whitney U-test is a test of significance that is analogous to a *t*-test but more appropriate for ordinal data such as the rankings generated by this portion of the survey.) Table 5 highlights significant differences as follows: where the mean scores for a risk were significantly different between conditions ($p < .05$), the risk has two asterisks; where the difference between conditions was marginally significant ($p < .10$), the risk has one asterisk.

A total of ten risks showed significant or marginally significant differences between the two conditions. Of these ten, the following five risks received higher mean rankings in the funding priority condition than in the risk level condition: hazardous waste, nuclear power, stratospheric ozone depletion, pesticide residue on foods, and terrorism. This difference indicates that the law students might have been just like experts in recognizing that the risk level for these is actually rather low; but they might have been just like laypersons in believing that these risks warrant higher funding priority nonetheless. This difference might be explained in two ways. First, in adopting the role of policy makers in the funding priority condition, respondents might simply have recognized the importance that others place on these risks and responded accordingly, notwithstanding their own predilections. Second, the students might have wanted higher funding for the same reasons that laypersons want higher funding for these risks, such as the reasons discussed by Slovic and his colleagues (the widespread devastation that could result from the risks, the particular danger to children and other innocent parties, etc.).[12]

By contrast, five risks showed significant or marginally significant differences in which the mean ranking was higher in the risk level condition than in the funding priority condition: automobile accidents, cigarette smoking (risk to smokers), poor diet/nutrition, indoor air pollution, and occupational injury and illness. What is notable about these five risks is that, unlike the five risks discussed above, these risks can be seen as matters of voluntary behavior and/or contractual relations, and they can be addressed fairly well via insurance arrangements and the tort system. For example, while respondents might see cigarette smoking and poor diet as substantial risks, they might see these risks as being better addressed by behavioral change and/or self-insurance than by government funding. Similarly, while the respondents might see indoor air pollution and occupational injury or illness as substantial risks, they might see these risks as being better addressed by insurance (including workers' compensation) or even by the tort system than by government funding. On the contrary, the five risks discussed above, with their potential widespread devastation, might be seen as less amenable to solution via behavioral modification, insurance, or the tort system.

---

12. See *id.*

Variance

Variance for each risk was generally similar between conditions, but Levene's test for equality of variances indicated that there were significant or marginally significant differences in variance for five of the risks. For loss of wildlife habitats, indoor air pollution, and pollution of surface waters, variance was higher in the risk level condition than in the funding priority condition. (For pollution of surface waters, this difference was just marginally significant.) Apparently, for these risks, respondents were less consistent in assessing the risk level than they were in assessing the proper funding priority. By contrast, poor diet/nutrition and infectious diseases (excluding AIDS) showed higher variance in the funding priority condition than in the risk level condition (although both of these differences were just marginally significant). For these risks, respondents were less consistent in assessing the proper funding priority than they were in assessing the risk level. Finally, one other interesting observation about variance was that two risks showed overall standard deviations that were significantly different from the average standard deviation (which was 5.55): those risks were cigarette smoking (risk to smokers), with a standard deviation of 7.75, and poor diet/nutrition, with a standard deviation of 7.43.

Correlations Between Risk Assessment and Resource Allocation

Finally, some of the risks in this portion of the survey matched programs included in the resource allocation portion of the survey. Accordingly, we derived Spearman correlation coefficients for certain pairings of risks in this portion of the survey and programs in the resource allocation portion. (Spearman coefficients were more appropriate than Pearson coefficients because of the ordinal nature of the risk assessment rankings.) We limited this computation to respondents in the program-basic and program-enhanced conditions of the resource allocation portion, because these were the only respondents who knew the nature of the programs when making their allocations. We expected correlations to be negative because, under the 1-to-24 ranking system of the risk assessment portion, greater risks received lower rank scores.

Of the pairings we tested, three were significantly correlated. First, risk rankings for AIDS were negatively correlated with allocations to the AIDS-related program ($r = -.438$). Second, risk rankings for poor diet/nutrition were negatively correlated with allocations to the fitness and nutrition program ($r = -.400$). Third, risk rankings for secondhand smoke were negatively correlated with allocations to the antismoking program ($r = -.331$). By contrast, risk rankings for cigarette smoking (risk to smokers) showed virtually zero correlation with allocations to the antismoking program, which is consistent with cigarette smoking's having the highest variance among all risks. (In fact, the Spearman correlation between risk rankings for cigarette smoking and risk rankings for secondhand smoke was only .182 and definitely not significant, which is also consistent with cigarette smoking's having such high variance.) Other pairings that did not show significant correlations were between risk rankings for nuclear power and allocations for nuclear power

plant inspections, between risk rankings for airline accidents and allocations for airline safety inspections, and between risk rankings for particulate air pollution and allocations for programs related to toxic air pollutants.

Summary

Law students seem to behave more like experts when assessing risk levels themselves. Their assessments are not particularly discordant with those of experts; at the very least, they are more congruent with expert assessments than are the assessments of laypersons. But when asked to establish funding priorities, law students do go beyond assessments of risk alone. Specifically, they apparently attend to factors such as voluntariness, alternative possibilities for addressing the risk aside from government funding, breadth of effect, and effect on children and other innocent parties; and/or they are responsive in their hypothesized roles as policy makers to the concerns of ordinary people, even when those concerns are not matched or justified by expert assessments of risk levels.

Fairness

The 1997 Preliminary Survey

The 1997 preliminary survey included an item presenting the following scenario: "A department store in your town sells snow shovels, usually at a price of $10 per shovel. The morning after a substantial snowstorm, the department store decides to raise the price to $15 per shovel." Respondents were then asked to indicate whether they believed the department store's decision was "completely fair," "acceptable," "unfair," or "very unfair." In most surveys, most people (80 percent or so) treat this decision as unfair.

Of the 116 responses, 29 (25.0%) indicated that the decision was completely fair, 66 (56.9%) said that it was acceptable, 17 (14.7%) said that it was unfair, and only 4 (3.4%) said that it was very unfair. Collapsing the data, then, 95 (81.9%) of the respondents thought the decision was completely fair or acceptable, while only 21 (18.1%) of the subjects thought it was unfair or very unfair. Chi-square tests on these two distributions indicated that each was significantly different from a random distribution.

These results differ greatly from results observed among other populations.[13] We do not know whether this is a law student effect, a law school effect, an elite law school effect, or a University of Chicago Law School effect. In general, the students in our survey were most like economists in their willingness to suffer the laws of supply and demand without protest. Because of certain respondent comments, we wondered if such tolerance was due to the respondents' perceiving snow shovels not as essentials but instead as luxuries, for which fairness could not provide a superior claim to efficiency. And we wondered about the extent to which law students might be prepared to address efficiency's effects on fairness via either prohibition of price increases or subsidies to offset price increases.

---

13. See Richard H. Thaler, Quasi Rational Economics 201 (New York, 1991).

The 1998 Survey

The 1998 survey presented respondents with three scenarios:

- The hardware store in your town sells snow shovels, usually at a price of $10 per shovel. The morning after a substantial snowstorm, the hardware store decides to raise the price to $15 per shovel.
- Due to the same substantial snowstorm, roads to the town are blocked, and the grocery store is unable to receive new inventory. The grocery store decides to double the price of meat and fruit.
- The grocery store also decides to double the price of diapers and baby formula.

Respondents were asked to indicate whether they believed the decision in each scenario was "completely fair," "somewhat fair," "somewhat unfair," or "completely unfair." For each scenario, respondents were also asked to indicate, using a 1–9 scale, whether the government should prohibit the price increase (1 = yes, 9 = no) and whether the government should subsidize consumers to offset the price increase (1 = yes, 9 = no). Because food and baby needs seem more important or indispensable than snow shovels, we expected the responses for these products to differ from responses for shovels.

The 1998 Survey Results

Tables 6 and 7 present results for the fairness portion of the 1998 survey. Analyses of these results yielded several observations.

First, a chi-square test comparing the fairness results for the snow shovel items on the 1997 preliminary survey and the 1998 survey showed no significant difference in the two distributions, whether we compared the data across all four possible responses or collapsed the responses into one fair category versus one unfair category.

	Table 6: Fairness Assessments (1998 Survey)							
	Actual Response Distribution/Mean					*Collapsed Response Distribution/Mean*		
	Completely fair (=1)	*Somewhat fair (=2)*	*Somewhat unfair (=3)*	*Completely unfair (=4)*	*Mean (midpt 2.5)*	*Fair (=1)*	*Unfair (=2)*	*Mean (midpt 1.5)*
Snow shovels	44 (47.3%)	25 (26.9%)	18 (19.4%)	6 (6.5%)	1.85	69 (74.2%)	24 (25.8%)	1.26
Fruit & meat	30 (31.9%)	22 (23.4%)	30 (31.9%)	12 (12.8%)	2.26	52 (55.3%)	42 (44.7%)	1.45
Diapers & formula	28 (30.1%)	19 (20.4%)	35 (37.6%)	11 (11.8%)	2.31	47 (50.5%)	46 (49.5%)	1.49

Second, the particular product mattered in the 1998 survey: people found increases for snow shovels more fair than increases for fruit and meat and for diapers and baby formula. More specifically: looking solely to the 1998 survey, chi-square tests showed that the distribution of responses was significantly dependent on the product for which prices were being increased ($p < .01$, whether assessed across all four responses or with the responses collapsed into one fair category versus one unfair category). Still more specifically, though,

subsequent chi-square tests showed no significant difference between the response pattern for meat and fruit and the response pattern for diapers and baby formula (whether assessed across all four responses or with the responses collapsed into fair versus unfair). But there was a significant difference between the response pattern for snow shovels and the response patterns, collapsed together, for meat and fruit and for diapers and baby formula ($p < .01$, whether assessed across all four responses or with the responses collapsed).

This significant difference indicated that respondents found price increases on fruit and meat and on diapers and baby formula less fair than a price increase on snow shovels. Notwithstanding that difference, though, respondents were more likely to find the price increases fair than unfair, regardless of the particular product.

Table 7: Preferences for Prohibition of Price Increases Versus Government Subsidy (1998 Survey)

	Should government prohibit the price increase? (1=yes, 9=no; midpoint 5)	Should government subsidize consumers to offset increase? (1=yes, 9=no; midpoint 5)	Collapsed mean (prohibition + subsidy) for each product
Snow shovels	7.59	7.85	7.72
Fruit & meat	6.48	6.18	6.33
Diapers & formula	6.34	6.07	6.21
Collapsed means for prohibition and subsidy across all products	6.80	6.70	6.75 (grand mean)

Third, we conducted within-subjects analyses on responses concerning government prohibition of price increases and government subsidies to offset price increases. These analyses revealed no significant difference overall in preference for prohibition versus subsidy. But there was a significant effect of the particular product for which a prohibition or subsidy was in question. Specifically, as with the responses above regarding fairness versus unfairness, subjects were more opposed to either prohibition or subsidy when the product was snow shovels than they were to either prohibition or subsidy when it was fruit and meat or diapers and baby formula. But again, notwithstanding that difference, mean responses leaned toward opposing prohibition or subsidy, regardless of the particular product.

Finally, there was a marginally significant interaction between the particular product and the relative preference for subsidy versus prohibition. Specifically, with regard to snow shovels (for which respondents were most tolerant of the price increases), respondents were a little more opposed to the subsidies than they were to the prohibition of price increases; with regard to fruit and meat and to diapers and baby formula (for which respondents were less tolerant of the price increases), respondents were a little more opposed to the prohibition of price increases than they were to the subsidies. This interaction, while only marginally significant, might indicate that, when a product is more important or indispensable, respondents such as these prefer to offset

the unfairness of the price increase with subsidies rather than prohibiting such price increases.

One possible rationale for the interaction could be that prohibiting price increases removes incentives for merchants to supply these important or indispensible products, whereas subsidies motivate the merchants to supply the products and receive the extra premium, while they prevent the individual consumer from bearing too much cost. Meanwhile a less important product might not justify a subsidy; even if prohibition of price increases is a disincentive for merchants to supply the product, consumers are not much harmed by the merchants' unwillingness.

* * * * *

In this essay we have reported on several studies designed to reveal law students' evaluations of issues of regulatory policy, especially with respect to risk allocation and risk assessment. Part of the purpose was pedagogical—to give students a sense of the range of problems encountered under the general rubric of "administrative law" (with similar such problems occurring in environmental law as well). An understanding of these problems can illuminate both regulatory policy and judicial review, and can usefully be brought to bear on many cases in the Administrative Law course. Part of our purpose was to see whether and how law students deviate from experts, who tend to focus on the number of lives saved; we wanted to explore whether law students think like ordinary people or like experts, and to understand their deviations, if any, from these two (somewhat stylized) groups.

Our most important findings are as follows. With regard to resource allocation, law students at the University of Chicago deviate from experts in giving weight to factors others than number of lives saved, when any such information is presented to them. That is, they also care about equitable issues of fairness and breadth. With regard to risk assessment, the law students are able to act like experts in assessing risk levels alone. When establishing funding priorities, however, they are responsive to the concerns of laypersons, even when such concerns are not supported by expert assessments; and they appreciate factors such as voluntariness, the availability of solutions aside from government funding, and potential effects of each risk.

But these law students also differ—and strikingly so—from ordinary people in their judgments about the role of fairness in certain markets. Among ordinary people, about 80 percent find market outcomes unfair and 20 percent find them fair. For law students the proportions are almost precisely reversed: 20 percent find unfairness and 80 percent find fairness. We do not know whether this remarkable difference is a consequence of being the kind of person who chooses law school, of law school training, or of University of Chicago Law School training.

As we have indicated, this exercise had two purposes. One was pedagogical, and the distribution of the survey (and preliminary discussions of the outcome) did help to focus student attention on some central issues in administrative law. The other purpose was to see how law students and perhaps lawyers

approach question of priority-setting and equity in the administrative state. The preliminary results are intriguing and highly suggestive; but there is much to learn, in particular because of possible distinctive effects arising from the respondents' being enrolled at the University of Chicago Law School, where the economic analysis of law is of substantial importance and emphasis. Further research could provide a great deal of insight into the particular judgments of lawyers, an important group of citizens who take substantial policy-making roles, about how government might make best use of its limited resources in reducing risks to life and health.