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Why Long Problems Are Hard to Govern

Starting in 1990, the Intergovernmental Panel on Climate Change (IPCC) has issued six assessment reports summarizing the state of climate science and what can be done to mitigate the problem and adapt to its impacts. These reports, which cover the entire scientific literature, have repeated essentially the same message in 1990 (1st), in 1995 (2nd), in 2001 (3rd), in 2007 (4th), in 2014 (5th), and in 2023 (6th), albeit with increasing precision. We are causing climate change. It will be devastating. We can prevent it by reducing our GHG emissions. We can reduce our suffering if we adapt to its impacts. We can be confident the seventh assessment report, due in 2028, will agree.

Despite decades of warnings, annual emissions have nearly doubled globally since 1990, pumping a quantity of GHGs into the atmosphere roughly equivalent to all the emissions from the Industrial Revolution to the end of the Cold War. Why have we not done more?

This chapter explores the political challenges that long problems pose. It is easy to see that long problems are hard to govern but harder to say exactly why. We intuitively understand the problem as excessive short-termism, both in our own lives and in society overall. But this begs the question, why do we individually and collectively suffer from a “presentist bias”?¹

There are many drivers behind short-termism, and the chapter first reviews the dominant ideas in the literature. But understanding why long problems are hard to govern—that is, why it is hard to create collective rules and interventions that steer outcomes to our long-term interests—requires more specific analysis. Although short-termism has all too many causes, the chapter seeks in particular to develop a political economy analysis of long-term governance.

This lens focuses our attention on what shapes political actors' preferences, how they organize to pursue their interests against those of other actors, and how institutions mediate this contestation. I organize the argument around three core political dilemmas of long problems. First, governance is often driven by people and groups strongly affected by a problem, but people in the future lack any agency over decision-making today. They only have *shadow interests* in the present. Second, long problems shift over time, but the institutions set up to govern them can be hard to update. This combination of dynamic problem structures and "sticky" institutions creates an *institutional lag* between our governance tools and the challenges we face. Finally and perhaps most significantly, long problems suffer an *early action paradox*: by definition, they require action before effects are felt, but this means we must act under conditions of uncertainty, low salience, and obstructionism. Chapter 3–5 return to the three dilemmas this chapter raises—starting with the early action paradox, as it is perhaps the most central—considering how we can face them and under what conditions we can prevail.

Short-Termism: The Tyranny of the Present

Policymakers, social scientists, psychologists, and everyday observation all tell us that as individuals and as societies, we often struggle to look beyond the immediate. Famously, studies show that most children cannot resist a marshmallow placed before them for more than a few minutes, even if they know that waiting just a few more minutes would earn them an extra marshmallow. Market analysts worry that CEOs often seek to maximize quarterly earnings reports instead of longer term value. And many observers of politics point to politicians focused more on tomorrow's headlines or next year's election than on the long-term good. Scholars have lamented that society is in a state of "time denial" in which too many of us are "time illiterate," having little sense of human history, much less planetary history.²

A long problem like climate change seems to demonstrate perfectly the dangers of short-termism. Because of the temporal gap between cause and effect, reducing emissions now prevents things from getting worse in the future. This lag means that actors in the present will have to wait to see the benefits of any contributions they make to preventing climate change. Adaptation to climate change is similar. Many investments to reduce climate impacts, like a new seawall or a restored coastal marsh that can absorb floods, could take years or decades to yield benefits, which only accrete over time. For example, in 1953,

a devastating flood from a storm on the North Sea swept up the river Thames, causing nearly two thousand deaths across Europe and the equivalent of billions of dollars of damage in today's terms. In response, the UK government studied the problem and ultimately decided to make a barrier across the river in East London, a project not finished until 1982.³ Although three decades late for those killed or displaced by the 1953 storm, the barrier has proven to be an increasingly valuable investment, being deployed more and more each decade.

Short-termism can be particularly vexing when it reinforces other aspects of problem structure. In climate, for example, short-termism reinforces the distributional challenges of acting because there is a significant power imbalance between those who cause the problem and those who bear its brunt. Both within countries and across them, to a first approximation, emissions are correlated with economic output and consumption and therefore with political power. Meanwhile, those countries and communities most vulnerable to climate change are those with least capacity to adapt, which is in turn correlated with a lack of economic weight and political power. Moreover, many of the future benefits of climate change are not tangible gains, like an artist's magnum opus that emerges after years of hard labor, but rather take the form of a lower level of risk compared to a modeled counterfactual scenario. So climate policy is not only a struggle to get actors in the present to do things that will yield benefits only in the future; it is a struggle to get the most powerful actors in the present to do concrete things that will provide intangible benefits to weaker actors in the future.

For these reasons, temporal mismatches are just as much at the heart of the climate challenge as the dilemma of collective action, and short-termism is just as much a problem as free riding, though the latter is more frequently discussed. As Mark Carney, the former Bank of England governor turned UN climate envoy, has noted, the issue is not just a "tragedy of the commons" but also a "tragedy of the horizon."

In *Governing for the Future*, Jonathan Boston comprehensively shows how this short-termism is overdetermined in our societies, embedded in both human psychology and institutions. Before turning to the political economy of long problems, it is useful to review these factors.

Consider our minds. Most social scientists understand the world with some implicit or explicit degree of discount rate, meaning we tend to think that actors value a thing in the present more than they value that same thing in the future. I return to the analytic uses and abuses of discount rates in chapter 6, but for now, it suffices to note the range of reasons why it may be true that we value proximate things over more distant things. Most simply, people may

have so-called pure time preferences, caring more about present welfare than future welfare. In other words, we may just really want that marshmallow *now*, not five minutes hence. The empirical evidence on this idea is mixed, however, as people's time preferences seem to vary across different areas of their lives in inconsistent ways. Children want marshmallows now, but people can also save money over years to support their children's education, for example. Preferences also seem to be hyperbolic, meaning they drop off sharply at first but then essentially remain constant long into the future. So while there is some evidence for "pure" short-termism at the individual level, it seems to operate in complex ways.⁴

Behavioral science helps explain some of these oddities. Bounded rationality leads us to expect our minds to deviate from rationally distributing values over time and instead to rely on numerous heuristics and cognitive shortcuts. Unfortunately, many of these also have the effect of overprioritizing the present. For example, people anchor their preferences on the status quo and are averse to losses, so they have a natural bias toward the present state of affairs even if it is suboptimal. People are also bad at accurately making the kinds of probabilistic judgments needed to weigh future options, particularly relative risks. And with limited cognitive bandwidth, we focus our scarce attention on the immediate over the distant.⁵ As Boston notes, quoting Al Gore, "the future whispers while the present shouts."⁶

Finally, even when we can perceive, understand, and value a long-term interest, it does not necessarily follow that we are able to act in a way to achieve it. Most of us know we would be better off exercising more, eating better, saving more money, and preparing tasks more in advance, but we still struggle to optimize these ideas in our daily lives. We often use commitment devices to try to force ourselves to act more consistently with our longer term goals, but the pull of the immediate is always there.

Although the limits of the human mind are clearly relevant when considering long problems, the short-termism of human institutions—our businesses, organizations, governments, and so forth—are even more significant. After all, it is on the organizational and societal scale that long problems will or will not be solved. However, the challenges these entities face are not just larger manifestations of the individual-level short-termist mechanisms identified above, though there are some analogues. Instead, institutions and organizations have their own features that create presentist bias.

Perhaps the most important one is the way many institutions are organized around relatively short-term evaluation and accountability cycles. Publicly

traded companies must make the case for ongoing investment to their shareholders each quarter. Schools are assessed regularly by government accreditation bodies, often via standardized tests. Nonprofit groups report to their board. Government departments must justify their performance and budget to leaders each year or two. And most political leaders and parties need periodic renewal every few years, either through elections or, for less democratic governments, the formal or informal validation of interest groups and elites.

On this latter point, there is a stubbornly persistent but unpersuasive “democratic myopia” thesis that elections in particular breed short-termism and that authoritarianism may therefore offer some insulation from its dangers.⁷ Although it is certainly true that elections can create short-term incentives, there is very little evidence that an absence of elections can avoid them.⁸ Just like democratic politicians, authoritarian governments require support to endure. Support may come from economic elites, from the military, from different segments of the population, or from foreign powers. The cost of support is some degree of accountability (albeit perhaps to a very narrow core of supporters), which in turn requires periodic evaluation. Should key supporters grow discontent, authoritarian rulers must either seek to repress them (a costly and potentially risky strategy) or respond to their needs. In this way, short-term pressures rise onto the autocratic agenda just as surely as they appear in electoral politics, though often with less predictability and regularity. Moreover, even if authoritarians could insulate themselves from short-term pressure, it does not necessarily follow that they would then have incentives to promote long-term welfare. Indeed, most studies show the authoritarian regimes tend to provide fewer public goods than their democratic counterparts.⁹

Looking across the whole evidence base suggests that there is much more variation in short-termism within both democracies and autocracies than between them. Researchers correlated an index of intergenerational solidarity with democracy and found, if anything, a roughly positive correlation between democracy and policies like investment in education, pensions, or environmental protection.¹⁰ As we might expect, factors like a country’s level of development and the quality of its bureaucracy roughly correlate with long-term governance as much as regime type.

The supposed autocratic advantage in long-termism is typically rooted more in a (largely valid) critique of electoral politics than a rigorous assessment of how autocracies really work in practice. Indeed, a more productive avenue of analysis is to look in detail at how decision-making in a political regime, democratic or autocratic, is structured. For example, some research

shows that proportional electoral rules give politicians greater electoral safety and so makes them more willing to impose short-term costs to secure longer term gains.¹¹ Similarly, countries with more institutionalized political parties invest more in technology development—which yields benefits only in the long term—than countries where parties come and go. The logic is that generations of politicians overlap in institutionalized parties, so those about to step down share a political interest with the newcomers eager to take their place. This creates a greater incentive to support technological development—which costs money in the present but provides benefits only in the future—than in countries where parties do not endure.¹²

But what about China or Singapore? Both countries are frequently cited as examples where political leaders, insulated from short-term pressures stemming from competitive elections, can take a longer view. Unlike most autocracies, these governments do indeed prioritize long-term planning. But even in this context, the constraints of relatively short evaluation cycles are widely observed. The Chinese government puts a five-year planning cycle at the heart of its policy process, issuing regular five-year plans that outline key policy objectives and targets against which officials will be judged. Although this system has some merits, it also suffers from short-term pressures. Because officials are evaluated on how successfully they meet the plan's goals, they tend to rush to complete their targets as the five-year deadline approaches. For example, at the end of 2020, as the deadline for meeting the targets of the thirteenth five-year plan approached, a number of local governments simply shut down electricity production to meet energy efficiency targets, resulting in the worst blackouts China has experienced in decades.¹³

As this example highlights, the real difficulty is that some kind of regular reporting and accountability is required for complex organizations such as governments to operate effectively. If shareholders could not count on regular performance reports from management, they would be loath to invest in a company. If regulators cannot regularly audit a school's performance, how can parents trust the teachers to educate their children? If political leaders have no way to manage bureaucrats, how can they achieve their political goals? And if constituents have no means for holding leaders to account, then political outcomes will be suboptimal. The principal-agent dynamics that pervade nearly all human organizations of any size or complexity force us to create institutions that build incentives around monitoring performance in an ongoing fashion. In other words, relatively short-term evaluation and accountability cycles are often necessary for institutions to operate effectively, even if they have perverse side

effects. Short-termism may be a bug, but it is also a feature of a complex human system in which accountability relationships are required.

Other dynamics push human institutions toward short-termism as well. Analogous to individual attentional scarcity, organizations can process only so many issues at once. After all, they have only so many staff to execute operations, only so many meetings and processes to come to collective decisions, only so many days in a legislative session, and only so many hours in a day for leaders to make decisions.¹⁴ Students of bureaucratic politics show how the timing of most decisions is not driven by their substantive importance so much as when deadlines, forcing moments, or windows of opportunity arise to require a decision, biasing attention toward the urgent.¹⁵ On top of this, the media raise the political salience of only a few issues at a time, forcing certain issues to the top of decision-makers' priorities and leaving others languishing in the shadows. Indeed, the organizational or political "attention deficit" is even more stark than it is for individuals since the number of issues is greater and the steps required to assess and implement a course of action longer and more complex. This attentional scarcity is part of why agenda-setting is so important for political outcomes. Unfortunately, the less attention there is to spare, the more urgent issues will be focused on at the expense of less urgent issues, regardless of their relative importance.

Finally, like individuals, institutions struggle to impose longer term constraints on themselves because of the temporal inconsistency of preferences. A CEO may wish to invest in long-term growth but find banks will not lend to her without sufficient short-term cash flow. A politician may be elected promising fiscal rectitude but then face a close election in which short-term job growth could be the deciding factor. A new government in a postconflict context may sincerely wish to uphold human rights but then face overwhelming pressure to crack down on opposition groups as its hold on power becomes tenuous. Just as individual preferences are inconsistent over time, so are the incentives that shape institutional decision-making.¹⁶

Governments therefore seek numerous solutions that allow them to make credible commitments, mostly by accepting limits on their freedom of action in the form of institutions like independent central banks or judiciaries, or international institutions like human rights tribunals, investment treaties, or trade bodies. But these tools are often imperfect and prone to reversal because governments find it very hard to credibly limit their own power. Sovereign in their borders, states' inability to limit themselves leaves them at the mercy of their own short-term whims.

In sum, short-termism is pervasive at both the individual and institutional levels. Even worse, these myopic timescales can reinforce each other. For example, scholars have found that where people trust the state to deliver long-term benefits, they are happy to support long-term policies. But where there is political uncertainty over whether political leaders can and will provide long-term benefits (e.g., not raid a pension fund for short-term projects), individuals' policy preferences show a parallel presentist bias.¹⁷ Or consider the role of the media as a vector for political communication and preference formation. A politician may wish to pursue long-term goals but also knows she will be either praised or vilified in the press based on what she does in the moment. With opponents launching attacks on social media or cable news instantly, her incentives will press against long-term approaches. In these ways, present-biased dynamics at the individual and institutional levels can reinforce each other, creating a broader "lock in" effect¹⁸ that makes it very hard for any one actor or institution to get beyond short-termism. After all, if you live in a society that struggles to commit itself to the long term, what value can you place on a long-term outcome? You too must prioritize the short term. For a world facing a rising number of long problems, this collective short-termism is a very dangerous state of affairs.

It is important not to overstate the inevitability of this danger, however. To understand how to overcome short-termism, we also need to understand its limits. Even though short-termism is pervasive, evidence shows it is also neither omnipresent nor monolithic.¹⁹ These exceptions are important because they can teach us about ways through and beyond short-termism. At the individual level, humans may have "marshmallow brains," as the philosopher Roman Krznaric puts it, but we also have "acorn brains"—a capacity for long-term planning that no other species possesses.²⁰ Studies find that our brains spend many "idle" hours thinking through possibilities and potentialities—for example, late-night worrying—in a way unique to humans.²¹ Human institutions are also capable of overcoming short-termism. Despite all the challenges, we do sometimes carry out long-term plans. Building on the success of the Thames Barrier's success in its first forty years, the UK government is now planning to extend and augment it so it will remain effective through the end of the century. Throughout history, humans have built cathedrals, pyramids, canals, and other great works even though many who toiled to make them never saw the end result. Certain religious groups, universities, and other human institutions are designed with a generation-spanning view. Chapters 3–5 draw on some of these exceptions as they propose strategies for governing long problems. Social scientists and policymakers should not accept

short-termism as a given but rather identify its drivers and determinants to devise strategies for meliorating it.

To do so, we need a more specific analysis of the political impediments long problems create for effective governance. These barriers are not just a failure of leaders or societies to take a long-term view. Instead, they are specific political mechanisms rooted in the logic of how governance does—and does not—happen: shadow interests, institutional lag, and the early action paradox.

Shadow Interests: Decision-Takers Have No Power over Decision-Makers

At heart, politics is the struggle of different interests to amass and wield power. Long problems are perhaps unique in that one set of interests, those most affected by a problem, are by definition absent from this process. They are not merely disenfranchised or marginalized; they simply do not yet exist.²²

I term these interests “shadow interests” for two reasons. First, like our shadows, they have no weight or agency in decision-making. They can only follow where we go. Second, like the shapes flickering across the wall of Plato’s cave, shadow interests are only dimly, subjectively perceived. Their exact form is unknowable, so different people can see them in different ways. In other words, even if we believe future people matter, we can only perceive their interests through our own projections. This one-sided nature of long problems makes them more difficult to resolve because the set of actors who would usually be a key part of driving toward a solution do not just lack political power, but they lack any agency whatsoever.

A 2013 report by the UN secretary-general recognized this conundrum:

Future generations are politically powerless, with the representation of their interests limited to the vicarious concern of present generations. As stated in the report of the World Commission on Environment and Development, entitled “Our common future,” “we act as we do because we can get away with it: future generations do not vote, they have no political or financial power; they cannot challenge our decisions” (A/42/427, annex, para. 25).²³

If we consider some of the most important “non-long” problems human societies have faced, the significance of shadow interests in long problems becomes clear. For example, the nineteenth-century struggle to abolish slavery in European colonies and in the Americas shows how even deeply oppressed

but existent interests were critical for change. Even though enslaved people of course lacked access to political power, they retained agency, and that agency played a key role in ending the institution of slavery. Most directly, figures like Harriet Jacobs or Frederick Douglass in the United States, Olaudah Equiano and Mary Prince in the United Kingdom, or José do Patrocínio in Brazil escaped bondage (or in the last case descended from those who did) and became advocates for abolition, influencing powerholders within the political system.²⁴ At the same time, people regularly revolted against their enslavers, seeking to free themselves by force. The fact that such efforts typically failed did not mean they were unimportant. While historians continue to debate the direct effect of such revolts,²⁵ the mere potential for enslaved people to exercise their agency through revolution meant that slaveholding societies had to invest vast resources in violent systems of repression. The difficulty of maintaining such systems, both economically and morally, hastened their demise. An enslaved person might have lacked political power of any kind, but his or her mere existence and (potential) agency were a critical and tangible part of the problem structure around ending slavery. As such, they were qualitatively different from the shadow interests of people who do not yet exist.

Numerous other examples demonstrate how the agency of affected people is a core part of how many political challenges get solved. For example, it is difficult to imagine the emergence of the modern welfare state in the twentieth century had marginalized populations bearing the brunt of inequality not organized themselves into political parties and won power. Nor would we expect pollution controls or health standards to be as strong had the victims of, say, chemical spills or tainted food not come forward to demand justice. In most countries, regulations now give those affected by such problems the ability to bring perpetrators to court.

Even when those affected lack direct agency, the fact that others can see and empathize with their suffering—as we do in countless humanitarian disasters, human rights violations, or crimes against humanity—creates a nontrivial tool to drive political action.²⁶ Under conditions of interdependence, decisions made in one part of the world can have sharp consequences for people far away who may have very few levers to affect especially the decisions of powerful countries.²⁷ For example, subsidies to protect farmers in rich countries can undercut the livelihoods of subsistence farmers across the world, or intellectual property rules to protect pharmaceutical companies can deprive whole populations of vital medicine. And yet these people nonetheless possess agency to resist, to move elsewhere in search of better conditions, or to seek to shame the powerful into recognizing their needs or otherwise intervening.

Imagine how each of those examples might have been different had the people affected not yet existed. Shadow interests are a problem because they cannot work via the usual mechanisms through which political contestation occurs. In Nobel Prize laureate Ronald Coase's famous hypothetical world of no transaction costs or power hierarchies, problems are solved efficiently because those negatively affected by a decision or action can seek compensation from those who benefit from it. In this way, all "externalities" can be efficiently "internalized" by the (assumed) ability of all parties to effortlessly make Pareto-enhancing contracts.²⁸ But this logic breaks down when those negatively affected simply do not yet exist. Who will sign the contract?

Coase's thought experiment perfectly shows how long problems thwart many conventional models of politics. For example, shadow interests help explain why we have not yet been able to resolve climate change through bargaining and are unlikely to do so. If we accept the conventional framing that mitigation creates costs in the present but avoids much greater costs in the future, a bargaining equilibrium should, in theory, exist in which those more affected by climate change compensate those causing it in order to get them to stop.²⁹ This kind of solution is often highlighted by, for example, students of trade theory. Trade liberalization benefits internationally competitive businesses but hurts those that are less prepared to deal with imports. But if the total gains outweigh the total costs, the industries that benefit should be able to compensate those that lose out in such a way that at least no one is worse off and overall welfare is higher. Even in the trade realm, however, such bargains are rare in practice.³⁰

In climate change, they are practically impossible for several reasons. As noted above, the future benefits for any given actor are uncertain (reduced risk compared to modeled counterfactuals), while the present costs are highly concrete. Those who would be negatively affected by action now have concentrated, powerful interests, while those who stand to lose out from climate change are weaker and more dispersed. But perhaps most centrally, the affected interests who would need to pay off polluters in the present simply do not yet exist. A "nonsimultaneous exchange" is therefore required.³¹ Such exchanges are theoretically possible, but the longer the problem, the more sustained they must be. For multigenerational exchanges, perhaps the only hope of approximating a bargaining solution is a kind of diffuse reciprocity in which the current generation, perhaps motivated by respect and gratitude for the contributions previous generations have made to our welfare, "pays it forward" by making similar investments for the next generation. Such a dynamic is certainly not alien to human nature but is difficult to achieve politically and likely depends on strong normative beliefs that privilege the welfare of future generations.

Of course, bargaining is not the only way to achieve political change. As the above example of abolishing slavery attests, activism, moral suasion, revolution, and war are just some of the pathways through which political contestation can come to a resolution. But none of these tools are available to shadow interests. Philosophers have accused the present of colonizing the future just as imperial powers colonized large swaths of the world, ignoring the presence of the people living there just as we ignore the future existence of people on the receiving end of long problems. Although the analogy may hold on the ethical dimension, the political dynamics are quite different. Colonized people eventually won their independence. But future people have no more hope of persuading us to make better choices for them or taking up arms against us to force us to do so than we may hope to alter the choices of previous generations. As Roman Krznaric writes, people in the future “cannot throw themselves in front of the king’s horse like a suffragette, block an Alabama bridge like a civil rights activist or go on a Salt March to defy their colonial oppressors like Mahatma Gandhi.”³²

In sum, shadow interests are not the same as weak interests. They are qualitatively different because they lack even latent agency. Because they do not yet exist, they cannot negotiate or militate for their goals. No one needs to repress them to ensure they do not get their way. To the extent the harmful impacts of long problem like climate change fall on shadow interests, many of the usual tools of politics will be unavailable.

Institutional Lag: Dynamic Problem Structures

We typically analyze political challenges by defining their “structure” in terms of characteristics like the set of relevant actors, the beliefs and information those actors possess, the distribution of their preferences and power, the institutional and material environment they inhabit, and as I argue, the length of time between causes and effects. As problems lengthen, however, none of these other elements can be taken as constant. Social scientists and policymakers often assume, implicitly, that a problem’s elements are fixed to make them more tractable for analysis or strategy. But as problems lengthen, that assumption grows less tenable. At the extreme, all “things” are, on some timescale, “processes.” As one philosopher of time notes, “the names we give to processes—the Himalayan Mountains, a kurrajong tree, a ladybug—stand for families of parameters stable for shorter or longer periods of time.”³³ Indeed, at the most fundamental level, the universe itself is changing and expanding. The physical conditions that governed its first moments are not ones that affect us today. This is of course true as well for the various elements of a political problem, especially human

and organizational phenomena like beliefs, interests, and power relationships. We often operate at timescales that make these factors relatively constant, but over the long term, they all change sooner or later.

Shifting problem structure creates one specific challenge for governing long problems: it increases the mismatch between the structure of a problem and the institutions we create to address that problem. Addressing political problems involves rules and organizations that structure actors' norms, expectations, and incentives, as well as the information they possess in regular ways. Such institutions define the "rules of the game." Constitutions determine who holds power and how other rules are made. Laws and regulations govern individual and economic behavior, potentially backed by the coercive power of the state. Treaties define mutual obligations between nation-states, while international organizations allow states to jointly address shared concerns. Nation-states are hardly the only actors creating such rules and organizations. Cities, businesses, civil society groups, and other sub- and nonstate actors institutionalize themselves in various ways, both within a country and through transnational networks and initiatives. Critically, institutions need not be written on paper or otherwise formalized. Informal institutions play a critical role in structuring politics as well.

For example, a pandemic may require international information-sharing agreements, rules restricting physical interaction, requirements on testing for disease, pooled programs to ensure vaccines reach the poor, and so forth. Climate change, of course, is implicated in a vast "regime complex"³⁴ (or "transnational regime complex"³⁵) made up of countless partially overlapping institutions, including national laws and policies,³⁶ bilateral, plurilateral, and multilateral treaties, sub- and nonstate rules and organizations, transnational networks and initiatives (many involving multiple types of actors),³⁷ and intergovernmental organizations, among others. In this way, climate change is typical of a number of "global issues" that have seen a proliferation of cross-border institutions over the last decades.³⁸

Institutions are therefore both a part of what makes up a political problem's structure (recall the fourth element defined in chapter 1) as well as essential tools political actors manipulate to address them. Political scientists seek to understand how actors seek to create and shape institutions to suit their goals, explaining institutional outcomes through a mix of what they do (functions) and what their creators want them to do (interests). Functionalist theories expect institutions to "match" the problems they seek to address. For example, in international relations theory, students of rational design identify regular patterns between institutional characteristics and problem structure (e.g., more

flexible commitments when uncertainty is higher).³⁹ After all, functionalists reason, actors would only bother to create and maintain an institution if they thought it could help them advance their goals.

Institutions also reflect power relationships. Because the rules of the game can have sharp distributional consequences, powerful actors seek to ensure they serve their interests. But even though this means that institutions tend to reflect the interests of the powerful, they can also put limits on power by making its exercise more regular, predictable, and legitimate. Therefore, for reasons of both efficiency and power, we should expect institutions to reflect other elements of a problem's structure, including its functional needs and the constellations of power and interests around it.

On the other hand, institutions, once created, also help to define a problem's structure and can be sources of power. The UN Security Council, created in the aftermath of World War II, was explicitly designed to reflect the interests of the dominant powers. The victorious powers gave themselves privileged seats. Those positions then became sources of power in later decades, as even countries that lost their superpower status maintained a veto over global security matters that came before the council. The United Nations Framework Convention on Climate Change (UNFCCC), in contrast, never adopted formal decision-making rules, instead defaulting to a norm of consensus decision-making that gives every country, in effect, a veto.

As these examples highlight, institutions are meaningful elements of a problem structure in part because they are sticky. Indeed, some degree of durability is assumed in the very concept of an institution and is both a core part of why institutions play such a central role in politics and also an inevitable product of the way institutions are created and changed by political actors.⁴⁰ To be able to influence actors' information, beliefs, and incentives, they cannot be merely transient reflections of a momentary constellation of power and interests. If you knew a law was here today but gone tomorrow, it would not seriously affect your planning. Similarly, if a political party expected a certain constitutional arrangement to fail, they would not build their strategy for winning power around it. All human institutions have some kind of half-life, though these vary significantly. On average, laws may change on a scale of years, national constitutions or international organizations on a scale of decades, and states on a scale of centuries. Informal norms may last for centuries and then fundamentally shift within a generation—for example, around slavery, women's role in society, racial equality, or sexuality. Persistence over time is a key part of why institutions are meaningful.

Institutions are sticky also because, once created, they are typically time consuming and difficult to change.⁴¹ National constitutions by design tend to require special procedures and supermajorities to amend. But even basic laws and regulations can only change with a mobilization of political interests, contestation or bargains across groups, and the nontrivial procedural steps of drafting, legislating, or rule-making, and potentially, legal challenge and review. At the international level, institutional change is often even more difficult because it tends to require agreement across heterogeneous national interests. The UN Security Council, for example, has resisted reform since its creation despite many attempts to modify its membership or the use of the veto. This kind of institutional inertia is a key driver of gridlock in global governance generally.⁴²

Studying how and why institutions change or not is a major concern of social scientists. In contrast to purely functionalist or power-based approaches, historical institutionalist frameworks emphasize not how institutions reflect a certain functional need or power structure but rather how they accrete and evolve over time.⁴³ Instead of smoothly “updating” as needs or interests evolve or as they are displaced by superior competitors, institutions can follow their own partially endogenous logic. For example, choices made at one moment can alter the choices available at later moments. Instead of optimizing across all possible equilibria at every stage, actors may find certain options more or less available depending on previous choices. This “path dependence”⁴⁴ is not necessarily determinative but can significantly shift institutional outcomes away from what a purely functionalist or power-based account would imply. Again, the Security Council provides a case in point. By institutionalizing the privileges of the victors of World War II, the council made itself very difficult to alter (largely by design), even as geopolitics changed radically. So, while institutions can change, they often resist it. And when they do change, they do not necessarily align with the underlying functional needs and power structures around them but rather reflect their own path dependencies.

This logic means that over time, institutions have scope to become increasingly disassociated from other elements of a political problem. Often, scholars conceptualize this dynamic as a form of punctuated equilibrium.⁴⁵ Institutions match the functional needs and power relationships that exist at a certain point in time, but as time goes on, functional needs and power relationships shift, making the institutions less and less fit for this purpose. Eventually, this gap contributes to some kind of crisis that “punctures” the status quo and from which a new institutional equilibrium emerges. For example, students of power transitions in international relations note how international orders reflect the

power and interests of the dominant state or states but then, as the balance of power shifts, often descended into crises from which new orders emerge.⁴⁶

This dynamic interacts with problem length. If institutions have divergent effects in the short term and the long term and the institution's creators have short time horizons, then the longer-term effects of institutions may be mere by-products.⁴⁷ Moreover, the longer the time between a problem's causes and effects, the more chance there is for interests and power to shift as, for example, technology evolves, norms change, economic models wax or wane, or, indeed, as our climate changes. The exact size of the gap of course depends on the relative rate of change between these other factors that make up a problem and the rate of institutional change. But anytime the former is greater than the latter, increased problem length will be associated with a greater institutional lag. To the extent institutions are sticky, they will not rapidly "self-correct" to respond to changed functional needs or power structures, and moreover, any changes that do occur can be influenced as much by previous institutional arrangements as current requirements. The longer the problem, the greater scope for such mismatches to grow. In this way, the natural stickiness of institutions—critical to their effectiveness—has a perverse interaction with problem length.⁴⁸

Multilateral governance of climate change provides an excellent example of institutional lag. Created in 1992, the UNFCCC already showed a certain degree of "inherited" path dependence at its birth. The mental model guiding its initial design was inspired in the ozone regime, created just five years earlier, and widely seen as successful case of multilateral environmental governance. Countries believed this "convention and protocol" model, in which a broad framework convention was followed by a series of increasingly specific negotiated deals that locked in firm commitments, was the best way to overcome what they perceived to be a collective action problem. The history of previous institutional choices thus powerfully informed countries' understanding of the problem and their preferred solution.

The new institution's governance quickly became a flashpoint of contention, with developed and developing countries failing to agree on formal rules of procedure. Overall, countries were wary about binding themselves to decision-making processes they could not control. The UNFCCC therefore defaulted to a norm of consensus-based decision-making, which basically means that nothing is agreed until every country agrees on every point. This decision rule makes the UNFCCC very sticky indeed.

This stickiness has produced a number of gaps between the needs of the problem and multilateral arrangements. Perhaps most obviously, the early

UNFCCC created a divide between the obligations of so-called Annex I countries (forty-three industrialized states) and all others, with the former required to move first on reducing emissions. This arrangement, again inspired by the ozone regime and previous environmental treaties, seemed to make good sense at the time. In 1992, the Annex I countries made up 54 percent of global emissions. In 1997, when the Kyoto Protocol was adopted, this was still 45 percent. In 2009, when the Copenhagen summit ended in stalemate after the failure of developed and developing countries to agree on a differentiation of responsibility, Annex I countries accounted for only 36 percent. At Paris, it was 32 percent. Whereas the general principle that industrialized countries should move first makes good sense (given that they have more capacity to do so and have benefited disproportionately from carbon-intensive development), which countries are and are not industrialized has changed significantly since 1992, while the institutional rules have been slow to adapt.

Another example, noted above, is the difficulty of shifting the definition of the climate problem. The initial focus of the UNFCCC was essentially entirely on reducing emissions. Vulnerable countries had to fight to include consideration of climate impacts in the process. It was not until the adoption of the Paris Agreement in 2015 that a UNFCCC outcome reflected relative parity between mitigation and adaptation. At present, the inclusion of compensation for loss and damage from climate change is fiercely contested. Other issues, like geoengineering, remain taboo. These issues are increasingly discussed in science and policy around the world but, given the stickiness of the UNFCCC, will only work their way slowly, if ever, into the multilateral discussions.

Going forward, the elements of the climate problem will continue to shift. I explore this further in chapter 6. We can say with certainty that climate impacts will be significantly worse in thirty years, but the array of material and social facts, problem understandings, and political dynamics is highly uncertain. As those factors continue to change, the stickiness of our institutions will create a growing lag between institutions and other elements of the problem.

The Early Action Paradox: Uncertainty, Saliency, Obstructionism, and Muddling Through

The final governance challenge long problems pose, and perhaps the most important, derives from the difficulty of mobilizing political action before a problem's effects are known and felt. Because long problems stretch far into

an unknowable future, it is more difficult to act decisively on them now. After all, how can we know which course of action is best? And how we can mobilize support to change things when the effects are so far off and so many more urgent priorities demand attention? Uncertainty and low salience in turn enable obstructionism, giving interests opposed to a certain course of action favorable political conditions to resist change.

But at the same time, long problems require early action. If causes and effects are separated by long periods, only early action can meaningfully influence outcomes. Waiting until effects manifest is, by definition, too late. Long problems therefore pose a governance paradox. Their greater uncertainty and muted urgency limits agency in the present and bolsters obstructionism, but early action is precisely what is needed to meaningfully affect outcomes given the long lag between cause and effect.

Consider first the relationship between problem length and uncertainty. All else equal, longer temporal distance between a problem's causes and effects leads to greater uncertainty because the elements that make up a problem can shift either endogenously or exogenously, as the previous section discussed. Technologies emerge and diffuse. Beliefs change. Power transitions from one set of actors or countries to another. Some of these changes may be quite specific to the problem at hand; others may stem from broad shifts in the "state of the world," as the rational design literature or common game theoretic approaches term it.⁴⁹ Long-termism is therefore a significant epistemic challenge.⁵⁰

This uncertainty limits the ability of actors to shape their environment through purposeful action. As the temporal range of the effects of political choices increase, we need more time to consider their effects, particularly if they might be irreversible.⁵¹ Actors cannot be sure that their efforts will have the desired outcome, and this doubt means they may be less willing to act, especially when action is costly. Instead, they "muddle through."

As political scientist Charles Lindblom's famous 1959 article with this title argued, even for non-long problems, policymakers rarely make every decision following a hyperrational, comprehensive, utility-maximizing policy development process.⁵² Instead, they consider a few proximate examples and choices and make an incremental step toward what they judge best. For long problems characterized by significant uncertainty, the hyperrational model Lindblom critiqued as unrealistic is additionally inappropriate. Instead, we can expect a number of sequential, incremental, boundedly rational choices to be the norm.

But the longer the problem, the worse this muddling through approach, or what Lindblom called making "successive limited comparisons," will fare

because only early actions can substantially shape the outcome. Urban planning demonstrates this challenge well. Deciding what to build where has long-lasting implications for city life, and all too often these decisions are made more by circumstances and accident than by farsighted planning. Steven Johnson recounts the story of the Collect Pond, a freshwater body in lower Manhattan that in the early nineteenth century was nearly protected and turned into a park that could have been one of the world's great urban spaces. But conservationists were unable to mobilize sufficient support, and by 1812, the pond was filled in and developed into housing, eventually becoming the notorious Five Points slum.⁵³

In climate policy, uncertainty is a major barrier to action. Consider, for example, efforts to decarbonize electricity generation, now considered a relatively low-hanging fruit of the mitigation process. In 1992, when the UNFCCC was created, non-hydro renewable energy accounted for a negligible fraction of global power generation. Just a few places in the world had wind turbines or solar panels, which were vastly more expensive than fossil fuel plants. Even where governments were willing to begin investing in these options, grid operators worried how these kinds of intermittent sources could be integrated at scale and so saw a need for stable "baseload" generators (like coal or gas plants) that would smooth the gaps between sunny and windy days. Even as the cost of solar and wind plummeted to reach parity (or beyond) with fossil fuels, this worry about how to incorporate new technologies into old grids has continued to be a major barrier to speedier rollout of renewable energy.⁵⁴

Finally, uncertainty around long problems also follows from our agency to shape them. Long problems are uncertain in part because they are indeterminate. This openness means that decisions made early in a problem's temporal frame can lead to starkly different outcomes. After all, nothing is set in stone. The previous section noted that political institutions often exhibit path dependence, but so too do other aspects of problem structure. For example, at the time of writing, global emissions will need to fall something like 7 percent each year until 2030 to reach the 1.5°C pathway outlined in the IPCC's 2018 report. Imagine, however, if we had managed to peak global emissions in 2012, on the twentieth anniversary of the UNFCCC, and had begun reducing from then. The annual reduction needed to achieve the same result in 2030 would only be 1–2 percent per year because our peak would have been lower and we would have more time to bring it down (see chapter 6). It still would have been an enormous task but a much more tractable one. Now imagine we delay action by another decade. How much harder will it be to achieve climate safety then?

Although uncertainty is a key barrier to early action, it is not the only one. Sometimes problems are well understood and action still falls short. Consider infectious diseases with pandemic potential. Experts had predicted the emergence of a threat like COVID-19 for decades. Commissions, ranking systems, and other measures were set in place to understand and prepare for its inevitable emergence, which were bolstered by more limited outbreaks like SARS or Ebola. Although of course we could not predict exactly when a pandemic would occur and what characteristics the disease would have, we knew such threats were coming. Despite this relative certainty, our preparations were manifestly insufficient.

Alongside uncertainty, distant effects are difficult to mobilize significant political action around because they lack salience. Even when information is available, there is no guarantee that actors spend their scarce attention on it, as discussed at the start of this chapter. Policymakers can address only so many topics at once, forcing the most urgent to the top of the priority list. Interest groups and citizens, also needing to prioritize urgent matters, lobby governments to address their most pressing issues. When effects sit far in the future, it is difficult for governments or those that influence them to take attention and resources from urgent priorities to the important things that no one is talking about.

The combination of uncertainty and low salience, in turn, enables obstructionism, the ability of interests tied to the status quo to maintain their interests. Consider the hurdles a policy entrepreneur would have to overcome to create and implement a policy addressing a problem with distant effects like climate change. First, that policy entrepreneur would have to herself see value in pursuing an obscure issue, one that is unlikely to garner her a quick win and the associated political benefits. Few will have incentives to pursue such causes. Second, she would have to mobilize a sufficient coalition of interests to be able to influence policy. This would require each of those interests choosing to focus on a distant topic over their more urgent priorities. Third, this interest coalition would need to force the issue onto the broader political agenda, competing for limited space with numerous immediate priorities. Fourth, the coalition would need to somehow overcome, compensate, or neutralize political opponents.

To the extent those opponents are worried about the short-term costs of action, everything that is hard for the long-sighted policy entrepreneur will be easy for them. Opposing long-sighted policy—that is, promoting short-term outcomes—will give them the opportunity for quick wins on issues that are relatively easy to mobilize interests around. And even if the long-term-oriented policy entrepreneur wins a battle, she must preserve and maintain those gains permanently, as opponents will seek to reverse any defeats they face. A one-off

victory may be important, but long problems often require sustained policies over time, while it takes only one victory by opponents to block them. The longer a problem's effects reach into the future, the more friction the policy entrepreneur will face at every stage, and, should she get a win, the more enduring her victories will need to be.⁵⁵ For these reasons, obstructionism becomes a major political barrier to early action.

Technology development provides a good example of how uncertainty, low salience, and obstructionism block effective policymaking. New technologies can have radical and unintended consequences, but these are very hard to know when they are just emerging, and they lack salience. Once the effects of a technology are understood and widely felt, however, it may be very hard to change that technology as it now has producers and users who will resist efforts to rein it in. As David Collingridge described the "dilemma of control" in 1980, "when change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult and time consuming."⁵⁶

Stimulating technological transitions faces a similar but inverse problem, as uncertainty and low salience creates opportunities for opponents to block or delay action, facilitating obstructionism. If there are legitimate doubts about future outcomes, more study and experimentation is always justified, and the risks of going down the wrong path cannot be ignored. Under such conditions, experimentation is a sound policy (see chapter 3), but as policy experiments unfold, the inevitable failures (a 100 percent success rate is a sure sign of an ineffective innovation policy) can bring political costs. Famously, the US solar company Solyndra received a \$500 million loan from the Department of Energy in the wake of the 2009 financial crisis to support the development of an innovative photovoltaic technology. But shortly thereafter, the cost of the alternative technology, silicon-based photovoltaic cells, fell dramatically, making Solyndra's product unviable. The company went bankrupt in 2011. It was also revealed that Solyndra had misled the government in its loan application. Fossil fuel interests seized on the case, and Republicans in Congress made it a centerpiece of their efforts to block further support for renewables, even though, on average, solar technology has been extraordinarily successful.⁵⁷

Under these conditions, muddling through becomes the more likely outcome. Unfortunately, a series of small incremental choices will struggle to deeply affect a long problem. Only when these incremental steps are additive and show increasing returns can they hope to develop into an effective response over time.⁵⁸ The history of renewable energy is in fact such a case, demonstrating how small investments and experiments by leaders can, over time, create technological changes that shift the problem structure in a positive direction. I return to

such “catalytic” strategies in chapter 3. But other aspects of climate and other long problems do not share this positive dynamic, unfortunately. For example, current investments in adaptation are woefully below optimal levels. Even in wealthy places where resources are sufficient and damage estimates are relatively clear, we are not building the seawalls, changing the zoning laws, restoring the marshes and mangroves, developing the irrigation systems, or protecting the groundwater resources we know we will increasingly need in the decades to come.⁵⁹

Or consider negative emission technologies. Many climate scenarios assume significant deployment of these tools, which do not yet exist beyond the pilot stage, in the decades to come (including all of the scenarios that informed the influential 2018 IPCC report on the goal of limiting climate change to 1.5°C). The scale of such technologies modelers envision we may need is vast. One study suggests a land area the size of Brazil may need to be given over to bioenergy with carbon capture and storage (BECCS), a process of burning biomass for energy and permanently sequestering the carbon released, effectively removing from the carbon cycle on a geologic timescale.⁶⁰ How this would be done technologically, economically, and politically remains hazy.⁶¹ Moreover, the issue is highly charged—what about the other uses of that land, or the people who live on it—and essentially taboo in the UNFCCC process. Under such conditions, the early action needed to deliver the outcomes the models envision is hamstrung.

For a long problem like adapting to climate impacts or deploying negative emissions technologies at scale in the next decades, muddling through is risky because early action is what matters. Building infrastructure, restoring natural coastal defenses, replenishing aquifers, and even relocating communities are drawn-out processes. Developing and deploying negative emissions technologies to remove billions of tons of carbon from the atmosphere will take similar amounts of time. If we wait until the need for them is urgent, they will be too late. Only more costly, less effective solutions will be available to us then.

The politics of early action are hard. Even for very short problems, like the spread of COVID-19, governments often struggle to act sufficiently in advance, only lumbering into action after a crisis emerges and the best solutions are already off the table.⁶² Long problems instead force us to address the question, how do we get a crisis-level response well in advance of the crisis? How do we achieve wartime mobilization before the first shot is fired? The next chapters examine solutions to the problems raised above, starting with the central dilemma of early action.