

ARTICLES

An Austrian Critique of Using Carbon Taxes to Manage Climate Catastrophe Risk

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Revising and extending the neoclassical rationale for pollution taxes, some economists have attempted to justify a carbon emissions tax as a way for the state to manage systemic climate risks for society. Deploying an approach to risk management commonly seen in financial markets, they depict a tax on carbon-based energy as a hedge against climate catastrophe. The Austrian school of economics has illuminated the conceptual defects of the neoclassical framework around welfare economics, market failure, negative externalities, and socialist economic planning generally. The risk management rationale for carbon taxes suffers from the same calculation and knowledge problems that encumber other state-centric schemes. This article critiques the proposed use of carbon taxes as climate risk insurance on the grounds that systemic risks are not insurable. Moreover, future climate costs cannot be calculated due to their subjectivity, the passage of time, and the absence of demonstrated preferences regarding property values. Both climate risk models and carbon tax cost-benefit models employ flawed assumptions and utility functions. This article proposes a strategic shrinking of the state's role in economic affairs and a return to sound money as superior ways to mitigate a society's climate disaster risks.

In 2019, four past chairs of the Federal Reserve and twenty-eight Nobel laureate economists signed a public letter endorsing a carbon tax in the US (Wall Street Journal 2019). The National Academies of Sciences, Engineering, and Medicine (2021, 12) proposed in 2021 to set a price on carbon emissions of \$40 per ton and to raise it annually by 5 percent above the inflation rate as part of a "transition to a net-zero economy" for the US.¹ The carbon tax is justified as a means of reducing industrial emissions of greenhouse gases that are blamed for impacting the global climate. Carbon emissions represent a so-called market failure in which emitters of greenhouse gases impose negative externality costs on future generations in the form of climate-related disasters.

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¹ A net-zero economy is defined as one in which all emissions of greenhouse gases are offset by actions to remove an equal amount of greenhouse gases from the atmosphere.

By assigning a “price” to current emissions, an excise tax would force fossil fuel energy producers to absorb these externality costs and to curb or halt their greenhouse gas emissions activities.

Some economists have layered an additional rationale onto the market failure framework: that a carbon tax would empower the state to manage societal climate risks. This collectivist risk management rationale expands on the negative externalities concept by claiming that only the state can manage systemic climate risks. A preeminent lobbyist for this view is Robert Litterman, a former Goldman Sachs partner and risk manager, who has compared the carbon tax to an insurance policy in a number of journal articles (e.g., Litterman 2013) and think tank position papers (e.g., Litterman 2015), and in US Senate testimony.²

“With public policy, the objective is to use prices to incentivize the right level of insurance against bad outcomes,” Litterman writes.³ The private insurance market can only protect against specific, small risks, he holds; climate risk is a unique, systemic risk that only the state can insure against:

There are risks that are so extreme that there is no way to diversify the exposure, they are systemic. This is the second kind of risk we need to manage [as distinguished from specific risk], and it requires a societal response. No entity, for example, can insure society against an equity market crash, nuclear war, or a global pandemic; and similarly, none can insure society against the systemic exposure created by climate change. This risk requires a systematic, coordinated, and comprehensive national and global policy response. Today, when specific risk protections are inadequate because of the scale of the disaster, we depend on the federal government to provide an emergency backstop.⁴

Carbon tax advocates position the levy as a way for the state to hedge against climate disaster just as a financial hedge protects an investor from a market crash. However, climate risk management by the state shares many shortcomings in common with the more traditional market failure framework typically used to justify pollution taxes. This article will argue that the critical weaknesses of statist climate insurance are as follows: (1) Taxes cannot perform the functions of an insurance policy. (2) Climate risks cannot be hedged the way investment risks can. (3) Lacking information about the

² *The Cost of Inaction on Climate Change: Hearing Before the U.S. S. Comm. on the Budget*, 117th Cong. (2021) (testimony of Dr. Robert B. Litterman, Chair, Climate-Related Market Risk Subcom.), https://www.budget.senate.gov/imo/media/doc/Robert_Litterman_-_Testimony_-_U.S._Senate_Budget_Committee_Hearing.pdf.

³ *Id.* at 5.

⁴ *Id.* at 5.

preferences of market participants, governments lack the ability to calculate future climate costs. (4) The state cannot accurately quantify climate risks. (5) For climate disasters occurring far in the future, the state lacks an appropriate discount rate for expressing economic damages in current dollars. (6) Climate risk models make unreasonable assumptions about the probability of disasters. (7) Climate risk models employ exaggerated assumptions about societal risk aversion. Rather than imposing a carbon tax, the state should seek to enhance society's resilience to climate catastrophes by strategically shrinking its own role in economic affairs and returning to a system of sound money.

A Tax Cannot Function as an “Insurance Policy”

A key shortcoming of Litterman's (2013) framework is the misapplication of the term “insurance” to a scheme in which the state guarantees the insured parties against losses. Litterman fails to explain how a climate state would be any better equipped than the private insurance market to estimate disaster costs and set a corresponding carbon tax, which functions as the “insurance premium.” If the risk is so extreme and systemic that it cannot be diversified away, then it is fundamentally uninsurable.

Private sector insurance provides compensation for specific types of calamities. The principle of insurance is that individuals and businesses are subject to risks that can be classified into uniform categories. Insurers cater to businesses with similar profiles and pool their risks of economic losses. The insurer uses the premiums paid to compensate the firms for any losses suffered, hopefully at a profit to the insurer.

A crucial feature of a specific, insurable risk is class probability. Ludwig von Mises writes: “Class probability means: We know or assume to know, with regard to the problem concerned, everything about the behavior of a whole class of events or phenomena; but about the actual singular events or phenomena we know nothing but that they are elements of this class” (von Mises 1998, 107). Insurers can only offer protection against a class of homogeneous actuarial risks where the probabilities of adverse events are measurable based on observable historical patterns. The kind of global climate catastrophes of unprecedented scale and sudden nature predicted by some of the more doomsaying climate forecasters—as distinguished from localized events such as flooding, drought, and disease outbreak—do not occur with known probabilities. For this reason, climate and other systemic risks are not insurable.

However, even with changing climate, it remains feasible for private markets to continue insuring against categories of disasters where the class probabilities increase slowly enough that actuarial adjustments can be made.

The “insurance policy” Litterman proposes is more accurately called a state-provided climate risk subsidy. The following are critical differences between competitive insurance services and collectivist risk reduction.

In a free market, insurers enable customers to choose from a variety of coverage plans based on their desired risk exposure. The insured acts voluntarily to purchase an insurance policy based on an individual appraisal that the benefits of the coverage outweigh the costs. In the state-dictated program, risk preferences are averaged across society, and all are forced into a one-size-fits-all coverage plan designed through opaque bureaucratic processes. A panel of government-appointed “experts” determines the premium (carbon tax) that must be paid based on the climate state’s rough estimates of climate damages.

In the private insurance market, firms set insurance premiums according to an actuarial analysis, based on historical probabilities, of expected payouts. The premium charged is limited by a combination of customers’ willingness to pay and the competitive intensity of the insurance market. In state-managed risk insurance, the state can mandate any premium it chooses, even raising it above the estimated property damage being “insured” against. The state also has the power to impose nonactuarial conditions, such as redistributive and social objectives, on insured parties.

In market-based insurance, policyholders pay premiums in order to pool their risks and potentially recover damages. In the state-subsidized version, the carbon tax is only applied to emitters and only compensates those damaged by emissions. There is no opportunity for a nonemitter to purchase additional protection from harm beyond what the state deems sufficient. Likewise, nonemitters who perceive less of a threat from emissions cannot opt out of the costs imposed collectively on society. Therefore, state-supplied climate risk protection lacks the basic features of an insurance policy.

Another problem with likening a carbon tax to insurance is that the tax does not actually compensate disaster victims. The ambitious objective of a carbon tax is to control planetary phenomena by preventing all purported human influences on climate. The carbon tax revenue is not collected into a pool of funds and invested for later use to pay insurance claims. Instead, carbon tax proposals are structured such that tax receipts are paid out to the general public as a dividend. Without a reserve of funds to pay the claims of disaster victims, taxpayers are on the hook for any climate disasters that the tax fails to prevent.

In true insurance, the cost of the premium serves as a restraint on the policyholder to prevent unnecessarily risky behavior. In climate “insurance,” the risk-subsidized are not penalized if they choose to live in flood zones or other risky geographies. In most cases, the insured parties do not pay

the climate tax but receive dividends from it. Thus, the statist climate risk programs create the very moral hazard that private insurance policies seek to avoid.

If a private insurer consistently miscalculates the actuarial risk of losses and charges the wrong premiums, it will lose business and eventually go bankrupt. In a climate risk subsidy scheme, if the state's experts poorly estimate actuarial risk and overcharge its captive "customers," no harm will come to the careers of the bureaucrats. The risk subsidy will continue largely as before. The monopoly "insurance" provider faces no competition, fears no loss of customers, and will not go bankrupt.

Litterman used an equity market crash, a nuclear war, and a global pandemic as examples of systemic calamities that only the state, given its scale and taxing power, can "backstop" society against.⁵ But the US government's track record of systemic risk management is not encouraging. The US bailouts of failing banks during the 2008–9 financial crisis escalated the national debt while rewarding firms that had mismanaged their subprime lending risks. The \$13 trillion of combined balance sheet expansion and stimulus spending by the Federal Reserve and the federal government during the 2020–23 pandemic resulted in a crushing national debt burden, supply shortages, and the worst consumer price inflation since the 1970s.

Other federal "backstops" ostensibly set up to protect entire sectors of the economy from specific and systemic risks have also performed poorly. Federal flood insurance has encouraged the building of more homes in flood-prone areas and increased aggregate property losses due to flooding. Implicit federal guarantees to residential mortgage underwriters Fannie Mae and Freddie Mac helped inflate the housing bubble and collapse in 2006–9, precipitating the global financial crisis.

A well-known state insurance provider is the Federal Deposit Insurance Corporation, which insures all bank deposits up to \$250,000. As Murray Rothbard (1994, 136) notes, banks are not a homogeneous class of businesses that face measurable failure risk. Bank failures are caused by unique errors and specific developments in the marketplace, and not by random events of known probability. The success of a bank's borrowers depends on nonrepeatable entrepreneurial actions. For these reasons, as well as the fact that fractional-reserve banks are inherently insolvent, banking is an uninsurable activity. Rothbard (1994, 136) described the notion of deposit insurance as "absurd and fraudulent." By reducing the sensitivity of bank managers to risk and by encouraging depositors to seek out higher yields without regard for bank quality, deposit "insurance" increases the likelihood of bank failures.

⁵ *Id.* at 5.

State-provided insurance backstops create moral hazard. If American citizens are told that the benefactor state has protected them from climate catastrophes, they are less likely to take action to protect themselves. The climate risk subsidy known as a carbon tax would not shield society from climate risk, but leave it more exposed.

Climate Risk Cannot Be Hedged Like an Investment Risk

In conjunction with his insurance metaphor, Litterman calls the carbon tax a hedge against climate risk. This hedge would function like an investor's hedge against investment risks. Per Litterman:

Our job as partners [at Goldman Sachs] was to make sure that we understood and managed all of the risks that we faced. Market risks, which were my responsibility, were among the easiest to manage.

The risks that we expected to get paid for were sized appropriately. Other risks were hedged. If, as risk manager, I identified a risk that was not intentional and was not being hedged, my job was to make sure that the responsible trader hedged that risk, or that the exposure was immediately escalated to senior management. Unintended risks, particularly those with catastrophic worst case scenarios, were an urgent problem, and in my career at Goldman they were never ignored.

The same principles apply to investing, and the same principles apply to managing climate risk. Having recognized the implications of these realities, years ago I became laser focused on appropriate pricing of emissions. (Litterman 2015)

Here, Litterman paints a picture that smart investors work to offset ("hedge") unintentional risks, and thus the state should do this on behalf of society. Yet there is no such thing as an investment devoid of unintended risks. No equity or bond investment is guaranteed to produce a gain. Even the heralded "risk-free" interest rate is subject to inflation risk and the risk of the sovereign issuer's default due to war, natural disaster, or fiscal mismanagement.

It is also the case that professional traders often employ complex trading strategies that entail risks which are difficult to predict. "Relative value" strategies, for instance, involve a return profile prone to occasional catastrophic losses. Trades on the direction of natural gas contract spreads are so risky that they are facetiously called "widow-makers." Despite the traders' attempts to hedge, they sometimes suffer large losses because the odds of a catastrophic loss change over time based on an evolving set of exogenous conditions (e.g., information, investor sentiment, weather, government action) that were not present historically. Risk is constantly evolving; it is not bounded within an undeviating historical range that traders can build into a

risk model. Just as departures from historical patterns in price relationships are inherently surprising, systemic crises cannot be predicted with confidence beforehand. Systemic risks cannot be hedged away by the state.

In financial markets, shorting equities generates a positive return in a bear market, providing a hedge or an insurance-like payoff. Litterman equates the payment of carbon taxes to shorting the stock market ahead of a crash: by incentivizing a shift to energy sources other than fossil fuels, the tax acts to hedge society against climate threats. Litterman (2013, 42) writes: “Investments in reducing emissions have payoffs that will be more valuable in scenarios with higher climate damage. If climate risk dominates economic growth risk because there are enough potential scenarios with catastrophic damages, then the appropriate discount rate for emissions investments is lower than [*sic*] the risk-free rate and the current price of carbon dioxide emissions should be higher. In those scenarios, the ‘beta’ of climate risk is a large negative value and emissions mitigation investments provide insurance benefits.”

However, the analogy to financial hedging is inapt. Emissions abatement does not produce an investment gain that can be used to offset a disaster loss. What carbon tax enthusiasts mean to accomplish with emissions abatement is the elimination of human influence on climate. Their hope is that the tax will destroy economic activity and thereby prevent future climate disasters. In effect, they want the financial hedge to perform the equivalent of the impossible task of preventing the stock market from ever crashing in the first place.

As with private versus public insurance, there are marked differences between hedging investment risk and hedging climate risk. An investment risk exposes the investor to a potential loss. To offset that risk, the investor can take a hedge position in an asset whose price is inversely correlated to the risk being avoided. For example, a put option strategy can be structured such that the value of the puts is expected to appreciate by the same amount that an underlying investment is expected to decline. In investment hedging, the seller of protection takes on the risk of a loss. An analogous liquidity provider that can take on the risks of systemic climate damages by selling an inversely correlated asset to the state is not available.

To be effective as a hedge, a carbon tax must prevent the precise amount of climate impact related to the emissions being taxed. Otherwise, the tax would result in over—or undercompensation for manmade climate impacts. If the climate state forecasts the climate perfectly, the carbon taxes paid will prevent future damages dollar for dollar. But what about a scenario in which the climate state accidentally sets the carbon tax too high, reducing emissions excessively? In theory, a higher-than-needed tax could cool the climate and

thereby confer unwarranted economic benefits on future generations at the expense of the current generation. Due to the passage of time, the transfer of wealth to posterity would be irreversible.

The magnitude of future climate damages over time is unknowable because the rate of climate cyclicity through history is not constant. Nor is the impact of a ton of US carbon emissions on the future climate predictable with any confidence. This is due to attribution challenges, the presence of various kinds of heat-trapping gases (CO₂, methane, chlorofluorocarbons, and water vapor) that may impact climate, time lag effects, and significant natural emissions of greenhouse gases.

While a unilateral US carbon tax would presumably reduce future climate impacts arising from US emissions, global carbon emissions would still grow due to non-US emissions. In 2022, the US reportedly produced just 12.6 percent of estimated global CO₂ emissions (World Population Review, n.d.). While the European Union has imposed an emissions cap-and-trade scheme, it is noteworthy that China and India, representing a combined 40 percent of global CO₂ emissions in 2022, are not subject to binding emissions reduction obligations under the 2015 Paris Agreement. CO₂-emitting industries in those countries continue to increase their production, rendering a unilateral US carbon tax ineffective at reducing climate risk. Moreover, the substitution of US fossil fuels with renewable energy could result in lower global fossil fuels prices relative to renewable energy prices. Weaker global fossil fuel energy prices could spur higher demand for fossil fuels outside the US, leading to faster growth of global CO₂ emissions, all else being equal. If oil, natural gas, and coal prices became more affordable, black market demand for fossil fuels would increase and political pressure to reduce carbon taxes would likely intensify.

Then there are a number of climate variables that can alleviate or even reverse the warming effect of carbon emissions. These include the sun's energy output; volcanic eruptions; changing cloud cover driven by changes in cosmic radiation from outer space; and the variations in eccentricity, axial tilt, and precession of the earth that create cyclicity in the distribution of solar radiation over the earth. Unfortunately, there is great uncertainty regarding the magnitude of these factors and how they might change. A change in any of these variables can alter the global climate, its pace of change, and its trajectory. Such changes could totally offset the calculated benefits of a carbon tax, rendering it ineffectual.

It is also possible that exogenous geological and astrophysical changes may accelerate climate warming or propel it past a tipping point. In this scenario, the need to curb anthropogenic carbon emissions might become more urgent. At the same time, both climate forecasts and calculations of the

carbon tax remedy would be fundamentally disrupted. If exogenous geological and astrophysical influences on climate become large enough, no carbon tax would be able to prevent the associated catastrophes.

The lack of predictability regarding the climate is coupled with an insurmountable calculation problem that prevents the state's planning apparatus from being able to set the optimal carbon tax. As Mises (1998, 676) observes regarding broader problems in setting prices within a command economy: "Socialism is not a realizable system of society's economic organization because it lacks any method of economic calculation." The data needed to make economic calculations are in a constant state of change as entrepreneurs make judgments and take actions based on their current intuition about future customer needs. Accordingly, the relevant data underlying a carbon tax are inherently unknowable outside the context of a free market. Exacerbating the problem is the fact that planners are unaware of their information deficiency. As F. A. Hayek noted in his 1974 Nobel Prize lecture, "The Pretence of Knowledge," would-be economic planners fall into the trap of thinking that the data available to them are all that matters:

Unlike the position that exists in the physical sciences, in economics and other disciplines that deal with essentially complex phenomena, the aspects of the events to be accounted for about which we can get quantitative data are necessarily limited and may not include the important ones. While in the physical sciences it is generally assumed, probably with good reason, that any important factor which determines the observed events will itself be directly observable and measurable, in the study of such complex phenomena as the market, which depend on the actions of many individuals, all the circumstances which will determine the outcome of a process . . . will hardly ever be fully known or measurable. And while in the physical sciences the investigator will be able to measure what, on the basis of a *prima facie* theory, he thinks important, in the social sciences often that is treated as important which happens to be accessible to measurement. (Hayek 1974)

Given the distortions created by a carbon tax and the planners' inability to make economic and climate calculations over large time scales, the state is unable to manage climate risk the way Wall Street risk modelers do for their clients. Financial speculation risk is fundamentally different from climate risk. A nation's economy is not a metaphorical investment fund, but a constellation of individual acting parties with unique risk preferences, time preferences, and time horizons.

Governments Lack the Ability to Calculate Future Climate Costs

State-administered climate risk management is a variation on the neoclassical concept of using pollution taxes to address “negative externalities.” The main difference is that neoclassical pollution taxes sought to mitigate *present-day* pollution costs, while the climate risk tax attempts to insure society against *conjectured future* emission costs. Carbon tax proponents envision incorporating the risk of potential long-term social costs into current energy prices:

Each ton of carbon dioxide (CO₂) and other greenhouse gasses (GHGs) released into the atmosphere leads to global warming, ocean acidification, and other ecological degradation—all of which impacts societal well-being. The relationship between these damages and GHG emissions is uncertain. The problem will not solve itself without government intervention, as property rights to the atmosphere are poorly defined (Coase 1960). However, following Pigou (1920), optimal usage of the atmosphere’s capacity to absorb GHGs can be obtained, in both theory and practice, when individuals are charged the full social cost of each ton they emit into the atmosphere, or conversely the benefits that accrue to society with the reduction of GHG emissions by one ton. (Daniel, Litterman, and Wagner 2016, 3)

In this framework, the carbon tax is the mechanism for optimizing social welfare and carbon emissions. Once the tax is imposed, carbon-based energy consumption will fall to what experts deem to be socially optimal, and global mean temperature will decline to the optimal level. Unfortunately, the state has no reliable means of quantifying future damage costs or climate risks. Without an accurate damage tally, the optimal tax cannot be calculated. Defining and measuring future climate damage accurately is an insurmountable challenge for the feasibility of state-administered climate insurance.

The state’s inability to calculate economic values underpins the Austrian school’s critique of socialist planning. It is also an important reason why pollution taxes do not resolve negative externalities. In the neoclassical paradigm, the purpose of economic exchange is to maximize welfare. By reducing the value of another party’s property, air emissions impose a negative cost. The existence of social costs is seen as evidence of the market’s failure to maximize welfare. The neoclassical remedy is for the state to calculate the optimal production level that brings the emissions’ marginal private benefit and marginal social cost into equilibrium. The pollution tax maximizes economic efficiency by forcing polluters to bear the costs of their emissions.

Austrian school economists have amply demonstrated the flaws of this externalities paradigm (O'Driscoll and Rizzo 1985; Cordato 2007). Austrians maintain that markets can never reach the imaginary state of perfect equilibrium, but are always in the process of working toward it. The state is unable to quantify the negative externalities of air emissions because costs are inherently subjective in nature. A key conceptual shortcoming of the neoclassical welfare model is its reliance on interpersonal comparisons of utility. As Murray Rothbard (1997, 211–54) elucidates, it is only possible to ascertain value by observing the demonstrated preferences of human beings through their actions. It is a fool's errand for economists to assign putative values to billions of hypothetical exchanges in a quantitative model of an economy without reference to how individuals act and behave in the real world.

For Austrians, the problem of air pollution is not one of market failure, negative externalities, and external diseconomies. Instead, the instances of negative externalities cited by opponents of the free market are failures of government to enforce property rights. As Rothbard (2009, 182) observes, “In so far as the outpouring of smoke by factories pollutes the air and damages the persons and property of others, it is an invasive act. It is equivalent to an act of vandalism and in a truly free society would have been punished after court action brought by the victims.”⁶

The Austrian school's critique of the negative externality framework applies with equal force to carbon tax schemes justified as collective risk management. Cordato (2004, 11) points out that a pollution tax gives the state the impossible task of calculating the optimal amounts of activity that should occur throughout an economy: “In the case of the tax, a central authority must know in advance the exact amount of the externality costs being imposed by the polluter, and the correct price and output, not only for the good in question but, since efficiency only makes sense in a general equilibrium context, for all other affected goods and services.”

In contrast to the more overt forms of socialist economic planning, neoclassical pollution tax schemes at least partially acknowledge the critical role played by the price mechanism in markets. Nonetheless, such interventions are unable to overcome fundamental information and calculation problems. Art Carden (2013, 30) observes that pollution taxes “are market-like, but they still rest on a planner's conceit that the optimal amount of a particular activity can be known independent of what is revealed by trade (or more generally, by consent).”

⁶ Climate-related property damages over long time scales could be remedied via judicial action, according to Rothbard (1982, 73): “To establish guilt and liability, strict causality of aggression leading to harm must meet the rigid test of proof beyond a reasonable doubt. Hunch, conjecture, plausibility, even mere probability are not enough. In recent years, statistical correlation has been commonly used, but it cannot establish causation, certainly not for a rigorous legal proof of guilt or harm.”

Consider how US government planners estimate the “social cost of carbon.” They employ integrated assessment models to derive an official range of estimates. Such models consist of (1) a climate forecast of global warming and expected physical impacts such as sea level rise and hurricanes through the year 2300 and (2) a forecasted value of climate damages caused by one ton of CO₂-equivalent emissions over the same time period. The variation in estimates of the social cost of carbon is determined by a range of assumptions, including the discount rate (the rate at which to discount the present value of future economic damages from manmade climate disasters), the sensitivity of the climate to greenhouse gases, the economic growth rate (with and without abatement measures), and the effectiveness of technological changes.⁷

The US government’s estimates of the social cost of carbon emissions are hopelessly speculative.⁸ For a carbon tax to be set at the correct level, the climate state would need to know the future manmade component of climate variations (as distinct from natural variations), the economic costs from manmade climate impacts at both a single point in time and all subsequent points in time, and the exact amount of emissions reduction needed to bring about an earthly climate devoid of human influences.

The theoretical framework of climate risk management is predicated on assumptions regarding planners’ ability to make inferences about objective property values among entire generations of diverse populations who do not yet exist, but who will supposedly make economic calculations as a single rational acting entity with identifiable risk preferences and aggregated utility functions. Mises (1998, 143) warned against treating diverse populations as a single entity: “To speak of society’s autonomous and independent existence . . . and its actions is a metaphor that can easily lead to crass errors.” Austrian economist John Brätland notes that while the individual entrepreneur clearly makes defined economic calculations and capital appraisals, such judgments cannot be collectivized for an entire society:

Individual appraisals are based on the entrepreneur’s individual plan for dealing with an uncertain and changing market. Acknowledgement that all markets are in disequilibrium at any instant in time and that each actor faces uncertainty means that any reckoning of capital is personal and entrepreneurial. To the extent that the fulfillment of entrepreneurial plans is contingent

⁷ The US government’s Interagency Working Group obfuscates the benefits to agricultural production from CO₂ fertilization by averaging the results of three IAMs—the dynamic integrated climate-economy (DICE), the framework for uncertainty, negotiation and distribution (FUND), and the policy analysis of the greenhouse effect (PAGE) models. DICE and PAGE assume there is virtually no boost to agricultural production from CO₂ emissions. See Patrick J. Michaels, Kevin D. Dayaratna, and Marlo Lewis, Comment on OMB “Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990” (June 21, 2021), <https://cei.org/wp-content/uploads/2021/06/Comments-OMB-Technical-Support-Document-Social-Cost-of-Carbon.pdf>.

⁸ For example, US government climate models typically assume a specific tonnage of CO₂ emissions by 2100, which causes warming, which in turn causes hurricanes, which in turn cause property damage. Estimation errors in each step of the causal chain necessarily generate compounding inaccuracy of the final damage estimate.

upon what may be mutually inconsistent assumptions, no aggregations of capital across individual enterprises can be legitimate. Some plans will be inconsistent with the plans of others and will fail. Hence, capital reckoning for society as a whole is meaningless. The extent that individual business plans may conflict and be incapable of mutual success creates a barrier to aggregation or “macro-reckoning.” Hence, society or a government as its agent has no aggregated measure of capital for which it can legitimately presume to make decisions. (Brätland 2006, 29)

Externality costs experienced by individual parties are private and subjective. They cannot be aggregated together and stated as a single quantity for a country. Nor can subjective marginal costs and benefits be compared to one another interpersonally in a simplified math equation claiming to demonstrate an improvement to social welfare (Cordato 2007, 6).

As O’Driscoll (1985, 140) explains, the passage of time and the changing preferences of economic agents prevent a pollution tax from ever being optimal. By the time state planners gather all the information necessary to calculate an optimal pollution tax, that information is obsolete. It is difficult enough to estimate the subjective costs and benefits of an economic transfer in the present day. But the carbon tax calculation goes one step further by comparing aggregated externality costs or benefits experienced by millions of individuals living in different decades. Not only must the administrator of a carbon tax make interpersonal comparisons of utility (which is not possible), it must make *intergenerational* interpersonal comparisons of utility.

How could the climate state quantify damages to individuals harmed by climate impacts many decades in the future? Even assuming causality between the emissions and the climate-related property damage, quantifying the harm and compensating for it is impossible without knowing both specific victims’ preferences and the costs of all property damage. Property values are continuously evolving due to the constantly changing preferences of market participants.

The cost to replace a flood-damaged house in thirty years depends on many things: location, recent transaction prices for comparable properties, mortgage rates, seasonality, the housing cycle, building product costs, raw material and commodity prices, fuel and transportation costs, and labor costs, as well as indirect and unmeasurable factors. Even if the climate state could accurately predict these factors for January 1, 2050, the combined cost estimate would be out of date by January 2, 2050, due to changing consumer sentiment, updated weather forecasts, and new replacement cost information. The magnitude of the uncertainty is multiplied across other properties potentially damaged in a single hurricane event, such as vehicles, office buildings, schools, infrastructure, et cetera.

An added Austrian insight on this matter regards the unique value subjectivity of property owners. Each property owner has a different tolerance for negative climate impacts. For example, increased moderate rainfall that does no outright damage is preferable to a hurricane. By what amount should the climate state take differentiated owner preferences into account?

Then there is the problem of positive climate impacts and externalities. Carbon tax proposals are designed to prevent climate damages without accounting for the tangible benefits of a warmer climate. Farmers and hydroelectric dam owners might view moderately increased rainfall as positive. Agricultural output in many regions would expand due to longer growing seasons. Many crops would grow faster and be more drought-resistant in the presence of higher carbon dioxide, a fertilizer. A warmer world would likely result in decreased human mortality from extreme cold weather. By the logic of neoclassical welfare economics, emitters of greenhouse gases are owed compensation from future generations for creating these benefits. A large number of people living in the future will experience a combination of climate benefits and costs which the state would have no fair way to disaggregate.

An additional problem concerns attribution. How would the climate state determine whether future damage to a specific house at a specific location will be caused by emissions? Hurricanes are known to occur naturally, without the presence of any manmade emissions. Climate state experts have no way of differentiating a manmade hurricane from a natural hurricane. The climate state would certainly be under political pressure to determine that most storm damage is caused by emissions, inflating the amount of climate risk subject to taxation.

And why use thirty years as the time frame for assessing climate damages? This time frame is arbitrary; three hundred years could just as easily be used. The further into the future the time frame is extended, the higher will be the carbon tax needed to cover the prospective damages. Yet future societies will surely develop more accurate climate forecasts, warning systems, and adaptive measures that reduce their climate risk dramatically. The state lacks the ability to calibrate the current carbon tax higher or lower to account for unpredictable technological advancement and better climate resilience in the distant future. In other words, it is not possible for the climate state to make contingent transfers of value between generations.

The State Cannot Accurately Quantify Climate Risks

If potential climate damage costs are inherently unquantifiable, the risk of such damage is also highly uncertain. As Litterman (2013, 43) acknowledges: “The fundamental problem, of course, with the insights provided by the economics of risk management is that the answer depends at its core on something unknowable. How significant is the risk of an unimaginable

and unmanageable catastrophe?” That the actual degree of climate risk is unknowable does not, however, shake Litterman’s confidence in the state’s ability to manage it. He states: “I believe that given that uncertainty, a cautious approach that weighs the cost of catastrophic outcomes above the potential benefits of hedging future economic growth is justified. It would be best to get started immediately by pricing carbon emissions no lower, and perhaps well above, a reasonable estimate of the present value of expected future damages, and allow the price to respond appropriately to new information as it becomes known.”

This is a version of the precautionary principle, which says that state action is the default solution when any environmental impact is suspected.⁹ Though Litterman does not explain how the state would quantify climate risks, he prefers bureaucratically administered risk management to decentralized, entrepreneurial, and profit-motivated risk management for dealing with climate risk.

But ultimately, Litterman understands that no bureau, panel, or appointee can forecast damages from what he calls “unknowable” risks. Fearing that the climate state would underestimate climate risk, Litterman the risk manager hedges by suggesting that the carbon tax might be set *even higher* than the “reasonable” estimate of expected future damages. He implicitly acknowledges that the state’s risk assessments would be inherently speculative. A damage estimate is not possible for individuals and firms that have not yet even acquired the supposedly damaged property. According to Rothbard’s (1997, 211–54) insight, value can only be inferred when asset owners demonstrate their subjective preferences by transacting; a bureaucratically formulated risk profile is no more accurate than one established by reference to astrology.

An Appropriate Discount Rate for Potential Climate Damages Does Not Exist

Litterman gives the following hypothetical to demonstrate how climate damage must be discounted:

Suppose, for argument’s sake, we ignore uncertainty and consider a simple example in which it is known that three tons of emissions will create a one-time damage 30 years from now of exactly \$100. Further suppose that the market price is \$60 for a government bond that delivers a risk-free promise to pay

⁹ Principle 15 of the 1992 Rio Declaration on Environment and Development states: “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” UN, *Report of the United Nations Conference on Environment and Development*, Rio de Janeiro, June 3–14, 1992, vol. 1, Resolutions Adopted by the Conference, A/CONF.151/26/Rev.1 (Vol. 1), 6, <https://documents.un.org/doc/undoc/gen/n92/836/55/pdf/n9283655.pdf?token=3aND8FzVMUT147vv3P8&fe=true>.

\$100 worth of principal on the same date 30 years from now (a discount rate of 1.7 percent). The \$100 taxpayer obligation in 30 years has the same value whether the government issues the bond or if it insures the damage that three tons of emissions are going to create. In this simplified example, the appropriate tax is \$60 today on three tons of emissions, or \$20 per ton. There is no need to appeal to ethical considerations or individual preferences in order to calculate the current value of those damages. (Litterman 2013, 41)

The choice of discount rate used by the state makes a huge difference to the value of estimated damages in present dollars. For example, \$10 billion of climate damages in thirty years equates to a present-day carbon tax liability of \$4.1 billion if discounted at 3 percent per year. The same amount of climate damage would require a carbon tax of \$7.4 billion—80 percent higher—if discounted at 1 percent per year.

Litterman (2013, 41) proposes discounting future climate damages by using the “risk-free” interest rate on US Treasury Inflation Protected Securities (TIPS) as the discount rate. The coupon of a TIPS is set at auction and paid twice per year, and the principal is indexed to the consumer price index (CPI). At the bond’s maturity, the Treasury is obligated to redeem the principal, which increases by the official inflation rate.

The weakness of this approach is that the TIPS yield curve only extends thirty years, while climate damages are projected well beyond thirty years. Litterman offers no means for the state to estimate climate damages in fifty to one hundred years. Discounting by using the TIPS rate may be futile, as the “inflation protection” feature of TIPS depends entirely on the government’s ability to assess price inflation. Austrian economists have challenged the notion of a CPI on the basis that increases in money supply do not cause identical changes in the prices of all goods. Due to the Cantillon effect, whereby newly created money causes varying price changes across the economy (Sieroń 2019), the stated “carbon price” would bear little relationship to reality, because the discount rate being used to translate future climate damages into a present value is based on an inaccurate assessment of consumer price inflation.

Climate Models Emphasize Low-Probability Catastrophes

In recent years, climate activists have argued that uncertainty about future climate impacts justifies higher externality cost estimates. Their case is predicated on the consideration of very low probability, high-cost, worst-case forecasts of climate devastation involving, for example, glacier melt and permafrost carbon loss. In these scenarios, global warming advances past an unquantified “tipping point” and then becomes irreversible:

Low-likelihood, high-impact outcomes could occur at regional scales even for global warming within the very likely assessed range for a given GHG emissions scenario. Global mean sea level rise above the likely range—approaching 2 m by 2100 and in excess of 15 m by 2300 under a very high GHG emissions scenario (SSP5–8.5) (low confidence)—cannot be ruled out due to *deep uncertainty* in ice-sheet processes and would have severe impacts on populations in low elevation coastal zones. If global warming increases, some compound extreme events [concurrent heatwaves and droughts or compound flooding] will become more frequent, with higher likelihood of unprecedented intensities, durations or spatial extent (high confidence). (IPCC 2023, 77–78; emphasis added)

Although the likelihood of novel ice-sheet processes “defies quantitative assessment,” the United Nations Intergovernmental Panel on Climate Change chooses to emphasize this risk “due to its high potential impact.” Premonitions of doom are easily incorporated into a cost-benefit model to justify a high carbon tax. In an influential 2009 academic paper, Harvard University economist Martin Weitzman (2009, 91) conceived of the “dismal theorem,” an argument for carbon taxation using concepts of utility theory, risk aversion, and decision-making under conditions of uncertainty. In deriving an estimate of the social cost of carbon, Weitzman assumed a much higher probability of extreme climate catastrophes than standard risk models typically do. Where the standard analysis characterizes probability using a normal curve, Weitzman advocated squeezing the curve such that the tails get fatter at the expense of a flatter center. Using a fat-tailed distribution of possible climate outcomes, Weitzman argued that the existence of even a low risk of climate catastrophe creates “potentially unlimited downside exposure.” By forcing his statistical climate damage curves to have fat tails, Weitzman’s newfangled model amplified the cost of carbon to orders of magnitude higher than the estimates of the standard cost-benefit models such as the dynamic integrated climate-economy (DICE) model originated by William Nordhaus in the late 1990s (Nordhaus 2017).

The dismal theorem framework manages to justify a carbon tax in virtually any climate scenario. If there is a high probability of a catastrophe, the government should impose a carbon tax. If there is an infinitesimally minute probability of apocalypse, aggressive taxation is nearly as urgent. Amplified fear of climate disaster practically absolves the climate state from the job of measuring negative externalities at all, or from the need to weigh the costs and benefits of a carbon tax.

While Weitzman’s dismal theorem was well received by climate activists, Nordhaus (2009, 6–7) pointed out that Weitzman’s utility functions “assume that zero [economic] consumption has utility of . . . negative infinity (and

unbounded positive marginal utility) as consumption goes to zero.” The dismal theorem, he wrote, assumes “that societies would pay unlimited amounts to prevent an infinitesimal probability of zero consumption.” In effect, Weitzman’s theorem could justify an infinite carbon tax.

Austrian author Henry Hazlitt (1979) famously wrote in *Economics in One Lesson*, “The art of economics consists of looking not merely at the immediate but at the longer effects of any act or policy; it consists in tracing the consequences of that policy not merely for one group but for all groups.” While Weitzman’s risk model purports to weigh all relevant considerations, it does not factor in the potential for central planning errors. The model unrealistically assumes zero probability of rare but very costly unintended consequences from a carbon tax. Stated differently, it assumes that rapid and aggressive economic decarbonization will prevent climate disasters, but will not cause any unforeseen disasters of its own. Inconveniently for climate activists, fat-tail risk analysis surely calls any carbon tax into serious question. Under Weitzman’s own utility function, society should be willing to pay a large amount to prevent the potentially catastrophic economic devastation created by a carbon tax.

Weitzman’s dismal theorem, like the precautionary principle, biases nearly all questions of high-cost, minimally plausible risks. Virtually any public policy proposal could be justified by the open-ended claim that it lowers the risk of a putative catastrophe. Weitzman (2009, 13) considered seven “nightmare scenarios” that are “perhaps comparable in conceivable worst-case impact to catastrophic climate change”: biotechnology, nanotechnology, asteroids, strangelets (hypothetical subatomic particles), pandemics, runaway computer systems, and nuclear proliferation. As with climate catastrophe, because none of these disasters occurs with known regularity, it is impossible to assign a probability to them. The dismal theorem calls for a distinct excise tax to fund countermeasures against each risk, with no prioritization. Weitzman (2009, 14) offered only his “raw intuition” that climate risk is the highest priority. Heavy on statistics and formulas, the dismal theorem creates the illusion of mathematical precision but is ultimately unhelpful in determining the best course of action.

Responding to his academic critics in 2014, Weitzman conceded that his model was flawed: “Let us immediately emphasize that which is immediately obvious. *The “dismal theorem” is an absurd result!* It cannot be the case that society would pay an infinite amount to abate one unit of carbon. Something must be very wrong in the formulation of the underlying model” (Weitzman 2014, 545; emphasis in original). Calling his own theorem a “cautionary tale” and downgrading it to a “reductio ad absurdum” illustration, he confessed to engaging in a form of motivated reasoning reflecting personal climate activism: “I wish I could report decisive convincing numerical results from modeling catastrophic climate change.” Likewise he expressed regret (“alas”)

that his risk model did not end the debate, and suggested revisions that could improve the political prospects of a US carbon tax: “To get catastrophic climate change to matter for policy depends on some combination of a high-enough probability of occurrence, a high-enough level of catastrophic damages, strong-enough tail hedging, a high-enough level of risk aversion, low-enough time discounting, and several other features” (Weitzman 2014, 546).

In the end, Weitzman’s theorem was unraveled by Hayek’s knowledge problem (Hayek 1974). In the 2014 article, Weitzman acknowledged that fat-tail models lack sufficient information to justify aggressive climate policy:

Whether some modified version of the “dismal theorem” is relevant or not is ultimately an empirical question. Unfortunately, it is an empirical question that depends on probability assumptions about extreme tail behavior, which are very difficult to resolve *because we know hardly anything about extreme tail probabilities*. The nature of tail events is that we have little past experience with them, and besides, climate change is a unique one-off event. This is a basic dilemma for climate change. Fat tails may be important, but how can we know their relative fatness and the tail-hedging effect of reducing extreme damages from a given climate-change investment? (Weitzman 2014, 546; emphasis added)

Climate Models Exaggerate Societal Risk Aversion

Taking a cue from Weitzman, economists Kent Daniel, Robert Litterman, and Gernot Wagner (2016) published a carbon tax pricing model in 2016. Dubbed EZ-Climate, it models a continuously changing carbon tax through the year 2300 based on assumptions regarding future climate damages, mitigation costs, and social utility. EZ-Climate is an adaptation of the binomial tree models used to price options and other financial derivatives in which the carbon tax is treated as an “investment,” and atmospheric carbon dioxide is treated as an “asset.”¹⁰

There are two methodological flaws in EZ-Climate. First, it makes arbitrary assumptions about utility and risk aversion based on aggregating individual preferences into a single preference for society. Like other cost-benefit and risk models, it makes inappropriate interpersonal and even *intergenerational* comparisons of utility. Second, the model’s selection of inputs is easily gamed

¹⁰ EZ-Climate is a recursive dynamic asset pricing model. Such models are used in the field of decision theory to value an investment based on future scenarios and the satisfaction one derives from money and consumption over time. The model uses a complex utility function, a mathematical representation of a decision-making process under conditions of uncertainty, to assign numerical values to different levels of consumption. The model can change the investment decision at various points in time based on unexpected events. “EZ” refers to the use of Epstein-Zin preferences, societal risk aversion, and the willingness to substitute consumption forward or backward in time (Epstein and Zin 1989).

to produce a desired outcome in terms of the carbon tax to be imposed. By specifying arbitrary parameters, the modelers are able to inject their subjective preferences into the algorithm and virtually guarantee a high carbon tax.

Litterman and his EZ-Climate coauthors developed their risk model as an alternative to standard models based on Nordhaus's DICE model. Mirroring Weitzman's rejection of thin-tailed probability curves, EZ-Climate's architects complain that standard risk models use a societal utility function with "low curvature" based on historical interest rates combined with the assumption of constant relative risk aversion. They find that the DICE model "all but prescribes a rising CO₂ price path over time" (Daniel, Litterman, and Wagner 2019, 20886)—that is, the carbon tax starts out low and increases over time. Due to uncertainty, the EZ-Climate model designers believe the initial carbon tax should be higher: "The less certain we are about the climate risks facing us in future states of the world, the higher the optimal price on carbon today," they assert (Daniel, Litterman, and Wagner 2016, 43).

But increasing the curvature of the utility function to assume greater risk aversion does not result in a higher initial carbon tax. Instead, it raises the discount rate used to calculate climate damages, resulting in a low or even a negative carbon tax. To get around this problem, EZ-Climate proposes a modified utility function that introduces a parameter called "intertemporal substitution" in addition to the one for risk aversion and employs different rates of substitution across time. The math is quite complicated but boils down to this: the adjustment enables the carbon tax enthusiasts to have their cake and eat it too. They can assume a high value for risk aversion and a low value for the discount rate instead of having to use the same value for both. The adjusted EZ-Climate model can now raise society's willingness to pay for climate damage without discounting the damage at a high interest rate. EZ-Climate yields an initial carbon tax of \$50 to \$200 per ton (2015 dollars), depending on the scenario, significantly higher than the National Academies of Sciences, Engineering, and Medicine's \$40 per ton (Daniel, Litterman, and Wagner 2019; NASEM 2021). "In contrast to most modeled CO₂ price paths, EZ-Climate suggests a high price today that is expected to decline over time," write EZ-Climate's designers (Daniel, Litterman, and Wagner 2019, 20886).

EZ-Climate's architects base their high climate risk aversion parameter on the equity risk premium (ERP) in financial markets. The ERP is the additional return that an investor expects to receive from investing in equities relative to Treasury bonds. The superior expected performance is essentially a form of compensation for taking on stocks' higher return volatility. Daniel, Litterman, and Wagner (2019, 20886) claim that the ERP demonstrates a pervasive aversion to all kinds of risk: "The risk premium (RP) of equities over bonds points to a fundamental difference in how much society is willing to pay to substitute consumption risk across states of nature compared to

over time.” However, historical ERP values are significantly higher than the ERP predicted by theoretical models, such as the capital asset pricing model.¹¹ Litterman (2013, 41) asserts that this evidence of investors’ preference for equities is also evidence of society’s aversion to nondiversifiable risk. The EZ-Climate model uses the historical ERP as a proxy for society’s fear of climate.

There are numerous problems with using the ERP as a fear gauge. First of all, and most fundamentally, relative risk aversion of investors in two classes of securities is not a direct measure of overall risk aversion. There is no connection between a desire to reduce investment return variability and a desire to avoid climate disasters. A society’s overall aversion to risk is influenced by many demographic, cultural, political and ethical factors that are unrelated to investing. Different population segments have differing risk tolerances. And the risk aversion of an individual can change over time in response to experiences, news flow, technological advances, the stability of the regulatory environment, and other critical factors. There is no basis for assuming that a population’s aversion to health risk, environmental risk, geopolitical risk, safety risk, et cetera would shift with changes in the ERP over time. An individual’s aversion to health risk cannot be reduced to a unit value and compared to another individual’s aversion to geopolitical risk. It is pointless to assemble a series of average historical returns in the equity and bond markets, subtract one from the other, and use that differential as the societal aversion to climate risk.

Second, while EZ-Climate’s utility function treats the ERP as the Holy Grail of quantifying risk aversion, equity risk cannot be expressed as an exact numerical value. In finance, several different methods are employed to approximate the ERP, including historical market returns and forward-looking estimates (Damodaran 2023, 82–126). Some analysts focus on a US ERP, while others use a global ERP (42). To correct for survivorship bias, some analysts include historical data for equities markets in which investments were wiped out by wars and expropriations (44–45). Some use an ERP incorporating the entire historical record, while others use a five—or ten-year moving average (30).

Third, the performance premium demanded for equities over bonds reflects the supply and demand for those securities as determined by investor preferences. Since investors’ risk preferences change over time, the ERP necessarily fluctuates for many reasons that have nothing to do with climate risk. Time preference (a society’s preference for current consumption over savings and future consumption) is another important driver of the ERP. An

¹¹ The “equity premium puzzle” claims that the long-term performance of equities provides more compensation for equity risk than should be the case if the CAPM pricing model is valid (Mehra and Prescott 1985). According to the CAPM’s math, an asset’s risk premium depends on the covariance between its financial return and the return of the broader investment universe. This parameter, “beta,” denotes an asset’s contribution to the overall risk of a portfolio.

economy featuring a low savings rate typically exhibits a higher risk aversion and a higher ERP, but time preference has nothing to do with aversion to climate risks.

Fourth, ERP varies by country based on societal characteristics unrelated to climate fear. ERP measures tend to be lower in countries with greater economic freedom, legal protection for private property, and lower levels of taxation. EZ-Climate would thus wrongly infer that unfree societies are more fearful of climate disasters. On the other hand, risk premiums tend to be higher in smaller, faster-growing economies due to greater economic uncertainty. Mistaking this for climate alarmism, EZ-Climate would saddle such countries with a higher carbon tax.

Fifth, EZ-Climate's authors ignore an important cause of equity risk aversion in the US: fear of the business cycle. Investors have often suffered sudden, sharp equity losses due to market crashes caused by loose monetary policies. The investment community's fear of Fed-created asset bubbles boosts the ERP measure, all else being equal. That behavioral disposition, however, says nothing about investors' willingness to pay for future generations' protection against hurricanes, droughts, fires, or blizzards.

Sixth, to the extent that there is some commonality between the ERP and generalized risk aversion, it is unreasonable to assign the average fear of a population to all of its members. Like value, risk is subjective. Some individuals in society are risk averse, and others are risk tolerant. Markets provide ways for exchanges between the two groups to take place (e.g., insurance, financial hedges) so that each is better off. A carbon tax forces the risk tolerant to subsidize the preferences of the risk sensitive.

Finally, the use of an ERP value to represent risk aversion in a model creates a false sense of confidence in the model's precision and predictive power. The risk preferences of many individuals in one market cannot be aggregated together into a mean and used to represent the entire society's aversion to other risks such as flying, rock climbing, bankruptcy, crime, or environmental disaster.

The inappropriate use of the ERP as a gauge of societal risk aversion biases EZ-Climate's carbon tax upward. Using a 1 percent ERP, the modeled carbon tax is approximately \$125 per ton of CO₂. When a 5 percent ERP is applied, the carbon price jumps to over \$180 per ton (Daniel, Litterman, and Wagner 2016, 6).

EZ-Climate also skews the carbon tax higher by incorporating risk of climactic "tipping points" in which global warming accelerates irreversibly and becomes self-propelling. As coauthor Litterman told a US Senate committee: "Risk management requires imagining 'worst case' scenarios,

by which we mean scenarios that are extremely bad, but plausible.”¹² EZ-Climate’s use of multiple tipping points elevates the initial carbon tax and creates a declining “price path” for the levy over time. The assumption of multiple tipping points boosts the initial value of the carbon tax because it “fattens the tail of the damage function” (Daniel, Litterman, and Wagner 2019, 20888). As Weitzman admitted about his dismal theorem, these authors’ purpose in using a fat-tailed distribution is to lift estimated climate damages. Litterman admits that EZ-Climate’s authors are motivated by public policy activism: “When we include risk in these models, including a small probability of a worst-case or ‘catastrophic’ scenario, the findings motivate an ambitious and rapid response.”¹³

Economic Freedom Is the Key to Risk Management

As demonstrated above, a carbon tax would not succeed in mitigating climate risk. However, other state actions could improve society’s resilience to climate catastrophes without requiring coercion of citizens, superhuman feats of mathematical calculation, or the ability to forecast the economic impacts of climate phenomena. To manage climate risk, the state should eliminate subsidized property insurance in disaster-prone areas, maximize economic freedom, and reform the fiat money system.

If the rate of natural disasters starts to accelerate in a particular region—for instance, due to hurricanes—the government should end all of its policies which encourage local populations to live in vulnerable areas. Subsidies for flood and hurricane insurance create moral hazard by socializing the risk of building on flood plains and near coastlines. The government “should not force people who do not live in such areas to continually fund insurance for those who assume the risk of living there,” write preeminent risk management expert Joseph Calandro Jr. and his colleagues Graham Hall and Steve Zheng (2021, 22). As the property damages from storms or other disasters increase to the point that the risk can no longer be transferred economically via insurance contracts, the private insurance market will stop underwriting risky behavior as a direct result of insurers’ incurring excessive losses on their book of business. In contrast, current state-administered and subsidized insurance schemes face political pressures to keep operating even when they are economically unsustainable.

Due to the discipline imposed by the threat of financial losses and bankruptcy, the private market is already well sensitized to climate risks. There are numerous examples of ways in which private markets already attempt to price natural disaster and climate risk. While some instances of

12 *The Cost of Inaction on Climate Change: Hearing Before the United States S. Comm. on the Budget*, 117th Cong. (2021) (testimony of Dr. Robert B. Litterman, Chair, Climate-Related Market Risk Subcom.), 1.

13 *Id.* at 7.

market pricing reflect the risk of regulatory costs being imposed by the state, other instances are tied solely to the physical risks associated with potential weather-related disasters. Multiple peer-reviewed studies surveyed by the Bank for International Settlements have identified this purely market-driven phenomenon (Eren, Merten, and Verhoeven 2022). Investors typically pay a premium for corporate bonds that tend to outperform during bad climate news events (Huynh and Xia 2021). Heightened risks from extreme weather events result in higher interest rates for sovereign borrowers in the Caribbean (Mallucci 2022). Over the last decade, risks from heat stress have been priced into municipal bonds, corporate bonds, and equity markets (Acharya et al. 2022). Similarly, US municipal bonds in geographies most exposed to potential sea level rise have sold at a slight discount to their peers (Goldsmith-Pinkham et al. 2022).

This is not to argue that private market participants can effectively insure all climate catastrophe risks. While damages due to localized weather events can be covered by property insurance, Swiss Re (2020) estimates that only half of potential global financial losses from natural catastrophes are covered by insurance. For reasons elaborated on earlier in this article, systemic climate risk is uninsurable. The point is that private risk insurers have stronger institutional incentives than state actors to safeguard the capital they put at risk. If uncertainty and knowledge/calculation problems detract from the private market's ability to protect against catastrophic losses, such information and calculation challenges are even more insurmountable for state actors that do not face market discipline.

Professional risk consultants advise their clients not to waste time preparing for unpredictable catastrophes. In a 2021 article in *Risk Management* magazine, Neil Hodge (2021) writes that firms are counseled to assess key vulnerabilities and what resources, processes, and capabilities would enhance their resilience and agility. At the societal level, prudent risk management entails enabling the population to withstand the full range of unforeseen, low-probability/high-impact risks. A myopic focus on climate risk leaves a society unprepared for other risks with similar profiles, such as asteroids, pandemics, artificial intelligence systems, and nuclear warfare. A carbon tax could make society more vulnerable to the full panoply of unforeseen calamities by depriving people of the resources they need to protect themselves.

A more effective way to improve a society's resilience is to foster strong economic growth and capital formation. Development economists have documented that wealthier countries have lower infant and child mortality and longer life expectancy than poorer societies (Pritchett and Summers 1996). More affluent societies are better positioned to safeguard themselves from, endure, and then recover from all manner of climate, safety, and health related disasters. Wealthier economies also invest in technologies that

enable better adaptation and resilience. The key to strong economic growth and income generation, especially as an economy recovers from a crisis, is freedom. In a 2016 analysis of 212 economic crises across 175 countries, Aarhus University economist Christian Bjørnskov (2016) demonstrated a robust association between lower levels of government regulation, smaller peak-to-trough gross domestic product ratios, and shorter recovery times from economic crises. The empirical data argue for a repeal of interventionist regulations.

A climate-related calamity could destabilize a US financial system already vulnerable to systemic risks associated with a \$34 trillion national debt (over 120 percent of GDP) and loose monetary policies.¹⁴ The US government can significantly reduce societal risk by reforming the fiat money system, which makes financial markets more failure-prone in two important ways. First, when the Federal Reserve lowers interest rates artificially, it encourages firms to take on debt. Overleveraged companies are more likely to fail in a meltdown. Second, easy-money policies inflate asset bubbles, which become a key source of systemic risk. To prevent a climate disaster from triggering a financial meltdown, the US should replace fiat money with a system of sound money.

Conclusion

A tax on energy emissions is not up to the task of climate risk management and insurance. Unprecedented and systemic risks are uninsurable by any entity, including the state. The promoters of collectivist, intergenerational risk management have used the analytical complexity of algorithmic climate models to mask the state's basic inability to gather sufficient information about preferences to calculate economic values. Cost-benefit models are incapable of quantifying future property damages associated with current carbon emissions and therefore cannot set an offsetting carbon tax. The same calculation and knowledge problems that encumber central economic planning also plague climate tax proposals. The state's inability to calculate stems from its failure to comprehend the vital function of unfettered market prices, its ignorance of the demonstrated preferences of acting human beings, and its inability to make interpersonal and intergenerational comparisons of utility. Climate risks in a society are inherently subjective, and cannot be reduced to a social utility function and managed collectively. To improve society's resilience to potential climate disasters, the state's role in economic and monetary affairs should be strategically reduced.

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¹⁴ According to risk expert Joseph Calandro Jr., market crashes tend to be associated with excessive financial leverage that causes cascading losses through interconnected financial relationships in conjunction with unexpected feedback loops. A high national debt burden renders a society more susceptible to financial contagion and reduces an economy's financial capacity to recover from disasters. Calandro (2016) estimates that 90 percent of GDP is the "tipping point" beyond which national debt makes a country's financial system unstable.



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REFERENCES

- Acharya, Viral V., Tim Johnson, Suresh Sundaresan, and Tuomas Tomunen. 2022. "Is Physical Climate Risk Priced? Evidence from Regional Variation in Exposure to Heat Stress." NBER Working Paper 30445, National Bureau of Economic Research, Cambridge, Mass. <https://doi.org/10.3386/w30445>.
- Bevere, Lucia, and Michael Gloor. 2020. *Natural Catastrophes in Times of Economic Accumulation and Climate Change Risks*. Sigma research series 2/2020. Swiss Re Institute, April 8. <http://www.swissre.com/institute/research/sigma-research/sigma-2020-02.html>.
- Bjørnskov, Christian. 2016. "Economic Freedom and Economic Crises." Supplement, *European Journal of Political Economy* 45:11–23. <https://doi.org/10.1016/j.ejpoleco.2016.08.003>.
- Brätland, John. 2006. "Toward a Calculational Theory and Policy of Intergenerational Sustainability." *Quarterly Journal of Austrian Economics* 9 (2): 13–45. <https://doi.org/10.1007/s12113-006-1007-z>.
- Calandro, Joseph, Jr. 2016. "Systemic Risk and Risk Management: Overview and Approach." *Journal of Insurance and Financial Management* 2 (8): 1–35. <https://doi.org/10.2139/ssrn.2815616>.
- Calandro, Joseph, Jr., Graham Hall, and Steve Zheng. 2021. "Property Natural Catastrophe Risk Analysis in an Era of Climate Change: Some Financial Services, Investment, and Public Policy Implications." *Journal of Impact and ESG Investing* 2 (1): 19–22. <https://doi.org/10.3905/jesg.2021.1.024>.
- Carden, Art. 2013. "Economic Calculation in the Environmentalist Commonwealth." *Quarterly Journal of Austrian Economics* 16 (1): 27–44. https://cdn.mises.org/qjae16_1_3.pdf.
- Coase, R. H. 1960. "The Problem of Social Cost." *Journal of Law and Economics* 3:1–44. <https://doi.org/10.1086/466560>.
- Cordato, Roy. 2004. "Toward an Austrian Theory of Environmental Economics." *Quarterly Journal of Austrian Economics* 7 (1): 3–16. <https://doi.org/10.1007/s12113-004-1031-9>.
- . 2007. *Efficiency and Externalities in an Open-Ended Universe: A Modern Austrian Perspective*. Auburn, Ala.: Ludwig von Mises Institute. <https://mises.org/library/book/efficiency-and-externalities-open-ended-universe>.
- Damodaran, Aswath. 2023. "Equity Risk Premiums (ERP): Determinants, Estimation and Implications—the 2023 Edition." Unpublished paper, April 3. <https://doi.org/10.2139/ssrn.4398884>.
- Daniel, Kent D., Robert B. Litterman, and Gernot Wagner. 2016. "Applying Asset Pricing Theory to Calibrate the Price of Climate Risk." NBER Working Paper 22795, National Bureau of Economic Research, Cambridge, Mass. <https://doi.org/10.3386/w22795>.
- . 2019. "Declining CO2 Price Paths." *Proceedings of the National Academy of Sciences* 116 (42): 20886–91. <https://doi.org/10.1073/pnas.1817444116>.
- Epstein, Larry G., and Stanley E. Zin. 1989. "Substitution, Risk Aversion, and the Temporal Behavior of Consumption and Asset Returns: A Theoretical Framework." *Econometrica* 57:937–69. <https://doi.org/10.2307/1913778>.
- Eren, Egemen, Floortje Merten, and Niek Verhoeven. 2022. "Pricing of Climate Risks in Financial Markets: A Summary of the Literature." BIS Papers No. 130, Bank for International Settlements Monetary and Economic Department, Basel, Switz.

- Goldsmith-Pinkham, Paul, Matthew T. Gustafson, Ryan C. Lewis, and Michael Schwert. 2022. "Sea Level Rise Exposure and Municipal Bond Yields." NBER Working Paper 30660, National Bureau of Economic Research, Cambridge, Mass. <https://doi.org/10.3386/w30660>.
- Hayek, Friedrich August von. 1974. "The Pretence of Knowledge." Nobel Prize lecture, December 11, 1974. <https://www.nobelprize.org/prizes/economic-sciences/1974/hayek/lecture/>.
- Hazlitt, Henry. 1979. *Economics in One Lesson*. New York: Crown.
- Hodge, Neil. 2021. "How to Address Low-Probability, High-Impact Risks." *Risk Management*, February 1, 2021. <https://www.rmmagazine.com/articles/article/2021/02/01/-How-to-Address-Low-Probability-High-Impact-Risks->.
- Huynh, Thanh D., and Ying Xia. 2021. "Climate Change News Risk and Corporate Bond Returns." *Journal of Financial and Quantitative Analysis* 56 (6): 1985–2009. <https://doi.org/10.1017/S0022109020000757>.
- IPCC (Intergovernmental Panel on Climate Change). 2023. *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by H. Lee and J. Romero. Geneva, Switz.: IPCC. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.
- Litterman, Robert B. 2013. "What Is the Right Price for Carbon Emissions?" *Regulation* 36 (2): 38–43.
- . 2015. "How to Think about Climate Risk." Niskanen Center. April 20, 2015. <https://www.niskanencenter.org/how-to-think-about-climate-risk/>.
- Mallucci, Enrico. 2022. "Natural Disasters, Climate Change, and Sovereign Risk." *Journal of International Economics* 139:103672. <https://doi.org/10.1016/j.jinteco.2022.103672>.
- Mehra, Rajnish, and Edward C. Prescott. 1985. "The Equity Premium: A Puzzle." *Journal of Monetary Economics* 15 (2): 145–61. [https://doi.org/10.1016/0304-3932\(85\)90061-3](https://doi.org/10.1016/0304-3932(85)90061-3).
- Mises, Ludwig von. 1998. *Human Action: A Treatise on Economics*. Scholar's ed. Auburn, Ala.: Ludwig von Mises Institute. <https://mises.org/library/human-action-0>.
- NASEM (National Academies of Sciences, Engineering, and Medicine). 2021. *Accelerating Decarbonization of the US Energy System*. Washington, D.C.: National Academies Press. <https://doi.org/10.17226/25932>.
- Nordhaus, William D. 2009. "An Analysis of the Dismal Theorem." Cowles Foundation Discussion Paper No. 1686, Cowles Foundation, Yale University, New Haven, Conn. <https://elischolar.library.yale.edu/cowles-discussion-paper-series/2003>.
- . 2017. "Revisiting the Social Cost of Carbon." *Proceedings of the National Academy of Sciences* 114 (7): 1518–23. <https://doi.org/10.1073/pnas.1609244114>.
- O'Driscoll, Gerald P., and Mario J. Rizzo. 1985. *The Economics of Time and Ignorance*. Oxford: Basil Blackwell.
- Pigou, Arthur C. 1920. *The Economics of Welfare*. London: Palgrave Macmillan.
- Pritchett, Lant, and Lawrence H. Summers. 1996. "Wealthier Is Healthier." *Journal of Human Resources* 31 (4): 841–68. <https://doi.org/10.2307/146149>.
- Rothbard, Murray N. 1982. "Law, Property Rights, and Air Pollution." *Cato Journal* 2 (1): 55–99.
- . 1994. "Deposit 'Insurance.'" In *The Case against the Fed*, 134–37. Auburn, Ala.: Ludwig von Mises Institute. <https://mises.org/library/book/case-against-fed>.
- . 1997. "Toward a Reconstruction of Utility and Welfare Economics." In *The Logic of Action: Applications and Criticism from the Austrian School*. Cheltenham, U.K.: Edward Elgar. <https://doi.org/10.4337/9781035335183>.

- . 2009. *Man, Economy, and State with Power and Market*. 2nd scholar's ed. Auburn, Ala.: Ludwig von Mises Institute. <https://mises.org/library/man-economy-and-state-power-and-market>.
- Sieroń, Arkadiusz. 2019. *Money, Inflation, and Business Cycles: The Cantillon Effect and the Economy*. Abingdon, U.K.: Routledge. <https://doi.org/10.4324/9780429023644>.
- Wall Street Journal. 2019. "Economists' Statement on Carbon Dividends." January 16, 2019. <https://www.wsj.com/articles/economists-statement-on-carbon-dividends-11547682910>.
- Weitzman, Martin L. 2009. "On Modeling and Interpreting the Economics of Catastrophic Climate Change." *Review of Economics and Statistics* 91 (1): 1–19. <https://doi.org/10.1162/rest.91.1.1>.
- . 2014. "Fat Tails and the Social Cost of Carbon." In "Papers and Proceedings of the One Hundred Twenty-Sixth Meeting of the American Economic Association." Special issue, *American Economic Review* 104 (5): 544–46. <https://doi.org/10.1257/aer.104.5.544>.
- World Population Review. n.d. "Carbon Footprint by Country 2024." Accessed March 6, 2024. <https://worldpopulationreview.com/country-rankings/carbon-footprint-by-country>.