CONTENTS

1

Long Problems

A Carbon View of Politics

I am carbon. I sink into a swamp roamed by dinosaurs. For eons, rock and silt settle over me. Their weight slowly presses me tighter and tighter, the passing millennia compacting me into peat, then lignite, then hard coal. Above me, the surface transforms from epoch to epoch. Continents drift, seas rise and fall, ice freezes and melts, but I remain unchanged. After an eternity, *Homo sapiens* are born.

Now things move fast. You dig me out of a pit. I blacken your lungs. You throw me in a furnace and the work of ages burns in a flash. Now I am flying, shooting out of a brick stack and high into the air. Trillions and trillions of molecules follow, pouring from ground to sky faster than ever before. In a geologic instant I blanket the earth.

But in what for me is a mere moment, your societies change beyond recognition. I bring industry, altering how you live and work and even what you believe. Those of you who exploit me most effectively become the most powerful empires ever seen, with armies, companies, and languages that cover the globe. Life speeds up. Instead of counting time from planting to harvest, you now orient your hours around train tables, factory shifts, and telegraphs. New ideas, inequities, and struggles lead to nationalism, democratization, labor movements, communism, fascism, and the most violence the world has ever seen. These conflagrations do not slow your transformation but speed it further. The social contract is torn up and rewritten through movements and revolutions. Your struggles for independence create scores of new nations, cooperating and competing through a growing array of international bodies. This interdependence combines with new technologies to create a hyperconnected form of capitalism that speeds life up again. Communication becomes instantaneous, but the surge of digital information enables new forms of

control as well as transparency. Politics becomes a fight between those who win or lose from these shifts. Superpowers rise and fall. Your numbers grow eightfold and you live longer and better than your ancestors could have imagined. Only in the last fraction of this geologic second do you grasp that I, the key to your transformation, carry also the threat to upend it.

I float serenely above your frenzy. In the few hundred years of human upheaval that followed the Industrial Revolution, my numbers have nearly doubled. Unlike you, I persist. The part of me that floated up in the puff of smoke from the world's first steam engine is still mostly there. Much of that bit of me will remain for centuries to come, outliving more than one hundred generations of the descendants of those who dug it out originally. The vast bulk of me that came after, the billions of tons of me that you pour into the sky each year, will last longer still.

My accumulation in the sky is already trapping so much of the sun's heat that the average temperature of the planet is more than a full degree Celsius warmer than it was when you started to burn me. This warming now triggers changes that could last far beyond the thousand years or so over which I will degrade. Plants and animals that go extinct will not re-evolve in that time. Forests that burn or dry into savanna or desert will not regrow in that time. Coral reefs that bleach and dissolve will not re-form in that time. Ice caps and glaciers will not refreeze and seas will not recede in that time.

You must wonder what will become of you during this next millennium and beyond of change. The planetary stability you evolved in is no more. You can model what will happen to me, but you struggle to imagine your own future. No one can say exactly what your technologies will allow, what you will value, how you will organize yourselves, or which interests will win and which will lose. But you do know that your chances now depend heavily on how well you can manage me and the climate change I cause. This is of course a question of how you manage yourselves—a question of politics—not just today or tomorrow but for as long as I and my consequences last.

The Argument in Brief

Problems like climate change unfold over the course of multiple human life spans. But our policy processes, the politics around them, and even the social science that tries to understand them do not match this time frame.

This temporal disconnect parallels the expansion of political problems across space. Over the modern era, globalization increased flows of money, goods, people, and ideas across borders. Transboundary policy issues like

trade, financial flows, migration, and cross-border pollution gained salience, enmeshing domestic and international politics. Faced with this new category of issues, society created a growing system of intergovernmental and transnational governance, forming the vast apparatus of global governance we have today. In parallel, social scientists developed new theoretical constructs like international regimes, cooperation theory, interdependence, and network governance to understand (and to seek to influence and improve) this system. As the "object" of politics and governance expanded across space, so too did political dynamics, institutions, and theories.

This book argues that the expansion of political problems across time requires a similar shift. Just as the "widening" of political problems across national boundaries has led to profound shifts in how we understand, study, and approach politics and governance, so too does their "lengthening" across time horizons.

Of course, political problems have always unfolded over time. But in our current epoch, changes in technology and ecology are putting time at the heart of politics in an unprecedented way. Climate change—the "long emergency"[1]—shows this clearly, but the dilemma of governance across time appears in myriad other challenges: managing new technologies like artificial intelligence (AI) and gene editing, demographic shifts toward an older population, infrastructure investment and urban planning, and many others. Although the book proposes a way of understanding and governing long problems in general, most of its examples focus on climate change.

I define problem length as the temporal gap between a problem's causes and effects, and long problems as those whose causes and effects span more than one human generation. However, the book focuses less on conceptualizing long problems and more on understanding their implications for politics and governance. It seeks to answer three questions.

Why are long problems hard to govern? Short-termism, the time inconsistency of preferences, and uncertainty about the future are widely acknowledged, among other temporal vexations, as barriers to effective policymaking. The book digs deeper into the mechanisms underlying these ideas to define precisely how and under what conditions they block solutions. It develops a political economy analysis of long-term governance, offering a new conceptualization of the political and governance challenges long problems pose, focusing on three:

- **The early action paradox**: Action that affects outcomes must occur well in advance of those outcomes, but such early action is stymied by uncertainty, low salience, and obstructionism.

- **Shadow interests**: People in the future have no agency or ability to shape politics in the present; their interests are mere shadows in politics.
- **Institutional lag**: Institutions created to address the early phase of a long problem struggle to remain useful as the problem's structure develops over time.

These three concepts provide an analytically useful way of studying the various political dynamics that often get lumped into general reflections on the problem of short-termism.

How can we govern long problems? There is a long history of political thought on how to address political dilemmas over time. Scholars, policymakers, and advocates have proposed dozens of mechanisms that aim to change decision-makers' motives, incentives, and capacities or that constrain them in different ways.[2] This book does not put forward a new silver bullet solution. Rather, I scrutinize the range of existing and proposed mechanisms with a social scientific test: How and under what conditions can we expect them to succeed? This analysis, which forms the bulk of the book, is organized around the three problems identified above: the early action paradox, shadow interests, and institutional lag. For each, I scan a range of existing and proposed solutions and evaluate what conditions—for example, what distributions of preferences and power, what institutional settings, what political strategies, and so forth—would actually be needed for them to succeed. Throughout, I argue that ultimately, effective governance of long problems requires political strategies that change incentives in the present. The result is a set of arguments on the most promising ways to move toward better governance of long problems, including a proposal in the conclusion for an agenda of institutional reforms to tackle climate change.

How can we study long problems? Finally, the book reviews how social science concepts and theories already help us understand long problems, notes their limits, and outlines a research agenda on the politics and governance of time. Taking problem length seriously changes how we interpret core policy challenges and the politics around them. For example, we can see climate change less as a free-riding problem or distributional problem and more as a transition problem. Inequality is less a matter of simple redistribution and more a matter of creating economic and social structures that create incentives for equality. In this way, problem length focuses researchers' attention on different dynamics and causal mechanisms than those commonly emphasized. Of course, social scientists already possess a formidable toolkit of theoretical

approaches, concepts, and methods to tackle temporal issues. These include historical institutionalism, path dependence, discount rates, transition studies, agent-based modeling, behavioral experiments, and many others. I briefly review such tools, highlighting their strengths and limitations, before arguing that social science needs to go further. I lay out a research agenda in three parts: studying rates of change as opposed to final outcomes, theorizing "problem structure" dynamically, and embracing empirical techniques that allow us to develop probabilistic knowledge about the future. The last of these proposes a significant epistemological shift in contemporary social science, arguing that too narrow a focus on identifying causality limits theory production because it truncates the object of study to the past.

Overall, the book makes the case that long problems like climate change require a fundamental rethinking of our political and governance strategies. Just as the expansion of "communities of fate"[3] across national boundaries has radically shifted political behavior, institutions, and thought, the long timescale of the most critical problems confronting society stands to remake the theory and practice of politics and governance.

This introductory chapter continues by defining political problems and demonstrating how their length, the temporal distance between a problem's causes and effects, is a key characteristic of all political challenges. It then discusses why we may encounter more long problems today than in the past, even though politics and society seem to have in some sense sped up. Appendixes 1 and 2 dig into these points in more detail for the interested reader. The chapter ends by locating the argument in contemporary debates and summarizing the remainder of the book.

Defining Problems and Their Length

Problem length is the time period over which the primary causes and effects of a problem unfold. To clarify this definition, it is important first to explain what is meant by a "problem" and how to think about its causes and effects. Defining political problems (or issues, or challenges; I use the terms interchangeably) is more difficult than it may seem. Although anyone, if asked, could likely rattle off a list of current challenges the world faces, the process through which problems come to be seen as such is complex. Even though we commonly refer to problems in broad terms as if they were singular—for example, climate, inequality, war—these issues are of course more accurately seen as amalgamations of different problems. For example, "climate" is

	Element	Climate change	Inequality	Pandemic disease
More objective	**Material or social facts**	Concentration of GHGs	Gini coefficient	Pathogen prevalence and characteristics
	Technical and scientific processes	Spectrometers, theory of the greenhouse effect	Income surveys, theories of economic distribution	Infection tests, germ theory
	Social understandings and preferences	Perceptions of climate risk	Norms around equality	Fear of disease
More constructed	**Political narratives, policies, and institutions**	Demands of a climate protester, goals of the Paris Agreement	Definition of poverty in a welfare program	Allocation of public health budget

FIGURE 1.1. Elements of a political problem

composed of major subproblems like mitigating greenhouse gases (GHGs) or adapting to climate impacts, each with its own countless subdivisions.[4] Moreover, political actors often do not share a common definition of a problem.

These complex "objects" of governance are partially given by social or material realities and partially defined by the processes of understanding and governing them.[5] A rich conceptualization of both objective and socially constructed elements is important for defining problem length.

At root, a political problem is a certain understanding of a collection of social and/or material facts that provides a frame for political behavior. Social and material facts like the distribution of wealth or the concentration of GHGs can exist independent of politics, but how they come to matter necessarily depends on the technical, social, and ultimately political processes through which they are understood, emphasized, institutionalized, and acted on. In this way, we can understand a political problem as consisting of at least four related elements (figure 1.1):

- A set of *material and/or social facts* (e.g., the concentration of GHGs in the atmosphere, the level of inequality in a society, the emergence of a deadly pathogen)
- The *technical and scientific processes* through which those facts are understood (e.g., spectrometers and an understanding of the greenhouse effect, surveys of income levels and economic theories of income distribution, microscopes and germ theory)

- *Social understandings* of these material and social facts, including how actors believe they will affect their interests (e.g., perceptions of climate risks, normative understandings of equality, fears of disease)
- *Political narratives, policies, and institutions* through which actors seek to shape outcomes toward their interests (e.g., the demands of a climate protester, the way a welfare program defines need, the choice of how to allocate public health investments)

Whereas the elements toward the upper end of this list are largely determined outside of social or political processes, those toward the bottom of the list are fundamentally social and political constructions. Indeed, these more social and political elements are so important that they can largely determine the political dynamics around a problem, even flying in the face of objective social and material realities. For example, infamously, scientists intent on justifying white supremacy devised theories and identified empirical collections of facts that aim to support that view.[6] Understanding political problems in this way means that the definition of a given political problem—climate change, inequality, a pandemic—is often contested, no matter what "the facts" are. Solutions and responses to problems are of course even more contested.

Constructivism has limits, however. Leaders may talk down the risk of a deadly pandemic in order to seek political advantage, but even the most Orwellian narrative cannot change epidemiology. Similarly, efforts to deny the reality of climate change have little hope of altering atmospheric physics. These "objective" elements are important because, as political scientist Alan Jacobs, who studies why governments invest over the long term or not, puts it, "the very slowness of many social, economic, and physical processes imposes a temporal structure on the logic of government action."[7]

Climate change superbly demonstrates the complexities of defining political problems. At present, the basic material facts and scientific theories of a changing climate are widely understood. Our emissions are changing the makeup of the atmosphere and therefore rapidly raising the earth's average temperature, affecting numerous planetary systems and the human systems that depend on them.[8] But this understanding has been fiercely contested and disputed over the past thirty years, as interest groups have sought to shape our collective understanding of the problem in a way that suits their goals. Just as with tobacco or acid rain, industry groups that feared regulation invested heavily to problematize, cast doubt on, and dispute the science of climate change.[9]

But even where there is consensus on the material facts, there may not be consensus on the definition of the problem. In the early years of global climate cooperation, the basic facts were understood to create, essentially, a prevention problem similar to other environmental concerns. If we see the emissions that cause warming as the problem, the solution is clearly to reduce them. For most of the last thirty years, and still today, the preponderance of both scholars and policymakers have seen the mitigation challenge as a collective action problem among states—how to get countries to act given the incentive to free ride.[10] But others have advocated seeing mitigation instead as a transition problem,[11] a distributional problem,[12] a lock-in problem,[13] a technological innovation problem,[14] an asset revaluation problem,[15] or through other lenses. I return to these alternative understandings in chapter 6. For now, the important point is that even where there is consensus on the material facts and broad objectives, there is not necessarily agreement on the nature of the problem overall. Most sophisticated observers would likely suggest that different aspects of the problem can be better or worse understood via some combination of these different lenses.

Moreover, reducing emissions is now understood to be only one aspect of the climate problem. This may seem obvious, but it was not always the case. As climate impacts became better understood and mitigation lagged, vulnerable countries pushed to expand the understanding of the climate problem to include efforts to adapt to climate change.[16] After all, even if prevention is perhaps preferable to treatment, a weak prevention strategy and no plans for treatment is cold comfort to those most at risk. Some mitigation advocates initially resisted this move as an admission of defeat or even a slippery slope toward giving up on prevention, while rich countries feared it might emphasize increasing financial support for the most vulnerable. But as the material facts of climate impacts have become impossible to ignore, adaptation has become a mainstream pillar of climate governance.

More recently, as climate impacts have continued to intensify, vulnerable interests are pushing to expand the climate problem further to include not just prevention and adaptation but also liability and compensation. After all, climate change is already creating "loss and damage," as the issue is termed in the United Nations (UN) process, which cannot be adapted to.

In the future, we can likely expect the definition of the problem to continue to evolve. For example, many argue we must understand the climate problem to include deployment of negative emissions technologies to suck carbon back out of the atmosphere (indeed, many scenarios for reaching global temperature goals assume them) or even solar radiation management, reflecting the

sun's energy back into space through aerosol sprays or other means of geoengineering. In a different vein, some groups advocate treating the climate problem like crimes against humanity, making "ecocide" a grave criminal offense equivalent to genocide.

Understanding how problems are defined matters because different definitions lead to different political implications. Defining climate as a collective action problem suggests one set of solutions; seeing it as a compensation problem provides another. Political scientists often describe the characteristics of a problem as the "problem structure" of a given issue[17] or, in the language of game theory, what type of "game" is being played. For example, problems can have more or less uncertainty, involve a large number of actors or only a few, or be characterized by greater or lesser alignment of interests.[18]

I argue that problem length—*defined as the temporal distance between the primary causes and effects of an issue*—is another critical but underappreciated dimension across which problems vary.[19] This definition links three concepts. First, causes can be understood as any of the background factors or dynamics that create or contribute to the four elements of a problem described above (figure 1.1). Similarly, effects are the outcomes of those elements.[20]

Second, we can define primacy as how directly and how significantly a cause is linked to an effect in a chain of causal relationships. For example, fossil fuel emissions are the primary cause of climate change because they have a direct effect on global temperatures and account for the bulk of global warming. The spread of industrialization, which led to a large increase in emissions, is less proximate but still significant. The technological breakthroughs or economic systems that allowed for industrialization are more distant still. On the other end of the causal chain, the change in global temperatures is a proximate contributor to droughts in some regions of the world, such as the Middle East. Such droughts are one of many contributing factors to economic and social disruptions in countries like Syria, which are in turn one factor increasing the risk of political violence and, ultimately, the civil war that broke out there in 2011. We would certainly not say that climate change "caused" the civil war in Syria, as it was neither necessary nor sufficient for that tragic outcome. But it has been identified as a background factor.[21] A challenge with long problems is that chains of cause and effect may be quite extended, increasing the number of intervening factors and allowing a multiplicity of processes to shape outcomes.[22] Although every problem can ultimately be linked in various ways to a wide array of processes, from an analytic standpoint it often makes most sense to weight the relatively proximate and significant causes more heavily.

Finally, we can define problem length as the temporal distance—measured in seconds, years, centuries, or millennia—between a problem's primary causes and effects. Climate change is obviously a long problem. The material fact of global warming is caused by the centuries-long accumulation of GHGs, especially carbon, in the atmosphere, which will continue to warm the planet for hundreds if not thousands of years after the world achieves net zero emissions, should that happen. A forest fire, in contrast, flares up suddenly, and its effects may disappear within a generation. Climate change is a relatively long problem. A forest fire is a relatively short one. Of course, if one probes the underlying causes of the forest fire, reaching beyond the proximate, one may find a link to a long problem like climate change. This example demonstrates how the processes through which problem definitions are constructed affects how long or short we consider them to be. Seen as just a one-off event, a forest fire is a short problem. Seen as a climate impact, it becomes a very long one. Like other elements of problem structure, length is therefore partially given exogenously and partially constructed.

It is important to distinguish long problems, defined in this way, from ongoing ones.[23] Many problems persist over time, perhaps even indefinitely, but this does not make them long problems. For example, every government needs to focus constantly on issues like providing medical care or educating the young. These tasks will extend as far into the future as we can imagine because there will be new people to care for and educate, but their primary causes and effects fall within a single generation. In other words, these are not long problems but ongoing shorter problems. Even here, though, note that different understandings of the problem imply different problem lengths. Seeing health care as an issue of treating immediate needs makes it a very short problem. Focusing instead on prevention creates a much longer temporal frame that includes factors like maternal and neonatal health and childhood nutrition. Similarly, improving social welfare is primarily seen as a question of redistribution between present generations. But research has shown that intergenerational factors like parents' educational attainment and even their childhood nutrition can shape their offspring's well-being. Analytically, it is important to distinguish problems that recur over and over again from those whose causes and effects stretch across long periods.

The political problems we confront run the gamut from short to long. As the examples in table 1.1 demonstrate, problems that span decades, centuries, or millennia are heterogenous: problems are long in different ways. For example, political scientist Paul Pierson identifies different examples of

Table 1.1. Examples of problems with different lengths

Problem	Causes	Effects	Temporal gap
Emergency response to natural disasters	Hurricanes, floods, fires, etc.	Loss of human life and welfare, property	Minutes, hours, days
Pandemic diseases (e.g., flu, coronavirus)	New/mutated pathogens	Loss of human life and welfare, reduction in economic activity	Weeks, months
Armed conflict	Political disputes	Loss of human life and welfare, destruction of physical capital	Weeks, months, years
Chronic diseases (e.g., cancer, heart disease)	Lifestyle, environmental conditions	Loss of human life and welfare, reduction in economic activity	Years, decades
Antimicrobial resistance	Overuse of antibiotics	Decreased efficacy of basic medicines	Decades
Protecting renewable natural resources (e.g., forests, fisheries)	Overuse	Resource depletion	Decades
Technology development	Investment in research and development and other innovation support	Increased productivity and growth, positive spillovers	Decades
Public debt (e.g., bonds)	Current funding needs	Future tax burden	Decades
Increasing human capital	Education and training	Productivity	Decades
Repairing the ozone layer	Ozone-depleting substances	Increased radiation	Decades
Geopolitical power transition	Changing economic and military capacities	Interstate conflict	Decades
Infrastructure (e.g., roads, bridges, dams)	Depreciation through time and usage	Reduced usability, economic impacts	Decades
Social mobility/ marginalization	Access to education and social and economic opportunities	Greater equality	Decades, centuries
Urban planning	Built environment	Lifestyle and transportation behaviors	Decades, centuries
Accumulation of debris in earth orbit	Growing use of satellites without disposal plans	Risk to satellites	Decades, centuries
Accumulation of microplastics in the food chain	Plastic use, disposal	Biodiversity, food systems reduced	Decades, centuries
Climate adaptation	Climate impacts	Environmental, social, and economic disruptions	Decades, centuries, milennia
Climate mitigation	Greenhouse gases	Temperature change	Centuries, millennia
Storage of radioactive waste	Power production	Health and environmental risks	Millennia

Note: See also Boston 2016, 109.

slow-moving causal processes that can create long problems.[24] Cumulative processes like urbanization, migration, literacy, or the spread of national identities tend to accrete gradually over time. In contrast, threshold effects may have cumulative causes, but their outcomes manifest rapidly, like discontent that slowly builds up but then explodes in a revolution. Perhaps the most difficult to analyze are multistage causal chains in which X leads to Y, but via a series of intermediate steps that each have their own logics and lengths.

Within each of these patterns, long problems may allocate costs and benefits differently across their span. Problems like climate change have, on average, present costs and future benefits. Taking on public debt, in contrast, involves paying future costs for present benefits.[25] Similarly, other problem features like irreversibility can tend to be associated with long problems (because their effects often take a long time to play out and so cannot be reversed quickly), but there are also irreversible problems that are not long (such as a radical technological breakthrough).

Long problems are a diverse group because problem length is only one of many dimensions across which problems vary. I do not argue that length is the only meaningful way to understand climate change, which scholars have discussed as a "super wicked" or "creeping" problem, or other long problems.[26] Certainly, a full understanding of any problem requires attention to characteristics beyond length. However, my focus here is to show how attention to this one characteristic, which seems quite intuitive prima facie, can in fact fundamentally reshape our understanding of politics.

Why We Need to Govern Long Problems

Why should we seek to understand and govern long problems? Perhaps the best metaphor comes from Geoffrey Vickers, a British polymath who shaped, and was shaped by, the upheavals of most of the twentieth century. In his 1970 *Value Systems and Social Process*, in a chapter titled "The End of Freefall," Vickers compares modern society to a person jumping off a tall building and, on the way down, remarking, "Well, I am fine so far."[27]

Human development is, like freefall, an exhilarating rush but one that needs direction if it is to end well. Vickers argued that if human civilization was to survive, "it will have to be controlled—that is, governed—on a scale and to a depth which we have as yet neither the political institutions to achieve nor the cultural attitudes to accept."[28] That is the challenge long problems pose to a society beginning to glimpse the ground below coming into view.

To be sure, governing across time is not a new aspiration. European monarchs still hear their subjects shout "Long live the king/queen!" In dynastic China, officials proclaimed the ruler should endure ten thousand years—meaning essentially forever—a phrase the Chinese Community Party also applied to Chairman Mao Zedong. In Nazi Germany, Adolf Hitler envisioned a thousand-year Reich. The 1789 American Constitution, like many of the written constitutions that have followed it, promises "to secure the Blessings of Liberty to ourselves and our Posterity." And the Charter of the United Nations begins by pledging "to save succeeding generations from the scourge of war." Indeed, the very idea of governance seems to require the durability of political order.

The difference now is that the objects of governance are increasingly in the future.[29] There are at least three reasons why long problems are increasingly prevalent. I explore these drivers more fully in appendix 1.

First, the scale and speed of development increasingly brings human systems into contact with planetary systems—like the carbon cycle—that operate on radically different timescales. As the economy has expanded, humanity's footprint on the planet has begun to alter the earth's fundamental geophysical, chemical, and biological systems. Human societies have of course ravaged parts of the world before, denuding Easter Island, killing off the megafauna of Australia or Madagascar, or fencing the American Great Plains. But around the middle of the twentieth century, we began to pass a threshold between localized and system-wide impacts, a period termed the "Great Acceleration."[30] Many describe the present epoch as the Anthropocene because humans are now the primary driver of planetary outcomes.

Planetary systems have their own timescales. As the beginning of this chapter noted, carbon persists in the atmosphere over centuries. Similarly, biodiversity may take millennia to re-form once destroyed, and synthetic chemicals can persist in the environment for eons. As we strain the boundaries of various planetary systems, we create changes that can alter the entire planet for geologic spans.[31] In other words, the material facts we confront, the first element of a political problem (the first row in table 1.1), are shifting as humanity shapes the earth's fundamental systems for the first time in our existence.

Second, technological and scientific development have changed both our material ability to shape the future as well as our ability to measure and understand problems beyond the present. Technological changes like gene editing or AI, to name just some examples, have the potential to fundamentally alter human society. Once created and deployed, their effects may not be reversable.

The impact of human development on the planet or the advent of nuclear weapons are similar. New tools also allow us to alter the future (and indeed the present) much more profoundly, reshaping material facts.

In the same vein, science and technology also allow us to extend the timescale on which we perceive problems by enhancing both our understanding of the past and our forecasting abilities (the second element in table 1.1). To even begin to understand the risks posed by climate change we had to gain a deep understanding of the chemistry and physics of the atmosphere. We had to look back in time to understand previous phases of the earth's history through techniques like chemical analysis of ancient ice cores or air trapped in prehistoric rocks. We had to gather data from thousands of old handwritten weather observations written in dozens of languages and passed down through a range of oral traditions. And we had to build complex computer models to simulate what, based on our understanding of all of the above as well as the economy and society, might happen in the future. Only through this "vast machine" of human knowledge have we begun to grasp the danger we face.[32] As this example shows, changes in science and technology allow us to perceive more distant risks and impacts, lengthening the time span of how we understand problems.

Third, and more tentatively, social beliefs about how to value future generations may be shifting (the third row of table 1.1). We *perhaps* are starting to care more about the future. To be sure, attention to the needs of future generations is embedded in nearly all traditional human ethical systems. For example, scholars often point to the Iroquois maxim to consider the impact of a decision across seven generations. The general principle that we should care about our descendants is so common across belief systems that it can be considered a kind of basic moral intuition, like the injunction against wanton murder, that stems naturally from humans' reliance on social organization and perhaps even our biological imperatives. Strikingly, belief systems that disagree on many key points share an emphasis on the value of the long term. For example, modern conservatism and ecologism disagree sharply in countless ways, including about how to address climate change, but both agree that people in the present have a duty to consider how their choices will affect people living in the future. In the realm of normative philosophy, a groundswell of literature has emerged arguing that we should value the future more, not least because of the ways in which the Anthropocene and changes in technology have increased in the weight of the present on the future.[33] Indeed, a whole philosophical movement, long-termism, has emerged around this idea, connected to consequentialist beliefs that "future people count. There could be a lot of them. We can make their lives go better."[34]

Social scientists are less concerned with which particular belief system motivates an interest in the future and more concerned with how those beliefs do or do not shape behavior and institutions. Some prima facie evidence suggests these concerns may be growing. Today, 41 percent of written constitutions make reference to future generations, as well as hundreds of international legal instruments, a trend that sharply accelerated from the 1990s onward.[35] In 2024 every member state of the United Nations adopted a Declaration on Future Generations that commits them to safeguard the interests and needs of our successors. Recent surveys of both legal professionals and laypeople have found striking support for the idea that future generations should be protected in law.[36] Such changes in political beliefs and institutions can shape how we think about the length of problems. Because political problems are socially constructed, to the extent our norms and institutions place more value on future generations (the fourth row in table 1.1), we will treat more problems as long problems.

So if our problems are longer because they have changed materially, we have the technology both to shape the future and to understand distant impacts more accurately, and we may care more about the future and act on this belief politically, we must seek to govern across time. This book asks, can it be done? If so, how?

About This Book

This book brings the core insights of political science to bear on the problem of governing over time. Theoretically, it does not propose and test a single explanation but rather seeks to develop a general political economy account of long problems. Empirically, it does not examine a set of cases but rather draws on a wide range of illustrative examples from around the world, rooted mainly but not exclusively in the problem of climate change. In this way, it seeks to show why long problems are hard to govern and how we might nonetheless seek to understand their politics so as to advance solutions. These arguments aim to speak to scholars and analysts studying long problems, to policymakers grappling with them, and to students and citizens looking to understand them.

This focus connects to a long tradition of scholarship. Governing over time is a very old problem. But the modern idea that we can and should look ahead, and indeed seek to shape the future to our goals, grew out of the nineteenth-century scientific revolution and its promise that we could understand the world and, through human ingenuity and agency, forge some kind of

"progress."[37] Later twentieth-century ideas on modernization rekindled this interest in understanding and shaping or even planning the future, just as reactions to some of the fruits of progress—for example, the threat of nuclear annihilation, environmental degradation—prompted calls to make forward-looking caution a fundamental principle for a society putting itself at risk.[38] Today, prompted in large part by the growing recognition of long problems, a wide range of disciplines are seeking to understand how human societies can best govern themselves over time.

The arguments in this book come from a political science perspective but one that takes seriously insights from a range of subfields and adjacent disciplines and one that seeks to speak to anyone interested in the problem of governance across time. Even though political science offers a powerful lens through which to study time problems, the field can also benefit enormously by looking at other ways of approaching the issue.

First, as discussed above, philosophers and normative political theorists have built a sophisticated literature examining why we should care about long problems and therefore raised the question of how they should be governed. Building from principles like the fundamental equality of human lives, or the duty not to interfere in the life chances of others, or traditional beliefs around stewardship, a surprisingly diverse array of philosophers have argued that present generations should care about future ones. By making clear that long problems *should* be governed and also by debating how we might best govern them, political philosophy has done much to put this topic on the agenda. Indeed, this book can be understood in part as an attempt to help the social science literature catch up with our normative colleagues.

Second, political scientists working in the realm of critical theory—a broad term for approaches that probe and question power, including nonpositivist approaches—have explored how time matters for conceptualizing power. For example, who wins and who loses from the instantaneous nature of modern financial transactions?[39] How are arguments around "prevention" mobilized to justify military interventions or policing?[40] How does the understanding of the future empower or disempower actors in the present? Following such questions, scholars speak of a "temporal turn"[41] in international relations theory.

Third, scholars working in the political science of the environment or in multidisciplinary environmental studies have grappled deeply with the temporal mismatch between human and environmental processes. This body of work has explored in detail the dynamics of prevention and of transition and has unpacked how uncertainty around future outcomes affects political

decision-making. Scholars of climate politics have posited theories of overcoming lock-in or generating "sticky" solutions.[42] A growing body of work on "governing in the Anthropocene" tackles directly how political systems are changing—or not—to respond to problems like climate change that extend across both space and time.[43]

Fourth, and more generally, systems and complexity theorists—including Geoffrey Vickers, quoted above, who was a pioneer of the field—have explored many of the patterns that long problems raise. When considering systems overall, differential rates of change, as opposed to levels, are often the most important variables to study. Causal processes may exhibit positive or negative feedback effects. Tipping points may lead to fundamentally new equilibriums, creating nonlinear processes. All of these concepts help us probe the time-dependent assumptions that bind much social science scholarship.

While these four bodies of work are mostly in dialogue with each other, one contribution of the book is to gather their insights together and to translate them into the language of most social scientists, who stand to gain from taking them seriously. It is fair to say that each of them is significantly ahead of the bulk of contemporary political science, economics, or related disciplines in their conceptualization of time. As I argue in chapter 6, most contemporary social science literature makes fairly strong (implicit) assumptions about problem length that truncate the scope of our analysis and limit the generalizability of our theories across time.

That is a shame because there is in fact a huge amount that political science in particular can contribute to these questions. I aim to show how the discipline's central concerns—how and why actors develop certain interests, how they build, wield, and contest power to advance those interests, and how institutions structure their interactions—enrich our overall ability to understand long problems. In particular, this book focuses on understanding the political implications of long problems and analyzing how and under what conditions governance may emerge. Political science has much to give back to the wider intellectual community grappling with the dilemma of long problems. Studying the political economy of long-term governance can help fill a vital gap between normative ideals and abstract concepts on the one hand and the realities of how societies organize themselves on the other hand.

Although attention to long problems remains underdeveloped in the core of political science, there are significant exceptions. As chapter 6 discusses, the discipline possesses significant tools for studying time. In particular, this book takes as its point of departure three key works: Paul Pierson's *Politics in Time*,

Alan Jacobs's *Governing for the Long Term*, and Jonathan Boston's *Governing for the Future*. Pierson not only provides a canonical treatment of path dependency but also sets out how to understand long-term processes of change and sequencing more generally. Jacobs analyzes the politics of intertemporal investments in democracies, creating both a theoretical structure and a rich empirical baseline for considering the politics of redistribution across time. And Boston encyclopedically surveys and evaluates mechanisms for how governance can be made less short term. I seek to build on these insights and other work in the field.[44]

The book proceeds as follows. Having presented the challenge of long problems and explained why they matter, in the next chapter I explore why long problems are hard to govern. It begins by compiling the various arguments made around short-termism in politics: why it exists and why it can lead to perverse outcomes. The bulk of the chapter, however, uses the concept of long problems to clarify three enormous political challenges. People in the future have only "shadow interests" in the present, limiting political agency that favors long-term outcomes. Dynamic problem structures that shift over time lead to institutions that lag behind what is functionally required of them. And because long problems require, by definition, action before their effects are felt, issues of uncertainty, low salience, and obstructionism are pervasive.

Chapters 3 through 5 then analyze strategies for governing long problems, corresponding respectively to the three challenges introduced in chapter 2: shadow interests, institutional lag, and the early action paradox. I start in chapter 3 with the last, as it encapsulates perhaps the core challenge of long problems: acting early. Making information about the future known and salient through informational tools or foresight processes can change action in the present when/if actors in the present have incentives to act in a long-term way, an important scope condition. But policymakers can also go further and use experimentalist governance techniques to confront the challenge of uncertainty directly, or deploy catalytic strategies and institutions, including those in the Paris Agreement, that can under certain conditions erode obstructionism by shifting incentives over time.

Chapter 4 turns to the challenge of shadow interests. Institutions that represent future interests in politics, either with reference to a specific issue like climate change or on behalf of future generations in general, can add an important element of agency to efforts to make knowledge of the future known and salient in politics. More powerfully, trustee institutions like courts and central banks can be given explicit mandates and powers to act on behalf of future interests. And a wide

range of strategies can be used to actually extend political actors' time horizons, including forms of participatory deliberation like climate assemblies.

Chapter 5 focuses on the dilemma of navigating the tension between durability and adaptability to overcome institutional lag. Long-term goal-setting like the Sustainable Development Goals (SDGs) can drive continuity, while tools like sunset and review clauses can create opportunities for reflexive updating. Similarly, by incorporating automatic trigger mechanisms—such as indexing policy to certain trends or outcomes—into governance, policymakers can ensure there is an opportunity to update, while building up reserves, such as those we see emerging in sovereign wealth funds, can provide the capacity to do so.

Each of these three chapters surveys a range of governance solutions to a specific challenge long problems pose and examines the conditions under which and processes through which they can have more or less effect on the problem. I do not present a novel empirical examination of how we have in the past governed long problems but rather use the book's theoretical tools to examine how we might do so drawing on a range of examples. Throughout, my focus is not on abstract solutions but how and under what conditions specific tools may or may not reshape politics. As these chapters show, these tools are used by and available to all types of countries—democracies and autocracies, wealthy and developing countries—with a wide range of political cultures. As with all governance, however, state capacity is needed to deploy such tools effectively. These chapters represent the bulk of the book's contribution, drawing extensively on the example of climate change but also drawing in other issues for comparison.

Unlike the others, chapter 6 targets scholars and research students specifically, looking at which social science tools, both theories and methods, can already help us analyze long problems and how new approaches can deepen our understanding of them. It explains how taking long problems seriously both challenges current approaches and creates exciting opportunities for theoretical innovation. It emphasizes the importance of looking at rates of change, dynamic problem structures, and empirical study of future outcomes. Readers not seeking to analyze long problems themselves may wish to skim or skip this chapter, though social scientists will find a perhaps provocative challenge to expand our methodological and even epistemological repertoire.

Finally, chapter 7 concludes by considering what it would really mean to govern across time. Although there has been some progress in climate policy in the last decades, we are collectively falling woefully short. The policy ideas exist, but sufficient political support for them does not. The arguments in

this book help explain why. The political institutions we have inherited are stacked against effective governance of long problems like climate change. To really tackle climate or any other long problem, we need to change the rules of the game.

I therefore propose an institutional agenda on climate change to help build the political conditions under which effective policy becomes more feasible. This agenda builds on the tools examined in chapters 3–5: weaving together future-oriented informational systems across the policymaking process, experimental and catalytic strategies and institutions, ways to represent future generations and create trustees for them that have real power, processes that can extend time horizons such as participatory deliberation, frameworks to set and continuously update long-term goals and pathways toward them, triggers to keep us on course, and new reserves to enable investment in transition and resilience. Together and over time, this family of long-term governance reforms could remake our political institutions in profound ways, reaching beyond a single issue like climate change and reorienting politics overall toward long-term interests.

However, the threat of climate change or any other long problem will not necessarily drive us toward this governance transformation. Indeed, we have reason to expect that as climate impacts and decarbonization grow more intense and existential, political pressure for immediate reaction and protection will make our political system more short-termist, not less. Instead, what the climate challenge does present is an opportunity for policymakers and citizens to catalyze more long-term governance systems going forward. The choice to do so or not is ours.

The book ends by considering the possibility that we succeed. Throughout human history, profound changes in political "technology"—the nation-state, representative democracy, global governance—have tended to lag changes in economic and social systems. But if we take governance of time seriously, then political decisions and activities can increasingly shape the social and economic future. Although there is always mutual feedback between these macrosystems, improving society's capacity to shape material and social outcomes in the future—that is, to govern time—can create unprecedented possibilities, perhaps both good and bad, for our collective agency.

INDEX