Washington and Lee Law Review

Volume 67 | Issue 1 Article 5

Winter 1-1-2010

Mitigating the Distributional Impacts of Climate Change Policy

Tracey M. Roberts

Follow this and additional works at: https://scholarlycommons.law.wlu.edu/wlulr

 Part of the Environmental Law Commons

Recommended Citation

Tracey M. Roberts, *Mitigating the Distributional Impacts of Climate Change Policy*, 67 Wash. & Lee L. Rev. 209 (2010).

Available at: https://scholarlycommons.law.wlu.edu/wlulr/vol67/iss1/5

This Article is brought to you for free and open access by the Washington and Lee Law Review at Washington and Lee University School of Law Scholarly Commons. It has been accepted for inclusion in Washington and Lee Law Review by an authorized editor of Washington and Lee University School of Law Scholarly Commons. For more information, please contact christensena@wlu.edu.

Mitigating the Distributional Impacts of Climate Change Policy

Tracey M. Roberts*

Abstract

Under both a cap-and-trade system and a greenhouse gas tax, the government will regulate energy suppliers and distributors, utility companies, and large manufacturers. These parties will bear the statutory incidence of the regulation. However, the financial impacts of regulating greenhouse gas emissions will be borne primarily by consumers. Consumers will bear the economic incidence of the regulation in the form of increased costs of gasoline, electricity, and home heating fuels and in increased consumer prices for all goods manufactured or distributed using fossil fuels. Greenhouse gas regulation will also generate significant revenue. This Article addresses the question of what should be done with those revenues. Models of the economic incidence of the two systems indicate that while high-income households will bear a larger portion of the distributional impacts because they consume more, low-income households will bear a disproportionate burden as a percentage of their household income. In view of the political challenges associated with redistribution, the practical challenges associated with calculating the net burdens of environmental regulation, and the central importance of protecting the least advantaged in society, this Article proposes that the optimal regulatory regime is one that neutralizes the distributional impacts. The government may achieve this by capturing revenues from a cap-and-trade system or a greenhouse gas tax and using those revenues to issue a rebate that is proportional to household income and scaled according to household size. This Article also suggests that the most efficient method for delivering the rebate is by issuing a refundable tax credit through the income tax system,

* Research Affiliate with the Climate Change Research Network of Vanderbilt University, and Fellow, Searle-Kauffmann Institute. The author would like to thank Alan Auerbach, Lily Batchelder, Victor Fleischer, William Greene, Mitchell Kane, Michael Oppenheimer, Matthew Reiber, Daniel Shaviro, Michael Vandenbergh, and Katrina Wyman for their comments and for helpful discussions on issues related to this Article.

based on the institutional compatibility of that system with the regulatory and distributional goals of the policy.

Table of Contents

I. Introduction

The international scientific and political communities have reached general consensus that greenhouse gas emissions caused by human activities

are likely to have dangerous, long-term impacts on the global climate and have concluded that action must be taken to address the causes of climate change if catastrophic losses are to be avoided.[1] Finally, after years of delay[2] and denial,[3] the United States has joined that consensus.[4]

---

1. The global average temperature has increased by 0.6 degrees Celsius since the pre-industrial era and scientists believe that an increase of between 1.4 and 4.3 degrees Celsius is now unavoidable. V. Ramanathan & Y. Feng, *On Avoiding Dangerous Anthropogenic Interference with the Climate System: Formidable Challenges Ahead*, 105 PROC. NAT'L ACAD. SCI. U.S. 14245, 14245 (2008); *see also* Susan Solomon et al., *Irreversible Climate Change Due to Carbon Dioxide Emissions*, 106 PROC. NAT'L ACAD. SCI. U.S. 1704, 1704 (2009) (reporting that climate change caused by carbon dioxide emissions is largely irreversible for 1,000 years after emissions cease). Scientists with the Intergovernmental Panel on Climate Change (IPCC) predict that a shift of this magnitude likely will result in increased frequency and severity of extreme weather (such as heat waves, tropical cyclones, floods, droughts, wildfires, and hurricanes), harm to and loss of unique and threatened environmental systems (such as alpine areas, glaciers, and coral reefs), and increased risk of large-scale climate shifts (such as deglaciation of ice sheets, rapid sea-level rise, ocean acidification, and changes in the circulation system of the ocean). *See* Joel B. Smith et al., *Assessing Dangerous Climate Change Through an Update of the Intergovernmental Panel on Climate Change (IPCC) "Reasons for Concern,"* 106 PROC. NAT'L ACAD. SCI. U.S. 4133, 4134–37 (2009) (describing the risks posed by global climate change, including harm to unique and threatened environmental systems, extreme weather events, and large-scale discontinuities). For a brief overview of the history of efforts to address climate change, see Reuven S. Avi-Yonah & David M. Uhlmann, *Combating Global Climate Change: Why a Carbon Tax Is a Better Response to Global Warming than Cap-and-Trade*, 28 STAN. ENVTL. L.J. 3, 14–20 (2009). For a brief overview of the science of climate change, see Michael P. Vandenbergh & Anne C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1679–87 (2007).

2. During the finalization of the Kyoto Protocol, the U.S. Senate unanimously passed the Byrd-Hagel Resolution, stating that it was the sentiment of the Senate that the United States should not be a signatory to any protocol that would seriously harm the U.S. economy or that failed to include emissions standards for developing nations. S. Res. 98, 105th Cong. (1997).

3. *See* Robert F. Rich & Kelly R. Merrick, *Use and Misuse of Science: Global Climate Change and the Bush Administration*, 14 VA. J. SOC. POL'Y & L. 223, 231–43 (2007) (reviewing allegations that the Bush administration censored and suppressed scientific views on global climate change); Juliet Eilperin, *White House Prods Allies to Oppose Limits on Greenhouse Gases*, WASH. POST, Nov. 26, 2008, at A4 (describing communications from the Bush administration urging mayors from cities across the United States to oppose emission limits on greenhouse gases); Andrew C. Revkin, *Climate Expert Says NASA Tried to Silence Him*, N.Y. TIMES, Jan. 29, 2006, at A1 (detailing claims by the top climate scientist at NASA that the Bush administration tried to silence his warnings about global warming).

4. Three separate groups of states and Canadian provinces have begun to develop cap-and-trade systems to reduce greenhouse gas emissions: the Western Climate Initiative (Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Ontario, Oregon, Quebec, Utah, and Washington); the Regional Greenhouse Gas Initiative (Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont); and the Midwestern Regional GHG Reduction Accord (Illinois, Iowa, Kansas, Michigan, Minnesota, Wisconsin, and Manitoba as full participants; Indiana, Ohio, and South Dakota as observers). Both the House and the Senate have proposed legislation to curb greenhouse gas emissions. *See generally* American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong.; America's Climate Security Act of

This Article concerns itself with the distributional impacts, or the "economic incidence," of climate change policy in the United States.[5] The Article first explains what "incidence" is and examines economic incidence under the various regulatory schemes that might be used to address climate change. A number of existing economic studies model the incidence of carbon taxes, greenhouse gas taxes, and cap-and-trade systems. This Article differs from those studies in that it compares data from the various incidence models, examines climate change proposals in light of the theory underlying equity and efficiency concerns, and proposes both a regulatory scheme and a delivery mechanism designed to balance those concerns. The Article argues that the best regulatory scheme will be one in which the government neutralizes the distributional impacts of climate change policy by (a) capturing the revenues or scarcity rents that result from the regulatory regime, and (b) redistributing those revenues or rents to households in a manner designed to offset the distributional impacts of the policy. The Article suggests that the best policy is one that neutralizes the distributional impacts by delivering a rebate that is proportional to the incidence at each decile of income, and scaled according to household size. Finally, the Article argues that the rebate would be most effectively delivered through the income tax system as a refundable tax credit.

The Article is organized as follows: Part II reviews the different forms of environmental regulation (command-and-control regulation, emissions trading systems, and excise taxes on greenhouse gas emissions), explains how incidence varies based on the form of regulation used, and pulls from the economic literature to identify the distributional consequences of both a cap-and-trade regime and a greenhouse gas tax. Part III examines the theoretical underpinnings of alternative policy choices in offsetting the distributional

---

2007, S. 2191, 110th Cong.; Low Carbon Economy Act of 2007, S. 1766, 110th Cong.; Global Warming Reduction Act, S. 485, 110th Cong. (2007); Global Warming Pollution Reduction Act, S. 309, 110th Cong. (2007); Climate Stewardship and Innovation Act of 2007, S. 280, 110th Cong.; Keep America Competitive Global Warming Policy Act of 2006, H.R. 5049, 109th Cong.; and Safe Climate Act of 2006, H.R. 5642, 109th Cong. In his first State of the Union address to Congress, President Barack Obama voiced his support for a cap on carbon dioxide emissions. *See* Posting of Kate Galbraith to the N.Y. Times Green Inc. blog, http://greeninc.blogs.nytimes.com/2009/02/25/obama-vows-support-for-renewables-and-a-carbon-cap/ (Feb. 25, 2009, 6:57 EST) (last visited Feb. 23, 2010) ("Mr. Obama clearly stated his support for a cap on carbon dioxide emissions: 'I ask this Congress to send me legislation that places a market-based cap on carbon pollution and drives the production of more renewable energy in America,' he said.") (on file with the Washington and Lee Law Review). In response to this call, the House of Representatives recently passed the American Clean Energy and Security Act of 2009. H.R. 2454, 111th Cong. (as passed by House, Jun. 26, 2009).

5. While any international emissions trading regime that ultimately may be developed will alter the pattern of incidence within the United States, this Article does not address incidence under international trading.

impacts, outlines the equity and efficiency debate, and concludes that these concerns are best addressed by providing a rebate that achieves distributional neutrality. The Article then identifies the optimal method for delivering that rebate based on institutional compatibility. Part IV concludes the Article.

II. Incidence of Climate Change Policy

In economic terms, the environmental effects of carbon dioxide and other greenhouse gases in the atmosphere are "externalities." An externality occurs when the actions of one individual or firm have a direct, unintended impact on another party for which that party has not been compensated.[6] Although society benefits from using fossil fuels, there is a social cost: Pollution in the form of greenhouse gases. Society enjoys a net gain in welfare as long as the social benefits from using fossil fuels are greater than the social costs of the harms caused by greenhouse gases. Problems arise when the individuals who enjoy the benefits of an activity are not the same as those who bear the costs of that activity. When the costs are shifted to others, they are said to be "externalized" and the harm is said to be a "negative externality."[7] When the harm caused by climate change is not included in the price of fossil fuels, the price for those fuels is too low, demand is too high, too many fossil fuels are used, too many goods are produced, and the harm from the resulting pollution exceeds the benefits from having access to the fuel and goods.[8]

The goal of much environmental regulation is to restore the balance between the social benefits of a polluting good and the social costs of pollution. There are a number of ways governments have sought to restore this balance. The primary instruments include command-and-control systems, cap-and-trade systems, and excise taxes on the polluting goods.[9] Alternate regulatory regimes may result in a different distribution of economic impacts among the various segments of the U.S. population. In general, these impacts are not considered

---

6. *See* NATHANIEL O. KEOHANE & SHEILA M. OLMSTEAD, MARKETS AND THE ENVIRONMENT 66 (2007) ("An externality results when the actions of one individual (or firm) have a direct, unintentional, and uncompensated effect on the well-being of other individuals or the profits of other firms.").

7. *See id.* at 65 (stating that a negative externality results when an activity indirectly imposes costs on a downstream party).

8. *See id.* at 67–70 (describing how a negative externality such as pollution is a market failure).

9. *See* Don Fullerton, *A Framework to Compare Environmental Policies*, 68 S. ECON. J. 224, 230–37 (2001) (describing eight major policy options for environmental regulation).

in decisions about whether to regulate.[10] Economists tend to ignore distributional impacts: Because the goal of economics is to maximize efficiency (enlarge the pie), they leave redistribution issues (division of the pie) to the tax and transfer system.[11] Because the process of maximizing efficiency can result in significant changes to the way the pie is divided, governments undertake redistribution. To do so, however, policymakers must identify the distributive consequences of the policy to society as a whole and ascertain the way the costs and benefits of the policy are allocated throughout the population.[12]

Each of the three main policy instruments for managing climate change distributes the benefits and the burdens differently. That is, each legislative structure may produce a different pattern of incidence. Before discussing these differences, this Article will provide a brief overview of economic incidence.

A. What Is Incidence?

When legislators impose a tax or regulation, the person on whom the tax or regulation is levied (the party responsible for turning the tax over to the government or for complying with the regulation) bears only the "statutory incidence" of the legislation; the economic incidence—the financial burden of the tax or regulation—may fall on others.[13] Ultimately, only human beings

---

10. *See* RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 181 (2008) ("In general, economic analysis tends to disregard distributional impacts, favoring wealth-maximizing regulation regardless of how that wealth is distributed.").

11. *See id.* (indicating that economic theory focuses on maximizing the net benefits of the regulation, but leaves the tax-and-transfer system to achieve a desirable distribution of resources).

12. *See id.* (noting that for a "centralized redistributive mechanism to work properly, there must be an understanding of the net distributive consequences of the regulatory system, that is, how the cumulative costs and benefits of regulations are borne by the American public and its many subpopulations").

13. *See* JONATHAN GRUBER, PUBLIC FINANCE AND PUBLIC POLICY 519 (2005) (defining statutory incidence and economic incidence and stating the rule that "the statutory burden of a tax does not describe who really bears the tax"). Note that this definition assumes that one of the goals of government is to maximize well-being and that well-being may be measured, at least in part, by income and the number of individuals in a household unit that share that income. It further assumes that well-being is enhanced by use of that income through consumption. Views to the contrary are emerging, however. *See, e.g.*, Mark A. Cohen & Michael P. Vandenbergh, *Consumption, Happiness, and Climate Change*, 38 ENVTL. L. REP. 10834, 10837 (2008) (arguing that utility is enhanced not only by consumption, but by access to resources that are not currently being measured, including leisure, health, family, and

bear these financial burdens.[14] The costs associated with climate change regulation incurred by a firm, such as an energy supplier, utility company, or manufacturing facility, will either be passed forward to consumers as increased prices for electricity, fuels, and consumer goods, or passed backward to investors (suppliers of capital) as lower returns on investment, to workers (suppliers of labor) as lower wages, or to owners of the fossil fuel resources (owners of coal mines and oil and natural gas wells) as reduction in the value of these resources.[15] As between producers and consumers, the economic burden of regulation will fall on the party with the least elastic response to the regulation.[16]

Elasticity of demand measures the sensitivity of the quantity of a good demanded to a change in price for that good.[17] In the tax context, elasticity is a measure of the extent to which an individual or group seeks to avoid the impact of a tax or regulation.[18] When a tax or regulation is imposed on greenhouse gases, it increases the price of fossil fuel-based energy supplies and increases the prices of other goods and services manufactured through their use. If, in response to a small price increase, a population changes its consumption pattern by shifting to substitutes or by consuming less, it has a highly elastic response. If, in response to large price increase, the population does not respond, it has a highly inelastic response. A number of factors impact the elasticity: (1) the availability of substitutes;[19] (2) the duration of

---

community); Douglas A. Kysar & Michael P. Vandenbergh, *Introduction: Climate Change and Consumption*, 38 ENVTL. L. REP. 10825, 10825–29 (2008) (outlining the role that considerations for consumption have played in environmental policy and the assumptions underlying the current debate between conservation and economic growth).

14. *See* GRUBER, *supra* note 13, at 518, 667 (explaining that while corporations remit corporate taxes to the government, individuals—such as consumers, workers, and investors—actually bear the corporate tax burden).

15. *See* Kevin A. Hassett, Aparna Mathur & Gilbert E. Metcalf, *The Incidence of a U.S. Carbon Tax: A Lifetime and Regional Analysis*, 30 ENERGY J. 155, 159 (2009) ("The final issue in an incidence analysis is how to allocate the tax burden between consumers and producers. Taxes on energy can be passed forward into higher consumer prices or backward in the form of lower returns to factors of supply (capital, labor, and resource owners).").

16. *See* GRUBER, *supra* note 13, at 525 ("Parties with inelastic supply or demand bear taxes; parties with elastic supply or demand avoid them.").

17. *See* ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS 32–33 (6th ed. 2005) (explaining that price elasticity of demand is a measure that reflects the change in demand for a good as a function of its change in price).

18. *See* GRUBER, *supra* note 13, at 524–27 (explaining that the elasticities of supply and demand ultimately determine who will bear the burden of taxes and who will be able to avoid them).

19. *See* HAL R. VARIAN, INTERMEDIATE MICROECONOMICS, A MODERN APPROACH 272 (7th ed. 2006) ("[T]he elasticity of demand for a good depends to a large extent on how many close

the price increase;[20] (3) the degree to which the good is essential;[21] (4) whether the good is a durable good (a good with a useful life greater than three years), which tracks with the significance of the good as part of the household budget;[22] and (5) the breadth of the tax.[23] In the context of climate change legislation, if a tax is levied on fossil fuels, elasticity will increase as more alternative energy substitutes become available. The longer the tax is imposed, the more time households have to take measures to avoid the impact of the increase in the price of fossil fuels (such as weatherizing or purchasing more fuel efficient vehicles). If a good is necessary, households will simply pay the higher price, though they may take more care in purchasing goods that comprise a larger share of their budgets in order to reduce the impact of the costs of those goods. The broader the tax and the more goods covered by the tax, the more difficult it becomes for households to avoid the impact of the tax.

Recently, a number of economic studies have been developed to model the economic incidence of climate change.[24] Most of these studies of both excise

---

substitutes it has.").

20. *See* PINDYCK & RUBINFELD, *supra* note 17, at 38 (noting that elasticities change depending on whether changes in demand are evaluated over the short term or the long term).

21. *See* GRUBER, *supra* note 13, at 525 (noting that the demand for essential goods is highly inelastic).

22. *See* PINDYCK & RUBINFELD, *supra* note 17, at 38–39 (explaining the relationship between demand and durability).

23. *See* GRUBER, *supra* note 13, at 538 ("[T]axes that are broader based are harder to avoid than taxes that are narrower, so the response of producers and consumers to the tax will be smaller and more inelastic.").

24. *See* Nicholas Bull, Kevin A. Hassett & Gilbert E. Metcalf, *Who Pays Broad-Based Energy Taxes? Computing Lifetime and Regional Incidence*, 15 ENERGY J. 145, 145–47 (1994) (introducing a model to study the lifetime economic incidence of a BTU (British Thermal Unit) tax and a carbon tax); CONGRESSIONAL BUDGET OFFICE, U.S. CONGRESS, WHO GAINS AND WHO PAYS UNDER CARBON-ALLOWANCE TRADING? THE DISTRIBUTIONAL EFFECTS OF ALTERNATIVE POLICY DESIGNS, at vii (2000) [hereinafter CBO], *available at* http://www.cbo.gov/ftpdocs/21xx/doc2104/carbon.pdf ("This study focuses on . . . how the costs of U.S. government policies to reduce CO2 emissions . . . would ultimately be distributed among U.S. households."); Terry Dinan & Diane Lim Rogers, *Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers*, 55 NAT'L TAX J. 199, 199–201 (2002) (describing the authors' study, which examines the distributional effects of a carbon allowance trading program); Ian W.H. Parry, *Are Emissions Permits Regressive?*, 47 J. ENVTL. ECON. & MGMT. 364, 364–67 (2004) (introducing a model to estimate the distributional effects of emissions permits for carbon, SO2, and NO2); Gilbert E. Metcalf, *A Proposal for a U.S. Carbon Tax Swap: An Equitable Tax Reform to Address Global Climate Change* 11–21 (Brookings Inst., The Hamilton Project, Discussion Paper No. 2007-12 2007) [hereinafter Metcalf (2007)], *available at* http://www.brookings.edu/papers/2007/10carbontax_metcalf.aspx (proposing a carbon tax swap to address climate change and evaluating the distributional impacts of the proposal); Hassett et al., *supra* note 15, at 155–57 (introducing the authors' study, which examines the economic incidence of a U.S. carbon tax); Dallas Burtraw, Rich

taxes and cap-and-trade systems assume that producers will fully shift the burden of the regulatory regime forward to consumers.[25] In the long run, capital is likely to be perfectly elastic because investors have numerous alternative options for investing their funds.[26] When capital may be invested in any country in the world, it will flow to other countries in order to avoid the burden of the tax.[27] Labor is also generally held to be perfectly elastic over the

---

Sweeney & Margaret Walls, The Incidence of Climate Change Policy, Where You Stand Depends on Where You Sit, at i–ii (Sept. 2008) (unpublished discussion paper, on file with the Washington and Lee Law Review) [hereinafter Burtraw (2008)], *available at* http://www.rff.org/RFF/ Documents/RFF-DP-08-28.pdf (summarizing the authors' study of the economic incidence of a carbon dioxide cap-and-trade program); Gilbert E. Metcalf et al., *Analysis of U.S. Greenhouse Gas Tax Proposals* 1 (Nat'l Bureau of Econ. Research Working Paper Series, Working Paper No. 13980, 2008) [hereinafter Metcalf (2008)], *available at* http://www.nber.org/ papers/w13980 (introducing the authors' study, which examines the economic effects and distributional impacts of cap-and-trade systems and emissions taxes); Dallas Burtraw, Rich Sweeney & Margaret Walls, *The Incidence of Climate Change Policy, Alternative Uses of Revenues from a Cap-and-Trade Auction* 1–3 (Apr. 2009, rev. June 2009) (unpublished discussion paper, on file with the Washington and Lee Law Review) [hereinafter Burtraw (2009)], *available at* http://www.rff.org/RFF/Documents/ RFF-DP-09-17-REV.pdf (introducing the author's study, which examines the economic incidence of different policy scenarios for allocating carbon allowances); CONGRESSIONAL BUDGET OFFICE, U.S. CONGRESS, THE ECONOMIC EFFECTS OF REGULATION TO REDUCE GREENHOUSE-GAS EMISSIONS (2009) [hereinafter CBO 2009] (examining the economic impacts of The American Clean Energy and Security Act of 2009 on households from compliance costs before and after the application of revenues from the policy).

25. *See supra* note 24 and accompanying text (identifying studies that assume the cost of climate change regulation will ultimately be passed on to consumers). *But see* A. Lans Bovenberg & Lawrence H. Goulder, Neutralizing the Adverse Industry Impacts of CO2 Abatement Policies: What Does It Cost? 39 (July 2000) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/ Documents/RFF-DP-00-27.pdf (concluding that industry will be able to shift a significant portion—but not all—of the regulatory burden to consumers). Bovenberg and Goulder developed their model to determine what it would cost to insulate the profits of key industrial stakeholders in the coal, oil, and gas industries in order to make regulation politically palatable. *Id.* at 4. Their model therefore assumed that capital was the only imperfectly elastic factor. *Id.* at 3, 40. They argued that while producers can shift onto consumers most of the burden from a carbon tax, they will bear some of the burden of the carbon tax because the supply is not infinitely elastic. *Id.* at 14. They concluded that the government would only need to provide a small portion of the emissions permits for free to these industries to neutralize the adverse impacts to capital. *Id.* at 27–28. Note that the impacts that they calculated were from an *unanticipated* carbon tax. *Id.* at 14. If the tax were anticipated, capital would begin to shift from the time the regulation was announced. At the time any regulation went into effect, capitalized assets would have settled at a new price that reflected the impact of the regulation and shareholders would have changed.

26. *See* Dinan & Rogers, *supra* note 24, at 206 ("In the long run capital and labor would leave carbon producing industries until returns to factors in those industries reflected returns throughout the rest of the economy.").

27. *See* Don Fullerton & Garth Heutel, *The General Equilibrium Incidence of*

long run because workers may retool, retrain, and relocate.[28] Short-term impacts may differ.[29]

Because both capital and labor tend to be highly elastic in the long run, economic models of the incidence of various climate change regimes predict that the full burden of a carbon tax or cap-and-trade regime will be passed through to consumers directly in higher prices for gasoline, fuel, oil, and electricity, and indirectly in higher prices for services and goods.[30] The increase in price for a good depends on the amount of energy used to produce and transport the good to its ultimate destination—the amount of carbon dioxide or other greenhouse gases imbedded in the item produced.[31] The total greenhouse gas tax paid or the total burden of a cap-and-trade regime borne by a household increases with the household's consumption of fuel, electricity, and goods.[32]

B. Policy Instruments for Controlling Emissions of Greenhouse Gases

There are three primary instruments for regulating environmental pollution: command-and-control systems, cap-and-trade systems, and excise

---

Environmental Taxes, 91 J. PUB. ECON. 571, 588 (2007) ("In a model with perfect international capital mobility, for example, the net return to capital is fixed by world capital markets, and so the pollution tax cannot place a burden on capital . . . .").

28. *See* Dinan & Rogers, *supra* note 24, at 203 (stating the assumption that "in the long run the supply of labor and capital into the production of carbon is perfectly elastic"). Note that the assumption that labor is elastic is controversial. *See, e.g.*, GRUBER, *supra* note 13, at 590–92 (describing economic findings indicating that the elasticity of labor supply varies depending on such factors as whether the focus is on primary earners or secondary earners, and also noting that existing studies on labor elasticity are subject to limitations and have not carefully studied all aspects of the issue).

29. In the short term, there may be high job losses in certain energy sectors, such as coal mining, or polluting industries that employ low-skill workers. *See* Parry, *supra* note 24, at 385 (suggesting that "if polluting industries disproportionately employ low-skill workers, [environmental policies] may impose an additional burden on low-income households"); *see also* Bull et al., *supra* note 24, at 161 (noting other studies that suggest energy taxes may cause disproportionately more job losses in coal producing regions, but declining to consider whether those job losses would be permanent or temporary).

30. *See* CBO, *supra* note 24, at viii (noting that companies would pass the costs of carbon-allowance trading on to households by increasing prices on energy and consumer products); Dinan & Rogers, *supra* note 24, at 206 (stating that in the long run the entire cost of carbon allowance purchases would be passed forward to consumers).

31. *See* Dinan & Rogers, *supra* note 24, at 203 ("Commodity prices increase based on the amount of carbon associated with their production and consumption . . . .").

32. *See id.* at 206 (stating that private sector cost increases would be passed onto households in proportion to their consumption of carbon-intensive goods).

taxes. Cap-and-trade systems and excise taxes are more efficient than command-and-control systems.[33] The next section explains how the three schemes work and gives an overview of the economic incidence under each system.[34]

1. Command-and-Control Regime

The most common method of environmental regulation in the United States—a command-and-control regulation—requires firms to limit the amount of pollution they release into the environment. Under a command-and-control regime, the two primary mechanisms for controlling pollution are design standards and performance standards.

Regulators use design standards to ensure that firms install specified pollution-reducing technology.[35] The costs of the technology are generally passed forward to consumers and the consumers experience financial burdens depending on the costs associated with installing and maintaining the technology. Because the technology to remove carbon dioxide and other greenhouse gases from emissions has not been fully researched and is not readily available,[36] policymakers are not likely to implement design standards

---

33. When evaluating regulatory instruments, policymakers consider efficiency, distributional impacts, access to revenues to address those impacts, administrative costs, enforcement concerns, implications for competition, uncertainty, and flexibility to make dynamic adjustments. *See* Fullerton, *supra* note 9, at 237–45 (describing competing policy objectives that policymakers must balance when formulating environmental regulations).

34. For helpful background, see generally KEOHANE & OLMSTEAD, *supra* note 6, Fullerton, *supra* note 9, and GRUBER, *supra* note 13.

35. *See* Robert N. Stavins, Policy Instruments for Climate Change: How Can National Governments Address a Global Problem 8 (Jan. 1997) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/Documents/RFF-DP-97-11.pdf ("Technology-based (or design) standards typically require the use of specified equipment, processes, or procedures.").

36. Note that carbon sequestration—the capture and compression of carbon dioxide gas for storage in deep geological formations—is currently under research, but has not been deployed. *See* Lawrence H. Goulder & William A. Pizer, The Economics of Climate Change 10 (June 2006) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/Documents/RFF-DP-06-06.pdf ("Geological sequestration (for example, injection into depleted oil or gas reservoirs) represents a very expensive proposition now but could be an important component of a long-term policy solution if costs decline."). The technology generally would be used only at large point sources such as fossil fuel power plants. Carbon dioxide scrubbers for use in manufacturing are also under research, but they too have not been implemented at any significant level. *See GOP Leaders Press DOE on Waxman's CO2 Control Target, CCS Timing*, ENERGYWASH. WEEK, April 29, 2009, at 6–7 (indicating that the EPA analysis of the Waxman-Markey bill assumes that carbon capture and sequestration technology will be deployed by 2015 and quoting Stephen Chu, Secretary of the

to address climate change,[37] and this Article will not address them in any depth.

When command-and-control regulations set performance standards, firms may either cut their production to meet the standard or retrofit their facilities to abate their emissions.[38] When they retrofit, the costs associated with the retrofit are passed on to consumers.[39] Firms that find it more difficult to abate (usually

---

Department of Energy, as expecting carbon capture and sequestration to be used within eight years).

37. There are additional efficiency-related reasons policymakers may avoid the use of design standards as well. Efficiency mandates that abatement be achieved at the lowest cost. Because it is the overall production of carbon dioxide emissions that are of concern, requiring all firms to abate to the same level is inefficient. First, firms with older technology generally have higher costs in retrofitting their production processes. *See* Lawrence H. Goulder & Ian W.H. Parry, Instrument Choice in Environmental Policy 7 n.6 (Apr. 2008) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/Documents/RFF-DP-08-07.pdf ("[I]t may be a lot less costly for firms that are currently upgrading or constructing new plants to incorporate a new abatement technology than for firms that must retrofit older plants that are not readily compatible with the newly mandated technology."). This raises competitive concerns among firms. The costs of abating emissions will vary from firm to firm based on the kinds of fuels used and the engineering challenges associated with the retrofitting process. *Id.* Firms pay the costs of acquiring and installing the technology and pass these costs on to consumers in higher prices. The incidence of those costs may vary by region based on the kinds of energy resources the region uses and the age of the energy production facilities that serve those regions. The required level of abatement could be achieved at lower cost if firms with older technology instead pay the firms with newer technology to abate to a higher level to cover the abatement requirements of the older firms as well as their own abatement requirements. Second, mandating technology removes the incentives for firms to develop new cost-effective abatement technologies. *See* Fullerton, *supra* note 9, at 245 (noting that a command-and-control regulation that requires an existing technology does not provide companies with an incentive to research and develop new cost-effective technologies). Finally, design standards generate no revenues that the government might use to offset the distributional impacts to the firms or to the consumers. *See id.* at 225 (drawing a distinction between policies that raise revenue, such as pollution taxes, and policies that do not raise revenue, such as command-and-control restrictions).

38. *See* Stavins, *supra* note 35, at 8 ("Performance-based standards are more flexible than technology-based standards, specifying allowable levels of pollutant emissions or polluting activities, but leaving the specific methods of achieving those levels up to regulated entities.").

39. Firms that find it cheaper to invest in technological retrofits (usually newer facilities) will invest and abate only enough to reduce pollution below the cap for their facility. In making a decision about whether to retrofit or to reduce output, firms weigh the present value of a future gain from retrofitting against the short-term costs of the retrofit. As long as prices are higher (because one of the effects of the cap is to limit production), firms have an incentive to make the technological change. However, as more firms retrofit, output increases and the scarcity rents decline. This reduces the incentive for firms to install abatement technology over time. This is a source of inefficiency because it would be more cost-effective for firms that have installed the technology to abate to the extent made possible by the abatement technology and for firms that do not find it cost-effective to install the technology to pay the ones that do, sharing in the aggregate costs of abatement and sharing in the benefits from the use of the technology.

older facilities) must decide whether to spend more money to retrofit or simply reduce output to meet their cap. When firms reduce their level of production to meet their facilities' regulatory caps on pollution, less pollution occurs, but fewer goods are produced and, therefore, prices rise.[40] The more they reduce output, the more consumers suffer from higher prices for the good, at least in the short term. The profits associated with this change in prices are known as scarcity rents because they arise from the artificially induced scarcity of the polluting goods that results from the limits on pollution.[41] Because the costs of production have not increased, firms enjoy the bulk of the scarcity rents as "windfall profits."[42] While the allocation of a portion of the scarcity rents to firms would allow the firms to recoup lost opportunities from reduction in output and cover costs of the abatement technology, most of the scarcity rents that firms would receive were formerly consumer surplus. In other words, consumers generally will pay the costs associated with climate change policy and shareholders of the energy suppliers will reap the profits from the increased prices.[43]

Performance standards are inefficient because they result in higher social costs.[44] The costs of installing abatement technology vary from firm to firm, and consumers suffer from higher prices because of reduced output by firms that choose not to install abatement technology.[45] Policymakers may avoid

---

40. Fullerton, *supra* note 9, at 232–33.

41. *See* Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677, 732 (1999) ("Scarcity rents are the market power to raise prices above the competitive equilibrium when output and new entrants to the industry are limited."); *see also* Fullerton, *supra* note 9, at 232 ("A scarcity rent is created because government has restricted the amount of production and consumers place a higher value on the remaining units of production.").

42. *See* Fullerton, *supra* note 9, at 233 ("Anybody who is handed an initial allocation of permits is handed a private profit."). Governments sometimes impose price restrictions to protect consumers from the price increases that result from regulation. Because prices are low, demand exceeds supply and questions of allocation arise providing opportunities for rent-seeking by firms, an economically wasteful activity. *Id.* at 235. In addition, price restrictions leave the government no revenue with which to address distributional impacts. Compliance costs are borne by the government, unless the government charges firms fees for monitoring and compliance, in which case those costs are passed forward to the consumer. *Id.* at 234–35. For these reasons, price restrictions are generally disfavored.

43. Governments may capture a portion of the scarcity rents through ordinary corporate taxes imposed on firm profits (which increase because of the scarcity rents received by firms) and through taxes on shareholder dividends and capital gains. In general, however, these taxes are not sufficient to offset the distributional impacts that households face from the price increases.

44. Stavins, *supra* note 35, at 8.

45. The aggregate costs are higher because each firm must independently meet the emissions standard. GRUBER, *supra* note 13, at 136–37. In contrast, permit-trading, discussed

these additional social costs through use of market-based solutions. Consequently, governments increasingly have turned to cap-and-trade systems and excise taxes to achieve environmental policy goals.[46]

2. Cap-and-Trade System

Under a cap-and-trade regime, the government sets a national cap on emissions and then issues permits to firms that emit pollution as part of their energy production or manufacturing processes.[47] The government maintains the cap on emissions by limiting the number of permits it issues.

The cap in a cap-and-trade regime ideally would be set at levels to correct fully for the environmental problem. This would restore the demand curve to the point at which the benefits to society from access to the polluting good are equal to—and offset—the costs to society from pollution generated by producing or using that good.[48] By limiting the quantity of pollution through a

---

below, allows firms to pay other firms to abate to a higher degree so that the abatement requirements of both firms are met. This is more cost-effective because the firm that abates may do so more cheaply than if each firm were trying to meet the emissions standard separately. *Id.* at 137–38.

46. Note that virtually all of the proposals for federal legislation to address climate change involve cap-and-trade systems or excise taxes on greenhouse gas or carbon dioxide emissions. *See supra* note 4 and accompanying text (identifying proposed legislation to address climate change).

47. For both cap-and-trade systems and excise taxes, the controls are likely to be implemented upstream. The regulated firms likely will be suppliers of fossil fuels, power plants, electrical utilities, and possibly manufacturing concerns that have significant energy demands. Fossil fuel importers will also be regulated in order to prevent "leakage." When operations are regulated or taxed, firms shift their operations or purchases of the regulated good to jurisdictions not subject to the regulation or taxation in order to lower costs. *See* Goulder & Parry, *supra* note 37, at 24 (noting that leakage can occur when new regulations raise production costs, thus causing polluting firms to relocate to other jurisdictions, and when new regulations increase the price of goods, thus shifting consumer demand for those goods to other jurisdictions). By placing the same financial burdens on goods and resources imported into the jurisdiction, policymakers prevent leakage and protect the integrity of their regulatory regime. Upstream regulation is cheaper for the government to administer and enforce because there are fewer entities to monitor. *See* Metcalf (2008), *supra* note 24, at 9–10 (describing the concept of point-of-taxation, and noting that applying a tax at an upstream point minimizes the administrative cost to the government).

48. *See* GRUBER, *supra* note 13, at 136–38 (suggesting that optimal pollution reduction occurs where, for each polluter, "the marginal cost of reducing pollution is set equal to the social marginal benefit of that reduction"); *see also* Louis Kaplow, *The Optimal Supply of Public Goods and the Distortionary Cost of Taxation*, 49 NAT'L TAX J. 513, 523–25 (1996) (arguing that the optimal level of an environmental tax would be just enough to procure the desired public good).

cap, production of the polluting good is reduced so that the social cost of pollution from using or manufacturing the polluting good equals the social value from making the supply of the polluting good available.[49] Firms may emit pollution up to the level specified under the firm's permits, and permits may be sold or transferred. To the extent that the costs associated with abating pollution are lower than the value of their permits, firms are incentivized to abate their emissions and sell their permits to other firms. Firms may finance their retrofits and cover the costs associated with shifting to alternate energy resources by selling their excess permits. The firms that find it more expensive to make these alterations to meet the caps instead may purchase additional permits and continue to operate at their existing levels of emissions. This exchange reduces the total costs of abatement and allows firms to share costs, improving efficiency.

The cap on emissions will limit the amount of output of the polluting good. As with command-and-control performance standards, when output is limited, prices rise, generating scarcity rents.[50] The way the government allocates the permits to the firms determines who enjoys the benefit of the scarcity rents and therefore the incidence.[51] If the government grants the permits to firms for free, "grandfathered permits," firms will enjoy additional profits from scarcity rents because the firms will have experienced no additional costs of production.[52] When the firms receive the scarcity rents, the benefits may be passed back to the owners of capital in the form of higher profits or back to labor in the form of higher wages, or they may be passed forward to consumers as lower prices.[53]

Unless regulation requires otherwise, firms may pass these windfall profits back to shareholders.[54] While the burden of a tax falls on the party that has the

---

49. *Supra* note 48 and accompanying text.

50. *Supra* notes 40–41 and accompanying text.

51. Fullerton, *supra* note 9, at 23. This Article does not consider the impacts of taxation of emissions permits. These issues are examined in Ethan Yale, *Taxing Cap-and-Trade Environmental Regulation*, 37 J. LEGAL STUD. 535, 535–37 (2008), and Mitchell Kane, Taxation and Global Cap-and-Trade (unpublished manuscript, on file with the Washington and Lee Law Review), *available at* http://www.law.nyu.edu/academics/colloquia/taxpolicy/ECM_PRO_061510.

52. Bovenberg & Goulder, *supra* note 25, at 14–15.

53. *See id.* at 15–16 (discussing the various levels of rents companies will be able to appropriate given different elasticity of demand).

54. Dinan & Rogers, *supra* note 24, at 213 (noting that households with high income and stock holdings will see an increase in income due to cap and trade regulation); Parry, *supra* note 24, at 365 ("Grandfathered permits . . . create windfall gains for shareholders."); Burtraw (2008), *supra* note 24, at 47 ("The value of emissions allowances accrue to the firm.").

least elasticity, the party with the greatest elasticity will reap the benefits of a subsidy or scarcity rents.[55] Again, because capital generally is assumed to be the most elastic factor, the shareholders of firms holding emissions permits ultimately will benefit.[56] Given that shareholders are disproportionately represented in the upper income brackets, this policy would be very regressive and would result in a large-scale transfer of former consumer surplus to the wealthy.[57]

In contrast, the value of the permits will be passed through to consumers in regions in which utilities are regulated under cost-of-service requirements.[58] This changes the incidence; in this situation it is consumers, rather than shareholders, who will benefit from the free allocation of permits. Consumers in regulated areas will experience, in general, lower electricity prices than consumers in regions that are not regulated. Unfortunately, this also undermines their incentive to conserve energy, undercutting the goal of the regulation.[59] Consequently, in order to ensure that the required overall cap will be met, policymakers will need to increase the national permit price so that consumers in other regions will reduce consumption sufficiently to counteract the overconsumption in the cost-of-service regulated regions.[60]

---

55. *See* Bovenberg & Goulder, *supra* note 25, at 15–16 (discussing the effects of elasticity on distributions of economic rents).

56. *See* Fullerton, *supra* note 9, at 233 ("Anybody who is handed an initial allocation of permits is handed a private profit."); Dinan & Rogers, *supra* note 24, at 213 (noting that households with high income and stock holdings will see an increase in income due to cap and trade regulation); Burtraw (2008), *supra* note 24, at 47 ("The value of emissions allowances accrue to the firm."); Bovenberg & Goulder, *supra* note 25, at 14 (discussing the rent and extra profit for a firm associated with grandfathered in permits). Note, however, that utility companies governed by regulations with cost-of-service requirements would be required to pass through the benefit of grandfathered permits and the scarcity rents to consumers, changing the incidence.

57. Parry, *supra* note 24, at 380–81.

58. *See* Burtraw (2008), *supra* note 24, at 52 ("[E]lectricity consumers in regions of the country with cost-of-service regulations do not see their prices rise as much."); Anthony Paul, Dallas Burtraw & Karen Palmer, Compensation for Electricity Consumers Under a U.S. CO2 Emissions Cap 25 (July 2008) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/Documents/RFF-DP-08-25.pdf ("Allocation to local distribution companies based on population could yield electricity prices in 2020 for populous regions with relatively clean sources of electricity generation that are actually below prices in the absence of climate policy.").

59. *See* Burtraw (2008), *supra* note 24, at 52 (noting that ramifications are high when low consumer prices prevent electricity supplies from reducing pollution due to the same or increased demand); Paul et al., *supra* note 58, at 24 ("The subsidy to electricity consumption has the effect of reducing the incentive for consumers to make investments in end-use efficiency.").

60. Burtraw (2008), *supra* note 24, at 43 ("As a consequence of the fact that consumers do not see higher prices, the amount of reduction necessary elsewhere in the economy goes up.");

Even under a free allocation of emissions permits, the government may capture a portion of the scarcity rents from firms through income taxes on corporate profits, shareholder dividends, and capital gains.[61] However, the portion the government captures would be significantly smaller than if the firms purchased the permits at auction because the highest federal marginal corporate tax rate is thirty-five percent. These profits also would be taxed at the state and local levels.[62] While federal, state, and local governments in aggregate may recover as much as forty-five percent of the value of the permits, fifty-five percent of the profits will be retained by shareholders of energy suppliers.[63] The tax revenues on corporate profits, shareholder dividends, and capital gains are not likely to be sufficient to offset the distributional impacts of the system.[64] While allocation of some portion of the permits for free may be politically necessary, very few free permits would be required to mitigate the short-term transitional costs to the oil, gas, and other fossil-fuel energy industries.[65]

If, in contrast, the permits are sold at auction, rather than being granted for free, firms seeking emissions permits will be required to pay the auction price of the permits. Consequently, the government will capture any scarcity rents that arise from the cap on pollution and may use those funds to address the distributional impacts of the cap-and-trade regime.

3. Excise Tax on Greenhouse Gases/Carbon Tax

An alternate method for internalizing negative externalities is to place a price on the harm caused to society from pollution and to add that sum to the price of the polluting goods by imposing an excise tax.[66] Under this mechanism—a "Pigouvian tax"[67]—each unit of pollution is taxed at a rate that

---

Paul et al., *supra* note 58, at 24 ("If electricity price rises less due to free allocation to electricity consumers then those consumers will have less incentive to purchase efficient air conditioners, refrigerators, etc., causing other sectors to do more work to achieve overall emission reductions.").

61. Dinan & Rogers, *supra* note 24, at 204.

62. *Id.*

63. *Id.*; CBO, *supra* note 24, at 12–13.

64. *See* Parry, *supra* note 24, at 379–80 (stating that the government would need to capture "80% of the permit rents to prevent the policy from being strongly regressive").

65. *See* Bovenberg & Goulder, *supra* note 25, at 39 (stating that "only a very small fraction of the potential rents associated with CO2 policies need to be earmarked for the fossil-fuel industries to preserve profits and equity values").

66. *See* VARIAN, *supra* note 19, at 613–14 (discussing the use of a tax on externalities to internalize the cost of pollution).

67. Pigouvian taxes are named for Arthur Pigou, the English economist who first

would increase the price of the polluting good to include the social cost, and the demand curve is shifted to the optimal quantity of polluting goods (and pollution).[68] When the tax is included in the cost to the consumer, the price of the good increases, fewer goods are purchased, demand falls, production slows to meet the lower demand, and pollution falls to a level in which the harm from the pollution is equal to the social benefits associated with the availability and consumption of the polluting good.[69] In general, an excise tax will yield similar benefits to a cap-and-trade system with auctioned permits in terms of effectiveness, efficiency and availability of revenues.[70] Under a greenhouse gas

---

suggested such taxes in his influential book, *The Economics of Welfare*. *See* ARTHUR C. PIGOU, THE ECONOMICS OF WELFARE 192 (4th ed. 1950) (discussing the use of taxes to internalize externalities).

68. *See* GRUBER, *supra* note 13, at 137 ("Pigouvian taxes cause efficient production by raising the cost of input by the size of its external damage, thereby raising private marginal costs to social marginal costs.").

69. *Id.*

70. *See id.* at 243–45 (discussing the economic consequences of an excise tax). The differences between the two systems, assuming no modifications to those systems, depend on whether uncertainty in the cost of regulation (and the price of permits) or uncertainty in the quantity of emissions (and the degree of environmental improvement) is preferable. Taxes provide certainty as to the price increase that will arise from regulation, but do not provide certainty that environmental improvement will occur. *See id.* at 74 (noting difficulties with these taxes). The firms that find it easier to abate do so and pay fewer taxes; the firms that find it more difficult to abate simply pay more taxes. If the tax is too low or the elasticity of demand is low, a tax may not reduce pollution by any significant degree. A cap-and-trade regime provides certainty as to the quantity of emissions that will be produced, but the extent of the price increase is uncertain and will depend on the elasticity of demand. If the elasticity of demand is high, the price increase in electricity, fuels, and goods will be low. If the elasticity of demand is low, the price increase will be high. In general, environmentalists will be more inclined to favor a cap-and-trade regime because they want to be certain that emissions will be reduced. Once the level of the tax is set, the firm has some certainty about the price increase that will occur. Theoretically, firms will prefer a tax to a cap-and-trade system because it provides certainty as to the cost. However, there are a number of ways in which both excise tax and cap-and-trade systems may be modified to address concerns about uncertainty in the price of regulation and the degree of environmental improvement. A cap-and-trade system may include systems to stabilize the permit price, such as provisions for banking and borrowing permits, a permit reserve, and a "safety-valve" provision that allows governments to issue more permits if the permit price rises sharply. *See* Henry D. Jacoby & A. Denny Ellerman, *The Safety Valve and Climate Policy*, 32 ENERGY POL'Y 481, 481–84 (2004) (discussing the various forms and functions of a safety valve and the effectiveness of each in preventing exorbitant cost increases); Brian C. Murray, Richard G. Newell & William A. Pizer, Balancing Cost and Emissions Certainty 3 (July 2008) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/Documents/RFF-DP-08-24.pdf (discussing one means of stabilizing a cap-and-trade system at the outset of implementation). Similarly, the government may include in the legislation provisions to retire permits over time to address a lack of environmental improvement. *See* CBO, *supra* note 24, at 8–14 (discussing the permit system in general). For an excise tax, the level of the tax may be adjusted upward or

tax, the government captures lost consumer and producer surplus as tax revenue and may use those revenues to offset the distributional impacts of the tax.

In sum, either a cap-and-trade system with auctioned emissions permits or an excise tax imposed on greenhouse gases will best internalize the negative externality in a cost-effective manner and provide revenues to offset the distributional impacts.[71]

C. Incidence Under Both a Cap-and-Trade Regime and an Excise Tax

In general, under both a cap-and-trade system and an excise tax, high-income taxpayers bear a larger portion of the burden in terms of dollars paid, but low-income taxpayers bear a greater burden in terms of the incidence as a percentage of income.[72] The sections below discuss the incidence under a cap-

---

downward, or the legislation may include an automatic adjustment based on achievement of or failure to achieve certain environmental goals. Fullerton, *supra* note 9, at 244–45; *see also* Louis Kaplow & Steven Shavell, *On the Superiority of Corrective Taxes to Quantity Regulation*, 4 AM. LAW & ECON. REV. 1, 10–12 (2002) (providing an example where the tax could be announced on a periodic basis and continually adjusted to reach optimal levels of pollution). Whether it is reasonable to believe that Congress will be able to muster the legislative will to increase the tax over time if it should be set too low is another question. *See* Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1179–89 (2009) (suggesting that fragmentation of the lawmaking authority at the state and national level, short-term election cycles, and lawmakers' dependence on large donations tend to undercut Congress's ability to set long-term policy and tend to derail legislation over time).

71. Issues of political economy may be determinative, however. The scarcity rents associated with a cap-and-trade regime will far exceed the actual costs associated with reducing pollution. *See* Dinan & Rogers, *supra* note 24, at 213 (noting that households with high income and stock holdings will see an increase in income due to cap and trade regulation); Parry, *supra* note 24, at 365 ("Grandfathered permits . . . create windfall gains for shareholders."); Burtraw (2008), *supra* note 24, at 47 ("The value of emissions allowances accrue to the firm."); Bovenberg & Goulder, *supra* note 25, at 15 ("[T]his rent can be quite large and, indeed, can imply substantial increases in profits and equity values to the regulated industries."). Consequently, this invites many firms to seek an advantage by lobbying to capture some share of those rents. With an excise tax there is less opportunity for firms to engage in rent-seeking behavior. *See* Avi-Yonah & Uhlmann, *supra* note 1, at 46 (discussing the opposition to carbon tax and why firms prefer cap-and-trade). For this reason, an excise tax might be preferred. However, because the American public has a general aversion to taxation, a cap-and-trade system may be a more attractive solution because the distributional costs are not as transparent as with an excise tax, though, as discussed below, the distributional impacts will be the same if the tax and the caps are set at levels to correct fully the harms caused by climate change. *See* Paul et al., *supra* note 58, at 24–25 (discussing the importance of lessening the impact upon consumers and the different ways to achieve this).

72. *See* Dinan & Rogers, *supra* note 24, at 203, 213 (noting that the lowest income group suffers the greatest when firms are grandfathered in or when taxes collected are used to reduce corporation income taxation); Parry, *supra* note 24, at 365 (discussing the regressive nature of

and-trade system with auctioned permits and an excise tax levied either on greenhouse gases or carbon dioxide emissions,[73] based on a number of economic studies performed from 1994 through 2009.[74] The incidence is tracked by income and by region. To determine the distributional impacts for a cap-and-trade system or a greenhouse gas tax actually passed by Congress, policymakers would need to model the incidence based on the actual cap set or the tax imposed in the climate change legislation.[75]

---

such schemes).

73. Some models include taxes on carbon or carbon dioxide rather than greenhouse gases generally because carbon dioxide is the most significant greenhouse gas in terms of production. Note that each cap-and-trade model includes different assumptions about the baseline year of emissions, the percentage reduction of emissions, the emissions price, and the year for which that price is taken. Similarly, each carbon or greenhouse-gas tax model includes different assumptions about the baseline year of emissions, the percentage reduction of emissions, the amount of the greenhouse gas or carbon tax, the year for which that tax is paid, and the consumption model. Different consumption models will result in data that distribute the incidence among income classes differently. Each consumption model involves an estimate of the way the tax will increase the price of gas, fuel, electricity, and the prices in consumer goods (the "imbedded carbon" or the greenhouse gas load that each form of consumer good bears). Each model also involves an interpretation of data from consumer surveys performed by the U.S. Census Bureau with respect to the kind and extent of consumption likely to occur at each level of the income distribution. For example, Dinan and Rogers merged household sample data from the Current Population Survey, which includes more detailed information on income and taxes from the tax-return data in the Statistics of Income, with the Consumer Expenditure Survey, which does not contain consumption information for the highest income households. *See* Dinan & Rogers, *supra* note 24, at 208 (discussing the econometric methodology used in the study).

74. More studies of the incidence of excise taxes than of cap-and-trade systems have been performed. In general, cap-and-trade systems have become popular only in recent years following the success of the cap-and-trade system for sulfur dioxide and nitrous oxide established in 1994 to curb acid rain production.

75. Note that the assumptions for each study, in particular the baseline emissions and the stringency of the reduction, will have a significant effect on the burdens that households will bear. Because aggregate greenhouse gases have increased significantly in the past thirty years, more recent baselines have significantly higher current emissions. *See* Metcalf (2007), *supra* note 24, at 5 (stating that the rate of warming has been accelerating over the past thirty years). Therefore, if dangerous increases in global temperatures are to be avoided, reductions required from more recent baselines must be greater than the reductions required from earlier baselines. According to Working Group III to the Fourth Assessment Report of the IPCC, to limit the temperature increase to 2 degrees Celsius above pre-industrial levels, developed countries would need to reduce emissions 10–40% below 1990 levels by 2020 and approximately 40–95% by 2050. Sujata Gupta et al., *Policies, Instruments and Co-operative Arrangements*, *in* CLIMATE CHANGE 2007: MITIGATION 745, 748 (Bert Metz et al. eds., 2007). Emissions in developing countries also would need to decrease by 2020, with emissions from all countries substantially below their current trajectories by 2050. *Id.* For each of the models, the lower the percentage reduction and the more distant the baseline year, the less representative the model may be for what is needed today to avoid dangerous climate change. Nevertheless, even if the models underestimate the percentage reduction in emissions required, they may represent what

Each of the incidence models included in this Article is a partial equilibrium analysis; the use of the scarcity rents or tax revenues have not been taken into consideration when calculating the burden on each income decile. Because they do not account for how revenues are spent, they provide a clearer view of the impacts on households at the different income levels.[76] This permits policymakers to decide how to distribute revenues among income groups.

1. By Annual Income

In general, if one assumes that household expenditures track with household income, the burden of a greenhouse gas tax or cap-and-trade regulation may be measured against annual income. Some economists suggest that annual income is not a good period for measuring these impacts,[77] subscribing instead to the permanent-income hypothesis first proposed by Milton Friedman.[78] Under the permanent-income hypothesis, lifetime income is held to be a better measure of consumption because individuals engage in

---

may be politically feasible in the United States as a set of initial standards. If the caps or taxes are set at the levels that fully internalize the costs of pollution, "first best" results are achieved in terms of efficiency. However, policymakers may phase-in regulation because the degree and extent of environmental harm are uncertain, because regulation may result in a distortion of the labor markets, because the elasticity of demand is uncertain (raising concerns that a cap would be too low or a tax too high), and because environmental benefits are difficult to quantify. In other words, the initial levels set for a cap or a tax may not be as stringent as they should be to correct fully greenhouse gas production. To phase-in regulation to permit a more gradual shift to cleaner substitute goods and fuels, and avoid shocks to the economy, emissions standards may be less stringent initially and tightened over time.

76. General equilibrium analyses can obscure the impacts because they report the net effects of a policy after taking into consideration the use of the revenues in a particular manner. Some of the economic studies included general equilibrium analyses, as well as the partial equilibrium analyses cited in this paper. This Article does not include the data from these general equilibrium analyses because they were based on assumptions about the use of revenues that are not the focus of this Article. Nevertheless, because this Article uses the data from partial equilibrium analyses, the impacts of prices for households in total dollar amounts may be somewhat overstated. Ultimately, the revenues from climate change legislation will remain in the economy and benefit households generally, even if those benefits are not distributed in a way that bears any relation to the burdens of the legislation.

77. *See* Bull et al., *supra* note 24, at 148 (discussing the appropriate time frame for analysis); Hassett et al., *supra* note 15, at 157–58 (choosing to use "an adjusted lifetime measure for consumption").

78. *See* Daniel Shaviro, *Beyond the Pro-Consumption Tax Consensus*, 60 STAN. L. REV. 745, 751 (2007) (discussing the merits of accounting for the expected lifetime earnings of a consumer); MILTON FRIEDMAN, A THEORY OF THE CONSUMPTION FUNCTION 20–37 (1957) (discussing the permanent income hypothesis).

consumption smoothing; they save or borrow in order to maintain roughly the same level of consumption over time and they consume in anticipation of future income from employment and bequests.[79] If households engage in consumption smoothing, incidence based on annual income would be biased toward regressivity.[80] Proponents of the permanent-income hypothesis suggest that by measuring lifetime consumption, economists would have a better sense of the impact of a greenhouse gas tax or cap-and-trade system on the welfare of a household.[81]

The permanent-income hypothesis rests upon a number of key assumptions, including the availability of complete markets and consistent rational choices by households over time.[82] These assumptions do not fully hold.[83] Individuals are limited in the availability of social insurance to hedge against risks that would impact lifetime income, they cannot change their past consumption based on new information about lifetime income, and they are limited in their ability to borrow against future income because of adverse selection effects and moral hazard.[84] Individuals also fail to show consistent preferences over time because of a tendency to discount future needs and because they classify and use income differently depending on its source.[85]

In addition, empirical studies show that households do not smooth consumption, but instead spend in accordance with their current income.[86]

---

79. *See* Hassett et al., *supra* note 15, at 157–59 (discussing the benefits of using a lifetime consumption model).

80. *See* Kartik B. Athreya & Devin Reilly, *Consumption Smoothing and the Measured Regressivity of Consumption Taxes*, 95 ECON. Q. 75, 75–78 (2009) (explaining the regressive nature of taxes on consumption).

81. Hassett et al., *supra* note 15, at 157–58; *see also* Bull et al., *supra* note 24, at 150–52 (arguing the benefits of a lifetime model over an annual model). As with the annual income-based analyses, these studies model the impact of a carbon tax on industry prices and consumer goods prices and use consumer expenditure survey data from the U.S. Bureau of Labor Statistics Consumer Expenditure Survey to calculate the burden that would accrue to each sample household. However, these studies model lifetime consumption by taking into account educational attainment and the life-cycle changes that they suggest would change household consumption over time.

82. Shaviro, *supra* note 78, at 749.

83. *Id.* at 749–50.

84. *Id.* at 770–74.

85. *Id.* at 774–76.

86. Data taken from the 1987 Consumer Expenditure Survey indicates that consumption tracks annual income. U.S. DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS, 1987 CONSUMER EXPENDITURE SURVEY (Bulletin No. 2354) (June 1990); *see also* Hassett et al., *supra* note 15, at 158 ("[C]onsumption, instead of being smooth, closely tracks current income over the lifecycle."); Bull et al., *supra* note 24, at 149 (stating that current consumption closely tracks current income); Christopher D. Carroll, *Buffer-Stock Saving and the Life Cycle/Permanent*

Data taken from the 1987 Consumer Expenditure Survey indicates that consumption tracks annual income.[87] An individual's energy use also appears to track current income over her lifespan.[88] For these reasons, this Article pulls data from studies that model incidence as a measure of annual household income.[89]

Tables 1 through 3 below set forth the results of various economic models addressing the incidence of a cap-and-trade regime sorted by income quintile. Table 1 provides data from the various cap-and-trade partial equilibrium analyses with respect to the estimated annual costs in U.S. dollars for households within each income quintile.

Income Hypothesis, 112 Q. J. ECON. 1, 1 (1997) (arguing that a buffer-stock model—where people save for emergencies rather than retirement—is a better model than the life-cycle hypothesis).

87. *See* Bull et al., *supra* note 24, at 149 (providing graph of 1987 Consumer Expenditure Survey results). Because consumption appears to track with current income, the only reason to use a permanent-income measure would be if the gasoline and energy use of younger or older individuals took up a larger share of their total consumption. *See id.* at 150 (discussing consumption patterns throughout life for energy and this effect on the permanent-income model). Based on driving patterns and other consumption patterns of older and younger individuals, this would seem unlikely. *See id.* at 156 (noting that the consumption of energy is relatively flat throughout life).

88. *See* Hassett et al., *supra* note 15, at 158 ("[E]nergy consumption also shows a marked lifetime pattern. Moreover, energy consumption, instead of being smooth, closely tracks current income over the life cycle.").

89. In addition, use of a lifetime measure would be theoretically inconsistent with the annual or shorter-term measures used in the tax and transfer system for redistribution. *See* Bull et al., *supra* note 24, at 152–57 (discussing the incidence and regressivity of an energy tax and the effects on income models). Note also that, in general, redistribution under the tax and transfer systems are based on measurements of annual income (such as the Earned Income Tax Credit (EITC)) or income during shorter periods (such as food stamps) based on an underlying assumption that households cannot or do not smooth income over their lifetime. *See* Lily L. Batchelder, Fred T. Goldberg, Jr. & Peter R. Orszag, *Efficiency and Tax Incentive: The Case for Refundable Tax Credits*, 59 STAN. L. REV. 23, 53–54 (2006) (discussing the U.S. tax system and refundable tax credits). Because the sole purpose of these incidence studies is to identify and offset the distributional impacts of climate change legislation, it would create additional administrative complexity to use a different measure to address the distributional impacts of climate change policy. I am grateful to Lily Batchelder for this last point.

Table 1. Cap-and-Trade: Incidence in Dollars per Household

Cap-and-Trade Model (Auctioned Permits)					
Quintiles	**1st**	**2d**	**3d**	**4th**	**5th**
2004 Parry[90]	$106	$160	$200	$266	$406
2002 Dinan & Rogers[91]	$558	$729	$955	$1236	$1802
2000 Congressional Budget Office[92]	$560	$730	$960	$1240	$1800

Table 2 calculates the share of the total burden borne by each quintile as a class. Households in the highest quintile will pay on average between 3.2 and 3.8 times the amount paid by households in the households in the lowest quintile.

Table 2. Cap-and-Trade: Share of Total Burden for Each Quintile

Cap-and-Trade Model						
Quintiles	**1st**	**2d**	**3d**	**4th**	**5th**	**Burden Ratio**[93]
2004 Parry	9.3%	14.1%	17.6%	23.3%	35.7%	3.8
2002 Dinan & Rogers	10.6%	13.8%	18.1%	23.4%	34.1%	3.2
2000 Congressional Budget Office	10.6%	13.8%	18.1%	23.4%	34.0%	3.2

Table 3 provides information on the annual costs of a cap-and-trade regime. The cost increases are equivalent to percentage decreases in after-tax income for households within each quintile.[94] The percentage change in after-tax income allows one to compare the extent to which relative income differences shift because of the tax imposed.[95] If lower-income groups see their after-tax incomes decrease at a higher rate than higher-income groups, then the

90. Parry, *supra* note 24, at 378.

91. Dinan & Rogers, *supra* note 24, at 212.

92. CBO, *supra* note 24, at 21.

93. Comparison of dollar burden on 5th quintile divided by dollar burden on 1st quintile.

94. *See* David Kamin, *What is a Progressive Tax Change?: Unmasking Hidden Values in Distributional Debates*, 83 N.Y.U. L. REV. 241, 268–69 (2008) (evaluating different measures of progressivity in light of various theories of distributive justice and concluding that to measure relative income inequality, one should examine the change in after-tax income that results from a change in tax policy).

95. *See id.* at 269 ("If percent change in after-tax income is uniform across income groups, then the relative differences between income groups—and the shares of total income earned—will not have changed.").

relative disparity between the two groups will have increased and "higher-income groups will receive a greater share of total income."[96] Table 3 also provides a ratio of regressivity, the cost as a percentage of income to the lowest bracket (1st quintile) divided by the cost as a percentage of income for the highest-bracket household (5th quintile). Households in the lowest-income quintile will bear between 1.9 and 3.9 times the burden borne by the highest-income quintile as a percentage of income.

Table 3. Cap-and-Trade: Burden as a Percentage Decrease in After-Tax Household Income

Cap-and-Trade Model (Auctioned Permits)						
Income Quintiles	**1st**	**2d**	**3d**	**4th**	**5th**	**Regressivity[97]**
2004 Parry[98]	1.3%	.87%	.77%	.72%	.65%	2.0
2002 Dinan & Rogers[99]	6.6%	3.7%	3.1%	2.7%	1.7%	3.9
2000 Congressional Budget Office[100]	3.3%	2.9%	2.8%	2.7%	1.7%	1.9

Tables 4 through 6 below set forth the results of various economic models addressing the incidence of a greenhouse gas tax or a carbon tax regime sorted by income decile. Where possible, the data have been converted to show incidence by quintile for comparison to the cap-and-trade data. Table 4 provides estimates for the annual costs in U.S. dollars of a carbon tax for each income decile.[101]

96. *Id.*

97. Comparison of burden on 1st quintile as a percentage of household income divided by burden on 5th quintile as a percentage of household income.

98. Calculated from Parry, *supra* note 24, at 378, by dividing the "initial burden" by the "net burden" and then multiplying by "% of income." While Parry included an adjustment for "profit income" from stock ownership for each quintile, this Article excludes "profit income" from the calculation because "profit income" reflects total value of stock holdings for each quintile rather than the distribution of electricity stock ownership across households within each quintile.

99. Dinan & Rogers, *supra* note 24, at 212.

100. CBO, *supra* note 24, at 21.

101. For most of the carbon tax and the greenhouse-gas tax studies, the dollar estimates of the financial burden for each decile were not included.

Table 4. Carbon Tax: Incidence in Dollars by Decile[102]

Income Decile	2007 Metcalf Carbon Tax[103] Price: $15/ton CO_2
1st	$276
2d	$404
3d	$485
4th	$551
5th	$642
6th	$691
7th	$781
8th	$883
9th	$965
10th	$1224

Table 5 calculates the share of the total burden for each decile. For comparison purposes, it also sets forth the share of burden by quintiles. Households in the highest quintile will pay on average 3.2 times the amount paid by households in the lowest quintile.

102. For this and several of these analyses, the authors removed the bottom 5% of the income distribution from the analysis. For this reason the distributional impacts will be understated for the bottom decile. These studies will report the incidence only for the bottom 5% to 10% of income and exclude the incidence for the population with income between 0 and 5%. The rationale behind this exclusion was that for the bottom 5% of households taking the survey, consumption exceeded 200% of reported income. *See* Dinan & Rogers, *supra* note 24, at 209 (discussing "extremely high consumption-to-income ratios for low-income households" that are "in excess of 200[%]"). The consumption model for the Bureau of Labor Statistics's 1987 Consumer Expenditure Survey showed that for the bottom 20% of households ranked by income, consumption as a percentage of after-tax income was 235.1%. *See id.* at 210 tbl.3 (listing consumption data for different income groups). Data taken from the 2004–2006 Consumer Expenditure Survey apparently yield similar results. *See* Burtraw (2009), *supra* note 24, at 7 (using the 2004–2006 Consumer Expenditure Survey to find that higher-income households spend a smaller portion of their income on energy). These results imply that income was understated. To the extent that these households may be earning more income than they are reporting, this also could place them in a different income decile, but there is no indication that this occurs more frequently for lower-income households than for higher-income households. In fact, one study has shown the opposite trend. *See* Andrew Johns & Joel Slemrod, The Distribution of Income Tax Noncompliance 2 (unpublished manuscript, on file with the Washington and Lee Law Review) (Sept. 18, 2008), *available at* http://www.bus.umich.edu/otpr/DITN%20091308.pdf (finding that the ratio of unreported income to true income increases with income).

103. Metcalf (2007), *supra* note 24, at 16 tbl.4.

Table 5. Carbon Tax: Share of Total Burden for Each Decile and Quintile

Deciles	2007 Metcalf Carbon Tax	Quintiles	2007 Metcalf Carbon Tax
1st	4.0%	1st	9.9%
2d	5.9%		
3d	7.0%	2d	15.0%
4th	8.0%		
5th	9.3%	3d	19.3%
6th	10.0%		
7th	11.3%	4th	24.1%
8th	12.8%		
9th	14.0%	5th	31.7%
10th	17.7%		
Burden Ratio[104]	4.4		3.2

Table 6 provides estimates of the annual costs of a carbon tax or a greenhouse tax as a percentage of income for each income decile. It also provides a ratio of regressivity—the cost as a percentage of income to the lowest bracket (1st decile) divided by the cost as a percentage of income for the highest-bracket household (10th decile).

104. Comparison of dollar burden borne by the highest income bracket (10th decile or 5th quintile) divided by dollar burden borne by the lowest income bracket.

Table 6. Carbon Tax: Burden as a Percentage Decrease in After-Tax Household Income

Deciles	2008 Metcalf GHG Tax[105]	2007 Metcalf Carbon Tax[106] $15/ton CO_2	2009 Hassett Carbon Tax[107]			1994 Bull Carbon Tax[108] $5/ton CO_2
			2003 Data $14.13/ ton CO_2	1997 Data $12.33/ ton CO_2	1987 Data $8.73/ ton CO_2	
1st[109]	3.7	3.4	3.74	4.53	4.04	3.10
2d	3.0	3.1	3.06	3.47	3.29	1.25
3d	2.3	2.4	2.36	2.99	2.64	1.10
4th	2.0	2.0	2.06	2.42	2.45	0.90
5th	1.7	1.8	1.76	1.98	1.92	0.85
6th	1.5	1.5	1.53	1.69	1.69	0.72
7th	1.3	1.4	1.30	1.53	1.51	0.69
8th	1.2	1.2	1.23	1.34	1.40	0.63
9th	1.0	1.1	1.01	1.14	1.19	0.56
10th	0.8	0.8	0.81	0.85	1.01	0.51
Regressivity[110]	4.6	4.25	4.62	5.33	4.00	6.07

Low-income households pay a larger portion of their income to cover the costs associated with climate change legislation than do high-income households.[111] When the carbon tax is measured as a fraction of annual income, the bottom ten percent of households in income bears between four and six times the burden borne by the top ten percent of households in income.[112]

105. Metcalf (2008), *supra* note 24, at 35 tbl.12.

106. Metcalf (2007), *supra* note 24, at 16 tbl.4.

107. Hassett et al., *supra* note 15, at 162 tbl.1.

108. Bull et al., *supra* note 24, at 155 tbl.2.

109. Note that for this analysis, the authors of this greenhouse gas tax study removed the bottom 5% of the income distribution from the analysis. *Supra* note 102 and accompanying text.

110. Comparison of 1st decile as a percentage of income divided by 10th decile as a percentage of income.

111. *See* Hassett et al., *supra* note 15, at 162 ("[T]he carbon tax is quite regressive when measured relative to current income for all three years.").

112. *See id.* at 162–63 (describing the differences in the carbon tax's impact on high- and

2. By Region

Two studies investigated the distributional impacts of a carbon tax by region.[113] The tables below show the average burden of a carbon tax as a percentage of income within each region.[114]

Table 8: Carbon Tax: Burden as a Percentage of Household Income

2009 Hassett Carbon Tax[115]	2003 Data $14.13/ton	1997 Data $12.33/ton	1987 Data $8.73/ton
New England	1.47	1.43	1.59
Mid-Atlantic	1.50	1.71	1.81
South Atlantic	1.62	1.98	1.90
East North Central	1.79	1.79	1.91
East South Central	1.92	1.92	2.01
West North Central	1.59	1.59	2.35
West South Central	1.84	1.84	2.11
Mountain	1.73	1.73	1.93
Pacific	1.54	1.54	1.50

The 2009 Hassett study reports that the differences in the carbon burden between regions are modest for consumption data taken for 1987, 1997, and 2003.[116] Differences between regions may be attributable to differences in driving patterns and weather conditions within those regions.[117] An earlier

---

low-income households).

113. *See id.* at 165 (summarizing the study's findings about the "geographic burden" of the carbon tax); Burtraw (2008), *supra* note 24, at 1 (stating that the study analyzed how "climate policy" would affect different regions in the United States); Burtraw (2009), *supra* note 24, at 1 ("We analyze the effects in [eleven] regions of the country and for households . . . .").

114. The states in each region are as follows:

> New England: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island; Midatlantic: New Jersey, New York, Pennsylvania; South Atlantic: West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, District of Columbia, Maryland, Delaware; East South Central: Kentucky, Tennessee, Missouri, Alabama, Mississippi; East North Central: Wisconsin, Illinois, Michigan, Indiana, Ohio; West North Central: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa; West South Central: Texas, Oklahoma, Arkansas, Louisiana; Mountain: Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico; Pacific: California, Oregon, Washington, Alaska, Hawaii.

Hassett et al., *supra* note 15, at 165 n.14.

115. *Id.* at 166 tbl.4.

116. *See id.* at 157 (stating that the study examined data from 1987, 1997, and 2003 and found that the "regional variation is at best modest" and stating that "one could argue that a carbon tax is distributionally neutral across regions").

117. *Id.* at 165.

study of an energy tax indicated that while the incidence of the direct portion of the tax (attributable to fuel, gas, and electricity) varied by region, the indirect portion of the tax (attributable to the carbon dioxide and other greenhouse gases "imbedded" in goods) offset those differences.[118] Some regions suffer higher electricity prices because their primary source of energy generation is carbon-intensive, such as coal; other regions are burdened more significantly from higher gasoline prices because of increased driving.[119] However, these impacts do not coincide.[120] The Burtaw study provides a more detailed breakdown of the regional analysis by income distribution.[121] Under this study, the different regions suffer similar levels of incidence as a whole, but low-income residents in the Northeast, the Ohio Valley, and Florida will be more heavily impacted by a carbon tax or a cap-and-trade regime due to home heating and electricity costs.[122]

D. Incidence Summary

In general, high-income taxpayers bear a larger portion of the burden of a greenhouse gas tax or cap-and-trade regime in terms of dollars paid. The highest income quintile bears between 3.2 and 3.8 times the burden borne by the lowest income quintile.[123] However, both cap-and-trade systems and excise taxes on greenhouse gas emissions are regressive.[124] Economic analyses generally concur that the burden of climate change legislation will fall more

---

118. Bull et al., *supra* note 24, at 157 ("Regional variation of the total cost of the [British Thermal Unit] tax is kept low by a countervailing effect between indirect and direct costs.").

119. CHAD STONE & HANNAH SHAW, CTR. ON BUDGET & POLICY PRIORITIES, EXTENDING "CLIMATE REBATES" TO INCLUDE MIDDLE-INCOME CONSUMERS 6 (2009), *available at* http://www.cbpp.org/files/2-19-09climate2.pdf.

120. *See id.* ("[R]egions with high gasoline consumption are not necessarily the same as those with high utility bills, and a substantial percentage of the impact is through indirect effects that are likely to be fairly similar across regions.").

121. *See* Burtraw (2008), *supra* note 24, at 1 (reporting that the study analyzed data from different regions and household incomes); Burtraw (2009), *supra* note 24, at 1 (stating that the study analyzed eleven regions in the United States and "households sorted into annual income deciles").

122. *See* Burtraw (2008), *supra* note 24, at ii (reporting that "[l]ow income households in the Northeast, Ohio Valley, and Florida are consistently among the most harmed"); Burtraw (2009), *supra* note 24, at 24 ("The average net consumer surplus loss, across all regions of the country, is 0.23[%] . . . and only varies by region from about 0[%] to 0.4[%].").

123. *See supra* Part II.C.1 (reporting that the burden ratio of the highest income quintile to lowest income quintile is between 3.2 and 3.8).

124. *See* Metcalf (2007), *supra* note 24, at 28 (stating that a common argument against "carbon change" is that such policies are regressive).

heavily on the poor than the wealthy.[125] For a greenhouse gas or a carbon tax the bottom ten percent of households in income bears approximately four to six times the burden borne by the top ten percent of households in income as a percentage of household income.[126] For a cap-and-trade system, the bottom twenty percent of households in income bears approximately two to four times the burden borne by the top twenty percent of households in income.[127] The Congressional Budget Office has estimated that because low- and moderate-income households consume more of their income and spend a larger share of their budgets on energy than higher-income households, they will bear a heavier burden from price increases resulting from any carbon tax or trading system.[128] Low-income households are also less likely to be able to shift their consumption patterns because they are more likely to rent their homes and generally do not have the property rights or the financial incentives to weatherize or install energy efficient appliances. The Center on Budget and Policy Priorities estimates that the households in the lowest income quintile will face approximately $700 per year in increased costs from climate change legislation that reduces emissions by fifteen percent below projected levels.[129] They anticipate that this sum will increase over time as the emissions standards become stricter and emission caps are lowered.[130] While regional differences in the burdens of climate change legislation may not be significant over the entire income distribution, low-income households in Florida, the Ohio Valley, and

---

125. *See* CBO, *supra* note 24, at viii (stating that the "increases would be regressive" and "they would place a relatively greater burden on lower-income households than on higher-income households"); Hassett et al., *supra* note 15, at 163–65 (indicating that while an annual income measure is most regressive when current consumption or lifetime-corrected consumption measures are used, the carbon tax is still regressive).

126. *See supra* Part II.C.1 (reporting the regressivity of the carbon tax).

127. *See supra* Part II.C.1 (calculating the regressivity of the cap-and-trade system). Note that, as a theoretical matter, these numbers are consistent. Theoretically, there would be no difference in distributional impacts between a tax and a cap-and-trade system for any given pollutant so long as the tax and cap are set at levels designed to internalize completely the externality. *See* HARVEY S. ROSEN & TED GAYER, PUBLIC FINANCE 90 (8th ed. 2008) ("Emissions fees and cap-and-trade systems are symmetrical policies . . . for every emissions fee, in theory there is a cap-and-trade system that achieves the same outcome, and vice versa.").

128. *See* CBO, *supra* note 24, at viii (reporting that the carbon tax or trading system would be regressive because "lower-income households generally consume a larger share of their income than higher-income households" and "a greater percentage of their income is spent on energy products").

129. ROBERT GREENSTEIN, SHARON PARROTT & ARLOC SHERMAN, CTR. ON BUDGET & POLICY PRIORITIES, DESIGNING CLIMATE-CHANGE LEGISLATION THAT SHIELDS LOW-INCOME HOUSEHOLDS FROM INCREASED POVERTY AND HARDSHIP 1–2 (2008), *available at* http://www.cbpp.org/files/10-25-07climate.pdf.

130. *Id.*

the Northeast will suffer disproportionate impacts as a result of increased home heating and electricity costs.[131]

III. Use of Revenues or Rents to Correct Distributional Impacts

Of the various proposals for use of climate change revenues, two dominate: (1) an equal rebate proposal[132] grounded in concerns for equity, and (2) a proposal to return the revenues to consumers through an adjustment to the income tax and labor tax rates[133] to maximize efficiency. To evaluate the best way to structure a benefit to address the distributional impacts of climate change legislation one first must be clear about the objectives. This section outlines the theoretical underpinnings for the two main proposals, examines their shortcomings, and then, in view of those shortcomings, proposes an alternative solution for the use of climate change revenues: Distributional neutrality with respect to the financial burdens that arise from climate change policy.

A. Policy Goals

1. Consideration of Equity: Equal Rebate

One proposal set forth in the economic literature provides for the distribution of an equal lump sum rebate to all households, an "equal rebate."[134]

---

131. Burtraw (2008), *supra* note 24, at ii.

132. *See* Bovenberg & Goulder, *supra* note 25, at 20–24 (reviewing "several mechanisms for achieving equity-value neutrality"); Dinan & Rogers, *supra* note 24, at 211–15 (discussing the effects of different carbon allowance trading proposals on household expenditures in the United States); CBO, *supra* note 24, at 20–27 (detailing possible plans for redistributing the revenues from carbon-allowance trading); Parry, *supra* note 24, at 382–85 (reporting the effects of different environmental policies on "social welfare"); Burtraw (2008), *supra* note 24, at 27–31 (assessing "different approaches to the distribution" of revenue raised from carbon dioxide emissions); Burtraw (2009), *supra* note 24, at 13–16 (evaluating the effects of a plan to "return CO2 to households on a per capita basis").

133. *See* Burtraw (2008), *supra* note 24, at 31–35 (discussing the effects of different proposals to reduce taxes); Burtraw (2009), *supra* note 24, at 16–19 (detailing different plans to reduce income and payroll taxes).

134. *See* Bovenberg & Goulder, *supra* note 25, at 20–24 (explaining a plan to distribute climate change policy revenue through a "lump-sum payment"); Dinan & Rogers, *supra* note 24, at 211–15 (reporting on the effects of different "lump-sum rebate" plans on "average household costs"); CBO, *supra* note 24, at 20–27 (describing a plan in which revenue is used to provide "lump-sum rebates to all households"); Parry, *supra* note 24, at 382–85 (analyzing the "social costs" of a lump-sum proposal); Burtraw (2008), *supra* note 24, at 27–31 (evaluating the effects

Under an equal rebate proposal, also known as "cap-and-dividend," all households would receive the same rebate.[135] Households that consume at the level of the average household at the fiftieth percentile of income would have the impacts of the tax or cap-and-trade regime fully offset.[136] Households that consume less would receive a rebate in excess of their burden.[137] Households that consume more would not have the burden completely offset.[138] While on aggregate, the equal rebate would fully offset the financial impacts of the greenhouse gas tax or cap-and-trade regime, lower-income households would have a net gain and higher-income households would have a net loss following delivery of the equal rebate.

The equal rebate proposal has some support within the scientific[139] and the public interest[140] communities, though the philosophical underpinnings may differ. There appear to be two theories of justice supporting this proposal. First, Utilitarians and other proponents for the maximization of social welfare suggest that the social welfare losses should be weighted between low-income

---

of the lump-sum plan on different income levels); Burtraw (2009), *supra* note 24, at 13–16 (describing the effects of a lump-sum proposal on different regions and income levels).

135. Dinan & Rogers, *supra* note 24, at 211–15.

136. *See* CBO, *supra* note 24, at 23 ("[T]he government could compensate all of the households in the first four quintiles and approximately 45[%] of households in the highest quintile for their policy-induced costs.").

137. *See id.* at 21 ("Average household income in the lowest quintile would increase because those households' lump-sum rebates would be larger than their cost increases as a result of the policy.").

138. *See id.* (stating that the policy would result in a "decline in average real income" for "households in the top quintile").

139. *See* Shoibal Chakravarty et al., *Sharing Global CO2 Emissions Among One Billion High Emitters*, 106 PROC. NAT'L ACAD. SCI. U.S. 11884, 11884 (2009) (stating that per capita emissions is acknowledged to be the only equitable goal). This group, headed by Stephen W. Pacala and Robert Socolow, suggests an intermediate compromise that would require each nation to cut emissions that exceed a cap equal to the nation's population times an individual emissions cap, estimated as the emissions from consumption associated with an income of $39,000 in U.S. dollars. *Id.* Conceptually, this is equivalent to setting a national cap and then delivering a rebate to each taxpayer designed to offset the consumption associated with $39,000 of income. However, the scheme does not specify how countries would meet their emissions reduction goals. *See also* Stephen W. Pacala, Equitable Solutions to Greenhouse Warming: On the Distribution of Wealth, Emissions and Responsibility Within and Between Nations (Nov. 14–15, 2007), *available at* http://www.iiasa.ac.at/Admin/PUB/podcast/ 16pacala.html.

140. *See* Why We Need Cap and Dividend, http://www.capanddividend.org/?q=readfirst/whycapanddividend (last visited Feb. 9, 2010) (discussing the need for a cap-and-dividend policy) (on file with the Washington and Lee Law Review). Proponents argue that, in any system that divides the commons into private property, all should have equal portions. Cap and Dividend vs. Tax and Refund, http://www.capanddividend.org/?q=readfirst/versus (last visited Feb. 9, 2010) ("The advantage of per capita dividends is that they cover everyone equally.") (on file with the Washington and Lee Law Review).

and high-income households based on declining marginal utility.[141] The equal rebate proposal is intended to correct for the general regressivity of the greenhouse gas tax and the cap-and-trade system.[142] According to the theory of declining marginal utility, the magnitude of social welfare loss from the loss of a dollar is greater for low-income households than for high-income households.[143] Conversely, the magnitude of social welfare gain from the receipt of a dollar is also greater for low-income households than for high-income households.[144] When taken to its logical conclusion, redistribution of climate change revenues based on declining marginal utility would continue until all households received an equal rebate.[145] An equal rebate overcompensates low-income households for the impacts they bear from climate change policy and under-compensates high-income households for the impacts they bear, essentially redistributing income from higher-income households to lower-income households.[146]

The equal rebate proposal is criticized because it fails to take into account the existing distribution of income and wealth.[147] Allocating permit

---

141. *See* Parry, *supra* note 24, at 382 tbl.5, 384 tbl.6 (calculating the net burden from an emissions trading regime to the bottom income quintile and the top income quintile of households based on the form of regulation and the mitigation scheme and applying different distributive weights to these impacts based on income).

142. *See* Dinan & Rogers, *supra* note 24, at 219 ("If the government sought to offset the regressivity of the policy-induced price increases by providing lump-sum rebates, lower-income households would be better off . . . .").

143. *See* Eric A. Posner & Cass R. Sunstein, *Should Greenhouse Gas Permits Be Allocated on a Per Capita Basis?*, 97 CAL. L. REV. 51, 72–73 (2009) (explaining the theory that people with lower incomes have higher marginal utility per dollar).

144. *See id.* ("[U]nder the theory that poor people have the highest marginal utility for a dollar, helping poor people will maximize global welfare.").

145. The equal rebate breaks down into two parts. First, households are restored to roughly the place they were before imposition of climate change legislation through a corrective payment based on consumption for their decile. Second, households above the national mean income receive an additional tax and households below the national mean receive an additional subsidy. For those above the national mean, households are taxed with a rate that rises as household income increases until the prior subsidy plus the tax matches the equal rebate. Households below the national mean receive an additional subsidy that increases as household income declines until the corrective payment plus the additional subsidy match the equal rebate. *See* Kaplow, *supra* note 48, at 523–24 (illustrating tax effects by breaking down the tax into two components).

146. *See id.* at 524 ("[W]hen there is a change in the distortionary cost of taxation, there also will be a countervailing change in the extent of redistribution.")

147. *See* Posner & Sunstein, *supra* note 143, at 73 (explaining that the per capita approach is often criticized because it presumes a correlation between population and wealth when actually "there is no statistically significant correlation between population and per capita GDP").

revenues on a per capita basis will allocate the same value to the wealthy as the poor, frustrating at least some of the welfarist's redistributive goals.[148] If the goal is to maximize social welfare through redistribution, then policymakers must identify the optimal distribution of resources and make some account of the existing distribution of income and wealth within the population to determine how much, if any, should be reallocated.[149] This necessarily would enmesh climate change policy in debates about redistribution. Concerns about redistribution are generally grounded in notions of "everyday libertarianism,"[150] the belief that each person should be entitled to the benefits of his labor and that taxation or other methods of redistribution must be specifically justified.[151] While political philosophers have questioned the assumptions underlying this position,[152] everyday libertarianism remains a strong ideological force within the United States,[153] and any allocation of climate change revenues that redistributes income from high-income to low-income individuals will likely face significant political resistance.

---

148. *See id.* at 73 (concluding that the per capita approach is a "crude and even arbitrary way to redistribute wealth" in comparison to the "pure redistributive approach, which gives few or no permits to rich states and all or most of the permits to poor states, regardless of population size").

149. *See id.* at 75 (contrasting the redistributive effects of the per capita approach with the general principles of redistributive policy). Note that this critique is not dispositive. From the welfarist perspective, even if greater redistribution would be preferred, granting equal rebates to low-income households still would be an improvement over the existing allocation. *See id.* (explaining that "as a matter of actual practice, these defects are not necessarily fatal to the per capita approach" because it is possible to argue that it nonetheless is "superior to a system that is the most likely alternative").

150. *See* LIAM MURPHY & THOMAS NAGEL, THE MYTH OF OWNERSHIP: TAXES AND JUSTICE 31–37 (2002) (arguing that opposition to tax-based redistribution of wealth is often based on a false sense of entitlement to the entirety of one's own pre-tax income).

151. *See id.* at 35–36 (explaining that everyday libertarianism is "a muted version" of libertarianism based on "the confused idea that net income is what we are left with after the government has taken away what *really* belongs to us"). *See generally* ROBERT NOZICK, ANARCHY, STATE AND UTOPIA 151 (1974) ("If the world were wholly just . . . . [t]he complete principle of distributive justice would say simply that a distribution is just if everyone is entitled to the holdings they possess under the distribution."); *id.* at 230 ("According to the entitlement conception of justice in holdings that we have presented . . . . [i]f the set of holdings is properly generated, there is no argument for a more extensive state based upon distributive justice.").

152. *See* MURPHY & NAGEL, *supra* note 150, at 31–37 (noting that everyday libertarianism fails to take into account the many ways in which property rights are not "natural rights" but instead exist only by virtue of state structures).

153. *See id.* at 31 (asserting that everyday libertarianism "infects much everyday thinking about tax policy" and "has great political significance").

Second, equal-rebate advocates argue that the atmosphere is a global commons and that equity demands that climate change revenues be distributed to individuals on an equal basis.[154] This proposal is grounded in an egalitarian theory of justice[155] that is concerned with equality of resources.[156]

---

154. *See* Posner & Sunstein, *supra* note 143, at 81–82 ("The atmosphere . . . is common property, belonging to everyone in the world. A climate treaty would close this commons, converting it into private property. It is only fair to distribute the parcels of property to the former users of the commons, namely, everyone in the world.").

155. There are two different kinds of egalitarianism that may apply: one that is concerned for equality of opportunity, and another that is concerned with equality of resources. In general, within the United States, questions of equal opportunity are inapposite because all residents historically have benefitted from externalizing greenhouse gas emissions, and because regional differences in development opportunities within the country are insignificant. *See* Hassett et al., *supra* note 15, at 157 (finding that within the United States "variation across regions is sufficiently small that one could argue that a carbon tax is distributionally neutral across regions"). Concerns about opportunity equality are important in the debate about allocation of emissions rights at the international level, however, where developing nations—such as China, Brazil, and India—are concerned that climate change regulation will slow their pace of development. *See* Posner & Sunstein, *supra* note 143, at 53–54 ("If that status quo is the baseline for allocating emissions rights, poor nations are likely to have great difficulty in achieving the levels of development already attained by wealthy nations."). Underdeveloped countries argue for an equal opportunity to achieve the same level of development as the Western world has through use of coal and other fossil fuel-based systems while externalizing the social costs of pollution by carbon dioxide and other greenhouse gases to all countries. *See id.* (explaining that "[t]hose concerned about the welfare of developing nations are especially interested in per capita allocations of emissions rights" to avoid allowing "existing distributions of wealth, insofar as they are reflected in current emissions, [to] form the foundation for climate change policy"). However, because development and population are not necessarily correlated, per capita allocation of emissions may not address this problem. *See id.* at 55 (explaining that many critics of per capita allocations argue that "per capita allocations will help some rich nations and hurt some poor ones" because "there is no correlation between population size and wealth per capita"). Critics point out that some countries with small populations are underdeveloped, while other countries with large populations are highly developed; therefore, allocating emissions allowances based on population will not adequately address the problem. *See id.* at 73–75 ("[T]he per capita approach is attractive to a welfarist only insofar as more populous states tend to be poorer. Not all heavily populated states are poor, however, and not all lightly populated states are rich."). At the international level, allocation of emissions rights on a per capita basis is also criticized for establishing that rights will be allocated to a nation based on its population, creating incentives for governments to spurn population-control efforts and other matters that impact global development and resources. *See id.* at 76–78 (explaining that the per capita approach would "establish that the most highly populated states would obtain the greatest benefits from international cooperation" while "governments that adopt policies that promote economic growth would be penalized").

156. *See generally* Ronald Dworkin, *What is Equality? Part 2: Equality of Resources*, 10 PHIL. & PUB. AFF. 283 (1981) (arguing that equality of resources may be achieved by auctioning off a set of resources and allowing trades to occur to permit all to be satisfied with their final lot). In general, the cap-and-dividend proposal resembles a Coasian solution—the government grants property rights to private parties and allows them to trade those rights until the equilibrium is reached and all parties are satisfied. *See* James K. Boyce & Matthew Riddle, *Cap*

Proposals for resource egalitarianism would likely also run afoul of corrective justice principles. The proposal to achieve equality of resources by distributing the climate change revenues on a per capita basis within the United States may be criticized on the ground that the wealthy pay both for the external social costs of their own consumption and for consumption by lower-income households.[157] Corrective justice would require instead that each household pay only for the harm that it has caused the environment.[158] Within the United States, any plan to address the distributional impacts of climate change policy would likely require that each household receive a rebate proportionate to the distributional impact it suffered.[159]

---

and Dividend: How to Curb Global Warming While Protecting the Incomes of American Families 5 (Political Econ. Research Inst. Working Paper No. 150, 2007), *available at* http://www.peri.umass.edu/fileadmin/pdf/working_papers/working_papers_101-150/WP150.pdf (explaining how a cap-and-dividend policy might work). By treating the atmosphere as a global commons and dividing it up into equal shares based on global population, each human being will have a tradable right to a share of the atmosphere. *See id.* ("A cap-and-dividend policy would transform the U.S. share of the Earth's carbon-absorptive capacity from an open-access resource into the common wealth of all Americans."). Like many Coasian solutions that involve large numbers of participants, this scheme would be undermined by the logistical difficulties and the substantial transaction costs associated with establishing a market at which all may trade their rights. *See* R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 1–6 (1960) (explaining how private bargaining can often overcome negative externalities without the need for government intervention). A similar economic result is obtained by regulating upstream and splitting the revenues that arise from regulation equally between all affected parties. *See* Boyce & Riddle, *supra*, at 5 (suggesting that "[c]arbon revenues would be most easily collected 'upstream'"); Burtraw (2009), *supra* note 24, at 13–15 (discussing a cap-and-dividend proposal). Of course, this does not account for those who would not be willing to sell their rights at any price. *See* Boyce & Riddle, *supra*, at 5–6 (explaining how a cap-and-dividend policy might work).

157. *See* Louis Kaplow, *On the (Ir)Relevance of Distribution and Labor Supply Distortion to Government Policy*, 18 J. ECON. PERSP. 159, 170 n.8 (2004) (explaining that when environmental regulations "hold the value of income transfers constant in real terms . . . the rich, through steeper marginal income tax rates, in essence pay for both their own environmental benefits and a share of others' benefits"); Kaplow, *supra* note 48, at 514, 516 (discussing the relationship between "the optimal supply of public goods and the distortionary cost of income taxation").

158. *See* Daniel A. Farber, *The Case for Climate Compensation: Justice for Climate Change Victims in a Complex World*, 2008 UTAH L. REV. 377, 388 (explaining that "people should not benefit from their own wrongdoing and should compensate those who have suffered as a result").

159. Note that at the international level, principles of corrective justice also would pave the way for the developed world to pay reparations for past emissions to countries likely to suffer harm from climate change. *See, e.g.*, *id.* (arguing that the United States has a duty to regulate greenhouse gas emissions based on tort law principles that "people should not benefit from their own wrongdoing and should compensate those who have suffered as a result"). The anthropogenic stock of greenhouse gases in the atmosphere was, until recent decades, almost exclusively the responsibility of the United States and Western Europe. *See id.* at 385–87

From a libertarian perspective, rights to the commons do not belong to all equally, but to those who acquire them first and put them to the best and highest use. This allocation of rights to the commons has its historical grounding in Locke's assertion that one has a right to the fruits of one's labor and to the portions of the commons with which one has mixed one's labor.[160]

(discussing the United States' responsibility for past emissions and climate change). Recently, China has succeeded the United States as the top emitter, though China's per capita emissions levels are significantly lower. *See* Posner & Sunstein, *supra* note 143, at 61 (explaining that China has surpassed the United States in aggregate emissions but the United States remains well ahead of China when emissions levels are calculated on a per capita basis). Developing countries—such as China, Brazil, and India—have called upon the developed world to pay for these past emissions. *See* Farber, *supra* note 158, at 380–81 (explaining that developing nations have called for the United States to pay for past emissions). Some scholars deflect this demand on the ground that the proposal is politically unfeasible. *See* Posner & Sunstein, *supra* note 143, at 87–91 ("[D]omestic self-interest imposes a significant limitation on what is feasible . . . nations should not be expected to sign a climate change agreement from which they are large-scale net losers."). While within a jurisdiction a government may make decisions to pay reparations for past harms or to distribute revenues or develop other programs to provide its citizens some measure of equal opportunity, large-scale transfers from developed countries to developing countries based on past emissions is unlikely to occur because there are no binding structures at the international level to encourage this. *See id.* at 87 ("[B]ecause treaties require the consent of treaty partners, states must believe that by entering a treaty they are serving their national interests."). Instead, each nation will negotiate based on its own needs and the breadth of its power base. *See id.* (explaining that "[a] workable climate treaty will have to be one that serves the interests of major industrial nations, including developing countries"). Consequently, the developed world is unlikely to agree to large-scale transfers to developing countries in excess of what they currently give in foreign aid. *See id.* at 83, 86–90 (explaining that developed countries "are unlikely to agree to massive . . . redistribution of wealth by entering a climate treaty" because "the existing level of foreign aid is probably not greatly lower than the amount that rich states are willing to pay in order to be altruistic"). While welfarists generally are concerned only with making redistributive decisions based on a current time-slice and not with the historical events that have led to the current distribution, *see id.* at 72–73 (explaining the perspective and concerns of welfarists), refusal to address historic responsibility has two important consequences. First, debates over the allocation of responsibility for the current stock of greenhouse threaten to derail international cooperation on climate change. Second, if no mechanism is in place to deal with past emissions or under-regulation of current emissions, the United States and other large-scale emitters will have incentive to under-regulate and to delay regulation. The author suggests that a nonprofit endowment fund funded by the governments of large-scale emitters address the harm from past emissions. This would bracket the issue of past emissions and permit climate change regulation to move forward within the United States, avoiding the additional costs that arise from delay in regulation. *See* Valentina Bosetti et al., *Delayed Action and Uncertain Targets. How Much Will Climate Policy Cost?* 7–9, 13–15 (CESifo Working Paper No. 2403, 2008), *available at* http://www.ssrn.com/abstract=1273510 (estimating the costs of delay).

160. *See* JOHN LOCKE, SECOND TREATISE OF GOVERNMENT 19 (C.B. Macpherson ed., Hackett Publ'g Co. 1980) (1690) ("Though the earth . . . be common to all men, . . . every man has a property in his own person: . . . the work of his hands . . . [is] properly his. Whatsoever then he removes out of the state that nature hath provided, . . . he hath mixed his labour with, and joined it to something that is his own . . . and thereby makes it his property.").

Locke acknowledged, however, that the right to the commons is limited; an individual has an exclusive right to those items pulled from the commons so long as "enough, and as good, [is] left in common for others."[161] Locke's proviso is generally interpreted in two ways: the stringent interpretation, which would not permit acquisition of common property if it resulted in another having lost opportunities to use that property, and the weaker interpretation, which would not permit acquisition of common property if it resulted in another no longer being able to use the property freely when previously he could.[162] While modern libertarian theory has reserved the authority to require compensation when the principles of justice in acquisition have been violated,[163] it would require compensation only when the weaker condition is satisfied. Justice in acquisition would require that one not worsen another's position by removing his free access to common resources he was using previously.[164] On the other hand, to the extent that the other person was not using those resources, libertarians would not recognize rights or require compensation, appealing to common justifications for private property itself: "[I]t increases the social product by putting the means of production in the hands of those who may use it most efficiently (profitably)."[165]

Finally, critics charge that the poor will never benefit from an allocation of emissions rights (or the value of emissions permits) because the permits are not granted to individuals directly, but to governments at the international level or to private industries within nations.[166] A per capita allocation of emissions

---

161. *Id.*

162. *See* NOZICK, *supra* note 151, at 176 (discussing two possible interpretations of Locke's proviso).

163. *See id.* at 178 ("Someone whose appropriation otherwise would violate the proviso still may appropriate provided he compensates the others so that their situation is not thereby worsened; unless he does compensate . . . his appropriation will violate the proviso of the principle of justice in acquisition and will be an illegitimate one."). To the extent that the atmosphere can be acknowledged as a global commons to which all have an equal right, an equal rebate theoretically would be justified as payment to each household for the right to use those commons.

164. *See id.* (asserting that "any adequate theory of justice in acquisition" would require that "a process normally giving rise to a permanent bequeathable property right in a previously unowned thing will not do so if the position of others no longer at liberty to use the thing is thereby worsened").

165. *Id.* at 177. Note that this position allocates greater rights to those who access resources prior in time, without regard for issues of intergenerational equity, which are significant concerns in the context of climate change. *See infra* notes 190–91 (discussing future effects of climate change).

166. *See* Posner & Sunstein, *supra* note 143, at 75 (explaining the risk that wealthy elites controlling governments of poor nations may not support redistribution of wealth and may use the proceeds of a permit system to increase their own wealth rather than to help the poor). As

rights can meet neither welfarist nor egalitarian goals unless the emissions rights or the value of those rights actually reach each individual within a country.

2. *Consideration of Efficiency (Offset of Benefits and Burdens)*

A number of public finance economists support using revenues from climate change legislation to reduce income or payroll taxes in order to improve efficiency.[167] Income and labor taxes are thought to distort an individual's decisions about whether or not to work; by effectively reducing the value of an individual's wages, income taxes and consumption taxes impact an individual's choice of labor over leisure.[168] Because environmental taxes and environmental regulation increase the price of consumption, they exacerbate this distortion, increasing inefficiency.[169] This "tax interaction effect" is believed to multiply the efficiency costs of labor and income taxes.[170] However, by using climate change revenues to lower income and labor taxes, existing efficiency losses from these taxes may be reduced and the tax interaction effect may be reduced or neutralized.[171]

These kinds of efficiency improvements are generally supported under one theory of justice commonly known as "the difference principle," proposed by John Rawls.[172] The difference principle is concerned primarily with the welfare

---

discussed in Part II, *supra*, if the permits are grandfathered (given away to firms for free), the poor will not benefit except to the extent that corporate taxes capture a portion of the windfall profits. If the permits are auctioned, the government will receive all of the revenue. Whether the poor will benefit depends on how the government allocates that revenue.

167. *See* Ian W.H. Parry, Roberton C. Williams & Lawrence Goulder, *When Can Carbon Abatement Policies Increase Welfare? The Fundamental Role of Distorted Factor Markets*, 37 J. ENVTL. ECON. & MGMT. 52, 53 (1999) ("Carbon taxes . . . enjoy the revenue-recycling effect as long as the revenues obtained are used to finance cuts in marginal tax rates of distortionary taxes such as income tax."); *see also* A. Lans Bovenberg & Lawrence H. Goulder, *Environmental Taxation and Regulation, in* HANDBOOK OF PUBLIC ECONOMICS 1471, 1476–77 (2d ed. 2002) (discussing the policy implications of using revenues from environmental taxes to finance cuts in distortionary taxes).

168. *See* Parry et al., *supra* note 167, at 53, 59–60 (discussing the interaction between taxes and labor supply).

169. *See id.* at 53 (explaining the tax interaction effect).

170. *See id.* at 53–54 (discussing the tax interaction effect).

171. *See id.* (explaining the need for and effect of using revenues from a climate change policy to reduce preexisting taxes); *see also* Burtraw (2009), *supra* note 24, at 16 n.12 (explaining that the tax interaction effect can be partially offset by using revenues from the new regulations to lower the marginal rates of distortionary taxes).

172. *See* JOHN RAWLS, A THEORY OF JUSTICE 75–78 (Harvard University Press 1971) (defining the difference principle).

of the least well-off in society.[173] Under this theory of justice, one would make all adjustments that improved welfare of at least one person without making anyone worse off.[174] In addition, one would make further adjustments to improve the welfare of the least well-off; however, to the extent that imposing a regulation or tax on the most well-off ultimately could harm the least well-off in society, one would refrain.[175] Because efficiency losses impact the poor, policies that improve efficiency, such as the use of revenues to decrease existing labor and income tax rates, must be considered under this theory of justice.

In general, most studies that model the use of climate change revenues to reduce income tax and payroll tax rates are shown to be very regressive, benefitting the wealthy.[176] These adjustments to the tax rates are thought to over-compensate the wealthy for the impacts of climate change policy.[177] Note,

---

173. *See id.* at 75–80 (explaining that the difference principle maximizes the expectations of those in society's least favored positions).

174. *See id.* at 70 ("[A]n arrangement of right[s] and duties . . . is efficient if and only if it is impossible to change the rules . . . so as to raise the expectations of any representative man (at least one) without at the same time lowering the expectations of some (at least one) other representative man.").

175. *See id.* at 78–79 ("[S]ociety should try to avoid the region where . . . difference between rich and poor makes the latter even worse off . . . ."). Rawls notes that there are many Pareto efficient allocations of wealth, including one in which a single person holds everything. From this Rawls concludes that efficiency cannot alone serve as a principle of justice, and goes on to develop the difference principle:

> Now those starting out as members of the entrepreneurial class in property-owning democracy, say, have a better prospect than those who begin in the class of unskilled laborers. It seems likely that this will be true even when the social injustices which now exist are removed. What, then, can possibly justify this kind of initial inequality in life prospects? According to the difference principle, it is justifiable only if the difference in expectation is to the advantage of the representative man who is worse off, in this case the representative unskilled worker. The inequality in expectation is permissible only if lowering it would make the working class even more worse off. Supposedly, . . . the greater expectations allowed to entrepreneurs encourages them to do things which raise the long-term prospects of the laboring class. Their better prospects act as incentives so that the economic process is more efficient, innovation proceeds at a faster pace, and so on. Eventually the resulting material benefits spread throughout the system and to the least advantaged.

Id. at 78.

176. *See* Burtraw (2008), *supra* note 24, at 31–34 (explaining that using climate change revenues to reduce taxes will disproportionately benefit higher-income groups); Burtraw (2009), *supra* note 24, at 16–19 (same).

177. *See* Burtraw (2009), *supra* note 24, at 16–19 (explaining that tax reductions have a regressive effect that disproportionately eliminates the burden for higher-income groups and fails to reduce the burden on lower-income groups).

however, that these models reduce income and labor tax rates in a way that does not reflect the incidence of climate change policy.[178] As Louis Kaplow demonstrates, efficiency concerns may be neutralized by adjusting income tax rates or labor tax rates in a way that fully corrects for the incidence of an environmental tax.[179] Nevertheless, even if adjustments to the income tax rates or labor tax rates are perfectly calibrated to offset the incidence of a greenhouse gas tax or cap-and-trade regime, this method will fail to address the distributional impacts of the policy for a significant number of households. The unemployed,[180] retirees, elderly citizens supported by Social Security, and individuals receiving social security disability insurance would be excluded from the benefit entirely or not have the financial impacts of the policy fully offset because these households are not currently earning income or because their income is not currently subject to income or labor taxes. Furthermore, few households in the lowest income decile actually pay income taxes by virtue of their exemptions and the standard deduction. Consequently, any changes in income tax rates would not offset the impacts of climate change policy. Modification of the income tax and labor tax rates, far from benefitting the least well-off, would in fact fail to address the needs of some of the most vulnerable populations in the United States.

Furthermore, efforts to maximize efficiency require that both the benefits and the burdens of climate change legislation be measured. As Louis Kaplow has pointed out, none of the current models takes into account the enhancement of social welfare and the distribution of environmental benefits that result from environmental taxes.[181] Distributional impacts are not estimated correctly unless the welfare gains from improving the environment are netted against the welfare losses associated with increased costs that arise from environmental

178. Burtraw provides a general equilibrium analysis of incidence of a cap-and-trade regime with an income tax reduction that is proportionate to the income taxes paid by each decile and a labor tax reduction of 2% for all deciles. Burtraw (2008), *supra* note 24, at 32–34. A model designed to offset incidence would scale the income tax cut with income, not with the income tax paid at each decile.

179. Kaplow, *supra* note 48, at 523–24 (describing a corrective tax scheme that "will eliminate any effects on labor supply from both the environmental tax itself and from the effects of that tax on environmental benefits").

180. As of December 2009, the national unemployment rate was 10.0%. BUREAU OF LABOR STATISTICS, EMPLOYMENT SITUATION DECEMBER 2009 (Jan. 8, 2010), *available at* http://www.bls.gov/news.release/empsit.nr0.htm.

181. *See* Kaplow, *supra* note 48, at 523–24 (analyzing environmental taxes in terms of both distortionary costs and the public good); *see also* Posner & Sunstein, *supra* note 143, at 70–71, 81–82 (arguing that because many populous nations have more to suffer from climate change and therefore more to gain from its regulation, these benefits should be taken into account when allocating rights).

regulation.[182] Because wealthier households are thought to enjoy environmental benefits preferentially, utility gains from environmental regulation are generally held to track with income.[183] Consequently, the financial impacts of environmental regulation may be largely offset by the social welfare gains for some deciles; this will depend on the distribution of social benefits associated with the environmental improvement.[184] In addition, the efficiency losses from the tax interaction effect are grounded in the assumption that marginal environmental benefits will be zero or less.[185] If, in fact, they are greater than zero and the environmental benefits have a negative impact on labor demand or a positive impact on labor supply, the magnitude of the efficiency losses from the tax interaction effect will be lower.

Unfortunately, climate change poses a unique set of problems for comparing the social costs and benefits of climate change policy. A number of economists hold that there are temporal and geographic differences between the households that will bear the burden of climate change regulation and the households that will benefit.[186] The harm from greenhouse gas emissions results from the accumulation of greenhouse gases; it increases not proportionately to the amount of emissions produced, but at an increasing rate based on the amount of emissions already in the atmosphere.[187] Therefore,

---

182. *See* Posner & Sunstein, *supra* note 143, at 81–82 ("[C]limate effects are extremely variable—hurting some people very badly, having no effect on others, and benefiting still others. From the standpoint of fairness, it would be strange to ignore these harmful effects while considering only the revenue effects.").

183. *See generally* WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 191–212 (Prentice Hall, Inc. 1975).

184. *See* Kaplow, *supra* note 157, at 162–63 (explaining that "benefits may have any relationship with income, not just being constant in dollars or strictly proportional to income").

185. *See* Bovenberg & Goulder, *supra* note 167, at 1494–97 (examining potential impacts of environmental taxes).

186. *See* Robert Mendelsohn, Ariel Dinar & Larry Williams, *The Distributional Impact of Climate Change on Rich and Poor Countries*, 11 ENVTL. & DEV. ECON. 159, 161 (2006) ("The results indicate that the poorest half of the world's nations suffer the bulk of the damages from climate change, whereas the wealthiest quarter has almost no net impacts.").

187. *See generally* Solomon et al., *supra* note 1. This is known as the stock-flow problem. To illustrate this concept, scholars frequently use an analogy comparing the Earth's atmosphere to a bathtub with a spigot that is much larger than its drain. While carbon dioxide and greenhouse gases are currently flowing into the tub at a brisk rate, the drain (the ability of the Earth's ecosystem to remove carbon dioxide from the atmosphere) is limited. Consequently, even if greenhouse gas production is slowed, the level of greenhouse gases in the tub will not fall unless the flow into the tub is slower than the drain out. Furthermore, given the existing level in the tub (the "stock" of greenhouse gases), the flows in will need to be significantly lower than the drain out if the level in the tub is to fall in the near future. *See* Lazarus, *supra* note 70, at 1164–66 (using the analogy of a bathtub drain to illustrate the stock-flow relationship).

even if governments regulate the amount of emissions produced, the potential for harm is not reduced unless the aggregate emissions in the atmosphere decline.[188] This will require stringent cutbacks in emissions today to avoid harms that are anticipated to occur fifty or one hundred years in the future.[189] Because many of the most significant environmental benefits that come from reducing greenhouse gases (such as the avoidance of catastrophic harm) are expected to occur in the distant future, economists discount the value of those benefits.[190] The higher the discount rate chosen, the smaller the estimate of the present value of those benefits will be.[191] Because the present value of the benefits of climate change policy is estimated to be small compared to the costs, some economists argue for delayed action and for under-regulation.[192]

In addition, impacts will vary geographically.[193] Developing countries and countries at low-latitudes will face greater risk due to greater sensitivity and

188. *See* Terry Barker et al., *Technical Summary*, *in* CLIMATE CHANGE 2007: MITIGATION, *supra* note 75, at 42–43 (explaining that emissions levels will need to be reduced significantly below current levels in order to reduce the potential for future harm).

189. *See* Ramanathan & Feng, *supra* note 1, at 14245 (observing that the Intergovernmental Panel on Climate Change estimates that approximately 25% of the committed global warming has already occurred, however, "[a]bout 90% or more of the rest of the committed warming . . . will unfold during the 21st century"); Solomon et al., *supra* note 1, at 1709 ("[S]ocietal decisions regarding carbon dioxide concentrations that have already occurred or could occur in the coming century imply irreversible dangers relating to climate change . . . pos[ing] substantial challenges to humanity in nature, with a magnitude that is directly linked to the peak level of carbon dioxide reached.").

190. *See generally* David Weisbach & Cass R. Sunstein, *Climate Change and Discounting the Future: A Guide for the Perplexed*, 27 YALE L. & POL'Y REV. 433, 438–49 (2009) (outlining the debate regarding the appropriate discount rate to employ to match cash flows in different periods, and arguing that overall savings and investment rates should be modified over time when discounting is shown to produce indefensible or unethical results).

191. Note that this calculation does not take into account the chance of catastrophic climate change or considerations of intergenerational equity. *See id.* at 436 (discussing the issue of discounting in the context of climate change). To the extent that future generations will be impacted, some have argued that equity requires intergenerational neutrality. *See id.* (noting the argument against a discounting scheme that would violate the principle of intergenerational neutrality by "treating the welfare of people who live in the future as far less important than the welfare of people who live in the present"); *see also* REVESZ & LIVERMORE, *supra* note 10, at 116–17 (discussing the application of both sustainable development principles, in which a certain amount and certain kinds of resources are set aside for future generations, and corrective justice principles, in which harms done by a generation must be corrected by that generation).

192. *See* Weisbach & Sunstein, *supra* note 190, at 433–34 ("[R]apid changes impose costs that are far too large relative to the benefits, and [Nordhaus] prefers a slow but steady change in the energy supply system. As a result, Nordhaus argues in favor of a relatively low carbon tax.").

193. *See* Smith et al., *supra* note 1, at 4134–35 (exploring the disparity of impacts caused by climate change and observing that "[s]ome regions, countries, and populations face greater harm from climate change, whereas other regions, countries, or populations would be much less

less capacity to adapt.[194] A number of economists conclude that the United States will benefit from global warming and, instead, will be harmed by climate change legislation.[195]

These assumptions about who will benefit from climate change legislation are beginning to be called into question, however. First, the United States already may be experiencing the adverse impacts of climate change.[196] The Western United States is subject to drought, heat waves, forest fires, flash floods, and mudslides.[197] In the Southeastern United States, hurricanes and floods are recurring events.[198] Similar impacts will continue to occur long before the risks of catastrophic loss are immediate.[199] While the United States may not be as vulnerable as some countries because of its relative wealth and infrastructure, which allow it to manage climate change impacts, these impacts are not expected to be gradual, but abrupt.[200] Specific populations—such as the elderly and the poor—within developed countries like the United States also may show

---

harmed—and some may benefit").

194. *Id.* at 4136.

195. *See* Mendelsohn et al., *supra* note 186, at 173 ("Poor countries continue to bear the burden of climate change damages, whereas rich countries likely benefit."); *see also* Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L.J. 1565, 1610–11 (2008) (going so far as to suggest that the countries most likely to be harmed by climate change should deliver side-payments to the United States to offset its current costs associated with greenhouse gas abatement).

196. *See* Smith et al., *supra* note 1, at 4135–36 (intimating, through mentioning extreme climate events such as Hurricane Katrina, that the United States is one of the developed countries with higher than expected levels of vulnerability to climate change impacts).

197. KURT M. CAMPBELL ET AL., CTR. FOR STRATEGIC & INTL. STUDIES, THE AGE OF CONSEQUENCES: THE FOREIGN POLICY AND NATIONAL SECURITY IMPLICATIONS OF GLOBAL CLIMATE CHANGE 37 (2007), *available at* http://csis.org/publication/age-consequences (finding that the Western United States "will experience progressively more severe and persistent drought, heat waves, and wildfires in future decades as a result of climate change" (footnote omitted)).

198. *See* Smith et al., *supra* note 1, at 4135–36 (identifying tropical cyclones, droughts, extreme heat waves, floods, and wildfires as examples of recent "extreme climate events" that are expected to increase in both quantity and intensity).

199. *See* Sean B. Hecht, *Climate Change and the Transformation of Risk: Insurance Matters*, 55 UCLA L. REV. 1559, 1561 (2008) ("If insurers do not rise to the challenge of climate change, there could be a serious financial and social crises on a global scale."). The National Oceanic and Atmospheric Administration estimates that weather and climate-sensitive industries are responsible, directly and indirectly, for approximately one-third of the U.S. gross domestic product. *Id.* at 1570 n.39.

200. CAMPBELL ET AL., *supra* note 197, at 37.

greater sensitivity and less capacity to recover, as was demonstrated with Hurricane Katrina in 2005.[201]

Scientists also predict that increased extreme weather events, coastal flooding, health impacts, and reduction in water supplies will result in net damage to global markets.[202] Given Americans' increasing reliance on foreign goods[203] and foreign investment opportunities,[204] U.S. household income and wealth would be subject to increased risks from climate change. Firms throughout the United States currently are acquiring insurance products to cover losses associated with these impacts.[205] However, there is some indication that the insurance markets themselves

---

201. *See* Smith et al., *supra* note 1, at 4136 ("There is increasing evidence of greater vulnerability of specific populations, such as the poor and elderly, to climate vulnerability and change in not only developing but also developed countries . . . . [and examples include] events such as Hurricane Katrina . . . ."). Hurricane Katrina in 2005 resulted in over 3,000 deaths and caused over $200 billion in property losses, including approximately $40 to $60 billion in privately insured losses. RAWLE O. KING, CONGRESSIONAL RESEARCH SERV., HURRICANE KATRINA: INSURANCE LOSSES AND NATIONAL CAPACITIES FOR FINANCING DISASTER RISK 4 (2005), *available at* http://www.au.af.mil/au/awc/awcgate/crs/rl33086.pdf. It has cost American taxpayers $7.9 billion to date. Shaila Dewan, *Ready or Not, Katrina Victims Are Losing Temporary Housing*, N.Y. TIMES, May 8, 2009, at 18.

202. *See* Smith et al., *supra* note 1, at 4136 ("[C]limate change over the next century is likely to adversely affect hundreds of millions of people through increased coastal flooding . . . [,] reductions in water supplies . . . [,] and increased health impacts . . . .").

203. *See* Press Release, Bureau of Econ. Analysis, U.S. Dep't of Commerce, U.S. International Trade in Goods and Services (Apr. 9, 2009), http://www.bea.gov/newsreleases/international/trade/2009/trad0209.htm (last visited Feb. 23, 2010) (noting that, in February 2009, the United States imported $152.7 billion in international goods and services, maintaining a $26 billion trade deficit) (on file with the Washington and Lee Law Review). These large numbers come in spite of the nation's current economic recession. *See* MARTIN NEIL BAILY & DOUGLAS J. ELLIOTT, BROOKINGS INST., THE U.S. FINANCIAL AND ECONOMIC CRISIS: WHERE DOES IT STAND AND WHERE DO WE GO FROM HERE? 2–11 (2009), *available at* http://www.brookings.edu/~/media/Files/rc/papers/2009/0615_economic_crisis_baily_elliott/0615_economic_crisis_baily_elliott.pdf (chronicling the history behind the "severe recession" from 2007 until 2009 and discussing its causes and effects).

204. *See* Michael J. Graetz & Itai Grinberg, *Taxing International Portfolio Income*, 56 TAX L. REV. 537, 538 (2003) ("In most years since 1990, the total market value of U.S. persons' foreign portfolio investments has exceeded the value of U.S. corporations' foreign direct investments, and the total amount of U.S. taxpayers' foreign portfolio income has exceeded their income from foreign direct investments." (footnote omitted)). "Cross-border portfolio investments are no longer a tiny tail on a large direct-investment dog. International portfolio investments now play a major role in the world economy, a role quite different from that played by foreign direct investments." *Id.*

205. *See* Hecht, *supra* note 199, at 1561 ("[The] awareness [that climate change poses a risk to the long-term stability of the insurance industry] has encouraged significant recent activity among insurance companies to attempt to assess and to react to climate change.").

are at risk from climate change.[206] Finally, the ancillary benefits of climate change legislation should also be considered.[207] Because other air pollutants may decline when carbon dioxide and other greenhouse gases are regulated, the environmental benefits from reduction of other forms of air pollution may have a beneficial impact that should be included in the analysis.[208]

To date, however, no quantification of the extent of the benefits of climate change legislation and no study of the distribution of these benefits within the United States have been performed. Because the extent and the distribution of the beneficial impacts of climate change legislation are difficult to ascertain, this method of offsetting the distributional impacts of the legislation remains impracticable at this stage.

---

206. *See* Carolyn Kousky & Roger M. Cooke, Climate Change and Risk Management: Challenges for Insurance, Adaptation, and Loss Estimation 6–10 (Feb. 2009) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/RFF/Documents/RFF-DP-09-03-REV.pdf (noting that insurance markets are at risk from climate change because of global micro-correlations, fat tails, and tail dependence and may even be subject to collapse).

207. *See* REVESZ & LIVERMORE, *supra* note 10, at 55–65 (arguing that a cost-benefit analysis with respect to environmental regulatory decisions should acknowledge both the collateral consequences and the ancillary benefits of the regulations).

208. *See* Dallas Burtraw et al., Ancillary Benefits of Reduced Air Pollution in the United States from Moderate Greenhouse Gas Mitigation Policies in the Electricity Sector 32–35 (Dec. 2001) (unpublished discussion paper, on file with the Washington and Lee Law Review), *available at* http://www.rff.org/rff/documents/rff-dp-01-61.pdf (noting that because the facilities that are regulated under climate change legislation will shift to cleaner energy sources, air quality may improve from reduction of Clean Air Act criteria pollutants). *But see* William F. Pedersen, *Adapting Environmental Law to Global Warming Controls*, 17 N.Y.U. ENVTL. L.J. 256, 261 (2008) (examining the problematic nature of emissions caps, and explaining that "[s]ince 'capped' sources in the aggregate are free to emit up to the 'capped' amounts, they will always do so rather than incur the expense of controls"); David Schoenbrod et al., *Climate Change and Air Pollution: An Integrated Proposal*, *in* BREAKING THE LOGJAM: ENVIRONMENTAL REFORM FOR THE NEW CONGRESS AND ADMINISTRATION 12 (2009), *available at* http://www.breakingthelogjam.org/CMS/files/ClimateReportv1r4.pdf ("Under the current state implementation plan process, cuts in criteria pollutants were not exceeded."). Note that pollution "hotspots" are expected to arise unless the caps for criteria pollutants are coordinated with the caps for greenhouse gases. *See id.* at 5 ("The principal argument against reliance on a federal cap and trade program to reduce criteria pollutants is that it could create local pollution hotspots."). Firms subject to greenhouse controls will emit less pollution under the Clean Air Act, but firms not subject to greenhouse controls will be allowed to emit more to meet the national Clean Air Act cap, leaving no net difference in the amount of pollution nationwide. *See* Pederson, *supra*, at 261 (noting the problems associated with a pollution cap approach). Some locations may, in fact, experience worse pollution where polluting firms in their area are not subject to the greenhouse gas limits. *See* Schoenbrod et al., *supra*, at 12 (observing that, under certain climate control schemes, some pollution sources could "increase their criteria pollutant emissions, so long as the cap was not exceeded").

3. Distributional Neutrality (Proportionate Rebate)

Providing an equal rebate to all U.S. households raises political concerns about entitlement to the commons and about redistribution that could delay action.[209] Modifying income tax or labor tax rates will not address the economic impacts of climate change policy for the most vulnerable households in the United States.[210] In addition, delivering a rebate that accounts for the fiscal benefits and burdens of climate change policy remains challenging.[211] Therefore, another solution is needed. One option is to restore the households to their economic position prior to the imposition of climate change legislation. This could be accomplished by capturing all climate change revenues and providing a rebate that is proportionate to the fiscal burden the greenhouse gas tax or the cap-and-trade regime imposed—a "proportionate rebate." This policy neutralizes the financial impacts of climate change legislation, sidesteps debates about redistribution, and holds out the possibility of calculating the net cost of climate change policy as more information becomes available about the distribution of environmental benefits. While there may be efficiency losses from the tax interaction effect, these must be balanced against the harm that would be suffered by the most vulnerable populations if excluded from the benefit because of age, disability, or unemployment. In addition, the conclusion that there will be efficiency losses from the tax interaction effect rests in part on the assumption that the marginal environmental benefits will be zero.[212] Because no studies have been performed yet that include an estimate of the environmental benefits, these efficiency losses may not be as significant as expected.

Under a proportionate-rebate scheme, the government would base a household's rebate on the average consumption for the average-income household within its income decile, and would scale the rebate according to household size.[213] Within each income decile, the households with average

---

209. *See supra* notes 146–65 and accompanying text (exploring the political and equitable issues associated with an equal rebate scheme).

210. *See supra* notes 147–49 and accompanying text (explaining that an equal rebate approach allocates the same value to the wealthy as to the poor).

211. *See supra* notes 176–208 and accompanying text (discussing the issues associated with offsetting the benefits and burdens of climate change policy).

212. *See* Parry et al., *supra* note 167, at 54 n.6 (observing that the "impossibility of efficiency gains was demonstrated through numerical simulations" (citing A. Lans Bovenberg & Lawrence H. Goulder, *Optimal Environmental Taxation in the Presence of Other Taxes: General-Equilibrium Analyses*, 86 AM. ECON. REV. 985, 989–95 (1996))).

213. The system would employ the same mechanism used to scale poverty level for family

consumption within the decile would have the burdens of the tax or cap-and-trade regime fully offset. Households that consumed less than average for their size and decile would be somewhat overcompensated. Households that consumed more than average for their size and decile would be undercompensated. This structure would provide incentives to conserve at all levels of income. Because the rebates generally restore households within each income decile to the income level they enjoyed before imposition of the tax or cap-and-trade regime, there is no net loss of income. The level of progressivity established by the income tax system remains the same as it was before imposition of the tax.

The Obama Administration estimates that the first-year revenues for a cap-and-trade system would generate approximately $80 billion[214] in gross revenues[215] annually. To illustrate how these funds would be distributed among deciles and quintiles of the population based on the distribution of the burden as estimated under a 2007 carbon tax model, Table 9 shows the distribution of climate change revenues among income deciles and quintiles.[216]

---

size.

214. Deborah Zabarenko & Ayesha Rascoe, *Obama Budget Realistic on Climate Revenue: Analysts*, REUTERS, Feb. 26, 2009, http://www.reuters.com/article/environmentNews/idUSTRE51P4Q920090226 (last visited Feb. 23, 2010) (on file with the Washington and Lee Law Review); *Obama Budget Plan Eyes Climate, Clean Energy*, ASSOCIATED PRESS, Feb. 26, 2009, http://www.msnbc.msn.com/id/29416656 (last visited Feb. 15, 2010) (on file with the Washington and Lee Law Review).

215. *See* CHAD STONE ET AL., CTR. ON BUDGET & POLICY PRIORITIES, HOW CBO ESTIMATES THE COST OF CLIMATE-CHANGE LEGISLATION 1 (2008), *available at* http://www.cbpp.org/files/5-13-08climate.pdf ("When the Congressional Budget Office prepares cost estimates for climate-change legislation, those estimates reflect what is known as a '25-percent income and payroll tax offset.' As a result of this offset, the *net* revenue . . . under a cap-and-trade program . . . is *25 percent smaller* . . . ."). If instead gross revenues were distributed as rebates, and the rebates were taxed as additional income, taxing the rebates would be neutral with respect to current distribution. *See id.* at 2 ("The only circumstance in which there would not be a 25-percent offset is when the allowances are given away in a form that effectively makes them taxable income to the recipient . . . ."). Distributing net revenues would be regressive.

216. *See supra* note 102 (explaining that the bottom 5% of the income distribution has been removed from certain analyses).

Table 9: Distribution of Revenues by Population Decile and Quintile

Proportionate Rebate: Distribution of Revenues Tracks Distribution of Burdens										
Deciles	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
Percentage Share of Burden by Decile	4.0%	5.9%	7.0%	8.0%	9.3%	10%	11.3%	12.8%	14.0%	17.7%
Dollars per Decile (in Billions)[217]	$3.2	$4.6	$5.5	$6.2	$7.3	$7.8	$8.8	$10	$10.9	$13.8
Dollars by Decile (in Billions)[218]	$2.4	$3.5	$4.2	$4.8	$5.6	$6.0	$6.8	$7.7	$8.4	$10.6
Quintiles	1st		2d		3d		4th		5th	
Percentage Share of Burden by Quintile	9.9%		15.0%		19.3%		24.1%		31.7%	
Dollars by Quintile (in Billions)[219]	$7.7		$11.7		$15.1		$18.8		$24.7	
Dollars per Quintile (in Billions)[220]	$5.9		$9.0		$11.6		$14.5		$19.0	

B. Choice of Method for Delivery: Institutional Compatibility

There are many ways to deliver a climate change rebate. Fortunately, several scholars have begun to develop a number of criteria with which to evaluate alternate systems for delivering public benefits. In their seminal article

217. Rebates would be taxed to recipients. *See supra* note 215 (explaining the results of taxing rebates).

218. *See supra* note 215 (explaining the 25% income and payroll tax offset). Revenue distributed among each income decile is net of the estimated sum retained by the government to compensate for the decline in payroll and income tax revenues.

219. *See supra* note 215 (explaining the revenue results when rebates are taxed). Rebates would be taxed to recipients.

220. *See supra* note 215 (explaining the 25% income and payroll tax offset). Revenue distributed among each income quintile is net of the estimated sum retained by the government to compensate for the decline in payroll and income tax revenues.

The Integration of Tax and Spending Programs,[221] David Weisbach and Jacob Nussim argue that once policymakers have decided to move forward with a particular benefit program, they should match the benefit program with the institutional structure that is most compatible.[222] To do this, policymakers must identify the tasks that will need to be performed to implement the program, determine whether existing institutions measure along the same lines, and examine whether, within those institutions, the same kinds of expertise would be required to deliver the new program.[223] By coordinating with other programs that measure along the same lines, the government may save time and significant administrative costs that otherwise would be required to set up a new agency, to train a new bureaucracy, and to operate a new administrative system.[224]

Similarly, Eric Toder suggests a set of criteria by which to evaluate whether a program would be administered more effectively through the income tax system or through a direct spending program: (1) expertise needed to determine eligibility and how funds are to be used, (2) compatibility of a budgeting and an accounting period in eligibility determinations, (3) administrative savings and transparency of administrative costs, (4) timing for delivery of benefits, and (5) nature and frequency of review of those benefits.[225]

In the sections below, this Article evaluates three proposed institutions for delivering the climate change rebate: funding through utility companies and gasoline suppliers, through state and federal human services agencies, and through the tax system. Funding through the tax system is evaluated using Weisbach, Nussim, and Toder's institutional compatibility criteria[226] and two other criteria relevant in determining institutional compatibility: (1) whether the delivery structure undermines or supports the regulatory goals of the

---

221. David A. Weisbach & Jacob Nussim, *The Integration of Tax and Spending Programs*, 113 YALE L.J. 995 (2004).

222. *See id.* at 975 ("The answer [to the question of where a certain program belongs] depends on institutional factors, not on definitions." (footnote omitted)).

223. *See id.* at 996 (using a tax program as an example and observing that "we want to integrate programs that have close complementarities with the tax system—e.g., programs that measure along similar margins").

224. *See id.* (using a tax program as an example and noting the coordination and specialization benefits that flow from pairing such a program with a similar preexisting program such as the IRS).

225. *See* Eric J. Toder, *Tax Cuts or Spending—Does It Make a Difference?*, 53 NAT'L TAX J. 361, 366–69 (2000) (fleshing out his proposed set of criteria).

226. *See supra* notes 222–25 and accompanying text (identifying Weisbach, Nussim, and Toder's criteria).

legislation, and (2) how effective the system is in reaching the targeted beneficiaries.

1. Utility Companies and Gasoline Distributors

One approach for offsetting distributional impacts that has been included in legislative proposals for a cap-and-trade system is to allocate free emissions allowances[227] or to provide rebates to utility companies,[228] on the understanding that the savings would be passed on to consumers.[229] This proposal has a number of shortcomings. First, if the utility companies simply pass the savings from their free allocation of allowances to all consumers through rate reductions, then the central goal of the climate change program is undercut.[230] Households will not have the financial incentive to reduce electricity use, and, consequently, consumption of electricity actually would increase relative to other forms of energy.[231] As a result of the lower prices in the electricity sector, more firms would shift their energy use to that sector, leading to greater emissions from electricity.[232] Consequently, higher levels of reductions would be required from other energy sectors for aggregate emissions to stay within the cap.[233] Second, this plan would address only the

---

227. *See* America's Climate Security Act of 2007, S. 2191, 110th Cong. § 1201 (as introduced in Senate, Oct. 18, 2007) (proposing the establishment of a certain quantity of emission allowances for each calendar year); American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 721 (as placed on calendar in Senate, July 7, 2009) (same).

228. *See* U.S. CLIMATE ACTION P'SHIP, A BLUEPRINT FOR LEGISLATIVE ACTION 13 (2009) [hereinafter USCAP], *available at* http://www.us-cap.org/blueprint/index.asp (recommending that "an adequate amount of allowance value be provided to U.S. manufacturers" and industries that will be "particularly challenged by U.S. climate policy"). The United States Climate Action Partnership is a coalition of large corporations and several nonprofit environmental organizations, including the Natural Resources Defense Council, the Environmental Defense Fund, the Pew Center on Global Climate Change, and the World Resources Institute.

229. Paul et al., *supra* note 58, at 25.

230. *See id.* ("When electricity consumers do not see the increase in retail electricity prices, they do not have an incentive to reduce electricity consumption . . . . [T]his . . . would lead to more electricity consumption, and . . . it would lead to more emissions from the electricity sector . . . ."); CHAD STONE & ROBERT GREENSTEIN, CTR. ON BUDGET & POLICY PRIORITIES, WHY UTILITIES ARE NOT WELL-SUITED TO DELIVER RELIEF TO LOW- AND MODERATE-INCOME CONSUMERS IN A CLIMATE BILL 3 (2009), *available at* http://www.cbpp.org/files/2-19-09climate.pdf ("People who do not realize that energy costs are going up will be far less likely to take steps to conserve energy or seek out energy efficiency improvements.").

231. Paul et al., *supra* note 58, at 25.

232. *See id.* (finding that lower prices in the electricity sector would "lead to more emissions from the electricity sector").

233. *Id.*

increased electricity costs.[234] The impacts from higher transportation fuel prices or the indirect cost increases in goods and services would not be covered.[235]

Another proposal involves offsetting existing consumer taxes on gas and diesel.[236] As with home heating and electricity costs, this plan would undercut the regulatory goals. If consumers do not experience increased prices at the pump, they will not have the economic incentive to reduce gas consumption, to acquire more fuel-efficient cars, or to shift to alternative fuels or less carbon-intensive forms of transportation. Again, this plan, even if paired with the reductions in household utility rates, would not address the indirect distributional impacts from the increases in prices of goods and services.

Another important concern with these programs is that the government, utility companies, and gasoline distributors lack the infrastructure to guarantee that the offsets will actually reach the consumer.[237] The government would need to develop additional structures to monitor the unregulated utilities and gasoline suppliers' delivery of these rebates and price offsets.[238] If the utility companies were to provide a rebate in the electricity bills based on household consumption levels, they would need to develop additional structures to gather additional data from the households in order to deliver a rebate that was proportionate to the distributional impacts on those households.[239] The costs associated with developing and maintaining these structures may be high; they necessarily would reduce funds available for rebates to consumers.[240] Even if the utility companies now had the infrastructure in place to collect and use this data to deliver rebates equitably, there is still no guarantee that all households would benefit from the rebate. For rental units, to the extent that utility costs

---

234. *See* STONE & GREENSTEIN, *supra* note 230, at 3 ("The purpose of giving funds to utility companies is to offset increases in electricity and natural gas bills.").

235. *See id.* (finding that more than half of the impact from climate change policy "will come in higher prices for a range of other goods and services, including gasoline and food"). Note that high home energy prices comprise less than half of the burden imposed by climate change legislation. *Id.*

236. *See* USCAP, *supra* note 228, at 13 ("USCAP recommends the judicious use of allowance value to ensure that consumers' transportation fuel impacts from allowance prices are generally proportionate to their electricity and natural gas impacts.").

237. STONE & GREENSTEIN, *supra* note 230, at 11.

238. *Id.* at 4; USCAP, *supra* note 228, at 13. Note also that USCAP—which promoted several different structures to recycle cap-and-trade allocation revenues through utilities companies and other entities in order to dampen the impacts of climate legislation on consumers—recommended that structures be developed to make sure that these benefits actually get to the consumers.

239. STONE & GREENSTEIN, *supra* note 230, at 2.

240. *Id.*

are included in rent, any rebates received by landlords are unlikely to be passed forward to tenants.[241] This is a particular hazard for low-income families who are more likely to rent than own their homes.[242]

A related proposal to alleviate the distributional impacts of spikes in home heating fuels, gas, and electricity to low-income households would expand the Weatherization Assistance Program (WAP) and the Low Income Home Energy Assistance Program (LIHEAP).[243] WAP helps low-income households weatherize their homes and improve energy efficiency.[244] Investment in WAP and similar programs would improve energy efficiency in homes, reduce demand for electricity and home heating fuels, and reduce the costs to other sectors of the economy to achieve emissions requirements.[245] LIHEAP provides vouchers to families suffering financial hardship during adverse weather conditions that allow them to pay for their home heating and electricity bills.[246] In general, because the benefits under LIHEAP cover the costs that a household incurs but cannot pay for, LIHEAP generally would undercut conservation by these low-income households so long as the household was assured of receiving the LIHEAP benefit.[247] However, this might be an appropriate use of some of the revenues from a greenhouse gas tax or a cap-and-trade regime in regions where low-income residents will be impacted disproportionately because of seasonal temperatures and regional housing

241. *Id.* at 11 ("[T]he sizeable share of Americans whose utilities are built into their rents could be left out entirely if climate assistance were delivered through utility companies.").

242. *See* CHRISTOPHER E. HERBERT ET AL., U.S. DEP'T OF HOUSING & URBAN DEV. HOMEOWNERSHIP GAPS AMONG LOW-INCOME AND MINORITY BORROWERS AND NEIGHBORHOODS vii (2005), *available at* http://www.huduser.org/Publications/pdf/HomeownershipGapsAmong Low-IncomeandMinority.pdf ("There are also large differences in homeownership rates by household income.").

243. *See* STONE & SHAW, *supra* note 119, at 5–7 ("Additional LIHEAP and WAP funds also could help low-income families that face particularly high home energy costs as a result of climate change legislation . . . ."); *see also* Burtaw (2008), *supra* note 24, at 45–47 (advocating investment of climate change revenues in end-use efficiency programs).

244. STONE & SHAW, *supra* note 119, at 5.

245. *See* Burtraw (2008), *supra* note 24, at 53 (indicating that the proposed policy "would lead to lower allowance prices, indicating less cost would be imposed on other sectors of the economy in order to achieve the specified climate goal").

246. *See* STONE & SHAW, *supra* note 119, at 5 (indicating that the current eligibility requirements are income below 60% of states' median income or 150% of federal poverty level).

247. *See id.* at 11 ("[R]outine consumer assistance through utility companies artificially lowers households' utility bills, and blunts the 'sticker shock' of higher bills. People who do not realize that energy costs are going up will be much less likely to take steps to conserve energy or seek out energy efficiency improvements.").

stock, such as Florida, the Ohio Valley, and the Northeast.[248] To the extent that there are regional reductions in claims under the WAP and LIHEAP programs, the funds should be shifted to those regions with a rise in claimants. In general, uptake under these programs tends to be lower than optimal.[249] Significant efforts would need to be made to increase uptake of benefits under both the WAP and LIHEAP programs in these regions.

2. Human Services Programs

A few advocates have proposed that an array of state and federal human service agencies deliver rebates to offset distributional impacts of a cap-and-trade or greenhouse gas tax to low-income households.[250] These proposals distribute the rebates as a supplement to existing benefits through the Social Security, the Supplemental Security Income, Veterans' Affairs, and Railroad Retirement systems, and state human services systems that deliver Food Stamps and Temporary Assistance to Needy Families (TANF).[251] Higher-income households would receive the rebate through the tax system.[252] These advocates argue that these programs provide more certainty that all intended beneficiaries will receive their rebates because approximately fifteen percent of households do not currently file income taxes.[253]

---

248. *See* Burtraw (2008), *supra* note 24, at 45–47 (suggesting that investing greenhouse gas taxes or cap-and-trade emissions permit revenues in end-use efficiency programs leads to much lower electricity sector emissions, provides a net gain to the bottom two deciles in the aggregate, and reduces their losses in the Northeast, the Ohio Valley, and Florida).

249. *See* STONE & SHAW, *supra* note 119, at 2 ("This low-income rebate program could easily be modified so it also provides relief to consumers with somewhat higher incomes."); *see also id.* at 10 ("For example, the Weatherization Assistance Program, which helps low-income households make their homes more energy efficient through measures such as better insulation and newer appliances, serves only a few hundred thousand homes a year.").

250. *See* SHARON PARROTT ET AL., CTR. ON BUDGET & POLICY PRIORITIES, HOW TO USE EXISTING TAX AND BENEFIT SYSTEMS TO OFFSET CONSUMERS' HIGHER ENERGY COSTS UNDER AN EMISSIONS CAP 7–8 (2009), *available at* http://www.cbpp.org/files/4-20-09climate.pdf (discussing how the proposal may result in some people qualifying for multiple climate rebates); *see also* CBO 2009, *supra* note 24, at 22–23 (describing climate change policy revenues under ACES 2009 to be used in part for energy rebate programs "for households whose gross income does not exceed 150 percent of the federal poverty level or that are receiving benefits through the supplemental Nutrition Assistance Program, the Medicare Part D low-income subsidy, the supplemental Security Income Program or other low-income assistance").

251. PARROTT ET AL., *supra* note 250, at 7.

252. *Id.* at 4.

253. *Id.*

The first consideration is whether the intended beneficiaries actually will receive the benefit. Uptake under these benefits systems is historically low.[254] In addition, as benefits are distributed through multiple agencies, coordination problems will arise. Allocation of climate change revenues among agencies may pose over- and under-counting problems at the agency level and will require agencies to coordinate where households currently receive more than one benefit. Households may be confused about which agency to approach to apply for benefits if they currently report to more than one agency. Applying for and maintaining multiple benefits impose significant social costs on households in terms of time, effort, and expense that should be taken into consideration when evaluating access and feasibility of institutional design.[255] In addition, it is unfair to require low-income households to travel to more than one state or federal agency and submit to eligibility evaluations to apply for a benefit that higher-income households may receive simply by filing their income tax returns.

Finally, by channeling the rebate through existing benefits programs, the purpose of the rebate would be disguised.[256] In contrast, segregating a climate rebate as a separate benefit may signal to households that they may need to budget for home energy cost increases, to conserve energy, and to shift to substitutes.[257]

3. *Income Tax System*

Under a proportionate-rebate scheme, the only expertise required to determine eligibility involves measurement of income and household size. Because the Internal Revenue Service has expertise in measuring income data and does so on an annual basis for virtually every U.S. resident, the income tax system should be considered as a candidate for delivering the rebate.[258] In

254. *See* Weisbach & Nussim, *supra* note 221, at 1004–05 (comparing participation rate in Food Stamp program (70%) to participation rate in EITC (89%)); *see also* Lawrence Zelenak, *Tax or Welfare? The Administration of the Earned Income Tax Credit*, 52 UCLA L. REV. 1867, 1915 (2005) (reporting that among families with children the Food Stamp participation rate is 50%, compared to the 90% participation rate for this group in the EITC).

255. Weisbach & Nussim, *supra* note 221, at 1002–03.

256. Except for the additional funds they are receiving on part of their public benefits, the rebate and the reason for the rebate would be invisible to the recipients.

257. *See* RICHARD H. THALER & CASS R. SUNSTEIN, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS 188–96 (2008) (discussing the impact of signaling on behavior).

258. *See* Toder, *supra* note 225, at 368 ("There is no point in establishing a new funding agency when potential subsidy recipients are already settling an annual balance with the IRS.").

general, policymakers weigh the risks of fraud against concerns about providing access when setting up eligibility criteria and processes.[259] Allowing individuals to identify themselves as eligible enhances the possibility of fraud, but expands access.[260] Employing a strict eligibility determination process as a condition for receiving the benefit reduces fraud but decreases access.[261] The economic constraints imposed on lower-income households from climate change legislation point toward extending broader access through self-declared eligibility.[262] In addition, the risk of fraud is low. A proportionate rebate increases with income. Because reporting higher income would expose the household to higher taxes, households are unlikely to overstate their income to receive a higher rebate.

To issue the rebate, the only other variable that must be measured is household size. The Internal Revenue Service also tracks this information through the annual return filing process.[263] Households are required to provide social security numbers for each household member. Because the Internal Revenue Service has expertise in verifying income and household size, and because individuals can identify themselves as eligible recipients of the rebate, the income tax system appears to be a good choice of institution for delivery of the climate change rebate.

The income tax system also has unique value in providing a well-recognized infrastructure for delivery of cash reimbursements. Because of the annual income-reporting requirement, the tax code provides an economy of scope not available through other programs.[264] This would allow the program to have extensive penetration among the pool of beneficiaries from the first year of implementation. The income tax system has a demonstrated track record in delivering rebates to low-income households; refundable tax credits under the EITC program have achieved nearly a ninety percent uptake rate among

---

259. *See id.* (discussing the trade-off between maximizing access for eligible beneficiaries and minimizing fraud by those ineligible for a benefit).

260. *Id.* at 368.

261. *Id.*

262. *See* Zelenak, *supra* note 254, at 1915 ("[T]he participation rate (that is, the percentage of eligible persons who receive benefits) is much higher with the EITC's self declared eligibility than with the Food Stamp program's precertification requirement.").

263. *See* DEPARTMENT OF THE TREASURY—INTERNAL REVENUE SERVICE, FORM 1040: U.S. INDIVIDUAL INCOME TAX RETURN 2009, http://www.irs.gov/pub/irs-pdf/f1040.pdf (last visited Feb. 7, 2010) (showing tax form and information collected on household size) (on file with the Washington and Lee Law Review).

264. *See* Weisbach & Nussim, *supra* note 221, at 996 ("[T]he IRS has expertise in measuring along those margins, and it exhibits economies of scope in such measurement.").

families with children.[265] By using infrastructure with which the public is familiar, policymakers may devote more resources to the actual rebates and to outreach targeting populations that do not usually file tax returns, such as low-income households, elderly populations receiving Social Security, and disabled individuals receiving Supplemental Security Income.[266] In contrast with the eligibility determination process within health and human service agencies, both nonprofit and for-profit firms are available to assist taxpayers in designating their eligibility for the benefit.[267]

Another consideration in the choice of an institution is whether there are likely to be savings in administration of the program. Inclusion of the climate change rebate within the income tax system would permit implementation of the program using existing infrastructure. This will reduce the costs of implementing the system and reduce enforcement and compliance costs by an order of magnitude,[268] thereby increasing administrative efficiency.[269] There are significant savings from using an existing measurement system to process the same information that must be provided by taxpayers in their annual returns. While the Internal Revenue Service might require additional manpower to enforce eligibility requirements and to measure program performance, no additional administrative structure would be required. Beneficiaries also save costs, time, and effort associated with application and

---

265. Zelenak, *supra* note 254, at 1915 n.197; Leonard E. Buman & Deborah I. Kobes, *EITC Reaches More Eligible Families Than TANF, Food Stamps*, 98 TAX NOTES 1769, 1769 (2003).

266. *See* Weisbach & Nussim, *supra* note 221, at 980 ("[T]hese features . . . are a key benefit of integration into the tax system because they take advantage of the existing infrastructure of tax collection. That is, integration allows for economies of scope in policy implementation with the resulting savings in administering and complying with the system.").

267. The Volunteer Income Tax Assistance Program provides tax assistance for low- and moderate-income households, and Tax Counseling for the Elderly, sponsored by the Internal Revenue Service and the American Association of Retired Persons, helps citizens aged sixty and older to file their taxes. See Michael Evangelist, National Community Tax Coalition: A Project of the Center for Economic Progress 1, http://www.tax-coalition.org/advocacy/materials/VITA_Funding_Policy_Brief.pdf ("Community Volunteer Income Tax Assistance (VITA) programs offer free tax help and related financial services to low-income individuals and families."). Jackson Hewitt and H&R Block also provide assistance. *See H&R Block Announces Programs to Help Taxpayers Claim EITC, Other Benefits for Low-Income Families*, BUS. WIRE, Feb. 11, 2008, http://www.allbusiness.com/legal/tax-law-income-tax/6779584-1.html (last visited Jan. 18, 2010) ("$30 Billion in Government Benefits Claimed through H&R Block in 2007") (on file with the Washington and Lee Law Review).

268. *See* Weisbach & Nussim, *supra* note 221, at 1006 (comparing the costs of administering the Food Stamps program with the costs associated with administering the EITC).

269. *See id.* at 1001–03 ("The argument for the integration of transfer programs such as the EITC and the FSP into the tax system is that integration enhances administrative efficiency by reducing bureaucratic costs and complexity.").

eligibility ordeals at multiple agencies. They would be required to invest no more effort than they would by filing their annual income tax statement. In addition, the tax system provides transparency to the public because households self-designate their eligibility.[270]

Another positive benefit in providing a financial benefit through the tax code is that it becomes easier to coordinate the step-up under the proportionate rebate for each decile with the phase-outs of other benefit programs, such as the EITC, the Child Care Credit, Food Stamps, and Temporary Assistance for Needy Families (TANF).[271] A number of public benefits have phase-out schedules in which the benefit declines as income increases.[272] The combined effect of multiple phase-outs may impose a higher marginal tax rate.[273] When the ranges of incomes over which the phase-outs occur coincide, the marginal tax increases can be stark.[274] Inclusion of financial benefits within the tax code permits these phase-outs to be coordinated so that taxpayers experience a more rational progression of rate increases.[275] This coordination advantage suggests that the climate change rebate is a good candidate for inclusion in the tax system.

Finally, the budgeting and accounting periods used to determine eligibility for the rebate would be compatible with the annual income tax return filing period.[276] This is because the goal of the climate change rebate is to ameliorate

---

270. *Id.* at 980.

271. *See id.* at 1002 ("Further benefits to coordination arise through the interaction of tax and transfer programs on a variety of margins.").

272. *Id.*

273. *See id.* ("For example, phase-outs of means-tested programs increase effective marginal tax rates, and failure to coordinate phase-outs can create extremely high rates for low-income individuals.").

274. *See* Daniel N. Shaviro, *Effective Marginal Tax Rates on Low-Income Households*, 84 TAX NOTES 1191, 1191 (1999) (explaining how effective marginal tax rates on low-income households can exceed 100 percent as a result of income-conditioned benefits phase-outs combined with income and labor taxes).

275. *See* Weisbach & Nussim, *supra* note 221, at 995 ("[P]utting a program into the tax system can be seen as a decision for simplicity."); *see also id.* at 1002 ("[P]hase-outs of means-tested programs increase effective marginal tax rates, and failure to coordinate phase-outs can create extremely high rates for low-income individuals."). Note that while the proposed proportionate rebate will increase as income does, it will be necessary to coordinate the programs to avoid disqualification errors that could otherwise result in the other benefit programs.

276. *See* Toder, *supra* note 225, at 367–68 ("Given that most individuals and businesses already file tax returns, a new tax incentive, even though it makes the tax law more complex, also has the advantage of not requiring a new point of contact between a citizen and a government agency.").

the impacts of climate change legislation on households in accordance with actual current consumption patterns.[277]

If the tax system is the best structure for delivering the climate change rebate, the question becomes, "What form should the rebate take?" Because the economic incidence of climate change legislation tracks with consumption and income, a number of proposals might be used: a reduction in payroll tax rates, a reduction in income tax rates, income tax deductions, nonrefundable tax credits, or refundable tax credits.

As mentioned above, using revenue from climate change legislation to modify income tax or payroll tax rates would exclude large numbers of some of the most vulnerable households. Individuals who are not earning wages (such as the unemployed and the elderly) and those who are not taxed on wages (such as the disabled and certain state workers) would not benefit from the reduction in payroll and income taxes. Alternative policies provide for delivery of deductions or nonrefundable tax credits to households. A deduction would benefit only the thirty-five percent of tax units that itemize.[278] When a household receives a benefit in the form of a deduction, the higher the income of the household, the higher the benefit, based on the marginal tax rate for the household. Therefore, offsets in the form of a deduction would be regressive.[279] Furthermore, households with no tax liability—those with the lowest income—would receive no benefit from an offset delivered as a nonrefundable credit or a deduction, even though they would be impacted most severely.[280] Tax deductions and nonrefundable tax credits benefit only those with tax liability; thirty-seven percent of tax units have no liability.[281]

In contrast, a refundable tax credit will reach households at all levels of the income spectrum. Some have suggested that policymakers expand the EITC program.[282] While this might be appropriate if the rebate were going

277. Several recent studies have shown that household consumption does track with annual income. *See* Bull et al., *supra* note 24, at 148 (confirming that consumption tracks with annual income); *see also* Carroll, *supra* note 86, at 2 (arguing that consumers with important income uncertainty who are sufficiently impatient set average consumption growth equal to their average labor income growth regardless of tastes; when wealth is below the savings target for emergencies they save and when wealth is above the target they consume).

278. Batchelder et al., *supra* note 89, at 53–54.

279. *Id.* at 49–50.

280. *Id.* at 54.

281. *Id.* at 53–54.

282. *See* CBO 2009, *supra* note 24, at 22–23 (describing the plan under ACES 2009 to expand the earned income tax credit payable to individuals without qualifying children). *But see* STONE & SHAW, *supra* note 119, at 3 (suggesting that a separate climate tax credit be extended to provide relief to middle-income consumers).

only to lower-income households with at least one working adult, it will exclude many low-income households that do not have at least one working adult, including the elderly, the unemployed, and those with disabilities.[283] If included in the EITC, the proportionate rebate would expand the EITC well beyond its current parameters and eligibility standards.[284] In addition, given the general disfavor of the EITC politically,[285] it may be advantageous to insulate climate change legislation for reasons of political economy. To avoid entangling climate change legislation with political battles over the EITC and to avoid complicating enforcement of the EITC program with broader income eligibility requirements, the proportionate rebate should be offered as a separate credit. Finally, a separate credit may provide an important behavioral signal to households to conserve energy and to budget for cost increases over the following year, providing benefits to both the household and the environment.[286]

4. Optimal Delivery System Based on Institutional Compatibility

The goal of a climate change rebate is to address the distributional impacts of climate change policy. Because these distributional impacts are measured in accordance with and track with income and household size, a proportionate rebate should be delivered as a refundable tax credit through the tax system. The Internal Revenue Service has expertise in this area and measures along the lines of household income and size. Because of this institutional compatibility, delivery of the rebate through the tax system will reduce administrative costs during deployment, operation, and enforcement, leaving more revenues for rebates. The tax system is the only institutional structure with the capacity to reach virtually all households impacted by climate change legislation, and, because it is familiar to these households, uptake will be maximized in a very short period. Use of some climate change revenues to increase the budget for WAP and LIHEAP may be warranted, however, to cure regional impacts

283. The eligibility rules for the EITC are outlined on the IRS website. Basic Qualifications, http://www.eitc.irs.gov/central/abouteitc/basicqualifications/ (last visited Feb. 23, 2010) (on file with the Washington and Lee Law Review).

284. *Id.*

285. *See* Steve Holt, *The Earned Income Tax Credit at Age 30: What We Know*, The Brookings Institution, Research Brief, Feb. 2006, 18–23 (providing an overview of the concerns and controversies associated with the EITC).

286. *See* THALER & SUNSTEIN, *supra* note 257, at 188–96 (discussing the impact of signaling on behavior).

associated with cost increases related to seasonal temperature changes and poor housing stock.

In contrast, other proposals have serious flaws and can undermine the goals of climate change legislation itself. Proposals to mitigate climate change policy impacts through rate reductions in gas taxes and electricity rates would undermine the efficiency goals of the climate change legislation: to encourage conservation and shifts to clean fuels and products. To maintain the cap in the face of rate reductions in specific energy sectors, other energy sectors will be forced to increase rates; this will result in expensive shifts to the lower-cost energy sectors without a corresponding increase in conservation or energy efficiency or a shift to non-fossil fuel substitutes. In addition, rate reductions in gasoline prices or electricity rates will not correct fully for the indirect distributional impacts of price increases on goods and services. Finally, costly administrative structures would be required to ensure that the economic benefit of allocations of free permits or tax abatements to unregulated utilities companies and transportation fuel suppliers would be passed through to consumers.

Delivery of the benefit through increases in existing benefits programs such as Food Stamps, TANF, Social Security, Supplemental Security Income, and other targeted programs would result in inefficiencies because of coordination problems, low uptake, and the social costs to low-income households in applying for and maintaining eligibility in an array of programs. Deploying a climate change rebate through programs generally targeted toward low-income households also might undermine the feasibility of climate change legislation as a matter of political economy.[287] Furthermore, if climate change funds are used simply to increase the amount of benefits under existing programs, beneficiaries are unlikely to be made aware of the need to conserve energy or budget for increased energy and other costs.[288]

IV. Conclusion

Climate change legislation is designed to internalize the negative externalities associated with the consumption of fossil fuels—the adverse effects of the aggregation of carbon dioxide and other greenhouse gases in the

287. The distributional impacts of climate change policy are broad. Limiting the rebates to low-income households raises redistribution issues. *Supra* notes 150–53 and accompanying text.

288. Except for an increase in the amount of benefits they are receiving, the rebate will be invisible to low-income recipients.

atmosphere. Whether in the form of a command-and-control system, a cap-and-trade system, or a greenhouse gas tax, the imposition of environmental controls will have distributional impacts. By measuring the distribution of these benefits and burdens, the incidence, and alternative climate change policies, policymakers are empowered to make important decisions about which policy structure to choose and where adjustments need to be made to ensure that the benefits and burdens are distributed appropriately.

Alternative climate change policy structures distribute the burdens and the benefits of the legislation in different patterns. Performance standards are inefficient because the aggregate costs for all firms to meet those standards are higher than they would be under a market-based regulatory mechanism. This produces a pattern of incidence that varies by region depending on the fuel source and the age of the energy facilities. A cap-and-trade system with grandfathered permits is highly regressive, transferring former consumer surplus to shareholders of fossil fuel energy suppliers and producing little revenue to offset adverse distributional impacts. Both a greenhouse gas tax and a cap-and-trade system with auctioned permits are superior instruments for regulating greenhouse gases because they are efficient and generate revenue that the government may use to offset adverse distributional impacts.

There are a number of proposals to address the distributional impacts of the legislation. Equal rebates, undergirded by both egalitarian and utilitarian principles, are subject to criticism because "everyday libertarianism" questions whether rights to the commons should be distributed on a per-capita basis and because equal rebates redistribute income from the wealthy to lower-income households. A number of economists advocate the use of climate change revenues to improve efficiency by reducing income tax and labor tax rates. This proposal fails to address the distributional impacts of climate change legislation for several of the most vulnerable populations, such as the elderly, the unemployed, and the disabled. If, instead, revenues from climate change regulation are used to deliver a rebate that is proportionate to income and scaled according to household size, the distributional impacts are neutralized within each income decile. However, because rent-seeking by firms or political trades may result in less revenue with which to offset all of the distributional impacts, rebates should be directed preferentially to households within the lower deciles of income; these households suffer disproportionately from the impacts of the greenhouse gas tax or cap-and-trade regime as a percentage of after-tax household income.

In identifying a mechanism for delivering climate change revenues, Congress should ensure that the mechanism supports the climate change goals, addresses both direct and indirect impacts, and reaches all intended

beneficiaries. Rate reductions in utility prices delivered by utility companies and gasoline tax reductions delivered through gas distributors fail to address the indirect costs to consumers from climate change policy, require an extensive bureaucratic apparatus to administer, and undermine the central legislative goal—to reduce consumption of fossil fuels through an artificially induced price increase. Rebates delivered along with other existing benefits through health and human services agencies show historically low uptake, give rise to under- or over-payments because of difficulties in coordinating the payments with benefits from other programs, and mask any signal to beneficiaries that they should conserve energy and budget for price increases.

In contrast, by employing existing infrastructure available through the tax code and the expertise available through the Internal Revenue Service, Congress may expedite efficient deployment of the program, maximize uptake of the benefit by the target communities, and ensure cost savings in administration and compliance. Based on the public's general familiarity with the system, the government may deliver the benefit without significant outlays for administration and outreach. While some resources will need to be devoted to extend access to Social Security beneficiaries and recipients of Supplemental Security Income that do not usually file income tax returns, most households are familiar with the system. Inclusion of the benefit in the tax code also would permit the phase-in of the climate change rebate to be coordinated with the phase-outs of the EITC, the Child Care Credit, and other direct benefit programs, ensuring that households receive all of the benefits to which they are entitled. Only the tax system provides the economy of scale and scope to reach full penetration of the market within the first few years of administration, delivers a rebate that offsets both direct and indirect impacts, saves low-income clients from multiple eligibility ordeals, and advances climate change legislative goals by signaling conservation.

THE WASHINGTON AND LEE LAW ALUMNI ASSOCIATION STUDENT NOTES COLLOQUIUM