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Sarah E. Light

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PRECAUTIONARY FEDERALISM AND THE SHARING ECONOMY

*Sarah E. Light**

ABSTRACT

The rise of the sharing economy exposes cracks in legislative and regulatory regimes designed with a different vision of the economy in mind. To date, scholars and policymakers have focused primarily on whether and how the government should regulate the sharing economy—that is, on what form, if any, regulation should take. This Article focuses on a logically antecedent question—who should decide. Using the potentially significant, yet uncertain, environmental impacts of Uber and Lyft as a case study, this Article argues that regulatory authority should be allocated according to the principle of precautionary federalism. Just as the precautionary principle tells us that regulation can proceed in the face of uncertainty about significant environmental, health, or safety risks, precautionary federalism embodies a default presumption in favor of multiple regulatory voices, and against broad exercises of preemption under such conditions. The presumption must be weighed against values favoring uniformity, taking into account trade-offs across different kinds of risks. And precautionary federalism is time-bound—it acknowledges that greater certainty about impacts may warrant a shift from one allocation of authority to another. This precautionary approach can serve an information-forcing function about the significance of uncertain impacts, and offers the best way to achieve the kind of rules called for by the precautionary principle.

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INTRODUCTION

The rise of the “sharing economy” challenges many of our previous assumptions about the law.¹ In areas as diverse as employment, insurance, privacy, and civil rights law, new firms like Uber and Lyft are rewriting traditional economic relationships both within and outside the firm.² These new business models do not easily fit into legislative, regulatory, or doctrinal schemes designed with a different vision of the economy in mind.³ Scholars and policymakers are grappling with whether and how to govern these new firms.⁴ Some advocate a free market, contending that regulating Uber/Lyft will stymie innovation.⁵ Others favor regulation, contending that failure to regulate will place Uber/Lyft at a competitive advantage over existing firms.⁶ Still

¹ Recognizing that there is some debate over what activities fall within the “sharing economy,” for purposes of this Article, I adopt an inclusive definition of the term as “[a]n economic system in which assets or services are shared between private individuals, either for free or for a fee, typically by means of the Internet.” *Sharing Economy*, OXFORD ENGLISH DICTIONARY (3d ed. 2015).

² Uber/Lyft have been categorized in various jurisdictions as “Transportation Network Companies” or TNCs. *See infra* Part III.B. I refer to this type of shared transportation as “Uber/Lyft,” rather than TNCs to avoid acronyms not typically used in public discourse regarding these platforms. This is not intended to imply any connection or joint venture between these firms.

³ Old statutes must confront not only new ecological problems like climate change, *see* Jody Freeman & David B. Spence, *Old Statutes, New Problems*, 163 U. PA. L. REV. 1, 2–3 (2014), but also innovative business models. As Ronald Coase recognized, entrepreneurs have many choices about how best to organize their productive activity, with options ranging from hierarchical firms that own assets and hire employees, all the way to the less integrated, more market-based business models these platforms have adopted, in which the firms “rent” rather than own assets like vehicles from their driver-partners, and contend that their driver-partners are independent contractors, rather than employees. R.H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386, 387 (1937) (noting that entrepreneurs seek to minimize their transaction costs, including regulatory costs, in choosing among forms of business organization); Oliver E. Williamson, *Markets and Hierarchies: Some Elementary Considerations*, 63 *AM. ECON. REV.* 316, 317 (1973) (arguing that entrepreneurs are likely to organize more hierarchically within firms when transaction costs make using the market more costly). One scholar has argued that *voluntary* peer production of goods and services constitutes a new, third form of economic organization separate and apart from firms and markets. Yochai Benkler, *Coase’s Penguin, or, Linux and the Nature of the Firm*, 112 *YALE L.J.* 369 (2002); Yochai Benkler, *Sharing Nicely*, 114 *YALE L.J.* 273 (2004).

⁴ *See, e.g.*, Orly Lobel, *The Law of the Platform*, 101 *MINN. L. REV.* 87 (2016); Sofia Ranchordas, *Innovation Experimentalism in the Age of the Sharing Economy*, 19 *LEWIS & CLARK L. REV.* 871 (2015); Brishen Rogers, *The Social Costs of Uber*, 82 *U. CHI. L. REV. DIALOGUE* 85 (2015); Sarah Schindler, *Regulating the Underground: Secret Supper Clubs, Pop-Up Restaurants, and the Role of Law*, 82 *U. CHI. L. REV. DIALOGUE* 16 (2015).

⁵ Richard A. Epstein, *The Political Economy of Crowdsourcing: Markets for Labor, Rewards, and Securities*, 82 *U. CHI. L. REV. DIALOGUE* 35, 36 (2015) (arguing that burdens of regulation will outweigh the benefits); Arun Sundararajan, *Why the Government Doesn’t Need to Regulate the Sharing Economy*, *WIRED* (Oct. 22, 2012, 1:45 PM), <http://www.wired.com/2012/10/from-airbnb-to-coursera-why-the-government-shouldnt-regulate-the-sharing-economy/>.

⁶ Freeman Klopott, *De Blasio Scraps Plan to Curb Uber’s New York City Growth After Backlash*, *BLOOMBERG* (July 22, 2015, 5:50 PM), <http://www.bloomberg.com/politics/articles/2015-07-22/de-blasio->

others ask what form such rules should take.⁷ But before determining *whether* and *how* to govern, we first ought to determine *who* should govern.

In some instances, the answer to this question may be straightforward. Dual federalism theory distinguishes the types of problems that would be better served through uniform federal rules or state experimentation.⁸ Which of these two regulators is optimal may depend, for example, upon whether the problem will generate interstate spillovers or inspire states to “race to the bottom” by setting the most lax environmental standards to attract investment, jobs, and tax revenue. In contrast, advocates of dynamic federalism have argued that overlapping jurisdiction across different levels of government can facilitate experimentation and policy diffusion, promote good governance, and even serve the national interest.⁹ Recently, scholars of both “localism” and

scraps-plan-to-curb-uber-s-nyc-growth-after-backlash (quoting Mayor DeBlasio as rejecting self-regulation for Uber/Lyft); cf. Kevin Werbach, *The Song Remains the Same: What Cyberlaw Might Teach the Next Internet Economy*, FLA. L. REV. (forthcoming 2017) (on file with author) (discussing the debate over whether to regulate the sharing economy, and noting its echoes of early debates in cyberlaw).

⁷ See, e.g., Eric Biber & J.B. Ruhl, *The Permit Power Revisited: The Theory and Practice of Regulatory Permits in the Administrative State*, 64 DUKE L.J. 133, 232–33 (2014) (suggesting that regulatory permits may be appropriately flexible to address new firms in the sharing economy).

⁸ For discussions of the rationales favoring federal, uniform rules under a dual federalism approach, see Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570, 570–71 (1996) (offering a pragmatic approach); David B. Spence, *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, 161 U. PA. L. REV. 431, 477–78 (2013) [hereinafter Spence, *Federalism, Regulatory Lags*] (examining federalism in the context of hydraulic fracturing); Richard B. Stewart, *Pyramids of Sacrifice? Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L.J. 1196, 1210–15 (1977) (examining theories favoring state or federal governance). For views favoring greater decentralization, see Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the “Race-to-the-Bottom” Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210, 1211–12 (1992) (rejecting the race-to-the-bottom argument for federal rules); David B. Spence, *The Political Economy of Local Vetoes*, 93 TEX. L. REV. 351, 351–52 (2014) [hereinafter Spence, *Local Vetoes*] (examining rationales for state and local governance of hydraulic fracturing).

⁹ See, e.g., David E. Adelman & Kirsten H. Engel, *Adaptive Federalism: The Case Against Reallocating Environmental Regulatory Authority*, 92 MINN. L. REV. 1796, 1798–99 (2008) (arguing that ecosystems, which both optimize and promote diversity, serve as a theoretical model for dynamic federalism); William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547, 1555–56 (2007) [hereinafter Buzbee, *Asymmetrical Regulation*] (favoring federal “floor preemption” rather than “ceiling preemption” to support experimentation); William W. Buzbee, *Interaction’s Promise: Preemption Policy Shifts, Risk Regulation, and Experimentalism Lessons*, 57 EMORY L.J. 145 (2007) [hereinafter Buzbee, *Interaction’s Promise*] (favoring federal regulatory “floors” rather than pure experimentalism); Ann E. Carlson, *Iterative Federalism and Climate Change*, 103 NW. U. L. REV. 1097, 1099–1100 (2009) (observing the interplay between federal and state governments regarding substantive standards for motor vehicle emissions); Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 176–77 (2006) (favoring dynamic regulatory overlap); Robert A. Schapiro, *Toward a Theory of Interactive Federalism*, 91 IOWA L. REV. 243, 244 (2005) (“Polyphonic

“federalism” have begun to recognize the independent interests and capacity of local governments in these debates.¹⁰ And some of the legal issues or impacts arising out of the sharing economy may interact with these debates in relatively straightforward ways. What is missing from this federalism scholarship, however, is a deep, express analysis of the role that uncertainty about potentially significant, even irreversible, impacts, such as the effect of innovative technologies and business models on climate change, should play in these analyses. This is not the traditional domain of federalism theory, but rather of the precautionary principle.¹¹

At its heart, the precautionary principle tells us that it is better to be safe than sorry in the face of significant risk of irreversible harm, even if we are uncertain about the magnitude of the risk.¹² This Article’s central claim is that

federalism . . . seeks to harness the interaction of state and national power to advance the goals associated with federalism.”).

¹⁰ While federalism theory has traditionally addressed the balance of power between two sovereigns—the federal and state governments—with local governments viewed as a constituent part of the state, many scholars now recognize that local governments have interests separate and apart from states. *See, e.g.*, Nestor M. Davidson, *Cooperative Localism: Federal-Local Collaboration in an Era of State Sovereignty*, 93 VA. L. REV. 959, 995–1000 (2007) (offering a vision of federal-state cooperation in which federal action can empower local governments, contrary to the unitary vision of states as “utterly powerless”); Heather K. Gerken, *Foreword: Federalism All the Way Down*, 124 HARV. L. REV. 4, 22–23 (2010) (recognizing the important role in federalism played by local and sublocal governments); Hari M. Osofsky, *Diagonal Federalism and Climate Change Implications for the Obama Administration*, 62 ALA. L. REV. 237 (2011) (discussing the “multiscalar” nature of climate change and the need to address emissions at multiple levels of government); Cristina M. Rodríguez, *The Significance of the Local in Immigration Regulation*, 106 MICH. L. REV. 567, 568 (2008) (arguing that policymakers should “restrain their impulses to preempt legislation by lower levels of government and to create incentives for cooperative ventures in immigration regulation”); Erin Ryan, *Environmental Federalism’s Tug of War Within*, in *THE LAW AND POLICY OF ENVIRONMENTAL FEDERALISM: A COMPARATIVE ANALYSIS* 355, 360–61, 361 n.37 (2015) (citing scholarship addressing local government within theories of federalism); *cf.* David J. Barron, *A Localist Critique of the New Federalism*, 51 DUKE L.J. 377, 378–79 (2001) (discussing similarities between “federalism” and “localism”). While other federal systems of government exist, and climate impacts are global in nature, my focus here is exclusively on federalism and the allocation of government authority in the United States.

¹¹ *See, e.g.*, Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841 (2006) (arguing that the precautionary principle is well suited to address both risk and uncertainty regarding irreversible and catastrophic harms, such as climate change, terrorism, and genetically modified foods). Sunstein argues that when a harm is “irreversible, and when regulators lack information about its magnitude and likelihood, they should purchase an ‘option’ to prevent the harm at a later date.” *Id.* at 841; *see also* sources cited *infra* Part I.A.

¹² DOUGLAS A. KYSAR, *REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY* 9 (2010) (regulators are “not to be hampered by a default assumption against government regulation in advance of complete scientific demonstration of harm”); Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1033 (2003). “Risk” is a known unknown—when probabilities can be assigned to different outcomes. “Uncertainty” is an unknown unknown—when no such probabilities can be assigned. *Id.*; *see also* Daniel A. Farber, *Uncertainty*, 99 GEO. L.J. 901, 903 (2011) (noting

what I call *precautionary federalism* offers a more complete answer than either dual or dynamic theories of federalism to the question of *who* should regulate under conditions of uncertainty. It also suggests an answer to a related question: *for how long*. Thus, precautionary federalism takes lessons from debates over the precautionary principle to a different context—the allocation of authority across different levels of government.

Precautionary federalism has three primary features.¹³ First, it embodies a default presumption in favor of multiple regulatory voices and against broad exercises of preemption under conditions of uncertainty about potentially significant environmental, health, or safety impacts of innovative technologies or business models. This approach can promote information generation, interest group interaction in multiple fora, and tailoring of policy to local conditions. Second, precautionary federalism takes a “wide viewscreen” approach to risk-risk trade-offs.¹⁴ It recognizes that concerns regarding uncertainty about one type of risk must be weighed against other risks. The value of promoting policy experimentation under uncertainty must also be weighed against competing values—such as promoting innovation—that may support more uniform rules. And third, precautionary federalism is time-bound. It acknowledges that greater certainty about impacts may warrant a shift from one allocation of authority to another, such as from regulatory overlap to greater consolidation. Put simply, when uncertainty is at its height, the benefits of policy experimentation and information gathering are at their highest and the need for precaution and experimentation is most acute; when greater certainty is achieved, more regulatory uniformity may become appropriate. Allocating authority through a lens of precaution can serve an information-forcing function about the significance of uncertain impacts and

that economic analysis tends to underestimate the likelihood of catastrophic outcomes in cases of uncertainty, and offering an alternative precautionary approach based on ambiguity theory). Here, because we cannot assign probabilities to the magnitude of Uber/Lyft’s impact on greenhouse gas emissions, their impact lies in the domain of uncertainty.

¹³ See *infra* Part I.D.

¹⁴ Cass Sunstein uses this terminology with respect to the precautionary principle itself, and I extend it here to precautionary federalism. Sunstein, *supra* note 11, at 846–47 (“[T]he refined precautionary principles should be implemented with wide rather than narrow viewscreens. They must be attentive to the full range of consequences, not simply to a subset.”). The concept of risk-risk trade-offs embodies the idea that controlling for one risk, such as avoiding potential dangers from a new drug that has yet to enter the market, can create another risk along the same axis, such as the failure to protect people who might be helped by the new drug. It also recognizes that risks can occur along different axes—for example, the trade-off in risks to the environment from driving versus risks to driver safety.

offers the best way to achieve the kind of rules called for by the precautionary principle.

Precautionary federalism thus differs from a traditional dual federalism approach because it recognizes the value of dynamic, overlapping authority under conditions of uncertainty about the impact of innovation on potentially significant—even irreversible—risks of harm. But a precautionary approach also differs from dynamic federalism. While the principle recognizes the value of dynamism under conditions of uncertainty as a default presumption, it acknowledges the possibility that greater certainty regarding potentially significant impacts, or other values, may shift the balance in favor of a single regulator and uniform, federal rules. This possibility of a shift is crucial for the approach's information-forcing function. Firms, which often prefer regulatory uniformity,¹⁵ may be willing to provide information about risks or modify their business practices to reduce risks to achieve greater regulatory certainty.

The case study I focus on here—Uber/Lyft's environmental impacts—poses a particularly acute form of this uncertainty problem because three different types of uncertainty interact: regulatory uncertainty (what is the best policy), uncertainty about the magnitude and direction of Uber/Lyft's potentially significant impact on the climate (as well as other local impacts), and uncertainty about how Uber/Lyft's business model may change over time (in response to either market or regulatory conditions).¹⁶ But the rise of Uber/Lyft also provides a motivating opportunity to rethink current allocations of authority over transportation emissions more broadly. Like other firms in the sharing economy, Uber/Lyft play an aggregative function for what otherwise might be considered millions of individual actions, each of which contributes in only an insignificant way to the problem at issue—here, climate change.¹⁷ Uber/Lyft own no vehicles yet facilitate access to transportation for more than a million people each day in private cars.¹⁸ Though global players,

¹⁵ See *infra* Part I.B.3.

¹⁶ Similar conditions exist in the case of hydraulic fracturing, for example. See Spence, *Local Vetoes*, *supra* note 8 (discussing federalism and localism in the hydraulic fracturing context); *infra* Part IV (discussing broader implications of precautionary federalism).

¹⁷ Cf. Michael P. Vandenbergh, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 VAND. L. REV. 515, 518 (2004) (arguing that environmental law must incorporate a greater focus on individual contributions to environmental harms, but acknowledging the challenges of focusing on individual action).

¹⁸ Avery Hartmans, *Uber Completed 62 Million Trips in July, Up 15% from the Previous Month*, BUS. INSIDER (Aug. 3, 2016, 5:49 PM), <http://www.businessinsider.com/uber-completes-62-million-trips-july-2016-8> (citing a figure of 62 million rides in July 2016 for Uber, and 13.9 million rides in the same month for Lyft).

these firms operate in, and in many ways interact differently across, local markets.¹⁹ And their environmental impacts range from the most global of all externalities—greenhouse gas emissions—to more arguably “local” impacts on traffic, congestion, and public transportation systems. Uber/Lyft thus aggregate the cumulative impact of these individual rides in a new way.²⁰

While legal scholars and policymakers have only just begun to pay attention to the uncertain environmental consequences of Uber/Lyft,²¹ these impacts are potentially significant at a global level and directly implicate the federalism questions posed here. Transportation accounts for more than one quarter of all greenhouse gas emissions in the United States.²² The Paris Agreement on climate change reached on December 12, 2015, makes clear that to avoid the most catastrophic impacts of climate change, the global economy must transition away from reliance on fossil fuels by the middle of this century, not only in electricity generation, but also in transportation.²³ Thus,

¹⁹ Nestor M. Davidson & John J. Infranca, *The Sharing Economy as an Urban Phenomenon*, 34 YALE L. & POL'Y REV. 215, 216–18 (2016) (discussing the sharing economy's synergistic relationship with local urban density); Daniel E. Rauch & David Schleicher, *Like Uber, but for Local Government Law: The Future of Local Regulation of the Sharing Economy*, 76 OHIO ST. L.J. 901 (2015) (arguing that local and state governments will adopt mixed forms of regulation of sharing firms, including public-private partnerships and subsidies, as tools for economic redistribution and the provision of local services). In contrast, traditional car rental agencies, which also operate in local markets, do not require the same kinds of local “networks” for their business models to succeed.

²⁰ Traditional policy rationales in federalism debates apply in unusual ways to these disaggregated firms. See *infra* Part IV.

²¹ See K. Casey Strong, Comment, *When Apps Pollute: Regulating Transportation Network Companies to Maximize Environmental Benefits*, 86 U. COLO. L. REV. 1049 (2015) (arguing that centralizing control in one regulator and treating transportation network companies differently from existing taxi or limousine services would best protect the environment). Interest in the environmental impacts of these firms is emerging. On November 13, 2015, the Natural Resources Defense Council (NRDC) announced that it would partner with the University of California Berkeley's Transportation Sustainability Research Center “on the first-ever climate impacts analysis” of Uber/Lyft. Amanda Eaken, *NRDC Urban Solutions to Lead First Climate Analysis of Uber and Lyft*, NRDC SWITCHBOARD (Nov. 13, 2015), http://switchboard.nrdc.org/blogs/aeaken/nrdc_urban_solutions_to_lead_f.html; see also VICTOR NGO, TRANSPORTATION NETWORK COMPANIES AND THE RIDESOURCING INDUSTRY: A REVIEW OF IMPACTS AND EMERGING REGULATORY FRAMEWORKS FOR UBER 8, 11 (Oct. 2015) (prepared for the City of Vancouver).

²² U.S. ENVTL. PROT. AGENCY, EPA 430-R-16-002, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2014 ES-23 (2016) (noting that transportation accounted for 26% of emissions in the United States in 2014, the second largest percentage behind electricity generation).

²³ U.N. Framework Convention on Climate Change, Paris Agreement Under the United Nations Framework Convention on Climate Change, art. IV, Dec. 12, 2015, http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf; Joeri Rogelj et al., *Energy System Transformations for Limiting End-of-Century Warming to Below 1.5 °C*, 5 NATURE CLIMATE CHANGE 519, 526 (2015) (concluding that to limit global warming to below 1.5 or 2 degrees Celsius will require a 25% reduction in greenhouse gas emissions from transportation); Kelly Levin, Jennifer Morgan & Jiawei Song, *INSIDER: Understanding the Paris Agreement's Long-term Goal to Limit Global*

there is the potential that Uber/Lyft—which facilitate transportation by personal vehicle—have significant, global environmental consequences.

But we actually do not know whether Uber/Lyft are “good” or “bad” for the environment in general, or for global greenhouse gas emissions in particular.²⁴ Each ride generates emissions, as well as other impacts on traffic and congestion. Whether this is good or bad for the environment depends upon what form of transportation is being replaced—rides in personal vehicles, taxis, or rides via public transportation.²⁵ If the competing option is taxis, the emissions impact depends further upon the relative fuel economy and emissions profiles of the two types of vehicles. Some cities have adopted incentives to encourage taxi fleet owners to purchase hybrid or low-emissions vehicles.²⁶ In addition, other cities charge a fee on taxi rides to support the local public transportation system.²⁷ These local rules do not generally apply to Uber/Lyft. If Uber/Lyft rides are perceived to be a more convenient and affordable option than public transit, they could decrease demand for continued investment and improvements in public transportation, with long-term consequences for the environment.

On the flip side, Uber/Lyft may be better for the climate than the status quo. If they are replacing rides in households’ personal vehicles, this may reduce demand for (and the lifecycle emissions associated with the production of) personal vehicles. If Uber/Lyft integrate their services well with public transit, their rise could increase demand for public transit.²⁸ In several cities,

Warming, WORLD RES. INST. (Dec. 15, 2015), <http://www.wri.org/blog/2015/12/insider-understanding-paris-agreement%E2%80%99s-long-term-goal-limit-global-warming>.

²⁴ See *infra* Part II.

²⁵ A recent study for the American Public Transportation Association, TCRP J-11/TASK 21, SHARED MOBILITY AND THE TRANSFORMATION OF PUBLIC TRANSIT (Mar. 2016) [hereinafter APTA REPORT] examines this and related questions, and concludes that a significant number of rides using Uber/Lyft are replacing personal vehicles and taxis for social trips between 10 p.m. and 4 a.m., when public transit options are limited. *Id.* at 10–16. Of course, it is essential to consider long-term demand for public transit as a dynamic issue, rather than one based only on the current availability of public transit.

²⁶ See *infra* Part II.

²⁷ Jose Martinez, *Proposal to Add 50-Cent Surcharge onto Car Service Rides to Fund MTA Gains Steam*, NY1 (June 17, 2015, 9:15 PM), <http://www.ny1.com/nyc/all-boroughs/news/2015/06/17/proposal-to-add-50-cent-surcharge-onto-car-service-rides-to-fund-mta-gains-steam.html>; Bill de Blasio, *A Fair Ride for New Yorkers*, N.Y. DAILY NEWS (July 18, 2015, 11:00 AM), <http://nydailynews.com/opinion/bill-de-blasio-fair-ride-new-yorkers-article-1.2296041>.

²⁸ Changes in demand for public transit among more affluent riders who can afford to use Uber/Lyft may implicate environmental justice considerations. On the concept of environmental justice, see Richard J. Lazarus, *Pursuing “Environmental Justice”: The Distributional Effects of Environmental Protection*, 87 NW. U. L. REV. 787 (1993).

Uber has introduced UberPool, and Lyft has introduced Lyft Line, in which individuals can share rides to common or nearby destinations, which may reduce vehicle miles traveled.²⁹ A city in Florida has recently partnered with Uber to subsidize rides within city limits and to offer a higher subsidy to rides that start or end at commuter rail stations.³⁰ Ridesharing firms like Bridj and Chariot provide private, multi-occupant vehicles as an alternative to public mass transit (a form of “pop-up mass transit”), setting routes in response to passenger need.³¹ Lyft has recently partnered with General Motors to make electric vehicles available to its drivers in certain cities in California.³² And there may be non-environmental benefits to Uber/Lyft, such as the potential to decrease drunk-driving, though empirical studies to date appear to conflict on this issue.³³ These impacts may vary according to local conditions.

In this context, it is especially important not to presume the current business model is static. The current business model of Uber/Lyft may simply be a temporary stopover on the way to further innovation, including the introduction of autonomous vehicles, which will likewise raise challenges for the allocation of regulatory authority.³⁴ Though empirical studies are beginning

²⁹ *Announcing UberPool*, UBER (Aug. 5, 2014), <https://newsroom.uber.com/announcing-uberpool/>; *Meet Lyft Line*, LYFT, <https://www.lyft.com/line> (last visited Aug. 18, 2016).

³⁰ Ariel Wittenberg, *Fla. City Subsidizes Uber Rides to Expand Commuting Options*, GREENWIRE (Apr. 15, 2016), <http://www.eenews.net/greenwire/stories/1060035694/feed>.

³¹ *FAQ*, BRIDJ, www.bridj.com/FAQ (last visited Nov. 12, 2016); *About Chariot*, CHARIOT, www.chariot.com/about (last visited Nov. 12, 2016).

³² *Express Drive Expands Footprint to California and Colorado*, LYFT (July 22, 2016), <https://blog.lyft.com/>.

³³ *Compare APTA REPORT*, *supra* note 25, at 14 (noting that many riders of Uber/Lyft volunteered that “alcohol consumption was a major consideration” in the choice to use those types of mobility options), and *New Report from MADD, Uber Reveals Ridesharing Services Important Innovation to Reduce Drunk Driving*, MADD (Jan. 27, 2015), <http://www.madd.org/media-center/press-releases/2015/new-report-from-madd-uber.html?referrer=https://www.google.com/>, and Brad N. Greenwood & Sunil Wattal, *Show Me the Way to Go Home: An Empirical Investigation of Ride Sharing and Alcohol Related Motor Vehicle Homicide* (Fox Sch. of Bus., Research Paper No. 15-054, 2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2557612 (discussing impact of Uber/Lyft on drunk-driving), with Noli Brazil & David Kirk, *Uber and Metropolitan Traffic Fatalities in the United States*, AM. J. EPIDEMIOLOGY 192, 196 (2016) (“[D]eployment of Uber services in a given metropolitan county had no association with the number of subsequent traffic fatalities.”).

³⁴ Uber is currently pilot testing autonomous vehicles in Pittsburgh, Pennsylvania. Uber Newsroom, *Pittsburgh, Your Self-Driving Uber is Arriving Now* (Sept. 14, 2016), <https://newsroom.uber.com/pittsburgh-self-driving-uber/>. On January 4, 2016, General Motors (GM) invested \$500 million in Lyft, and the firms have announced their plans to work together toward the development of a fleet of driverless cars. Eric Newcomer, *GM Invests \$500 Million in Lyft*, BLOOMBERG (Jan. 4, 2016, 8:30 AM), <http://www.bloomberg.com/news/articles/2016-01-04/gm-invests-500-million-in-lyft-to-bolster-alliance-against-uber>. Other major car manufacturers have followed suit with similar partnerships and investments. *See, e.g.*, Mike Isaac & Neal E. Boudette, *Automakers Befriend Start-Ups Like Uber, Girding Against a Changing Car Culture*, N.Y. TIMES (May 24, 2016), <http://www.nytimes.com/2016/05/25/technology/uber-gett-ridesharing-toyota-vw.html>; *Launch of*

to emerge on the environmental impacts of Uber/Lyft, a great deal of uncertainty remains.³⁵

The question of who should decide whether and how to regulate these impacts does not arise on a blank slate. Federal laws, including the Clean Air Act and the Energy Policy and Conservation Act, govern emissions standards for greenhouse gases and conventional pollutants from new motor vehicles.³⁶ And each statute contains language preempting state or local regulation of vehicle emissions. Courts have interpreted these statutes' preemption provisions broadly to prevent local governments from seeking to limit greenhouse gas emissions arising out of the use and operation of local taxi fleets.³⁷ These broad preemption interpretations may likewise be extended to prohibit state or local efforts to address emissions arising out of Uber/Lyft. At the state level, Uber/Lyft have successfully lobbied more than a dozen state legislatures to preempt all local and municipal governance of such firms.³⁸ While these recently enacted state laws do not explicitly address environmental impacts, their language is extremely broad.³⁹ These state preemption provisions could likewise prohibit experimentation with local efforts to address Uber/Lyft's environmental impacts. A precautionary approach would require a narrower interpretation of the preemption language to permit local governments to exceed existing federal or state emissions rules.

This Article thus offers three new insights for federalism theory. First, federalism theory has paid inadequate attention to the need for precaution

Strategic Partnership in Berlin: Volkswagen Group and Ride Hailing Provider Gett Plan to Expand On-Demand Mobility Solutions and Activities in Europe, VOLKSWAGEN (June 1, 2016), http://www.volkswagenag.com/content/vwcorp/info_center/en/news/2016/06/Gett_start.html (discussing VW investment in ride-hailing service Gett). These investments and partnerships demonstrate the rapidly evolving nature of shared transportation and emphasize the fact that the dominant firms in this market simultaneously have a local, national, and even global presence. For a preliminary discussion of how precautionary federalism would apply to autonomous vehicles, see *infra* Part IV.B.

³⁵ See *infra* Part II.

³⁶ See *infra* Part III.A.

³⁷ For a discussion of the distinction between local policies that have been preempted and those that have survived a preemption challenge, see *infra* Part III.

³⁸ See *infra* Part III.B. Some recent scholarship calls preemption by state governments of local laws "intrastate" preemption. See, e.g., Paul Diller, *Intrastate Preemption*, 87 B.U. L. REV. 1113, 1114 (2007); Hannah J. Wiseman, *Disaggregating Preemption in Energy Law*, 40 HARV. ENVTL. L. REV. 293, 309–10 (2016) (discussing federal and intrastate preemption of energy governance in both "Dillon's Rule" and "home rule" states, and arguing that disaggregating different aspects of regulatory risk for the purpose of allocating regulatory authority would be beneficial).

³⁹ See *infra* note 212 (listing state laws that preempt all local governance of transportation network companies like Uber and Lyft).

under conditions of uncertainty. It is not only uncertainty about ecological impacts such as climate change that warrant a precautionary approach; the rise of innovative business models and technologies can likewise create uncertainty.⁴⁰ Most importantly, there may be interaction effects between uncertain environmental consequences and innovative, adaptable business models and technologies. Second, and relatedly, precautionary federalism is attuned to trade-offs; it expressly recognizes that allocations of authority designed to address one risk may exacerbate other risks. Thus, as with a wide viewscreen approach to regulation at one level of government, we should take a wide viewscreen approach to federalism and the allocation of regulatory authority. Third, precautionary federalism has implications for when one allocation of authority should be replaced by another. In other words, scholars and policymakers should grapple more actively with the bases for a shift in the allocation of regulatory authority.⁴¹ Precautionary federalism addresses this concern in ways that neither dual nor dynamic federalism theories do. When uncertainty about interaction effects among innovative business models, regulation, and environmental, health, or safety impacts is at its height, the benefits of experimentation and information gathering are at their highest; when uncertainty diminishes, more consolidation or uniformity may be appropriate. Again, issues surrounding uncertainty must be weighed against competing values; uncertainty is not itself outcome-determinative.⁴² Thus, the principle of precautionary federalism that I advance here makes a significant contribution both at the theoretical and policymaking levels.

This Article is structured as follows. Part I sets the stage by describing the values served by the precautionary principle. It then demonstrates that neither dual nor dynamic theories of federalism have grappled explicitly with these values, and lays out the principle of precautionary federalism as a step forward.

⁴⁰ Other scholars have addressed the implications of the rise of the service economy for the choice of public policy instruments without focusing on issues of federalism or precaution. *See, e.g.*, James Salzman, *Beyond the Smokestack: Environmental Protection in the Service Economy*, 47 *UCLA L. REV.* 411 (1999).

⁴¹ In the context of substantive legal rules, several scholars have argued that legislators and regulators must think more explicitly about when regulatory programs should end—in their words, “exit.” However, these accounts do not address the issue of “exit” or the shifting boundaries of regulatory authority within the context of federalism theory. J.B. Ruhl & James Salzman, *Regulatory Exit*, 68 *VAND. L. REV.* 1295, 1295 (2015) (arguing that “exit is a fundamental feature of regulatory design,” but not focusing on questions of federalism); *see also* Justin R. Pidot, *Governance and Uncertainty*, 37 *CARDOZO L. REV.* 113, 121 & n.27 (2015) (offering a framework for governance through static or dynamic law under conditions of uncertainty, but declining to address federalism or the allocation of authority other than as a matter of resources).

⁴² In addition, there may be disagreements over values that will certainly play a role in the allocation and reallocation of authority.

Part II discusses the rise of Uber/Lyft as a compelling case study for a precautionary approach in light of these firms' potentially significant, yet uncertain environmental impacts. Part III demonstrates that existing legal rules at the federal and state levels are inconsistent with the precautionary approach that is needed in this context. Part IV establishes that existing theories of federalism do not capture certain unique features of Uber/Lyft and argues that precautionary federalism offers a better approach.⁴³ Part IV also suggests broader applications of precautionary federalism, for example, to the cases of hydraulic fracturing and autonomous vehicles.⁴⁴ It concludes that precautionary federalism offers the best way to achieve the kind of rules called for by the precautionary principle.

I. A PRECAUTIONARY APPROACH TO FEDERALISM

Both the theory and practice of federalism are primarily concerned with two questions: (1) which level of government is best situated to enact legal rules addressing a particular problem, and (2) what values or purposes does this choice serve.⁴⁵ Theoretical and practical approaches to these questions have changed over time.⁴⁶ Dual federalism scholars ask which of two sovereigns—the federal government or the states—is the optimal regulator. In contrast, dynamic federalism scholars contend that federalism need not be a

⁴³ I address the federalism question from a *policy-neutral* perspective—that is, without taking any position as to what particular form regulation should take in this context. Cf. Spence, *Federalism, Regulatory Lags*, *supra* note 8, at 436 (taking a policy-neutral approach in the context of hydraulic fracturing). Indeed, a regulator may decide that the best course is to apply existing rules to innovative business models, craft new rules that apply only to innovative business models, or rethink the regulatory regime entirely. This offers an additional reason to avoid the term “TNC,” as that term embodies an assumption that a separate regulatory category is required. Decisions both about whether to regulate, and how to regulate, must ultimately be left up to those regulators who are allocated authority under the principle of precautionary federalism.

⁴⁴ For an extension of this principle to the context of toxic chemical regulation, see Sarah E. Light, *Foreword: Regulating Toxic Chemicals through Precautionary Federalism*, PENN UNDERGRADUATE L.J. (forthcoming 2016) (manuscript at 3–4).

⁴⁵ Elsewhere I have argued that private firms and non-governmental organizations should be considered both as complementary “regulators” and possibly competing ones. Sarah E. Light & Eric W. Orts, *Parallels in Public and Private Environmental Governance*, 5 MICH. J. ENVTL. & ADMIN. L. 1, 3–4 (2015) (arguing that instrument choice literature must recognize the parallel forms of governance employed by public and private actors); see also Sarah E. Light, *The New Insider Trading: Environmental Markets within the Firm*, 34 STAN. ENVTL. L.J. 3 (2015) (examining the parallel use by public and private actors of tradable permits and carbon fees to reduce greenhouse gas emissions). How private governance fits into a theory of precautionary federalism is outside the scope of this paper, which focuses exclusively on public law rules.

⁴⁶ Esty, *supra* note 8, at 600–05 (discussing the historical trajectory of the balance of federal versus state power in environmental regulation).

“zero-sum” game between exclusive federal or state authority.⁴⁷ But these theories have not grappled explicitly with the role that precaution under conditions of uncertainty should play in guiding our answers to these fundamental questions.

This Part first discusses the precautionary principle and its application in contexts of potentially catastrophic or irreversible harms, such as climate change. It then discusses the rationales for and values advanced by theories of both dual federalism and dynamic federalism. Finally, this Part offers the principle of precautionary federalism as an alternative and discusses the values that it serves.

A. *The Precautionary Principle*

The precautionary principle addresses the question of *whether* to regulate when there is a risk of potentially significant environmental, health, or safety consequences, even when there is a lack of certainty about the magnitude or type of potential harm.⁴⁸ Broadly speaking, the principle tells regulators that they need not wait until there is certainty about such risks before taking action. It shifts the burden of proof onto the regulated community to demonstrate that regulation is not warranted, and away from the regulator to demonstrate that it is.⁴⁹ In colloquial terms, the precautionary principle tells us that it is better to be safe than sorry.⁵⁰

Despite this tidy summary, there is arguably no single precautionary principle.⁵¹ While the strongest form of the principle—one that would prohibit an activity in the face of risk even before the magnitude of risk is known—has been controversial and widely criticized for failing to recognize risk-risk trade-

⁴⁷ ERIN RYAN, *FEDERALISM AND THE TUG OF WAR WITHIN*, at xiii (2011) (rejecting the model of “‘zero-sum’ federalism”); Erin Ryan, *Negotiating Federalism*, 52 B.C. L. REV. 1, 4 (2011) (examining evidence of intergovernmental bargaining distinct “from the stylized model of zero-sum federalism dominating political discourse”); cf. Robert A. Schapiro, *Justice Stevens’s Theory of Interactive Federalism*, 74 FORDHAM L. REV. 2133, 2133 (2006) (rejecting descriptive power of dual federalism model).

⁴⁸ David A. Dana, *A Behavioral Economic Defense of the Precautionary Principle*, 97 NW. U. L. REV. 1315, 1316, 1320 (2003).

⁴⁹ *Id.* at 1315; KYSAR, *supra* note 12, at 9; cf. Noah M. Sachs, *Jumping the Pond: Transnational Law and the Future of Chemical Regulation*, 62 VAND. L. REV. 1817, 1836–38 (2009) (discussing the different burdens of proof in toxic chemical regulations in the United States and Europe).

⁵⁰ Sunstein, *supra* note 12, at 1019.

⁵¹ Richard B. Stewart, *Environmental Regulatory Decision Making Under Uncertainty*, in 20 RESEARCH IN LAW AND ECONOMICS: AN INTRODUCTION TO THE LAW AND ECONOMICS OF ENVIRONMENTAL POLICY 71, 76 (Timothy Swanson ed., 2002) (discussing four versions of the principle).

offs,⁵² that is not the form of the principle I employ here. Rather, I rely on what even critics of the principle have called an “important” and “uncontroversial” formulation.⁵³ When there is a risk of harm that is potentially irreversible and catastrophic, such as in cases of climate change or genetically modified organisms, it makes sense to regulate an activity in a way that adopts special precaution even if we are uncertain about the magnitude of the risk.⁵⁴ Cass Sunstein has equated the use of the precautionary principle under these conditions to purchasing an “‘option’ to prevent the harm at a later date” when better information becomes available.⁵⁵

In the case study I offer here, as in all cases of risk regulation, there are multiple risks and uncertainties. There is general uncertainty about the environmental harm—the magnitude of potential risks of climate change. But there is also uncertainty about how the innovative business model adopted by Uber/Lyft interacts with climate change. We do not yet know whether it increases or decreases greenhouse gas emissions or emissions of local air pollutants. We do not know whether it increases or decreases support for public transportation, or whether any such impact is generalizable across all localities. We do not know whether this business innovation will facilitate further innovation, for example if it will hasten the development or deployment of autonomous or electric vehicles, that may likewise have implications for climate change. What we *do* know is that this new system of transportation

⁵² For example, Cass Sunstein has argued that the strongest form of the precautionary principle is “paralyzing” and provides “no guidance” because both regulatory action (such as banning a new drug to prevent the risk of deaths, which may lead to deaths for those the drug would have helped) and inaction (allowing the new drug to enter the market, but causing the deaths of those who are harmed by the drug) can be described as precautionary. Sunstein, *supra* note 12, at 1020, 1023–24; *see also* Farber, *supra* note 12, at 914 (“The implication of the precautionary principle is that it is better to overregulate than underregulate new technologies—but this can actually result in more harm to public health or welfare under some circumstances.”). Frank Cross has put it bluntly, “[i]f a public health regulation of nuclear power causes a shift to fossil fuels, the health costs may be considerable.” Frank B. Cross, *Paradoxical Perils of the Precautionary Principle*, 53 WASH. & LEE L. REV. 851, 865 (1996). Jonathan Wiener has argued that “optimal regulation” must take into account such trade-offs. Jonathan B. Wiener, *Precaution in a Multirisk World*, in HUMAN AND ECOLOGICAL RISK ASSESSMENT: THEORY AND PRACTICE 1509, 1520 (Dennis J. Paustenbach ed., 2002) (“Uncertainty is not the crucial problem—trade-offs are.”). *But see* Noah M. Sachs, *Rescuing the Strong Precautionary Principle from its Critics*, 2011 U. ILL. L. REV. 1285 (disputing Sunstein’s claims in the context of chemical regulatory reform).

⁵³ Sunstein, *supra* note 12, at 1016 (arguing that the principle’s ability to “counteract the tendency to demand certainty” is “uncontroversial”).

⁵⁴ Sunstein, *supra* note 11, at 845–46 (arguing that even skeptics of the precautionary principle should recognize its importance in the context of irreversible and catastrophic risks); Farber, *supra* note 12, at 905 (arguing that the precautionary principle is particularly suited to conditions of uncertainty, rather than risk, about catastrophic outcomes).

⁵⁵ *Id.* at 841.

involves millions of individual rides in personal vehicles, each of which contributes emissions to the atmosphere. In the transportation setting in particular, where climate change is caused by the cumulative contributions of millions of individuals—but any individual contribution is not significant on its own—individuals are prone to minimize the need for regulatory action, especially action that increases costs in the short run.⁵⁶ In this context of uncertainty, it is precisely when there are calls for no regulation that regulators should be most attuned to the need for precaution.⁵⁷

The precautionary principle serves several core functions. A precautionary approach can counteract certain cognitive biases, including people's tendency to prefer avoiding "sure, immediate losses" rather than "unsure, non-immediate losses."⁵⁸ This unconscious preference to avoid immediate rather than future losses is often referred to as the bias of "myopia."⁵⁹ The precautionary principle counters this bias by recognizing that regulation may proceed even if regulators cannot conclusively establish the certainty of the future loss—they can only establish potential and risk. In contrast, a cost-benefit approach can magnify this bias, because it cannot account for the "unsure" future losses in its equations. Counteracting the bias of myopia is particularly important in the context of environmental, health, and safety rules, where policy choices explicitly require balancing between the immediate, and more easily measurable, costs of regulation (including the financial costs of compliance, and the restriction of certain forms of activity) and abstract environmental, health, or safety benefits that accrue in the future, often to future generations.⁶⁰ A second bias that a precautionary approach can counteract is the inability of individuals to perceive their small contributions to climate change to be significant in the aggregate—the so-called "one percent problem," which contributes to the tragedy of the commons.⁶¹

⁵⁶ Kevin M. Stack & Michael P. Vandenbergh, *The One Percent Problem*, 111 COLUM. L. REV. 1385, 1386–88, 1398–1402 (2011) (arguing that although climate change can only be solved through regulation of small contributions to global greenhouse gas emissions, biases lead individuals to discount or ignore small values); see also Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244 (1968) (arguing that individuals are not motivated to protect resources when their impact from resource use is small but personal gains are large).

⁵⁷ Cf. Sunstein, *supra* note 12, at 1017 ("Sometimes people do seem to seek certainty before showing a willingness to expend costs, and well-organized private groups like to exploit this fact. Insofar as the precautionary principle counteracts the tendency to demand certainty, it should be approved.")

⁵⁸ Dana, *supra* note 48, at 1316–17.

⁵⁹ *Id.* at 1324–25 (discussing ways that the precautionary principle counteracts cognitive biases).

⁶⁰ *Id.* at 1320.

⁶¹ See sources cited *supra* note 56.

These concerns are compelling in the context of vehicle emissions. Combining these biases creates a perfect storm. The prospect that an Uber/Lyft ride might be more expensive in the short term—for example, because of a tax or a requirement to use more expensive low-emissions vehicles—is not necessarily an appealing prospect for those drawn to the firm’s lower fares compared to taxis. And while the cumulative environmental impact of millions of individual rides is unquestionably significant, individuals are unlikely to perceive their own contributions to be meaningful. There may thus be a tendency toward under-regulation.

While the precautionary principle has faced criticism, such criticism can be overcome through careful design. David Dana has described the two primary critiques as the “indeterminacy critique” and the “bad choices critique.”⁶² The indeterminacy critique rests on the premise that the precautionary principle does not dictate specific policy outcomes, and thus does not constrain regulatory decision-making. However, this does not render the principle without meaning, as many other legal principles likewise do not dictate specific policy outcomes.⁶³ As Dana has argued:

Principles can express and reinforce value commitments and procedurally structure decisionmaking without dictating a single set of specific, substantive outcomes; principles may help put certain extreme options off the table, provide a boost to the advocacy of some in the political community, and force others in that community to marshal more evidence on behalf of their positions.⁶⁴

The “bad choices” critique suggests that the principle fails to take into account risk-risk trade-offs. For example, if regulating Uber/Lyft meant that households would purchase more private cars, this outcome could generate additional emissions in the production of those cars. And it is important to look beyond the particular risk of one type of harm—climate change—to consider other social impacts. For example, if regulating Uber/Lyft led to an increase in local drunk-driving deaths, this trade-off would need to be factored into the regulatory decision-making process. Thus, while it is true that both action and inaction can have social consequences,⁶⁵ this does not necessarily lead to

⁶² Dana, *supra* note 48, at 1317–20; *cf.* Farber, *supra* note 12, at 917–19 (noting that the “vagueness” critique can be remedied by limiting the principle to settings of uncertainty, irreversibility, and catastrophic harms; that risk-risk trade-offs do not always “apply in practice;” and that the principle can “counter defects in the ways that people process probability information”).

⁶³ *Id.* at 1317–18.

⁶⁴ *Id.*

⁶⁵ Sunstein, *supra* note 12, at 1056.

paralysis; such critiques can be overcome. Policies can be designed in ways that minimize such concerns, for example, by not banning an activity outright, but rather using targeted rules to address the particular concern at issue. Such targeting may be easier in the case of firms like Uber/Lyft that gather a great deal of data about their rides, as better information can support more precise regulatory targeting.⁶⁶

These two critiques become especially important when considering the lessons of the precautionary principle for federalism theory. As I explain further below, precautionary federalism does not dictate a specific outcome in all cases. It simply requires expressly taking uncertainty and risk-risk trade-offs into account in determining the allocation of regulatory authority. It suggests that uncertainty tips the balance in favor of overlapping jurisdiction and regulatory experimentation, but recognizes that other factors can rebut that presumption. Precautionary federalism can correct for biases that may be particularly acute in the environmental, health, and safety contexts, in which vague benefits of future environmental protection are being weighed against immediate, tangible costs. And precautionary federalism can help to put “extreme options,” like broad preemption language, off the table—at least until further information becomes available. The next two sections examine the values motivating choices about the allocation of regulatory authority in the federalism literature and demonstrate that these accounts do not appreciate the role that precaution should play.

B. Dual Federalism

Traditional dual federalism theory asks which level of government—federal or state—can provide “optimal” environmental rules.⁶⁷ The arguments generally coalesce into four categories but favor exclusive authority in a single regulator. They do not, however, expressly address whether precaution about potentially significant risks should play any role.⁶⁸

⁶⁶ See *infra* Part IV.

⁶⁷ See, e.g., Esty, *supra* note 8, at 574 (seeking the “optimal environmental policy level”); Revesz, *supra* note 8, *passim* (discussing the economic goal of finding the “optimal” level of regulation); see also Cary Coglianese & Kalypso Nicolaidis, *Securing Subsidiarity: The Institutional Design of Federalism in the United States and Europe*, in *THE FEDERAL VISION: LEGITIMACY AND LEVELS OF GOVERNANCE IN THE UNITED STATES AND THE EUROPEAN UNION* 277 (Kalypso Nicolaidis & Robert Howse eds., 2001).

⁶⁸ I prefer the more neutral terms of “centralized” or “decentralized” authority to recognize that local governments can play a decentralized role, and that state governments can be “centralized” vis-à-vis local governments. To the extent that I refer to a choice between federal versus state authority in this section, this reflects the language of dual federalism scholarship.

1. *Uniformity versus Regulatory Competition*

The first set of arguments about the optimal regulator addresses the choice between the need for uniform federal rules versus the value of regulatory competition. Advocates of centralization argue, first, that if states are competing for mobile industrial capital, there is a risk that they will engage in a “race to the bottom” to set minimal environmental standards in order to create a climate more favorable for business investment in their state.⁶⁹ Second, federal uniformity is more efficient and can promote “economies of scale” both for industry and for regulators setting environmental standards.⁷⁰

Critics of uniformity respond that regulatory competition allows states to serve as Brandeisian “laboratories of experimentation.”⁷¹ Decentralized experimentation can enhance social welfare because policies can be tailored to local conditions and preferences.⁷² And in a marketplace of ideas, the best policies may ultimately be adopted by other states or even the federal government.⁷³ Competition among local governments for mobile industrial capital restrains any tendency to overregulate.⁷⁴

⁶⁹ Stewart, *supra* note 8, at 1211–12.

⁷⁰ Esty, *supra* note 8, at 585–86 (arguing that federal bureaucrats are more capable of setting environmental standards cost-effectively than fifty state bureaucracies).

⁷¹ *New State Ice Co. v. Liebmann*, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting) (“It is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country.”); FELIX FRANKFURTER, *THE PUBLIC AND ITS GOVERNMENT* 49–50 (1930) (“[O]ur federalism calls for the free play of local diversity in dealing with local problems.”); see also Henry M. Hart, Jr., *The Relations Between State and Federal Law*, 54 COLUM. L. REV. 489, 493 (1954). *But see* Susan Rose-Ackerman, *Risk Taking and Relection: Does Federalism Promote Innovation?*, 9 J. LEGAL STUD. 593, 593–94 (1980) (concluding that states are unlikely to innovate in light of risk-averse state and local policymakers); Michael A. Livermore, *The Perils of Experimentation*, YALE L.J. (forthcoming 2017) (manuscript at 2–3) (arguing that policy experimentation should be tailored to produce a socially optimal amount of deliberative and political information, not just more information).

⁷² Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416, 418 (1956) (“The consumer-voter may be viewed as picking that community which best satisfies his preference pattern for public goods. . . . The greater the number of communities and the greater the variance among them, the closer the consumer will come to fully realizing his preference position.”). Tiebout’s hypothesis depends upon certain assumptions, including full mobility of voters, full knowledge of the different expenditure patterns of local governments, and no externalities (positive or negative) among communities based on the provision of public goods. *Id.* at 419; see also ALBERT O. HIRSCHMAN, *EXIT, VOICE, AND LOYALTY: RESPONSES TO DECLINE IN FIRMS, ORGANIZATIONS, AND STATES* 17 (1970).

⁷³ Esty, *supra* note 8, at 606.

⁷⁴ Spence, *Local Vetoes*, *supra* note 8, at 384–85. Of course, residents and voters are not entirely mobile; and some kinds of investment are location-specific. For example, in evaluating whether state or local governments are best situated to regulate hydraulic fracturing, it is important to acknowledge that some assets,

Those favoring decentralization question whether the “race to the bottom” actually occurs.⁷⁵ For example, Ricky Revesz has rejected the idea that states will make suboptimal choices about environmental regulations in order to attract industry.⁷⁶ States selling the public good of “location rights” to mobile firms are not equivalent to market participants selling widgets, who compete by lowering prices. States do not face market discipline or the risk of bankruptcy if they fail.⁷⁷

Others contend that the race to the bottom exists, but that it does not “play out” in the manner that economic models suggest.⁷⁸ The trade-offs for firms and individual voters between economic and environmental benefits are not easily compared, especially when environmental benefits and costs are not easily quantified.⁷⁹ States may not be examining the costs and benefits of attracting a specific firm, but rather attempting generally to be “business-friendly,” thus systematically overvaluing employment and tax revenues, and undervaluing environmental protection.⁸⁰

These discussions assume, however, that the regulators understand with some degree of certainty the environmental harms to be regulated—for example, that there are smokestacks with measurable rates or types of emissions. At least, they do not factor uncertainty or precaution into the analysis. These analyses also seem to assume a certain kind of business firm—

such as oil, gas, and minerals, are immobile. *Id.* at 384. The sharing economy, in which assets like cars are provided by peers rather than a firm, are precisely the opposite. *See infra* Part IV.

⁷⁵ Wallace E. Oates & Robert M. Schwab, *Economic Competition Among Jurisdictions: Efficiency Enhancing or Distortion Inducing?*, 35 J. PUB. ECON. 333, 336 (1988); Revesz, *supra* note 7, at 1219–20 (critiquing “race-to-the-bottom” arguments); *id.* at 1236–39 (citing William A. Fischel, *Fiscal and Environmental Considerations in the Location of Firms in Suburban Communities*, in FISCAL ZONING AND LAND USE CONTROLS 119 (Edwin S. Mills & Wallace E. Oates eds., 1975)).

⁷⁶ Revesz, *supra* note 8, at 1217–18.

⁷⁷ *Id.* Recently, legal scholars have discussed whether states should, like municipalities, be permitted to use Chapter 9 of the Bankruptcy Code to shed excess debt in light of significant pension liabilities. *See, e.g.*, Vincent S.J. Buccola, *An Ex Ante Approach to Excessive State Debt*, 64 DUKE L.J. 235, 269–75 (2014) (discussing this debate).

⁷⁸ Esty, *supra* note 8, at 607 n.134 (“Firms rarely move based on environmental standards. Nor do governments overtly change their laws to keep businesses from migrating. . . . Instead, governments relax their environmental enforcement. Or, even more commonly, governments choose not to adopt more stringent standards, even if more vigorous requirements would be welfare enhancing, because economic interests are heard while environmental ones are not.”); *see also* Kirsten H. Engel, *State Environmental Standard-Setting: Is There a “Race” and Is It “to the Bottom”?*, 48 HASTINGS L.J. 271 (1997) (reviewing empirical evidence to suggest state competition leads to suboptimal standard-setting).

⁷⁹ Esty, *supra* note 8, at 585 & n.45 (noting debate over whether environmental externalities can be quantified).

⁸⁰ *Id.*

one that must make choices about where to locate, rather than firms in the sharing economy, which can locate simultaneously in multiple jurisdictions at low marginal cost.

2. *Spillovers, Externalities, and the Matching Principle*

The second set of arguments about the optimal regulator is concerned with externalities or spillovers outside the jurisdiction. This debate acknowledges that there can be market failures when decentralized actors set environmental standards. A state can externalize environmental harms to neighboring states, while internalizing the benefits of industrial activity.⁸¹

The “matching principle” is one solution to this problem, though not the only one.⁸² Under this principle, the ideal regulator is the smallest jurisdiction that captures both the positive and negative externalities associated with the polluting activity. The relevant inquiry under the matching principle is where the burdens and benefits of industrial activity fall. If all of the significant effects (both burdens and benefits) lie within a state’s borders, then the state is likely to set the optimal level of environmental stringency because it can balance between its citizens’ preferences for environmental protection and economic growth. If, however, there are significant environmental effects *outside* the state’s borders, then federal rules may be required.⁸³ Even advocates of decentralization often recognize that federal rules may be necessary to address the spillover problem.⁸⁴

Again, however, to apply the matching principle, there must be at least some degree of certainty regarding the burdens and benefits of the activity to be regulated.

⁸¹ Richard L. Revesz, *Federalism and Interstate Environmental Externalities*, 144 U. PA. L. REV. 2341 (1996) (arguing that interstate externalities are a compelling reason for federal environmental rules, but that current federal statutes fail to address the externality problem effectively); Stewart, *supra* note 8, at 1215 (discussing spillovers); *see also* Esty, *supra* note 8, at 587–97 (discussing “structural mismatches” that encompass both negative and positive externalities). Many scholars identify this problem as one of “poorly defined property rights.” Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority*, 14 YALE L. & POL’Y REV. 23, 36 (1996).

⁸² Butler & Macey, *supra* note 81, at 24–26. Although the “matching principle” sounds neutral, it assumes a default of decentralized governance and requires justification for federal intervention. *Id.*; *see also* Revesz, *supra* note 81, at 2410–14 (proposing tradable permits in units of “environmental degradation” to address interstate externalities).

⁸³ While the affected states could bargain, this would be costly. Butler & Macey, *supra* note 81, at 37–38. This approach also fails to account for the value of nature for its own sake, rather than for whatever utility it offers to humans.

⁸⁴ *Id.* at 29; Revesz, *supra* note 81, at 2342–44.

3. *Public Choice Theories*

The third set of arguments about the optimal regulator derives from public choice theory, which involves the application of economic concepts to the legislative process in an effort to offer a positive account of how that process operates.⁸⁵ Public choice scholars examine the interest group dynamics that drive policymaking. Within this literature, competing models exist, from the pluralist vision of legislators as “referees” who “ratif[y] the victories of successful coalitions” to the view that interest groups’ policy success depends upon the relative costs and benefits of proposed legislation.⁸⁶

In the environmental context, the costs of regulations are often borne by a small number of firms—concentrating their interests and their intensity of preferences. In contrast, the benefits of regulation like cleaner air accrue to the public, which is less likely to be politically organized.⁸⁷ Although one might assume that larger groups would be more successful in a majoritarian political system, Mancur Olson and others have demonstrated that smaller groups with concentrated interests often organize more effectively, especially when potential beneficiaries of regulation are the “diffuse public.”⁸⁸

Two other complications affect public choice models in the environmental context. First, environmental protection is not the only salient issue for voters.⁸⁹ Second, and relatedly, because of information asymmetries and the challenges of valuing intangibles like a “clean environment,” members of the public may place less weight on environmental interests than more concrete interests like preferences to reduce taxes or increase employment.⁹⁰

⁸⁵ Esty, *supra* note 8, at 597–99; Daniel A. Farber & Philip P. Frickey, *The Jurisprudence of Public Choice*, 65 TEX. L. REV. 873, 876–78 (1987) (discussing implications of public choice literature for judicial decisions); Richard L. Revesz, *Federalism and Environmental Regulation: A Public Choice Analysis*, 115 HARV. L. REV. 553 (2001) (challenging the assumption that environmental interest groups will be more successful at a federal level); Spence, *Federalism, Regulatory Lags*, *supra* note 8, at 466.

⁸⁶ Farber & Frickey, *supra* note 85, at 883–86 (quoting E. LATHAM, *THE GROUP BASIS OF POLITICS* 35 (1952)).

⁸⁷ Esty, *supra* note 8, at 597–98.

⁸⁸ MANCUR OLSON, *THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS* 53–57 (1965) (arguing that small groups with concentrated interests can organize more effectively than large groups with diffuse interests). Other scholars have suggested some caveats to this assumption. *See, e.g.*, John E. Jackson & David C. King, *Public Goods, Private Interests, and Representation*, 83 AM. POL. SCI. REV. 1143, 1143–47 (1989).

⁸⁹ Esty, *supra* note 8, at 598.

⁹⁰ *Id.*; *cf.* Cary Coglianese, *Social Movements, Law, and Society: The Institutionalization of the Environmental Movement*, 150 U. PA. L. REV. 85, 118 (2001) (arguing that environmental social movements require concrete, rather than abstract, focal points).

Which regulator is optimal under this analysis depends upon a number of factors. Firms in certain industries prefer national, uniform standards because it is inefficient and expensive for them to follow multiple, possibly conflicting standards.⁹¹ Some scholars of federalism have argued that environmental interests likewise should prefer a national forum, to a state or local forum.⁹² On this view, state and local governments are more easily influenced by industry and union pressures, which are well funded and well organized at local levels.⁹³ Thus, concentrating advocacy at a single level of government—the federal level—would be more efficient and effective.⁹⁴ In addition, some have suggested that national politicians and regulators take more of a “‘long run’ or ‘national’ perspective” than state or local actors.⁹⁵ However, more recent scholarship has rejected these claims, and empirical evidence likewise suggests that a federal forum is not necessarily best in all cases.⁹⁶ For example, environmental interest groups have organized successfully in local disputes over hydraulic fracturing,⁹⁷ and many environmental organizations have regional and local offices, rather than national representation alone.⁹⁸ For existing industrial activity, it may be straightforward to assess where interest-group coalitions are likely to form. For innovative business models like Uber/Lyft, there is some uncertainty regarding how and where interest group battles will play out.

4. *Good Governance and Non-Consequentialist Theories*

The fourth category of arguments favors either centralized or decentralized governance to promote normative values such as political participation, expressive values, or the “national interest.” For example, because state and local government representatives are closer to the citizens who elect them,

⁹¹ Revesz, *supra* note 85, at 573 (noting firm preferences for uniform standards to promote economies of scale in production).

⁹² Stewart, *supra* note 8, at 1213.

⁹³ *Id.*; see Revesz, *supra* note 85, at 562; Spence, *Federalism, Regulatory Lags*, *supra* note 8, at 460–68 (discussing rationales favoring federal regulation).

⁹⁴ Stewart, *supra* note 8, at 1213.

⁹⁵ *Id.* at 1215. This point relates to Stewart’s argument that federal regulators may be better at making “commitments entailing material sacrifice.” *Id.* at 1217.

⁹⁶ Butler & Macey, *supra* note 81, at 45 & n.43; Revesz, *supra* note 85, at 558–73; cf. Claire Cain Miller, *Liberals Turn to Cities to Pass Laws and Spread Ideas*, N.Y. TIMES (Jan. 26, 2016), http://www.nytimes.com/2016/01/26/upshot/liberals-turn-to-cities-to-pass-laws-and-spread-ideas.html?smprod=nytcore-iphone&smid=nytcore-iphone-share&_r=0.

⁹⁷ Spence, *Federalism, Regulatory Lags*, *supra* note 8, at 480–83 (discussing local bans on hydraulic fracturing).

⁹⁸ Revesz, *supra* note 85, at 569.

decentralized decisionmaking can facilitate feelings of self-determination and active participation in the democratic process.⁹⁹ Moreover, policy diversity for its own sake may have “moral virtue.”¹⁰⁰ Utilitarian and social welfare-maximizing theorists, however, would reject such a virtue-based, non-consequentialist approach as “forc[ing] people to pay for goods that they don’t want.”¹⁰¹ Political theorists and legal scholars have long considered the role that such “checks and balances,” and the structure of political institutions can play to prevent abuses, such as tyranny and oppression.¹⁰²

Good governance and the need to avoid tyranny and oppression are foundational questions for representative democracy. They are less specifically concerned with the type of uncertainty regarding environmental, health, or safety impacts I address here than the three categories above. It remains important to acknowledge these values, as they may either reinforce or compete with concerns regarding uncertainty. For example, it may be that these concerns about good governance support the idea of overlapping regulatory authority when we are uncertain about impacts of the type discussed here. In times of uncertainty, it may be especially important for citizens to have a direct ability to express their policy preferences and give voice to different, innovative ways of solving problems.

⁹⁹ Stewart, *supra* note 8, at 1210.

¹⁰⁰ *Id.* at 1211.

¹⁰¹ Esty, *supra* note 8, at 612 (quoting Butler & Macey, *supra* note 81, at 51).

¹⁰² For example, Adriaan Lanni and Adrian Vermeule have argued that political institutions in ancient Athens were organized around the principle of “precautionary constitutionalism,” which they define as “the idea that institutions should be designed to safeguard against political risks, limiting the downside and barring worst-case political scenarios, even at the price of limiting the upside potential of the constitutional order.” Adriaan M. Lanni & Adrian Vermeule, *Precautionary Constitutionalism in Ancient Athens*, 34 CARDOZO L. REV. 893, 894–96 (2013) (noting that “the political risks most often seen as requiring stringent safeguards are: dictatorship and tyranny, in the sense of rule by one man; oligarchy or aristocratic rule; majoritarian tyranny and oppression of political or ethnic minorities; excessive centralization; and deprivation of property rights” and citing, among others, Karl R. Popper and David Hume); Adrian Vermeule, *Precautionary Principles in Constitutional Law*, 4 J. LEG. ANALYSIS 181, 181–84 (2012) (arguing that the precautionary principle of risk regulation raises similar questions as precautionary constitutional design, which has long aimed to prevent political risks such as self-dealing, tyrannical majorities, and biased adjudication). Vermeule sorts anti-precautionary arguments into four categories based on Albert Hirschman’s work: (1) futility—that the precaution will be ineffective at achieving the desired outcome; (2) jeopardy—that the precaution will exacerbate other types of risks; (3) perversity—that the precaution will exacerbate the same type of risk it seeks to prevent; and (4) a preference for *ex post* remedies, rather than *ex ante* precautions. *Id.* at 196 (citing ALBERT O. HIRSCHMAN, THE RHETORIC OF REACTION: PERVERSITY, FUTILITY, JEOPARDY 7 (1991)).

C. *Dynamic Federalism*

In contrast to this search for a single, optimal regulator lies dynamic federalism, which favors diversity and overlapping jurisdiction among multiple regulators.¹⁰³ Dynamic federalism exists in many different forms.¹⁰⁴ There is, for example, what William Buzbee calls federal “floor” preemption—the setting of minimum environmental standards by the federal government, with the understanding that states (or possibly local governments) may exceed this floor.¹⁰⁵ At the far end of the dynamic spectrum is pure “democratic experimentalism,” which favors local experimentation and decentralization to promote learning through “benchmarking, simultaneous engineering, and error detection.”¹⁰⁶ In this form of dynamism, any level of government may govern, without preemption by any higher authority, and without the certainty of a federal floor.

Cooperative federalism shares features of both dual and dynamic approaches, but does not sit fully in either camp.¹⁰⁷ In cooperative federalism, the federal government issues national performance standards (such as National Ambient Air Quality Standards under the Clean Air Act), and then authorizes states to enforce those standards through their own regulatory programs, with the option to exceed the federal standards in some instances. It is neither purely dual (because both federal and state actors have authority to

¹⁰³ Adelman & Engel, *supra* note 9, at 1830 (discussing the virtue of policy diversity).

¹⁰⁴ Cf. Heather K. Gerken, *Our Federalism(s)*, 53 WM. & MARY L. REV. 1549, 1550 (2012) (noting the many forms of federalism).

¹⁰⁵ Buzbee, *Asymmetrical Regulation*, *supra* note 9, at 1551–52.

¹⁰⁶ Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267, 314 (1998).

¹⁰⁷ Cooperative federalism has received a great deal of attention in recent scholarship on federalism and the separation of powers, as many significant recent statutes including the Patient Protection and Affordable Care Act and No Child Left Behind employ cooperative schemes. *See, e.g.*, Jessica Bulman-Pozen, *Federalism as a Safeguard of the Separation of Powers*, 112 COLUM. L. REV. 459, 471–77 (2012) (arguing that in cooperative federalism schemes in which states are empowered to enforce federal law, states can serve to check executive power in the name of faithfulness to Congressional intent); Jessica Bulman-Pozen & Heather K. Gerken, *Uncooperative Federalism*, 118 YALE L.J. 1256 (2009) (focusing on the role of states as dissenters within cooperative federalism schemes); Abbe R. Gluck, *Intrastatutory Federalism and Statutory Interpretation: State Implementation of Federal Law in Health Reform and Beyond*, 121 YALE L.J. 534, 589–92 (2011) (arguing that states play a crucial, yet undertheorized role, in implementing and interpreting federal health care law); Gillian E. Metzger, *Agencies, Polarization, and the States*, 115 COLUM. L. REV. 1739, 1766 (2015) (arguing that states can constrain agencies and the executive through their participation in cooperative federalism schemes like the Affordable Care Act). Despite these accounts of the values of cooperative federalism, “dual” federalism schemes with strong preemption provisions persist.

act), nor purely dynamic (because the federal government sets the standards to be implemented by the states).¹⁰⁸

Dynamism serves multiple normative ends.¹⁰⁹ For example, the *adaptive* view of dynamic federalism replaces the search for an optimal solution to environmental problems with an ecosystem-based model that balances optimization with the search for diverse and malleable solutions.¹¹⁰ *Iterative* federalism describes a world in which different levels of government influence one another's policies in an iterative process over time.¹¹¹ *Empowerment* federalism and *polyphonic* federalism embrace the diversity of multiple voices in governance.¹¹² Most recently, scholars of the new "national" school of federalism have argued that states, and even local governments, through different political institutions and negotiated agreements, can promote *national* values through more decentralized participation in governance.¹¹³

¹⁰⁸ Adelman & Engel, *supra* note 9, at 1811–13.

¹⁰⁹ RYAN, *supra* note 47, at xiv, 34–67 (discussing "checks and balances" across different levels of government; greater "accountability and transparency"; "local autonomy"; and the "pragmatic" ability of the federal government to "cope effectively with interjurisdictional problems that the states could not manage on their own").

¹¹⁰ Adelman & Engel, *supra* note 9, at 1801, 1849 (arguing that dynamic approaches serve adaptive values because dynamism, like ecosystems, can simultaneously promote optimization and diversity).

¹¹¹ See, e.g., Buzbee, *Interaction's Promise*, *supra* note 9, at 162–64 (arguing that "floor" preemption provides opportunities for interactive dynamism, while avoiding the risks of the regulatory commons); Carlson, *supra* note 9, at 1100 (discussing the development of motor vehicle emissions standards as an iterative process between the federal government and California); Engel, *supra* note 9, at 170 (same, and observing interactivity over sulfur dioxide and mercury limits on power plants).

¹¹² See, e.g., ERWIN CHERMERINSKY, ENHANCING GOVERNMENT: FEDERALISM FOR THE 21ST CENTURY 1 (2008); ROBERT A. SCHAPIRO, POLYPHONIC FEDERALISM: TOWARD THE PROTECTION OF FUNDAMENTAL RIGHTS 7 (2009). Other approaches exist. Jody Freeman and Daniel Farber have offered a vision of "modular," flexible institutional frameworks. Jody Freeman & Daniel A. Farber, *Modular Environmental Regulation*, 54 DUKE L.J. 795, 797–98 (2005).

¹¹³ See Jessica Bulman-Pozen, *Executive Federalism Comes to America*, 102 VA. L. REV. 953 (2016) (arguing that significant interaction between executives at the federal and state levels can promote national policies with state differentiation); Bulman-Pozen & Gerken, *supra* note 107; Heather K. Gerken, *Dissenting by Deciding*, 57 STAN. L. REV. 1745 (2005); Heather K. Gerken, *Exit, Voice, and Disloyalty*, 62 DUKE L.J. 1349 (2013); Heather K. Gerken, *Federalism as the New Nationalism: An Overview*, 123 YALE L.J. 1889, 1893 (2014); Abbe R. Gluck, *Our [National] Federalism*, 123 YALE L.J. 1996 (2014); Cristina M. Rodríguez, *Negotiating Conflict Through Federalism: Institutional and Popular Perspectives*, 123 YALE L.J. 2094 (2014). William Boyd and Ann Carlson observe that in light of Congress's failure to adopt a uniform federal approach to electricity regulation, state public utility commissions have engaged in significant innovation that will help achieve a federal goal: the transition to a less-carbon-intensive electric grid. William Boyd & Ann E. Carlson, *Accidents of Federalism: Ratemaking and Policy Innovation in Public Utility Law*, 63 UCLA L. REV. 810 (2016).

Overlap promotes accountability and democratic participation by creating multiple fora in which the public can participate.¹¹⁴ This overlap can limit the risks of interest group capture at one level of government,¹¹⁵ and thus may enhance individual liberty.¹¹⁶ In addition, when interest groups have the potential to approach and convince multiple regulators to enact their favored policies, this can lead not only to policy innovation, but also to policy diffusion.¹¹⁷ Dynamic federalism is more comfortable than dual federalism with diversity and regulatory learning, especially when addressing diffuse contributions to harm.

Of course, the values that dynamism promotes are sometimes in tension, and regulators must choose which values to prioritize.¹¹⁸ For example, the need for “checks and balances” may conflict with the desire for transparency and accountability: in cases of overlapping jurisdiction, voters may not know which sovereign is responsible for the laws that they dislike.¹¹⁹

There are other drawbacks to dynamism. For example, William Buzbee has argued that there is a risk of under-regulation in cases of jurisdictional overlap, such as in pure democratic experimentalism.¹²⁰ To correct for this concern, as well as inertia, status quo bias, and other factors that may inhibit regulatory innovation, he advocates federal regulatory “floors” that leave room for higher local standards.¹²¹ Buzbee argues that federal regulatory floors can promote policy diversity while avoiding the tragedy of a regulatory commons.¹²² Others recognize that dynamism is in conflict with the desire for “uniformity, finality, and hierarchical accountability.”¹²³ And as a matter of positive political theory or public choice theory, industry generally prefers uniform rules and complete

¹¹⁴ RYAN, *supra* note 47, at 44.

¹¹⁵ Engel, *supra* note 9, at 161.

¹¹⁶ THE FEDERALIST, No. 51, at 321–22 (James Madison) (Clinton Rossiter ed., 1961).

¹¹⁷ Engel, *supra* note 9, at 173 (“[I]nterest groups spread innovation when they move between levels of government in an effort to find policymakers receptive to their agenda. Ambitious politicians at one level of government also spread innovation when they adopt an issue neglected by the other level of government . . . in an effort to distinguish themselves in bids for higher office.”).

¹¹⁸ RYAN, *supra* note 47, at 38–67 (discussing tension among competing values).

¹¹⁹ *Id.* at 45.

¹²⁰ William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1, 6–7 (2003) (relying on political economic literature and behavioral law and economics to argue that potential regulators will underinvest in regulation when jurisdictional overlap occurs).

¹²¹ *Id.*; Buzbee, *Asymmetrical Regulation*, *supra* note 9, at 1555–56; *cf.* Dorf & Sabel, *supra* note 106, at 314 (favoring local experimentation and decentralization).

¹²² Buzbee, *Asymmetrical Regulation*, *supra* note 9, at 1555–56.

¹²³ Schapiro, *supra* note 9, at 290.

“ceiling preemption” of alternative forms of governance to avoid conflicting state rules.¹²⁴

Thus, there are many competing values to consider. Balancing among these competing normative concerns remains a central consideration both of federalism theory and of federalism practice.¹²⁵ But there should be room to consider uncertainty and the need for precaution more deeply. Even dynamic federalism, which recognizes the need for policy diversity—and thus, inherently assumes some view of regulatory uncertainty—does not incorporate any express analysis of the role of precaution. Nor does it expressly recognize the importance of taking a “wide viewscreen” approach to acknowledge that any allocation of overlapping authority may actually increase other risks along the same or different axes.

The theory of precautionary federalism thus builds upon the foundations of dual and dynamic federalism, but advances the discussion by examining the interaction effects among innovative business models and technologies, their impacts, and different regulatory options, taking lessons from debates over the precautionary principle into the allocation of governmental authority.

D. Precautionary Federalism

Precautionary federalism is a principle for allocating power across the federal, state, and local governments. It is a flexible approach that takes uncertainty and trade-offs into account when allocating authority. It permits greater policy experimentation across different levels of government when there is greater uncertainty about the interaction effects among environmental impacts, innovation, and regulation. It expressly recognizes that the allocation of authority to address one risk may increase risks along the same or other dimensions. And it suggests that an initial allocation of authority may give way to another—including one that is more concentrated or uniform—when uncertainty diminishes.

In short, the principle has three main elements. First, it sets a default presumption in favor of dynamism and against broad exercises of preemption under conditions of uncertainty to promote policy diversity, allow interest

¹²⁴ Buzbee, *Interaction's Promise*, *supra* note 9, at 160.

¹²⁵ RYAN, *supra* note 47, at xii–xiii (recognizing this tension among competing values in federalism, and advocating a theory of “Balanced Federalism”).

group interaction in multiple fora, and permit tailoring to local conditions.¹²⁶ Second, it recognizes that there are trade-offs across risks.¹²⁷ The benefits of dynamism under conditions of uncertainty must be weighed against other values, including those favoring uniform rules. And third, precautionary federalism is time-bound. It acknowledges that greater certainty about impacts may warrant a shift from one allocation of authority to another, such as from dynamism to greater consolidation, and that new uncertainties may require a shift in the opposite direction.¹²⁸

In situations in which we are uncertain about the current environmental, health, or safety impacts of a new form of activity, and the effect that the regulatory scheme might have on those impacts over time, a dynamic approach is likely (though not guaranteed in all cases) to serve precautionary ends better than a dual federalism one. Just as we do not know under conditions of uncertainty what the best regulatory policy is, we also do not necessarily know who will be the best regulator, or whether a “best” regulator exists at all. Precautionary federalism thus offers a theoretical basis for dynamism under conditions of significant uncertainty, when the need for multiple regulatory voices and policy innovation is strongest.¹²⁹ Interest group dynamics cannot be easily determined under such conditions. If there is a possibility of capture at one level of government, then having multiple fora in which to debate policy can promote better policy outcomes. And it may be useful to determine in the first instance whether regulation should be tailored to local conditions, or whether diversity in local conditions is not salient. Thus, broad exercises of preemption should be avoided if states or local governments desire to exceed federal floors.

But the presumption in favor of dynamism must be weighed against other factors, including whether policy diversity will stifle potentially positive business or technological innovation. It must also be weighed against the possibility that allocating government authority to address one significant risk may exacerbate either the same risk, or risks along other dimensions. In addition, the type of uncertainty must be considered. If, for example, there is

¹²⁶ Cf. KYSAR, *supra* note 12, at 19 (“[P]recautionary approaches can be defended as being particularly well suited to safeguarding life and the environment under conditions of uncertainty and ignorance . . .”).

¹²⁷ Sunstein, *supra* note 11, at 867.

¹²⁸ Cf. Ruhl & Salzman, *supra* note 41 (discussing “exit” of substantive legal rules).

¹²⁹ Cf. Buzbee, *Interaction’s Promise*, *supra* note 9, at 158 (“In settings of dynamism and uncertainty, especially where problems are caused by diverse sources at different scales and manifested in different ways, a single federal answer displacing all other regulatory approaches and institutions is particularly risky.”).

uncertainty about whether a new economic activity will lead to significant interstate spillovers, then a certain type of dynamism—such as federal floor preemption (rather than federal uniform rules) may be the most appropriate dynamic approach.¹³⁰ The existence of interstate spillovers should not automatically preempt state or local governments from exceeding those floors, however, there may be limited information about the interaction of these new forms of business with local conditions. However, if the risk of potentially significant harm arises from *policy diversity itself*—for example, conflicting policies regarding how autonomous vehicles must drive under certain traffic conditions—then a precautionary approach recognizes that the need for uniformity may outweigh the benefits of multiple regulatory voices.¹³¹

Precautionary federalism implicates an important but undertheorized issue in this literature: namely, under what circumstances there is a basis to rethink the initial allocation of regulatory authority. Put another way, at some point, must one allocation of authority give way to another in either a fluid or discrete shift? Theorists of dynamic federalism suggest that dynamism can promote adaptive learning and adjustment to new information in the types of substantive policies that are developed.¹³² Precautionary federalism goes one step further to suggest that one allocation of authority may give way to another when there is greater certainty about the interaction effects among environmental impacts, business innovation, and regulation.¹³³ Precautionary

¹³⁰ For example, if there were uncertainty over whether a new species of genetically modified grain might interbreed with native species, and the seeds could be carried on the wind from a state with lax or no regulation to a state with strict rules, allowing a single state not to regulate could have the same impact as no regulation at all. While a dual theorist would argue that this interstate spillover warrants a federal uniform rule, precautionary federalism suggests that a federal uniform regulatory “floor” can address the spillover problem, while simultaneously allowing other regulators—including state or local governments, or both—to exceed that floor or adopt alternative, non-conflicting rules simultaneously.

¹³¹ See *infra* Part IV.

¹³² Adelman & Engel, *supra* note 9. To be sure, many scholars of dynamic federalism recognize that the federal government maintains a “trump” card to overrule state or local governance decisions, and to consolidate regulatory authority by virtue of the Supremacy Clause. See, e.g., Bulman-Posen & Gerken, *supra* note 107, at 1300 (referring to Congress’s “trump card”); Heather K. Gerken, *Slipping the Bonds of Federalism*, 128 HARV. L. REV. 85, 118 (2014) (noting that Congress has a “supremacy trump card”). But precautionary federalism is more explicit than most dynamic scholarship about the possibility of shifting not only unidirectionally from state experimentation to uniform federal rules, but also from federal rules to state experimentation, and back again. Precautionary federalism also acknowledges more explicitly the possibility that dynamism is not appropriate even in the first instance. It is beyond the scope of this paper to discuss in depth the mechanisms that can facilitate such shifts; that discussion will remain for another day.

¹³³ Cf. William W. Buzbee, *Contextual Environmental Federalism*, 14 N.Y.U. ENVTL. L.J. 108, 112 (2005) (discussing how “the time element, or changing historical circumstances, will modify regulatory capabilities and behavior”). Time is not only important for regulatory capabilities, environmental harms, and

federalism thus addresses head-on Sunstein’s critique that the precautionary principle fails to consider the harms of regulatory *action* alongside its concern with regulatory *inaction*.¹³⁴ Because different regulators may choose different policies—or no regulations at all—precautionary federalism can offer a window into how different approaches fare. Once more information is known about the interaction effects among environmental impacts, innovation, and chosen regulations, a different allocation of authority may become appropriate. This potential for a shift can promote learning about the effectiveness of the tools different regulators have chosen.

Like the precautionary principle, precautionary federalism can thus serve an information-forcing function. In the context of substantive law, by placing the burden on firms to justify why regulation is not required, the precautionary principle “legitimately requires risk creators to research and justify the risks they impose on society.”¹³⁵ For example, California’s Proposition 65 is a substantively precautionary statute regulating risks from toxic chemicals.¹³⁶ It requires the placement of a warning label on products containing chemicals that are initially determined to be carcinogenic.¹³⁷ However, the label is not required if the firm manufacturing the chemical or whose product uses the chemical can demonstrate that the substance poses “no significant risk” of causing cancer and “no observable effect” of reproductive toxicity at certain levels.¹³⁸ This precautionary approach creates incentives for firms to generate such information.

Similarly, assuming that firms generally prefer uniform, rather than multiple, regulatory standards, precautionary federalism can provide incentives to firms to demonstrate why a default of dynamism is not required and why uniformity is more appropriate. To do so, firms may either provide more accurate information about their impacts than the information possessed by regulators, or may choose to minimize those impacts. Alternatively, firms may demonstrate that local conditions are not sufficiently different to warrant local

political incentives, as Buzbee argues. *Id.* at 114. Time likewise matters for changes in business models and forms of business organization. *See* sources cited *supra* note 3.

¹³⁴ In this way, precautionary federalism addresses head-on the need to consider risk-risk trade-offs. KYSAR, *supra* note 12, at 11–12.

¹³⁵ Sachs, *supra* note 52, at 1285.

¹³⁶ Safe Drinking Water and Toxic Enforcement Act of 1986, CAL. HEALTH & SAFETY CODE CH. 6.6; OFFICE OF ENVTL. HEALTH HAZARD ASSESSMENT, PROPOSITION 65 IN PLAIN LANGUAGE (2013).

¹³⁷ CAL. HEALTH & SAFETY CODE § 25249.6.

¹³⁸ CAL. HEALTH & SAFETY CODE § 25249.10; Wiener, *supra* note 52, at 1517.

policy experimentation.¹³⁹ The resulting improved certainty about impacts may support industry's general preference for fewer regulatory voices and greater uniformity of standards.¹⁴⁰ The information-forcing nature of precautionary federalism may be especially important for firms in the sharing economy, which collect a great deal of data on individual rides, yet have only selectively disclosed this data to date.¹⁴¹

Just as the precautionary principle would reject the extreme option that the sharing economy or other new forms of economic organization should be allowed freedom to innovate without *any* government regulation,¹⁴² precautionary federalism generally rejects the claim that at this point, a single regulator can be selected as “optimal.” Although other scholars focus on *whether* the government should regulate the new sharing economy, the normative principles of precaution apply as well to the question of *who gets to decide*. Uncertainty about the impacts of new business models—in the face of significant environmental, health, or safety risks—should not be a signal to avoid or defer regulation; nor should it be a signal to select a single regulator and to exclude others. These are the “extreme options” that should be off the table. Instead, uncertainty requires precaution about who gets to decide. We cannot choose *ex ante* who will be the optimal regulator to the exclusion of others (or whether an optimal regulator exists). At the outset, the burden

¹³⁹ The point here is that firms facing precautionary federalism as a result of uncertainty should be motivated to address that uncertainty head-on either by making public more data regarding their environmental, health, or safety impacts, or by reducing those impacts. A challenge for precautionary federalism, just as for the precautionary principle, is precisely how to measure the level of uncertainty that would trigger a shift to more consolidated governance under these circumstances.

¹⁴⁰ While legal scholarship has long assumed that Congress sets the boundaries between federal and state action in statutes, there is an emerging literature on the role of the executive branch and agencies in this realm. See Bulman-Pozen, *supra* note 113, at 953–54 (rejecting the assumption that Congress alone polices the boundaries of federal-state relations, and discussing the rise of the executive branch in this realm); Gillian E. Metzger, *Administrative Law as the New Federalism*, 57 DUKE L.J. 2023 (2008) (discussing the role of agencies in federalism); Catherine M. Sharkey, *Inside Agency Preemption*, 110 MICH. L. REV. 521 (2012) (discussing how agencies preempt state law). Such determinations are also frequently, though not always, subject to judicial review.

¹⁴¹ These firms are, at heart, about data analytics. Chanelle Bessette, *Does Uber Even Deserve Our Trust?*, FORBES (Nov. 25, 2014, 5:36 PM), <http://www.forbes.com/sites/chanellebessette/2014/11/25/does-uber-even-deserve-our-trust/#69a8719d66d5> (discussing Uber's “God view” pursuant to which customer data and movement can be tracked, including data suggestive of “one-night stands”).

¹⁴² See sources cited *supra* note 5; cf. Molly Cohen & Arun Sundararajan, *Self-Regulation and Innovation in the Peer-to-Peer Sharing Economy*, 82 U. CHI. L. REV. DIALOGUE 116–17 (2015) (“[P]latforms should not be viewed as entities to be regulated but rather as actors that are a key part of the regulatory framework in this arena.” (emphasis added)). Even these authors recognize that in some cases in which “the interests of digital, third-party platforms are not always perfectly aligned with the broader interests of society, some governmental involvement or oversight is likely to remain useful.” *Id.* at 117.

should be on the regulated community to demonstrate why uniform rules are best.

A precautionary approach can adapt quickly to both business and technological innovation. The rise of for-profit firms like Uber/Lyft—which are organized differently from traditional taxi fleets—are not the teleological endpoint of industrial organization.¹⁴³ They are rather likely a stepping stone, but one that could lead in many different directions. Whatever technological or business innovations Uber/Lyft or their successors adopt, precautionary federalism, in which multiple voices are speaking, can ensure that their potentially significant impacts are addressed in a meaningful way.

Having laid out the principle of precautionary federalism in general terms, the next two Parts turn to the case study of Uber/Lyft. Part II proposes that the rise of Uber/Lyft as a new system of transportation poses a risk of significant environmental impacts, but that there is uncertainty about the magnitude and direction of those impacts. Part III argues that the current approach to preemption at both the federal and state levels violates the principle of precautionary federalism.

II. UBER/LYFT'S UNCERTAIN ENVIRONMENTAL IMPACTS

A. *How Uber/Lyft Work*

Uber/Lyft provide an Internet-based application (app) that connects people who need rides with drivers who can offer those rides. The rider pays by credit card via the app, and the payment is split between the driver and the firm.¹⁴⁴ These firms own no vehicles.¹⁴⁵ Uber thus describes itself “as a ‘technology company,’ not a ‘transportation company,’ and describes the software it provides as a ‘lead generation platform.’”¹⁴⁶ Lyft’s business model is similar.¹⁴⁷

Uber currently operates in 470 cities in over 69 countries, including 239 cities in North America.¹⁴⁸ In December 2014, the firm asserted that it was

¹⁴³ See sources cited *supra* note 3 (discussing different forms of business organization).

¹⁴⁴ O’Connor v. Uber Techs., Inc., 82 F. Supp. 3d 1133, 1135 (N.D. Cal. 2015).

¹⁴⁵ *Id.* at 1137.

¹⁴⁶ *Id.*

¹⁴⁷ LYFT, <http://www.lyft.com> (last visited Sept. 21, 2016).

¹⁴⁸ CITIES, UBER, <http://www.uber.com/cities> (last visited Nov. 12, 2016).

providing one million rides globally each day.¹⁴⁹ Lyft operates in 235 cities in the United States, and projects that it will provide 90 million rides in 2015 and 205 million rides in 2016.¹⁵⁰

B. *The Potential Environmental Impacts of Uber/Lyft*

While the impact of any individual ride may be negligible, cumulatively, transportation by vehicle in the United States is a significant source of greenhouse gas (and other local) emissions. In 2014, the transportation sector accounted for 26% of all greenhouse gas emissions in the United States.¹⁵¹ One recent study concluded that to limit global warming to 1.5 degrees Celsius—an ambitious goal to avoid the most catastrophic effects of climate change—will require significant reductions in emissions not only from electricity generation but also from the transportation sector.¹⁵² Uber/Lyft represent a potentially new transportation system—one that depends upon transportation by vehicle, and one that may complement, compete with, or ultimately replace existing transportation systems.

There are many unknowns about whether, taking a life cycle approach, the entry of Uber/Lyft into new markets increases or decreases greenhouse gas emissions as compared to the status quo. In order to answer this question, one must calculate the cumulative emissions from Uber/Lyft rides. But it is important to ask what these rides are replacing (known as “modal shift”), and whether these rides are “induced” (meaning that the rider would not have made the trip in the absence of Uber/Lyft). If such rides replace public transit, emissions may increase. Even taxi rides might lead to fewer emissions if those taxis are low-emissions vehicles—as incentivized by certain municipal

¹⁴⁹ See *supra* note 18 and accompanying text.

¹⁵⁰ Available *Lyft Cities*, LYFT, www.lyft.com/cities (last visited Sept. 21, 2016); Maya Kosoff, *Shockingly, Lyft Isn't Getting Demolished by Uber*, BUS. INSIDER (Mar. 16, 2015, 4:59 PM), <http://www.businessinsider.com/lyft-internal-growth-numbers-revealed-2015-3>; Daniel Miller, *Lyft vs. Uber: Just How Dominant Is Uber in the Ridesharing Business?*, MOTLEY FOOL (May 24, 2015, 6:03 PM), <http://www.fool.com/investing/general/2015/05/24/lyft-vs-uber-just-how-dominant-is-uber-ridesharing.aspx>.

¹⁵¹ ENVTL. PROT. AGENCY, EPA-420-F-16-020, FAST FACTS: U.S. TRANSPORTATION SECTOR GREENHOUSE GAS EMISSIONS: 1990–2014, at 1 (June 2016). This is the second largest industrial source of emissions, after electricity generation. *Id.* Light-duty vehicles, including passenger cars make up sixty-one percent of that total. *Id.* There is regional variation in these figures. GABE PACYNIK ET AL., REDUCING GREENHOUSE GAS EMISSIONS FROM TRANSPORTATION: OPPORTUNITIES IN THE NORTHEAST AND MID-ATLANTIC 8–10 (Nov. 2015), http://www.georgetownclimate.org/sites/www.georgetownclimate.org/files/GCC-Reducing_GHG_Emissions_from_Transportation-11.24.15.pdf (comparing transportation emissions in nine northeast and mid-Atlantic states with national average).

¹⁵² See Rogelj et al., *supra* note 23.

governments.¹⁵³ On the flip side, if the rise of Uber/Lyft leads households to forego purchasing cars, then upstream emissions from the manufacture of new cars may be avoided.

To date, empirical research on the environmental impacts of shared transportation has focused more broadly on carpooling, in which the number of people riding in a single car increases, or on business-to-peer car-sharing systems, in which a single firm (such as Zipcar or car2go) owns vehicles that members can rent on a short-term basis.¹⁵⁴ That research suggests that car-sharing systems reduce greenhouse gas emissions overall.¹⁵⁵ One study conducted in 2010 concluded that, while the overall effect of membership in car-sharing organizations like Zipcar and car2go reduces household greenhouse gas emissions, the “reduction is not generalizable,” as some households’ very large reductions offset the “collective small emission increases of other households.”¹⁵⁶ A more recent 2016 study concluded that access to car2go led some members to forego purchasing a car, and others to sell cars they already owned, which led to an overall reduction in vehicle-miles traveled for members.¹⁵⁷ They noted that there was significant variation among

¹⁵³ See *infra* Part III.B. In 2012, when UberX launched in San Francisco and New York, the company promoted it as a less expensive alternative to UberBlack with privately owned hybrid vehicles. Liz Gannes, *A Status Symbol Moves Down Market: The Context for Uber's Lower-Priced Launch*, ALL THINGS D (July 2, 2012), <http://allthingsd.com/20120702/a-status-symbol-moves-down-market-whats-behind-the-uberx-launch/>. However, Uber currently sets no specific environmental standards for the vehicles its drivers may use. UberX vehicles must be model-year 2000 or newer, with some cities requiring even newer vehicles for UberX, UberBlack, or UberSUV. *Driving Jobs v. Driving With Uber*, UBER, <https://www.uber.com/driver-jobs> (last visited Jan. 28, 2016); *Full Vehicle List*, UBER, <http://www.driveubermc.com/vehicles/full-list/> (last visited Jan. 28, 2016). Newer model-year vehicles are likely (on average) to have better fuel economy than older vehicles, in light of progressive increases in Corporate Average Fuel Economy (CAFE) standards over time; however, fuel economy depends entirely on the vehicle. See *infra* Part III.A.

¹⁵⁴ See, e.g., Nelson D. Chan & Susan A. Shaheen, *Ridesharing in North America: Past, Present, and Future*, 32 TRANSP. REVS. 93 (2012) (discussing environmental impacts of ridesharing, but not TNCs); Jörg Firnkorn & Martin Müller, *What Will Be the Environmental Effects of New Free-Floating Car-Sharing Systems? The Case of car2go in Ulm*, 70 ECOLOGICAL ECON. 1519 (2011) (discussing the environmental effects of one-way business-to-peer car-sharing systems like car2go); Elliot W. Martin & Susan A. Shaheen, MTI REPORT 09-11, GREENHOUSE GAS EMISSION IMPACTS OF CARSHARING IN NORTH AMERICA 3 (June 2010) (concluding that large emissions reductions by some households outweigh small increases by many households joining car-sharing organizations); Elliot Martin, Susan A. Shaheen & Jeffrey Lidicker, *Impact of Carsharing on Household Vehicle Holdings: Results from North American Shared-Use Vehicle Survey*, 2143 TRANSP. RES. REC. 150 (2010) (finding that households participating in business-to-peer car-sharing programs reduce their vehicle holdings).

¹⁵⁵ See sources cited *supra* note 154.

¹⁵⁶ Martin & Shaheen, *supra* note 154, at 3.

¹⁵⁷ Elliot Martin & Susan Shaheen, *Impacts of Car2go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions: An Analysis of Five North American Cities 3–4* (July 2016) (unpublished manuscript), http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_

the five cities in their study, in particular, regarding the relationship between car-sharing and public transit use (modal shift), with more users reducing public transit use than increasing it.¹⁵⁸ Several other studies have concluded that member households significantly reduced their vehicle ownership after joining a car-sharing organization.¹⁵⁹

To date, only one study by Rayle et al. specifically examines the greenhouse gas emissions impacts of Uber/Lyft, which the authors of that study call “ridesourcing.”¹⁶⁰ With caveats about the observational nature of the study, the lack of peer review, and the limited number of neighborhoods they surveyed, Rayle et al. concluded that Uber/Lyft’s model “appears to . . . substitute for longer public transit trips, but otherwise complements transit.”¹⁶¹ They observed that “a substantial portion of sampled ridesourcing trips are spatially and temporally not well served by public transit.”¹⁶²

The impact on car ownership and modal shift, however, were ambiguous.¹⁶³ Individuals using Uber/Lyft “appear to be less likely to own an automobile” in the first instance, but ninety percent reported no change in vehicle ownership since they started using these services.¹⁶⁴ This finding stands in contrast to assertions by Uber’s CEO in London that each of its 7,000

FiveCities_2016.pdf (finding that car2go removed an average of seven to eleven vehicles from the road across the five cities studied including through suppression of purchases and shedding of existing vehicles). The study was based on a survey sent to car2go members in the cities of San Diego, Seattle, Vancouver, Calgary, and Washington, D.C., with 9,497 responses, and smaller numbers of valid responses for different aspects of their conclusions. *Id.* at 7–8 (acknowledging the limits of self-reported data). As of July 2015, three one-way car-sharing organizations, including car2go, served over 500,000 members. *Id.* at 7. The study did not examine local emissions.

¹⁵⁸ Martin & Shaheen, *supra* note 157, at 3–4, 11–13.

¹⁵⁹ *See, e.g.*, Martin et al., *supra* note 154, at 150–51.

¹⁶⁰ Lisa Rayle et al., App-Based, On-Demand Ride Services: Comparing Taxi and Ridesourcing Trips and User Characteristics in San Francisco 2 (Univ. of Cal. Transp. Ctr., Working Paper, Nov. 2014) (on file with author). They contrast “ridesourcing” with “ridesharing,” which “involves the grouping of travelers in a private vehicle, each heading to a similar destination, with the goal of reducing congestion, travel costs, fuel consumption, and vehicle emissions.” *Id.* In contrast, Uber/Lyft drivers “do not share a destination with passengers,” but rather derive income from the arrangement. *Id.*

¹⁶¹ *Id.* at 18. The authors conducted an intercept study in three San Francisco neighborhoods, interviewing people who had just exited Uber/Lyft vehicles or who had used Uber/Lyft within the previous two weeks. *Id.* at 6–7. They asked about distance traveled, point of origin and destination, and how the individual would have traveled if Uber/Lyft did not exist. *Id.* at 6–12.

¹⁶² *Id.* at 1–2.

¹⁶³ *Id.*

¹⁶⁴ *Id.* at 2, 13.

driver-partners in that city is “taking seven and a half cars off the road.”¹⁶⁵ A report by the Shared-Use Mobility Center for the American Public Transportation Association (APTA Report) suggests that a middle ground may be more accurate.¹⁶⁶ The APTA Report concluded that “people who take greater advantage of shared modes [of transportation] report lower household vehicle ownership. . . .”¹⁶⁷ In addition, the APTA Report observed that since beginning to use shared transportation, 20% of all survey participants reported that they had postponed purchasing a car, and 18% reported that they had decided not to purchase a car.¹⁶⁸ Finally, the Report concluded that the majority of Uber/Lyft trips occurred during nighttime hours when public transit was less available.¹⁶⁹

Rayle et al. also observed that Uber/Lyft create a small (8%) “induced travel effect,” meaning that the presence of the service leads to rides that would not otherwise have taken place.¹⁷⁰ For those who would have made the trip in the absence of Uber/Lyft, 39% reported that they would have used a taxi, 33% would have traveled by bus or rail, and 6% would have driven.¹⁷¹ With respect to Uber/Lyft’s impact on overall vehicle miles traveled, the authors reached no definitive conclusion.¹⁷²

Four potentially significant impacts remain unaddressed in this literature. First, these studies do not address the potential impact of Uber/Lyft on support for public transportation in the future, including the degree to which this support may vary by locality.¹⁷³ Second, there does not appear to be any

¹⁶⁵ Natasha Lomas, *Let’s Talk about Uber, Congestion and Urban Air Quality*, TECHCRUNCH (Aug. 26, 2015), <http://techcrunch.com/2015/08/26/uber-london-impact/>.

¹⁶⁶ APTA REPORT, *supra* note 25, at 7.

¹⁶⁷ *Id.*

¹⁶⁸ *Id.* at 8–9.

¹⁶⁹ *Id.* at 10–14.

¹⁷⁰ Rayle et al., *supra* note 160, at 13, 18–19. Although perhaps a small example of induced travel, Uber offered its members a free “UberCADE” during the weekend leading up to the 2016 Democratic National Convention in Philadelphia—a maximum twenty-minute motorcade consisting of “a Cadillac STS and two Suburbans with ‘Secret Service agents,’ according to an email sent to users.” Lauren Feiner, *Uber Offers Free “Presidential” Motorcades in Lead Up to Philly’s DNC Weekend*, PHILLY.COM: IN TRANSIT (July 22, 2016, 4:34 PM), <http://www.philly.com/philly/blogs/in-transit/Uber-offers-free-presidential-motorcades-in-lead-up-to-Phillys-busiest-week.html>.

¹⁷¹ Rayle et al., *supra* note 160, at 13 & tbl.4.

¹⁷² *Id.* at 17.

¹⁷³ Carmel DeAmicis, *Why Ridesharing Companies Like Uber and Lyft Have Yet to Prove Their Environmental Friendliness*, GIGAOM (Sept. 21, 2014, 6:25 PM), <https://gigaom.com/2014/09/21/why-ridesharing-companies-like-uber-and-lyft-have-yet-to-prove-their-environmental-friendliness/> (“If Uber, Lyft, and Sidecar draw people away from the Muni, buses, BART, and taxis, San Francisco will have to change

significant data on the impact of Uber/Lyft on the local environment, including traffic, congestion, and local tailpipe emissions.¹⁷⁴ Third, there is no substantial discussion of the effect of shared transportation on the potential for greater sprawl. Finally, there is no discussion of the relative significance of global, national, and local environmental impacts from such firms, which would aid in determining whether there may be a single ideal locus for regulatory authority when these impacts are better understood.

C. *Demographics of Uber/Lyft*

Because public choice theories figure prominently in scholarly work on federalism, it is important to understand who belongs to the potential political constituencies that might support or oppose Uber/Lyft. Supporters are likely to include both riders and drivers,¹⁷⁵ while opponents are likely to include taxi drivers and taxi fleet owners.

It is not yet clear where advocates of public transit will stand. Uber/Lyft riders are often young and urban.¹⁷⁶ More than one quarter of Uber users come from the top income quartile.¹⁷⁷ Uber drivers tend to be younger than

public transit supply to match the decreased demand. That in turn could make the system even less reliable, and people with higher incomes might reject it altogether.”)

¹⁷⁴ In London, the number of private, for-hire vehicles increased by more than 25% since 2013 when Uber entered the market, while the number of London taxis only increased by 1.5% in that period. Lomas, *supra* note 165. Other city regulators have raised similar concerns about air quality and traffic congestion. See, e.g., Jonathan Friedman, *Uber “Horrible for Air Quality and Traffic Congestion,” Santa Monica Mayor Says*, SANTA MONICA LOOKOUT (Mar. 23, 2015), http://www.surfsantamonica.com/ssm_site/the_lookout/news/News-2015/March-2015/03_23_2015_Uber_Horrible_for_Air_Quality_and_Traffic_Congestion_Santa_Monica_Mayor_Says.html (discussing how the business model may contribute to increased traffic because drivers are continuously on the streets); Terrence Henry, *Have Lyft and Uber Made Traffic in Austin Worse? The City Wants to Find Out*, KUT.ORG (Aug. 3, 2015), <http://kut.org/post/have-lyft-and-uber-made-traffic-austin-worse-city-wants-find-out> (discussing whether Lyft and Uber are making traffic worse in Austin); Annie Zak, *Seattle Mayor: Apps Like Uber Could Make Traffic Problems Worse If Not Managed Correctly*, PUGET SOUND BUS. J. (Oct. 16, 2015, 10:11 AM), <http://www.bizjournals.com/seattle/blog/techflash/2015/10/seattle-mayor-apps-like-uber-could-make-traffic.html> (discussing concerns about traffic).

¹⁷⁵ Many drivers have raised concerns about lack of worker protections, but these concerns have translated into calls for better worker protections, not calls for a rejection of the new firms entirely. See, e.g., Noam Scheiber, *Uber Drivers and Others in the Gig Economy Take a Stand*, N.Y. TIMES (Feb. 2, 2016), http://www.nytimes.com/2016/02/03/business/uber-drivers-and-others-in-the-gig-economy-take-a-stand.html?_r=0.

¹⁷⁶ Felim McGrath, *The Demographics of Uber’s US Users*, GLOBAL WEB INDEX (July 29, 2015), <http://www.globalwebindex.net/blog/the-demographics-of-ubers-us-users>.

¹⁷⁷ *Id.*; see also Felim McGrath, *Uber: Half of 16-34s Are Interested*, GLOBAL WEB INDEX (Apr. 24, 2015), <http://www.globalwebindex.net/blog/uber-half-of-16-34s-are-interested>.

traditional taxi drivers and are more likely to be college-educated.¹⁷⁸ This demographic also tends to use public transportation more than other demographics.¹⁷⁹ Thus, modal shift from public transit to Uber/Lyft by this demographic could lead to less support for public transit in the long run. A worsening of public transportation options could have not only environmental implications, but possibly environmental justice implications for those who cannot afford to ride Uber/Lyft. Taking a “wide viewscreen” approach, it is worth noting one study that suggested Uber vehicles were faster and cheaper at serving low-income neighborhoods than taxis.¹⁸⁰ However, another recent study found that African American passengers faced longer wait times for Uber rides than others, and that Uber drivers were significantly more likely to “cancel” rides for passengers with “African American sounding” names than other riders.¹⁸¹ And there may not be an either/or choice between public transit and Uber/Lyft; there are opportunities for public–private partnerships that may improve the environmental impacts of such firms. For example, the City of Altamonte Springs, Florida has begun a pilot program to subsidize Uber rides that start or end at a commuter rail station.¹⁸² Likewise, the Southeastern Pennsylvania Transportation Authority (SEPTA) announced a pilot program in the summer of 2016 to subsidize Uber rides that end at certain regional rail stations in the suburbs of Philadelphia at which there is insufficient parking.¹⁸³

This emergent transportation system poses the risk of significant environmental impacts—impacts that have global, national, regional, state, and local implications. Yet there is currently uncertainty about the magnitude and direction of these potential impacts. This uncertainty warrants a precautionary approach that facilitates local experimentation. The regulatory reality,

¹⁷⁸ Jonathan V. Hall & Alan B. Krueger, *An Analysis of the Labor Market for Uber’s Driver-Partners in the United States* 7–9, 24 (Princeton Univ. Indus. Relations Section, Working Paper No. 587, 2015).

¹⁷⁹ For example, Americans under the age of thirty are more than twice as likely to ride public transit than Americans between the ages of thirty and sixty, and seven times more likely to use public transit than Americans over sixty. TRANSITCENTER, WHO’S ON BOARD 2014: MOBILITY ATTITUDES SURVEY 38–39 (2014), <http://transitcenter.org/wp-content/uploads/2014/08/WhosOnBoard2014-ForWeb.pdf>.

¹⁸⁰ See ROSANNA SMART ET AL., FASTER AND CHEAPER: HOW RIDE-SOURCING FILLS A GAP IN LOW-INCOME LOS ANGELES NEIGHBORHOODS 4 (2015), <http://botecanalysis.com/wp-content/uploads/2015/07/LATS-Final-Report.pdf> (“Uber is faster and cheaper by a large measure.”). Uber Technologies funded this research. *Id.* at 2.

¹⁸¹ Yanbo Ge et al., *Racial and Gender Discrimination in Transportation Network Companies* 1–3, 12 (Nat’l Bureau of Econ. Research, Working Paper No. 22776, 2016), <http://www.nber.org/papers/w22776.pdf>.

¹⁸² Wittenberg, *supra* note 30.

¹⁸³ Jason Laughlin, *SEPTA, Uber Team to Ease Suburban Parking Crunch*, PHILLY.COM: IN TRANSIT (May 24, 2016, 4:21 PM), <http://www.philly.com/philly/blogs/in-transit/SEPTA-to-partner-with-Uber-in-the-burbs.html>.

however, looks quite different. The next Part examines how existing federal and state laws broadly preempt local environmental experimentation to the extent that they expressly seek to limit vehicle emissions. The principle of precautionary federalism requires reevaluating these rules.

III. EXISTING AND EMERGING LEGAL FRAMEWORKS

A. *Federal Preemption of Vehicle Emissions Standards*

The environmental impacts of transportation are simultaneously global, national, regional, and local in scope. Yet Congress has determined—and the Supreme Court has reinforced through broad exercises of preemption—that both fuel economy and greenhouse gas emissions standards are best regulated through uniform federal rules. Precautionary federalism suggests that this state of affairs is ripe for reconsideration as transportation in the United States is undergoing what may be a systemic shift.¹⁸⁴

Under the Energy Policy and Conservation Act (EPCA) and the Clean Air Act, Congress has delegated to the Department of Transportation and the Environmental Protection Agency (EPA) authority to regulate fuel economy and emissions standards (including greenhouse gas emissions standards), respectively, for new vehicles.¹⁸⁵ The EPCA contains express preemption language prohibiting any state or local government from adopting or enforcing “a law or regulation related to fuel economy standards or average fuel economy standards for automobiles covered by an average fuel economy

¹⁸⁴ There has been only limited action at the federal level specific to Uber/Lyft, and none focused on environmental impacts. In June 2015, for example, the Federal Trade Commission (FTC) convened a conference on the sharing economy, inviting scholars and policymakers to address issues regarding consumer protection, such as whether “reputation systems” and “trust mechanisms” protect consumers and promote “informed choices,” or are subject to bias and manipulation by self-interested parties, the impact of Uber/Lyft on competition and consumer choice, responsibility for consumer injury, and privacy protection. Fed. Trade Comm’n, *The “Sharing” Economy: Issues Facing Platforms, Participants, and Regulators: A Federal Trade Commission Workshop* 4–7 (2015), https://www.ftc.gov/system/files/documents/public_events/636241/sharing_economy_workshop_announcement.pdf.

¹⁸⁵ 42 U.S.C. § 7251 (2012); 49 U.S.C. § 32902(a) (2012); 49 C.F.R. § 501.3(a)(1)(i) (2013). Although the EPA initially declined to regulate greenhouse gas emissions from mobile sources under this provision of the Clean Air Act, the agency reversed course after the Supreme Court’s decision in *Massachusetts v. EPA*, 549 U.S. 497, 534–35 (2007). For a detailed discussion of how these federal agencies collaborated with industry to set harmonized regulations for fuel economy and emissions, including greenhouse gas emissions, see Jody Freeman, *The Obama Administration’s National Auto Policy: Lessons from the “Car Deal”*, 35 HARV. ENVTL. L. REV. 343 (2011). See also Osofsky, *supra* note 10, at 249–52 (discussing environmental regulation of motor vehicles).

standard under this chapter.”¹⁸⁶ The Clean Air Act’s rules for vehicle emissions likewise preempt any state or political subdivision from adopting or attempting to enforce “any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines.”¹⁸⁷ The State of California, however, is exempt from this rule if it first obtains a waiver from the EPA concluding that its standards are “at least as protective of public health and welfare” as the federal standards, and other states may then adopt California’s standards under certain circumstances.¹⁸⁸

Notably, when faced with three potentially conflicting sets of rules, automobile manufacturers brought suit against several states that had adopted California’s emissions standards, contending that they were preempted by the EPCA and the Clean Air Act.¹⁸⁹ Industry ultimately voluntarily dismissed these suits when the Department of Transportation, the EPA, and the State of California, working in consultation with industry, negotiated a set of uniform standards that increased average fuel economy and limited greenhouse gas emissions from vehicles.¹⁹⁰

Despite this strong federal preemption language, both Congress and the Supreme Court have recognized the significant local interest in regulating transportation.¹⁹¹ Since 1952, the Supreme Court has recognized that the “operation of taxicabs is a local business” and that “Congress has left the field largely to the states.”¹⁹² Likewise, the D.C. Circuit has recognized that even in

¹⁸⁶ 49 U.S.C. § 32919(a) (2012). Courts read express preemption language using the words “related to” broadly. *See, e.g.*, N.Y. State Conference of Blue Cross & Blue Shield Plans v. Travelers Ins., 514 U.S. 645, 656 (1995); *Morales v. Trans World Airlines, Inc.*, 504 U.S. 374, 383–84 (1992).

¹⁸⁷ 42 U.S.C. § 7543(a) (2012).

¹⁸⁸ 42 U.S.C. § 7543(b) (2012) (noting that compliance with the California standard, if preemption is waived by the EPA, constitutes compliance with the Act); *see also* 42 U.S.C. § 7507 (2012) (noting that states in non-attainment areas may adopt California’s standards for motor vehicle emissions). The California and federal standards have influenced one another in an iterative process over time. *See* sources cited *supra* note 111.

¹⁸⁹ *See Freeman, supra* note 185, at 345; *see also* *Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 2d 295, 343–49 (D. Vt. 2007) (holding that the regulations were not preempted).

¹⁹⁰ *See* Motion to Dismiss at 2–4, *Central Valley Chrysler-Jeep Inc. v. Goldstene*, No. 08-17378 (9th Cir. Apr. 6, 2010) (stipulating that the motion should be dismissed); Motion to Dismiss, *Lincoln-Dodge Inc. v. Sullivan*, No. 06-70T (D.R.I. Apr. 7, 2010); Motion to Dismiss, *Green Mountain Chrysler-Plymouth-Dodge-Jeep v. Crombie*, No. 2:05-cv-00302-wks (D. Vt. Apr. 7, 2010).

¹⁹¹ 42 U.S.C. § 7543(d) (2012) (“Nothing in this part shall preclude or deny to any State or political subdivision thereof the right otherwise to control, regulate, or restrict the use, operation, or movement of registered or licensed motor vehicles.”).

¹⁹² *Buck v. California*, 343 U.S. 99, 102 (1952); *see also* MARK A. FRANKENA & PAULA A. PAUTLER, AN ECONOMIC ANALYSIS OF TAXICAB REGULATION 1 (1984) (“[T]he taxicab industry is heavily regulated, mainly by local governments.”); Paul Stephen Dempsey, *Taxi Industry Regulation, Deregulation & Reregulation: The*

the context of uniform federal emissions control standards, “the longstanding scheme of motor vehicle emissions control has always permitted the states to adopt in-use regulations—such as carpool lanes, restrictions on car use in downtown areas, and programs to control extended idling of vehicles—that are expressly intended to control emissions.”¹⁹³

Despite this recognition of a strong local interest in the environmental impacts of transportation, however, the Supreme Court has read the Clean Air Act’s preemption provisions broadly to limit sub-federal action in this arena. In *Engine Manufacturers Association v. South Coast Air Quality Management District*, the Supreme Court held that the Clean Air Act preempted state standards governing not only the manufacture of new vehicles, but also standards governing the purchase of private vehicle fleets.¹⁹⁴ The South Coast Air Quality Management District had enacted “Fleet Rules” requiring the purchase of low-emissions vehicles by both public and private actors, to the extent that such vehicles were available in the market.¹⁹⁵ Reflecting an overriding concern about economies of scale in production, the Court concluded that a state command to purchase certain fuel-efficient vehicles was as much a prohibited “standard,” as “a command, accompanied by sanctions, that a certain percentage of a manufacturer’s sales volume must consist of such vehicles.”¹⁹⁶ By declining to address, however, whether “voluntary incentive programs” to purchase fuel-efficient vehicles were preempted, the Court left some room for state or local governments to offer such incentives for the purchase or use of low-emissions vehicles.¹⁹⁷

Recognizing the impact that transportation emissions have in their cities and towns, local governments have attempted to reduce emissions arising out of local vehicle travel, including for-hire vehicles like taxis. However, because of the Court’s expansive reading of this preemption language, these efforts have been limited and have met with mixed results.¹⁹⁸ More successful efforts

Paradox of Market Failure, 24 *TRANSP. L.J.* 73, 75 (1996) (“Today, nearly all large and medium-sized communities regulate their local taxicab companies.”); Robert M. Hardaway, *Taxis and Limousines: The Last Bastion of Economic Regulation*, 21 *HAMLIN J. PUB. L. & POL’Y J.* 319, 331 (2000) (“Limousines remain as the last relic of transportation regulation in America.”).

¹⁹³ *Engine Mfrs. Assoc. v. EPA*, 88 F.3d 1075, 1094 (D.C. Cir. 1996).

¹⁹⁴ 541 U.S. 246, 255 (2004). After laying out this general principle, the Court remanded the matter to apply it to the rules at issue. *Id.* at 258–59.

¹⁹⁵ *Id.* at 248–49.

¹⁹⁶ *Id.* at 248–49, 255.

¹⁹⁷ *Id.* at 255.

¹⁹⁸ These efforts have been consistent with the leading role local governments have played addressing climate change, including both increasing resiliency and reducing emissions. For example, the C40 Cities

have included incentive programs to encourage taxi fleet owners to purchase hybrid or low-emissions vehicles, including by offering “head of the line” privileges to such vehicles at airports, or increasing the rates that fleet owners can charge drivers for hybrid vehicles.¹⁹⁹ Less successful efforts have placed additional burdens on the purchase or use of lower fuel-economy vehicles. Owners of taxi fleets have challenged some of these efforts, claiming preemption under EPCA and the Clean Air Act. The success or failure of these programs has largely depended upon whether the local efforts can be characterized as voluntary incentive programs (which are not preempted),²⁰⁰ or mandatory purchase obligations (which are).²⁰¹

Other municipal efforts to reduce emissions from local taxi fleets have been successful when cities have managed to adopt rules collaboratively and avoid preemption challenges in the courts. For example, in 2008, the City of San Francisco enacted the Clean Taxi Act to reduce greenhouse gas emissions.²⁰² As of July 2013, the San Francisco Municipal Transportation Agency reported that 97% of the city’s taxis are either hybrid or compressed natural gas vehicles.²⁰³ Opposition from the taxi industry to these environmental rules was

Climate Leadership Group now encompasses more than eighty affiliated cities worldwide to address climate change. *About C40*, C40 CITIES, <http://www.c40.org/about> (last visited Jan. 31, 2016). In 2014, the Mayors of Philadelphia, Houston, and Los Angeles announced the formation of the Mayors’ National Climate Action Agenda to set more concrete emissions reduction goals. MAYORS’ NATIONAL CLIMATE ACTION AGENDA: AN INITIATIVE TO COMBAT CLIMATE CHANGE AND PREPARE FOR GLOBAL WARMING (2014), http://www.houstontx.gov/mayor/press/Climate_Action_Agenda.pdf.

¹⁹⁹ See *D/FW Airport Revisits Head of Line Taxi Policy*, DALLAS BUS. J. (Dec. 16, 2011, 5:00 AM) <http://www.bizjournals.com/dallas/print-edition/2011/12/16/dfw-revisits-head-of-the-line-taxi.html>.

²⁰⁰ See, e.g., *Ass’n of Taxicab Operators USA v. City of Dallas*, 720 F.3d 534, 535 (5th Cir. 2013) (rejecting preemption challenges to local programs that could be characterized as incentives to purchase low-emissions vehicles rather than mandates); *Green All. Taxi Cab Ass’n v. King Cty.*, No. C08-1048RAJ, 2010 WL 2643369, at *5 (W.D. Wash. June 29, 2010).

²⁰¹ See, e.g., *Metro. Taxicab Bd. of Trade v. City of New York*, 615 F.3d 152, 158 (2d Cir. 2010) (concluding that decreasing the rate that fleet owners could charge drivers for vehicles with poor fuel economy was a prescriptive mandate to purchase a low-emission vehicle and holding that the rule was preempted). Ironically, the United States filed an amicus brief in that action that argued against preemption of the local rule. *Id.* at 154; see also *Ophir v. City of Boston*, 647 F. Supp. 2d 86, 94 (D. Mass. 2009).

²⁰² 2008 *Clean Air Taxi Frequently Asked Questions*, S.F. MUN. TRANSP. AGENCY, <https://www.sfmta.com/sites/default/files/pdfs/CAT-FAQ.pdf> (last visited Oct. 24, 2016).

²⁰³ *July 15, 2013 Percentage of Clean Vehicles*, S.F. MUN. TRANSP. AGENCY (July 5, 2013), <https://www.sfmta.com/sites/default/files/pdfs/2013-15-7%20Cab%20Companies%20Percentage%20of%20Clean%20Vehicles.pdf> (providing the 97% figure); see Press Release, S.F. Mayor, San Francisco Taxis Surpass Emissions Goal (Feb. 8, 2012), <http://www.sfmayor.org/index.aspx?page=684> (defining “clean” taxis as hybrid or CNG); see also *California Clean Cab Partnership*, CTR. FOR SUSTAINABLE ENERGY, <https://energycenter.org/programs/clean-cab-partnership> (last visited Feb. 1, 2016); Patricia Patton, *San Francisco Greens Its Taxi Fleet*, CARE2 (Feb. 17, 2012),

limited in part as a result of the collaborative nature of the process of adopting the rule, and the provision of funding to help offset incremental costs. But not all cities can count on such collaborative interest-group dynamics.

To date, there are currently no such legal rules governing the emissions of Uber/Lyft rides, though some cities have begun to conduct studies on their environmental impacts.²⁰⁴ The overarching concern is that the Clean Air Act and EPCA may be read to preclude local experimentation on reducing the emissions impacts of these rides.

B. State Preemption of Local Governance

In addition to the federal laws that preempt state and local governance, a number of states have recently enacted legislation or regulations that govern Uber/Lyft to the exclusion of local control.²⁰⁵

Uber/Lyft's active lobbying efforts to enter new markets have been the subject of a great deal of commentary. While many other firms face significant costs to enter new markets, such as the purchase of assets or the building of facilities, Uber/Lyft are different. To enter new markets, they do not need to purchase new vehicles, hire new drivers, or even find parking spaces. Regulatory barriers are, in many cases, the only significant barriers to entry, as

mandating.html; cf. *Metro. Taxicab*, 615 F.3d at 155 (noting that fleet owners did not challenge the rule that increased lease caps for hybrid vehicles).

²⁰⁴ CITY OF NEW YORK, OFFICE OF THE MAYOR, FOR-HIRE VEHICLE TRANSPORTATION STUDY 5 (Jan. 2016) (limited New York study of e-dispatch vehicles' impacts on traffic and congestion); PORTLAND PRIVATE FOR-HIRE TRANSP. INNOVATION TASK FORCE, RECOMMENDATIONS ON TAXIS AND TNCS 10 (Aug. 11, 2015), <http://media.katu.com/documents/Portland+Private+For-Hire+Task+Force+Recommendations.pdf> (recommending that "no action is appropriate at this time" regarding the environmental impacts of taxis and Uber/Lyft despite acknowledging such impacts); see also Emily Badger, *Uber Offers Cities an Olive Branch: Your Valuable Trip Data*, WASH. POST (Jan. 13, 2015), <https://www.washingtonpost.com/news/wonk/wp/2015/01/13/uber-offers-cities-an-olive-branch-its-valuable-trip-data/>; Carl Bialik, *The Debate on Uber's Impact in New York City is Far From Over*, FIVETHIRTYEIGHT (July 23, 2015, 2:06 PM), <http://fivethirtyeight.com/datalab/the-debate-on-ubers-impact-is-far-from-over/> (discussing proposed cap on Uber vehicles); Matt Flegenheimer, *De Blasio Administration Dropping Plan for Uber Cap, for Now*, N.Y. TIMES (July 22, 2015) (noting that since 2011, when Uber entered the New York City market, the number of private, for-hire vehicles has increased by more than 60%); SUNIL JOHAL, SARA DITTA & NOAH ZON, EMERGING ISSUES IN THE TAXI AND LIMOUSINE INDUSTRY (2015), http://documents.ottawa.ca/sites/documents.ottawa.ca/files/documents/otlrsr_emerging_issues_en.pdf (mentioning environmental issues but reaching no conclusions); Justin Kintz, *Driving Solutions to Build Smarter Cities*, UBER (Jan. 13, 2015), <https://newsroom.uber.com/us-massachusetts/driving-solutions-to-build-smarter-cities/> (discussing agreement between Uber and the City of Boston to share certain anonymized trip data).

²⁰⁵ While, as a doctrinal matter, the analysis of such state law preemption provisions is different from the preemption analysis under federal law because it implicates different state "home rule" provisions, as a matter of policy, the issues favoring a narrow exercise of preemption are similar in both contexts.

long as there are drivers willing to drive. In some cases, local governments have welcomed their entry. In other cases, local governments have resisted.²⁰⁶ For purposes of precautionary federalism, the key fact about emerging legal regimes governing Uber/Lyft is the adoption of more than a dozen state rules that preempt all local governance, including, potentially, environmental governance. These emerging state laws have not focused on environmental impacts—the states instead are focusing on setting minimum insurance requirements, mandating background checks, and providing licensing rules. However, several of the laws are worded so broadly that they could be interpreted to preempt local regulation of *any* aspect of Uber/Lyft’s operation, including any efforts to address emissions or other environmental impacts.²⁰⁷ Given the uncertainty about these firms’ environmental impacts, a precautionary approach suggests that laws preempting local governance of environmental impacts are an extreme option that should be rejected at this time.

The California Public Utilities Commission (Commission) was the first state agency to wade into the debate over whether and how to regulate Uber/Lyft, adopting regulations in September 2013.²⁰⁸ The Commission created a new regulatory category, transportation network company or “TNC,” which has since been adopted by other states and municipalities.²⁰⁹ The California rules require Uber/Lyft to: obtain a license from the Commission to operate within the state, require criminal background checks on drivers, establish driver training programs, implement a “zero-tolerance” policy on drugs and alcohol, hold liability insurance, and conduct certain car inspections.²¹⁰ The rule appears to have served as a model for other states.

²⁰⁶ See *supra* note 204.

²⁰⁷ These limitations would go beyond the federal rules that address only emissions standards and vehicle fuel economy.

²⁰⁸ In California, while local governments regulate taxis, the state retains authority to regulate other vehicles for hire, including so-called “charter party carriers.” CAL. CONST., art. XII, § 8 (West, Westlaw through 2016); CAL. PUB. UTIL. CODE §§ 5353(g), 5381 (West 2010) (specifically exempting taxicab regulation from Commission jurisdiction). In California, between 2013 and August, 2015, Uber spent \$925,000 on lobbyists, and Lyft spent \$362,000. Alison Vekshin, *Uber Unleashes Lobbyists in California to Reshape Driver Rules*, BLOOMBERG (Aug. 24, 2015, 5:00 AM), <http://www.bloomberg.com/politics/articles/2015-08-24/uber-unleashes-lobbyists-in-california-to-reshape-driver-rules>.

²⁰⁹ CAL. PUB. UTILS. COMM’N, R.12-12-011, PROPOSED DECISION ADOPTING RULES AND REGULATIONS TO PROTECT PUBLIC SAFETY WHILE ALLOWING NEW ENTRANTS TO THE TRANSPORTATION INDUSTRY 11 (2013) [hereinafter CPUC DECISION].

²¹⁰ Press Release, Cal. Pub. Utils. Comm’n, CPUC Establishes Rules for Transportation Network Companies (Sept. 19, 2013), <http://sn.cpuc.ca.gov/SafetyBlog.aspx?id=301&blogid=88>.

Despite the Commission's "commitment to environmental enhancement," however, the rules make no mention of environmental impacts.²¹¹

To date, more than a dozen states have enacted legislation authorizing Uber/Lyft that contains broad language preempting all local regulation.²¹² Two states have adopted laws governing Uber/Lyft with slightly more limited preemption language, prohibiting the imposition of fees or limits on "the operation of TNC services," but recognizing that local traffic and parking rules apply.²¹³ Illinois, in contrast, has adopted floor preemption language, which prohibits local governments from regulating "in a manner that is less restrictive than the regulation by the State under this Act."²¹⁴ Six states have adopted legislation authorizing Uber/Lyft to operate without any broad preemption of local or municipal rules, though some of these state laws are narrow, governing

²¹¹ CPUC DECISION at 4. Notably, the agency mission incorporates environmental concerns. CAL. PUB. UTILS. COMM'N, www.cpuc.ca.gov (last visited Jan. 29, 2016) (noting the Commission's "commitment to environmental enhancement and a healthy California economy").

²¹² ARIZ. REV. STAT. ANN. § 28-142 (West, Westlaw through 2016 2d Reg. Sess.) (effective July 3, 2013) (preempting local regulations except with respect to airports); COLO. REV. STAT. § 40-10.1-603 (West 2016) (providing for exclusive state jurisdiction); GA. CODE ANN. § 40-1-191 (West 2015) ("The General Assembly fully occupies and preempts the entire field of administration and regulation over ride share network services, transportation referral services, transportation referral service providers, and taxi services as governed by this part" with the exception of local rules governing such services at airports); IDAHO CODE ANN. § 49-3715 (West, Westlaw through 2016 2d Reg. Sess.) (effective Apr. 6, 2015) (preempting local governance); IND. CODE ANN. § 36-9-2-4 (2016) (precluding local regulation); ME. REV. STAT. ANN. tit. 29-A § 1677 (West, Westlaw through 2015 2d Reg. Sess.) (effective June 30, 2015) (stating that municipalities may not regulate TNCs, their drivers, or their vehicles); MONT. CODE ANN. § 69-12-342 (2015); NEB. REV. STAT. § 75-109.01 (2015) (providing for exclusive jurisdiction in the Public Service Commission and precluding local taxes and operational requirements); NEV. REV. STAT. ANN. § 706A.310 (2015) (precluding most local regulation of TNCs); N.D. CENT. CODE ANN. § 39-34-06 (West, Westlaw through 2016 Special Sess.) (effective Apr. 22, 2015) (precluding local regulation of TNCs); OKLA. STAT. tit. 47, § 1030 (2015) (vesting exclusive jurisdiction over TNCs in the Oklahoma Corporation Commission); S.B. 984, 2015 Gen. Assemb., Reg. Sess. §§ 2603-04 (Pa. 2016) (designating TNCs as "public utilit[ies]" and providing that municipalities may "not impose a tax on or require a license for" a TNC, with the exception of licenses and regulations that relate to airports); TENN. CODE ANN. § 65-15-302 (West, Westlaw through 2016 2d Reg. & Extraordinary Sess.) (effective May 20, 2015) (preempting municipal regulation of TNCs except reasonable regulation at commercial airports); VA. CODE ANN. § 46.2-2099.46 (West, Westlaw through end of 2016 Reg. Sess.) (effective July 1, 2015) ("Nothing in this section shall be construed as authorizing the adoption of local ordinances providing for local regulation of transportation network companies, TNC partners, or TNC partner vehicles."); WIS. STAT. § 440.465 (2015) (preempting municipalities from regulating TNCs, with the exception of airport rules).

²¹³ 2015 N.C. Sess. Laws 2015-237 (§ 20-280.10). Similarly, South Carolina's statute provides that TNCs are governed "exclusively" by state law, except that "TNC drivers remain subject to all local ordinances outside the scope of this article, whether directly or indirectly impacting the delivery of TNC driver services including, but not limited to, parking and traffic regulations that are not inconsistent with the provisions of this article." 2015 S.C. Acts 88 (§ 58-23-1710(A)). However, political subdivisions may not impose taxes on TNCs. *Id.* § 58-23-1710(B).

²¹⁴ 625 ILL. COMP. STAT. ANN. 57/32 (2016) (containing floor preemption language).

only insurance requirements.²¹⁵ Finally, a number of states have legislation pending—some purporting to preempt local rules, some not.²¹⁶ In three states, proposed statewide rules died in committee or were vetoed.²¹⁷

Many of these provisions appear to limit the authority of local governments to regulate Uber/Lyft not only with respect to issues of licensing, insurance, and safety, but also to any other requirements—including possibly, environmental rules. Recognizing that Uber/Lyft perform an aggregative function—and potentially represent a new system of transportation, rather than merely individual rides—suggests that such provisions are overbroad.

The firms' expenditures on statewide lobbying suggest their strong preference to preempt local governance that would limit or otherwise encumber them with additional regulatory burdens. For example, Uber and Lyft collectively spent approximately \$1.2 million in Texas, seeking statewide legislation permitting their operation “without the interference of city ordinances,” but were unsuccessful.²¹⁸ The proposed bill, H.B. 2440, included

²¹⁵ MD. CODE ANN., PUB. UTIL. § 10-406 (West, Westlaw through 2016 Reg. Sess.) (effective Apr. 8, 2016) (authorizing counties and municipalities to impose certain assessments or taxes on TNC rides to be used for transportation purposes); MINN. STAT. ANN. § 65B.472 (2016) (requiring insurance); TEX. INS. CODE ANN. § 1954.051 (West, Westlaw through 2015 Reg. Sess.) (effective Jan. 1, 2016); WASH. REV. CODE §§ 48.177.005, 48.177.010 (2016) (discussing insurance coverage only); H.B. 24, 2014 Leg., Gen. Sess. (Utah 2014) (discussing insurance coverage only). In some cases, the scope of these state laws is narrow and not likely to implicate environmental impacts. For example, the laws of Minnesota, Utah, and Washington cited herein govern only insurance requirements. And Louisiana's law sets uniform insurance requirements for TNCs, but maintains local control regarding “ownership, registration and operation” of vehicles. LA. STAT. ANN. § 45:200.11 (2007).

²¹⁶ S.B. 58, 29th Leg., Reg. Sess. (Alaska 2015); H.B. 120, 29th Leg., Reg. Sess. (Alaska 2015) (no preemption language); S.B. 1280, 28th Leg., Reg. Sess. (Haw. 2015); H.B. 1287, 28th Leg., Reg. Sess. (Haw. 2015) (both bills containing preemption language); H. File 394, 2015 Leg., Reg. Sess. (Iowa 2015) (preemption language); H.B. 931, 189th Gen. Court, Gen. Sess. (Mass. 2015) (preempting local governments from regulating TNCs); S.B. 184, 2015 Leg. (Mich. 2015) (no preemption language); S.B. 385, 2015 Leg., Reg. Sess. (W. Va. 2015); H.B. 2736, 2015 Leg., Reg. Sess. (W. Va. 2015) (tabled in the Senate; containing preemption language). Other states' bills died in committee in 2015. *See, e.g.*, H.B. 6349, 2015 Gen. Assemb., Reg. Sess. (Conn. 2015) (no preemption); S.B. 1326, 2015 Leg., Reg. Sess. (Fla. 2015) (no preemption); H.B. 817, 2015 Leg., Reg. Sess. (Fla. 2015) (preemption).

²¹⁷ H.B. 1211, 2015 Leg., Reg. Sess. (Miss. 2015) (died in committee); H.B. 272, 52nd Leg., 1st Sess. (N.M. 2015) (containing preemption language; died in committee). On April 20, 2015, the Governor of Kansas vetoed a bill that would have regulated TNCs statewide. S.B. 117, 2015 Leg., Reg. Sess. (Kan. 2015). However, the legislature overrode the veto, and it appears that the bill has been adjourned to 2016. S.B. 117, 2016 Leg., Reg. Sess. (Kan. 2016).

²¹⁸ Lauren Etter, *Uber Heads for Loss in Bid for Statewide Texas Rideshare Law*, BLOOMBERG (May 21, 2015), <http://www.bloomberg.com/politics/articles/2015-05-21/uber-heads-for-defeat-in-bid-for-statewide-texas-ridesharing-law>; David Saleh Rauf, *Legislative Showdown Over Ride-Share Begins in House*, SAN ANTONIO EXPRESS-NEWS (Apr. 8, 2015), http://www.expressnews.com/news/politics/texas_legislature/article/Legislative-showdown-over-ride-share-begins-in-6187721.php.

language that would have prohibited local governments from imposing taxes on, or requiring licenses for, TNC firms or drivers, and that would have precluded subjecting “a transportation network company or transportation network driver to the municipality’s or other local entity’s rate, entry, operational, or other requirements.”²¹⁹ The final law enacted in Texas did not contain preemption language.²²⁰

Local government officials have expressed concern about the statewide preemption of local rules. For example, officials in Philadelphia and Washington, D.C. have issued fines or impounded Uber/Lyft cars, and cities in Alaska, Alabama, Massachusetts, New York, and Oregon have adopted rules suspending or banning TNCs.²²¹ In 2014, the City of Seattle initially sought to impose a cap on the number of Uber/Lyft vehicles in the city, but ultimately abandoned the measure.²²² The same issue arose in New York City.²²³ These efforts may reflect entrenched interests at the local level favoring existing taxi fleets, but they also appear to reflect concerns regarding uncertain environmental impacts such as congestion and traffic. Even some *state* legislators are questioning whether state preemption of local governance is wise. For example, after the state of Maine passed a law that preempted local regulation, one legislator introduced a bill to limit preemption because of the

²¹⁹ H.B. 2440, 84th Leg., Reg. Sess., § 2402.018 (Tex. 2015) (emphasis added).

²²⁰ TEX. INS. CODE ANN. § 1954.102 (West, Westlaw through 2015 Reg. Sess.) (effective Jan. 1, 2016) Had Texas preempted local governance, the City of Austin would not have been permitted to adopt its own requirements relating to safety, including mandating fingerprinting for all drivers of for-hire vehicles. Mike McPhate, *Uber and Lyft End Rides to Protest Fingerprint Background Checks*, N.Y. TIMES (May 9, 2016), <http://www.nytimes.com/2016/05/10/technology/uber-and-lyft-stop-rides-in-austin-to-protest-fingerprint-background-checks.html>; David Z. Morris, *A Swarm of Startups Are Filling the Uber Void in Austin*, FORTUNE (May 29, 2016, 10:37 AM), <http://fortune.com/2016/05/29/uber-alternatives-austin/> (noting that Uber pulled out of Austin after the City insisted on fingerprinting drivers for safety). Such safety rules likewise implicate principles of precautionary federalism.

²²¹ Eva GrantSimran Khosla, *Here’s Everywhere Uber is Banned Around the World*, BUS. INSIDER (Apr. 8, 2015, 11:03 AM), <http://www.businessinsider.com/heres-everywhere-uber-is-banned-around-the-world-2015-4> (listing other cities); Lane Lambert, *Uber, Lyft banned from Braintree*, PATRIOT LEDGER (May 13, 2015, 7:42 AM), <http://www.patriotledger.com/article/20150512/NEWS/150518784>; Steve Quinn & Shelby Sebens, *Uber Quits Anchorage, Sued in Oregon*, HUFFINGTON POST (May 6, 2015), http://www.huffingtonpost.com/2015/03/06/uber-anchorage-oregon-lawsuit_n_6820966.html; *Uber Regulation: US Cities That Have Successfully Stood Up to Uber*, WHO’S DRIVING YOU? (July 19, 2015), <http://www.whosdrivingyou.org/blog/us-cities-stood-up-regulate-uber>.

²²² Taylor Soper, *Seattle Prepares to Legalize Uber, Lyft on Monday*, GEEKWIRE (July 13, 2014, 11:57 PM), <http://www.geekwire.com/2014/taxiseattle/>.

²²³ Klopott, *supra* note 6.

City of Portland's inability to control Uber/Lyft at the airport.²²⁴ That bill, entitled "An Act to Allow Municipalities to Regulate Transportation Network Companies," failed on November 19, 2015.²²⁵

There is no question that it is in Uber/Lyft's interests to seek uniform rules at the state, rather than the local level, and to do so at the earliest stage possible. Statewide rules allow these firms to achieve economies of scale in their lobbying efforts. Support of local taxi firms and drivers is likely to be more concentrated at the local level, but more diluted at the state level. These lobbying efforts recall similar efforts by energy firms engaged in hydraulic fracturing to seek statewide rules preempting local efforts to regulate environmental impacts through local zoning.²²⁶ As in the case of hydraulic fracturing, many of the environmental impacts of Uber/Lyft, such as changes in traffic and congestion, and those more significant for Uber/Lyft, such as changes in demand for public transit, are likely to be felt most deeply in local communities. Some of the environmental impacts, including greenhouse gas emissions, may lend themselves to local action in service of national interests. A vision of precautionary federalism should motivate both legislators and courts to narrow the scope of preemption at the federal and state levels to permit experimentation and learning at this time of uncertainty.

²²⁴ Matt Byrne, *Bill Calls for Letting Maine Municipalities Set Rules for Uber Drivers*, PORTLAND PRESS HERALD (Sept. 28, 2015), <http://www.pressherald.com/2015/09/28/bill-calls-for-letting-maine-municipalities-set-rules-for-uber-drivers/>.

²²⁵ *Id.*; *126th Legislature—Second Regular Session Legislative Council Action on Legislative Council Action on Legislative Bill Requests*, MAINE STATE LEGISLATURE (Nov. 19, 2015), <https://legislature.maine.gov/uploads/originals/r2-request-for-screening-vote-detail-by-sponsor.pdf>.

²²⁶ See Spence, *Local Vetoes*, *supra* note 8, at 393–97. Courts have been split as to whether statewide oil and gas laws preempt local zoning, though the courts have been motivated as much by the text and purpose of specific state statutes and constitutional provisions, as by general policy values regarding federalism or localism. Compare *Wallach v. Town of Dryden*, 16 N.E. 3d 1188, 1191 (N.Y. 2014) (rejecting state preemption of local zoning); and *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 913 (Pa. 2013) (rejecting state preemption of local zoning), with *City of Longmont v. Colo. Oil & Gas Ass'n*, 369 P.3d 573, 577 (Colo. 2016) (holding that municipal ban on hydraulic fracturing was preempted by state law); *State ex rel. Morrison v. Beck Energy Corp.*, 37 N.E. 3d 128 (Ohio 2015) (finding express preemption based on the statutory language), and *Northeast Natural Energy, LLC v. City of Morgantown*, No. 11-C-411, 2011 WL 3584376 (W. Va. Cir. Ct. Aug. 12, 2011) (holding that statewide regulations preempted a city ordinance banning hydraulic fracturing). Other state legislatures have also attempted to preempt local governance of hydraulic fracturing in light of local bans. See, e.g., S.B. 809, 55th Leg., Reg. Sess. (Okla. 2015); H.B. 40, 84th Leg., Reg. Sess. (Tex. 2015).

IV. LAW AND POLICY IMPLICATIONS

As a normative matter, precautionary federalism tells us that uncertainty about the potentially significant environmental impacts of Uber/Lyft at this time weighs against strong preemption of state and local government policy experimentation. State and local governments should be permitted to require the use of low-emission vehicles for transportation for hire and to regulate environmental risks that state regulators did not contemplate. This approach would either require legislators to draft statutes without broad preemption language, or courts, and in some cases agencies, to exercise preemption narrowly in both the federal and state contexts. This approach would advance a number of core values, including placing the burden on the regulated community to come forward with evidence as to why one level of government should preempt experimentation by other levels of government. It can also promote policy diversity and tailoring to local conditions in a way that enhances democratic participation. Overlapping jurisdiction can counter powerful interest groups by making multiple fora available for debate and can limit the possibility of capture at a single level of government. And precautionary federalism requires taking a wide view approach to risk-risk trade-offs, including the possibility that allowing experimentation can increase other risks, both for the environment and along other axes. Finally, precautionary federalism recognizes that this initial allocation of authority may give way to more centralization either if other values compel it, or if greater certainty arises about the interaction effects among these new forms of business, their environmental impacts, and different forms of regulation.

This Part applies the values underlying federalism theory to the case of Uber/Lyft and suggests that precautionary federalism more completely captures what is at stake in determining how to allocate regulatory authority than existing approaches. It concludes by suggesting how precautionary federalism would apply in two other contexts of business and technological innovation outside the sharing economy—hydraulic fracturing and autonomous vehicles—to demonstrate the theory's broader relevance.

A. A Precautionary Approach

Existing theories of dual and dynamic federalism, and the values that motivate them, do not easily capture all relevant aspects of the sharing economy. Viewing this issue through the lens of dual federalism theory, the impact of Uber/Lyft on greenhouse gas emissions is the classic case of

interstate (or more accurately, global) spillovers requiring a national, uniform approach.²²⁷ No state or local government internalizes both the benefits and the harms of business activity that emits greenhouse gases. Rather, decentralized governments can externalize the costs of emissions while reaping the benefits of economic activity within their borders. Under a dual federalism approach, greenhouse gas emissions offer the best possible case for uniform national standards (as a second-best strategy after global standards) because states have incentives to under-regulate, and “race to the bottom.”²²⁸

Similarly, as a matter of public choice theory, car manufacturers, whose upstream decisions about vehicle fuel economy and emissions affect the environmental impacts of downstream drivers, likewise favor national uniformity to achieve economies of scale. This approach is consistent with the uniform national vehicle emissions and fuel economy standards under the Clean Air Act and the EPCA.²²⁹ While these federal standards permit some state innovation under the California waiver provision, the federal standards preempt other states from experimenting, and almost all local government action seeking to reduce emissions or improve fuel economy.

A dynamic theorist would disagree, arguing that climate change is actually the paradigmatic case for dynamism.²³⁰ As Elinor Ostrom has recognized, while the effects of climate change are global, its causes are deeply local, including “the actions undertaken by individuals, families, firms, and actors at a much smaller scale.”²³¹ When federal leadership on climate change was not forthcoming, state, regional, and local governments stepped in to fill the void. State regulators and regional bodies have adopted rules and innovative policies that have refined one another’s regulatory programs. Indeed, at this point, it is somewhat uncontroversial to argue that state and local innovation with respect

²²⁷ See Coglianese, *supra* note 90, at 116–17.

²²⁸ See, e.g., Cary Coglianese & Jocelyn D’Ambrosio, *Policymaking Under Federal Pressure: The Perils of Incremental Responses to Climate Change*, 40 CONN. L. REV. 1413, 1415 (2008) (arguing that sub-federal climate policies may be “worse” than no action at all).

²²⁹ See 42 U.S.C. § 7401 (2012); 42 U.S.C. §§ 6291–6317 (2012).

²³⁰ RYAN, *supra* note 47, at 167–76; Adelman & Engel, *supra* note 9, at 1846–49 (arguing that state initiatives on climate change demonstrate descriptive power of dynamic theories of federalism); Boyd & Carlson, *supra* note 113; Buzbee, *Interaction’s Promise*, *supra* note 9, at 148 (“Numerous state and local initiatives regulating GHG emissions follow federal reluctance to address the causes of climate change.”).

²³¹ Elinor Ostrom, *A Polycentric Approach for Coping with Climate Change* 4 (World Bank, Working Paper No. 5095, 2009), <http://www10.iadb.org/intal/intalcdi/pe/2009/04268.pdf>.

to climate change is an essential aspect of public policy to tackle this complex problem.²³²

A new “nationalist” theorist of federalism might argue that state and local governance can serve the national interest to combat climate change. Local transportation policy, including the availability of public transit, may have a profound impact on this national problem. This dynamism, of course, may come at the expense of greater uniformity and certainty for industry, as well as accountability and transparency.

What is missing from these accounts is the value of precaution, and an understanding that innovative forms of business interact in different and in some cases, surprising, ways with the values underlying both dual and dynamic federalism. Having argued that precaution weighs against uniform federal rules and strong preemption in this case, the final Part of this Article balances this presumption against other federalism values and offers an independent reason for a precautionary approach—namely, informational benefits.

1. Uniformity and Interstate Spillovers

Traditional justifications for federal uniform rules do not neatly apply to the environmental impacts of Uber/Lyft. To be sure, the platforms are themselves available nationally and do not differ by locality. Additionally, greenhouse gas emissions raise the problem of interstate spillovers. However, while much ink has been spilled on the states “racing to the bottom,” this dynamic is not likely to be a primary driver of state rules in the context of the sharing economy. By their very nature, Uber/Lyft are unlike classic “smokestacks,”²³³ in which a single, hierarchical firm must decide where to locate, exclusively, among multiple state jurisdictions. Because Uber/Lyft rely on individual drivers to provide rides in their personal vehicles, these firms can co-exist in multiple jurisdictions—wherever there are willing drivers with private vehicles. The firms can simultaneously enter different markets, at

²³² Kirsten Engel, *State and Local Climate Change Initiatives: What Is Motivating State and Local Governments to Address a Global Problem and What Does This Say About Federalism and Environmental Law?*, 38 URB. LAW. 1015, 1016 (2006); Kirsten H. Engel, *Whither Subnational Climate Change Initiatives in the Wake of Federal Climate Legislation?*, 39 PUBLIUS 432, 433 (2009); Kirsten H. Engel & Scott R. Saleska, *Subglobal Regulation of the Global Commons: The Case of Climate Change*, 32 ECOLOGY L.Q. 183, 209 (2005).

²³³ Cf. Salzman, *supra* note 40, at 417 (defining “smokestack services”).

minimal marginal cost for Uber/Lyft (other than regulatory costs), because the firms need not supply any of the cars or employ any new drivers.²³⁴

To be sure, there may be markets that are more desirable than others—for example, major cities such as New York, Chicago, or Los Angeles—such that other markets are not perfect substitutes. But the possibility of locating in multiple states and municipalities simultaneously affects the dynamics of regulatory competition differently from the case of more traditional, hierarchical firms facing exclusive choices about where to locate. In this way, state and local governments are simply not competing for industrial investment in ways that would prompt a race to the bottom. There is thus less of a concern about under-regulation if decentralized actors are setting rules in this context. If one local government decides not to regulate the environmental impacts of Uber/Lyft, there may be some additional greenhouse gas emissions. However, this is unlikely to be a case of interstate spillovers that could potentially *negate* all of the benefits of regulation elsewhere. In contrast, if there were uncertainty over whether a genetically modified fish might interbreed with native species, and the fish might travel from one state to another in a river or lake, then allowing a single state *not* to regulate could have the same impact as no regulation at all. That is not the issue here. Even if it were such a case, federal floor preemption, in which state or local governments could exceed the floor, would address the problem. Thus, this rationale for federal uniform rules with strong preemption is lacking when applied to sharing economy firms like Uber/Lyft. The same argument applies to state rules preempting local governance.

2. *Public Choice, Laboratories of Experimentation, and Good Governance*

Similarly, while public choice theories appear to describe somewhat accurately the strong preemption approach that Uber/Lyft have pursued in some states in the safety, privacy, and insurance context, they do not necessarily provide the best approach, as a normative matter, to allocating authority to address these firms' environmental impacts. Uber/Lyft's strategy of seeking preemption of local governance allows them to achieve certain economies of scale and efficiencies in their lobbying efforts. It avoids the need for them to obtain separate permission to operate in hundreds or thousands of

²³⁴ Business-to-peer sharing firms, such as Zipcar, Enterprise CarShare, or car2go, which actually own vehicles that can be rented for short-haul trips, would face higher marginal costs to purchase cars (and, in some cases, to locate parking spaces) to enter new markets.

localities nationwide. In addition, municipal taxi fleet owners and drivers are more likely to be well mobilized at the local level in light of historical regulatory practices. At the state level, their interests are likely to be more diffuse.

But when we do not know whether this new transportation system is good or bad for the environment, or the magnitude of differences among localities, overlapping jurisdiction may provide an important precautionary check against the significant lobbying expenditures of Uber/Lyft at the state level.²³⁵ Permitting greater local experimentation would provide an incentive for these firms to come forward with information regarding their impacts at the local level in order to demonstrate that no local rules should be required, that local rules should be less stringent, or that state or federal rules with preemption language are actually appropriate, because local variation is not significant.²³⁶

Depending upon one's view of "decentralization"—and whether *state* regulators or *local* regulators are the locus of decentralization—statewide uniform rules are either consistent or inconsistent with arguments in favor of uniform or decentralized rules. If one thinks of state regulators as the locus of "decentralization" (as many scholars of traditional dual federalism do), then uniform rules at the state (rather than the federal) level are consistent with decentralized approaches. Fifty regulators, rather than one, can promote policy diversity, by tailoring to decentralized conditions and preferences, and different fora for interest group attention. Yet, if one thinks about a spectrum from uniform federal rules to decentralization at the *local* level, then statewide preemption of local rules is more consistent with a "uniform" approach that prevents local experimentation. This is especially true given the similarity in language among the state statutes governing Uber/Lyft. These state rules do not signal deep regulatory competition among states; nor are they evidence of significant state experimentation as laboratories of democracy.

Regardless of whether one views them as "centralized" or "decentralized," statewide rules preempting local governance are inconsistent with precautionary federalism in this case at this time. While the states, rather than the federal government, may be closer to the people, local governments are

²³⁵ See Engel, *supra* note 9, at 161. It is important to distinguish between the appropriateness of statewide rules on insurance and employment relations that protect consumers and drivers, and the overly broad preemption language in these laws that may stifle local government innovation with respect to environmental, health, or safety impacts.

²³⁶ This may also provide substantive incentives for the firms to improve their emissions profiles.

certainly more so.²³⁷ Competition, both horizontally (across states or across localities) and vertically (across different levels of government), can diffuse the potential for regulatory or legislative capture, and can serve to “check and balance” concentrations of power at the hands of one level of government.²³⁸

Moreover, public choice theory is not merely about aggregation of preferences. It is also about recognizing the intensity of preferences.²³⁹ David Spence’s analysis of local bans on hydraulic fracturing is instructive on this point.²⁴⁰ Spence contends that “local-government decisions on [hydraulic fracturing] ought to be *less* susceptible to businesses’ organizational advantages than state-government decisions because the issue is much more salient at the local level.”²⁴¹ In that context, data demonstrate that both at the state and national levels, on average, there is considerable support for hydraulic fracturing.²⁴² Yet, the negative effects are likely to be most strongly felt (and thus the views are most strongly negative) at local levels. Thus, an approach that recognizes intensity of preferences ought to provide local government with a “veto option,” which can actually enhance overall welfare.²⁴³

Thus, even on a public choice account, there is room for giving voice to local preferences that may differ from federal or state preferences, and that may differ from other local preferences. Local governments may care most deeply about the risks of climate change including sea-level rise, or they may care about traffic and congestion. They may also care more deeply about other values and choose not to exceed federal emissions standards. But traditional values favoring uniform, federal rules, or even rules favoring state governance alone, do not neatly apply in this context at this time. A precautionary approach offers a more nuanced recognition of these complexities, and the need to balance multiple risks.

3. *Informational Benefits*

Precautionary federalism offers an independent reason for permitting state or local governments to exceed federal or state environmental standards.

²³⁷ Davidson, *supra* note 10, at 1000.

²³⁸ Ryan, *supra* note 47, at 12.

²³⁹ Spence, *Local Vetoes*, *supra* note 8, at 385–93.

²⁴⁰ *Id.*

²⁴¹ *Id.* at 387.

²⁴² *Id.* at 388–89.

²⁴³ *Id.* at 389.

Precautionary federalism is information-forcing. It can help to generate information about the environmental impacts of Uber/Lyft, particularly with respect to the significance of diversity among local conditions. If firms prefer uniform rules, then a precautionary approach would place the burden on these firms to provide more information about their environmental impacts in order to achieve the uniform rules they desire. Precautionary federalism would thus serve the ends of the precautionary principle through burden-shifting in the allocation of regulatory authority.

Ironically, a great deal (though not all) of the needed data is collected by Uber/Lyft already. Some news reports have focused on the more tawdry aspects of this data collection, but these firms are, at heart, about data analytics.²⁴⁴ Uber, for example, tracks the locations and times of pickup and drop off, which can be compared to public transit stops and schedules.²⁴⁵ It tracks which vehicles pick up which passengers, and provides data regarding the average speed of travel on receipts after each trip.²⁴⁶ These data could be analyzed to generate information about cumulative emissions, by calculating more precisely the emissions generated during each trip, and whether those trips could have been taken on public transit. Additional interview-based research is needed to determine the impacts on user vehicle ownership and modal shift. But making available relevant data regarding emissions would certainly go a long way to help answer these important questions about the environmental impacts of these firms and reduce uncertainty.²⁴⁷ A precautionary approach can thus help to provide incentives to firms to offer more certainty about their impacts in order to achieve the kind of regulatory uniformity they likely prefer.

Precautionary federalism also offers advantages in a time of rapid innovation in forms of business organization. Some business firms seek to avoid regulations targeted to particular business models through creative use of

²⁴⁴ See Bessette, *supra* note 141.

²⁴⁵ *What to Expect When You Ride*, UBER NEWSROOM (Nov. 25, 2013), <https://newsroom.uber.com/uber-safety-transparency/> (last updated Dec. 7, 2015) (“Every Uber receipt includes your driver’s name and photo, your exact route and timeline, as well as your average speed and distance.”).

²⁴⁶ *Id.*

²⁴⁷ While this article does not focus on the role of private governance in precautionary federalism, there may be a role to play. If a firm provided greater certainty about environmental impacts through private environmental governance, that might support an argument for greater consolidation of regulatory authority. For example, if Uber/Lyft decided to partner only with “driver-partners” driving zero-emissions vehicles, or all rides involved car-pooling, or these platforms reported all emissions generated from their rides to a third-party public platform, then the environmental impacts of this form of business would be more certain than they are now.

corporate organization. Policy variation and overlap may make this more challenging. Firms have many different choices about how to organize themselves along the continuum from hierarchies to markets.²⁴⁸ In many of these choices, entrepreneurs seek to minimize their costs—including regulatory costs—in choosing their form of business organization.²⁴⁹ Whether Uber/Lyft were organized to revolutionize transportation or to avoid existing rules on taxi fleet caps becomes irrelevant to the inquiry. What *is* relevant is an understanding that regulations are costs that entrepreneurs take into account in organizing their businesses, and that permitting experimentation can facilitate more nimble responses to rapid changes in business organization. Precautionary federalism can allow regulators to remain agnostic about whether Uber/Lyft in their current form will be good or bad for the environment—we simply do not yet know. But the choices we make today can influence the answer in the future and affect how quickly regulators can respond.

Under conditions of uncertainty, it is especially difficult—if not impossible—to determine who is the “optimal” policymaker (assuming that there is an optimal policymaker in all circumstances, which may not be the case). Precautionary federalism recognizes the importance not just of substantive policy diversity, but of regulator diversity as well. Not only do we not always know *ex ante* whether regulatory action or inaction will lead to greater risks or greater enhancements of welfare;²⁵⁰ we also do not always know whether a single regulator or a combination of regulators will best serve those ends. Affording multiple levels of government the option to experiment and interact can help answer those questions. Of course, any policy will not only reveal facts about the world as it is; it will also shape the future direction of both the relevant regulatory targets and their environmental impacts. It is

²⁴⁸ Coase, *supra* note 3, at 387.

²⁴⁹ *Id.*; see also Oliver E. Williamson, *Markets and Hierarchies: Some Elementary Considerations*, 63 AM. ECON. REV. 316, 316-17 (1973) (arguing that entrepreneurs take into account regulatory costs, as well as uncertainties, in determining whether to use hierarchical forms of organization or markets and the price mechanism); cf. Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305 (1976) (arguing that the term “hierarchy” fails to capture the complexity that firms are actually a “nexus” of contracts in which what is “inside” and what is “outside” the firm cannot be neatly distinguished).

²⁵⁰ Yair Listokin has offered an economic justification for the argument that “the best policy choice in the face of uncertain outcomes depends critically on the reversibility of the policy.” Yair Listokin, *Learning Through Policy Variation*, 118 YALE L.J. 480, 553 (2008). Listokin argues that “[a] federal system offers the possibility of learning through the experience of one jurisdiction without having to impose a high-variance policy on all jurisdictions.” *Id.* at 552.

like the purchase of an “option” to prevent significant harm until better information is available.²⁵¹

Imagine that one locality, particularly concerned with an increase in greenhouse gas emissions, wanted to mandate that all Uber/Lyft vehicles be low-emissions or electric vehicles. Right now, there is a question as to whether such a rule would be preempted by either federal or state law (depending upon the state). If courts or agencies²⁵² exercised preemption narrowly, a locality might yet be able to experiment in this way.²⁵³ The Uber/Lyft case, for example, is unlike California’s low-emissions vehicle rules that the Supreme Court struck down in *Engine Manufacturers Association v. South Coast Air Quality Management District*, which required certain, specified entities to purchase such vehicles. In contrast, the local rule governing Uber/Lyft rides would not require Uber/Lyft to purchase any low-emissions vehicles. Uber/Lyft do not own any vehicles. Nor would any individual driver be required to purchase a low-emissions vehicle, because individuals are not obligated to drive for these firms. Thus, such a rule would interact differently in the sharing economy context than for other forms of business organization.²⁵⁴ And while this limitation of federal preemption might impose some regulatory costs on Uber/Lyft, those costs would likely be lower than for a traditional, hierarchical firm that would be required to purchase low-emissions vehicles itself. Recognizing the unlikelihood that Congress will revisit the text of these statutes, at the very least precautionary federalism suggests that courts and agencies should exercise preemption narrowly in both the federal and state contexts when it comes to regulating Uber/Lyft’s environmental impacts.

B. Broader Applications of Precautionary Federalism

While Uber/Lyft provide a strong case for precautionary federalism, the principle has broader application. I conclude by offering two brief examples in

²⁵¹ Cf. Sunstein, *supra* note 11, at 841.

²⁵² For example, in some states, it is an agency like a public utility commission that would address this issue in the first instance, rather than a court. *See supra* Part III.B.

²⁵³ Hannah Wiseman might say that this approach would disaggregate rules governing the manufacture of new vehicles from purchase or use requirements. *See supra* note 38.

²⁵⁴ In addition, a precautionary approach could support regional efforts to reduce transportation emissions, such as through the Transportation and Climate Initiative. *Five Northeast States and DC Announce They Will Work Together to Develop Potential Market-Based Policies to Cut Greenhouse Gas Emissions from Transportation*, GEO. CLIMATE CTR. (Nov. 24, 2015), <http://www.georgetownclimate.org/five-northeast-states-and-dc-announce-they-will-work-together-to-develop-potential-market-based-poli>.

which a precautionary approach offers new insights about the allocation of regulatory authority in cases of technological innovation. One addresses environmental concerns in the hydraulic fracturing context; the second, safety concerns about autonomous vehicles.²⁵⁵

Hydraulic fracturing raises similar concerns about potentially significant, yet uncertain environmental impacts. Some of those impacts are global, such as greenhouse gas emissions, while others, like impacts on traffic, congestion, air quality, and water quality, affect the local environment more acutely. There is significant uncertainty about whether hydraulic fracturing is good or bad for the environment. On the positive side, advocates argue that natural gas is cleaner than coal and produces fewer harmful greenhouse gas emissions when burned. In contrast, critics argue that fugitive methane emissions released during the fracturing process can negate some of those benefits, and further contend that replacing coal with natural gas will simply delay a transition to renewables.²⁵⁶ Under conditions of uncertainty, a precautionary approach would permit local communities to regulate or limit hydraulic fracturing without federal or state preemption, not only because of concerns over local impacts on traffic, congestion, or water contamination, but also in light of these more global concerns, until greater certainty about hydraulic fracturing's impact on the climate is achieved.

The second example in which precautionary federalism offers new insights is the case of safety regulations for autonomous vehicles. Advocates contend that autonomous vehicles (AVs) will transform transportation in the United States, if not the world, and will make transportation safer. Recently, the National Highway Traffic Safety Administration (NHTSA), the federal agency responsible for setting federal motor vehicle safety standards, asserted that “the excitement around highly automated vehicles . . . starts with safety.”²⁵⁷ Yet there is tremendous uncertainty about the path that this technological innovation may take. We do not yet know whether AVs will become truly “driverless,” or whether a role for human drivers will remain. We also do not know for how long the status quo of human-driven cars will co-exist with developing AV technology. And even driverless AVs could adopt different technologies and algorithms that could conflict. These uncertainties raise

²⁵⁵ The principle also applies to the allocation of authority to regulate toxic chemicals. Light, *supra* note 44 (manuscript at 8–9).

²⁵⁶ Spence, *Local Vetoes*, *supra* note 8, at 385–93 (discussing impacts of hydraulic fracturing).

²⁵⁷ NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FEDERAL AUTOMATED VEHICLES POLICY 5 (Sept. 2016) [hereinafter 2016 NHTSA POLICY] (noting that 94% of vehicle crashes arise from “human choice or error”).

safety concerns along the same axis, but in the opposite direction. This technological innovation could increase the likelihood of accidents, at least in the short term.²⁵⁸ For example, AVs might be great at reducing accidents if only driverless AVs are on the road, yet much less adept at predicting what unpredictable human drivers will do. Even if only driverless AVs were on the roads, an AV confronted with the need to make a split-second determination about how to avoid a collision has many options.²⁵⁹ If different vehicle manufacturers program their vehicles with conflicting algorithms regarding how to avoid a collision or otherwise operate safely in traffic conditions, this could increase the risk of accidents. AVs thus hold significant potential to decrease traffic fatalities and crashes by reducing human driver error, but also (especially in the short-term) the potential to increase risks along the same axis.²⁶⁰ Currently, technological uncertainty about the path AV innovation will take interacts with regulatory uncertainty about how best to regulate this technological innovation to promote safety.

Under current law, NHTSA is responsible for setting federal safety standards for motor *vehicles*, while the states are responsible for regulating *human drivers* through licensing, insurance, and traffic laws.²⁶¹ The rise of AVs, in which the vehicle and its programming take on certain core functions once within the control of the human driver, challenges this federalism boundary. To date, several states have adopted differing rules authorizing AVs either on testing grounds or public roads, some requiring human drivers to be in the driver's seat; some not.²⁶² The potential for conflict may become more acute as vehicles move out of testing and begin to cross state lines.

²⁵⁸ *Id.* at 26.

²⁵⁹ *Id.* Of course, the AV's "reaction" is determined by algorithms and assumptions embedded into its code by humans engineers. DAVID A. MINDELL, OUR ROBOTS, OURSELVES: ROBOTICS AND THE MYTHS OF AUTONOMY 220 (2015) ("[A]utonomy is *human action removed in time.*") (emphasis in original).

²⁶⁰ A recent crash involving a Tesla Model S vehicle garnered a great deal of attention in this regard. Anjali Singhvi & Karl Russell, *Inside the Self-Driving Tesla Fatal Accident*, N.Y. TIMES (July 12, 2016), <http://www.nytimes.com/interactive/2016/07/01/business/inside-tesla-accident.html>. There are, of course, other potential benefits along other axes, including the potential to offer mobility to the elderly or people with disabilities.

²⁶¹ 2016 NHTSA POLICY, *supra* note 257, at 38.

²⁶² Rachel Abrams, *Self-Driving Cars May Get Here Before We're Ready*, N.Y. TIMES (Jan. 21, 2016), http://www.nytimes.com/2016/01/22/business/dealbook/davos-self-driving-cars-may-get-here-before-were-ready.html?_r=0; JAMES M. ANDERSON ET AL., AV TECHNOLOGY: A GUIDE FOR POLICYMAKERS 56–65 (Rand Corp. Eds. 2016) (summarizing state rules and discussing potential of autonomous vehicles to reduce crashes); *Automated Driving: Legislative and Regulatory Action*, STAN. CTR. FOR INTERNET & SOC'Y, https://cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action (listing regulatory and legislative actions regarding autonomous vehicles); Ariel Wittenberg, *States Race to Let Autonomous Cars Drive Alone*, GREENWIRE (Sept. 19, 2016), www.eenews.net/stories/1060043030 (noting

This is a case in which the *type* of uncertainty is particularly important for a precautionary federalism analysis. While precautionary federalism sets a default of dynamic policy experimentation, in some cases the benefits of uniformity can outweigh that presumption. For example, if AVs begin to cross state lines more regularly, and there were significant safety benefits to uniform federal safety standards for crash avoidance algorithms or technology, this could outweigh the presumption. If *policy conflict itself* could raise safety problems, the case for uniformity is stronger. This is, of course, only a very preliminary discussion of a highly complex problem, but it highlights an example of how the analysis could play out.

Consistent with a precautionary approach, on September 20, 2016, NHTSA issued policy guidance regarding AVs that expressly recognizes the need for ongoing reevaluation in light of evolving circumstances.²⁶³ The 2016 NHTSA Policy takes the position that hardware and software are part of the vehicle, and thus subject to *federal* motor vehicle safety standards.²⁶⁴ However, it does not formally preempt state law, as the position is embodied in policy guidance, rather than notice-and-comment rulemaking. Thus, NHTSA's action acknowledges that experimentation should not be preempted at this time, but that preemption may be needed as the technology continues to develop.

These examples demonstrate that a precautionary approach has implications beyond environmental impacts and beyond the sharing economy.

CONCLUSION

While this Article has offered a description and defense of the principle of precautionary federalism, this approach raises questions that are ripe for additional research. Some of these questions also arise in the context of the precautionary principle, such as how much uncertainty is required for a precautionary approach, and how to measure that uncertainty. Other issues are unique to the federalism context. For example, when there is overlapping authority across jurisdictions, choice of law and deference issues are implicated. In addition, since precautionary federalism suggests that there may

that several states and the District of Columbia permit testing of AVs with a human driver present, and other states are permitting such vehicles without a human driver in the vehicle).

²⁶³ 2016 NHTSA POLICY, *supra* note 257, at 3.

²⁶⁴ 2016 NHTSA POLICY, *supra* note 257, at 38 (noting that “as this area evolves, the ‘unknowns’ of today will become ‘knowns’ tomorrow. We do not intend to write the final word on highly automated vehicles here”). The Policy encourages, but does not require, states to adopt a Model State Policy to promote uniform rules at the state level. *Id.* at 39.

be a basis to shift from one allocation of authority to another when better information becomes available, the question arises as to what mechanisms can be used to effectuate that shift. Precautionary federalism requires some form of statutory or regulatory review of the allocation of authority. While some scholars have debated the merits of legislative sunset provisions in different substantive statutes,²⁶⁵ and others have explored regulatory mechanisms like waivers and non-enforcement to update substantive law,²⁶⁶ it is worth exploring precisely how to ensure that allocations of authority can likewise shift over time in the federalism context. Other questions that are worthy of further exploration include the role that private environmental governance should play in precautionary federalism.²⁶⁷ While it is beyond the scope of this Article to resolve all of these issues, it offers them as a preliminary research agenda on precautionary federalism.

Because firms like Uber and Lyft are facilitating transportation by vehicle, they may have significant environmental impacts. However, we do not yet know for sure. We do not know how significantly the impacts vary across localities. Just as the precautionary principle counsels us that regulators need not wait for certainty about the magnitude of potentially significant harms, precautionary federalism offers an approach to the allocation of authority under conditions of uncertainty. We simply cannot know who the best regulator is, or whether a “best” regulator exists at all. Because precautionary federalism is time-bound, the potential of a shift from one allocation of authority to another can serve an information-forcing function about the significance of uncertain impacts. Precautionary federalism thus offers the best way to achieve the kind of rules called for by the precautionary principle.

²⁶⁵ Rebecca M. Kysar, *Lasting Legislation*, 159 U. PA. L. REV. 1007 (2011) (critiquing sunset provisions in legislation); Rebecca M. Kysar, *The Sun Also Rises: The Political Economy of Sunset Provisions in the Tax Code*, 40 GA. L. REV. 335, 338 (2006) (discussing sunset provisions in tax law).

²⁶⁶ See, e.g., David J. Barron & Todd D. Rakoff, *In Defense of Big Waiver*, 113 COLUM. L. REV. 265 (2013) (arguing that “big waiver”—congressional delegation to agencies of the power to “unmake statutory provisions”—is a powerful tool to update stale laws); Daniel T. Deacon, *Administrative Forbearance*, 125 YALE L.J. 1548 (2016) (discussing express delegations of forbearance authority to agencies as a tool to address changed circumstances in substantive law).

²⁶⁷ See *supra* note 45 and sources cited therein.