Torts as the Union of Liberty and Efficiency: An Essay on Causation

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INTRODUCTION

In a well-known essay the philosopher Bertrand Russell observed that "cause" tends to disappear from science. In a mature science, according to Russell, precise mathematical relationships link the variables. A variety of relationships among variables are recognized in mathematics, such as functional relationships (\(y = f(x)\) or "\(y\) is a function of \(x\)"), but there is no relationship in mathematics called a causal relationship. According to Russell, the disappearance of "cause" from scientific discourse and its replacement by precise mathematical terms is evidence of scientific progress.

Economic models of tort law are based on functional relationships among such variables as the probability of accidents, the harm they cause, and precaution against them. Being mathematical relationships, they are not explicitly causal (although they are implicitly), so Russell's observation that "cause" disappears is apparently true of the economic analysis of tort law. In tort law, however, causality is a necessary condition for liability in most cases. In so far as the formal models describe tort law, the legal concept of cause must be imbedded in the math. How is legal cause imbedded in formal models? Do the formal models clarify difficult legal issues about causation, as concluded by such writers as Calabresi, Shavell, and Landes and Posner? Is the disappearance of "cause" from the formal models evidence of scientific progress and a reason for celebration, as Russell's views suggest? Or do the formal models...
obscure legal cause and suppress interesting legal issues, as asserted by critics such as Wright.\(^3\)

This article tries to answer these questions by explaining the relationship between liberty and efficiency. A boundary exists between personal freedom and responsibility to others. The boundary is crossed when one person causes harm to another. Causation in tort law is, thus, a way of describing the point where personal freedom runs out and responsibility to others begins. An account of causation in tort law is necessarily an account of a society's conception of liberty.

This account of causation in torts, or accounts similar to it, has been advanced by opponents of the economic analysis of law as a way of refuting it.\(^4\) What opponents have failed to notice is the natural link between liberty and Pareto efficiency, which is the fundamental normative concept in contemporary economics. A change is a Pareto improvement by definition if it makes at least one person better off and no one worse off, where "better off" and "worse off" are measured relative to an initial distribution of resources.\(^5\) In efficiency models of the law, the initial distribution of resources includes basic rights such as those protected by tort law. A non-economic theory is required to explain and justify the basic tort rights that constitute a society's conception of liberty. The efficiency analysis treats these basic rights as part of the initial distribution of resources against which Pareto improvements are measured. So answers to some of the deepest questions in tort law are presupposed, rather than supplied, by the efficiency analysis.

Once these answers are supplied, however, the efficiency models have much to contribute to tort law. The purpose of efficiency models of law is to discover Pareto improvements and explain how courts can make them. A Pareto improvement increases the value of the initial distribution of resources. The efficiency analysis treats these basic rights as part of the initial distribution of resources against which Pareto improvements are measured. So answers to some of the deepest questions in tort law are presupposed, rather than supplied, by the efficiency analysis.


liberty and efficiency. This understanding provides the best answers for questions of causation in tort law.

Part I of this article contains a brief explanation of the conventional ideas of cause in tort law. Part II offers a detailed explanation of the idea of cause in efficiency models of tort law. Finally, Part III develops the conception of torts as the union of liberty and efficiency.

I. CAUSE IN TORT LAW

The idea of causation may seem simple—perhaps an image comes to mind of billiard balls colliding with each other—but this impression is misleading. To illustrate some complications, suppose a psychiatrist says that a young woman's suicide was caused by her childhood seduction, or an economist says that devaluation caused inflation, or a minister says that God caused an earthquake. These uses of "cause" are far more problematic than colliding billiard balls. There is, in fact, a long philosophical tradition of distinguishing various types of causes. Aristotle, for example, distinguished four types of causes. Tort theorists have also distinguished various types of causes, but the courts are content to limit themselves to two types in most cases. The first and more comprehensive of these is "cause-in-fact," and the second is "proximate cause."

A. Cause-In-Fact

The law borrows words from common speech and gives them a technical meaning. To distinguish between the plain meaning and the technical meaning, lawyers append to a word the phrase "in fact" or "in law." The appendage "in fact" indicates that the word should be given its plain meaning, whereas the appendage "in law" indicates it should be given a special legal meaning. Cause-in-fact as a condition of recovery thus implies that the plaintiff cannot recover unless the defendant "caused" the accident according to the word's plain meaning. Establishing that the defendant's act was the cause-in-fact of the plaintiff's harm is a necessary condition (but not a sufficient condition) for the plaintiff's recovery in most cases.

6. This section is based upon R. COOTER & T. ULEN, LAW AND ECONOMICS ch. 8 (1988).
7. The four types of causes are the material cause, the formal cause, the efficient cause, and the final cause. The doctrine of the four types of cause is quite subtle and complicated. See Moravcsik, Aristotle on Adequate Explanation, 28 SYNTHESE 3 (1974). The Greek word "aitia" apparently had broader meaning than the English word "cause." Vlastos suggested that "aitia" was used in any context where English speakers use "because," which includes circumstances under which the explanation makes reference to reasons rather than causes. See G. VLASTOS, PLATONIC STUDIES 76-110 (2d ed. 1981). I am grateful to Alan Code for these citations.
The requirement of cause-in-fact has procedural significance that often controls the outcome of cases. Matters of fact are decided by the jury, or by the judge if there is no jury, in the first court to hear the case. In contrast, matters of law are decided by judges, especially in appellate courts. Insofar as cause-in-fact is the root of liability, the crucial determination in cases will be made in trial courts, often by juries.8

A legal theory that attributes liability on the basis of cause as determined by its plain meaning suffers from the ambiguity of ordinary language. The ambiguity of ordinary language is revealed in cases that are beyond the usual range of the word’s application. (Such unusual cases are discussed in a subsequent section.) The problem cases cannot be clarified by scrutinizing the plain meaning of “cause” because these cases are exactly the ones in which the criteria that control the word’s plain meaning fail to give definite guidance.

One response to problem cases is to build a legal theory that will clarify the plain meaning of “cause” and extend its range. Epstein, building on the earlier work of Hart and Honoré, tries to accomplish this goal by reducing causal attribution to a small number of paradigm cases.9 Hard cases are approached by testing their fit with the paradigms. To illustrate, a batsman hit an unusually long cricket ball that cleared a fence and struck a woman. When she sued, the British courts (and subsequent commentators) struggled with the case, and eventually found that she could not recover because there was no negligence on the part of anyone, including the cricket club. Epstein, however, reached a different conclusion by applying his method. One of the basic paradigms of tort, according to Epstein, is “A hit B.”10 The case fits the paradigm, so Epstein would find for the plaintiff.

Another approach to problems cases, besides reasoning by paradigms, is to attempt a definition of cause in terms of necessary and sufficient conditions. There is a simple criterion, called the “but-for test,” that lawyers often use to decide whether action A was the cause-in-fact of event B. “But for A, would B have occurred?” If the answer to this question is “No,” then, according to this test, A is the cause-in-fact of B. If the answer to this question is “Yes,” then A is not the cause-in-fact of B.

8. A careful description of what must be proved about causation to establish liability in tort is provided by Keeton, Causation, 28 S. Tex. L.J. 189, 231 (1986).
9. Hart and Honoré distinguished three types of causes: contingency, reason, and opportunity. Hart & Honoré, supra note 4, at 2. Epstein distinguished force (A hit B), fright (A frightened B), compulsion (A compelled B to hit C), and dangerous condition (A created the dangerous condition that resulted in harm to B). Epstein, supra note 4, at 160-89.
10. See Epstein, supra note 4, at 169-71.
The but-for test, which is another way of asking whether one event was a necessary condition for another,11 is adequate for determining whether the defendant's tortious act was the cause-in-fact of the plaintiff's injury in most cases, but not in all cases. For example, the but-for test gives the wrong answer when the effect was over-determined. To illustrate, suppose a fire caused by the defendant's negligence reaches a house and burns it down just before the site is reached by another fire caused by lightning.12 The defendant's negligence was the cause-in-fact of the fire that actually destroyed the plaintiff's house. The defendant's negligence, however, was not a necessary condition for the building to burn down; it would have burned down anyway because of the fire caused by lightning. In this example, the defendant's negligence fails the but-for test, even though it was the cause-in-fact of the plaintiff's loss.

This example illustrates something that philosophers have long recognized: causation is more complicated than a necessary condition. One way to respond to the fact that cause-in-fact is more complicated than a necessary condition is to try to define cause as a complex combination of necessary and sufficient conditions. To illustrate a particularly clever attempt along these lines, Mackie proposed that a cause is (get ready for a mouthful) an insufficient but necessary part of an unnecessary but sufficient set of conditions for the effect.13 In short, cause is an INUS condition. Let's consider each element in this definition separately. The event constituting the cause is insufficient because it presupposes a background set of conditions without which there will be no effect. Within those background conditions, according to this definition, the cause is necessary to produce the effect. Furthermore, the cause and the background conditions, occurring together, are jointly sufficient for the effect. However, the effect may be produced in other ways, so this cause and these background conditions are unnecessary for the effect to occur.

This attempt by Mackie to define causality through a combination of logical operators is more convincing (and a lot more complicated) than the but-for test. It is possible to contrive still more subtle and complicated combinations of logical operators that are even more convinc-

11. The argument by Fletcher, supra note 4, and Epstein, supra note 4, that cause is the root of tort liability, comes close to the view that cause is a necessary and sufficient condition for tort liability.

12. This hypothetical is an illustration from Restatement (Second) of Torts § 432(d), illustration 4 (1965).

13. Mackie, Causes and Conditions, 2 Am. Phil. Q. 245, 245-47 (1965). Wright pointed out to me that this is based upon Hart and Honoré's NESS test. See Hart & Honoré, supra note 4, at 105-10.
There are apparently scholars who believe that some such analysis will provide the best explanation of causation in torts. Instead of exploring the paradoxes and problems of these approaches, I will indicate in a general way why I think the theory advanced in this paper is more promising.

As case law evolves in torts, judges must draw the boundary between freedom and responsibility. Drawing the boundary involves questions about liberty and efficiency. For judges to debate these questions, there must be language that is neutral in the sense that alternative conceptions of liberty and efficiency can be described without bias. The debate cannot be decided by the meaning of the basic terms in which it is conducted. To be specific, an analysis of the meaning of "cause" in plain speech, as applied to tort cases, cannot decide the issues facing judges. Rather, an analysis of meaning accomplishes the more modest task of increasing the clarity of expression by the different sides in the debate. Plain speech theories should clarify issues of causation, not foreclose them. Deciding issues of causation in tort law requires appeal to substantive values like liberty and efficiency.

**B. Proximate Cause**

Besides cause-in-fact, there is an additional causal requirement in most tort suits that is illustrated by a familiar verse from Mother Goose:

For want of a nail, the shoe was lost;
For want of a shoe, the horse was lost;
For want of a horse, the rider was lost;
For want of a rider, the battle was lost;
For want of the battle, the kingdom was lost.
And all for the want of a horseshoe nail.

This verse illustrates that "but-for" causes can be ordered from the remote to the proximate; furthermore, as but-for causes become more remote, at some point attributing cause no longer makes sense. Indeed, the conclusion that the downfall of the kingdom was caused by the want of a horseshoe nail is absurd.

Explanations pick the cause from many background conditions.

14. An interesting approach is to define a logical operator called "cause" and develop the rules by which it joins variables. This is a more rigorous, formal approach than concatenating necessity and sufficiency. See G. Von Wright, supra note 1.

15. See Wright II, supra note 3, at 1788-1813.

The loss of a horseshoe nail is a reasonable explanation for why a horse went lame. When the object of explanation expands from a horse going lame to a rider being lost, to a battle being lost, and finally to the downfall of a kingdom, the context changes dramatically and new criteria must be adopted for distinguishing between cause and background conditions. The want of a horseshoe nail is a background condition, not the cause, of the kingdom’s downfall. To explain the downfall of the kingdom, another type of fact must be chosen from the prevailing conditions other than the want of a horseshoe nail.

In general, a relationship R between variables is transitive provided that for any three variables a, b, and c:

\[ aRb \text{ and } bRc \text{ implies } aRc. \]

To illustrate, “a is larger than b” and “b is larger than c” implies that “a is larger than c.” Thus the relationship “larger than” is transitive. What about causal relationships? If causal relationships were transitive, then “a causes b” and “b causes c” would imply “a causes c.” The Mother Goose verse is a play on the fact that causal relations are imperfectly transitive. The causal inference has force line by line in the verse, but it decays as the chain that starts from the loss of the horseshoe nail grows longer. The verse is amusing because the inference fails imperceptibly by degrees. Causation can be called a “decaying transitive relation” because extending the chain of inference weakens the relationship without destroying it.

Tort law takes account of the decaying transitivity of cause by requiring as a condition for recovering damages that cause be proximate rather than remote. As the Mother Goose verse suggests, proximity is a matter of degree. Courts do not seem to have a firm rule for deciding how close the injurer’s act must be to the accident to create liability.

Prescribing such a rule would involve specifying the rate at which the


18. I offer the following definition of decaying transitivity. Let \( p(aRb) \) denote the probability that \( xRy \) for any relationship \( R \) and any variables \( a \) and \( b \). Transitivity is decaying if \( aRb, bRc, \) and \( cRd \) implies that \( p(aRc) > p(aRd) \) for any variables \( a, b, c, d \).

19. Of course, lawyers have tried to extract a rule from the inchoate cases. Keeton tries to summarize court practice as follows:

Legal causation can be delineated in three general propositions for proximate causation where factual causation is presumably established. First, an actor’s negligence is a proximate cause of harm to the plaintiff only if harm to one similarly situated to plaintiff was reasonably foreseeable. Second, an actor’s act or omission is a proximate cause of harm to the plaintiff only if the harm arose out of a damaging event or accident of the same general character as that which was reasonably foreseeable. Finally, an actor’s conduct is a proximate cause of harm to the plaintiff only if the harm was not brought about by a new and independent cause (a superseding cause).

Keeton, supra note 8, at 236.
inference decays, which appears difficult or impossible. The proximity requirement is apparently a matter of judgment that is enhanced by examining cases.\textsuperscript{20}

What elements are involved in reaching such a judgment? This question sharply divides legal scholars. One view is that no new elements are involved (or none should be involved) because "proximate cause" is an aspect of "cause-in-fact." The terms do not designate distinct concepts, according to this view, but instead they indicate two steps in applying a single concept.\textsuperscript{21} The single concept is the idea of cause as understood in ordinary discourse and sharpened by the history of its application to cases in torts.

The sentence, "The defendant's act caused the plaintiff's injury," sounds like pure description of facts, whereas the sentence, "The defendant is responsible for the plaintiff's injury," sounds like a judgment requiring the application of norms. These propositions are often linked in ordinary discourse, as in the statement, "The defendant caused the plaintiff's injury, so the defendant is responsible for it." There is a puzzle here. On the one hand, cause appears to be a natural fact whereas responsibility appears to be a normative judgment, so there is a gap between them. On the other hand, in discourse we often pass directly from describing causes to making judgments about responsibility as if there were no gap.

A theory of tort liability must solve this puzzle by providing a systematic account of the relationship between causing harm and being responsible for it. One strand of legal thought, the "plain meaning" approach already discussed, grounds the judgment in the fact. In this tradition there is not much of a gap between describing the facts and reaching a judgment about responsibility.\textsuperscript{22} So the judgment of responsibility is reached by carefully attending to the facts. This approach makes

\textsuperscript{20} Begin with Palsgraf v. Long Island Ry., 248 N.Y. 339, 162 N.E. 99 (1928), in which Judge Cardozo enunciated the "reasonably foreseeable" test mentioned by Keeton. See supra note 19.

\textsuperscript{21} See Epstein, supra note 4, at 160.

\textsuperscript{22} Fletcher argues that the gap is smaller for his theory than for utilitarian or economic alternatives:

The paradigm of reasonableness requires several stages of analysis: defining the risk, assessing its consequences, balancing costs and benefits. The paradigm of reciprocity requires a single conclusion, based on perceptions of similarities, of excessiveness, and of directness. If an argument requires several steps, it harks in the respectability of precision and rationality. Yet associating rationality with multistaged argumentation may be but a spectacular lawyerly fallacy. Fletcher, supra note 4, at 573.

But acts are susceptible to many descriptions and mere observation may not provide the basis for adopting one description rather than another. The description relevant to an assignment of liability is specified by tort law. Thus, Wright distinguishes between the defendant's act causing harm and the defendant's tortious act causing harm. Wright II, supra note 3, at 1759-74.
the determination of cause decisive for the assignment of liability. Cause is in the driver’s seat and liability is a passenger.

The opposite view is that proximate cause introduces entirely new elements into the inquiry, the new elements being normative considerations, such as policy values and goals. There is, according to this view, a large gap between describing material causes and reaching a judgment about responsibility, which is filled by these normative elements. The legal realists take this view to its extreme by concluding that proximate cause is the guise in which courts smuggle policy judgments into the case in order to decide it on grounds that are unrelated to causation. Instead of description grounding the judgment, according to this view, the judgment of responsibility grounds the description of legal cause. The judgment of responsibility is in the driver’s seat, and cause is a passenger. As explained in the next section, the efficiency theorists are, in this respect, much like the realists, since they take the view that ascribing proximate cause is, or should be, a policy judgment.

II. Cause in the Economic Analysis of Tort Law

Legal cause will be related to cause in formal models by a brief review of the history of the economic analysis of torts. A major source of contemporary economic analysis of law is Coase’s seminal article, *The Problem of Social Cost*, published in 1960. This article attacks the causation requirement for recovery in tort. Since Coase’s article, the economic analysis of law has flourished and matured. Contemporary theories draw upon formal models that use more rigorous analytical techniques than Coase used, but, as I will show, the disparagement of legal cause persists as an inherent feature in the logic of these models.

A. Coase’s Repudiation of Cause-In-Fact

In his classic article, Coase attempted to debunk the idea that cause, in its plain meaning, should influence the assignment of liability in tort law. He observed that forbidding one person from interfering with another is itself a form of interference by the state. From this observation he concluded that it is not intrinsically better for law to prevent one person from interfering with another than to leave them alone. Coase developed this stance in detail under the implicit assumption that economic

23. See Wright’s discussion of causation and the legal realists. Wright II, supra note 3, at 1737-39. See also Calabresi, supra note 2.
efficiency is the law's purpose. The fact that one person interferes with another indicates nothing, according to Coase, about whether a liability rule would be more or less efficient than a rule of no liability.

To illustrate, in some regions of America there is open range (farmers must protect their crops against straying cattle) and in other regions the range is closed (ranchers must prevent their cattle from straying and destroying the farmers' crops). The question of open versus closed range is, for Coase, a question of cheaper beef or cheaper crops. The law should open or close the range depending upon which alternative yields larger net economic benefits. Popular intuitions about whether farmers or ranchers cause the harm done by straying cattle cannot decide whether opening or closing the range is more efficient. In general, such liability issues should be decided, according to Coase, by a cost-benefit analysis.

B. Cause in Formal Models

By such arguments Coase sought to debunk the role of cause in deciding tort liability. Subsequent work on the economic analysis of torts has preserved the essentials of Coase's theory, while making some concessions to the language of causation. In his pioneering book *The Cost of Accidents*, Calabresi identified the following variables as elements in the simplest, most fundamental economic model of accidents: the probability of an accident, the dollar value of the harm caused by an accident, and the expenditures on precaution taken against accidents. The accident's probability multiplied by the resulting harm equals, by definition, the expected harm. Calabresi proposed that an important goal of tort law is to minimize the sum of the cost of precaution and the expected harm from accidents.

In the simplest situation imagined by Calabresi, there may be several people who can prevent the accident, but not at the same cost. The party who can prevent the accident at less cost than anyone else is the cheapest cost avoider. According to Calabresi's theory, the court should assign liability for the accident to the cheapest cost avoider, at least insofar as

26. Calabresi states, "[t]he second and perhaps more important way general deterrence reduces accident costs is that it encourages us to make activities safer." G. CALABRESI, supra note 2, at 73. He also discusses this framework in Calabresi, Optimal Deterrence and Accidents, 84 YALE L.J. 656 (1975). I use the term "precaution" to encompass all the ways of making an activity safer. The reader should realize that Calabresi also discusses a much wider framework of social costs ("Secondary Accident Costs") in *The Cost of Accidents*. The goal of minimizing the sum of accident costs and the cost of accident avoidance was also analyzed by Posner in Posner, A Theory of Negligence, 1 J. LEGAL. STUD. 29 (1972).
the goal of tort law is economic efficiency. But-for causation provides a guide to making this determination, although the final determination must be made on different grounds. The final determination, according to Calabresi, is often reached by the court through its inquiry into proximate cause. Like the legal realists, Calabresi views proximate cause as a guise for policy judgments. He believes the court should identify the cheapest cost avoider and then describe him as the cause of the accident. This is a tautology (or perhaps a tortology), but Calabresi expects the language of cause to survive rather than to be replaced by direct appeal to the goals controlling its use.

The efficiency of various tort rules was first tested against Calabresi's standard of cost minimization in a formal model by John Brown. The basic structure of Brown's model is worth repeating for those unfamiliar with it because his paper established the mathematical mode that has become the norm in the economic analysis of tort law. Expenditure on precaution, denoted x, reduces the probability of accidents, denoted p, as indicated by the function \( p = p(x) \). The probability of an accident \( p \) times the loss from the accident, denoted \( A \), equals the expected loss. Thus, the expected loss from accidents is a (decreasing) function of precaution, or expected loss \( = p(x)A \). The full cost of accidents in the most basic economic model equals the sum of the cost of precaution \( x \) and the expected harm:

\[
x + p(x)A.
\]

Efficiency requires setting expenditures on precaution \( x \) at a level that minimizes this sum.

27. Calabresi writes, "[i]f market deterrence were the only goal of tort law, then all causation problems would be reduced to a search for the cheapest cost avoider. Tort law, however, is a system that responds to mixed goals." Calabresi, supra note 2, at 100.

28. For example, Calabresi states:

General or market deterrence, then, relies on causal linkage as one crucial element in identifying the optimal loss bearer. It relies on but for cause as a sound way of determining, on a case-by-case basis, what burden-incentive should be placed on the loss bearer. Yet neither concept, together or separately, suffices to identify the proper loss bearer. The requirement of proximate cause is necessary to select[,] from actors who may be cheapest cost avoiders because they are sufficiently linked, those who in fact are.

Id. at 87 (emphasis in original).

29. Calabresi reasons:

I am inclined to believe that the requirement of causation in all three of its parts (causal link, but for and proximity) will survive in many areas of non-fault liability rather than be replaced by direct appeals to those clearly identified goals which, by and large, those requirements seem to serve.

Id. at 108 (emphasis in original).


31. Brown's formulation distinguished injurer's precaution from victim's precaution; he also distinguished the amount of precaution from its price. I have collapsed these distinctions to simplify the exposition.
The variable x is not, however, chosen directly by the court. Rather, the court establishes liability rules that create incentives for private parties to set x at particular levels. In his study, Brown obtained explicit mathematical expressions for the incentives of various liability rules, such as strict liability and negligence, and then tested them to see whether rational decision makers would respond to these incentives by choosing x to minimize the cost of accidents. In technical language, he investigated whether the equilibrium levels of precaution under various liability rules equal the efficient levels of care.

Brown did not explicitly concern himself with the problem of cause. Perhaps he thought, like Calabresi, that cause is merely a conclusion put on the case. Brown's model, however, implicitly used a concept of cause that is prominent in subsequent articles by economists. As explained, Brown assumed a functional relationship between precaution x and the probability of an accident p. The connection between precaution and the occurrence of an accident is probabilistic in Brown's model. Since the relationship is probabilistic, a particular level of precaution is unnecessary for the occurrence of an accident. Recall that the but-for test asks whether a particular act is necessary for a specific effect. In general, probabilistic relations do not describe necessary conditions. So the implicit concept of cause in Brown's model must be different from cause-in-fact as explained by the but-for test. To illustrate, suppose that a reckless driver crashes into the rear of another automobile. In Brown's model, recklessness increases the probability of an accident. It does not follow, however, that the accident would have been avoided but for the recklessness.

Noting this fact, economic analysts distinguished probabilistic cause from but-for cause,32 and built models based upon the former. An example of explicit, detailed consideration of probabilistic cause is provided by Shavell's recent article,33 which extends the analyses of Brown and Calabresi, as I will illustrate by adapting one of Shavell's examples.34 The probability that a bicyclist riding in the park will strike a pedestrian depends in part upon whether the bicycle is equipped with a light. This relationship is an application of Brown's general function p = p(x), in which x denotes the brightness of the bicycle's light and p denotes the

32. Calabresi discussed three types of cause: probabilistic, but-for, and proximate. Calabresi, supra note 2, at 71-73. Shavell contrasts retrospective cause and prospective cause, where the former is identified with but-for cause and the latter is identified with probabilistic cause. Shavell, supra note 2, at 466-70.
33. See Shavell, supra note 2.
34. Shavell's third example involves a bicyclist, a jogger and visibility. Id. at 472, 477.
probability of striking a pedestrian. Another determinant of the probability of such an accident, besides being equipped with a light, is the weather. Thus an accident is more likely on a foggy night than on a clear night. Unlike Brown, Shavell did not limit his analysis to relations between the probability of accidents and precautions against them, but explicitly considered the effects of conditions beyond human control such as the presence of fog. This broadening of the inquiry can be expressed formally by allowing the variable $z$ to represent natural visibility, which is impaired by fog, and rewriting the probability function as $p = p(x, z)$.

In a tort suit the court must decide whether the defendant’s behavior fell within the scope of liability as specified by the law. The scope of liability refers to the conditions under which a defendant will be held responsible for the plaintiff’s loss. Suppose an economic model leads to the conclusion that bicycles should not be ridden without a light of power $x^*$ when visibility falls below some level $z^*$. Under these assumptions, an efficient tort rule might take the form that the bicyclist is liable for accidents when riding without an adequate light ($x < x^*$) under conditions of poor visibility ($z < z^*$). Thus the boundaries on the scope of liability are defined mathematically by $x^*$ and $z^*$.

Increasing the scope of liability has three main effects identified by Shavell: 1) the burden on injurers is increased, thereby discouraging people from engaging in the dangerous activity; 2) the administrative cost of deciding more court cases probably increases; and 3) injurers have greater incentives to take precautions when engaging in the dangerous activity. To illustrate, expanding the scope of liability for bicyclists would probably cause fewer people to ride; broader liability would probably result in more trials; and those who ride would take more precaution. The scope of liability is optimal from the viewpoint of economic efficiency when the losses and gains from a small increase in it cancel each other. To be exact, the scope of liability is optimal when a small increase causes a gain in the form of fewer accidents, the value of which is exactly offset by a loss in the form of a lower activity level and higher costs of precaution and litigation.

35. Shavell first discusses the effects of modifying the scope of liability under a rule of strict liability; then he discusses the effects under negligence. But he concludes that the effects are much the same, stating, "[h]owever, once one recognizes that under the negligence rule there is an important element of strict liability . . . all the results concerning the scope of liability under strict liability become relevant under the negligence rule." Id. at 489. This conclusion is too glib, because a negligence rule induces a discontinuity in cost at the legal standard of care that spoils marginalist reasoning. See Cooter, Prices and Sanctions, 84 COLUM. L. REV. 1523, 1539 (1984).

36. Shavell reasons that, "[f]or a type of accident to be included in the scope of liability, it should have the fundamental characteristic that, given the circumstances under which it occurs,
It is against this efficiency standard that Shavell evaluated the legal rules of causation in torts, praising or blaming each rule depending upon whether each correctly balances costs. Shavell concludes from applying his model to case law that there is a close, but imperfect correspondence between the scope of liability in tort law and the scope of liability required to achieve economic efficiency. If there is a close fit between legal cause and economic efficiency, the court will say that a defendant caused the accident when his behavior was inefficient, but not otherwise.

C. Problem Cases Involving Cause

Much of the dispute about cause in tort law concerns a set of problem cases where the question of causality is perplexing. In these cases simple inferences from observation leave courts in a muddle, so they must be more explicit about causation than in routine cases. When intuitive thinking becomes confused, a formal model is illuminating, provided that it fits the facts. When economic models are applied to problem cases in tort law, the results are often useful and illuminating. A brief application of the efficiency models to problem cases illustrates the economic style of analysis, even though a full application is beyond this article's scope.

Let us begin with some questions raised by causal over-determination. I already mentioned the example of two fires, one started by negligence and the other by lightning, burning towards the same house. If the fire set by negligence reaches the house first and destroys it, can the owner recover even though the house would have been destroyed anyway? The efficiency analysis provides a simple answer in such cases of over-determination: The law should not create incentives to waste resources attempting to avoid the inevitable. Thus, if two fires are burning there must be a sufficiently high potential for reducing losses by taking more care.” Shavell, supra note 2, at 484.

37. For example, Shavell states:

Thus if the instrumentalist approach yields a successful explanatory theory, it must be that the intuitions about what is just comport with the application of a cost-benefit calculus in relation to the posited social goals.

Yet, it also seems undeniable that the conceptions of when it is just to include a type of accident in the scope of liability have some life of their own, independent of any clear connection with postulated social goals through provision of incentives (or spreading of risks). Now there is no reason why, as a purely formal matter, the conceptions could not themselves be included among the social goals. However, their inclusion would detract from the analysis. More insight can be had by elaborating a parsimonious theory and by qualifying it at the end than by building into it all manner of assumption. Id. at 502-03.

38. This section relies heavily on material presented by Steve Sugarman to a torts seminar at the Boalt Hall School of Law, University of California, Berkeley.
towards a house and either fire is sufficient to destroy it, and no other property is in danger, spending resources to put out just one of them is wasteful. Insofar as allowing recovery would create incentives for wasteful precautions, a court applying efficiency analysis should not allow the plaintiff to recover in such cases of causal over-determination.

Another example is where a patient does not give informed consent to an operation because the surgeon fails to provide the patient with the necessary facts. If the operation goes awry, can the patient recover from the surgeon even though the patient would have consented if informed? The economic analysis of law provides a definite answer: If there really were no doubt that a patient would consent to surgery, expending resources to obtain it would be wasteful, so liability should not attach to the surgeon. In practice, however, we may be uncertain that someone would consent short of actually obtaining it, in which case the surgeon can be held liable in order to provide incentives to obtain actual consent.

Another problem case involves superseding negligence. To illustrate, suppose a wholesaler accidentally delivers gasoline to a retail store in containers marked "kerosene." The wholesaler discovers the error and phones the retailer to arrange an exchange, but before the wholesaler can get to the store to pick up the containers, the retailer accidentally sells one to a customer who is subsequently injured. In this example, the wholesaler's negligence was superseded by the retailer's negligence. When the customer is injured, should liability rest with the wholesaler or the retailer?

More than one person often has access to precautions that reduce the probability of the accident. When efficiency requires precaution by more than one person, the precaution is said to be bilateral, as opposed to unilateral. In cases of bilateral precaution, the fundamental economic problem for law is to create efficient incentives for several people at once. The solution is similar for all types of bilateral precaution. Bilateral precaution in economic models usually takes the form of precaution by defendant and plaintiff, but in the preceding example, the plaintiff is not one of the parties who can prevent the harm. Rather, the retailer and the wholesaler can prevent it. This, however, is merely a detail in an effi-

39. A case involving similar facts is Cobbs v. Grant, 8 Cal. 3d 229, 502 P.2d 1, 104 Cal. Rptr. 505 (1972).
40. This hypothetical is based on Catlin v. Union Oil Co., 31 Cal. App. 597, 161 P. 29 (1916). Superseding causes are discussed in Keeton, supra note 8.
41. A standard conclusion in the economic analysis of law is that the efficiency problem raised by bilateral precaution can be solved in principle through some form of a negligence rule, as opposed to a rule of strict liability. The general problem is analyzed in Cooter, Unity in Tort. Contract. and Property: The Model of Precaution, 73 CALIF. L. REV. 1 (1985).
ciency analysis. It makes little difference formally whether or not the victim is one of the parties who should take precaution.

Superseding negligence does not raise a special problem of efficient incentives that is different from other cases of bilateral precaution. Under any form of a negligence rule, the parties who can escape liability by behaving nonnegligently will minimize their own costs by conforming to the legal standard of care, provided that it does not deviate too far from the efficient standard of care. In cases involving superseding negligence, both parties will normally have adequate incentives to take care, regardless of how the law allocates liability between them. To choose between alternative allocations of liability, an efficiency analysis must take account of considerations other than precaution, such as incentives for suits and activity levels. A fine analysis of these considerations in cases of superseding negligence is, however, beyond this article's scope.

Another type of problem case involves the "wrong hazard." To illustrate, a stevedore drops a plank into the hold of a ship and it causes a fire. Dropping a plank into a ship's hold might ordinarily cause a head injury, but not a fire. Should the stevedore or his employer be liable for the damage done by the fire? Another hypothetical example of the wrong hazard is when someone hands a loaded pistol to a child and he drops it on his foot. Is the person who handed the pistol to the child liable for the broken foot?

Shavell's analysis suggests the following approach to such cases: when the scope of liability is increased, potential defendants have stronger incentives to take precaution, and potential plaintiffs have stronger incentives to bring costly suits. The scope of liability should not be expanded unless the net benefit from increased precaution by defendants more than outweighs the increase in the cost of additional suits. In cases of the "wrong hazard" the injurer will not foresee a connection between his act and the accident. Since the injurer makes no connection, bringing these events within the scope of liability will not affect the injurer's precaution or the frequency of accidents. So giving plaintiffs a cause of action in cases of the wrong hazard is probably inefficient.

42. This familiar result in the economic analysis of torts was first suggested by Brown when he proved that several forms of the negligence rule are efficient provided that the standard of care is determined by the Hand Rule. An explanation of the general result and a brief history of its assimilation into the torts literature is found in Cooter & Ulen, An Economic Case for Comparative Negligence, 61 N.Y.U. L. REV. 1067, 1081-83, 1084-86 (1986).
43. See In re An Arbitration Between Polemis and Another and Furness, 3 K.B. 560, 21 All E.R. 40 (1921).
44. This hypothetical appears in RESTATEMENT (SECOND) OF TORTS § 281 comment f, illustration 3 (1965).
45. See Shavell, supra note 2, at 490. This argument needs to be developed with greater preci-
Another type of problem case involves causal uncertainty. To illustrate, suppose the defendant pollutes drinking water with a carcinogen and ten percent more people get cancer than was otherwise expected. Further proof connecting the pollution to the illness of particular persons is impossible. Can some or all of the cancer victims recover?\textsuperscript{46} Or suppose a person falls overboard on a ferry and drowns. The ferry should have had a lifesaving ring but it did not. A lifesaving ring would have been effective in twenty percent of such cases. Can the heirs of the victim recover from the owner of the ferry?\textsuperscript{47}

In economic models, efficiency requires the injurer to balance the cost of additional precaution against the reduction in expected harm. The injurer already bears the cost of her own precaution. The incentive problem is to make her internalize the expected harm. In the example of polluted water, the expected harm equals the incidence of cancer caused by the pollution multiplied by the cost the disease imposes upon its victims. Let $p$ indicate the increased probability of cancer caused by the pollution and let $A$ be the harm suffered by a cancer victim. The expected harm, then, is $pA$.

If the injurer is liable for $pA$, the money collected can be treated as a pool of funds to be allocated among victims according to some distributional rule. The polluters will face incentives for efficient precaution so long as they are liable for the expected harm they cause, regardless of how this pool of funds is parceled out among the victims. The rule ordinarily followed is to award damages of $A$ to accident victims whose harm was caused by the defendant. By hypothesis, there is no way to make this causal determination. In the polluted water case, the court could divide the pool of damages equally among everyone contracting cancer, in which case each victim would get less than $A$. Alternatively, the court could award damages of $pA$ to everyone exposed to the risk of getting cancer, including the people who did not contract it. Either approach will provide incentives for efficient precaution by the injurer, because in both approaches the injurer’s liability equals the expected harm $pA$. A similar analysis applies to the example of the missing lifesaving ring.

I have discussed several different types of problem cases—over-determination, intervening cause, wrong hazard, and causal uncertainty.

\textsuperscript{46} A related case on water contamination is Stubbs v. City of Rochester, 226 N.Y. 516, 124 N.E. 137 (1919).

\textsuperscript{47} This hypothetical is inspired by examples illustrated in M. FRANKLIN & R. RABIN, CASES AND MATERIALS ON TORT LAW AND ALTERNATIVES 275 (3rd ed. 1983).
My discussion is intended to show that the economic analysis provides some leverage for moving these stubborn cases, even though the difficulties they raise are too profound to solve in a couple of paragraphs.

D. Reduction of Cause to Efficiency

Judging by the work of Coase, Calabresi, Brown, and Shavell, the efficiency analysis of tort rules proceeds in three steps. The first step is formulating a functional relationship between the probability of an accident, the injurer’s precaution, and certain background conditions like visibility in the bicycle example. The second stage is finding the optimal scope of the liability rule from the viewpoint of economic efficiency. The causation requirement is an aspect of the scope of efficient liability rules. In this tradition, if efficiency requires holding the defendant liable, he is said to have caused the accident, but not otherwise. Thus the ascription of cause in the third step announces a judgment about efficiency. “Cause” is reduced to “efficiency” in the sense that the ascription of legal cause is wholly dependent upon the judgment about economic efficiency.

Landes and Posner are more explicit than others about this policy judgment. They say in bald terms that the party who should be held liable for an accident under an efficiency standard will be deemed to have caused it. It makes no sense, in their view, to say that the defendant caused the accident and he should not be held liable for it. Saying the defendant caused the accident means, in their view, that efficiency requires holding him liable. Insofar as efficiency is the only criterion for applying the word “cause,” the legal meaning of this word is exhausted by the efficiency analysis. If “cause” has no legal meaning beyond efficiency, it can be eliminated from discourse without loss, at least among economically literate scholars.

48. I have not discussed in this article the conclusions of economic analysts concerning which rules are efficient. For a summary, see Cooter & Ulen, supra note 6, at chs. 8, 9.
49. Landes and Posner state:
One strain in the modern philosophical literature on causation regards the cause of an occurrence as whatever antecedent condition, necessary or sufficient, is most significant in relation to the reasons for which causal ascription is being made. . . . If the basic purpose of tort law is to promote economic efficiency, a defendant’s conduct will be deemed the cause of an injury when making him liable for the consequences of the injury would promote an efficient allocation of resources to safety and care; and when it would not promote efficiency for the defendant to behave differently, then the cause of the accident will be ascribed to “an act of God” or some other force on which liability cannot rest. In this view, the injurer “causes” the injury when he is the cheaper cost avoider; not otherwise. The idea of causation becomes a result rather than a premise of the economic analysis of accidents.
Landes & Posner, supra note 2, at 110.
50. Landes and Posner state:
From here it is but a short step to the conclusion that the idea of causation can very largely
The logic of the efficiency analysis of tort law seems to require reducing cause to efficiency, much as Russell noted that "cause" is replaced in science by more exact functional relationships. To evaluate this claim, it is necessary to be more explicit about what is being reduced to what in economic models. The relationship between defendant's precaution $x$ and the probability $p$ that the plaintiff suffers an accident is said to be an "externality." This term has several different meanings in economics, two of which will be distinguished.\textsuperscript{51}

The first type, which I call a "material externality,"\textsuperscript{52} exists when there is an interdependency in utility or production functions. To illustrate, if my smoking affects the quality of the air that you breathe, both of us will have preferences concerning how much I smoke. This is a situation in which one variable, representing the extent to which I smoke, enters two utility functions, yours and mine. Similarly, when the function $p = p(x,z)$ is interpreted to mean that, given the environmental conditions $z$, the probability $p$ that one person suffers harm depends upon the precaution $x$ taken by another person, the variable $x$ enters into two utility functions, which makes them interdependent.

In functional relationships like $p = p(x,z)$, the values of the independent variables determine the value of the dependent variable. The determination of one variable by others is said to be causal, not merely a correlation. The function describing a material externality thus indicates a causal relationship between one person's behavior and another's utility or profit. The independent variables in a function characterizing a material externality can be called material causes of the value of the dependent variable. To illustrate, "probabilistic cause" refers to a particular type of material cause in which the functional relationship is probabilistic. Thus the bicyclist's precaution $x$ and visibility $z$ cause the probability $p$ of an accident to take the value given by the function $p = p(x,z)$.
Notice that the efficiency analysis presupposes that causal attribution in torts cases draws upon underlying generalizations, like \( p = p(x, z) \), that apply to all similar situations, past or future. Many courtroom explanations of accidents, however, refer to particular events that immediately preceded the accident, without explicit reference to generalizations. The connection between the cause and its effect is stated as an observable fact, without reference to a generalization. If generalizations play any role in these statements, they are merely common-sense propositions that form part of everyone’s understanding of the world, such as “A person struck by a moving car will be injured” or “Bicycle lights improve the rider’s visibility in a fog.” These generalizations are so commonplace that cause is said to be observed, not deduced.

The “plain fact” approach to legal cause, discussed earlier, may deny that generalizations like \( p = p(x, z) \) have a role in causal attribution in the courtroom, whereas such generalizations necessarily have a role in reaching an efficiency judgment.

53. A causal explanation that draws upon a generalization like \( p = p(x, z) \) has been called “prospective” since it applies to all similar situations in the future. The prospective cause of a particular event is identified by bringing it under a generalization as an instance of it. See Shavell, supra note 2.

54. This disagreement resembles an earlier debate among philosophers touched off by Hempel’s claim that general truths must be invoked, implicitly or explicitly, when explaining a particular event. These general truths, according to Hempel, are the “covering laws” that serve as premises in deducing the event being explained. Every full explanation of a particular event, according to Hempel, contains a major premise, a minor premise, and a conclusion. The major premise is a generalization concerning a regularity found in the world; the minor premise asserts that the generalization applies to the case at hand; the conclusion is that one event caused the other. To illustrate from economics:

<table>
<thead>
<tr>
<th>Major premise:</th>
<th>Inflation causes devaluation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor premise:</td>
<td>Inflation preceded the devaluation of 1967.</td>
</tr>
<tr>
<td>Conclusion:</td>
<td>Inflation caused the devaluation of 1967.</td>
</tr>
</tbody>
</table>

The explanation proceeds by bringing a particular event described in the minor premise under a general law stated in the major premise. The general law is called the “covering law” because it covers the facts at issue. See C. Hempel, Aspects of Scientific Explanation, in ASPECTS OF SCIENTIFIC EXPLANATION AND OTHER ESSAYS IN THE PHILOSOPHY OF SCIENCE 331, 415-24 (1965); Hempel, Deductive-Nomological vs. Statistical Explanation, in 3 MINNESOTA STUDIES IN THE PHILOSOPHY OF SCIENCE 98 (H. Feigl & G. Maxwell ed. 1962); Hempel, The Logic of Functional Analysis, in SYMPOSIUM ON SOCIOLOGICAL THEORY 271 (L. Gross ed. 1959); Hempel & Oppenheim, The Logic of Explanation, in READINGS IN THE PHILOSOPHY OF SCIENCE 319 (H. Feigl & M. Brodbeck ed. 1953).

54. For a defense of Hempel’s model as applied to historical explanation, see Donagan, Explanation in History, in THEORIES OF HISTORY 428 (P. Gardiner ed. 1959). For a review of Hempel’s critics, see Brodbeck, Explanation, Prediction, and “Imperfect” Knowledge, in 3 MINNESOTA STUDIES IN THE PHILOSOPHY OF SCIENCE 231 (H. Feigl & G. Maxwell ed. 1962).

Anyone familiar with economics can think of numerous examples of explanations that have this form. Hempel has apparently characterized a common form of scientific explanation, but Hempel originally asserted that all explanations, even historical, have this form. Hempel moderated his original claim that the “deductive-nomological model” is the only form of a full explanation in light of his critics, but he never conceded much. This is not credible as an account of most historical explanations, as philosophers have pointed out. An especially compelling criticism of such views is
Having discussed material interdependencies, I move on to the second type of externality in models of tort law, which I call an "incentive externality." An incentive externality exists when some of the costs or benefits of a decision escape the decision maker and fall upon others. This type of externality creates an incentive problem because a self-interested person will not take account of the full costs and benefits of his decisions. To illustrate, under a rule of no liability, an injurer who fails to take precaution imposes risks upon others. Unless victims can bribe the injurer into taking precaution, doing so is not in the latter's self-interest. In contrast, when costs and benefits are fully internalized, the decision maker sweeps all relevant benefits and costs into his decision calculus.

Material externalities often create incentive externalities. To illustrate, when factory smoke harms consumers there is a material externality, and when a factory is not liable for the harm caused by the smoke it emits, there is an incentive externality. This is a problem for public policy. Government must act to prevent excessive smoke. What is the best response? The material externality, being a characteristic of taste and technology, cannot be eliminated except by discovering a clean technology. A change in law, however, can correct the incentive externality. If the factory is fully liable for the harm caused by its emissions, it will internalize the full cost of polluting and there will be no incentive externality on the part of the factory. Structuring the law to eliminate incentive externalities is the best public policy response to material externalities.

Economic theory builds upon simple elements that are relatively stable, specifically taste and technology. Material linkages like \( p = p(x, z) \) are used in economic models to discover efficient liability rules. Having described the material linkages by functions and having derived the efficient liability rule, the model builder can proceed to the next step of assigning legal cause. A defendant whose behavior falls within the scope of liability of an efficient rule is said to have caused the harm. I describe the behavior that gives rise to liability under an efficient tort rule as the "legal cause of the harm under an efficiency norm."

To contrast material cause and legal cause under an efficiency norm,
return to the example of the bicyclist and the pedestrian. Suppose that visibility is good enough so that efficiency does not require a cyclist to have a light, yet having a light would still reduce the probability of striking a pedestrian. Under these conditions, the absence of a light could be a material cause of the higher risk of an accident. An efficiency analysis, however, would conclude that riding without a light under these circumstances should not be deemed the legal cause of a collision between a cyclist and a pedestrian. So riding without a light may be the material cause of an accident without being the legal cause under an efficiency norm. On the other hand, if circumstances change and an accident occurs when the cyclist is riding without a light under conditions in which an efficient rule requires him to have one, the absence of a light is both the material cause and the legal cause of the accident under an efficiency norm.

It is now possible to provide a clear statement of the relationship between causation and efficiency in economic models of tort law. The efficiency models begin with functional relations like $p = p(x,z)$ that describe generalizations about material externalities. Tort law is viewed as an instrument for eliminating the incentive externalities created by the material externalities described in these functions. Thus, the efficiency models conclude that the defendant caused the accident and is liable to the plaintiff provided that defendant's behavior is a material cause of external harm to the plaintiff and a rule of defendant's liability provides incentives for efficient behavior by the parties.

III. EFFICIENCY AND LIBERTY

The efficiency models discussed in the preceding section are both valuable in understanding tort law and seriously incomplete. They are incomplete because basic tort rights should be understood as part of the initial distribution of resources that is the starting point for any economic analysis. This section of the article sketches some formal attributes of a theory of liberty that provides an account of the initial distribution of resources, explains why the efficiency analysis requires such a theory, and concludes with an account of tort law as the union of liberty and efficiency.

A. A Theory of Liberty

Liberty requires a protected zone around each person within which discretion can be exercised without interference from others. In drawing the boundaries of the protected zone, the law must balance the freedom
of each person to act and the responsibility of each person not to harm others. Two specific considerations relevant to tort law must be weighed. First, an individual who causes harm to another should compensate the victim. Without this obligation tort law would fail to protect individuals from continual interference by others. Second, some consequences must be judged too remote to give rise to liability. Without this restriction every act would give rise to liability for some harm distantly connected to it.

The obligation of a person who harms another to pay compensation is closely connected to cause-in-fact. The restriction that some effects are too remote to give rise to liability is closely connected to proximate cause. So the two fundamental concepts of causality in torts—cause-in-fact and proximity—are the instruments for balancing freedom and responsibility when prescribing a legal conception of liberty.57

A limitation of the efficiency analysis is that it cannot provide adequate explanation or justification for some basic tort rights, such as bodily integrity. No one is permitted to intentionally harm another's body without obtaining his or her consent (and maybe not even then). In this sense, everyone owns his or her own body. Efficiency arguments can be constructed to justify this fact, such as the following. Suppose we both have sound bodies, but you own my body and I own yours. I value the ownership of my body more than yours, and you value the ownership of your body more than mine. So we would both be better off to swap. The common law saves the cost of the transaction by allocating to each of us the ownership of our own bodies in the first place. The common law can thus be construed as assigning ownership over our own bodies for the sake of efficiency.

This argument is more clever than convincing. Does anyone really think that a person owns his or her own body because that is more efficient? If it turned out that enslaving some people would increase national wealth, would the law embrace slavery? If a rich person would be willing to pay more to injure a poor person than the poor person would pay to escape injury, would the law permit the rich person to injure the poor person? If a crippled person would prefer to own someone else's body rather than his own, should the law take this fact into account

57. The view that causation in tort and liberty are intimately linked is argued by Epstein, supra note 4. This view is compatible with many different substantive theories of liberty. To illustrate, Epstein argues that the absence of a duty to rescue in the common law tradition follows from a theory of liberty; however, a theory of liberty closer to the one developed by John Rawls might lead to very different conclusions about this specific duty. See generally J. RAWLS, A THEORY OF JUSTICE (1971).
when assigning rights to bodies? The efficiency explanation is unconvincing because it makes ownership of our own bodies contingent on particular facts that must be true in order for efficiency to require each of us to own our own bodies. The preceding questions, however, show that most of us would persist in thinking that people should own their own bodies even if these facts were altered. A convincing justification must make the ownership of our own bodies more certain and fixed than in the efficiency analysis.

This criticism places limits on Coase's attempt to debunk causation in torts. Recall that Coase can be interpreted as arguing that one person should not be prohibited from interfering with another unless efficiency requires the prohibition. This argument makes some sense with respect to cows and crops, but not with respect to bodies. Prohibiting one person from physically harming another should not depend upon a cost-benefit analysis reaching the conclusion that such a prohibition is efficient. Suppose a cost benefit analysis reached the opposite conclusion. Few judges would be convinced that inflicting physical harm should be allowed just because the injurer is willing to pay more for the right to harm another than the victim is willing to pay to be free from harm.

A similar argument can be applied to the distribution of physical property. To illustrate, consider a sketch of Aristotle's conception of the relationship between distributive justice and corrective justice. According to Aristotle, each type of society has its own principle of wealth distribution. Thus, a democratic society favors an equal distribution; in contrast, an aristocratic society favors the principle that the best should have more. Once a society's conception of the just distribution is achieved, a person who disrupts it does an injustice that must be corrected, according to this theory, by paying compensation. To be specific, a person who causes a tortious accident must compensate the victim in order to restore a just distribution of wealth.

This conception of corrective justice can come into conflict with cost-benefit analysis as applied to tort liability. To illustrate, suppose that I burn off the chaff from the harvested wheat fields at Whiteacre in a way that endangers the neighboring estate of Blackacre. If I value the right to burn my fields more than my neighbor values the right to be free from the associated risk, economic efficiency demands that I continue to burn. This result can be achieved at the least cost if I am given that

right. If, in contrast, the courts give Blackacre's owners the right to be free from danger, I will have to buy it from them, which involves an additional transaction. In general, law achieves the efficient allocation of entitlements at the lowest transaction costs by allocating them directly to the parties willing to pay the most for them.

This efficiency principle makes ownership contingent upon a cost-benefit analysis concluding that the owner of an entitlement is willing to pay the most for it. All arguments from cost-benefit analysis, even those proceeding from different assumptions to different conclusions than in the preceding paragraph, make the ownership of real property contingent upon specific facts. A corrective justice argument, in contrast, would probably begin from the premise that the right of the owners of Blackacre to be free from the danger created by burning the fields at Whiteacre is grounded in an initially just distribution that is not contingent on the outcome of a cost-benefit analysis. This account of corrective justice, however, might leave many questions undecided. The efficiency analysis would show how to decide these open questions so as to maximize the value of the basic rights defined in the underlying theory of distribution.

Aristotelian theory provides one way of establishing an initial distribution of wealth. Other ways are offered by alternative philosophies. For example, societies based upon market capitalism distribute wealth to people according to the marginal productivity of the resources that they own, including their labor and capital. I will make no attempt to compare distributional principles or to choose the best among them. Rather, I want to show in the next section that before the efficiency analysis can proceed, an initial distribution must be specified that includes ownership of bodies and property. It is incoherent to suppose that the efficiency analysis can turn upon itself and prove what it assumes.

B. Pareto Efficiency

Most economic models take efficiency as their objective, especially Pareto efficiency. A change is a Pareto improvement by definition provided that someone is made better off and no one is made worse off. Pareto efficiency is achieved when the scope for Pareto improvements is exhausted. "Better off" and "worse off" are measured by each person's well-being relative to a benchmark distribution of resources. The benchmark for purposes of policy analysis, referred to as the "initial distribution" in this article, is usually the status quo distribution of income, but in principle the benchmark may be any ideal income distribution.

The Pareto criterion is impractical as a guide to policymaking when
literally construed because it is impossible in practice to identify a policy change that makes someone better off without making anyone worse off. It can be modified, however, and extended in ways that are practical. The standard modification is to allow changes in policy for which the winners win more than the losers lose. So long as the winners win more than the losers lose, the former could compensate the latter and still have more besides. Such a change is called a "hypothetical Pareto improvement" because the Pareto standard can be satisfied in principle by an appropriate redistribution of the gains.\textsuperscript{59} The redistribution is, however, only hypothetical, so this standard allows changes that make some people worse off. The standard of hypothetical Pareto improvements is the foundation of cost-benefit analysis, according to which a change should be made if the benefits to the winners exceed the costs to the losers.

The initial distribution of resources is the Archimedean point by which the efficiency analysis is levered. If this point detaches itself and moves, the comparison of alternative policies in terms of their relative efficiency becomes incoherent. For example, it is well-known that cost-benefit analysis only works so long as background prices remain unchanged; when background prices vary, cost-benefit analysis can yield incoherent and paradoxical results.\textsuperscript{60} To keep background prices constant, the fundamental distribution of income must not be disturbed.

The presupposition of an initial distribution of resources, including legal entitlements, can be located in the logic of the efficiency models of torts. There are three steps in constructing such a model. First, material interdependencies must be sketched. Taste and technology are described in this step. The second step is to establish what people are willing to pay for torts rights. The prices that people are willing to pay depends upon their tastes and also upon their ability to pay. Ability to pay depends in turn upon the distribution of income and wealth. The second step thus involves allocating resources to people to establish their ability to pay. After taste, technology, and initial endowments in resources are specified, alternative tort rules can be compared according to their efficiency.


\textsuperscript{60} It is well-known that techniques such as cost-benefit analysis are susceptible to grave defects when background prices can vary. For example, the net benefits of changing from state A to state B may be positive when evaluated at the prices prevailing in A, and the net benefits of changing back from B to A may be positive when evaluated at the prices prevailing in B. So a cost benefit analysis would favor a change from A to B, and also favor a change from B back to A. This is known as reversibility.
This is the third step, in which a judgment is reached concerning the efficiency of different liability rules.

To illustrate how the judgment in the third step presupposes the first two steps, consider the models of Coase, Calabresi, Shavell, and Landes and Posner. In their models, the person to whom efficiency requires assigning liability is said to have caused the accident. But such a judgment about efficiency cannot be reached without first specifying how much injurers and victims are willing to pay to avoid accidents. A person may be willing to pay a lot more for a right if she is rich rather than poor. Thus people's willingness to pay depends upon their wealth as determined by the initial allocation of resources.

When questions of tort law are framed at a sufficient level of generality, the alternatives being contemplated affect the background prices that are needed to launch an efficiency analysis. This is true of the question, "Why do we own our own bodies?" It is also true of questions concerning large effects upon income and wealth. For example, "Why not allow the poor to expose the chattels of the rich to risk with impunity?" Or, "Why does a person own the product of his labor and capital?"

Although an efficiency analysis cannot effectively explain or justify basic tort rights, once these rights are recognized as premises, an efficiency model can say a lot about how to increase their value. Given that people own their own bodies, should this right be protected by a rule of strict liability or negligence? If the right is violated, how should compensatory damages be computed? If the right is intentionally violated, should punitive damages be allowed? What standard of proof should the plaintiff have to meet? If these questions are answered by identifying and adopting efficient legal rules, the value of the underlying rights will be maximized.

C. Union of Liberty and Efficiency

These arguments suggest how to think about economic and legal conceptions of cause in torts. Many forms of behavior are interdependent. When one person's behavior affects the well-being of another, there is a material externality. Any society must adopt standards regulating such behavior. These standards must balance the freedom of each person to act and the responsibility of each person not to harm others. A society's conception of freedom and responsibility is embodied in an initial allocation of legal rights. These rights must be protected and adjusted to particular situations. The efficiency analysis takes the distribution of basic rights as given and identifies forms of protection and adjustment that
will maximize their value. Pareto efficiency is, thus, the natural complement to a theory of liberty as applied to the law of torts.

Different societies adopt different conceptions of liberty as embodied in their tort rules, and the same society may change its conception over time. Efficiency analysis presupposes a conception of liberty to specify the initial distribution of basic tort rights, but the efficiency analysis is consistent with many different conceptions of liberty. There are, however, some conceptions of liberty that fit better with the efficiency analysis than others. Because Pareto efficiency measures the value of an entitlement according to how much people are willing to pay for it, the Paretian approach is based upon valuations by individuals. This approach fits best with individualistic theories of liberty.

To illustrate, in his magisterial book *A Theory of Justice*, Rawls developed a concept of the person in which rational people are viewed as pursuing life-plans for personal development. Pursuing such a plan requires legal freedom and material resources. Tort law would be especially appropriate for such people if it were designed to prevent them from interfering with each other’s exercise of basic liberties, and if this protection of the basic liberties were achieved at minimum cost in terms of material resources. Thus the conception of tort law as the union of liberty and efficiency fits well with the conception of the state as an instrument to enable people to pursue their rational life-plans.

Another example of a close fit between this conception of tort law and a prominent theory of liberty is provided by Nozick’s *Anarchy, State, and Utopia*. According to this book, basic tort rights are natural rights. The state is constructed, according to this theory, not to create these rights, but to recognize and protect them. The main reason for public protection, rather than private protection, is that government can provide more secure protection at lower cost. In this theory, the goals of the state sort neatly into the two categories of recognizing natural rights and protecting them efficiently, which corresponds to the two aspects of the conception of tort law embodied in the union of liberty and efficiency.

61. Communitarian theories do not fit because many theorems in economics require for their truth a substantial separation of utility functions. To illustrate, consider a religious community whose conception of the true faith involves the detailed regulation of the beliefs and behavior of its members. The members of such a community will have strong preferences about the beliefs and behavior of other members of the community. Insofar as these preferences affect behavior and evaluations of it, the utility functions are separable. So the model of perfect competition would have limited value as a predictive or evaluative technique when applied to the members of such a religious community whose utility functions are truly independent.


CONCLUSION

Bertrand Russell's observation that "cause" tends to disappear from scientific discourse describes the efficiency analysis of tort law. In the efficiency models, causal relations are precisely described in mathematical functions that characterize material externalities. The models are used to identify legal rules that create incentives for efficient behavior. Behavior falling within the scope of liability under these rules can be called the legal cause of the harm under an efficiency norm.

The efficiency analysis presupposes an initial distribution of resources, including the fundamental legal rights created by tort law. These fundamental rights embody a conception of liberty that balances freedom and responsibility. The efficiency analysis shows how to maximize the value of these basic rights. Understanding tort law as the union of liberty and efficiency reconciles two opposing theories of it. Theorists concerned with defining liberty should admit that increasing its value is an important goal of the courts, and the practitioners of the efficiency analysis must acknowledge that it presupposes an initial allocation of normative resources. So it seems that Russell was only half right (or only half wrong). The disappearance of cause from economic models of tort represents in part scientific progress and in part the suppression of fundamental philosophical issues.