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The Case Against a Carbon Tax

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Executive Summary

A carbon tax is an artificial cost levied by a government upon entities buying and selling energy sources that emit carbon dioxide and other greenhouse gases. The motivation underlying the policy is that the burning of carbon-based fuels contributes to the greenhouse effect, by which global warming is alleged to inflict damage on human welfare. In the carbon tax framework, these emissions constitute a negative externality—a cost not taken into account by existing market prices. A carbon tax seeks to internalize that cost and, in so doing, nudge the market away from coal, oil, and natural gas—fuels that currently supply 80 percent of the energy used in the United States.[1]

Typical carbon tax proposals target an energy source early in the chain of commerce. So, for example, rather than motorists facing the tax at the gasoline pump or homeowners on their electricity bills, oil refiners and coal producers are taxed—and pass the cost to consumers in the form of higher prices. Carbon tax proponents claim that the imposition of such costs would induce households and businesses to take full account of the impact of their behavior and would lower the economy's carbon intensity as a result.

The logic of the carbon tax has a certain plausibility, but the case against it, as this policy paper will explain, is much stronger. Our analysis relies on standard results concerning the economics and political calculus of a U.S. carbon tax. We are stipulating the standard mechanisms of anthropogenic global warming and the magnitudes of various parameters concerning the physical science, as codified in the periodic reports of the United Nations Intergovernmental Panel on Climate Change (IPCC) and other mainstream bodies. Our critique of a carbon tax is independent of the objections that some climate scientists have raised to the predominant narrative. If accurate, their objections would make the case for a U.S. carbon tax weaker still.

This paper comprises six core points against the carbon tax:

- **Carbon taxes are set arbitrarily.**

Carbon taxes are set using non-objective standards. The much-debated "social cost of carbon" is a subjective construct that relies not only upon multi-century climate models, but also upon analyst preferences, most notably the highly contentious choice of a discount rate for public policy.

- **The climate change mitigation goals of the world's leading political bodies are at odds with the climate economics literature.**

The 2018 IPCC recommendation for governments to implement policies compatible with limiting global warming to 1.5°C above pre-industrial levels ignores the economic harm such policies would impose in the near term. The recommended course would be likely to cause more economic damage than global warming itself, according to mainstream work in climate economics.

- **A U.S. tax-and-rebate plan would slow economic growth.**

Americans in the lowest income quintile use a greater percentage of their income to meet their energy needs than the remainder of Americans, rendering carbon taxes regressive. So-called rebates can

attempt to offset this effect, but only at the expense of the economy as a whole. According to most studies—including those coming from carbon tax proponents—carbon taxes slow economic growth unless a large portion of the tax revenue is allocated to corporate tax reductions. Recycling revenue through rebates is particularly harmful to overall economic performance.

- **Carbon taxes have unexpected, adverse tax effects.**

Carbon taxes initiate vertical tax competition between federal, state, and local governments. Furthermore, as excise taxes, carbon taxes can have a greater distortionary effect on economic activity than do taxes on income, undermining the claims of carbon tax advocates that a tax swap would increase efficiency.

- **A U.S. carbon tax would be irrelevant.**

The U.S. is only responsible for around 15 percent of global carbon dioxide emissions.[2] While populous countries like China, India, and Bangladesh continue to grow their industrial capacities—and, as a result, increase their emissions—U.S. emissions have decreased by more than 10 percent since 2005. The only carbon tax with teeth would be one with global reach, which is a nonstarter.

- **A U.S. carbon tax that would replace existing regulations and/or taxes is not politically viable.**

A carbon tax that would replace regulations and/or corporate income taxes would fail to satisfy the environmental activist class's appetite for control. The only carbon tax that stands a chance politically would come on top of onerous regulation and taxation.

I. The Case Against a Carbon Tax

A. Carbon Taxes and Social Cost: An Exercise in the Arbitrary

The social cost of carbon (SCC) is the estimated marginal external cost of a unit emission of carbon dioxide, based upon the future damages (such as reduced agricultural productivity, increased flood damage, or worsened health and mortality) or future benefits (such as increased agricultural productivity) that that unit will cause through its contribution to the greenhouse effect and the planetary warming effects thereof. The metric is the basis for the artificial cost put on carbon-emitting fuels, typically denoted in dollars per metric ton of carbon dioxide or carbon dioxide-equivalent. SCC estimates vary greatly, as demonstrated by the difference between the Obama administration estimate of $42 per metric ton in 2020[3] and the Trump administration estimate of $7.[4] In fact, estimates vary greatly even within reports from *the same* administration. Though the $42 estimate was the Obama administration's headline figure, in the same report other estimates for 2020 are as low as $12 and as high as $123.

The central misunderstanding concerning the social cost of carbon is the notion that it is an empirical aspect of nature, existing independent of human judgment, like the mass of Jupiter or the temperature at which water boils. In reality, the social cost of carbon is an estimate that rests upon normative

judgments and assumptions supplied by the modeler. Two economists can give vastly different estimates of the social cost of carbon, even if they agree on the objective facts underlying the analysis.

i. Integrated Assessment Models

Integrated Assessment Models (IAMs) are the tools with which people analyze the potential effects—positive and negative—of carbon dioxide emissions. IAMs link climate models with economic models to project and monetize welfare impacts. The two most prominent IAMs are the Climate Framework for Uncertainty, Negotiation, and Distribution (FUND),[5] developed by Richard Tol, and the Dynamic Integrated Climate-Economy model (DICE),[6] developed by William Nordhaus.

Using the IAMs, modelers estimate the marginal cost to the economic system as a whole of emitting a ton of carbon dioxide. But, crucially, even if we assent to the climate projections utilized and trust the economic variables selected by the developers to adequately capture economic costs and benefits in the future, in order to understand the resulting SCC we need to grasp two instrumental variables: the discount rate and the time horizon.

ii. Discount Rate

The discount rate is used to translate future costs and benefits into present dollar terms. As described by Nordhaus in his criticism of the notorious climate policy document produced for the government of the United Kingdom known as the *Stern Review*, "discounting is a factor in climate-change policy—indeed in all investment decisions—that involves the relative weight of future and present payoffs."[7] The discount rate is, in essence, the relative importance we place on costs and benefits that will arise in the future as compared with costs and benefits today. Regarding global warming, the most adverse effects are projected to occur far in the future, but the cost of regulating emissions occurs in the present. The discount rate addresses the question, how much benefit do we require in the future to prompt us to take on a cost now?

As practiced in standard cost-benefit analyses, the discount rate is predicated by a rate of time preference, with other variables including consumption growth rates and the elasticity of marginal utility. Individuals and firms make calculations of this sort each day: weighing the value of consumption against the value of investment, taking into account assessments of risks and expectations of future opportunities. But a social cost of carbon effectively establishes a public position on what is a private concern. When analysts assert an SCC of *x* dollars, they are smuggling in their own normative views. This is what most drew ire to the *Stern Review*, for example, which generated its analysis from the premise that the proper rate of time preference is close to zero—i.e., that human welfare today should be granted no preference over human welfare in the future.

Some libertarians argue that a rate of time preference of zero is ethically appropriate and that a positive discount rate benefits human beings today at the expense of future human beings.[8] They imply that enriching ourselves now constitutes an intergenerational wealth transfer, akin to wealth confiscation and redistribution perpetrated among the living today. But it remains unclear how wealth that has yet to be created can be taken from entities that as of yet do not exist.

Fortunately, there is an alternative to wrangling in the ethics of intertemporal and interpersonal value comparisons. Rather than analysts imparting their own normative views to generate a discount rate, another option is to consider market prices. According to this approach, a public policy discount rate should begin with the opportunity cost of capital and, thus, cleave to prevailing market rates of return.

Indeed, this is one of the approaches the White House Office of Management and Budget directed agencies to consider in their regulatory analyses in 2003:

> The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector.[9]

A 7-percent rate is commonly taken as the upper bound of the discount rate debate, but some analyses suggest the rate of return to private capital may be considerably higher.[10] Even using the conservative 7-percent rate, however, we see enormous fluctuations in SCC estimates relative to the rates of 2.5 percent, 3 percent, and 5 percent. The magnitude of divergence generated by discount rate adjustments can be observed in the table below, produced by the Heritage Foundation.[11] According to calculations based on simulation results using Nordhaus's DICE model, the SCC fluctuates by nearly a factor of ten in the year 2020 when comparing the 2.5-percent discount rate result of $56.92 with the 7-percent rate result of $5.87. To be clear, these divergent estimates refer to the same underlying simulation of climate change damages. It is simply because those net damages, which accrue over centuries into the future, are "discounted" to the present at different annual percentage rates that the results contrast so drastically.

Average SCC Baseline, End Year 2300

Year	Discount Rate 2.5%	Discount Rate 3%	Discount Rate 5%	Discount Rate 7%
2010	$46.57	$30.04	$8.81	$4.02
2015	$52.35	$34.32	$10.61	$5.03
2020	$56.92	$37.79	$12.10	$5.87
2025	$61.48	$41.26	$13.60	$6.70
2030	$66.52	$45.14	$15.33	$7.70
2035	$71.57	$49.03	$17.06	$8.70
2040	$76.95	$53.25	$19.02	$9.85
2045	$82.34	$57.48	$20.97	$11.00
2050	$87.69	$61.72	$23.06	$12.25

Source: Calculations based on Heritage Foundation Monte Carlo simulation results using the DICE model.

Dayaratna, Kevin D., and David Kreutzer, "Loaded DICE: An EPA Model Not Ready for the Big Game," *The Heritage Foundation*, November 21, 2013.
https://www.heritage.org/environment/report/loaded-dice-epa-model-not-ready-the-big-game

iii. Time Horizon

A second, related concept that contributes to SCC estimates is the time horizon. This concept is simple, but highly impactful in determining an SCC estimate: how far into the future should we weigh costs?

When taking note of the *multi-century* time horizon used in IAMs, the preposterousness of a near-zero time preference for public policy analysis is made clear. Again, from Nordhaus's critique of the *Stern Review*:

> This approach is more difficult to interpret when it involves different generations living many years from now, and it arises with particular force when the current generation's great(n)-grandchildren consume goods and services that are largely unimagined today. These will almost certainly involve unrecognizably different health-care technologies, with supercomputers cheap enough and small enough to fit under the skin, and future generations that grow up and adapt to a world that is vastly different from that of today.

We have little idea of the challenges and opportunities human beings centuries into the future will face. But regardless of one's normative orientation, at some point, cutting back on economic output today, in order to bestow benefits on humans who may have moved to other planets (or been wiped out by an asteroid strike,[12] for that matter) would be bad economics. This sheer ignorance stymies the social discounting exercise. Valuing our economic prospects next week, next year, and next decade makes sense; valuing the economic prospects of hypothetical members of our species that might live in the next millennium strains the limits of rational consideration.

To illustrate the problem further, we can quote once again from Nordhaus:

> The effect of low discounting can be illustrated with a 'wrinkle experiment.' Suppose that scientists discover a wrinkle in the climate system that will cause damages equal to 0.1 percent of net consumption starting in 2200 and continuing at that rate forever after. How large a one-time investment would be justified today to remove the wrinkle that starts only after two centuries? Using the methodology of the [Stern] Review, the answer is that we should pay up to 56 percent of one year's world consumption today to remove the wrinkle. In other words, it is worth a one-time consumption hit of approximately $30,000 billion today to fix a tiny problem that begins in 2200.

As this example shows, the discount rate and the time horizon used in an analysis can have huge ramifications in terms of an implied policy on climate change. And yet these considerations are not empirical questions that can be settled by physical measurement; instead they are normative disagreements. To sweep these concerns under the rug and report as indisputable estimates of the social cost of carbon is to mislead policymakers and the public.

iv. Global vs. Domestic Costs and Benefits

A third contributor to SCC estimates worthy of mention is the inclusion or exclusion of foreign benefits and damages.

When assessing cost-benefit questions, the U.S. government ought to be straightforward in its presentation of findings on where costs and benefits accrue. The costs that may come with global warming would not be distributed evenly across the country, let alone across the globe.[13] Some people will benefit from the greening effect of increased carbon dioxide concentrations and the longer growing season promoted by warmer temperatures. Conversely, some people will find their regions' climates less hospitable than they were in the 20th century.

In selecting SCC values, some analysts prefer to include global effects while others prefer to focus on domestic effects. This creates significant differences in SCC estimates. For instance, the Obama administration opted for a global estimate, while the Trump administration prefers to focus on the domestic costs and benefits. The Obama estimate, partly due to this consideration, is much higher.

The issue is sometimes presented as being a conflict between industrialized and developing countries, but the reality is not so simple. As described by David Anthoff, Richard Tol, and Gary Yohe in "Discounting for Climate Change (2009)":

> One of the basic results of the climate change impact literature is that poor countries tend to be more vulnerable to climate change, and the results in Figure 3 certainly reflect this. With zero income elasticities, the SCC tends to be higher—at least, if the discount rate is low. If the discount rate is high, the SCC is negative (that is, climate change is a net benefit); and with zero income elasticities, the SCC is even more negative (that is, climate change is an even greater benefit). The reason can be found in the positive impacts of carbon dioxide fertilization on agriculture in poor countries.[14]

So while it is the case that the poorer countries of, for instance, South Asia may bear greater global warming consequences than North American countries, they also stand to benefit in the near term from the direct positive impact of carbon dioxide fertilization on agricultural yields. Further, and more crucially, many of the countries that would theoretically be most harmed by rising sea levels are instituting energy policies that run counter to global emissions reduction goals. Bangladesh is frequently cited as a populous country at risk to climate damages, and yet it plans to increase its percentage of electricity generated from coal from 2 percent to 50 percent by 2030.[15] It is difficult to justify taxing carbon emissions in the United States largely for the benefit of people in places like Bangladesh when they plan to enrich themselves with continued investment in fossil fuels.[16]

In any event, most Americans would probably be surprised to learn that according to the estimates published by the Obama administration, only 7 to 23 percent of the benefits of reducing carbon dioxide emissions would accrue to Americans.[17] Thus, even if a particular policy (such as a carbon tax or limits on coal-fired power plants) appeared to pass a cost-benefit test, that would not mean *Americans* were better off. No, it would merely mean that Americans paid an economic cost for a larger benefit, most of which was given to the rest of the world. This is the nature of national and sub-national policies designed to tackle an ostensibly global problem, but few Americans would realize this subtlety. Ultimately, the answer to the global vs. domestic question relies on normative premises and that should be transparent to the American public, which would bear the cost of a carbon tax.[18]

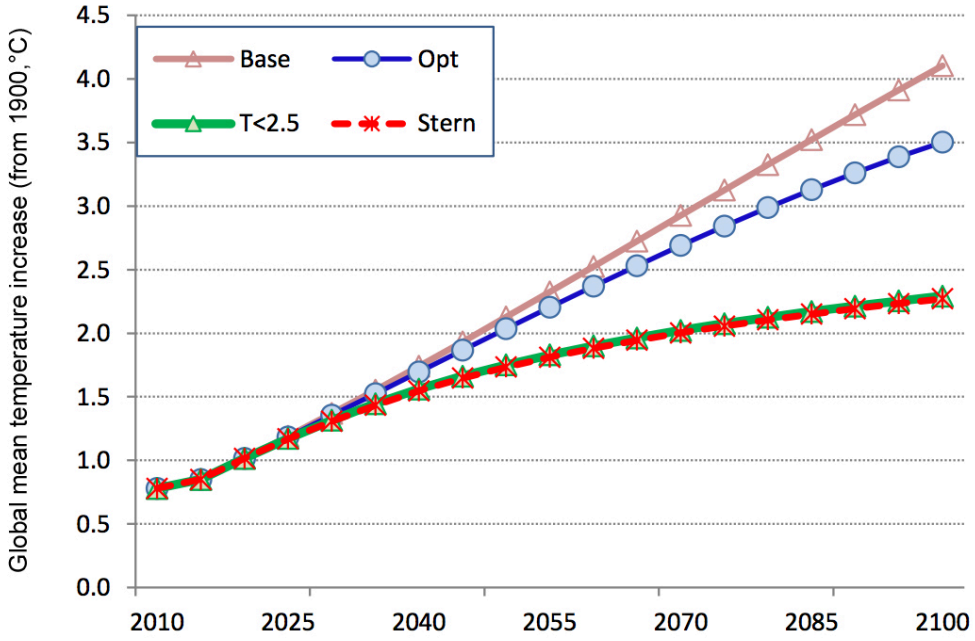
The social cost of carbon is not an objectively-derived figure. Even if we operate on the premise that economic value can be calculated in the form of "social cost," the SCC is contingent upon the

particular normative perspective one chooses to favor. Depending upon the discount rate, the time horizon, and the choice to include or exclude global effects, one can generate virtually any SCC desired.[19]

B. Climate Action Comes at a Cost: IAMs vs. the IPCC

As the above sections indicate, IER does not take a favorable view toward the endeavor of estimating a social cost of carbon. Still, it is interesting to observe that the IAM godfather, William Nordhaus, takes a markedly less severe view of future climate damages than does the world's leading political body on climate change, the IPCC. In the fall of 2018 the IPCC released a special report advising the world's governments to take steps to limit global warming to 1.5°C above pre-industrial levels.[20] The same week, Nordhaus was awarded an economics Nobel.[21] Though popular media widely reported the two announcements in tandem,[22] in actuality the messages of the respective bodies operated at cross-purposes.

Nordhaus's work supports a carbon tax, but he concludes that if his "optimal" carbon tax were in place, the total warming that would occur would be well above the 1.5°C stipulated by the IPCC. The 2016 update to his DICE model points to a far more lenient 3.5°C of warming above 1900 levels as the economically optimal trajectory.[23] The chart below shows a baseline warming scenario in which global mean temperature climbs above 4.0°C relative to the 1900 mean, another warming scenario corresponding with *Stern Review* mitigation measures in which the mean remains below 2.5°C of increase relative to 1900, and Nordhaus's "optimal" scenario—located in the middle—in which mitigation strategies would result in a global mean temperature increase of 3.5°C relative to 1900.[24]



Nordhaus, William D., "Projections and Uncertainties About Climate Change in an Era of Minimal Climate Policies," *The National Bureau of Economic Research*, December 2016: 17. https://www.nber.org/papers/w22933.pdf

In other words, according to Nordhaus, who has just been awarded the world's most famous intellectual prize, the economic harm that would be required to limit global warming to the IPCC's recommended 1.5°C would greatly outweigh the savings that would accrue from avoided future damages. As Norhaus wrote in 2016, "the international target for climate change with a limit of 2°C appears to be infeasible with reasonably accessible technologies— and this is the case even with very stringent and unrealistically ambitious abatement strategies."[25] Major media coverage led the public to believe that Nordhaus's work *affirms* the recommendations coming from the UN. But it does not.

The point here is that even on the terms endorsed by the world's leading integrated assessment modeler, a scenario with continued economic opportunity and development accompanied by *some* global warming would be better than one in which we cut off growth to limit emissions. To illustrate this point further, consider the table below, adapted from Nordhaus's work by Robert P. Murphy for his 2009 article, *Rolling the DICE: William Nordhaus' Dubious Case for a Carbon Tax*.[26] According to the DICE projections, the "optimal tax" delivers net benefits of $3.07 trillion relative to a "no controls baseline," while limiting warming to 1.5 degrees causes net *damages* of $14.44 trillion. In fact, the projected cost of abatement required to limit warming to 1.5°C would exceed the environmental damages in the "no controls baseline" scenario by over $4 trillion. This is important to bear in mind when political bodies like the IPCC advocate choking economic activity to stop emissions.

DICE's Relative Benefits of Different Climate Policies
(in Trillions of 2005 $U.S. Dollars)

Climate Policy	PDV Difference from Baseline	PDV of Environmental Damages	PDV of Abatement Costs	Sum of Damages and Costs
No controls baseline	0.00	22.55	0.04	22.59
Optimal tax	+3.07	17.31	2.20	19.52
Limit CO2 to 560 ppm	+2.67	15.97	3.95	19.92
Kyoto with the United States	+0.63	21.38	0.58	21.96
Kyoto without the United States	+0.10	22.43	0.07	22.49
Stern Review discount rate	-14.18	9.02	27.74	36.77
Limit temp. to 1.5°C	-14.44	9.95	27.08	37.03
Limit CO2 to 420 ppm	-14.60	9.95	27.24	37.19
Gore's 90 percent emissions cut	-21.36	10.05	33.90	43.96

Note: PDV = present discounted value.
Source: Adapted from Nordhaus 2008, 89.

Murphy, Robert P. "Rolling the DICE: William Nordhaus' Dubious Case for a Carbon Tax," *The Independent Review*, vol. 14, no. 2, Fall 2009: 197-217. https://www.instituteforenergyresearch.org/wp-content/uploads/2008/06/2008-06_rolling_the_dice_murphy.pdf

Though the specific numbers have changed in DICE revisions, the upshot is that according to Nobel recipient William Nordhaus government action to mitigate warming has the potential to be far costlier than the warming itself. We can use more recent estimates from the literature to ask: just how high would a carbon tax need to be set in order to meet the 1.5°C threshold suggested by the IPCC? At least $135 per ton by the year 2030 and perhaps as high as a stupefying $5,500.[27] Considering that U.S. annual per capita emissions sit at around 15 metric tons, these figures would prove catastrophic if implemented.

C. Economic Growth and Regressivity

Carbon taxes are widely understood to be regressive because poorer households spend a higher percentage of their income on energy expenses than do richer households. Thus, in percentage terms, a carbon tax has a larger effect on the budgets of poorer households than of richer households. To offset carbon taxes' regressivity, many tax advocates, such as the Climate Leadership Council,[28] propose using tax revenue to supply households with lump-sum rebate checks.

The tax-and-rebate approach could indeed have a mollifying effect on a population that would otherwise clearly be harmed by a tax increase, but the same can be said of any wealth redistribution. A carbon tax rebate scheme is not dissimilar to a universal basic income and would come with all of the attendant problems and bad incentives.[29] Further, the tax-and-rebate approach has been shown to be uniquely destructive of economic growth among the various revenue-recycling strategies.

The 2018 study conducted by Capital Alpha Partners, LLC., *The Carbon Tax: Analysis of Six Potential Scenarios*, analyzes model carbon tax legislation using scoring conventions similar to those of the Joint Committee on Taxation, the Congressional Budget Office, and the U.S. Treasury Department.[30] The study addresses six different pricing structures. Two are carbon taxes that begin at a set rate—$40 and $49 dollars per metric ton—and increase annually. Four are carbon taxes that phase in over time to terminal values of $36, $72, $108, and $144 per ton. The revenue-recycling strategies assessed include corporate tax reduction, deficit reduction, infrastructure spending, personal tax reduction, and the granting of lump-sum rebates.

A special focus of the study is on the many suggestions that with the correct "tax swaps" a carbon tax could produce incremental economic growth. The authors report that a pro-growth carbon tax would be difficult to achieve using standard scoring conventions. According to the study:

> Carbon tax-financed tax reform is unlikely to be pro-growth. Most tax reform and tax swap scenarios modeled lead to reduced GDP relative to the reference case for the entirety of our 22-year forecast period. Better than break-even economic performance with revenue-neutral tax reform may not be possible under standard scoring conventions unless distributional concerns are completely ignored, and low-income taxpayers bear the cost of corporate tax relief...We find that break-even or slightly better performance relative to the no-tax reference case requires the majority of, if not all, net revenue from the carbon tax to be directed to corporate tax reform, regardless of the regressive impact this would have on lower-income taxpayers.

In other words, and contrary to the claims of groups like the Climate Leadership Council, for carbon tax legislation to have a positive effect on economic growth, all or nearly all of the revenue collected from the tax must be offset by tax reductions at the corporate level. This eliminates the availability of revenue for use as a lump-sum rebate to make whole and entice buy-in from the poorer households whose budgets would be tightened most by a carbon tax. No carbon tax plan will both stimulate growth and counter regressivity. Moreover, write the study's authors:

> Small but persistent reductions in GDP relative to the no-tax reference case over a period of many years lead to trillions of dollars in lost production, with challenging implications for federal, state, and local government finances. Sensitivity analyses of the Budget of the United States Government conducted by the Office of Management and Budget (OMB) underscore the cost of even temporary, cyclical losses.

From this research, we conclude that the likelihood of a carbon tax being an economic positive for the United States is slim.

D. Tax Effects

Beyond the macroeconomic effects of a carbon tax noted above, more esoteric effects may arise as well. One of those is called the tax interaction effect. It is worthwhile to consider this somewhat technical concept because it turns the conventional call to "tax bads, not goods" on its head.

As first illustrated by A. Lans Bovenberg and Lawrence H. Goulder in the late 1990s, carbon taxes are a relatively inefficient way to raise revenue, and this deficiency can swamp even the potential environmental benefits of a carbon tax.[31] Bovenberg and Goulder's findings suggest that the macroeconomic toll of a carbon tax will tend to be higher than the toll caused by a more broad-based tax. Broad tax bases allow tax *rates* to be lower for a given target revenue. But a carbon tax targets a particular subset of economic actions (such as producing gasoline), and will therefore exacerbate distortions in markets for intermediate inputs, consumer goods, labor, and capital.

In accordance with Bovenberg and Goulder's work, it is likely that even the vaunted revenue-neutral carbon tax would impose more deadweight loss on the economy than the tax status quo. Even if carbon tax receipts were used to reduce the burden of, say, taxes on labor, the "interaction" of the carbon tax with the *remaining* tax on labor could amplify the distortion so that it is greater than it was before the carbon tax was introduced. Bovenberg and Goulder used numerical simulations of the U.S. economy and tax code to estimate that, in certain situations, the "optimal" carbon tax would be lower than the stipulated negative externality, *even if* all proceeds were used to reduce the tax rate on "good" activities (like working).

Furthermore, carbon taxes instigate what is known as vertical tax competition, meaning that a tax at the federal level would cut into the revenue available for state and local governments to administer their affairs. Though we at IER are no fans of state gasoline taxes, a federal carbon tax would compete with those taxes by deterring gasoline purchases on the margins, leaving state governments deprived of key revenue sources. Moreover, like all other entities within the economy, states would face increased energy costs as a result. Indeed, state governments would be meaningfully burdened by a federal carbon tax. According to *The Carbon Tax: Analysis of Six Potential Scenarios*, when static and

dynamic effects are added together, a tax starting at $40 per ton and rising 2 percent each year would impose an average annual static burden of $25.51 billion on the states. In terms of individual states, this means annual budget shortfalls of around half a billion dollars.[32] As the study emphasizes, this is yet another group that would demand to be made whole from the impact of a carbon tax, leaving even less net revenue available for other purposes, such as cutting the corporate income tax to boost GDP growth or giving rebates to poor households.

E. Globality

For all of the above reasons we should be skeptical of a carbon tax and yet we have not even mentioned what is perhaps the most fatal of carbon tax flaws.

If global warming is indeed a problem, a domestic carbon tax is not the solution. The United States has decreased its emissions by 14 percent since 2005, while over the same period global energy-related carbon dioxide emissions have risen by 20 percent.[33] As of 2017 the U.S. was emitting less than 15 percent of the global total. China, already emitting close to twice the greenhouse gas volume of the U.S., will allow its emissions to climb by another 15 percent by 2030. While these figures refer to cumulative emissions, rather than per capita emissions, the imbalance cannot go unaddressed. To put into perspective how mammoth China's future output will be, consider that it is currently *in the process of building* more coal electricity generation capacity[34] than the United States has in service at this time.[35] Given these figures, we should immediately be wary of a domestic tax on energy.

A global problem would require a global solution and, therefore, ever-elusive global enforcement. Since a carbon tax would incentivize businesses to flee from the taxing jurisdiction to a less burdensome environment (a phenomenon known as leakage), the typical carbon tax plan put forth in the U.S. includes what is called a border adjustment. A border adjustment is essentially a tariff to account for legal and regulatory differences across international borders. The border adjustment would be intended to both keep energy-intensive activities from fleeing and to prevent consumers from choosing to buy cheaper goods from countries lacking stringent mitigation policies. For example, upon importing an energy-intensive good, like aluminum, the importer would be charged by the government to make up for the absence of a carbon tax (or equivalent mitigation strategy) in the exporting country.

Given that a unit of carbon dioxide emitted in Shenzhen has an equal impact on atmospheric concentrations as one emitted in Charlotte, border adjustment would be a necessary element of a carbon tax if the tax were to have any impact on global emissions totals. But since fossil fuel energy supports every element of the global supply chain, enforcement would be enormously costly from an administrative standpoint, while also being highly vulnerable to noncompliance and faulty reporting. Trade disputes with countries less willing to hamstring their economies could also arise. Additionally, if demand falls in a taxed jurisdiction, a subsequent fall in prices elsewhere could theoretically negate the taxed jurisdiction's emissions reduction. Again, climate change mitigation would require a globally integrated regime.

The Paris Agreement is touted as such a regime, but it is also notorious for the flexibility it offers to signatory states. While the Obama administration committed the U.S. to reducing domestic emissions (without a carbon tax) to 26-28 percent below 2005 levels by 2025, China would only *start* reducing emissions in 2030. Other countries, like Australia, Canada, and South Korea—three of the world's

fifteen largest economies—are nominally committed to the Paris Agreement, but have quickly fallen off from the trajectories necessary to meet their commitments. Moreover, even if every signatory lived up to its declared pledge, current estimates say that the world would still warm by 3°C,[36] well above the official goal of the Paris Agreement. Beyond moral censure, the agreement has no means to enforce compliance. A carbon tax would face the same hurdles. A domestic carbon tax, while likely to cause significant harm to the U.S. economy, would be futile as a strategy for mitigating global warming.

F. Politics

Carbon taxes appeal to a narrow slice of the American public, but since this slice includes a sizable roster of accomplished economists and centrist think tanks, carbon tax advocates are granted a wide berth in our political discourse. The "Economists' Statement" that appeared on the pages of the *Wall Street Journal* in January 2019 is representative of prominent carbon tax thinking.[37] The statement establishes five pillars for a carbon tax that its signatories would consider both appropriate and capable of generating widespread popularity.

While all five of the statement's pillars are tacitly covered in this paper, the third demands particular focus. It reads:

> A sufficiently robust and gradually rising carbon tax will replace the need for various carbon regulations that are less efficient. Substituting a price signal for cumbersome regulations will promote economic growth and provide the regulatory certainty companies need for long- term investment in clean-energy alternatives.

Economists and think tanks like the R Street Institute[38] argue that a carbon tax would deliver positive economic outcomes if it were paired with tax simplifications elsewhere and the elimination of burdensome, entangling regulations. Be that as it may, the expectation that a carbon tax would *replace* other taxes and/or regulations rather than *accompany* them runs counter to political realities. Outside the carbon tax cocoon, politicians and environmentalists are clamoring for more regulations, mandates, and subsidies. The obvious example as of this paper's writing is the so-called Green New Deal,[39] which eschews a tax swap and embraces command-and-control. The three examples below typify the thinking of the environmentalist movement on carbon taxes:

- "Putting a price on carbon could be an important part of a comprehensive program. It can't do the job alone, though, and is not a replacement for carbon limits under our current laws." — Rhea Suh, President, Natural Resources Defense Council[40]

- "There's one other truly grave danger with carbon pricing that zealous advocates occasionally do fall into: the idea that it's the only thing that needs to be done...At best it's one arrow in a quiver full of other arrows we're also going to need to let loose in a volley."—Bill McKibben, Founder, 350.org[41]

- "The thing about carbon pricing is, it's helpful, but it's not dispositive. There are a number of sectors that are impervious to a carbon price, or close to impervious. A carbon price works when it's part of a package that includes R&D and performance standards. It does not work in

> isolation. It helps, but it doesn't do nearly as much as is required."—Hal Harvey, CEO, Energy Innovation[42]

To state what the environmentalists' body of work makes obvious: a carbon tax only appeals to that faction, if at all, in conjunction with a wide range of other emissions reduction strategies. A carbon tax that will draw environmentalist support is not a tax-for-regulation swap, but a complement to existing and accelerated regulation. Alluring though it may be to academic economists, a carbon tax that replaces regulatory fiat fails to satisfy the environmental activist class's appetite for control. The promised compromise is out-of-touch and unrealistic because the conditions of a carbon tax are not exogenous to the political process. Politicians will be responsive to the environmental attitudes expressed in the quotes provided above. When you combine this with other public choice considerations, such as that regulators have incentives to choose emissions goals that go beyond those implied by SCC estimates, it becomes clear that the concept of a revenue-neutral carbon tax that reduces other regulations is not a real-world policy proposal.

Another factor that should dampen the expectations of carbon tax advocates is the unpopularity of new taxes more broadly. Regulations increase costs in ways that consumers are unlikely to discern or associate with legislation, but energy taxes are quite visible in the prices of our key purchases. Promises to "make polluters pay" poll well, but when homeowners see electricity rate hikes and motorists see prices climb at the gas pump they are not happy. In a recent instance, the 2018-2019 outburst of civil unrest in France, known at the *Gilets Jaunes* movement, began as a response to the French government's implementation of a fuel tax increase to reach emissions targets. Energy affordability is experienced as an essential component of prosperity—and rightfully so.

II. Carbon Tax Examples

A. Taxes in the Real World

i. Australia's Carbon Tax

The most informative carbon tax episode for U.S. observers transpired in Australia. Australia is a similarly vast and energy-rich country with a widely dispersed population that provides a better comparison to the U.S. than other OECD countries would. Australia's carbon tax saga began with the 2007 *Prime Ministerial Task Group on Emissions Trading*. After a flirtation with a cap-and-trade system, the Labor government passed a carbon tax through the Clean Energy Act of 2011.[43]

The tax went into effect on July 1, 2012, at 23 Australian dollars (AUD) per ton. One year later it was raised to 24.15AUD per ton. Facilities that emitted more than 25,000 metric tons of carbon dioxide equivalent annually were directly liable under the carbon tax, and monitored by the Clean Energy Regulator. Natural gas suppliers were also directly liable. According to a July 2014 report published by the government, 75,000 businesses were required to pay the tax in its first year and a half, with 370 directly liable, another 1,000 responsible for an equivalent greenhouse gas levy, and the remainder paying through fuel tax equivalency.[44]

As documented by Australian economist Alex Robson in January 2014 in the pages of *Economic Affairs*, the carbon tax was immediately harmful to the country's economy.[45] Robson's peer-reviewed

study, a precursor to which was commissioned by IER, found that in the first year under the carbon tax household electricity prices rose 15 percent, including the largest quarterly rate jump on record. By 2014, 19 percent of Australian household electricity costs were a product of the tax and accompanying mandates and regulations. Additionally, a number of business closures were directly linked to the carbon tax within its first year and, correspondingly, unemployment figures climbed sharply.

In July 2014, just two years after implementation and in an expression of the open-ended nature of the political process, the Australian parliament repealed the tax. Upon the announcement of the repeal, the Treasury estimated that it would save Australian households an average of 550AUD per year.[46] Despite the carbon tax repeal, Australia's energy economy remains straitjacketed by a dizzying array of mandates and regulations that regularly leave electricity customers in a state of vulnerability as rolling blackouts are utilized in the hottest, highest-demand months of the year.

ii. British Columbia's Carbon Tax

The Canadian province of British Columbia (BC) implemented a carbon tax in 2008. The tax was set at 10 Canadian dollars (CAD) per metric ton of emissions at its inception with a gradual rise until it reached a plateau of 30CAD in 2012. In April of 2018 it increased to 35CAD and will increase by an additional 5CAD each subsequent April until it hits 50CAD in 2021.[47] The BC experience gives us insight into both the risks of a carbon tax to an economy and the flimsiness of political compromise. BC's economy has made itself vulnerable to the inevitable relocation of economic activity away from unfriendly tax environments and the provincial government has reneged on its original commitment of revenue-neutrality.

In a recent study by Canada's Fraser Institute, *Assessing British Columbia's Tax Competitiveness*, authors Taylor Jackson and Ben Eisen write:

> Given the role of carbon-based energy (gasoline, diesel, natural gas, etc.) in the production processes of many firms, the higher carbon tax rate will impose greater costs on BC businesses. The negative impacts of these costs will amplify the competitiveness challenges BC is already facing with respect to other North American jurisdictions, many of which do not have carbon pricing. BC currently has no rules in place to offset any of the cost of the escalating carbon tax on emissions-intensive, trade-exposed industries. Thus, a comparable large emitter in BC and Alberta would face different costs even if the carbon tax rate was the same.[48]

While carbon taxes are discouraging to business and can lead to their relocation, an example of leakage and deadweight loss, carbon taxes also have more prosaic effects. One of the central aspects of carbon tax theory is that people will change their behavior when faced with higher prices. To the chagrin of tax advocates, BC motorists appear to have changed their behavior in an unexpected way. In the aftermath of the BC carbon tax's introduction, researchers Nicholas Rivers and Brandon Schaufele published a paper claiming an extraordinary drop in emissions from gasoline consumption of more than 3.1 million metric tons during its first four years.[49] What the researchers do not explore in earnest is the possibility that motorists in southern British Columbia were avoiding the carbon tax by crossing the Canada-U.S. border to buy gasoline in neighboring Washington State. The researchers acknowledge this possibility, remarking that "a portion of residents likely do regularly shop for

gasoline in the US." But they do not take their investigation much further, concluding that "the distance to the US and inconvenience associated with crossing an international border likely make cross-border shopping for gasoline a costly undertaking." However, according to Statistics Canada, a massive uptick in Canadian-plated cars crossing the border to and from BC ensued following the tax's introduction.[50] It is likely that due to a reliance on the proxy statistic of gasoline sales, rather than gasoline consumption itself, commentators have overstated BC's fuel-related emissions reductions.

Of great relevance to the U.S. carbon tax debate is the revenue-neutrality pledge with which BC's carbon tax earned support. Like some American proposals, BC lowered other taxes when it introduced its carbon tax. This is the oft-cited "textbook" approach to carbon taxes. Indeed, a pair of environmental economists referred to the BC approach in 2012 as "the best climate policy in the world."[51] But textbook theory rarely, if ever, withstands contact with the political process, and BC's carbon tax has failed to maintain revenue neutrality. Again, according to the Fraser Institute:

> When the BC government first introduced the carbon tax in 2008, it explicitly embraced the principle of revenue neutrality (Lammam and Jackson, 2017). Part of the then government's reason for insisting on revenue neutrality was to signal to British Columbian business and residents that the carbon tax would not be a net tax increase. Revenue neutrality was also intended to help mitigate some of the economic costs of the carbon tax...[but] the revenue neutrality commitment has now been abandoned and the BC government intends to use the revenues generated by the carbon tax for various other purposes.

The ongoing BC carbon tax experiment and the short-lived Australian foray provide useful examples to American politicians and analysts seeking evidence of carbon taxes' economic effects and political durability.

B. U.S. Carbon Tax Proposals

i. The Curbelo Carbon Tax

In July 2018, Rep. Carlos Curbelo (R-FL) filed the inaptly named Market Choice Act[52], with Reps. Brian Fitzpatrick (R-PA) and Francis Rooney (R-FL) as co-sponsors. The bill placed a fee of $24 on the production of fossil fuels for each ton of carbon dioxide equivalent released upon combustion, with the point of taxation being oil refineries, gas processing plants, and coalmines. The bill also targeted industrial facilities in more than a dozen sectors.

The Curbelo carbon tax rose by 2 percent annually, adjusted for inflation, until 2030. It also was subject to further adjustment upward if it failed to reach its emissions reductions goals. The proposal called for 70 percent of the tax revenue to go to the Highway Trust Fund, 10 percent to states in the form of grants for low-income households, and 5 percent to chronic coastal flooding mitigation and adaptation projects, with the remaining revenue going toward various R&D efforts and assistance to displaced energy workers.

According to Columbia University's Center on Global Energy Policy—which partnered with Rep. Curbelo for his bill's rollout event—the Curbelo tax would have resulted in measurable economic

harm to the United States over the course of the next ten years.[53] Columbia's analysis showed that by 2030 the tax would have increased average electricity prices by as much as 10 percent, increased gasoline prices by nearly 10 cents per gallon, and increased annual per capita energy expenditures by between $180 and $280, bringing down GDP by about two-tenths of a percent.

Furthermore, the Curbelo tax would have reduced U.S. emissions by only an additional 10 percent from the current downward trajectory. In the context of the economic blossoming taking place in Asia—and the concomitant emissions increases—a 10-percent difference in U.S. emissions would be of negligible significance to atmospheric greenhouse gas concentrations.

ii. The Deutch Carbon Tax

Curbelo's tax bill failed to gain traction and, after Curbelo was ousted from Congress by his constituents in the 2018 midterm elections, Rep. Ted Deutch (D-FL) took up the carbon tax mantle. Deutch introduced a bill in both the 2018 lame duck period and the 116th Congress in January of 2019. The Deutch proposal, officially the Energy Innovation and Carbon Dividend Act,[54] establishes a carbon tax of $15 per ton of carbon dioxide equivalent in 2019, set to increase by $10 every year thereafter. The tax is imposed on any covered entity's use, or sale or transfer for use, of any covered fuel. Covered fuels include crude oil, natural gas, coal, and derived products. Covered entities include, but are not limited to, refineries, petroleum importers, coal mining operations, coal importers, and companies entering pipeline quality natural gas into the transmission system. Reps. Francis Rooney (R-FL), Adam Schiff (D-CA), and Charlie Crist (D-FL), among others, have co-sponsored the bill.

The Deutch tax plan's $15 starting point masks the severity of its $10 annual increase. Under the Deutch plan, the Treasury is responsible for redistributing tax revenue via so-called dividend payments to American households. This revenue strategy was demonstrated in *The Carbon Tax: Analysis of Six Potential Scenarios* to be profoundly harmful to the American economy—perhaps more damaging than any of the other regularly-proposed strategies. Unsurprisingly, even carbon tax advocates have panned the Deutch plan. Noah Kaufman, of the aforementioned Center on Global Energy Policy, wrote of the proposal, "Using revenues for rebates under the Deutch plan would sacrifice opportunities for better macroeconomic outcomes or government services."[55]

iii. Washington State Referenda

Following the resounding 2016 defeat of Initiative 732's carbon tax[56]—a proposal designed by an environmental economist, yet pilloried by major environmental groups[57]—citizens of Washington voted again on a state-level carbon tax in November of 2018. While the 2016 proposal involved tax reductions elsewhere, the 2018 proposal, known as Initiative 1631,[58] allocated tax revenue to new spending. 1631 imposed a carbon tax of $15 per metric ton of carbon dioxide emitted. The tax was set to increase by $2 per year, to over $40 per metric ton by 2030, assuming 3-percent annual inflation.

Under the 1631 tax plan, a 15-person, largely-unelected board determined how to spend the $1 billion annual revenue expected by 2023. The board's mandate was to "reduce pollution, promote clean energy, and address climate impacts." In an interesting wrinkle, had the board failed to meet its emissions reduction targets, the carbon tax would have escalated and the board would have been

granted more power. According to the Washington Policy Center, the tax would have cost households between $234 and $305 in the first year, and as much as $877 annually after ten years.[59] Initiative 1631 was voted down, 56 percent to 44 percent.

III. Conclusion

- **Carbon taxes are set arbitrarily.**

Carbon taxes are reliant upon the social cost of carbon, an amorphous concept, which on the basis of an analyst's normative framework can vary enormously. It is inappropriate for use in policymaking.

- **The climate change mitigation goals of the world's leading political bodies are at odds with the climate economics literature.**

Limiting global warming to 1.5°C above pre-industrial levels, as advised by the IPCC, presupposes mitigation strategies that would impose grave harm in the near term. The recommended course would be likely to cause more economic damage than global warming itself, according to mainstream work in climate economics.

- **Carbon taxes are regressive and harm the economy.**

As suggested by studies such as *The Carbon Tax: Analysis of Six Potential Scenarios* and borne out by the trial in Australia, carbon taxes come at a significant cost to consumers and the economy as a whole. Using revenue for infrastructure spending, deficit reduction, and particularly so-called rebates, hurts overall economic performance. Carbon tax advocates are left with a choice: harm GDP growth or directly induce suffering for low-income households.

- **Carbon taxes have unexpected, adverse tax effects.**

A federal carbon tax would stress state governments by increasing their costs and reducing their tax revenue. Furthermore, carbon taxes can be more distortionary than other taxes, such as on income, undermining the claims of tax advocates that a tax swap would increase efficiency.

- **A U.S. carbon tax would be irrelevant.**

The United States is no longer the world's workshop. Implementing a carbon tax on Americans will have little to no impact on global temperatures. Populous countries like China, India, and Bangladesh rightfully continue to grow their industrial capacities—and, as a result, their emissions—while the U.S. emissions have fallen steeply due in large part to the shale gas revolution. Only an integrated global emissions reduction system would be meaningful.

- **A U.S. carbon tax that would replace existing regulations and/or taxes is not politically viable.**

As illustrated by the fervor with which environmentalists and several declared 2020 presidential candidates have embraced the command-and-control vision of the so-called Green New Deal, a carbon tax that replaces regulations would fail to satisfy the environmental activist class. The promised revenue-neutral tax-for-regulation swap is out-of-touch and unrealistic. In British Columbia, where revenue-neutrality was one of the carbon tax's selling points, the commitment has been rescinded. The only carbon tax with political viability would be one placed atop onerous regulatory and tax regimes.

Final Remarks

A carbon tax is unjustified and it is unwise. Carbon taxes have demonstrated themselves to be both costly and incapable of constraining governments from implementing and maintaining other burdensome regulations and taxes. The U.S. is better off without one. Rather than stifling economic exchange with a government-imposed artificial price, the best path forward in the face of global warming and other perceived threats is to facilitate opportunity, technological progress, and wealth maximization by freeing markets of energy mandates, caps, and taxes.

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