

IMPOSED RISK CONTROVERSIES: A CRITICAL ANALYSIS

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The dice should be loaded against any "right" to protection against risk.

—Aaron Wildavsky (1980, p. 39)

Introduction

In recent years much has been written on the general subject of risk of physical harm. The topic has been widely discussed by policy analysts, economists, ethicists, lawyers, scientists, and others (see references).

In this paper I will focus on risk controversies of a familiar type: Someone in one locale is concerned about being seriously injured as a result of human activities carried on elsewhere. The discussion will be limited to risks that are unintentional in the sense that no one is deliberately threatening others or desires their harm. Examples are controversies over nuclear reactors, dams, toxic pollutants, and biological laboratories containing virulent organisms.

The controversies can be termed ones of "imposed risk." As such, they raise a number of fundamental questions:

1. When has a risk of physical injury been "imposed" on someone, and when has it resulted from an agreement, or been "accepted" or "assumed"?
2. When are we justified in stopping someone from imposing a risk and on what normative basis?

Cato Journal, Vol. 2, No. 1 (Spring 1982). Copyright © Cato Institute. All rights reserved.

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3. Who should bear which costs and burdens of the argument in the resolution of risk disputes?
4. Would imposed risk be better dealt with by a common-law approach rather than a legislative and regulatory one?

The Problem Delineated

Energy and Harm

The immediate cause of physical injury is energy in various forms: Mechanical, as when machinery flies out of control; gravitational, as when a dam bursts or a tall building topples over; chemical, as with fires, explosives, and pollutants; biological, electromagnetic, or nuclear.

When is Risk Imposed?

For a risk of harm to be imposed, other people must be responsible for the potentially harmful form of energy. Excluded, then, are fears over "acts of God," in which the harmful form of energy is purely the product of nature, such as tidal waves. Also excluded are self-created risks, in which someone has created through his own actions the harmful energy that threatens him, as in starting a fire. In the case of defective products, one might be harmed "as a result of" the actions of others; but strictly speaking, the risk has not been imposed.

In general, much exposure to risk would not result except for prior agreements between those at risk and those responsible for the energy or the locale in which the exposure takes place. These risks must also be ruled out as "not imposed." Examples are risks from purchased products that are combustible, toxic, or otherwise hazardous on their own. Also excluded are the dangers at a location where one is an employee, customer, or other type of "invitee." In particular, the risks of using a road are "not imposed." Strictly speaking, the risks encountered by trespassers also are not imposed.

In determining whether such risks are "excessive," one must look to the agreements and understandings from which they arose. Normatively, the issues are very different from cases of imposed risk.

In cases of imposed risk, someone in one locale is concerned about being harmed by some form of energy that others create, control, or manage somewhere else. For the harm to occur, there must

be a flow of energy across property lines or boundaries. Usually, the flow is into the locale in which the harm occurs, although there are examples in which the flow is reversed. (Consider excavation at the base of a hill that causes a landslide on residential lots further up.) In this paper "invasion" will be used to describe the flow of energy across boundaries regardless of the direction.

Imposed-risk controversies can arise over both potential and actual invasions. In controversies of the first type, the issue is whether or not an invasion, assumed to be harmful, will in fact occur. Typically, such controversies involve "potentially mischievous stores of energy," such as the water walled up behind a dam. Controversies over actual invasions, on the other hand, center on the extent to which an invading substance is in fact a threat to health. Prominent examples are disputes over low-level emission of substances that are known to be toxic at higher concentrations, e.g., radiation from nuclear and coal plants. Typically, the invasions are so small in size that they are unobjectionable except for their possible toxicity.

Foreseeability

In characterizing imposed risk there is one more factor to consider — foreseeability. It should be noted that in many risk controversies, foreseeability is not an issue. Major controversies typically involve new technologies being employed in already populated areas in a manner that no one could have foreseen. To argue that people already there have "assumed" or "accepted" the risk is to presume they made a deliberate choice that never took place. When is a foreseeable risk accepted or assumed and so not imposed? There are two cases to consider depending on whether the potentially harmful energy is created before or after those at risk move into the vicinity.

First, suppose someone moves to a locale where he knows his health could be endangered from an industrial facility nearby. Has the risk been imposed? Strictly speaking, no, but it may have been imposed on the previous owner. And if so, why shouldn't the previous owner be able to pass onto the new one whatever rights he had against the imposition? A right that has been violated should not disappear just because its possessor transfers something that was his to exchange in the first place.

The other case is when someone moves to a locale and it is "foreseeable" that the risky activity will later be located nearby. Literally speaking, the risk has been imposed, since initiation of the activi-

ty puts the risk on someone already in the vicinity. Some might argue, on the other hand, that the risk has been accepted or assumed and that it was up to the person moving in to avoid the risk by purchasing additional land rights or locating somewhere else.

There are at least three problems with the latter view. That one can foresee future actions of others is debatable. What looks obvious in hindsight may require unusual alertness and intelligence to foresee. Secondly, this view opens the door to extortion. One can threaten to initiate all kinds of foreseeably risky activities, unless one is paid off in advance. Finally, to protect against far-reaching accidents, one would have to purchase land rights over a large surrounding area. Because of these difficulties, the "foreseeability" view will be rejected here. Risks arising after the acquisition of land will be considered "imposed."

The intellectual problem raised by imposed risk controversies is how to reason to their resolution in a generally compelling manner. Ideally, the logic should be so fundamental and deeply rooted in human nature that all parties to the controversy find the reasoning cogent. In the next section we turn from the characterization to the normative analysis of imposed risk.

Alternative Normative Approaches

Respect for Persons

Is there anything universal about human beings to which we can appeal to resolve risk controversies? The great diversity of values and beliefs would seem to indicate not. There is, however, at least one characteristic that we share: We all choose goals and pursue them. And in pursuing our ends, we want our persons and our activities to be physically respected by others. We do not want others to injure us or to disrupt our activities without a compelling justification. This is true for both sides in a dispute over risks.

In risk controversies, however, the wish to be respected logically cuts both ways. On the one hand, it is only rational for people to be concerned about "significant" increases in health risks. Health, after all, is fundamental in that it is a *sine qua non* for all activity. On the other hand, the desire to be free from meddlesome restraints governing every conceivable risk is also only rational in that such restraints would paralyze all activity. The two sides of the issue are logically linked and neither can be pushed to an extreme without ending up in inconsistency. The horns of this dilemma will be further examined below.

The only way to avoid impalement is to hold that "significant" risks should be enjoined, and "trivial" ones allowed. But which risks are which and what of any grey matter in between? In the next section I will attempt to delineate the distinctions relying on the desiderata of respect, impartiality, and objectivity. The end result will be some approximate quantitative standards for resolving risk controversies. Unlike the cost-benefit approaches to risk currently in fashion, the delineation will not proceed in terms of economic values. Efficiency, cost, and willingness-to-pay will have a role to play in borderline cases, but these considerations are highly constrained by more dominant "ethical" ones.

To put the framework to be developed in perspective, it is worthwhile first to consider the difficulties of alternative normative approaches.

The Outer Extremes

Two extreme positions bound all approaches to imposed risk. The first is to allow legal remedies only for harm that has already occurred and to have no remedies for risk *per se*. The second is to prohibit all risk.

The "no prior remedies" position is the most palatable when coupled with a policy of strict liability for any harm arising from imposed risk.¹ This is because strict liability gives people a strong incentive not to create risks for fear of having to pay large damage settlements. But even assuming strict liability for actual harms, what is wrong with complete *laissez-faire* for risk?

The answer, of course, is that people will sometimes create substantial risks through misjudgment or simply through carelessness. Strict liability is cold comfort to those at risk because it is far from a perfect system of insurance or restitution. The best someone at risk can expect should he be injured is to be compensated. But if the injurer is insolvent, the compensation will be inadequate. A requirement that risk-creators carry adequate insurance does not save the "no prior remedies" position. For many people, death or serious injury is not financially compensable.

Assuming that people value their health more than financial reward, it would be only rational to want to intervene in the hazardous activities of others to protect against serious risk. This would reduce individual freedom and may result in higher costs, but these are only secondary concerns in comparison with the loss of health.

¹ For a theory of strict liability, see Epstein (1980).

If the other extreme — the prohibition of all imposed risk — were in force, one would have to have the consent of all those who might possibly be harmed. To fly a plane, for instance, would require the permission of all those living below the route. To light a fire might require consent of the entire community.

Clearly, then, both positions must be rejected as irrational, and the task remains of finding a satisfactory normative basis from which to draw the line between enjoined and allowable risks.

Utilitarianism and Economics

One can attempt to determine risk policy primarily on the basis of its social consequences. Below, "utilitarian" will refer to all such attempts to base policy on the desirability of its results, such as with cost-benefit analysis.

Within the modern utilitarian tradition, Bayesian decision theory sheds light on the paradox of "the value of life," on how to make complex safety/cost tradeoffs consistent with one's fundamental preferences, and on how to make such tradeoffs on behalf of others when delegated to do so (Howard 1979). Also, economic theory can be used to demonstrate how imposed risk and its legal remedies can be less than ideally efficient. Lastly, the general utilitarian problem — how to choose fairly the action or rule that leads to the "greatest expected good" — has been rigorously analyzed (Harsanyi 1979).

Attempts, however, to draw normative conclusions about imposed risk on the basis of these theoretical results run into several logical, ethical, and informational problems. Assume that someone would voluntarily incur a risk in exchange for benefits either for himself or others. From this, it simply does not follow that the risk should be imposed on him so long as the benefits are forthcoming. There is a logical and ethical gulf between voluntary preferences (the bedrock of Bayesian decision theory and economic analysis) and conclusions about imposition. Even if one embraces the maxim, "Do what is good over all," and the person to be put at risk agrees that the benefits outweigh the risk in a utilitarian sense, the risk should not necessarily be imposed on him without his consent.

Still at issue is the ethical treatment of that person. Standard utilitarian analysis, which focuses on the consequences of policies and ignores what might be termed "procedural values," begs this fundamental issue of treatment. To the extent that people want to be respected in their choices and pursuits, such analysis is constantly in danger of yielding counterintuitive and invalid results.

One can attempt to salvage utilitarian approaches by incorporating respect for persons explicitly into the analysis. This raises the interesting question of whether treatment considerations wouldn't ordinarily so dominate the analysis that the usual consequential considerations could be ignored. (How often is respect for persons really at odds with the attainment of a more efficient or better society?)

Resolving this question, however, is not crucial; the utilitarian approach flounders on informational grounds alone.² Utilitarian policy assessments turn on judgments about people's particular values and needs and on how they will respond to the policies under consideration. Such judgments are necessarily highly subjective and hence, too indefinite and intellectually slippery to resolve legal controversies on a compelling basis.

In addition, there are the difficulties of planning under utilitarian policy. Decisions about the future can be made, at best, with only a hazy sense of how subsequent controversies over the planned activities will eventually be resolved. If risk policy is not to make a mess of the pursuit of ends, it must be more objectively based than utilitarian analysis.

Rights

Over the last decade rights theorists have strongly criticized utilitarian approaches to law and developed extensive theories of justice based on a variety of normative principles (Nozick 1974; Rawls 1971; Rothbard 1981). Existing rights theories, however, are unclear in their implications on issues of imposed risk.

Perhaps the most definitive is libertarian rights theory, which focuses on the legitimate and illegitimate use of force against individuals. Libertarian theory assumes that everyone has a property right to his own person and that no one may initiate force against another as long as that person has not violated the property rights of others (Rothbard 1981). Imposed-risk controversies do not involve the initiation of force that might result in harm to others. But given only this, libertarian principles are inconclusive.

"Clear and present danger" is sometimes cited as the correct criterion for intervention, but without sufficient explanation or justification (Gibson 1981, p. 2). Also modern technology raises serious questions about the stringency of the criterion. Suppose, for

²For an informational critique of the idea of basing law on economic efficiency considerations, see Rizzo (1980).

instance, that one sees trucks loaded with drums marked "toxic" regularly pulling into the woods of a neighboring farm. The ground water beneath the farm and the surrounding area is the region's source of drinking water. This farm has recently been purchased by an "outsider," whom no one in the surrounding area has met. Inquiries about what is going on are met with polite but firm rebuffs. "No Trespassing" signs have been posted and several guard dogs put on watch.

Does a "clear and present danger" exist? Not necessarily. The drums might not have anything toxic in them, or the owner might be storing toxic chemicals on the farm, but only temporarily and in a safe manner. Is no intervention justified? Shouldn't the new owner be required to offer an explanation?

In arguing against intervention based on utilitarian calculation, libertarian theorists have pointed to uncertainty, ignorance, and the subjectivity of knowledge. But they have not yet developed their own theory of justice to the point where it satisfactorily accounts for these important phenomena. The result has been sharp disagreement on many of the important issues of the day, such as nuclear power (Gofman and O'Connor 1980; *Inquiry* editors 1980) and aerial spraying of the pesticide, malathion (California Libertarian Party 1981; Gibson 1981).

To break the intellectual impasse on risk, appeal must be made to something deeper than the existing conception of rights, which brings us back to the concept of respect. Libertarian conceptions of rights are themselves shorthand notions for the respect owed to others. To say that someone has a property right to a particular entity is to prohibit others from interfering with that person's possession, use, or disposal of the entity.

Intervention Consonant With Respect

Potentially Mischievous Stores of Energy

Let us consider risk controversies over potential invasion first. Suppose in a suburban area that experiences occasional earthquakes, a real estate developer proposes to build a building without special earthquake engineering. A homeowner near the building site objects, arguing that the building could topple over during a quake, crushing his house and anyone inside. An independent civil engineer has estimated that the chances of this occurring are somewhere between 1 in 10,000 and 1 in 100,000 per year.

The example raises in stark form the issue of when imposed risk should be prohibited and when it should be allowed. The limits will be determined on the basis of the normative principles for which I argued in the previous section. In summary, these are:

1. People should be respected in their persons in the sense that others should not impose "nontrivial" risks on them of serious bodily harm;
2. People should be respected in their pursuits and not forcibly restrained in their activities because of "trivial" risks that are not generally compelling;
3. The limits should be objective and impartial in the sense of depending on judgments about objective events and not on people's particular values or the details of their lives.

What limits satisfy the above criteria? The third criterion requires that the limits should be standard and uniform over time, that is, independent of anyone's particular age or health. The first two require the standard to be such that in living under it, people are very unlikely to be prematurely killed or incapacitated.

Suppose that the standard is such that people face chances of 1 in 100 to 1 in 1,000 of being seriously injured. Is this standard acceptable? Would it be sufficiently respecting of persons? I contend not.

On the other hand, suppose the likelihood of being injured by imposed risk during one's life was 1 in 100,000 or less. Would one be justified in demanding that others reduce the risks even further? I contend not. Relative to other concerns, the risk is much too trivial.

We are then left with the grey area — on the order of 1 in 10,000. To determine a uniform, *per annum* standard of risk from this grey area limit, we have to take into account the pattern of human life expectancy. Given the age distribution of human life expectancy, what amount of risk per year produces a total lifetime risk on the order of 1 in 100,000? The answer is approximately one in a million per year.

On this basis, the following standard has been developed for risks of seriously harmful invasions: If the risk is about 1 in 100,000 per year or more, it is enjoined. If it is 1 in ten million or less, then no legal remedy is warranted. And finally, if the risk is one in a million, some compromise should be sought. This will be discussed further below.

Reconsidering the earthquake example, we find the imposed risk violates the standard by at least a factor of 10. Under the standard, therefore, the homeowner has the "right" to object to the construc-

tion of the tall building unless it is engineered to reduce the risk.

As another example, suppose a homeowner objects to his neighbor's barbecue fires. His concern is that they might shoot off sparks and create a fire that would spread to his house and severely burn him. An independent fire insurance appraiser estimates the chances of this happening to be less than 1 in 100 million per year. In this case the risk is trivial, the homeowner's worry is unreasonable, and the standard does not provide a remedy.

Finally, suppose a businessman is concerned about a neighboring company that stores explosives in a shed not far from his office. An insurance appraiser judges the risk of a major explosion to be "somewhere around one in a million per year." This is a borderline case. In terms of the normative criteria presented above, the issue produces an intellectual stalemate. The businessman has some grounds for concern; the company, on the other hand, has some reason for annoyance. A compromise is in order. It is at this stage in resolving risk controversies that efficiency perhaps has a role to play. A compromise that is inefficient in terms of the conflicting parties' interests can hardly be justified as being reasonable. The appraiser, however, might point out that the risk could be greatly reduced if the explosives were stored in a reinforced concrete box costing only a few hundred dollars. A both efficient and fair way to resolve the controversy might be to require the company to purchase and use the box, with the businessman paying part of its cost. The solution would be efficient to the extent that it is the least costly way to reduce the risk to a nonobjectionable level. It would be fair since the entire cost of risk reduction should not be borne by the company alone.

There are many controversies in which borderline risks cannot be reduced to satisfactory levels except at great cost. In such cases, the most efficient and fair solution might be to require those creating the low levels of risk to pay a small amount of *ex ante* compensation to those who have to endure it. Bayesian decision theory might be employed in determining a justifiable amount. Since the risk is imposed, however, and not chosen, the *ex ante* compensation should not eliminate future liability.

It should be emphasized that in the position developed here, economic considerations play only a limited, second-order role.³ Where they do enter, they do so in tandem with considerations of

³This is in contrast to the normative theory of law of Posner (1979), in which economic efficiency is central.

fairness. The foremost principle is that of respect for persons and their activities.

Minute, Possibly Toxic Invasions

In taking up the other category of risk controversies, let us again begin with an example. A rural resident is concerned about a nearby nuclear facility that emits radiation. The exposure he receives is approximately 10 percent of that from natural sources (10 millirems in comparison with 100 received naturally). As a result of the additional radiation, his chances of getting cancer are estimated to increase by one in a million for each year of exposure (an estimate based on the findings of the National Academy of Sciences (BEIR 1980, p. 342)). Is this a borderline case?

Under the standard developed above for potential invasions, it would be, but should actual invasions be treated the same as potential ones? Intuitively, it seems that actual invasions should be subject to a stricter standard.

It might be argued that risks are equivalent so long as the overall likelihood of harm is the same, and so the same standard ought to apply. This overly narrow consequentialist view, however, ignores any sense of right not to be disturbed in one's own space. In short, it ignores consideration of respect.

Human life expectancy is a natural, objective reference point from which to gauge the significance of risk. The standard developed from this reference point should apply to actual as well as potential invasions. (Hereafter it shall be referred to as the primary imposed risk standard.) Actual invasions, however, involve an additional consideration: Not "significantly disturbing" another's environment. An additional standard therefore is needed, with an appropriate reference point, which can be provided by the total toxic risk from chemicals, organisms, and radiation found naturally in the environment. So long as the total risk from man-made invasion is comparatively small (and satisfies the primary standard), there would seem to be little if any grounds for complaint. But how little is "small in comparison"? I suggest on the order of one hundredth of the natural risk.

If this reasoning is accepted, we can deduce a quantitative standard for toxic invasions. We need only multiply an order of magnitude estimate of natural toxic risk by one hundredth. The problem, however, is that there is no published estimate of total, natural toxic risk; and while it is small, attempting to put together a defensible estimate from available sources is a major research task.

Thus, determination of the quantitative standard cannot be completed here.

If, however, an invasion involves particles or substances found naturally in the environment, its insignificance can be demonstrated in a simpler and more straightforward manner: If the invading quantities are two or more orders of magnitude less than the natural quantities, then it follows that the risk associated with the invasion is less than one hundredth of the total natural toxic risk. Thus, meeting this "comparison of physical quantities" standard is sufficient to meet the more fundamental "comparison of risks" standard.

Going back to the radiation example, we find the facility must reduce its radiation emissions by a factor of 10 (down to one millirem of exposure per year), if the increase in toxicity of the rural resident's environment is to be insignificant under the "comparison of quantities" test. If we assume a linear relationship between radiation exposure and the risk of cancer, reducing the emissions by a factor of 10 reduces the annual incremental risk of cancer to the rural resident to approximately 1 in 10 million. Thus, reducing the emissions by a factor of 10 reduces the risk to a nonobjectionable level under the primary standard as well.

If natural radiation is the major natural source of toxic risk, then under the assumptions made so far, a standard on the order of one millirem per year of imposed radiation would be quite defensible. This compares with the original Federal Radiation Council guideline of approximately 170 millirems and a current U.S. Environmental Protection Agency standard of 25.⁴

But if the cancer risk from radiation is an order of magnitude higher than has been assumed, as some scientists contend (Gofman 1981, p. 314), then a one-millirem invasion would be borderline under the primary standard, although small in comparison with the exposure from natural sources. (As a point of interest, it has been estimated that the U.S. nuclear power industry exposes the general public to .03 millirems per year (BEIR 1972, p. 19), but this estimate is hotly disputed (Gofman 1981, p. 530).)

It has been assumed so far that the invading substance can be toxic at low levels. Another way to demonstrate insignificance, of course, would be to show that below certain concentrations, toxicity most likely ceases. This has not been demonstrated for radiation, but does appear to be the case for many of the more common

⁴*Code of Federal Regulations*. 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

pollutants (carbon monoxide, sulfur dioxide, nitrogen oxides, and lead). Similarly, the concentrations of malathion used in the recent aerial sprayings in northern California against the Mediterranean fruit fly do not appear to be toxic (Marx 1981).

An Adjudicatory Framework

Questions

The discussion so far raises at least as many questions as it answers:

1. Should people have to respond to any charge of "excessive imposed risk"?
2. In proceedings to resolve risk controversies, who should have to argue what, and who should bear the costs?
3. What about risks associated with new technologies, with which there is little experience?
4. What about conflicting expert judgments about the likelihood of harm? Would judgments be so hard to predict that numerous controversies would break out, requiring considerable legal resources to resolve?
5. How would people respond to the incentives created by the adjudicatory system?

All these questions cannot be addressed here in detail; I will only offer some views.

A Normative View

Those concerned about imposed risk typically face major informational barriers in gauging it accurately. Specialized technical knowledge and on-site inspection may be required. Those involved with dangerous forms of energy owe it to others to provide credible evidence that the risk does not violate the standards developed above. If they do not provide such evidence, and, if on the basis of available information there is reason to believe they are in violation, then they should have to dispel the concern as a matter of law. Furthermore, they should have to bear all reasonable costs associated with the legal proceedings. (The reason is that in creating and failing to assuage a reasonable concern of harm, they have not sufficiently respected others.)

A Procedure and Its Incentives

This normative view could be implemented in a two-stage ad-

judicatory procedure as follows: Prior to the initial hearing, the plaintiffs would have to contact the defendants who are creating the risk, giving them a chance to respond voluntarily. Assuming the plaintiffs are dissatisfied with the response, they could then make the case in a preliminary hearing that there are reasonable grounds for believing the standards have been or will be violated. The hearing would be presided over by a single "judge" with appropriate expertise, who would decide on the reasonableness of the plaintiffs' prima facie case. The judge would contact the defendants about the preliminary hearing, but it would be their decision whether or not to attend and represent themselves.

If the judge dismissed the plaintiffs' concern, they would have to pay the nominal costs of the preliminary hearing. (In this manner defendants would not be needlessly dragged into a hearing. In particular, the hearing fee would provide plaintiffs with an incentive to bring only reasonable concerns before the judge. Thus, the dice would be loaded against any right to protection against risk — but not to the point of injustice.)

If, on the other hand, the preliminary judgment was in favor of the plaintiffs, then a full-scale hearing would be initiated, and the burden of the argument would shift to the defendants. The defendants would have to pay for all the plaintiffs' reasonable costs for both hearings. This strict reimbursement principle would encourage lawyers, scientists, and engineers to form private concerns that would be on the lookout for excessive risks. They could recover their costs from reasonable legal fees for the plaintiffs they defend. The principle would also encourage would-be defendants to consider risks carefully and impartially beforehand and to commission reputable independent studies of novel risks to provide evidence of compliance and to keep themselves out of fullings. In order to enhance their credibility, would-be defendants could submit their activities to voluntary regulation by insurance companies, which in turn would represent them in the hearing process. Thus, risk oversight might become a *business* rather than a tax-supported activity. Finally, should someone find himself a defendant subject to a full-scale hearing, the strict reimbursement principle is an incentive to settle matters as quickly as possible — preferably before the hearing begins.

Once in a full-scale hearing, defendants and plaintiffs would make their case to an independent panel or "jury" with particular expertise in the risk at issue.⁵ The panel would have to come to a consensus about which steps, if any, the defendants should take to

reduce the risk. The fact that the standards require risk estimates with only order of magnitude precision should facilitate consensus; but should panel members cling to widely varying estimates that straddle the standard, a compromise remedy would have to be devised. The remedy should leave at least a majority of the panel of the opinion that the standards are not being violated outright. In fashioning the compromise, the panel should be able to seek additional information from both the plaintiffs and defendants so as to make it as fair and as least costly as possible. This is simply the best that human beings with very limited prescience can do.

The Role of Precedents

The judgments rendered in the hearing process would serve as precedents for judges and panels in the future. The precedents would be prima facie binding, overturnable on the basis of new information or experience about the risk in question. The precedents would provide planning guidelines to would-be defendants. Also, the body of precedents together with the reimbursement principle would deter unnecessary litigation, since it is not in plaintiffs' and defendants' interest to go through with a hearing when the outcome is reasonably clear.

New Technologies

Reasonable estimates of risk are likely to vary the most for radically new, potentially dangerous technologies. It may be in the interest of companies that want to develop such technologies to seek a prior, "declaratory" judgment on their safety before proceeding. Going up against a tough devil's advocate will put their planning to a rigorous test, and provide some legal assurance that their activities will not later be enjoined.

There are several steps that a company developing a new, hazardous technology can take to narrow the range of reasonable estimates and reduce the risk below the standards developed above. First, a company can submit a detailed analysis of the risky actions and what engineering steps it plans to take either to eliminate the risk or to reduce it to insignificance. Evidence at this stage of careful thinking and quality management may be sufficient to justify a low-risk estimate.

⁵The concept of legal bodies with special competence to render scientific and technological judgments is discussed in "The Scientific Court Experiment: An Interim Report." *Science* 193 (20 August 1976): 653-656.

The second step could be to exploit any analogies between the proposed venture and past ones that were notably safe and well managed. A company can point to its own proven track record, to the positive experiences of other companies developing new technologies, and to any technological or managerial similarities between its own venture and notably safe ones. The company can then cite the reasons why its new venture will be at least as safe as the analogous ones (assuming the company is trying to improve upon the past).

The company can also purchase insurance, and if it receives a particularly good rating from an insurance firm with proven judgment, then this fact can be introduced as further evidence of a safely planned venture. The same insurance company perhaps could act in a regulatory capacity, as suggested earlier.

Finally, if the company wants to carry on some particularly hazardous activity and the other steps are not sufficient, the company can conduct the activity on a small scale at a remote location. After gaining experience and confidence, the company could expand the activity and move it closer to populated areas.

Conclusion: Common Law vs. Regulation

Whether a common-law approach to risk should replace the current regulatory approach is another issue that deserves book-length treatment. Since such a radical change in policy would have to overcome a great deal of scepticism, however, I want to make a few concluding points in defense of a common-law approach.

The Lack of Historical Support

Most scepticism stems from the fact that history has spoken almost uniformly against this idea: Risk has always been dealt with through regulation. Prior to the Industrial Revolution, except for urban fires and contagious disease, imposed risk was not much of a social concern. The technology did not exist to create major imposed risks, and people were faced with far more important matters of survival. During the Industrial Revolution, people began to consider the injustice of imposed risk. A legal vacuum existed, however, and the state-run, monopolistic, resource-constrained legal systems had no clear incentive to innovate or the ability to expand judicial services in order to address the problem. A more pressing task was to fashion a tort law that could deal with all the actual harms in a politically feasible way.⁶ An excessive 19th cen-

tury concern with objectivity may also have prevented the courts from dealing with the issue of risk.

Various well-publicized accidents helped to galvanize public opinion and put pressure on the legislatures to fill the vacuum left by the courts. The pressures were resisted by special interests who preferred the legal status quo, but eventually legislation was passed. The result, however, was a number of ad hoc policies born in back-room political compromises. Since the courts were inadequate to the task, regulatory bodies were set up with much stronger powers than the courts. Subjective questions of risk became subordinate to the whims of those running the agencies. The result is today's maze of unprincipled and often conflicting regulations — from those embodied in zoning codes to those of the Nuclear Regulatory Commission. While to some extent we have learned to live with risk regulation, it has not been without great cost, and few are happy with it.

Today's regulatory system may have been historically inevitable, but this does not imply that far more enlightened alternatives toward risk do not exist and could not be put into place should people change their traditional way of thinking.

The Impossible Transition

Sceptics would also wonder how the transition would occur. Let me offer only a couple of suggestions.

A system of courts specializing in risk could be set up or encouraged to develop. The courts would have the power to overturn past regulatory decisions or current standards after it could be satisfactorily argued that they were unnecessarily restrictive for keeping risks low. The courts would also have the power to deal with new imposed-risk issues and new precedents if the case could be made that existing law was inadequate.

Nonoptimal Enforcement

Sceptics might also worry about too much or too little enforcement in a privately enforced system of common law. Even if law firms defended people on a contingency fee basis, would all risk that should be stopped get stopped? For instance, would firms not want to take on cases with highly uncertain outcomes? What about situations in which the risk creator is insolvent and those at risk too

⁶For an account of the fashioning of American tort law in the first half of the 19th century, see Horwitz (1977).

poor to hire a lawyer? On the other hand, would firms inefficiently duplicate each other's efforts in scouting out excessive risks? It is important to point out, however, that these are also problems encountered with the regulatory process.

In closing, let me switch from defensive to positive considerations.

1. Under the principle of "losers pay," the common-law system developed above would be self-financing, would not require tax funding, and could expand and contract, depending on the case load.
2. People would be able to initiate the hearing process at low cost; this system promises to be more responsive than a faceless regulatory agency.
3. The system could take on new risk problems as they arose, rather than letting a crisis build, as is often required for a legislative solution to be adopted.
4. In general, it would evolve a body of law from direct contact with the problems, rather than responding from a position of little experience and from "on high."

Most importantly, the common-law approach would move the resolution of risk controversies from a partisan political arena into the hands of impartial judges and panels. They would operate in a more open system and be required to explicitly justify their conclusions.

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COMMENT ON "IMPOSED RISK"

James L. Johnston

There are at least two grounds on which to commend Gerald Sauer's paper on imposed risk. One is the powerful criticism he offers of traditional regulation by government for handling (or should I say, mishandling) problems of externalities. The other is the courageous attempt to fashion a new judicial institution for settling disputes arising out of situations, like the typical pollution problem, where liability is not well defined.

The system proposed is a two-step process. The first is a kind of arbitration where participation by the "defendant" is voluntary. If the judgment at the first stage goes against the defendant, the system progresses to the second stage; otherwise the process is completed.

At the next stage a full-scale hearing is conducted and the burden of the argument shifts to the defendant. The decision is rendered by a panel, which also decides on the size of the damage award. In the first stage legal fees would be borne by the plaintiffs. Only if there were a successful judgment at first stage would the burden of the legal fees (for both stages) fall on the defendant.

Sauer correctly concludes that once decisions develop a pattern and become predictable for a set of cases, disputes will tend to be settled outside of the hearing process. The reason, of course, is that final decisions, when they can be anticipated, tend to dominate the earlier negotiations. However, that same argument can be used to question whether the first stage of the hearing process can use one set of rules for the burden of proof and legal fees and another set for the second stage. It would seem that rules at the second stage would dominate the first stage and the negotiations that might precede it. Thus, the intent of having a modest barrier at the first stage against nuisance suits is effectively defeated.

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Sauer expects that only problems with a nontrivial probability of occurrence will be brought to his dispute settlement machinery, or indeed to any mechanism or institution devoted to the definition and enforcement of property rights. That is only partially true. The missing consideration is the magnitude of the damage. Decisions sought will be those where the product of the probability of occurrence *and* the damage that would result is significantly greater than the ordinary ambient riskiness of going about one's life.

There is also a question about risk. Specifically, it is not a single-dimensional attribute. For example, water quality for irrigation purposes is adversely affected to a serious extent when only traces of boron are present, yet the suitability of such water for human consumption is unaffected.

The foregoing are, of course, minor flaws. I do not mean to imply, however, that the paper will stand as a contribution if only a few repairs are made. There are some fundamental problems that cannot be so easily accommodated. One is that risk and damage are unknowable to any workable extent. Consequently, the system may not produce the appropriate damage awards. The implication of this is serious. Without an improvement in the definition and enforcement of property rights the allocation of resources will be further distorted. An even more serious problem is the fashioning of a complex legal institution in advance of fully understanding the problem of externalities and what free-market institutions already exist for accommodating them.

Gerald O'Driscoll makes the point eloquently in his comments on the Epstein paper elsewhere in this journal. Markets already address externalities where it is worth it to do so. So-called "failures" of the market are little more than examples that some economists present to their students to help the freshmen understand the rudiments of supply and demand. Only the least competent economists turn that exercise into a campaign to make the world conform to the "pure and perfect competition" model.

This is not to say that the market has already devised all the solutions and none remain. Before advocating a new institution, however, it would seem appropriate to take inventory of what free-market solutions have previously emerged in selected instances. It would also seem reasonable to quantify in a gross fashion the value of attempting to improve the property rights, so that the cost of any new institution could be weighed against it. What these two steps imply is that the market may have already worked out solutions to the serious problems, and the remaining cases may be too costly to

solve with the present technology.

If one were to make a list of market solutions to externality problems, it might be rather long. The following is just a partial one, but still instructive: Law suits, injunctions, and arbitration; insurance; sales tied in with excludable goods; patents and copyrights; clubs; social ostracism; unitization of oil fields; fish farms; rentals of bees; hunting preserves; fishing licenses where the proceeds go for restocking; toll roads, vehicle registration fees, and motor fuel excises that can only be spent on roads; and cable-TV scramblers.

These all imply that competition and the potential gain from excluding free riders is sufficient in many areas. On the other hand, government institutions, including the new quasi-judicial ones that attempt to improve environmental quality, are not subject to the same discipline and are not forced to demonstrate that a positive net contribution results from their existence.

Indeed, there is reason to believe that government regulation to cope with environmental externalities may make the problem worse. It is to Sauer's credit that he offers a strong critique of regulators. To my mind, however, a couple of important aspects are omitted. First, vesting decision-making authority with regulators who bear neither the full rewards for successes nor the full liability for their mistakes actually creates a new externality without eliminating the old one.

In addition, there is seldom a systematic trade-off between the costs and benefits of regulation or standard, to say nothing of an attempt to identify spillover effects from the regulations. Perhaps the worst case is when regulations specify the particular abatement technology to be used, such as stack-gas scrubbers for coal-fired boilers. The effect here is to retard the development of more effective abatement technologies.

There may be ways to repair Sauer's proposal so that the political system does not turn his suggested solution into an additional problem. If there are, I am unaware of them. All this leads me to worry whether one can reasonably expect Sauer's legal machinery to actually produce an improvement. While I would hope for the best, I am prepared for the worst.