HEINONLINE

USING WARNINGS TO EXTEND THE BOUNDARIES OF CONSUMER SOVEREIGNTY

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I.   GOVERNMENT INTERVENTION IN CONSUMER CHOICES

A variety of social institutions influence consumer choices. Government agencies provide regulation, Congress and the state legislatures enact legislation, and the courts enforce legal rules. The desirability, scope, and character of these limitations on product choices and consumer behavior vary considerably across different contexts.

Even within a particular area of intervention, such as government regulation, considerable heterogeneity exists. Regulations differ substantially in terms of the extent of the intervention and interference with consumer choice. In some cases, products are banned altogether, as when pharmaceuticals approved for use in Western Europe have not been approved for use in the United States. In other cases, products are restricted to certain consumers, as when only certified pesticide applicators are licensed to use the more potent pesticides. There may also be constraints on the type of product attributes, such as a requirement that a car have air bags to protect the passengers riding in the front seats. Regulations can also take a less intrusive form, such as hazard warnings that provide information concerning the risks of a product or the manner in which the product should be used.

Legislative interventions have also been quite diverse. Congress and the state legislatures have levied taxes on particular products, such as cigarettes, alcohol, and gasoline. These taxes increase the economic costs of purchase and consequently decrease consumer demand for the product.

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Efforts to restrict product demand may be more explicit, as in the case of laws that set a minimum drinking age or a minimum age for the purchase of cigarettes. Finally, Congress also provides hazard warnings for products, such as legislatively required cigarette warnings.

There are other policy objectives that lead to interference with consumer choice. Governments require money to carry out their functions. Taxing consumers and products may be a mechanism for raising these funds, but taxation will necessarily affect the prices consumers face. Even income taxes interfere at least in part by altering the labor-leisure choice.

The role of the courts is perhaps most diverse because courts serve as a mechanism for enforcing both regulatory and legislative sanctions. In addition, courts govern the scope of tort liability for hazardous products. Products subject to rules regarding design defects, inadequate warnings, and similar limitations may generate tort liability awards against the manufacturer, and these awards in turn provide incentives for the manufacturer to make its products safer. Such incentive effects are not always desirable. Considerable uncertainty regarding the extent of tort liability as well as the probability of an extremely large damage award may discourage innovation in areas in which consumers value products, but for which there is a danger of unanticipated tort liability.

II.   WHY INTERFERE WITH PRIVATE CHOICES?

Market choices provide for a matching of consumer, producer, and worker preferences. In idealized market situations, the unconstrained choices of consumers, coupled with the provision of goods in the marketplace by competitive firms, lead to efficient outcomes as consumers select the bundle of goods they most prefer.[1] There may be, however, many departures from the idealized world. These departures are described as various forms of market failure, where "market failure" simply means a failure of market transactions in the real world to live up to the idealized assumptions hypothesized by economists.

Perhaps the most notable market failure is that of an effect

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1. *See* HAL R. VARIAN, MICROECONOMIC ANALYSIS 203-07 (1978).

that goes beyond a particular transaction to affect others adversely, a phenomenon commonly referred to as an "externality."[2] Common externalities include pollution caused by firms as part of the production process as well as pollution caused by consumers, as in the case of environmental tobacco smoke.[3] The existence of such externalities does not imply that products associated with polluting production processes should not be produced or that consumers should not be permitted to consume products that generate pollution.[4] It does, however, provide a rationale for some potentially productive intervention, such as imposing smoking restrictions or pollution standards.

A second class of market failures consists of errors in private decisions. People may make flawed risk judgments, may not make wise choices involving events with potentially catastrophic outcomes, and may not think clearly about the future implications of their current decisions.[5] While there may be errors of these various kinds, what is of primary interest to economic analysts is whether these errors are systematic in any particular direction.[6] For example, a systematic exaggeration in risk perception could lead to excessive care in particular domains. Fear of flying and the associated risks of airplane travel could, for example, lead people to drive even though driving in fact may be more hazardous.

The welfare consequences of the error, however, must be evaluated carefully. We make decisions every day for which we may not have full information. Not all such decisions lead to negative consequences, however. For example, scientists still know very little about why aspirin has its beneficial effects. However, the lack of our knowledge does not necessarily imply that our decisions are in error or that our freedom to make these decisions should be constrained. Almost invariably, we

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2. *See id.*

3. *See* W. Kip Viscusi, *Secondhand Smoke: Facts and Fantasy*, REG. NO. 3 1995, at 42, 43.

4. For example, the U.S. steel industry and electric power plants are sources of pollution. However, few have proposed that we eliminate electric power or the domestic production of steel, even though these enterprises cannot be made pollution free.

5. *See* JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES *passim* (Daniel Kahneman et al. eds., 1982) [hereinafter JUDGMENT UNDER UNCERTAINTY] (reviewing some of the inadequacies of individual choices).

6. For a review of some of the systematic biases in people's risk beliefs, see W. KIP VISCUSI, RATIONAL RISK POLICY 5-25 (1998).

must make decisions with uncertain implications when we fail to have complete information, whether it be with respect to today's weather forecast or the chemical composition of the foods we eat, but this does not mean that these decisions are mistaken. Furthermore, acquiring information itself is costly, so that many of the choices we make will be made based on our subjective assessments of the risk. A substantial literature indicates that decisions made without certainty are in fact often more rational than first acquiring information because information acquisition is costly.[7]

While the potential rationales for government intervention are quite diverse and often compelling, it should also be emphasized that there are dangers to intervention.[8] Consumer choice plays a constructive role in circumventing these dangers by enabling consumers to match their product and activity choices with their own preferences. Indeed, that is the very nature of the way in which markets operate, based upon the usual assumption of economic models. In particular, given their budgets, consumers select the mix of goods and services that produces the highest level of welfare, given their budgets and the costs of goods and services. The fact that a market failure exists does not imply that there is no constructive role for choice. Nor does it imply that government intervention is always superior to no intervention. Rather, these issues must be assessed on a case-by-case basis and will depend on the relative efficacy of the government policy as well as on the extent of the consumer market failure.

One potentially attractive way to foster better market outcomes without interfering with consumer choice is to rely on hazard warnings and other informational regulations.[9] These interventions provide information to consumers that will enable them to make decentralized decisions more in line with the kinds of choices that we like to promote. Moreover, it is a

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7. *See, e.g.,* HOWARD RAIFFA, DECISION ANALYSIS: INTRODUCTORY LECTURES ON CHOICES UNDER UNCERTAINTY 42-43 (1968) (demonstrating, through a detailed formal analysis, that the benefits of "buying" information will sometimes fail to exceed the costs).

8. *See* VISCUSI, *supra* note 6, at 103-05.

9. *See generally* W. KIP VISCUSI & WESLEY A. MAGAT, LEARNING ABOUT RISK: CONSUMER AND WORKER RESPONSES TO HAZARD INFORMATION (1987) (reviewing the economic benefits of hazard warnings and other informational policies) [hereinafter LEARNING ABOUT RISK]; WESLEY A. MAGAT & W. KIP VISCUSI, INFORMATIONAL APPROACHES TO REGULATION (1992) (same).

form of intervention that addresses only the particular contexts of misuse that lead to harm.[10] By contrast, bans on products and regulations of product attributes eliminate these items from consumer choice in all contexts, eliminating potentially useful applications of the product and thereby failing to maximize social utility.

In this article I will explore the potential role of regulatory interventions and their efficacy in alleviating some forms of market failure. While the emphasis will be on the potential benefits of informational regulations, it should nevertheless be acknowledged that there remains a substantial role for other kinds of regulatory interventions as well.

III. Are Consumers' Risk Judgments Rational?

There is a tendency to focus on the salience of particular market failures that may exist in particular consumer contexts. The Clean Air Act, for example, requires that the Environmental Protection Agency set ambient air quality standards without considering their cost, as there is a focus on the pollution externality rather than on cost-benefit balancing.[11] However, the existence of market failures, such as a lack of perfect risk information, does not always imply that there is no systematic element to market choices.[12] Analysis of people's choices in risk contexts is perhaps most instructive because that is an area of choice in which it is often suggested that people are particularly prone to error.[13]

Despite the potential shortcomings of people's choices in risk contexts, the individual rates of tradeoff reflected in risk-money tradeoff valuations are often quite substantial and systematic. The most diverse evidence in the literature consists

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10. *See* Magat & Viscusi, *supra* note 9, at 182.

11. *See* W. Kip Viscusi, Fatal Tradeoffs: Public and Private Responsibilities for Risk 251 (1992).

12. In the case of cigarettes, for which there is a wide range of risk perceptions on the part of consumers, there is still a systematic element in terms of the price effects on cigarette demand, as higher cigarette prices lower the quantity of cigarettes consumed. *See* W. Kip Viscusi, Smoking: Making the Risky Decision (1992); W. Kip Viscusi, *Cigarette Taxation and the Social Consequences of Smoking*, *in* Tax Policy and the Economy 51, 78-92 (James M. Poterba ed., 1995). *See also* Joni Hersch, *Teen Smoking Behavior and the Regulatory Environment*, 47 Duke L.J. 1143, 1151-55 (1998).

13. *See* Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics & Biases*, *in* Judgment Under Uncertainty, *supra* note 5, at 4-18.

of studies of labor market outcomes.[14] Workers will demand a higher wage rate to face a job that poses extra risk. This principle was articulated by Adam Smith over two centuries ago.[15] Using data on worker wages, the risks of these jobs, and worker and job characteristics, economists have analyzed how much extra workers are paid for risk and have calculated implicit values of life based on these estimates.[16] For example, if a worker received $500 in extra pay to face an annual risk of death of one chance in 10,000, the implicit value of life would be $5,000,000.[17] Put somewhat differently, a group of 10,000 individuals, each of whom faces a one in 10,000 chance of dying, would together face one expected statistical death. As compensation each member would receive $500, so that compensating the group of 10,000 individuals for exposure to the risk would result in a total compensation of $5,000,000 for the one statistical death.

Although labor market estimates of the implicit value of life vary depending on the risk level in the sample, the characteristics of the sample, and the extent to which people have chosen to incur the risk, most estimates in the literature cluster in the $3,000,000-$7,000,000 range.[18] Thus, there is a mid-point value of $5,000,000 per life based on labor market evidence.

These premiums for exposure to job risks tend to follow expected patterns. Consider the evidence derived from premiums for exposure to non-fatal risks on the job, which are measured in terms of the implicit value of on-the-job injuries to workers.[19] The variations that I will consider are those that pertain to the respondent's smoking status and whether the respondent uses seatbelts while riding in a car. The group of respondents with the highest value for on-the-job injuries consists of those who do not smoke and who regularly use their seatbelts. The intermediate group consists of people who take one of these two different precautions. The group with the

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14. *See* VISCUSI, *supra* note 11, at 34-47 (reviewing the labor market studies of wage-risk tradeoffs).
15. *See* ADAM SMITH, AN INQUIRY INTO THE NATURE AND CAUSES OF THE WEALTH OF NATIONS 100 (Modern Library 1937) (1776).
16. *See* VISCUSI, *supra* note 11, at 51-59.
17. *See id.* at 73.
18. *See id.*
19. *See id.* at 59-65.

lowest value for on-the-job injuries consists of smokers who do not use their seatbelts. These findings are quite consistent with a recognition of heterogeneous risk-taking behavior in which those who are most willing to bear risk sort themselves into the riskier activities, such as taking a dangerous job, acquiring a hazardous product, or failing to use certain kinds of safety equipment.

The market evidence on consumer valuations in the context of product risk is also consistent with these findings. Researchers have estimated the implicit value of life from smoke detector and seatbelt use.[20] There have also been detailed estimates of the implicit value of life reflected in the price of cars, based on the principle that safer cars should command a higher price.[21] These estimates indicate a value of roughly $3,000,000 per life.[22] Similar estimates have been made with respect to the response of housing prices to hazardous waste site exposures.[23]

These estimates suggest that there is some consistency in the risk-money tradeoff. But are people really cognizant of the future implications of their actions? Are they myopic in their behavior, and do they ignore the future consequences of their risk, whether the risk be that of a job fatality or the hazards posed by certain products? The evidence in the literature on the choices people actually make suggests that there is not such myopia.[24] Analysts have estimated the implicit rates of interest generated by job choices that affect the worker's fatality risk, as well as those generated by purchases of used cars that affect the buyer's fatality risk over the life of the car. In each case, the estimated rates of interest implicit in the consumer choice are in the same range as market rates of interest, a result that is consistent with behavior that at least is broadly rational in character.[25]

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20. *See id.* at 66.
21. *See id.*   -
22. *See id.* at 73. *See also* Mark K. Dreyfus & W. Kip Viscusi, *Rates of Time Preference and Consumer Valuations of Automobile Safety and Fuel Efficiency*, 38 J.L. & ECON. 79, 102 (1995).
23. *See* Ted Gayer et al., *Private Values of Risk Tradeoffs at Superfund Sites: Housing Market Evidence on Learning About Risk*, REV. ECON. & STAT. (forthcoming 1999) (manuscript on file with author).
24. *See* VISCUSI, *supra* note 11, at 101-04, 111-14 (reviewing evidence on consumer myopia and worker myopia with respect to job risk choices).
25. *See id.*; Dreyfus & Viscusi, *supra* note 22, *passim.*

IV. ARE CONSUMERS' RISK JUDGMENTS ACCURATE?

People are not always fully informed about all the consequences of their actions. This is true not only for hazardous products, but also for most of the choices we make. For example, all students entering law school do not know who their post-law school employer will be or what their salary level will be upon graduation, but they nevertheless choose to enter. The key concern is whether errors in risk judgments are large. Do they have severe welfare consequences? Can we learn over time and improve our choices? Can risk communication potentially alleviate the informational shortcomings and lead us to make sounder choices? Perhaps the biggest problem is hidden risks about which consumers may be completely ignorant.

Our definition of full information for consumer decisions falls short of requiring complete information. For example, we do not need to know all the chemical constituents of the food we eat or the mechanical nuances of the machines we operate.[26] Similarly, we do not need to know all the adverse consequences of a risky act and their full implications for our future welfare. What is important is that people be aware of some adverse consequences and the associated probabilities for consequences that are sufficiently large so as to appropriately deter people from undertaking risky behavior to the same extent as would be the case if they had perfect information. It is thus essential that people understand enough of the consequences and the probabilities of their occurrence that they will have the correct incentives with respect to both product choice and product use.[27] In the case of product use, there also must be knowledge of appropriate precautions and their efficacy.
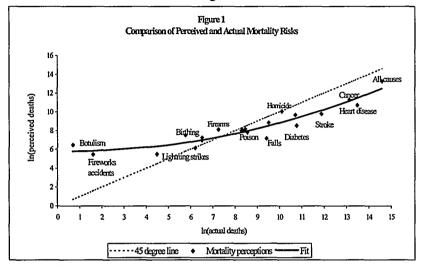
A common assumption in discussions involving imperfect information is that there is systematic underassessment of the risks.[28] Lack of perfect information and errors in risk

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26. We typically take on faith that eating broccoli and spinach is good for us, but it is unlikely that a great majority of the citizenry could give precise chemical breakdowns of these foods.

27. For a formal model of the influence of risk information on levels of consumption, see W. Kip Viscusi, *Cigarette Warnings: The Perils of the* Cipollone *Decision*, 3 SUP. CT. ECON. REV. 239, 242-51 (1993).

28. For example, a principal underpinning of strict liability is that consumers may

perception, however, do not always imply underestimation of the risk. In fact, the opposite is more likely to be the case for relatively infrequently occurring risks, such as those associated with most consumer products. Figure 1 summarizes the risk beliefs for a sample of almost 500 individuals.[29]   On the horizontal axis is the natural logarithm of the actual number of

Figure 1
Comparison of Perceived and Actual Mortality Risks

deaths from various causes. The vertical axis gives the natural logarithm of the perceived number of deaths for almost 30 different causes. If risk beliefs were the same as actual risk levels, then the pattern of responses would lie along the 45 degree line sketched in Figure 1. However, as Figure 1 shows, people have a tendency to overestimate low probability events and underestimate larger risks. Thus, rare events such as botulism, fireworks accidents, and lightning strikes, all of which lead to relatively few deaths, tend to be overestimated. By contrast, the more fundamental risks to our lives, such as the risks of stroke, heart disease, and cancer, tend to be underestimated.

Another implication of Figure 1 is that people will place too

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underestimate the risk associated with products. In the case of products liability, such an assumption of underestimation of risks is needed to justify any constructive role of liability in creating safety incentives. If risk perceptions are adequate, market outcomes will be efficient. *See, e.g.,* W. KIP VISCUSI, REFORMING PRODUCTS LIABILITY 62-65 (1991).

29. These statistics are based on a consumer survey undertaken by the author in 1998 in Phoenix, Arizona. Respondents were given the total number of deaths in each year associated with automobile accidents and were asked to estimate the total number deaths associated with a series of other sources of mortality.

great a weight on reductions in risk that reduce the risk to zero. Because of the overestimation of small risks, elimination of these small risks will produce more of a perceived reduction in risk than has in fact occurred.

There is a quite different implication of Figure 1 for changes in risk that do not result in a complete elimination of the risk. As shown by the fact that this curve is flatter than the 45-degree line, when there is a reduction in risk, people will tend to underestimate how much the risk has declined relative to the actual risk decrease. The practical result of this perceptional bias is that people may tend to underestimate the safety improvements associated with using safety equipment such as seatbelts.

Other anomalies and apparent irrationalities documented in the literature pertain to aspects of the risk other than its magnitude.[30] The degree of ambiguity concerning the risk is often a salient concern. People tend to overreact to risks that are ambiguous. They would, for example, prefer to face a known risk level of 10 in 10,000 rather than have a 50-50 chance of either a 5 in 10,000 risk or a 15 in 10,000 risk of an adverse event.[31]

Risk changes often produce extreme results, particularly to the extent that these risk increases lead to a change from an accustomed risk level. For example, consumers overreact to increases in product risks.[32] Once there is a disruption in the accustomed risk level, most consumers would either refuse to buy a product or would require a considerable price cut in order to find the product attractive.[33] Newly publicized product risks consequently tend to generate consumer alarm that, in a democratic society, will lead to pressures for potentially excessive government regulation.

The data in Tables 1 and 2 illustrate these patterns. They show information on consumer responses to changes in risk for household chemical products.[34] The first set of risk pairs, inhalation and skin poisoning, pertains to risks faced by adult

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30. For a review of these anomalies, see VISCUSI, *supra* note 6, *passim*.
31. This effect is often called the Ellsberg Paradox. *See* Daniel Ellsberg, *Risk, Ambiguity, and the Savage Axioms*, 75 Q.J. ECON. 643, 643-669 (1961).
32. Evidence on this phenomenon is presented in Table 2.
33. *See infra* notes 35-36 and accompanying text.
34. These tables are drawn from MAGAT & VISCUSI, *supra* note 9, at 60-63.

consumers of insecticide. The second risk pair, inhalation and child poisoning, represents the risks faced by the children living in the respondents' households. The third risk pair, gassing and eye burns, pertains to the risks faced by adult consumers of toilet bowl cleaner. The fourth risk pair, gassing and child poisoning, pertains to risks faced by children living in the household of a consumer of toilet bowl cleaner. In each . case the initial risk level was 15 injuries of each type per 10,000 bottles used.

Table 1
Marginal Valuations of Reducing Both Risks by 5/10,000

	Incremental Willingness to Pay (Dollars/Bottle)			
Starting Risk (Injuries/ 10,000 Bottles)	Inhalation - Skin Poisoning	Inhalation - Child Poisoning	Gassing - Eyeburn	Gassing - Child Poisoning
15	1.04	1.84	0.65	0.99
10	0.34	0.54	0.19	0.24
5	2.41	5.71	0.83 ·	0.99

The first row in Table 1 gives the average consumer's willingness to pay in terms of an additional amount per bottle for a product that would reduce the risk from 15 in 10,000 to 10 in 10,000. For the various risks described, these amounts range from $0.65 to $1.04. Consumer willingness to pay for the next incremental risk reduction from 10 in 10,000 to 5 in 10,000 was less, ranging from $0.19 to $0.54 per bottle. The final risk reduction from 5 in 10,000 to 0 yielded considerably higher estimates, particularly for the insecticide product, where the willingness to pay ranged from $2.41 per bottle to $5.71 per bottle. Consumers clearly place a premium on complete elimination of the risk, and this premium reflects the overvaluing of such risk reductions and the zero-risk mentality that may bias consumer decisions.

How might consumers react if the product risk were increased a bit? Table 2 (see below) reports on these responses for the same set of risk pairs as in Table 1.

Table 2

Responses to Risk Increase (+1, +1) Valuation Questions*

Injury Pair	Percentage for Whom Product is Too Risky to Purchase	Mean Value ($/Bottle) of Positive Responses
Inhalation - Skin Poisoning	77.2	2.86
Inhalation - Child Poisoning	68.1	3.19
Gassing - Eyeburn	61.5	5.52
Gassing - Child Poisoning	74.3	1.28

*This question asked subjects what price discount they would require on the new product to accept an additional risk of 1/10,000 for both injuries, starting with risks of 15 injuries per 10,000 bottles sold for both injuries.

The survey initially asks consumers how they would respond to a risk increase of 5 in 10,000, which is symmetric with the risk decreases valued in Table 1. The responses were so strongly negative that they threatened the integrity of the survey. As a result, the focus was on very minor risk increases of 1/10,000 for each of the two risk components. Despite making the risk decrease quite small, the majority of consumers—as high as 77% for the risk pair of inhalation and skin poisoning—would refuse to buy the product at any price. Thus, consumers were unwilling to take a product discount and even were unwilling to use the product for free when compensated for using the risky product. As for the minority of consumers who were willing to purchase the product, they required a substantial price cut—as high as $5.52 per bottle for the risk pair of eye burns and gassing. It is noteworthy that the mean value of the price decrease consumers required in response to a risk increase of 1 in 10,000 exceeded the amount that consumers were willing to pay for a risk decrease from 15 in 10,000 to 5 in 10,000 based on the results in Table 1. Thus,

consumers were at least ten times as averse to risk increases as they were to small risk decreases, assuming that they were willing to buy the riskier product at all. Consequently, newly publicized risks will generate very strong consumer reactions and intense pressures for government regulation.

The role of publicity is also quite surprising. One might expect that the more information people receive about risks, the more likely they are to make accurate risk judgments.[35] As it turns out, highly publicized risks for the most part tend to be overestimated.[36] The substantial attention given in the press to risk does not convey probabilities regarding the risk, which would tend to foster more accurate risk judgments, but instead highlights the total death toll associated with the risk. The result is that people tend to overestimate the frequency of occurrence of highly publicized events. This publicity accounts for much of the overestimation of risks for dramatic events such as fireworks accidents, lightning strikes, and natural disasters.[37]

Publicity concerning risks often takes the form of experts from different camps disagreeing about the risk.[38] What, for example, happens when the industry insists that the risk is low, but the government believes that the risk is high? When experts disagree and are representing different sets of interests, the surprising result is that consumers do not simply average the estimates.[39] Rather, consumers tend to place the greatest weight on the worst case scenario.[40] Thus, there is a tendency to overestimate the risk as compared to what would happen if respondents simply averaged the risk judgments of the

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35. By definition, providing full information will enable people to form perfect risk judgments. However, more information that is not complete, such as providing information regarding the numerator of the risk (i.e., the total number of people killed) but not the denominator (i.e., the number of people exposed to the risk) will not necessarily produce accurate risk judgments.

36. *See* Barbara Combs & Paul Slovic, *Newspaper Coverage of Causes of Death*, 56 JOURNALISM Q. 837, 838-43 (1979).

37. *See id.* The author's survey that formed the basis for Figure 1 also supported this conclusion.

38. For example, the American Medical Association and the head of the Food and Drug Administration disagreed about the risk associated with breast implants. *See* W. Kip Viscusi, *Alarmist Decisions with Divergent Risk Information*, 107 ECON. J. 1657, 1658 & n. 5 (1997).

39. *See id.* at 1668.

40. *See id.* at 1668-69.

competing experts.[41] What these and the other results suggest is that the various heuristics and biases affecting risk judgments do not always lead to risk underestimation, but that in many cases they do lead to overestimation and overreaction to product risks.

The net effect of these various biases in risk perception is mirrored in risk judgments regarding risky products. Table 3 (see below) provides estimates of the risk beliefs for cigarette smoking based on national surveys undertaken in 1985 and 1997 as well as regional surveys that I undertook in 1991 for North Carolina and in 1998 for Massachusetts.[42] The first set of questions pertains to risks associated with lung cancer. Based on the best scientific evidence available, the lung cancer mortality risk level is between 0.05 and 0.10.[43] Actual risk beliefs are considerably higher even for smokers, with all estimated lung cancer risk being at least 0.31 for the four surveys indicated.[44]

Based on the Surgeon General's estimates, the total mortality risk associated with smoking is between 0.18 and 0.36.[45] Once again, there is a pattern of overestimation of the risk, even by smokers.[46] The upper bound estimate of the true risk lies beyond the average risk estimate that smokers attach to mortality risks.[47]

Even if people understood the probability of death, they still might not understand the expected length of life lost as well. The last panel in Table 3 reports two different wordings for the life expectancy question, and in each case there is a substantial misperception of life expectancy loss. Since the average life expectancy loss across both men and women is seven years for the entire population, the estimated life expectancy loss figures in Table 3 exceed the scientific reference points in every case.

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41. *See id.* at 1668-70.
42. For a fuller discussion of this data, see VISCUSI, *supra* note 12, *passim*. Except for the 1991 survey, these efforts were all undertaken in support of the defense in the cigarette litigation. *See* Coyne Beahm, Inc. v. FDA, 966 F. Supp. 1374 (M.D.N.C. 1997), *rev'd sub nom.* Brown & Williamson Tobacco Corp. v. FDA, 153 F.3d 155 (4th Cir. 1998), *cert. granted*, 119 S. Ct. 1495 (1999).
43. *See* VISCUSI, *supra* note 12, at 7.
44. *See id.* at 7, 75-77.
45. *See id.* at 80.
46. *See id.* at 79-81.
47. *See id.*

Table 3
Summary of Smoking Risk Perception Results

Risk Question (Sample)	Risk Estimate	
	Full Sample	Current Smokers
Lung Cancer:		
Among 100 smokers, how many of them do you think will get lung cancer because they smoke? (U.S., 1985)	0.43	0.37
Among 100 smokers, how many of them do you think will die from lung cancer because they smoke? (N.C., 1991)	0.38	0.40
Among 100 smokers, how many of them do you think will develop lung cancer because they smoke? (U.S., 1997)	0.47	0.40
Out of every 100 smokers, how many of them do you think will die from lung cancer because they smoke? (M.A., 1998)	0.48	0.42
Total Mortality:		
Among 100 smokers, how many of them do you think will die from lung cancer, heart disease, throat cancer, and all other illnesses because they smoke? (N.C., 1991)	0.54	0.47
Among 100 cigarette smokers, how many of them do you think will die from lung cancer, heart disease, throat cancer, or any other illness because they smoke? (U.S., 1997)	0.50	0.42
And out of every 100 cigarette smokers, how many of them do you think will die from lung cancer, heart disease, throat cancer, or any other illness because they smoke? (M.A. 1998)	0.54	0.46

Table 3 continued

Risk Question (Sample)	Risk Estimate	
	Full Sample	Current Smokers
Life Expectancy Loss:		
The average life expectancy for a 21-year old male (female) is that he (she) would live another 53 (59) years. What do you believe the life expectancy is for the average male (female) smoker? (N.C., 1991)	8.5 (males)	6.9 (males)
	13.2 (females)	10.9 (females)
As you may know, an average 21-year old male (female) would be expected to live to the age of 73 (80). What do you think the life expectancy is for the average male (female) smoker? (U.S., 1997)	10.1 (males)	7.9 (males)
	14.8 (females)	12.3 (females)
As you may know, an average 21-year old male (female) would be expected to live to the age of 73 (80). What do you think the life expectancy is for the average male (female) smoker? (M.A., 1998)	10.1 (males)	8.6 (males)
	15.9 (females)	13.2 (females)

Cigarette smoking poses substantial risks. However, these risks have been highly publicized and have been the target of mandated government warnings.[48] By all objective measures, the result is that people tend to overestimate or misunderstand the risks associated with smoking.[49]

A fashionable but misguided literature hypothesizes that people suffer from optimism bias and cognitive dissonance.[50]

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48. *See* 15 U.S.C. §§ 1331-1341 (1994).

49. *See* VISCUSI, *supra* note 12, at 79-81.

50. *See* Neil D. Weinstein, *Unrealistic Optimism About Susceptibility to Health Problems: Conclusions from a Community-Wide Sample*, 10 J. BEHAVIORAL MED. 481, 494-96 (1987) [hereinafter Weinstein, *Unrealistic Optimism*]; Neil D. Weinstein, *Why It Won't Happen to Me: Perceptions of Risk Factors and Susceptibility*, 3 HEALTH PSYCHOL. 431 (1984) [hereinafter Weinstein, *Why It Won't Happen to Me*].

This literature suggests that even though they assess the risks of bad outcomes associated with smoking, cigarette consumers do not believe that the adverse effect will happen to them. This criticism pertains not just to cigarettes, but to the whole range of risks posed by jobs and products.

Notwithstanding these claims of optimism bias, there is evidence that the economic effect of these risk beliefs is consequential. Higher perceived risk levels generate substantial compensating differentials for risk in terms of higher wages for risky jobs and lower prices for hazardous products.[51] If people suffered from an optimism bias and truly believed that it would not happen to them, they would dismiss these risks as being inconsequential for the choices they make as consumers. In much the same way, the higher the risk people believe smoking poses, the less likely they are to smoke.[52]

Much of the source of the apparent optimism bias may be a result of the framing of the risk question. Respondents are typically asked whether they are above average or below average in terms of the risks they face from a particular source. Such comparisons with an average individual in effect ask people to find fault with themselves,[53] something that most people are unwilling to do. For example, most people do not view themselves as below average drivers.[54] Similarly, few respondents may be willing to admit that they are truly below average in terms of their use of safety precautions.[55]

In an earlier study funded by the Environmental Protection Agency to test this optimism bias hypothesis, we focused on how respondents viewed the risks of child poisoning in their households. When asked whether their household posed above average or below average risks to children, virtually all respondents indicated that they lived in a comparatively safe household that was below average in risk.[56] Nevertheless,

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51. *See* VISCUSI, *supra* note 11, at 80-81.
52. *See* VISCUSI, *supra* note 12, at 89-95.
53. *See* Weinstein, *Why It Won't Happen to Me, supra* note 50, at 485-87.
54. This type of effect as well as consumers not wishing to believe that they are above average in riskiness is discussed in James R. Bettman et al., *Cognitive Considerations in Presenting Risk Information, in* LEARNING ABOUT RISK, *supra* note 9, at 17.
55. *See id.*
56. *See* MAGAT & VISCUSI, *supra* note 9, at 21-44; Wesley A. Magat et al., *Risk-Dollar Tradeoffs, Risk Perceptions, and Consumer Behavior, in* LEARNING ABOUT RISK, *supra* note 9, at 95.

when asked whether they would be willing to pay more for safer consumer products to protect their children against child poisoning risks, their estimates were inordinately large and reflected a substantial overvaluation of risk decreases. When concrete consumer choices were at stake, the apparent optimism bias from a comparative question did not translate into a failure to reveal a substantial valuation of risk.

V. HAZARD WARNINGS AS A POTENTIALLY EFFECTIVE POLICY

If consumers are informed of the risks, then there is substantial evidence that they can make reasonable decisions in a wide variety of contexts.[57] The difficulty in many instances is that consumers may not be aware of the particular hazards posed by the product or how precautions can reduce these risks.[58] Although one could always ban the product altogether, such a brute force policy would deprive consumers of a potentially valuable product. Hazard warnings can potentially eliminate the informational problem while keeping the product on the market.

When thinking of informational approaches to regulation, one should not limit the menu to on-product warnings alone. A broader hazard communication system might include public service announcements, training programs, and other mechanisms for providing information that will enable people to make sounder risk decisions.[59] For simplicity, however, I will refer primarily to on-product warnings as the mechanism for informational transfer.

The key criterion for judging a warning is the extent to which it provides new information in a convincing manner. The evidence in the literature suggests that warnings that simply serve as reminders do not have a consequential effect on consumers' decisions.[60] Rather, consumers need a credible warning that tells them what they did not already know before or that enables them to refine their judgments regarding a risk

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57. *See* VISCUSI, *supra* note 11, *passim*.

58. *See* MAGAT & VISCUSI, *supra* note 9, *passim* (discussing the role of hazard warnings in eliminating each of these sources of market imperfection).

59. *See* VISCUSI, *supra* note 28, at 139-42 (discussing broadly the various means of providing information about risk).

60. *See id.* at 140.

that they did not fully understand previously.[61]

Substantial evidence indicates that hazard warnings can influence risk beliefs. Warning labels for asbestos, TNT, and other hazardous chemicals in the workplace affect workers' risk perceptions in the expected manner.[62] As a result of their beliefs that the work is riskier, workers require higher wages to work on these hazardous jobs, and they quit if their wages are not increased.[63] Warning labels emphasize the discrete choice whether to be exposed to the risk on a particular job or whether to buy a risky product.[64]

A second type of warning is directed at influencing precautionary behavior, given that the consumer has already chosen to purchase the risky product or work on the hazardous job.[65] An example of this type of warning is the set of warning instructions on drain openers. These warnings advise the consumer to wear rubber gloves while using the product and to store the product in a childproof location.[66] These warnings increase the level of precaution-taking by consumers, but they do not achieve 100% compliance because different consumers assess different costs to undertaking these precautions.[67]

Cognitive limitations and potential errors in risk judgment do not simply affect people's initial risk perceptions. These factors also influence how hazard warnings are processed and the kinds of warnings that will be successful.[68] Due to cognitive limitations, the information format, structure, and content all affect whether the hazard warning will be successful in achieving the intended effect on risk behavior.[69] Individuals are limited in terms of their information processing capabilities so that information overload is frequently an issue.

61. *See id.* at 141-46.
62. *See* W. Kip Viscusi & Charles J. O'Connor, *Adaptive Responses to Chemical Labeling: Are Workers Bayesian Decision Makers?*, 74 AM. ECON. REV. 942, 948-55 (1984).
63. *See id.* at 953-55.
64. Warning labels for cigarettes and for the tooth staining risks of tetracycline are also of this type.
65. *See generally* MAGAT & VISCUSI, *supra* note 9 (exploring the various warnings that affect precautions); LEARNING ABOUT RISK, *supra* note 9 (exploring same).
66. *See* MAGAT & VISCUSI, *supra* note 9, at 108-12.
67. *See* W. Kip Viscusi et al., *The Effect of Risk Information on Precautionary Behavior, in* LEARNING ABOUT RISK, *supra* note 9, at 76-80 and tbls. 4.3, 4.6, 4.8.
68. *See* Bettman et al., *supra* note 54, at 14-31.
69. *See id.*

In an earlier study for the Environmental Protection Agency, Wesley Magat and I found that hazard warnings that include very detailed risk information confuse consumers.[70] These warnings conveyed so much detail regarding the potential ramifications of using the product that consumers could not identify the specific precautions that were most important for avoiding the product risk.[71] Warnings that included much less detail, but which were more narrowly focused on the essential information, were more successful in conveying to consumers the knowledge they needed with respect to the appropriate precautions.[72]

Overly detailed warnings are not the result of market forces, but instead are the consequence of regulatory and liability-related pressures. For example, the EPA specifically approved the pesticide warnings that were the object of the study.

It is also noteworthy that stronger warnings are not necessarily better. Excessive warnings distort relative product risk comparisons. If, for example, we were to label everything in the supermarket as dangerous, then consumers would be unable to draw any distinctions as to which products merit additional care.[73] Excessive warnings also could threaten their own credibility, leading consumers to dismiss such warnings altogether.

An additional factor that should influence warnings policy is that a common format for warnings is often desirable.[74] Unlike the usual economic prescription that freedom of individual choice enhances welfare,[75] in this instance a common format may assist consumers in processing the warning information.[76] For example, when considering different warnings for prescription drugs, the Food and Drug Administration approved a structure that promotes commonality in the organization of the information about the product. This

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70. *See* MAGAT & VISCUSI, *supra* note 9, at 88-92.

71. *See id.*

72. *See id.*

73. *See id.* at 169-71 (showing that hazard warnings on conventional consumer items can lead consumers to believe that such items are just as hazardous as cigarettes, which in fact are much more dangerous).

74. *See* Bettman et al., *supra* note 54, at 28.

75. This effect is due to the fact that fewer constraints always are better in terms of increasing one's options.

76. *See* Bettman et al., *supra* note 54, at 29-30.

enabled consumers to locate instructions for use and hazard warnings in a similar location on different products, making information acquisition easier.[77] Similarly, a common warnings vocabulary in which words such as "poison," "danger," "warning," and the like have a similar meaning across products enables people to make sounder judgments about the consequences of that particular product for their welfare.[78]

VI. Criteria for Regulatory and Liability Reform

The overall implication of these results is that the usual presumption of an irrational consumer is not warranted. Risk perceptions are not always accurate, but risk underestimation is not the norm.

The absence of perfect information does not necessarily imply that products need to be banned and that consumer choices need to be limited. Properly designed hazard warnings are often preferable. Indeed, there may even be a problem of excessive incentives for producers to overwarn because of substantial tort liability judgments, hazard warning cases, and various government regulations.

The potential advantages of warnings are considerable. In any market context there is typically substantial heterogeneity in individuals' willingness to bear risk and in the kinds of products they prefer. Hazard warnings enable consumers to make decentralized choices for the products that best promote their welfare. Moreover, relying on a warnings strategy rather than a policy that interferes with consumer choices eliminates the potential welfare losses from more obtrusive forms of government intervention.

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77. *See* VISCUSI, *supra* note 28, at 51.
78. *See id.*