

Mathur, Aparna

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Rethinking the Green New Deal: Using Climate Policy to Address Inequality

Aparna Mathur
American Enterprise Institute

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***RETHINKING THE GREEN NEW DEAL: USING CLIMATE POLICY TO ADDRESS
INEQUALITY***

Aparna Mathur, American Enterprise Institute*¹

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Abstract

The Green New Deal is best understood as an ambitious mobilization of the economic and environmental resources of the country to achieve, within a period of ten years, the twin targets of a cleaner economy with net-zero greenhouse gas emissions and a more equal and fair society where workers can get decent paying jobs with benefits, healthcare, housing and economic security. The challenge with the Green New Deal is to combine these two goals and address the question of financing both in a practical as well as an effective manner. As I explain in this paper, one such solution could be a carbon tax. A well-designed carbon tax could raise over a \$100 billion in revenues on an annual basis, which could then be used to achieve other social and economic policy goals.

Keywords: Green New Deal, Carbon Tax, EITC, CTC

¹Resident Scholar, Economic Policy Studies, American Enterprise Institute. 1789 Massachusetts Avenue, Washington D.C. 20036. Email: amathur@aei.org. Phone: 202.828.6026. I would like to thank Erin Melly for excellent research assistance. I would also like to thank Leonard Burman, William Gale, and others at the National Tax Symposium for excellent suggestions and comments.

I. INTRODUCTION

The Green New Deal is best understood as an ambitious mobilization of the economic and environmental resources of the country to achieve- within a period of ten years-the twin targets of a cleaner economy with net-zero greenhouse gas emissions and a more equal and fair society where workers can get decent paying jobs with benefits, healthcare, housing and economic security (H.Res.109, 116th Cong. 2019). In terms of specific climate policy, it calls for repairing and upgrading the infrastructure, as well as manufacturing facilities in the United States in order to eliminate pollution and greenhouse gas emissions, guaranteeing universal and affordable access to clean water and electricity, investing in renewable power sources and upgrading to “smart” power grids, restoring and protecting threatened and weakened ecosystems, and finally investing in cleaner transportation systems. On the public policy goals of strengthening labor standards and boosting worker wages, it calls for providing people with affordable and high quality healthcare, housing, benefits such as paid family leave and vacation and sick days, and addressing the challenges of wage stagnation as well as growing income and wealth inequality across race and gender. While the list of goals proposed by proponents of the Green New Deal is long, details on how to achieve these goals are lacking. What are the best means to address climate policy goals? Which policy changes will result in higher wages and better jobs for workers? How do we address inequality, especially across race and gender? In this paper, I provide a framework for thinking through these questions and a means of connecting climate policy targets with inequality reduction.

What the Green New Deal gets right is its attempt to make climate policy a centerpiece of its policy platform. At a global level, carbon emissions from fossil fuels have increased significantly over the last several decades. As per the Intergovernmental Panel on Climate Change,

carbon dioxide emissions have increased 90 percent since 1970, with emissions from fossil fuel combustion and industrial processes contributing about 78 percent of the total greenhouse gas emissions increase from 1970 to 2011 (IPCC, 2014). These assessments suggest that these emissions increases, as well as the rising concentrations of greenhouse gases in the atmosphere, are driving increases in the global average surface temperature. However, the best means to achieve greenhouse gas emissions reductions is not outlined in the Green New Deal bill text.

The second broad goal of the Green New Deal is its stated aim of reducing inequality and improving the lives of poor households. Again, a focus on inequality, and particularly on the need to improve economic opportunity for low-income households, is warranted. While the extent to which income inequality has widened is debated (Auten and Splinter, 2018), there is no denying that there is a lack of economic opportunity for disadvantaged households, in terms of access to good, decent paying jobs, schooling for children, and access to good social networks (Chetty et al, 2016).

The challenge with the Green New Deal is to combine these two goals and address the question of financing both in a practical as well as an effective manner. As I explain in this paper, one such solution could be a carbon tax. A well-designed carbon tax could raise significant revenues on an annual basis, which could then be used to achieve other social and economic policy goals (Mathur and Morris, 2015).

This paper is organized as follows. In Section II, I begin by introducing the concept of a carbon tax as a means to achieving climate goals. I discuss the possible implications of a carbon tax on households, as well as the macroeconomy in terms of achieving emissions reductions and raising tax revenues. Section III considers additional revenue sources, such as a 70 percent tax on earned income above \$10 million. Section IV discusses how the revenues from a carbon tax could

be used to achieve larger social policy goals, such as encouraging work and wages, expanding benefits, helping families address issues like childcare and paid leave, and finally as a means to boosting the economy. Section V combines these forms and funding mechanisms to create hypothetical policy packages, and Section VI concludes.

II. ADDRESSING CLIMATE POLICY: A CARBON TAX EXPLAINED

Economists have long argued that market based instruments are more efficient than regulations or mandates as a means of addressing the social damages arising from polluting activities (Goulder and Parry, 2008; Aldy et al. 2010). Market-based instruments refer to policies that force firms to “internalize” the cost of polluting activities. In the context of climate change arising from greenhouse gas (GHG) emissions, the polluting activity is the release of carbon dioxide and other greenhouse gases.² Carbon taxes and cap and trade systems are two examples of market based instruments that create a cost to emissions. A carbon tax does this directly by taxing the carbon content of fuels while a cap and trade system imposes a cost by requiring the surrender of valuable permits in proportion to the carbon content of fossil fuels.³ A major concern with either a carbon tax or a cap and trade program to reduce emissions is that the burden of the costs arising from the policy will fall disproportionately on poorer households – or in the terminology of incidence analysis, the policies will be regressive (see, among others, Poterba, 1991, Metcalf, 2009, Williams et al. 2015). However, a recent analysis using Treasury data on 322,000 families suggests that when measuring carbon tax burdens as a fraction of consumption, a carbon tax may in fact, be marginally progressive (Cronin, Fullerton and Sexton, 2017). Further,

² The major greenhouse gases include carbon dioxide, methane, nitrous oxide, and various fluorocarbons and other gases.

³ While this analysis focuses on energy-related carbon emissions only, a carbon tax or cap and trade system can incorporate all greenhouse gases, typically by using the 100-year global warming potential coefficient for the various gases to convert to a CO₂ equivalent.

several recent research papers show that the regressivity of pricing carbon through market-based means can either be partially or fully offset if revenues are recycled appropriately. Mathur and Morris (2012), Hassett, Mathur and Metcalf (2009), Marron and Toder (2013), Dinan and Lim Rogers (2002) and Dinan (2012) all demonstrate that carbon pricing is quite regressive when measured relative to current income. In particular, Mathur and Morris (2012) find that the burden in the lowest income decile is over five times the burden in the top decile when measured as a fraction of annual income. Table 1 shows the carbon tax impacts on households at various deciles, relative to income.

While the tax is regressive, a tax could raise sufficient revenues so that rebates to low income households could offset some fraction of the burden. As per the Energy Information Administration, energy related emissions of CO₂ were 5,268 million metric tons in 2018 (U.S. Energy Information Administration, 2019). Given a \$25 per metric ton tax rate, ignoring short run reductions in emissions and assuming as is typical that about 85 percent of these emissions are taxable (i.e. approximately 4,479 million metric tons are taxable), a carbon tax is expected to raise \$112 billion in 2018. Aldy et al. (2008) estimates that a \$10 tax per metric ton of carbon would raise approximately \$60 billion per year. Other studies have suggested that a carbon tax would raise roughly \$125 billion annually, with variation occurring based upon the policies design (Palmer, Paul and Woerman, 2012). Similarly, the Congressional Budget Office estimated that a \$28/metric ton price on carbon would raise approximately \$103 billion in its initial year (CBO, 2009).⁴

⁴ Similarly, in 2018 CBO estimated that a \$25/metric ton carbon tax would raise approximately \$100 billion in additional tax revenue in its first year of implementation (Ramseur and Leggett, 2019). This paper uses revenue estimates from a \$28/metric ton pricing of carbon since the distributional effects of Dinan (2012) use this carbon pricing point, and I consider those distributional effects in my net burden analysis.

Several recent papers have outlined proposals to use revenues to offset the additional burden that a carbon tax imposes on the bottom deciles of the income distribution. Ideas include lump sum rebates, payroll tax cuts and corporate tax swaps, expansion of the EITC and other transfer payments such as SNAP, TANF, etc., and an expansion of Social Security benefits. Studies typically find that such revenue rebates could potentially be a means by which the burden of the carbon tax, could be either partially or fully offset, while leaving enough revenues to meet other policy goals. For an extensive overview of recent tax reform policy proposals help low-income households, see Sawhill and Pulliam (2019).

In terms of climate impacts, a carbon tax has the potential to achieve emissions reductions not simply by reducing the use of traditional fossil fuels like coal, oil and natural gas but also by encouraging investments in clean technologies. Nordhaus (1993) uses a dynamic integrated climate-economy (DICE) model that integrates the dynamics of emissions and economic costs to maximize a social welfare function that is the discounted sum of the utilities per capita of consumption. According to the model, in 1995, a 20-percent cut in emissions from 1990 levels equates to a \$55.55/ton carbon tax rate, in 1995 dollars (Nordhaus, 1993). Later, Nordhaus (2008) builds upon his work and sets the optimal global price at \$9.5 per ton of CO₂ in 2015, which is roughly \$34.87 per ton of carbon. Palmer, Paul and Woerman (2012) estimate a \$10 carbon tax to have minimal emissions reduction effects, while a \$25/metric ton carbon tax would reduce emissions by over 25 percent. Researchers at MIT estimate that an initial carbon price of \$18 per ton of CO₂, rising 4 percent per year, would achieve a CO₂ target of 550 ppm by 2100 (Paltsev et al., 2007). Metcalf (2008) uses MIT's Emissions Prediction and Policy Analysis (EPPA) model to show that, in the short-run, total greenhouse gas emissions would be reduced 14 percent in 2015 with a \$15 per ton CO₂ tax (equivalent to \$55 per ton of carbon), raising \$90.1 billion in revenue,

assuming no behavioral responses⁵. Metcalf and Weisbach (2008) estimate that about 90 percent of U.S. greenhouse gasses could be brought into the tax base at a relatively low cost.

Finally, a carbon tax could allow some cost savings as well while spurring new investments in clean R&D technologies. Currently, the U.S. spends about \$4 billion annually in oil and gas production tax breaks. These can be removed along with investment and production tax credits for renewable energy projects, which would no longer be needed since the tax on carbon is an implicit subsidy to renewable fuels. The latter cost \$3 billion per year.⁶ Finally, a tax on carbon will encourage producers to shift away from polluting fuels and towards cleaner technologies due to increased energy prices.⁷ In a recent paper, Fried (2018) shows that a carbon tax induces large changes in green innovation, which increases the effectiveness of the tax in reducing emissions. Accounting for this effect, implies that the size of the starting carbon tax can be made lower by about 19 percent to achieve a 30 percent reduction in emissions over 20 years.

III. ALTERNATIVE PROPOSALS FOR RAISING REVENUES

While a carbon tax is appealing to economists, it has less appeal for policymakers in Congress. Several concerns are raised about the practical applicability of a carbon tax such as its regressive impacts on households and businesses, differential burdens across the country, and whether a carbon tax will achieve any climate policy goals given the global nature of the problem. As alternatives, several recent proposals to raise revenues, as well as address inequality, aim at much higher marginal tax rates on top earners. For instance, Rep. Ocasio-Cortez, who co-

⁵ Expanding the tax to beyond carbon to include all greenhouse gases would raise an estimated \$100.8 billion. Note that the results are for 2015, but the carbon tax is in 2005 dollars.

⁶ These ideas are discussed in *Paying for Pollution: Why a carbon Tax is Good for America*, Metcalf (2019)

⁷ In *Fiscal Therapy*, Gale (2019) also argues for a carbon tax as a revenue raiser, while suggesting financial assistance for affected workers as jobs transition away from traditional fossil fuel industries to newer, cleaner industries.

sponsored H. Res. 109 (the Green New Deal Resolution), proposed a 70 percent tax rate on those with incomes above \$10 million. Elizabeth Warren has proposed a wealth tax of 2 percent on assets more than \$50 million. Are these better approaches to both addressing inequality and using the revenues to finance climate and other policy goals? Below, I show that high income tax rates applied to the very top of the income distribution are problematic as revenue raisers because of the very high elasticity of taxable income associated with these high earners. While I focus on income tax rates, the behavioral response issue is equally applicable to wealth taxes.

There is a large literature in public finance that has studied how taxpayers respond to high income tax rates (Feldstein, 1999, Chetty, 2009). In general, while real responses, such as changes in the labor supply have been estimated to be low, other responses- such as shifting taxable income to different taxable bases, shifting taxation forward to a different time period, or even shielding income from taxation through use of deductions, credits and tax shelters- tend to be high. This is particularly true for high-income taxpayers who have a greater ability to take advantage of such tax avoidance activities. The elasticity of taxable income (ETI) captures all of these responses, measured as the percentage change in reported taxable income in response to a percentage change in the (net-of) tax rate.

In a recent review of the research, Saez, Slemrod, and Giertz (2012) conclude that the findings from most empirical studies suggest that the behavioral response to changes in marginal tax rates is likely to be concentrated at the top of the income distribution, with less evidence of any response for the middle- and upper-middle-income individuals. The literature on the ETI largely focuses on low and middle-income households, with a few exceptions, and estimates a central ETI estimate of 0.25. However, estimates focused on top earners are larger. For instance, Goolsbee (2000) used panel data on executive compensation from 1991 to 1995 to study the responsiveness

of executives' taxable income to Omnibus Budget Reconciliation Act 1993. He calculated very high short-term elasticities of greater than one, attributed to the exercise of options in anticipation of tax rate increases. He calculated a lower one-period-ahead elasticity of 0.4. Another example of the larger elasticity for high-income taxpayers is the recent ETI literature focused on corporate executives, such as the work by Gorry et al. (2018).

In Gorry et al. (2018), measured differences between the tax rates on current and deferred income are used to estimate ETI and decompose the total elasticity into real responses (reductions in total reported income due to a reduction in labor supply) and income-shifting responses across tax bases and over time. The resulting ETI estimate is above one, which is significantly higher than that found in prior studies. Further, decomposing this overall response, the authors find that much of the behavioral response to taxation comes from the income-shifting response, rather than the real response.

Given these ETI estimates, what does the optimal revenue maximizing tax rate, r^* , for the top tax bracket look like? Using the formula presented in Saez, Slemrod and Giertz (2012), the optimization rate can be written as:

$$r^* = \frac{1}{1 + a \cdot e}$$

A top rate above r^* would be inefficient because decreasing the rate would both increase the utility of taxpayers with high incomes while also increasing government revenue. The parameter a is a constant that depends upon the shape of the income distribution, particularly the top tail of the distribution. Using estimates of thresholds and average incomes of various fractiles within the top decile of the US income distribution provided in Piketty and Saez (2003), the parameter a is estimated to be equal 1.5 in recent years. So what happens when we plug in an elasticity, e , of 0.25

or 0.6, or higher, into the denominator of this formula? With an elasticity of 0.25, the optimal tax rate could be much higher, above 70 percent. This is why Diamond and Saez (2011) argue for raising rates to 73 percent. However, accounting for the larger behavioral response of higher income individuals with an ETI of 0.6, for instance, the optimal tax rate is 53 percent, and if the elasticity were closer to 1.0, the top rate would be 40 percent. Hence, the ETI has a significant impact in determining optimal income tax rates. Giertz (2009) shows that with an elasticity of 0.2, 0.5 and 1, behavioral responses would have reduced the straight revenue gain of the potential expiration of the Bush tax cuts by 12, 31 and 62 percent, respectively.

Given the findings relating to the elasticity of taxable income specifically for high-income taxpayers, we can now try to forecast the revenue implications. To study the impact of the 70 percent tax rate on revenue gain, I use the Tax-Calculator release 2.2.0 developed by AEI's Open Source Policy Center and housed by the Policy Simulation Library. Tax-Calculator uses the 2011 IRS-SOI Public Use File (PUF) and a recent Census Current Population Survey (CPS) to compute federal income taxes and Federal Insurance Contribution Act (FICA) taxes for a sample of filing units, beginning in 2013. The model then creates a micro dataset that closely reproduces the multivariate distribution of income, deduction and credit items in 2009, and extrapolates to 2015-2029 levels in accordance with Congressional Budget Office (CBO) forecasts released in the spring of 2016. Additional information on non-filers is taken from the March 2013 Current Population Survey. All estimates in this paper model tax reforms using Tax-Calculator release 2.2.0.

I begin by using total taxable income reported by those earning above \$10 million as the tax base. The taxable income concept used here includes ordinary income, as well as capital gains and dividends income. While we apply the tax rate and the ETI to this income, it is important to

remember that capital gains and dividends are taxed at different rates and the elasticity associated with that income has in some cases been estimated to be higher than 0.25 (Bogart and Gentry, 1995). An increase to a 70 percent tax for taxable income above \$10 million decreases the net-of-tax rate on that portion of income by 52.38 percent. Assuming the ETI to be 0.25, this implies that taxable income would fall by 13.10 percent. Assuming the ETI to be 0.6, this implies that taxable income would fall even more, by 31.43 percent. I estimate that applying a 70 percent tax rate to income over \$10 million and assuming no behavioral response generates an additional \$104.5 billion above the baseline tax revenue generated from the current top rate of 37 percent. However, assuming an elasticity of these individuals of 0.25 only generates \$75.5 billion in revenue from a 70 percent tax – approximately \$29 billion less than the static estimation. Furthermore, an even stricter behavioral assumption of an elasticity of 0.6 only generates \$34.8 billion additional in tax revenue. In other words, applying a 70 percent tax rate to taxable income over \$10 million generates nearly 89 percent more tax revenue from this group than under current law. Yet, accounting for behavioral responses decreases this revenue gain by 27.8 to 66.7 percent, depending upon the magnitude of the elasticity assumption.⁸

What happens if we exclude capital gains and dividends from income? A 70 percent tax on incomes above \$10 million applied to a tax base comprised of ordinary income (defined as wages, salaries, interest, and business income) would increase the tax revenue (assuming no behavioral response) by \$16.5 billion in 2019. However, assuming these individuals respond to this reform

⁸ I calculate the revenue increase from this reform in each year to create a 10-year budget window until 2029. Revenue increases annually as one would expect, with major increases in 2026, due to the expiration of many provisions of the Tax Cuts and Jobs Act that lessened the tax burden on the top income bracket from 2019-2025. From 2019 to 2029, as compared to current law baseline estimates, a 70 percent tax on income over \$10 million would generate a revenue increase of approximately \$1.15 trillion, assuming a static model with no behavioral responses. However, assuming a strong behavioral response in which the elasticity of taxable income is 0.6, the provision only generates \$359 billion across the decade.

such that their ETI is equal to 0.25, then only \$11.9 billion is generated from this 70 percent tax—27.8 percent less than the static estimation. Furthermore, using an elasticity of 0.6, we see only an additional \$5.5 billion in tax revenue. It is likely that this second set of revenue estimates, which apply the rate increase only to ordinary income, are closer to the true value of the revenue gain from this tax increase. This is because a simple increase in the federal income tax rate would not actually mean that all taxable income above \$10 million is subject to the higher rate. Taxable income includes capital gains and dividends, which are taxed under a different rate and only upon realization. Therefore, individuals can defer realization in high tax years, which implies that this income base has a different elasticity.⁹

The above exercise suggests that accounting for behavioral responses matters when making projections about revenues needed for policy reforms, and once such behavioral responses are accounted for, the Green New Deal is not likely to be funded by such a tax. However, there are several other policy reforms, which are likely to have more feasible political traction and implementation and generate higher revenue than the aforementioned policy.

I present the projected revenue gains from other policy reforms in Table 2. All results presented henceforth in this paper exclude those with negative after-tax income and those claimed as dependents in the baseline sample. Additional revenue is calculated by subtracting the total tax revenue under the reform scenario from the current estimated total tax revenue in 2018.

The first idea is changing the tax base of the amount of income subject to the social security payroll tax. I find that the modest proposal of increasing the cap to \$150,000 reduces the average

⁹ Along the same lines, modeling by the Tax Foundation shows that when accounting for both the elasticity of taxable income as well as the capital gains elasticity, the proposal would lose approximately \$63.5 billion between 2019-2028 (Pomerleau and Li, 2019),

after-tax income of the top 10 percent by 0.23 percent, while generating \$26.7 billion in revenues¹⁰. Increasing the cap to \$175,000 still only reduces the average after-tax income of this group by 0.43 percent, while generating an additional \$48.16 billion in revenue.

Similar proposals have been discussed several times before by Senators Moynihan and Kerrey, President Clinton and President Bush, in the context of bolstering Social Security funds. More recently, Diamond and Orszag (2005) have argued for doing away with the cap on taxable earnings, while projections from CBO estimate revenue increases of increasing the amount of earnings subject to the social security payroll tax to a \$250,000 threshold (CBO, 2016). Several others (Friedbeg, 2000, Wilson, 2001) also worry about the deadweight loss of raising taxes on high-income earners. However, there is still considerable uncertainty about what the elasticity would be for this type of a tax hike. Liebman and Saez (2006) find little evidence to support a large behavioral response and estimates from the Congressional Research Service find net positive revenue outlays from increasing the maximum taxable earnings subject to the Social Security payroll tax (CRS, 2018).

Another possible reform idea is targeting existing child tax credits better towards the most vulnerable. This has the added advantage of increasing the amount of revenues available to expand benefits for low-income workers. A potential Child Tax Credit reform is as follows. Currently, individuals with incomes equal to or below \$200,000 if filing singly or \$400,000 if filing jointly are eligible to receive the CTC. Incomes near the ceiling of this eligibility requirement are in the top 10 percent of the income distribution. Clearly, not nearly as much revenue is generated from this tax reform relative to the social security reform policy, though the negative impact on after-

¹⁰ The current law 2018 baseline states that income above \$128,400 is not subject to the social security payroll tax.

tax incomes is much smaller in magnitude. The impact is felt among the top 20 percent of the income distribution, most highly concentrated among the top 10 percent. Incomes of these households decrease by less than half a percentage point.

Several other ideas have been proposed as well that would make sense as revenue raisers. Many of these broaden the base and move away from income taxation towards consumption taxation. In a recent paper, Burman (2019) proposes a Universal EITC funded by a Value Added Tax. Carroll and Viard (2012) proposed an X Tax, which is a two part-tax with separate components for households and businesses. While the revenue impacts are unclear, the X-tax would avoid taxing savings and investments, and could potentially grow the long-run size of the U.S. economy by as much as 9 percent (Auerbach, 1996). Others, like eliminating stepped-up basis, could potentially yield \$470 billion over ten years, but are likely to have negative impacts on saving and investment (Tax Foundation, 2016) and taxing carried interest as ordinary income would have marginal impacts on revenues.

For purposes of this paper, we restrict our attention to a subset of these options. In the next section, I show how the revenues could be used to achieve several policy goals listed in the Green New Deal, and their impact on inequality.

IV. REDUCING INEQUALITY FROM TARGETED REFORMS

Recent data from the Congressional Budget Office (2018) shows that post-tax and transfer income grew by 103 percent between 1979 and 2015 for the top quintile, relative to 79 percent for the lowest quintile, and 46 percent for the middle three quintiles. Income inequality statistics are constantly being revised as new and better data are made available. In a recent paper, Auten and Splinter (2018) show that the share of post-tax income for the top 1 percent grew by much less

than had been reported in Piketty and Saez (2003), with the use of revised methodologies. However, a focus on policies towards improving economic opportunity is always warranted. As the work by Chetty et al. (2016) shows, economic mobility can be improved by addressing issues relating to access to human capital investments, greater resources for low income families that can be transferred through the tax and transfer system, as well as opportunities to connect workers with jobs and social networks. In this section, I focus on a few reforms with potential positive implications for low-income families.

A. EITC Reform

The Earned Income Tax Credit is an anti-poverty program that aims to supplement earned incomes for low income families through a refundable tax credit. The fact that the credit is refundable means that not only does it provide tax savings to households on their tax liability, but it also directly transfers any remaining credit amounts (beyond the tax liability) to families as cash. The EITC works, not only by providing cash directly to families and thus directly reducing poverty (Neumark and Wascher, 2001), but also by encouraging work among recipient families, because of the way it is structured (Eissa and Liebman, 1996, Meyer and Rosenbaum, 2001). Several recent proposals offer ideas for reforming the EITC by expanding the credit for families without children, making the credit available monthly, and expanding the amount of the credit (Burman, 2019, Maag et al., 2019). Previous work, such as Mathur and Morris (2017), puts forth a policy simulation in which Congress expands the EITC program for childless workers. Building upon this work, I use the Tax-Calculator release 2.2.0 to estimate the costs and distributional impacts of expanding the EITC in other ways. I model seven different reforms to the EITC, all in terms of a baseline 2018 law. Note that all the analyses included in this paper exclude filers claimed as dependents, as well as filers with negative baseline after-tax incomes. After-tax income, as defined by Tax-Calculator

and used in all analyses in this paper, is the sum of wage and salary income net of certain items¹¹ minus all federal tax liability (individual and payroll).

The EITC reforms are as follows: (1) doubling the maximum credit amounts (2) tripling the maximum credit amounts (3) doubling the phase-in rates (4) eliminating the phase-in (such that everyone below the phase-out threshold receives the maximum credit), (5) cutting the phase-out rate of the maximum credit in half (6) equalizing the EITC such that all filers receive the same credit amounts, phase-in, and phase-out rates, irrespective of the number of children, and finally, (7) increasing the phase-out rate threshold by 1.5 times its 2018 baseline level.

Table 3 shows that the most costly reform is tripling the maximum credit, which increases the average after-tax income by \$386 if averaged across the full sample of filers, and by \$2,404 if averaged across and by filers with non-zero income changes. The least costly reform is doubling the phase-in rate, with an average increase in after-tax income of \$735 per affected filer. Comparing the averages across the full sample and the sample whose change in after-tax income is not zero is useful in understanding the policy's distributional implications. The closer these averages are, the more evenly distributed the policy is across the population. However, the average change in after-tax income, even restricted to only the impacted filers, does not provide a complete understanding of the EITC reform's distributional implications. Precisely which percentiles are impacted? Examining the distributional percentage change in after-tax income across the baseline

¹¹ Items netted out of wage and salary income include: defined contribution pension contributions, tax-advantaged defined contribution pension contributions for taxpayer and spouse, taxable and non-taxable interest income, dividends, state and local income tax refunds, alimony received, Sch. C business net income/loss, capital gain distributions not reported on Sch. D, Form 4797 other net gain/loss, taxable IRA distributions, total pension and annuity income (including defined benefit-plan benefits), Sch. E total rental, partnership, S-Corporation income/loss, Sch. F farm net income/loss, Sch. D net short-term capital gain/loss, Sch. D net long-term capital gain/loss, other Additional Marginal Tax taxable income items from Form 6251 and half of the employer share of FICA taxes on wages/salaries.

income distribution is more informative in terms of inequality and equity policy discussions. I present this analysis in the subsequent distribution plots.

As illustrated in Figure 1A, while doubling the maximum EITC amount is targeted in the sense that it does not help those in the top 25 percent of the income distribution in any way, the poorest filers feel little impact from this reform. Doubling the maximum credit has the largest average tax change, but a large portion of this tax reduction is concentrated at the 30th to 50th income percentiles. This makes sense since this is the group that is in that region of the EITC.

Conversely, Figure 1B highlights that a reform that enables all filers to receive the maximum EITC credit until their income hits the phase-out threshold is far more concentrated at the bottom of the income distribution. Although the average tax reduction is only \$802 (less than 34 percent of the income increase due to doubling the maximum EITC), it is the bottom 20 percent receiving this benefit. Note that this policy increases the lowest-end after-tax incomes by more than 50 percent.¹²

Under current law, the EITC is dependent upon the number of children a filer has. For instance, the 2018 maximum credit amount for a filer with no children is only 8 percent of that of a filer with three or more children. Reforming the EITC such that the maximum credit amounts, phase-in rates and phase-out rates are equal irrespective of a filers' number of children could also align with the policy goal of helping low-wage workers. In other results not shown here, I set the schedule for all filers equal to that of single filers with three or more children. In this case, the bottom 60 percent are largely impacted by this reform. The 20th to 25th percentile of workers

¹² All distributional analyses exclude percentiles with non-positive after-tax income, as well as those claimed as dependents. In our sample, the first and second percentiles each have average non-positive baseline after-tax income, and are therefore excluded. Often, those with large business losses make up a significant part of this non-positive income population. These individuals often have other means of wealth. As such, I find it misleading to include them in the sample and analyze them among the poorest households, thus justifying the exclusion of non-positive incomes.

receive the largest increase in after-tax income, with over a 10 percent increase. The level of after-tax income increase phases-out over the income distribution, with essentially all tax changes concentrated on the bottom 60 percent.

B. Child Tax Credit Expansion

The Child Tax Credit (CTC) aims to help middle to low income families account for the expenses of childcare and reduce their tax burden. Under current law, in 2019 the CTC can be claimed for \$2,000 per qualifying child dependent. This credit reduces a filer's tax liability by \$2,000. Of this credit, \$1,400 is refundable, while the remaining \$600 of the credit is non-refundable. This refundable portion of the CTC is known as the Additional Child Tax Credit, and it is limited to 15 percent of earnings above \$2,500 (thus, those with incomes below \$2,500 cannot claim this refundable \$1,400 credit)¹³. Dependents who do not qualify for the CTC may be eligible under the Credit for Other Dependents, for a non-refundable credit of \$500 per dependent.^{14,15}

Table 4 describes a list of potential reforms to the CTC that would expand the credit in ways to help achieve the overall goal of reducing inequality and increasing prosperity for lower-income working individuals, as stated in the Green New Deal. The most costly reform to the CTC is doubling the credit to \$4,000 and making it entirely refundable, which produces a large average tax cut of \$541 per filer, and \$2,619 per filer with a non-zero income change. The least costly

¹³ The Tax Cuts and Jobs Act reduced the earnings limitation from \$3,000 to its current level of \$2,500. This provision is set to expire and return to pre-TCJA levels at the end of 2025.

¹⁴ <https://www.irs.gov/credits-deductions/child-tax-credit-and-credit-for-other-dependents-at-a-glance>

¹⁵ Another potential reform is to the Child and Dependent Care Credit. The CDCC is a credit of up to \$3,000 for one qualifying dependent and \$6,000 for two qualifying dependents. The credit can be claimed for expenses related to the care of a qualifying individual that enabled the filer or a spouse to work¹⁵. However, this is not refundable, which means that the benefits are concentrated among relatively middle and higher income earners, and not among those who do not have a tax liability. Unfortunately, Tax Calculator does not currently have information on childcare expenses, so we are unable to model how making the credit refundable would help low income workers.

reform is making the current total \$2,000 entirely refundable, which produces an average after-tax increase of \$433 per impacted filer.

Again, I analyze the distributional implications of these CTC reforms. Figure 2A illustrates the effects of doubling the non-refundable portion of the CTC. The 80th percentile would see nearly a 1 percent increase in after-tax income, while the bottom half would see little to, at most, a 0.2 percent increase in after-tax income.

Instead, if we make CTC's current total value of \$2,000 per child entirely refundable and eliminate the \$2,500 minimum income requirement, as in Figure 2B, this would increase incomes at the very bottom by nearly 1 percent, while the bottom 20th to 40th percentiles see an increase in after-tax income by somewhere between 0.3 to 0.7 percent. The effects phase out from the 40th to 60th percentiles, and no effects reach above the 65th percentile.

C. Paid Family Leave

Another pro-family and pro-work policy that is mentioned in the Green New Deal agenda is paid family leave. Research shows that paid leave policies allow women to stay engaged in the workforce (Ruhm et al.) while also leading to better health for the mother and child, and better bonding between fathers and children. There are three forms of paid leave: (1) parental leave, which allows employees time off at the time of the birth or adoption of a new child; (2) family caregiving leave, which allows employees to take time off to care for the medical needs of a family member; (3) medical leave, which allows employees to take time off to care for his or her own medical needs.

Using the Paid Family Leave Cost Model (PFL-CM), as developed by Ben Gitis of the American Action Forum¹⁶, I present estimates for the costs of implementing various federal paid family leave programs in Table 5. The PFL-CM uses the 2012 FMLA public use file to estimate take-up rates, leave duration and other information of users of a federal paid leave policy. Applying the 2017 Current Population Survey to these parameters, the model estimates the total cost of a policy. For more details, specific take-up rates, and data usage, see the PFL-CM open-source repository.¹⁷ As is clear from the table, costs increase as the policy becomes more expansive in scope, as well as more generous in its details like duration and wage replacement.

D. Universal and Targeted Basic Income

Finally, another possible policy solution to reduce income inequality and provide economic opportunity to those at the bottom of the income distribution is a basic income program. For purposes of this paper, I define a basic income program as either universal or targeted.

Using Tax-Calculator release 2.2.0, I developed a set of costs estimates for different targeted and universal basic income policies, presented in Table 6. For each program, there is a certain amount of tax revenue generated on the additional income, which is assumed to be taxable. The increased tax revenue is then subtracted from the total transfers to determine the total cost of the program. In the following table, I provide cost estimates under two scenarios 1) UBI systems added on top of all existing benefit and entitlement programs 2) UBI systems when repealing SNAP, TANF and UI benefits.

¹⁶See the open-source model at <https://github.com/PSLmodels/PFL-CM>

¹⁷ See the open-source model at <https://github.com/PSLmodels/PFL-CM>

Lower-income households spend more of their disposable income on basic needs, so a marginal increase in household income of \$10,000 has a larger impact on lower-income households than a high-income household. For instance, a taxable \$5,000 basic income program increases the average after-tax income of 18-20 year olds in the bottom decile by 9.24 percent, whereas the same increases the average after-tax income of the top decile by 0.08 percent.

V. COMPARING AND COMBINING REFORMS

The preceding results suggest that there is ample opportunity to create policy packages that are financed by some combination of carbon taxes, social security cap on earnings, or even consumption taxes and are geared towards using existing or new tax and transfer programs to help improve living standards for low-income households. While a modeling of the net costs and distributional impacts that allows for possible interaction effects of the policies is beyond the scope of this paper, the aim is to provide general aggregate estimations, sufficient to determine how beneficial each policy is to the most vulnerable populations, such as the bottom 20 percent of the income distribution¹⁸. I make a carbon tax central to each of the policy reforms discussed below because a primary focus of the Green New Deal is attaining climate policy goals, and not simply raising revenues for reducing inequality. For instance, a hypothetical policy package, Package A, can be as follows: (a) Eliminate the EITC phase-in rate, (b) Equalize the EITC, such that all filers (irrespective of number of children) receive the 2018 credit amount for households with three children, (c) Make the CTC entirely refundable and eliminate the \$2,500 income minimum, and

¹⁸ Note that a validity test models the individual tax reforms captured in Tax-Calculator simultaneously. This validity test models all tax reforms of each package (both funding mechanisms and inequality-reducing reforms) at once, producing a partial net cost. Then, I add the static impact of a carbon tax and the paid family leave policy (if applicable to that package) to the partial net cost to produce that package's full net cost. This allows for interaction effects between reforms to be considered, except for those of the carbon tax and paid leave policies, which are beyond Tax-Calculator's scope. Results are consistent and therefore interaction effects are likely minimal. Capturing all effects is beyond the scope of this paper. Rather, a general determination of the packages' net costs and benefits is instead the central intent of this paper.

(c) Implement a federal paid family and medical leave plan mirroring the AEI-Brookings Paid Family Leave proposal plan.¹⁹ This could be mostly achieved through a \$28/metric ton carbon tax.²⁰ In order to make Package A closer to budget neutral, you could institute a 70 percent tax on income above \$10 million. However, policymakers need to recognize that this tax would not generate as much revenue due to the aforementioned behavioral responses. In addition, it could have longer-term consequences for savings and investment decisions. This additional tax would bring the net cost of Package A to \$3.74 billion.²¹ Even further, increasing the cap on earnings subject to the social security payroll tax to \$135,000 would bring Package A to near budget neutrality, with a total cost of \$0.03 billion. Another policy package option would be to combine: (a) basic income policy of \$5,000 to all filers ages 18-20, and (b) doubling the EITC for all filers. This could also largely be funded through a \$28/metric ton carbon tax. Including a reform to modest reform to social security to increase the payroll cap to \$135,000 would make Package B virtually budget neutral, in fact having a slight overall revenue gain. Table 7 presents the total and net costs of each policy package, as well as the net effects on the bottom and top income quintiles.

Again, it is important to remember that while a carbon tax does impose an additional burden on low-income households, this can be offset through a combination of policies shown above. Also, the benefits to the climate are not modeled but should be considered. Finally, even though a high tax rate on top earners is likely to lead to lower revenues than anticipated, policies that impose those rates may still be considered, as long as there is a realistic assessment of the revenue potential

¹⁹ Note that paid parental leave plan uses the midpoint cost estimation. While the midpoint is recognized as a moderate estimate of such costs, uncertainty in a new federal plan is inherent and recognized, contingent upon take-up and usage rates and employer responses. As such, estimations of the paid leave plans (and all cost and funding mechanisms) are estimations based on modeling of available data, with acknowledgement that behavioral responses exist.

²⁰ In 2018, the Congressional Budget Office estimates that a \$25/metric ton carbon tax would yield approximately \$103 billion in its first year of implementation (Congressional Research Service, 2019).

²¹ This calculation is done by using the revenue estimate presented earlier in this paper found by applying a 70% tax on income above \$10 million, using taxable income as the tax base and an elasticity of taxable income of 0.6.

of those policies, and an understanding of the broader economic costs of such policies on savings and investments.

VI. CONCLUSION

The Green New Deal aims to achieve two goals. The first is a substantive shift towards clean energy and a net reduction in energy emissions of greenhouse gases to zero. The second, a major reduction in economic inequality and improvement in standards of living through higher wages, jobs and benefits for workers. There are multiple means by which these twin goals can be attained. For instance, climate goals can be attained through enhanced subsidies for renewable energy sources, more regulations on polluting entities, and greater federal investments in R&D. At the same time, reducing inequality can occur through a mix of direct and indirect programs aimed at transferring resources to poorer households, while taxing richer households. In this paper, I show that these dual goals can be achieved through a carbon tax, in combination with other tax and transfer program changes. The advantage of a carbon tax is that it can push us towards attaining climate goals while at the same time, raise enough revenues such that tax dollars can finance expansions in targeted programs like the Earned Income Tax Credit, the Child Tax Credit and also targeted versions of a basic income program. While a carbon tax makes economic sense, it is less appealing to policy makers, many of whom have advocated for significantly higher tax rates on the rich. In this paper I show that while such policies may be popular as a means to reduce inequality, the revenue gain is likely to be fairly minimal once behavioral responses are taken into account.

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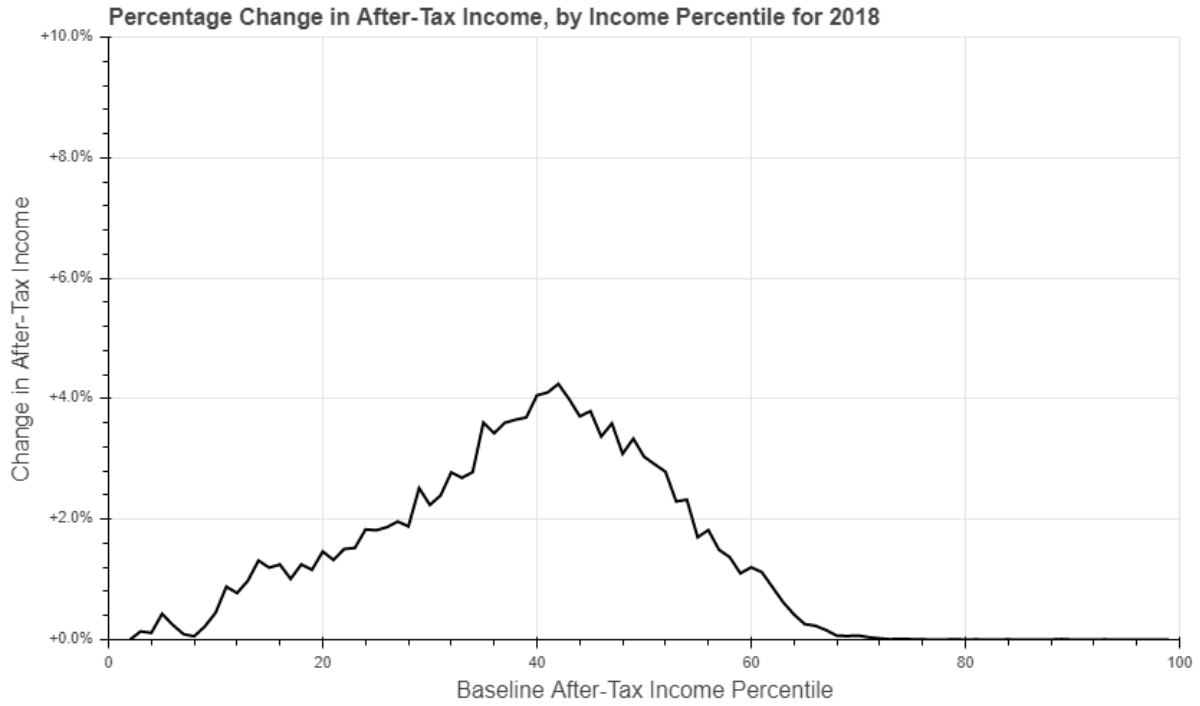
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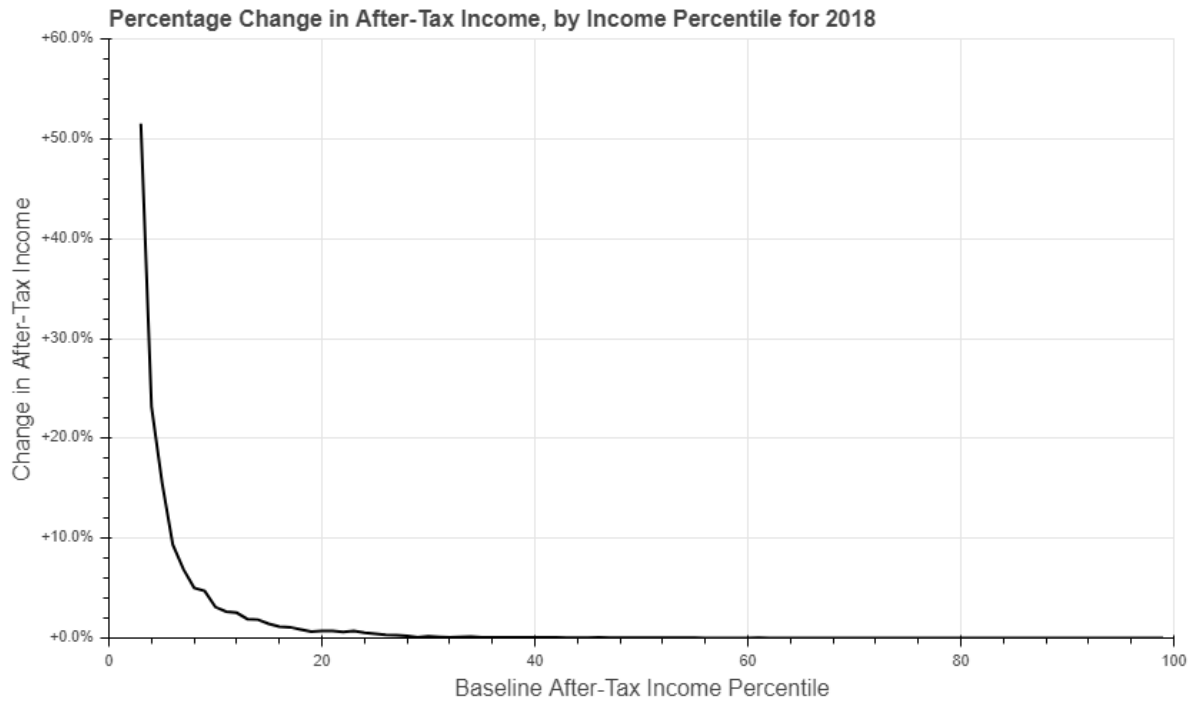
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Figure 1A
Distributional Impact of Doubling the EITC Maximum Credit



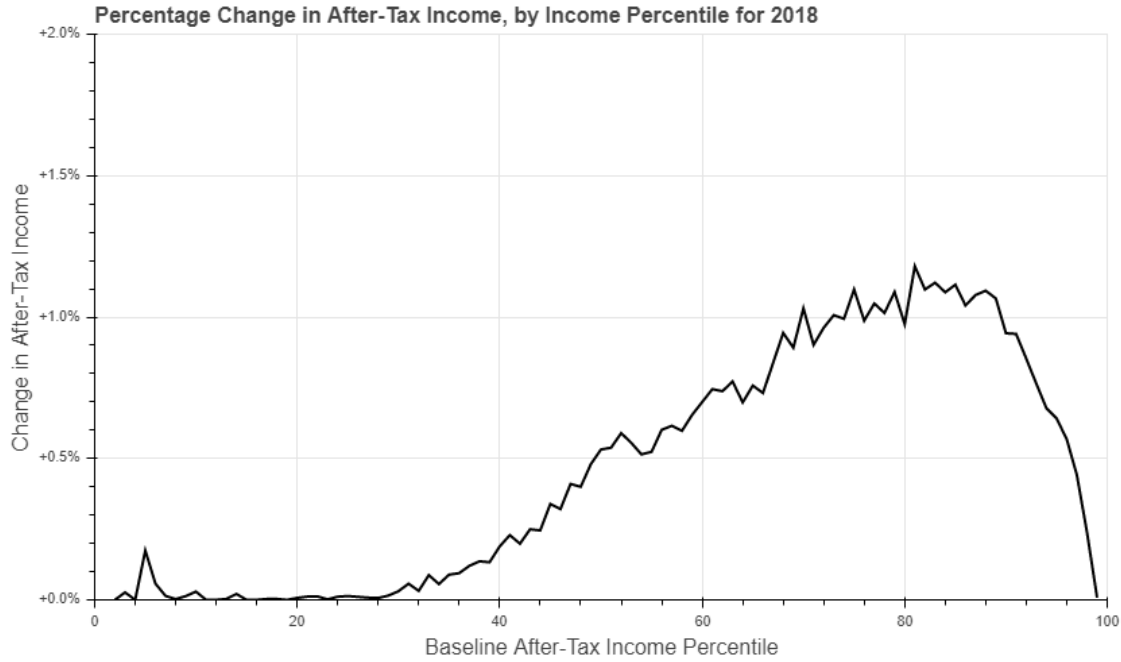
Source: Author's calculations using OSPC's microsimulation model, Tax-Calculator release 2.2.0

Figure 1B
Distributional Impact of Eliminating the EITC Phase-In Rate



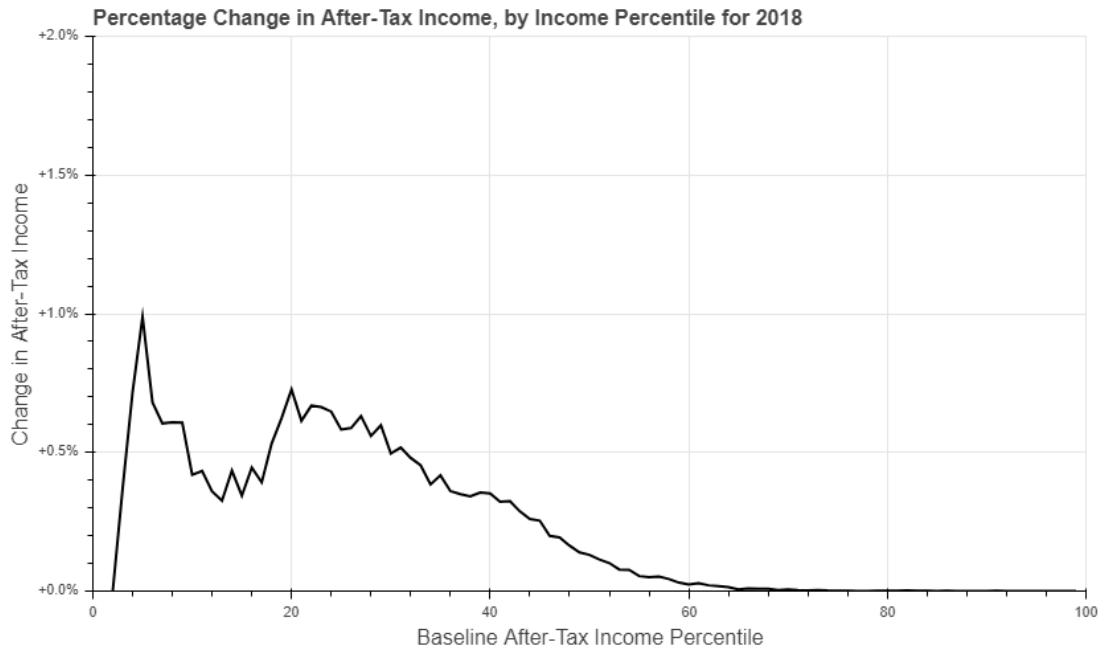
Source: Author's calculations using OSPC's microsimulation model, Tax-Calculator release 2.2.0

Figure 2A
 Distributional Impact of Doubling the Non-Refundable Portion of the CTC



Source: Author's calculations using OSPC's microsimulation model, Tax-Calculator release 2.2.0

Figure 2B
 Distributional Impact of Making the Entire CTC Refundable and Eliminating the \$2,500 Income Requirement



Source: Author's calculations using OSPC's microsimulation model, Tax-Calculator release 2.2.0

Note: After-tax income includes the cash value of all transfer payments available in the PUF IRS data used by Tax-Calculator

Table 1
Overview of Literature on the Distributional Impacts of Carbon Pricing

Paper	Ratio of carbon policy burden on low-income households to high-income households, by annual household income	Burden on low-income households as a fraction of income (%)
Mathur and Morris (2012)	5.62	3.54
Hassett, Mathur and Metcalf (2009)	4.62	3.74
Marron and Toder (2013)	5.0	3.0
Dinan and Lim Rogers (2002)	3.88	6.6
Dinan (2012)	3.57	2.5

Notes:

1. Estimates from [Mathur and Morris \(2012\)](#) in column one are the author's calculations of the ratio of the bottom to top decile's within-decile average ratio burden of a \$15/metric ton carbon tax to annual household income. Column two shows the bottom decile's carbon tax burden as a percent of household income [Table 1].
2. Estimates from [Hassett, Mathur and Metcalf \(2009\)](#) in column one are the author's calculations of the ratio of the bottom to top decile's within-decile average ratio burden of a \$15/metric ton carbon tax to annual household income for 2003. Column two shows the bottom decile's carbon tax burden as a percent of household income [Table 1].
3. Estimates from [Marron and Toder \(2013\)](#) in column one are the author's calculations of the ratio of the bottom to top quintile's within-quintile average burden of a \$15 per metric ton carbon tax. Column two shows the bottom quintile's carbon tax burden. [Table 1].
3. Estimates for [Dinan and Lim Rogers \(2002\)](#) are based on a carbon allowance trading policy. Column one shows the author's calculations of the ratio of the bottom to top quintile's annual increase in average household costs due to allowance costs and deadweight loss in the carbon market as a share of income, using expenditure data. Column two shows the bottom quintile's carbon tax burden as a percent of after-tax income [Table 4].
4. Estimates for [Dinan \(2012\)](#) in column one are the author's calculations of the ratio of the bottom to top quintile's within-quintile average burden of a \$28/metric ton price on carbon as a percent of households' after-tax income (before indexing of transfer payments) . Column two shows the bottom quintile's carbon tax burden as a percent of households' after-tax income before indexing of transfer payments [Figure 2].

Table 2
Revenue Generated from Various Tax Reforms

Reduce Income Threshold for Eligibility for the Child Tax Credit to: (\$)	Additional Tax Revenue Generated (\$ billions)
350,000 married and 175,000 single	0.75
300,000 married and 150,000 single	1.94
250,000 married and 125,000 single	3.98
200,000 married and 100,000 single	7.57
Increase the Cap on Earnings subject to the Social Security payroll tax to (\$):	
130,000	2.34
135,000	9.20
140,000	15.51
150, 000	26.66
175,000	48.16

Source: Author's calculations based on Tax-Calculator release 2.2.0

Table 3
Costs and Changes in After-Tax Income of Reforming the EITC

	Cost of Reform (\$ billions)	Avg. Change in After-Tax Income per Filer, across all filers (\$)	Avg. Change in After-Tax Income per Filer, across filers with non-zero income change (\$)
Double maximum credit amount	62.21	386	2,404
Triple maximum credit amount	103.26	640	3,428
Double phase-in rate	4.64	29	735
All receive maximum credit until phase-out (eliminate phase-in)	11.58	72	802
Cut phase-out rate in half	15.18	94	775
Equal credit and rates across number of children	84.13	521	2,160
1.5 x phase-out threshold	16.88	105	947

Source: Author's calculations based on Tax-Calculator release 2.2.0

Notes:

1. Baseline is 2018 current law values of the EITC: \$519 for filers without children, \$3,461 for one child, \$5,716 for two children and \$6,431 for three or more children. The phase-in rate is 7.65% for no children, 34% for 1 child, 40% for 2 children and 45% for 3 or more children. The phase-out rate is 7.65% no children, 15.98% for once child and 21.06% for 2 or more children.
2. The reform creating equal credit maximums across children increases all filers' maximum credit potentials to \$6,431 their phase-in rate to 45% and their phase-out rate to 21.06%, irrespective of children.
3. Analysis excludes filers claimed as dependents and filers with negative baseline after-tax income.

Table 4
Aggregate Costs and Changes in After-Tax Income of Reforms to the Child Tax Credit

Tax Reform	Cost of Reform (\$ billions)	Avg. Change in After-Tax Income per Filer (\$)	Avg. Change in After-Tax Income per Filer, across filers with non-zero income change (\$)
Double Non-Refundable value per child	63.72	395	2,565
\$1,000 bonus credit for qualifying children under five	10.01	62	1,123
All \$2,000 of credit is refundable	3.44	21	433
All \$2,000 of credit is refundable and eliminate \$2,500 income requirement	7.12	44	444
Increase the credit to \$2,750 and make it entirely refundable	37.53	233	1,148
Double credit to \$4,000 and make it entirely refundable	87.18	541	2,661
Double maximum other dependent non-refundable credit	7.87	49	590

Source: Author's calculations using OSPC's microsimulation model, Tax-Calculator release 2.2.0

Note: The Tax Cuts and Jobs Act doubled the Child Tax credit in 2018. Baseline amounts presented here are as per values under 2018 law (post-TCJA).

Table 5
Costs of Federal Paid Family and Medical Leave Programs

Types of Leave	Max Leave Duration (weeks)	Wage Replacement Rate (%)	Max Weekly Benefits	Waiting Period (weeks)	Work Requirement	Take-Up	Total Cost (%)	Plan Parameters Modeled After:
Parental	8	70	600	1	FMLA	High-end	10,500,000,000	AEI-Brookings Working
Parental	8	70	600	1	FMLA	Low-end	8,300,000,000	Group Compromise Plan
All three	12	66	1,000	1	None	Low-end	28,600,000,000	FAMILY Act
All three	12	66	1,000	1	None	High-end	62,800,000,000	

Source: Authors' estimates based on the Paid Family and Medical Leave Cost Model (PFL-CM) developed by Ben Gitis, <https://github.com/PSLmodels/PFL-CM>.

Notes:

1. Estimations modeled according to the parameters noted, with plans modeled as closely as possible to the act/law referenced; certain complexities and nuances were beyond the capability of the model to capture.
2. The estimation for the FAMILY Act is likely above the true value, as the work requirements is based upon that of the Social Security benefit formula, which covers more individuals than the FMLA eligibility, though is more restrictive than the no work requirement modeled.

Table 6
Costs of Basic Income Policies

Reform Policy	Additional Tax Revenue from UBI (\$ billions)	Cost of UBI Policy (\$ billions)	Net Total Program Cost (\$ billions)	Total Program Cost, Repealing Benefits (\$ billions)
\$5,000 fully taxable, 18-20 years old	6.70	56.61	49.91	-74.04
\$10,000 fully taxable, 18-20 years old	14.48	113.22	98.74	-25.21
\$5,000, fully taxable, 21 years and older	160.11	1,145	985.12	861.17
\$10,000 fully taxable, 21 years and older	337.23	2,290	1,953	1,829

Source: Author's calculations using Tax-Calculator release 2.2.0

Notes:

1. Numbers may not add/subtract exactly due to rounding.
2. The net total cost is the total cost of the UBI policy minus the additional tax revenue generated from the policy.
3. Costs when repealing benefits derived from subtracting the additional tax revenue from the total UBI payments, and then subtracting the value of all SNAP, TANF and UI benefit payments (\$123,952,020,000).
4. SNAP and UI benefit amounts are from fiscal year 2018, while SNAP benefit payment is per fiscal year 2017 (the most recent year with data).
5. Data for the benefit programs collected from the [Office of Family Assistance](#), the [Food and Nutrition Service](#) and the [United States Department of Labor](#).

Table 7
Next Costs and Impacts on Inequality of Policy Packages

Policy Package and funding mechanism	Total Cost (\$ billions) [1]	Total Revenue Generation (\$ billions) [2]	Net Cost (\$ billions) [3]	Cost to Bottom 20% (% change in after-tax income) [4]	Benefit to Bottom 20% (% change in after-tax income) [5]	Net Effect on Bottom 20% (% change in after-tax income) [6]	Net Effect on Top 20% [7]
A: carbon tax	112.24	103.00	9.24	3.57	24.06	20.49	-0.70
A: carbon tax & 70% tax	112.24	108.50	3.74	3.57	24.06	20.49	-0.33
A: carbon tax & social security cap increase	112.24	112.20	0.04	3.57	24.06	20.49	-0.14
B: carbon tax	112.12	103.00	9.16	3.57	6.00	2.43	0.04
B: carbon tax & social security	112.12	112.20	-0.04	3.57	6.00	2.43	-0.03

Source: Author's calculations using Tax-Calculator release 2.2.0; Marron and Toder (2013); Dinan (2012)

Notes:

1. Column [1] is the sum of the revenue needed to implement the reforms of each package, as calculated individually in the prior tables using Tax-Calculator release 2.2.0.
2. Column [2] is the sum of the revenue generated from funding sources reforms of each policy package. Note that the revenue generated for the carbon tax is \$103 billion, as per the Congressional Budget Office
3. Column [3] is Column [1] minus Column [2].
4. Column [4] is the carbon tax burden as a fraction of after-tax income of the bottom quintile as estimated by Dinan (2012) [see Table 1 of this paper]. Estimates from Dinan (2012) are selected for this analysis because his income classifier (after-tax income) is most similar to the one used in this paper, the analysis is quintile based, and a carbon tax of \$28/metric ton is used as the point of analysis in both that study and these policy packages.
5. Column [5] of Package A is calculated by modeling the EITC change and the CTC expansion simultaneously. Column [5] of Package B is calculated by modeling the UBI and EITC simultaneously. Note that I cannot capture the potential implications of the paid leave plan in Package A, though it is understood as a benefit to the bottom 20%.
6. Column [6] is equal to Column [5] minus Column [4]. Interaction effects between the individual tax reforms are captured through the simultaneous modeling; however, the interaction effect between the carbon tax mechanism and the other tax reforms is not captured. This as a limitation and area to be explored in future research.
7. Column [7] of Package A models the change in after-tax income of the top quintile from both CTC reforms of this package (modeled via Tax-Calculator release 2.2.0; note the EITC reform does not impact this quintile) plus the -0.7% reduction in after-tax income from a \$28/metric carbon tax, as estimated in Dinan (2012). Column [7] of Package B models the change in after-tax income of the top quintile from UBI and Social Security reforms of this package (modeled via Tax-Calculator release 2.2.0; note the EITC reform does not impact this quintile) plus the -0.7% reduction in after-tax income from a \$28/metric carbon tax, as estimated in Dinan (2012).