

ESSAY

Anti-Patents

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Conventional wisdom has long perceived the patent and tort systems as separate legal entities, each tasked with a starkly different mission. Patent law rewards novel ideas; tort law deters harmful conduct. Against this backdrop, this Essay uncovers the opposing effects of patent and tort law on innovation, introducing the “injurer-innovator problem.” Patent law incentivizes injurers—often uniquely positioned to make technological breakthroughs—by allowing them to profit from licensing their inventions to competitors. Yet tort law, by imposing liability for failures to invest in care, forces injurers to incur the cost of implementing their own inventions. When the cost of self-implementation exceeds the revenues that may be reaped from patenting new technologies, injurers are better off refraining from developing socially desirable inventions. The injurer-innovator problem remarkably persists under both negligence and strict liability regimes, and in the face of different victim types. Multiple real-world examples demonstrate the extent and pervasiveness of this phenomenon.

To realign the incentives provided by the patent and tort systems, this Essay proposes a new legal construct: anti-patents. While a standard patent grants an inventor the exclusive right to use its invention, an anti-patent creates the converse exclusivity regime: the inventor, and only the inventor, is not required to use the invention. Importantly, anti-patents retain the existing patent protection, allowing injurer-innovators to charge monopolistic prices from competitors but simultaneously eliminating the obstacle created by tort law. An injurer-innovator who owns an anti-patent will enjoy immunity from the heightened standard of care to which the rest of the industry would now be subject. The Essay further shows that the anti-patent mechanism not only succeeds at harmonizing patent and tort law toward the advancement of technological progress but also outperforms alternative schemes employed to stimulate innovation (i.e., prizes, grants, and tax benefits). Finally, it ties

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the logic that underlies anti-patents to existing doctrines designed to elicit the disclosure of private information.

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INTRODUCTION

Injurers are major innovators. Consider, for example, child-resistant caps, the standard practice in the packaging of many drugs these days.¹ Or think of safety razors, an essential product for both industrial and consumer use.² Or take pedestrian-detection systems, which are being adopted by an increasing number of carmakers.³ Each of these technological innovations was developed by injurers in response to risks associated with their prod-

¹ See Gregory B. Rodgers, *The Safety Effects of Child-Resistant Packaging for Oral Prescription Drugs: Two Decades of Experience*, 275 JAMA 1661, 1664 (1996) (discussing the customization of childproof caps, and estimating they have prevented approximately 460 deaths over a period of eighteen years).

² See, e.g., Randal C. Picker, *The Razors-and-Blades Myth(s)*, 78 U. CHI. L. REV. 225, 239–44 (2011) (explaining how this technology has come to dominate the market).

³ See, e.g., Peter C. Baker, *Collision Course: Why Are Cars Killing More and More Pedestrians?*, THE GUARDIAN (Oct. 3, 2019), <https://perma.cc/Y4TH-R6RZ> (“As of last year, pedestrian-sensing technology is now standard on close to a third of new vehicles sold in the US, and available as an add-on for another third. In the EU, regulations passed earlier this year will make such systems mandatory on new cars starting in 2022.”).

ucts or activities. The “Palm N Turn” cap was developed by International Tools Limited—a major manufacturer of plastic packages—after learning of the risks its packages posed to children.⁴ Safety razors owe their origin to Gillette and its engineers.⁵ And pedestrian-detection systems were first designed and implemented by Volvo to render their cars safer to third parties.⁶ As these and many other examples show, due to their unique expertise and experience, injurers are often best positioned to invent precautions that foster safety and avert harms.

This Essay, however, unveils a previously unnoticed failure of the legal system to incentivize injurers to innovate. Injurer-innovators operate under two sets of rules. First, *patent law* incentivizes these actors, as potential innovators, to engage in research and development (R&D). Any eligible invention is entitled to twenty years of exclusivity that allows the injurer-innovator to reap monopolistic revenues.⁷ Second, as potential tortfeasors, injurer-innovators also operate in the shadow of *tort law*. Guided by the objective of minimizing the cost of accidents and their avoidance, tort law requires that these injurer-innovators invest in socially desirable precautions.

At first glance, the use of patent law and tort law in tandem seems to be straightforward, as each is tasked with a different mission. As scholars have emphasized, “the goals of tort law and patent law are different—the former is . . . intended to optimize the costs of accidents, while the latter serves to optimize incentives for technological innovation.”⁸ Unsurprisingly, then, courts and scholars alike have routinely treated patent law and tort law as independent systems that operate in distinct domains.⁹

⁴ See Milton Tenenbein, *Child-Resistant Closure: Yesterday, Today and Tomorrow*, 24 INJ. PREV. 2, 2 (2018); see also Lina Dimopoulos, *Dr. Henri Breault – Child Proof Safety Caps*, THE DRIVE, <https://perma.cc/V9YU-3BZA> (“[Dr. Henri] Breault teamed up with Peter Hedgewick, president of ITL industries, to facilitate the development of the ‘Palm N Turn’ bottle cap in 1967, a device typically requiring the manual dexterity of an adult in order to operate properly.”).

⁵ See Picker, *supra* note 2, at 232–34 (describing the product’s history).

⁶ See AM. AUTO. ASS’N, AUTOMATIC EMERGENCY BRAKING WITH PEDESTRIAN DETECTION 8 (2019) (“In 2011, Volvo introduced the first pedestrian detection mitigation system available in the U.S.”).

⁷ See 35 U.S.C. § 154.

⁸ Dmitry Karshedt, *Divided Infringement, Economics, and the Common Law*, 67 FLA. L. REV. F. 329, 330–31 (2015).

⁹ See, e.g., *Zacchini v. Scripps-Howard Broad. Co.*, 433 U.S. 562, 573 (1977) (noting that tort law seeks to discourage wrongful behavior and protect such interests as “mental distress,” whereas “patent and copyright law[] focus[] on the right of the individual to

This Essay challenges this entrenched perception, showing that the conventional understanding regarding the division of labor between patent law and torts is misguided.¹⁰ Particularly, we contend that the patent and tort systems pull in opposite directions. Patent law indeed rewards innovation, but in important ways tort law inhibits it.

This overlooked characteristic of tort law stems from the duty it imposes on injurers to invest in cost-effective precautions. What this duty entails depends on the available technologies. As new technologies emerge, injurers must adapt their level of care. This basic tenet of tort law implies that innovation is a double-edged sword for injurers. On one hand, because of the patent system, innovation allows injurers to profit by licensing their inventions to others. On the other hand, because of the tort system, innova-

reap the reward of his endeavors and hav[e] little to do with protecting feelings or reputation”); see also Jeff A. Ronspies, *Does David Need a New Sling? Small Entities Face a Costly Barrier to Patent Protection*, 4 J. MARSHALL REV. INTELL. PROP. L. 184, 186 (2004) (“Patent law serves to encourage social growth by protecting one party through the temporary exclusion of others. In contrast, tort law . . . attempts to encourage socially-responsible behavior Thus, unlike patent law, tort law exists to be used as a sword.”); Raymond A. Mercado, *Ensuring the Integrity of Administrative Challenges to Patents: Lessons from Reexamination*, 14 COLUM. SCI. & TECH. L. REV. 558, 581 (2013) (“[P]atent law is a curiously insular area of doctrine, and rarely does it intersect with tort law.”). *Compare* *Philius v. City of New York*, 75 N.Y.S.3d 511, 520 (N.Y. App. Div. 2018) (Connolly, J., concurring) (“[O]ne of the principal aims of tort law is to deter conduct that produces harm.”), with *In re Cipro Cases I & II*, 134 Cal. Rptr. 3d 165, 185 (Cal. Ct. App. 2011), *rev’d*, 348 P.3d 845 (Cal. 2015) (“The very purpose of patent law is to encourage inventive effort.”).

¹⁰ The existing literature has focused on how tort liability may affect innovation in the context of negligence law and custom. Negligence law, particularly the rule concerning custom, may discourage injurers from engaging in activities that deviate from community standards (as such behavior may appear negligent). See generally Gideon Parchomovsky & Alex Stein, *Torts and Innovation*, 107 MICH. L. REV. 285 (2008). See also Christopher Buccafusco, *Disability and Design*, 95 N.Y.U. L. REV. 952, 981–82 (2020) (considering products liability law and courts’ reliance on industry standards as possible legal barriers for innovation); Alberto Galasso & Hong Luo, *Tort Reform and Innovation*, 60 J.L. & ECON. 385, 386 (2017) (“[A] number of legal scholars have warned about a possible chilling effect of the current tort system on innovation; that is, large damage awards and the court’s reliance on custom may reduce physicians’ willingness to adopt new but riskier technologies, even if they are potentially superior to customary treatments.”). This argument, however, hinges on courts’ failure to realize when innovation is socially desirable. Custom, while relevant, does not dictate the standard of reasonable care. See *T.J. Hooper v. N. Barge Corp.*, 60 F.2d 737, 740 (2d Cir. 1932); RESTATEMENT (THIRD) OF TORTS: PHYS. & EMOT. HARM § 13 (AM. L. INST. 2010) (“An actor’s departure from the custom of the community . . . is evidence of the actor’s negligence but does not require a finding of negligence.”). Thus, when courts properly account for the value of innovation, this chilling effect of negligence law is of limited scope. By contrast, the problem identified by this Essay persists even when courts properly apply the standard of reasonable care.

tion will commonly raise injurers' own costs of care: injurers developing new technologies will be required to self-implement them. When the cost of self-implementation is substantial, innovation—even when socially desirable—can make injurers worse off. Anticipating the need to adjust its own level of care, such an injurer-innovator will forgo the development of socially desirable precautions. And most strikingly, this shortcoming arises under both negligence and strict liability regimes.¹¹

The concern that tort law undermines the incentives set by the patent system is not mere speculation. We present evidence showing that tort law's chilling effect on innovation has played a key role in injurers' decisions.¹² The apprehension that their innovation will raise their own costs of care led injurers to abandon the development of socially desirable precautions. While these innovations would have allowed the injurers to gain significant revenues through patents, the revenues were eclipsed by the costs the injurers would have had to bear to implement their own invention to avoid liability.

Against this backdrop, which has thus far eluded the attention of courts and commentators, the Essay advocates a new legal construct that would realign patent and tort incentives and harmonize these fields. Specifically, we introduce the mechanism of anti-patents. While a standard patent grants an inventor the exclusive right to use its novelty, an anti-patent creates the converse regime: the inventor, and only the inventor, is *not* required to use the innovation. Importantly, anti-patents would retain the existing patent protection, allowing innovators to reap monopolistic revenues from competitors, but would simultaneously eliminate the obstacle created by tort law. By owning an anti-patent, injurer-innovators will enjoy immunity from the heightened standard of care to which the rest of the industry would now be subject (because of the invention).¹³

As we further demonstrate, the proposed anti-patent mechanism not only succeeds at aligning patents and torts toward the advancement of technological progress, but also outperforms other incentive schemes employed to stimulate innovation. In

¹¹ See *infra* notes 19–24 and accompanying text.

¹² See *infra* Part II.

¹³ We use the term anti-patents to highlight the crucial element that the patent would heighten the level of precaution required of all producers of the relevant product *except* for the patentee. Other appellations are possible as well (injurer-innovator patents, differential-level-of-care patents, enhanced patents, etc.). The key is the conceptual innovation—*only* the patentee need not implement the patent.

particular, we highlight the advantages of anti-patents over governmental transfers—the predominant substitute to the patent system.¹⁴ Such governmental schemes (i.e., prizes, grants and tax benefits) are highly susceptible to informational asymmetries rendering them ill fitted to the context of injurer-innovators.¹⁵ The effectiveness of these schemes also depends on the government’s ability to credibly commit to and follow its promises.¹⁶ By contrast, anti-patents are immune to information gaps and incentivize innovation without any reliance on governmental aid.

While anti-patents may appear to depart from fundamental principles of liability, we show that their contours cohere with existing rules applied in other contexts. For example, anti-patents bear a close resemblance to whistleblower protection. Whistleblowers are often offered immunity in exchange for revealing incriminating information.¹⁷ Anti-patents provide tortfeasors a similar form of immunity—exempting them from an elevated level of care in order to incentivize the disclosure of information that benefits society. Anti-patents can also be analogized to “grandfathering” rules: with anti-patents, injurer-innovators would be allowed to operate under the preexisting tort standard. They would not be required to implement new technologies when such exemption advances social welfare.¹⁸ Anti-patents thus conform to the underlying logic and structure of familiar existing doctrines.

Structurally, this Essay unfolds in three main parts. Part I discusses the impediment posed by tort law against innovation by injurers. It shows that tort law—through the duty it imposes on injurers to invest in care—often undermines the incentives generated by the patent system. Part II proceeds by tying our theory to practice, illustrating through real-world examples how the tort system undermines patent incentives. In each of these cases, a

¹⁴ See, e.g., Steven Shavell & Tanguy van Ypersele, *Rewards Versus Intellectual Property Rights*, 44 J.L. & ECON. 525, 529–30 (2001) (comparing innovation incentives under intellectual property vis-à-vis governmental reward systems); cf. *infra* notes 118–29 and accompanying text.

¹⁵ See *infra* notes 128–31 and accompanying text.

¹⁶ See *infra* notes 131–32 and accompanying text.

¹⁷ See, e.g., Yehonatan Givati, *A Theory of Whistleblower Rewards*, 45 J. LEGAL STUD. 43, 43–44 (2016) (noting that information about illegal behavior can be obtained either by law enforcement or by rewarding informed parties in exchange for disclosure); cf. *infra* notes 133–37 and accompanying text.

¹⁸ See, e.g., Steven Shavell, *On Optimal Legal Change, Past Behavior, and Grandfathering*, 37 J. LEGAL STUD. 37, 38 (2008) (describing grandfathering as a policy “allowing noncompliance for parties already participating in an activity and complying with rules in the past”).

valuable invention was detrimentally delayed due to injurer-innovators' concern over the effect its novelty would have on the costs of care. Part III then introduces and discusses the anti-patent mechanism that resolves the incompatibility of tort and patent law. It compares anti-patents to possible alternatives, showing that anti-patents outperform other potential incentivizing schemes (beyond the patent system). A conclusion follows.

I. TORT LIABILITY AND THE COST OF INNOVATION

This Part establishes the distortive effect of tort liability on innovation incentives. While the literature has conventionally assumed that innovators will seek a patent whenever the expected revenues outweigh R&D costs, we claim that injurers, operating in the shadow of tort law, face a particular dilemma when considering the development of desirable new technologies. Any technological breakthrough an injurer introduces will require other injurers to adjust their behavior. Yet the injurer itself will have to raise its own level of care as well, often at high costs. In light of these costs, injurers may decide to withhold desirable technological advancements that could substantially reduce harm.

As we show, this problem is ubiquitous. It arises under the two main tort law regimes and in cases involving various categories of victims. Section A begins by considering injurer-innovators' misaligned incentives under negligence. Section B shows that the ascribed problem persists under strict liability. Section C further generalizes the analysis, demonstrating that tort law's distortive effect on innovation emerges in settings featuring victims and precautions of different types.

A. Negligence

The determination of liability under negligence hinges on the cost-effectiveness of the precautions the defendant could have, but failed, to take. When a plaintiff can show that the cost of an untaken precaution was lower than the value of that precaution (as measured by the expected harm reduction), breach is established.¹⁹ This, in turn, highlights that the standard of reasonable

¹⁹ See RESTATEMENT (THIRD) OF TORTS: PHYS. & EMOT. HARM § 3 (AM. L. INST. 2010) ("Primary factors to consider in ascertaining whether the person's conduct lacks reasonable care are the foreseeable likelihood that the person's conduct will result in harm, the

care, and consequently the scope of injurers' liability, are closely tied to the existing knowledge on how harm can be minimized. As the victim must point out a specific neglected precautionary measure, she may rely on only what is known to be capable of preventing her injury.

This characteristic of the negligence standard turns injurers' innovation decisions into a two-way street. Like any other innovator, an injurer whose invention enhances social welfare can gain from licensing its invention to others. Yet such innovation also broadens the scope of the injurer-innovator's liability. Notably, if the injurer-innovator avoids implementing its own invention, its victims—now possessing superior knowledge on ways to prevent the harm—will be able to establish breach.²⁰ The following example shows that concerns regarding the costs of self-implementation can deter injurers from developing improvements that increase social welfare.

1. Example 1: negligence.

A and *B* are two factories operating in separate neighborhoods. Each factory's pollution results in a harm of \$50K (so there is a total harm of \$100K). The only way for each factory to prevent the pollution is by installing a filter at a cost of \$60K. As the cost of care exceeds the harm ($\$60K > \$50K$), neither factory is required to invest in the filters.

Suppose that *A* discovers how to manufacture better-designed filters. Developing this new type of filter requires a \$15K investment. Due to the new technology, the cost of installing the

foreseeable severity of any harm that may ensue, and the burden of precautions to eliminate or reduce the risk of harm.”); *see also* *United States v. Carroll Towing Co.*, 159 F.2d 169, 173 (2d Cir. 1947) (introducing the Hand formula, under which liability arises if the cost of the defendant's untaken precaution is lower than the probability of harm multiplied by the magnitude of harm).

²⁰ For a related argument, see Steven Shavell, *Liability and the Incentive to Obtain Information About Risk*, 21 J. LEGAL STUD. 259, 259–61 (1992). As economist Steven Shavell points out, if the negligence standard is based on the available information about precautions, it may disincentivize injurers to update this information. *Id.* at 261. Shavell's analysis, however, centers exclusively on the incentives provided by the tort system and does not account for weighing these incentives vis-à-vis the competing incentives supplied by patent law. Furthermore, a paramount insight offered by Shavell is the optimality of strict liability at inducing information acquisition by injurers. *Id.* at 260; *see also* Assaf Hamdani, *Mens Rea and the Cost of Ignorance*, 93 VA. L. REV. 415, 419 (2007) (“Strict liability is [] more appropriate when the market does not provide offenders with incentives to obtain information.”). By contrast, as we will show in Part II.B, the injurer-innovator problem persists—and even intensifies—under strict liability.

filters will drop to \$20K (compared to \$60K for the existing filters).

Note that from a social perspective, *A*'s innovation is highly desirable. With the existing filters, the neighbors suffer a harm of \$100K. *A*'s new technology enables preventing this harm cost-effectively. The combined cost of developing the new filters (\$15K) and installing them (\$20K + \$20K) is less than the harm these filters prevent. The new filters secure net savings to society of \$45K (\$100K – \$55K).

Consider next *A*'s incentives, governed simultaneously by patent law and tort law. The patent system, for its part, rewards *A* for its innovation. After developing the new filters, *A*—now possessing an exclusive patent—can license its innovation to *B*. From *B*'s perspective, buying the new filter is necessary to avoid liability. Failure to install the new filter will allow the neighbors to sue *B* for negligence, as the cost of care is now lower than their harm. Note, however, that the price that *A* can charge for its patent is limited by *B*'s option to simply compensate the victims. Specifically, since the cost of installing the new filters is \$20K, *A* cannot ask for more than \$30K for its patent. If *A* demands more than \$30K, *B* is better off polluting (and paying \$50K in damages). The maximum gain that *A* can obtain for its patent is thus \$30K.

If patent law were the only set of rules under which *A* operated, the harm to the neighbors would be prevented, thereby maximizing social welfare. This is so because *A*'s cost of developing the invention (\$15K) is outweighed by the revenues from the patent (\$30K). But now incorporate the other set of rules that apply, namely the standard of negligence. Once it reveals the new technology, *A* exposes itself to negligence claims if it does not implement its own invention. Developing the new filters requires *A* to raise its own level of care—namely, installing the new filters—to avoid liability. This additional cost of \$20K makes the innovation unprofitable for *A*. The overall costs of development and self-implementation eclipse the gains guaranteed by the patent system (\$15K + \$20K > \$30K).²¹

²¹ The problem arises under the following terms. There are n injurers, each inflicting harm whose expected value is h . Let b denote the cost of precautions. Under negligence, each injurer is obligated to incur the cost of b if and only if $b < h$, meaning that it is absolved from such duty if $b > h$. Suppose that the latter is the case, and that some injurer i may invest c (a sum of money) in research and development that would uncover a new precautionary technology whose implementation cost is $\underline{b} < h < b$. Further assume that

Generalizing our examples, tort law effectively taxes injurer-innovators, thereby discouraging the advancement of socially desirable technologies. While innovation invariably requires expenditures on R&D, the negligence standard makes innovation particularly costly for injurers. Revealing that a harm can be averted in previously unknown ways effectively requires injurers to bear additional costs in harm prevention. Thus, remarkably, despite the fact that our patent system provides strong incentives to research and innovate, negligence—the tort system’s dominant liability regime—might completely eradicate them.

B. Strict Liability

At first glance, strict liability seems to resolve the problem. In contrast to negligence, under strict liability victims are not required to identify an untaken, cost-effective precaution. Rather, liability is predicated on causation; injurers must compensate for any harm resulting from their activities. Unsurprisingly, then, scholars have long assumed that strict liability induces optimal care.²² Similarly, strict liability has been viewed as inducing optimal innovation, on the theory that an injurer discovering a better technology to avert harm will benefit from developing it.²³

To see this, consider again the two-factory example. Under strict liability, *A*’s development of the new filters now carries *two* benefits. First, as before, it will allow *A* to license its patent to *B* for \$30K. Second, the new filters will eliminate the harm to the neighbors, thereby saving *A* \$50K in damages. The overall benefit (\$80K) exceeds *A*’s costs of developing and self-implementing the new filters (\$35K). More generally stated, strict liability ensures

$n\underline{b} + c < nh$ —that is, the aggregate cost of technological advancement is less than the aggregate harm, making it socially desirable. If *i* were to invest *c* and patent the new technology, competing injurers would be willing to pay up to the price that assures a nonnegative benefit from implementing it. Consequently, the maximum price that *i* could possibly charge from each competitor is $h - \underline{b}$ (for any price beyond this, competitors are better off not purchasing the technology and instead causing the harm and paying damages). Hence, the profit that *i* reaps from innovation under the negligence rule is $\Pi^N = (n - 1)(h - \underline{b}) - c - \underline{b}$. Since *i* incurs no cost without inventing—on account of our baseline premise that $b > h$ —she will only innovate if $\Pi^N > 0$. Threshold conditions for innovation are therefore: $n > n^N \equiv \frac{h+c}{h-\underline{b}}$; $\underline{b} < \underline{b}^N \equiv \frac{(n-1)h-c}{n}$; $h > h^N \equiv \frac{n\underline{b}+c}{n-1}$.

²² See, e.g., STEVEN SHAVELL, ECONOMIC ANALYSIS OF ACCIDENT LAW 23 (1987) (demonstrating that under strict liability, individual tortfeasors “will [] choose both the optimal level of care and the optimal level of activity”).

²³ As noted, this conclusion negates the customary view that perceives strict liability as inducing optimal information acquisition by injurers. See *supra* note 20, at 260.

that injurers internalize all the costs and benefits of their innovation.

Yet a deeper look reveals that the injurer-innovator problem often persists under strict liability. Consider the next example.

1. Example 2: strict liability.

As before, each factory pollutes and causes a harm of \$50K. The cost of installing a filter is \$60K. A can develop a new filter (at a cost of \$15K) that reduces installation costs to only \$20K. Victims, however, either do not know they are suffering a harm or know of their harm but are unaware that it is caused by the pollutants emitted by the factories.

When victims are unaware of their harm or its source—a common issue in tort-related injuries—tort law’s distortive effect on innovation resurfaces even under strict liability.²⁴ The reason is that when injurers alone possess information on the risks their activities pose, innovation again becomes a double-edged sword. Introducing a new technology may expose injurers to responsibility for harms previously assumed to be caused by a different source and/or harms of which victims were unaware. The upshot is that injurers may choose, because of the tort system, to avoid desirable innovation.

In Example 2, although the development of the new filters is socially desirable, A will be reluctant to expose its innovation. A cannot introduce the benefit of its invention without simultaneously implicating itself in the harm its neighbors suffer. Once it reveals the harm to the victims, A will have to implement its innovation to avoid liability. Injurers’ incentives under strict liability therefore largely mirror those observed under negligence.

But there is more to it. Strict liability may actually intensify the injurer-innovator problem. To see this, suppose that filters

²⁴ See, e.g., Alexandra D. Lahav, *The Knowledge Remedy*, 98 TEX. L. REV. 1361, 1365 (2020) (explaining that in various tort-related contexts “without government or privately funded studies, causation in complex cases . . . is difficult, perhaps impossible, to prove”). For further studies concerning the difficulties various victims confront in proving causation, see Wendy E. Wagner, *Choosing Ignorance in the Manufacture of Toxic Products*, 82 CORNELL L. REV. 773, 777–90 (1997) (discussing types of uncertainties present in toxic tort cases); Wendy E. Wagner, *Commons Ignorance: The Failure of Environmental Law to Produce Needed Information on Health and the Environment*, 53 DUKE L.J. 1619, 1623 (2004) (discussing the “problems that incomplete and contested information about the causes of environmental harm present to [environmental law theorists’] idyllic assumptions”).

are a mitigating precaution, rather than a preventive one—in-
stead of averting the harm altogether, a filter can only alleviate
the pollution. As the ensuing example illustrates, in such circum-
stances injurers' innovation incentives are often optimal under
negligence but not under strict liability.

2. Example 3: strict liability versus negligence.

As in Example 2, *A* alone is aware of the harm caused by the
pollution.

Suppose now that the cost of installing the new filter is \$5K
(rather than \$20K), and that the new filter reduces (rather than
eliminates) pollution by 70%. The cost of developing the new filter
remains \$15K.

The new filter, again, increases social welfare. The combined
costs of development and installation by both factories ($\$15K +$
 $\$5K + \$5K = \$25K$) are lower than the corresponding reduction in
victims' harm ($70\% \times \$100K = \$70K$). Consider initially *A*'s incen-
tives under a negligence regime. Exposing the risk posed by the
pollution and developing the new (socially desirable) filter will al-
low *A* to license its patent to *B*. Note that the maximum amount
that *A* can charge *B* is, again, \$30K. This is so because *B*'s failure
to install the filter will result in liability of \$35K (the harm that
B could prevent by using the filter: $70\% \times \$50K$). Since the cost of
installing the filter is \$5K, *B* will be willing to pay up to \$30K for
the patent. This amount, however, is now sufficient to more than
cover *A*'s overall costs of developing and self-implementing the
filter ($\$15K + \$5K < \$30K$). Accordingly, despite the duty to invest
in its own new technology, *A*'s interest is to reveal its novel
precaution.

Consider next strict liability. If *A* exposes the harmful effect
of the factories' activity, *B*'s incentives are essentially identical to
those under negligence: purchasing the new filter will allow *B* to
save \$35K ($70\% \times \$50K$) in liability. It will thus pay, again, up to
\$30K for *A*'s patent. But, in contrast to the result under negli-
gence, this amount is insufficient to cover *A*'s costs under strict
liability. This is because under strict liability, injurers must com-
pensate victims even when taking optimal care. *A*, after installing
the new filter, must pay \$15K ($30\% \times \$50K$) in damages. This ad-
ditional cost, arising only under strict liability, undermines *A*'s
innovation incentives. The overall costs of development, self-im-
plementation, and liability exceed *A*'s revenues from licensing its

patent ($\$15K + \$5K + \$15K > \$30K$). Strict liability thus exacerbates the distortive effect of tort law on innovation.

The key point in the above examples is that injurers' innovation entails the exposition of *unknown* information to courts and victims. In Example 1, the introduction of the novel technology informs courts and victims about new ways to prevent the harm and thus affects the required standard of care. In Examples 2 and 3, the innovation informs courts and victims about the existence of unknown harm. In all these cases, tort law undermines the incentives provided by the patent system.

C. Victim Types

The examples above, which involved pollution, focused on victims who do not transact with the injurers. The factories' motivation to take care thus exclusively hinges on their potential liability for the neighbors' harm. When victims are possible buyers of injurers' products—that is, when they are consumers—the analysis arguably changes.

The existence of a contractual relationship with victims intensifies injurers' innovation incentives. Consumers, so the argument goes, will pay higher prices for safer products. And when innovation is socially desirable, market forces—that is, what injurers can gain from selling their products—seem to resolve the injurer-innovator problem. Injurers' additional revenues from selling an improved product will cover the costs of innovation.

While this argument is intuitively compelling, it is critically premised on consumers' willingness to pay for safer products. In many real-life situations, however, this assumption is at best dubious: ample evidence shows that consumers tend to underestimate the value of safer products for several reasons, chief among them insufficient information.²⁵ Consumers are often unaware of risks associated with products, or simply underestimate the probability and magnitude of the potential harm.²⁶ Sellers may thus

²⁵ See, e.g., Oren Bar-Gill & Franco Ferrari, *Informing Consumers About Themselves*, 3 ERASMUS L. REV. 93, 93 (2010) ("Imperfect information and imperfect rationality lead to misperception of benefits and costs associated with a product. As a result, consumers might fail to maximize their preferences in product choice or product use.").

²⁶ See Oren Bar-Gill & Elizabeth Warren, *Making Credit Safer*, 157 U. PA. L. REV. 1, 15 n.24 (2008) ("[O]ptimism can lead consumers to underestimate product risks, or to underestimate their own exposure to product risks.").

fail to reap the full benefit (by means of increased revenues) that emanates from safety improvements.²⁷

This reality means that tort law's chilling effect on innovation exists even when the victims are consumers. Injurers' revenues from their patents along with consumers' higher payments might still be eclipsed by injurers' costs of development and self-implementation. When consumers underestimate the value of safer products, injurers are often better off withholding information on innovative technologies that will minimize harm. The injurer-innovator problem thus prevails.

II. EVIDENCE

The preceding analysis laid out the theoretical background underlying the injurer-innovator problem. In this Part, we move away from the abstractions and present real-world examples that illustrate the stifling effect of tort liability on innovation and the ensuing grave consequences for victims. These examples feature each of the elements underlying the analysis in Part I: injurers who are subject to negligence or strict liability regimes (or both), unknown harms, victims of different types, and precautions whose effectiveness is not fully recognized by consumers.

We begin with the example of Blitz, once the United States' leading producer of gasoline cans. We then discuss DuPont and the manufacturing of PFOA—a highly valuable (yet harmful) chemical. We finally consider Bic and the development of disposable lighters. In each of these examples, the defendant—a major potential injurer—had discovered a new, and socially beneficial, technology that would have rendered its activity or products safer. This innovation was patentable, and thus a source for potential high revenues from licensing it to others. Nevertheless, the defendants decided not to pursue these technologies, seeking

²⁷ For evidence from the food industry, see, for example, Roselyne Alphonse, Frode Alfnes & Amit Sharma, *Consumer vs. Citizen Willingness to Pay for Restaurant Food Safety*, 49 FOOD POL'Y 160, 162–63 (2014) (reporting that consumers display lower willingness to pay for improved food safety standards in restaurants compared to the entire citizen population), and John W. Malone, Jr., *Consumer Willingness to Purchase and to Pay More for Potential Benefits of Irradiated Fresh Food Products*, 6 AGRIBUSINESS 163, 167 (1990) (noting that about 54% of households were unwilling to pay a price premium to purchase irradiated food notwithstanding its benefits). See also David Dranove, Craig Garthwaite & Manuel Hermosilla, *Does Consumer Demand Pull Scientifically Novel Drug Innovation?*, 53 RAND J. ECON. 590, 592, 605–06 (2022) (empirically demonstrating that pharmaceutical firms underinvest in research and development for novel drugs on account of consumer demand).

to avoid the cost of implementing their own inventions. The upshot was the infliction of severe harms that could have been avoided. Eventually, these technologies were exposed (often through litigation) and became required by regulators.

A. Blitz

Blitz U.S.A., Inc. was the United States' top manufacturer of gasoline cans.²⁸ Starting in 1993, Blitz was sued numerous times for injuries resulting from the gas cans exploding during use,²⁹ a phenomenon termed flashback explosions.³⁰ These incidents occur when gas vapors pass through the spout while the gas is being poured and are ignited by a heat source like a flame or spark.³¹ The flame is sucked back through the spout,³² igniting the gas and air mixture left in the can and “spraying fireballs of flaming gas vapor and liquid.”³³ The resulting injuries are often severe: the Consumer Product Safety Commission (CPSC) calls them potentially “deadly or life-altering.”³⁴

Flashback explosions can be prevented by installing “flame arrestors.”³⁵ These safety devices are mesh screens or discs with holes,³⁶ made out of either plastic or metal,³⁷ that prevent flames

²⁸ See Clifford Krauss, *A Factory's Closing Focuses Attention on Tort Reform*, N.Y. TIMES (Oct. 4, 2012), <https://www.nytimes.com/2012/10/05/business/in-a-shuttered-gasoline-can-factory-the-two-sides-of-product-liability.html>.

²⁹ See *Gaddy v. Blitz U.S.A., Inc.*, 2010 WL 11527376, at *1 (E.D. Tex. Sept. 13, 2010).

³⁰ *Consumer Panel Calls for Flame Arresters on Gas Cans After NBC Report*, NBC NEWS INVESTIGATIONS (Dec. 5, 2013), <https://perma.cc/G3ZF-ZVVV> [hereinafter *Consumer Panel*].

³¹ *Id.*

³² See Clark Fouraker, *Mesh Screen Could Possibly Keep Gas Cans from Exploding*, USA TODAY (Nov. 14, 2013), <https://perma.cc/G3TF-VLFJ>.

³³ *Consumer Panel*, *supra* note 30.

³⁴ See *id.* (quoting a CPSC statement).

³⁵ See Fouraker, *supra* note 32. Flame arrestors “can prevent these types of [explosions] from occurring.” Glen Stevick, Joseph Zicherman, David Rondinone & Allan Sagle, *Failure Analysis and Prevention of Fires and Explosions with Plastic Gasoline Containers*, J. FAILURE ANALYSIS & PREVENTION, 455, 464 (2011). Flame arrestor is a general term for a class of safety device that can take many forms (including over a dozen forms tested in 2012–2013 by ASTM International, the industry technical standards group, and Worcester Polytechnic Institute for use in gas cans). See *Consumer Panel*, *supra* note 30 (referencing twelve tested flame arrestor designs); Rich Gardella, *New Tests Show Flame Arresters Can Stop Gas Can Explosions*, NBC NEWS INVESTIGATIONS (Feb. 20, 2014), <https://perma.cc/CA7T-HEETH> [hereinafter *New Tests*] (referencing fourteen distinct prototypes of flame arrestors).

³⁶ See *Consumer Panel*, *supra* note 30.

³⁷ See *New Tests*, *supra* note 35.

from passing through them by dispersing and absorbing heat energy.³⁸ Importantly, flame arrestor designs can be patented.³⁹ Patented flame arrestors have been used in containers with flammable contents, like liquor bottles and lighter fluid containers.⁴⁰ They are also used in metal gas cans (called “safety” gas cans)⁴¹ including Blitz’s own metal cans,⁴² a different product much less popular than plastic cans.⁴³ Blitz did not use them, however, in its plastic gas can designs.⁴⁴

Blitz considered developing flame arrestors for its plastic gas cans in the early 2000s. In a 2005 internal memorandum—titled “My Wish List” and “Expectations for Gas Cans”—Blitz’s CEO, Rocky Flick, included an apparent request that the company “develop and introduce [a] device to eliminate flashback from a flame source.”⁴⁵ Additionally, a sketch made somewhere between 2004 and 2006 by Charlie Forbis, a senior Blitz designer reporting to the head of Blitz’s research and development efforts, depicted a preliminary flame arrestor design for plastic gas cans.⁴⁶ Blitz also met with Underwriters Laboratories in 2005 to discuss flame arrestors for plastic cans.⁴⁷ Ultimately, however, Blitz “decided to stop actively working on designing a flame arrester for its gas cans.”⁴⁸ A Blitz employee who had been working on flame arrestors threw away materials from his internet and paper book research on flame arrestors from around the same time period.⁴⁹

In subsequent litigation initiated by victims of plastic gas can explosions, Blitz offered varying explanations for why its flame arrestor ideas were abandoned and no flame arrestor was developed for its plastic cans. Blitz, at different times, claimed that

³⁸ See Lisa Myers & Richard Gardella, *Wal-Mart Agrees to Contribute \$25 Million to Settle Gas Can Explosion Lawsuits*, CNBC NEWS (Dec. 9, 2013), <https://www.cnbc.com/2013/12/09/wal-mart-agrees-to-contribute-25-million-to-settle-gas-can-explosion-lawsuits.html> [hereinafter *Walmart*].

³⁹ See, e.g., U.S. Patent No. 9,707,422 B2 (Mar. 4, 2015) (for a flame arrestor for use in a “volatile liquid storage container”).

⁴⁰ See *Consumer Panel*, *supra* note 30.

⁴¹ *Id.*

⁴² See Katie Gommel, *Video: The Real Faces Behind Blitz’s Exploding Gas Cans*, AM. ASS’N FOR JUST. (Oct. 5, 2012), <https://web.justice.org/fighting-for-justice-blog?page=12>.

⁴³ See *id.* (“Plastic gas cans represent 95 percent of all gas cans sold in America, or an estimated 19 million per year.”).

⁴⁴ See *New Tests*, *supra* note 35.

⁴⁵ Krauss, *supra* note 28 (quoting the Flick memorandum).

⁴⁶ See *Gaddy*, 2010 WL 11527376, at *2.

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ *Id.*

flame arrestors were unnecessary,⁵⁰ ineffective,⁵¹ or encouraged unsafe behavior.⁵² However, Max Bazerman, a Harvard behavioral economist who served as an expert witness in Blitz gas can litigation, pointed out that it was the cost of lost product sales from implementing the safety change that caused Blitz not to pursue flame arrestors.⁵³ Bazerman noted testimony from a former Blitz employee indicating that Blitz presented to Walmart a gas can design that would have included an arrestor, but “Walmart rejected Blitz’s design on the basis of the price increase [of less than \$1 per can from including a flame arrestor], and Blitz halted its redesign project.”⁵⁴

Blitz’s decision to give up on its innovative design because of the cost of self-implementation stands in sharp contrast to the social benefit offered by the innovation. Congressman Mike Thompson, who sponsored a 2019 bill directing the CPSC to require that plastic gas cans include flame arrestors,⁵⁵ alluded to the unequivocal recommendation of the Napa County Fire Captain: “With such a small monetary cost for the solution, the resulting reduction of the injuries, [and the] associated suffering and expense of what usually is lifelong treatment, the consumer will experience very little impact aside from increased safety.”⁵⁶

Studies by experts have similarly emphasized the high desirability of expanding the use of flame arrestors.⁵⁷ The CPSC found reports in federal databases of at least eleven deaths and 1,200 emergency room visits associated with gas cans exploding during pouring in just fifteen years.⁵⁸ William Hickerson, president of

⁵⁰ See Mark M. Bello, *After Blitz USA Goes Down in Flames, Bill Calls for Flame Arrestors on Portable Fuel Containers*, THE LEGAL EXAM’R: LAWSUIT FUNDING NEWS (Apr. 13, 2017) <https://perma.cc/JGP5-DW5M> (paraphrasing Blitz as claiming “the containers are only unsafe when people misuse them or when parents aren’t watching their kids”).

⁵¹ See *Green v. Blitz U.S.A., Inc.*, 2011 WL 806011, at *1 (E.D. Tex. Mar. 1, 2011).

⁵² See Krauss, *supra* note 28.

⁵³ See MAX H. BAZERMAN, THE POWER OF NOTICING: WHAT THE BEST LEADERS SEE 152 (2014).

⁵⁴ *Id.*

⁵⁵ See H.R. 806, 116th Cong. (2019); Rich Gardella, *New Law Requires Portable Gas Containers to Add Devices to Protect Against Explosions*, NBC NEWS (Dec. 31, 2020), <https://perma.cc/HA4H-LMEJ> [hereinafter *New Law*].

⁵⁶ *Thompson Legislation to Prevent Fire Accidents Signed into Law*, U.S. CONGRESSMAN MIKE THOMPSON (Dec. 28, 2020), <https://perma.cc/RZ42-TWKC> [hereinafter *Thompson Legislation*].

⁵⁷ See Fouraker, *supra* note 32.

⁵⁸ *Consumer Panel*, *supra* note 30.

the American Burn Association, estimated that “thousands of injuries each year” would be avoided as a result of the installation of flame arrestors in plastic gas cans.⁵⁹

In 2013—almost a decade after Blitz decided not to pursue its innovation—the CPSC issued a statement urging gas can manufacturers to implement flame arrestors.⁶⁰ However, by that time, Blitz had already gone bankrupt and was out of business.⁶¹ Some of the remaining manufacturers followed the CPSC recommendation and installed flame arrestors. But many did not, and injuries continued to arise.⁶² In response, in 2020 Congress enacted legislation requiring the CPSC to mandate flame mitigation devices in all plastic gas cans.⁶³

The Blitz example illustrates the problem that arises when innovation is the creation of injurers who operate under the tort system. If Blitz were not a manufacturer itself, its innovative flame arrestor would have been developed and patented. Manufacturers would have then purchased the new safety device to avoid liability, to the benefit of potential victims. But because Blitz was a major manufacturer whose risky products could have been made safer through the new flame arrestor, it faced a hard choice. Introducing the new flame arrestor would have required Blitz to implement it in its own products, thereby incurring extra costs and lower revenues. Blitz ultimately decided to avoid developing the new safety device, despite its social value.

B. DuPont

Perfluorooctanoic acid (PFOA), known as C8 because of the eight-carbon chain that makes up its chemical backbone,⁶⁴ is a slippery substance that has been used in products from nonstick pans to waterproof outerwear and pizza boxes.⁶⁵ PFOA was invented by 3M in the first half of the twentieth century and

⁵⁹ *Thompson Legislation*, *supra* note 56.

⁶⁰ *See Consumer Panel*, *supra* note 30.

⁶¹ *See Walmart*, *supra* note 38.

⁶² *See Bello*, *supra* note 50; *New Law*, *supra* note 55.

⁶³ *See* 15 U.S.C. § 2056d.

⁶⁴ *See* Sharon Lerner, *The Teflon Toxin*, TYPE INVESTIGATIONS (Aug. 11, 2015), <https://perma.cc/SK6Q-HBU8> [hereinafter *Teflon Toxin*].

⁶⁵ *See* Nathaniel Rich, *The Lawyer Who Became DuPont's Worst Nightmare*, N.Y. TIMES MAG. (Jan. 6, 2016), <https://perma.cc/GN52-Y6N8>; Lauren Zanolli, *Why You Need to Know About PFAS, the Chemicals in Pizza Boxes and Rainwear*, THE GUARDIAN (May 23, 2019), <https://perma.cc/NB9W-K5PW>; *Teflon Toxin*, *supra* note 64.

DuPont started purchasing it in 1951 for the manufacture of Teflon, a chemical coating.⁶⁶ In addition to 3M and DuPont, Dow Chemical has used PFOA, as have Daikin, Solvay Solexis, and other companies.⁶⁷

DuPont started testing PFOA for health impacts as early as 1961, first finding that it augmented the size of animal livers and then finding in the 1970s that it stayed in factory workers' blood.⁶⁸ DuPont did not alert the Environmental Protection Agency (EPA) to its findings.⁶⁹ Later, 3M conducted research and found that PFOA caused birth defects in rats.⁷⁰ DuPont verified 3M's research and began monitoring the children of female workers who handled PFOA while pregnant.⁷¹ Finding that two out of seven had birth defects, DuPont transferred female workers out of the PFOA unit.⁷²

DuPont's employees were not the only ones affected by PFOA. By 1984, DuPont learned that PFOA had entered the local water supply near factories, after sampling tap water in an employee's home and public water fountains.⁷³ PFOA was emitted from DuPont's Washington Works facility in West Virginia in a variety of ways: it was poured from outflow pipes into the Ohio River, buried in landfills from which it could leach into wells, and released into the air via smokestack.⁷⁴ In May 1984, DuPont executives were called to an urgent meeting in DuPont's Wilmington, Delaware, headquarters to discuss the PFOA crisis.⁷⁵ A memo about this meeting, later revealed in litigation against DuPont,

⁶⁶ See Rich, *supra* note 65. PFOA was used to smooth out lumps in Teflon. See Roy Shapira & Luigi Zingales, *Is Pollution Value-Maximizing? The DuPont Case* 6 (Nat'l Bureau of Econ. Rsch., Working Paper No. 23866, 2017).

⁶⁷ See Valerie Volcovici, *EPA-Recommended Chemicals Levels in Water Too High: U.S. Report*, REUTERS (June 20, 2018), <https://perma.cc/C2VB-5DSE>; *Fact Sheet: 2010/2015 PFOA Stewardship Program*, U.S. EPA (Apr. 5, 2023), <https://perma.cc/ZAM9-5J2K> [hereinafter *PFOA Stewardship Program*].

⁶⁸ Rich, *supra* note 65.

⁶⁹ *Id.*

⁷⁰ *Id.*; see also Memorandum from Bruce W. Karrh to C. De Martino (Mar. 25, 1981) (on file with author).

⁷¹ Shapira & Zingales, *supra* note 66, at 8–9.

⁷² *Id.*

⁷³ *Id.* at 9; see Rich, *supra* note 65.

⁷⁴ Shapira & Zingales, *supra* note 66, at 6 (citing Dennis J. Paustenbach, Julie M. Panko, Paul K. Scott & Kenneth M. Unice, *A Methodology for Estimating Human Exposure to Perfluorooctanoic Acid (PFOA): A Retrospective Exposure Assessment of a Community (1951–2003)*, 70 J. TOXICOLOGY AND ENVTL. HEALTH, PART A 28 (2007)).

⁷⁵ See *id.* at 9.

sheds light on the three possibilities facing the executives: stopping or reducing the use of PFOA, maintaining the use of PFOA, or continuing the use of PFOA while investing in methods for abatement.⁷⁶

One of these abatement methods was incineration. According to the 1984 memo, DuPont executives considered investing in techniques to incinerate PFOA, which they called “thermal destruction.”⁷⁷ The estimated cost was a \$1 million upfront investment with a \$1 million annual operating cost.⁷⁸ DuPont, however, never implemented the idea.⁷⁹

Around 2000, once the grave health implications of PFOA started surfacing, numerous plaintiffs sued DuPont based on PFOA’s harms.⁸⁰ A key question was the appropriateness of DuPont’s decision to avoid incinerating PFOA. In a 2017 trial, DuPont claimed that the choice not to pursue incineration was due to the risk that burning PFOA would release a different toxin.⁸¹ This allegation, however, was rejected by the court.⁸² The DuPont documents, in fact, “included detailed plans to design the incineration facility in ways that prevent the alleged release of new toxic chemicals.”⁸³ As these documents showed, DuPont decided to reject incineration in order to minimize costs.⁸⁴

DuPont’s decision not to further pursue the research and development of its incineration facility reduced social welfare. As Professors Roy Shapira and Luigi Zingales noted, “testimonies of DuPont’s own executives suggest that incineration would have been the best option to limit the societal costs of [PFOA] pollution.”⁸⁵ The societal health costs of DuPont’s use of PFOA have been estimated at \$10,696,250 per year in 1984 dollars, a figure far exceeding the costs of building (\$1 million) and operating

⁷⁶ See Memorandum from J.A. Schmid to T.M. Kemp & T.L. Schrenk (May 23, 1984) (on file with the Env’tl. Working Group at <https://perma.cc/RS3J-XP97>) [hereinafter Schmid Memorandum] at 1–2; Shapira & Zingales, *supra* note 66, at 7.

⁷⁷ See Shapira & Zingales, *supra* note 66, at 2; Schmid Memorandum, *supra* note 76.

⁷⁸ See Shapira & Zingales, *supra* note 66, at 2.

⁷⁹ See *id.* DuPont maintained its objection despite being urged by 3M two years later, in 1986, that PFOA should be either “incinerated or dumped in a commercial landfill.” *Id.* at 9.

⁸⁰ See *id.* at 16.

⁸¹ See *id.* at 14.

⁸² See Shapira & Zingales, *supra* note 66, at 14.

⁸³ *Id.*

⁸⁴ See *id.*

⁸⁵ *Id.*

(\$1 million annually) the incineration facility.⁸⁶ As shown by experts during trial, incineration would have prevented PFOA from contaminating the water.⁸⁷ It therefore would have been socially optimal for DuPont to have designed and built an incineration facility.

Privately, though, DuPont was better off using PFOA without an abatement method. As Shapira and Zingales showed, DuPont faced a particularly low likelihood of paying for the harm it caused.⁸⁸ A number of factors made the prospects of liability especially low: the dangers of PFOA were known to only a small number of experts and executives; scientific evidence was unavailable; and regulators approved the use of PFOA.⁸⁹ Thus, although incineration was socially desirable, DuPont executives concluded that it was in their interest not to incinerate.

3M stopped producing PFOA in 2000, leading DuPont to open a factory in Fayetteville, North Carolina, to manufacture PFOA itself.⁹⁰ By then, DuPont had “increased its discharge of [PFOA] into the environment by up to a factor of three” since 1984.⁹¹ In 2002, the EPA launched a “priority review” of PFOA, and in 2006, it brokered a voluntary agreement among eight major chemical

⁸⁶ Shapira and Zingales calculated an annual cost of \$24,875,000 and list a deflation value of .43 to convert the amount to 1984 dollars, yielding \$10,696,250. See Shapira & Zingales, *supra* note 66, at 50. It should be noted that this considers only the seventy thousand people in the Washington Works plant area with drinking water contaminated by DuPont. See *id.* at 12. This also assumes that there are no costs other than human health. *Id.* at 14. Based on these costs, stopping the use of PFOA was not an optimal choice privately or socially. Shapira and Zingales used an estimate of “between \$100M and \$200M annually in profits” from PFOA, which they attribute to DuPont executives. *Id.* at 11. Writer Nathaniel Rich estimated that PFOA products represented a billion dollars in profit each year. See Rich, *supra* note 65.

⁸⁷ See Dispositive Motions Order No. 12, *In re E. I. Du Pont de Nemours & Co.*, 2016 WL 659112, at *6 n.6, *9 (S.D. Ohio Feb. 17, 2016).

⁸⁸ See Shapira & Zingales, *supra* note 66, at 17–19.

⁸⁹ See *id.* at 21–23, 31. As it turned out, the harms of DuPont’s handling of PFOA came to light because of a confluence of events: the involvement of a defendant-side lawyer as the representative for the plaintiffs; DuPont employees’ creation of a paper trail regarding PFOA effects; the filing in West Virginia, one of the few states allowing a medical monitoring claim; and DuPont’s acceptance of a science panel’s findings regarding a link between PFOA and certain illnesses. See *id.* at 17–19.

⁹⁰ Hollie Good, *DuPont C8 Contamination in Parkersburg, West Virginia and Ohio, USA*, ENVTL. JUST. ATLAS (May 21, 2021), <https://perma.cc/4PB5-JCXD>.

⁹¹ See Dispositive Motions Order No. 12, 2016 WL 659112, at *9.

companies, including DuPont, titled the 2010/2015 PFOA Stewardship Program.⁹² All participating companies committed to reducing PFOA emissions by 95% by 2010 and to eliminating the product by 2015.⁹³

DuPont did not fully phase out PFOA until 2015, 30 years after the meeting in which executives considered getting rid of it via incineration.⁹⁴ Today, 99.7% of Americans have PFOA in their bloodstreams, and research on PFOA has found probable links to testicular cancer, kidney cancer, pregnancy-induced hypertension, thyroid disease, ulcerative colitis, and high cholesterol.⁹⁵

DuPont's conduct may seem inexplicable and harmful to its own interests, but it is consistent with the injurer-innovator problem we have presented and is another manifestation of it. After discovering some of the grave risks associated with PFOA, DuPont embarked on researching and developing a solution to neutralize these risks.⁹⁶ This was most natural, considering DuPont's record. Employing more than ten thousand scientists and experts, DuPont had long been recognized as a powerhouse of scientific innovation.⁹⁷ DuPont already owned a number of patents involving incineration techniques, so it was the ideal actor for resolving the lingering PFOA trouble. Attending to the PFOA crisis was also a source of potentially significant profits. Because multiple actors within the industry were discharging PFOA, DuPont could have reaped substantial revenues from licensing its novel incineration technology.⁹⁸

Why then did DuPont executives decide to cease the development of the incineration facility, and to give up on the potential gains from selling its solution to many other manufacturers? The

⁹² *PFOA Stewardship Program*, *supra* note 67; see also Mariah Blake, *Welcome to Beautiful Parkersburg, West Virginia*, HUFFINGTON POST (Aug. 27, 2015), <https://perma.cc/HYZ7-VSVN>; Zanolli, *supra* note 65.

⁹³ See *id.* at 67.

⁹⁴ See Blake, *supra* note 92; Schmid Memorandum, *supra* note 76.

⁹⁵ Antonia M. Calafat, Lee-Yang Wong, Zsuzsanna Kuklennyik, John A. Reidy & Larry L. Needham, *Polyfluoroalkyl Chemicals in the U.S. Population: Data from the National Health and Nutrition Examination Survey (NHANES) 2003–2004 and Comparisons with NHANES 1999–2000*, 115 ENVTL. HEALTH PERSPS. 1596, 1597 (2007); *C8 Probable Link Reports*, C8 SCI. PANEL, <https://perma.cc/BS63-FNQR>. These findings were accepted by DuPont as part of a settlement in a class action suit. See Shapira & Zingales, *supra* note 66, at 19.

⁹⁶ See Rich, *supra* note 65.

⁹⁷ See Shapira & Zingales, *supra* note 66, at 29–30 (“[DuPont] has traditionally been known as ‘the scientists’ company,’ employing 10,000 scientists.”).

⁹⁸ See, e.g., *PFOA Stewardship Program*, *supra* note 67.

answer lies again in the dual status of DuPont, functioning concurrently as a manufacturer that inflicts harm and as an innovator that could reduce this harm. Revealing its innovation would have required DuPont to expose the unknown risks associated with PFOA, and—most crucially—to implement its own technology. As the cost of implementation was high, and the likelihood of detection seemed low, DuPont executives ultimately determined that it was in the company’s interest to abandon their innovative incineration project.⁹⁹

C. Bic

Regulation of child-resistant lighters has been a remarkable success story. According to a 2022 study, this regulation—requiring lighters to minimize the risk of children’s use—saves the lives of at least 150 people a year, and yields annual risk-reduction benefits in the range of \$940 million to \$1.465 billion.¹⁰⁰ In fact, a cost-benefit analysis “based on a retrospective assessment of the regulation finds a more favorable impact than was anticipated.”¹⁰¹ Yet what has been lost in the shuffle is how tort law, prior to the regulation, discouraged major manufacturers from developing childproof lighters.

Introduced in the early 1960s, disposable lighters quickly became a common means for igniting fire.¹⁰² The leading manufacturer was Bic, a French-Canadian company known for its major inventions (including, among other inventions, the modern ballpoint pen). Offering a unique combination of a low price and high usability, Bic’s lighters came to dominate the market.¹⁰³ Safety,

⁹⁹ Shapira and Zingales estimated that DuPont executives confronted a probability of detection lower than 19%. Shapira & Zingales, *supra* note 66, at 17–20.

¹⁰⁰ See 16 C.F.R. § 1210 (2022). See generally Kip W. Viscusi & Rachel Dalafave, *The Broad Impacts of Lighter Safety Regulations*, J. BENEFIT-COST ANALYSIS (2022).

¹⁰¹ Viscusi & Dalafave, *supra* note 100, at 149.

¹⁰² *Our Story*, CRICKET LIGHTERS (2023), <https://perma.cc/LFF6-ML8R> (describing the development of the first disposable lighters by Cricket in the 1960s); *Lighters Required To Be Child-Proof*, N.Y. TIMES (June 10, 1993), <https://www.nytimes.com/1993/06/10/us/lighters-required-to-be-child-proof.html#:~:text=The%20Consumer%20Product%20Safety%20Commission,children%20under%205%20to%20operate> (reporting estimated sales of “half-billion [] lighters each year in the United States”); Tamar Lewin, *Lausuits, and Worry, Mount over Bic Lighter*, N.Y. TIMES (Apr. 10, 1987), <https://www.nytimes.com/1987/04/10/business/lawsuits-and-worry-mount-over-bic-lighter.html?searchResultPosition=1>.

¹⁰³ See Lewin, *supra* note 102 (noting that in 1987, Bic controlled “58 percent of the market,” rendering it the leading manufacturer of disposable lighters).

however, turned out to be a major drawback. The simple operational mechanism of the lighters enabled children, even very young children, to set unwanted fires.¹⁰⁴ As the lighters became increasingly common, so, too, did lethal fires caused by children playing with them.

Lawsuits were piling up against Bic.¹⁰⁵ Victims sought to impose liability on the basis of two claims: first, that the lighters were defective—a product liability claim;¹⁰⁶ and second, that selling the lighters without taking proper measures to ensure their safety constituted negligence.¹⁰⁷ In addressing the lawsuits, Bic claimed that the risk was obvious, and that children were unintended users.¹⁰⁸ Consequently, Bic argued, responsibility for the harm should lie with the parents or guardians for failing to secure the lighters outside of children's reach.¹⁰⁹ Bic vigorously fought to prevent the litigation from reaching discovery and advocated for self-imposed safety regulation based on industry standards.¹¹⁰

¹⁰⁴ See Jodi Duckett, *Lighters Must Be Child Resistant Under New Product-Safety Rule*, MORNING CALL, at D01 (quoting a former CPSC chairman stating that, prior to the adoption of the regulations, “[m]ost young children who start fires by playing with lighters are ages 3 and 4[,] [b]ut a child as young as 2 years old is capable of operating a lighter.”).

¹⁰⁵ See Lewin, *supra* note 102 (reporting that “[a]ccording to an informal network of personal injury lawyers,” by 1987 Bic faced “hundreds of claims” for fires caused by its lighters, which placed “Bic . . . under attack” for failing to make its lighters “child-resistant”); Todd J. Gillman, *Commission Study Faults Bic Lighters on Safety*, WASH. POST (Aug. 5, 1987), <https://www.washingtonpost.com/archive/business/1987/08/05/commission-study-faults-bic-lighters-on-safety/65c5bb9b-5ea1-473f-85f7-6639d5e5d012/> (noting that a House subcommittee began to study the problem after “Bic faced as many as 1,000 lawsuits worldwide” for harms caused by its lighters).

¹⁰⁶ See, e.g., *Scarpetta v. Health-Tex, Inc.*, 1990 WL 52986, at *3 (N.D. Ill. Apr. 26, 1990) (plaintiff's strict liability claim).

¹⁰⁷ See, e.g., *id.* at *4 (plaintiff's negligence claim).

¹⁰⁸ See, e.g., *id.* (accepting Bic's response that “the ordinary consumer of a Bic lighter is an adult” and that “[a]ccordingly, the Bic lighter is not dangerous to an extent beyond which the ordinary consumer is capable of contemplating and is not, therefore, unreasonably dangerous”); *Kirk v. Hanes Corp.*, 771 F. Supp. 856, 859 (E.D. Mich. 1991) (holding that the manufacturer had no duty to warn with regard to “open and obvious danger” of its disposable butane lighter).

¹⁰⁹ See Lewin, *supra* note 102 (citing Bic's statement that “users [of lighters] have a special responsibility to be careful” and thus Bic should not be blamed for children's misuse of its products).

¹¹⁰ See, e.g., Mark A. Hansen, *Warning: Don't Flick with Bic*, 82 ABA J. 22, 22–23 (1996) (explaining, based on plaintiff lawyers' descriptions, Bic's aggressive litigation strategy as particularly “bare-knuckled, hardball and no-holds barred”); Lewin, *supra* note 102 (“Lawyers who have brought cases against Bic say the company works hard to suppress reports of any defects with its lighters.”).

Initially, Bic's efforts successfully averted inquiries as to the safety of its lighters.¹¹¹ With the increase of child-initiated fires, however, a number of plaintiffs were able to convince courts to allow discovery.¹¹² Such discovery revealed that Bic was aware of the risk of children's misuse and had considered different innovative lighter designs that would be child-resistant.¹¹³ Bic, however, kept these designs private.¹¹⁴

Bic's behavior should now look familiar, sharing many of the traits already observed in the Blitz and DuPont cases. From Bic's standpoint, any patent on child-resistant designs carried two potential advantages. With safer lighters, revenues from sales would rise insofar as consumers would agree to pay a higher price for a better product. Additionally, the monopolistic status Bic could gain as a patent holder would have allowed it to license its innovative designs to other manufacturers.

Despite these advantages, Bic did not pursue a patent application. Bic was concerned that consumers would underestimate the benefit of child-resistant lighters (a concern that turned out to be well-founded).¹¹⁵ Revenues from greater sales were therefore questionable. Even more importantly, any such patent would have exposed Bic to tort liability. Registering a patent on child-resistant design would have entailed the disclosure of Bic's ability to develop safer lighters. This, in turn, would have undermined

¹¹¹ See Hansen, *supra* note 110 (citing Bic's general counsel that "nearly 90 suits over allegedly faulty lighters have been decided in the company's favor"). Some courts decided in favor of Bic. See, e.g., *Bradley v. Bic Corp.*, No. GC-G-88-391 (Fla. Cir. Ct. 1989) (holding that a failure to make a disposable lighter—a product intended for adult use—childproof will not support an action for negligence or for strict liability); *Adams v. Perry Furniture Co.*, 497 N.W.2d 514, 519–20 (Mich. Ct. App. 1993) (same); see also *Eads v. Bic Corp.*, 740 F. Supp. 1433, 1434 (W.D. Mo. 1989) (discussing courts' rulings in previous cases).

¹¹² See *Bondie v. Bic Corp.*, 739 F. Supp. 346, 346, 350 (E.D. Mich. 1990) (rejecting a request for summary judgment in a claim based on children's improper use of Bic lighters); *Carlson v. Bic Corp.*, 840 F. Supp. 457, 459, 463 (E.D. Mich. 1993) (same); *Todd v. Societe Bic*, 991 F.2d 1334, 1336, 1340 (7th Cir. 1993), *rev'd* 21 F.3d 1402 (7th Cir. 1994) (en banc) (same).

¹¹³ See *Phillips v. Cricket Lighters*, 773 A.2d 802, 814 (Pa. Super. Ct. 2001) ("Designers, manufacturers, and distributors of [disposable lighters had] 'been well aware, since at least the early 1970's, that there was a potential significant serious hazard of catastrophic injury and death, particularly to the young, as a result of children utilizing or playing with disposable butane cigarette lighters.'").

¹¹⁴ Bic's strategic decision to withhold patenting (and applying) its child-resistant designs was revealed in at least one case. See, e.g., *Bondie v. Bic Corp.*, 739 F. Supp. 346, 346, 350 (E.D. Mich. 1990).

¹¹⁵ Bic's records showed that its novel child-resistant lighter, retailing for about ten to fifteen cents more than its regular lighter, "ha[d] not sold well." See *Lighters Required to Be Child-Proof*, *supra* note 102 (citing Linda Kwong, a spokesperson for Bic).

Bic's main line of argumentation that the harms originated in parents' failure to exercise care. Refraining from exposing its innovation allowed Bic to keep its information private, while contesting liability in court.

The concerns over lighter safety ultimately prompted calls for regulatory intervention. Only then, anticipating the upcoming safety requirements, did Bic move to modify its lighter designs to be child-resistant and register patents on those designs.¹¹⁶ The introduction of the regulatory standards on lighter safety overcame the deterrent effect that tort law had on innovation.

D. On the Breadth of the Problem

Blitz, DuPont, and Bic illustrate the opposing effects of the patent and tort systems. One may question, however, how broad the problem is in practice—that is, if these examples are relatively isolated or instead represent a general (and disturbing) phenomenon. In this regard, two points bear emphasizing. First, all three examples involved major manufacturers whose products or processes posed significant risks to consumers or third parties. Each of the manufacturers was part of a large market in which other actors operated, and thus the potential revenues from licensing a patent were substantial. Yet the manufacturers ultimately opted to avoid innovating: the cost of self-implementation made the innovation unattractive.

Second, the three cases share unusual circumstances, providing a unique opportunity to observe the distortions that result from the injurer-innovator problem. In each example, the pertinent injurer's decision to give up on its technological novelty was revealed in court through litigation. Crucially, the plaintiffs managed to discover documents—which the defendants never intended to become public—with information on each defendant's deliberate decision to cease the development of its socially desirable innovation. This sort of evidence rarely comes to light, as injurers are typically careful to avoid such documentation in the first place. Injurer-innovators, precisely for the reasons discussed

¹¹⁶ Bic eventually moved to register its first patent of a child-resistant design only in 1988. U.S. Patent No. 4,830,603 (Sept. 14, 1988). Even then, it postponed manufacturing its first child-resistant lighter until 1992, a short period before the adoption of the pertinent regulation. *See generally Bic to Launch a Child-Safe Butane Lighter*, L.A. TIMES (Aug. 26, 1991), <https://www.latimes.com/archives/la-xpm-1991-08-26-fi-1015-story.html#:~:text=The%20disposable%20razor%20and%20indestructible,will%20hit%20stores%20next%20spring>.

above, may never proceed to the development stage. And even if they do, they may be able to avoid discovery (both literal and legal). In this respect, the three examples—in which the manufacturers took active measures to examine their new technology and documented it—are unusual creatures. Ordinarily, injurers' decisions to forgo technological breakthroughs—because of concerns over the cost of self-implementation—will remain unknown. There is good reason to believe, therefore, that the examples we have identified are the proverbial tip of the iceberg.

III. INTRODUCING ANTI-PATENTS

The conventional construct of patents bestows an in rem right upon patent holders.¹¹⁷ Once awarded a patent, the innovator possesses an exclusive right to use its invention; it can utilize its novelty while preventing others from doing so. To remediate the injurer-innovator problem, we propose that the inventor, and only the inventor, be exempted from using the invention. The granting of the patent will create the same changes (however big or small) in the liability of all the makers of a given product, except that such changes in tort liability will not apply to the patentee. We call this reverse exclusivity regime anti-patents. Anti-patents retain the existing patent protection, allowing injurer-innovators to charge monopolistic prices from competitors, but simultaneously eliminate the obstacle created by tort law.

A. The Mechanism

The principal objective of anti-patents is to align the incentives of injurer-innovators with those of society. Specifically, anti-patents are devised to neutralize the adverse impact of the tort system on innovation incentives. As shown, the tort-induced burden of self-implementation is, at its core, what separates the injurer-innovator from all other innovators. By releasing the injurer-innovator from the need to implement its own new technology, anti-patents overcome the hurdle that tort law poses against innovation.

From a doctrinal perspective, anti-patents differ from the present regime in one major respect. Like any other patentee, and

¹¹⁷ See, e.g., Stephen Yelderman, *Coordination-Focused Patent Policy*, 96 B.U. L. REV. 1565, 1577–78 (2016) (“As the theory goes, a patent’s in rem exclusivity—its ability to restrain others without needing to show a contractual relationship or even a chain of direct copying—can . . . [enhance] development and exploitation of new technologies.”).

consistent with conventional patent law, an injurer-innovator will be entitled to reap revenues from licensing its socially desirable invention to others. As dictated by tort law, other potential injurers will then have to adjust their level of care. Competitors who fail to integrate the new technology into their production process or products will be subject to liability. In this regard, anti-patents retain the basic structure of both the patent and tort systems. Yet, and here is where anti-patents diverge from the customary framework, the need to adjust the level of care will *not* apply to the injurer-innovator itself. As opposed to its competitors, the injurer-innovator will bear no liability if choosing not to implement the technology it invented.

To see this, return to Example 1 involving the two factories. Recall that each factory inflicted a harm of \$50K, and that *A* could develop a new filter at a cost of \$15K. Installing the filter would cost each factory \$20K. An anti-patent regime will induce *A* to develop the filter: *A* will be able to license the filter to *B* for \$30K (*B*'s benefit in avoiding liability). Importantly, since *A* itself will not need to install the filter, its benefit will exceed the cost it must invest in developing the filter ($\$30K > \$15K$). Releasing *A* from bearing the cost of self-implementation is what makes all the difference here. *A* will develop the new filter whenever the cost of R&D falls short of the benefit that other actors reap from the new technology. The same logic applies to Examples 2 and 3.

The social advantage of anti-patents can now be readily seen. In economic parlance, anti-patents facilitate a Pareto improvement: the proposed regime improves the welfare of many victims, while no other victim is worse off. In our example, residents in the vicinity of *B* will enjoy a healthier environment, while the situation of *A*'s neighbors remains unchanged. In fact, and as will be demonstrated in the next Section, anti-patents can easily be devised to also account for *A*'s neighbors, thereby enhancing all victims' welfare.

An anti-patents regime would have likewise prevented the outcomes in each of the real-world examples we have discussed. In these cases, the root cause for the defendant's decision not to pursue its socially desirable invention was concerns over the cost of self-implementation. Realizing that the monopolistic revenues might fall short of the combined cost of development and self-implementation led to Blitz, DuPont, and Bic hiding their innovation. However, under the anti-patent mechanism, the cost of self-implementation would have no longer mattered. Recall that the

relevant inventions were socially desirable—the benefit they provided to society surpassed the cost of their development (and hence could be sold profitably). Thus, with anti-patents, the defendants would have been incentivized to patent their inventions.¹¹⁸

B. Implementation

A straightforward way in which the legal system can apply anti-patents is through federal or state legislation. Such legislation would relieve injurer-innovators from the burden of implementing their own new technologies. But even without such legislation, courts can incorporate anti-patents quite seamlessly into the existing legal regime through tort law.

Consider first the case of negligence (Example 1). Anti-patents essentially expand the Hand formula, which is often used to determine unreasonable behavior.¹¹⁹ Under the formula, a defendant should be held liable only when it failed to take cost-justified precautions. When the injurer-innovator problem arises, exempting the defendant from the need to self-implement its newly developed technology is necessary to induce the invention in the first place. Thus, ruling that the injurer-innovator (and only the injurer-innovator) need not adjust its standard of care following its invention falls within the cost-benefit calculation that underpins the Hand formula. The anti-patents mechanism is an application of the Hand test of determining unreasonable behavior.

Next, consider strict liability (Example 2), particularly claims based on products liability law. Here as well, judges may incorporate the mechanism of anti-patents into the existing legal mold. A manufacturer's failure to update its products in light of

¹¹⁸ Recall that in the absence of anti-patents, the injurer-innovator's profit from innovation is $\Pi^N = (n-1)(h - \underline{b}) - c - \underline{b}$, and it will pursue technological advancements only if $\Pi^N > 0$. This implies that the threshold conditions for innovation without anti-patents are: $n > n^N \equiv \frac{h+c}{h-\underline{b}}$; $\underline{b} < \underline{b}^N \equiv \frac{(n-1)h-c}{n}$; $h > h^N \equiv \frac{n\underline{b}+c}{n-1}$. See *supra* note 21. Under our proposed regime, the injurer-innovator's profit function becomes: $\Pi^{AP} = (n-1)(h - \underline{b}) - c$. Again, since it invests in development only if $\Pi^{AP} > 0$, the threshold conditions become: $n > n^{AP} \equiv \frac{h+c-\underline{b}}{h-\underline{b}}$; $\underline{b} < \underline{b}^{AP} \equiv \frac{(n-1)h-c}{n-1}$; $h > h^{AP} \equiv \frac{(n-1)\underline{b}+c}{n-1}$. We thereby obtain $n^{AP} < n^N$ and $h^{AP} < h^N$ —that is, the minimum value of n and h that is required for innovation is lower under anti-patents, whereas $\underline{b}^{AP} > \underline{b}^N$, namely, the maximum value of \underline{b} required for innovation is higher under anti-patents.

¹¹⁹ See RICHARD EPSTEIN, TORTS 129 (1999) (“In . . . appellate discussions, the modern tendency is to resort quickly to the general cost-benefit Hand formula.”). As we noted, the Restatement (Third) advocates the use of a “risk-benefit” test for determining negligence. See *supra* note 19.

technological advancements will normally be considered a design-defect case.¹²⁰ In this context, courts have often invoked the risk-utility test to determine whether a given design meets the required standard.¹²¹ As is the case with the Hand formula, judges can readily integrate the anti-patent mechanism into the risk-utility test. Specifically, they may hold that the injurer-innovator's retainment of the technology that preexisted its invention does not amount to a defective design. While other manufacturers must improve their products in accordance with the new technology, this duty will not apply to the technology's creator, in order to incentivize its creation at the outset. Risk-utility analysis itself mandates the exemption of the injurer-innovator from the need to self-implement its invention.

Before concluding this Section, the confines of the anti-patents mechanism should be considered. Particularly, one may wonder about the scope of exemption that should be conferred upon injurer-innovators. One possible approach is to apply anti-patents comprehensively, whereby injurer-innovators will never be required to self-implement their inventions. An alternative would limit this exemption to cases in which, absent the exemption, innovation would have been hindered because of the cost of self-implementation. The main advantage of the former approach is its administrative simplicity: courts would apply anti-patents categorically. The foremost virtue of the second approach is its careful, rigorous treatment of anti-patents. Injurer-innovators would enjoy the exemption only when necessary.

We advocate the second approach, namely the employment of anti-patents only when the exemption is imperative to incentivize innovation. The main reason is that the injurer-innovator problem often arises in contexts in which potential victims may suffer physical harm. Absolving injurer-innovators from self-implementing their inventions should thus be preserved only in situations in which society at large would be worse off without it. This more tailored approach ensures that anti-patents will exist only when judges are persuaded that the resulting benefits of anti-patents exceed the costs.

¹²⁰ See DAVID G. OWEN, *PRODUCTS LIABILITY LAW* 482–503 (3d ed. 2015) (discussing various tests of liability for a design defect).

¹²¹ See, e.g., DAN B. DOBBS, *THE LAW OF TORTS* §§ 456–57 (2d ed. 2016) (elaborating on courts' use of the risk-utility test for determining design defects).

C. Anti-Patents Versus Governmental Rewards

Patents serve as the legal system's main venue to induce innovation. Yet governmental support in technological progress provides an important alternate path. This Section contrasts anti-patents with possible government-based solutions to the injurer-innovator problem, showing that anti-patents outperform the latter.

Governmental inducements in the context of innovation come in three main forms: grants (subsidies), tax benefits, and prizes.¹²² Grants and tax benefits are, respectively, payments and discounts given *ex ante* to innovators in support of their research and development expenditures, whereas prizes are *ex post* payments guaranteed to innovators for technological and scientific breakthroughs.¹²³ Arguably, any of these options could be used to resolve the injurer-innovator problem.¹²⁴ By offering injurers sufficiently sizable grants, tax benefits, or prizes (or a combination thereof), the government can ensure that injurers benefit from developing new technologies.¹²⁵ Such payments or discounts can counterbalance the costs associated with the duty of self-implementation.

All three forms of governmental support, however, have significant disadvantages. Information asymmetries, specification errors, and moral-hazard concerns greatly undermine the government's ability to incentivize innovation in the face of tort law.

¹²² See Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 326–67 (2013) (contrasting patents, prizes, grants, and tax cuts as innovation incentives); see also Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1586–87 (2003) (discussing prizes and subsidies).

¹²³ See Hemel & Ouellette, *supra* note 122, at 308 (“Grants and tax credits provide rewards *ex ante*, before the results of R&D are known. By contrast, prizes and patents provide rewards *ex post*, after an R&D project has produced a novel discovery.”).

¹²⁴ For economic perspectives on governmental involvement that might outperform the patent system in incentivizing innovation, see, for example, Shavell & van Ypersele, *supra* note 14, at 525–26 (contending that a system that allows innovators to choose between a reward and intellectual property rights is superior to a system that merely offers the latter); Joseph E. Stiglitz, *Economic Foundations of Intellectual Property Rights*, 57 DUKE L.J. 1693, 1713 (2008) (“[A] well-designed innovation system will be a mixed system, involving patents and other elements, like prizes and government support of basic research, for instance, at a university.” (emphasis omitted)).

¹²⁵ See, e.g., Richard A. Posner, *Intellectual Property: The Law and Economics Approach*, 19 J. ECON. PERSPS. 57, 58–59 (2005) (“A reward system, in principle, provides both incentives and access—the creator of intellectual property is compensated for the cost of creation, but because the creator has no right to exclude others from access to the property, the price is forced down to marginal cost by competition from copiers.”).

While these deficiencies are inherent to any governmental solution to the injurer-innovator problem, they do not emerge under anti-patents. This is not to say that governmental support is irrelevant. As we show, anti-patents can be combined with governmental support (of the sort we will shortly explain) to fully eradicate the injurer-innovator problem.

Information asymmetries impose substantial limits on the government's capability to stimulate innovation among injurers. Public financing of technological advancements is provided in connection with pre-identified goals. Legislatures and regulators usually offer grants, tax benefits, and prizes to induce innovators to resolve *known* problems.¹²⁶

The responsive nature of governmental support in innovation renders it less effective when problems are *not* publicly known. The injurer-innovator problem, as explained, invariably arises in cases in which information on the existence of a problem is known to injurers only. Just consider the DuPont case, where the risks regarding the use of PFOA were known to only the injurers.¹²⁷ The government had no knowledge of the health hazard posed by PFOA, and of course no basis to offer inducements to remediate a problem of which it was unaware.

Specification errors are another obstacle. Under all three governmental schemes, a decision must be made as to the *size* of the payment or discount awarded to innovators.¹²⁸ For example, consider prizes. The federal government, regulators, and states have

¹²⁶ See, e.g., Hemel & Ouellette, *supra* note 122, at 321:

In some cases, lawmakers themselves decide which projects are worthy of financing; in other cases, they allocate money to agencies with broad research goals but delegate to agency officials the decisions about which projects to fund. In both cases, the decision about which projects are funded and how much funding they receive is made by central planners, not individual researchers or market actors.

For example, the Orphan Drug Act of 1983, 21 U.S.C. §§ 360aa–360ee, provides grants, tax benefits, and a period of market exclusivity to companies that develop drugs to treat rare diseases, reflecting the belief that for rare diseases drugs are socially beneficial but insufficiently incentivized by the existing patent system. See, e.g., Judy Vale, *Expanding Expanded Access: How the Food and Drug Administration Can Achieve Better Access to Experimental Drugs for Seriously Ill Patients*, 96 GEO. L.J. 2143, 2166–67 (2008).

¹²⁷ See *supra* notes 64–99.

¹²⁸ See Hemel & Ouellette, *supra* note 122, at 307 (“Participants in the patents-versus-prizes debate have recognized that patents may be preferable to prizes when the government is unable to accurately value projects.”).

offered prizes in the range of a few thousand to millions of dollars.¹²⁹ In a similar vein, ex ante governmental support (i.e., grants and tax benefits) varies substantially in its amounts.¹³⁰

Yet determining the proper reward amount is particularly challenging in the injurer-innovators context.¹³¹ Such a determination requires identifying injurers' costs of implementation, but those costs would often depend on multiple contingences and information known to injurers only. Awarding an insufficient payment (or discount) will fail to induce injurers to innovate. Awarding an excessive amount will induce innovation that might not be socially desirable.

Arguably, the government may evade these obstacles by devising an alternative system—particularly, a new prize-based system—for rewarding welfare-enhancing innovation. Under this system, any innovator proving that its novelty enhances social welfare will be entitled to an ex post governmental reward. Such a regime will remove the concerns over information asymmetries, as governmental support no longer hinges on identification of pre-specified problems. In addition, under this new system, the size of the reward will be determined in accordance with the innovator's individual costs. Consequently, the risk of insufficient or excessive rewards would be greatly minimized.

Such a regime, however, intensifies a third disadvantage: moral hazard. The features of the alternative system—with both the granting of a *reward* and the amount of that reward calculated ex post—prompt distrust among potential innovators. Under this system, once inventions are made public, the government has an incentive to err on the side of lower payments. Agencies, and the legislatures that oversee them, have multiple spending priorities.¹³² The government's temptation to conservatively

¹²⁹ *Id.* at 317–18.

¹³⁰ *See id.* at 326 (“Estimates of the effectiveness of the R&D credit vary widely.”).

¹³¹ *See, e.g.*, Benjamin N. Roin, *The Case for Tailoring Patent Awards Based on Time-to-Market*, 61 UCLA L. REV. 672, 723 n.240 (2014) (contending that R&D costs are unobservable to the government). *See also generally* Ufuk Akcigit, Douglas Hanley & Stefanie Stantcheva, *Optimal Taxation and R&D Policies*, 90 ECONOMETRICA 645 (2022) (addressing structural information asymmetry between the government and private firms in terms of R&D expenditure).

¹³² *See* Posner, *supra* note 125, at 59 (“A greater danger is that the reward system will be politicized. The danger is avoided when the system is private rather than public.”). Agency heads and legislators with long time horizons may want to fully reward innovators in the hope of incentivizing future innovators, but that goal will conflict with more immediate funding imperatives and may not be politically wise (in the same way that climate

award innovators (after the fact) and thus free up funds for other programs is clear. And, anticipating such governmental behavior, innovators may avoid investing in searching for new technologies in the first place.

It should therefore come as no surprise that our legal system relies predominately on the patent system, rather than on governmental aid, to induce innovation. And even when governmental support is provided, it is usually in the form of *ex ante* (and specified) rather than *ex post* (and unspecified) rewards. The inevitable conclusion is thus that the alternative system is unlikely to provide a feasible remedy to the injurer-innovator problem.

Anti-patents, by contrast, manage to evade the impediments that plague government-based solutions. First, anti-patents do not give rise to the information-asymmetry failure. At its core, the anti-patent mechanism draws on the patent and tort systems to incentivize injurer-innovators to search for, reveal, and remediate deficiencies associated with their own activities. Therefore, anti-patents are not premised on the government's awareness of pre-identified problems. Second, determination of the size of the proper reward is straightforward. Injurer-innovators are absolved from bearing the costs of self-implementing their novelty. Last, the institutional separation that underlies anti-patents eliminates the moral hazard concerns characterizing governmental support. Anti-patents separate those deciding what constitutes an innovation (i.e., courts conferring anti-patent protection) from those bearing the costs emanating from such decisions (i.e., competitors paying for the patent).

While government-based schemes are ill fitted to addressing the injurer-innovator problem, government support may be combined with anti-patents to maximize their effectiveness. One implication of anti-patents is the differential treatment of potential victims. Injurer-innovators enjoying an anti-patent can maintain their original level of care, while competitors must implement the new technology to avoid liability. The result is that potential victims of injurer-innovators face heightened risks compared to other victims.

Governmental payments can be used to level the playing field among victims. In particular, the government can offer to reimburse injurer-innovators for the cost of implementing their newly

change regulation and long-term deficit reduction often give way to short-term considerations).

invented technology. Such payments ensure that *all* potential victims, including those who may be harmed by anti-patent holders, face identical risks. Importantly, note that governmental involvement here is not designed to incentivize innovation *ex ante*, but rather operates exclusively *ex post*. Anti-patents, as a standalone, optimally incentivize innovation in the face of tort liability. *After* the introduction of the invention, the government can reimburse an injurer-innovator and secure the invention's implementation by the entire injurer cohort. Thus, reserving governmental intervention as a supplemental element of anti-patents, rather than a substitute for them, enables a regime that produces both optimal innovation and equality among potential victims.

D. Addressing Potential Objections

We foresee two major objections that may be raised against anti-patents. First, one might challenge the easing of tortfeasors' level of care in exchange for innovation on grounds of both efficaciousness and fairness. According to this criticism, the legal system should not reward wrongdoers at (what may seem) the victims' expense.

A second critique focuses on the existence of a differential standard of care within a given industry or across similar risky activities. Anti-patents, the argument goes, would have subjected Blitz, for example, to a less demanding safety standard than other manufacturers of gas cans. While other manufacturers would be required to install the Blitz-developed fire arrestor in their plastic cans, Blitz itself would be permitted to keep using its old, riskier design. Thus, it might be argued that manufacturers are treated unequally. We address these objections in order.

To what extent is the concern over rewarding wrongdoers troubling? Anti-patents can be analogized to existing legal schemes that are designed to achieve closely related objectives. Consider two examples in which our legal system absolves blame-worthy agents in order to extract useful information that can aid society. The first is whistleblower laws. Federal and many state laws grant immunity to individuals who reveal incriminating information that implicates their employers.¹³³ This immunity is

¹³³ See, e.g., STEVEN M. KOHN, CONCEPTS AND PROCEDURES IN WHISTLEBLOWER LAW 1 (2001); see also Yuval Feldman & Orly Lobel, *The Incentives Matrix: The Comparative Effectiveness of Rewards, Liabilities, Duties, and Protections for Reporting Illegality*, 88

granted to uncover pertinent information that otherwise would likely remain in the dark.¹³⁴ Such immunity is often accompanied by substantial monetary rewards.¹³⁵ Thus, although the reporting individual might have actively participated in the illicit activity and should have—under regular circumstances—faced sanctions, whistleblower laws not only shield her but also reward her in exchange for the provision of useful information. The same is true for anti-patents. While injurer-innovators are exempted from adjusting their level of care, this exemption is essentially a reward for the patent they register, namely, for the information they reveal.

Note that, by its design, the anti-patent mechanism can be construed as an extension of whistleblower laws. It bears emphasis that whistleblower laws were in force in some of the real-world examples discussed above. Notably, in the DuPont case, despite the immunities provided by such laws, employees chose not to disclose information they had on PFOA and its inherent risks.¹³⁶ This is not entirely surprising. After all, to secure whistleblower status, an employee is required to turn against her entire cohort, including her employers and peers. This decision entails risking one's career and reputation, and therefore the whistleblower immunity is in many cases insufficient to elicit information.¹³⁷

Anti-patents overcome this structural failure by extending the whistleblower concept: instead of concentrating on the employee level, the mechanism transcends to the firm level. It perceives the entire industry as possessing the relevant information, and incentivizes manufacturers to reveal (i.e., to patent) valuable information, by guaranteeing that this information will not adversely affect their liability.

The second example is the doctrine of “subsequent remedial measures.” Under Rule 407 of the Federal Rules of Evidence,

TEX. L. REV. 1151, 1153 (2010) (“Dozens of existing federal statutes and hundreds of state statutes include [] whistle-blower protections or incentives in a vast range of fields including tax regulation, environmental law, employment discrimination, health and safety, and trading standards.”); Givati, *supra* note 17, at 48–50 (reviewing whistleblower laws).

¹³⁴ See, e.g., Alexander Dyck, Adair Morse & Luigi Zingales, *Who Blows the Whistle on Corporate Fraud?*, 65 J. FIN. 2213, 2215 (2010) (noting that easy access to information allows employees to report corporate fraud).

¹³⁵ See generally Givati, *supra* note 17.

¹³⁶ See, e.g., Toxic Substances Control Act 15 U.S.C. § 2622; Federal Water Pollution Control Act, 33 U.S.C. § 1367; Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9610.

¹³⁷ See Feldman & Lobel, *supra* note 133, at 1157–58.

information on remedial measures taken after an accident is generally inadmissible as evidence of ex ante misconduct.¹³⁸ This Rule is, again, an information-generating mechanism. Information on subsequent remedial measures may well carry probative value regarding the defendant's liability. Nevertheless, the legal system chooses not to use it: Rule 407 motivates injurers to use newly discovered precautions ex post, rather than to hide them out of fear of admitting guilt.¹³⁹ Anti-patents follow the same logic and structure.

The second criticism, as noted, bemoans the differential level of care that anti-patents set forth for potential injurers. This argument essentially spotlights the fact that, upon enjoying an anti-patent, the relevant injurer-innovator can maintain a standard of care that falls below the socially desirable one (given its own invention). We contend, again, that this result might be less exceptional than it appears at first sight.

Grandfathering statutes are a case in point. Under such statutes, preexisting injurers are allowed to preserve the technological standard they already use, while new entrants must abide by higher standards—the technology available at the point they enter the market.¹⁴⁰ The inevitable result is, therefore, of a differential standard of care. New entrants are subject to a higher standard of care than preexisting actors.

One rationale that underlies grandfathering statutes is to induce actors to enter the market, assuring them that they will not be required to constantly adjust their level of care to the best available technology.¹⁴¹ Anti-patents perform a similar function with respect to the applicable standard of care. The mechanism stimulates injurer-innovators to invest in the development of new

¹³⁸ FED. R. EVID. 407.

¹³⁹ See Richard A. Posner, *An Economic Approach to the Law of Evidence*, 51 STAN. L. REV. 1477, 1485 (1999) (“The primary concern [underlying Rule 407] is that the admissibility of such evidence would, by discouraging repairs, increase the risk of future accidents.”). See generally Dan M. Kahan, *The Economics—Conventional, Behavioral, and Political—of “Subsequent Remedial Measures” Evidence*, 110 COLUM. L. REV. 1616 (2010) (reviewing conventional justifications of Rule 407).

¹⁴⁰ For a survey, see Richard J. Lazarus, *Congressional Descent: The Demise of Deliberative Democracy in Environmental Law*, 94 GEO. L.J. 619, 623–29 (2006) (describing environmental regulations passed by Congress); Gideon Parchomovsky & Endre Stavang, *The Green Option*, 99 MINN. L. REV. 967, 974–80 (2015) (noting widespread grandfathering in environmental and land use regulations); and Jonathan Remy Nash & Richard L. Revesz, *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 101 NW. U. L. REV. 1677, 1677–80 (2007) (discussing the expansion of grandfathering provisions).

¹⁴¹ See Shavell, *supra* note 18, at 38–39.

technologies while assuring them that this investment will not render them worse off. The result, as in the case of grandfathering statutes, is that the standard of care varies across tortfeasors.

The resemblance in result between grandfathering statutes and anti-patents, however, does not imply their conceptual identity. Anti-patents may usefully be thought of as the mirror image of grandfathering. While grandfathering statutes *adhere* to the existing technological standard, the anti-patent mechanism seeks constant *change* and celebrates innovation. An anti-patents mechanism is dynamic in nature. At any given point, different injurers may reap the benefit that this legal construct packs. To turn back to Examples 1–3, while *A* may benefit from an anti-patent at one point, once *B* comes up with an even better filter, the anti-patent mechanism would benefit *B* instead.

To conclude, the anti-patent mechanism utilizes the existence of competition between injurers and offers a unique solution to the injurer-innovator problem. This solution shares the advantageous features of several existing doctrines designed to elicit the disclosure of socially beneficial information.

CONCLUSION

Patent and tort law have long been viewed as operating in distinct domains. The preceding analysis has suggested that this perception is misguided; they are not distant relatives but rather competitors with one another. Particularly, when injurers are also potential innovators, patent and tort law pull in opposite directions. Whenever the cost of self-implementing a new technology surpasses the revenues that may be reaped by owning a patent, tort law undermines patent law and may discourage technological improvements. This dynamic prevails under both negligence and strict liability and is immune to variations in victim type. The cases of Blitz, DuPont, and Bic suggest that this phenomenon is real and worrisome.

Upon identifying the overlooked injurer-innovator problem, we have in this Essay developed a solution: anti-patents. This solution turns the conventional exclusivity structure of patent law on its head. The proposed regime allows a patent holder, and only a patent holder, to avoid implementing the patented invention, thereby keeping its cost of care unchanged. By doing so, anti-patents remove the obstacle set by tort law and allow injurer-innovators to gain from their inventions.

Anti-patents outperform potential alternatives such as prizes, grants, and tax benefits. The proposed legal construct also shares common features with existing doctrines designed to induce the disclosure of private information. Anti-patents therefore offer a new scheme under which the patent and tort systems can be realigned, averting the injurer-innovator problem.