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## Prevention and Cure

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# PREVENTION AND CURE

*Michael Pappas\**

*Laws can address harms in two distinct yet intersecting ways. They may intervene to prevent harms from occurring, or they may allow harms to arise and then try to cure them.*

*Whether operating separately or in tandem, prevention and cure approaches pervade laws, policies, and individual actions. A landlord may exercise prevention via a “no pets” policy, or she may opt for cure by requiring pet owners to pay a damage deposit and cleaning fee. Alternatively, a combination of prevention and cure governs motorist behavior. Speed limits seek to prevent accidents while negligence liability provides compensation for accident victims. Further, climate-change policies seek to prevent climate-impacts by curtailing greenhouse-gas emissions, and they attempt to cure climate-harms via disaster assistance.*

*Prevention and cure are ubiquitous, but their features and relationship are underexplored. This Article changes that. It investigates prevention and cure to provide a novel framework for assessing and enhancing the structure of law and policy. This informs policy design across a range of substantive areas. It identifies situations that counsel predominant prevention or cure approaches, and it uncovers mutually reinforcing prevention-and-cure combinations. Further, the Article applies the prevention-and-cure framework to explain and critique policy domains ranging from motorist behavior to climate change. This perspective particularly illuminates how the various legal and policy responses to climate change interrelate, and how they miss opportunities to align complementary prevention and cure measures. It identifies how relatively small structural changes can conjoin seemingly disparate climate-change regulations, liabilities, programs, and precautions into a cohesive policy landscape.*

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## TABLE OF CONTENTS

INTRODUCTION .....	1070
I. CONCEPTUALIZING PREVENTION AND CURE.....	1074
A. The Basic Prevention and Cure Distinction .....	1074
B. Prevention and Cure in Doctrines, Policies, and Economic Principles .....	1075
1. Doctrines and Policies.....	1075
2. Economic Principles .....	1078
C. Interplay Between Prevention and Cure .....	1079
II. PREVENTION AND CURE ACROSS DIVERSE VALUES.....	1080
A. Normative Commitments and Conceptions of Harm ...	1080
1. Positivism.....	1081
2. Utilitarianism .....	1083
3. Natural Rights .....	1086
4. Distributive Justice.....	1091
B. Scenarios Suggesting Predominant Prevention or Cure Strategies.....	1094
1. Readily Curable Versus Effectively Incurable Harms.....	1094
2. Justifiable Harm or Undesirable Behavior.....	1096
3. Coordination.....	1098
III. IMPERFECTIONS IN APPLIED PREVENTION AND CURE .....	1100
A. Over-inclusive and Under-inclusive Prevention.....	1101
1. Knowledge Limitations.....	1101
2. Political Pressures .....	1102
3. Uncertainty, Transaction Costs, Under-protection and Under-compensation .....	1103
B. Over-inclusive and Under-inclusive Cure .....	1105
1. Under-inclusive Cure .....	1105
2. Over-inclusive Cure .....	1107
IV. INTEGRATED PREVENTION AND CURE STRATEGIES .....	1108
A. Major Variations of Prevention and Cure.....	1109
1. External or Internal .....	1112
a. External or internal prevention .....	1112
b. External or internal cure .....	1117
c. Graphical depiction and application to climate change.....	1118
2. Property Rule or Liability Rule.....	1120

a.	Prevention by property rule or liability rule .....	1121
b.	Cure by property rule or liability rule.....	1122
c.	Graphical depiction and application to climate change .....	1124
3.	Ex-Ante or Ex-Post .....	1126
a.	Ex-ante and ex-post prevention .....	1126
b.	Ex-ante and ex-post cure .....	1128
c.	Graphical depiction and application to climate change .....	1129
4.	Actor Presumption or Victim Presumption.....	1130
a.	Graphical depiction and application to climate change .....	1131
B.	Complementary Prevention and Cure Measures .....	1133
1.	Addressing Under-inclusive Prevention .....	1133
2.	Addressing Over-inclusive Prevention .....	1134
3.	Addressing Under-inclusive Cure.....	1135
4.	Addressing Over-inclusive Cure.....	1136
C.	Prevention and Cure in Integrated Policy Landscapes .	1138
1.	Motorist Behavior .....	1139
a.	External prevention.....	1139
b.	Cure .....	1140
c.	Internal prevention.....	1142
d.	The policy landscape surrounding motorist behavior .....	1143
2.	Climate Change.....	1143
a.	External prevention.....	1144
b.	Cure .....	1146
c.	Internal prevention.....	1148
d.	The policy landscape surrounding climate change .....	1148
	CONCLUSION .....	1150

## INTRODUCTION

When do we want a rule of “don’t touch” and when do we want “you break it, you buy it”? When “do not enter” and when “leave it like you found it”? When “no dogs” and when “pet deposit plus cleaning fee”? Put another way, when should we *prevent* harms, avoiding them at the cost of foreclosed opportunity, and when should we let actions proceed relatively unconstrained, seeking to *cure* problems that arise?

Prevention and cure approaches pervade both private behavior and public and private law. Most basically, prevention seeks to avoid harms, and cure seeks to remedy harms. This Article contends that prevention and cure are foundational concepts for law and policy, and that appreciating structures of prevention and cure can explain and improve law across numerous substantive areas.

Consider a few contemporary examples. Should policies drastically curtail greenhouse gas emissions to avert the harms of climate change, or should emissions persist as they may, with society reacting to climate impacts that arise? Should some speech be restricted, or should all speech be free of limitations other than liability for damages? Should breakthrough pharmaceuticals hit markets immediately, or should they be unavailable until approved? Should land development be governed by planning and zoning laws, or should courts just resolve conflicts as needed? Should internet platforms screen user-uploaded content for copyright violations, or should they simply take down infringing material upon notice from a copyright holder? These debates sound in different fields, but underlying them all is the choice among prevention and cure strategies.

From parenting decisions to policy preferences, the prevention-and-cure framework applies broadly. Indeed, ideological divides often track inclinations toward prevention or cure. For instance, arguments (typically from the political left) for urban planning, pollution control, consumer protection, and regulatory oversight appear to embrace the idiom that “an ounce of prevention is worth a pound of cure.”<sup>1</sup>

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1. See *An Ounce of Prevention Is Worth a Pound of Cure*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/anounceofpreventionisworthapoundofcure> (last visited June 4, 2021) (describing the idiom). For examples of arguments that appear to embrace the idiom, see, e.g., Albert C. Lin, *The Unifying Role of Harm in Environmental Law*, 2006 WIS. L. REV. 897, 910–11; Christopher H. Schroeder, *Lost in the Translation: What Environmental Regulation Does that Tort Cannot Duplicate*, 41 WASHBURN L.J. 583, 589 (2002).

Alternately, arguments (typically from the political right) for deregulation,<sup>2</sup> entrepreneurial opportunity, cutting red tape, and limiting government embrace an “I’ll clean up after myself” (or, possibly, “better to ask forgiveness than permission”) approach rooted in cure.

To crystalize the distinction between prevention and cure, imagine two extreme policies. First, consider a pure prevention regime. This would constrain all potentially harm-causing behavior and would avoid many harms. However, it would almost surely fail to contain *all* antisocial behavior, and it would foreclose much potentially beneficial activity.<sup>3</sup>

Alternatively, consider an extreme cure regime. It would impose no limits on behavior, maximizing autonomy to act, but it would require that any resulting harms be remedied.<sup>4</sup> The prospect of cure obligations would incentivize actors to take some precautions, but invariably some irreparable harms would arise.

These hypotheticals showcase the divergence between prevention and cure as well as their respective limitations, illustrating why prevention and cure approaches rarely operate in isolation. While individual prevention and cure measures can sometimes be substitutes, policy structures typically combine complementary prevention and cure approaches. Thus, revisiting the question “when do we want a rule of ‘don’t touch’ and when do we want ‘you break it, you buy it,’” most often we will want to deploy elements of both. This Article details when and how laws can do so.

By building the conceptual framework of prevention and cure, the Article illuminates the core architecture of law and policy, providing both descriptive and prescriptive insights. Descriptively, the Article exposes recurrent structures of prevention and cure that underlie legal doctrines across diverse substantive areas. Using the prevention-and-cure framework, the Article explains a sweeping range of common-

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2. See, e.g., Barak Y. Orbach, *The New Regulatory Era—An Introduction*, 51 ARIZ. L. REV. 559, 559 (2009) (explaining changes in political attitudes towards regulation following the 2008 financial crisis).

3. Cf. David Fouse, *Do Public Health Protections Infringe on Freedoms?*, PUB. HEALTH NEWSWIRE (Oct. 21, 2011, 4:18 PM), <https://web.archive.org/web/20180821110740/http://www.publichealthnewswire.org/?p=1630> (describing the tension between public health regulations and personal freedom).

4. See Catherine A. Hardee, *Considering Consequences: Autonomy’s Missing Half*, 43 PEPP. L. REV. 785, 788 (2016).

law, statutory, and constitutional principles. For instance, among many other examples, the Article clarifies climate change law and policy, applying the framework to make sense of major climate change litigation and regulation, elucidate key differences in cap-and-trade and carbon-tax policies, and uncover connections between disaster assistance and tort liability. Moreover, the prevention-and-cure framework offers a structure to understand not only individual legal approaches but also relationships among policies. Accordingly, the Article analytically (and graphically) maps interlinked policy landscapes surrounding climate change and other policy contexts.

Prescriptively, the prevention-and-cure framework helps enhance policy design. It identifies scenarios suggesting predominant prevention or cure approaches, and it recommends effective combinations of prevention and cure. Further, it diagnoses structural policy gaps where prevention and cure measures fail to reinforce each other. For example, it illuminates how the various legal and policy responses to climate change interrelate, and how they miss opportunities to align complementary prevention and cure measures. Further, it reveals relatively small structural changes that can knit seemingly disparate climate change regulations, liabilities, programs, and precautions into a cohesive policy landscape. Through this and other applications, the prevention-and-cure framework offers a theoretical and practical lens to explain, critique, and improve law and policy.

Additionally, the prevention-and-cure framework advances multiple strains of academic literature. It bridges legal philosophy,<sup>5</sup> law and economics,<sup>6</sup> and numerous public- and private-law doctrines, including tort, property, contract, constitutional law, and environmental law. It also weaves together prominent lines of scholarship addressing the relationship of risk and harm,<sup>7</sup> the roles of

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5. See, e.g., Robert P. George, *Natural Law*, 31 HARV. J.L. & PUB. POL'Y 171, 184 (2008).

6. See, e.g., Marcel Boyer & Donatella Porrini, *Modelling the Choice Between Regulation and Liability in Terms of Social Welfare*, 37 CANADIAN J. ECON. 590, 590–612 (2004).

7. See, e.g., ARIEL PORAT & ALEX STEIN, TORT LIABILITY UNDER UNCERTAINTY 103–10 (2001); Steven Shavell, *The Optimal Structure of Law Enforcement*, 36 J.L. & ECON. 255, 257 (1993); Nuno Garoupa & Marie Obidzinski, *The Scope of Punishment: An Economic Theory of Harm-Based vs. Act-Based Sanctions* 1–17 (Ctr. for Econ. Pol'y Res., Discussion Paper No. 5899, 2006).

private liability and public regulation,<sup>8</sup> and the deployment of property rules and liability rules.<sup>9</sup>

Finally, the prevention-and-cure framework makes novel contributions through its expansive scope. Building on prior scholarship that focused primarily on tort and property law,<sup>10</sup> this framework transcends substantive legal domains. Moreover, this breadth comes with depth. The Article considers multiple policy-design variables, both individually and in combination, yielding a more expansive model and more refined observations than did prior work.<sup>11</sup> Additionally, whereas previous literature offered relatively static comparisons of binary regimes,<sup>12</sup> this Article provides dynamic analysis of how different policy choices compare, interconnect, and feedback upon each other. Finally, the Article incorporates a plurality of values into the prevention-and-cure framework, making it adaptable to a variety of normative commitments beyond the primarily utilitarian focus of previous analyses.<sup>13</sup>

Structurally, the Article proceeds as follows: Part I establishes the prevention-and-cure framework. It outlines the basic distinction, and it surveys diverse examples of prevention and cure approaches. It also highlights key interrelations between prevention and cure.

Part II considers how different normative values influence preferences for prevention and cure. It expounds how positivist, utilitarian, natural rights, and distributive justice commitments generate competing conceptions of “harm,” and it identifies scenarios that call for predominant prevention or cure strategies.

Next, Part III examines the practical limitations of prevention and cure. It surveys how prevention and cure measures may be either over-

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8. See, e.g., Steven Shavell, *Liability for Harm Versus Regulation of Safety*, 13 J. LEGAL STUD. 357, 357 (1984); Donald Wittman, *Prior Regulation Versus Post Liability: The Choice Between Input and Output Monitoring*, 6 J. LEGAL STUD. 193, 193–211 (1977).

9. See, e.g., Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972); Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 71 (1996).

10. See *supra* notes 7–9.

11. Earlier related work typically considered binary policy regimes along an individual dimension, for example juxtaposing public regulation and private liability. See *id.*

12. See *id.*

13. See *id.*



inclusive or under-inclusive and how this may frustrate various normative commitments.

Finally, Part IV provides insights for designing integrated prevention and cure strategies. It explores variations of prevention and cure, such as 1) internal or external implementation, 2) property-rule or liability-rule enforcement, 3) ex-ante or ex-post timing, and 4) actor-presumption or victim-presumption. It also details how particular complementary prevention and cure measures can combine to advance policy goals. Finally, it examines how multiple prevention and cure measures can assemble into interconnected policy landscapes, and it applies these insights to explain and critique policies addressing motorist behavior and climate change. Through this application, Part IV demonstrates how disjointed prevention and cure measures inhibit climate change policy goals, and it suggests how expanding particular cure variations can reinforce climate-policy efforts.

## I. CONCEPTUALIZING PREVENTION AND CURE

Prevention and cure are trans-substantive<sup>14</sup> approaches for addressing harm.<sup>15</sup> Prevention tries to avoid harms, and cure attempts to remedy them. While the two approaches interrelate,<sup>16</sup> they are nonetheless conceptually distinct. This Part outlines the basic binary of prevention and cure, essentializing them to highlight core aspects and to underpin subsequent analysis of their nuances. It also applies the prevention-and-cure framework to explain legal doctrines and economic principles. Finally, it discusses key interrelations between prevention and cure.

### A. *The Basic Prevention and Cure Distinction*

Prevention approaches are actions, interventions, or choices that seek to avoid harm. Prevention may be private or public. For instance, prevention may include precautionary actions (e.g., signs warning of a slippery floor), prohibitions on actions (e.g., laws against drunk

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14. “Trans-substantive” refers to a discernible concept that remains consistent across a variety of substantive areas. See David Marcus, *Trans-Substantivity and the Processes of American Law*, 2013 BYU L. REV. 1191, 1197.

15. For a discussion of the concept of harm, see *infra* Part II.

16. See *infra* discussion Section I.A.

driving), or conditions on actions (e.g., requirements for construction permits). The defining feature of prevention is an attempt to direct behavior to avoid negative impacts. Thus, prevention focuses centrally on *behavior* or *action*.

Alternatively, cure approaches are efforts to remedy harms, and cure too can be private or public. Frequently cure approaches place remedial obligations on actors who cause harms. For example, negligent drivers who cause automobile accidents face liability. However, as a conceptual matter, cure approaches need not track causation. For example, hospitals offering emergency services must treat harms they did not cause and must provide care even if neither the harm-causing party nor the injured party can pay.<sup>17</sup> Some cure arrangements even have victims provide their own remedies, essentially letting harms fall where they may.<sup>18</sup>

This reveals the fundamental aspect of cure: it simply reacts to harms. While linking cure obligations to harm causation may comport with notions of justice or create desirable incentives, cure itself has no inherent commitment to causation or avoidance. Thus, whereas prevention focuses centrally on directing *behavior* or *action*, cure focuses centrally on handling the *result* or *damage*. This key distinction separates prevention and cure and underpins this Article's analytical framework.

### *B. Prevention and Cure in Doctrines, Policies, and Economic Principles*

The prevention-and-cure framework exposes recurrent, trans-substantive structures in legal doctrines, policy configurations, and economic principles. This helps explain individual doctrines, doctrinal interplay, and policy landscapes. It also allows insights from one area of law to inform seemingly unrelated legal contexts.

#### 1. Doctrines and Policies

The prevention-and-cure framing elucidates individual doctrines, doctrinal complements and substitutes, and broad policy approaches.

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17. See, e.g., *Emergency Medical Treatment & Labor Act*, CTRS. FOR MEDICARE & MEDICAID SERVS., <https://www.cms.gov/regulations-and-guidance/legislation/emtala/> (last modified Mar. 4, 2021, 11:59 AM).

18. See *infra* Section IV.A.1.b for a discussion of external cure.

First, attention to prevention and cure regimes reveals nonintuitive links among common-law, constitutional-law, statutory, and regulatory doctrines. For instance, the doctrine of negligence embodies a cure approach. Individuals may act as they will, but they must remedy harms caused by unreasonable behavior. The doctrine of nuisance is similar. Individuals have latitude to use property, but when conflicts arise, courts assess relative rights and order remedies for harms. Additionally, eminent domain and regulatory takings doctrines reflect constitutional cure approaches. Both doctrines authorize broad government action but require compensation for incursions on private property rights. Statutory and regulatory regimes also employ cure strategies. For example, Clean Water Act regulations use offsets to cure environmental harms; they maintain “no net loss” of wetlands by requiring an entity destroying wetlands to create or restore other wetlands.<sup>19</sup>

Prevention approaches too span common law, constitutional law, statutes, and regulations.<sup>20</sup> As a broad example, criminal laws frequently proscribe certain behavior (e.g., theft) to avoid harms. Additionally, trespass doctrines foreclose unpermitted entry onto property to prevent physical or dignitary harms. Further, the common-law standard for issuing injunctions seeks to avoid irreparable harms. Numerous constitutional provisions also adopt prevention approaches. Article I, Section 10 directs “No State shall enter into any Treaty, Alliance, or Confederation,” and this forbids behavior that might harm the union or interfere with federal foreign affairs powers.<sup>21</sup> Similarly, Eleventh Amendment immunity prevents individuals from suing states, absent the state’s consent, to avoid harms to sovereignty.<sup>22</sup> Some constitutional doctrines even prevent acts of prevention. For example, the presumptive unconstitutionality of “prior restraints” on speech<sup>23</sup> guards against harm to the free press<sup>24</sup> by limiting

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19. Clean Water Act, 33 U.S.C. § 1321 (2018).

20. Cf. Philip M. Nichols, *The Good Bribe*, 49 U.C. DAVIS L. REV. 647, 660–61 (2015) (explaining different academic approaches to prevention).

21. U.S. CONST. art. I, § 10, cl. 1.

22. See generally *Alden v. Maine*, 527 U.S. 706 (1999) (discussing the history of Eleventh Amendment immunity).

23. See, e.g., *Bantam Books, Inc. v. Sullivan*, 372 U.S. 58, 70 (1963); Ariel L. Bendor, *Prior Restraint, Incommensurability, and the Constitutionalism of Means*, 68 FORDHAM L. REV. 289, 291 (1999).

24. See *Near v. Minnesota ex rel. Olson*, 283 U.S. 697, 719–20 (1931).

government censorship power. Finally, prevention abounds in legislation and regulation. The Clean Water Act prohibits unpermitted pollution of navigable waters,<sup>25</sup> the 1958 Federal Switchblade Act prohibits interstate travel with automatic knives,<sup>26</sup> a Louisiana law prohibits taking white or albino alligators from the wild,<sup>27</sup> and a federal regulation requires hair nets and beard covers in certain food-manufacturing contexts.<sup>28</sup> All of these restrict behaviors to prevent an array of harms.

The prevention-and-cure framework also accentuates doctrinal complements and substitutes. For instance, laws address potential harms from motorist behavior by blending prevention and cure approaches. Prohibitions on drunk driving and speeding represent straightforward prevention approaches. Laws disallow these behaviors to avoid harms. Concurrently, tort liability for accidents represents a cure approach. Much driving proceeds with relatively little external constraint, and when accidents invariably occur, injured parties turn to tort liability<sup>29</sup> and automotive insurance<sup>30</sup> for remedies.

Alternately, the contract doctrines of specific performance and efficient breach exemplify prevention and cure operating as substitutes. Specific performance adopts a prevention approach by enforcing a contract to “assure[] that the contractual duty is performed.”<sup>31</sup> This directs behavior to avoid the harm of breach by precluding the breach altogether.

Conversely, efficient breach exemplifies cure.<sup>32</sup> The doctrine holds that a party may breach a contract if all parties would be no

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25. 33 U.S.C. § 1251 (2018).

26. 15 U.S.C. § 1242 (2018).

27. LA. STAT. ANN. § 56:280 (West, Westlaw through the 2020 Second Extraordinary Sess.).

28. 21 C.F.R. § 110.10(b)(6) (2019).

29. Typically, tort liability exemplifies ex-post cure. *See infra* Section IV.C.1.b.

30. Automotive insurance itself provides ex-post cure, but laws mandating that drivers carry automotive insurance are a form of ex-ante cure similar to security deposits. *See infra* Section IV.C.1.b.

31. *See* Steven Shavell, *Specific Performance Versus Damages for Breach of Contract* 7 (John M. Olin Ctr. for L., Econ., & Bus. Discussion Paper, Paper No. 532, 2005), [http://www.law.harvard.edu/programs/olin\\_center/papers/pdf/Shavell\\_532.pdf](http://www.law.harvard.edu/programs/olin_center/papers/pdf/Shavell_532.pdf).

32. The principle of efficient breach provides an example, but some commentators suggest that efficient breach is rarely found in practice. *See, e.g.,* Roger B. Dworkin, *The Process Paradigm: Rethinking Medical Malpractice*, 41 WAKE FOREST L. REV. 509, 513 (2006); D. Daniel Sokol, *Order Without (Enforceable) Law: Why Countries Enter into Non-Enforceable Competition Policy Chapters in Free Trade Agreements*, 83 CHI.-KENT L. REV. 231, 250 n.83 (2008). However, other scholars maintain that even if cases do not label doctrinal rulings as efficient breach per se,

worse off (i.e., if the breaching party pays full expectancy damages).<sup>33</sup> For instance, imagine Actor contracts with Victim to supply a product worth \$100 to Victim (i.e., expectancy damages are \$100). Then Better Price offers to buy Actor's product for \$210. Actor could breach the contract with Victim, pay Victim \$100, sell to Better Price for \$210, and net \$110. Under these facts, all parties are as well off (or better) if the breach occurs because Actor will completely remedy the legally recognized harm to Victim.<sup>34</sup> By allowing the breach, subject to compensation, efficient breach embraces cure.

Depending on context, contract law deploys either prevention via specific performance (e.g., requiring delivery of unique goods) or cure via efficient breach (e.g., requiring expectancy damages for fungible goods).

Finally, the prevention-and-cure framework clarifies major policy approaches, such as overarching responses to climate change. One policy avenue, termed "climate mitigation," seeks to avoid climate change harms by, for example, reducing greenhouse gas emissions. This represents prevention. Another policy direction, termed "climate adaptation," focuses on navigating the impacts of climate change—for example, by relocating communities or modifying infrastructure to cope with sea level rise. This tracks cure.

## 2. Economic Principles

The prevention-and-cure framework also illuminates the two standard metrics of economic efficiency, Pareto and Kaldor-Hicks, which inform policy analysis and design. Evaluating efficiency under the Pareto standard reflects a prevention approach, whereas adopting the Kaldor-Hicks standard tends toward cure.

The Pareto standard asks if a change from the status quo makes one party better off while making no one else worse off. If so, the change is "Pareto superior."<sup>35</sup> This standard resonates with prevention

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the prevalence of expectancy damages represent de facto practice of the efficient breach. See MAXWELL L. STEARNS ET AL., *LAW AND ECONOMICS: PRIVATE AND PUBLIC* 74 (2018).

33. See, e.g., *Efficient Breach*, LEGAL INFO. INST., [https://www.law.cornell.edu/wex/efficient\\_breach](https://www.law.cornell.edu/wex/efficient_breach) (last visited Apr. 11, 2021); STEARNS ET AL., *supra* note 32.

34. See generally Richard R.W. Brooks, *The Efficient Performance Hypothesis*, 116 *YALE L.J.* 568 (2006) (discussing utilitarian and moral aspects of efficient breach).

35. See STEARNS ET AL., *supra* note 32, at 20.

because it avoids harms, protecting individuals at the expense of foregone opportunity.

Alternatively, the Kaldor-Hicks standard considers a change efficient if it produces more benefits than it does costs, even if the change leaves some parties worse off.<sup>36</sup> Rather than focusing on individuals, as the Pareto standard does, the Kaldor-Hicks approach adopts a societal cost-benefit analysis.<sup>37</sup> It reasons that if aggregate gains exceed aggregate losses, society benefits because gaining parties *could* compensate losing parties (even if they do not actually do so).<sup>38</sup>

In this way, Kaldor-Hicks efficiency shares underpinnings with cure. Both Kaldor-Hicks and cure allow behavior to proceed based on presumptions that harms can be remedied. Additionally, Kaldor-Hicks and cure both disassociate remedial obligations from causation: Kaldor-Hicks imposes no actual remedial burdens at all, and cure regimes need not link remedial duties with causes of harm.

The prevention-and-cure framework helps distill the respective commitments of the Pareto and Kaldor-Hicks approaches. The Kaldor-Hicks standard uses cure concepts to justify exposing individuals to harms (e.g., involuntary transfers<sup>39</sup>) in pursuit of collective social advances. Conversely, the preventive Pareto standard protects individuals from harm, even at the expense of thwarting potential social benefits.<sup>40</sup>

### C. Interplay Between Prevention and Cure

The previous sections outlined the defining distinctions between prevention and cure. This section describes two important ways that they interrelate: 1) cure obligations create incentives for prevention, and 2) since prevention efforts cannot eliminate harms, they leave room for cure.

First, cure incentivizes prevention. Actors frequently avoid harms to obviate the costs of cure. Indeed, economic analysis of tort law has long suggested that the prospect of liability (i.e., cure) leads actors to

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36. *Id.* at 21.

37. *See, e.g.*, Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 *YALE L.J.* 165, 170 (1999).

38. *See, e.g., id.* at 190.

39. *See, e.g., id.* at 170.

40. STEARNS ET AL., *supra* note 32, at 20–21; Adler & Posner, *supra* note 37, at 188.

invest in cost-effective precautions (i.e., prevention).<sup>41</sup> For example, concern over tort liability may lead the owner of a swimming pool to build a precautionary fence around the pool.

Additionally, prevention leaves room for cure because prevention measures cannot completely eliminate harms. Indeed, attempts to do so would be costly and futile.<sup>42</sup> Even focused, effective prevention efforts will not result in full compliance. As long as there is driving, there will likely be some drunk driving. Additionally, because of residual risk, some harms are essentially unpreventable. Some car crashes will occur despite safe driving; some well-made, properly-used products will malfunction; and some workers will be hurt even at safe jobsites. Cure is the only option to address such unpreventable harms.<sup>43</sup>

These connections between prevention and cure are enormously important for policy design, and subsequent sections address them in more detail.

## II. PREVENTION AND CURE ACROSS DIVERSE VALUES

The prevention-and-cure framework transcends not only different substantive contexts but also diverse values. This Part examines how differing normative commitments generate competing conceptions of “harm,” which in turn yield different preferences for prevention and cure approaches. It also identifies scenarios that call for predominant prevention or cure strategies.

### A. Normative Commitments and Conceptions of Harm

Laws and policies rely on prevention and cure structures to address *harms*. This necessitates some underlying concept of “harm” to guide the deployment of prevention or cure approaches. However, ideas of harm are unfixed and inherently contestable. As philosopher Joel Feinberg observed, “harm” may represent a nonnormative, value-neutral “setback to interests,” or it may represent a normative

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41. See STEARNS ET AL., *supra* note 32, at 73–78; Shavell, *supra* note 8.

42. Cf. W. Kip Viscusi, *Toward a Diminished Role for Tort Liability: Social Insurance, Government Regulation, and Contemporary Risks to Health and Safety*, 6 YALE J. ON REG. 65, 93 (1989) (explaining the impossibility of eliminating health and safety risks).

43. Cf. *id.* (citing cure via compensation as an “important social objective”).

“wrong.”<sup>44</sup> Either way, harm takes shape only in relation to the *interests* that are “setback” or the *values* that are “wronged.”<sup>45</sup>

This section surveys how influential normative commitments shape notions of harm. It considers how positivist, utilitarian, natural rights,<sup>46</sup> and distributive justice perspectives yield particular conceptions of harm. It also analyzes how these ideas of harm influence prevention and cure approaches by applying them to examples of eminent domain, drunk driving, and climate change.

### 1. Positivism

Positivism roots the legitimacy of laws in social authorities (e.g., legislatures) rather than in background morals or principles.<sup>47</sup> For a positivist, any law duly enacted by a recognized authority is valid.<sup>48</sup> Thus, positivism exalts process<sup>49</sup> and typically defers to lawmaking bodies. However, positivism need not entail rubberstamping, particularly in the face of political-process dysfunctions. Rather, positivist commitments can accommodate concerns over interest-group influence and rent seeking.<sup>50</sup>

The concept of harm, from a positivist perspective, also centers on duly enacted laws. Legal proscriptions and liabilities define harms and determine the prevention and cure measures to address such harms.

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44. See 1 JOEL FEINBERG, *THE MORAL LIMITS OF THE CRIMINAL LAW: HARM TO OTHERS* 31 (1987).

45. Cf. Bernard E. Harcourt, *The Collapse of the Harm Principle*, 90 J. CRIM. L. & CRIMINOLOGY 109, 114 (1999) (explaining historical change in attitudes toward harm).

46. This Article adopts the term “natural rights” to include what is commonly conceived of as “natural law,” with its religious-based morality roots, as well as more secular conceptions of morality. See generally Eduardo M. Peñalver, *Restoring the Right Constitution?*, 116 YALE L.J. 732, 737–49 (2007) (providing the history of natural law theory); George, *supra* note 5 (analyzing natural law theories through a lens of morality).

47. See, e.g., H.L.A. HART, *THE CONCEPT OF LAW* 185–86 (2d ed. 1994); see also Michael Baur, *Beyond Standard Legal Positivism and “Aggressive” Natural Law: Some Thoughts on Judge O’Scannlain’s “Third Way,”* 79 FORDHAM L. REV. 1529, 1538–39 (2011) (arguing that positivism flows from natural law).

48. Cf. Baur, *supra* note 47, at 1529–30 (explaining that legal positivism recognizes a law’s validity through social facts or conventions, not norms or moral principles).

49. See, e.g., Randolph Marshall Collins, *The Constitutionality of Flag Burning: Can Neutral Values Protect First Amendment Principles?*, 28 AM. CRIM. L. REV. 887, 894 (1991); William N. Eskridge, *Public Values in Statutory Interpretation*, 137 U. PA. L. REV. 1007, 1014 (1989).

50. See, e.g., Daniel A. Farber & Philip P. Frickey, *Foreword: Positive Political Theory in the Nineties*, 80 GEO. L.J. 457, 459–63 (1992).



To illustrate positivist conceptions of harm and their implications for prevention and cure, consider examples of eminent domain, drunk driving, and climate change.

First, imagine an exercise of eminent domain to condemn Owner's home. Further, imagine that Owner subjectively values her home well above its market value and that she disagrees with the condemnation's purpose. From a positivist perspective, no harm arises as long as the government pays Owner fair market value and the condemnation fits the legal definition of "public use." This is because the Fifth Amendment allows condemnation for public use if just compensation (i.e., market value) is paid.<sup>51</sup> So, even though Owner suffers subjective losses and believes the condemnation illegitimate, no legally cognizable (i.e., positivist) harm arises.

Alternatively, a positivist harm would arise if the condemnation contravened the Fifth Amendment, either by lacking a public-use justification or failing to provide just compensation.<sup>52</sup> To address such harm, positivism would prescribe either prevention or cure, depending on the relevant law. In this case, Fifth Amendment doctrine would invalidate (i.e., prevent) a condemnation that lacks a public-use justification. However, it would order payment (i.e., cure) for a condemnation that fails to provide just compensation.

Moving to the example of drunk driving, because it is illegal, the act of drunk driving itself constitutes a positivist harm, regardless of whether physical injury results. Moreover, laws address this harm through both prevention (e.g., prohibitions and fines) and cure (e.g., negligence per se and dram shop liability). Absent the prohibitions and liabilities particular to drunk driving, the action itself would not constitute a positivist harm.

Finally, in the context of climate change, positivism explains the divergent results in the two Supreme Court cases regarding greenhouse gas emissions, *Massachusetts v. EPA*<sup>53</sup> and *American Electric Power Co. v. Connecticut*.<sup>54</sup> In both cases, plaintiffs asserted harms from unchecked emissions, and the Court decided both cases

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51. U.S. CONST. amend. V.

52. *Id.*

53. 549 U.S. 497 (2007).

54. 564 U.S. 410 (2011) [hereinafter *AEP*].

through positivist application of the Clean Air Act (CAA).<sup>55</sup> In *Massachusetts v. EPA*, the Court found unregulated greenhouse gas emissions were a harm because the CAA required EPA to address such emissions.<sup>56</sup> The Court prevented<sup>57</sup> further harm by ordering EPA to comply with the CAA.<sup>58</sup> Conversely, in *AEP v. Connecticut*, the Court held that unregulated greenhouse gas emissions could not constitute a public-nuisance harm because the CAA displaced such common-law claims.<sup>59</sup> In both cases, positivist statutory application determined whether unregulated emissions were a cognizable harm.<sup>60</sup>

## 2. Utilitarianism

Utilitarianism seeks to maximize social welfare<sup>61</sup> by achieving “the greatest amount of good for the greatest number.”<sup>62</sup> To do so, utilitarian analysis weighs all the costs and benefits (broadly defined) of policy options and pursues the course that yields the greatest net benefit. To compare dissimilar costs and benefits,<sup>63</sup> utilitarianism requires some universal metric, and economic measures typically serve as the common currency. Thus, economic analysis is a primary evaluative tool for utilitarianism.<sup>64</sup>

Harm, to a utilitarian, is any cost that detracts from social welfare.<sup>65</sup> This means that utilitarian conceptions of harm can extend

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55. *EPA*, 549 U.S. at 505; *AEP*, 564 U.S. at 418–20.

56. *EPA*, 549 U.S. at 532.

57. This is an example of ex-post prevention, addressed further *infra* Section IV.A.3.a.

58. *EPA*, 549 U.S. at 535.

59. *AEP*, 564 U.S. at 420–23.

60. *Id.* at 425; *EPA*, 549 U.S. at 528.

61. Though utilitarianism and positivism are often associated, utilitarianism is outcome-driven whereas positivism is agnostic towards laws’ impacts. See, e.g., Maura Strassberg, *Taking Ethics Seriously: Beyond Positivist Jurisprudence in Legal Ethics*, 80 IOWA L. REV. 901, 914–15 (1995) (discussing the links between positivism and utilitarianism).

62. Julia Driver, *The History of Utilitarianism*, STAN. ENCYCLOPEDIA PHIL. (Sept. 22, 2014), <https://plato.stanford.edu/entries/utilitarianism-history/>.

63. For a discussion of the difficulty in determining comparative utilitarian benefit, see Adler & Posner, *supra* note 37.

64. *Cf.*, e.g., ROBERT COOTER & THOMAS ULEN, *LAW AND ECONOMICS* 4 (6th ed. 2012) (providing an overview of the impact of economics on the analysis and practice of law); Avery Wiener Katz, *Positivism and the Separation of Law and Economics*, 94 MICH. L. REV. 2229, 2239 (1996) (describing the influence of economics on the law); Jules L. Coleman, *Crimes and Transactions*, 88 CALIF. L. REV. 921, 927 (2000) (explaining the relationship between economics and criminality).

65. *Cf.* Driver, *supra* note 62 (explaining that the focus of utilitarianism is to “maximize the overall good”).

beyond positivist ones. For instance, utilitarian analysis views subjective and intangible losses as harms, even if such losses are not legally recognized harms.<sup>66</sup>

Utilitarianism addresses harms differently at the individual and social level. Utilitarianism seeks to avoid (i.e. prevent) harms to net social welfare, even if that means allowing some particular individual harms. The justification is that the overall social benefit offsets (i.e. cures) the individual harms.<sup>67</sup> Accordingly, to a utilitarian, the choice between prevention and cure regimes is necessarily an empirical question.<sup>68</sup>

Revisiting the examples of eminent domain, drunk driving, and climate change helps explain. First, recall the hypothetical eminent-domain condemnation of Owner's home, and recall that Owner subjectively values her home above its market value. From a utilitarian perspective, the homeowner's loss of subjective value is a harm.

However, the utilitarian response to this harm depends on a broader measurement of social welfare. For instance, imagine that the condemnation is to build a lightly trafficked highway that will also require condemnation of other homes.<sup>69</sup> If the aggregate costs (all homeowners' subjective losses plus highway construction costs) outweigh the aggregate benefits (a little-used highway), the condemnation causes net social harm. Utilitarian analysis calls for preventing the condemnations and highway project.

Alternatively, imagine that the highway would benefit many people and would require only the condemnation of Owner's home. If the highway's aggregate benefits now exceed its costs (Owner's subjective losses plus highway construction costs), the condemnation

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66. Utilitarian conceptions of harm may also be narrower than positivist ones, such as when positive law identifies a harm in a scenario that utilitarianism views as merely distributional. For example, if a law requires that an insurance company cover certain losses, but the insurance company refuses to pay the policyholder for such losses, then the policyholder has suffered a harm in a positivist sense but not necessarily in a utilitarian sense. From a utilitarian standpoint, unless the payment impacts net social welfare, then the issue is merely distributional and creates no social harm.

67. *See supra* discussion Section I.B.2.

68. Utilitarian analysis should also consider the costs of administering different combinations of prevention and cure approaches.

69. Baltimore's "road to nowhere" serves as an unfortunate example of such a project. *See* Johnny Miller, *Roads to Nowhere: How Infrastructure Built on American Inequality*, *GUARDIAN* (Sept. 23, 2018, 10:27 AM), <https://www.theguardian.com/cities/2018/feb/21/roads-nowhere-infrastructure-american-inequality>.

represents a net social gain. Here, utilitarianism supports the condemnation and considers the net benefits to effectively cure Owner's harms.

Crucially, in both scenarios, Owner's harms are identical. However, the utilitarian response to these harms, whether via prevention or cure, varies based on the social welfare context.

Moving to the example of drunk driving, such behavior represents a utilitarian harm only when it decreases social welfare. Thus, utilitarianism would prevent drunk driving to an optimal point where the aggregate costs (broadly defined) of both drunk driving and its prevention efforts are lowest. At that point, some drunk driving would likely still occur, but utilitarian analysis would not consider those instances a social harm because eliminating them would be costlier than allowing them.

Finally, utilitarian analysis of climate change asks whether greenhouse gas emissions cause net losses or net gains, and empirical disagreement over this question causes major climate-policy divergence. If, as some prominent economists argue, climate change costs outweigh the benefits of current greenhouse gas emissions, then climate change is a social harm.<sup>70</sup> Accordingly, utilitarianism suggests preventing the harm by reducing emissions to the point where their benefits exceed projected climate change costs. Proposed climate policies like the Waxman-Markey Bill<sup>71</sup> and the Obama-era Clean Power Plan<sup>72</sup> generally followed this utilitarian approach. Both aimed to eliminate lower-value emissions to reduce climate change costs while retaining the greatest benefits from remaining emissions.

However, if, as some economists assume, the benefits of current emissions outstrip climate change costs,<sup>73</sup> then utilitarian analysis suggests development gains are worth climate impacts.<sup>74</sup> If so,

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70. See, e.g., Expert Report of Joseph E. Stiglitz, Ph.D. at 7, *Juliana v. United States*, No. 6:15-cv-01517-TC (D. Or. June 28, 2018), [https://biotech.law.lsu.edu/blog/document\\_cw\\_01-2.pdf](https://biotech.law.lsu.edu/blog/document_cw_01-2.pdf).

71. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (1st Sess. 2009).

72. U.S. ENV'T PROT. AGENCY, OVERVIEW OF THE CLEAN POWER PLAN: CUTTING CARBON POLLUTION FROM POWER PLANTS, <https://archive.epa.gov/epa/sites/production/files/2015-08/documents/fs-cpp-overview.pdf> (last visited Apr. 11, 2021).

73. Matthew Rendall, *Discounting, Climate Change, and the Ecological Fallacy*, 129 ETHICS 441, 444 (2019) ("Economists commonly assume that economic growth will leave future generations richer than the present one, in spite of climate change.").

74. *But see id.* at 444–45 (criticizing this premise).

emission reductions are unwarranted because enhanced social welfare theoretically cures climate-related losses. Under these assumptions, utilitarianism supports Trump Administration policies that minimally restrict emissions<sup>75</sup> or bypass climate change analysis<sup>76</sup> in pursuit of economic growth.

Though seemingly antithetical, the divergent emissions policies described above share consistent utilitarian concepts of harm and criteria for deploying prevention or cure. The policy differences manifest from conflicting estimates of aggregate costs and benefits.

### 3. Natural Rights

From a natural rights perspective, laws must comport with principles of morality, right action, or justice. Procedures alone cannot legitimize laws, as with positivism, nor are all values fungible in pursuit of social welfare, as with utilitarianism.<sup>77</sup> Rather, a natural rights approach holds that valid laws must adhere to certain essential normative standards.<sup>78</sup>

This section focuses on particular natural rights commitments to individual liberty and autonomy, which emerge as common themes across diverse natural rights theories.<sup>79</sup> Such concepts of liberty and autonomy are considered essential to “integral human fulfillment”<sup>80</sup> because they entail “the capacity to be one’s own person, to live one’s life according to reasons and motives that are taken as one’s own and not the product of manipulative or distorting external forces.”<sup>81</sup> Further, these liberty and autonomy values are inclusive,

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75. Dallas Burtraw & Amelia Keyes, *10 Big Little Flaws in EPA’s Affordable Clean Energy Rule*, RES. FOR THE FUTURE (July 22, 2019), <https://www.rff.org/publications/issue-briefs/10-big-little-flaws-in-epas-affordable-clean-energy-rule/>.

76. Lisa Friedman, *Trump Rule Would Exclude Climate Change in Infrastructure Planning*, N.Y. TIMES (Jan. 18, 2021), <https://www.nytimes.com/2020/01/03/climate/trump-nepa-climate-change.html>.

77. Cf. George, *supra* note 5, at 184 (explaining that natural law is fundamentally concerned with incommensurable “basic human goods”).

78. Cf. Adler & Posner, *supra* note 37, at 171 (discussing a cost-benefit analysis approach to crafting regulations).

79. See James Donato, Note, *Dworkin and Subjectivity in Legal Interpretation*, 40 STAN. L. REV. 1517, 1517 (1988) (noting that natural rights theories can be rooted in sources ranging from god and nature to secular “history and community structure”).

80. George, *supra* note 5, at 172.

81. John Christman, *Autonomy in Moral and Political Philosophy*, STAN. ENCYCLOPEDIA PHIL. (June 29, 2020), <https://plato.stanford.edu/entries/autonomy-moral/>; see JOSEPH RAZ, *THE MORALITY OF FREEDOM* 371–74 (1988).

encompassing both potential actors' "freedom to" act and potential victims' "freedom from" subjugation.<sup>82</sup>

Given natural rights' commitments to liberty, a natural rights harm is any undue incursion on liberty. As for what constitutes an undue incursion, that depends on one's underlying concept of autonomy, and two influential moral-political theories offer prominent standards for measuring natural rights harm. These theories are the "neutralist" and "legal moralist" approaches.<sup>83</sup>

Under the neutralist approach,<sup>84</sup> a harm to the liberty of potential actors arises from any state coercion that constrains behavior absent injury to others.<sup>85</sup> Further, a harm to the liberty of potential victims arises from any behavior that actually causes injury.<sup>86</sup>

Alternatively, from a legal moralist perspective, harms to the liberty of potential victims (including individuals or society at large) arise when actions transgress moral principles.<sup>87</sup> In such cases, the "wrong"<sup>88</sup> or "sin"<sup>89</sup> constitutes a harm even in the absence of identifiable injury to others.<sup>90</sup> Harms to the liberty of potential actors occur only when moral action is foreclosed.

Though neutralists and legal moralists identify harms differently, both approaches, and natural rights perspectives in general, address harms similarly. They embrace prevention and eschew cure.

Legal moralist perspectives adopt prevention both to ensure moral behavior (protecting potential victims) and to enable choices within moral bounds (protecting potential actors).<sup>91</sup> For example, Robert George has offered legal moralist arguments both for laws

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82. Cf. Christman, *supra* note 81 (explaining that "[p]ersonal (or individual) autonomy should also be distinguished from *freedom*").

83. Neil M. Gorsuch, *The Right to Assisted Suicide and Euthanasia*, 23 HARV. J.L. & PUB. POL'Y 599, 662 (2000).

84. *Id.* at 666.

85. JOHN STUART MILL, ON LIBERTY 68–69 (Gertrude Himmelfarb ed., Penguin Books 1974) (1859). See Gorsuch, *supra* note 83, at 662, 666; Harcourt, *supra* note 45, at 109, 110, 131.

86. MILL, *supra* note 85, at 68–69. See Gorsuch, *supra* note 83, at 666; Harcourt, *supra* note 45, at 131.

87. See Harcourt, *supra* note 45, at 116–25.

88. See FEINBERG, *supra* note 44, at 34.

89. Harcourt, *supra* note 45, at 125 (quoting Patrick Devlin, *Morals and the Criminal Law*, in *The Enforcement of Morals* 22 (1965)).

90. See Gorsuch, *supra* note 83, at 667–70.

91. See, e.g., Harcourt, *supra* note 45, at 173–75; Robert P. George, *Ruling to Serve: A Fundamental Argument for Limited Government*, FIRST THINGS (Apr. 2013), <https://www.firstthings.com/article/2013/04/ruling-to-serve>.

suppressing pornography<sup>92</sup> (i.e. preventing wrongs) and against laws mandating sex education for children (i.e. preventing limitations on acceptable behavior).<sup>93</sup>

Neutralists also employ prevention, both to protect potential actors from government oppression and to protect potential victims from identifiable harms.<sup>94</sup> For instance, neutralism welcomes policies disallowing censorship or prohibiting assault. However, as prevention measures become more attenuated from actual harm, they risk breaching neutralist principles.<sup>95</sup> For example, a prohibition on transporting automatic knives<sup>96</sup> violates neutralist tenets because it proscribes action that causes no injury.

Unlike prevention, cure grates with natural rights principles, whether legal-moralist, neutralist, or otherwise. While cure may appear to protect both potential actors (by limiting behavioral constraints) and victims (through the prospect of remedy), cure fundamentally contradicts natural rights commitments to autonomy by forcing harmed parties into *involuntary* exchanges of rights.

Cure, by its nature, imposes a transactional relationship and plunges parties into a market. In a cure scenario, the occurrence of harm compels an exchange between the harmer and harmed. Both parties must join the relationship, but only the harmer has the agency to initiate it (by causing the harm). So even if the harmed can choose her price,<sup>97</sup> which is not guaranteed,<sup>98</sup> the forced transaction gives harmers excessive liberty at the expense of the harmed.<sup>99</sup> This

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92. See, e.g., ROBERT P. GEORGE, MAKING MEN MORAL: CIVIL LIBERTIES AND PUBLIC MORALITY 188 (1993).

93. See, e.g., Robert P. George, 2018 *President's Essay: Returning to Our Principles*, HERITAGE FOUND. (Dec. 25, 2018), <https://www.heritage.org/article/2018-presidents-essay-returning-our-principles>.

94. MILL, *supra* note 85, at 68–69 (Mill's harm principle expressly recognizes that "power can be rightfully exercised . . . to *prevent* harm to others." (emphasis added)).

95. See *id.* at 149. For a survey of literature on "risks that fail to materialize as harms," see Lee Anne Fennell, *Property and Half-Torts*, 116 YALE L.J. 1400, 1403 n.6 (2007).

96. See 15 U.S.C. § 1242 (2018).

97. See *infra* Section IV.A.2. Cf. Coleman, *supra* note 64, at 924 (explaining that criminal conduct constitutes an illegitimate transaction because the actor asserts an authority he does not possess).

98. See *infra* Section IV.A.2.

99. See MILL *supra* note 85, at 68–69. This can additionally distort self-direction because individuals may experience constant anxiety over others' actions and may alter behavior to avoid being victims.

exemplifies a “distorting external force[.]” undermining autonomy and self-determination.<sup>100</sup>

Moreover, the transactional nature of cure fundamentally clashes with the idea of inviolate natural rights. By creating a system where compensation trades against natural rights violations, cure commodifies inherently non-fungible values. For instance, legal moralism seeks to suppress moral transgressions as inherent “wrongs.” However, a cure regime proposes a market for such wrongs, allowing parties to sin at will, as long as they pay for the indulgence. Similarly, neutralism aims to preserve individuals’ options for self-fulfillment. Allowing government to curtail such options, if it pays reimbursement, contradicts neutralism’s core purpose.

Reconsidering the examples of eminent domain, drunk driving, and climate change helps illustrate natural rights conceptions of harm and the applicable prevention approaches. Starting with eminent domain, from a neutralist perspective, the condemnation of Owner’s home constitutes a harm because it coerces Owner despite her causing no injury to others. The prospect of compensation (i.e. cure) cannot redeem this coercion; rather a neutralist analysis would disallow (i.e. prevent) the condemnation.

A legal moralist approach would reach similar results. Though legal moralism permits laws to pursue moral commitments, condemning Owner’s home to build a highway fall outside that moral authority.<sup>101</sup> Thus the condemnation unduly constrains moral action, harming autonomy and requiring prevention.

In the case of drunk driving, the neutralist and legal moralist perspectives diverge regarding harm. To a legal moralist, drunk driving likely represents an inherent wrong, regardless of its consequences. Thus, laws against drunk driving validly prevent immoral behavior and do not unduly infringe on liberty.

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100. Cf. Jules L. Coleman & Jody Kraus, *Rethinking the Theory of Legal Rights*, 95 YALE L.J. 1335, 1339 (1986) (discussing how liberty and control are lost when one confers to another the ability to diminish the value of one’s resources, subject to compensation); Christman, *supra* note 81 (providing an overview of autonomy in political and moral philosophy).

101. Cf. George, *supra* note 91 (explaining the tension between government’s duty to act for the common good and individual liberty).



For a neutralist, however, not all drunk driving is a harm because not all drunk driving injures others.<sup>102</sup> As a result, blanket prohibitions on drunk driving harm actors by unduly infringing their liberty. Therefore, laws prohibiting drunk driving should be replaced (i.e. prevented) with more tailored measures that protect the liberty of both actors and victims.

Finally, regarding climate change, from both neutralist and legal moralist perspectives it is debatable whether greenhouse gas emissions are harms. Climate change threatens to be a distorting external force that fetters individuals' autonomy, and all greenhouse gas emissions contribute to climate change. However, the neutralist question is whether any particular emission injures an individual. If so, then emissions are harms. But, if particular emissions are too attenuated from manifest climate injuries, then they are not neutralist harms.

For a legal moralist, whether emissions are harms depends on whether they transgress a given moral code. Of course, this depends on one's particular code, but even holding moral commitments constant, the answer is elusive.<sup>103</sup> For instance, some Evangelical Christians argue the moral necessity of reducing greenhouse gas emissions,<sup>104</sup> while others find emission reductions morally reprehensible.<sup>105</sup> Thus, natural rights perspectives can differ over whether greenhouse gas emissions are harms.

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102. Cf. Gorsuch, *supra* note 83, at 666 (presenting a theory of neutralism in which the government may only employ coercive means, such as criminal sanctions, to prevent choices that result in harm to others). A neutralist could take the position that drunk driving always constitutes a harm to others (i.e., a harm to the liberty of potential victims) because drunk driving creates a likelihood, if not certainty, of injury to potential victims. Adopting this premise, a neutralist could justify a prohibition on drunk driving as consistent with the harm principle.

103. Cf. Alex Shashkevich, *Stanford Research Examines Moral Significance of Actions Causing Climate Change*, STAN. NEWS (Feb. 23, 2017), <https://news.stanford.edu/2017/02/23/moral-element-climate-change/> (discussing research that aims to create frameworks governments can use to evaluate the moral implications of their energy policies).

104. See, e.g., Samantha Harrington, *Christian Author Sees Climate Change as a Moral Issue*, YALE CLIMATE CONNECTIONS (July 16, 2019), <https://www.yaleclimateconnections.org/2019/07/christian-author-sees-climate-change-as-a-moral-issue/>; see also Suzanne Goldenberg, *Climate Denial Is Immoral, Says Head of US Episcopal Church*, GUARDIAN (Mar. 24, 2015, 9:12 AM), <https://www.theguardian.com/environment/2015/mar/24/climate-change-denial-immoral-says-head-episcopal-church> (discussing various religious leaders' positions that climate denial is immoral).

105. See, e.g., *An Evangelical Declaration on Global Warming*, CORNWALL ALL., <https://cornwallalliance.org/2009/05/evangelical-declaration-on-global-warming/> (last visited Apr. 11, 2021).

Assuming emissions are harms, then both legal moralist and neutralist perspectives counsel prevention.<sup>106</sup> This is the posture taken in the well-publicized climate change lawsuit *Juliana v. United States*.<sup>107</sup> In that case, the plaintiffs assert a fundamental (and natural) right to “a climate system capable of sustaining human life.”<sup>108</sup> To protect that right, they ask the court to order prevention in the form of mandatory government action to remediate greenhouse gas emissions.<sup>109</sup>

However, if greenhouse gas emissions are not harms, then emissions limits themselves harm the liberty of actors and should be prevented. Such reasoning appears in prominent Evangelical opposition to emissions reduction policies.<sup>110</sup>

#### 4. Distributive Justice

Distributive justice perspectives maintain that concepts of “justice” should guide allocations of burdens and benefits.<sup>111</sup> Theorists have proposed various normative criteria for just allocations, including principles of desert, strict egalitarianism, and feminism.<sup>112</sup> Among these, John Rawls’s “difference principle” remains particularly influential.<sup>113</sup> Rawls argues that justice requires resource

106. What level of prevention is a separate and important question. As philosopher Blake Francis has observed,

Carbon dioxide emissions won’t ever go away—we exhale it . . . . So there is nothing inherently wrong with emitting carbon dioxide. But there does seem to be something terribly wrong with the scale of human emissions since the Industrial Revolution. But at the same time, we are all the beneficiaries of incredibly important advancements in medicine, science, infrastructure and other areas from the Industrial Revolution.

Shashkevich, *supra* note 103.

107. 947 F.3d 1159 (9th Cir. 2020).

108. *Id.* at 1164 (internal quotations omitted).

109. *Id.* at 1164–65.

110. *See, e.g., An Evangelical Declaration on Global Warming, supra* note 105.

111. *See, e.g.,* David Elkins, *Responding to Rawls: Toward a Consistent and Supportable Theory of Distributive Justice*, 21 *BYU J. PUB. L.* 267, 267 (2007); Julian Lamont & Christi Favor, *Distributive Justice*, *STAN. ENCYCLOPEDIA PHIL.* (Edward N. Zalta ed., 2017), <https://plato.stanford.edu/entries/justice-distributive/>; Peter Benson, *The Basis of Corrective Justice and Its Relation to Distributive Justice*, 77 *IOWA L. REV.* 515, 535 (1992).

112. *See, e.g.,* Lamont & Favor, *supra* note 111. While some notions of justice may derive from natural rights-based principles, including ideas of liberty and autonomy, *see, e.g.,* JOHN FINNIS, *NATURAL LAW AND NATURAL RIGHTS* 169, 174 (2d ed. 2011), this section considers distributive justice separately from the liberty-based natural rights commitments.

113. *See* JOHN RAWLS, *A THEORY OF JUSTICE* 75 (1971); Thomas C. Grey, *Property and Need: The Welfare State and Theories of Distributive Justice*, 28 *STAN. L. REV.* 877, 879–80 (1976); Christian Barry, *Redistribution*, *STAN. ENCYCLOPEDIA PHIL.* (Feb. 7, 2018), <https://plato.stanford>

distributions to aid the worst-off and disrupt the inequitable status quo.<sup>114</sup>

From a distributive justice perspective, harm arises when a distribution conflicts with a given vision of justice. For example, a Rawlsian harm arises from any unequal distribution that fails to benefit the poorest members of society.<sup>115</sup> Alternatively, from a strict egalitarian perspective, any unequal allocation constitutes a harm.

Both prevention and cure can potentially address distributive justice harms. All distributive harms are theoretically curable through reallocation of resources, and cure is the only option to address both preexisting distributive harms, such as entrenched injustices, or unavoidable harms, such as natural unfairness in skill or ability.<sup>116</sup> Prevention, in the form of just initial distributions, is possible only for ongoing or future allocations.<sup>117</sup>

Reconsidering the examples of eminent domain, drunk driving, and climate change is instructive. From a Rawlsian perspective, whether the condemnation of Owner's home is a harm depends on Owner's status in society and the allocation of benefits from the highway project. For instance, if Owner is impoverished and the highway will primarily benefit the wealthy, then the condemnation is a harmful injustice. This harm could be prevented by desisting the condemnation, or it could be cured by redistributing greater benefits to Owner, such as by paying her more than her subjective value for the home.<sup>118</sup>

Moving to drunk driving, data suggests that alcohol-related crashes disproportionately impact recent Latino immigrants, particularly undocumented ones.<sup>119</sup> Such outsized burdens on a

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.edu/entries/redistribution/.

114. See JOHN RAWLS, *POLITICAL LIBERALISM* 23 (1993); Grey, *supra* note 113, at 880; Elkins, *supra* note 111, at 291–92.

115. Barry, *supra* note 113.

116. Elkins, *supra* note 111, at 291–92.

117. For example, environmental and energy law scholars have suggested that in the transition from fossil fuels to low-carbon energy sources, policies should prospectively avoid replicating historic inequities in allocating burdens and benefits. See, e.g., Shelley Welton & Joel Eisen, *Clean Energy Justice: Charting an Emerging Agenda*, 43 HARV. ENVTL. L. REV. 307, 321 (2019).

118. Cf. Hanoch Dagan, *Takings and Distributive Justice*, 85 VA. L. REV. 741, 751, 761 (1999) (discussing compensation for takings of substantial segments of an injured party's estate).

119. Mariana Sanchez et al., *Drinking and Driving Among Recent Latino Immigrants: The Impact of Neighborhoods and Social Support*, 13 INT'L J. ENVTL. RES. & PUB. HEALTH 1055 (2016).

marginalized community represent a Rawlsian harm. In response, prevention policies might try to reduce disproportionate drunk driving in immigrant communities,<sup>120</sup> or cure policies might allocate greater support services to help immigrant communities cope with higher rates of drunk driving.

Finally, turning to climate change, distributive harms can arise both from climate change impacts and from emissions reduction policies. Climate change will disproportionately afflict the poor and vulnerable, causing displacement and hunger and risking “climate apartheid.”<sup>121</sup> Recognizing this concern, the “climate justice” movement pursues policies both to decrease greenhouse gas emissions (i.e. prevent future disproportionate impacts) and to help communities “access[] revenue generation opportunities in the new energy economy” (i.e. cure entrenched inequities by reallocating resources).<sup>122</sup>

However, efforts to avoid climate change can also cause distributive harms. For instance, emissions reduction policies can disproportionately impact low-income communities by raising energy and transportation prices.<sup>123</sup> Some argue for preventing these distributive harms by leaving greenhouse gas emissions unregulated.<sup>124</sup> Others suggest a cure approach like a “revenue neutral carbon tax,”<sup>125</sup> which uses pricing to reduce emissions but then

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120. This risks a different distributive harm of over-policing these communities. Similar instances of over-policing have occurred in other minority communities, and to prevent such distributive harms enforcement policies have been discontinued. Cf. Joseph Goldstein, *Sniff Test Does Not Prove Public Drinking, a Judge Rules*, N.Y. TIMES (June 14, 2012), <https://www.nytimes.com/2012/06/15/nyregion/sniff-test-doesnt-prove-public-drinking-judge-says.html> (describing a court’s ruling that police officer sniff tests are insufficient to establish the alcoholic content of a beverage consumed in public); Joe Satran, *The Secret History of the War on Public Drinking*, HUFFINGTON POST (Dec. 6, 2017), [https://www.huffpost.com/entry/public-drinking-laws\\_n\\_4312523](https://www.huffpost.com/entry/public-drinking-laws_n_4312523).

121. *World Faces ‘Climate Apartheid’ Risk, 120 More Million in Poverty: UN Expert*, U.N. NEWS (June 25, 2019), <https://news.un.org/en/story/2019/06/1041261>.

122. *NAACP Environmental and Climate Justice Program*, NAT’L ASS’N FOR THE ADVANCEMENT OF COLORED PEOPLE, <https://www.naacp.org/environmental-climate-justice-about/> (last visited Apr. 11, 2021).

123. See, e.g., *NAACP Environmental and Climate Justice Program*, *supra* note 122.

124. *An Evangelical Declaration on Global Warming*, *supra* note 105.

125. See, e.g., Jonathan H. Adler, *Opinion, Trump Pulled Us Out of the Paris Accord. So What’s the Conservative Playbook for Climate Change?*, L.A. TIMES (Nov. 5, 2019, 12:14 PM), <https://www.latimes.com/opinion/story/2019-11-05/post-paris-accords-conservatives-need-a-climate-plan>.

redistributes tax proceeds to aid those disproportionately impacted by the reductions.<sup>126</sup>

### *B. Scenarios Suggesting Predominant Prevention or Cure Strategies*

This section identifies particular scenarios that suggest predominant prevention or cure strategies, and it explores how these scenarios arise under positivist, utilitarian, natural rights, and distributive justice perspectives. Specifically, it differentiates between readily curable harms that favor cure versus effectively incurable harms that call for prevention. It also considers justifiable harms that recommend cure and undesirable acts that suggest prevention. Finally, it discusses how efforts to coordinate behavior counsel prevention approaches. Throughout, it illustrates these scenarios with climate change examples.

#### 1. Readily Curable Versus Effectively Incurable Harms

One factor suggesting either predominant prevention or cure is an action's consequences: whether its harms are reparable. For readily curable harms, a cure approach suffices, whereas effectively incurable harms call for prevention.

The difference between readily curable and effectively incurable harms arises from the practical limitations of cure. Cure has only three tools to address harms: repair, replacement, and compensation. As a result, cure satisfyingly remedies harms to reparable interests (e.g., by fixing a car), replaceable interests (e.g., by providing a new car), or commodifiable interests (e.g., by providing the monetary value of a car). Such harms are readily curable,<sup>127</sup> and avoiding them may not be worth the foregone behavior.

However, interests that are not reparable, replaceable, or compensable<sup>128</sup> are effectively incurable because the tools of cure

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126. U.N. Framework Convention on Climate Change, Revenue-Neutral Carbon Tax: Canada, <https://unfccc.int/climate-action/momentum-for-change/financing-for-climate-friendly/revenue-neutral-carbon-tax> (last visited Apr. 11, 2021).

127. As discussed *infra* Section IV.A.2.a, in such cases a liability-rule remedy and a property-rule remedy (assuming no opportunistic inflation) should yield essentially the same result, and either should provide adequate compensation.

128. See, e.g., Margaret Jane Radin, *Property and Personhood*, 34 STAN. L. REV. 957, 1005–06 (1982).

mismatch the harms.<sup>129</sup> Irreparable interests cannot be repaired (e.g., a deceased loved one cannot be fixed), and irreplaceable interests cannot be replaced (e.g., a new loved one cannot be supplied). The only remaining cure option is compensation, but this proves clumsy when interests are incommensurable with money (e.g., the financial equivalent of a loved one).<sup>130</sup> Thus, irreparable, irreplaceable, and non-commodified interests suggest predominant prevention strategies.<sup>131</sup>

Positivism, utilitarianism, natural rights, and distributive justice offer different visions of relatively curable and effectively incurable harms. Under positivism, laws delineate what is curable and incurable.<sup>132</sup> A contractor may remedy unpermitted construction by purchasing a retroactive permit (readily curable), whereas a legislature may not implement an unconstitutional law, even with compensation (effectively incurable). In the climate change context, laws that recognize climate harms treat them as relatively incurable and accordingly prioritize preventive emission reductions. For example, California's Global Warming Solutions Act identifies numerous irreparable climate impacts<sup>133</sup> to justify imposing 80% emission reductions by 2050.<sup>134</sup>

Utilitarian commitments treat individual losses as readily curable, allowing them to tradeoff in cost-benefit analyses.<sup>135</sup> However, social welfare losses are effectively incurable because they impoverish

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129. In such cases, a liability-rule remedy and a property-rule remedy would likely diverge greatly, and neither may be adequate compensation. *See infra* Section IV.A.2.a.

130. *See* Cass R. Sunstein, *Incommensurability and Valuation in Law*, 92 MICH. L. REV. 779, 845–46 (1994) (discussing the nexus between incommensurability and property and liability rules); Richard A. Epstein, *Are Values Incommensurable, or Is Utility the Ruler of the World?*, 1995 UTAH L. REV. 683, 713–14.

131. *See* Michael Pappas & Victor B. Flatt, *Climate Changes Property: Disaster, Decommodification, and Retreat*, 82 OHIO ST. L.J. 331, 389 (2021) (suggesting that when markets have not naturally emerged for certain interests, this suggests an implicit collective calculus that commodifying those interests is unsuitable and undesirable); Radin, *supra* note 128, at 1005–06.

132. *See supra* Section II.A.1.

133. *See* Global Warming Solutions Act of 2006, CAL. HEALTH & SAFETY CODE § 38501 (Deering 2021).

134. *2017 Scoping Plan Documents*, CAL. AIR RES. BD., <https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2017-scoping-plan-documents> (last visited Apr. 11, 2021).

135. *See supra* Section II.A.2.

society and shrink the production possibility frontier.<sup>136</sup> Thus, if climate change causes social welfare losses, then it is an incurable harm that counsels prevention via emissions reductions.<sup>137</sup>

Similarly, because natural rights perspectives consider any undue incursion on liberty effectively incurable, if greenhouse gas emissions constitute a natural rights harm, then prevention is in order.<sup>138</sup>

Finally, while all distributive harms are theoretically curable via redistribution, practical limitations render some distributive harms effectively incurable.<sup>139</sup> Appreciating this distinction helps navigate the seemingly irreconcilable distributive justice concerns with both climate change impacts and greenhouse gas emission reductions. Regressive impacts of climate change, including the displacement of impoverished communities, can yield subjective losses that are effectively incurable. Conversely, regressive monetary burdens from emissions limits are readily curable through financial redistribution. Thus, policies can simultaneously address both distributive justice concerns via prevention for climate impacts complemented with cure for disproportionate financial burdens. Plans for revenue neutral carbon taxes propose just such a balance.<sup>140</sup>

## 2. Justifiable Harm or Undesirable Behavior

Another influence for preferring predominant prevention or cure is an action's context: whether the action is justifiable, regardless of its harmful impacts, or whether it is undesirable, despite not causing apparent injury. Justifiable actions suggest cure, whereas undesirable behavior recommends prevention.

Examples of justifiable harms include transgressions driven by human necessity. For instance, acts of theft to avert starvation or trespass to escape peril are justifiable even though they cause harms. While prevention of theft or trespass could ordinarily be appropriate,

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136. *Lesson 1: Are Disasters Good for the Economy?*, FOUND. FOR TEACHING ECON., <https://www.fte.org/teachers/teacher-resources/lesson-plans/disasterslessons/lesson-1-are-disasters-good-for-the-economy/> (last visited Apr. 11, 2021).

137. See Expert Report of Joseph E. Stiglitz, *supra* note 70, at 9; Rendall, *supra* note 73, at 445.

138. See *supra* Section II.A.3.

139. See *supra* Section II.A.4.

140. See *supra* Section IV.C.2.a.

in these contexts preventing the harms would endanger human life.<sup>141</sup> The justifiability of these acts advises a cure strategy.

Alternately some acts may be undesirable, regardless of consequence. For example, drunk driving may be universally unwelcome, even when no one gets hurt.<sup>142</sup> Addressing such “damnum absque injuria” or “negligence in the air”<sup>143</sup> suggests predominant prevention.

Again, positivist, utilitarian, natural rights, and distributive justice perspectives offer different ideas of justifiable and undesirable acts.<sup>144</sup> To a positivist, justifiable actions and undesirable behaviors are simply a matter of definition. Permitted acts are, implicitly, justifiable, and unpermitted acts are, implicitly, undesirable. The later are prevented while the former are not.

To a utilitarian, actions are justifiable, even if they cause injury, as long as their benefits outweigh their costs. For example, theft to avert starvation is justifiable because the benefits (a life saved) outweigh the costs (stolen food). Utilitarianism would not prevent such action and would consider its impacts cured by the offsetting social gains. Conversely, actions that cause more aggregate cost than benefit are undesirable, even if some instances do not cause injuries. Drunk driving fits this description, and utilitarian analysis supports preventing drunk driving to a level that avoids social welfare losses.<sup>145</sup>

When applied to natural rights, the concepts of justifiable action and undesirable behavior highlight core differences between neutralist and legal moralist commitments. For a neutralist, the concepts are inapposite because no injury-causing behavior is justifiable (it infringes the liberty of victims), and no behavior is undesirable unless it causes injury (to protect the liberty of actors). For a legal moralist, actions can be justifiable or undesirable depending on their consistency with a given moral code. Actions reflecting moral principles are justifiable, regardless of their impacts. For example, healthcare providers might morally refuse to perform certain services,

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141. Though society may wish to prevent such circumstances from arising in the first place.

142. *Cf.*, e.g., Fennell, *supra* note 95, at 1408 (explaining that self-help measures may be taken to avoid factory pollution even in the absence of any harmful result).

143. *See* Martin v. Herzog, 126 N.E. 814, 816 (N.Y. 1920).

144. *See* discussion *supra* Section II.A.

145. *See* discussion *supra* Section II.A.2.



regardless of consequences for patients.<sup>146</sup> Alternatively, legal moralists might find some behavior, such as buying alcohol on Sundays, fundamentally undesirable and prevent it regardless of its consequences.<sup>147</sup>

Finally, analysis of justifiability or undesirability adds little to distributive justice inquiries, which already incorporate contextual evaluations. From a distributive perspective, justifiable actions are the same as non-harmful actions; they facilitate a desired distributional outcome. Similarly, undesirable actions are the same as harmful actions; they thwart desired distributions.<sup>148</sup>

Returning to climate change, the link between justifiable actions and cure helps explain policies, like the Trump Administration's Affordable Clean Energy Rule,<sup>149</sup> that minimally restrict greenhouse gas emissions.<sup>150</sup> Such policies implicitly (or explicitly) reason that emissions are so socially and economically important that they are worth potential climate harms. Because they consider emissions justifiable,<sup>151</sup> these policies disfavor prevention (i.e., deprioritize emission reductions) and preference cure (i.e., react to climate impacts that arise).<sup>152</sup>

### 3. Coordination

Finally, efforts to coordinate behavior call for predominant prevention strategies. While most policies try to influence behavior, sometimes coordination itself becomes a central aim. For instance, coordinated behavior can provide a solution for “prisoners’ dilemma”

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146. Cf. *Conscience Protections for Health Care Providers*, U.S. DEP'T HEALTH & HUM. SERVS., <https://www.hhs.gov/conscience/conscience-protections/index.html> (last updated Mar. 22, 2018) (detailing several protections for health care providers who are unwilling to perform abortions).

147. See *supra* Section II.A.3.

148. See *supra* Section II.A.4.

149. *Affordable Clean Energy Rule*, U.S. ENV'T PROT. AGENCY, <https://www.epa.gov/stationary-sources-air-pollution/affordable-clean-energy-rule> (last visited Apr. 11, 2021).

150. See Burtraw & Keyes, *supra* note 75 (describing the limited emissions reductions of the rule).

151. Few would suggest that greenhouse gas emissions are inherently undesirable regardless of their impacts. Indeed, all living beings emit greenhouse gasses. Cf. Shashkevich, *supra* note 103 (discussing the balancing of benefits and trade-offs in fields relevant to climate change).

152. As discussed *infra* Section IV.A.1.c., this may be limited to external cure through disaster assistance or even letting losses fall where they may.

and “tragedy of the commons” problems.<sup>153</sup> Additionally, “coordination games” model situations where coordinated activity produces the best outcome. A common example is the “driving game.” It describes two drivers approaching each other from opposite directions on a narrow road. To avoid colliding, both drivers must swerve to the side, and swerving left or right are equally appealing. Here, the most important factor is that the drivers coordinate. Whether they swerve left or right is immaterial; that they choose in a concerted fashion (both to their left or both to their right) determines whether they pass safely. In scenarios like these, coordination itself is a core objective, and legal contexts ranging from contract doctrines to Commerce Clause jurisprudence place a premium on coordination.<sup>154</sup>

Prevention offers clearer information to facilitate coordination than does cure.<sup>155</sup> Revisiting the driving game, a prevention approach, such as a sign directing traffic, fosters easy coordination. Cure cannot harmonize behavior so directly. While drivers could decide how to swerve based on information from past collisions,<sup>156</sup> that would be costlier and less consistent than a preventive approach.<sup>157</sup>

Promoting coordination via prevention is consistent with positivism and utilitarianism. Innumerable positive laws, such as traffic regulations, coordinate through prevention. Additionally, using prevention to lower coordination costs has utilitarian appeal. Natural rights perspectives also accommodate coordinative prevention, as long as it does not infringe liberty. Neutralists would accept coordination to avoid harms, and legal moralists adopt coordination to promote morals. Finally, distributive justice can embrace prevention to coordinate preferred distributive outcomes.<sup>158</sup>

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153. See, e.g., ELINOR OSTROM, *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION* (1990).

154. See, e.g., Maxwell L. Stearns, *Constitutional Law’s Conflicting Premises*, 96 NOTRE DAME L. REV. 447, 451–52 (2020).

155. See Viscusi, *supra* note 42, at 76.

156. This would involve using information about cure to inform private precaution.

157. Viscusi, *supra* note 42, at 72, 76 (“The great benefit of regulation is that every party covered by the regulation does not incur information costs. In contrast, the tort system imposes information costs for every case.”). Cf. Shavell, *supra* note 8, at 358–71 (juxtaposing activities controlled mainly by liability and activities subject to significant preventative regulation); George, *supra* note 5, at 186–87 (illustrating the need for a preventative measure, namely government regulation, to maintain highway traffic safety).

158. See *supra* Section II.A.

Turning again to climate change, coordination challenges have hampered international emission-reduction efforts, but the Paris Agreement demonstrates how a prevention policy can help overcome coordination barriers. Prior to 2016, the United States and other nations hesitated to reduce emissions without a shared global commitment.<sup>159</sup> In 2016, the Paris Agreement invited such international cooperation through a treaty to prevent global temperatures from exceeding a stated level.<sup>160</sup> To date 191 nations have joined the Agreement,<sup>161</sup> and its shared prevention goal has been instrumental for nations to coordinate their emission reductions.

### III. IMPERFECTIONS IN APPLIED PREVENTION AND CURE

The previous Part considered how prevention and cure conceptually fit with different normative values and factual scenarios. This Part addresses the practical limitations of applied prevention and cure approaches.

In theory, prevention could precisely avoid harms without undue constraints. And, in theory, actors could effectually cure all harms they cause. However, practical applications of prevention and cure will almost certainly be flawed. They may be over-inclusive or under-inclusive (and sometimes may actually be both).<sup>162</sup> This Part explores the imperfections likely to arise in applied prevention and cure, and it considers how they impact positivist, utilitarian, natural rights, and

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159. See *History of UN Climate Talks*, CTR. CLIMATE & ENERGY SOLUTIONS, <https://www.c2es.org/content/history-of-un-climate-talks/> (last visited Apr. 11, 2021).

160. U.N. Framework Convention on Climate Change, *The Paris Agreement*, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> (last visited Apr. 11, 2021).

161. U.N. Framework Convention on Climate Change, *Paris Agreement—Status of Ratification*, <https://unfccc.int/process/the-paris-agreement/status-of-ratification> (last visited Apr. 11, 2021). The Trump Administration formally withdrew the U.S. from the Paris Agreement in 2020 based on its disagreement with the substance of the emission reduction commitments. See Frank Jordans & Seth Borenstein, *US Formally Exits Paris Pact Aiming to Curb Climate Change*, AP NEWS (Nov. 4, 2020), <https://apnews.com/article/us-leaves-paris-agreement-climate-change-1331bc3002175645dda8eb7ff3c1075>; Press Release, U.S. Dep't of State, *On the U.S. Withdrawal from the Paris Agreement* (Nov. 4, 2019), <https://2017-2021.state.gov/on-the-u-s-withdrawal-from-the-paris-agreement/index.html>. The U.S. has since rejoined the Paris Agreement under the Biden Administration. See Statement, White House, *Paris Climate Agreement* (Jan. 20, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/20/paris-climate-agreement/>. No other countries have attempted to withdraw.

162. Prevention may be both over- and under-inclusive if it both over-constrains behavior and still does not adequately avert harm. Cure may be both over- and under-inclusive by imposing too much liability on some parties and too little on others.

distributive justice commitments. It also offers examples of how these imperfections manifest in the climate change context.

### A. Over-inclusive and Under-inclusive Prevention

Prevention measures may be either over-inclusive, constraining too much behavior, or under-inclusive, permitting too many harms. Knowledge limitations and political pressures contribute to both over- and under-inclusion. Additionally, uncertainties, transaction costs, under-protections, and under-compensation can cause over-inclusive prevention.

#### 1. Knowledge Limitations

To avoid harms, prevention measures must anticipate when and how harms will arise. Such predictions may be informed, but they cannot be certain. Thus, knowledge limitations pose an inherent challenge for prevention regimes.<sup>163</sup> Sometimes a lack of knowledge begets over-inclusive prevention, whether intentionally prophylactic or simply misestimated. In other cases, knowledge limitations may cause under-inclusive prevention due to misunderstood risks or unforeseen harms.

These knowledge limitations frustrate utilitarian efforts to predict the costs and benefits of prevention measures. Additionally, because knowledge limitations cause ill tailoring of prevention regimes, they raise natural rights concerns about infringement on the liberty of victims (with under-inclusion) or actors (with over-inclusion).

Knowledge limitations loom large for climate change policies. Beyond the scientific consensus that human-induced climate change is occurring,<sup>164</sup> high uncertainty shrouds nearly every prediction of climate change impacts and timing.<sup>165</sup> Most environmentalists believe these knowledge limitations have resulted in under-inclusive efforts to prevent climate change, whereas opponents of greenhouse gas

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163. Cf. Kaplow & Shavell, *supra* note 9, at 722–23 (explaining that a problem with liability rules is that the behavior of parties prior to takings must be considered); Viscusi, *supra* note 42, at 87 (concluding that even workers' compensation, which passes benefits to claimants with very little distortion, does not create efficient risk-reduction incentives).

164. *Scientific Consensus: Earth's Climate Is Warming*, NASA GLOB. CLIMATE CHANGE, <https://climate.nasa.gov/scientific-consensus/> (last updated Mar. 3, 2021).

165. See, e.g., Matt Simon, *Climate Change Is Very Real. But So Much of It Is Uncertain*, WIRED (July 17, 2019, 1:00 PM), <https://www.wired.com/story/climate-change-is-very-real-but-so-much-of-it-is-uncertain/>.

regulation worry that knowledge limitations have created over-inclusive prevention.<sup>166</sup>

## 2. Political Pressures

Political pressures can also cause over- or under-inclusion in government-imposed prevention measures.<sup>167</sup> Prevention efforts can generate concentrated benefits and diffuse costs, making them a target for interest groups who lobby to capture benefits while spreading burdens.

This can drive over-inclusive prevention. For instance, interest group pressures might produce unwarranted licensure requirements or environmental regulations that claim to prevent harms but actually just restrict competition.<sup>168</sup> Alternately, political pressures can cause under-inclusive prevention. For example, interest-group influence can hollow environmental protections, ossify outdated regulations,<sup>169</sup> or secure carve-outs for favored industries.<sup>170</sup>

These political pressures can undermine positivist commitments by compromising the lawmaking process, and they can subvert utilitarian principles by promoting inefficient policies. Further, interest group influence raises distributive justice concerns. If powerful actors can advantageously shape or navigate prevention measures, they enrich themselves at the expense of the less fortunate.<sup>171</sup>

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166. See, e.g., *id.*

167. External prevention is not necessarily hopelessly subject to these influences. For example, some commentators suggest that competing interest groups may check each other. See, e.g., JAMES RASBAND ET AL., *NATURAL RESOURCES LAW AND POLICY* 5 (3d ed. 2016). Others suggest that spreading regulatory authority over multiple public institutions helps avoid concentrated influence. See William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547, 1599–1600 (2007).

168. See, e.g., Daniel C. Esty, *Toward Optimal Environmental Governance*, 74 N.Y.U. L. REV. 1495, 1515 (1999); Jonathan R. Macey, *Transaction Costs and the Normative Elements of the Public Choice Model: An Application to Constitutional Theory*, 74 VA. L. REV. 471, 508 (1988).

169. See Gerrit De Geest & Giuseppe Dari-Mattiacci, *Soft Regulators, Tough Judges*, 15 SUP. CT. ECON. REV. 119, 120, 123 (2007); Eric Helland & Jonathan Klick, *The Tradeoffs Between Regulation and Litigation: Evidence from Insurance Class Actions*, 1 J. TORT L., no. 3, 2007, at 1, 4.

170. See, e.g., Joseph P. Tomain, *Shale Gas and Clean Energy Policy*, 63 CASE W. RES. L. REV. 1187, 1210 (2013).

171. Cf. De Geest & Dari-Mattiacci, *supra* note 169, at 125 (explaining that different law is aimed at controlling the behavior of rich and poor injurers).

Climate change policies evidence such political pressures. In particular, powerful fossil fuel and energy industries have lobbied heavily to curb emission-reduction measures,<sup>172</sup> arguably leading to under-inclusive prevention of climate change.<sup>173</sup>

### 3. Uncertainty, Transaction Costs, Under-protection and Under-compensation

Private actors may adopt internal prevention measures<sup>174</sup> to avoid costs,<sup>175</sup> and such incentive-based prevention can be efficient and well-tailored. However, uncertainties, transaction costs, under-protections, and under-compensation incentivize over-inclusive internal prevention, which can foreclose desirable actions and gainful trades.<sup>176</sup>

For instance, uncertainty over liabilities and the transaction costs of gaining certainty can lead parties to forego beneficial behavior. As an illustration, recall the example of efficient breach: Actor contracts with Victim to supply a product worth \$100 to Victim (i.e., expectancy damages are \$100), but then Better Price offers to buy Actor's product for \$210. If Actor is confident that she will owe only expectancy damages, then Actor should breach, pay Victim expectancy damages of \$100, sell to Better Price for \$210, and end up with \$110. Given certainty about her liability, Actor has little incentive to exercise private prevention and avoid the breach. However, if Actor is unsure whether her damages will exceed \$110, she may exercise prevention and avoid the breach, even if it would have ultimately been worthwhile.<sup>177</sup>

As the example shows, if a party faces uncertain liability or transaction costs, she may adopt over-inclusive prevention and forego otherwise beneficial behavior. This is a variation on Ronald Coase's

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172. *Fossil Fuel Interests Have Outspent Environmental Advocates 10:1 on Climate Lobbying*, YALE ENV'T 360 (July 19, 2018), <https://e360.yale.edu/digest/fossil-fuel-interests-have-outspent-environmental-advocates-101-on-climate-lobbying>.

173. Though opponents of climate regulation argue the opposite: that environmentalist political influence has led to over-inclusive prevention of emissions.

174. See *infra* Section IV.A.1 (discussing internal prevention).

175. See *supra* Section I.C.

176. See generally R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 1 (1960) (explaining how actions of firms may have harmful effects on others).

177. Cf. Shavell, *supra* note 31, at 6 & n.16 (introducing the same concept as it relates to goods and property sales).

insight that individuals will not make otherwise gainful trades if transaction costs outweigh the benefits of the trade.<sup>178</sup> Similarly, actors will not take otherwise gainful actions (i.e., will exercise over-inclusive prevention) if the uncertainties and transaction costs outweigh the potential gains.

Payments to “patent trolls”<sup>179</sup> further illustrate how legal uncertainties and transaction costs induce over-inclusive private prevention. Patent trolls typically acquire patents to threaten infringement suits against companies.<sup>180</sup> In doing so, patent trolls bet that companies will pay for a license, even if the patent claim is questionable, because that would be cheaper than litigating the patent’s validity.<sup>181</sup> Thus, patent trolls expect companies to employ over-inclusive internal prevention (in the form of purchasing licenses) because of legal uncertainties and transaction costs.<sup>182</sup> If the patent’s invalidity were certain or litigation costs were low, companies might proceed despite the patent troll’s threat, but the high uncertainty and transaction costs frequently lead companies to deploy over-inclusive prevention by paying trolls.<sup>183</sup>

Private parties may also employ over-inclusive prevention if they believe that their interests will be under-protected or their losses will be under-compensated.<sup>184</sup> For instance, if property rights are ill-enforced, then property holders will likely undertake excessive precautions (like special locks or private security) to guard against harms.<sup>185</sup> Such over-inclusive prevention comes at the opportunity cost of more desirable pursuits. Similarly, if bicyclists are

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178. See Coase, *supra* note 176, at 15–19.

179. “Patent troll” is a derogatory term for an entity that uses a patent for profit via licensing or litigation rather than for innovation or production. See, e.g., David S. Abrams et al., *The Patent Troll: Benign Middleman or Stick-Up Artist?* 3–4 (Nat’l Bureau of Econ. Research, Working Paper No. 25713, 2019), <https://www.nber.org/papers/w25713>. More derogatory still, some label “patent trolls” as “stick-up artists.” See *id.* at 3.

180. See, e.g., Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2008 (2007).

181. *Id.* at 2009.

182. *Id.* at 2008–10.

183. *Id.*

184. This correlates with under-inclusive cure, discussed *infra* Section III.B.1.

185. See Kaplow & Shavell, *supra* note 9, at 722; see also Henry E. Smith, *Property and Property Rules*, 79 N.Y.U. L. REV. 1719, 1730 (2004) (explaining how high-valuing property owners can “opt-out” of the legal system with self-protection measures).

systematically under-compensated in automotive collisions, fewer people are likely to bicycle, even if they would like to.

Some climate change responses reflect over-inclusive private prevention due to uncertainty. For instance, some parties have begun hoarding resources to buffer unknown climate risks, and these actions are likely both over-protective and socially damaging.<sup>186</sup>

### *B. Over-inclusive and Under-inclusive Cure*

Like prevention, cure too can be over- and under-inclusive. Under-inclusive cure allows actors to externalize costs and neglects to make victims whole. Over-inclusive cure imposes disproportionate costs on actors and undermines victims' incentives for precaution.

#### 1. Under-inclusive Cure

Cure measures are under-inclusive when they allow actors to externalize costs onto victims. By allowing actors to retain their actions' benefits but offload their costs, under-inclusive cure both under-compensates victims<sup>187</sup> and creates perverse incentives for actors.

Some cure measures are intentionally under-inclusive and externalize costs by design. Most obviously, tort immunity doctrines free some actors of cure obligations. Doctrines limiting the scope of liability, such as the negligence concept of proximate cause, also purposefully cabin cure duties.<sup>188</sup> Similarly, bankruptcy doctrines that discharge debts and other instances of judgment-proof actors occasion under-inclusive cure.<sup>189</sup> Finally, some damages doctrines, like statutory damage caps or rules limiting non-economic damages,<sup>190</sup> expressly limit cure by externalizing some (sometimes all) costs of action.<sup>191</sup>

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186. See Shi-Ling Hsu, *Climate Triage: A Resources Trust to Address Inequality in a Climate-Changed World*, 50 ENVTL. L. 97, 107–08 (2020).

187. Viscusi, *supra* note 42, at 96–97.

188. See, e.g., HARRY SHULMAN ET AL., *LAW OF TORTS: CASES AND MATERIALS* 281–329 (6th ed. 2015). For example, a train that causes a major fire may be liable for damages to a structure adjacent to the track but not to additional neighboring ones. See *id.*

189. See Kaplow & Shavell, *supra* note 9, at 721; De Geest & Dari-Mattiacci, *supra* note 169, at 121; cf. F.H. Buckley, *The Bankruptcy Priority Puzzle*, 72 VA. L. REV. 1393, 1418–19 (1986) (explaining how limited liability may distort incentives to take preventative measures).

190. See, e.g., SHULMAN ET AL., *supra* note 188; STEARNS ET AL., *supra* note 32.

191. Cf. Kaplow & Shavell, *supra* note 9, at 746 (illustrating the concept through the example of a property owner who has an entitlement to burn leaves at the cost of his neighbors).



Other doctrines default to under-inclusive cure by forcing victims to overcome barriers to recovery. For example, placing burdens of proof on plaintiffs sets a presumption of under-inclusive cure by denying remedies in close cases.<sup>192</sup>

While these examples may represent calculated policies to subsidize particular actors, they nonetheless embody under-inclusive cure because they force victims to bear externalized costs. This raises positivist, utilitarian, natural rights, and distributive justice concerns. For example, measures that allow actors to retain benefits but spread costs create suspicion of rent seeking and interest group influence, potentially challenging positivist legitimacy.<sup>193</sup> Additionally, externalized costs grate against utilitarian analysis and create incentives that can amplify social welfare losses.<sup>194</sup> Under-inclusive cure encourages actors to continue harmful conduct without optimal precaution<sup>195</sup> and victims to adopt over-inclusive prevention measures.<sup>196</sup> This also ignores natural rights commitments by stripping protection of victims' autonomy,<sup>197</sup> and it likely has regressive distributive impacts because those least able to protect themselves will bear more externalized costs.<sup>198</sup>

Regarding climate change, the consistent failure of climate-based tort claims provides an overarching example of under-inclusive cure.<sup>199</sup> The doctrinal hurdles in tort law have allowed the parties most responsible for greenhouse gas emissions to externalize essentially all remedial costs.<sup>200</sup>

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192. Viscusi, *supra* note 42, at 69.

193. Cf. Yotam Kaplan, *In Defense of Compensation*, 70 ALA. L. REV. 573, 604 (2018) (using the example of a home security system to illustrate this point).

194. See, e.g., Shavell, *supra* note 8, at 359–71.

195. See discussion of the model of precaution and the interplay between prevention and cure, *supra* Part I. See also De Geest & Dari-Mattiacci, *supra* note 169, at 140 (noting that there is no general regulatory standard prompting injurers to take the best level of precaution).

196. See *supra* Section III.A.

197. See, e.g., JULES L. COLEMAN, RISKS AND WRONGS 326 (1992).

198. See Kaplan, *supra* note 193, at 575–76.

199. See generally Douglas A. Kysar, *What Climate Change Can Do About Tort Law*, 41 ENV'T L. 1, 2–44 (2011) (discussing obstacles in climate change litigation and the subsequent lack of satisfactory remedy).

200. *Id.*

## 2. Over-inclusive Cure

Cure may be over-inclusive in two regards: how much is paid and who pays. First, over-inclusive cure can describe excessive liability that obligates actors to overcompensate for harms. Second, over-inclusive cure can describe overbroad remedial duties or gratuitous care. In either case, over-inclusive cure yields problematic incentives.

Overcompensation requirements raise the costs of activity and may induce actors to decrease desirable behavior (resulting in over-inclusive internal prevention).<sup>201</sup> For instance, some argue that medical malpractice liability is excessive and that it increases costs, depresses access, and lowers quality of healthcare.<sup>202</sup> Commentators also suggest that products liability damages for asbestos are inordinate and produce undesirable results.<sup>203</sup> Additionally, overcompensation can incentivize potential victims to neglect their own precautions, causing under-inclusive internal prevention.<sup>204</sup>

Over-inclusive cure can also involve overbroad liability spreading or gratuitous care. Unlike overcompensation, which saddles injury-causing actors with too much cost, overbroad liability spreading can impose too little cost on injury-causing actors, allowing them to externalize burdens for harms they produce. Such over-inclusive cure can arise if an entire industry or the public at large foots the bill for a privately caused harm.<sup>205</sup> Gratuitous care has similar effects. For instance, if a third party, such as a doctor in the family, treats injuries at no cost to the victim or, importantly, to the actor,<sup>206</sup> then the actor has externalized the costs of the injury.<sup>207</sup>

Policies may intentionally embrace over-inclusive cure to ensure that victims have recourse for harms, and allocating resources to protect victims potentially advances distributive justice principles.

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201. See *infra* Section IV.A.1.a (discussion of internal prevention).

202. See *Medical Malpractice Litigation Raises Health Care Cost, Reduces Access and Lowers Quality of Care*, EMP. POL'Y FOUND. (June 19, 2003), [https://www.heartland.org/\\_template-assets/documents/publications/14736.pdf](https://www.heartland.org/_template-assets/documents/publications/14736.pdf).

203. See Viscusi, *supra* note 42, at 99–100.

204. See *infra* Part IV.

205. There is an important distinction between this liability spreading, which externalizes costs, and the passing of costs to consumers, which internalizes harm.

206. See SHULMAN ET AL., *supra* note 188, at 291.

207. The same result can arise from any positive externalities. For instance, unpriced ecosystem services can sometimes effectively neutralize private parties' pollution, allowing the polluter to avoid bearing those pollution costs. See NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 266–68 (Gretchen C. Daily ed., 1997).

However, positivist, utilitarian, and natural rights worries may persist. Both overcompensation and liability spreading ply government policies to concentrate benefits, so they may implicate positivist concerns with interest-group influence and rent seeking.<sup>208</sup> Further, utilitarians may fear that over-inclusive cure distorts costs and benefits to the point of social welfare losses.<sup>209</sup> Finally, requirements of overcompensation or liability spreading threaten the natural rights liberty of actors by imposing undue obligations.<sup>210</sup>

Climate change offers numerous examples of over-inclusive cure via overbroad liability spreading. To take a global instance, the costs of greenhouse gas emissions are borne globally, even though a small group of nations contribute the great majority of these emissions.<sup>211</sup> Because these costs, as well as any remedial efforts, are distributed disproportionately to causation, climate change imposes over-inclusive cure.

#### IV. INTEGRATED PREVENTION AND CURE STRATEGIES

This Part explores how integrated strategies of prevention and cure can mitigate over- and under-inclusion concerns and advance various positivist, utilitarian, natural rights, and distributive justice commitments. To build a foundation for discussing these integrated strategies, Section A first analyzes major variations of prevention and cure and illustrates how these variations fit together to shape individual prevention and cure measures. Then, Section B details how particular complementary prevention and cure measures can combine symbiotically to advance policy goals. Finally, Section C examines how a suite of prevention and cure measures can assemble into interconnected policy landscapes, and it applies these insights to explain and critique policy structures addressing motorist behavior and climate change. In particular, it uncovers how current climate policy suffers because of disjointed prevention and cure measures, and it suggests how expanding particular cure variations can reinforce climate policy efforts.

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208. See discussion *infra* Section II.A.1.

209. See discussion *infra* Section II.A.2.

210. See discussion *infra* Section II.A.3.

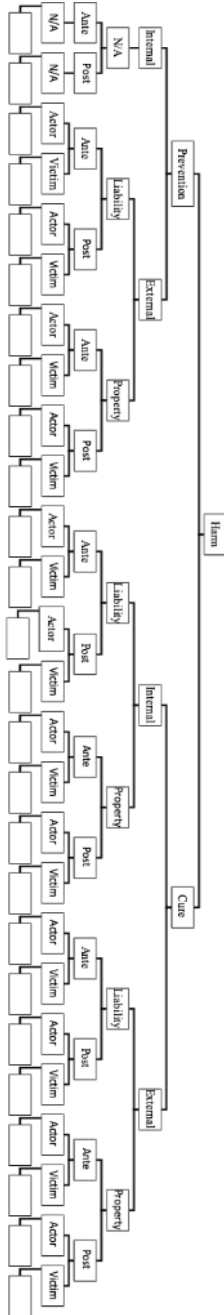
211. See *Each Country's Share of CO2 Emissions*, UNION OF CONCERNED SCIENTISTS (Aug. 12, 2020), <https://www.ucsusa.org/resources/each-country-share-co2-emissions>.

*A. Major Variations of Prevention and Cure*

This section explores four important variations of prevention and cure: (1) external or internal, (2) property-rule or liability-rule, (3) ex-ante or ex-post, and (4) actor-presumptive or victim-presumptive. It illustrates each of these variations through climate change examples.

Before engaging these variations in detail, Figure 1 offers a visual overview to demonstrate how the variations fit together within the prevention and cure framework.

Figure 1: Flowchart of Prevention and Cure Framework





As Figure 1 illustrates, the analysis begins by identifying a harm (top row in figure) and adopting either a prevention or cure approach to address that harm (second row). Then both prevention and cure approaches offer possible variations. Both prevention and cure can be either internal or external (third row), liability-rule or property-rule (fourth row),<sup>212</sup> ex-ante or ex-post (fifth row), and actor-presumptive or victim-presumptive (sixth row).<sup>213</sup>

This set of variations is cumulative, meaning that any applied instance of prevention or cure reflects a set of choices about each variation. Accordingly, Figure 1 presents the variations as a flowchart to depict how the ultimate result of all variation choices (seventh row, left blank) describes an individual policy measure for addressing a harm.

As subsequent sections discuss, these individual policy measures (which ultimately populate the seventh row, and which Section IV.C will illustrate with examples regarding motorist behavior and climate change) can combine into integrated policy landscapes. For now, Section A builds the foundation for later sections by detailing the particular variations underlying individual prevention and cure measures.

## 1. External or Internal

Prevention and cure may be either external or internal. For prevention, the distinction between external and internal turns on the entity *imposing* the precaution, whereas the difference between external and internal cure turns on the entity *supplying* the remedy.

### *a. External or internal prevention*

Efforts to prevent harm may come from external or internal sources. External prevention measures rely on governmental authority to limit or compel certain actions, and prescriptive regulations are the quintessential example. For instance, a stop sign is an external prevention measure to avoid the harm of auto accidents. External prevention also includes legal limits on governmental powers, such as

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212. As discussed *infra* Section IV.A.2, the property-rule versus liability-rule distinction is not applicable to internal prevention.

213. As discussed *infra* Section IV.A.4, the actor presumption versus victim presumption is also not applicable to internal prevention.

constitutional provisions proscribing certain government actions.<sup>214</sup> The unifying feature of external prevention measures is that the force of law directly dictates actions.

Conversely, internal prevention measures are essentially self-regulation; they involve actors' self-directed efforts to avoid harms. These measures are not mandated by law, but they often arise in reaction to incentives created by legal obligations.<sup>215</sup> For example, internal prevention frequently aims to cost-effectively avert legal liabilities, either by obviating the *causes* of harm or by staving off victims' *realization* of harm.

To avoid the causes of harm, parties can undertake precautions. For example, manufacturers might *sua sponte* include warning labels or physical guards on potentially dangerous products. Parties may also avoid causing harm by desisting activities. For example, a manufacturer may discontinue producing a dangerous product.

Alternatively, actors may forestall victims' realization of harm by preemptively acquiring legal entitlements to avoid infringing upon them.<sup>216</sup> This reflects internal prevention through consolidation. For example, a noisy factory might purchase surrounding properties to avoid nuisance liabilities. Such consolidation does not change the harm-causing activity; the factory remains noisy. Rather, it removes would-be victims from the position to realize harm. Thus, consolidation measures attempt to, quite literally, internalize impacts.<sup>217</sup>

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214. For example, constitutional amendments beginning "nor shall congress . . ." or "no state shall . . ." See, e.g., U.S. CONST. amend. I ("Congress shall make no law respecting an establishment of religion . . ."); *id.* amend. XIV, § 1 ("No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States . . .").

215. See *supra* Part III. Internal prevention can also arise in response to numerous other motivations. For example, neighborly norms may lead to individuals not undertaking noisy actions, such as mowing lawns, before 10:00 AM, even if the actions would trigger no liability. Internal prevention may also seek to avoid other costs, such as client or employee dissatisfaction, fluctuation in revenues or input prices, or transaction costs. See *supra* Part III.

216. See Coase, *supra* note 176, at 8–15; *cf.* Fennell, *supra* note 95, at 1458 (explaining that explicit government-sanctioned options, such as purchasing a license or paying a tax, allow parties to gauge benefits of engaging in an activity).

217. In some instances, courts disfavor, and sometimes invalidate, attempts to use consolidation as an internal prevention strategy. For example, courts have frequently invalidated attempts by doctors to secure exculpatory clauses for medical malpractice. See, e.g., Matthew J.B. Lawrence, Note, *In Search of an Enforceable Medical Malpractice Exculpatory Agreement: Introducing Confidential Contracts as a Solution to the Doctor-Patient Relationship Problem*, 84 N.Y.U. L. REV. 850, 854 (2009).



Regardless of whether internal prevention measures address the causes or realization of harms, they share one unifying feature: self-imposition.

Internal and external prevention measures are not necessarily exclusive. In fact, parties often adopt internal prevention on top of external prevention, particularly when regulatory compliance does not guarantee freedom from liability.<sup>218</sup> For example, some municipal regulations (external prevention) merely require shoveling snow from a sidewalk within eight hours of daylight,<sup>219</sup> but individuals may still preemptively salt sidewalks or clear snow earlier (internal prevention) to avoid potential negligence liability.

Indeed, some policies use external prevention to induce internal prevention. For instance, environmental cap-and-trade policies mandate maximum pollution levels (external prevention) but then allow trading of pollution entitlements, expecting that some firms will voluntarily reduce pollution (internal prevention) to sell their entitlements.<sup>220</sup> Thus, external and internal prevention can be mutually reinforcing.<sup>221</sup>

However, in other situations, external and internal prevention may tradeoff against each other, at least at the margins. For instance, internal prevention efforts can displace external prevention. This can be desirable; private actions may reduce harms enough to obviate public regulation. However, if private efforts are fleeting or ineffective or if they come at the expense of public values, transparency, and procedural safeguards,<sup>222</sup> then internal displacement of external prevention becomes disquieting.

Conversely, external prevention may also displace internal precautions, which can produce perverse incentives. For example, the “Peltzman effect” hypothesis suggests that individuals react to public

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218. See Shavell, *supra* note 8, at 371; De Geest & Dari-Mattiacci, *supra* note 169, at 120.

219. See, e.g., D.C. DIST. DEP’T OF TRANSP., DO THE RIGHT THING! CLEAR YOUR SIDEWALKS, [https://ddot.dc.gov/sites/default/files/dc/sites/ddot/page\\_content/attachments/Sidewalk%20Snow%20Clearing%20Responsibilities%20-%20Residents%20and%20Private%20Property%20Owners.pdf](https://ddot.dc.gov/sites/default/files/dc/sites/ddot/page_content/attachments/Sidewalk%20Snow%20Clearing%20Responsibilities%20-%20Residents%20and%20Private%20Property%20Owners.pdf) (last visited Apr. 11, 2021).

220. See Viscusi, *supra* note 42, at 77–78.

221. See De Geest & Dari-Mattiacci, *supra* note 169, at 125.

222. See Jody Freeman, *Extending Public Law Norms Through Privatization*, 116 HARV. L. REV. 1285, 1290 (2003); Dave Owen, *Consultants, the Environment, and the Law*, 61 ARIZ. L. REV. 823, 824–25 (2019); Joshua Ulan Galperin, Foreword, *Private, Environmental, Governance*, 9 GEO. WASH. J. ENERGY & ENV’T L. 1, 2 (2018).

precautions, like car safety regulations, by reducing private precautions, like safe driving.<sup>223</sup> Along similar lines, some argue that federal policies to prevent wildfires and floods lead individuals to undertake riskier development in hazardous areas.<sup>224</sup> Thus, external prevention can erode internal prevention and create moral hazards.

Whether operating as complements or substitutes, internal and external prevention have relative strengths and weaknesses, particularly for addressing knowledge limitations and residual risk.

For instance, while knowledge limitations beset all prevention measures, external or internal prevention can offer relative knowledge advantages for avoiding certain harms. Internal prevention provides knowledge advantages for highly contextual harm avoidance, whereas external prevention may better address acontextual risks. As Steven Shavell has argued, when avoiding harm depends on contextual details, private actors can possess superior knowledge.<sup>225</sup> Shavell offers the example of an individual cutting down a tree near a neighbor's house.<sup>226</sup> Since the individual can appreciate the precise size and location of the tree, she can tailor precautions more effectively than a public regulator might.<sup>227</sup> Conversely, when harm avoidance depends on more general, acontextual information, public regulators can have knowledge advantages. Shavell poses the example of a small fumigation company that applies pesticides without fully understanding their chemistry.<sup>228</sup> In this instance, the risk of harm depends more on the pesticide than on the immediate factual context, and the public regulator may possess superior knowledge about the chemicals' risks.<sup>229</sup>

External prevention can also offer advantages for lowering residual risks. Though no prevention measure can completely eliminate risk, external prevention can reduce residual risk more

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223. See Sam Peltzman, *The Effects of Automobile Safety Regulation*, 83 J. POL. ECON. 677 (1975).

224. See Alison Berry, *Forest Policy Up in Smoke: Fire Suppression in the United States*, PROP. & ENV'T RSCH. CTR., [https://www.perc.org/wp-content/uploads/2007/09/Forest\\_Policy\\_Up\\_in\\_Smoke.pdf](https://www.perc.org/wp-content/uploads/2007/09/Forest_Policy_Up_in_Smoke.pdf).

225. See Shavell, *supra* note 8, at 366.

226. *Id.*

227. *Id.*

228. *Id.* at 369.

229. See *id.* at 359–60, 369; see also Viscusi, *supra* note 42, at 76 (explaining the general benefits of governmental regulation based on governmental knowledge).

directly, predictably, and extensively than can internal prevention. Because internal prevention is individual and largely incentive-based, policy efforts can only indirectly influence internal prevention, such as by changing incentive structures. Additionally, individuals are unlikely to adopt more precaution than they find individually cost-effective. However, external prevention can directly impose precautions to reduce residual risk, and it can calibrate precautions based on values other than cost-effectiveness. For example, external prevention can maximize saving lives rather than economic efficiency by imposing more protective precautions than would be cost-effective for some individuals.<sup>230</sup>

A hypothetical helps illustrate these points: Imagine a dangerous industry, where if negligence leads to a fatality, a firm's total expected cost<sup>231</sup> is \$2 million per fatality. Through cost-effective precautions, a firm can avoid all but two fatalities per year. Finally, precautions to reduce yearly fatalities from two to one would cost an additional \$3 million per year.

Under these facts, the two yearly fatalities represent residual risk that cannot be avoided by cost-effective precautions. To reduce fatalities from two to one would cost more (\$3 million) than a firm would save (\$2 million at most),<sup>232</sup> so firms have no financial incentive to lower this risk.

If policymakers seek to lower annual fatalities from two to one (i.e., reduce residual risk), external prevention can directly pursue this goal. Policies could require the necessary precautions to reduce fatalities, or they could mandate that firms cease operating if they cause more than one yearly fatality. Under the given facts, such measures would plainly require firms to take more precaution than their individual incentives would otherwise direct (i.e., spending \$3 million to save \$2 million, or ceasing operation). However, the regulation would predictably advance the policymakers' goal of decreasing fatalities.

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230. See, e.g., Viscusi, *supra* note 42, at 89; Adler & Posner, *supra* note 37, at 245–47.

231. Inclusive of liability and all other relevant costs.

232. Under the negligence standard, the firm may be acting reasonably by taking precautions that avoid all but two yearly fatalities. If so, the firm would not actually be liable for the two yearly fatalities, meaning that additional precautions would not actually avoid any costs. However, if the firm were found to negligently violate the duty of reasonable care, it would face \$2 million for the fatality.

Conversely, policies attempting to lower fatalities through internal prevention would be indirect and unpredictable. Policymakers might try to raise the cost of fatalities, say to \$4 million per fatality, but the path for doing so is murky because policies may not be able to increase negligence damage awards in a predictable and targeted way. To influence internal prevention would require circuitous efforts to adjust liability (i.e., cure) without certain results.

Obviously, this hypothetical presents a stylized scenario, but it illustrates how external prevention offers advantages for reducing residual risk.

*b. External or internal cure*

Cure can also be external or internal, depending on the party that supplies the remedy. Internal cure regimes require the harm-causing<sup>233</sup> actor to provide a remedy, thereby internalizing cure obligations. External cure regimes place cure burdens on entities other than the harm-causing actor.

Examples of internal cure are familiar. Tort doctrines follow this approach, at least nominally.<sup>234</sup> Additionally, regulatory takings and eminent domain reflect internal cure approaches because the harm-causing actor, even if a government entity, bears remedial liabilities internally.<sup>235</sup>

External cure arises anytime harm burdens fall on entities other than the harm-causing actor. This includes burdens on groups, the general public, or victims themselves. For example, social insurance programs, like the worker's compensation program, the social security disabilities program, and the National Flood Insurance program, create external cure structures because remedies come from groups that did not cause the harms at issue.<sup>236</sup> Further, doctrines that recognize immunities or limit damages impose external cure by spreading cure burdens to victims rather than harm-causing actors. Similarly, policies

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233. A Coasian view might object to this normative use of the term causation. *See generally* Coase, *supra* note 176, at 2 (discussing reciprocal causation). However, this use of the term assumes that entitlements are already determined.

234. If tort regimes systematically allow for externalized costs of harm, they become de facto external cure regimes.

235. However, to the extent these doctrines externalize subjective losses, they can be seen as engaging some external cure.

236. *See* STEARNS ET AL., *supra* note 32, at 17–18; Viscusi, *supra* note 42, at 70.

that fully externalize costs onto victims—for example, by letting harms fall where they may—represent external cure approaches.

Internal cure comports with ideas of market discipline and, possibly, justice. By forcing actors to internalize their costs, it sends market signals about desirable behavior. Alternatively, external cure undercuts market discipline in service of other goals like subsidizing actions and, in the case of social insurance, ensuring compensation for victims.<sup>237</sup>

Policies can choose between internal and external cure approaches, or they can combine them as alternative remedies. For example, adopting internal cure along with external cure (in the form of social insurance) in reserve can protect victims from judgement-proof defendants. Some environmental laws take such an approach, holding responsible parties liable for pollution but also providing public funds as a backstop for environmental cleanup.<sup>238</sup>

*c. Graphical depiction and application to climate change*

Figure 2 summarizes internal and external variations on prevention and cure.

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237. See Viscusi, *supra* note 42, at 66.

238. See, e.g., Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9607 (2018).

Figure 2: Internal and External Prevention and Cure

	Internal	External
Prevention	Actors' self-directed precaution	Government-imposed regulation
Cure	Harm-causing actor has remedial obligation	An entity other than the harm-causing actor (a group, the general public, or the victim herself) bears the harm burden

The following climate change examples showcase internal and external variations on prevention and cure.

On the prevention side, external prevention measures include government regulations aimed at mitigating climate change effects by reducing greenhouse gas emissions. For example, California's Global Warming Solutions Act requires 80% emission reductions by 2050.<sup>239</sup> Alternately, internal prevention measures entail voluntary efforts to mitigate climate change impacts. Such internal prevention can occur at small scales—for example, when individuals try to reduce their carbon footprints—or at large scales, such as when corporations elect to limit their emissions through “private environmental governance.”<sup>240</sup>

As for cure, internal cure would involve liability for climate change harms in proportion to contribution to climate change. While some tort suits have pursued such internal cure—for example, by alleging that major greenhouse gas emitters are liable for climate-exacerbated hurricane damages<sup>241</sup>—all such attempts have been unsuccessful.<sup>242</sup> At the present, no legislation or judicial decision has imposed liability proportionate to climate change causation, so there are no examples of actual internal cure for climate change harms. Rather, in the context of climate change, all cure practice has been

239. 2017 Scoping Plan Documents, *supra* note 134.

240. See Michael Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129 (2013).

241. See, e.g., *Comer v. Murphy Oil USA*, 607 F.3d 1049, 1050 (5th Cir. 2010) (en banc).

242. See, e.g., *id.* at 1055.

external, meaning that the costs of climate change harms have fallen disproportionately to greenhouse gas emissions. Such external cure has come in the form of social insurance—for example, via disaster assistance programs that alleviate burdens of climate-exacerbated storms or floods. Additionally, external cure has entailed individual victims bearing their own costs of climate impacts, for example by expending their own funds to rebuild or relocate after climate-induced storms or floods.

Figure 3 summarizes these climate change examples of internal and external prevention and cure.

Figure 3: Examples of Internal and External Prevention and Cure

	Internal	External
Prevention	Voluntary reduction of greenhouse gas emissions	Government-imposed reduction of greenhouse gas emissions
Cure	Major greenhouse gas emitters are liable for climate change harms	Disaster assistance programs or victims pay for climate change harms

## 2. Property Rule or Liability Rule

Another important variation for prevention and cure is whether they employ property rules or liability rules. Liability rules impose relatively objective prices, often linked to market prices, whereas property rules impose relatively subjective prices, which can exceed market prices and theoretically approach the infinite.<sup>243</sup> Prevention can regulate behavior through either property rules or liability rules, and cure can offer either property-rule or liability-rule remedies.

243. Cf. Kaplow & Shavell, *supra* note 9, at 756–57 (observing property rules and liability rules as a continuum from zero to infinitely high damages); see also Andrew Blair-Stanek, *Tax in the Cathedral: Property Rules, Liability Rules, and Tax*, 99 VA. L. REV. 1169, 1175–77 (2013) (summarizing scholarship on property rules and liability rules).

*a. Prevention by property rule or liability rule*

Prevention measures (specifically external prevention)<sup>244</sup> can direct behavior via liability rules or property rules. Liability-rule prevention charges a predictable monetary price for restricted behavior. Alternatively, property-rule prevention mandates performance on threat of imprisonment, compelled behavior, or escalating penalties.

Examples of liability-rule prevention include measures that restrict behavior by imposing costs. For example, parking meters disallow parking absent a payment of either the meter rate beforehand or a parking ticket afterwards. Similarly, carbon taxes prohibit pollution without payment of a fee. Moreover, countless other fines, pricing mechanisms, and Pigouvian taxes<sup>245</sup> fit this description. All constrain behavior subject to relatively predictable monetary costs.

Contrarily, property-rule prevention mandates behavior on penalty of incarceration or other coercion. A primary example of property-rule prevention is criminal liability.<sup>246</sup> Additionally, any prevention measures that enforce performance via punitive damage awards, civil contempt proceedings, or injunctions adopt a property-rule approach.

Prevention regimes can, and often do, combine liability rules and property rules. Enforcement of restricted behavior may begin with predictable fines (liability-rule prevention) and escalate to punitive monetary figures or court orders (property-rule prevention).<sup>247</sup> For example, to prevent trespass, the common law imposes nominal or economic damages (liability-rule prevention) for isolated instances but injunction (property-rule prevention) for threat of repeated trespass.

Liability-rule prevention can be more adaptable than property-rule prevention, making it more appealing from some perspectives and

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244. The distinction between property-rule and liability-rule enforcement is not meaningful for internal prevention measures, which are voluntarily adopted and thus not subject to enforcement.

245. "Pigouvian taxes" are fees imposed to discourage certain undesired behaviors. *See, e.g., Arthur Cecil Pigou, 1877-1959*, THE LIBR. OF ECON. & LIBERTY, <https://www.econlib.org/library/Enc/bios/Pigou.html> (last visited Apr. 11, 2021).

246. *See, e.g., Blair-Stanek, supra* note 243, 1192 n.164; *cf. Coleman, supra* note 64, at 923 (explaining the theory behind criminal liability through a hypothetical incident in which a guitar is stolen).

247. *See STEARNS ET AL., supra* note 32, 70–71.



less appealing from others. Since liability-rule prevention allows actors to either comply or pay, individuals can exercise greater choice. This can help reduce over-inclusive prevention, contributing to utilitarian social welfare and preserving greater autonomy for actors.

However, liability-rule prevention risks being under-inclusive. Utilitarians might worry that it will systematically underprice harmful behavior, and legal moralists can criticize it for institutionalizing markets for immoral behavior.<sup>248</sup> Finally, liability-rule prevention may be ill suited to address either the very wealthy, for whom the cost may be trivial, or the very poor, who may be effectively judgment proof and therefore unaffected by price.<sup>249</sup> In such contexts, property-rule prevention may be more appropriate.<sup>250</sup>

*b. Cure by property rule or liability rule*

In the context of cure, remedies reflect either property rules or liability rules, depending on who determines the extent of the remedy. Many cure approaches employ liability rules whereby an objective third party designates the cost of remedying harm. For example, torts doctrines rely on judges or juries to award damages, and eminent domain looks to fair market value.

Alternatively, some cure doctrines take a property-rule approach, requiring actors to satisfy victims' wishes when remedying harms. For instance, courts have awarded property-rule remedies in trespass cases involving building encroachments, where an actor builds a structure that inadvertently crosses a few inches into a victim's property.<sup>251</sup> In such cases, courts have imposed injunctions that require the actor to either remove the encroaching structure or pay the victim's chosen price.<sup>252</sup> Some environmental statutes also apply property-rule cure approaches by requiring actors to undo environmental harms via

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248. This opens liability-rule prevention to a natural rights criticism similar to that of cure. *See supra* Section II.A.3; Fennell, *supra* note 95, at 1418 (identifying "a morally grating locution like 'an entitlement to pollute'"); *see also* Jonathan Remy Nash, *Framing Effects and Regulatory Choice*, 82 NOTRE DAME L. REV. 313, 360–61, 370–71 (2006) (comparing meritless institutions like murder and racism to somewhat-beneficial pollution, and suggesting changing naming conventions to address this difference).

249. *See* STEARNS ET AL., *supra* note 32, at 18–19.

250. *See* Kaplow & Shavell, *supra* note 9, at 721.

251. *See, e.g.*, *Pile v Pedrick*, 31 A. 646, 647 (Pa. 1895).

252. *See, e.g., id.* These injunctions could also be seen as ex-post prevention of future trespass, but since they seek to remedy victims, they better resemble cure.

abatement, remediation, and restoration.<sup>253</sup> Similarly, environmental compensatory mitigation programs require developers to replace environmental function lost as a result of development.<sup>254</sup>

The general tradeoffs between such property-rule and liability-rule approaches are well rehearsed, but in the context of cure, a few bear emphasizing. First, liability-rule cure can raise utilitarian, natural rights, and distributive concerns if damage awards systematically undercompensate victims.<sup>255</sup> If this is the case, cure is under-inclusive, allowing actors to externalize costs and encroach further onto victims' liberties. Such externalized costs can render a nominally internal cure regime into a *de facto* external cure regime. Property-rule approaches can counteract such instances of under-inclusive cure by allowing victims to indicate what would make them whole.

With that said, property-rule cure can also potentially lead to foregone beneficial behavior via both over-inclusive prevention and over-inclusive cure. Since property-rule damages are less predictable than liability-rule damages, the uncertainty over exposure could lead actors to over-inclusive internal prevention of desirable actions.<sup>256</sup>

Property-rules can also create over-inclusive cure by positioning victims to opportunistically demand overcompensation, which would also create incentives for actors to refrain from desirable activities. Because cure imposes a transactional relationship in which the victim has constructively sold harm at a yet-to-be determined price, the actor is in a must-pay situation. If the victim can then choose the price, she may strategically demand an inflated or even extortionate sum, knowing that the harm-causing actor cannot exit the transaction and cannot verify her subjective valuation of the harm.<sup>257</sup> To borrow economic terminology for this scenario, property-rule cure can put the

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253. See Heidi Wendel, Note, *Restoration as the Economically Efficient Remedy for Damage to Publicly Owned Natural Resources*, 91 COLUM. L. REV. 430, 442 (1991); Clean Water Act, 33 U.S.C. § 1321 (2018); Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9607 (2018).

254. See, e.g., section 404 of the Clean Water Act wetlands program. U.S. ENV'T PROT. AGENCY, WETLANDS COMPENSATORY MITIGATION, [https://www.epa.gov/sites/production/files/2015-08/documents/compensatory\\_mitigation\\_factsheet.pdf](https://www.epa.gov/sites/production/files/2015-08/documents/compensatory_mitigation_factsheet.pdf) (last visited Apr. 11, 2021).

255. Cf. Kaplow & Shavell, *supra* note 9, at 731 (arguing that altering the process by which damages are calculated to better approximate harm would increase disputes and consume greater resources).

256. See, e.g., Smith, *supra* note 185, at 1730.

257. See, e.g., *id.* at 1729.

victim in the position to extract “appropriable quasi-rents,”<sup>258</sup> which can decrease social welfare as well as infringe on the liberties of actors.

*c. Graphical depiction and application to climate change*

Figure 4 summarizes property-rule and liability-rule variations on prevention and cure.

Figure 4: Property-Rule and Liability-Rule Prevention and Cure

	Property Rule	Liability Rule
Prevention	Required performance enforced by imprisonment, compelled behavior, or escalating penalties	Predictable monetary price for restricted behavior
Cure	Victim determines costs of remedying harm	Objective third party determines costs of remedying harm

Climate change examples help illustrate property-rule and liability-rule variations on prevention and cure.

Policies to prevent climate change harms have adopted both property-rule and liability-rule approaches to reducing greenhouse gas emissions. For example, as discussed above, a carbon tax is a liability-rule measure for greenhouse gas reductions. One can pay a fixed price to emit greenhouse gasses, and there is no upper limit on emissions. Thus, restricted behavior is priced not prohibited.

Alternatively, a cap-and-trade regime reflects a property-rule prevention approach. Cap-and-trade policies prescribe a total level of greenhouse gas emissions (i.e., a cap), allocate emission entitlements within that cap, and then allow entitlement-holders to buy or sell entitlements (i.e., trade).<sup>259</sup> This represents a property rule because it mandates certain performance standards: force of law prohibits

258. See STEARNS ET AL., *supra* note 32, at 22.

259. Steven Nadel, *More States and Provinces Adopt Carbon Pricing to Cut Emissions*, ACEEE: BLOG (Jan. 3, 2019), <https://aceee.org/blog/2019/01/more-states-and-provinces-adopt>.

emitting greenhouse gasses beyond one's entitlements, and it prohibits total emissions beyond the cap. Because cap-and-trade policies employ a performance-based, property-rule approach, there is no guaranteed opportunity to emit greenhouse gasses at a given price.<sup>260</sup> Rather, a would-be emitter must meet some entitlement holder's chosen price or cease emitting, and the price of emission entitlements can increase based on subjective valuation and demand.

Regarding cure, a property-rule approach would allow victims to designate the appropriate remedy for their climate change harms. Though such approaches are relatively uncommon, voluntary buyout programs for disaster-ravaged properties provide a limited example. Under such programs, government agencies offer to purchase properties damaged by climate-exacerbated disasters like storms or floods.<sup>261</sup> When property owners elect to be bought-out, they implicitly choose the buyout price as sufficient compensation for their climate-harmed property.<sup>262</sup> For property owners who opt to sell, voluntary buyout programs reflect property-rule cure for some climate harms.

More commonly, cure for climate change harms involves liability rules. For instance, disaster-assistance or flood-insurance programs provide victims a fixed amount of compensation according to some schedule of relief.

Figure 5 summarizes these climate change examples of property-rule and liability-rule prevention and cure.

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260. *Id.*

261. New York's voluntary buyback program for climate-vulnerable properties is an example. *See, e.g., Buyout and Acquisition Programs*, N.Y. GOVERNOR'S OFF. OF STORM RECOVERY, <https://stormrecovery.ny.gov/housing/buyout-acquisition-programs> (last visited Apr. 11, 2021).

262. While this remedy may not be perfect, the acceptance suggests that it is adequate in the eyes of the participating parties.

Figure 5: Examples of Property-Rule and Liability-Rule Prevention and Cure

	Property Rule	Liability Rule
Prevention	Greenhouse gas cap-and-trade	Carbon tax
Cure	Voluntary buyout participation	Disaster assistance or flood insurance with fixed schedule of damages

### 3. Ex-Ante or Ex-Post

Prevention and cure approaches may also employ different timing variations. They may deploy ex-ante measures before a given harm or ex-post measures after a particular harm. This distinction is relative rather than absolute; whether an approach is ex ante or ex post must be measured from a designated event. Nonetheless, the election of ex-ante or ex-post approaches can have important practical implications.

#### *a. Ex-ante and ex-post prevention*

Since prevention efforts seek to avoid harms, they can lend themselves to predictive, ex-ante outlooks. However, ex-post prevention is just as common. By instituting behavioral limits after some harms have occurred, ex-post prevention can benefit from increased knowledge and possibly offer better tailoring, albeit at the cost of the preceding harms.

Ex-ante prevention seeks to anticipate and avoid harms before they occur. For instance, regulations limiting scientific research on cloning, genome editing, or infectious disease<sup>263</sup> exemplify ex-ante external prevention. In the same vein, private companies sometimes decline to make certain technologies available to the public, or to the

263. See generally Natalie Ram, *Science as Speech*, 102 IOWA L. REV. 1187 (2017) (examining federal regulation of scientific experimentation and research).

military,<sup>264</sup> out of concern about possible harms. This represents ex-ante internal prevention, as do consolidation efforts, such as a noisy factory's prospective purchase of surrounding properties.

Prevention efforts also frequently take ex-post forms, imposing behavioral limits in response to harms that have already arisen. There are countless examples of ex-post internal prevention; these occur whenever an actor institutes precautions following a particular accident or liability. Ex-post external prevention is also routine. For instance, numerous federal environmental laws were enacted in response to environmental disasters.<sup>265</sup> Additionally, court-ordered "prophylactic remedies" not only compensate for past harms but also compel measures to avoid similar harms.<sup>266</sup> For instance, to redress sexual harassment, courts may not only assess damages (i.e., cure) but also require new employment practices, employee training, and grievance procedures (ex-post prevention).<sup>267</sup>

The major tradeoffs between ex-ante and ex-post prevention involve knowledge limitations and avoided harms. Ex-post prevention can incorporate accumulated experience to inform its tailoring,<sup>268</sup> albeit at the cost of allowing some harms to occur. But, experience does not guarantee better harm avoidance, and the ex-post perspective may skew prevention due to cognitive biases that overweight the importance of recent, available, confirming, or intense information.

On the other hand, ex-ante prevention may avoid marginally more foreseeable harms or irreparable losses. Further, despite (or, rather, because of) these knowledge limitations, ex-ante prevention may allow regulations (i.e., external prevention) to proceed under a sort of "veil of ignorance," potentially allowing decisions to be made on

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264. Cf. Tony Romm & Drew Harwell, *Microsoft Workers Call for Canceling Military Contract for Technology that Could Turn Warfare into a "Video Game,"* WASH. POST (Feb. 22, 2019, 2:00 PM), <https://www.washingtonpost.com/technology/2019/02/22/microsoft-workers-call-cancelling-military-contract-technology-that-could-turn-warfare-into-video-game/> (describing Microsoft's choice to continue its relationship with the Defense Department despite employee concerns).

265. See generally ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY (6th ed. 2009) (describing the history of federal environmental laws).

266. DOUGLAS LAYCOCK, MODERN AMERICAN REMEDIES: CASES AND MATERIALS 272 (2d ed. 1994).

267. See Tracy A. Thomas, *Understanding Prophylactic Remedies Through the Looking Glass of Bush v. Gore*, 11 WM. & MARY BILL RTS. J. 343, 352 (2002).

268. See Kyle D. Logue, *In Praise of (Some) Ex Post Regulation: A Response to Professor Galle*, 69 VAND. L. REV. EN BANC 97, 122 (2016).

principles and without knowledge of particular winners or losers.<sup>269</sup> Thus, ex-ante prevention may marginally reduce interest-group influence. However, because a lack of experience can heighten knowledge limitations, ex-ante prevention increases risks of over-inclusivity, by foreclosing too much behavior, or under-inclusivity, by failing to accurately predict harms.

*b. Ex-ante and ex-post cure*

Cure frequently adopts an ex-post perspective by seeking to remedy existing harms. However, cure obligations can also take an ex-ante approach by securing remedies before harms arise.

Ex-post cure is typical of liability and social insurance structures; there, the occurrence of harm triggers cure obligations. Ex-ante cure is less common. It imposes cure obligations in anticipation of future harms. For example, security deposits or bonding requirements make actors post remedial funds before undertaking potentially harm-causing behavior.<sup>270</sup> Environmental mitigation or offset requirements similarly solicit ex-ante cure.<sup>271</sup> For example, before destroying a wetland, an actor may be tasked with replacing its ecological function.<sup>272</sup>

The tradeoffs between ex-ante and ex-post cure involve balancing barriers to action with assurances of compensation. Ex-post cure imposes lower up-front costs, but it risks actors, like judgment-proof defendants, who cannot remedy their harms. Ex-ante cure raises the initial costs of action but assures that actors can provide some measure of cure,<sup>273</sup> avoiding the externalities associated with judgment-proof defendants.<sup>274</sup>

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269. See, e.g., Brian Galle, *In Praise of Ex Ante Regulation*, 68 VAND. L. REV. 1715, 1723–24 (2015).

270. See, e.g., Maureen D. Carman, *Regulatory and Transactional Bonding: A Primer on Surety Bonding for the Mineral Lawyer*, 17 E. MIN. L. FOUND. 227, 228 (1997).

271. See, e.g., Bruce R. Huber, *Negative-Value Property*, 98 WASH. U. L. REV. (forthcoming 2021).

272. See Michael Faure & Jing Liu, *New Models for the Compensation of Natural Resources Damage*, 4 KY. J. EQUINE, AGRIC. & NAT. RES. L. 261, 269 (2011–2012).

273. In this way ex-ante cure resembles liability-rule external prevention because it raises the cost of actions which leads to decreased action. However, ex-ante cure retains a major distinction from prevention: in the case of prevention, pricing schemes need not actually allocate revenues to victims. See STEARNS ET AL., *supra* note 32. However, ex-ante cure provides assurances to victims by holding funds for future compensation.

274. See, e.g., Kaplow & Shavell, *supra* note 9, at 740.

However, because ex-ante cure requires money up front, it potentially imposes over-inclusive cure in the form of excessive short-term costs. For example, some actors might ultimately be solvent for longer-term liabilities but may not be able to afford immediate bonding requirements. For those marginal actors, ex-ante cure could foreclose otherwise cost-effective behavior. While there are various ways to lower these short-term costs, the nature of ex-ante cure is that it will impose costs earlier than will ex-post cure. This can assure marginally more compensation, but it risks marginally less activity.

*c. Graphical depiction and application to climate change*

Figures 6 summarizes ex-ante and ex-post variations on prevention and cure.

Figure 6: Ex-Ante and Ex-Post Prevention and Cure

	Ex Ante	Ex Post
Prevention	Behavior restricted in anticipation of future harm	Behavior restricted in reaction to past harm
Cure	Cure obligation secured in advance of harm	Cure obligation secured after harm

The climate change context offers additional examples of ex-ante and ex-post prevention and cure efforts. Many greenhouse gas reduction policies represent ex-ante prevention because they seek to avoid future harms that have yet to manifest. For example, a major goal for emission-reduction policies is to hold global temperature rise below two degrees Celsius above pre-industrial levels, which will hopefully avoid catastrophic climate change impacts.<sup>275</sup>

Other climate change policies represent ex-post prevention aimed at dodging recurrence of harms. For instance, some disaster-response policies buy properties flooded by climate-exacerbated storms and

275. See, e.g., U.N. Framework Convention on Climate Change, *supra* note 160.



retire them from redevelopment, transforming them into greenspace that will not be harmed by flooding and that can buffer communities against future storms.<sup>276</sup>

In terms of cure, any disaster assistance or tort liability for climate harms represents ex-post cure. As for ex-ante cure, examples arise from “managed retreat” policies that preemptively buyout and relocate climate-vulnerable populations, such as coastal communities threatened by sea level rise, when harms are foreseeable but have yet to occur.<sup>277</sup>

Figure 7 summarizes these examples of ex-ante and ex-post prevention and cure.

Figure 7: Examples of Ex-Ante and Ex-Post Prevention and Cure

	Ex Ante	Ex Post
Prevention	Emissions reduction to hold global temperature rise below 2 degrees	Retiring flooded properties and managing them as greenspace
Cure	Managed retreat policies	Disaster assistance and tort damages

#### 4. Actor Presumption or Victim Presumption

Finally, both prevention and cure regimes can assign burdens of proof to create presumptions in favor of either actors or victims. For instance, external prevention<sup>278</sup> measures may presume an action is exempt from regulation unless proven otherwise (an actor presumption), or that an action is restricted absent contrary evidence

276. *Buyout and Acquisition Programs*, *supra* note 261.

277. *Managed Retreat Strategies*, ADAPTATION CLEARINGHOUSE, <https://www.adaptationclearinghouse.org/resources/managed-retreat-strategies.html> (last visited Apr. 11, 2021).

278. Delineating these presumptions is immaterial for internal prevention, which involves no third-party arbiter to impose a burden of proof.

(a victim presumption).<sup>279</sup> The FDA employs an actor presumption for foods derived from genetically modified plants.<sup>280</sup> Such foods are “generally recognized as safe,” and thus not subject to regulations unless otherwise indicated.<sup>281</sup> Conversely, some state water laws impose a victim presumption through the “no harm rule,” which disallows the transfer of water rights absent proof that the transfer will not harm other water users.<sup>282</sup>

Internal and external cure regimes also create presumptions by allocating burdens of proof. Actor presumptions are common. For instance, negligence liability (internal cure) reflects an actor presumption; to recover, a victim must prove duty, breach, causation, and damages.<sup>283</sup> Similarly, federal disaster assistance programs (external cure) require victims to demonstrate that they qualify for remedial programs.<sup>284</sup>

Victim presumptions are rarer but still arise in both internal and external cure measures. For example, some radioactive waste facilities are presumed liable (internal cure)<sup>285</sup> for nearby radioactive contamination.<sup>286</sup> Additionally, hospital emergency rooms (external cure) presume that victims are entitled to curative treatment.

#### *a. Graphical depiction and application to climate change*

Figure 8 summarizes actor-presumptive and victim-presumptive variations on prevention and cure.

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279. The “precautionary principle” in its strong form calls for such a presumption. *See, e.g.*, Noah M. Sachs, *Rescuing the Strong Precautionary Principle from Its Critics*, 2011 U. ILL. L. REV. 1285, 1288.

280. *See* Foods Derived from New Plant Varieties, 57 Fed. Reg. 22,984 (May 29, 1992).

281. *See id.*

282. Scott C. Miller, *Water Law 101: A Primer for Resource Developers and Landmen*, 61 ROCKY MTN. MIN. L. INST., §§ 21.01–.02 (2015).

283. *See* STEARNS ET AL., *supra* note 32, at 72.

284. *See, e.g.*, *Individual Assistance*, FEMA, <https://www.fema.gov/individual-disaster-assistance> (last updated Dec. 16, 2020).

285. This liability constitutes internal cure because it imposes a remedial obligation on the actor causing the harm. Here, the provision creates a presumption of causation. However, radioactive waste facilities can rebut this presumption by proving that they did not cause the radioactive contamination. Thus, remedial obligation turns on the question of causation, making this an internal cure approach regardless of the presumption.

286. *See, e.g.*, Pa. St. Healthcare L. Libr. 25 § 237.1 (2019).

Figure 8: Actor-Presumptive and Victim-Presumptive Prevention and Cure

	Actor Presumption	Victim Presumption
Prevention	Presumption that action is permitted	Presumption that action is forbidden
Cure	Victim must prove entitlement to remedy	Victim presumptively entitled to remedy

Climate change policies feature a mix of actor presumptions and victim presumptions. For instance, California regulations adopt both actor-presumptive and victim-presumptive prevention measures regarding greenhouse gas emissions. Emissions from certain activities are presumptively regulated, absent a “demonstration of nonapplicability” or “verification for reduced emissions.”<sup>287</sup> This represents a victim presumption because the emissions are regulated unless proven otherwise. Alternately, some actions are presumed not to have significant greenhouse gas emission impacts.<sup>288</sup> This is an actor presumption because, barring contrary evidence, these actions are spared regulatory obligations.

Climate change cure can also demonstrate actor presumptions and victim presumptions. For instance, climate change tort liability is actor-presumptive; victims must prove their entitlement to a remedy. Alternately, managed retreat efforts can be victim-presumptive if they presuppose that residents of disaster-vulnerable areas are qualified for buyouts and relocation efforts.

Figure 9 summarizes these examples of actor-presumptive and victim presumptive prevention and cure.

287. CAL. AIR RES. BD., UNOFFICIAL ELECTRONIC VERSION OF THE REGULATION FOR THE MANDATORY REPORTING OF GREENHOUSE GAS EMISSIONS § 95101(g)-(h) (Apr. 2019), <https://ww3.arb.ca.gov/cc/reporting/ghg-rep/regulation/mrr-2018-unofficial-2019-4-3.pdf>.

288. See BAY AREA QUALITY MGMT. DIST., CALIFORNIA ENVIRONMENTAL QUALITY ACT: AIR QUALITY GUIDELINES (May 2017), [https://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa\\_guidelines\\_may2017-pdf.pdf](https://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf).

Figure 9: Examples of Actor-Presumptive and Victim-Presumptive Prevention and Cure

	Actor Presumption	Victim Presumption
Prevention	Actions presumed not to have significant emissions impacts	Actions with presumptively regulated emissions
Cure	Tort	Geography-based managed retreat

### *B. Complementary Prevention and Cure Measures*

As the previous section detailed, different alignments of the prevention-and-cure variations can produce nuanced individual policy measures. Still, any individual measure in isolation is limited and will risk over- or under-inclusivity. Combining mutually reinforcing prevention and cure measures allows for more holistic policy approaches that can mitigate instances of over- and under-inclusivity. This section identifies particularly complementary variations and combinations of prevention and cure.

#### 1. Addressing Under-inclusive Prevention

External prevention risks being under-inclusive due to knowledge limitations and interest-group influence. Reinforcing external prevention with internal cure measures can help counteract this under-inclusivity.

External prevention measures will rarely be perfectly calibrated to avoid harm.<sup>289</sup> Knowledge limitations will leave some harms unanticipated, and political pressures may drive policies to favor particular interests at the expense of avoiding harms.<sup>290</sup> As a result,

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289. Even if prevention efforts were perfectly tailored, some residual risk of harm would remain.

290. *See supra* Section III.A. Internal cure can also struggle from knowledge limitations and can be reinforced by internal prevention.

external prevention measures are apt to struggle with under-inclusivity.

Internal cure can alleviate such under-inclusivity by providing relief to victims and by creating incentives for actors to exercise well-tailored internal prevention. For victims suffering un-avoided harms, internal cure provides recourse.<sup>291</sup> Moreover, by forcing actors to internalize costs, internal cure creates incentives to foresee and avoid potential harms via internal prevention. This helps mitigate the knowledge limitations that beset external prevention, and it can help temper interest-group influence on regulations.<sup>292</sup> For example, even if industry lobbying has secured favorable treatment such as minimal regulation or nugatory safety requirements (under-inclusive external prevention), the prospect of meaningful liability (internal cure obligations) creates incentives for cost-effective precautions (internal prevention). Thus, robust internal cure<sup>293</sup> can mollify the potential under-inclusivity of external prevention.

## 2. Addressing Over-inclusive Prevention

Uncertainty over liabilities can push internal prevention toward over-inclusivity, potentially impeding desirable behavior. However, particular cure variations can help increase certainty about liabilities and thereby abate over-inclusive internal prevention. For instance, liability-rule cure offers more predictable remedies than does property-rule cure. Indeed, the examples of efficient breach discussed in Parts I and III<sup>294</sup> demonstrate how predictable liability-rule cure (in the form of expectancy damages) is crucial for calibrating internal prevention in that context. Additionally, ex-ante cure, such as bonding requirements, offers actors certainty about their potential liabilities by requiring that obligations be paid in advance. Adopting such cure variations to reduce uncertainty can help actors tailor internal prevention to avoid over-inclusivity.

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291. This is so if it is not under-inclusive. See discussion *infra* Section IV.B.3.

292. Cf. Buzbee, *supra* note 167, at 1598 (advocating for policies that allow citizens and groups to influence regulatory choices).

293. This requires ensuring that cure is truly internal.

294. See *supra* Section I.B.1. and Section III.A.3.

### 3. Addressing Under-inclusive Cure

Under-inclusive cure can under-protect victims and create problematic incentives for actors.

To address victims' under-inclusivity concerns, cure regimes can adopt property-rule, victim-presumptive, and ex-ante cure variations. Property-rule cure empowers victims to designate satisfying remedies, victim-presumptive cure increases victims' access to remedies, and ex-ante cure guards against judgment-proof actors. Combining some or all of these variations helps shield victims against under-inclusive cure, regardless of whether a cure regime is internal or external.

The distinction between internal and external cure becomes important regarding under-inclusive cure's incentives for actors. Since internal cure forces actors to internalize harms, it creates incentives for cost-effective precautions (internal prevention). Thus, internal cure measures coupled with property rules, victim presumptions, and ex-ante obligations militate against under-inclusive cure's problematic incentives and its under-compensation.

However, some instances of under-inclusive cure intentionally subsidize actors, and it may prove politically infeasible to implement robust internal cure, much less to couple it with property rules, victim presumptions, and ex-ante obligations. In this case, external cure in the form of social insurance may be preferable to address the drawbacks of under-inclusive cure. Such social insurance could still ensure that victims are made whole, especially if it employs property rules or victim-presumptions. It could also retain subsidies for actors, spreading the subsidy costs over society rather than concentrating them on victims.

Finally, external prevention can reinforce these cure variations in addressing under-inclusive cure. Regulations can generally complement internal and external cure regimes by guiding behavior to reduce residual risk, thereby decreasing instances of harm that provide opportunities for under-inclusive cure. More specifically, external prevention can couple with external cure to allow the benefits of social insurance while still ensuring certain levels of precaution, thereby avoiding increases in residual risk. This combination allows policies to simultaneously protect victims and subsidize actors against liability (both through social insurance), while still requiring actors to take

some desirable precautions (through external prevention) that the subsidized liability would otherwise undermine.

To illustrate this dynamic, recall the hypothetical dangerous industry, where if negligence leads to a fatality, a firm's total expected cost is \$2 million per fatality.<sup>295</sup> Through precautions that are cost-effective under the negligence regime, a firm could avoid all but two fatalities per year.

Now, imagine that the relevant cure regime changes from negligence (internal cure) to social insurance (external cure), whereby victims still receive \$2 million per fatality, but the firm contributes only \$500,000 of that amount. This social insurance subsidy changes the firm's calculation of cost-effective precaution. Since the firm bears a much lower cost per fatality, more fatalities per year become cost effective, and the firm will likely reduce precautions accordingly. In turn, this increases residual risk. The firm's former cost-effective precautions prevented all but two yearly fatalities; the firm's new cost-effective precautions will allow more than two annual fatalities.

To counteract this effect, external prevention can complement social insurance. For instance, a regulation could require the firm to maintain precautions that prevent all but two yearly fatalities. This would allow for the same social insurance benefits (guaranteeing victims \$2 million per fatality while reducing the firm's liability costs to \$500,000 per fatality), but it would also maintain precaution levels to avoid a spike in residual risk.

#### 4. Addressing Over-inclusive Cure

When over-inclusive cure induces over-compensation, it can stifle desirable behavior, and property-rule cure risks just such overcompensation by potentially allowing victims to make strategic inflated demands. However, combining property-rule cure with complementary strategies can temper this risk. First, coupling property-rules with external cure in the form of social insurance can ease overcompensation burdens on actors. Second, limiting property-rule cure to particular subject matters or coupling it with internal prevention approaches like consolidation can limit the potential for opportunistic demands that generate overcompensation. Finally,

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295. See *supra* Section IV.A.1.a.

blending the previous two strategies, social insurance could provide property-rule cure only in situations that limit opportunistic demands.

First, property rules linked with social insurance can spread the cost of cure broadly. For example, imagine that victims can name their price for any nuisance harms caused by a noisy factory (property-rule cure), but that the local municipality subsidizes half the cost of all these nuisance liabilities. Here victims may potentially demand overcompensation, and the municipal subsidy would not remove the possibility of such strategic behavior. In fact, it may increase the likelihood by creating deeper pockets to meet such demands. However, the subsidy could prevent concentrated overcompensation burdens on the factory, allowing for the property-rule cure without chilling desirable factory operations.

Second, to check overcompensation, property-rule cure could apply only in situations where opportunistically inflating costs is difficult. Such situations can arise from particular subject matters or from prior agreements. For example, when cure entails demonstrable, verifiable performance, victims cannot easily inflate harms. For instance, tearing down an encroaching structure, remediating pollution, or replacing ecological function are all tethered to verifiable results.<sup>296</sup> Because these measures of cure are performance based, they restrict the possibility of victims seeking overcompensation.<sup>297</sup>

Similarly, prior agreements can also create measurable gauges of harm, thereby limiting room for opportunistic demands. For instance, liquidated damages clauses in contracts allow potential victims to state in advance their expected measure of subjective harm,<sup>298</sup> thereby bounding potential remedy requests. Asking would-be victims to anticipate harms in advance may not give a perfect measure of actual harms, but it allows cure approaches to honor victims' stated prices (i.e., apply property rules) without too much concern about strategic behavior.<sup>299</sup>

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296. They may still leave room to argue about the extent and quality of the necessary performance, but they are at least measurably performance based.

297. Cf. Kaplow & Shavell, *supra* note 9, at 722–23 (identifying disadvantages of liability rules).

298. See STEARNS ET AL., *supra* note 32, at 25.

299. Additionally, property rules can encourage ex-ante bargaining in these contexts. See RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 70 (4th ed. 1992); Kaplow & Shavell, *supra* note 9, at 722.



Such use of prior agreements shows how internal prevention via consolidation can complement property-rule cure. For example, imagine that a noisy factory contracts with neighboring Victim, agreeing that the factory will pay Victim a set price if it emits loud noise that disturbs Victim's property. This contract represents internal prevention via consolidation (the factory has prevented Victim's realization of harm), and it enables internal property-rule cure because Victim will receive her chosen price (the agreed contract price) for the noisy harm. All the while, because the price is settled in advance, the contract limits the risk of Victim's opportunistic demands.

Finally, property-rule cure regimes can combine social insurance with verifiable measures of harm. For example, imagine that a municipality wishes to subsidize a local noisy factory. The municipality could commit to share the cost of the factory's noise contracts with its neighbors. This scenario combines internal prevention (consolidation via noise contracts) with external cure (the municipality shares the cost of curing the factory's noise harms) that simultaneously guarantees property-rule cure (victims receive their chosen price for noise) and limits opportunistic behavior (the price is agreed in advance).

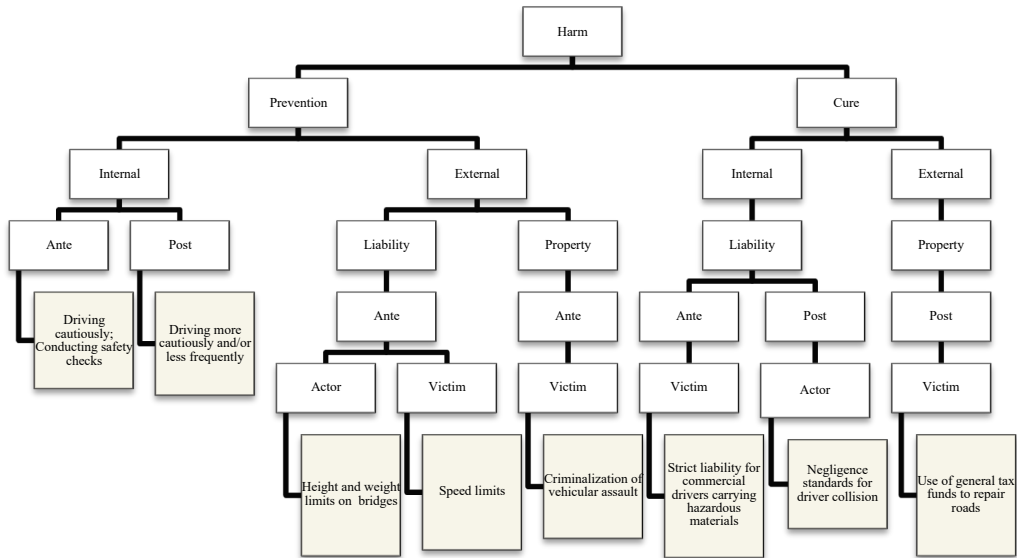
### *C. Prevention and Cure in Integrated Policy Landscapes*

Building on the previous sections, this section examines how different prevention and cure measures interlace to form integrated policy landscapes. In particular, it analyzes how layered sets of external-prevention, cure, and internal-prevention measures compose the policy structures surrounding motorist behavior and climate change. These applications showcase the descriptive and prescriptive capacity of the prevention-and-cure framework. The analysis of motorist behavior demonstrates how interrelated prevention and cure measures can coalesce into a coherent policy landscape. Conversely, examination of climate change policy reveals individual prevention and cure measures working largely in isolation, which hampers their singular and cumulative effectiveness. This structural analysis identifies complementary measures, particularly internal cure, that can reinforce climate change policy.

### 1. Motorist Behavior

A congruous web of prevention and cure measures governs motorist behavior. Figure 10 depicts the policy landscape, and subsequent sections discuss relevant external-prevention, cure, and internal-prevention measures in detail. The final section analyzes how these measures interact to form a consonant and consistent policy landscape.

Figure 10: Motorist Behavior Policy Landscape



#### a. External prevention

A variety of external prevention measures restrict motorist behavior, with different approaches tailored to the desirability of different actions.

For extremely undesirable behavior, like vehicular assault, a maximum-prevention approach involves:

- 1) ex-ante,
- 2) property-rule,
- 3) external prevention, with
- 4) a victim presumption.

This configuration describes criminalization of behavior. The state restricts behavior (external prevention); the behavior is presumed

harmful unless proven otherwise (victim presumption); the restriction attaches prior to harm occurring (ex-ante); and it is enforced via imprisonment (property-rule).

However, such maximum prevention is overkill for unwanted behavior, like speeding, that is undesirable but not as offensive. Adjusting one variation, by shifting from a property rule to a liability rule, offers a less stringent prevention approach:

- 1) ex-ante,
- 2) liability-rule,
- 3) external prevention, with
- 4) a victim presumption.

This describes traffic restrictions like speed limits. The state still restricts behavior (external prevention); the behavior is presumed harmful unless proven otherwise (victim presumption); and the restriction attaches prior to harm occurring (ex-ante). However, now the prevention is enforced via a fine (liability-rule).

For generally desirable behavior, prevention approaches become less restrictive still. To accomplish this, the configuration can adjust from victim presumption (behavior is restricted unless proven otherwise) to actor presumption (behavior is unrestricted unless proven otherwise). This change yields:

- 1) ex-ante,
- 2) liability-rule,
- 3) external prevention, with
- 4) an actor presumption.

This captures measures like weight and height restrictions for trucks on particular bridges or roads. Under such restrictions, most driving is allowed, but certain instances of demonstrably harmful driving (weights or heights that prove harmful to infrastructure) are subject to penalty.

### *b. Cure*

Turning to cure, since all prevention efforts, even maximally restrictive ones, leave residual risk, some harms will inevitably occur from driving. Addressing such harms requires cure measures, which can differ across causes or types of harm.

To address harms caused by everyday behavior, such as damages from one private driver colliding with another, a typical configuration is:

- 1) ex-post,
- 2) liability-rule,
- 3) internal cure, with
- 4) an actor presumption.

This captures a negligence standard. Once a harm arises (ex-post), if the victim can prove the elements of liability (actor presumption), then the harm-causing actor must remedy the harm (internal cure) by paying a court-determined sum (liability-rule).

Alternatively, to address harms from particularly dangerous driving, the configuration can adjust to allow easier recovery for victims. This yields:

- 1) ex-ante,
- 2) liability-rule,
- 3) internal cure, with
- 4) a victim presumption.

Now dangerous drivers who may cause harms must provide remedies (internal cure) prospectively in the form of a bond (ex-ante), and once the harm arises, the actor faces strict liability (victim presumption) for a court-determined sum (liability-rule). Commercial drivers carrying hazardous materials face cure structures like this.<sup>300</sup>

Finally, to address the accumulated harms that driving causes to roads, a broad remedial configuration can impose:

- 1) ex-post,
- 2) property-rule,
- 3) external cure, with
- 4) a victim presumption.

This resembles the use of general tax funds to repair roads.<sup>301</sup> Road damage arises from diffuse actors, but general taxes extend even beyond the group that causes the harm, for example by reaching infrequent drivers and non-drivers. As a result, harm-causing actors

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300. See *Insurance Filing Requirements*, FED. MOTOR CARRIER SAFETY ADMIN., <https://www.fmcsa.dot.gov/registration/insurance-requirements> (last updated Dec. 16, 2019).

301. See, e.g., Tony Dutzik & Gideon Weissman, *Who Pays for Roads? How the "Users Pay" Myth Gets in the Way of Solving America's Transportation Problems*, U.S. PIRG EDUC. FUND & FRONTIER GRP. (2015), <https://uspig.org/sites/pirg/files/reports/Who%20Pays%20for%20Roads%20vUS.pdf>. (documenting the extent to which general tax funds are used to pay for highways).

partially externalize costs (external cure). Further, taxpayers pay this cure by default (victim presumption). Finally, the cure is performance based (property-rule); the total cure obligation is whatever emerges as the ultimate cost of fixing the road.<sup>302</sup>

*c. Internal prevention*

All of the cure obligations in the previous section create incentives that influence internal prevention measures, such as how and how-often people drive.

For example, under the negligence standard, drivers face cure obligations if victims prove harms caused by unreasonable driving. This creates incentives for ex-ante, internal prevention, like driving with reasonable care.<sup>303</sup> However, the negligence regime is not so onerous as to greatly decrease driving.

If cure obligations are more victim-oriented than the negligence standard—for example, if cure includes victim presumptions and ex-ante bonding requirements—the increased liability creates incentives for more extensive ex-ante, internal prevention. Faced with such cure duties, drivers may both increase precautions and decrease activity levels.<sup>304</sup> So, for example, hazardous material carriers may conduct more frequent safety checks on equipment, or some commercial drivers may choose not to carry hazardous materials.

Finally, a broad remedial standard, such as general tax funds for road repair, is unlikely to incentivize private prevention. Because the external cure structure spreads costs disproportionately to the causes of harm, it diminishes incentives for particular harm-causing actors (such as frequent drivers, drivers of heavy vehicles, or drivers who use snow-chains) to undertake precautions or decrease behavior.

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302. Such costs frequently overrun third-party measurements like bids or estimates. *Cf.* Dakshina G. De Silva et al., *Project Modifications and Bidding in Highway Procurement Auctions* 1 (Fed. Res. Bank of Atlanta, Working Paper No. 2015-14, 2015), <https://www.frbatlanta.org/-/media/Documents/research/publications/wp/2015/14.pdf> (describing specific difficulties inherent in highway construction auctions).

303. For careless drivers who have been liable for harms, the experience of having paid damages may lead to ex-post internal prevention, such as driving with even greater care.

304. Increased liability can make additional precautions cost-effective. *Cf.* STEARNS ET AL., *supra* note 32, at 74 (describing the relationship between liability, precautions, and costs).

*d. The policy landscape surrounding motorist behavior*

The combination of prevention and cure measures addressing motorist behavior knit together to form a relatively integrated and reinforcing policy landscape. The various external prevention measures calibrate different deterrence levels for more- and less-desirable behaviors. Additionally, the external prevention measures work in concert with the cure measures. For example, by regulating speeding and restricting vehicle weight and height, the external prevention measures reduce residual risk below what might otherwise be cost-effective under a negligence cure regime. At the same time, the internal-cure provisions, such as negligence and strict liability, counteract potentially under-inclusive regulations (external prevention) by incentivizing tailored internal-prevention measures. The cure measures also mitigate under-inclusive prevention by addressing unforeseen or unavoidable harms. Finally, the variety of complementary cure measures helps balance concerns about over- and under-inclusive cure. Negligence measures seek to optimally compensate victims while not over-detering beneficial driving, strict liability guarantees victims remedies for injuries from hazardous activities, and external-cure measures guard against potential under-inclusive funding for road repairs.

Thus, the prevention and cure measures governing motorist behavior form a generally cohesive policy landscape. This does not immunize each individual measure from criticism, and indeed the prevention-and-cure framework helps identify potentially problematic measures and suggest strategies for improvement.<sup>305</sup> Nonetheless, accepting that individual measures are (and will always be) imperfect, this integrated collection of prevention and cure measures coherently addresses motorist behavior.

## 2. Climate Change

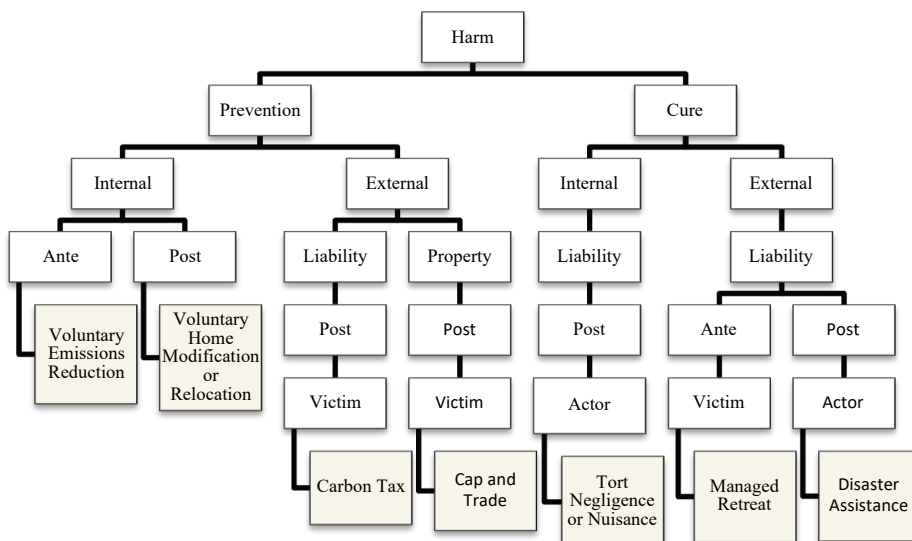
In contrast with the congruous policy landscape surrounding motorist behavior, the individual prevention and cure measures addressing climate change are largely independent and isolated,

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305. For instance, if in practice the negligence standard represents de-facto external cure because victims are unable to consistently carry their burden of proof, this may counsel adopting different cure variations, such as victim presumptions, to internalize costs and reinforce internal prevention.

limiting the efficacy of each measure and leaving significant gaps in climate policy. Figure 11 depicts the climate change policy landscape, and later sections explore the external-prevention, cure, and internal-prevention measures aimed at climate change harms. The final section explains why this assembly of prevention and cure measures remains disjointed, and it highlights tactics to help integrate climate policy.

Figure 11: Climate Change Policy Landscape



### *a. External prevention*

Unlike the external prevention measures addressing motorist behavior, which are common and generally consistent across the United States, external prevention of climate change is relatively uncommon and highly inconsistent. Until recently, there were no external-prevention efforts to avoid climate harms by curbing greenhouse gas emissions, and currently there remains little external prevention at the federal level and in many states.<sup>306</sup> However, some states have adopted external-prevention efforts to reduce emissions, and other jurisdictions may consider implementing such measures.<sup>307</sup>

306. See Nadel, *supra* note 259.

307. *Id.*

Examining the prevailing external prevention approaches helps uncover their different attributes and advantages.

Among external-prevention options, a carbon tax, which requires greenhouse gas emitters to pay per unit of emission, may be least restrictive (depending on the price of the tax). A carbon tax represents:

- 1) ex-ante,
- 2) liability rule,
- 3) external prevention, with
- 4) a victim presumption.

Carbon taxes are government-imposed measures (external prevention) that regulate greenhouse gas emissions to mitigate future climate harms (ex-ante).<sup>308</sup> They impose a given price for emissions (liability-rule), and emissions are presumptively subject to the tax (victim presumption). The higher the carbon-tax price, the more it will reduce emissions, but a carbon tax itself does not set a total limit on emissions. Rather, actors can emit as much greenhouse gas as they can afford.<sup>309</sup>

No states currently impose carbon tax policies, though Washington and Massachusetts have considered it.<sup>310</sup> Additionally, the City of Boulder, Colorado as well as two Canadian provinces employ carbon taxes.<sup>311</sup>

Potentially more restrictive than a carbon tax, a cap-and-trade approach employs a property rule rather than a liability rule. A cap-and-trade policy represents:

- 1) ex-ante,
- 2) property-rule,
- 3) external prevention, with
- 4) a victim presumption

Like a carbon tax, a cap-and-trade program is a government-imposed regulation (external prevention) that seeks to avoid future climate harms (ex-ante), and emissions are presumptively subject to the cap-and-trade program (victim presumption). However, unlike a carbon-tax, a cap-and-trade program adopts a property-rule structure by requiring performance (a cap on total emissions). Thus, while both

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308. See, e.g., U.N. Framework Convention on Climate Change, *supra* note 126.

309. See *id.*

310. Nadel, *supra* note 259.

311. *Id.*



cap-and-trade and carbon-tax approaches can theoretically reduce emissions to the same extent, cap-and-trade programs can do so more directly. Currently, eleven states employ some version of cap and trade.<sup>312</sup>

Other relatively common greenhouse gas emissions reduction efforts include renewable portfolio standards,<sup>313</sup> fuel efficiency standards,<sup>314</sup> and commitments to zero-carbon development.<sup>315</sup> These all impose performance standards on certain emitting sources, so like cap-and-trade regimes, these measures represent 1) ex-ante, 2) property rule, 3) external prevention with 4) a victim presumption.

### *b. Cure*

As for cure, there is currently little practical prospect of internal cure for climate harms, so effectively all climate change cure is external. The details of the relevant cure configurations help explain why.

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312. California, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont have active cap and trade systems. Jason Ye, *U.S. State Carbon Pricing Policies*, CTR. FOR CLIMATE AND ENERGY SOLS., <https://www.c2es.org/document/us-state-carbon-pricing-policies/> (last updated June 2020). These states represent “over a quarter of the U.S. population and account for a third of U.S. GDP.” *Id.* Additionally, Virginia has indicated a willingness to join a cap-and-trade program. Sarah Rankin, *Virginia Moves Toward Joining Cap-and-Trade Program*, AP NEWS (Feb. 27, 2020), <https://apnews.com/article/virginia-climate-change-business-ccc455631eee64caf01aff0765c849d4>.

313. Renewable portfolio standards require that by a certain future date a given percentage of electricity sold in the jurisdiction must come from renewable (typically low- or zero-carbon) sources. See Richard Bowers, *Updated Renewable Portfolio Standards Will Lead to More Renewable Electricity Generation*, U.S. ENERGY INFO. ADMIN. (Feb. 27, 2019), <https://www.eia.gov/todayinenergy/detail.php?id=38492>. At least 29 states have adopted some form of renewable portfolio standard. *Id.*

314. Fuel efficiency standards aim to reduce greenhouse gas emissions by requiring that vehicles sold in future years meet minimum fuel efficiencies (typically minimum miles per gallon). The federal government imposes some fuel efficiency standards. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., CORPORATE AVERAGE FUEL ECONOMY, <https://www.nhtsa.gov/laws-regulations/corporate-average-fuel-economy> (last visited Apr. 11, 2021).

315. Zero-carbon or “net zero” development goals include municipal commitments that all buildings in a city will be carbon-neutral by a given date. See, e.g., N.Y.C. COUNCIL, CLIMATE MOBILIZATION ACT, <https://council.nyc.gov/data/green/> (last visited Apr. 11, 2021); Press Release, New York City Council, Council to Vote on Climate Mobilization Act Ahead of Earth Day (Apr. 18, 2019), <https://council.nyc.gov/press/2019/04/18/1730/> (requiring building retrofits that will reduce emissions by 80% by 2050).

Tort liability potentially provides internal cure to address climate change harms,<sup>316</sup> but its actor-presumptive structure has proven a major barrier for victims seeking remedies. The relevant tort regimes, such as negligence or nuisance, are typically:

- 1) ex-post,
- 2) liability-rule,
- 3) internal cure, with
- 4) an actor presumption.

In any context an actor presumption can impede victims' access to cure, but in climate change cases, the actor presumption poses a particularly high hurdle. For example, scientific uncertainty over causation of climate harms leaves plaintiffs with a daunting burden in pressing their claims. This makes internal cure for climate harms practically unavailable.

As a result, external cure is, de facto, the exclusive option for victims of climate change harms such as floods or wildfires. Victims may be forced to bear such harms themselves, but in some cases social insurance is available, such as through flood-insurance or disaster-assistance programs. Such programs represent:

- 1) ex-post,
- 2) liability-rule,
- 3) external cure, with
- 4) an actor presumption.

These programs are funded disproportionately to climate change causation (external cure), and they respond to harms that have already occurred (ex-post). Victims must prove that they qualify for the programs (actor presumption), and if so, they receive some objective measure of relief (liability-rule).

As an alternative to this ex-post approach, prospective managed retreat programs potentially provide ex-ante, external cure for some climate change victims. Because such programs seek to preemptively relocate vulnerable populations before disastrous climate change impacts, they represent:

- 1) ex-ante,
- 2) liability-rule,

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316. However, even bringing a tort claim in this context requires overcoming justiciability issues, and a number of courts have dismissed such claims on justiciability issues related to positivism. *See supra* Section IV.C.2.c.

- 3) external cure, with
- 4) a victim presumption

*c. Internal prevention*

The limited prospect of internal-cure obligations for climate change harms offers little meaningful incentive for internal prevention measures. However, some individuals and organizations still undertake voluntary internal prevention. For instance, some individuals perform internal, ex-ante prevention by attempting to lower their carbon footprints. Similarly, some organizations engage in ex-ante internal prevention through commitments to lowering greenhouse gas emissions.

Victims of climate-change-exacerbated harms may also adopt ex-post, internal prevention, such as by relocating to avoid future climate harms or by modifying their homes to be more resilient (e.g., raising a house above flood level). However, the availability of external cure like disaster assistance or subsidized flood insurance can reduce incentives for such precautions and encourage victims to remain in climate-vulnerable areas.<sup>317</sup>

*d. The policy landscape surrounding climate change*

The policy landscape surrounding climate change is patchy and disconnected, hampering its effectiveness. Practically speaking, this is unsurprising. As evidenced by the hearty climate change denial by executives and legislators at both the federal and state levels, many jurisdictions effectively do not consider climate change a harm.<sup>318</sup> Thus, there are relatively few prevention or cure measures addressing climate change, and climate policy may be feeble by design. Nonetheless, analyzing climate change policy structure helps to precisely critique its gaps and to inform future efforts at improvement.

External prevention of climate change presents enormous risk of under-inclusion (or, possibly, over-inclusion, if one believes emissions reductions are unnecessary). Obviously, the fact that only a minority of U.S. jurisdictions regulate greenhouse gas emissions diminishes the likelihood of avoiding climate harms. Moreover, huge

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317. See generally Pappas & Flatt, *supra* note 131 (describing the cycle of repetitive losses in communities vulnerable to natural disasters and recovery from insurance companies).

318. See *supra* Part IV.

knowledge limitations afflict efforts to tailor appropriate greenhouse gas reduction measures. Further, the potential financial impacts of greenhouse gas restrictions attract the influence of many powerful interest groups looking to shape regulations to their advantage.<sup>319</sup>

The status of climate change cure measures exacerbates these potential problems. The lack of meaningful internal cure undercuts incentives for internal prevention, meaning that climate policy wastes the potential for internal cure to mitigate under-inclusive prevention. Moreover, the functional absence of internal cure likely causes under-inclusive cure by leaving victims without recourse.

While external-cure measures, like disaster assistance or flood insurance, may seek to help such victims, these programs too are under-inclusive because not all victims qualify or receive satisfactory remedies.<sup>320</sup> At the same time, these external-cure programs also cause moral hazard problems that undermine victims' incentives to adopt internal prevention. For example, the prospect of disaster assistance can perpetuate risky development and redevelopment in climate-vulnerable areas. While external-prevention measures, such as regulations limiting such hazardous development, could help counteract these problems, disaster-assistance and flood-insurance programs do not effectively incorporate such development restrictions.<sup>321</sup>

Finally, climate policy fails to make the most of voluntary internal prevention efforts. Such internal prevention measures, like diffuse efforts to reduce carbon footprints, could benefit from greater coordination via external-prevention guidance.

Because current climate policy does not harness complementary prevention and cure measures, it ends up being less than the sum of its parts. It relies on disparate, isolated policies, missing opportunities for reinforcing measures to either amplify effectiveness or check over- and under-inclusive tendencies. In particular, one of the most glaring gaps is the lack of meaningful internal cure. This aspect of climate policy severs many complementary links between prevention and

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319. For example, political pressure may mean that regulations never restrict greenhouse gas emissions stringently enough.

320. *See generally* Pappas & Flatt, *supra* note 131 (discussing the inadequacies of current available remedies for climate disasters).

321. *Id.*

cure, and providing more potent internal cure represents a key step for creating more integrated policies. While the irreversible impacts of climate change may call for a strong dose of prevention, such prevention would be enhanced by well-matched cure.

#### CONCLUSION

Prevention and cure are foundational elements of legal architecture, spanning diverse substantive areas and normative commitments. A nuanced framework of prevention and cure provides both overarching theoretical perspectives and specific practical insights into the structure of law and policy.