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A PRIMER ON CARBON TAXES

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EXECUTIVE SUMMARY

Carbon taxes are again being discussed in the U.S. as a means of reducing emissions of carbon dioxide and other greenhouse gases (GHGs).

Three main arguments are proffered in support of carbon taxes, either alone or in combination:

1. That by setting a price on GHG emissions equal to the "social cost of carbon," a carbon tax would optimally reduce GHG emissions.
2. That replacing existing regulations, subsidies, and tax expenditures with a carbon tax would more cost-effectively achieve emissions-reductions goals.
3. That a revenue-neutral carbon tax would be economically beneficial.

These arguments are found to be wanting.

First, in theory a carbon tax set at the "social cost of carbon" would lead to an optimal rate of GHG emissions. However, the "social cost of carbon" is highly uncertain. The current U.S. administration has chosen to use estimates of the "social cost of carbon" developed during the Obama administration, which would be in the region of $53 per metric ton of "carbon dioxide equivalent" emissions. This is likely significantly higher than the optimal rate.

A carbon tax applied with no offsetting reductions in other taxes or changes in regulations would increase the cost of goods and services. Energy and energy-related goods would be especially hard hit. A tax of around $50 per ton would raise natural gas prices by about

40% and gasoline prices by about 15% above recent levels. This would reduce economic growth by as much as 0.2% and also reduce employment. Even taking into account reductions in damage associated with GHG emissions, applying a carbon tax at a rate of $53 per ton would most likely cause net economic harm.

Second, numerous existing regulations, subsidies, and tax expenditures currently aim to reduce GHG emissions, including: the Renewable Fuel Standard, vehicle fuel economy and GHG emission standards, renewable portfolio standards, and tax credits for renewable energy and low-emission vehicles. These regulations, subsidies, and tax expenditures cost hundreds of billions of dollars but do relatively little to reduce emissions. Replacing them all with a carbon tax applied at a uniform rate would in principle be both much less costly and more effective as a means of incentivizing reductions in emissions.

In practice, the likelihood of such a “grand bargain” being successfully implemented is extremely low because powerful, concentrated special interests who currently benefit from the regulations, subsidies, and tax expenditures would lobby heavily to maintain them.

Third, a revenue-neutral carbon tax, achieved by reducing either corporate income tax or the payroll tax or both, could have net benefits even if existing policies aimed at reducing carbon emissions were not repealed. However, it is unlikely that a carbon tax would be implemented in a truly revenue-neutral manner. Many proposals from Congress and the Biden administration propose paying for new programs with carbon tax revenues, suggesting that there would be pressure to increase such revenue. This is precisely what happened in British Columbia, where an initially revenue-neutral carbon tax has gradually been increased. Elsewhere in the world, carbon taxes have almost ubiquitously been used for revenue-raising purposes.

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PART 1

INTRODUCTION

Governments across the world, including the U.S. federal government and many state governments, have sought to regulate emissions of greenhouse gases (GHGs) through a vast array of regulations and subsidies. Several of these have been controversial. For example, federal mandates and subsidies to promote the production and use of ethanol as a fuel have been criticized by both economists and environmentalists. Meanwhile, vehicle and appliance energy efficiency standards became a cause célèbre in the recent U.S. presidential election.

“*Governments across the world, including the U.S. federal government and many state governments, have sought to regulate emissions of greenhouse gases (GHGs) through a vast array of regulations and subsidies.*”

In the face of such controversies, many economists and policy advocates (on both the political left and right) have argued that a carbon tax would be a more efficient policy to reduce GHGs emissions than these regulations and subsidies.[1]

There are broadly three arguments made in favor of introducing a carbon tax. First, from an economic perspective, it is viewed as an efficient way to reduce GHG emissions, thereby internalizing the “social cost” of those emissions.[2] Second, regardless of whether a carbon tax is desirable per se, it is widely viewed as being superior to existing regulations and subsidies. Third, even if a carbon tax were introduced on top of existing regulations and subsidies, some argue that it would have net economic benefits if it were implemented revenue-neutrally.

This brief considers the arguments for and against such a tax. It is organized as follows:

- Part 2 describes and evaluates the merits and drawbacks of the social cost argument.
- Part 3 discusses the economic effects of introducing a carbon tax without any other changes in tax, subsidy, or regulatory policy. The aim is to describe the effects of introducing a carbon tax on top of existing policies.
- Part 4 describes and critically evaluates the “grand bargain” argument, whereby a carbon tax is introduced as a replacement for existing regulations, subsidies, and tax expenditures that are aimed at reducing GHG emissions.
- Part 5 assesses the possibility and consequences of introducing a revenue-neutral carbon tax, that is to say combining the introduction of a carbon tax with offsetting reductions in other taxes, so that net revenue remains constant.
- Part 6 offers some concluding remarks.

1 For a recent statement to that effect signed by over 3,500 economists, see: https://clcouncil.org/economists-statement/. Some economists began arguing for a carbon tax long before most of the regulations and subsidies aimed at reducing carbon emissions were introduced. See e.g. David Pearce, “The role of carbon taxes in adjusting to global warming,” *Economic Journal*, Vol. 101, 1991, 938–48.

2 Ibid. and James M. Poterba, “Tax policy to combat global warming: On designing a carbon tax,” in Rudiger Dornbusch and James M. Poterba (eds), *Global Warming*, Cambridge, Mass.: MIT Press, 1992, 71-98.

PART 2

THE SOCIAL COST CASE FOR A CARBON TAX

Underlying most carbon tax proposals is the assumption that GHG emissions impose a cost on society (abbreviated as "social cost"), that this social cost can be known, and that by setting the tax rate on emissions equal to this social cost, emitters will be incentivized to reduce emissions up to the point where the marginal damage inflicted by emissions is equal to the tax.

While the social cost argument is theoretically appealing, there are many practical difficulties. First and foremost are the challenges of calculating the long-term benefits and costs of cutting GHG emissions. Such calculations require estimates of the likely effects of different rates of GHG emissions not only on the climate but on human society *into the far distant future*. That entails making assumptions about future changes in the costs of abating GHG emissions and in the ability of humans to adapt. In other words, to calculate both the costs and the benefits of emissions reductions entails the use of assumptions regarding the technologies that will be available in the future.

The problem is that *it is not possible to know what technologies will be available even a decade hence*, let alone in half a century or more. So, while it might be possible to predict with some degree of accuracy the likely rate of emissions of GHGs in the future *under a range of specific technological assumptions*, it is impossible to know how reliable those assumptions are.

> *While the social cost argument is theoretically appealing, there are many practical difficulties. First and foremost are the challenges of calculating the long-term benefits and costs of cutting GHG emissions.*

Nonetheless, sequential administrations have chosen to adopt a "social cost of carbon" (SCC) based on such assumptions.[3] In 2016, the Obama administration adopted an SCC of $44 per metric ton (in 2016 dollars), based on an updated report of the Interagency Working Group on the Social Cost of Greenhouse Gases.[4] This is likely significantly higher than the optimal rate.[5] In March 2017, the Trump administration disbanded the Interagency Working Group and in August 2018 the EPA adopted an SCC with a range of between $1 per metric ton and $8 per metric ton for emissions in 2030 (in 2016 dollars), depending on the discount rate applied.[6] On February 26, 2021, the Biden administration announced that it

3 A major motivating factor behind the establishment of the Interagency Working Group was a series of legal decisions that obligated federal agencies to use an SCC in certain rulemakings. See Julian Morris, *Climate Change, Catastrophe, Regulation and the Social Cost of Carbon*, Los Angeles: Reason Foundation, 2018. https://reason.org/policy-study/climate-change-catastrophe-regulation-and-the-social-cost-of-carbon/

4 Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, Washington, DC: U.S. EPA, August 2016, Appendix A. https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf

5 Morris, *Climate Change, Catastrophe, Regulation and the Social Cost of Carbon.*

6 The White House, Presidential Executive Order on Promoting Energy Independence and Economic Growth, March 28, 2017 https://www.federalregister.gov/documents/2017/03/31/2017-06576/promoting-energy-independence-and-economic-growth; EPA, *Regulatory Impact Analysis for the Proposed Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program*, U.S. Environmental Protection Agency, EPA-452/R-18-006, August 2018, Section 7-5. https://www.epa.gov/sites/production/files/2018-08/documents/utilities_ria_proposed_ace_2018-08.pdf

would revert to the earlier Interagency Working Group estimate of the SCC,[7] which implies an SCC in 2021 of about $53 per metric ton.[8] (The administration plans to develop its own SCC, which reports suggest will be considerably higher.)

7 The White House, "A Return to Science: Evidence-Based Estimates of the Benefits of Reducing Climate Pollution," February 26, 2021. https://www.whitehouse.gov/briefing-room/blog/2021/02/26/a-return-to-science-evidence-based-estimates-of-the-benefits-of-reducing-climate-pollution/

8 The 2016 Interagency Working Group estimate of the SCC for 2021 (at a discount rate of 3%) was $42 in 2007 dollars. Since 2016, the consumer price index has risen by about 26%, so in 2021 dollars that becomes $53.

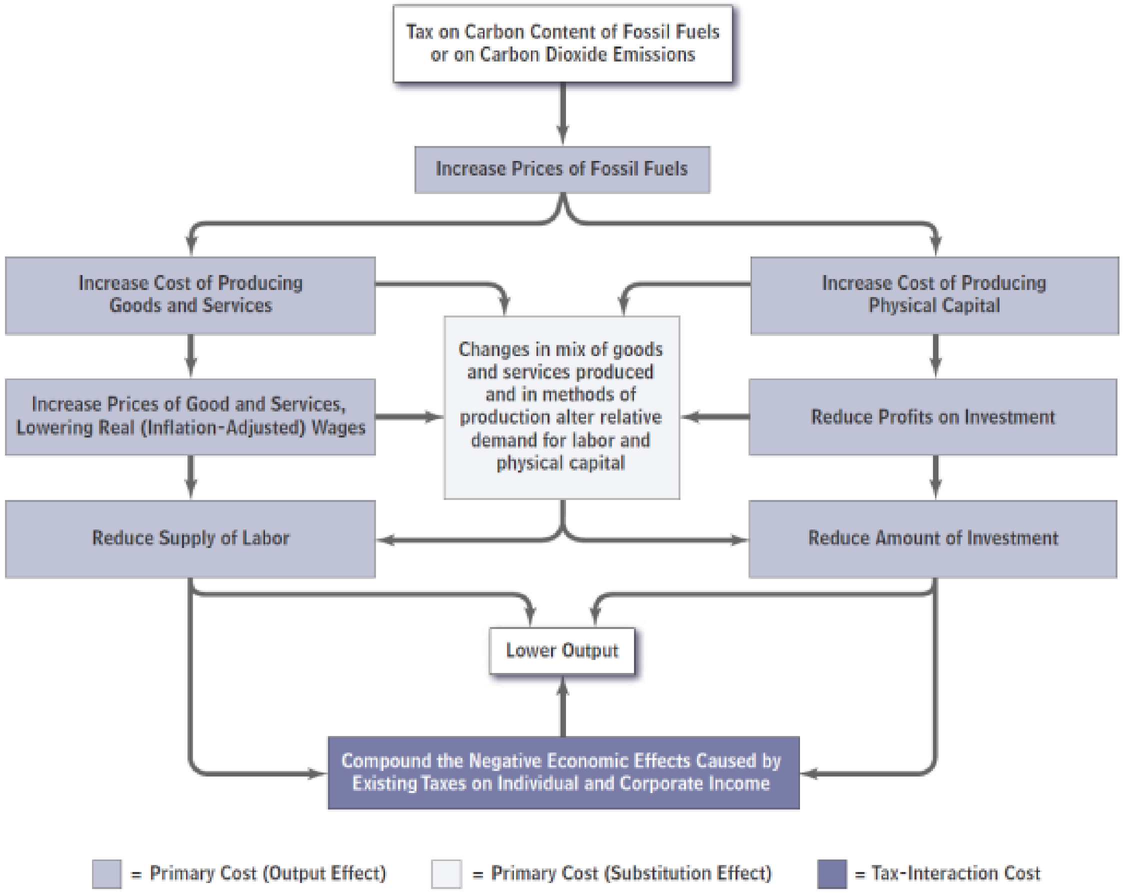
PART 3

THE ECONOMIC EFFECTS OF A CARBON TAX

It is indisputable that the introduction of a carbon tax *without any other regulatory or tax changes* would raise the cost of goods, services, and capital, thereby reducing net income and lowering investment, output, and economic growth. These effects can be seen in Figure 1, which was produced by the Congressional Budget Office for a 2013 report.

This part considers some of the factors affecting the implementation of the carbon tax and then summarizes research assessing the economic consequences of an upstream/midstream carbon tax.

FIGURE 1: THE ECONOMIC EFFECTS OF A CARBON TAX



Source: CBO, *Effects of a Carbon Tax on the Economy and the Environment*, Washington, D.C.: Congressional Budget Office, 2013.

3.1 FACTORS AFFECTING THE IMPLEMENTATION OF A CARBON TAX

The economic effects of a carbon tax will depend on many factors. Most important is the size of the tax. But how the tax is applied is also important. Dealing with the latter first: to the extent that a carbon tax is aimed at incentivizing reductions in GHG emissions, ideally it would be applied at the point at which those emissions are generated—and would apply to all sources. This is because the aim of the tax is to incentivize those who emit GHGs to reduce their emissions. Those incentives will be strongest if the tax is applied to the emissions, rather than some proxy for emissions such as products containing carbon that are subsequently burnt.

> *In practice, attempting to tax emissions directly could be challenging because of high monitoring and enforcement costs.*

In practice, attempting to tax emissions directly could be challenging because of high monitoring and enforcement costs. Large stationary sources, such as coal, oil and gas producers, smelters, cement manufacturers, and large electricity generators could feasibly and cost-effectively install GHG-monitoring technologies (indeed, many already have such monitoring in place), data from which could be supplied to enforcement agencies in real time.[9] It would be somewhat more difficult to monitor emissions from other stationary sources, such as homes and farms, especially for GHGs other than CO_2 (imagine attempting to monitor methane emissions from individual cows). And in some cases, such as private residences, such monitoring would raise privacy concerns.[10] However, as monitoring technologies improve and become less costly, direct monitoring may become more cost-effective. Nonetheless, if a carbon tax were to be applied in the near future, it would likely be applied upstream or midstream (i.e. in the case of fuels, this would be at the point of production or distribution of fuels) and would create a system of rebates for downstream users who can show that they have effectively reduced emissions below the average amount that would occur when using the carbon-emitting product (for example by capturing and storing carbon dioxide).

Another factor affecting how a carbon tax would be applied is the treatment of imported goods. Since a carbon tax would increase the domestic cost of goods relative to those imported from jurisdictions without such a tax, some production would shift to those other jurisdictions, resulting in carbon “leakage” (i.e. an increase in foreign emissions of GHGs). Theoretical estimates suggest that leakage could amount to between 5% and 150% of all emissions.[11] While the majority of theoretical estimates are in the 5% to 40% range, for

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9 Hilary Sigman, “Monitoring and Enforcement of Climate Policy,” in Don Fullerton and Catherine Wolfram (eds), The Design and Implementation of US Climate Policy Oxford University Press, 2012.

10 In theory, these might be addressed e.g. by using a system of blockchain-based smart contracts that limit the sharing of personally identifiable information.

11 Christoph Böhringer, Edward J. Balistreri, and Thomas F. Rutherford, “The Role of Border Carbon Adjustment in Unilateral Climate Policy: Overview of an Energy Modeling Forum Study (EMF 29),” *Energy*

energy-intensive industries that are highly exposed to international competition, such as cement, steel, and aluminum, leakage could be as high as 90%.[12] Empirical estimates have found leakage rates within this range, with one study finding implied leakage rates as high as 40%.[13] By implementing a carbon border adjustment (essentially a tariff on imported goods applied in proportion to the likely emissions embodied in those goods), leakage could be reduced substantially.[14] However, there is a danger that such an adjustment would be used for protectionist purposes, leading to much greater economic harm, so the design of the adjustment requires considerable care.

The size of any carbon tax is a highly contentious issue. As noted in Part 2, sequential administrations have assigned a non-zero carbon tax, and the current U.S. administration has seemingly adopted an SCC of $53 per metric ton. However, this is likely considerably higher than the optimal rate.

3.2 THE LIKELY ECONOMIC EFFECTS OF A CARBON TAX

Several studies have sought to evaluate the effects of a carbon tax. This section focuses on two studies that specifically evaluated the effects on the U.S. of implementing a carbon tax at a rate close to that proposed by the Biden administration.

Economics Vol. 34 Supplement 2, 2012, S97-110; Frédéric Branger and Philippe Quirion, *Would Border Carbon Adjustments prevent carbon leakage and heavy industry competitiveness losses? Insights from a meta-analysis of recent economic studies*. CIRED Discussion Paper No. 52-2013, 2013. http://www2.centre-cired.fr/IMG/pdf/CIREDWP-201352.pdf; Mustafa H. Babiker, "Climate Change Policy, Market Structure, and Carbon Leakage," *Journal of International Economics*, Vol. 65, 2005, 421–445.

12 Yihsu Chen, "Does a Regional Greenhouse Gas Policy Make Sense? A Case Study of Carbon Leakage and Emissions Spillover," *Energy Economics*, Vol. 31, 2009, 667-673.

13 Rahel Aichele and Gabriel Felbermayr, "Kyoto and Carbon Leakage: An Empirical Analysis of the Carbon Content of Bilateral Trade." *The Review of Economics and Statistics*, Vol. 97(1), March 2015, 104–115. https://www.mitpressjournals.org/doi/pdf/10.1162/REST_a_00438

14 Michael A. Mehling et al. "Designing Border Carbon Adjustments for Enhanced Climate Action," *American Journal of International Law*, Vol. 113(3), 11 July 2019. https://www.cambridge.org/core/journals/american-journal-of-international-law/article/designing-border-carbon-adjustments-for-enhanced-climate-action/BF4266550F09E5E4A7479E09C047B984

3.2.1 OTA ANALYSIS

A 2017 study for the U.S. Treasury's Office of Tax Analysis (OTA) considered the effects of introducing a carbon tax at a rate of $49 per metric ton of carbon dioxide equivalent (mt CO_2-e)[15] in 2019, rising incrementally to $70 per metric ton of CO_2e in 2028.[16] The OTA analysis assumed that the tax would initially be applied to all hydrocarbon energy sources and 33% of non-energy sources, with that proportion rising to 67% in 2020 and 100% from 2021. The OTA analysis did not include a border adjustment. Table 1 shows the effects of the initial tax on prices of various hydrocarbon energy sources relative to average prices in 2019, assuming that the full amount of the tax is passed through to consumers.

TABLE 1: EFFECT OF TAX AT $49/METRIC TON OF CARBON DIOXIDE EQUIVALENT (MT CO_2-E)

Fuel (units)	CO_2 content (kg/unit)	Tax @ $49/mt CO_2-e	Price Increase from Tax
Natural gas (Mcf)	53.12	$2.60	40%
Anthracite (short ton)	2,578.68	$126.36	55%
Bituminous (short ton)	2,236.80	$109.60	65%
Sub-bituminous (short ton)	1,685.51	$82.59	85%
Lignite (short ton)	1,266.25	$62.05	76%
Gasoline (gallon)	8.89	$0.44	15%
Home heating oil (gallon)	10.16	$0.50	14%
Jet fuel (gallon)	9.57	$0.47	20%

Source: Author's calculations based on: John Horowitz et al., *Methodology for Analyzing a Carbon Tax*, U.S. Department of the Treasury, Office of Tax Analysis, Working Paper 115, January 2017 (tax rates); U.S. Energy Information Administration (2019 prices).

The OTA researchers used Input-Output analysis to identify the broader effects of such a tax on a range of prices, using a Treasury model from 2007 adjusted for changes in average energy intensity. They estimated that electricity prices would rise by about 17%, air transportation costs would rise by 7.5%, and mass transit costs would rise by 6.4%. They also estimated that, with no adjustment to other taxes, after-tax household income would decline by an average of 1.5%. And they estimated that the tax would be moderately

15 Carbon dioxide equivalent is used as a common metric for various GHGs. See footnote 20.

16 John Horowitz et al., *Methodology for Analyzing a Carbon Tax*, U.S. Department of the Treasury, Office of Tax Analysis, Working Paper 115, January 2017.

progressive, with incomes of the bottom quintile falling by 1%, while the incomes in the top two quintiles would fall by about 1.75%.

3.2.2 TAX FOUNDATION ANALYSIS

A 2019 study by researchers at the Tax Foundation analyzed the effects of a carbon tax set initially at $50 per metric ton of CO_2, limited to energy-related carbon dioxide emissions but with a border adjustment, and rising at 5% annually.[17] They found that such a tax would increase government revenue by approximately $1.9 trillion over 10 years, reduce GDP by 0.4% and result in the loss of the equivalent of 421,000 full-time jobs. Moreover, they found that a carbon tax would be regressive in percentage terms: those in the bottom quintile would see their income reduced by about 2% on average, with the impact as a percentage of income falling as income rises.

3.2.3 DISCUSSION OF EFFECTS

From these and other studies,[18] it is clear that, other things being equal (and especially if no changes were made to regulations or other taxes), a carbon tax applied at the currently proposed rate of $53 per metric ton of CO_2-e would have adverse effects on the U.S. economy, resulting in lower output, lower incomes, job losses, reduced investment and rates of economic growth, and could also be regressive.

17 Kyle Pomerleau and Elke Asen, *Carbon Tax and Revenue Recycling: Revenue, Economic, and Distributional Implications*, Washington, D.C.: Tax Foundation, 2019. https://taxfoundation.org/carbon-tax/

18 Adele Morris and Aparna Mathur (*Distributional Effects of a Carbon Tax in Broader U.S. Fiscal Reform*, Brookings Institution, 2012) found that a carbon tax applied at a rate of $15/ton would be regressive, reducing consumption among the lowest decile by over 2%, while consumption by the top decile would be reduced by only about 1.3%.

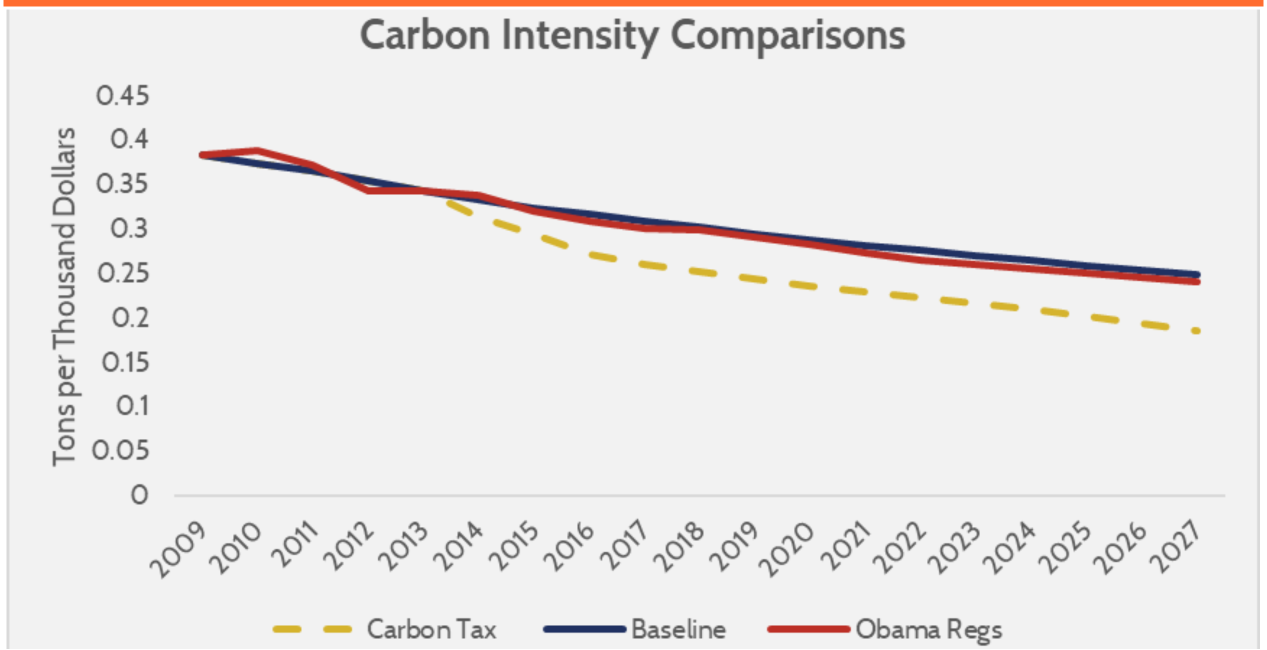
PART 4

THE GRAND BARGAIN ARGUMENT

> *While a carbon tax would clearly impose a cost on society, some argue that those costs could be offset by eliminating the plethora of regulations, subsidies, and tax exemptions currently implemented in the name of cutting GHG emissions.... These interventions are very costly.*

While a carbon tax would clearly impose a cost on society, some argue that those costs could be offset by eliminating the plethora of regulations, subsidies, and tax exemptions currently implemented in the name of cutting GHG emissions. Among the most significant of these are: the Renewable Fuel Standard, vehicle fuel economy and GHG emission standards, renewable portfolio standards, and tax credits for renewable energy and low-emission vehicles. These interventions are very costly. In 2018, the American Action Forum (a Washington, D.C.-based non-profit headed by Douglas Holtz-Eakin, former chief economist of the President's Council of Economic Advisors) calculated that regulations introduced by the Obama administration would cost a total of $548 billion in net present value terms between 2009 and 2027 (had they been fully implemented).[19] The EPA estimated that those regulations would reduce GHG emissions by the equivalent of 720 million tons of carbon dioxide per year.[20] However, AAF found that most of the emissions reductions occur as a result of a relative reduction in economic activity, rather than a reduction in emissions intensity per dollar of output, as can be seen in Figure 2.[21]

FIGURE 2: EFFECT OF DIFFERENT POLICIES ON THE CARBON INTENSITY OF U.S. ECONOMIC ACTIVITY



Source: Philip Rossetti, Dan Bosch, and Dan Goldbeck, *Comparing Effectiveness of Climate Regulations and A Carbon Tax*, American Action Forum, July 2, 2018.

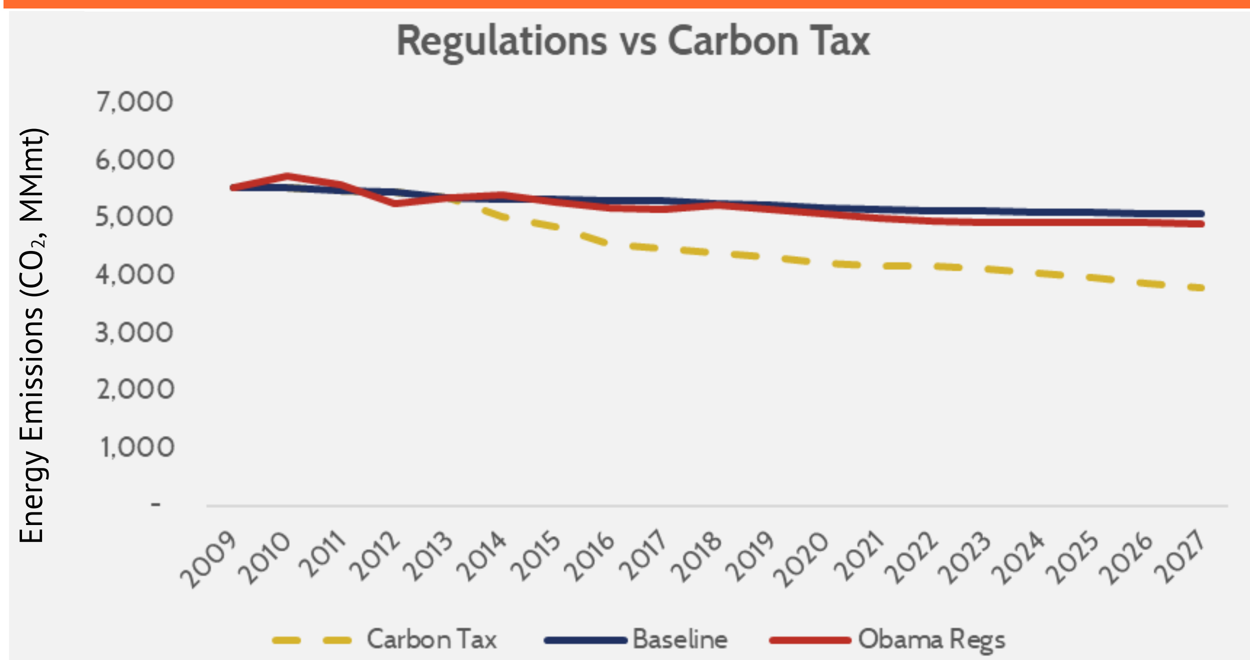
[19] Philip Rossetti, Dan Bosch, and Dan Goldbeck, *Comparing Effectiveness of Climate Regulations and A Carbon Tax*," American Action Forum, July 2, 2018. https://www.americanactionforum.org/ research/comparing-effectiveness-climate-regulations-carbon-tax-123/

[20] Ibid. The majority of GHG emissions are carbon dioxide. Emissions of other GHGs, such as methane and NOx, are converted into "carbon dioxide equivalent" for comparability. https://www3.epa.gov/ carbon-footprint-calculator/tool/definitions/co2e.html#:~:text=Carbon%20 dioxide%20equivalent %20or%20CO,in%2040%20CFR%20Part%2098.

[21] Rossetti, Bosch, and Goldbeck, *Comparing Effectiveness of Climate Regulations and A Carbon Tax*. For a discussion of the importance of energy and carbon intensity to future carbon emissions, see Julian Morris, *Evidence-Based Policies to Slow Climate Change*, Los Angeles: Reason Foundation, 2021.

As such, AAF estimates that the cost of emissions reductions resulting from reduced carbon intensity in response to regulations is over $300 per metric ton of carbon. By contrast, if regulations were replaced with a carbon tax, a much greater proportion of the emissions reduction would come from a fall in the carbon intensity of production and consumption, such that the cost per ton of carbon reduced would be less than half that of the regulatory policies. Moreover, AAF estimates that a $25 per metric ton carbon tax would not only be more cost effective than regulations but also more effective, as can be seen in Figure 3.

FIGURE 3: EFFECT ON ENERGY-RELATED EMISSIONS OF CARBON DIOXIDE UNDER DIFFERENT POLICIES



Source: Philip Rossetti, Dan Bosch, and Dan Goldbeck, *Comparing Effectiveness of Climate Regulations and A Carbon Tax*, American Action Forum, July 2, 2018.

So, if it were possible to scrap the existing regulations and subsidies and replace them with a uniform carbon tax, the U.S. would be far better off both economically and environmentally.

However, even this conclusion may be overly optimistic. A recent meta-analysis of studies of carbon pricing policies (including taxes, permit auctions, and carbon price floors associated with emission trading programs) found that such policies have had very modest effects—amounting to reductions in GHG emissions of between 0% and 2% per year.[22] In no small part, this is because, while carbon pricing incentivizes the use of current generation lower-carbon technologies at the margin, it does relatively little to incentivize the development of new lower-carbon sources of energy.[23]

4.1 IS A GRAND BARGAIN DESIRABLE—OR REALISTIC?

There is little doubt that it would be desirable to repeal all the inefficient regulations and subsidies that are ostensibly justified as means of reducing GHG emissions. The question is whether it is desirable to replace them with a carbon tax, which, notwithstanding any benefits from reducing the effects of climate change, would impose significant costs on society. Two factors are particularly relevant here: first, whether there is a more cost-effective way to repeal these harmful regulations and subsidies, and second, if so, whether a repeal and replace grand bargain stands a greater chance of success than the alternative, more cost-effective approach.

4.2 IS THERE A MORE COST-EFFECTIVE WAY TO REPEAL THE EXISTING REGULATIONS AND SUBSIDIES?

In principle, there *is* a much less costly way to repeal those regulations and subsidies. Since these policies evidently drive up the cost of goods and services, harming most businesses and consumers and reducing economic growth, while generating little if anything in the way of public benefits, most businesses and consumers—i.e. most voters—would be better off if they were scrapped. One would think that politicians minded to serve the public interest, or even just their electorate, would have scrapped them long ago. So, why haven't they?

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22 Jessica F. Green, "Does carbon pricing reduce emissions? A review of ex-post analyses," *Environmental Research Letters*, Vol. 16, 2021, 043004 https://doi.org/10.1088/1748-9326/abdae9

23 See e.g.: Matt Hourihan and Robert D. Atkinson, *Inducing Innovation: What a Carbon Price Can and Can't Do,* Washington D.C.: Information Technology and Innovation Foundation, March 2011. https://itif.org/publications/2011/03/23/inducing-innovation-what-carbon-price-can-and-cant-do

> *Once implemented, regulations and subsidies tend to create concentrated benefits among often-powerful groups of vested interests. Meanwhile, the costs of regulations and subsidies tend to be widely dispersed.*

Once implemented, regulations and subsidies tend to create concentrated benefits among often-powerful groups of vested interests.[24] Meanwhile, the costs of regulations and subsidies tend to be widely dispersed. As a result, attempts to remove regulations and subsidies that impose net costs on society often generate very vocal and concentrated opposition, whereas support for repeal tends to be both weak and dispersed. And it is not just the *voice* of those who oppose repeal that matters. Most politicians are motivated to do what is most likely to gain their re-election. That means, among other things, ensuring that they gain the support of wealthy donors and powerful vested interests.

The failure to repeal the Renewable Fuel Standard (RFS) offers a classic example of this. The RFS mandates the use of specific amounts of alternative fuels (such as ethanol) in motor fuels.[25] While premised on the assumption that these alternative fuels reduce the use of oil and associated emissions, in practice the RFS has had little if any effect on either.[26] But the RFS *has* raised the cost of motor fuels and caused over 20 million acres of land to be diverted to the production of crops that are then converted to ethanol.[27] This has had

24 James M. Buchanan and Gordon Tullock, "Polluters' Profits and Political Response: Direct Controls versus Taxes," *The American Economic Review,* Vol. 65, No. 1, 1975, 139-147.

25 EPA, *Renewable Fuels Program*. https://www.epa.gov/renewable-fuel-standard-program

26 GAO, *Renewable Fuel Standard: Information on Likely Program Effects on Gasoline Prices and Greenhouse Gas Emissions,* U.S. Government Accountability Office, GAO-19-47, May 3, 2019. https://www.gao.gov/products/GAO-19-47#:~:text=Effect%20on%20prices.,may%20have%20diminished%20over%20time.

27 Ibid. and Rita H Mumm et al., "Land usage attributed to corn ethanol production in the United States: sensitivity to technological advances in corn grain yield, ethanol conversion, and co-product utilization," *Biotechnology for Biofuels*, Vol 7, 2014, Article 61. https://biotechnologyforbiofuels.biomedcentral.com/track/pdf/10.1186/1754-6834-7-61.pdf;

numerous adverse environmental effects.[28] In spite of widespread opposition from environmental groups, consumer groups, and think tanks, the RFS continues to receive support from members of Congress across the political spectrum.[29] The reason? The RFS is an effective subsidy to agribusiness (i.e. businesses ranging from the producers of seed, fertilizer, and pesticide, to landowners, to distillers, and to other companies that produce biofuels), which is one the most powerful lobby groups in the U.S.; for the past decade, agribusinesses have spent over 100 million dollars each year on lobbying, employing over 1,000 lobbyists in the process.[30] Woe betide any politician who dares cross that lobby.

4.3 IF REGULATIONS AND SUBSIDIES CAN'T BE REPEALED ON THEIR OWN, IS A GRAND BARGAIN MORE FEASIBLE?

To the extent that the primary barrier to repealing harmful regulations and subsidies is the concentrated vested interests that benefit from them (and would thus be harmed by repeal), it is not clear that repeal and replace is any more feasible than repeal on its own. The question is: could a grand bargain be structured in such a way that it provides sufficient benefits to the business interests who would be harmed by repealing regulations and subsidies in order to offset the adverse effects of the repeal on those businesses?

The answer is: probably not. Again, it comes back to concentrated benefits and dispersed costs. As noted, the current beneficiaries of the regulations and subsidies are highly concentrated, whereas the effects of a carbon tax would be dispersed across the economy. Consider policies such as renewable portfolio standards, which require a minimum proportion of electricity to be generated by specific technologies (usually wind and/or solar), and renewable energy production tax credits. These policies clearly benefit various companies involved in the production, installation, and maintenance of wind and solar electricity generation. While a carbon tax would increase the costs of generating energy from hydrocarbon fuels, it would not necessarily increase those costs sufficiently to make

28 Arthur R. Wardle, *A Review of the Environmental Effects of the Renewable Fuel Standard's Corn Ethanol Mandate*, The Center for Growth and Opportunity at Utah State University, 2018. https://www.ourenergypolicy.org/wp-content/uploads/2018/10/environmental-effect-renewable-rfs-corn-ethanol-mandate.pdf

29 Friends of the Earth, *Joint advocacy efforts on biofuels policy*. https://foe.org/blog/biofuels-coalition-work/; Ballotpedia, *Renewable Fuel Standard*. https://ballotpedia.org/Renewable_Fuel_Standard

30 Open Secrets, *Sector Profile: Agribusiness*. https://www.opensecrets.org/federal-lobbying/sectors/summary?cycle=2019&id=A

solar or wind power competitive in many, perhaps even most, cases (of course this would depend on the size of the tax and changes in the efficiency of production of electricity from wind and solar, as well as the costs of storage).[31] So, those "renewable" energy companies that have been propped up by renewable portfolio standards and production tax credits would lobby fiercely (i.e. spend tens if not hundreds of millions of dollars) to oppose the reform.[32]

> *While a carbon tax would increase the costs of generating energy from hydrocarbon fuels, it would not necessarily increase those costs sufficiently to make solar or wind power competitive in many, perhaps even most, cases.*

Meanwhile, especially if combined with a carbon border tariff adjustment (to take account of imports of carbon-intensive goods), a carbon tax would likely increase the cost of electric vehicles at a rate higher than the increase in costs of gas, diesel, and hybrid vehicles due to the much greater carbon intensity of materials used in EVs (especially lithium and other rare earth metals used in the batteries). A recent meta-analysis found that on average the production of EVs results in the emission of 10.8 metric tons of CO_2-e, while gasoline vehicle production results in the emission of 6.6 metric tons of CO_2-e.[33] A \$50 per metric ton tax on CO_2-e would thus raise the average cost of an EV by \$540, while the cost of an equivalent gasoline vehicle would rise by \$330. Meanwhile, according to the OTA analysis described above, under a \$49 per metric ton of CO_2-e tax, the cost of

31 For an analysis of the relative cost of different energy sources see: Julian Morris, *Evidence-Based Policies to Slow Climate Change*, Los Angeles: Reason Foundation, 2021.

32 In December 2020, following fierce lobbying by the wind industry, the federal production tax credit for wind power was once again extended for a year. See: WPED Staff, "PTC extended by one year, new offshore wind tax credit inserted in Congress bill," *Windpower*, December 22, 2020. https://www.windpowerengineering.com/ptc-extended-by-one-year-new-offshore-wind-tax-credit-inserted-in-congress-bill/

33 Kevin Joseph Dillman et al. "Review and Meta-Analysis of EVs: Embodied Emissions and Environmental Breakeven." *Sustainability*, Vol. 12, 2020, 9390. https://www.mdpi.com/2071-1050/12/22/9390/pdf

electricity is expected to rise at a slightly higher rate (17%) than the cost of gasoline (15%), meaning that the total cost of owning an EV would rise relative to that of a gas vehicle. So, expect fierce opposition from most vehicle manufacturers and vendors—and perhaps especially those who predominantly produce and sell EVs.

While in principle it might be possible more directly to compensate the companies who suffer losses from the removal of regulations and subsidies, this would at least partly defeat the object of the exercise (it would replace one set of subsidies with another) and would almost certainly be considered highly iniquitous. However, short of such a *quid pro quo*, it is not clear how the grand bargain is supposed to work.

"While in principle it might be possible more directly to compensate the companies who suffer losses from the removal of regulations and subsidies, this would at least partly defeat the object of the exercise (it would replace one set of subsidies with another) and would almost certainly be considered highly iniquitous."

Reality so far has borne this out. Despite assiduous efforts by numerous organizations, a grand bargain has remained elusive. Meanwhile, surveys suggest that, in spite of bipartisan support for policies to limit carbon emissions, legislators prefer continued application of inefficient renewable energy mandates and subsidies rather than the introduction of a carbon tax.[34]

[34] Nathan Lee and Domnick Stecula, "Subnational bipartisanship on climate change: evidence from surveys of local and state policymakers," *Climatic Change*, 2021, Vol. 164 (1),1-12. https://link.springer.com/article/10.1007%2Fs10584-021-02964-x; Parrish Bergquistet et al., "Combining climate, economic, and social policy builds public support for climate action in the US," *Environmental Research Letters*, Vol. 15(5), 2020, 054019. https://doi.org/10.1088/1748-9326/ab81c1

PART 5

THE REVENUE NEUTRALITY ARGUMENT

The third argument made in favor of a carbon tax is that if it were done in a “revenue neutral” manner—that is to say, funds raised via the carbon tax could be offset by reducing other taxes—it could have economic advantages. For example, the Tax Foundation modeled the effects of various revenue-neutral carbon taxes and found that if such a tax were paired with a reduction in either payroll taxes or corporation taxes, it would increase economic output.[35]

While such an arrangement may be desirable in principle, it may not be politically feasible. And if it is politically feasible, there may be superior alternatives that are equally politically feasible. The following sections consider two options for implementing a revenue-neutral carbon tax: reducing taxes paid by corporations and reducing personal income tax. These are followed by a discussions of alternative ways to achieve similar objectives, the amounts of revenue that might be raised by a carbon tax and thus in principle available to offset other taxes, and a discussion of the political feasibility of implementing a carbon tax that remains revenue neutral.

[35] Kyle Pomerleau and Elke Asen, *Carbon Tax and Revenue Recycling: Revenue, Economic, and Distributional Implications*, Tax Foundation, November 6, 2019. https://taxfoundation.org/carbon-tax/

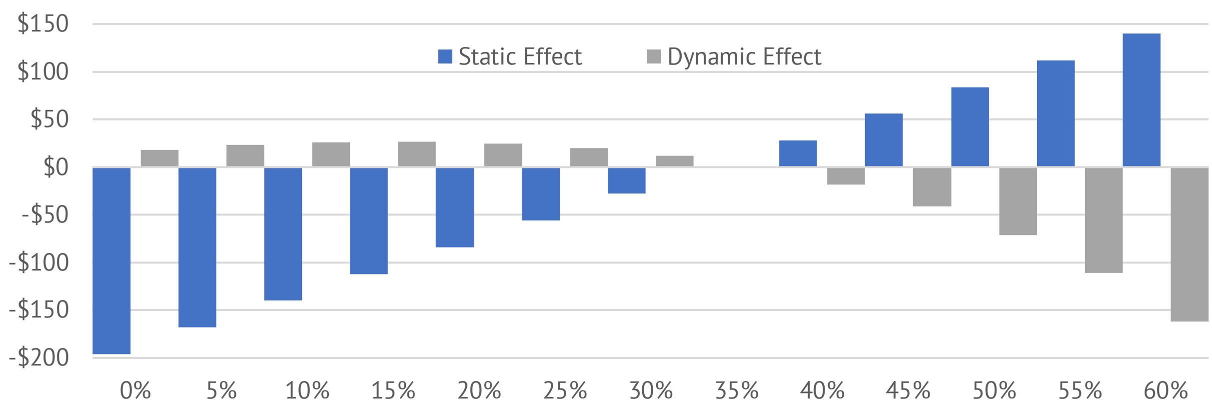
5.1

USING REVENUE FROM A CARBON TAX TO REDUCE CORPORATE TAXES

Many economic analyses have found that corporate income tax (CIT) is the most distorting tax, both because of its direct negative effect on investment and because of the many exemptions, credits, and expenditures that enable some corporations to lower their tax burden at the expense of others.[36]

A 2013 analysis by the Tax Foundation found that reducing CIT would lead to higher levels of investment, more innovation, and higher rates of economic growth, thereby increasing revenue from other taxes.[37] Moreover, the lower the rate of CIT, the bigger this effect. Indeed, it found that even total elimination of CIT would increase future government revenue sufficiently to offset the loss of revenue from CIT (see Figure 4).

FIGURE 4: STATIC AND DYNAMIC EFFECT ON FEDERAL REVENUE ($ BILLION, VERTICAL AXIS) OF CHANGES IN CORPORATE INCOME TAX RATE (HORIZONTAL AXIS, RELATIVE TO 2012 CIT RATE OF 35%).



Source: Michael Schuyler, Growth Dividend from a Lower Corporate Tax Rate, Washington D.C.: Tax Foundation, March 12, 2013. https://taxfoundation.org/growth-dividend-lower-corporate-tax-rate

36 Simeon Djankov et al., "The Effect of Corporate Taxes on Investment and Entrepreneurship," *American Economic Journal: Macroeconomics* Vol. 2(3), 2010, 31–64. Karel Mertens and Morten Ravn, "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States," *American Economic Review* 103(4), 2013, 1212–47. Christina D Romer and David H. Romer, "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review* Vol.100(3), 2010, 763–801. Simeon Djankov, "Corporate Tax Cuts: Examining the Record in Advanced Economies," Washington, D.C.: Peterson Institute for International Economics, 2017. https://www.piie.com/publications/policy-briefs/corporate-tax-cuts-examining-record-other-countries

37 Michael Schuyler, *Growth Dividend from a Lower Corporate Tax Rate*, Washington D.C.: Tax Foundation, March 12, 2013. https://taxfoundation.org/growth-dividend-lower-corporate-tax-rate

However, reductions in or (especially) elimination of the CIT would likely result in a short-term fall in government revenue, so partially replacing that revenue loss with a less distorting tax, such as a carbon tax, could be appealing.

Federal government revenue from CIT has been generally declining in the U.S. for the past 20 years. In 2019, it generated revenue of $230 billion.[38] If a $50 per metric ton carbon tax were introduced at the same time that CIT were scrapped, most if not all the immediate revenue lost by removing CIT could be made up through the carbon tax.

The Tax Foundation didn't model the elimination of CIT in its analysis of the effects of offsetting a carbon tax. But it did model the effects of reducing the CIT to 11%, making the 100% bonus depreciation permanent, and canceling the amortization of research and development costs. It calculated that such a change would be revenue neutral.[39]

"The Tax Foundation found that the combination of the $50 per metric ton carbon tax and changes to corporation taxes would lead to an increase in GDP of 0.8%, an increase in wages of 0.5%, but a fall in employment of nearly 200,000."

The Tax Foundation found that the combination of the $50 per metric ton carbon tax and changes to corporation taxes would lead to an increase in GDP of 0.8%, an increase in wages of 0.5%, but a fall in employment of nearly 200,000. (The employment effects are presumably indirect. In a free market, wages would adjust with little to no effect on long-term employment. But factors such as minimum wage laws mean that wages often cannot

38 *Briefing Book,* Washington, DC.: The Tax Policy Center, May 2020 https://www.taxpolicycenter.org/briefing-book/how-does-corporate-income-tax-work

39 Kyle Pomerleau and Elke Asen, "Carbon Tax and Revenue Recycling: Revenue, Economic, and Distributional Implications," Tax Foundation, November 6, 2019. https://taxfoundation.org/carbon-tax/

adjust adequately.[40]) The combination would still be regressive, with the lowest quintile seeing income fall by about 1%, while the highest quintiles would see incomes rise.

The OTA also evaluated the distributive effect of using revenue from a carbon tax to reduce the corporate income tax. Doing so reduces the tax's net effect, and the tax remains regressive, with all but the top 5% of income earners remaining worse off.

By contrast, an earlier study published by the Brookings-Urban Center found that a carbon tax combined with corporate tax cuts could be moderately progressive.[41]

5.2 USING THE CARBON TAX TO REDUCE PAYROLL TAXES

Like the CIT, individual income taxes are also highly distorting and reduce investment and economic growth.[42] The Tax Foundation looked at the effect of reducing payroll taxes and replacing the lost income with a carbon tax. It estimated that the $50/ton carbon tax described earlier would reduce the federal payroll tax by 2.24%, taking it from 6.2% to 3.94%. Such a reduction would result in increased hours worked equivalent to a rise in employment of 102,000 full-time jobs, leading to a net income increase for 95% of taxpayers, with incomes rising by between 0.1% and 0.4%, and a net GDP increase of 0.1%.

In the OTA's analysis, using the carbon tax to reduce payroll taxes leaves the income of the majority of people largely unaffected; only those in the top 5% see a significant fall in income.

40 Doruk Cengiz et al., "The Effect of Minimum Wages on Low-Wage Jobs," *The Quarterly Journal of Economics*, Vol 134(3), 2019, 1405–1454. https://doi.org/10.1093/qje/qjz014

41 Adele Morris and Aparna Mathur, *Distributional Effects of a Carbon Tax in Broader U.S. Fiscal Reform*, Brookings Institution, 2012.

42 See William McBride, *What is the Evidence on Taxes and Growth*. Washington DC: Tax Foundation, 2012.

5.3 OTHER WAYS TO ACHIEVE REVENUE NEUTRALITY

Several studies have considered alternative ways to achieve revenue neutrality. For example, using a rebate targeted at poorer consumers.[43] While some of these are less regressive—or even progressive—the tradeoff is that they adversely affect output. In principle, it might be possible to devise some combination of corporate tax cuts, payroll tax cuts, and rebates to lower-income consumers that reduces the regressivity of a carbon tax while maintaining or even increasing output. Whether such a goldilocks policy is achievable in practice is another matter.

5.4 HOW MUCH REVENUE WOULD BE AVAILABLE FROM A CARBON TAX IN PRACTICE?

When calculating the revenue that would be available from a carbon tax, the Tax Foundation and OTA both assume a reduction by what is known as the "excise tax offset." Basically, the tax increases costs to businesses and/or consumers, which results in a reduction in profit and/or income, which in turn reduces output, thereby reducing consumption of products subject to the tax. The Tax Foundation assumes that the excise tax offset reduces revenue by between 20% and 25%. The OTA uses a figure of 25%. These amounts are included in the modeling described earlier.

However, a 2018 analysis by Capital Alpha Partners found that "Using standard scoring conventions and assuming that Congress would protect taxpayers in the lowest two income quintiles from a tax increase, a carbon tax produces net revenue available for tax reform of only 32 cents on the dollar."[44] As such, the net effects of a revenue-neutral carbon tax might be less beneficial, and could be economically harmful.

[43] Both OTA and the Tax Foundation consider such policies, as do Donald Marron and Eric Toder, *Carbon Taxes and Corporate Tax Reform*, The Urban Institute and Urban-Brookings Tax Policy Center, February 11, 2013.

[44] Capital Alpha Partners, *The Carbon Tax: Analysis of Six Potential Scenarios*, Capital Alpha Partners, LLC, October 2018.

5.5 IS IT LIKELY THAT A CARBON TAX COULD BE IMPLEMENTED IN A "REVENUE NEUTRAL" MANNER?

A further challenge with a "revenue neutral" carbon tax is the problem of accretion.

A further challenge with a "revenue neutral" carbon tax is the problem of accretion. Even if such a tax were initially implemented in a way that ensured revenue neutrality (e.g. by reducing CIT or the payroll tax), once the tax is implemented politicians may be tempted to increase the rate of the tax without simultaneously reducing the rate at which other taxes are applied. This pressure to increase a carbon tax in order to raise additional revenue would be exacerbated by the relatively low price-elasticity of demand for carbon-based fuels (a consequence in part of the lack of substitutability), which would make this an attractive proposition for big-government fans who like taxes that are disguised as being "good for us."

Adding to this temptation is the widely held view that a carbon tax should increase at a rate higher than inflation in order to encourage the development of innovative, low-carbon technologies, thereby reducing exposure to the tax in the future.[45] However, there are good reasons to think that cost-efficient abatement to achieve a specific limit on future global mean temperature increases likely entails a lower initial carbon price, rising more slowly.[46]

45 See e.g.: Lint Barrage, "Optimal Dynamic Carbon Taxes in a Climate–Economy Model with Distortionary Fiscal Policy." *The Review of Economic Studies*, 87 (1), 2020, 1–39.

46 Derek Lemoine and Ivan Rudik, "Steering the Climate System: Using Inertia to Lower the Cost of Policy," *The American Economic Review*, Vol. 107(10), 2017, pp. 2947–2957.

… there are good reasons to think that cost-efficient abatement to achieve a specific limit on future global mean temperature increases likely entails a lower initial carbon price, rising more slowly.

Moreover, to the extent that a carbon tax becomes a reliable source of revenue, there would almost certainly be pressure to increase it, regardless of any new information concerning the actual effects of carbon emissions on the climate (i.e. we could become locked into a carbon tax even if at a later date it becomes clear that such a tax is not necessary).

Evidence from the real world confirms that accretion is likely. The carbon tax in British Columbia is a case in point. When B.C.'s carbon tax was originally introduced in 2008, the provincial government simultaneously reduced corporate income tax, small business income tax, and the bottom two personal income tax rates, such that the carbon tax was effectively tax neutral. However, over time B.C.'s government changed how it calculated revenue neutrality to include pre-existing tax expenditures. Scholars Charles Lammam and Taylor Jackson of the Fraser Institute note that by 2013-2014, the carbon tax increase that year to C$30/ton resulted in a net taxation increase of $226 million, when the pre-existing tax expenditures are stripped out.[47] Projecting forward, they estimated that from 2013/2014 to 2018/2019, citizens of British Columbia would have paid an additional $865 million in taxes.

[47] Charles Lammam and Taylor Jackson, *Examining Revenue Neutrality in British Columbia's Carbon Tax*, Vancouver, B.C.: Fraser Institute, 2017. https://www.fraserinstitute.org/sites/default/files/examining-the-revenue-neutrality-of-bcs-carbon-tax.pdf

A more recent analysis by Jairo Yunis and Elmira Aliakbari of the Fraser Institute, which looked at carbon taxes and related policies in high income OECD countries, found that, on average, "74 percent of carbon tax revenues in high-income OECD countries go directly into their general budget with no earmarking for any specific expenditure, while 12 percent are ring-fenced for environmental spending, and only 14 percent for revenue-recycling measures. This means that most governments are using carbon taxes as a revenue-raising tool rather than a mechanism to internalize the negative externalities of emissions in a cost-effective manner."[48]

48 Jairo Yunis and Elmira Aliakbari, *Carbon Pricing in High-Income OECD Countries*. Vancouver, B.C.: Fraser Institute, 2020. https://www.fraserinstitute.org/sites/default/files/carbon-pricing-in-high-income-oecd-countries.pdf

PART 6

CONCLUSIONS

This brief has explored the main arguments put forward in support of introducing a carbon tax. Part 2 considered the argument that a carbon tax is justified on the grounds that the carbon emissions impose a net external cost on society. While that may be true, the scale of those external costs remain uncertain. In determining an appropriate price for carbon emissions, the current U.S. administration uses “social cost of carbon” estimates developed during the Obama administration of approximately $53 per metric ton of CO_2-e. Part 3 explored the economic implications of applying a carbon tax at about that rate. Such a tax would significantly increase the cost of energy and energy-related goods. Studies show that, in the absence of any other changes to taxes, subsidies, or regulations, a carbon tax of around $50 per metric ton would cause U.S. GDP to fall by about 0.4%, lead to hundreds of thousands of lost jobs, and cause incomes to fall across the board, perhaps especially among those already on lower incomes.

While a carbon tax on its own would undoubtedly cause economic harm (notwithstanding any environmental benefits that might arise), it would likely be far less harmful than the many regulations and subsidies currently implemented to reduce carbon emissions. It would also likely be more effective than those policies in reducing emissions. So, in principle, a “grand bargain” in which a carbon tax were introduced in return for eliminating all those more-harmful policies would have merit.

While a carbon tax on its own would undoubtedly cause economic harm (notwithstanding any environmental benefits that might arise), it would likely be far less harmful than the many regulations and subsidies currently implemented to reduce carbon emissions.

Unfortunately, as discussed in Part 4, the existing regulations and subsidies have created sets of concentrated beneficiaries, while the harms they cause are dispersed among the wider population. As such, any attempt to reform these policies is likely to be met with fierce and well-funded opposition.

Part 5 noted that a revenue-neutral carbon tax, achieved either by reducing (possibly even eliminating) corporate income tax or by reducing the payroll tax, could have net benefits even if existing policies aimed at reducing carbon emissions were not repealed. However, it seems unlikely that a carbon tax would be implemented in a truly revenue-neutral manner. Even if such a tax were initially close to revenue neutral, numerous pressures would almost inevitably lead to it being increased at a rate such that it would generate additional net tax revenue.

Given the economic harm that would be caused by a carbon tax, and since most if not all the benefits from either a grand bargain or a revenue-neutral carbon tax would be generated by the reduction in other taxes, regulations, and subsidies, it would seem preferable for governments to reduce those taxes (or, at least not increase them), and remove those regulations and subsidies without imposing a carbon tax.

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