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GOVERNANCE AND UNCERTAINTY

Justin R. Pidot[†]

Government actors create law against a backdrop of uncertainty. Limited information, unpredictable events, and lack of understanding interfere with accurately predicting a legal regime's costs, benefits, and effects on other legal and social programs and institutions. Does the availability of no-fault divorce increase the number of terminated marriages? Will bulk-collection of telecommunications information about American citizens reveal terrorist plots? Can a sensitive species breed in the presence of oil and gas wells? The answers to these questions are far from clear, but lawmakers must act nonetheless.

The problems posed by uncertainty cut across legal fields. Scholars and regulators in a variety of contexts recognize the importance of uncertainty, but no systematic, generally-applicable framework exists for determining how law should account for gaps in information.

This Article suggests such a framework and develops a typology of strategies for accounting for uncertainty in governance. This typology includes "static law," as well as three varieties of "dynamic law." "Static law" is a legal rule initially intended to last in perpetuity. "Dynamic law" is intended to change, and includes: (1) durational regulation, or fixed legal rules with periodic opportunities for amendment or repeal; (2) adaptive regulation, or malleable legal rules with procedural mechanisms allowing rules to change; and (3) contingent regulation, or malleable legal rules with triggering mechanisms to substantively change the rules.

Each of these strategies, alone or in combination, may best address the uncertainty inherent in a particular lawmaking effort. This Article provides a diagnostic framework that lawmakers can use to identify optimal strategies. Ultimately, this approach to uncertainty yields immediate practical benefits by enabling lawmakers to better structure governance.

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INTRODUCTION

When governmental actors create legal regimes, they do so in the face of uncertainty.¹ They predict a regime's costs, its results, and its

¹ When I refer to "legal regimes" or "law" I mean the full panoply of legal rules—statutes, regulations, and court decisions. Similarly, "lawmakers" constitute those that create legal rules,

effect on other legal and social institutions. But these predictions are often just educated guesses. Limited information, unpredictable events, and lack of understanding mean that lawmakers inevitably face difficult choices about how to regulate a changing world. Indeed, advances in knowledge often serve to unmask the extent of uncertainty, rather than to resolve it. Albert Einstein's famous statement about mathematics applies with equal force to law: "As far as the [laws] . . . refer to reality, they are not certain; and as far as they are certain, they do not refer to reality."² Governments operate against this backdrop of ubiquitous uncertainty.

Let's consider a few examples. When Congress appropriates money annually to fund the federal government, it makes decisions based on projections of tax revenue. These projections may be right and they may be wrong. In 2007, the nonpartisan Congressional Budget Office overestimated federal revenue for 2008 by more than \$200 billion.³ At the start of 2011, the Office underestimated federal revenue for that year by \$70 billion.⁴ Likewise, when a state highway department adjusts the speed limit on a highway to enhance public safety, it may accurately understand the relationship between speed and public safety, or it may not. For example, evidence is equivocal that Montana's accident rate declined when the state imposed a seventy-five miles per hour daytime speed limit on highways that had previously been unrestricted.⁵ Counterintuitively, posting a speed limit could lead individuals to drive faster or to refrain from wearing their seat belts.⁶ And when public land managers authorize development of natural resources, they might not

whether they occupy positions in the legislative, executive, or judicial branches of government.

² Albert Einstein, *Geometry and Experience*, Lecture Before the Prussian Academy of Sciences (Jan. 27, 1921), http://www.relativitycalculator.com/pdfs/einstein_geometry_and_experience_1921.pdf.

³ Compare CONG. BUDGET OFF., *THE BUDGET AND ECONOMIC OUTLOOK: AN UPDATE* x tbl.1 (2007), https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/08-23-update07_0.pdf (estimating 2008 total revenues at \$2.771 trillion), with CONG. BUDGET OFF., *THE BUDGET AND ECONOMIC OUTLOOK: FISCAL YEARS 2009 TO 2019* 16 tbl.5 (2009), <https://www.cbo.gov/sites/default/files/111th-congress-2009-2010/reports/01-07-outlook.pdf> (reporting 2008 total revenues of \$2.524 trillion); see also CONG. BUDGET OFF., *THE UNCERTAINTY OF BUDGET PROJECTIONS: A DISCUSSION OF DATA AND METHODS* (2007), <https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/03-05-uncertain.pdf>.

⁴ Compare CONG. BUDGET OFF., *THE BUDGET AND ECONOMIC OUTLOOK: FISCAL YEARS 2011 TO 2021* xii tbl.1 (2011), https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/reports/01-26_fy2011outlook.pdf (estimating 2011 total revenues at \$2.228 trillion), with CONG. BUDGET OFF., *THE BUDGET AND ECONOMIC OUTLOOK: FISCAL YEARS 2012 TO 2022*, xii tbl.1 (2012), https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/reports/01-31-2012_Outlook.pdf (reporting 2011 revenues at \$2.302 trillion).

⁵ See, e.g., Press Release, Chad Dornsife, Nat'l Motorists Ass'n, *Montana: No Speed Limit Safety Paradox* (May 10, 2001), <http://www.motorists.org/press/montana-no-speed-limit-safety-paradox>.

⁶ *Id.*

accurately predict how development will affect the health of sensitive species. For example, in 2000, the Bureau of Land Management (BLM) developed a blueprint for natural gas development in the Pinedale region of Wyoming based on estimates about the effects that development would have on resident greater sage grouse.⁷ Eight years later, sage grouse populations had declined significantly more than predicted.⁸ These examples demonstrate the obvious: the world is a dynamic place. The environment, the economy, and technology—each of these areas involves significant uncertainty. Yet, law must respond to social, environmental, and economic problems. Lawmakers must act, even recognizing the limits of their knowledge, or else remain forever paralyzed.⁹

Notwithstanding uncertainty, governance can successfully pursue the goals of lawmakers. Law can be crafted to forthrightly address uncertainty and to respond to new and emerging information and circumstances. Where legal rules serve an instrumental purpose, accounting for uncertainty may enable those rules to better accomplish that purpose.¹⁰

Scholars in an array of fields have recognized that legal rules can be improved by taking account of the uncertainty facing lawmakers. The efficacy of dynamic and flexible legal regimes has been a dominant discourse in the field of environmental and natural resources law.¹¹ Scholars in fields as disparate as financial policy¹² and international law have also considered the issue.¹³ Yet despite the widespread interest in developing governance strategies to account for uncertainty, no legal scholarship has yet offered a systematic, trans-substantive framework

⁷ See, e.g., *Theodore Roosevelt Conservation P'ship v. Salazar*, 661 F.3d 66, 69–70 (D.C. Cir. 2011).

⁸ See, e.g., *id.*

⁹ Sometimes, lawmakers invoke uncertainty to justify non-action. See, e.g., 148 CONG. REC. S1693–01 (daily ed. Mar. 8, 2002) (statement of Sen. Kerry) (opposing extension of the Price-Anderson Act due to a lack of information about the nuclear industry).

¹⁰ Where law serves other functions, such as codifying a moral intuition, lawmakers will still face uncertainty, but it may be less relevant to their decision-making. For advocates of marriage equality, for example, even if uncertainty existed about the effect that same-sex marriage would have on marriage rates in the country, such uncertainty would not bear on the moral imperative to grant same-sex couples equal rights.

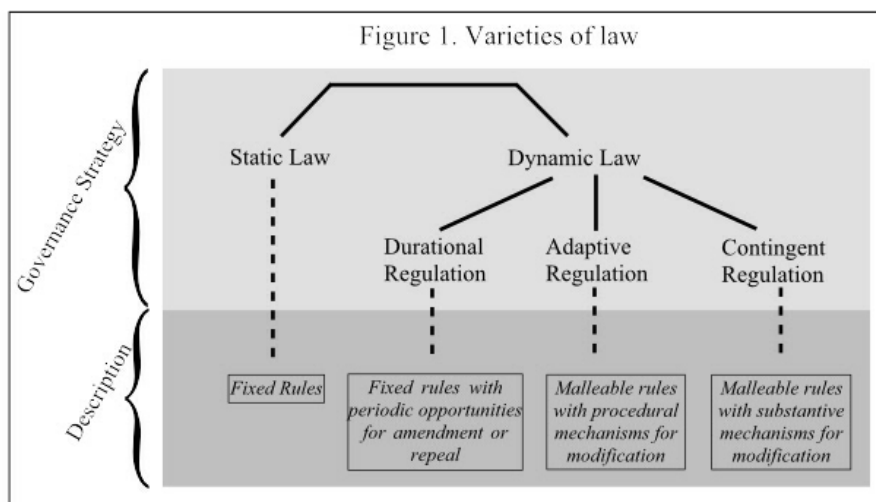
¹¹ See, e.g., Eric Biber, *Adaptive Management and the Future of Environmental Law*, 46 AKRON L. REV. 933, 938 (2013); Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 VAND. L. REV. 1, 5 (2014); Holly Doremus, *Adaptive Management as an Information Problem*, 89 N.C. L. REV. 1455, 1459 (2011) [hereinafter Doremus, *Adaptive Management as an Information Problem*]; Annecoos Wiersema, *A Train Without Tracks: Rethinking the Place of Law and Goals in Environmental and Natural Resources Law*, 38 ENVTL. L. 1239, 1248–53 (2008).

¹² See Zachary J. Gubler, *Experimental Rules*, 55 B.C. L. REV. 129, 134 (2014).

¹³ See Rosie Cooney & Andrew T.F. Lang, *Taking Uncertainty Seriously: Adaptive Governance and International Trade*, 18 EUR. J. INT'L L. 523, 524, 534 (2007).

for understanding the relationship between governance and uncertainty.¹⁴

This Article takes up that task. In particular, it develops a typology of governance strategies, as illustrated in Figure 1, and provides a diagnostic framework to guide selection among those strategies. This typology includes what I will refer to as “static law,” as well as three varieties of “dynamic law.” Static law is defined as substantive legal rules intended at the outset to regulate in perpetuity. Dynamic law includes (1) durational regulation, defined as fixed legal rules with periodic opportunities for amendment or repeal; (2) adaptive regulation, defined as legal rules coupled with procedural mechanisms to require reconsideration if new information emerges; and (3) contingent regulation, defined as legal rules coupled with triggers for automatic adjustment based on foreseen future events. Each of these tools appropriately addresses uncertainty in some circumstances. Each provides benefits and each imposes costs. Understanding the unique dimensions of each tool can guide lawmakers to create legal regimes better tailored to achieving desired outcomes.



These tools are classified from an ex ante perspective: the character of a legal regime is established at the point of its creation, not at any subsequent point in time. All law, even static law, is subject to

¹⁴ By trans-substantive, I mean that principles relating to incorporating uncertainty into legal rules “do not vary depending upon the antecedent legal regime.” David Marcus, *Trans-Substantivity and the Processes of American Law*, 2013 BYU L. REV. 1191, 1193 (2013); see also David Marcus, *The Past, Present, and Future of Trans-Substantivity in Federal Civil Procedure*, 59 DEPAUL L. REV. 371 (2010).

amendment or reconsideration. What distinguishes static law from dynamic law—and adaptive regulation, durational regulation, and contingent regulation from one another—are the mechanisms by which lawmakers account for uncertainty at the moment they create a legal rule. Did lawmakers envision future changes to the law? Did they facilitate such changes? These are the questions that delineate the governance strategies examined in this Article.

As a concrete example of these strategies in action, consider the following situation: A local zoning board debates restricting construction near the ocean to avoid new development in areas threatened by a rise in sea level. The board has a suite of options. First, it could rely on static law and—based on the best information it can find—prohibit all development within one vertical foot of the best estimated mean high water line fifty years hence. Such an approach has advantages. It provides certainty about legal limitations and avoids public expenditures associated with monitoring sea level rise and modifying development rules. The approach also has costs because it may not optimally govern development. If sea level rises by more than estimated, the one-foot rule will inadequately protect new construction. If sea level rises by less than estimated, the one-foot rule will overly restrict the use of land.

As an alternative to static law, the board could rely on durational regulation and impose the one-foot rule, but make the rule expire in ten years, forcing the board to revisit the issue at that time and incorporate new information about any rise in sea level. Or the board could take an adaptive regulatory approach by imposing the one-foot rule coupled with a provision that automatically triggers reconsideration if the rate of sea level rise exceeds expectations. Finally, the board could rely on contingent regulation and impose the one-foot rule coupled with a decision tree for regulatory adjustment, allowing the development ban to automatically adjust to the best scientific prediction for a future rise in sea level. If estimates for a rise in sea level increased by a foot, the one-foot ban would become a two-foot ban. If science indicates that the sea level is no longer expected to change, then the ban would be relaxed.

This Article considers each of these tools as archetypes, evaluating the purest form of each strategy to reveal core advantages and disadvantages. In practice, of course, legal regimes will diverge from these archetypes, incorporating strategies that rely on multiple tools. While complexity will inevitably occur in the real world, understanding the strengths and weakness of each distinct approach can lead to better designs for legal regimes.

The approach lawmakers select to account for uncertainty matters. Too often, efforts that seem promising in the abstract flounder, resulting in a system of purportedly dynamic law failing to keep pace with

unfolding events. Environmental law has borne witness to numerous such failed efforts as the promise that a legal rule will account for new information often gives way to political and legal forces invested in the status quo. For example, the plan BLM adopted in 2000 to govern oil and gas development in the Pinedale Anticline included a mechanism of adaptive regulation to adjust the rules as the effects of development on resident sage grouse became better understood.¹⁵ The plan swiftly confronted legal challenges,¹⁶ and despite mounting evidence that oil and gas development was hurting the resident sage grouse population more than expected, no change in management occurred.¹⁷ In 2008, BLM abandoned its 2000 plan entirely.¹⁸

Recognizing the strengths and weakness of the tools discussed in this Article can help lawmakers do a better job taking account of incomplete information. Contingent regulation in particular may ameliorate thorny problems that are endemic to previous attempts at dynamic law. Such efforts have faced stiff obstacles because governing bodies have often failed to provide the ongoing resources that are necessary to successfully revisit existing rules and, where such revisitation has occurred, interest group politics appears to have obstructed meaningful change.¹⁹ In situations where lawmakers can accurately predict a range of likely future circumstances, contingent regulation allows for rapid modification of legal rules without requiring further intervention by the lawmakers themselves, thereby avoiding the delay and commitment of resources attendant to reconsideration of existing rules. At the same time, contingent regulation carries baggage: unlike adaptive or durational regulation, contingent regulation cannot respond to unforeseen circumstances or incorporate strategies that develop after enactment of the legal regime. It is, in other words, significantly less nimble than other forms of dynamic law.

Before proceeding further, a word on nomenclature is necessary. This Article develops a set of standardized terms. Existing terminology is both underinclusive and overinclusive. The terms used here—static law, durational regulation, adaptive regulation, and contingent

¹⁵ See THEODORE ROOSEVELT CONSERVATION P'SHIP, PINEDALE ANTICLINE FACT SHEET 3, <http://www.trcp.org/assets/pdf/pinedale-anticline-fact-sheet.pdf> (last visited Feb. 15, 2015).

¹⁶ See *id.* (explaining that the Pinedale Anticline Working Group, a citizens' advisory committee, was challenged as a violation of the Federal Advisory Committee Act).

¹⁷ See *Theodore Roosevelt Conservation P'ship v. Salazar*, 661 F.3d 66, 70 (D.C. Cir. 2011).

¹⁸ See BUREAU OF LAND MGMT., FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE PINEDALE ANTICLINE OIL AND GAS EXPLORATION AND DEVELOPMENT PROJECT app. 10-2 (2008) [hereinafter BLM 2008 SEIS APPENDIX], <http://www.blm.gov/style/medialib/blm/wy/information/NEPA/pfodocs/anticline/fseis.Par.41023.File.dat/11App10.pdf>.

¹⁹ See, e.g., Alejandro E. Camacho, *Can Regulation Evolve? Lessons from a Study in Maladaptive Management*, 55 UCLA L. REV. 293, 329–34 (2007).

regulation—refer precisely to the mechanisms in a legal regime that allow (or not) new information to modify that regime. Sometimes, these terms cut more broadly than those currently in use. For example, durational regulation encompasses law that includes termination dates, which others have termed “experimental rules” or “temporary legislation,” and other techniques for promoting reconsideration of legal rules.²⁰ The terms used in this Article do not encompass ancillary measures that are necessary for successful dynamic law. For example, the term adaptive management, which is ubiquitous in the environmental and natural resources literature, often refers to a legal regime that includes both an internal procedure for modifying legal rules, which this Article would describe as adaptive regulation, and a comprehensive monitoring program to derive information about environmental conditions that can fuel that process of modification.²¹ Environmental monitoring, and other means of assessing the effectiveness of law, is a necessary component of any effective strategy to make law respond to changing circumstances. Otherwise, new information may not emerge. Monitoring is, however, distinct from the legal mechanisms that enable dynamism, and such efforts are not included as part of the definition of adaptive regulation.

The terms used here also avoid conceptual muddiness that has arisen in the existing literature. For example, some scholars and regulatory documents use the term adaptive management to refer to any mechanism that allows regulatory regimes to change, regardless of whether that mechanism involves substance or procedure.²² Others insist that only process-oriented mechanisms for change constitute true adaptive management.²³ This Article disaggregates process- and substance-based mechanisms into adaptive regulation and contingent regulation, sidestepping this debate and allowing independent analysis of each strategy.

Finally, this Article holds certain things constant as it explores governance strategies. First, it does not address vexing problems about how to set goals for governance and, relatedly, how to establish risk

²⁰ Jacob E. Gersen, *Temporary Legislation*, 74 U. CHI. L. REV. 247 (2007); See Gubler, *supra* note 12.

²¹ See, e.g., Biber, *supra* note 11, at 934–35; Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenge of “New Age” Environmental Protection*, 41 WASHBURN L.J. 50, 53 (2001) [hereinafter Doremus, “New Age” Environmental Protection].

²² See, e.g., Bradley C. Karkkainen, *Panarchy and Adaptive Change: Around the Loop and Back Again*, 7 MINN. J. L. SCI. & TECH. 59, 71–72 (2005); Courtney Schultz & Martin Nie, *Decision-Making Triggers, Adaptive Management, and Natural Resources Law and Planning*, 52 NAT. RESOURCES J. 443, 444 (2012).

²³ See, e.g., J.B. Ruhl & Robert L. Fischman, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424, 426, 430–31 (2010).

tolerance in any particular legal regime.²⁴ Second, it does not address what policy instruments best achieve established goals. Strenuous disagreement exists about whether regulatory prohibitions or market mechanisms optimally address social problems. These debates are orthogonal to the issues explored here.²⁵ Either approach could be deployed as static law, durational regulation, adaptive regulation, or contingent regulation. Third, debates about lawmaking often involve discussions about locating decisions with the appropriate government actor—local, state, federal, or international.²⁶ That debate also does little to inform the choice between dynamic and static law. Governments at all levels can avail themselves of the suite of strategies discussed here.²⁷

This Article proceeds in four Parts. Part I provides an account of uncertainty across contexts. Part II discusses static law, identifies examples, and explores the benefits and burdens created by relying on that approach. Part III provides similar treatment to each form of dynamic law. And Part IV provides a diagnostic framework to enable lawmakers to better design legal regimes in particular circumstances. It does so by exploring the costs and benefits of making law dynamic, the variability of uncertainty, and the resource constraints that lawmakers face. Different combinations of these factors suggest certain and identifiable regulatory responses.

A more systematic approach to governing uncertainty will result in better governance and better social outcomes. This Article provides guideposts for lawmakers who are faced with the difficult task of creating legal rules without complete information.

I. UNCERTAINTY ACROSS CONTEXT

Lawmakers never act with perfect information. Never. Social and natural conditions change, prevailing norms evolve, and even in the absence of change, lawmakers often misunderstand both the conditions

²⁴ See Dave Owen, *Probabilities, Planning Failures, and Environmental Law*, 84 TUL. L. REV. 265, 270 (2009).

²⁵ A market-based approach that creates tradable emissions permits could, for example, include a contingent approach if additional permits were set to be injected into the market if the price of each permit exceeded a certain threshold.

²⁶ See Jody Freeman & Daniel A. Farber, *Modular Environmental Regulation*, 54 DUKE L.J. 795, 803 (2005).

²⁷ That is not to say that the nature of the governmental entity that is engaged in lawmaking is unimportant to the selection of appropriate tools. As discussed in Part IV.C, *infra*, the resource endowment of a lawmaking body is an important factor in designing a dynamic legal regime. Resource endowment may loosely correlate with the level of government—for example, federal agencies may possess more resources than municipal governments—but tool selection is not sensitive to the level of government itself.

they seek to control and the effects of the regulatory interventions they select. A legal tool well-suited to control a relatively rare activity may become antiquated, inefficient, or ineffective if that activity becomes common.²⁸ Nonetheless, law is often made with little thought about the eventuality of new information emerging or about social conditions changing. Sometimes that approach makes sense. Sometimes the uncertainties facing lawmakers are modest, and the benefits of a stable legal regime outweigh the benefits that would accrue from dynamic and responsive legal rules. Not always.

Uncertainty is not monolithic.²⁹ Lawmakers may know virtually nothing about a significant aspect of a problem they seek to address. For example, if the international community decides to pursue a strategy of geoengineering to reduce the magnitude of climate change, that effort would face staggering uncertainty about the efficacy of the intervention and the potential magnitude of any secondary effects.³⁰ On the other hand, uncertainty may be of a lesser degree. For example, when a city decides to open a new library, it may not be able to perfectly forecast the number of patrons, but based on its experience, it may be able to arrive at a reasonable estimate, and in any event the consequences of misestimating may be modest. Uncertainty also may be foreseen or entirely unknown. In other words, lawmakers may understand their own lack of knowledge, or they may be unaware of that deficit.

The problems uncertainty poses for governance has received considerable attention in a few contexts, particularly in environmental and natural resources law, which over the course of decades has attempted to reinvent the regulatory state to enable an iterative decision-making process that continually incorporates new information.³¹ Recently, J.B. Ruhl and James Salzman have engaged in broader examination of one type of legal change: the termination of legal regimes, which they refer to as exit.³² In essence, exit is simply a

²⁸ Hannah Wiseman has referred to the phenomenon of a governance decisions becoming inefficacious due to the increasing scale of a regulated activity as a “regulatory diseconomy of scale.” Hannah J. Wiseman, *Remedying Regulatory Diseconomies of Scale*, 94 B.U. L. REV. 235, 238 (2014).

²⁹ See *infra* Part IV.B.

³⁰ See, e.g., Albert C. Lin, *Does Geoengineering Present a Moral Hazard?*, 40 ECOLOGY L.Q. 673, 678 (2013) (“[G]eoengineering involves grave uncertainties and potential hazards.”).

³¹ See, e.g., Craig & Ruhl, *supra* note 11, at 1, 7. “Adaptive management,” as this effort is labeled in regulatory reform, has received considerable attention. Westlaw’s database of journal and law review articles indicates that nearly 300 articles have used the term “adaptive management” in the same paragraph as “natural resources” or “environment.”

³² J.B. Ruhl & James Salzman, *Regulatory Exit*, VAND. L. REV. (forthcoming), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2482392. Ruhl and Salzman comprehensively analyze the means by which both regulatory and benefit providing government programs end. They argue that “it is as important to think clearly about exit in the

form of radical legal evolution that occurs when lawmakers respond to new information or changing circumstances that demonstrate that a legal regime is beyond saving, or perhaps, that the targeted problem has been solved. In any case, as with the problem of exit, the core task of governing in the face of uncertainty is trans-substantive. Similarities in the task of governing without complete information suggest similarities in response. Lawmakers seeking to protect environmental assets can learn from lawmakers seeking to protect the health of financial markets and vice versa.

This Part sets the stage for the exploration that follows by briefly discussing uncertainty in three contexts: the regulation of driving, financial markets, and environment and natural resources. These fields involve local, state, federal, and international government entities.³³ All branches of government are involved, including legislatures, executive branch agencies, and courts. In other words, these examples reveal that an analysis of uncertainty and governance can guide the decisions of virtually all governmental actors.

A. *Driving*

The most straightforward of the three examples is driving regulations, sometimes referred to as the “rules of the road.”³⁴ Some rules of the road are constant, such as requiring driving on the right hand side of the road in the United States.³⁵ Others vary from location to location and over time, such as applicable speed limits.

Uncertainty pervades decisions about the rules of the road. Start with the most fundamental tenet of traffic regulations in the United States: drivers must use the right side of the road.³⁶ This rule was

administrative state as it is to think clearly about the creation of new programs in the first place.” *Id.* at 38. I agree that questions about regulatory exit are crucial. Law makers should consider exit strategies alongside other issues related to the evolution of legal rules.

³³ For a discussion of interactions between levels of government institution, see Justin Pidot, *Deconstructing Disaster*, 2013 BYU L. REV. 213, 243–54 (2013) [hereinafter Pidot, *Deconstructing Disaster*]. See also, e.g., Robert L. Fischman, *Cooperative Federalism and Natural Resources Law*, 14 N.Y.U. ENVTL. L.J. 179, 184 (2005) (discussing cooperative federalism).

³⁴ See *the rule of the road*, OXFORD ENG. DICTIONARY (3d ed. 2010), <http://www.oed.com/view/Entry/166506?isAdvanced=true&result=1&rskey=AhhFlw&> (defined at note P15 to the entry for “road”) (defining “rule of the road” as “more generally (usu. in *pl.*) a set of rules and guidance for road users”).

³⁵ See, e.g., Convention on Road Traffic art. 9, Sept. 19, 1949, 3 U.S.T. 3008.

³⁶ The importance of standardizing the side of the road used within a particular jurisdiction is sufficiently great that an international convention has been ratified by 95 countries requiring standardization. The Convention on Road Traffic provides that “[a]ll vehicular traffic proceeding in the same direction on any road shall keep to the same side of the road, which shall be uniform in each country for all roads.” *Id.*

developed as a custom in the colonial era and was first codified by the Pennsylvania state legislature in 1792.³⁷ Selecting a driving side had consequences that were unforeseen at the time. A study published by J.J. Leeming in 1969 found that fewer traffic accidents occur in countries that require driving on the left.³⁸ Christian Foerch and Helmuth Steinmetz explain that this phenomenon may occur, at least in part, because of asymmetric patterns in the development of brain lesions following a stroke.³⁹ When the United States adopted its rules regarding driving side, this information did not exist. Uncertainty, then, colored even this oft-cited example of a “coordination norm,” in which the specifics of a legal rule are viewed as inconsequential.⁴⁰ In other words, even the most basic, seemingly unimportant, lawmaking exercises involve uncertainty because the consequences of those exercises may not be fully understood.

Establishing speed limits also involves uncertainty. Public roads in the United States have posted speed limits to promote public safety.⁴¹ The relationship between speed limits and public safety, however, continues to be debated,⁴² as does the degree of safety afforded by any

³⁷ See An Act to Enable the Governor of this Commonwealth to Incorporate a Company for Making an Artificial Road from the City of Philadelphia to the Borough of Lancaster, ch. 1640, § 21 (1792), reprinted in 14 The Statutes at Large of Pennsylvania from 1682 to 1801, at 279, 293 (James T. Mitchell & Henry Flanders eds., 1909), <http://www.palrb.us/statutesatlarge/17001799/1792/0/act/1640.pdf>; see also Richard F. Weingroff, *On the Right Side of the Road*, FED. HIGHWAY ADMIN., <http://www.fhwa.dot.gov/infrastructure/right.cfm> (last updated Oct. 17, 2013). Historians have speculated that the custom emerged either as a means of distancing the colony from the traditions of England or because of predominant right-handedness and accessibility to whips and guns. *Id.*; Dan Keegan, *Driving on the Wrong Side*, DRIVERS.COM (Dec. 5, 2006), <http://www.drivers.com/article/332>.

³⁸ J.J. LEEMING, ROAD ACCIDENTS: PREVENT OR PUNISH (1969).

³⁹ Christian Foerch & Helmuth Steinmetz, *Left-Sided Traffic Directionality May Be the Safer “Rule of the Road” for Ageing Populations*, 73 MED. HYPOTHESES 20, 20 (2009).

⁴⁰ Adrian Vermeule, *Conventions of Agency Independence*, 113 COLUM. L. REV. 1163, 1186 (2013) (“Some conventions are probably pure coordination norms, such as driving on one side of the road or the other (or so a stock example runs).” (footnote omitted)); see also Richard H. McAdams, *The Expressive Power of Adjudication*, 2005 U. ILL. L. REV. 1043, 1060 (2005) (identifying the “choice of whether to drive on the left or right side of the road” as a “pure coordination game”). The fact that driving-side rules affect public health does not mean that they should not be viewed as a coordination norm, since the coordination function of such rules predominates. Rather, this example illustrates that every choice—even those involving coordination norms—may have unforeseen consequences.

⁴¹ See *State Traffic and Speed Laws*, MASS. INST. TECH., <http://www.mit.edu/~jfc/laws.html#types> (last modified Apr. 12, 2015). Speed limits can also serve other goals, including promotion of efficient transportation and fuel economy. See, e.g., Allen M. Brabender, *The Misapplication of Minnesota’s Speeding Statute and the Need to Raise the Posted Limit or Expand Use of the Dimler Amendment*, 27 HAMLIN L. REV. 1, 4 (2004); Barbara Kritchevsky, *Whose Idea Was It? Why Violations of State Laws Enacted Pursuant to Federal Mandates Should Not Be Negligence Per Se*, 2009 WIS. L. REV. 693, 695 (2009).

⁴² See, e.g., Dornsife, *supra* note 5 (arguing that Montana speed limits did not improve public safety); Lee S. Friedman et al., *Long-Term Effects of Repealing the National Maximum*

particular speed limit along any particular stretch of road. Some studies suggest that speed limits have little effect on average driving speeds, and others suggest that average driving speeds may have little effect on public safety.⁴³ Moreover, some studies find that reducing a speed limit may sometimes cause more accidents.⁴⁴ Local and state transportation regulators must act with the knowledge that they cannot predict the results of their actions perfectly.

B. *Environment and Natural Resources*

Environmental and natural resources law has an intimate relationship with the science of natural systems.⁴⁵ Scholars and lawmakers fixate on uncertainty because of a sea change in the scientific understanding of ecology.⁴⁶ When Congress enacted most federal environmental laws, the majority of scientists viewed the natural world as inherently stable: ecosystems followed predictable evolutionary stages, often referred to as stages of succession, and perturbations in the natural environment dampened over time.⁴⁷ Nature resembled a lake's surface on a windless day. A rock cast into the lake would create ripples, but those ripples would diminish and ultimately disappear. Under this account, human activity disturbed a natural equilibrium state, threatening permanent disturbance of the natural condition. Environmental and natural resources law sought to minimize and ameliorate that disturbance, seeking a return to the placidity of the lake's surface.

The trouble with the equilibrium view of ecology is that it fails to explain changes observed in natural systems in the absence of human intervention. As a result, that view fell into disrepute.⁴⁸ The ecological model that replaced it posited that the state of nature is a "complex,

Speed Limit in the United States, 99 AM. J. PUB. HEALTH 1626, 1626 (2009) (finding a 9.1% increase of fatalities on rural interstates following the repeal of federal speed limit).

⁴³ See FRED MANNERING, THE EFFECTS OF INTERSTATE SPEED LIMITS ON DRIVING SPEEDS: SOME NEW EVIDENCE (2007), <http://ibtta.org/sites/default/files/Speed%20Limit%20and%20factors%20safety.pdf>; Patrick McCarthy, *Effect of Speed Limits on Speed Distributions and Highway Safety: A Survey of Recent Literature*, 21 TRANSPORT REVIEWS 31, 36–37 (2001).

⁴⁴ See MANNERING, *supra* note 43.

⁴⁵ See, e.g., A. Dan Tarlock, *Environmental Law: Ethics or Science?*, 7 DUKE ENVTL. L. & POL'Y F. 193, 194 (1996) (arguing that "environmental law and management should derive their primary political power and legitimacy from science"); Wiersema, *supra* note 11, at 1245.

⁴⁶ See, e.g., KAI N. LEE, COMPASS AND GYROSCOPE: INTEGRATING SCIENCE AND POLITICS FOR THE ENVIRONMENT 9–12 (1993).

⁴⁷ See, e.g., Fred P. Bosselman & A. Dan Tarlock, *The Influence of Ecological Science on American Law: An Introduction*, 69 CHI.-KENT L. REV. 847, 863–69 (1994).

⁴⁸ See *id.* at 869.

stochastic nonequilibrium one.”⁴⁹ The popular notion of the “butterfly effect,” which fancifully describes the flap of a butterfly’s wings causing a tornado on the other side of the globe, captures the essence of this model.⁵⁰ With the rise of this new understanding of ecology, legal scholars advocated for a new model of regulation. J.B. Ruhl, among the most prolific of these scholars, explained the need for regulatory reinvention: “To manage the impact of human society on the inherently chaotic, adaptive environment, the environmental law system itself must possess those dynamical qualities.”⁵¹

Uncertainty in environmental and natural resources law is not abstract. The BLM regulates natural gas development on federal lands in Sublette County, Wyoming that overlie a geologic formation known as the Pinedale Anticline, which is believed to contain the third largest natural gas reserve in the United States.⁵² Large numbers of natural gas wells permeate the area.⁵³ Those lands also provide important habitats for the greater sage grouse,⁵⁴ a species being considered for listing under the Endangered Species Act (ESA).⁵⁵ Evidence suggests that oil and gas development disrupts greater sage grouse mating rituals, thereby reducing the population.⁵⁶ The extent of that effect remains unclear, as does the distance in time at which the effect declines or disappears.⁵⁷

⁴⁹ A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L.A. L. REV. 1121, 1123 (1994); see also Jonathan B. Wiener, *Law and the New Ecology: Evolution, Categories, and Consequences*, 22 ECOLOGY L.Q. 325, 327 (1995) (reviewing JONATHAN WEINER, *THE BEAK OF THE FINCH: A STORY OF EVOLUTION IN OUR TIME* (1994)).

⁵⁰ See *THE BUTTERFLY EFFECT* (New Line Cinema 2004). For the origins of the term, see Edward N. Lorenz, Professor of Meteorology, Mass. Inst. of Tech., *Predictability; Does the Flap of a Butterfly’s Wings in Brazil Set off a Tornado in Texas*, Address at the 139th Meeting of the American Association for the Advancement of Science (Dec. 29, 1972).

⁵¹ J.B. Ruhl, *Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law*, 34 HOUS. L. REV. 933, 940 (1997) [hereinafter Ruhl, *Thinking of Environmental Law*].

⁵² See 43 U.S.C. § 1732(a) (2012); *Theodore Roosevelt Conservation P’ship v. Salazar*, 661 F.3d 66, 69 (D.C. Cir. 2011).

⁵³ See BUREAU OF LAND MGMT., RECORD OF DECISION FOR THE SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE PINEDALE ANTICLINE OIL AND GAS EXPLORATION AND DEVELOPMENT PROJECT 4 (2008) [hereinafter BLM ROD], <http://www.blm.gov/style/medialib/blm/ny/information/NEPA/pfodocs/anticline/rod.Par.50775.File.dat/00ROD.pdf>.

⁵⁴ See BUREAU OF LAND MGMT., 1 FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE PINEDALE ANTICLINE OIL AND GAS EXPLORATION AND DEVELOPMENT PROJECT 3-140-3-147 (2008) [hereinafter BLM 2008 SEIS], http://www.blm.gov/style/medialib/blm/ny/information/NEPA/pfodocs/anticline/fseis.Par.30367.File.dat/vol1_ea.pdf.

⁵⁵ See, e.g., Diane Cardwell & Clifford Krauss, *Frack Quietly, Please: Sage Grouse is Nesting*, N.Y. TIMES, July 20, 2014, at A1.

⁵⁶ See BLM 2008 SEIS, *supra* note 54, at 3-143.

⁵⁷ As BLM considered reauthorizing an oil and gas development plan in 2008, wildlife groups urged it to impose a two-mile buffer zone around leks, which are areas in which a

Moreover, other factors also contribute to the decline of the greater sage grouse, including livestock management,⁵⁸ invasive plants, wildfire frequency, climate change, and direct habitat loss and fragmentation.⁵⁹ As a result, it is unknown whether regulating oil and gas development can slow or halt the decline of the greater sage grouse population, or what regulatory interventions will best protect the species.

Traditional environmental law also encounters uncertainty. The Clean Air Act requires the Environmental Protection Agency (EPA) to establish a primary National Ambient Air Quality Standard (NAAQS) for seven air pollutants at a level sufficient to protect public health, allowing for “an adequate margin of safety.”⁶⁰ The public health effects of air pollution are, however, incompletely understood. For example, in 2011 the EPA undertook a review of the primary NAAQS for carbon monoxide, considering epidemiological data suggesting that carbon monoxide could pose a greater risk to human health than previously thought.⁶¹ The EPA determined, however, that the data failed to demonstrate a causal link between carbon monoxide concentrations and adverse health effects.⁶² Because that link was sufficiently uncertain in the EPA’s view, it declined to more strictly regulate carbon monoxide.⁶³

C. Financial Markets

Understanding financial markets—as well as the entities that participate in them and the transactions that affect them—also involves

species performs communal mating rituals. See Steve Davies, *BLM’s Pinedale Anticline EIS Survives Appeal*, ENDANGERED SPECIES & WETLANDS REP. (Nov. 18, 2011), <http://www.eswr.com/2011/11/blms-pinedale-anticline-eis-survives-appeal>. BLM opted to impose a half-mile buffer zone instead. BLM ROD, *supra* note 53, at A-18.

⁵⁸ See Greater Sage-Grouse Umbrella Candidate Conservation Agreement with Assurances for Wyoming Ranch Management between [redacted private landowner(s)] and the U.S. Fish & Wildlife Serv. (Nov. 8, 2013), http://www.fws.gov/wyominges/PDFs/Species_Listed/Umbrella_CCAA/WY%20Statewide%20Ranch%20Management%20Sage-grouse%20CCAA.pdf.

⁵⁹ See U.S. FISH & WILDLIFE SERV., THE GREATER SAGE-GROUSE: FACTS, FIGURES AND DISCUSSION 2 (2015), http://www.fws.gov/greatersagegrouse/factsheets/GreaterSageGrouseCanon_FINAL.pdf.

⁶⁰ 42 U.S.C. § 7409 (b)(1) (2012); see WILLIAM H. RODGERS, JR., ENVIRONMENTAL LAW 156–57 (2d ed. 1994). The EPA cannot consider other facts, such as the cost that a NAAQS might impose. See *Whitman v. Am. Trucking Ass’ns*, 531 U.S. 457, 475–76 (2001); see also David M. Driesen, *Should Congress Direct the EPA to Allow Serious Harms to Public Health to Continue? Cost-Benefit Tests and NAAQS Under the Clean Air Act*, 11 TUL. ENVTL. L.J. 217, 223 (1998).

⁶¹ See Review of National Ambient Air Quality Standards for Carbon Monoxide, 76 Fed. Reg. 54,294, 54,294–54,297 (Aug. 31, 2011).

⁶² See *Cmty.s. for a Better Env’t v. EPA*, 748 F.3d 333, 336 (D.C. Cir. 2014).

⁶³ *Id.*

uncertainty.⁶⁴ A few seemingly simple and widely agreed upon goals dominate regulation in this field: economic regulation should aim for stable growth, low unemployment, controlled inflation,⁶⁵ and should prevent fraud and other dishonest dealings that destabilize the economy.⁶⁶ How government can best accomplish those goals, and whether government intervention can succeed at all, are hotly contested.⁶⁷ This dispute is in part ideological, but it is compounded by a lack of knowledge and information. As Roberta Romano has explained, “the nub of the regulatory problem derives from the fact that financial firms operate in a dynamic environment in which there are many unknowns and unknowables and state-of-the-art knowledge quickly obsolesces.”⁶⁸

⁶⁴ Indeed, as Steven McNamara has explained, scholars debate even the extent to which the function of financial systems *can* be understood:

For the academics who study the financial system, derivatives regulation highlights certain crucial epistemological questions: What are the limits of the evidence that can be drawn on to obtain an accurate understanding of the financial system?: How should we view propositions that we highly suspect may be true but cannot confidently prove? And how should we deal with uncertainty, both in the attempt to accurately understand the financial system, and in the possible effects of the regulations we impose on it?

Steven McNamara, *Financial Markets Uncertainty and the Rawlsian Argument for Central Counterparty Clearing of OTC Derivatives*, 28 NOTRE DAME J.L. ETHICS & PUB. POL’Y 209, 211 (2014).

⁶⁵ Congress has entrusted these responsibilities to the Federal Reserve and the Federal Open Market Committee. *See, e.g.*, 12 U.S.C. § 225a (2012) (“The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy’s long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.”).

⁶⁶ *See* 15 U.S.C. § 78b(4) (2012) (justifying regulation of securities transactions because “[n]ational emergencies, which produce widespread unemployment and the dislocation of trade, transportation, and industry, and which burden interstate commerce and adversely affect the general welfare, are precipitated, intensified, and prolonged by manipulation and sudden and unreasonable fluctuations of security prices and by excessive speculation on such exchanges and markets”).

⁶⁷ *See, e.g.*, Editorial, *Jobs and the Fed: Near-Zero Interest Rates Haven’t Led to Robust Economic Growth*, WALL ST. J. (Aug. 3, 2014, 5:17 PM), <http://www.wsj.com/articles/jobs-and-the-fed-1406933061>; Patrick Brennan, *Rand Paul Endorses an Aggressive Fed*, NAT’L REV.: CORNER BLOG (Aug. 9, 2013, 12:43 PM), <http://www.nationalreview.com/corner/355385/rand-paul-endorses-aggressive-fed-patrick-brennan>; Peter Wallison, *Hey, Barney Frank: The Government Did Cause the Housing Crisis*, ATLANTIC (Dec. 13, 2011), <http://www.theatlantic.com/business/archive/2011/12/hey-barney-frank-the-government-did-cause-the-housing-crisis/249903>.

⁶⁸ Roberta Romano, *Regulating in the Dark*, in REGULATORY BREAKDOWN: THE CRISIS OF CONFIDENCE IN U.S. REGULATION 87 (Cary Coglianese ed., 2012); *see also* Brett McDonnell, *Don’t Panic! Defending Cowardly Interventions During and After a Financial Crisis*, 116 PENN. ST. L. REV. 1, 18 (2011) (“How do we go about regulating financial markets and institutions in light of the vast uncertainty that confronts both the regulators and the regulated?”).

Consider the “great recession” that began in 2007.⁶⁹ The public looked to Congress and other government entities to implement policies to promote economic recovery and to safeguard against another catastrophic failure in the financial markets.⁷⁰ That task was made difficult because lawmakers acted “with a radically inadequate understanding of what went wrong and of the effect proposed regulations w[ould] likely have.”⁷¹

Uncertainty for financial regulators exists even in ordinary economic times. For example, when the Federal Reserve establishes a target interest rate in hopes of spurring economic growth while avoiding undue inflation, it can do no more than make an educated guess about the effects of its decision.⁷² Similarly, when Congress and the U.S. Securities and Exchange Commission (SEC) impose disclosure obligations on financial institutions or prohibit certain types of transactions, they make educated guesses that the adopted policy will generate benefits in terms of transparency and economic stability without unnecessarily increasing transaction costs or prohibiting experimentation that could lead to growth.⁷³ In each circumstance, the lawmaker—Congress, the Federal Reserve, and the SEC—knows that any policy would involve substantial tradeoffs, but the magnitude of those tradeoffs is unknown, and possibly unknowable.

D. *And Everywhere Else*

These three examples illustrate the sheer breadth of the challenges posed by uncertainty. Uncertainty exists everywhere, including whenever the government acts. Will increasing prison sentences for migrants convicted of illegal reentry deter noncitizen drug traffickers, as

⁶⁹ See Chris Isidore, *The Great Recession: Economists Generally Agree This Is the Worst Economic Downturn Since the Great Depression, but They Say Despite Pain, Another Depression Isn't Likely*, CNN (Mar. 25, 2009, 5:19 PM), http://money.cnn.com/2009/03/25/news/economy/depression_comparisons. This worldwide economic downturn had numerous causes, and the collapse of the financial markets was, in a sense, a symptom of systemic problems in credit markets and in other sectors. See, e.g., RICHARD A. POSNER, *THE CRISIS OF CAPITALIST DEMOCRACY* 5–7 (2010).

⁷⁰ See, e.g., *Buffett Warns Congress: Lawmakers Face “Biggest Financial Meltdown in American History” If They Don't Act*, CNN (Sept. 28, 2008, 11:40 AM), <http://money.cnn.com/2008/09/28/news/economy/Buffett.bailout/?postversion=2008092811>.

⁷¹ See McDonnell, *supra* note 68, at 2–3.

⁷² See, e.g., Richard Clarida et al., *The Science of Monetary Policy: A New Keynesian Perspective*, 37 J. ECON. LITERATURE 1661, 1661 (1999) (“[A] stream of empirical work beginning in the late 1980s has made the case that monetary policy significantly influences the short-term course of the real economy. The precise amount remains open to debate.” (footnote omitted)).

⁷³ See Gubler, *supra* note 12, at 137–38.

some proponents of amendments to the Immigration and Nationality Act argued?⁷⁴ Does no-fault divorce increase the number of terminated marriages? Will bulk collection of telecommunications information about American citizens reveal terrorist plots? Does legalization of marijuana increase childhood use of the drug? Will trade sanctions affect Russia's activities in Ukraine?

The list of questions facing lawmakers is endless, and these questions often cut to the heart of their efforts at governance. If Congress sought to reduce drug smuggling by enhancing prison terms for those convicted of illegal reentry, and the increase had no deterrent effect, then Congress made the wrong choice.⁷⁵ To account for the possibility of error, lawmakers have a variety of tools from which to select.

II. STATIC LAW

Lawmakers design static law to withstand the test of time. This mode of regulating has historically been the default for law. Consider canonical historical examples: the Ten Commandments, Hammurabi's Code, and the code of Justinian, each inscribed in stone—a symbol of durability and longevity.⁷⁶ The story of Moses descending from Mount Sinai clutching two tablets inscribed with the Decalogue does not envision a future where the rule “thou shalt not kill” is revisited based on experience with its efficacy and effect.⁷⁷ That rule, and others believed to be established by divine command, are laws intended for eternal application, insensitive to new information, changing circumstances, or evolving cultural norms. This method of governing constitutes static law.

⁷⁴ See 133 CONG. REC. S4992-01 (daily ed. Apr. 9, 1987) (statement of Sen. Chiles) (proposing “[a] bill to provide for additional criminal penalties for deported aliens who reenter the United States”); see also Bindu Jacob, Notes & Comments, *Immigration Law: Criminal Penalties for Deported Aliens Who Illegally Reenter the United States*—Hugo Roman Almendarez-Torres v United States, 118 S. Ct. 1219 (1998), 14 TEMP. INT'L & COMP. L.J. 401, 414–15 (2000) (describing the history of the Anti-Drug Abuse Act of 1988 provision that enhanced criminal penalties for deported aliens who reenter the United States).

⁷⁵ See César Cuauhtémoc García Hernández, *Immigration Detention as Punishment*, 61 UCLA L. REV. 1346, 1366–68 (2014); Zoey T. Jones, Note, *Prescribing Disproportionate Punishment: The Federal Sentencing Guidelines for Illegal Reentry*, 33 CARDOZO L. REV. 1217, 1234 (2012).

⁷⁶ See, e.g., Adam J. Hirsch, *Cognitive Jurisprudence*, 76 S. CAL. L. REV. 1331, 1331 (2003) (“In times past, we have fancied law a product of the Deity, and we are still apt to depict it as something transcendent, or even broodingly omnipresent, if not divine.”).

⁷⁷ *Exodus* 20:13 (King James).

Static law transcends religious traditions. For parts of the United States' legal history, judges were understood to uncover common law legal rules from objectively derivable—thereby permanent—principles.⁷⁸ The notion of *stare decisis*, which retains significant importance and resonance today, is also a static approach to law. When judges render decisions, they act with the expectation that in the absence of unusual circumstances, the decisions they make will remain binding.⁷⁹

Static law may appear insensitive to uncertainty. It is better understood, however, as a method of addressing uncertainty. Tuning a legal rule to new information and circumstances involves costs, and static law represents a conclusion that the benefit of legal stability outweighs the benefits of crafting a dynamic legal regime. This means that lawmakers may select static law as the optimal tool to achieve their goals even in circumstances where they recognize that substantial uncertainty exists.

A. *The Structure of Static Law*

Static law is a certain and ascertainable legal rule created without provision for future modification of that rule. The theoretical model is straightforward: lawmakers identify a problem, then adopt a regulatory intervention to address that problem. In doing so, lawmakers intend for the intervention to remain fixed, making no special allowances that could facilitate a future modification. To the challenge of uncertainty, static law answers: if in the future relevant information emerges, existing legal rules will continue to apply.

Statutory, regulatory, and constitutional law each incorporates static law. It may manifest at different levels of generality, encompassing both rules and standards, with varying degrees of malleability attendant

⁷⁸ See MORTON J. HORWITZ, *THE TRANSFORMATION OF AMERICAN LAW: 1780–1860* 8 (1977) (“The equation of common law with a fixed, customary standard meant that judges conceived of their role as merely that of discovering and applying preexisting legal rules.”); see also Matthew Steilen, *Judicial Review and Non-Enforcement at the Founding*, 17 U. PA. J. CONST. L. 479, 554 (2014) (“[A]t the turn of the nineteenth century[,] . . . American courts turned away from a static private-law regime.”).

⁷⁹ *Stare decisis* is defined as “[t]he doctrine of precedent, under which a court must follow earlier judicial decisions when the same points arise again in litigation.” *Stare Decisis*, BLACK’S LAW DICTIONARY (10th ed. 2014). For two discussions of the doctrine in general, see Michael S. Paulsen, *Does the Supreme Court’s Current Doctrine of Stare Decisis Require Adherence to the Supreme Court’s Current Doctrine of Stare Decisis?*, 86 N.C. L. REV. 1165, 1169 (2008), and Henry Paul Monaghan, *Stare Decisis and Constitutional Adjudication*, 88 COLUM. L. REV. 723, 728 (1988).

to each of those legal forms.⁸⁰ The requirement of driving on the right side of the road falls on the rule side of the equation—it is precise and not subject to interpretation or nuance.⁸¹ The prohibition that a law enforcement officer may not use excessive force is, on the other hand, a static standard.⁸² While the application of that standard to any particular circumstance will vary, and the standard itself takes account of the totality of the circumstances, it is intended to be a persistent limitation on law enforcement activities.⁸³ Static law standards may incorporate evolving cultural norms, and thus appear to change. For example, the doctrine allowing legal proscription of obscene material is based, in part, on “contemporary community standards.”⁸⁴ But that legal standard—that is, the governing legal rule—remains static.

To be sure, static law does not mean that a legal rule will last forever in practice, only that at its inception no provision is made to facilitate change. Legal regimes of all stripes end. As James Salzman and J.B. Ruhl have observed, “exit is . . . a ubiquitous, inevitable feature of governance.”⁸⁵ Where a legal regime does not plan for its own termination or modification, it can nonetheless evolve through amendment or repeal, or it can be overruled by judicial decisions. But amending static law often requires significant investment of resources, and doing so may destabilize settled expectations that stem from the belief that the legal regime will persist.⁸⁶

Modern efforts to develop modalities of dynamic law, discussed in Part III, respond to the perceived failings in static law, particularly to the perception that static law fails to address emerging information.⁸⁷ While

⁸⁰ See, e.g., Kathleen M. Sullivan, Foreword, *The Justices of Rules and Standards*, 106 HARV. L. REV. 22, 27, 57–69 (1992); Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 562 (1992).

⁸¹ See 60A C.J.S. Motor Vehicles § 652 (“The fundamental rule of traffic is to keep to the right even though there is no oncoming traffic.” (footnote omitted)).

⁸² See, e.g., Nancy Leong, *Making Rights*, 92 B.U. L. REV. 405, 445–55 (2012) (discussing excessive force doctrine). This requirement is also an example of a legal standard created by the judiciary, as the excessive force limitation is a judicial interpretation of the Fourth Amendment. See *Graham v. Connor*, 490 U.S. 386, 396 (1989).

⁸³ See *Graham*, 490 U.S. at 396.

⁸⁴ *Miller v. California*, 413 U.S. 15, 24 (1973).

⁸⁵ Ruhl & Salzman, *supra* note 32, at 4.

⁸⁶ See *James B. Beam Distilling Co. v. Georgia*, 501 U.S. 529, 548 (1991) (“By announcing new rules prospectively or by applying them selectively, a court may dodge the *stare decisis* bullet by avoiding the disruption of settled expectations that otherwise prevents us from disturbing our settled precedents.”).

⁸⁷ See Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1464 (“[A]daptive management was a reaction to the perceived inadequacies of management based on pre-decision comprehensive analysis.”). A famous (or notorious, depending on your perspective) mechanism by which early environmental law purported to identify appropriate regulation in the face of uncertainty was the “precautionary principle.” See, e.g., Michael Ilg, *Complexity, Environment, and Equitable Competition: A Theory of Adaptive Rule Design*, 41

it is true that static law is not intended to change, that itself is a response to uncertainty, and an appropriate response in some circumstances, particularly where the costs imposed by dynamic law outweigh the benefits of making law responsive.⁸⁸

B. *Static Law Across Context*

Static law abounds in all manner of legal contexts. Consider a few examples: The right side driving rule constitutes quintessential static law. When legislatures adopted this rule, they envisioned no mechanism for the rule changing. Around the world it is exceptionally rare for a nation to change its laws governing which side of the road to use.⁸⁹

The Constitution creates a blueprint for our federal government. Article V of the Constitution allows for amendment, but it does so only through a process significantly more onerous than by a majority vote,⁹⁰ thereby making constitutional rules the most difficult legal rules to change in the United States.⁹¹ Only sixteen amendments currently exist, in addition to the first ten Amendments in the Bill of Rights,⁹² which is fewer than one amendment for every decade of the Constitution's

GEO. J. INT'L L. 647, 651–53 (2010). While analysis of the merits of the precautionary principle lie beyond the scope of this Article, it would, in essence, resolve uncertainty in favor of enhanced environmental protection. *See id.* Lawmakers could rely on the precautionary principle as a rule of decision in formulating any of the varieties of law discussed in this Article.

⁸⁸ *See infra* Part IV.A.

⁸⁹ *See* Tom Vanderbilt, *Whose Side of the Road Are You on?: For the First Time in Ages, a Country Is Switching to Driving on the Left. Should We all Drive on the Same Side?*, SALON (Aug. 14, 2009, 6:19 AM), http://www.salon.com/2009/08/14/driving_on_left.

⁹⁰ U.S. Const. art. V.

⁹¹ *See* Justin R. Pidot, *Jurisdictional Procedure*, 54 WM. & MARY L. REV. 1, 29 (2012) (citing Keith E. Whittington, *Judicial Review and Interpretation: Have the Courts Become Sovereign When Interpreting the Constitution?*, in AMERICAN INSTITUTIONS OF DEMOCRACY: THE JUDICIAL BRANCH 116, 132–33 (Kermit L. Hall & Kevin T. McGuire eds., 2005)). Arguably, Article V does envision amendment, and therefore the Constitution could be viewed as a form of dynamic law. Because the amendment process is more difficult than the baseline of amendment by majority vote, it is better conceived of as an effort in static law. The difficulty of amending constitutional provisions does not make them more static law than statutes. The definition of static law used in this Article relies on whether lawmakers incorporated means of facilitating modification when first enacting law. The challenges imposed by Article V do, however, illustrate that static law may be virtually permanent both in terms of the initial intentions of the lawmakers and in terms of the experience of the law moving forward.

⁹² *See The Constitution: Amendments 11–27*, ARCHIVES.GOV, http://www.archives.gov/exhibits/charters/constitution_amendments_11-27.html (last visited Sept. 16, 2015) (stating that first ten Amendments make up the Bill of Rights and that the Eighteenth Amendment was repealed by the Twenty-First Amendment).

existence.⁹³ As a result, constitutional provisions like the First Amendment's prohibition on "abridging the freedom of speech" have remained a fixed component of the United States' governing architecture.⁹⁴

The U.S. Senate ratified the Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment in 1990,⁹⁵ and Congress enacted legislation to implement aspects of the Convention in 1994.⁹⁶ The Convention allows for no deviations from its absolute prohibition on torture.⁹⁷ Sanford Levinson has described the Convention and other laws prohibiting torture as "establish[ing] a Ulyssean contract to be honored whatever the lure of the Sirens, including the alleged justifications attached to engaging in war or responding to other national emergencies."⁹⁸ Then, following the attacks on September 11, 2001, the "war on terror" began.⁹⁹ Neither the future occurrence of these transformative events, nor the effects of the commitment not to torture, could have been known in 1994. Nonetheless, Congress did not provide for modification when it implemented the Convention, but rather, it held fast to the normative commitment that torture is always bad.

The General Mining Law of 1872 has governed the process by which private individuals can acquire a right to mine on federal land for well over a century.¹⁰⁰ The conditions in 1872 differed dramatically from those of today. The statute includes no mechanism to facilitate modification and "[d]espite much contemporary hostility to the Mining Law of 1872 and high level political pressure by influential individuals and organizations for its repeal, all repeal efforts have failed, and it remains the law."¹⁰¹ Decisions by federal agencies to grant permits similarly constitute static law because many such permits lack mechanisms for modifying the permit's terms. For example, when the Army Corps of Engineers issues a permit to authorize the filling of a

⁹³ See *A More Perfect Union: The Creation of the U.S. Constitution*, ARCHIVES.GOV, http://www.archives.gov/exhibits/charters/constitution_history.html (last visited Sept. 16, 2015) (stating that the U.S. Constitution was ratified in 1788).

⁹⁴ U.S. CONST. amend. I.

⁹⁵ See 136 CONG. REC. S17486-01 (daily ed. Oct. 27, 1990).

⁹⁶ See Foreign Relations Authorization Act, Fiscal Years 1994 and 1995, Pub. L. No. 103-236, § 506, 108 Stat. 382 (1994).

⁹⁷ See Sanford Levinson, "Precommitment" and "Postcommitment": *The Ban on Torture in the Wake of September 11*, 81 TEX. L. REV. 2013, 2014 (2003).

⁹⁸ *Id.* at 2017.

⁹⁹ See *Hamdi v. Rumsfeld*, 542 U.S. 507, 520 (2004).

¹⁰⁰ See, e.g., *High Country Citizens All. v. Clarke*, 454 F.3d 1177, 1179, 1182-85 (10th Cir. 2006) (citing 30 U.S.C. §§ 21-47 (2012)).

¹⁰¹ *United States v. Shumway*, 199 F.3d 1093, 1098 (9th Cir. 1999).

waterway under section 404(a) of the Clean Water Act,¹⁰² the permit does not include a provision to require later excavation of that waterway should new circumstances emerge.¹⁰³

C. *Benefits and Burdens of Static Regulation*

Despite the uncertainty faced by lawmakers, static law affords many benefits. Across a suite of circumstances, it may constitute optimal policy.

First, static law entrenches values that society deems to be important. Where a value is of weight, uncertainty about the consequences of protecting that value may be irrelevant. In other words, static law can serve a mast-tying function, committing society to a particular legal course irrespective of new information or circumstances, and in so doing, static law sends a strong signal about the importance of the values it protects. Lawmakers can, of course, later revisit and modify a static law. Because of institutional, legal, and political barriers, however, such reconsideration is often difficult, particularly where the norms embodied in a static law have successfully shaped cultural values.

Consider the legal prohibition on torture again.¹⁰⁴ By committing to that prohibition, notwithstanding its uncertain effects, Congress reinforced the cultural norm against torture. The effects are apparent. In the wake of 9/11, the President could have asked Congress to modify the law to permit torture in certain circumstances where, for example, an imminent threat to national security existed.¹⁰⁵ Some scholars have argued that such legislation may even have garnered popular support.¹⁰⁶ Instead, the Administration attempted to work within the existing framework by labeling coercive interrogation techniques such as waterboarding as something other than torture, an effort that itself has been the subject of significant controversy.¹⁰⁷ Because the ban on torture

¹⁰² See, e.g., *Solid Waste Agency of N. Cook Cty. v. U.S. Army Corps of Eng'rs*, 531 U.S. 159, 162 (citing 33 U.S.C. § 1344(a) (2012)).

¹⁰³ The regulations governing the section 404(a) program are set forth in 33 C.F.R. §§ 320–338 (2015).

¹⁰⁴ See David Luban, Essay, *Liberalism, Torture, and the Ticking Bomb*, 91 VA. L. REV. 1425, 1439 (2005).

¹⁰⁵ Cf. Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment art. 2(2), Dec. 10, 1984, 1465 U.N.T.S. 85 (“No exceptional circumstances whatsoever, whether a state of war or a threat of war, internal political instability or any other public emergency, may be invoked as a justification of torture.”).

¹⁰⁶ See, e.g., Alan M. Dershowitz, *The Torture Warrant: A Response to Professor Strauss*, 48 N.Y. L. SCH. L. REV. 275, 277 (2004).

¹⁰⁷ See, e.g., Christopher Kutz, Essay, *Torture, Necessity and Existential Politics*, 95 CAL. L. REV. 235, 240 (2007). To be clear, the point is not that the Administration’s effort to define

was crafted as static law, it established a relatively fixed terrain across which later debates about interrogation occurred.¹⁰⁸

Similarly, constitutional rules have moral force, in part because of their static nature. The First Amendment, for example, was adopted against a backdrop of uncertainty. The drafters of the Amendment could only speculate about the importance of facilitating a market place of ideas and innovation, or the balance between the benefits of protecting speech and the costs to individual or government interests. Two hundred years later, these issues remain a subject of spirited debate.¹⁰⁹ Nonetheless, the First Amendment created a strong cultural and legal signal about the social value of protecting speech, and that rule has remained unchanged.¹¹⁰

Second, in many cases, static law saves resources. It may accomplish this by eliminating legal uncertainty—even as it fails to account for factual uncertainty—and providing a predictable framework within which regulated parties can operate. In so doing, static law may achieve socially optimal outcomes even in circumstances where the adopted rule is not itself optimal. This will be true when the costs—both economic and otherwise—associated with modifying a legal rule

waterboarding as something other than torture was successful. The United States government has itself previously viewed the practices as constituting torture. See Luke Whelan, *New Documents Show the US Called Waterboarding Torture During World War II*, MOTHER JONES (Dec. 17, 2014, 8:05 PM), <http://www.motherjones.com/politics/2014/12/waterboarding-torture-japan-world-war-ii>. Rather, the static law structure of anti-torture law created a baseline against which the Administration acted in trying to justify its practices.

¹⁰⁸ The Endangered Species Act's (ESA) prohibition on the taking of endangered species constitutes another example of static law's role in inculcating and enforcing norms. See Endangered Species Act of 1973, sec. 9, Pub. L. No. 93-205, 87 Stat. 884 (1973) (codified as amended at 16 U.S.C. § 1538(a) (2012)). Section 9 of the Act embodied a social value that human activity should not extinguish other forms of life. The rule was written in absolute terms, and early in the statute's life, the Supreme Court explained that "Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities." *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 194 (1978). Although Congress also enacted section 10 of the ESA to allow certain takings of endangered species, preserving species from extinction remains a popular and important policy. See HARRIS INTERACTIVE, ENDANGERED SPECIES ACT POLL 2 (2011), <http://ht.ly/4appW>.

¹⁰⁹ For example, both the legality and propriety of criminalizing revenge pornography—the act of distributing graphic sexual images of someone without their consent—has been a recent subject of considerable debate. See, e.g., Clay Calvert, *Revenge Porn and Freedom of Expression: Legislative Pushback to an Online Weapon of Emotional and Reputational Destruction*, 24 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 673, 700–01 (2014); Danielle K. Citron & Mary A. Franks, *Criminalizing Revenge Porn*, 49 WAKE FOREST L. REV. 345, 347–49 (2014); Ian Farrell et al., *Colorado's New Revenge Porn Statute is Good Law and Sound Policy*, HUFFINGTON POST: BLOG (June 1, 2014, 11:25 AM), http://www.huffingtonpost.com/ian-farrell/colorados-new-revenge-por_b_5427703.html.

¹¹⁰ This is, of course, an oversimplification, as legal doctrine surrounding the First Amendment has evolved through judicial decisions. Compare, e.g., *Virginia v. Black*, 538 U.S. 343 (2003) (upholding a Virginia statute criminalizing cross burning), with *R.A.V. v. City of St. Paul*, 505 U.S. 377 (1992) (invalidating a St. Paul, Minnesota hate crime ordinance).

outweigh the benefits that accrue from better tailoring that rule to changing circumstances or new information.¹¹¹ The costs avoided by static law take two forms. Fixed rules reduce the risks of investment. This is a central benefit of the rule of law. A nation with a stable and certain set of legal rules will attract foreign investment and investors will demand lower interest rates.¹¹² In other words, the very act of creating static law has salutary effects to the extent that those affected by the regulation believe in the stability of the regime, at least during the period relevant to an investment decision.¹¹³ People make investments based on existing legal rules, and static law honors these investments with future certainty.¹¹⁴ Static law also avoids costs of transitioning between legal regimes. When rules change, those affected must change their behavior in response. Depending on the magnitude of the change, this can itself impose substantial costs.¹¹⁵

Consider again the example of the rule requiring drivers to travel on the right side of the road. Unlike the First Amendment and the Convention Against Torture,¹¹⁶ no normative commitment adheres to this rule, and as discussed, evidence suggests that the United States follows the worse rule because driving on the right side correlates with a greater number of accidents.¹¹⁷ Nonetheless, relying on static law to establish the right-side driving rule also created significant benefits. For example, choosing a uniform and certain standard may have facilitated

¹¹¹ By using the language of costs and benefits, I do not mean to invoke purely economic cost-benefit analysis of the type critiqued by scholars such as Lisa Heinzerling and Frank Ackerman. See, e.g., FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 207–08 (2004); Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553, 1558–60 (2002). There are circumstances where a traditional economic analysis would indicate that stable but poorly calibrated legal rules will outperform those that are more flexible and responsive. Indeed, traditional economics might overvalue stability because dynamic law will often benefit environmental values that are difficult to monetize. *Id.*

¹¹² See Gaëtan Verhoosel, *Foreign Direct Investment and Legal Constraints on Domestic Environmental Policies: Striking a “Reasonable” Balance Between Stability and Change*, 29 LAW & POL’Y INT’L BUS. 451, 453 (1998).

¹¹³ Static law may also reduce investment in lobbying for modification of an existing legal rule because achieving such modification is substantially more difficult than adjusting dynamic law. Economic and social capital that might be expended in seeking such a change can thus be put to other productive uses.

¹¹⁴ Investment under existing legal rules also serves to generate de facto static law because rules that have engendered substantial investment become politically harder to change. See William N. Eskridge, Jr. & John Ferejohn, Essay, *Super-Statutes*, 50 DUKE L.J. 1215, 1218–20 (2001).

¹¹⁵ See Gubler, *supra* note 12, at 139 (“Laws may become entrenched because the more people that rely on them, the more valuable they become and the less likely they are to be displaced, even by a potentially superior law.”).

¹¹⁶ See discussion *supra* notes 95–99 and accompanying text.

¹¹⁷ See LEEMING, *supra* note 38.

the spread of the automobile.¹¹⁸ It may have encouraged car companies to invest substantial resources in designing and building cars, confident that these cars would not suddenly become obsolete. It also may have facilitated purchasing decisions by individuals and companies because they could be confident that their investment would not suddenly become functionally useless. The benefits of selecting a fixed rule—driving on the right-hand side of the road—likely outweigh the costs of the small uptick in traffic accidents associated with that rule. Moreover, switching rules would likely incur substantial transitional costs. Companies would have to redesign models and production facilities, and individuals would have to abandon existing vehicles in favor of new ones. Moreover, during the transition period, road accidents would likely increase as people grew accustomed to the new regime.

Third, static law can create incentives for private market actors to engage in pro-social conduct. This is illustrated by many of the so-called “command-and-control” approaches to environmental law.¹¹⁹ By instantiating a legal rule with firm application, the government encourages regulated parties to channel energy and resources to developing means of conforming to that rule. This is just what occurred when Congress banned chlorofluorocarbons through the Clean Air Act amendments of 1990.¹²⁰ Congress faced considerable uncertainty about the economic repercussions of a ban, but nonetheless adopted a stringent and specific timetable for eliminating these substances that deplete the ozone layer.¹²¹ Industry responded by developing commercially viable alternatives.¹²²

¹¹⁸ It is not impossible, however, to change which side of the road drivers use. In 2009, the island nation of Samoa did just that. See Vanderbilt, *supra* note 89. That decision was not motivated by concern for public safety. Rather, Samoa believed that it could import cars more cheaply from Australia and New Zealand, which require driving on the left, than from countries that drive on the right. *Id.*

¹¹⁹ I have not identified an agreed upon term in the literature to describe non-adaptive decision-making and have selected “static law” because it captures a primary axis along which it diverges from adaptive management. The command-and-control “approach typically proceeds by imposing rigid standards of conduct on individual pollution sources . . . backed up by sanctions designed to assure full compliance with such standards by each source.” James E. Krier & Richard B. Stewart, *Using Economic Analysis in Teaching Environmental Law: The Example of Common Law Rules*, 1 UCLA J. ENVTL. L. & POL’Y 13, 15 n.3 (1980).

¹²⁰ Clean Air Act, Amendments, Pub. L. No. 101-549, 104 Stat. 2399 (1990) (codified as amended at 42 U.S.C. §§ 7401–7671q (2012)).

¹²¹ See *id.* (codified as amended at § 7407); see also Clare Langley-Hawthorne, *An International Market for Transferable Gas Emission Permits to Promote Climate Change*, 9 FORDHAM ENVTL. L.J. 261, 276–77 (1998) (identifying a concern about the uncertainty of economic effects of ozone depletion and development of alternative technologies).

¹²² See Elizabeth R. DeSombre, *The Experience of the Montreal Protocol: Particularly Remarkable, and Remarkably Particular*, 19 UCLA J. ENVTL. L. & POL’Y 49, 59 (2001). Title VI of the Clean Air Act was the United States’ means of accomplishing the goals established in the Montreal Protocol. See tit. VI, 104 Stat. 2399 (codified as amended §§ 7671–7671q).

Fourth, static law reduces the burden of governing. Lawmakers face abundant demands for their attention. Static law reduces these demands because it allows lawmakers to address problems only once. This benefit may be particularly acute in the context of politically charged, divisive decisions. In such circumstances, a lawmaking body may take significant time to overcome political opposition. Deciding once, rather than in an iterative fashion, may be the only realistic means of addressing a problem in such circumstances.

Administrative agencies face similar political and resource constraints. The Administrative Procedure Act, for example, imposes process requirements on agency decisions that can consume substantial resources.¹²³ Where applicable, the National Environmental Policy Act and the Endangered Species Act also impose resource intensive procedural requirements.¹²⁴ The cost to agencies associated with creating dynamic law may, in some circumstances, outweigh the benefits of creating a legal regime responsive to new information.

The primary drawback of static law is encapsulated in its name. Static law is static. It lacks nimbleness and flexibility, and may be particularly unsuited to governing complex and chaotic situations. Where lawmakers deploy static law to govern such circumstances, standards, programs, and other legal interventions may become outdated but nonetheless persist because of the difficulty of changing static law once it is created. These changes in circumstances may arise because of new information, new technologies, or as Hannah Wiseman has explained, because the scale of a regulated activity has increased.¹²⁵ Even when lawmakers agree that a static law regime needs to be amended—or abandoned altogether—it may nonetheless persist because lawmakers lack the resources or attention to address the matter.¹²⁶ Reliance on outdated laws is not only ineffective, but also undermines the public's faith in their government.¹²⁷

¹²³ See, e.g., 5 U.S.C. § 553 (2012).

¹²⁴ See, e.g., 16 U.S.C. § 1536 (2012); 42 U.S.C. § 4332(C) (2012).

¹²⁵ Wiseman, *supra* note 28, at 238. As Brigham Daniels has explained, “institutions built to address yesterday’s problems become today’s obstacles to change.” Brigham Daniels, *Emerging Commons and Tragic Institutions*, 37 ENVTL. L. 515, 522 (2007). Daniels examines a particular regulatory context—managing common resources—and explains that the desire for stable institutions to govern such resources can create what he terms “tragic institutions,” which burden future efforts to manage those resources in light of changing values or new information. See *id.* at 539.

¹²⁶ Wiseman, *supra* note 28, at 272.

¹²⁷ Moreover, the difficulty of modifying static law may mean that change will occur only in the wake of extreme circumstances. Cf. *id.* at 241 (noting that the “regulatory lag” associated with unconventional oil and gas development “partially results from the tendency of policymakers, agencies, and stakeholders to rely upon dramatic incidents and major technological modifications . . . as triggers of needed regulatory change”). Following dramatic

Static law may also be ill-suited to the problems faced in mature regulatory contexts. When lawmakers first turn their attention to a set of problems (e.g., environmental problems), static law may achieve considerable success. J.B. Ruhl made this observation in reference to command-and-control mechanisms, which generally constitute static law rules that govern the discharge of pollution: the first generation of environmental regulation achieved success by “pick[ing] the low-hanging fruit [F]or example, it has targeted emissions from smokestacks and discharge pipes, disposal of wastes in landfills, transportation of hazardous chemicals, and similar discrete, easily-identified sources of environmental harm.”¹²⁸ Ruhl suggested that static law poorly addresses the thornier problems that remain. This same observation applies to other contexts. Lawmakers sensibly begin with those problems that are easiest to address, and such problems may lend themselves to static law solutions. After more than two centuries of governance, American law may have solved many such problems, and what remains may require the dynamic approaches discussed in the next Part.

III. DYNAMIC LAW

Static legal rules, sensible when enacted, may become out of date, outliving their usefulness. Even unconstitutional laws remain on the books long after they become unenforceable.¹²⁹ Even popular culture understands that laws may persist too long. In the hit television show *Parks and Recreation*, the town of Pawnee, Indiana has an obviously unconstitutional law governing city council elections. On the eve of such an election, the lead character is told by a voting official that “[a] final tally [of votes] within one percent will trigger an automatic recount. In the event of an exact tie, the seat is awarded to the male candidate and the female candidate is put in jail.”¹³⁰ The official

and vivid regulatory failure, the government may feel pressure to act quickly to change existing programs. But such rushed action will itself often lack nuance.

¹²⁸ J.B. Ruhl, *Regulation by Adaptive Management—Is it Possible?*, 7 MINN. J.L. SCI. & TECH. 21, 21 (2005) [hereinafter Ruhl, *Regulation by Adaptive Management*].

¹²⁹ See, e.g., William Michael Treanor & Gene B. Sperling, *Prospective Overruling and the Revival of “Unconstitutional” Statutes*, 93 COLUM. L. REV. 1902, 1907 (1993); Hillary Greene, Note, *Undead Laws: The Use of Historically Unenforced Criminal Statutes in Non-Criminal Litigation*, 16 YALE L. & POL’Y REV. 169, 174 (1997); Brian Palmer, *How a Bill Becomes Not a Law: What Happens to Unconstitutional State Laws? Can They Just Stay on the Books Forever?*, SLATE (Apr. 4, 2013, 3:12 PM), http://www.slate.com/articles/news_and_politics/explainer/2013/04/north_carolina_state_religion_bill_does_unconstitutional_legislation_disappear.html.

¹³⁰ *Parks and Recreation: Win, Lose, or Draw* (NBC television broadcast May 10, 2012).

acknowledges, “I don’t think it would hold up in court, but it is city law.”¹³¹ This fictional account mirrors reality. Static law sticks around.¹³²

Permanence has advantages. So too does flexibility and dynamism. Dynamic law enables lawmakers to craft regulatory interventions to respond to new information and shifting conditions.

This Part provides an account of mechanisms by which legal rules can respond to new information, identifying three primary modes of dynamic law. First, durational regulation promotes whole-cloth amendment and reconsideration of law after it is adopted by creating periodic opportunities for review.¹³³ It achieves this end without creating specialized procedural rules that are calibrated to emerging information. Rather, durational regulation creates open-ended opportunities for the amendment and repeal of existing rules. Second, adaptive regulation creates a process that is internal to a legal framework and allows for reconsideration of that framework’s rules.¹³⁴ This reconsideration could occur, and perhaps ideally would occur, by a subsidiary body specially charged with managing the legal regime. It may also occur by the initial lawmaking body itself. Third, contingent regulation eschews process-based approaches to dynamism, and instead incorporates mechanisms that provide for automatic substantive changes to legal rules based on foreseeable future conditions.¹³⁵

From a theoretical perspective, this typology recognizes that law can respond to uncertainty either internally or externally. In other words, a legal regime can itself include mechanisms by which the rules attendant to that regime can change—the internal approach of adaptive regulation and contingent regulation—or a legal regime can include mechanisms that encourage lawmakers to amend or replace that regime—the external approach of durational regulation. Where a dynamic law regime includes internal mechanisms for change, those mechanisms may be procedural or substantive in nature. In other words, dynamism can include specific, substantive adjustments to governing legal rules if certain events come to pass—contingent regulation—or it can specify procedures for developing such adjustments—adaptive regulation.

Each approach—internal and external, procedural and substantive—has advantages. This Part examines each mechanism in turn.

¹³¹ *Id.*

¹³² See sources cited *supra* note 129.

¹³³ See *infra* Part III.B.

¹³⁴ See *infra* Part III.B.

¹³⁵ See *infra* Part III.C.

A. *Durational Regulation*

Durational regulation addresses uncertainty by facilitating periodic opportunities for the amendment or repeal of existing rules. The underlying legal rules may resemble static law. Durational regulation contains no specialized set of procedures to govern the modification of rules. Rather, lawmakers that promulgate durational regulation can intervene in response to new information or changing circumstances, and durational regulation facilitates that intervention. In other words, unlike static law, which is intended to remain a permanent fixture in the architecture of the legal system, durational regulation is intended only for temporary or durational use.¹³⁶

1. The Structure of Durational Regulation

Durational regulation involves the open-ended reconsideration, revision, or repeal of existing rules by lawmakers to address new information and emerging circumstances. Such a process differs from adaptive regulation because it involves no predefined procedures by which new information would trigger reconsideration, and it differs from contingent regulation because it involves no pre-commitment as to the substance of future changes in a legal rule. Instead, lawmakers simply make new decisions as new decisions become desirable, in consideration of any information they believe is relevant. The problem, of course, is that making decisions in a democracy is difficult and time consuming, in no small part because lawmakers face nearly endless demands on their time and attention. Durational regulation seeks to overcome those barriers. Sometimes it accomplishes that task by reducing the difficulty of decision-making, either by relaxing legal constraints or by creating periodic opportunities for lawmakers to reconsider rules should they so desire. Other times durational regulation creates significant incentives for lawmakers to revisit existing rules—incentives designed to counteract barriers to decision-making.¹³⁷ To the challenge of uncertainty, durational regulation answers: if relevant information emerges in the future, lawmakers should intervene to consider any information they deem appropriate, and should take any steps they deem necessary.

¹³⁶ The term “durational regulation” draws its origin from the original term “duration clause,” which, in one of its more common forms, is included in sunset provisions. For a discussion of duration clauses, see Gersen, *supra* note 20, at 248.

¹³⁷ See *infra* notes 145–66 and accompanying text.

Durational regulation can function by reducing obstacles to decision-making by relaxing legal constraints on the decision-making process, including constraints imposed by process rules. Such relaxation decreases the cost to lawmakers of revisiting their decisions, thus making amendment or repeal more likely. Durational regulation can also function by requiring lawmakers to convene at specified times to discuss any changes to a legal rule that may be required. Such opportunities place amendment or repeal on the agenda, which helps to overcome the inertia that can arise from the multifarious obligations facing government actors.

Alternatively, durational regulation can leave in place the existing architecture by which reconsideration of law occurs, and instead can create incentives for lawmakers to overcome the barriers they face. A longstanding mechanism for creating such incentives is the practice of establishing deadlines by which existing legal rules must be revisited, and which create either real-world or political consequences for inaction. Deadlines can be hard or soft, depending on the consequences that would occur if a deadline is missed.

Sunset provisions create a form of “penalty default” for lawmakers by imposing hard deadlines by which lawmakers must revisit decisions before earlier decisions expire on their own terms.¹³⁸ Ian Ayres and Robert Gertner originally conceived of penalty defaults in the context of default rules for contracts—rules that neither party to a contract would prefer to be bound by—thereby “giv[ing] at least one party to the contract an incentive to contract around the default rule and therefore to choose affirmatively the contract provision they prefer.”¹³⁹ Sunset provisions operate similarly by creating a default regime in which the absence of further lawmaking causes a legal rule to disappear entirely. Assuming that lawmakers believe legal rules serve important purposes,

¹³⁸ See, e.g., Gersen, *supra* note 20, at 253; Wiseman, *supra* note 28, at 272. Not every provision terminating a legal rule after a certain period of time constitutes durational regulation. Sometimes, a temporary legal intervention is all that is required to address a problem. At other times, a temporary intervention may have different, desirable consequences when compared to a permanent intervention. For example, there is evidence that a temporary reduction in taxes for stock dividends that are distributed to shareholders may boost the size of dividend distributions more than a permanent tax cut. See Steven A. Bank, *Dividends and Tax Policy in the Long Run*, 2007 U. ILL. L. REV. 533, 536 (2007). In such circumstances, the temporary nature of a legal rule is not serving the purpose of facilitating reconsideration, and as such, the rule does not constitute durational regulation as the term is used in this Article.

¹³⁹ See Ian Ayres & Robert Gertner, *Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules*, 99 YALE L.J. 87, 91 (1989). Penalty defaults are not a perfect analogy for durational regulation. Durational regulation creates incentives for decision-making at a later date in order to reveal the preferences of lawmakers at that time based on information that was unavailable at the moment that a legal rule was initially created. Penalty defaults in contract law, on the other hand, promote additional decision-making at the inception of a contract on the basis of information already in the possession of at least one of the parties.

sunset provisions impose real costs for failure to act, and therefore create positive incentives—which are sometimes substantial—for decision-making to occur before an important legal rule expires.

Deadlines can also be softer in nature, decoupled from the real-world consequences of automatic rule termination, and instead can involve a commitment to make a decision by a certain time, thereby imposing a political cost for failure to act. For example, a statute may require an administrative agency to reconsider an earlier decision within a set number of years.¹⁴⁰ These statutory deadlines “are usually deemed directory,” rather than mandatory.¹⁴¹ In circumstances where an agency’s violation of a statutory deadline becomes extreme, the Administrative Procedure Act provides a backstop by allowing affected parties to sue an agency that has “unlawfully withheld or unreasonably delayed” action.¹⁴² Even unenforceable deadlines, however, serve a function. They create political and public pressure for action.

Not all deadlines constitute durational regulation. The purpose of durational regulation, like other forms of dynamic law, is to make law responsive to emerging information. Lawmakers may deploy deadlines for other purposes. The “fiscal cliff” of 2013 is one example.¹⁴³ In 2011, Congress increased the borrowing authority of the United States to avoid a government default on federal loans, but it proved unable to agree to a package of spending cuts and tax increases necessary to avoid the need for further borrowing.¹⁴⁴ Instead, Congress enacted the Budget Control Act, which included automatic, across-the-board budget cuts to

¹⁴⁰ See, e.g., 42 U.S.C. § 7411 (b)(1)(B) (2012) (“The Administrator shall, at least every 8 years, review and, if appropriate, revise such standards [of performance for new stationary sources (buildings, structures, facilities, or installations) of air pollutants] . . .”).

¹⁴¹ *Trans Fleet Enters., Inc. v. Boone*, 987 F.2d 1000, 1005 (4th Cir. 1992) (“Even statutory time limits for agency action are usually deemed directory.”); see CHARLES ALAN WRIGHT & CHARLES H. KOCH, JR., 33 FEDERAL PRACTICE & PROCEDURE § 8387 (1st ed. 2015) (“Review of delay takes on the search for negligent omission or reckless disregard of the administrative duty.”).

¹⁴² 5 U.S.C. § 706(1) (2012). Environmental plaintiffs have enjoyed significant success in suing for violations of statutory deadlines contained in the Endangered Species Act, perhaps in part because the deadlines are so short and the courts provide the relevant agencies relatively little wiggle room. See generally Benjamin Jesup, *Endless War or End This War? The History of Deadline Litigation Under Section 4 of the Endangered Species Act and the Multi-District Litigation Settlements*, 14 VT. J. ENVTL. L. 327 (2013) (recounting the history of deadline suits under the Endangered Species Act).

¹⁴³ See Lori Montgomery & Rosalind S. Helderman, *Congress Approves “Fiscal Cliff” Measure*, WASH. POST (Jan. 1, 2013), http://www.washingtonpost.com/business/economy/house-members-meet-to-review-senate-passed-cliff-deal/2013/01/01/6e4373cc-5435-11e2-bf3e-76c0a789346f_story.html.

¹⁴⁴ See Josh Chafetz, *The Phenomenology of Gridlock*, 88 NOTRE DAME L. REV. 2065, 2068–69 (2013).

programs favored by both Democrats and Republicans.¹⁴⁵ Those cuts—referred to as “sequestration”—were to take effect on January 2, 2013.¹⁴⁶ Sequestration resembles the deadlines discussed above, but the purpose of sequestration differed. Congress designed these spending cuts to force a political compromise, not to facilitate responsiveness to new information.¹⁴⁷ Therefore, sequestration did not constitute durational regulation.

2. Durational Regulation Across Context

Durational regulation has occurred throughout American law. Probably the most common form is the sunset provision. This strategy stretches back as far as the framing of the Constitution. Article I requires Congress to appropriate money for the military no less than every two years.¹⁴⁸ In the *Federalist Papers*, Alexander Hamilton explained that the two-year appropriation limit promoted congressional deliberation: “The Legislature of the United States will be *obliged*, by this provision, once at least in every two years, to deliberate upon the propriety of keeping a military force on foot.”¹⁴⁹ In other words, as Jacob Gersen has explained, the Constitution forces Congress “to reconsider the need for a standing military, and incorporate information about changing circumstances into legislative deliberations.”¹⁵⁰

Federal statutes sometimes include similar provisions. Such “temporary legislation” was common early in American history, but has become less commonplace.¹⁵¹ Congress does continue to use sunset provisions on occasion. For example, the Public Safety and Recreational Firearms Use Protection Act banned the manufacture and transfer of assault weapons and included a sunset provision that caused the ban to

¹⁴⁵ Budget Control Act of 2011, Pub. L. No. 112-25, 125 Stat. 240 (codified as amended in scattered sections of 2 U.S.C., 20 U.S.C., and 31 U.S.C.); see BILL HENIFF JR. ET AL., CONG. RESEARCH SERV., THE BUDGET CONTROL ACT OF 2011 4 (2011) (describing Budget Control Act’s goal of forcing lawmakers to reach a compromise on spending).

¹⁴⁶ 125 Stat. 240.

¹⁴⁷ See HENIFF, *supra* note 145.

¹⁴⁸ U.S. CONST. art. I, § 8, cl. 12 (granting Congress the power to appropriate money “[t]o raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years”).

¹⁴⁹ THE FEDERALIST NO. 26 (Alexander Hamilton).

¹⁵⁰ See Gersen, *supra* note 20, at 251.

¹⁵¹ See *id.*

expire after a decade.¹⁵² During that decade, Congress directed the Attorney General to “study the effect” of various provisions of the law, including the assault weapons ban, and “determine their impact, if any, on violent and drug trafficking crime.”¹⁵³ This legislation provides a useful illustration of durational regulation. Congress created a means of generating information about the efficacy of the assault weapons ban and sought to ensure reconsideration of the ban by means of its automatic expiration. The assault weapons ban also provides a cautionary tale about durational regulation. Sometimes, politics gets in the way, and the impending termination of an important legal regime fails to actually compel its reconsideration and reauthorization. Rather, the regime does in fact terminate.¹⁵⁴

Congress also sets deadlines for administrative agencies, although these provisions typically function as softer deadlines. For example, section 111 of the Clean Air Act requires the EPA to revisit technology-based standards for categories of stationary sources every eight years.¹⁵⁵ Section 111 does not, however, operate as a sunset provision to automatically terminate the standards after eight years.¹⁵⁶ The deadline has the effect, however, of creating public, political, and legal pressure for the EPA to update the standards to account for new information. Similarly, the Forest and Rangeland Renewable Resources Planning Act¹⁵⁷ requires the U.S. Forest Service to issue fifteen-year management plans for each national forest.¹⁵⁸

Forms of durational regulation other than those that contain deadlines also exist in practice. The Federal Reserve’s management of

¹⁵² Public Safety and Recreational Firearms Use Protection Act, Pub. L. No. 103-322, §§ 110101–110106, 108 Stat. 1796, 2000 (1994) (codified at 18 U.S.C. §§ 921(a)(31), 922(w) (2000) (repealed 2004)).

¹⁵³ *Id.* at § 110104.

¹⁵⁴ The assault weapons ban indeed terminated in this manner. See Joel Roberts, *Assault Weapon Ban Expires*, CBS NEWS (Sept. 13, 2004, 9:42 AM), <http://www.cbsnews.com/news/assault-weapon-ban-expires>. The termination of the assault weapons ban could be viewed as a successful use of dynamic law. If one viewed the results of the Attorney General’s study as supporting repeal of the ban, then Congress’s failure to reauthorize the ban—either in its original form or in a form modified by reference to the knowledge generated by the study—embodies an appropriate change in law based on new information. The entrenched political dynamics of gun control suggest, however, that information production had less to do with the expiration of the ban than ideology.

¹⁵⁵ Clean Air Act, § 111, 69 Stat. 322 (1955) (codified as amended at 42 U.S.C. § 7411(b)(1)(B) (2012)) (“The Administrator shall, at least every 8 years, review and, if appropriate, revise such standards.”); see also Wiseman, *supra* note 28, at 291–92.

¹⁵⁶ See § 7411.

¹⁵⁷ Forest and Rangeland Renewable Resources Planning Act of 1974, Pub. L. No. 93-378, 88 Stat. 476 (codified as amended at 16 U.S.C. §§ 1600–1614 (2012)).

¹⁵⁸ See § 1604(f)(5). Congress has repeatedly passed laws allowing the Forest Service to continue to enforce outdated laws. See, e.g., *Montanans for Multiple Use v. Barbouletos*, 568 F.3d 225, 227–28 (D.C. Cir. 2009).

monetary policy is a good example. By statute, the Federal Open Market Committee, a subdivision of the Federal Reserve, must meet “at least four times each year.”¹⁵⁹ These prescribed meetings create periodic opportunities for the Committee to discuss and modify monetary policy. The ability to make such modification is further facilitated because the operations of the Committee are largely exempt from ordinary administrative process requirements,¹⁶⁰ including from typical avenues of congressional oversight.¹⁶¹ In other words, a specific substantive area of law—monetary policy—has been entrusted to a governing body that is required to meet periodically and whose decision-making processes are subject to a preferential set of procedural rules. That body is then charged with establishing and modifying policy to account for new information and changing circumstances.

International treaty regimes provide a second example. In many cases, after the enactment of a multilateral treaty, the parties convene after a specified period at a conference of the parties (or “COP”) at which any issue affecting the treaty can be discussed and resolved.¹⁶² The issues addressed at a COP are far-ranging, and typically the treaties themselves do not provide an exhaustive list. Rather, the COP creates an opportunity for the signatories to the treaty to gather and address emerging issues.¹⁶³

Congress’s rules governing deliberation over the federal budget constitutes a third example. Few decision-making bodies have a reputation as poor as Congress, and in part that stems from Congress’s inability to take action.¹⁶⁴ One obstacle to congressional action is the Senate procedural rule that requires a supermajority vote in order to pass most legislation.¹⁶⁵ That supermajority rule can result in lengthy

¹⁵⁹ See 12 U.S.C. § 263(a) (2012). The current practice of the Committee is to meet eight times each year. See Board of Governors of the Federal Reserve System, *Federal Open Market Committee*, <http://www.federalreserve.gov/monetarypolicy/fomc.htm> (last visited Feb. 15, 2015).

¹⁶⁰ See, e.g., *Raichle v. Fed. Reserve Bank of N.Y.*, 34 F.2d 910, 913–14 (2d Cir. 1929); Steven M. Davidoff & David Zaring, *Regulation by Deal: The Government’s Response to the Financial Crisis*, 61 ADMIN. L. REV. 463, 477–78 (2009).

¹⁶¹ See 5 U.S.C. § 807 (2012) (exempting monetary policy from Congressional review).

¹⁶² See Annecoos Wiersema, *The New International Law-Makers? Conferences of the Parties to Multilateral Environmental Agreements*, 31 MICH. J. INT’L L. 231, 235–36 (2009).

¹⁶³ See *id.*

¹⁶⁴ See 6% *Think Congress Is Doing a Good or Excellent Job*, RASMUSSEN REP. (Aug. 5, 2014), http://www.rasmussenreports.com/public_content/archive/mood_of_america_archive/congressional_performance/6_think_congress_is_doing_a_good_or_excellent_job. A Rasmussen poll conducted in July of 2014 reveals both the perception that congress performs poorly and that a majority of respondents believed that “passing good legislation is a more important role for Congress than preventing bad legislation from becoming law.” *Id.*

¹⁶⁵ See, e.g., Tonja Jacobi & Jeff VanDam, *The Filibuster and Reconciliation: The Future of Majoritarian Lawmaking in the U.S. Senate*, 47 U.C. DAVIS L. REV. 261, 266 (2013).

periods of inaction. Delays significantly undermine the benefits of budgeting, particularly because budgeting involves substantial uncertainty “on ‘both’ sides of the ledger,” and because both tax revenues and necessary expenditures may exceed projections.¹⁶⁶ Congress enacted the Congressional Budget and Impoundment Control Act of 1974 to facilitate budgeting and to make it more responsive to new information.¹⁶⁷ The Act, among other things, eliminated the Senate’s supermajority rule when applied to budget resolutions, and replaced it with a reconciliation process that allowed no more than twenty hours of debate.¹⁶⁸ In other words, with respect to budgeting, Congress has reduced the barriers to decision-making.

3. Benefits and Burdens of Durational Regulation

When lawmakers revisit decisions, they can incorporate emerging information and address new circumstances. This allows the law to remain current. Durational regulation nonetheless imposes costs by requiring lawmakers themselves to take further action.

A few scholars have lauded the potential for durational regulation to enable legal experimentation, particularly deadline-based durational regulation.¹⁶⁹ Sunset provisions create a natural trial period for a legal rule during which additional information about that rule and its context can be gathered. That approach may have particular utility when lawmakers enter a new field of regulation, or when they respond to a new problem. As Jacob Gersen explains, “[b]ecause temporary legislation reduces background uncertainty and mitigates certain forms

¹⁶⁶ David Kamin, *Risky Returns: Accounting for Risk in the Federal Budget*, 88 IND. L.J. 723, 731 (2013). The federal government cannot spend more money than appropriated by Congress. Where emerging events require spending of money in excess of appropriations, Congress appropriates additional funds through a supplemental appropriations bill. See, e.g., Press Release, Sen. Dianne Feinstein (D-Cal.), U.S. Sen., *Feinstein Remarks in Support of Supplemental Appropriations Bill* (July 31, 2014), <http://www.feinstein.senate.gov/public/index.cfm/press-releases?ID=776864e4-fd96-4024-ad06-c86833e749f0>.

¹⁶⁷ Congressional Budget and Impoundment Control Act of 1974, Pub. L. No. 93-344, 88 Stat. 297 (codified as amended at 31 U.S.C. § 1301 (2012)).

¹⁶⁸ See Jacobi & VanDam, *supra* note 165, at 292–303.

¹⁶⁹ See Gersen, *supra* note 20, at 253 (arguing that temporary laws provide concrete advantages over permanent laws from an informational perspective); Rebecca M. Kysar, *Lasting Legislation*, 159 U. PA. L. REV. 1007, 1067 (2011) (criticizing the political and economic costs of temporary rules, but acknowledging the importance of experimental rules in the face of emergencies or uncertainty); Romano, *supra* note 68, at 88. Jessica Owley’s consideration of “term conservation easements,” which would require easement holders to reconsider terms after a time interval, identifies similar advantages. See Jessica Owley, *Changing Property in a Changing World: A Call for the End of Perpetual Conservation Easements*, 30 STAN. ENVTL. L.J. 121 (2011).

of cognitive bias, it is likely to provide far more advantages than drawbacks as a legislative response to newly recognized risks.”¹⁷⁰ Moreover, expressly experimental rules may facilitate agreement because the anticipated cost of complying with a rule for only a short period of time may be relatively insignificant.

Durational regulation, then, may prove most effective in situations where uncertainty is at its apex, where the costs of stagnation are high, and where the costs of change are relatively low. Where an agency has inadequate information to even identify the likely consequences of a new legal rule, planning for contingencies at the outset—as contingent regulation would require—may prove difficult, resource-intensive, or impossible.

Durational regulation also serves a salutary signaling purpose. One problem created by static law is that it creates an appearance of permanence that can mislead regulated parties. Durational regulation puts regulated parties on notice that applicable legal rules are likely to change. Notice may lead to more sensible investment decisions or choices that hedge against the cost of future modifications of legal rules.

Durational regulation is not without flaws, however. Laws tend to become path-dependent, meaning that temporary rules may become permanent by default, even where adjustment would be beneficial.¹⁷¹ The history of the Voting Rights Act may present an example. Section 5 of the Act requires political jurisdictions with a history of discrimination to seek approval from the Attorney General of the United States, before altering voting rules.¹⁷² Congress created a formula to identify those states that would be subject to section 5 and attached a sunset provision to the formula to facilitate future adjustments. The formula, however, proved sticky and Congress did not make adjustments to incorporate new information. For this reason, the Supreme Court invalidated the provision that contained the formula in *Shelby County v. Holder*.¹⁷³ Moreover, in some circumstances, lawmakers may face significant political obstacles to effectively implementing durational regulation because iterative decision-making processes provide opportunities for “regulated [entities to] develop[] lasting contacts and coalitions” designed to thwart future regulatory efforts.¹⁷⁴

¹⁷⁰ Gersen, *supra* note 20, at 248.

¹⁷¹ See Gubler, *supra* note 12, at 134.

¹⁷² Voting Rights Act of 1965, § 5, Pub. L. No. 89-110, 79 Stat. 437, 439 (codified as amended at 52 U.S.C. § 10301 (2012)). These jurisdictions can, alternatively, file a lawsuit seeking a declaration approving of the new procedure. *Id.*

¹⁷³ 133 S. Ct. 2612, 2631 (2013).

¹⁷⁴ Lynn E. Blais & Wendy E. Wagner, *Emerging Science, Adaptive Regulation, and the Problem of Rulemaking Ruts*, 86 TEX. L. REV. 1701, 1713 (2008).

Durational regulation, particularly deadline-based durational regulation, also imposes hefty burdens on lawmakers.¹⁷⁵ Those burdens fall with particular severity on administrative agencies that are required to comply with resource-consuming processes, such as notice-and-comment rulemaking, and are faced with the prospect of judicial challenges after each iterated decision. This dynamic produces a perverse political economy for agencies: Permanent rules consume fewer resources and limit litigation to a single instance, but such rules do not account for new information. Temporary rules increase resource costs and litigation risks, but produce a better legal regime. Zachery Gubler has proposed a possible solution to this problem, arguing that courts should provide increased deference to agencies that promulgate temporary rules,¹⁷⁶ although the textual basis for differing standards of judicial deference in the Administrative Procedure Act is unclear.

Agency capture may also occur where durational regulation involves a specialized decision-maker tasked with continuously updating a particular legal regime.¹⁷⁷ Narrowing an agency's jurisdiction to facilitate consistent attention to a particular problem increases the likelihood that a small group of private parties will be the primary voices heard by that agency and a primary source of future staff.¹⁷⁸ Such dynamics may distort decision-making.¹⁷⁹ For example, federal law tasks Regional Fishery Management Councils with setting annual catch limits, based on evolving information, to ensure that yields are sustainable.¹⁸⁰ These councils primarily interact with the fishing industry and—

¹⁷⁵ Private parties may also face increased burdens, as those interested in durational regulation will need to deploy resources to advocate on behalf of their interests when a regulation's duration has passed. Cf. Owley, *supra* note 169, at 169 (identifying concern that term conservation easements may increase transaction costs).

¹⁷⁶ Gubler, *supra* note 12, at 134. Gubler explains that the political economy benefits from enhanced deference. If time-limited rules have a better chance of surviving judicial review than permanent rules, interest groups that favor a policy will also favor a time-limited rule. *Id.* If interest groups support time-limited rules, that will pressure agencies to pursue such an approach. *Id.*

¹⁷⁷ Agency capture refers to the ability of interest groups to coopt agency decision-making processes. See Rachel E. Barkow, *Insulating Agencies: Avoiding Capture Through Institutional Design*, 89 TEX. L. REV. 15, 22–23 (2010); John Shepard Wiley Jr., *A Capture Theory of Antitrust Federalism*, 99 HARV. L. REV. 713, 724–25 (1986).

¹⁷⁸ See Nicholas Bagley, *Agency Hygiene*, 89 TEX. L. REV. SEE ALSO 1, 4 (2010).

¹⁷⁹ Cf. Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 3 (1989) (“[S]pecialization will produce a court with tunnel vision, with judges who are overly sympathetic to the policies furthered by the law that they administer or who are susceptible to ‘capture’ by the bar that regular[ly] practices before them.”).

¹⁸⁰ See 16 U.S.C. § 1852 (2012); see generally Roger Fleming et al., *Twenty-Eight Years and Counting: Can the Magnuson-Stevens Act Deliver on Its Conservation Promise?*, 28 VT. L. REV. 579 (2004).

consistent with similar concerns about agency capture—have been criticized for inadequately protecting fish stocks.¹⁸¹

In some circumstances, durational regulation strategies may face political difficulties because they can appear costlier than permanent rules when reviewed under current accounting practices. In considering legislative sunset provisions, George Yin explains that the method of projecting budgetary impact of any proposed legislation systematically disadvantages time-limited laws.¹⁸² This effect occurs because the cost of permanent legislation is assessed over a “budget window period,” which is typically five or ten fiscal years, and budget analyses ignore all costs after that window.¹⁸³ This artificially reduces the perceived cost of permanent legislation as compared to temporary legislation.¹⁸⁴ This is not a theoretical flaw with durational regulation, but is rather a practical difficulty facing lawmakers who are seeking to implement this strategy.¹⁸⁵

B. Adaptive Regulation

Like durational regulation, adaptive regulation facilitates reconsideration of legal rules. Adaptive regulation has been popularized by the glut of adaptive management programs that have been incorporated into environmental and natural resources law. It incorporates specialized procedures that require reconsideration of legal rules in response to new information or changing circumstances.

1. The Structure of Adaptive Regulation

Adaptive regulation creates procedures within a legal framework that require reconsideration of the substantive rules. This is accomplished as follows: Lawmakers create a legal rule and attach a process to that rule by which reconsideration will occur as new information becomes available. During such reconsideration, the legal rule can be modified in whatever way is deemed appropriate. Adaptive

¹⁸¹ See JOSH EAGLE ET AL., TAKING STOCK OF THE REGIONAL FISHERY MANAGEMENT COUNCILS 27–28 (2003); Katrina Mariam Wyman, *from Fur to Fish: Reconsidering the Evolution of Private Property*, 80 N.Y.U. L. REV. 117, 180 (2005); Fleming, *supra* 180, at 613.

¹⁸² George K. Yin, *Temporary-Effect Legislation, Political Accountability, and Fiscal Restraint*, 84 N.Y.U. L. REV. 174, 186–87 (2009).

¹⁸³ *Id.* at 178.

¹⁸⁴ *Id.* at 180.

¹⁸⁵ Even in the absence of this accounting-based distortion, the application of a discount rate could complicate economic comparison between durational regulation and static law.

regulation may rely on either the initial lawmakers, or another subsidiary body, to engage in the process of reconsidering legal rules. Adaptive regulation is “an iterative, incremental decisionmaking process built around a continuous process of monitoring the effects of decisions and adjusting decisions accordingly.”¹⁸⁶ To the challenge of uncertainty, adaptive regulation answers: if relevant information emerges in the future, procedures will require consideration of that information and an appropriate response.

This model of dynamic law is purely procedural in nature. Scholars of adaptive management—the most prevalent form of adaptive regulation—even dispute whether adaptive regulation should pursue specified goals, or whether the goals of regulation should instead emerge and change through the iterative process of defining the contours of the legal regime.¹⁸⁷ In other words, adaptive regulation does not pursue ideal governance at the outset, and lawmakers need not—and should not—pre-commit to specific substantive changes to a law in the event of either foreseen or unforeseen future occurrences. Rather, the premise of adaptive regulation is that accounting for new information is better done over time. Adaptive regulation encompasses a range of regulatory approaches, including, at one extreme, a grant of broad discretion for lawmakers to revisit and modify a legal rule when new information is identified, and at the other, a set of highly structured provisions governing when and how reconsideration must occur. Adaptive regulation, then, attempts to create a system that can improve with experience.¹⁸⁸

¹⁸⁶ Ruhl, *Regulation by Adaptive Management*, *supra* note 128, at 28; *see also* Notice of Availability of a Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, 65 Fed. Reg. 35,242-01, 35,252 (June 1, 2000) (“Adaptive management is an integrated method for addressing uncertainty in natural resource management. It also refers to a structured process for learning by doing.” (citations omitted)); Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1464 (“[A]ny adaptive strategy must include at least two key features: iterative decisionmaking and a commitment to learning over time.”).

¹⁸⁷ *Compare* Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1469 (emphasizing “the need for clear goals set exogenously to the adaptive management process”), *with* NAT’L RESEARCH COUNCIL, NAT’L ACAD. OF SCI., ADAPTIVE MANAGEMENT FOR WATER RESOURCES PROJECT PLANNING 24 (2004) (listing elements of adaptive management as including “[m]anagement objectives that are regularly revisited and accordingly revised” by participating stakeholders).

¹⁸⁸ The Fish and Wildlife Service has identified the following key elements of an adaptive management strategy:

- (1) identify the uncertainty and the questions that need to be addressed to resolve the uncertainty;
- (2) develop alternative strategies and determine which experimental strategies to implement;
- (3) integrate a monitoring program that is able to detect the necessary information for strategy evaluation; and
- (4) incorporate feedback loops that link implementation and monitoring to a decision-making process (which may

Scholars and lawmakers have developed the concept of adaptive management—the most mature form of adaptive regulation—out of a desire to have legal regimes reflect the chaotic, turbulent perturbations that exist in the natural world.¹⁸⁹ J.B. Ruhl has stated this view eloquently in his advocacy for adaptive management. Ruhl argues that “[t]o manage the impact of human society on the inherently chaotic, adaptive environment, the environmental law system itself must possess those dynamical qualities.”¹⁹⁰ Just as caterpillars evolve over the generations to become resistant to defensive toxins produced by the plants they eat,¹⁹¹ adaptive regulation evolves with the generation of new information about environmental conditions and effective strategies for mitigating the negative effects of human activity. This is often accomplished through hefty reliance on public participation based on models of new governance.¹⁹² Such efforts are intended to enhance ecological learning, build trust between stakeholders, better broadcast the results of monitoring, and ensure that evolution in management occurs.¹⁹³ These public participation processes, however, while central to many proposals for adaptive management, are not necessarily inherent in adaptive regulation itself.

More than other forms of dynamic law, adaptive regulation may be designed not only to respond to new information, but also to generate that information. As a Department of the Interior report explains, “[a] distinguishing feature [of adaptive management] is the use of management interventions as experimental treatments, the fundamental goal of which is to improve management.”¹⁹⁴ This is particularly true for

be similar to a dispute-resolution process) that result in appropriate changes in management.

Notice of Availability of a Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, 65 Fed. Reg. at 35,252; *see also* J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—With Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1391 (2011) [hereinafter Ruhl, *Resilience and Adaptive Capacity*].

¹⁸⁹ *See* Tarlock, *supra* note 49, at 1128–29.

¹⁹⁰ Ruhl, *Thinking of Environmental Law*, *supra* note 51, at 940.

¹⁹¹ *See* John Smiley, *Plant Chemistry and the Evolution of Host Specificity: New Evidence from Heliconius and Passiflora*, 201 SCIENCE 745, 745 (1978).

¹⁹² *See, e.g.*, Maria E. Fernandez-Gimenez et al., *Adaptive Management and Social Learning in Collaborative and Community-Based Monitoring: A Study of Five Community-Based Forestry Organizations in the Western USA*, 13 ECOLOGY & SOC’Y, no. 2, art. 4, at 9 (2008), <http://www.ecologyandsociety.org/vol13/iss2/art4>.

¹⁹³ *See id.*

¹⁹⁴ BYRON K. WILLIAMS & ELEANOR D. BROWN, DEP’T OF THE INTERIOR, ADAPTIVE MGMT. WORKING GRP., ADAPTIVE MANAGEMENT: THE U.S. DEPARTMENT OF THE INTERIOR APPLICATIONS GUIDE v (2012), <https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/DOI-Adaptive-Management-Applications-Guide.pdf>.

what is termed “active” adaptive management.¹⁹⁵ Active adaptive management treats the project of governance as an experiment, tasking lawmakers with developing multiple regulatory treatments for testing to be used simultaneously. For example, a state agency attempting to reduce nonpoint source water pollution from road construction projects might require silt fences along one stream, a vegetative buffer along another, and a storm water management system along a third. Over time, the agency would assess the efficacy of each management regime and use comparative information to formulate new policies. The agency’s process would not be crabbled by any front-end limitations. The agency could allow each treatment to persist, make modifications to the treatment, or abandon it altogether—as deemed appropriate. While active adaptive management is, perhaps, ideally suited to developing a richer understanding of regulatory interventions, it has rarely been implemented in practice because it requires a careful and resource-consuming process of formulating policy alternatives and implementing them in such a way so as to produce useable information.¹⁹⁶ Moreover, where the consequences of poor management decisions are significant, experimentation may lead to undesirable, high-profile failures.¹⁹⁷ Compare two hypothetical agencies attempting to preserve an endangered species. The first implements a single management regime that fails, leading to the species’ extinction. The second implements three approaches, two of which fail, leading to a two-thirds decline of the population. The latter agency may actually be subject to greater criticism than the first. The fact that one policy intervention worked may suggest to the public that the agency should have known how to preserve the species, but decided to experiment with other, inferior policies.

Adaptive regulation is an enticing concept, particularly to those with a scientific frame of mind. The scientific method emphasizes experimentation to confirm or disprove hypotheses. From existing observations and information, the scientist develops a hypothesis. This hypothesis is then tested through experimentation and the new information that is generated is then used to refine (or even abandon) the initial hypothesis, setting the stage for a further round of

¹⁹⁵ See Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1465–66; see also Biber, *supra* note 11, at 938.

¹⁹⁶ See Ruhl & Fischman, *supra* note 23, at 441.

¹⁹⁷ See Notice of Availability of a Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, 65 Fed. Reg. 35,242–01, 35,252 (June 1, 2000) (“[A]n active approach may pose too much of a risk to the species . . . [and] may also be too cumbersome.”).

experimentation.¹⁹⁸ In the world of science, developing and refining hypotheses may be the intellectually challenging part of the process, but experimentation consumes the majority of resources.

So the scientist wants government to be: Agencies should develop a hypothesis about how a regulatory tool will achieve a desired outcome. This hypothesis should then be tested in the real world through regulatory action; and the agency should refine or abandon the hypothesis based on new information, and develop a new or refined regulatory approach. The trouble is that, unlike a scientific laboratory, the decision by a government agency to adopt a particular hypothesis and implement a particular “experiment” is what consumes significant time and resources. Making decisions requires significant effort; agencies must engage with regulated communities and the broader public, must conduct any necessary environmental review, must compile a record that supports the decision, must proceed through the stages of decision-making that have been established by the Administrative Procedure Act, and must eventually deploy the legal resources that are necessary to address any legal challenges. In some sense, this contrast highlights the difference between despotic government and democratic government. The principle investigator in a lab has the dictatorial authority to make a specific decision as she deems appropriate. However, agencies must proceed in accordance with democratic principles. The calculus of legislative bodies is similar.

Adaptive management has become the dominant model for managing natural resources problems. It has become so central to the thinking of scholars in the field that it is imported whole cloth into other innovations in the field. For example, one definition of ecosystem management—which at its core suggests that management of natural resources should occur at an ecosystem level because of interconnections among natural constituencies—defines it as “management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function.”¹⁹⁹ So too does the influential exposition of ecosystem management by R. Edward Grumbine, which identifies adaptive management as a core

¹⁹⁸ See Erica Beecher-Monas, *The Heuristics of Intellectual Due Process: A Primer for Triers of Science*, 75 N.Y.U. L. REV. 1563, 1579 (2000).

¹⁹⁹ Kalyani Robbins, *An Ecosystem Management Primer: History, Perceptions, and Modern Definitions*, in *THE LAWS OF NATURE: REFLECTIONS ON THE EVOLUTION OF ECOSYSTEM MANAGEMENT LAW & POLICY* 9 (Kalyani Robbins ed., 2013) (quoting Norman L. Christensen, *The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*, 6 *Ecological Applications* 665 (1996)).

component of ecosystem management.²⁰⁰ Kalyani Robbins similarly explains that “[i]n implementing ecosystem management, arguably the most core universally expected element is adaptive management.”²⁰¹ She further describes adaptive management as “a completely indispensable component” of ecosystem management.²⁰² The definition suffers from over-determination. Ecosystem management does not require adaptive management. Understandings of ecosystems are uncertain and in flux, and policy should account for that. But law can account for uncertainty in multiple ways, not just through adaptive management.

The reflexive turn to adaptive regulation when uncertainty arises, particularly in the guise of adaptive management, may be problematic. That does not undercut, however, the importance of this policy option in certain circumstances.

2. Adaptive Regulation Across Context

As has been explained, adaptive regulation is ubiquitous in natural resources law. The Department of Interior, which houses the U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service has an adaptive management working group,²⁰³ and each component has incorporated adaptive management into site-specific management decisions.²⁰⁴ The U.S. Forest Service similarly views adaptive management as a key component of its decision-making process,²⁰⁵ and adaptive management has played an important role in the management of oceanic fisheries.²⁰⁶

²⁰⁰ See *id.* at 10.

²⁰¹ *Id.* at 12.

²⁰² *Id.*

²⁰³ See, e.g., GEORGE H. STANKEY ET AL., U.S. DEP’T OF AGRIC., ADAPTIVE MANAGEMENT OF NATURAL RESOURCES: THEORY, CONCEPTS, AND MANAGEMENT INSTITUTIONS (2005).

²⁰⁴ See, e.g., BUREAU OF LAND MGMT., U.S. DEP’T OF THE INTERIOR, FIRE PLANNING HANDBOOK H-9211-1 6-1 (2012), http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.4265.File.dat/FINAL_H-9211-1_transmittal%20sheet.pdf; BUREAU OF LAND MGMT., U.S. DEP’T OF THE INTERIOR, RECORD OF DECISION & APPROVED RESOURCE MANAGEMENT PLAN FOR CLEAR CREEK MANAGEMENT AREA 22 (2014) [hereinafter BLM, CLEAR CREEK MANAGEMENT AREA], http://www.blm.gov/style/medialib/blm/ca/pdf/hollister/planning.Par.27928.File.dat/CCMA_ROD_2014_final_with_cover508.pdf; FOREST SERV., U.S. DEP’T OF AGRIC., LEARNING TO MANAGE A COMPLEX ECOSYSTEM: ADAPTIVE MANAGEMENT AND THE NORTHWEST FOREST PLAN (George H. Stankey et al. eds., 2006), http://www.fs.fed.us/pnw/pubs/pnw_rp567.pdf; Camacho, *supra* note 19, at 302–03; *Winter Use Adaptive Management Program*, NAT’L PARK SERV., <http://www.nps.gov/yell/parkmgmt/wuamp.htm> (last visited July 22, 2015).

²⁰⁵ See FOREST SERV., U.S. DEP’T OF AGRIC., LAND MANAGEMENT PLANNING HANDBOOK: CHAPTER 40—KEY PROCESSES SUPPORTING LAND MANAGEMENT PLANNING (2013), http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5409879.pdf.

²⁰⁶ See PAC. FISHERY MGMT. COUNCIL & NAT’L MARINE FISHERIES SERV., GROUND FISH

In some instances, lawmakers command that adaptive management should be used, but then provide little specific guidance as to what goals should be pursued, what information should be collected, or how that information should affect future decisions. In 2009, President Barack Obama issued an Executive Order addressing the restoration of the Chesapeake Bay, which required the development of a strategy “for coordinated implementation of existing programs and projects to guide efforts to protect and restore the Chesapeake Bay” and to include “a process for the implementation of adaptive management principles, including a periodic evaluation of protection and restoration activities.”²⁰⁷ The Order further required the EPA to “identify pollution control strategies and actions authorized by the EPA’s existing authorities to restore the Chesapeake Bay that . . . are based on sound science and reflect adaptive management principles”²⁰⁸ But the Executive Order provides little guidance as to how the EPA is to accomplish these tasks.

Many agencies provide more detailed adaptive management programs, identifying triggering events that will initiate the process of reconsidering applicable legal rules. For example, the Fish and Wildlife Service produced a “conservation strategy” for grizzly bear populations to support its 2007 decision to remove certain populations from the endangered species list.²⁰⁹ The delisting decision explains that “[r]ecovery of a species is a dynamic process requiring adaptive management . . . that may, or may not, fully follow the guidance provided in a recovery plan.”²¹⁰ The strategy specifies that “[t]he best way to ensure a healthy population of grizzly bears is to monitor both population and habitat parameters closely and respond when necessary with adaptive management addressing the problems of the population in a dynamic way. That is what this [c]onservation [s]trategy is designed to accomplish.”²¹¹ The strategy further identifies specific situations in which adaptive management would be utilized. The strategy creates a taskforce responsible for monitoring the grizzly bear population and

FISHERY MANAGEMENT PLAN AMENDMENT 20 (TRAWL RATIONALIZATION) E-2 (2010), http://www.pcouncil.org/wp-content/uploads/PCGFFMP_A20_AsApproved.pdf.

²⁰⁷ Exec. Order No. 13508, 74 Fed. Reg. 23099, 23100 (May 12, 2009).

²⁰⁸ *Id.* at 23101.

²⁰⁹ Removing the Yellowstone Distinct Population Segment of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife, 72 Fed. Reg. 14,866-01 (Mar. 29, 2007) (codified at 50 C.F.R. pt. 17); INTERAGENCY CONSERVATION STRATEGY TEAM, U.S. FISH & WILDLIFE SERV., FINAL CONSERVATION STRATEGY FOR THE GRIZZLY BEAR IN THE GREATER YELLOWSTONE AREA 31 (2007) [hereinafter USFWS, GRIZZLY STRATEGY], <http://www.fws.gov/mountain-prairie/species/mammals/grizzly/ConservationStrategygrizzlybearGYA.pdf>.

²¹⁰ Removing the Yellowstone Distinct Population Segment of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife, 72 Fed. Reg. at 14,869.

²¹¹ USFWS, GRIZZLY STRATEGY, *supra* note 209, at 20 (citation omitted).

provides that any member of the taskforce can call for a “Biology and Monitoring Review” process that would include “identify[ing] the reasons why particular demographic or habitat objectives have not been achieved and . . . modify[ing] management as necessary.”²¹² Despite this detailed adaptive management plan, the Ninth Circuit invalidated the delisting decision, explaining that “[f]or adaptive management of a potential threat to suffice as a basis for a delisting determination, we believe that more specific management responses, tied to more specific triggering criteria, are required.”²¹³ In the nomenclature that this Article proposes, the court essentially rejected the concept of adaptive regulation, instead requiring that agencies implement contingent regulation.²¹⁴

Adaptive management is also included in less headline-grabbing decisions. For example, BLM incorporated adaptive management into its travel management plan for the Clear Creek Management Area. Clear Creek includes a geologic formation which is high in asbestos and through which numerous off-road vehicle trails cross.²¹⁵ BLM’s goals in managing vehicle access in the area are to minimize the risks to public health that may be caused by traversing this formation and to allow ample opportunities for recreation.²¹⁶ The plan provides the public with access to certain routes and establishes that “[i]f any of the following ‘adaptive management criteria’ are met, BLM would reinitiate travel management planning.”²¹⁷ Those criteria include the emergence of research establishing “effective strategies” to reduce exposure to asbestos or indicating a “significant reduction in the toxicity values for asbestos.”²¹⁸

Adaptive regulation has seen little actual use outside the environmental and natural resources context, although scholars increasingly call for its adoption. Roberta Romano, for example, has argued that financial markets present regulators with a dynamic environment full of unknowns and that adaptive regulation should be deployed to allow laws to respond to market feedback.²¹⁹ The importance of implementing such an approach arises from the externalities imposed by regulations that are poorly calibrated to

²¹² *Id.* at 10.

²¹³ *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1029 (9th Cir. 2011).

²¹⁴ *See id.*

²¹⁵ *See* BLM, CLEAR CREEK MANAGEMENT AREA, *supra* note 204, at 1-1.

²¹⁶ *Id.* at 21.

²¹⁷ *Id.*

²¹⁸ *Id.* at 22.

²¹⁹ *See, e.g.*, Romano, *supra* note 68, at 103; *see also, e.g.*, Charles K. Whitehead, *The Goldilocks Approach: Financial Risk and Staged Regulation*, 97 CORNELL L. REV. 1267, 1295 (2012).

address financial markets—regulations which are often created in a moment of crisis against a backdrop of incomplete information.²²⁰

Rosie Cooney and Andrew Lang have similarly proposed incorporating adaptive regulation into international governance regimes.²²¹ International trade agreements, for example, often involve complex interdependencies between states that are incompletely understood, and such agreements therefore have unpredictable and sometimes negative outcomes.²²² By focusing on continuous learning, governance structures could better reflect the dynamic nature of international social systems.²²³ Cooney and Lang specifically argue that the World Trade Organization (WTO) should incorporate adaptive regulation because that entity faces significant uncertainty about the effects of its decisions on natural, social, and economic systems.²²⁴ Adaptive regulation could enable the WTO to avoid acting prematurely, and could instead enable it to proceed experimentally in order to improve the effectiveness of its interventions.²²⁵

3. Benefits and Burdens of Adaptive Regulation

Adaptive regulation has proven to be an intoxicating approach to lawmaking and scholars and has become a mainstay of environmental and natural resources policymaking, although even its strongest advocates recognize that it may not be suited for all regulatory contexts.²²⁶ It has three significant benefits.

First, adaptive regulation allows lawmakers to adjust their decisions based on new information and new conditions without predetermining the most appropriate regulatory response. By declining to commit to policy responses in advance, adaptive regulation avoids the inertia created by front-end decisions.²²⁷ Once government has announced a particular course for regulation, changing that course can be difficult because regulated entities organize their affairs around the announced course. Because adaptive regulation is intentionally and transparently open-ended, it reduces the expectation of regulatory

²²⁰ See Romano, *supra* note 68, at 88.

²²¹ Cooney & Lang, *supra* note 13, at 524.

²²² *Id.* at 532–33.

²²³ *Id.* at 534.

²²⁴ *Id.* at 536, 547–48.

²²⁵ *Id.*

²²⁶ See, e.g., Craig & Ruhl, *supra* note 11, at 12–13.

²²⁷ While the use durational regulation reflects the appeal of ongoing change in a similar fashion to the appeal of adaptive regulation, it does so less self-consciously and creates a risk that the initial legal regime may become institutionalized and therefore difficult to change.

certainty. This is particularly true for active adaptive management, whereby agencies deploy multiple regulatory interventions simultaneously.²²⁸ In such circumstances, no one rule will become entrenched because several are implemented simultaneously.

The flexibility of adaptive regulation, at least in theory, is difficult to overstate. Adaptive regulation tries to replace guesswork at the front end of a regulatory regime with knowledge as the regime unfolds. No matter the sophistication or expertise of lawmakers, unforeseen events will occur, and adaptive regulation is designed with that in mind. Adaptive regulation recognizes the impossibility of achieving socially optimal rules, and it emphasizes the search for improvement as a replacement for efforts to achieve perfection.

Second, adaptive regulation spreads the cost of decision-making over time by reducing up-front costs, particularly when compared to contingent regulation and its requirement that lawmakers identify and plan for all foreseeable contingencies before making an initial decision.²²⁹ Where uncertainty is at its apex, this may be a particularly effective strategy. Lawmakers may have little ability to predict which circumstances may emerge in the future, and the effort to do so may prove costly and ineffective. Adaptive regulation requires no such planning because it allows rules to change as new information arises.

Third, adaptive regulation may be better suited to producing information than other approaches to uncertainty. Difficult governance problems require investigation and experimentation. Many social problems appear intractable, and an evolutionary approach to governance offers the promise of transformation and consensus. This approach is of particular appeal where the risk of catastrophic or irreversible consequences is low. For example, the Forest Service manages seventy-nine experimental forests on federal land with the clear purpose and design of improving the government's understanding of the effectiveness of forestry practices.²³⁰ The long-term effects of experimenting within those forests are low, particularly because they account for only a quarter of one percent of all national forest lands.²³¹

²²⁸ See *supra* notes 195–97 and accompanying text.

²²⁹ The monitoring required for effective adaptive regulation may carry substantial costs. See Biber, *supra* note 11, at 945–48. Effective monitoring is, however, required for all forms of dynamic law.

²³⁰ See, e.g., FOREST SERV., U.S. DEP'T OF AGRIC., EXPERIMENTAL FORESTS AND RANGES OF THE USDA FOREST SERVICE (Mary Beth Adams et al. eds., 2008), http://www.nrs.fs.fed.us/pubs/gtr/gtr_ne321R.pdf. Experimental forests and ranges are used for scientific research of all types, not only research into forest management. See *id.*

²³¹ Compare Ariel E. Lugo et al., *Long-Term Research at the USDA Forest Service's Experimental Forests and Ranges*, 56 BIOSCIENCE 39, 41 (2006) (stating that USDA experimental forests and ranges encompass 196,300 hectares), with FOREST SERV., U.S. DEP'T OF AGRIC., NATURAL RESOURCE BASED TOURISM 1, http://pdf.usaid.gov/pdf_docs/Pdacj363.pdf (stating

Adaptive management has become widely embraced because it is difficult to dispute its premises.²³² The modern eye recognizes complexity and uncertainty everywhere. We fear to commit to any particular policy for fear of being wrong. Adaptive management has a palliative effect by allowing us to postpone hard decisions until a future time. Why choose today when we will know more tomorrow?

While the effectiveness of current instantiations of adaptive regulation have come under fire in recent years, few environmental law scholars dispute that uncertainty about the environment requires open-ended evolutionary processes of adaptive regulation. Adaptive regulation might be too costly,²³³ difficult to reconcile with existing administrative law²³⁴ or statutes,²³⁵ unlikely to survive judicial review,²³⁶ or too easily manipulated for political gain.²³⁷ But most scholars agree that it is “far more suited to the needs of future regulatory challenges than is prescriptive regulation.”²³⁸ These concerns, however, are substantial and worthy of consideration. In many circumstances, other forms of dynamic law may address uncertainty while avoiding these problems.

A central problem of adaptive regulation is that it only provides for process, and due to resource constraints, a lack of political will, or continuing uncertainty, the promise of adaptation is too often unfulfilled. Adaptive regulation “can make it easier for agencies to yield to the temptation to dodge difficult, controversial decisions,” and to

that USDA manages 77 million hectares). Policy experimentation faces significantly higher risks in other contexts. For example, the federal government manages the Columbia River for the purposes of conserving thirteen threatened and endangered fish stocks and producing a considerable portion of the Northwest’s electricity. See BONNEVILLE POWER ADMIN., REINVESTING IN ASSETS 4 (2013), <http://www.bpa.gov/news/pubs/FactSheets/fs-201307-Reinvesting%20in%20assets.pdf>; Michael C. Blumm & Aurora Paulsen, *The Role of the Judge in ESA Implementation: District Judge James Redden and the Columbia Basin Salmon Saga*, 32 STAN. ENVTL. L.J. 87, 99 (2013).

²³² For example, J.B. Ruhl recently outlined principles for the development of laws that can exhibit resilience and adaptive capacity in the face of climate change. Ruhl, *Resilience and Adaptive Capacity*, *supra* note 188, at 1382. His model emphasizes the development of law that contains internal mechanisms to develop in new directions based on emerging information, relying heavily on theories of adaptive management. See *id.* at 1391. It is certainly true that climate change has the potential to place unforeseeable strain on society and the legal structure. Emphasizing open-ended evolution, however, overlooks the many consequences of climate change that are foreseeable and that can enable government to put substantive responses in place to those consequences, rather than to simply wait until they manifest.

²³³ See Doremus, *Adaptive Management as an Information Problem*, *supra* note 11.

²³⁴ See Ruhl, *Regulation by Adaptive Management*, *supra* note 128.

²³⁵ See Julie Thrower, Note, *Adaptive Management and NEPA: How a Nonequilibrium View of Ecosystems Mandates Flexible Regulation*, 33 *ECOLOGICAL L.Q.* 871, 879 (2006).

²³⁶ See Ruhl & Fischman, *supra* note 23, at 447.

²³⁷ See Doremus, “New Age” *Environmental Protection*, *supra* note 21, at 55–56.

²³⁸ Ruhl, *Regulation by Adaptive Management*, *supra* note 128, at 29.

address challenging problems by offering vague promises for future action.²³⁹ Ensuring public accountability can also prove challenging because adaptive regulation processes are often opaque to outside observers.²⁴⁰

The challenges that come with adaptive regulation may be responsible for its mixed track record in practice. The promise of flexible regulation has often devolved into endless iterative decision-making processes that have lost sight of the relevant fundamental goals. One example is the decades-long adaptive management of the Columbia River, which sought to balance the needs of endangered salmon with agricultural and electric utility interests.²⁴¹ Regulators have relied on adaptive management to consistently side-step difficult political issues, and this indefinite regulatory limbo has resulted in the Oregon District Court vacating numerous plans for operating the system.²⁴²

Adaptive regulation also may not provide the information that is needed to recalibrate a regulatory regime. Holly Doremus has argued that adaptive regulation only makes sense when experimentation with management options can reasonably be expected to fill the information gaps that regulators face.²⁴³ Where experimentation is unlikely to produce useful information—because, for example, the number of variables are too high or the timescale to assess the success of any option is too great—adaptive regulation will not produce improved governance, but rather will constitute an empty formality.²⁴⁴

Adaptive regulation also faces legal problems because its fundamental premise—open-ended discretion and flexibility—conflicts with the broader framework of administrative law. The procedural requirements of the Administrative Procedure Act, the National Environmental Policy Act, and the Endangered Species Act, among others, make it difficult for agencies to quickly modify their decisions to

²³⁹ Ruhl & Fischman, *supra* note 23, at 459–60.

²⁴⁰ See Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1463 (“Uncertainty therefore makes it difficult for the public to discern whether managers are doing their best to follow legislative direction or instead bowing to political pressure.”).

²⁴¹ See, e.g., Schultz & Nie, *supra* note 22, at 470–73; John M. Volkman, *How Do You Learn from a River? Managing Uncertainty in Species Conservation Policy*, 74 WASH. L. REV. 719, 740–62 (1999).

²⁴² See, e.g., Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv., 839 F. Supp. 2d 1117 (D. Or. 2011); Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv., 254 F. Supp. 2d 1196 (D. Or. 2003); Idaho Dep’t of Fish & Game v. Nat’l Marine Fisheries Serv., 850 F. Supp. 886 (D. Or. 1994), *vacated as moot*, 56 F.3d 1071, 1074 (9th Cir. 1995).

²⁴³ Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1467. Doremus specifies three necessary conditions for adaptive management: “First, there must be an information gap that is important to management choices. Second, it must seem possible to fill that gap on a management-relevant time scale. Third, it must seem possible to adjust the initial decision over time in response to new information.” *Id.*

²⁴⁴ *Id.* at 1467–68.

incorporate new information.²⁴⁵ Moreover, courts have generally found that a general commitment to adaptively manage is an insufficiently precise explanation for an agency's approach to meeting its statutory obligations.²⁴⁶ These constraints are not inherent problems of adaptive regulation, but rather make effective adaptive regulation difficult to achieve.

Relatedly, adaptive management may offer agencies a means of increasing their discretion at the expense of democratic constraints. In its 2004 planning regulations, the U.S. Forest Service proposed a "paradigm shift in land management planning" and embraced a more adaptive approach to managing forestlands²⁴⁷—an emphasis that persisted in the 2008 and 2015 planning rules.²⁴⁸ Critics have argued that, in reality, this move toward adaptation constitutes "a means to remove standards, undermine [the National Environmental Policy Act] and [the National Forest Management Act], and maximize agency discretion."²⁴⁹

Managing public resources to enhance learning also poses normative problems. Federal land managers have an obligation to manage public resources for the benefit of the public. Producing knowledge is important and worthwhile, but such production should not become an end goal. Just as a financial manager should make investments geared toward enhancing a client's wealth, so too should governmental entities act to preserve and enhance the quality of public resources for the benefit of the public. The importance of achieving resource protection is sometimes overlooked by advocates of adaptive regulation, who occasionally act more like scientists than policy experts. For example, Kai Lee lamented Australia's decision to ban timber harvesting in the rainforests of Queensland. Prior to the ban, timber managers experimented with models for sustainable yields. "Without an experimental program of management at the ecosystem scale, . . . we can be certain that some important questions will remain unanswered."²⁵⁰ Lee is certainly correct that banning logging caused government managers to lose the opportunity to learn more about the effects of

²⁴⁵ See Ruhl & Fischman, *supra* note 23, at 426; see also Craig & Ruhl, *supra* note 11.

²⁴⁶ See, e.g., *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1029 (9th Cir. 2011).

²⁴⁷ National Forest System Land Management Planning, 70 Fed. Reg. 1023-01, 1024 (Jan. 5, 2005) (codified at 36 C.F.R. pt. 219).

²⁴⁸ See National Forest System, Land Management Planning Directives, 80 Fed. Reg. 6683-01, 6684 (Feb. 6, 2015); National Forest System Land Management Planning, 73 Fed. Reg. 21,468-01, 21,468 (Apr. 21, 2008) (codified at 36 C.F.R. pt. 219).

²⁴⁹ Martin Nie, *Whatever Happened to Ecosystem Management and Federal Lands Planning?*, in *THE LAWS OF NATURE: REFLECTIONS ON THE EVOLUTION OF ECOSYSTEM MANAGEMENT LAW & POLICY* 67, 68, 77 (Kalyani Robbins ed., 2013).

²⁵⁰ LEE, *supra* note 46, at 112.

timber harvesting. If logging can no longer occur, however, that knowledge is of questionable value from the perspective of managing public resources. Adaptive regulation, then, may threaten to substitute the goals of scientific inquiry for the goals of governance.

Finally, adaptive management may prove rudderless in at least some of its manifestations. Adaptive regulation could be used both to tailor regulation to new information and to determine the very goals of management. In other words, “knowledge gained by experiment would improve either the goals pursued or the means by which they are achieved.”²⁵¹ If the goals of governance are up for grabs in an adaptive management process, this renders the project of governance inherently unstable.²⁵² Where a policy’s meta-goal includes the modification of its first order priorities, it risks proceeding without a compass.

C. *Contingent Regulation*

Unlike durational regulation and adaptive regulation, contingent regulation incorporates mechanisms that automatically adjust the substantive content of legal rules when foreseeable events occur or new information emerges. To an extent, contingent regulation resembles static law in that it involves no ongoing process for reconsidering legal rules. Yet, contingent regulation remains responsive.

1. The Structure of Contingent Regulation

Contingent regulation resembles the type of contingency planning consistently practiced by individuals, families, and businesses. It is a branching legal framework that creates an initial legal rule, identifies foreseeable events that might undermine the efficacy of that rule, and creates a plan as to how that legal rule should change in response. In a sense, contingent regulation is static because choices are all made at the outset when a law is first created. Yet it is also dynamic because the operative legal rule changes alongside changing circumstances. To the challenge of uncertainty, contingent regulation answers: if relevant information emerges in the future, the legal rule will automatically change in a predetermined fashion.

Like durational and adaptive regulation, contingent regulation enables law to keep pace with real-world circumstances. If adaptive

²⁵¹ *Id.* at 129.

²⁵² *Cf.* Doremus, *Adaptive Management as an Information Problem*, *supra* note 11, at 1469 (identifying “the need for clear goals set exogenously to the adaptive management process”).

regulation is the regulatory analog of evolution, contingent regulation is analogous to the somewhat more obscure biological concept of “plasticity.” Plasticity refers to the ability of organisms to respond to changes in the environment based on existing genetic traits.²⁵³ For example, some caterpillars exhibit different coloration and shape depending on their food source. If the caterpillar eats oak flowers, for example, it grows to camouflage itself as an oak catkin. If it eats leaves, it grows to camouflage itself as a twig.²⁵⁴ The caterpillar has the genetic potential to assume either shape, and the environment it happens to encounter determines its form. Contingent regulation proceeds similarly. Lawmakers put in place a regulatory structure that functions as the DNA of the law. That DNA encodes built-in responses to identified contingencies.

Contingent regulation is, then, an *ex ante* approach to uncertainty. In formulating contingent regulation, lawmakers must identify and map possible circumstances that will arise after a legal rule is promulgated. For each foreseeable condition, a decision must be made as to if and how the legal rule should change in response. Naturally, it is unavoidable that a framework built on contingent regulation will envision many eventualities that will never come to pass.

2. Contingent Regulation Across Contexts

While contingent regulation has not previously been named, it has been deployed in both legislation and regulation. At times this has occurred under the moniker of adaptive management, despite the differences inherent in the two approaches.

The Fish and Wildlife Service’s handbook governing Habitat Conservation Plans (HCPs) is one of the few sources that treat contingent regulation as distinct from adaptive management.²⁵⁵ The Endangered Species Act requires an HCP for any party seeking an incidental take permit to authorize an activity that may incidentally harm a threatened or endangered species.²⁵⁶ Such harm is otherwise

²⁵³ See Cynthia Weinig et al., *Testing Adaptive Plasticity to UV: Costs and Benefits of Stem Elongation and Light-Induced Phenolics*, 58 *EVOLUTION* 2645, 2645 (2004); John L. Maron et al., *Rapid Evolution of an Invasive Plant*, 74 *ECOLOGICAL MONOGRAPHS* 261, 261–62 (2004).

²⁵⁴ See Douglas W. Whitman & Anurag A. Agrawal, *What is Phenotypic Plasticity and why is it Important?*, in *PHENOTYPIC PLASTICITY OF INSECTS: MECHANISMS AND CONSEQUENCES* 2 (Douglas W. Whitman & T.N. Ananthakrishnan eds., 2009).

²⁵⁵ See FISH & WILDLIFE SERV., U.S. DEP’T OF THE INTERIOR, *ADDENDUM TO THE HCP HANDBOOK 5* (2000) [hereinafter *USFWS, HCP ADDENDUM*], <http://www.fws.gov/midwest/endangered/permits/hcp/pdf/HCPAddendum.pdf>.

²⁵⁶ 16 U.S.C. § 1539(a)(2) (2012).

prohibited.²⁵⁷ An HCP must, “to the maximum extent practicable, minimize and mitigate the impacts” of the activity on the protected species.²⁵⁸ The handbook governing the development of HCPs requires “contingency planning” to “incorporate measures to be implemented” in the event that “circumstances that can be reasonably anticipated” occur.²⁵⁹ The handbook treats contingency planning as distinct from adaptive regulation, explaining that it “lays a foundation for contingency planning in HCPs that may or may not include adaptive management.”²⁶⁰ Elsewhere, however, the Fish and Wildlife Service has treated contingency planning as a variety of adaptive management.²⁶¹

The City of Seattle’s HCP, which covers the Cedar River watershed, is a good example of contingent regulation.²⁶² The City uses the watershed as its water supply and its activities in the watershed impact fourteen protected species, including six birds, six fish, and two mammals.²⁶³ The plan establishes extensive conservation efforts for these species and includes

a commitment to an adaptive approach with two variations: (1) contingent responses for changed circumstances related to environmental events, and a formal approach with predefined criteria and decision thresholds for specific activities where considerable uncertainty exists; and (2) a second, less formal and more flexible approach that will be used as a simple tool or mechanism for responding to new information and experience that can be used to make conservation, management, and mitigation strategies more effective.²⁶⁴

The first approach constitutes contingent regulation: it provides specific triggers and specific responses to emerging conditions. The

²⁵⁷ 16 U.S.C. § 1538(a)(1) (2012).

²⁵⁸ § 1539(a)(2)(B)(ii).

²⁵⁹ USFWS, HCP ADDENDUM, *supra* note 255, at 5–6; *see also* J.B. Ruhl, *Regulation by Adaptive Management*, *supra* note 128, at 49 (explaining that the “No Surprises rule” includes requirements to “specify the kinds of events and responses for which adjustments will be made”).

²⁶⁰ USFWS, HCP ADDENDUM, *supra* note 255, at 5.

²⁶¹ *See* Marj Nelson, *The Changing Face of HCPs*, U.S. FISH & WILDLIFE SERV., <http://www.fws.gov/endangered/what-we-do/bulletins/bulletin-summer2000.html> (last visited Sept. 16, 2015).

²⁶² *See generally* SEATTLE PUB. UTILS., CITY OF SEATTLE, FINAL CEDAR RIVER WATERSHED HABITAT CONSERVATION PLAN (2000) [hereinafter SEATTLE HCP], http://www.seattle.gov/util/EnvironmentConservation/OurWatersheds/Habitat_Conservation_Plan/AbouttheHCP/Documents/index.htm.

²⁶³ *Id.* at 3.4-3. Not all of these species are threatened or endangered. HCPs may, however, include plans for species that may be afforded protection under the ESA at a later time. *See* U.S. FISH & WILDLIFE SERV., HABITAT CONSERVATION PLANS UNDER THE ENDANGERED SPECIES ACT 1 (2011), <http://www.fws.gov/endangered/esa-library/pdf/hcp.pdf>.

²⁶⁴ SEATTLE HCP, *supra* note 262, at 4.5-3.

second approach constitutes open-ended and largely unspecified adaptive regulation.

The contingent regulation aspects of the plan further identify management responses in the event of “forest fires,” “windstorms,” “disease outbreaks and insect infestations,” “landslides,” and “drought.”²⁶⁵ These prescriptions are detailed and specific. If a forest fire “remove[s] forest cover on at least 300 acres but less than 2,000 acres in any major subbasin,” then the City will take management action, including “[m]easures to reduce erosion and sedimentation, including stabilization of slopes and soils by such steps as reseeding, reforestation, and log terracing.”²⁶⁶

BLM’s 2008 plan for managing natural gas activities in the Pinedale Anticline also incorporates contingent regulation.²⁶⁷ The plan includes a “Wildlife Monitoring and Mitigation Matrix,”²⁶⁸ which identifies species of concern and various criteria that BLM will monitor. If, for example, a “30% change in total number of active” locations for greater sage grouse mating rituals occur, then mitigation is required,²⁶⁹ including “[p]rotection of flank areas from disturbance (e.g., voluntary lease suspensions, lease buyouts, voluntary limits on area of delineation/development drilling) to assure continued habitat function of flank areas, and to provide areas for enhancement of habitat function.”²⁷⁰

Reliance on contingency, rather than adaptation, has caused consternation for some scholars. For example, J.B. Ruhl and Robert Fischman discuss contingency planning as a form of adaptive management, referring to the contingency provisions of HCPs as “‘a/m-lite,’ a watered-down version of [adaptive management] theory that resembles ad hoc contingency planning more than it does planned ‘learning while doing.’”²⁷¹ Contingent regulation is not, however, a variety of adaptive management, but rather its own approach to governance.

²⁶⁵ *Id.* at 4.5-67-76.

²⁶⁶ *Id.* at 4.5-69.

²⁶⁷ See *supra* notes 53-57 and accompanying text.

²⁶⁸ BLM ROD, *supra* note 53, at app. B-1.

²⁶⁹ BLM 2008 SEIS APPENDIX, *supra* note 18, at 10-3.

²⁷⁰ *Id.* at 10-5. “Flank areas” are on the periphery of the Pinedale Anticline and not the primary focus of gas development under BLM’s current plan. See BLM ROD, *supra* note 53, at 8.

²⁷¹ Ruhl & Fischman, *supra* note 23, at 426 (footnote omitted); see also Ruhl, *Regulation by Adaptive Management*, *supra* note 128, at 49 (discussing contingencies in HCPs). In his detailed review of the HCP program, Alejandro Camacho descriptively distinguishes between contingency planning and adaptive management while arguing that “the Services have failed to adaptively manage the regulatory process.” See Camacho, *supra* note 19, at 357. Camacho does not analyze the differences between these forms of dynamic regulation.

3. Benefits and Burdens of Contingent Regulation

Contingent regulation offers advantages unrealized by other forms of dynamic law. This Section describes those advantages in more detail than that provided for adaptive regulation and durational regulation because contingent regulation has received so little attention. Understanding contingent regulation as a unique policy approach, rather than as a failure of adaptive regulation, reveals its worth. True adaptive regulation, with its open-ended and difficult-to-cabin commitment to “learning while doing” may be a necessary but costly approach to certain problems where uncertainty permeates the regulatory context. Contingent regulation, however, provides an essential tool to allow government to implement future-oriented actions without taking on the panoply of burdens imposed by adaptive regulation.

All forms of dynamic law enable legal rules to respond to new information and all generate information that may, in turn, improve those legal rules. Contingent regulation requires additional study of regulatory problems at the outset, thereby increasing the information available to regulators before they make a decision. Such information is generated for two reasons. In creating contingent regulation, lawmakers must fully specify and study the regulatory task at hand, and they must identify with precision the uncertainties faced as well as the extent to which future circumstances can be predicted.²⁷²

Contingent regulation also creates incentives for regulated parties to share information, thereby increasing the information available to lawmakers.²⁷³ The information-forcing role of contingencies is well understood in the private party context. Parties in a contract negotiation have incentives to downplay their assessment of the likelihood of future events that will devalue the consideration they offer, but contingencies

²⁷² Generating information about the future may also have the salutary effect of improving the initial regulatory regime. For example, Lynn Blais and Wendy Wanger have argued that when making rules, agencies “would evaluate . . . the degree to which technological innovation is likely to advance in the relevant field in the future” and would incorporate such information into established standards. Blais & Wagner, *supra* note 174, at 1731 (2008). Engaging in the process of developing contingent regulation will compel such consideration. *Id.* at 1732.

²⁷³ As Lynn E. Blais and Wendy E. Wagner have explained, regulatory efforts designed to address problems that have not galvanized the public face significant obstacles because “interested parties—most likely regulated groups—will have a great deal of information at their fingertips and both the incentives and the resources to use the courts and any other mechanisms at their disposal . . . to delay . . . rulemaking or rule revision.” Blais & Wagner, *supra* note 174, at 1712. Contingent regulation does not fully correct this problem because regulated industries may be able to stave off regulatory efforts before they have begun. Where a lawmaker begins construction of a legal regime to address a problem, however, contingent regulation can facilitate information disclosure, which in turn can facilitate public engagement.

can force disclosure. Imagine the following contract negotiation between an oil company and an industrial customer for a requirements contract for a supply of oil. The oil company suggests that the price of oil will increase during the coming year and, therefore, asks for a price above current market. The industrial customer has less information about the future price of oil and bargains at a disadvantage. The customer can, however, resolve this informational asymmetry by offering to accept a price that exceeds the current market, but on the condition that if oil prices fall, the contract price will be substantially reduced. The contingency will force the oil company to disclose the information it holds. If the oil company has reasonable confidence that oil prices will rise, it will accept the bargain. If, on the other hand, the oil company has little confidence in its prediction, or possesses information that prices will fall, then it will not.

Contingent regulation acts similarly. Regulated parties generally have an incentive to conceal information about the potential harm caused by their activities. Creating contingencies can erode this incentive because the advocacy efforts of regulated parties will reveal their knowledge: they will resist rules attached to contingencies that they expect to occur and will remain indifferent to those attached to contingencies that they expect will not occur. In a hypothetical example, a zoning board considers a measure to restrict development within an area likely to be subject to flooding in the event of a one-foot rise in sea level. One board member opposes restricting development because, she explains, it will unnecessarily inhibit economic growth because sea levels are not rising. A second board member favors restricting development because of an expected rise in sea level. Contingent regulation tests the convictions of both parties by creating a regime that includes relaxed restrictions if sea levels remains constant, but creates rigid restrictions if sea levels rise. If both board members have confidence in their negotiating positions, they should accept this compromise. If one or the other does not sincerely adhere to her negotiating position, then she will resist the compromise, thereby disclosing information about her true assessment of the situation, which in turn will facilitate a more finely tuned negotiation.

Similarly, business interests that seek to avoid perceived burdensome regulations of carbon emissions may express objections in the form of denying the existence of climate change. The process of developing contingent regulation can unmask such pretextual disagreement. This will be true generally. Regulated parties often oppose regulation by contesting causation rather than by challenging the goals of environmental protection. As Kai Lee explains, “conflict over means

becomes a way of disputing goals.”²⁷⁴ Contingent regulation can peel back such dishonest opposition.

A related advantage is that where disagreements involve differing beliefs, contingent regulation facilitates compromise. That is because contingent regulation can accommodate competing predictions about the future by creating regulatory rules to govern each possibility.

Contingent regulation also more easily accommodates existing norms of administrative law than adaptive regulation does. Ruhl and Fischman have explored the tension between administrative law and adaptive regulation, finding that the United States government has lost more than half of the cases in which plaintiffs challenged decisions to implement adaptive regulation.²⁷⁵ Administrative law requires federal agencies to fully explain their decisions at the outset,²⁷⁶ favoring a front-loaded decision process that culminates in a single record of decision that allows for judicial review. Environmental review obligations imposed by the National Environmental Policy Act (NEPA) further complicate adaptive regulation because “a promise to adaptively manage problems may not fulfill the NEPA requirement that agencies take a ‘hard look’ at the impacts of their action.”²⁷⁷ Adaptive regulation fits with these requirements poorly because it relies on evolutionary decisions that do not manifest at a single moment. Contingent regulation, on the other hand, fits comfortably within the existing framework. Contingent regulation requires lawmakers to address foreseeable circumstances and to identify specific government responses. Agencies will have to adequately justify these substantive decisions, and fully analyze their environmental consequences. That process lends itself to existing modes of judicial review. This is not a theoretical advantage of contingent regulation, but rather a practical advantage that suggests that contingent regulation may be more successful than adaptive regulation in light of the existing architecture of administrative law.

Contingent regulation also minimizes delays in responding to new information. Government decision-making takes time and consumes resources. Where changing conditions require new legal rules, all other forms of governance require lawmakers to intervene. Because lawmaking processes inherently favor the status quo, parties that benefit

²⁷⁴ LEE, *supra* note 46, at 107.

²⁷⁵ See Ruhl & Fischman, *supra* note 23, at 445.

²⁷⁶ See, e.g., *Citizens to Pres. Overton Park, Inc. v. Volpe*, 401 U.S. 402, 420 (1971), *abrogated on other grounds by Califano v. Sanders*, 430 U.S. 99 (1977).

²⁷⁷ Ruhl & Fischman, *supra* note 23, at 460; see also *High Sierra Hikers Ass'n v. Weingardt*, 521 F. Supp. 2d 1065 (N.D. Cal. 2007) (vacating an agency decision to liberalize a campfire policy that included an adaptive management plan to address potential problems).

from the existing regime will have incentives to delay or derail reform. Contingent regulation allows for a prompt and nimble response to changing circumstances because the new legal rule has already been selected. Modification becomes a ministerial act, rather than requiring renewed deliberation.

Finally, contingent regulation may enable lawmakers to avoid public choice pitfalls. Public choice theory posits that a relatively small number of parties affected strongly by government action will have greater influence on government decision-making than a larger group of parties that experience smaller affects.²⁷⁸ While scholars may overestimate the effects of such interest-group politics,²⁷⁹ it has been well documented in at least some instances.²⁸⁰

Processes to adopt static law also may be particularly susceptible to public choice problems because those parties subject to government restrictions seeking to provide diffuse public goods have significant incentive to lobby for loose standards. When the government adopts regulations to govern conduct, private interests will often be easy to ascertain. And because static law imposes certain and precise limitations, these rules will be highly salient to affected parties. Duration and adaptive regulation may reduce public choice at the time of the initial decision because possible future changes in legal rules will be unclear. However, later reevaluations will likely crystallize the effect that new management regimes will have. Because contingent regulation establishes regulatory rules that will come into effect in the future, but only if certain events transpire, these decisions should be less salient to private interests, thereby reducing incentives for lobbying. Indeed, it may be unpredictable when initial rules are established which parties will be most affected by future restrictions because the timing of those restrictions is unclear. Moreover, if different contingencies benefit different parties, then everyone may support a contingent regulation approach when first promulgated in hopes that the contingency that benefits them will go into effect.

Contingent regulation is not a panacea. Unlike durational and adaptive regulations, contingent regulation frontloads governmental

²⁷⁸ Public choice theory posits “that a small number of people or corporations with similar interests and a relatively large stake in regulatory outcomes will enjoy comparative success organizing into effective lobbying groups.” Brett McDonnell & Daniel Schwarcz, *Regulatory Contrarians*, 89 N.C. L. REV. 1629, 1643 (2011).

²⁷⁹ Public choice theory does not exhaustively explain decisions of administrative agencies. Dave Owen has argued, for example, that in addition to responding to political constituencies, “meaningful regulatory effort comes from within the agencies.” See Dave Owen, *Critical Habitat and the Challenge of Regulating Small Harms*, 64 FLA. L. REV. 141, 188 (2012).

²⁸⁰ See, e.g., D. Daniel Sokol, *Explaining the Importance of Public Choice for Law*, 109 MICH. L. REV. 1029, 1034–37 (2011) (book review).

costs. It forces lawmakers to consider foreseeable future circumstances and decide how law should respond, even if those circumstances may not manifest. Forecasting potential future circumstance may be expensive both in terms of money and time, particularly if foreseen circumstances will require nuanced responses.

The efficacy of contingent regulation will also be cabined by the ability of lawmakers to predict and plan. Moreover, contingent regulation cannot take account of unforeseen future events. Because it may require substantial government investment to develop a regulatory superstructure capable of responding to foreseen circumstances, that regime may prove particularly sticky should unforeseen circumstances occur. Such stickiness may result from the “sunk cost” fallacy, a cognitive error that causes people to increasingly resist changing course as historic costs increase.²⁸¹ In other words, if contingent regulation fails to identify future circumstances, amendment or repeal may be particularly difficult to accomplish.

Contingent regulation is also less flexible than either durational regulation or adaptive regulation. As Bradley Karkkainen has argued in his critique of contingency planning, “it does not have the open texture, flexibility, unboundedness, and openness to surprise and unanticipated changes contemplated by advocates of adaptive management.”²⁸² Contingent regulation creates a specific set of regulatory responses to a specific set of conditions. It cannot respond to conditions other than those envisioned at the outset, and it will not optimally respond if new information reveals problems with pre-selected regulatory responses.

These are substantial shortcomings, although each model of governance has its weakness. The next Part will suggest criteria for selecting models of governance to address specific problems.

IV. GOVERNANCE TOOL SELECTION

As Parts II and III have explained, lawmakers have multiple strategies at their disposal to address uncertainty when enacting law. Consider again the state highway department concerned about fatalities on a particular stretch of highway, and suppose that the highway has an existing speed limit of sixty-five miles per hour. Imagine the department has set a goal of reducing accidents by twenty-five percent. The

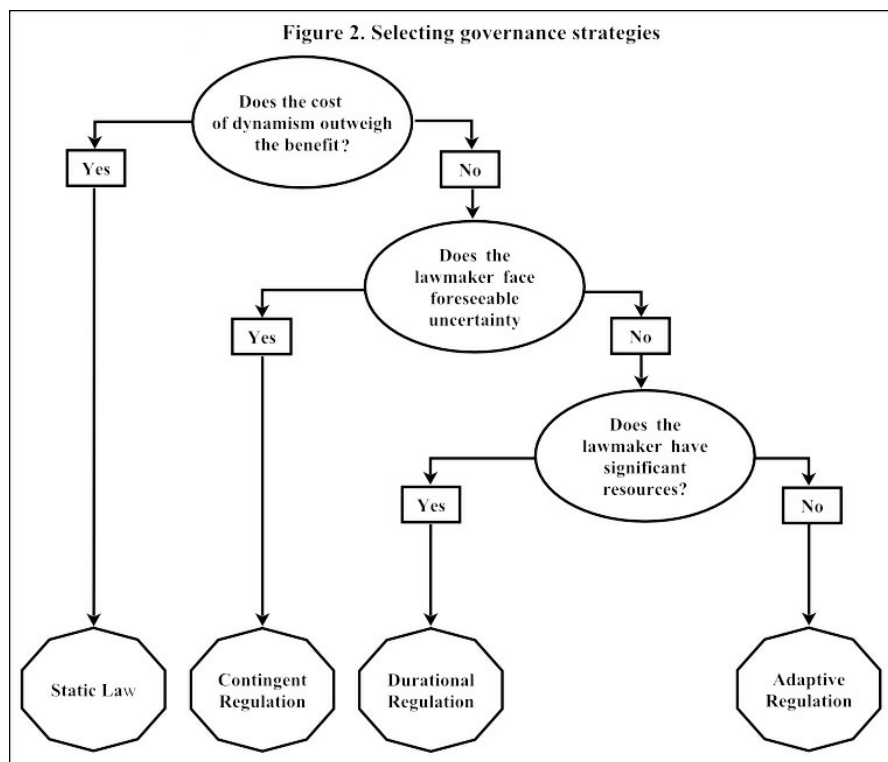
²⁸¹ See Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1482–83 (1998); see also Kevin J. Lynch, *The Lock-In Effect of Preliminary Injunctions*, 66 FLA. L. REV. 779, 784–85 (2014) (arguing that sunk costs may distort judges’ decisions on the merits following the issuance of a preliminary injunction).

²⁸² Karkkainen, *supra* note 22, at 72.

department could take four approaches. First, the department could rely on static law. It would look at available information, which, say, indicates that a fifty-five miles per hour speed limit will achieve the desired results, and then impose that speed limit. Second, the department could rely on durational regulation by imposing a fifty-five miles per hour speed limit set to automatically expire after two years. Third, the department could use adaptive regulation. It could set the speed limit at fifty-five miles per hour and put in place a process by which the driving conditions on the road will be revisited if new information emerges. If and when such information emerges, the department would consider that information and make any necessary adjustments. Perhaps monitoring the road indicates that a particularly sharp curve contributes to accidents, and in response to that information, the road could be realigned to eliminate the danger. Fourth, the department could rely on contingent regulation. The department could set the speed limit at fifty-five miles per hour and specify that if, after two years, safety has improved by less than the twenty-five percent goal, the speed limit will automatically reduce by five miles per hour. If, on the other hand, safety improves by more than twenty-five percent, the speed limit could automatically rise by five miles per hour.

How should a lawmaker select an approach in a specific circumstance? When is stability more important than dynamism? And if dynamism better addresses a particular problem or a particular set of circumstances, what form should that dynamism take?

This Part turns to those questions. As it reveals, optimal tool selection takes account of a number of factors, including the costs associated with dynamic law, the variety of uncertainty involved, and the resources a lawmaker possesses to revisit past decisions. As Figure 2 suggests, particular models of governance will often be suited to a particular constellation of those variables. Where dynamism imposes a high cost relative to the benefits likely to flow from more responsive governance, static law should be chosen. Where the benefits exceed costs, a dynamic solution is more appropriate. In such circumstances, contingent regulation is most appropriate where the lawmaker has reasonable confidence that it can predict likely future circumstances. If not, durational regulation is appropriate where the lawmaker is resource rich. If the lawmaker faces the likelihood of unforeseen future circumstances and is resource poor, it should select adaptive regulation. These variables—the benefits and costs of dynamism, the type of uncertainty involved, and the resource richness of the lawmaker—provide a diagnostic framework to aid lawmakers in deciding what form of governance is best suited to a particular problem. Each variable is discussed in greater detail in the remainder of this Part.



A. *Costs and Benefits of Dynamism*

The first variable lawmakers need to consider when selecting a tool to govern in the face of uncertainty is the expected costs and benefits associated with making a legal regime respond dynamically to new information. Where the cost of dynamism outweighs likely benefits, static law is the most appropriate tool. Where dynamism will result in net social benefit, a form of dynamic law is appropriate.

Understanding the benefits side of this equation involves assessing the goals of lawmaking and the severity of errors. Dynamic law provides few benefits for certain lawmaking goals, particularly where a legal rule is designed to instantiate a particular moral viewpoint, such as the Convention Against Torture's prohibition on torture,²⁸³ or a punishment practice pursuing retributive ends. Such legal rules are communicative acts and do not primarily aim at attaining particular results. Dynamic law has little to offer. When, however, a legal regime

²⁸³ See *supra* notes 95–99 and accompanying text.

aims at real-world effects, such as protecting public health, deterring illegal entry into the country, or ensuring the survival of an endangered species, creating a legal regime that can account for new information yields benefits.

Such benefits may, however, be slight. Sometimes getting a legal regime exactly right matters a great deal, other times it matters less. When states adopted the right side driving rule, uncertainty existed as to the consequences of that decision, but the likely severity of those consequences was low. The right side driving rule may slightly increase accident rates, but that risk is likely outweighed by the value of a stable legal regime.²⁸⁴ Other times, tailoring a legal rule to new information is likely to generate significantly greater benefits. If information reveals that SEC regulation of derivatives markets is allowing high volatility due to uncertainty about the risk adhering to certain financial instruments, and that this dynamic could lead to another recession, adjustments of that regime will create important dividends.

The costs of dynamism arise from two sources: the cost to government actors in developing and implementing law, and the costs to the regulated community of responding to law. Creating dynamic regulation is an inherently complex task that requires lawmakers to consider more than the immediate government action at hand. Putting in place mechanisms to address changing circumstances may require substantial investment at the front end as lawmakers design policy. Dynamic law may require more attention, involve more expertise, and take longer to develop. This burdens lawmakers and also delays regulatory intervention, as well as the social benefits that such intervention produces. This means the costs of developing dynamic law will virtually always exceed static law—however, the severity of that discrepancy may differ dramatically from context to context. Up-front costs also vary among varieties of dynamic law. Contingent regulation will often consume the most resources because it requires lawmakers to map foreseeable future circumstances and develop individual responses for each of the circumstances envisioned. Adaptive regulation and durational regulation do not require comprehensive prediction of future circumstances; rather, they require lawmakers to develop procedures and incentives to facilitate later reconsideration. As such, they will typically require fewer up-front resources than contingent regulation would, but greater up-front resources than static law.

Dynamic law also imposes ongoing costs on government.²⁸⁵ These resources will be consumed by efforts to monitor the efficacy of the

²⁸⁴ See *supra* note 118 and accompanying text.

²⁸⁵ By delayed costs, I mean costs that arise after the initial decision-making process.

initial legal rule. Modification under all three models of dynamic law will also consume resources. From this perspective, contingent regulation fairs better than adaptive regulation and durational regulation. Contingent regulation does not require government actors to develop new regulatory responses to emerging information. Rather, the legal regime itself has a blueprint identifying how legal rules will change. Nonetheless, contingent regulation requires government resources to formally trigger a contingency and notify regulated entities of new legal rules. Durational regulation and adaptive regulation will consume greater costs over time because they require lawmakers to reconsider the legal regime in light of new information. The process of reconsidering legal rules will also provide an opportunity for interested parties to engage in rent-seeking behavior to pursue modification of legal rules that are beneficial to them.²⁸⁶

The ongoing costs of durational and adaptive regulation may be particularly high when these strategies are deployed by administrative agencies. NEPA and its state counterparts require analysis of foreseeable environmental consequences of agency decisions.²⁸⁷ Where agencies create internal mechanisms by which decisions will adjust, they must assess the consequences of each contingency incorporated into the legal framework alongside the consequences of the initial decision. Courts may also view adaptive regulation with skepticism, increasing the cost of that strategy.²⁸⁸

Dynamic law, particularly adaptive and durational regulations, may also impose significant political costs. Virtually every modification of existing rules will result in a response from some political constituency. That response may constrain the willingness of government actors to engage in other sensitive decision-making processes, and it may result in a decision not to modify the legal rule

²⁸⁶ See, e.g., Richard L. Hasen, *Lobbying, Rent-Seeking, and the Constitution*, 64 STAN. L. REV. 191, 196 (2012) (explaining the effects of using lobbying “to skew public policy in particular directions”). Congress’s inability to modify statutes, even when there is broad support for reform, exemplifies this pattern. The prospect of congressional action galvanizes interest groups to demand additional modifications in order to benefit their own interests. The Endangered Species Act may have benefitted from this phenomenon. During the 1990s, there was reasonably broad support for some modification of the Act to ameliorate some of its more economically costly effects. But Congress could not agree on a particular and limited set of adjustments, and as a result, the Act remained unchanged. See RICHARD J. LAZARUS, *THE MAKING OF ENVIRONMENTAL LAW* 125–50 (2004).

²⁸⁷ See, e.g., 40 C.F.R. § 1508.8(b) (2015) (defining the word “effects” to include effects that are “reasonably foreseeable” for the purposes of NEPA); CAL. CODE REGS. tit. 14, § 15064(d) (requiring consideration of “reasonably foreseeable indirect physical changes in the environment which may be caused by the project” under the California Environmental Quality Act).

²⁸⁸ See Ruhl & Fischman, *supra* note 23, at 445.

despite new information justifying such modification. Revision of existing rules may also be perceived to shift blame. Where a legal rule is malfunctioning, current political leaders can lay responsibility at the feet of those leaders who developed the current rule. Once a revision is made, any further malfunction will be charged to current leadership.

Dynamic law will also impose costs on regulated parties and other affected constituencies. For example, a change in the SEC rules governing the election of corporate boards may require companies subject to those rules to redesign their election procedures. A change in the emissions standards for nitrogen oxide may require companies to retrofit existing facilities or change production techniques.

Uncertainty about legal rules may also chill investment. Where law is stable and certain, private parties can rely on it to order their affairs.²⁸⁹ Dynamic law injects uncertainty into the legal environment, and may cause private parties to refrain from efficient investment, even if that investment would generate a social surplus. For example, an energy company may decide to forgo development of natural gas resources if mitigation measures designed to protect the greater sage grouse remain in flux and susceptible to significant change.²⁹⁰ This reluctance is likely to increase proportionally to the unpredictability of the legal regime. For that reason, contingent regulation may chill investment less than durational or adaptive regulation. Contingent regulation provides notice about future legal rules, and regulated parties may be able to quantify the costs of those future legal rules—and their probability of being triggered—and invest accordingly. Durational or adaptive regulation provide less notice of what future rules may be, thereby increasing the planning challenge for regulated parties.

Finally, dynamic law will impose transitional costs. Even if the ongoing cost of complying with a legal rule may be the same as complying with a new rule, switching between the two may require regulated parties to retrain employees, reformulate production processes, or redesign products. Moreover, the individuals regulated by the new rule will incur cognitive costs as they reorient their behavior to conform to new requirements.

B. *Varieties of Uncertainty*

The second variable lawmakers should consider is the type of uncertainty that they face. Too often, uncertainty is viewed as

²⁸⁹ See *supra* notes 111–15 and accompanying text.

²⁹⁰ See *supra* note 14 and accompanying text.

monolithic. A more nuanced conception of uncertainty reveals that the type of uncertainty involved in a decision has consequences for the optimal type of law.²⁹¹

Consider the stylized example of the highway department seeking to reduce accidents by modifying the speed limit. If the department has high confidence in the prediction that a fifty-five miles per hour speed limit will achieve the desired reduction in traffic accidents—in other words, uncertainty is low—static law may be the best approach, because the cost of promulgating static law is typically the lowest, and the benefits of dynamism would also be low. If, instead, the department has high confidence that adjusting the speed limit is the best approach to increasing safety—but does not know precisely what speed limit is necessary to achieve the desired reduction in accidents—it faces a circumstance where there is uncertainty, but that uncertainty is cabined to the degree of efficacy of the regulatory tool being deployed. Such circumstances favor contingent regulation. Finally, if the department has little confidence that adjusting the speed limit will improve safety, and is unsure what other steps it should consider, it faces general uncertainty about causation and the effectiveness of intervention. That situation favors either an adaptive or durational approach, enabling the department to consider other regulatory interventions such as enhanced enforcement or increased penalties as new information emerges.

The inability to perfectly predict future conditions relevant to a lawmaking enterprise—as with the highway department considering a new speed limit—comes in at least three general varieties: risk, foreseeable uncertainty, and unforeseeable uncertainty.

Risk involves circumstances where an identifiable set of future conditions is likely to occur and the likelihood of each condition can be ascertained.²⁹² For example, when BLM establishes a buffer zone around sage grouse mating habitat, risk would be involved if BLM could determine that a half-mile buffer has a twenty-five percent chance of completely protecting that habitat, a fifty percent chance of slightly

²⁹¹ This section discusses the degree of uncertainty that may exist. Varieties of uncertainty can be differentiated across other metrics too, although those metrics have less relevance to selecting a governance strategy. For example, some sources of uncertainty may be endogenous to a legal regime and other sources exogenous. In other words, sometimes information does not exist about the efficacy of a legal rule, or the harm caused by regulated activity, but uncertainty may also exist about the context of regulation that is not linked to the regulatory effort itself. For example, in regulating oil and gas development in order to protect the greater sage grouse, BLM may be uncertain about the extent to which climate change is harming the species. Climate change is not directly caused by development activities, nor is it sensitive to the portfolio of management decisions that BLM has at its disposal. It is, therefore, exogenous to the decision that is facing the agency, despite constituting an important factor for consideration.

²⁹² See POSNER, *supra* note 69, at 290.

reducing the quality of the habitat, and a twenty-five percent chance of destroying the quality of the habitat.

Uncertainty, and not risk, is involved if a reasonable estimate cannot be derived of both possible future circumstances and the likelihood that they will come to pass. Uncertainty itself can be further subdivided. Some uncertainty is foreseeable and other uncertainty is not. Donald Rumsfeld famously addressed this dimension of uncertainty when he distinguished between “known unknowns,” and “unknown unknowns.”²⁹³ Known unknowns are foreseeable. That is true even if no basis exists for estimating the likelihood that any one of a discrete set of identifiable future conditions will occur.

Consider again BLM’s regulation of natural gas development and the effects of such development on greater sage grouse populations. Scientists may be able to foresee that development will affect the sage grouse, and based on observation or experimentation, identify possible aspects of development activities that cause harm. Sage grouse may abandon breeding habitat because humans visit nearby oil and gas infrastructure, because of the noise produced by such infrastructure, or because certain other species are attracted to such infrastructure. The magnitude of the effect of any of these vectors of disturbance or the sensitivity of that vector to intervention may be unknown, but a lawmaker would face foreseeable uncertainty in regulating, so long as these are the possible causes of greater sage grouse decline and mechanisms could be identified to address these causes, at least to some extent. If, however, oil and gas development affects the greater sage grouse through an entirely unrecognized pathway, it would constitute unforeseeable uncertainty. For example, natural gas development may actually affect sage grouse by increasing the frequency of wild fires, but no one recognized that issue at the time a management regime was created. Similarly, the emergence of a new technology that radically reduces the effect that drilling activities have on sage grouse may be unforeseeable.²⁹⁴

The foreseeability of uncertainty may depend upon whether uncertainty pertains to chains of causation or the magnitude of effects. Understanding the relationship between the location of an oil and gas well and reproductive success of the sage grouse involves two inquiries: does proximity matter, and if so, how much does it matter. The first is a question about causal connection, the second a question about

²⁹³ Donald H. Rumsfeld, Sec’y of Def., U.S. Dep’t of Def., DoD News Briefing—Secretary Rumsfeld and Gen. Myers (Feb. 12, 2002), <http://archive.defense.gov/Transcripts/Transcript.aspx?TranscriptID=2636>.

²⁹⁴ For a discussion of the incorporation of new technology into pollution control standards, see Blais & Wagner, *supra* note 174.

magnitude. Uncertainty about the magnitude of effects generally creates foreseeable uncertainty, whereas uncertainty about causation is more likely to create unforeseeable uncertainty.²⁹⁵ Contrast a situation where land managers understand too little about a natural system to identify likely causes of disturbance and one where land managers can identify five causes of disturbance but do not know the significance of any one cause. In the former circumstance, the managers face unforeseeable uncertainty; in the latter, they face foreseeable uncertainty.

To the extent uncertainty is foreseeable—meaning that a potential range of future circumstances can be identified—lawmakers can identify substantive regulatory responses to address those possibilities. This will be particularly efficacious where regulatory responses are relatively simple. For example, where lawmakers are unsure about the future frequency of an activity subject to regulation, and therefore cannot identify the number of staff needed to effectively administer a program, a rule could be created that automatically increases staffing alongside an increasing prevalence of the activity.²⁹⁶ In other words, contingent regulation can effectively be deployed. On the other hand, if uncertainty is unforeseeable, lawmakers can only create mechanisms for modifying law as new information emerges. In other words, unforeseeable uncertainty requires either durational or adaptive regulation.

C. *Lawmaker Resources*

The third variable affecting tool selection is the amount of resources available to a lawmaker. Lawmakers face dramatically different obligations and have dramatically different resources with which to carry out those obligations. Some lawmaking bodies have jurisdiction over only a few decisions; others must consider a whole host of competing priorities.²⁹⁷ The Federal Open Market Committee, for example, primarily wields but a single policy instrument: establishing target interest rates and authorizing the purchase and sale of securities to achieve those interest rates.²⁹⁸ Legislative bodies of general jurisdiction, on the other hand, face innumerable demands on their attention.²⁹⁹

²⁹⁵ Uncertainty about the future prevalence of a regulated activity generally involves questions of magnitude, not of causation. See Wiseman, *supra* note 28, at 237–39.

²⁹⁶ See *id.* at 247.

²⁹⁷ See, e.g., Pidot, *Deconstructing Disaster*, *supra* note 33, at 253–54.

²⁹⁸ See Mark F. Bernstein, Note, *The Federal Open Market Committee and the Sharing of Governmental Power with Private Citizens*, 75 VA. L. REV. 111, 112–15, 114 n.13 (1989).

²⁹⁹ See Bradley C. Karkkainen, *The Police Power Revisited: Phantom Incorporation and the Roots of the Takings “Muddle”*, 90 MINN. L. REV. 826, 839 (2006) (“[T]he police power [is] the

An assessment of the resources possessed by a lawmaker requires consideration of two measures. First, it must take into account the volume of issues requiring the lawmaker's attention. Identifying the range of issues vying for position on an agenda will be defined, at least in part, by the scope of a lawmaker's legal authority. Resource constraints inevitably require lawmakers to prioritize certain issues at the expense of others, and many will be entirely neglected.³⁰⁰ The more limited a lawmaker's resources, the less desirable dynamic law is, particularly varieties that require substantial discretionary intervention by lawmakers, such as durational regulation.

Second, an assessment of resources must take into account the variable capacities of lawmakers to make decisions. Some have the resources to make only a few decisions, while others can make a larger number. Governance capacity may turn on a number of factors, including the nature of the responsibilities of that body's members, the degree of expertise the body possesses, and the complement of staff available to assist in formulation of policy. Contrast, for example, the Board of Governors of the Federal Reserve with Wyoming's legislature. The Board of Governors oversees a narrow, albeit extremely complex, set of issue—monetary policy and banking regulation—and it has only a handful of policy interventions at its disposal.³⁰¹ The Wyoming legislature potentially has before it the full panoply of issues arising under a state's police power.³⁰² The Board of Governors is made up of leaders in the financial field with a wealth of expertise.³⁰³ The legislature prides itself in being made up of every-day citizens, none of whom will have expertise in every issue.³⁰⁴ The Board of Governors has a staff of more than 2,650.³⁰⁵ Wyoming legislators lack even a single dedicated staff person, and the legislature as a whole is served by a small non-

states' reserved power to regulate to protect the public health, safety, morals, and general welfare.”).

³⁰⁰ See Hirsch, *supra* note 76, at 1343–44. Conflicting demands on attention causes what is referred to as “task interference,” whereby the attention paid to any particular task is a function of the attention paid to other competing tasks. *Id.* at 1342–52.

³⁰¹ See BD. OF GOVERNORS OF THE FED. RESERVE SYS., THE FEDERAL RESERVE SYSTEM: PURPOSES AND FUNCTIONS 4–6 (9th ed. 2005), http://www.federalreserve.gov/pf/pdf/pf_complete.pdf.

³⁰² See WYO. CONST. art. 3, § 1 (“The legislative power shall be vested in a senate and house of representatives, which shall be designated ‘the legislature of the State of Wyoming.’”).

³⁰³ See, e.g., Board of Governors of the Federal Reserve System, Janet Y. Yellen, <http://www.federalreserve.gov/aboutthefed/bios/board/yellen.htm> (last updated Feb. 3, 2014).

³⁰⁴ See *Citizen's Guide to the Wyoming Legislature*, WYO. ST. LEGIS., <http://legisweb.state.wy.us/leginfo/guide98.htm> (last updated 2002) (“Wyoming remains one of the few states having a true part-time citizen legislature.”).

³⁰⁵ See BD. OF GOVERNORS OF THE FED. RESERVE SYS., FED. RESERVE, 100TH ANNUAL REPORT 396 (2013).

partisan office with less than fifty full-time employees.³⁰⁶ The sixty members of the legislature serve only part time and the legislature itself convenes for an average of approximately one month a year.³⁰⁷ The members of the Board of Governors serve in their position full time.³⁰⁸

Lawmakers, like individuals, also experience cognitive obstacles when facing numerous competing demands on their attention. Recognition of these obstacles flows from the concept of bounded rationality, which explains that the human brain has limited resources, and thus decision-making is naturally limited.³⁰⁹ Bounded rationality has spawned the entire literature of behavioral economics, and the insights from this field are important when considering governance in the face of uncertainty, because they underscore the restraints imposed by the lawmakers' limited attention. Making law requires time, mental energy, and attention; when this is in short supply, a legal regime requiring constant tending will fail. As Adam Hirsch has succinctly explained: "Governors are no less constrained in their mental resources than are the governed."³¹⁰

The relative resource endowment of a lawmaker has significant implications for governance selection. The more well-endowed with resources the lawmaker, the more appropriate will be durational regulation, which allows for greater discretion on the part of lawmakers about if and when to revisit legal rules. Adaptive regulation, at least when well defined, creates a mechanism to automatically trigger reconsideration. Both strategies require a prolonged investment of resources by the lawmaker, but durational regulation will often require the greater investment. Therefore, where unforeseen uncertainty exists, a lawmaker with fewer resources would do well to rely on adaptive regulation.

CONCLUSION

Lawmakers must develop legal regimes to address problems even when significant uncertainty exists about the nature of those problems

³⁰⁶ *Legislative Service Office*, WYO. ST. LEGIS., <http://legisweb.state.wy.us/LSOWeb/LegislativeServiceOffice.aspx> (last visited Sept. 16, 2015).

³⁰⁷ *Citizen's Guide to the Wyoming Legislature*, WYO. ST. LEGIS., <http://legisweb.state.wy.us/leginfo/guide98.htm#citizen> (last updated 2002).

³⁰⁸ 12 U.S.C. § 241 (2012); *Who Are the Members of the Federal Reserve Board, and How Are They Selected?*, FED. RES., http://www.federalreserve.gov/faqs/about_12591.htm (last updated July 22, 2015).

³⁰⁹ See, e.g., HERBERT A. SIMON, *REASON IN HUMAN AFFAIRS* (1983); Hirsch, *supra* note 76, at 1331.

³¹⁰ Hirsch, *supra* note 76, at 1333.

and the efficacy of legal responses. In doing so, lawmakers should be realistic about the legal, political, and informational obstacles they face, and design legal frameworks calibrated to effectively account for new information in practice, rather than just in theory. This Article has examined four types of mechanisms through which lawmakers can act. Each has advantages and each will be best suited to certain problems in particular contexts.

The four strategies are separate and distinct, but in practice the boundaries separating one from another may blur. Sometimes a legal mechanism may plausibly be characterized as more than one type of regulation, and sometimes a legal regime will incorporate multiple mechanisms. Indeed, combining tools may often achieve the best outcome because most contexts involve multiple varieties of uncertainty. Moreover, static law may be coupled with dynamic law to obtain the benefits of each. For instance, a lawmaking body like Congress may enact a legal framework providing broad static goals that is separate and distinct from implementation of those goals, which may be carried out by a subsidiary government entity, like a federal agency, through dynamic law.³¹¹ Aspects of the Endangered Species Act function in just this fashion. Section 7 entirely prohibits federal agencies from undertaking activities likely to jeopardize endangered species—a static legal rule.³¹² The Fish and Wildlife Service operationalizes that broad command and, in doing so, often relies on adaptive regulation.³¹³

At other times, a single lawmaker may deploy multiple legal tools to achieve a desired result. In BLM's 2008 management plan for oil and gas development near Pinedale, Wyoming, the agency attempted to address potential impacts to the sage grouse by: (1) identifying specific triggering events to automatically cause identified management responses; (2) providing a means by which the agency could modify its mitigation plans as new information became available; and (3) establishing an annual meeting between BLM and regulated parties to discuss mitigation efforts.³¹⁴ In other words, the plan attempts to address the uncertainty attendant to developing oil and gas resources in sage grouse habitat through adaptive, durational, and contingent regulations.

³¹¹ Elements of the Clean Air Act provide a good example of this approach. As Ann Carlson has explained, the Clean Air Act has proven “surprisingly adaptable, durable and innovative” due, in part, to Congress’s use of broad statutory language to delegate authority to EPA. Ann Carlson, Lecture, *An Ode to the Clean Air Act*, 30 J. LAND USE & ENVTL. LAW 119, 120 (2014).

³¹² Endangered Species Act of 1973, Pub. L. No. 93-205, § 7, 87 Stat. 884 (1973) (codified as amended at 16 U.S.C. § 1536(a)(2) (2012)).

³¹³ See Joseph M. Feller, *Collaborative Management of Glen Canyon Dam: The Elevation of Social Engineering Over Law*, 8 NEV. L.J. 896, 897 (2008).

³¹⁴ See generally BLM 2008 SEIS APPENDIX, *supra* note 18, at 10-2 to -5.

This Article provides a theoretical and analytic framework to understand, assess, and choose among legal mechanisms that account for the uncertainty that confronts lawmakers. Each approach to governance has distinctive features, and distinguishing among them provides analytical clarity. Such clarity yields immediate practical benefits by enabling lawmakers to better structure governance.