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Introduction

Just a little more than 150 years after the publication of *Das Kapital*,[1] by the eponymous Karl Marx, capitalism finds itself under scrutiny again. For a time the failures of Marxism, as a political ideology, and the failures of socialism, as a means of economic organization, were so globally apparent that there seemed no longer to be anything to argue about. Inequality has now rekindled the old debate over capitalism versus alternative forms of government or economic organization.

Differences in degree are masked by a simple capitalism-versus-socialism dichotomy. Nevertheless, this book takes up this debate on these simplified terms, and with respect to only one question, but one of existential importance to humankind: How will human civilization right its horribly, tragically errant relationship with the planet it inhabits? Climate change, water pollution by nutrients, plastics, and hydrocarbons, the vast transformation of large landscapes, and the assault of industrial chemicals about which we know virtually nothing, head up a long list of ways in which human civilization faces colossal upheaval, a comeuppance of a longstanding disregard for the environmental consequences of human activity. Earth itself will support some lifeforms indefinitely, but the range of climatic and environmental conditions in which humans can thrive is limited. Humankind is now threatening the planet's ability to support humankind. What will save us from ourselves? For better or for worse, it will be capitalism that saves us.

That may seem like a strange assertion to some. Activists, scholars, researchers, interested citizens, and maybe even politicians that have been concerned with environmental issues may be surprised, and some chagrined, to hear such a thing, given how much damage capitalist economies have already done to the global environment. Not only that, some prominent capitalists continue to get in the way of environmental regulation and reform. It seems Pollyannaish to suggest that capitalism can turn around and start doing the opposite of what it's been doing for well over a century.

But that simplistic view misses the wide varieties of ways in which capitalism works and the infinite number of goals that capitalists pursue (it is not just profit).

Capitalism is not a monolith. Capitalism can exist in authoritarian states such as China, in libertarian states such as the United States, and in social democratic states such as the Scandinavian countries. In this variety of governments, cultures, and ideologies, capitalism has clearly held sway as the preferred method of economic governance, even as it faces different limits in different countries. In this hour of global environmental crisis, capitalism is the only way to quickly enough marshal the human, financial, and material resources necessary to right the direction of a huge, ponderous ship: a global economy powered by fossil fuels and trillions of dollars of polluting capital. If there is something that can fix this broken form of capitalism, it is capitalism.

Capitalism, like socialism, is difficult to define and frequently misunderstood. By "capitalism" I mean a form of economic governance with decentralized decision-making through prices, explicit or implicit, which govern a system in which not only is there free trading in markets, but free movement of factors of production. Money, labor, and other useful inputs (including environmental ones) are all factors of production, and capitalism requires that the owners of these factors of production be free to deploy them in whatever venture they choose. There are limits, of course. Slavery is forbidden, so there is no price on human bondage. But capitalism often means that the most profitable venture finds itself with the most useful factors of production, and competitors fall away, even fail. This is an oversimplification, and I undertake a lengthier discussion in Chapter 2.

Importantly, capitalism is not the absence of law or government, nor even a widely held illusion that government is "neutral" with respect to values, and that it can simply "call balls and strikes" like an impartial umpire in a baseball game. Capitalism embodies bundles of values that vary from country to country. This book suggests only elevating one: protection and restoration of the global environment. It is a far-reaching value because humankind has fouled its own nest in so many ways in so many countries and cultures. But it is a momentous one, because the whole of humankind is now at risk of descending into greatly diminished, and possibly some post-apocalyptic, existence. Whatever diverse meanings people may place on "capitalism" and on "human civilization," it is now a clear and present danger that the global environment may deteriorate enough to make both of these things difficult to sustain in a recognizable form. That dark future may be nearer than we would like to believe.

The way that capitalism is practiced must change, of course. It has been profitable to externalize environmental harms onto the planet and the rest of society. That is not only a human and planetary tragedy, but it is an anathema to capitalism. At a minimum, a healthy capitalist economy would count and value the vast forms of ecosystem services provided to many productive, profit-making enterprises. Clean air and water are not only vital to a healthy and productive population of human workers, but also as inputs to many industrial processes. But a healthy capitalism would go well beyond that, and place protection of the global environment at the

center of industrial and commercial activity, where it belongs. Just as capitalism wrought momentous changes that have transformed society, it can be redirected to transform it again, but with the new goal of protecting and restoring the global environment.

This book suggests ways in which capitalism can be shunted away from its currently unsustainable (ecologically *and* economically) collision course with the global environment, and how capitalism can be harnessed to help solve the environmental crises facing humankind. Some parts of capitalism are already hard at work solving some of the environmental market failures that other parts of capitalism have created. Saving humankind and many other species will require that these restorative forms of capitalism be allowed to thrive. But more than that is required. Capitalist society must not only beat a hasty retreat from its destructive aspects, but also allow some new forms of capitalism to emerge, develop, and mature.

The necessary transformation of capitalism will be profound, but not necessarily jarring for everybody. In fact, it is already well underway. Driving electric cars or hybrid-electric cars, drawing electricity from a solar rooftop, and using energy- and water-efficient appliances is already routine for many, and would represent just a minor change for most consumers. Overall consumption patterns need not change dramatically.

It is on the production side that change is afoot. Given what we now know about impacts on human and nonhuman life, some methods of industry and commerce are now clearly inferior to alternatives. The *way* that energy and goods are produced must clearly change. Change is of course difficult, but the nature of capitalism is that progress comes through competition and change. Joseph Schumpeter thought that "creative destruction" brought about by healthy competition was the core feature of capitalism.[2] Businesses and industries *must* come and go. One example of an industry that has become anachronistic is coal mining. Coal combustion can now be replaced by a variety of alternative energy sources, and in fact has been in many places. In the United States and elsewhere, low natural gas prices have outcompeted coal as a fuel of choice for electricity generation. While it is important to acknowledge the economic and emotional toll of change for coal workers, it is also worth keeping it in context. With the development of the internet and the advent of travel websites, about 50,000 travel agents in the United States went out of business from 2000 to 2016.[3] That is also about the same number of workers in the coal mining industry who are at risk.[4] In healthy capitalist economies, the only constant is change.

There has been considerable discussion at times in the United States and other countries of a "Green New Deal" to address not only climate change, but a variety of related social ills, such as inequality, health care, and education. Almost all countries must absolutely do better on all of these issues, but it does not necessarily follow that they must all be addressed together, even if there are significant linkages. This book argues that transformative change need not cost extremely large amounts of

money, nor need it involve a dizzying number of legal changes, provided it retains a laser-like focus on protecting and restoring the global environment. Most of what is needed to address climate change and the other critical environmental problems is readily available in a familiar policy toolbox. It is just that none of these have been explicitly put forth as ways to redress environmental harms within the rubric of capitalism. As it happens, the Green New Deal has been vague enough that different political candidates have been able to endorse the idea while putting a unique stamp upon it. My view is that profound change does not require the scale of change and expenditure that seems to be suggested by Green New Deal proponents.

1.1 MEETING THE ANTHROPOCENE

Some scientists have argued that in terms of Earth's history, it has entered a new geological epoch: the Anthropocene. Following the Holocene, a period of about 12,000 years beginning with the end of the Ice Age, the Anthropocene would be that period in which human activity began to have a significant impact on the Earth's ecosystems. The International Union of Geological Sciences, which declares these epochs, charged a working group with a preliminary decision and recommendation as to whether to declare this new epoch. In 2019, the Anthropocene Working Group voted overwhelmingly in favor of declaring that the Anthropocene should be treated as a "formal chrono-stratigraphic unit," or epoch. The recommendation would date the beginning of the Anthropocene to about the mid-twentieth century, when the advent of the nuclear age and the time in which many signals – "geological proxy signals," to the Working Group – indicate that the Earth has begun to change. The Working Group described these geological signals of human activity:

> Phenomena associated with the Anthropocene include: an order-of-magnitude increase in erosion and sediment transport associated with urbanization and agriculture; marked and abrupt anthropogenic perturbations of the cycles of elements such as carbon, nitrogen, phosphorus and various metals together with new chemical compounds; environmental changes generated by these perturbations, including global warming, sea-level rise, ocean acidification and spreading oceanic "dead zones"; rapid changes in the biosphere both on land and in the sea, as a result of habitat loss, predation, explosion of domestic animal populations and species invasions; and the proliferation and global dispersion of many new "minerals" and "rocks" including concrete, fly ash and plastics, and the myriad "technofossils" produced from these and other materials.[5]

This is a to-do list, and it is a daunting one. It is even a bit understated, as the threat of climate change is not described in its actual nightmarish detail: the last time that atmospheric carbon dioxide concentrations were this high – more than 400 parts per million – was 3 to 5 million years ago,[6] the temperature was approximately 5 to 7 degrees Fahrenheit warmer, and sea levels were between 16 and 130 feet higher than

today.[7] And yet, the news always seems to be getting *worse*: ice shelfs are melting more quickly than expected,[8] coral reefs are dying off more quickly and dramatically than expected,[9] and wildfires have burned more ferociously and longer than expected.[10] And climate change is not the only threat, perhaps not even the most immediate one. Millions of people worldwide die annually of air pollution.[11] Humankind is not so much at a crossroads as it is at a precipice.

There is no doubt that the Anthropocene has the fingerprints of capitalism all over it. But to try to *rein in* capitalism so that it does less of what it currently does is not enough. The world's extractive, destructive, fossil fuel-based economy strives *against* restraints imposed by environmental law. It must somehow be made to strive *for* good environmental outcomes. Capitalism has undergone dramatic transformations in the past. Never has it been more important that it do so again.

Nor is there anything capable of changing capitalism's direction other than capitalism itself. Moral arguments are clearly necessary to change broad, worldwide attitudes toward environmental stewardship. But that cannot be the basis for industrial transformation, as is evident from decades of bickering over environmental priorities, locally, nationally, and globally. Some propose socialism, or something akin to it. But the environmental record of socialist countries is clearly worse than that of capitalist countries. Nothing short of an authoritarian state, and a harshly punitive one at that, could actually direct everybody in the right direction. Even then, the history of corruption, illegal markets, and bureaucratic fecklessness in authoritarian states does not bode well if the mission is to change direction quickly.

1.2 ONLY CAPITALISM CAN SAVE HUMANKIND FROM ITSELF

In 1833, the United States had only 380 miles of railroad tracks, most of it local, with no sense that trains could run on anything more than a dedicated line running from one place to another.[12] There was no network. Alfred Chandler's account of railroad expansion highlights what was new about the railroad venture: railroad tycoons, using joint stock corporations, began to undertake complex managerial tasks, like harmonizing the design of railroad tracks, keeping track of production and delivery of goods, agricultural commodities, and consumers, all in a variety of places throughout a very large area. The amount of money needed to create these business enterprises, to enter into production and delivery agreements, and to build the railroad tracks themselves was extremely large for that time. There was not even enough money that could be raised from all of the beneficiaries: farmers, merchants, and manufacturers that would be connected by a rail network. Unable to raise enough money in the United States, the railroad companies sought investment from European investors.[13] Once funded, the railroad enterprises became these institutions unto themselves, said to "take on a life of their own."[14] Investment in building railroad tracks and cars was massive for the time: $700 million between 1850 and 1860 alone.[15] By 1860, 30,000 miles of track had been laid.[16] By 1881, at

Promontory Summit in Utah, the West and East Coasts of a newly enlarged and post–Civil War country had been connected by rail. By 1890 railroad companies were the largest business enterprises in the world, employing more workers and handling more funds than the largest American governmental or military organizations.[17]

It is hard to overstate the significance of the railroads to development of the United States. Mid-nineteenth century railroad construction represents one of the earliest large-scale construction projects not undertaken by a government. Railroads connected an entire nation, and a large one at that, fomenting the rapid economic development that followed. As Alfred Chandler chronicled,

> The new sources of energy, and new speed and regularity of transportation and communication caused entrepreneurs to integrate and subdivide their business activities and to hire salary managers to monitor and coordinate the flow of goods to their enlarged enterprises.[18]

Railroad investment even ushered in a new era in finance. The amount of trading in railroad stocks and bonds made the New York Stock Exchange one of the largest and perhaps the most sophisticated capital market in the world.[19]

That is not to celebrate it all. Much of the hard labor was performed by Chinese immigrants treated like slaves, and the resulting massive, haphazard, indiscriminate development of the American West was predicated on the largest displacement and disenfranchisement of aboriginal populations carried out by any human society, ever. But it is also important to notice the railroad example as evidence of the ability of human society to dramatically remake itself. Capitalism *can* transform itself from a resource-consuming to a resource-restoring juggernaut. In addition to a very large amount of investment and capitalist energy, it will require direction.

A more modern example of the transformative impact of capitalism is the fairly dramatic – by the standards of the electricity generation industry – change in fuel sources for electricity generation in the United States. Decades of regulatory efforts produced some modest reductions in the use of coal for generating electricity. What sustained regulatory efforts could not do, however, a distinctly capitalist enterprise did. The advent of hydraulic fracturing, or "fracking," the cracking of geologic formations to gather small and disparate bubbles of natural gas, sent natural gas prices plummeting, and relegated coal to a fossil fuel of second choice. The story of how fracking became a scale operation by many atomistic natural gas companies is a complex one, weaving together narratives of technology, property rights and energy economics,[20] but one thing is for sure: the development of unconventional natural gas sources was an intensely capitalist enterprise. As in the railroad business, that is not to say that this story is an entirely uplifting one; natural gas has forced coal production to the margins, but must very soon give way to renewable, fossil-free sources of energy. Fracking also uses and spoils large amounts of water, and has been implicated in cases of drinking water contamination.[21]

Finally, of course, under a global capitalist system, technology has transformed telecommunications, consumer electronics, retail, and even politics; again, not necessarily for the better. Electronic gadgets, the product of a worldwide production chain, do things unimaginable just a few years ago. Online retail dominated by Amazon has brought almost everything to doorsteps. Along with its competitor Walmart, the two have together transformed retail and lowered prices, even as they have wiped out entire towns and the civic life within. Social media has profoundly changed the way people relate to each other. While it has served as a social conduit and fundraising tool, it has also spread dark and shadowy misinformation broadly and dangerously. While it has been a tool for democracy movements such as the Arab Spring, it has also facilitated Russian interference with American elections.

It is easy to find fault with how capitalism has imposed tremendous social and environmental costs. In each case and in countless other examples of capitalism run wild, enormous benefits were realized and also enormous costs suffered. But these examples illustrate how powerful and transformative capitalism can be, not just the resulting damages. If it is argued that capitalist economies produce greater social and environmental costs than those under say, socialist economies – a dubious claim – it is because only capitalist economies have been truly transformative. Only under a capitalist system could the vast Western United States be connected and settled, could the plodding electricity generation sector change its energy source, and could electronics have taken hold of so many lifestyle choices. There is no evidence that socialist economies are capable of such transformation, though in fairness that is due in part to the paucity of sustained examples of a socialist economy.

Capitalism is a form of economic governance that embraces the decentralization of information, rather than trying to conquer it, as a socialist system must. Capitalism is a means of achieving hyper-coordination of resources, ideas, and human initiative. It is that hyper-coordination of disparate factors of production that makes capitalism so powerful and potentially disruptive. A free flow of factors of production means that they can be withdrawn from some industry or some geographic region. There is nothing about capitalism that requires such large social and environmental damages, or ignorance of these damages. The large social and environmental costs suffered under capitalist systems have been failures of government, not failures of capitalism. Capitalism has been pointed in the wrong direction, and has bounded off too exuberantly in that wrong direction.

Energy companies are a case in point. The advent of hydraulic fracturing, or fracking, has been a mixed blessing. On the one hand, it has and will continue to push out the use of coal as an electricity generation fuel and dramatically reduce carbon dioxide emissions and other pollutants. On the other hand, fracking has produced a variety of other environmental costs, and given the increasingly dire findings about climate change, natural gas cannot stay long at the apex of the energy

pyramid. But it has been transformative in a way that is hard to envision in a socialist economy. For those that imagine that the social and environmental costs of energy production would be better managed under something other than capitalism, the track records of Saudi Aramco, the Chinese oil giants, and many state-owned energy companies are not very reassuring.

Winston Churchill said that "Democracy is the worst form of government, except for all the others that have been tried from time to time."[22] He has been misquoted at times as having said that *capitalism* is the worst economic system, except for all the others. That seems accurate as well. There is something fundamental about capitalism, in all its forms, that creates a tendency to produce both wealth and transformation. The environmental crises that are now upon humankind require large changes in a relatively short time, and nothing appears quite capable of that other than capitalism.

1.3 FIXING CAPITALISM: TAXING BADS

Fixing capitalism, at least in the United States, will require capital investment to be driven by genuine market principles, *including* an accurate accounting of the external environmental costs. If polluters are not required to pay for their costs of pollution, then they will enjoy a competitive advantage over other firms and other industries, attracting more and better financing and more and better workers. Ignoring pollution is not "liberty." It is anarchy, and a gross misallocation of resources. The point of capitalism is to allocate factors of production to their most productive uses. A functional capitalism is one that would send price signals to divert factors of production away from polluting firms and toward firms that can make the same products with less pollution.

In the United States, pollution regulation has been accomplished mostly by the Congressional enactment of large, complex environmental statutes, to be carried out by the U.S. Environmental Protection Agency (EPA). The EPA has historically gone about its job mostly by issuing regulations to proscribe pollution, which have evolved over time. Once quite specific and prescriptive, pejoratively (and not entirely fairly) dubbed "command-and-control" regulation, they suffered from a propensity to micromanage production processes to reduce pollution. While having the advantage of certainty and ease of enforcement, this micromanagement caused polluting firms to eschew or entirely overlook more effective and cheaper pollution reduction methods. That is not the EPA's fault: its regulatory mandate under statutes such as the Clean Air Act and the Clean Water Act restrict its discretion as to how to reduce pollution. Then and now, Congress and some environmental advocacy organizations have exhibited some inclinations toward this micromanagement, sometimes with ironically negative environmental consequences. In a widely cited book, Bruce Ackerman and William Hassler document how environmental groups and coal interests conspired to convince naïve members of Congress to enact

a requirement that new coal-fired power plants install sulfur dioxide pollution-reducing "scrubber" technology, an end-of-pipe piece of equipment.[23] This convenient deal simultaneously gave the coal industry a lifeline and the environmental groups a superficial "win" in supposedly reducing emissions (unclear). The problem is that of all of the different ways to reduce sulfur dioxide, scrubbers were among the least efficient. Everybody got a win, except for electricity consumers and the environment.

The lesson is that preventing environmental harm must be less prescriptive and more outcome-focused. For its part, the EPA, operating on the front lines of environmental regulation and having no desire to micromanage, seems to have had some sense of this, and has actually been quite innovative in introducing flexibility into its regulations while remaining consistent with its statutory mandates. Specific and prescriptive technology standards have mostly given way to performance standards, which only mandate a certain *rate* of pollution, not the method itself.

But the evolution of how environmental harms are reduced must press deeper into the capitalist realm to unleash entrepreneurial energies. Laws to reduce environmental harms must target the harms directly, not the processes that produce the harm. Unleashing entrepreneurial energies requires maximizing the options available to reduce pollution. A firm seeking to reduce its pollution might tinker with a polluting process, replace the entire process, or it might dispense with the product altogether in favor of a new way to meet consumer demand. It might even redefine consumer demand by creating new markets. A pollution reduction scheme must throw open all of these options for pollution reduction. A government regulation might leave open some of these options, but insofar as they are predicated on any specific process, product, or method, they can never be truly neutral.

Moving forward, a capitalism-friendly environmental legal regime would directly *tax* environmental harm on a per-unit basis, so that polluters would always face a marginal cost of polluting, and constantly have an incentive to try to reduce it. Environmental law should avoid, as much as possible, prescribing *how* harm is reduced. A scheme of environmental taxation would focus on the outcome – the proper role of government – while leaving methodology to the polluter, which possesses not only the intimate knowledge of its production processes, but its entire array of options. Faced with a price signal on environmental harm, a private firm may alter its production process, substitute products, or even leave the product market altogether. These would be complex and multilayered decisions that would be very difficult for a government agency to navigate. Grappling with alternatives and wrestling them into a tractable menu of options is what private, capitalist firms do. In the interests of reducing costs and increasing profits, firms search for more effective ways of meeting market demand. As long as firms face a marginal cost of polluting, they will hunt for new ways to reduce their pollution tax bills. In fact, this is one of the principal strengths of capitalism: its capacity to induce innovation.

What a system of environmental taxation would do is align the profit-making incentives and incentives to innovate with environmental objectives.

Not every environmental harm can be taxed, of course. Some pollutants, such as mercury, lead, or asbestos, are so harmful that outright bans are more appropriate. And many acts of pollution are difficult to detect, so that taxation would be fruitless. Moreover, in many cases, industries might benefit from government agencies simply setting certain standards in the interests of coordination, so that scale economies might be developed in certain pollution reduction methods. For example, the regulation of chlorine emissions from pulp and paper mills is difficult to detect, but what is known is that certain methods reduce emissions to a very small, if still slightly malodorous level. Industry and the EPA seem to have made peace in terms of the amount of industry expense needed to install this equipment, and the amount of public harm suffered as a result of it. Some arrangements or regulation might be best left alone.

Environmental taxation is nothing new. It is not even news that environmental taxation can feed a healthy capitalist economy – over the past thirty years, Sweden has both reduced its environmental impacts and prospered economically. What is new is the urgency of marshaling capitalist energies in the cause of reducing humankind's massive footprint. The Swedish experience – it is too mature to be labeled an experiment – must be upgraded, scaled up, and globalized. First and foremost, a carbon tax must be instituted to impose a price on greenhouse gas emissions, mostly but not exclusively on fossil fuels. Carbon taxation (and other carbon prices, such as cap-and-trading programs that require tradable permits to emit) have already demonstrated a capacity to unleash new entrepreneurial energies for figuring out how to do almost everything while emitting less. But a carbon tax, still in need of expansion, is just a template for other environmental taxes.

Much environmental policymaking has focused, and continues to focus, on subsidizing what is viewed as being a positive environmental outcome. Politically, that is a much easier task than imposing a tax on what is known to be negative environmental outcome. But as it happens, subsidization perversely moves away from the relative strength of government, and activates the relative weaknesses of both government and the private sector. It is politically difficult, but much more effective, efficient, and principled for government bodies to exercise its relative strengths: identifying harms and threats to the public. The United States Environmental Protection Agency, probably the most important information-gathering and environmental regulatory agency in the world, has been adept at identifying environmental "bads," pollution problems that pose threats to human health or the environment. Much-maligned and often fighting rearguard actions against politicians with anti-environmental agendas, the EPA has done an admirable (if imperfect) job of identifying and regulating numerous air, water, and land pollutants. It is after all, the job of government to identify public harms and protect the public from them, because it would never be in the interest of any single person