

## A Carbon Tax to Finance Child Tax Credit Expansion

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In this article, the authors explore four carbon tax revenue swaps that would expand the child tax credit, and they consider the policy's potential effect on the federal budget, the distribution of the tax burden, poverty, and labor supply.

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A carbon tax is considered by most economists to be the most efficient and effective way to reduce carbon emissions. However, a long-standing political challenge to a carbon tax is the perception that it would disproportionately burden low- and

middle-income households relative to high-income households.<sup>1</sup> Many analysts and lawmakers have proposed using carbon tax revenues to either cut taxes or increase transfers to low- and middle-income households to mitigate any regressive effect.<sup>2</sup> Perhaps the most prominent revenue recycling proposal would use carbon tax revenue to distribute carbon dividends — per-person lump sum payments.<sup>3</sup>

A potential revenue swap similar to carbon dividends would use carbon tax revenue to finance an expansion of the child tax credit (CTC). In 2021 lawmakers temporarily expanded the CTC as part of the American Rescue Plan Act, and since then lawmakers and policy analysts on both sides of the aisle have been debating additional expansions. For example, President Biden has proposed temporarily expanding it in his latest budget,<sup>4</sup> and Rep. Ashley Hinson, R-Iowa, and Sen. Marco Rubio, R-Fla., proposed a CTC expansion as part of a broader pro-family package.<sup>5</sup>

This article explores a revenue recycling option — what we call a revenue swap — that would use carbon tax revenue to finance an expansion of the CTC. This revenue swap would enact a roughly \$35-per-metric-ton carbon tax and use the revenue to finance one of four CTC expansion options. Using the American Enterprise Institute's open-source "Tax-

<sup>1</sup>Dorian Carloni and Terry Dinan, "Distributional Effects of Reducing Carbon Dioxide Emissions With a Carbon Tax," Congressional Budget Office Working Paper 2021-11 (Sept. 2021).

<sup>2</sup>Kyle Pomerleau and Elke Asen, "Carbon Tax and Revenue Recycling: Revenue, Economic, and Distributional Implications," Tax Foundation (Nov. 6, 2019).

<sup>3</sup>Climate Leadership Council, "The Four Pillars of Our Carbon Dividends Plan" (updated Sept. 2019).

<sup>4</sup>Treasury, "General Explanations of the Administration's Fiscal Year 2024 Revenue Proposals" (Mar. 9, 2023).

<sup>5</sup>See Hinson release on package to expand the CTC (Sept. 15, 2022).

Calculator,” we model the effect of this potential revenue swap on the federal budget, the distribution of the tax burden, poverty, and labor supply.

### I. A Carbon Tax and U.S. Climate Policies

The Biden administration has set ambitious climate goals to reduce U.S. greenhouse gas emissions by half by 2030 compared with 2005 levels.<sup>6</sup> U.S. federal climate mitigation has relied on tax incentives and regulations. Democratic lawmakers in 2022 passed the Inflation Reduction Act, which included \$394 billion in energy and climate funding, a majority of it in the form of clean energy tax credits for producers and consumers.<sup>7</sup>

The Rhodium Group estimated that the IRA climate and energy provisions would cut net U.S. emissions to a level 31 percent to 44 percent below 2005 levels by 2030, as opposed to a cut of 24 percent to 35 percent under current policies.<sup>8</sup> More climate mitigation measures will be needed to further reduce emissions to meet the Biden administration’s climate goals.

Despite the projected emission reductions resulting from the IRA climate provisions, there are several challenges to using tax breaks to address climate change. First, industry-specific tax credits are not as broad as an economywide carbon tax and would not reduce emissions as much. For example, clean vehicle credits would encourage more purchases of electric vehicles, but they would not encourage consumers to use electricity from clean energy sources. Second, heavily subsidized clean energy may lead to an increase in overall energy consumption as energy becomes cheaper generally. As a result, some of the federal funding spent on clean energy credits may be wasted.<sup>9</sup>

A better decarbonization policy would be to implement a broad-based carbon tax. Economists widely agree that a carbon tax is the most effective policy for encouraging emissions reduction.<sup>10</sup> The tax would be levied per unit of carbon emissions generated from economic activities. It would be technology-neutral and provide flexibility for companies and individuals to reduce emissions.<sup>11</sup>

In recent years, leading trade associations and business groups have publicly supported enacting a U.S. carbon tax to address climate change. For example, the Business Roundtable and the American Petroleum Institute have explicitly endorsed the imposition of a carbon price.<sup>12</sup> Leading trade groups in the financial sector, including the Institute of International Finance and the American Bankers Association, also called for a carbon pricing policy in early 2021.<sup>13</sup>

If a carbon tax was implemented, the existing clean energy tax breaks and regulations meant for reducing greenhouse gas emissions could be repealed. This would raise revenue and more efficiently encourage emissions reductions.

### II. CTC Expansion Options

Over the past few years, lawmakers and policy analysts have proposed various designs for CTC expansions. The proposals all focus on increasing the size of the CTC and providing additional benefits for young children (those under 6 years old) but vary in other design features. Their differences include the maximum value of the credit, the extent to which benefits go to households with no earned income, income levels at which credits phase out, and the rate at which the credits phase out.

Table 1 compares current policy (the tax credit in force until 2026) with four expansion options. The total credit amount for each alternative policy

<sup>6</sup> White House fact sheet, “President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies” (Apr. 22, 2021).

<sup>7</sup> McKinsey & Co., “The Inflation Reduction Act: Here’s What’s in It,” Insights (Oct. 2022).

<sup>8</sup> Ben King, John Larsen, and Hannah Kolus, “A Congressional Climate Breakthrough,” Rhodium Group (July 28, 2022).

<sup>9</sup> Shutting Pomerleau, “Now That the Inflation Reduction Act Is Passed, Do We Still Need a Carbon Tax?” Niskanen Center (Dec. 2022).

<sup>10</sup> Heather Long, “‘This Is Not Controversial’: Bipartisan Group of Economists Calls for Carbon Tax,” *The Washington Post*, Jan. 16, 2019.

<sup>11</sup> Shutting Pomerleau and Ed Dolan, “Carbon Pricing and Regulations Compared: An Economic Explainer,” Niskanen Center (Sept. 2021).

<sup>12</sup> Valerie Volcovici, “Business Roundtable CEO Group Announces Its Support for Carbon Pricing to Help Fight Climate Change,” Reuters, Sept. 16, 2020; and American Petroleum Institute, “Climate Action Framework” (2021).

<sup>13</sup> Shutting Pomerleau, “Leading Trade Groups in the Financial Sector Support Carbon Pricing,” Niskanen Center (Feb. 21, 2021).

is set so that their budgetary effect is the same: \$95.2 billion per year.

### A. Current Policy CTC

Before 2018 the CTC was a \$1,000 refundable tax credit for households with children under age 17. The credit phased in at 15 cents per dollar of earned income (wages plus net self-employment income) above \$3,000. The credit phased out at a rate of 5 cents per dollar for households with adjusted gross income above \$110,000 (married filing jointly) and \$75,000 (single filers and heads of household). The credit thresholds were not adjusted for inflation.<sup>14</sup>

The Tax Cuts and Jobs Act of 2017 expanded the CTC to \$2,000 per child under the age of 17, of which up to \$1,400 was refundable (\$1,600 today, after inflation adjustments). It reduced the earned income phase-in threshold to \$2,500 and substantially increased the phaseout thresholds to \$400,000 (married filing jointly) and \$200,000 (single filers and heads of household). The thresholds were not adjusted for inflation, except for the refundable portion of the credit. The TCJA individual income tax provisions, including the expanded CTC, are scheduled to expire at the end of 2025.<sup>15</sup>

### B. Option 1: Working Families Tax Relief Act

The Working Families Tax Relief Act of 2023 (WFTRA) is a proposal very similar to the temporary CTC expansion that was passed as part of ARPA and in force for 2021.<sup>16</sup> For children under age 6, this proposal would increase the credit by \$1,600, from \$2,000 to \$3,600 per child. For children between ages 6 and 17, the credit would rise by \$1,000, to \$3,000 per child. The proposal would also make the CTC fully refundable. It would further eliminate the earned income threshold and the 15 percent phase-in, providing the full credit to households without earned income. The additional credit amount would phase out at 5 cents per dollar for

households with AGI over \$150,000 (married filing jointly), \$112,500 (heads of household), and \$75,000 (single filers). The base credit of \$2,000 would phase out for households with AGI over \$400,000 (married filing jointly), \$300,000 (heads of household), and \$200,000 (single filers).

### C. Option 2: Child Allowance

A child allowance would provide a lump sum benefit to households for each child. An allowance would be available to all households with children, regardless of income. Thus, it would neither phase in with earned income nor phase out for households with a high AGI. The sample child allowance proposal we model here would provide a credit of \$2,600 per child. This proposal would also provide an additional \$1,000 benefit for children under 6 years old. This allowance would extend the benefit to 17-year-old children.

### D. Option 3: Hybrid Expansion

A hybrid expansion is a middle ground between the current CTC and a child allowance for low-income households. It would provide a portion of the credit as a flat, lump sum benefit with no earned income requirement. The remainder of the credit would phase in with earned income. This credit would similarly phase out for high-income households, but the threshold would be reduced to target the credit toward low- and middle-income households. This style of reform was proposed by Sens. Mitt Romney, R-Utah, and Michael F. Bennet, D-Colo., in 2019.<sup>17</sup> Analysts, including the Bipartisan Policy Center<sup>18</sup> and Brookings Institution researchers Wendy Edelberg and Melissa Kearney,<sup>19</sup> have also proposed credits with this design.

This hybrid expansion option would increase the maximum credit to \$3,100 and make the entire credit refundable. The credit would be \$3,720 for children under the age of 6. Half of the credit

<sup>14</sup> Congressional Research Service, "The Child Tax Credit: Legislative History" (Dec. 2021).

<sup>15</sup> *Id.*

<sup>16</sup> S. 1992 ("To amend the Internal Revenue Code of 1986 to expand the earned income and child tax credits, and for other purposes."); and the American Rescue Plan Act of 2021.

<sup>17</sup> See Bennet and Romney release on the path to bipartisan compromise on refundable credits and business tax fixes (Dec. 15, 2019).

<sup>18</sup> Bipartisan Policy Center, "A Bipartisan Plan to Permanently Reform the Child Tax Credit" (Aug. 2021).

<sup>19</sup> Edelberg and Kearney, "A Proposal for an Enhanced Partially Refundable Child Tax Credit," the Aspen Institute and the Hamilton Project (Mar. 2023).

**Table 1. Current Policy and CTC Expansion Options**

	Current Policy	Working Families Tax Relief Act	Child Allowance	Hybrid Expansion	Payroll Tax Refundability
Total maximum credit amount	\$2,000 for children under 17	\$3,000 for children ages 6 to 17 \$3,600 for children under 6	\$2,600 for children ages 6 to 17 \$3,600 for children under 6	\$3,100 for children ages 6 to 16 \$3,720 for children under 6	\$3,700 for children ages 6 to 16 \$4,950 for children under 6
Lump sum portion	\$0	\$3,000 for children between 6 and 18 \$3,600 for children under 6	\$2,600 for children between 6 and 18 \$3,600 for children under 6	\$1,550 for children between 6 and 17 \$1,860 for children under 6	\$0
Refundable portion	\$1,600	Entire credit	Entire credit	Entire credit	Entire credit
Earned income phase-in threshold	\$2,500	N/A	N/A	\$0	\$0
Phase-in rate	15%	N/A	N/A	20%	15.3%
Phaseout threshold	\$200,000 (\$400,000 married filing jointly)	\$75,000 (\$150,000 married filing jointly, \$112,200 heads of household) for the \$1,000/\$1,600 additional credit amount; \$200,000 (\$400,000 married filing jointly, \$300,000 heads of household) for the \$2,000 credit amount under current policy	N/A	\$75,000 (\$110,000 married filing jointly)	\$200,000 (\$400,000 married filing jointly)
Phaseout rate	5%	5% for both the \$2,000 credit and the \$1,000 additional credit	N/A	1%	5%

would be available to households without earned income; the remaining 50 percent would phase in at 20 cents per dollar of earned income. The credit would phase out at 1 cent per dollar of AGI over \$110,000 (married couples filing jointly) and \$75,000 (single filers and heads of household).

**E. Option 4: Payroll Tax Refundability**

This expansion would increase the value of the CTC and tie its refundability to payroll tax

liability. Under current law, an individual faces two payroll taxes, split evenly between employees and employers: a 12.4 percent tax to finance Social Security and a 2.9 percent tax to finance Medicare. In total, an individual faces roughly a 15.3 percent marginal tax rate starting at the first dollar of wage income.

This specific option would increase the total CTC to \$3,700 (\$4,950 for young children). The CTC would be fully refundable, but the value of



the credit would be limited to one's payroll tax liability. In effect, this means that the credit would phase in at 15.3 cents per dollar of earned income starting at the first dollar of earnings. This proposal would not alter the phaseout threshold, which would remain at \$200,000 in AGI (\$400,000 for married couples filing jointly) or the phaseout rate of 5 percent. This type of reform has been proposed by Hinson and Rubio.<sup>20</sup>

### III. Fiscal Implications

One of the advantages of a carbon tax over other carbon mitigation policies such as tax credits, subsidies, and regulations is that it can raise a significant amount of revenue. The amount of revenue a carbon tax could raise depends on the breadth of the tax, the rate, how the rate escalates over time, and how carbon emissions respond to the tax. A broad-based carbon tax would raise more than a narrow-based tax. Further, if a carbon tax greatly reduced emissions, it would raise less than if it resulted in only modest emission reductions.

The net revenue effect of a carbon tax would be less than the amount the tax directly raises. As an excise tax, a carbon tax would create a wedge between the prices consumers pay and the revenues received by producers (workers and owners of capital). As a result, the real value of wages, salaries, and capital income would fall, reducing the amount of that income subject to the individual and corporate income tax and payroll taxes.

For example, a vacuum company produces a vacuum that it sells for \$100. The vacuum is subject to a \$10 excise tax. The vacuum company would only receive \$90 in revenue after taxes, and thus would have less money available to pay its workers and owners. With lower revenue, the business would report lower profits and pay less corporate income tax. The workers and owners, with lower real incomes, would pay less payroll and individual income tax.

Because of the excise tax offset,<sup>21</sup> a carbon tax needs to raise enough revenue to cover both the

CTC expansion and the reduction in income and payroll taxes to be revenue neutral.

Expanding the CTC would both reduce federal revenue to the extent that it offsets income tax liability and increase government spending to the extent that it represents a refund (negative income tax liability). We estimate that the WFTRA CTC expansion would cost \$95.2 billion in 2024 and, as noted above, set the credit amount for the other alternatives to match this cost.

In Table 2 we illustrate the budgetary costs of the CTC expansion options and the gross and net effects of a carbon tax to offset the expanded credit's cost. We estimate that a broad-based, \$35-per-metric-ton carbon tax would raise approximately \$122.2 billion in isolation — enough to cover the reduction in income and payroll tax revenue of \$27 billion because of the excise tax offset and the \$95.2 billion cost of the credits.

**Table 2. Fiscal Implications of a CTC Expansion and a Carbon Tax, 2024**

	2024
<b>CTC expansions</b>	<b>-\$95.2 billion</b>
Gross carbon tax revenue	\$122.2 billion
Individual income tax offset	-\$18.3 billion
Payroll tax offset	-\$7.3 billion
Corporate income tax offset	-\$1.4 billion
<b>Net carbon tax revenue</b>	<b>\$95.2 billion</b>
<b>Net budgetary effect</b>	<b>\$0</b>
Carbon tax rate (per metric ton)	\$35
<i>Source:</i> Authors' calculations using AEI's open-source Tax-Calculator.	

The estimates in Table 2 reflect the revenue effect of a carbon tax in 2024, assuming that carbon emissions fall by 17 percent from the baseline.<sup>22</sup>

These revenue estimates are against a current-policy baseline. Thus, they are modeled against a baseline that includes the individual income provisions of the TCJA. The long-run revenue

<sup>20</sup>Hinson, *supra* note 5.

<sup>21</sup>Joint Committee on Taxation, "The Income and Payroll Tax Offset to Changes in Excise Tax Revenues," JCX-59-11 (Dec. 2011).

<sup>22</sup>Marc Halstead, "Carbon Pricing Calculator," Resources for the Future (Aug. 2020). See Appendix for more details.

implications could be significantly different depending on how the CTC expansion is structured and whether lawmakers extend some or all of the individual income tax provisions of the TCJA.

#### IV. Distributional Effect

Our analysis finds that a carbon tax alone is slightly regressive in that it burdens the top 1 percent of households slightly less than it does other households as a share of after-tax income. However, paired with an expansion of the CTC, it would be highly progressive.

As noted, a carbon tax would place a wedge between the prices consumers pay for goods and services and the revenues producers receive. In practice, this would either cause nominal wages and capital income to fall or, if the Federal Reserve were to accommodate the tax, cause prices of goods and services to rise to hold nominal incomes constant, with real incomes still falling.

As a consumption-based tax, a carbon tax would burden all households in proportion to their share of labor compensation, government transfers,<sup>23</sup> and above-normal returns to saving.<sup>24</sup>

A carbon tax, by design, also burdens goods and services with higher carbon content more than those with low or no carbon content. Thus, households with a larger share of consumption dedicated to carbon-intensive goods and services would face an above-average carbon tax burden. Meanwhile, households with a below-average share of consumption dedicated to those goods would face a below-average carbon tax burden.<sup>25</sup>

Accounting for these two effects, we find that a carbon tax's distributional effect would only be slightly regressive. (See Table 3.) Taxpayers in each income group would see a reduction in after-

tax income of 0.7 percent, except for households in the top 1 percent, which would see a slightly lower reduction in after-tax income of 0.6 percent. High-income households would face a slightly lower tax burden because a larger share of their income tends to be capital income, which is partially exempt from the carbon tax, as discussed above. Our analysis also finds that a below-average share of high-income households' total consumption is of carbon-intensive goods.

Pairing a CTC expansion with a carbon tax would be progressive. Each CTC expansion paired with a carbon tax would increase the after-tax income for the bottom two income quintiles while reducing the after-tax income for the top income quintile.

However, the effect on certain income groups would vary because of differences in how each expansion is designed.

A notable difference is how each option affects low-income households. The WFTRA, child allowance, and hybrid expansion options provide large benefits for the lowest quintile of income earners, raising their after-tax incomes by between 7.2 and 8.2 percent. This is because these three expansions extend all or some of the CTC to households with no earned income. In contrast, the payroll tax refundability option provides no credit to households with no earned income and phases in the benefit at 15.3 percent. As a result, it only increases the after-tax income of the bottom quintile by an average of 1.1 percent.

Another notable difference between the alternative CTC expansions is their effect on middle-income households (those in the third quintile). The WFTRA, hybrid expansion, and payroll tax refundability proposals all offset the burden of the carbon tax for those households on average. And payroll tax refundability ends up offsetting the carbon tax for households up to the fourth quintile, on average. Under a child allowance option, however, middle-income households face a slight tax increase.

The effect on middle-income households is driven primarily by the size of the credit expansion. Since the WFTRA, hybrid expansion, and payroll tax refundability proposals target the benefits by either phasing in the benefit for low-income households or phasing out the benefit for high-income households, the credit amounts can

<sup>23</sup> Households earn a portion of their income from government transfers. Transfers that are adjusted for changes in prices are not burdened by a consumption tax. However, transfers tied to real incomes, such as Social Security benefits, are burdened by a consumption tax in the long run.

<sup>24</sup> Under a consumption tax, the portion of income put aside as savings is exempt from taxation. This exemption for savings is equal to, in present value, an exemption for the normal return to saving. A normal return is the minimum return required to compensate a saver for deferring consumption. Any returns exceeding a normal return are considered above normal.

<sup>25</sup> For an overview of the distributional implications of a carbon tax and alternative estimates, see Carloni and Dinan, *supra* note 1.

**Table 3. Distributional Effect of a Carbon Tax and CTC Expansions, 2024**  
(percentage change in after-tax income)

Income Group	Carbon Tax in Isolation	Paired With a Carbon Tax			
		Working Families Tax Relief Act	Child Allowance	Hybrid Expansion	Payroll Tax Refundability
0-20	-0.7%	8.2%	7.2%	7.3%	1.1%
20-40	-0.7%	1.5%	1.0%	1.5%	1.1%
40-60	-0.7%	0.1%	-0.1%	0.1%	0.6%
60-80	-0.7%	-0.2%	-0.3%	-0.2%	0.2%
80-90	-0.7%	-0.6%	-0.4%	-0.5%	-0.1%
90-95	-0.7%	-0.7%	-0.6%	-0.7%	-0.4%
95-99	-0.7%	-0.7%	-0.4%	-0.7%	-0.5%
Top 1%	-0.6%	-0.6%	-0.5%	-0.6%	-0.6%
All	-0.7%	0%	0%	0%	0%

*Source:* Authors' calculations.

be larger, assuming the same budgetary cost (between \$3,000 and \$3,700 per child between 6 and 17 years old). The child allowance, being universal regarding income, ends up providing the smallest credit expansion (\$2,600 per child between 6 and 17 years old).

In addition to increasing the progressivity of the tax code, this revenue swap would change the relative tax burden across households with and without children. The CTC expansion would only go to households with children, while the carbon tax would burden both households with and without children. As a result, each of these expansion options would redistribute roughly \$65 billion from households without children to households with children.

As shown in Table 4, households without children would see an average reduction in after-tax income of 0.7 percent because of the carbon tax. In contrast, households with children would see, on average, an increase in after-tax income of 1.5 percent under each CTC expansion option.

High-income households would face a reduction in after-tax income regardless of household type. Households without children do not receive a CTC. The CTC expansions generally phase out for high-income households or, in the case of the child allowance, provide a benefit too

small to offset the carbon tax burden for high-income households.

## V. Poverty

Proponents of expanding child and family benefits argue that these provisions could meaningfully reduce poverty and child poverty.<sup>26</sup>

Traditionally, poverty is measured using the official poverty measure, which classifies a household as in poverty if its income is below a specific threshold. A notable limitation of the official poverty measure is that it neither includes transfers to nor subtracts taxes from a household's resources. An alternative measure of poverty, the supplemental poverty measure (SPM), accounts for these policies. Thus, taxes and benefits for low-income households can affect measured poverty under the SPM.

In isolation, a carbon tax would reduce household resources by reducing real after-tax incomes. However, the burden on low-income households would be relatively modest and would only increase the SPM poverty and child poverty rates by 0.1 percentage points each.

<sup>26</sup>Elise Gould, "Child Tax Credit Expansions Were Instrumental in Reducing Poverty Rates to Historic Lows in 2021," Economic Policy Institute (Sept. 22, 2022).

**Table 4. Distributional Effect of CTC Expansions and a Carbon Tax by Household Type, 2024  
(percent change in after-tax income)**

Income Quintiles	Households Without Children	Households With Children			
	All CTC Revenue Swap Options	Working Families Tax Relief Act	Child Allowance	Hybrid Expansion	Payroll Tax Refundability
0-20	-0.7%	15.5%	13.3%	14.5%	2.7%
20-40	-0.8%	4.9%	3.6%	5.2%	4.1%
40-60	-0.7%	2.2%	1.4%	2.4%	4.1%
60-80	-0.7%	1.0%	0.6%	1.0%	2.4%
80-90	-0.7%	-0.5%	0.1%	0.0%	1.3%
90-95	-0.7%	-0.8%	-0.2%	-0.6%	0.7%
95-99	-0.7%	-0.7%	0.1%	-0.6%	-0.2%
Top 1%	-0.6%	-0.7%	-0.4%	-0.7%	-0.7%
All	-0.7%	1.5%	1.5%	1.5%	1.5%

All four of the CTC expansion options would more than offset the effect of the carbon tax and would, on net, reduce both SPM poverty and child poverty. (See Table 5.) The poverty reduction would depend on both the size of the credit and the availability of the credit to very-low-income households. The WFTRA paired with a carbon tax would produce the largest reduction in SPM poverty (1.5 percentage points, or 4.9 million people) and child poverty (4.3 percentage points, or 3.1 million children). This is because the credit expansion is relatively large (\$3,000 and \$3,600 for young children) and is available regardless of earned income.

Although the child allowance expansion option also provides the full benefit to households with no earned income, the credit expansion is smaller (\$2,600 and \$3,600 for young children). As a result, it reduces SPM poverty and child poverty by slightly less — 1.3 and 3.9 percentage points, respectively.

The hybrid expansion only provides half the credit amount (\$1,550) to households with no earned income. However, the SPM poverty reduction is not significantly lower than it is under the child allowance expansion option — a 1.2 percentage point reduction in SPM poverty

and a 3.4 percentage point reduction in child poverty.

The payroll tax refundability expansion option would result in a modest reduction in SPM poverty and child poverty of 0.2 and 0.6 percentage points, respectively. Although this proposal increases the total size of the credit the most, the benefits are more targeted toward households over the poverty threshold because of the phase-in based on the payroll tax.

## VI. Work Incentives

Taxes can affect labor supply by changing the returns to work. A change in the returns to work can affect both the willingness to enter the labor force (referred to as the extensive margin) and how many hours an individual chooses to work (referred to as the intensive margin) through two channels: the substitution effect and the income effect. The substitution effect occurs when a change in after-tax income affects the relative attractiveness of work and leisure. The income effect occurs when a change in after-tax income affects an individual's ability to consume more goods and services, including leisure.

In a review of the literature, the Congressional Budget Office concluded that the substitution effect varies by household income and is



**Table 5. Supplemental Poverty Measure, Carbon Tax and CTC Expansions, 2024**

	Overall poverty		Child poverty	
	Rate	People (millions)	Rate	People (millions)
Baseline	11.7%	39.4	12.4%	9.1
Carbon tax in isolation	+0.1%	+0.4	+0.1%	+0.1
Carbon tax paired with:				
Working Families Tax Relief Act	-1.5%	-4.9	-4.3%	-3.1
Child allowance	-1.3%	-4.4	-3.9%	-2.8
Hybrid expansion	-1.2%	-4	-3.4%	-2.5
Payroll tax refundability	-0.2%	-0.8	-0.6%	-0.4
<i>Source: Authors' calculations.</i>				

generally larger for low-income households and secondary earners. It also finds that substitution effects are larger than income effects.<sup>27</sup>

A carbon tax would reduce the return to work by reducing real after-tax wages. Real wages would fall because of either a reduction in nominal wages or an increase in prices.

The CTC directly influences the return to work through the phase-in and phaseout of benefits. The CTC increases the after-tax return to work for low-income households by phasing in the credit and offsetting some income tax at the margin. At the same time, the 5 percent phaseout of the CTC, in effect, subjects households in the phaseout range to a 5 percent marginal tax rate, on top of existing taxes. Each expansion option for the CTC would influence work incentives by altering some combination of the credit size, the phase-in, and the phaseout of the credit.

In isolation, the carbon tax and the CTC expansion would also affect total after-tax income and work incentives through the income effect. The CTC expansion would increase after-tax income and reduce hours worked through the income effect. In contrast, a carbon tax would reduce after-tax income and increase hours worked through the income effect. Enacting these policies at the same time would result in a positive

income effect for some households and a negative income effect for others but, assuming a budget-neutral swap, the effects would roughly cancel out across the entire population.

Table 6 summarizes the labor supply effects of a carbon tax in isolation and each CTC expansion option paired with a carbon tax.

**Table 6. Effect on Labor Supply of a Carbon Tax and CTC Expansions**

	Percent Change in Labor Supply	Full-Time-Equivalent Jobs (thousands)
Carbon tax in isolation	-0.13%	-188.1
Carbon tax paired with:		
Working Families Tax Relief Act	-0.36%	-518.6
Child allowance	-0.3%	-437
Hybrid expansion	-0.22%	-322
Payroll tax refundability	-0.06%	-86.8
<i>Source: Authors' calculation.</i>		

<sup>27</sup> CBO, "How the Supply of Labor Responds to Changes in Fiscal Policy" (Oct. 2012).

In isolation, a carbon tax would reduce labor supply by 0.13 percent, which is equal to 188,100 full-time-equivalent jobs.<sup>28</sup> This represents the combined response caused by the reduced returns to work (substitution effect) and reduction in after-tax income (income effect).

The carbon tax paired with WFTRA would reduce labor supply by 0.36 percent, or 518,600 full-time-equivalent jobs. This credit expansion would affect work incentives in two ways. First, individuals now subject to the phase-in of the CTC would see a 15 percentage point increase in their marginal tax rate because of its elimination. Second, introducing an additional phaseout for taxpayers with AGI over \$75,000 (\$150,000 for married couples filing jointly) would raise effective marginal tax rates for workers subject to the phaseout by 5 percentage points.

The labor supply effect of the hybrid expansion would be slightly smaller than that of the WFTRA swap — a reduction of 0.30 percent, or 437,000 full-time-equivalent jobs. The hybrid expansion maintains the phase-in and increases the rate from 15 percent to 20 percent. As a result, many low-income households would see a 5 percentage point cut in their marginal tax rate. However, this is more than offset by the 1 percent phaseout. This is because the phaseout applies to many more households than the current phaseout even though its rate is lower (1 percentage point instead of 5 percentage points).

The child allowance swap would reduce labor supply by 0.22 percent (322,000 full-time-equivalent jobs), or nearly 40 percent less than the WFTRA expansion option. Although the child allowance would eliminate the phase-in of the CTC, raising marginal tax rates for low-income households, it would also eliminate the phaseout of the credit, which would reduce marginal rates for others. It also avoids the WFTRA provision of adding an additional phaseout for households.

Finally, the payroll tax refundability swap would somewhat offset the negative labor supply effects of the carbon tax and would only reduce the total labor supply by 0.06 percent, or 86,800 full-time-equivalent jobs. This CTC expansion

would increase the phase-in rate by 0.3 percentage points, but because the credit is much larger (\$3,700 instead of \$2,000), it takes a higher level of income to fully phase in. As a result, more households face the 15.3 percentage point reduction in their marginal tax.

## VII. Conclusion

A carbon tax remains an important policy to reduce greenhouse gas emissions in the United States. Lawmakers could address concerns about the tax's effect on low-income households in several ways. We have examined a potential swap that would use revenue from a carbon tax to expand the CTC and explored four CTC expansion options that have the same budgetary effect (\$95 billion per year), financed by a \$35-per-metric-ton carbon tax.

We find that a carbon tax alone would be slightly regressive across the income distribution, burdening the top 1 percent of households somewhat less than other households. However, a carbon tax paired with an expanded CTC would be progressive and would increase the after-tax income of low-income households on average while raising the tax burden on the top 80 percent of households. The extent to which the revenue swap increases the after-tax income of low-income households depends primarily on what share of the CTC is available to households with little or no earned income. Households without children, regardless of income level, would face higher taxes because the CTC only benefits households with children. This revenue swap would redistribute an estimated \$65 billion from households without children to households with children.

A revenue swap like this would also reduce SPM poverty. Again, the extent to which the policy reduces SPM poverty depends on how much the CTC households with little or no earned income can receive and, less significantly, the size of the credit expansion.

Meanwhile, the effect these swaps would have on labor supply depends heavily on the design of the credit. In particular, it depends on both the phase-in and phaseout of benefits for households. A CTC expansion could either offset the negative labor supply effects of a carbon tax or exacerbate them.

<sup>28</sup> Change in labor supply is the percent reduction in quality-adjusted hours worked, or hours worked weighted by an individual's earnings.

Our modeling suggests that there are important tradeoffs in designing a CTC expansion, especially for targeting benefits through phase-ins and phaseouts.

Holding the budgetary effect of a CTC expansion constant, lawmakers can provide a larger credit to specific households by phasing out the credit. This can allow the CTC to be more progressive and further reduce poverty. However, this sort of targeting results in a steeper reduction in labor supply. This is because the targeting of the CTC through phase-ins or phaseouts are implicit taxes on households subject to them.

Take, for example, the WFTRA CTC expansion and the child allowance expansion option. We find that the WFTRA is the most progressive of the four CTC expansions modeled and reduces poverty the most. However, this is at the cost of introducing a new benefit phaseout that reduces labor supply. A child allowance mitigates the negative labor supply effect by eliminating the phaseout of the benefit. However, without a phaseout, the credit size needs to shrink to keep the budgetary cost constant, which results in slightly less poverty reduction.

This analysis also highlights some of the downsides of using carbon tax revenue to expand the CTC. First, our modeling shows that a carbon tax would reduce the size of the labor force. Three of the four CTC expansion options modeled here exacerbate this effect. Lawmakers concerned about this outcome may want to pursue other revenue swaps, such as a reduction in payroll taxes, which would, on net, increase labor supply.<sup>29</sup>

A carbon tax-CTC revenue swap would only offset the carbon tax burden for households with children. Households without children would face a tax increase with no offset. An alternative policy, such as carbon dividends, could provide a lump sum benefit to all households and ensure that childless low-income households would not be burdened by the carbon tax.

We also highlight a key issue that has been absent from the debate over the CTC expansion: Consistent with previous modeling, our analysis finds that a CTC expansion can reduce work

incentives. However, previous analyses only considered the effect of the CTC in isolation. The ultimate effect of a CTC expansion on labor supply depends on how these policies are financed. Tax increases would, unavoidably, reduce incentives to work, save, and invest. At the same time, tax increases would offset the income effect of the CTC — the incentive to work less because after-tax incomes are higher. Lawmakers should consider this when both designing any credit expansion and choosing how to finance it.

## VIII. Appendix

The CTC estimates were produced using Tax-Calculator version 3.3.0. Tax-Calculator is AEI's open-source individual income and payroll tax microsimulation model.<sup>30</sup>

Gross carbon tax revenues were estimated using 2024 total U.S. carbon-equivalent emissions data from the U.S. Energy Information Administration and the Environmental Protection Agency. The analysis assumed that the carbon tax would apply to all greenhouse gas emissions. Based on the Rhodium Group's estimates, we assumed that the climate provisions of the IRA would result in a 33 percent additional reduction of emissions compared with the emissions reduction under previous law.<sup>31</sup> Based on the Resources for the Future Carbon Pricing Calculator, we further assumed that the carbon tax would result in a 17 percent reduction in carbon emissions from the baseline because of the imposition of the carbon tax.<sup>32</sup> We applied the same responsiveness to energy-related emissions and other greenhouse gas emissions to estimate the carbon tax's emissions reduction effect.

We estimated the distributional effect of the carbon tax using Tax-Calculator 3.3.0 in three steps.

The first step allocated the tax based on the sources of income that the carbon tax would burden. Thus, the tax was allocated to each tax unit based on its share of labor compensation, cash transfers, and above-normal corporate and

<sup>30</sup> Tax-Calculator version 3.3.0, available at <https://github.com/PSLmodels/Tax-Calculator>.

<sup>31</sup> King, Larsen, and Kolus, *supra* note 8.

<sup>32</sup> Halstead, *supra* note 22.

<sup>29</sup> Kyle Pomerleau and Asen, *supra* note 2.

noncorporate returns. Labor compensation is equal to wages and salaries, pension contributions, and the employer's share of the payroll tax. Corporate above-normal returns are equal to roughly 50 percent of dividends, capital gains, and a portion of pension income. Noncorporate above-normal returns are equal to roughly 70 percent of schedule C, E, and F income. Cash transfers are the sum of Social Security benefits and unemployment insurance. The share of capital income subject to the carbon tax was estimated using Bureau of Economic Analysis National Income and Product Accounts data.

The second step reallocated the initial carbon tax burden based on the relative price effect of the carbon tax. Using Current Population Survey data, consumption data was imputed to each tax unit. The imputations were matched based on income and demographic characteristics in each data set. Tax units that consume a larger-than-average share of goods burdened by the carbon tax face a greater-than-average carbon tax burden than tax units that consume a smaller share of goods burdened by the carbon tax. The relative price effects were modeled using data from the Tax Policy Center.<sup>33</sup>

The final step estimated the revenue and distributional effect of the income and payroll tax offset. The offset was modeled in Tax-Calculator by reducing sources of income by the wedge that the carbon tax placed between consumer prices and producer revenues. The wedges on each type of income (labor compensation, cash transfers, noncorporate capital income, and corporate capital income) were estimated using national income and product accounts data.

The labor supply and poverty effects of each policy were modeled using a method similar to that used by Seiter<sup>34</sup> and Brill et al.,<sup>35</sup> with one addition: We separately modeled the labor supply response of primary and secondary workers. ■

<sup>33</sup> Joseph Rosenberg, Eric Toder, and Chenxi Lu, "Distributional Implications of a Carbon Tax," Urban-Brookings Tax Policy Center (July 2018).

<sup>34</sup> Grant M. Seiter, "CTC Labor Response — Technical Description," AEI (2021).

<sup>35</sup> Alex Brill, Kyle Pomerleau, and Seiter, "The Tax Benefits of Parenthood: A History and Analysis of Current Proposals," AEI (Feb. 23, 2021).

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