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Shi-Ling Hsu

Florida State University College of Law

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A Complete Analysis of Carbon Taxation: Considering the Revenue Side

SHI-LING HSU†

ABSTRACT

Climate policy in the United States always seems to face strong political headwinds. It is not so much that voters dismiss the threat of climate change, or that they believe climate change is a “hoax,” but coming up with a fair and effective policy has always seemed so daunting. This Article argues that the simplest answer is not, contrary to initial appearances, daunting at all. The most effective and most efficient climate policy at the federal, state, and local level is a carbon tax.

Carbon taxation has always seemed politically implausible, due in large part to an inherent public aversion to taxes, but also due to a campaign of misinformation, paralleling the campaign against climate change itself. An important way of countering this bias and this campaign is to emphasize the revenue side of carbon taxation. Without a robust discussion of the uses of carbon tax revenues, the only salient part of a carbon tax to voters is the all-too-apparent cost. There is no sense of the benefits of revenues.

This Article fills this gap by presenting a menu of revenue options, along with a discussion of the macroeconomic and the distributional consequences of the different options. This analysis is an input into a political process, which must ultimately decide on the objective, but only with the guidance of some quantitative analysis. This Article closes with an argument for a “lump sum distribution” approach, in which carbon tax proceeds are returned directly back to carbon taxpayers on a largely per-capita basis.

† D’Alemberte Professor and Associate Dean for Environmental Programs, Florida State University College of Law. The author would like to thank James Handley and Gary Lucas, Jr. for their comments and help, the participants at a workshop at the University of Florida Levin College of Law at the 2016 J.B. & Maurice C. Shapiro Environmental Law Symposium and at the 2016 Vermont Law School Colloquium on Environmental Scholarship, and the always-helpful library staff at the Florida State University College of Law. The author is a member of the Advisory Board of Citizens’ Climate Lobby.

This approach largely insulates the poorest two-thirds from increases in energy and other goods and may not be economically inferior to other options as economists have historically assumed.

INTRODUCTION

Few predicted that among the many controversies Donald Trump would court as President of the United States, climate change would figure very prominently. But hope that President Trump might be less dogmatic than Candidate Trump has faded, as climate skeptics—those that doubt the need to address climate change¹—have loaded their allies and staffers into key positions.² Former Oklahoma Attorney General Scott Pruitt, who made his name suing the U.S. Environmental Protection Agency over its climate regulations,³ is now the EPA Administrator. Most of all, the President announced in June⁴ that he would

1. Labels for people that disagree with the need to address climate change necessarily touch on sensitivities, but one label that seems to have stuck is “skeptic.” One climate scientist that has engaged with opponents of climate policy is former Georgia Tech professor Judith Curry, who uses the term “skeptic.” See Michael D. Lemonick, *Climate Heretic: Judith Curry Turns on Her Colleagues*, NATURE (Nov. 1, 2010), <http://www.nature.com/news/2010/101101/full/news.2010.577.html>. This label is used more freely than the more derogatory “climate denier,” which suggests that the individual denies the very validity of climate science.

2. Oklahoma Senator James Inhofe and Myron Ebell, who is Director of the Center for Energy and Environment at the Competitive Enterprise Institute, have been long-time climate skeptics, and have long vigorously fought regulations and laws to address climate change. They have been a major source of personnel for the Trump Administration. See, e.g., Robin Bravender, *Ebell’s Goal: Reforms ‘President Warren’ Can’t Reverse*, GREENWIRE (Feb. 6, 2017), <http://www.eenews.net/greenwire/stories/1060049598>; Robin Bravender, *Enter the Inhofe Infantry*, GREENWIRE (Feb. 10, 2017), <http://www.eenews.net/greenwire/stories/1060049898/>.

3. See, e.g., Coral Davenport, *Scott Pruitt, Testifying to Lead E.P.A., Criticizes Environmental Rules*, N.Y. TIMES (Jan. 18, 2017), https://www.nytimes.com/2017/01/18/us/politics/scott-pruitt-testifying-to-lead-epa-criticizes-environmental-rules.html?_r=0.

4. Michael D. Shear, *Trump Will Withdraw U.S. From Paris Climate Agreement*, N.Y. TIMES, June 2, 2017, at A1.

withdraw the United States from the Paris Agreement,⁵ the international accord to reduce greenhouse gases, and the first to involve global binding emissions targets.⁶ This sharp turn in federal policy, along with increasingly grim news of rising temperatures,⁷ collapsing ice shelves,⁸ and massive flooding on the heels of punishing drought,⁹ have created a new sense of urgency. Broad, existential worrying will make it difficult for the Trump Administration to bury climate change as a topic of discussion and dissent.

Some of this urgency and worry has spouted forth as a call for a carbon tax.¹⁰ What else is there, now that the Obama Administration's Clean Power Plan—its initiative to curb carbon dioxide emissions from the electricity sector¹¹—is in the hands of Scott Pruitt? But upon reflection, there is more than just desperation in this recent push for a carbon tax. For one thing, there is the possibility that states may act in the absence of meaningful federal policy. There is

5. Framework Convention on Climate Change, *Adoption of the Paris Agreement*, U.N. Doc. FCCC/CP/2015/L.9/Rev.1 (Dec. 12, 2015), <https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>.

6. European Commission, *Climate Action, Paris Agreement* (June 14, 2017) https://ec.europa.eu/clima/policies/international/negotiations/paris_en.

7. Jugal K. Patel, *How 2016 Became Earth's Hottest Year on Record*, N.Y. TIMES (Jan. 18, 2017), <https://www.nytimes.com/interactive/2017/01/18/science/earth/2016-hottest-year-on-record.html>.

8. Jugal K. Patel, *A Crack in an Antarctic Ice Shelf Grew 17 Miles in the Last Two Months*, N.Y. TIMES (Feb. 7, 2017), <https://www.nytimes.com/interactive/2017/02/07/science/earth/antarctic-crack.html?emc=eta1>.

9. Joseph Serna, *'Atmospheric River' Slams California Again as State Decides Whether to Keep Drought Restrictions*, L.A. TIMES (Feb. 7, 2017, 6:10 PM), <http://www.latimes.com/local/lanow/la-me-ln-rain-storm-wind-20170207-story.html>.

10. See Martin S. Feldstein et. al., *A Conservative Case for Climate Action*, N.Y. TIMES, Feb. 8, 2017, at A25; see generally Jerry Taylor, *A Conservative Carbon Tax*, MILKEN INST. REV. (Jan. 19, 2017), <http://www.milkenreview.org/articles/a-conservative-carbon-tax?IssueID=18>.

11. Carbon Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

also a sense that with the Republican Party in full control of the federal government, it will *own* federal policy.¹² One of the cheapest and politically advantageous things an embattled Trump Administration or GOP Congress could do to distract from turmoil and unrest would be to make a positive push on climate policy and enact a federal carbon tax.

Certainly, a carbon tax is the climate option most consistent with libertarian values, emphasizing as it does minimization of government intervention and the use of markets to promote technologies, as opposed to regulation under the Clean Air Act and governments “picking winners and losers.”¹³ Credible leaders in business and government keep bringing it up. In his controversial advisory relationship with the President, Tesla founder Elon Musk was reported to have floated the idea of a carbon tax.¹⁴ Five prominent Republicans, including former Secretaries of State George Schultz and James Baker, stepped forward in February to propose a revenue-neutral carbon tax to White

12. See Terence Burlij, *Boehner: Obamacare Repeal and Replace ‘Not What’s Going to Happen,’* CNN (Feb. 24, 2017, 10:19 AM), <http://www.cnn.com/2017/02/23/politics/john-boehner-obamacare/> (quoting John Boehner: “All this happy talk that went on in November and December . . . about repeal . . . if you pass repeal without replace, first, anything that happens is your fault. You broke it.”).

13. See Jerry Taylor, *Debating Carbon Taxes with Oren Cass (and Bill Gates)*, NISKANEN CTR. (Apr. 19, 2017), <https://niskanencenter.org/blog/debating-carbon-taxes-oren-cass-bill-gates/> (“Why tax rather than regulate greenhouse gas emissions? The most straightforward reason is that leaving it to market actors to decide where, when, and how to reduce emissions will likely prove faster and more efficient than leaving those decisions to government regulators . . . Market actors are far more likely to find the right answers to those questions through experimentation, tested by profit and loss, than are politicians and/or regulators informed by energy technocrats.”).

14. Kevin Cirilli, *Elon Musk Floated the Idea of a Carbon Tax to Trump, an Official Says*, BLOOMBERG (Jan. 26, 2017, 11:52 AM), <https://www.bloomberg.com/politics/articles/2017-01-26/tesla-s-musk-said-to-float-idea-of-a-carbon-tax-to-trump-ceos>.

House officials.¹⁵ Even Secretary of State Rex Tillerson, in his former job as ExxonMobil CEO, expressed a preference for a carbon tax over alternatives, although that seemed more aimed at defeating the American Clean Energy and Security Act of 2009,¹⁶ a cap-and-trade bill to regulate greenhouse gas emissions.¹⁷

An extremely broad consensus exists among economists¹⁸ and climate experts¹⁹ that a carbon tax is the most economically efficient, most administratively simple, and most effective way to reduce emissions of carbon dioxide and other greenhouse gases. Implementing details are important, but the core mechanism of a carbon tax—the unitary levy of a fee scaling with carbon dioxide emissions²⁰—is the basic approach that most likely

15. The five Republicans were James Baker, former Secretary of the Treasury and White House Chief of Staff to President Reagan; George P. Schultz, former Secretary of State to President Reagan; Henry Paulson, former Secretary of the Treasury to President George W. Bush; Martin Feldstein, former Chief Economic Advisor to President Reagan; and Gregory Mankiw, former Chief Economic Advisor to President George W. Bush. See John Schwartz, 'A Conservative Climate Solution': Republican Group Calls for a Carbon Tax, N.Y. TIMES, Feb. 7, 2017, at A13.

16. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (2009).

17. See John Schwartz, Tillerson Led Exxon's Shift on Climate Change; Some Say 'It Was All P.R.', N.Y. TIMES, Dec. 28, 2016, at A16.

18. See *Carbon Taxes II*, IGM CHICAGO (Dec. 4, 2012, 1:08 PM), <http://www.igmchicago.org/surveys/carbon-taxes-ii> (showing eighty seven percent of economic experts, ninety-eight percent when weighted by confidence, agreeing or strongly agreeing that a carbon tax of \$20 would be more beneficial than economically harmful); see also *Carbon Tax*, IGM CHICAGO (Dec. 20, 2011, 1:48 PM), <http://www.igmchicago.org/surveys/carbon-tax> (showing ninety percent of economic experts, ninety-five percent when weighted by confidence, agreeing or strongly agreeing that a carbon tax would reduce emissions more efficiently than a collection of other climate policies).

19. See PETER HOWARD & DEREK SYLVAN, INST. FOR POL'Y INTEGRITY, EXPERT CONSENSUS ON THE ECONOMICS OF CLIMATE CHANGE 16 (2015), <http://policyintegrity.org/files/publications/ExpertConsensusReport.pdf>.

20. SHI-LING HSU, THE CASE FOR A CARBON TAX: GETTING PAST OUR HANG-UPS TO EFFECTIVE CLIMATE POLICY 15 (2011).

produces the most emissions reductions at the lowest cost and administrative burden.²¹ This consensus is bipartisan.²²

Perhaps *because* a carbon tax is such an effective and efficient option, climate skeptics have waged a particularly ferocious campaign to stamp out any attempts to enact one.²³ Economic-sounding pseudo-analyses from faux think tanks purport to explain the costs of a carbon tax without acknowledging any revenue collection at all, essentially assuming that all carbon tax revenues would be gathered together as a pile of cash and burned.²⁴ A tax of \$30 per ton

21. A somewhat close second to carbon taxation is “cap-and-trade,” the implementation of a program to issue emissions allowances and permit holders to trade amongst themselves for the right to emit. *See, e.g.*, Lawrence H. Goulder & Andrew Schein, *Carbon Taxes vs. Cap and Trade: A Critical Review* 36 (Nat’l Bureau of Econ. Research, Working Paper No. 19,338, 2013), <http://www.nber.org/papers/w19338>; *The EU Emissions Trading System (EU ETS)*, EUR. COMMISSION, http://ec.europa.eu/clima/policies/ets_en (last visited June 10, 2017).

22. HSU, *supra* note 20, at 185.

23. *See* Gary M. Lucas, Jr., *Voter Psychology and the Carbon Tax* 28 (Tex. A&M Univ. Sch. of Law, Research Paper No. 17-18, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2915339; *see also* sources cited *infra* note 24.

24. *See, e.g.*, IERDC, *Do We Need a Carbon Tax?*, YOUTUBE (Jul. 16, 2013), <https://www.youtube.com/watch?v=vkxPs9MOVzo> (arguing that a carbon tax would hurt families, but making no mention of what would happen to carbon tax revenues); *Carbon Tax*, INST. FOR ENERGY RES., <http://instituteforenergyresearch.org/topics/policy/carbon-tax/> (last visited June 10, 2017) (“The promise of ‘revenue neutrality’ is quite hollow, given U.S. history. The federal income tax rate was instituted with a top tax rate of 7 percent in 1913, which was jacked up to 77 percent by 1918. Currently, there are numerous academic and political proposals that want to use carbon tax revenues to fund new programs and ‘reduce the deficit,’ *leaving less available for tax relief and meaning the carbon tax would be a net tax increase on Americans.*”); David W. Kreutzer & Nicholas D. Loris, *Carbon Tax Would Raise Unemployment, Not Swap Revenue*, HERITAGE FOUND. (Jan. 14, 2013), <http://www.heritage.org/environment/report/carbon-tax-would-raise-unemployment-not-swap-revenue> (“Two suggestions to garner more bipartisan support for a carbon tax have been to ensure that the tax is revenue neutral by reducing other taxes or to replace the EPA’s regulations of greenhouse gas emissions with the CO2 tax. Both proposals are political impossibilities. Just

on the roughly 5.5 gigatons of carbon dioxide emitted in the U.S. each year²⁵ would produce revenues of at least \$150 billion in the first year.²⁶ Assuming away such large revenues is to highlight just the cost while blacking out the benefits, akin to complaining about spending money on roads and bridges without acknowledging the benefits of a transportation system. Needless to say, these pseudo-analyses also assume the social cost of carbon to be zero.²⁷ In other words, they assume that there is absolutely no environmental or social benefit to reducing greenhouse gas emissions or the other pollutants that accompany fossil fuel combustion.²⁸

the sniff of a new revenue stream to the tune of hundreds of billions of dollars annually has the special interests in Washington running to Congress for more handouts. Before carbon tax legislation has even been introduced, ideas on how to use the revenue already include income transfers, paying for defense spending cuts, reducing the deficit, transferring money to developing countries to adapt to climate change and the list goes on. History shows that any time more money comes into the coffers of the federal government, there is a political interest to spend it one way or another.”).

25. *Figure 1. U.S. Greenhouse Gas Emissions by Gas, 1990–2014*, ENVTL. PROTECTION AGENCY (Aug. 1, 2016), https://www.epa.gov/sites/production/files/2016-08/us-ghg-emissions_fig-1.csv.

26. A carbon tax might not capture every single source of carbon dioxide emissions, although other estimates suggest that revenues could be higher. See Feldstein et al., *supra* note 10.

27. The U.S. Government, through an interagency working group convened by the Council of Economic Advisers and the Office of Management and Budget, has the estimated current “social cost of carbon”—the marginal cost to society—at \$42 per ton of carbon dioxide. This assumes a discount rate of three percent. INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12,866 (2010), <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf> [<https://perma.cc/QC5W-JW3V>]. The interagency working group acknowledges that this is likely an underestimate, due to the difficulty of estimating the damages of, for example, catastrophic changes in climate. *Id.*

28. See, e.g., Kreutzer & Loris, *supra* note 24, at 1–2 (“Unilaterally reducing greenhouse gases would not make a dent on global emissions and, consequently, would do next to nothing to reduce global temperatures. Even if the U.S. were to curb carbon emissions 83 percent below 2005 levels by 2050 (what cap-and-trade bills required), it would reduce global temperatures by only a few tenths

A complete analysis of a carbon tax requires not only acknowledgement of the environmental and social benefits of reducing greenhouse gas emissions, but some treatment of the revenue side. This is a critical part of the analysis, since carbon tax revenues can be used to reduce other taxes. In fact, carbon taxes are likely less distortionary than many other taxes, so that a carbon tax “swap” could be economically efficient, *even without counting the climate benefits*.²⁹ Reviewing and analyzing different options for carbon tax revenues is not only important for providing the whole picture of carbon taxation, but for highlighting the important political and economic tradeoffs implicit in revenue decisions. Disposing of \$150 billion is fiscal policy and is deeply political.

Along those lines, economic and policy analysis is absolutely critical to making informed political judgments. Sound analysis must do battle with the faux economics that

of a degree.”); ROBERT P. MURPHY, INST. FOR ENERGY RESEARCH, CARBON ‘TAX SWAP’ DEALS: A REVIEW AND CRITIQUE 1 (2012), <http://instituteforenergyresearch.org/wp-content/uploads/2012/11/IER-Murphy-Carbon-Tax-Swap-Deals-A-Review-and-Critique.pdf> (“The ‘social cost of carbon’ is not the proper benchmark to use when calibrating a carbon tax implemented unilaterally by the U.S. government because of the problem of ‘leakage.’ That term denotes the probability that carbon-emitting activities in a regulated jurisdiction will be relocated to another, less-regulated jurisdiction. It is incorrect to count a ton of reduced U.S. emissions as providing benefits equal to the ‘social cost of carbon,’ if the policy that causes this reduction in U.S. emissions goes hand-in-hand with *increased* emissions elsewhere.”).

29. See Sebastian Rausch & John Reilly, MIT Joint Program on Sci. & Pol’y Global Change, *Carbon Tax Revenue and the Budget Deficit: A Win-win-win Solution?* 2 (2012), <http://dspace.mit.edu/handle/1721.1/72548#files-area>; Warwick McKibbin et al., *The Potential Role of a Carbon Tax in U.S. Fiscal Reform*, Brookings Inst. (July 24, 2012), <https://www.brookings.edu/research/the-potential-role-of-a-carbon-tax-in-u-s-fiscal-reform/>; Ian W.H. Parry & Antonio Miguel Bento, *Tax Deductions, Environmental Policy, and the “Double Dividend” Hypothesis*, 39 J. Envtl. Econ. & Mgmt. 67, 69–70 (1999); Ian W.H. Parry et al., *When Can Carbon Abatement Policies Increase Welfare? The Fundamental Role of Distorted Factor Markets*, 37 J. Envtl. Econ. & Mgmt. 51, 68–69 (1999).

have crept into climate policy.³⁰ It is true that the likelihood of a political debate over fiscal carbon policy being sidetracked by ideologues and distortions is somewhere north of ninety-nine percent. However, the alternative is to throw up one's hands and make these decisions blindly, solely on ideological grounds, never knowing if policy does what its proponents think it will do. As James Madison wrote, "popular Government without popular information . . . is but a Prologue to a Farce or a Tragedy."³¹

This Article is also important to support potential state and local initiatives to levy a carbon tax. Certainly, there are a number of deeply blue states that may take matters into their own hands, as California did with its state global warming law, The Global Warming Solutions Act of 2006.³² In Washington State, a tiny, hand-to-mouth grassroots organization called CarbonWA shocked the environmental world by getting its proposed state carbon tax onto the 2016 ballot, along the way gathering 360,000 signatures, fully five percent of the state population.³³ If the federal government remains feckless on climate policy, it is entirely possible that a state with less toxic politics could find its way to seeing the merits of carbon taxation, not the least of which could be to address budget woes.

30. See sources cited *supra* note 24.

31. Letter from James Madison to W.T. Barry (Aug. 4, 1822) reprinted in THE FOUNDERS' CONSTITUTION (Philip B. Kurland & Ralph Lerner eds., 1987), <http://press-pubs.uchicago.edu/founders/documents/v1ch18s35.html>.

32. CAL. HEALTH & SAFETY CODE §§ 38500-99 (West 2014).

33. See Chelsea Harvey, *It Could be the Nation's First Carbon Tax. And Environmentalists are Fighting Over It*, WASH. POST (Oct. 17, 2016), https://www.washingtonpost.com/news/energy-environment/wp/2016/10/17/it-could-be-the-nations-first-carbon-tax-and-environmentalists-are-fighting-over-it/?utm_term=.e5e7a3f2a906; Shi-Ling Hsu, *Environmentalists' Disdain for Washington's Carbon Tax*, SLATE (Oct. 20, 2016, 11:03 AM), http://www.slate.com/articles/health_and_science/science/2016/10/environmentalists_are_against_i_732_washington_s_carbon_tax.html.

I. CARBON TAXATION, IN CONTEXT

Carbon taxation is not a radical new idea. The origins of pollution taxation date back to the early twentieth-century writings of economist Arthur Pigou.³⁴ A “Pigouvian tax” is a unitary tax levied on emitters to force them to account for the damages caused by their emissions, which are often invisible, or “external” to the emitter.³⁵ While actual damages from climate change are probably nonlinear,³⁶ a carbon tax that at least scales linearly with carbon dioxide emissions differentiates between different fossil fuels and activities by their contributions to climate change.³⁷ Following the lead of Pigou, many jurisdictions in the world have adopted carbon taxes, covering a variety of groups of emitters. These programs make a variety of uses of carbon tax revenues, in a variety of different political contexts. These examples, reviewed below, offer guidance about revenue choices for U.S. carbon taxes at the federal, state, or local level.

A. *Where in the World Is Carbon Taxed?*

At the time this Article was being written, some form of a carbon tax existed in fifteen countries.³⁸ Norway, Sweden,

34. See A.C. PIGOU, *THE ECONOMICS OF WELFARE* 131–35 (1928). Taxes that reflected the extent of negative externality thus became known as “Pigouvian” taxes. See WILLIAM J. BAUMOL & WALLACE E. OATES, *THE THEORY OF ENVIRONMENTAL POLICY* 21–23 (Cambridge Univ. Press 1988).

35. See TOM TIETENBERG & LYNNE LEWIS, *ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS* 357 (2014).

36. See Martin L. Weitzman, *What is the “Damages Function” for Global Warming, and What Difference Might it Make?* 1 *CLIMATE CHANGE ECON.* 57, 57 (2010).

37. HSU, *supra* note 20, at 27 (“[A]t least with respect to fossil fuels, measuring the amount of carbon dioxide emitted is trivial, as the carbon content of almost any fossil fuel is known when it is extracted.”).

38. *Putting a Price on Carbon with a Tax*, WORLD BANK (Apr. 7, 2016), <http://www.worldbank.org/content/dam/Worldbank/document/SDN/background->

Denmark and Finland all enacted national carbon taxes from 1990 to 1992, the first countries to do so. The Scandinavian countries are the most aggressive in terms of climate policy, but the implementation of their carbon taxes have been complicated by their membership in the European Union or the European Economic Area, whose rules prohibit pricing or taxing retail electricity in ways that discriminate against providers from other member states.³⁹ Finland's carbon tax, therefore, exempts fuels used for electricity generation,⁴⁰ and instead taxes electricity consumption, missing an opportunity to disincentivize the use of fossil fuels to generate electricity.⁴¹ For the same reason, Sweden's carbon tax—the world's highest at about \$120 USD per ton of carbon dioxide⁴²—also exempts fossil fuels for electricity, although most of Sweden's electricity is generated by nuclear or hydroelectric power.⁴³

note_carbon-tax.pdf [<http://perma.cc/G7MK-A7YM>].

39. Philipp Genschel & Markus Jachtenfuchs, *How the European Union Constrains the State: Multilevel Governance of Taxation*, 50 EUR. J. POL. RES. 293, 302 (2011).

40. See, e.g., Act on Excise Duty on Electricity and Certain Fuels 1996 (Act No. 1260/1996) (Fin.), <http://www.finlex.fi/fi/laki/alkup/1996/19961260>; ORG. FOR ECON. CO-OPERATION & DEV., INVENTORY OF ESTIMATED BUDGETARY SUPPORT & TAX EXPENDITURES FOR FOSSIL FUELS 153–64 (2013), http://www.oecd-ilibrary.org/environment/inventory-of-estimated-budgetary-support-and-tax-expenditures-for-fossil-fuels-2013_9789264187610-en; STEFAN SPECK ET AL., NATL. ENVTL. INST. OF DEN., THE USE OF ECONOMIC INSTRUMENTS IN NORDIC AND BALTIC ENVIRONMENTAL POLICY 2001–2005 at 99–113 (2006), <http://www.norden.org/da/publikationer/publikationer/2006-525/>.

41. Sarianne Tikkanen, *Remarks on Signs of Environmental Tax Reform in Finland*, in CRITICAL ISSUES IN ENVIRONMENTAL TAXATION: INTERNATIONAL AND COMPARATIVE PERSPECTIVES 330 (Hope Ashiabor et al. eds., 2006).

42. As of March 12, 2015, the Swedish Krona traded for 0.116 U.S. Dollars. *Historic Lookup*, X-RATES, <http://www.x-rates.com/historical/?from=USD&amount=1&date=2015-03-12> (last visited June 24, 2017). A carbon tax of 110 kr per kilogram of carbon dioxide translates into a carbon tax of \$116 US per ton of carbon dioxide. See *Objectives and Instruments*, SVENSK ENERGI, <http://www.svenskenergi.se/Elfakta/Miljo-och-klimat/Mal-och-styrmedel/> (last updated Apr. 14, 2016).

43. See LAG (1994 :1776) OM SKATT PÅ ENERGI (Svensk författningssamling

European nations face other complications. Almost all European countries are covered by the European Union Emission Trading System (EUETS), which requires certain industrial emitters of greenhouse gases to hold tradeable permits for their emissions.⁴⁴ Those countries taxing carbon—Denmark, Sweden, Finland, France, Iceland, Ireland, Norway, and Switzerland—thus generally exempt industries covered by the EUETS in order to avoid essentially double-taxing the same emissions.⁴⁵

A second wave of carbon tax laws began in 2008, with Switzerland⁴⁶ and the Canadian province of British Columbia⁴⁷ enacting carbon taxes in 2008, Ireland⁴⁸ and Iceland⁴⁹ in 2010, Mexico⁵⁰ and Japan⁵¹ in 2012, and

[SFS] 2017:410 (Swed.), http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Lag-19941776-om-skatt-pa-en_sfs-1994-1776/. See also INT'L ENERGY AGENCY, ENERGY POLICIES OF IEA COUNTRIES: SWEDEN 2013 REVIEW 3 (2013), http://www.iea.org/textbase/nppdf/free/2013/sweden2013_excerpt.pdf.

44. See, e.g., Barry Anderson & Corrado Di Maria, *Abatement and Allocation in the Pilot Phase of the EU ETS*, 48 ENVTL. & RESOURCE ECON. 83, 83–84 (2011); EUR. COMMISSION, *supra* note 21.

45. WORLD BANK, *supra* note 38. Switzerland is an exception, but it has its own trading system.

46. Bundesgesetz über die Reduktion der CO₂-Emissionen [CO₂-Gesetz], [Federal Law on the Reduction of CO₂ Emissions] Oct. 8, 1999, SR 641.71, arts. 1, 5 (Switz.), <http://www.admin.ch/opc/en/classified-compilation/20091310/index.html>.

47. Carbon Tax Act, S.B.C. 2008, c 40 (Can.).

48. Finance Act 2010 (Act No. 5/2010) (Ir.), <http://www.irishstatutebook.ie/pdf/2010/en.act.2010.0005.pdf>.

49. Lög um umhverfis- og auðlindaskatta [Environmental and Natural Resources Tax Act] (2016) (Ice.), <http://www.althingi.is/altext/stjt/2009.129.html>.

50. Ley Federal de Derechos [LFD], Diario Oficial de la Federación [DOF] 11-12-2013 (Mex.).

51. See *Details on the Carbon Tax (Tax for Climate Change Mitigation)*, MINISTRY ENV'T GOV'T OF JAPAN, https://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf (last visited June 11, 2017).

France⁵² and Chile⁵³ in 2014. The taxes are modest, ranging from about \$2 USD per ton of carbon dioxide to \$30 USD.⁵⁴ Almost all contain exclusions, exemptions, and other provisions that distort economic decisions and make it difficult to estimate their impacts on greenhouse gas emissions. Costa Rica charges a tax of 3.5 percent of the market value of fossil fuels,⁵⁵ an *ad valorem* tax that fails to distinguish among the divergent carbon content of coal, natural gas, and petroleum. Chile's carbon tax is limited to thermal power plants.⁵⁶ Mexico taxes fossil fuels, but limits the tax to three percent of the sales price of the fuel, making it essentially an *ad valorem* tax.⁵⁷ All of these idiosyncratic ways of taxing carbon make it difficult to estimate the effects of these policies, or even the effective carbon price.

Carbon taxes exist at the subnational level. The Canadian province of British Columbia has a simple, transparent carbon tax, with few of the distortions common in other programs. The tax ramped up from \$10 CAD per ton of carbon dioxide-equivalent emissions in 2008 up to the

52. Loi 2013-1279 du 29 décembre 2013 de finances rectificative pour 2013 [Law 2013-1279 of December 29, 2013 to Amend the Budget for 2013], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], Dec. 30, 2013, https://www.legifrance.gouv.fr/jo_pdf.do?numJO=0&dateJO=20131230&numTexte=2&pageDebut=21910&pageFin=22188.

53. Law No. 20780 art. 8, Septiembre 29, 2014, DIARIO OFICIAL [D.O.] (Chile). See Kate Galbraith, *Climate Change Concerns Push Chile to Forefront of Carbon Tax Movement*, N.Y. TIMES (Oct. 29, 2014), https://www.nytimes.com/2014/10/30/business/international/climate-change-concerns-push-chile-to-forefront-of-carbon-tax-movement.html?_r=0.

54. See sources cited *supra* notes 46-53.

55. PETER J. MEYER, CONG. RESEARCH SERV., R40593, COSTA RICA: BACKGROUND AND U.S. RELATIONS 5 (2009).

56. See sources cited *supra* note 46-53.

57. Ley Federal de Derechos [LFD], Diario Oficial de la Federación [DOF] 11-12-2013 (Mex.).

current fixed rate of \$30 CAD per ton.⁵⁸ The carbon tax applies to twenty classes of fossil fuels and other specified combustibles,⁵⁹ but excludes fuels exported from British Columbia and fuels used for inter-jurisdictional travel.⁶⁰

B. *What in the World Happens to Carbon Tax Revenues?*

Globally, all carbon tax programs combined take in about \$13 billion USD annually.⁶¹ Some taxes are very low—Japan’s carbon tax is less than \$3 USD per ton of carbon dioxide⁶²—and the collected revenues amount to about \$4 per capita.⁶³ Sweden’s carbon tax is not only the highest in terms of tax level, but also the largest in terms of revenue: \$3.7 billion USD in 2013, which is about \$381 per capita or about 0.67% of Gross Domestic Product (GDP).⁶⁴ Were the United States to adopt even a small federal carbon tax—on the order of \$10 per ton—it would instantly become the largest in terms of revenues, and much larger than all other carbon taxes in the world combined.

Very broadly and generally, carbon tax revenues can be put to one of three uses: (1) spending on environmental, or climate-related projects; (2) returning money to taxpayers,

58. Carbon Tax Act, S.B.C. 2008, c 40 (Can.) (Schedule 1).

59. *Id.* (Schedule 2).

60. *Id.* § 10.

61. Jeremy Carl & David Fedor, *Tracking Global Carbon Revenues: A Survey of Carbon Taxes Versus Cap-and-Trade in the Real World*, 96 ENERGY POLY 50, 53 (2016) (The figure shown in Table 2 is \$21.7 billion, but that includes \$8.8 billion from an Australian pricing program that was canceled after a change in federal government).

62. See *Details on the Carbon Tax (Tax for Climate Change Mitigation)*, MINISTRY ENV'T GOV'T OF JAPAN, https://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf (last visited June 11, 2017). As of February 8, 2017, 289 Japanese yen per ton of CARBON DIOXIDE is approximately \$2.53 (US). See *Historic Lookup*, X-RATES, <http://www.x-rates.com/historical/?from=JPY&amount=289&date=2017-02-08> (last visited June 24, 2017).

63. Carl & Fedor, *supra* note 61.

64. *Id.*

or “revenue recycling”; or (3) for general revenue purposes.⁶⁵ In purely economic terms, there is no reason *not* to treat carbon tax revenues like any other source of government revenue,⁶⁶ but the political reality seems to be that in order to enact a carbon tax, it must be accompanied by some other policy that satisfies a political objective.⁶⁷ Carbon tax revenues provide a vehicle for satisfying those objectives. Climate skeptics who pretend that carbon tax revenue would be burned in a bonfire⁶⁸ are intentionally concealing the necessary flipside of taxation: revenues.

Only five of the fifteen carbon taxing jurisdictions spend revenues on environmental or climate-related uses.⁶⁹ Two—Japan and France—have very small carbon taxes and spend one hundred percent of revenues on alternative energy and conservation measures,⁷⁰ viewing their carbon taxes solely as financing mechanisms. Economists generally frown upon such a pairing, deriding it as a “belt and suspenders” approach, preferring the elegance of a simple tax, set at an appropriately high level, rather dealing with two moving parts at once.⁷¹ But pairing a carbon tax with “green” spending has political attractions, as voters contemplating taxes may like to believe that the additional

65. *Id.* at 51.

66. For arguments for deficit reduction, see, e.g., William G. Gale et al., *Carbon Taxes as Part of the Fiscal Solution*, BROOKINGS INST. (Mar. 12, 2013), <https://www.brookings.edu/research/carbon-taxes-as-part-of-the-fiscal-solution/>; Jerry Taylor, *Should Carbon Tax Revenue Be Used to Retire Debt?*, NISKANEN CTR. (Apr. 28, 2015), <https://niskanencenter.org/blog/should-carbon-tax-revenue-be-used-to-retire-debt/>.

67. *See, e.g.*, Gale et al., *supra* note 66.

68. *See* sources cited *supra* note 28.

69. Carl & Fedor, *supra* note 61, at 53.

70. *Id.*

71. DONALD B. MARRON & ADELE C. MORRIS, HOW SHOULD GOVERNMENTS USE REVENUE FROM CORRECTIVE TAXES? 10 (2016), <http://www.urban.org/sites/default/files/publication/77251/2000595-How-Should-Governments-Use-Revenue-from-Corrective-Taxes.pdf>.

taxes paid are spent on something tangible and useful.⁷² As a carbon price represents an unambiguous cost to an individual voter, pairing it with a social good to address an environmental problem could add to its allure.⁷³

The four Scandinavian countries, all early adopters of a carbon tax, all treat roughly half of their carbon tax revenues as general government revenues.⁷⁴ As these taxes have all been in place for almost thirty years,⁷⁵ there is less political impetus for compensating disadvantaged parties; carbon taxes have been baked into prices for a generation. Some later adopters, Iceland and Ireland, have suffered financial crises⁷⁶ and treat almost all of their carbon tax proceeds as badly-needed general government revenues.⁷⁷

In most of the rest of the world, revenue recycling is focused on improving the political economy of carbon taxation. As the effects of carbon taxation are unevenly felt, revenue recycling can be targeted towards disaffected groups or populations. For example, a frequent source of opposition to carbon taxes stems from the widely-held perception that they are regressive—that they impose a disproportionate impact on poorer individuals and households.⁷⁸ Whether carbon taxation is actually

72. See, e.g., Shi-Ling Hsu et al., *Pollution Tax Heuristics: An Empirical Study of Willingness to Pay Higher Gasoline Taxes*, 36 ENERGY POL'Y 3612, 3616 (2008).

73. *Id.*

74. Carl & Fedor, *supra* note 61.

75. WORLD BANK, *supra* note 38 and text accompanying.

76. See, e.g., *Iceland to End Capital Controls from 2008 Financial Crisis*, BBC NEWS (Mar. 12, 2017), <http://www.bbc.com/news/business-39248677>; *Ireland's Banking Crisis: a Timeline*, TELEGRAPH (Mar. 31, 2011), <http://www.telegraph.co.uk/finance/financialcrisis/8419616/Irelands-banking-crisis-timeline.html>.

77. Carl & Fedor, *supra* note 61, at 53.

78. See discussion *infra* notes 99-102 and notes 150-**Error! Bookmark not defined.** and accompanying text.

regressive or not is an open question,⁷⁹ but given the widespread perception that it is, proposals have been made to recycle revenues to compensate poorer households for higher energy prices. Carbon taxation can also increase production costs; revenue recycling could finance the reduction of corporate income taxes to help domestic industries compete internationally. Six carbon-taxing jurisdictions reduce some corporation-based taxes (this includes payroll taxes, which may inure to the benefit of individuals), and four reduce personal income taxes.⁸⁰ Most recent adopters of carbon taxation have chosen one of these two forms of revenue recycling.

British Columbia's carbon tax was meant to be "revenue neutral," and so was packaged with reductions in the marginal income tax rates of the lowest two tax brackets, as well as reductions in the corporate income tax rate.⁸¹ The tax also included provisions for additional "adjustment measures"⁸² to ensure that the province took in less money in carbon tax revenues than it spent under the law. The provincial government was so committed to preventing a net increase in government revenues that it enacted a bizarre provision requiring the provincial Finance Minister to *personally* guarantee that carbon tax outflows exceeded revenues, imposing a salary penalty as punishment if that did not occur.⁸³ Unsurprisingly, the British Columbia carbon tax has turned out to be consistently revenue-*negative*, taking in much less in

79. See discussion *infra* notes 99-102.

80. See Gale et al., *supra* note 66.

81. Kathryn Harrison, *The Political Economy of British Columbia's Carbon Tax* 9–10 (Organization for Economic Cooperation and Development, Working Paper No. 63, 2013), <http://www.dx.doi.org/10.1787/5k3z04gkhhkg-en>.

82. Carbon Tax Act, S.B.C. 2008, c 40, § 2 (Can.).

83. *Id.* §§ 3–5.

revenues than it has cost the province.⁸⁴

British Columbia's brute force implementation of a revenue-neutrality mandate is clumsy, but it highlights a thorny problem with revenue recycling: if the goal of revenue recycling is to achieve a balance between inflows and outflows in a carbon tax law, the inherent uncertainties of revenue collection make it difficult to guarantee neutrality. How much emissions would decline due to a carbon tax is uncertain, making the revenue side uncertain.⁸⁵ Income and sales tax revenues are also notoriously volatile.⁸⁶ It becomes a tricky matter to forecast whether a carbon tax with revenue recycling would increase or decrease government receipts, and by how much.

II. OPTIONS FOR CARBON TAX REVENUES IN THE UNITED STATES

Focusing on revenue uses is so important because hostility towards any policy bearing the label "tax" is based on the instant comprehension that it will *cost*.⁸⁷ Economic anxieties in the general populace persist beyond the 2008–09 financial crisis and exacerbate the visceral nature of this realization, making it cognitively challenging for most people to think any further. Lost, then, is any appreciation of the other side of taxation and the productive uses to

84. See B.C. MINISTRY OF FIN., BUDGET AND FISCAL PLAN 2015/16—2017/18, 60 (2015), http://bcbudget.gov.bc.ca/2015/bfp/2015_Budget_and_Fiscal_Plan.pdf. (Table 1, showing revenue measures [outflows] exceeding revenues.)

85. For a review of the uncertainties of carbon elasticity—the amount of carbon dioxide emissions reductions resulting from carbon pricing, see NOAH KAUFMAN ET AL., PUTTING A PRICE ON CARBON: REDUCING EMISSIONS, WORLD RESOURCES INST. 8 (2016), <http://www.wri.org/publication/putting-price-carbon-reducing-emissions>.

86. See, e.g., ELIZABETH MCNICHOL, CTR. ON BUDGET & POL'Y PRIORITIES, STRATEGIES TO ADDRESS THE STATE TAX VOLATILITY PROBLEM: ELIMINATING THE STATE INCOME TAX NOT A SOLUTION 1 (2013), <http://www.cbpp.org/sites/default/files/atoms/files/4-18-13sfp.pdf>.

87. See Lucas, *supra* note 23, at 21.

which revenues may be deployed. This may be of particular relevance should a state government decide to enact a carbon tax, as state governments often have less flexibility with new revenue sources.⁸⁸

A central theme of this Article is that decisions on the uses of carbon tax revenues are not purely economic in nature. If they were, then there is no reason to stray from the standard public finance position of simply absorbing carbon tax revenues into the general treasury and appropriating them where most needed.⁸⁹ Rather, enacting a carbon tax, along with its revenue implications, is a discrete action with specific political and legal choices. This Article seeks to examine these implications.

Of the possible uses of carbon tax revenues nine discussed in this Part have been the most commonly discussed in the United States.

A. *Option One: Reduce Personal Income Taxes*

Carbon tax revenues can be used to reduce marginal personal income tax rates. Both carbon tax and personal income tax revenues can only be estimated, so there is some uncertainty in determining how much of a reduction in personal income tax rates would correspond to a given carbon tax rate. Personal income tax revenues, in particular, depend on a variety of factors, such as compliance rates⁹⁰ (which themselves are a function of the resources afforded the Internal Revenue Service to monitor

88. See Russell S. Sobel & Gary A. Wagner, *Cyclical Variability in State Government Revenue: Can Tax Reform Reduce It?*, ST. TAX NOTES 569, 569 (2003).

89. See Craig Brett & Michael Keen, *Political Uncertainty and the Earmarking of Environmental Taxes*, 75 J. PUB. ECON. 315, 316 (2000).

90. See Jeffrey A. Dubin et al., *The Effect of Audit Rates on the Federal Individual Income Tax, 1977–1986*, 43 NAT'L TAX J. 395, 396 (1990).

compliance),⁹¹ economic conditions, income distributions, and international tax dynamics.⁹²

B. *Option Two: Reduce Corporate Income Taxes*

U.S.-based corporations face the highest statutory income tax rates of all thirty-four countries in the Organization for Economic Cooperation and Development (OECD).⁹³ While U.S. corporations also enjoy an intractably large and bewildering array of tax benefits,⁹⁴ effective corporate income tax rates are still high in comparison with other OECD countries.⁹⁵ In recent years, a number of U.S.-incorporated firms have actually changed their taxpaying status by merging with a foreign corporation, and re-incorporating in another country, thereby avoiding high U.S. rates.⁹⁶ Corporate income taxes are also believed to displace investment, thereby dampening economic activity and growth.⁹⁷ Most economic models seem to suggest that reducing corporate income taxes would be one of the more economically efficient uses of carbon tax revenues, reducing

91. *Id.* at 406.

92. See CHARLES L. BALLARD ET AL., A GENERAL EQUILIBRIUM MODEL FOR TAX POLICY EVALUATION 1–5 (1985) (describing detailed model of tax revenues, based on a variety of economic factors).

93. *OECD Tax Database*, ORG. FOR ECON. CO-OPERATION & DEV., http://www.oecd.org/tax/tax-policy/tax-database.htm#C_CorporateCapital (Table II.1., Corporate Income Tax Rates [2016]) (last visited June 11, 2017).

94. See Michael P. Devereux et al., *Corporate Income Tax Reforms and International Tax Competition*, 17 *ECON. POL'Y* 449, 492 (2002).

95. See KEVIN A. HASSETT & APARNA MATHUR, AM. ENTERPRISE INST. FOR PUB. POL'Y RES., REPORT CARD ON EFFECTIVE CORPORATE TAX RATES: UNITED STATES GETS AN F 3–5 (2011), <https://www.aei.org/wp-content/uploads/2011/10/TPO-2011-01-g.pdf>.

96. See, e.g., David Jolly, *Ireland, Home to U.S. 'Inversions,' Sees Huge Growth in G.D.P.*, N.Y. TIMES (July 12, 2016), <https://www.nytimes.com/2016/07/13/b/dealbook/ireland-us-tax-inversion.html>.

97. See Steven Fazzari et al., *Investment, Financing Decisions, and Tax Policy*, 78 *AM. ECON. REV.* 200, 204 (1988).

as it does what is considered to be a highly distortionary tax.⁹⁸

C. Option Three: Reduce Capital Gains Taxes

As opposed to reducing taxes on labor, revenues could be used to reduce taxes on investments. Capital gains taxes reduce investment activity by reducing profitability. Both individuals and corporations pay capital gains taxes, but capital investment is largely the domain of the wealthy,⁹⁹ making this option politically challenging.

D. Option Four: Reduce Consumption Taxes, Such As Sales Taxes

Instead of tax reductions benefiting wealthy individuals and corporations, carbon tax proceeds might be better used to benefit poorer households. One way of doing this is to reduce consumption taxes, such as sales taxes, which are generally considered regressive.¹⁰⁰ The United States does not have a federal sales tax, so this option would only be available at state and local levels.

E. Option Five: Reduce Payroll Taxes

So-called payroll taxes—those levied in the context of an employment relationship, such as social security and workers compensation,¹⁰¹ are taxes on labor income, but are

98. See JARED CARBONE ET AL., RESOURCES FOR THE FUTURE, DEFICIT REDUCTION AND CARBON TAXES: BUDGETARY, ECONOMIC, AND DISTRIBUTIONAL IMPACTS 8 (2013), <http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Rpt-Carbone.et.al.CarbonTaxes.pdf>.

99. David Domeij & Jonathan Heathcote, *On the Distributional Effects of Reducing Capital Taxes*, 45 INT'L. ECON. REV. 523, 538–39 (2004).

100. See, e.g., William G. Gale, *Don't Buy the Sales Tax*, BROOKINGS INST. (Mar. 1, 1998), <https://www.brookings.edu/research/dont-buy-the-sales-tax/>.

101. See Daniel B. Suits, *Measurement of Tax Progressivity*, 67 AM. ECON. REV. 747, 749 (1977).

collected by employers. Most payroll taxes are regressive,¹⁰² with poorer taxpayers bearing a disproportionately large share of the burden in funding these schemes.¹⁰³ A carbon tax paired with reduction in payroll taxes could result in a progressive tax shift that also offers the benefit of encouraging employment by effectively raising wages.

F. Option Six: Rebate All the Proceeds In a Lump Sum To All Households

A more direct way of helping poorer households is to return the proceeds directly back to taxpayers in the form of a lump sum. In schemes that return carbon tax proceeds to head-of-household taxpayers on a roughly per person scheme, the effect is to actually *overcompensate* poorer households for higher energy costs, as they will generally get back more in their lump sum than they pay out in higher costs.¹⁰⁴ The highest income (and highest-consuming) households would be worse off.¹⁰⁵

G. Option Seven: Reduce the Impacts on Fossil Fuel Sectors by Funding Support and Retraining Programs

A source of vigorous political opposition to climate policy comes from industrial sectors and geographic regions that are highly dependent upon fossil fuels.¹⁰⁶ A common suggestion has thus been to include in climate policy a

102. *Id.*

103. *But see* Don Fullerton & Gilbert E. Metcalf, *Tax Incidence*, in 4 HANDBOOK OF PUBLIC ECONOMICS 1787, 1792 n.3 (Alan J. Auerbach & Martin Feldstein, eds., 2002) (noting that the payroll taxes are not regressive if the funds are used to provide progressive benefits).

104. ROBERTON C. WILLIAMS III ET AL., THE INITIAL INCIDENCE OF A CARBON TAX ACROSS INCOME GROUPS 12 Tbl. 2 (2014), <http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-14-24.pdf>.

105. *Id.*

106. *See, e.g.*, Barbara Freese, Coal: A Human History 247–61 (2003).

component that would alleviate the economic dislocation caused by a large shift in energy resources.¹⁰⁷

G. Option Eight: Fund Clean Energy Initiatives

In addition to taxing a “bad”—greenhouse gas emissions—it might be desirable to subsidize a “good”—low-carbon or non-carbon technologies. Carbon taxes impose a marginal cost on greenhouse gas emissions, but it might be possible to also make non-marginal costs, such as capital investment, lower for desirable technologies. For example, as part of an economic stimulus package to address the 2008–09 global financial crisis, the American Recovery and Reinvestment Act¹⁰⁸ put into place subsidies for renewable energy sources, which have contributed to an upsurge in wind and solar energy deployment.¹⁰⁹

H. Option Nine: Keep the Revenue for General Treasury Purposes, Including Paying Down Debt

All of these first eight options essentially pre-commit carbon tax revenues to some stated purpose. As a logical matter, nothing is ever gained by *limiting* the options available; having more flexibility should always be welfare-increasing. In that vein, the best logical option is to *not* commit to recycling revenues, but to simply absorb them into the general treasury, for the legislature to use it as it deems fit. At the federal level, it is entirely possible that the best use of carbon tax proceeds would be to pay down

107. See ADELE C. MORRIS, BROOKINGS INST., BUILD A BETTER FUTURE FOR COAL WORKERS AND THEIR COMMUNITIES 17 (2016), <https://www.brookings.edu/wp-content/uploads/2016/04/build-a-better-future-for-coal-workers-and-their-communities-morris-updated-071216.pdf>

108. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009).

109. *Id.* § 1603(a)-(d).

sovereign debt.¹¹⁰

But this little bit of logic behind the last option would just look objectionably like a simple tax increase to a vast majority of voters, left or right. To fall back on economic dogma is to abdicate the political discussion. The chasm between what makes sense from a theoretical public policy point of view and what makes political sense only underscores the need for climate policy, and carbon taxation in particular, to grapple with political realities. This Article is an attempt to link economic and political discussions.

III. DISTRIBUTIONAL AND MACROECONOMIC IMPLICATIONS OF REVENUE OPTIONS

How then, to choose from among this bewildering array of options? Taking it as a given that allocation of carbon tax revenues is a deeply political decision, some quantitative understanding of the impacts of revenue options is essential to making *informed* political decisions. Analysis of the macroeconomic and distributional implications of different revenue options is essential to informed carbon tax revenue-allocation, as it should be for any fiscal policy.

Organizing these options clarifies the political objectives that might be satisfied by each option. Revenue recycling Options One, Two, and Three might be roughly characterized as options that benefit the wealthy. All of those taxes are based on income of some sort, and since wealthy populations contribute such a large fraction of *income* tax proceeds—the top one percent of U.S. income earners paid 37.8 percent of all federal income taxes in 2013¹¹¹—reducing those taxes would, by and large, benefit

110. See Gale et al., *supra* note 66.

111. Scott Greenberg, *Summary of the Latest Federal Income Tax Data, 2015 Update*, TAX FOUND. (Nov. 19, 2015), https://taxfoundation.org/summary-latest-federal-income-tax-data-2015-update#_ftn1 (Table 6, Total Income Tax Shares, 1980–2013).

those paying more of the income taxes. It is certainly possible to impose progressiveness into a personal income tax reduction, as British Columbia's carbon tax did, reducing personal income tax rates for only the two lowest of five income tax brackets.¹¹²

Revenue recycling Options Four, Five, and Six might be roughly characterized as options that benefit low- and moderate-income households. All of these options return carbon tax proceeds to individuals and households, and all do it to virtually *all* individuals and households, but in a way that redounds to greater benefit to low and moderate income households. Poorer households have a higher marginal utility of money,¹¹³ so the modest relief afforded by these forms of revenue recycling are more economically important to poorer households than rich ones, even if they receive the same amounts.¹¹⁴

The last trio of revenue recycling Options Seven, Eight, and Nine, grapple with the fundamental question of how government should spend money. A carbon tax could be just one of several sources of government revenue, and the standard public finance doctrine is to give legislators discretion to make fiscal decisions unfettered by earmarks.¹¹⁵ However, it seems politically unpalatable at the moment to impose a carbon tax without any compensating benefit attached to it.

In any case, without some quantitative analysis, any political discussion of carbon tax revenues remains unmoored from reality. Some effort to quantitatively express net changes to discrete groups of people is needed to understand the distributional implications. As well, some

112. Harrison, *supra* note 81, at 10.

113. See Edward J. McCaffrey, *Why People Play Lotteries and Why It Matters*, 1994 WIS. L. REV. 71, 76 (1994).

114. See *supra* text accompanying notes 98–101.

115. Brett & Keen, *supra* note 89.

attempt to forecast the macroeconomic impacts of carbon taxation and concomitant revenue use is absolutely necessary to identify the likely tradeoffs in making revenue decisions, as it always is for fiscal policy.

A. A Macroeconomic Hierarchy of Options

The macroeconomic and distributional impacts of carbon taxes and of different revenue recycling schemes have been estimated using economic models. Most commonly, “computable general equilibrium” (CGE) models use broad economic data to project how an economic change will impact general economic conditions.¹¹⁶ As opposed to some older, less comprehensive models, a CGE model employs data from a broad range of industries, households, and sectors, to estimate a set of dynamic relationships among them.¹¹⁷ For example, a CGE model would include one or more own-price electricity elasticities, so that if electricity prices increased by a certain amount, the CGE model would have a component that would, as a first-order estimate, predict how much less electricity was consumed by households.¹¹⁸ On top of that estimate, however, are the many other relationships impacted by electricity prices and their potential to impact household decisions—like the potential for higher electricity prices to increase prices for other goods and services, which could in turn affect home electricity consumption.¹¹⁹ But much larger are a wide variety of relationships among a broad range of economic agents. CGE models attempt to capture those interdependencies, so that one price change in one

116. Peter B. Dixon & B.R. Parmenter, *Computable General Equilibrium Modelling for Policy Analysis and Forecasting*, in HANDBOOK OF COMPUTATIONAL ECONOMICS 3-79 (Hans M. Amman et al. eds., 1996).

117. *Id.* at 5-6.

118. *See, e.g.*, CARBONE ET AL., *supra* note 98, at 3.

119. *See* WILLIAMS III ET AL., *supra* note 104, at 2-3.

market—like one created by a carbon tax—can be accurately modeled and most of the economic ripples captured. Especially for a policy like a carbon tax, in which energy prices would affect almost every other market,¹²⁰ a CGE model is the best, if the most data-intensive tool to estimate broader economic effects. Perhaps more importantly for our purposes, a CGE model can capture the impacts of *different* households,¹²¹ so it can differentiate the impacts of a carbon tax across the income spectrum, answering important distributional questions.

One CGE model developed by researchers at Resources for the Future (RFF), a respected environmental economic think tank, is what is known as an “overlapping generations” model, which estimates the impacts upon different populations by age cohort.¹²² This model offers a finer-grained analysis of the distributional impacts, as well as the effects of a carbon-tax-and-revenue-recycling policy over time, differentiating among generations.

The RFF model considered four categories of revenue recycling options: reducing “capital taxes,” either corporate income taxes or capital gains taxes (Options Two and Three), reducing “labor taxes” or personal income taxes (Option One), reducing consumption taxes (Option Four), or rebating carbon tax revenues in a lump sum transfer (Option Six).¹²³ The lump sum would be paid to adults, not children.¹²⁴ RFF’s results, graphed below, compare the

120. ROBERTON C. WILLIAMS III ET AL., THE INITIAL INCIDENCE OF A CARBON TAX ACROSS U.S. STATES 5 (Resources for the Future, Discussion Paper No. 14-25, 2014), <http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-14-25.pdf> (specifying a model with 19 industries, 15 of them carbon-intensive).

121. WILLIAMS III ET AL., *supra* note 104, at 196.

122. *Id.*

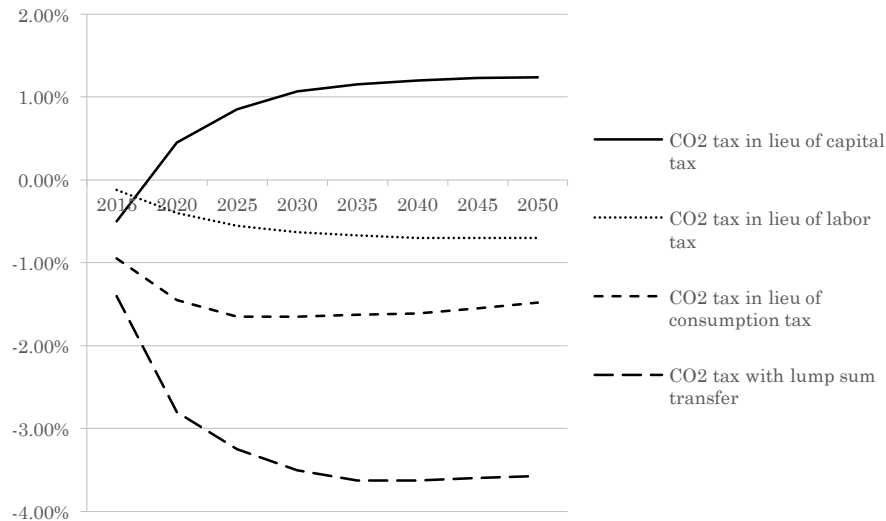
123. CARBONE ET AL., *supra* note 98, at 4; WILLIAMS III ET AL., *supra* note 104, at 4–5 (excluding consumption tax reductions).

124. CARBONE ET AL., *supra* note 98, at 13. A slightly different RFF model assumed the lump sum would be paid to all individuals, adults and children

macroeconomic effects of four carbon tax revenue options over time. The lines compare GDP in four scenarios. The top line shows that in the beginning, a carbon tax paired with a reduction in taxes on capital investment would initially depress GDP slightly, but quickly yield *greater* GDP than the world without any carbon taxes and any tax reductions. The second line from the top shows that a carbon tax paired with a reduction in payroll taxes never produces more economic growth than the world without the tax shift, though that option certainly has more progressive distributional effects than cuts to corporate income taxes would. Finally, using a carbon tax to reduce consumption taxes and to produce a lump sum transfer (rebate) fares the worst as macroeconomic policy, but these options offer significant progressive distributional advantages.

alike. WILLIAMS III ET AL., *supra* note 104, at 4.

FIGURE 1. Percentage Difference in GDP: \$30/ton Revenue Neutral Carbon Dioxide Tax Relative to Base Case¹²⁵



It is important, however, to note three things about Figure 1. First, the RFF model *assumes the social cost of carbon is zero*.¹²⁶ In other words, these GDP projections do not take into account that reducing greenhouse gas emissions will produce any benefits in the form of higher GDP. This is not, of course, to cede to climate skeptics, or to imitate their fallacious analysis, that the costs of climate change are low or zero. Damages from climate change are uncertain, but they are certainly not zero. Curbing greenhouse gas emissions is so important that a carbon tax would easily pass a cost-benefit test,¹²⁷ especially if the

125. CARBONE ET AL., *supra* note 98, at 8.

126. *Id.* at 3 (“The analysis does not consider the benefits of reducing greenhouse gas emissions.”).

127. See, e.g., JAMES H. WILLIAMS ET AL., PATHWAYS TO DEEP DECARBONIZATION

near-term health and environmental co-benefits of reduced fossil fuel combustion are included,¹²⁸ and even more so if the possibility of catastrophic damages are included.¹²⁹ Rather the RFF study identifies some no-cost or very-low-cost ways to reduce greenhouse gas emissions.¹³⁰ Its results suggest that even if one insists that climate change is a “hoax,” a well-designed carbon tax shifting tax burden from productive activities to carbon emissions could be economically beneficial, or at the very least, minimally disruptive. Of course, because of this conscious omission, the RFF results should not be considered any kind of cost-benefit analysis, as the benefit side would necessarily include *both* the economic benefits of revenues and the many environmental and social benefits of reducing emissions.

Second, the figure compares GDP levels, not GDP growth rates. U.S. GDP in 2013 was \$16.77 trillion; one percent of that is \$167 billion. According to this RFF model, if one were to levy a carbon tax and reduce personal income taxes by the exact amount of the carbon tax revenues, GDP would be only about half a percent lower, every year, over the long term. Again, this consciously assumes (without

IN THE UNITED STATES 24 (2014) (average median value of just over \$300 billion). Even the fairly conservative social cost of carbon of \$69 per ton, in 2050 dollars, assuming a three percent discount rate, multiplied by 5.5 gigatons of carbon dioxide emissions each year, yields a benefit of \$380 billion. *See* sources cited *supra* notes 26, 27. *See also* Tamma A. Carleton & Solomon M. Hsiang, *Social and Economic Impacts of Climate*, 353 *SCIENCE* 1112, 1123 (2016) (estimating future impacts of climate change at \$9.7 trillion, discounted to present value).

128. The non-climate costs of fossil fuel combustion are most pronounced with coal, which imposes a large variety of environmental and health costs, from the destructive mining methods to the emission of fine particulate matter leading to cardiopulmonary disease and premature death. *See e.g.*, Paul R. Epstein, et al., *Full Cost Accounting for the Life Cycle of Coal*, 1219 *ANNALS N.Y. ACAD. SCI.* 73, 85 (2011).

129. *See* Martin Weitzman, *Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change*, 5 *REV. ENV'TL ECON. & POL'Y* 275, 275 (2011).

130. *See* CARBONE ET AL., *supra* note 98, at 10 (“[t]he most important interpretation of this figure is that the effects are relatively small.”).

asserting) that there is zero value in reducing of greenhouse gas emissions themselves.

Third, as comprehensive and cutting-edge as the RFF model is, it fails to fully account for a potentially important economic anomaly. CGE models simulate two effects: consumer spending, which stimulates the economy by demanding things, and producer investment, which stimulates the economy by investing to produce things.¹³¹ So a populist impulse to place money in the hands of individuals ordinarily carries an opportunity cost: it displaces money in the hands of producers—commonly corporations—which would spend the money on capital investments, creating jobs and therefore more demand. But here is the economic anomaly: it has been commonly observed that subsequent to the 2008–09 global financial crisis, many firms have been hoarding cash, eschewing capital investments, and therefore not stimulating economic activity anyway.¹³² If, taking into account historical investment trends, that is true, and if there is a systemic economic reason for a lack of corporate spending, then there is no reason to be placing money in the hands of corporations, since they are not spending it anyway. The only place to stimulate economic activity would be on the consumer side. And if that is true, then a carbon tax paired with either the lump sum rebate or the consumption tax relief might actually perform better economically than the alternatives. This is not a settled economic question, so whether one believes that money is better placed in the hands of consumers or producers is likely to depend more on ideology than empirical support.

With all that in mind, the model still produces, for

131. Dixon & Parmenter, *supra* note 116, at 5 (“They describe how demand and supply decisions made by different economic actors determine the prices of at least some commodities and factors.”).

132. See, e.g., Adam Davidson, *Why Are Corporations Hoarding Trillions?* N.Y. TIMES, January 24, 2016, at MM22.

economists, an unsurprising hierarchy of options. From a *strictly macroeconomic* standpoint, and using *conventional assumptions*, the use of carbon revenues that best stimulates economic growth is to reduce capital taxes. The intuition behind this tentative result is that corporate income taxes and capital gains taxes are distortionary, causing a misallocation of resources, particularly in the United States where rates are high.¹³³ In fact, even without considering any social cost of carbon, the simple transfer of tax from corporate taxpayers to carbon emitters will generate a small increase in GDP over the long run, on the order of one percent. Taking as a given the contestable but reasonable assumptions embodied in the RFF model, *that is a free lunch*. A carbon tax paired with an equivalent corporate income tax relief is likely to reduce emissions *and* increase economic output. GDP should not be the only, or even the most important criterion; many mainstream economists are dismayed at the continuing dominance of GDP as an indicator.¹³⁴ But it is a rough measure of economic activity and therefore of economic health, if one that should be taken with a grain of salt.

No one paying attention to American politics could possibly accept the preceding paragraph without misgivings. A reduction in corporate income taxation would redound overwhelmingly to the benefit of the richest

133. See sources cited *supra* notes 93-95.

134. EDWARD D. KLEINBARD, WE ARE BETTER THAN THIS: HOW GOVERNMENT SHOULD SPEND OUR MONEY 19 (2014) (“To summarize, GDP and similar metrics are poor surrogate measures of welfare.”). See, e.g., Daniel Kahneman et al., *Back to Bentham? Explorations of Experiences Utility*, 112 Q. J. OF ECON. 375, 375 (1997); Andrew J. Oswald, *Happiness and Economic Performance*, 107 ECON. J. 1815, 1815 (1977) (“Economic performance is not intrinsically interesting. No-one is concerned in a genuine sense about the level of gross national product last year or about next year’s exchange rate The relevance of economic performance is . . . not the consumption of beefburgers, nor the accumulation of television sets, nor the vanquishing of some high level of interest rates, but rather the enrichment of mankind’s feeling of well-being. Economic things matter only in so far as they make people happier.”).

individuals—those that have the requisite wealth to invest in equities and profit from lowered corporate income tax rates.¹³⁵ In a period of widening American wealth and income inequality,¹³⁶ it is surely a dicey political proposition to use a carbon tax to widen wealth and income gaps.

In fact, the apparent misfortune is the result that the option that best addresses inequality—the lump sum distribution—appears to be the *least* friendly to economic growth. Collecting a carbon tax and rebating the proceeds in a lump sum distribution admirably protects low-income households. But if one warily accepts GDP as a rough measure of efficiency, then it appears that efficiency and progressiveness are at odds.

It is worth noting that an alternative model, commissioned by the advocacy group Citizens' Climate Lobby (CCL), found dramatically more positive economic outcomes for a lump sum distribution.¹³⁷ That study found that GDP would *grow* over time.¹³⁸ While the models have many similarities, the dramatic difference in macroeconomic projections are attributable to two differences. First, the RFF model assumed that capital was free to flow across borders, so that a carbon tax would send some capital offshore, to produce in other, carbon tax-free countries.¹³⁹ The CCL model assumes quite the opposite:

135. See, e.g., Arnold C. Harberger, *The Incidence of the Corporation Income Tax*, 70 J. POLIT. ECON. 215, 215 (1962).

136. See, e.g., THOMAS PIKETTY, *CAPITAL IN THE TWENTY-FIRST CENTURY* 375 (2014).

137. *Our Solution: Carbon Fee and Dividend Policy*, CITIZENS' CLIMATE LOBBY, <https://citizensclimatelobby.org/carbon-fee-and-dividend/> (last visited June 24, 2017).

138. SCOTT NYSTROM & PATRICK LUCKOW, *THE ECONOMIC CLIMATE, FISCAL, POWER, AND DEMOGRAPHIC IMPACT OF A NATIONAL FEE-AND-DIVIDEND CARBON TAX* 21 (2013), <http://citizensclimatelobby.org/wp-content/uploads/2014/06/REMI-carbon-tax-report-62141.pdf> (Figure 3.5).

139. WILLIAMS III ET AL., *supra* note 104, at 7 ("We assume international prices are fixed (i.e., a small open economy assumption) and that domestic and

the legality and enforcement of a border tax adjustment, which would allow the United States to impose a tariff on goods imported from countries without a carbon tax.¹⁴⁰ Such a provision would prevent capital from flowing out of the U.S. in search of carbon tax-free jurisdictions. The consistency of such a provision with international trade law is uncertain, with many implementing details determinative of whether the World Trade Organization (WTO) would allow it.¹⁴¹

The second difference accounting for the less rosy economic projections by the RFF model is that the CCL-commissioned model included the co-benefits of reduced air pollution.¹⁴² Reducing carbon dioxide emissions by reducing coal combustion produces health benefits having nothing to do with climate change.¹⁴³ In addition to carbon dioxide emissions, coal combustion produces sulfur dioxide and fine particulate matter pollution, which causes cardiopulmonary diseases that cause roughly 7,500 premature deaths per year.¹⁴⁴ Adding in those health benefits, and the contribution of an additional 7,500 people per year surviving and contributing to economic growth is bound to improve the economic outlook.¹⁴⁵

A macroeconomic analysis takes on more complexity if a

international varieties of each good are imperfect substitutes for each other.”).

140. NYSTROM & LUCKOW, *supra* note 138, at 17–18.

141. See Nigel Bankes et al., *International Trade and Investment Law and Carbon Management Technologies*, 53 NAT. RES. J. 285, 322, 322–23 (2013). *But see* Joost Pauwelyn, *Carbon Leakage Measures and Border Tax Adjustments Under WTO Law*, in RESEARCH HANDBOOK ON ENVIRONMENT, HEALTH AND THE WTO 48–49 (Provost C., & G. Van Calster, eds, 2012).

142. NYSTROM & LUCKOW, *supra* note 138, at 43.

143. Epstein, *supra* note 128.

144. JONATHAN BANKS & DAVID MARSHALL, CLEAN AIR TASK FORCE, REGULATION WORKS: HOW SCIENCE, ADVOCACY AND GOOD REGULATIONS COMBINED TO REDUCE POWER PLANT POLLUTION AND PUBLIC HEALTH IMPACTS 4 (2015), <http://www.catf.us/resources/publications/files/RGGI-Report.pdf>.

145. *Id.*

state-level carbon tax is under consideration. A border tax adjustment at a state level, to prevent capital from fleeing a carbon-taxing state, would need to be carefully designed to avoid running afoul of the dormant Commerce Clause.¹⁴⁶ Certain industries may be much more important in some states, creating larger employment effects than would be the case on the national level. Some states do not have personal or corporate income taxes.¹⁴⁷ Also, the RFF and CCL-commissioned studies have parameters for household-level behavior, but these are much more reliable at the federal level than at the state level. Thus, these analyses should be viewed with caution when applied to a state carbon tax.

B. *Some Distributional Considerations*

The shortcomings of GDP as an economic indicator are really secondary to a much larger failing, at least from a political economy perspective; it says nothing about distribution. So while a boost to GDP must certainly be a good thing, the proper place of GDP is alongside a number of other criteria for what constitutes good policy. Large policy changes inevitably create winners and losers, and it is important to be mindful of the political truism—that losers scream louder than winners applaud.¹⁴⁸ Making

146. See, e.g., Darien Shanske, *State-Level Carbon Taxes and the Dormant Commerce Clause: Can Formulary Apportionment Save the World?*, 18 CHAPMAN L. REV. 191, 205–09 (2014); David Gamage & Darien Shanske, *A State-Level Carbon Tax With Border Adjustments*, 83 STATE TAX NOTES 911, 917 (2017).

147. Seven states do not have an income tax. Thomas C. Frohlich, *States With No Individual Income Tax*, USA TODAY (Mar. 19, 2016), <http://www.usatoday.com/story/money/personalfinance/2016/03/19/states-no-individual-income-tax/81965082/>.

148. The origin of this saying is unclear, but the most credible attribution of a variation of this is to Joel Slemrod, a professor at the Stephen M. Ross School of Business at the University of Michigan. See *Joel Slemrod '73 on Reforming the Tax Code*, PRINCETON ALUMNI WKLY. (Princeton Univ., Princeton, N.J.), Apr. 3, 2013, <https://paw.princeton.edu/article/joel-slemrod-%E2%80%9973-reforming->

serious attempts to compensate losers, or to minimize their losses, is practicing good politics.

This is especially true of a fairly large policy change, such as a carbon tax. Collecting \$150 billion in revenues from Americans would already be disruptive; the wrenching economic effects on some industries is even more cause for concern. A carbon tax *must* address the distributional consequences of its revenue uses, and this section turns to several potential distributional considerations.

1. Regressiveness

As noted above, a naked carbon tax, without any revenue recycling, is widely believed to be regressive. The costs of fossil-generated energy is generally a larger *fraction* of a poorer household's budget, even if it is in absolute terms, smaller than that of a rich household's budget.¹⁴⁹ Revenue recycling Options Four, Five, and Six all seek to target a significant portion of the revenues towards poor, disproportionately affected households.

Consumption taxes, even if they exempt basic needs such as food and clothing, still tend to be more economically painful to lower-income households than rich ones.¹⁵⁰ While everybody pays the same sales tax rate, and while rich households pay more in absolute terms (because they buy more), sales taxes represent a larger and more precious fraction of a poorer household's budget, which has less flexibility. Curtailing sales taxes would thus have an anti-regressive effect.

By the same logic, payroll taxes, which are generally

tax-code.

149. See HSU, *supra* note 20, at 124–38.

150. The matter of tax incidence is complicated and context-specific, but as a general matter, consumption taxes, such as sales taxes and excise taxes, are considered regressive. See, e.g., Fullerton & Metcalf, *supra* note 103 at 1819. But see James M. Poterba, *Lifetime Incidence and the Distributional Burden of Excise Taxes*, 79 AM. ECON. REV. 325, 325 (1989).

taxed at a flat rate up to an annually-determined maximum amount,¹⁵¹ are regressive because even though lower-income households pay less, those amounts paid impose greater and more painful constraints on their budgets than those of richer ones.¹⁵² Reducing payroll taxes would thus generally work a greater benefit for poorer households.

Finally, a lump-sum distribution also works on this same smaller-but-more-painful principle, only in reverse: a lump sum of money distributed to all households would be equal across all households in absolute terms, but would be more economically valuable to the poorer household.¹⁵³ Consider the needs of a poor household, and imagine what it could do with a check for \$500: far more than it would in the hands of a wealthy household.

Economic models suggest that a carbon tax paired with a lump sum distribution will make *most* households better off, including lower-income ones.¹⁵⁴ The RFF model discussed above suggests that the *median-income-quintile household*—those twenty percent of households that have forty percent above them and forty percent below them—would be slightly better off with a carbon tax paired with a lump sum distribution.¹⁵⁵ A \$30 per-ton carbon tax would produce a lump sum rebate of \$1,600, easily more than offsetting a higher energy bill of \$531, and even offsetting an average loss of personal income—due to lost jobs—of \$834.¹⁵⁶ The median-income-quintile household would experience a net gain of \$279.¹⁵⁷

151. See, e.g., 26 U.S.C. §§ 3101(a), 3111(a) (2015).

152. Fullerton & Metcalf, *supra* note 103, at 1789.

153. See *supra* note 113 and accompanying text.

154. WILLIAMS III, ET AL., *supra* note 104, at 12 Tbl. 2.

155. *Id.*

156. *Id.*

157. *Id.*

To those that might complain that a carbon tax with a lump sum distribution is “redistribution”: it certainly is. In the RFF model, the \$30 carbon tax with a lump sum distribution would cost the highest-income quintile—the top twenty percent—more than \$6,000, or 1.93% of that quintile’s average household income of about \$310,000.¹⁵⁸ At the other end of the income spectrum, the lowest quintile—the bottom twenty percent—would realize a net benefit of about \$1,200, a good 3.36% of that quintile’s average household income of \$35,000.¹⁵⁹ When all is said and done, even by the fairly crabbed assumptions of the RFF model, the extent of wealth redistribution is fairly modest.

But even at the end of this line of careful analysis, a wrinkle awaits. The widespread perception that a carbon tax is regressive may not be completely accurate. As it turns out, it is not necessarily the case that a carbon tax imposes disproportionate costs on poorer households than rich.

The CGE models that attempt to model distributional impacts use household income as a measure of the ability to absorb the higher energy costs of a carbon tax. But year-to-year income may not accurately capture the true economic well-being of some individuals, some of whom may currently have low incomes but high future income potential, such as those seeking post-secondary graduate education in business, medicine, or law. At the opposite end of the age spectrum, retirees may have very little income, but may be drawing down on a large retirement portfolio of investments; nor could those individuals be considered “poor.” Wealth, or “lifetime income,” would be better indicators of the ability to absorb higher costs from carbon

158. *Id.*

159. *Id.*

taxation, but are more difficult to measure.¹⁶⁰ So, what to do?

Milton Friedman's "permanent income hypothesis" suggests that individuals and households *smooth* consumption over the expected course of their lives, sometimes spending more and sometimes spending less than their income might suggest.¹⁶¹ Given that, economists have wondered if consumption is actually a better indicator of economic well-being than income, and that taxes on consumption (such as sales taxes) are actually less regressive than previously thought.¹⁶² As a logical extension, economists have wondered if a carbon tax is as regressive as some fear.¹⁶³ If wealth, or lifetime income, is a better measure of the ability to absorb the higher costs of a carbon tax, and consumption is a better indicator of wealth, then a carbon tax may actually do a bit of the redistribution all by itself.¹⁶⁴

An additional reason that carbon taxation may not be as regressive as initially feared is that some individuals and households with low incomes receive government benefits, some of which are indexed for inflation. A carbon tax that increases energy costs would also trigger increases in these benefits, insulating their recipients from some of the economic harm.¹⁶⁵ However, it is important to note that

160. See, e.g., FRANK A. COWELL, MEASURING INEQUALITY 4–7 (2009) (comparing income with "lifetime income," or wealth).

161. Milton Friedman, A Theory of the Consumption Function 221 (1957).

162. Poterba, *supra* note 150.

163. Kevin A. Hassett et al., *The Incidence of a U.S. Carbon Tax: A Lifetime and Regional Analysis*, 30 ENERGY J. 155, 166–67 (2009) ("Our results suggest that when the total lifetime effect of a carbon tax is taken into account, the regressivity of the tax decreases.").

164. Don Fullerton et al., *Does the Indexing of Government Transfers Make Carbon Pricing Progressive?*, 94 AM. J. AGRIC. ECON. 347, 352 (2011).

165. A recent paper makes the bold assertion that carbon taxation, even without considering the revenue side, is a progressive tax. Julie-Anne Cronin et

even in low-income groups, recipients of government benefits constitute a relatively a small fraction,¹⁶⁶ so that inflation indexing itself is far from a salve for regressiveness.

No one would assert that income is uncorrelated with wealth, so clearly the CGE models are telling us *something* about the regressiveness of a carbon tax. What these areas of uncertainty highlight is not so much the indeterminacy of economic analyses, but the need to deploy them in a nuanced way, collecting up the economic insights without elevating them to the level of gospel. The economic analyses on carbon taxation provide policymakers with pages for a playbook of policy considerations. Along with those economic considerations are political ones, and reaching political decisions requires a judicious mixing of all of them. A core argument of this Article is a call for a sophisticated, but critical appreciation for the economic impacts of carbon taxation. That revenue uses are political is beyond doubt. But making decisions about revenue absolutely requires the input of economic analysis.

2. Alleviating Impacts on Fossil Fuel-Producing Communities

Part of what makes climate policy so contentious is the concentration of job losses in particular industries and in particular regions. While most economic analysis suggests that fossil fuel job losses will be roughly matched by employment gains in renewable energy, efficiency, and public transportation,¹⁶⁷ one cannot overlook the fact that those gains would not necessarily be realized by those who lose their jobs in fossil fuel industries like coal mining. In

al., *Vertical and Horizontal Redistributions from a Carbon Tax and Rebate* 19 (Nat'l Bureau of Econ. Research, Working Paper No. 23250, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2941404.

166. *Id.* at 7.

167. *See supra* note 104 and accompanying text.

terms of winners applauding and losers screaming, coal miners are already screaming, and loudly.¹⁶⁸

Option Seven seeks to soften the blow to individuals and households in regions dependent upon a fossil fuel-based economy for whom climate policy poses the greatest threat. Dislocated coal mine workers, for example, would not simply suffer higher costs of energy and goods; they would need assistance to relocate and find new employment. Moreover, when communities dependent upon fossil fuel exploitation wither, members of those communities lose their social capital, which is often their only buffer against economic hardship.¹⁶⁹ These groups focus their political power by singular commitment to opposing the thing that would ruin them: climate policy.

It has therefore been suggested that climate policy include something for industries, regions, and communities dependent upon fossil fuel usage, if not out of obligation, then at least out of a strategic desire to improve the political acceptability of climate policy.¹⁷⁰ Retraining individual workers would seem to go the farthest in terms of addressing concerns with economic dislocation.¹⁷¹ Taking into account the needs of individuals and households in these vulnerable groups and communities is, from this perspective, nothing more than another aspect of

168. Those in the coal industry have turned to complaining that President Obama's policies amounted to a "war on coal," even if low natural gas prices have had a much greater effect. Ronald Bailey, *Natural Gas Ambush Killed of Coal Mining Industry, Not Obama's 'War on Coal,'* REASON: HIT & RUN BLOG (Oct. 11, 2016, 10:00 AM), <http://reason.com/blog/2016/10/11/natural-gas-ambush-killed-off-coal-minin>.

169. ROBERT D. PUTNAM, *BOWLING ALONE: THE COLLAPSE AND REVIVAL OF AMERICAN COMMUNITY* 359 (2000) ("Historically social capital has been the main weapon of the have-nots, who lacked other forms of capital."); James M. Acheson, *The Maine Lobster Market: Between Market and Hierarchy*, 1 J. L. ECON. & ORG. 385, 385–86 (1985).

170. See, e.g., MORRIS, *supra* note 107.

171. See MORRIS, *supra* note 107, at 20.

regressiveness: concern about poor individuals hurt by higher fuel costs should logically extend to individuals displaced by loss of income and social capital.

Retraining programs would need to be part of a larger, more comprehensive program. There is no point in retraining individuals for non-existent jobs. The Bureau of Labor Statistics reports that about 53,000 workers are employed by the coal industry,¹⁷² making a transition of that scope worthy of considerable thought and planning. A more comprehensive and thoughtful effort would redevelop the economy of entire regions.

3. Other Objectives: Boosting Renewable Energy and Reducing Debt

Another possible use for carbon tax revenues is to use some of the revenues to further support, through subsidies, low-carbon or non-carbon technologies. Most economists are critical of linking a carbon tax to subsidies for fossil fuel alternatives, in effect duplicating efforts to price the external costs of greenhouse gas emissions. Most energy subsidies are economically inefficient anyway,¹⁷³ so that such a “belt-and-suspenders” approach to shifting energy away from fossil fuels and toward low- or non-carbon sources is a less elegant and potentially more wasteful approach than setting a carbon tax price trajectory sufficient to drive innovation and displace fossil fuels.¹⁷⁴

On the other hand, some economists also recognize that fossil fuel industries have an enormous head start over alternative, low- or non-carbon technologies, and would

172. U.S. BUREAU OF LAB. STAT., MAY 2016 NATIONAL INDUSTRY-SPECIFIC OCCUPATIONAL EMPLOYMENT AND WAGE ESTIMATES: COAL MINING (2016), https://www.bls.gov/oes/current/naics4_212100.htm#00-0000.

173. See, e.g., CONG. BUDGET OFF., THE RENEWABLE FUEL STANDARD: ISSUES FOR 2014 AND BEYOND 3, <https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/45477-Biofuels2.pdf>.

174. See MARRON & MORRIS *supra* note 71, at 10.

therefore support some modest subsidization of these upstart industries.¹⁷⁵ Having evolved for over a century, incumbent fossil fuel-based industries enjoy huge advantages in terms of scale economies and research and development infrastructure, which might not be completely overcome by a carbon tax.¹⁷⁶ But engaging in this kind of “catch-up” subsidization runs the risks of locking in certain technologies, just as fossil fuel subsidies have done for fossil fuels, so some caution would seem to be warranted.¹⁷⁷

A final option, given the challenges of choosing wisely how to spend money on climate-related objectives, is to just consider carbon tax proceeds as another source of revenue.¹⁷⁸ In the United States, roads, highways and bridges as well as public transportation systems teeter on the brink of collapse, starved for funding because the federal gasoline tax is not indexed for inflation, and Congress has not mustered the courage to increase it in twenty-four years.¹⁷⁹ American public education seems to be in perpetual crisis. Many sewage treatment plants in the United States have not been updated for generations.¹⁸⁰ A

175. See Daron Acemoglu et al., *Transition to Clean Technology*, 124 J. POL. ECON. 52, 100–01 (2014).

176. See Shi-Ling Hsu, *Capital Transitioning: An International Human Capital Strategy for Climate Innovation*, 6 TRANSNAT'L ENVTL. L. 153, 153–76 (2017).

177. See Shi-Ling Hsu, *Capital Rigidities, Latent Externalities*, 51 HOUS. L. REV. 719, 738–39 (2014).

178. See MAI FARID ET AL., INT'L MONETARY FUND, AFTER PARIS: FISCAL, MACROECONOMIC, AND FINANCIAL IMPLICATIONS OF CLIMATE CHANGE 20 (2016), <https://www.imf.org/external/pubs/ft/sdn/2016/sdn1601.pdf>.

179. See Jerome Dumortier et al., *State and Federal Fuel Taxes: The Road Ahead for U.S. Infrastructure Funding* 16 (Ind. Univ. Sch. of Pub. & Env'tl. Affairs, Working Paper No. 2016-1, 2016), <http://ageconsearch.umn.edu/bitstream/233758/2/IU%20SPEA%20AgEcon%20Papers%202016-1.pdf>.

180. See KEITH MILLER ET AL., CTR. FOR AM. PROGRESS, HOW TO UPGRADE OUR NATION'S WASTEWATER AND DRINKING-WATER INFRASTRUCTURE 7 (2012), <https://www.americanprogress.org/wp-content/uploads/2012/10/MillerWaterInfrastructureReport.pdf>.

multi-trillion-dollar infrastructure backlog awaits.¹⁸¹ And lest we forget, mandated spending programs such as Social Security and Medicare consume fully two-thirds of the federal budget¹⁸² and continue to weigh on budgetary decisions. It is even worth considering using carbon tax proceeds to pay down federal governmental debt. Fully two-thirds of U.S. federal debt is held by institutional investors and other private investors,¹⁸³ so that the roughly six percent of the federal budget dedicated to interest payments is a transfer from American taxpayers to investors. None of these uses are an inherently poor use of carbon tax revenues.

Some of these considerations might not seem so politically implausible if a state level carbon tax was under consideration. State government spending priorities might be less suspicious and more pressing than federal ones. The State of Washington is currently under a contempt order from its own supreme court, stemming from the case *McCleary v. State*,¹⁸⁴ to discharge a state constitutional obligation to fully fund uniform public education. In a 2012 ruling, the Washington State Supreme Court held that the State “failed to meet its duty under article IX, section 1 by consistently providing school districts with a level of resources that falls short of the actual costs of the basic education program.”¹⁸⁵ In 2015, after giving the state

181. See *2013 Report Card for America's Infrastructure*, AM. SOC'Y CIV. ENGINEERS (March 20, 2014), <http://www.infrastructurereportcard.org/wp-content/uploads/2013ReportCardforAmericasInfrastructure.pdf> [<http://perma.cc/2CUY-F6QQ>].

182. *Federal Spending: Where Does the Money Go*, NAT'L PRIORITIES PROJECT, <https://www.nationalpriorities.org/budget-basics/federal-budget-101/spending/> (Fig. 1) (last visited June 11, 2017).

183. See *Federal Spending: Borrowing and the Federal Debt*, NAT'L PRIORITIES PROJECT, <https://www.nationalpriorities.org/budget-basics/federal-budget-101/borrowing-and-federal-debt/> (last visited June 11, 2017).

184. *McCleary v. State*, 173 P.3d 227 (Wash. 2012).

185. *Id.* at 261.

legislature several opportunities to present a funding plan, the supreme court found the state in contempt and ordered the payment of \$100,000 per day for every day that the state remained in violation. As part of the order, the Washington State Supreme Court directed the state to identify “dependable and regular” funding sources.¹⁸⁶

What would it take for Washington State to embrace a carbon tax as a source of revenue for funding public education? That requires political tea-leaf reading skills beyond the ability of this author. But it surely seems worth imagining that such a proposition sounds less crazy at the state level than it would at a federal level.

IV. CARBON FEE AND DIVIDEND

All of this only begs the political, values-based question: apart from reducing emissions, what should the secondary purpose of a carbon tax be? Should it reduce inequality, or should it boost economic growth? One answer to this question is try and minimize the prominence of this secondary purpose. One way to do that is to rebate carbon tax proceeds back to carbon taxpayers, in a lump sum distribution.

The idea of returning carbon tax proceeds as a lump sum distribution to all households did not *originate* with the group Citizens’ Climate Lobby, but certainly its continuing and dogged advocacy over a period of years has pushed the lump sum distribution idea to the climate policy fore.¹⁸⁷ The CCL proposal, which it calls “fee and dividend,”

186. *McCleary v. State*, No. 84362-7 (Wash. Aug. 13, 2015) (discussing order of contempt).

187. See, e.g., Susan Phillips, *Climate Activists Court Hill Republicans with ‘Civil Conversations,’* NPR (June 14, 2017, 4:35 PM), <http://www.npr.org/2017/06/14/532969087/climate-caucus-successfully-courts-more-congressional-republicans>. The author is a member of the Citizens’ Climate Lobby Advisory Board.

is to collect a carbon tax, initially set at \$10 per ton but increasing each year by \$10 per ton, and distribute the revenues in lump sum distributions to each household.¹⁸⁸ Distributions are given on a per adult basis, plus a half-share for each child, up to two children, so that a household is essentially one, two, or three adults.¹⁸⁹ Carbon taxes are collected by a dedicated trust instrument bound to rebate all revenues minus administrative costs, which CCL has rather pessimistically estimated at seven to eight percent of revenues.¹⁹⁰ CCL avoids the word “tax”—which would imply a potential government-spending purpose—and instead uses the term “fee.” A supporter of the concept, former Secretary of State George P. Schultz (who, as noted above, propounded his own similar proposal in February) said, “[i]t’s not a tax if the government doesn’t keep the money.”¹⁹¹

Such dedicated instruments have precedents. Sovereign wealth funds are generally trust instruments insulated from legislative interference, such as the Alaska Permanent Fund Corporation, which was constitutionally chartered to receive oil royalties collected by the State, and either distribute them to Alaskans or invest them in mostly income-producing investments.¹⁹² The basic idea is to

188. For the Citizens’ Climate Lobby proposal, see *Legislative Proposal: Carbon Fee and Dividend*, CITIZENS’ CLIMATE LOBBY, <https://citizensclimatelobby.org/carbon-fee-and-dividend/> (last visited June 11, 2017) (advocating for a “carbon free and dividend” since at least 2014).

189. *Id.*

190. See *Administrative Costs of Carbon Fee and Dividend*, CITIZENS’ CLIMATE LOBBY, <https://citizensclimatelobby.org/administrative-cost/> (last visited June 11, 2017).

191. *5 Conservatives Arguing for a Price on Carbon*, CITIZENS’ CLIMATE LOBBY (Feb. 1, 2017), <http://citizensclimatelobby.org/5-conservatives-arguing-price-carbon/>.

192. See *What is the Alaska Permanent Fund?*, ALA. PERMANENT FUND CORP., <http://www.apfc.org/home/Content/aboutFund/aboutPermFund.cfm> (last visited June 11, 2017).

ensure that revenues are not commingled with other sources of revenue, which could be used for some other legislative purpose.¹⁹³

A. A Macroeconomic Appraisal

The RFF study placed lump sum distribution at the bottom of the list of four revenue uses in terms of macroeconomic efficiency, the intuition being that with all of the distortionary taxes that could be reduced, using the money to give directly back to people is a relatively ineffective way of generating economic activity and growth. This comes with the caveat that conventional CGE models might not accurately reflect decisions made in this current, ahistorical economic climate.¹⁹⁴

The economic study commissioned by CCL is, perhaps unsurprisingly, considerably more sanguine. As noted above, the economic analysis of the CCL fee-and-dividend proposal assumes that capital outflows can be limited by an enforceable border tax adjustment,¹⁹⁵ as contrasted with the RFF assumption that a carbon tax would drive investment dollars abroad to jurisdictions free of carbon taxation.¹⁹⁶ The CCL-commissioned study also takes into account the co-benefits of reducing coal use in the form of fewer premature deaths from air pollution.¹⁹⁷ Putting these critical assumptions together, along with some other modeling liberties, is enough for the CCL fee-and-dividend proposal to show significant gains in GDP over time, on the

193. See Stephen Jen, *Sovereign Wealth Funds: What They Are and What's Happening*, 8 *WORLD ECON.* 1, 1 (2007) ("A SWF is a government investment vehicle that invests in foreign currency denominated assets and whose management is distinct from that of official reserves.").

194. See *supra* note 132 and accompanying text.

195. See NYSTROM & LUCKOW, *supra* note 138, at 17.

196. CITIZENS' CLIMATE LOBBY, *supra* note 137.

197. NYSTROM & LUCKOW, *supra* note 138, at 2.

order of a half a percent in the long term.¹⁹⁸

Certainly, the decision in the CCL study to account for other environmental harms of reduced coal usage is entirely appropriate. The linkage between coal combustion and cardiopulmonary disease and death is now indisputable,¹⁹⁹ so a policy that reduces coal usage should be credited with indirectly, but clearly, saving lives. It also seems more justifiable for the CCL study to assume the existence of a border tax adjustment consistent with international trade law, than it is for the RFF study to assume none. While the literature is maddeningly inconclusive,²⁰⁰ the more plausible, albeit less cautious, assumption is that some enforceable form of a border tax adjustment would survive WTO scrutiny, and that carbon tax-induced capital flows to carbon tax-free jurisdictions would be minimal.

In conclusion, it seems safe to say that a fixation on the effects of a carbon tax on GDP is not likely to provide much guidance. Given the economic and legal uncertainties, there is no good reason to elevate macroeconomic considerations above other ones in assessing carbon taxation. Moreover,

198. *Id.* at 21.

199. See, e.g., Johanna Lepeule, et al., *Chronic Exposure to Fine Particles and Mortality: An Extended Follow-up of the Harvard Six Cities Study from 1974 to 2009*, 120 ENVTL. HEALTH PERSP. 965, 970 (2012); Francine Laden et al., *Reduction in Fine Particulate Air Pollution and Mortality: Extended Follow-up of the Harvard Six Cities Study*, 173 AM. J. RESPIRATORY & CRITICAL CARE MED. 667, 669–71 (2006); C. Arden Pope III et al., *Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution*, 287 J. AM. MED. ASS'N 1132, 1136 (2002); C. Arden Pope III et al., *Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults*, 151 AM. J. RESPIRATORY & CRITICAL CARE MED. 669, 672–73 (1995); Douglas W. Dockery et al., *An Association Between Air Pollution and Mortality in Six U.S. Cities*, 329 NEW ENG. J. MED. 1753, 1756–59 (1993); HEALTH EFFECTS INST., SPECIAL REPORT: REANALYSIS OF THE HARVARD SIX CITIES STUDY AND THE AMERICAN CANCER SOCIETY STUDY OF PARTICULATE AIR POLLUTION AND MORTALITY 90 (JULY 2000) <http://pubs.healtheffects.org/view.php?id=6>

200. See, e.g., GARY CLYDE HUFBAUER ET AL., GLOBAL WARMING AND THE WORLD TRADING SYSTEM 48 (2009); Bankes et al., *supra* note 141, at 413–15; Pauwelyn, *supra* note 141, at 48–49.

CGE models seem to confirm the intuition that what amounts to a small redistribution—on the order of a few hundred dollars from a rich household to a poor one—will not wreak the widespread economic havoc that climate skeptics have been warning us about.

B. *Some Distributional Considerations*

The absence of widespread economic havoc does not imply the absence of *localized* economic havoc. Certainly, a reduction in coal usage would lead to the continued decline of coal-producing regions. That would certainly be an important political consideration, except for one curious and shocking thing: a carbon tax with a lump sum distribution would, on the whole, *benefit* most households in those regions dependent on coal production. Both the RFF and CCL-commissioned models show net gains for most households in the Appalachian region.²⁰¹ The RFF study shows small declines for the heavily coal-dependent states of West Virginia and Kentucky, but because the losses are concentrated in the highest-income households, the majority of households in those states—the poorest three quintiles—actually are better off in a world with a carbon tax with a lump sum distribution.²⁰² That is not to say *all* of the households in the lowest three quintiles are better off. There is likely considerable heterogeneity within those large groups, but on average those demographics benefit. Recall, too, that the RFF model incorporates the somewhat crabbed assumption that capital is free to flee the United States in search of carbon tax-free jurisdictions.²⁰³

201. See Kevin Ummel, Impact of CCL's Proposed Carbon Fee and Dividend Policy: A High-Resolution Analysis of the Financial Effect on U.S. Households 29 (Int'l Inst. Applied Sys. Analysis, Working Paper v1.3, 2016), <https://citizensclimatelobby.org/wp-content/uploads/2016/02/Household-Impact-Study-Ummel.pdf>; WILLIAMS III ET AL., *supra* note 120, at 14–22.

202. See WILLIAMS III ET AL., *supra* note 120, at 19 (Fig. 4).

203. CITIZENS' CLIMATE LOBBY, *supra* note 137.

The intuition behind this surprising result is that a lump sum distribution approach, as noted above, is progressive.²⁰⁴ For the poorest households, the lump sum distribution is likely to be larger than the increases in energy costs. The fee-and-dividend approach thus effects a small wealth transfer from rich households to poor ones. In the Appalachians, the distribution is apt to be so valuable to households in addressing immediate needs that the economic boost overwhelms the job losses. Moreover, job losses in those regions are already high due to a variety of economic factors, not the least of which is low natural gas prices.²⁰⁵ While a carbon tax adds insult to injury, its actual contribution to the region's woes would be small. Coal usage has plummeted so quickly and sharply that the declines have surpassed the reductions originally projected to occur under the Obama Administration's Clean Power Plan, *a full five years before it was due to take effect*.²⁰⁶ Coal is dying, and policy is largely irrelevant. Viewed in that light, a carbon fee-and-dividend, aiding as it does the poorest, is a salve and not a curse for aggrieved Appalachians.

C. A Political Appraisal

Apart from addressing regressiveness and other distributional concerns, the lump sum approach has other political advantages. First, it addresses the concern that a carbon tax or climate policy would "grow" government. The point of a separate dedicated instrument is to *guarantee* that the carbon fees are collected, and returned. Second, it is a revenue recycling option that is guaranteed to remain

204. See discussion *supra* Section III.B.1.

205. See Walter J. Culver & Mingguo Hong, *Coal's Decline: Driven by Policy or Technology?* 29 ELEC. J. 50, 51 (2016); Bailey, *supra* note 168.

206. Annalee Armstrong, *Coal Generation Drop in 2015 Beats EPA's Clean Power Plan Expectations*, SNL ENERGY (Jan. 9, 2017, 10:24 AM), https://www.snl.com/Cache/snlpdf_e86c249b-d67e-4d8e-9e18-3ecb89a7fbb7.pdf.

revenue neutral, as the only disbursements made are those collected as carbon fees. Recycling revenues by reducing income taxes, sales taxes, or other taxes with uncertain collections, runs the risk of a significant net revenue loss or gain, introducing a potential political and economic complication.²⁰⁷

There is one last subtle, but critically important advantage to the lump sum distribution approach: a carbon tax with a lump sum distribution provides a climate policy in which the risk of rent-seeking, while not eliminated, is at least *minimized*. The basic components of the fee and dividend approach are so simple and straightforward, so cabined off from other policies, that an attempt to rent-see would painfully obvious. If a carbon tax (or “fee”) is going to be collected, carbon taxpayers are going to be very interested in how that money is spent. An attempt to rent-see on the back of a carbon tax would run up against a suspicious and highly motivated carbon tax-paying electorate. The lump sum distribution option is a way of reducing the number of political objectives a single one: a modest wealth redistribution.

Of all of the potential political objectives that could be addressed by carbon tax revenues, the one that would seem to generate the loudest applause and the least screaming would be the small wealth redistributions modeled by the RFF and CCL studies, among others. Addressing as it does the impacts on coal-producing regions by helping the poorest, the fee-and-dividend approach offers the simplest single political objective, and the best chance to isolate that single objective. For potential legislative sponsors actually interested in good, simple policy, fee-and-dividend offers the opportunity to make one small positive change in climate policy. The incentive for those lawmakers would be to fend off attempts to inject rent-seeking into a fee-and-dividend.

207. See *supra* notes 86-88 and accompanying text.

Once a climate policy is held hostage to one thing, it will be hostage to everything.

V. A FINAL, FISCAL WILD CARD

In the midst of the 2008–09 financial crisis, much discussion at the federal level focused on how to stimulate economic activity in a recession veering dangerously toward a becoming full-blown, catastrophic depression.²⁰⁸ Economic activity is highly relational; if large, systemically-important sectors and populations withdraw from economic activity, it can discourage other sectors and populations from transacting as well, in turn further dampening economic activity. Economists across the political spectrum favored an injection of government spending to jump-start economic activity, and arrest the downward spiral of economic malaise that was beginning to take hold.²⁰⁹ The question was exactly how the U.S. government was going to spend money to stimulate the economy.

Mark Zandi, the chief economist at Moody's Analytics, the research arm of the credit rating giant, authored a report and testified before the Senate Finance Committee comparing the impacts on U.S. GDP of different ways to inject money into the economy.²¹⁰ For each option, Zandi estimated how much of a short-term (one year) increase in GDP would occur for every dollar spent by the federal government.²¹¹ The options included not only outright

208. For an account, see TIMOTHY F. GEITHNER, *STRESS TEST: REFLECTIONS ON FINANCIAL CRISES* (2014).

209. See, e.g., Martin Feldstein, *The Stimulus Plan We Need Now*, WASH. POST (Oct. 30, 2008), <http://www.washingtonpost.com/wp-dyn/content/article/2008/10/29/AR2008102903198.html> (Feldstein is a conservative economist who served the three previous Republican presidents).

210. See *The Economic Outlook and Stimulus Options: Hearing Before the S. Budget Comm.*, 110th Cong. 18–30 (2008) (written testimony of Mark Zandi, chief economist and cofounder of Moody's Economy.com).

211. *Id.* at 27.

expenditures, but *de facto* expenditures in the form of tax cuts and other forbearances in revenue collections.²¹² Table 1 lists the options, in decreasing order of effectiveness.

TABLE 1. Capital Injection Options in the U.S. Economy²¹³

Policy	Fiscal "Bang For the Buck"
Temporarily Increase in Food Stamps	1.73
Extending Unemployment Insurance Benefits	1.63
Increase Infrastructure Spending	1.59
General Aid to State Governments	1.38
Temporary Payroll Tax Holiday	1.29
Refundable Lump-Sum Tax Rebate	1.22
Temporary Across-the-Board Tax Cut	1.03
Non-refundable Lump-Sum Rebate	1.01
Permanent Extension of Alternative Minimum Tax Patch	0.49
Make Dividend and Capital Gains Tax Cuts Permanent	0.38
Make Bush Income Tax Cuts Permanent	0.31
Cut in Corporate Tax Rate	0.30
Accelerated Depreciation	0.25

This list should *not* be confused with long-term economic effectiveness. The effects of capital accumulation, which would be best encouraged by the policies at the

212. *Id.*

213. *Id.*

bottom of that list, take considerably longer than the one-year time frame used by Zandi, whose charge was to determine which tool would best provide the “shock treatment” required in a dangerous economic slowdown. The most effective measures—those at the top of the list—place money in the hands of consumers, especially poorer households. Those at the bottom, which pump money into the hands of producers and potential capital investors, were projected to be the least effective, at least in the short term.

While this short-term analysis by Zandi does not substitute for long-term economic analysis, it is surely worth remembering that this period following the financial crisis has seen corporations hoarding cash, and *not* spending money on investments, and therefore job creation. And do the short-term shock treatments, which happen to benefit poor households, provide any long-term economic benefit? That is a question that could easily divide Nobel Laureates, and probably falls into that class of economic questions that depend a fair bit on ideology. However, it seems important to avoid reifying certain pervasive (and perhaps unavoidable) macroeconomic assumptions, because the political implications are so profound, and the justifications so tenuous.

CONCLUSION

Carbon taxation can no longer be viewed in isolation as a front-end cost, without considering potential back-end benefits. The omission from previous works, including my own book, *The Case for a Carbon Tax*,²¹⁴ was in neglecting to tie together the economic case for carbon taxation as a climate policy, with a discussion of the uses to which carbon tax revenues would be put. Choosing from among different uses of carbon tax revenues is ineluctably a political choice

214. HSU, *supra* note 20.

with economic and distributional consequences. Without this discussion, the unassailable merits of a carbon tax cannot be sensibly translated into policy.

Interest and industry groups have sought to reinforce the negative connotations with the word “tax” by obfuscating the revenues considerations of using carbon tax proceeds, and essentially assuming them away.²¹⁵ Such assumptions are actually *worse* than assuming that the money is spent on something wasteful, like the proverbial Alaskan bridge to nowhere—at least that money would be essentially gifted to a construction industry and its workers, who would thereafter spend it, re-injecting some of that wasted money into the economy. It is obvious why these groups make such an outlandish assumption: there is much good that can be done with carbon tax proceeds, in most cases more than compensating for the economic costs of a carbon tax, even without taking into account the benefits of reducing greenhouse gas emissions and the risks of climate change. Carbon taxation is the camel’s nose that threatens to completely upend the comfortable fossil fuel-centered energy policy tent, and allowing that carbon tax revenues can be useful is to allow that nose to enter.

Bearing in mind the built-in assumptions of CGE models, it is clear that the dire predictions of a carbon tax destroying or even seriously damaging the U.S. economy are nonsense. Thoughtful design might actually result in something close to a no-cost or very low-cost policy. Moreover, if one assumes even modest economic benefits from reducing greenhouse gas emissions and conventional co-pollutants, the economic case for a carbon tax becomes overwhelming.

Carbon tax revenues can potentially serve political purposes and/or economic purposes, with those two types of objectives potentially at odds, but quite possibly not.

215. See sources cited *supra* note 24.

Conventional modeling assumptions would suggest that carbon tax revenues are best used to reduce some distortionary taxes such as corporate income taxes, capital gains taxes, and perhaps income taxes. However, the political climate in the United States is such that inequality is currently a salient concern. The more politically palatable use of revenues would be to reverse the regressive effects of carbon taxation, and address a variety of inequality concerns. These are not commonly thought among economists to be economically efficient, but enough economic uncertainty exists so that this bit of postulation is fair game for debate. Taking political and economic concerns together, there would appear to be more net political gains to be had by orienting carbon tax revenues towards poorer households, and adopting the lump sum distribution, or fee-and-dividend approach.

Towards that end, a carbon fee-and-dividend approach is promising in that it carries a small amount of political baggage. Redistributions are political red meat for some conservatives, but that is only an ideological flashpoint, devoid of any empirical heft. Assigning a number to that redistribution—on the order of \$1,000 per household—defuses the rhetorical power of this argument. There is moreover good reason to suspect that the real costs are lower still, as the conditions have rarely been more ripe for consumer spending to take the lead in stimulating economic activity. The fact that conventional economic modeling assumptions may not adequately account for this historical anomaly should not be a bar to a fairly modest economic experiment, especially if it reduces the risks of climate change.

And finally, to repeat a theme of this Article, many of the political taboos at the federal level are less formidable at the state level, so that the merits of a carbon tax may be more relevant for states. State spending is dominated by

public secondary education, public higher education, transportation, and Medicaid,²¹⁶ bread-and-butter programs that resonate even in a toxic political environment. To tax greenhouse gas emissions to fund these uses would be considerably more plausible than would be many federal spending programs. Climate policy in the era of Trump might, after all, see the introduction of carbon taxation in the United States.

216. See NAT'L ASS'N STATE BUDGET OFFICERS, STATE EXPENDITURE REPORT: EXAMINING FISCAL 2014–2016 STATE SPENDING 7 (2016), <http://www.nasbo.org/reports-data/state-expenditure-report/state-expenditure-archives>.