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1

Introduction

TOWARD EXPERIMENTALIST GOVERNANCE

Can the world meet the challenge of climate change?

After more than three decades of global negotiations, the prognosis looks bleak. The most ambitious diplomatic efforts have focused on a series of virtually global agreements such as the Kyoto Protocol of 1997 and Paris Agreement of 2015. But with so many diverse interests across so many countries, it has been hard to get global agreement simply on the need for action, and *meaningful* consensus has been even more elusive. Uncertainty about which emissions reduction strategies work best has impeded more robust action; prudent negotiators have delayed making commitments and agreed only to treaties that continue business as usual by a more palatable name. All the while, emissions have risen by nearly two-thirds since 1990, and they keep climbing—except for the temporary drop when the global economy imploded under the coronavirus pandemic. Yet to stop the rise in global temperature, emissions must be cut deeply—essentially to zero over the long term.

Meanwhile, similar problems have plagued global governance more generally. The World Trade Organization (WTO), founded in 1995, has been paralyzed for more than a decade by the kind of consensus decision-making that has hamstrung climate diplomacy. In many other domains, from human rights to investment to monetary coordination, international order seems to be fraying. With no global hegemon and no trusted technocracy—welcome changes in the eyes of many—there is no global authority to mend it.

Popular protest has only reinforced this global gridlock. The Great Recession of 2008 exposed the limits of the postwar model of economic growth, and the economic shock triggered by the pandemic has dramatically exacerbated social inequality. No wonder that climate change and economic policy have become even more densely intertwined politically. For conservatives in many countries, decarbonization is a fraught symbol of the global elite. Repudiating climate agreements—Donald Trump's snubbing of the Paris Agreement, for example—has been seized on as a way to reassert the primacy of national interests after decades of unchecked globalism. For progressives, meanwhile, efforts to reconcile sustainability and inclusive well-being find expression in calls for massive public investments such as a Green New Deal. That vision has found tentative success in only a small fraction of the global economy—one that accounts for a shrinking slice of global emissions.

But bleak as it is, this record is not the whole story. Alongside the string of disappointing global agreements and false visions of surefire solutions are significant as well as promising successes in many other domains. We can learn from them in the fight to rein in warming. From the global to the local levels, and at every level in between, models of effective problem-solving have already emerged and continue to make progress on issues, like climate change, that are marked by a diffuse commitment to action, but no clear plan for how to proceed. These efforts work in countries as diverse as China, Brazil, and the United States, and for international problems as diverse as protecting the ozone layer and cutting marine pollution. They address challenges as intrusive and contentious as any that arise with deep decarbonization, and tackle challenges whose solutions require unseating powerful interests and transforming whole industries. In sector after sector, from steel to automobile transport to electric power, real progress in the elimination of emissions is gaining momentum.

The strategy underlying these initiatives points the way forward. They work by setting bold goals that mark the direction of the desired change. But they acknowledge up front the likelihood of false starts, given the fact that the best course of action is unknowable at the outset. They encourage ground-level initiative by creating incentives for actors with detailed knowledge of mitigation problems to innovate and then converting the solutions into standards for all. But they also enable ground-level participation in decision-making to ensure that general measures are accountably contextualized to local needs. When experiments succeed, they provide the information and practical examples needed to mold politics and investment differently—away from vested interests and toward clean development. They

solve global problems not principally with diplomacy but instead by creating new facts on the ground—new industries and interest groups that benefit from effective problem-solving, and that push for further policy effort.

We call this approach to climate change cooperation *experimentalist governance.* It is sharply at odds with most diplomatic efforts—including the important but ultimately flawed Paris Agreement—which so far have failed to make a meaningful dent in global warming. The architects of global climate treaties assumed that the dangers of climate were clear, and that solutions were in hand or easily discoverable. The real problem—in their understanding, often the only one—was the allocation of the costs of adjustment and the associated mobilization of political will. Since cutting emissions is expensive, and each nation is tempted to shirk its responsibilities and shift the costs to others, climate diplomats took it for granted that no nation would cooperate unless all are bound by the same commitments. The analogy was to a group of shepherds, aware that together they are overgrazing the commons they share, but each calculating that it is foolish to reduce their flocks unless all the others do. From those assumptions came the requirement that climate change agreements should be global in scope and legally binding. The result is global action no more ambitious than what the least ambitious party will allow.

These assumptions have not stood up to the test of time, and neither has the paradigm for solving the climate problem. Above all, the easy availability of solutions can't be taken for granted. The experience of recent decades with, for example, electric vehicles, integration of renewables in the power grid, and improvements in ground-level pollution control, shows the difficulties. While solutions can be achieved, they are hard to come by and require deep, coordinated changes in many domains. Progress depends on the degree to which innovation is encouraged and coordinated. From this perspective, the problem that the overgrazing shepherds face is not primarily to agree on sharing the burdens of adjustment but to make adjustment feasible by cooperating to develop a new breed of sheep that grazes on less grass—and perhaps new varieties of grass and pasture practices as well. If that metaphor captures the fundamental challenge of climate change, then the best way to build effective consensus is not to ask who will commit to certain predetermined outcomes no matter what but instead to begin by systematically encouraging solving problems at many scales and piecing the results together into ever-stronger solutions. Global commitments, achieved through diplomacy, should be the outcome of our efforts rather than the starting point.

This is a book about extraordinary but little-noticed innovations in organization and governance that take this alternative approach. We show

how experimentalist strategies work under conditions of deep and pervasive uncertainty about the right solutions even when familiar approaches fail. We illustrate how they link local action with more encompassing coordination to speed the solution of general problems and, conversely, how they adapt general solutions to local contexts. We explain how public, private, and civil society actors, monitoring themselves and each other, can work together to advance decarbonization while making the economy more efficient and nimble. Along the way, we revisit enough of the history of climate change agreements to explain how the dominant institutions of the day all but foreclosed effective cooperation. Our central aim is to reorient our current climate change regime away from failed efforts based on ex ante global consensus, and toward a system anchored in local and sectoral experimentalism and learning. We firmly believe we can meet the stark challenges before us, and experimentalist governance shows us how.

A paradigm case of experimentalist governance and central example running through this book is the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer—by many measures, the single most effective agreement on international environmental protection. We argue that we still have a lot to learn from Montreal as well as a lot to *unlearn* from mistaken views about the basis of its accomplishments. To set the stage for the rest of the book, we give a preview in the following section of the nuts and bolts of the protocol's exemplary successes. We then spell out the fundamental principles that made it work: the bedrock design ideas of experimentalism, which we will explore in more depth in later chapters. Next, we identify three flaws of traditional climate change policy thinking that impede more effective forms of action and go on to discuss how all of this relates to the signature piece of climate diplomacy today: the Paris Agreement of 2015. We end with the plan for the rest of the book.

The Montreal Protocol: An Exemplary Success

Crafted in the late 1980s, the Montreal Protocol was ahead of its time.[1] Not only was it highly effective, but it became a model for what might be achievable in solving the problem of climate change. Despite widespread admiration for the successes of Montreal, the real reasons for its achievements were largely misunderstood and misapplied in the case of climate change. Although the ozone and climate regimes looked quite similar on the surface, Montreal advanced quickly to solve the ozone problem while there was little problem-solving in the domain of climate change.

It is useful to go back in history to probe why Montreal worked—and how it became an exemplary system of experimentalist governance. That proper understanding is essential to knowing not just why the ozone layer is healing but also how to make more progress on climate change by creating an institutional architecture that takes uncertainty for granted—a system that is a spur to innovation rather than a cause of political gridlock.

Beginning in the 1970s, scientists detected chemical reactions thinning the atmospheric ozone layer that protects most life on earth from ultraviolet radiation. The cause was traced to the emissions of chlorofluorocarbons (and later other chemicals, including halons) that were then widely contained or used in the manufacture of many products, from aerosol sprays to fire extinguishers, styrofoam, refrigeration and industrial lubricants, and cleaning solvents. After more than a decade of contentious debate, two linked treaties, the Vienna Convention (1985) and Montreal Protocol (1987), created the framework for a global regime whose governance procedures were elaborated in the following years. The original black letter provisions in these agreements were thin on content; success came from how these institutions evolved through practice. Nobody used the term "experimentalist governance" to describe what they were doing, but experimentalism is the system that they created.

The core of this system of governance is a schedule to control and eventually eliminate nearly all ozone-depleting substances (ODS). The measures are reassessed every few years in light of current scientific, environmental, technical, and economic information, and the schedule is adapted as necessary. The periodic meeting of the parties has broad authority to review the implementation of the overall agreement, and make formal decisions to add controlled substances or adjust schedules.

In this regime, problem-solving is broken down into sectors that use similar technologies, and is guided by committees representing industry, academia, and government regulators. The committees organize working groups of ODS users and producers to review and assess efforts, mainly in industry, to find acceptable alternatives. The reviews consider key individual components as well as whole systems—for example, assessing whether a refrigerant that depletes the ozone layer can be replaced by an analogous and more benign alternative as well as whether refrigeration systems that utilize these new chemicals can work reliably and at an acceptable cost. Pilot projects yield promising leads that attract further experimentation at a larger scale, allowing the committees to judge if the nascent solution is robust enough for general use. Without the institutions of the Montreal

Protocol, what looks like the successful spontaneous search for alternative technologies would not have been possible.

If this search comes up short, the committees and their oversight bodies authorize exemptions for "essential" and "critical" uses, or extend timetables for phaseout. When the use of ODS was phased out in the metered dose inhalers that propel medication into the lungs of asthmatics, for instance, the sectoral committee consulted doctors, pharmaceutical companies, and device manufacturers country by country to determine substitutes along with transition schedules that met the safety and efficacy requirements of patients. When a few firms invented an array of alternative metered dose inhalers using benign propellants, the committees put the industry on notice that the old methods would be banned. Innovative firms had a strong incentive not to be left out, and persistent laggards faced exclusion from the market.

Over time, an amendment procedure allowed additions within the existing categories of coverage and also brought new categories of emissions under control. The boundaries around "sector" were adjusted as the properties of each class of ODS was understood and new sectors were implicated. Analysts often celebrate Montreal because it followed the science of ozone depletion, but that science at the time of Montreal's adoption was indeterminate as to ozone safe solutions, and the real root of success was the Montreal orchestration of experimentation and learning about uncertain industrial futures.

Membership in the Montreal Protocol expanded sharply as well. Initially the protocol focused on industrialized countries, as they had the highest consumption of ODS and were most compelled politically to stop ozone thinning. But use increased rapidly among developing countries, and they were allowed to extend their compliance schedules so as to encourage their participation in the protocol. As a further incentive, essentially all the costs of compliance for developing countries were paid by the Multilateral Fund (MLF) financed by the rich countries—costs that included not just the new technologies but also the local administrative capacity needed to oversee the preparation and execution of comprehensive regulatory plans for phasing out the production and use of ozone-destroying chemicals sector by sector. Simply making new technology available would not have compelled the use of these benign alternatives; local contextualization was essential, and the fund helped build that capacity. Administratively, the fund is probably the best-managed funding mechanism in the history of international environmental governance. Politically, it helped transform the ozone problem from one with a guaranteed deadlock—since developing countries did not

want to bear all of these costs themselves—into one that was more practical politically.

The Montreal regime operates against the backdrop of vague but potentially draconian penalties for governments and firms that drag their feet. For the Western governments that initiated the regime, such as the United States, those penalties were electoral. (Those were the bygone days when the United States was a reliable leader on global environmental topics.) For the industrial firms that made the noxious substances, the penalties were about brand value and the license to operate. DuPont, the most visible of these firms and therefore the most vulnerable, broke ranks with the rest of the industry to demand a phaseout. (It helped that the alternatives might prove more profitable.) Once there was one innovator, it was too costly for others to lag behind. And in countries that actively undermine the Montreal Protocol—Russia at first, but others later on, including India and China—the penalties were threats such as trade sanctions that came from other powerful governments, mainly in the industrialized world, that wanted Montreal to work and also wanted to make sure their home industries would not be undercut by violators overseas.

Designing for Uncertainty

The features of the Montreal approach that make it a good model can be captured in a handful of design principles. Together they characterize a distinctive decision-making process that is well suited to domains, like climate change, marked by great complexity and uncertainty where the very nature of possible outcomes is unknowable in advance.

This approach starts with a thin consensus among an open group of founding participants motivated to act. The precise definition of problems, let alone the best way to respond to them, can't be anticipated at the outset, but there is enough agreement on how to get started. In the case of Montreal, that initial agreement took the form of an acknowledgment that ozone thinning was a problem that must be stopped, and a first step would require cutting in half the most widely used ODS by 1998. At the time there was no agreement on the magnitude of the risk, the feasibility of finding particular substitutes by certain dates, or even whether 50 percent cuts were the right goal. Consensus thickens with effort, however, and new knowledge demonstrates what is needed, and which actors are capable and trustworthy. Interests are mutable as actors come to anticipate an advantage in the destabilization of the status quo and more demanding regulation. Participation is open, in the sense that

new actors outside the circle of founders are invited in as their experience and expertise become relevant to addressing core problems.

In this scheme, the actual problem-solving is devolved to local or front-line actors—those most likely to have the kind of experience and expertise that embodies unanticipated possibility and unsuspected difficulty. Under Montreal, the most essential ground-level work has been technological, and performed by industrial enterprises developing and testing new chemicals and equipment along with local regulators that figure out how this equipment will operate in real-world conditions—for example, how metered dose inhalers can meet drug safety standards.

This local problem-solving is regularly monitored by a more comprehensive body. In the case of Montreal, assessment panels and sectoral committees periodically take stock of local problem-solving and help codify lessons. Monitoring is typically implemented by peer review: actors with overlapping but distinct areas of expertise and experience evaluate particular projects against others of their kind. The fund monitors projects in developing countries, and updates pooled knowledge about what actions cost and whether they work—vital information because each time Montreal parties adjusted or amended regulatory obligations, they also needed to update the funding plan. These routines help spot and scale successful innovation, and make it easier to nip budding failures. Just as an initial, broad understanding of problems is corrected by local knowledge, so local choices are corrected in light of related experience elsewhere.

A comprehensive review leads, in turn, to periodic adjustments along with a redirection of means and ends. From a distance, Montreal looks like a regime that always ratcheted commitments tighter, but viewed close-up, it becomes apparent that progress was less linear. Goals were periodically relaxed through exemptions and deadline extensions when problems proved unexpectedly hard. Science helped identify broad goals, but the pace of on-the-ground problem-solving—along with what the parties were willing to spend through the MLF and other funding mechanisms—determined compliance deadlines and the timing of additions to the list of regulated substances. Periodically, a centralized assessment panel takes stock of the lessons, and offers a plan for how emission controls could be adjusted, the benefits to the ozone layer, and what it would cost.

A distinctive combination of penalties and rewards incentivizes both public and private participation in this type of regime. By rewarding leaders to bet on change, they make it risky for laggard firms and government to bet against it. This *penalty default*, as it is known, destabilizes the status quo;

obstruction becomes the riskiest bet of all. And once the logjam of current interests is broken, shifting the question from *whether* change is possible to *how* it can be implemented in diverse conditions, the failure to keep pace is viewed more as a symptom of ignorance and incapacity than as an expression of selfish cunning.

The initial form this feedback effect takes is to call attention to shortfalls and offer assistance, not punish wrongdoing. Only when misbehavior persists and comes to seem incorrigible does the reaction become draconian: actors that repeatedly prove unwilling or unable to improve are threatened with expulsion from the community, typically by being excluded from key markets.

These principles are unfamiliar in the realms of climate policy because much of that world frames climate change correctly as a problem of global collective action, but incorrectly equates global problem-solving with the search for solutions through consensus diplomacy. Most diplomacy, we will suggest, largely follows and aids on-the-ground experimentation and problem-solving rather than leading from the front. These principles, however, are not alien to the regulators, firms, and nongovernmental organizations (NGOs) that have stumbled onto ways of working together to solve hard problems. They have discovered that the only way to move beyond the status quo is to destabilize it, and then learn, quickly, to use the daring and imagination that bubble up in the open space to develop better approaches.

Experimentalist Governance Hidden in Plain Sight

This experience of managing under conditions of complexity and uncertainty is familiar to regulators and firms working on ground-level problem-solving. To understand why it has not translated easily into international efforts, it is helpful to take a closer look at conventional assumptions. In particular, policy choices have often been structured around three false dichotomies.

The first and most consequential is the view that organizations are either top-down or bottom-up. Top-down organizations are bureaucracies of the kind we associate with big corporations or big government. Precise goals are set at the top, and translated into detailed rules or operating routines in order to direct execution. Frontline workers apply the rules or follow the routines; middle managers see that they do or make ad hoc adjustments as necessary. Bottom-up organizations, for their part, seem hardly like organizations at all; they are forms of coordination that emerge as actors—ideally on equal

footing, left to themselves, and given enough time to suffer the consequences of their mistakes—eventually master common problems.[2]

The Paris meeting was a victim of this top-down, bottom-up dichotomy. It was convened in the recognition that top-down climate organization, culminating in the Kyoto Protocol, had failed. The parties to Paris took that failure to mean one had to embrace bottom-up organization. But the opposite of a failure does not make a success. Bottom-up organization under real-world conditions—where some actors are much more powerful than others, local agreement is often perturbed by outsiders, and time for decisions is short—is merely a recipe for churning and inaction without direction and discipline.

By contrast, experimentalist governance is neither top-down, like a hierarchy, nor bottom-up, like a self-organizing group. It is both in turn, as lower levels of institutions correct higher ones and vice versa. Mindful that climate change actors are too heterogeneous in their interests and capacities for self-organization, experimentalist governance imposes top-down framework goals and penalty defaults to give direction to bottom-up invention. It provides incentives to both capable, potential innovators and less capable, potential laggards to encourage advances that are ultimately workable for all. This combination of seemingly incompatible features makes experimentalism especially suited to areas like climate change that carry a significant degree of uncertainty.

The second and closely related false dichotomy that has hindered progress on climate change is the choice between technocracy and democracy. In this vision, organizations are either hierarchically controlled by technocrats and managers asserting or pretending to expertise, or else they are democratically accountable to their members and other stakeholders.

One of those who saw past this dichotomy was the pragmatist philosopher John Dewey. Dewey took uncertainty and change as the dominant problems of political life, and the need to adapt institutions to new circumstances as the continuing challenge to democracy. The response, he argued, was to explicitly acknowledge the fallibility of current arrangements, and make concrete problems the trigger to the adjustment of methods and clarification of goals. But he cautioned that the collaborative investigation of alternatives can only be effective if it integrates the knowledge of experts with the experience and values of citizens, for it is the citizen who knows best "where [the shoe] pinches, even if the expert shoemaker is the best judge of how the trouble is to be remedied."[3] The broad participation of stakeholders in the Montreal sectoral committees provides a glimpse of how such cooperation can work. As trust in elites frays in our democracies and

decarbonization reaches deeper into everyday life, this kind of working collaboration between shoemakers and shod is increasingly important. It is how systems of governance—even at the international level—will earn and retain greater democratic accountability.

A third misleading dichotomy pits organizations against markets. Decision-making in organizations is said to be centralized, initially by command—or when rules run out, by discussion and deliberation. In markets, by contrast, decision-making is supposed to be decentralized, with coordination achieved by prices.

This distinction has proved in its own way as limiting as the top-down and bottom-up dichotomy thanks to its application to thinking about carbon markets. Though they were not included formally in the founding agreements on climate change, carbon markets quickly became integral to the ideal conception of a global regime. As soon as emissions reductions targets were set, it became clear that their very rigidity entailed the need for some compensating flexibility. Market mechanisms seemed to square the circle, such as cap-and-trade schemes and offsets that allowed polluters with high costs of abatement to buy permits to pollute from those who have low costs of control. As individual actors minimize the costs of or returns from abatement, the overall effect is a gain in what economists call "static efficiency."[4]

The really big gains in pollution reduction, however, come not from the optimization of current practices but instead from destabilizing innovation—innovation that sharply reduces the carbon footprint of a product or whole production process, or even completely redefines an entire industry. Achieving these transformative outcomes is difficult. Producing the next generation of familiar technology is relatively straightforward and cheap; striking out in radically new directions to create much cleaner technology is risky and expensive in comparison. The rewards and penalties needed to directly incentivize that shift would have to be high and speculative—so high and so speculative as to make them politically unacceptable. For these and other reasons, pure market instruments have never imposed limits severe enough or prices high enough to test the effects of high-powered incentives on innovation. There is scant evidence that in their normal operation, they contribute much to "dynamic efficiency"—efficiency over the longer term, as technology and interests are changing.

Experimentalist governance, we will argue, makes a start at filling in this oversight in the discussion as well. Experimentalist institutions straddle the dichotomy between markets and organizations. They encourage and build on the kinds of decentralized or localized individual initiative and coordination

we associate with markets.[5] But unlike markets, local decisions in experimentalist systems don't influence each other merely through prices. Rather, they also and often most directly ramify through processes like standards setting and revision that depend on discussion and deliberation—discursive processes, as in organizations.[6] In fact, we will contend that especially with regard to dynamic efficiency—on which progress toward a sustainable world ultimately depends—it is by this combination of price incentives and discursive, decentralized coordination that experimentalist governance can make good on the promise of carbon markets.

Finally, experimentalism agrees with the literature on international regime complexes in marking the demise of consensus-based, hierarchical, and global governance institutions.[7] In that vacuum—a gridlock of governance—the regime complex literature has documented the rise in many domains of disjointed constellations and partial regimes, pursuing sometimes complementary and sometimes conflicting purposes, and in the absence of any superior authority, forced to negotiate relations among themselves.[8] The literature on regime complexes focuses in fact on describing the emerging processes of negotiations, and the distributions of role and authority that may result from them. Experimentalist governance concentrates instead on the way regime complexes—metaregimes—can provide the context for experimentalist organizations, most especially in the crucial case of the Paris Agreement. For decades, scholars have viewed the climate change problem as one that requires giant, global contracts, with parties facing strong incentives to breach.[9] By contrast, we see cooperation emerging from the process of learning through experiments and the adjustment of interests in tandem.

Beyond Paris

How could all of this redirect climate policy strategies today? Experimentalist governance, we argue, provides a set of tested principles to guide the construction of regimes that do a good job of managing problems steeped in uncertainty when conventional organizations can't. There remains a role for international diplomacy, such as under the Paris Agreement, but that role is considerably smaller than its enthusiasts think. Successful problem-solving requires experimentation—a process that occurs mainly within countries and industrial sectors, not orchestrated through global agreements. While there is a role for a more centralized review and assessment of that decentralized experimental information, one of the lessons from the Montreal

experience concerns how to design and evolve the institutions useful for that review and assessment. In the main, however, the way forward is to work sector by sector, within institutions that have the ability to apply experimentalist governance.

With regard to warming-related emissions in particular, it is useful to distinguish two types of sectors.

At one extreme are sectors comprised of globalized and highly concentrated industries, such as aircraft, steel, cement, auto, gas, and oil, whose products or production methods are subject to international standards. In these sectors, deep decarbonization entails risky and costly *innovation* at the frontier of technology, often driven by penalty defaults. International cooperation is appealing to firms under these conditions because it allows them to pool in some measure knowledge and risks—the Swedish steelmaker bets on one radical alternative to the current methods, the American on another technology, and periodically they carefully compare notes—and by demonstrating the feasibility of alternatives, they can raise standards and protect themselves against cutthroat competition from firms that continue to produce the traditional way. Thus Maersk, the world's largest container shipping company by fleet size and cargo volume—and thus the firm best positioned to gain from successful advances—coordinated a series of technology demonstration programs inside the International Maritime Organization that was cofunded by governments and linked to proposals for new standards. Because cargo ships are long-lived and hard to change once built, Maersk also works with these same governments to gradually align equipment and local standards to superior solutions, proving the workability of many paths to improvement and making it easier for other International Maritime Organization members to join in.

At the opposite extreme are more place-based sectors such as residential and commercial construction and power grids incorporating clean energy sources. In these cases, production is largely for local markets, using many local inputs, even if key components like wind turbines, nuclear fuel, or flooring materials are global commodities. The central challenge for international cooperation at this extreme is not simply innovation but also *contextualization:* making new technology work reliably in various places, according to local circumstances. Standards that shape these industries are more likely to be local and national than international. Integrating renewables on California's grid is different than doing so on India's, even though both buy solar panels from the same global market. Cooperation can accelerate emissions reductions by pooling learning; even if solutions are quintessentially place

based, they typically result from the reelaboration of innovative techniques developed elsewhere. Knowing where to start and what doesn't work under conditions similar to one's own is invaluable information.

In between these two extremes are hybrid cases, such as forestry products or palm oil, where the inputs are predominantly local, but the markets—and the standards and trade barriers that control access to them—are international. Reducing illegal logging or burning forests to clear land for agriculture requires reaching deep into local economies, often under limited control by the national state, to give small producers lucrative and stable alternatives to the current, environmentally destructive ones. Progress here is slow, but it continues.

This sectoral taxonomy matters because it informs where to focus effort, how to organize it, and where to look for the many signs of progress already emerging. The Paris Agreement can't guide, much less participate directly in, sectoral experimentation at the frontier of technological innovation or the contextualization of place-based solutions. However, there has been a profusion of problem-solving efforts along these lines within other forums. Some are informed by experimentalist principles. If anything, there is a surfeit of national and international organizations directed to these tasks. The challenge for international cooperation on climate change today isn't creating new sectoral institutions as much as identifying and coordinating the efforts of those that do or could work.[10]

Even though Paris has little to contribute directly to this process, it does serve one essential and exclusive function. It is the most legitimate institution in global politics where climate change is discussed; it sets goals that while probably impossible to meet, are widely agreed on as a starting point. In short, it is the climate conscience of the world. Its presence makes it easier for governments, firms, and NGOs to punish—in the name of Paris—actors that drag their feet. Without Paris, it would be much more challenging—politically and legally—for protesters to rattle companies that cause big emissions and push governments to act on climate change. These are the penalty defaults that destabilize the status quo and motivate innovation, and they are essential to our vision of experimentalist-driven decarbonization.

In fact, precisely because we see the fate of climate action as bound up with the development of other international organizations and efforts, this book is also about a broader transformation of the world order. A new climate change regime, evolved from the foundations of Paris but in more experimentalist directions, foretells a new kind of globalization—one, we argue, that is already in the works.

The Plan of the Book

In chapter 2, we trace the history of climate change diplomacy, attributing its failures to departures from the experimentalist lessons at the heart of the Montreal Protocol. Both the 1987 Montreal Protocol and 1992 United Nations Framework Convention on Climate Change (UNFCCC) were founded with similar, sparse legal language. What's different is how they evolved. With Montreal, which we examine in greater depth, the evolution turned it into a system for experimentalist governance that made it successful. Climate change evolved differently, with efforts overly focused on global diplomacy and the crafting of global consensus rather than experimentation and learning. We argue that these diplomatic efforts ultimately foundered, in part, because they drew the wrong lessons from Montreal. If Paris is to avoid remaking these and related mistakes, its architects will need to understand why experimentalism works and how it can be applied in practice.

In chapter 3, we present the theoretical underpinnings of experimentalism and illustrate its operation in practice. We look at the emergence of new forms of contract and administration that assume that the precise outcome of collaboration cannot be determined ex ante, and therefore that goals and methods have to be elaborated provisionally—step by step through experimentation across a wide range of opportunities, along with joint reviews of progress in which partners assess and come to rely on one another's capacities. In this setting we show why penalty defaults, in contrast to conventional fines for the infraction of clear rules, are the kind of sanctions appropriate to conditions of uncertainty. And we explain how institutionalized deliberation, often in the form of peer review, is essential to evaluating the lessons of experimentation, guiding further inquiry, and informing eventual standards. While this book is focused on climate change, the logic of experimentation applies to solving a wide range of problems marked by deep uncertainty.

The following two chapters look at experimentalist governance in action.

Chapter 4 examines experimentalist *innovation*. We explore three case studies of public-private collaboration at the technological and policy frontier: innovation in a range of key energy technologies by the Advanced Research Projects Agency–Energy (ARPA-E) of the US Department of Energy (DOE); the development of scrubbers to control sulfur dioxide (SO_2) pollution in the context of a pioneering cap-and-trade system of pollution permits; and the work of the California Air Resources Board (CARB) on vehicular emissions standards. As conventionally understood, these examples illustrate the three competing approaches to addressing climate

change: one that looks to the state, one that looks to the market, and a third that splits the difference by leveraging the power of the state to threaten exclusion from the market. Rather than identify one of these approaches as optimal, we contend that in all of these modes of innovation, experimentalism is essential. The more profound and disruptive the innovation, the greater the need for institutions designed with a recognition that the right answers are unknowable ex ante, and only through experimentation via joint action between government and business is it possible to identify practical solutions. We deliberately take all three examples from the United States in order to repudiate the notion that successful public-private collaboration is culturally or politically impossible here.[11]

Chapter 5 explores the other prong of sector-based action, experimentalist *contextualization*: government-industry collaborations that turn technological advances into reliable on-the-ground systems in particular places. Again we consider three case studies: control of agricultural pollution in Ireland, the emerging regime to combat illegal logging in Brazil, and the integration of renewable energy into a power grid. We show how, in the absence of any overarching design, regulators, firms, farms, and NGOs are nevertheless creating—in all but name—expansive environmental protection regimes, stretching from the ground to the national or international level. Across all of these cases, central governance mechanisms help to establish which approaches are working in context and revise higher-level goals. Once those goals are (provisionally) set, rules and operating routines are contextualized to local circumstances.

In chapter 6, we apply the logic of experimentalism to international cooperation for deep decarbonization. In sectoral innovation at the frontier, the characteristic challenge for governance is conciliating progress by a small vanguard of innovators with the ultimate inclusion of the rest of the (initially less capable) global economy. In contextualization, the challenge is to accelerate and reduce the costs of reciprocal learning and capacity building among regions facing similar local problems—and using this capacity building to augment local political support so that progress on decarbonization is less vulnerable to changes in the political wind.[12] Much of the research on the politics of climate change has emphasized how organized interest groups block policy; with experimentalism, properly applied, we see a mechanism through which some of those groups find new interests, and politics becomes both dynamic and pointed toward decarbonization.[13] We find exemplary institutions engaged in innovation and contextualization; the immediate task for policy, we argue, is finding or building more, not

asserting that Paris itself can perform these functions. Paris, though, does retain an essential role. As the climate conscience of the world, its legitimacy can be leveraged to induce groups to act in the name of Paris in establishing or applying penalty defaults to firms or governments.

Finally, in chapter 7, we look beyond climate change to the future of globalization more generally. Governing in the midst of uncertainty—while avoiding both gridlock and unaccountable technocratic control—is a generic problem of international affairs and solving shared global problems, not unique to climate change governance. The same troubles beset the coordination of trade policy and the WTO, the very core of the global economy. In this chapter, we call for reforms in trade cooperation—away from consensus-based, globe-spanning institutions, and toward the piecing together of expansive regimes from smaller, open, more collaborative, and accountable initiatives. Indeed we show that such transformations are already taking place, mirroring similar developments in climate change governance. Together these initiatives point the way toward a radical new form of globalization—one that advances piecemeal, by narrow agreements rather than all-or-nothing global commitments, and keeps action democratically accountable by remaining under sovereign control. Globalization should be reimagined, in the image of the climate regime's successes, to respect uncertainty and difference. This book is a tool for that reimagination.

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