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# ESTIMATING THE NET FISCAL COST OF A CHILD TAX CREDIT EXPANSION

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## ABSTRACT

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**Estimating the Net Fiscal Cost of a Child Tax Credit Expansion**

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## Abstract

Recent proposals to expand the Child Tax Credit (CTC) are at the center of current policy discussions in the United States. We study the fiscal cost of three such proposals that would expand refundability of the credit to low-income children, increase the maximum credit amount, and/or eliminate the income phase-out to make the credit universal. For each proposal, we use the Current Population Survey to estimate three components of the net fiscal cost: the direct cost (additional tax refunds or lower tax liability), revenue changes due to taxpayers' labor supply responses, and long-term changes in tax revenue due to changes in children's future earnings. We find that direct costs are by far the most important component but that long-term earning changes also play an important role, offsetting 20% of the direct costs of making the credit fully refundable. In contrast, labor supply responses modestly contribute to the fiscal cost of the CTC expansions we model.

## I. Introduction

The Child Tax Credit (CTC) is a federal income tax benefit for families with children. First enacted in 1997, the credit has been the focus of increasing political attention and debate in recent years. In particular, some researchers and advocates have criticized its design, pointing out that – before 2021 - children living in the lowest-income households received no or limited benefits and children of color received the lowest average benefits. Recent proposals to reform child benefits to remedy these concerns have been embraced by President Biden, members of Congress, and in influential reports authored by academics. Proponents of these reforms point to research suggesting significant short- and long-term benefits of increased financial assistance to low-income households in which children are being raised.

In this paper we study the cost of three proposals to expand the CTC relative to 2020 law: making the credit fully refundable allowing even very low-income families to receive the maximum benefit, making the 2021 American Rescue Plan Act (ARPA) reform permanent (which makes the credit fully refundable and increases the generosity of the credit), and creating a universal child allowance that would provide a flat dollar amount to all children regardless of income. We focus on the fiscal cost of these proposals, and specifically, on three factors that shape the net cost of the policy. First, using the Current Population Survey (CPS), we estimate the direct fiscal cost – i.e., the additional tax refund or reduced tax liability that taxpayers would

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receive under the reform, relative to 2020 tax law. Second, we study how an expanded CTC would shape individuals' labor supply decisions through both income effects and changes in marginal tax rate schedules. Third, drawing on a literature estimating effects of financial support on children's earnings in adulthood, we estimate how an expanded CTC would affect tax revenue in later years. We quantify each of these cost components and explore their sensitivity to alternative assumptions.

We find that making the CTC fully refundable for low- and middle-income taxpayers with children while maintaining the pre-2021 maximum benefit amount would cost approximately $21 billion annually. We estimate the reform would very slightly reduce labor supply among low-income taxpayers in the short-term but actually reduce the net fiscal cost of the policy by about 20% by increasing longer-term federal revenue collection. The primary mechanism for this increase stems from the effect of the expanded credit on future earnings of children in low-income households. We also estimate the net fiscal cost of a permanent extension of the CTC in place during 2021 ("the ARPA design"), which was fully refundable and which contained a higher maximum CTC benefit amount. The larger maximum credit amount substantially raises the net fiscal cost of this policy relative to full refundability alone – we estimate it to be approximately $85 billion annually. Finally, we estimate that a universal CTC, delivering the 2021 maximum benefit as a flat dollar amount per child regardless of income, would cost somewhat more, approximately $95 billion annually. For all three of these policies, we estimate that the direct costs dwarf changes in revenue due to labor supply effects but we find that longer-term changes in revenue due to increased earnings by the children who benefit lead to reduced net fiscal costs in the range of 15 to 20%.

A number of previous studies have analyzed the costs of the components of the CTC expansion proposals upon which we focus. In particular, a number of researchers have modeled the distributional effects of proposed CTC expansions, which yields a direct fiscal cost for the policy (e.g., Tax Policy Center 2021, Acs and Werner 2021, Garfinkel et al. 2021). Like us, Garfinkel et al. (2021) also investigated the long-term effects of the policy on tax revenue due to increased earnings (as well as other mechanisms in their case). Finally, both Garfinkel et al. (2021) and a National Academies of Sciences report (2019) estimated the revenue effects of labor supply changes induced by the CTC expansion, although both focused only on the associated income effects of the policy. In contrast, we also model labor-supply changes resulting from changes in the marginal tax rate schedule that taxpayers would face under an expanded CTC. Contemporaneously with our study, Corinth et al. (2021) also investigate the labor supply effects of the CTC expansion, although their modeling approach differs from ours and they do not consider effects stemming from increased financial assistance to low-income children.[2]

The remainder of the paper proceeds as follows. Section II provides background and a brief history of the CTC. Section III discusses the large literature from which our analysis draws the parameters we assume. In Section IV we estimate the costs of full refundability. Section V we estimate the cost of alternative policies that would expand the CTC. In Section VI we consider the sensitivity of our results to alternative behavioral assumptions and modeling choices. Section VII concludes.

[2] We consider an approach to estimating labor supply responses similar to Corinth et al. (2021) in Section VI, below.

## II. Background and History of the CTC

The CTC was enacted as part of the Taxpayer Relief Act of 1997. The credit was introduced as a $400 per child credit under age 17 that was largely non-refundable. It primarily benefited middle and upper-middle income taxpayers. The credit has never been indexed to inflation, but has been expanded several times since its initial enactment. In 1999, the maximum benefit increased to $500 per child. In 2001, the credit increased to $1,000 as part of the Economic Growth and Tax Relief Reconciliation Act, which phased in fully in 2003. Finally, in 2018, the credit increased to $2,000 as part of the 2017 Tax Cuts and Jobs Act – though for many families this represented more of a consolidation of family benefits than a true reduction in tax liability because of the simultaneous elimination of the exemption for dependents (Maag 2019). Starting in 2001, a portion of the CTC was made broadly available as a tax refund and thereby benefited taxpayers with zero or negative tax liability.[3] After 2017, families could receive up to $1,400 per child as a tax refund.[4]

Until 2009, there was a minimum earnings threshold of $10,000 to receive a tax refund from the CTC; this threshold was reduced to $3,000 as part of the American Recovery and Reinvestment Act in 2009, and subsequently lowered to $2,500 as part of the 2017 tax bill. Families first offset taxes owed with the CTC and then could receive up to 15 cents of credit for each dollar earned in excess of the minimum earnings threshold until the combined value of the nonrefundable and refundable portions of the credit was equal to the maximum credit a family qualified for or until the maximum refundable credit had been reached. The minimum earnings required to claim the full credit depended on the number of qualifying children in the household and the filers' tax liability.

The CTC also has an upper income threshold, above which the credit phases out. In 1997, the phase-out region began at $55,000 for married filing separate returns, $75,000 for unmarried filers, and $110,000 for married joint return filers. Beginning in 2018, the phase-out threshold was increased substantially to $200,000 for unmarried filers, and $400,000 for married joint return filers when other tax benefits were consolidated with the CTC. Benefits phased out at a rate of $50 for every $1,000 of earnings above the upper income threshold until 2021. In 2021, the formula was changed to accommodate two phase out ranges: the expanded credit amount began phasing out at $75,000 for single filers, $112,500 for head of household filers and $150,000 for married couples. Second, the remaining $2,000 credit phased out according to the 2018 phase-out schedule described above.

The requirements for a child to qualify a taxpayer for the CTC are similar, but not identical, to other child-linked tax provisions. First, the taxpayer generally must reside with the child for more than half of the year. Second, the taxpayer must be older than the child and one of a

[3] Prior to this, families with at least three children could receive a refundable CTC calculated as payroll taxes in excess of the EITC.

[4] Beginning in 2018, families with dependents who do not qualify for the CTC, including children ages 18 or full-time students 19 through 24, older dependents, and some children who are not citizens can qualify for a smaller, nonrefundable credit referred to as the Other Dependent Tax Credit. This credit phases out concurrent with the higher phase-out of the CTC.

specified set of relatives to the child, such as the child's parent, grandparent, sibling, aunt, uncle, or step-parent. Third, the child must not provide more than half of his or her own support. Fourth, when multiple taxpayers would qualify to claim the same child, a series of tie-breaker rules specify which tax unit may do so. Finally, since 2018, only children with Social Security Numbers can be claimed for the credit.[5]

The CTC has long been criticized for not providing benefits to the lowest-income households. Estimates suggest that approximately 27 million children under age 17 (one-third of all children in the U.S.) were living in households that were not eligible for the full benefit under the pre-2021 law (Burman and Wheaton 2005; Greenstein et. al 2018; Collyer et al. 2019; Goldin and Michelmore 2020). Of those 27 million, approximately 6.5 million children were completely ineligible for the credit, either due to insufficient household earnings or because they did not reside with a qualifying relative. Approximately half of Black and Hispanic children were not eligible for the full CTC under the pre-2021 law compared to about 25% of white and Asian children (Goldin and Michelmore 2020).

The American Rescue Plan Act (ARPA) of 2021 introduced several temporary changes to the CTC to broaden access to the benefit for tax year 2021. The maximum credit was increased to $3,000 per child aged 6 to 17 and $3,600 per child under age 6. Families can receive up to half of that amount as monthly payments which started as early as July 2021 and will continue through December 2021 unless families opt out. The remainder of the credit can be claimed on a 2021 tax return, no earlier than February 15, 2022. Families that opt out of advanced, monthly payments can claim their full credit on their 2021 tax return. The credit is fully refundable – low-income families qualify for the full benefit, regardless of how much they earn. The credit phases out in two steps. First, the credit begins to decrease at $112,500 of income for single parents filing as head of household ($150,000 for married couples), declining in value at a rate of 5 percent of adjusted gross income over that amount. It cannot go below the value of the credit in 2020, which did not begin phasing out until adjusted gross income reached $200,000 for single parents ($400,000 for married couples). The credit applies to all children who qualify; all else equal, larger families receive higher benefits. As a result, the income level at which the credit is fully phased out varies based on how many children are in the family.

After 2021, the CTC is scheduled to return to its pre-2021 design, with a maximum value of up to $2,000 per child and limited refundability. In his budget proposal, President Biden proposed extending the 2021 CTC design through 2025 and extending full refundability and eligibility for 17-year-olds (but not the higher maximum credit amounts) thereafter.

## III. Previous Literature

The recent expansion of the credit will increase after-tax income for the many families who were previously ineligible, or received only a portion of the CTC. Many families that were already

[5] We do not observe in our data whether children have a Social Security Number (SSN), but estimates from the Urban Institute tax model suggest that only about 75,000 tax filing units would be fully excluded from the CTC because their children lack SSNs.

receiving the full benefit will also experience an increase in after-tax income, as their benefits will increase from $2,000 per child up to $3,000 for children ages 6 to 17 and to $3,600 per child under age 6. A long line of research informs our understanding of how these expansions may affect families and children in both the short- and long-term.

*Effects of Financial Assistance on Children's Well-Being*

A large body of evidence suggests that increasing income, particularly among low-income families, has a positive causal impact on a number of child outcomes, ranging from early childhood up through early adulthood.

For instance, research on the Earned Income Tax Credit (EITC), a refundable tax credit for low-income workers and one of the largest anti-poverty programs in the United States, links the credit with higher infant birth weight (Hoynes, Miller, and Simon 2015), higher child test scores (Dahl and Lochner 2012; 2017), improved access to private health insurance (Baughman 2012), and improved maternal health (Averett and Wang 2013; Evans and Garthwaite 2014). More recently, there is also evidence of long-run improvements in child outcomes due to the EITC, from increases in educational attainment and earnings (Bastian and Michelmore 2018), to improved health and reductions in obesity in early adulthood (Braga et al 2020).

Another component of the proposed CTC expansions is that they provide larger benefits for younger children. The benefits of early childhood interventions are well-established in the literature (e.g. Cunha and Heckman 2007; Duncan et al. 2007; Duncan and Sojourner 2013; Bailey et al. 2020a). Providing a more generous child benefit for families with children under age 6 is likely to have greater payoffs for both children and society in the form of improved human capital, better health, and reductions in poverty, crime, and incarceration rates.

In estimating the costs of an expanded CTC, we will consider behavioral responses in both the short- and long-run. If an expanded CTC creates substantial negative labor supply effects, for instance, this would add to the cost of the program through reductions in tax revenue. On the other hand, if an expanded CTC leads to substantial improvements in child outcomes, this could reduce the long-run costs of the program through reductions in crime, improvements in education and labor market outcomes, and reductions in dependence on social welfare programs. We consider both labor supply and earnings responses in greater detail below.

## *A. Prior Research on Labor Supply Responses*

Expanding the CTC could affect labor supply decisions of taxpayers subject to the reformed credit. The direction of the effect is theoretically ambiguous, and the effect likely differs by income, marital status, and gender. On the one hand, removing the earnings requirement from the child tax credit will reduce the incentive for some parents to work (Rachidi 2021). On the other hand, the increased income from the benefit could allow parents to pay for child care or access to reliable transportation, which may increase their labor supply, as well as incur the expenses and foregone part-time income necessary to transition to full-time work (West et. al 2021).

Responses may also differ depending on whether they were eligible for a full or partial child tax credit under the previous law. Because of the earnings requirements to claim the child tax credit under previous law, approximately 27 million children under age 17 lived in families that were not eligible for the full credit, including about 6.5 million children who were completely ineligible (Greenstein et al. 2018; Goldin and Michelmore 2020). Those who were completely ineligible for the credit will face an income effect from the increased generosity of the benefit, while those who were eligible for a partial credit will face both an income as well as a substitution effect generated by changes in their marginal tax rates and incentive to maintain employment. We discuss each of these responses, and the literature on labor supply elasticities in more detail below.

*i. Income effects*

Expanding the CTC could generate income effects in two ways. First, for filers whose earnings were too low to qualify for the full pre-2021 CTC benefit, making the credit fully refundable will raise their after-tax incomes (in some cases, substantially). Second, by increasing the maximum credit amount, the expansion would generate income effects for all taxpayers, including those already benefiting by the full credit amount. By increasing after-tax income, either of these income effects could in theory increase demand for leisure and reduce incentives to work.

While we lack empirical evidence on labor supply responses to this particular type of shock to household income, smaller policy changes in the U.S. and in other countries offer some insights. For instance, in Alaska, all residents receive an annual dividend from the profits generated from the states' oil reserves, known as the Alaska Permanent Fund. The benefit amount fluctuates depending on the investments in any given year, but averages about $2,000 per person per year. Recent research on the effect of this universal benefit finds no negative effect on employment, and some evidence of a positive part-time employment effect among women (Jones and Marinescu 2018).

In North Carolina, the opening of a casino on a Cherokee reservation created a natural experiment where adult members of the Cherokee tribe were suddenly eligible for annual benefits (averaging about $4,000 per adult per year) from the profits of the casino. Previous research finds no significant effect of the benefit on labor force participation of men or women, though they do find suggestive evidence of declines in full-time work among women (Akee et al 2010). In Canada, the introduction of a child allowance program had no negative effect on the labor supply of single mothers (Baker, Messacar, and Stabile 2021), though an earlier study of a child benefit policy in Manitoba, Canada did find that increasing the generosity of the benefit led to reductions in earned income among low-educated households (Milligan and Stabile 2009).

More broadly speaking, there is a large literature in labor economics that estimates labor supply elasticities with respect to changes in household income. An older paper by Blundell and Macurdy (1999) provides a review of this literature, and estimates extensive-margin labor supply elasticities with respect to changes in household income of -0.05 for married men, -0.12 for married women, and -0.085 for single women. On the intensive margin, they estimate hours of work elasticities of -0.05 for married men, -0.09 for married women, and -0.07 for single women. Notably, because these elasticities are estimated from policy reforms for which the

additional income was not concentrated among low-income parents, they may not capture any positive effects of income on finding and maintaining employment for that group.

*ii. Substitution effects*

For certain taxpayers eligible for a partial benefit under the pre-2021 CTC, eliminating the refundability phase-in rate by earnings would increase marginal tax rates, thus reducing the return to work. Similarly, eliminating the earnings phase-in would increase the relative appeal of not working at all relative to working, which could in principle induce even some middle and higher income earners to exit the labor force (see Corinth et al. 2021 for an extended discussion of this point).

The literature on the labor supply effects of the Earned Income Tax Credit (EITC) offers some insights into the labor supply responses among this group. The EITC has a similar benefit structure as the previous CTC structure, in that benefits phase-in up to a certain level, reach a plateau, and then phase out at higher levels of income. The phase-out threshold for the EITC is substantially lower than that of the CTC, with the EITC completely phasing out for incomes above roughly 230 percent of the federal poverty line. A long line of research on the EITC has evaluated both the extensive and intensive margin effects of expanding the EITC over the last several decades, with most evidence pointing towards large, positive extensive margin effects of the EITC on single mothers (see Hotz and Scholz 2003; Chetty et al. 2013; and Nichols and Rothstein 2016 for reviews), slight negative extensive margin effects for married mothers (Eissa and Hoynes 2004), and no effect of the policy on the labor supply of men.[6] Extensive margin elasticities with respect to changes in the net-of-tax return to work, calculated based on changes in the EITC tax schedule, range from 0.30 to 0.45 (see Chetty et al. 2013).[7]

There is not much empirical evidence that individuals respond to intensive margin labor supply incentives embedded in the EITC benefit structure. Nichols and Rothstein (2016) summarize this literature, and estimate intensive margin labor supply elasticities ranging from about 0.07 to 0.10, smaller than the extensive margin elasticities found in this literature. This lack of an intensive margin effect could be explained by a couple of factors: individuals may lack information on their precise positioning on the EITC benefit schedule and therefore do not know

[6] There is scant evidence on how the previous structure of the CTC affects labor supply, though one study finds negative labor supply effects associated with children aging out of the qualifying child age range (Lippold 2019).

[7] Methods for calculating these elasticities vary. Those cited here are calculated by measuring the percent change in labor supply divided by the percent change in after-tax labor income (i.e. the "return to work") before and after reforms to the EITC, as advocated by Chetty et al. (2013). Other, larger elasticities reported elsewhere (e.g. Hotz and Scholz 2003) are based on changes in gross labor income rather than net labor income, and suffer from other measurement issues. For instance, Hotz and Scholz (2003) calculate an elasticity of 1.16 from resaerch done by Eissa and Liebman (1996). This calculation overestimates the return to work (i.e. the denominator in the elasticity formula) by relying on average earnings among working single mothers between 1984 and 1990, rather than using earnings from the pre-reform period. They also do not take into account the change in return to work by comparing after-tax and transfer income among working and non-working single mothers between 1984 and 1990. Chetty et al. (2013) adjust for these measurement concerns and calculate an elasticity of 0.30 based on the same empirical results in Eissa and Liebman (1996).

how their labor supply decisions may affect their eligibility, or they are unable to meaningfully adjust their employment and earnings throughout the year so as to maximize their benefits.

There has been at least some support for the second hypothesis, by comparing the behavior of wage and salary workers to self-employed individuals, who typically have more control over their hours worked and reporting of earnings to the IRS. Previous research has shown that self-employed individuals are more likely to report earnings right around the first kink point in the EITC benefit schedule. Most of this literature argues that this response likely reflects a reporting issue rather than a meaningful change in labor supply (e.g. LaLumia 2009), since self-employed individuals at all income levels tend to self-report earnings less accurately than wages reported by employers on behalf of wage and salary workers.

More broadly speaking, there is also a line of research that uses changes in tax rates to estimate extensive and intensive margin labor supply elasticities with respect to marginal tax rates. McClelland and Mok (2012) conduct a literature review and estimate a range of extensive margin elasticities with respect to marginal tax rates: 0 to 0.10 for men and single women[8], and 0 to 0.30 for married women. On the intensive margin, they estimate elasticities ranging from -0.10 to 0.20 for men and single women, and 0.10 to 0.30 for married women. Notably, these ranges include estimates from studies examining behavioral responses to policies enacted as long ago as the 1980s and 1990s; more recent studies have documented lower elasticities as married women's attachment to the labor force has strengthened (McClelland and Mok 2012). For instance, Lin and Tong (2017) use changes in the tax code during the 2000s and estimate extensive margin elasticities for married men ranging from 0 to 0.03, and 0.07 to 0.11 for married women. On the intensive margin, the authors separately estimate income effect elasticities with respect to the net-of-tax price of income (-0.04 to 0.0 for married men -0.12 to -0.04 for married women) and substitution effect elasticities (-0.01 to 0.11 for married men 0.08 to 0.22 for married women).

Beyond the income effect of the CTC, there are theoretical reasons to expect that the expansion may *increase* parental labor supply. A monthly benefit could provide parents with the means to purchase more reliable child care, which could allow them to work more. Previous research has found that access to the Head Start preschool program increased labor supply among single mothers, providing evidence on the importance of access to affordable child care in labor supply decisions (Wikle and Wilson 2020). A monthly payment of $500 to some randomly selected residents of Stockton, California was associated with an increase in full-time employment as recipients of the payments were able to complete internships, training, and coursework that improved employment (West et. al 2021).

Overall, there is not much empirical evidence that moderately-sized shocks to household income lead to substantial declines in labor supply. However, nothing on the scale of the contemplated CTC expansions has been implemented in recent years, which makes predictions of this type difficult. There is also a dearth of research on how these income effects affect different groups – men versus women, higher-income households versus lower-income households, married couples versus single parents, and by age of child, race, and ethnicity.

[8] Including both those with, and without children.

### *B. Prior Evidence on Long-Term Revenue effects*

While there is not much empirical evidence of negative labor supply effects of shocks to household income, the long-run effects of the child tax credit expansion could be quite different, particularly among the children of child tax credit recipients. With the growing availability of long-run panel data sources such as the Panel Study of Income Dynamics (PSID) and longitudinal administrative data, there is a growing body of research on the long-run effects of childhood exposure to social safety net programs. Previous work finds positive effects of early life exposure to food stamps, Head Start, and the EITC on a variety of long-run outcomes such as educational attainment, earnings and employment in early adulthood, adulthood health, and longevity. These long-run positive effects, if generalizable to the expansion of the child tax credit, would substantially reduce the long-term costs of the program.

The literature on the long-run effects of exposure to the EITC in childhood on outcomes in adulthood suggests that a $1,000 increase in EITC exposure in childhood increases the likelihood of completing a college degree by 4% (Bastian and Michelmore 2018), increases the likelihood of working and earnings in early adulthood by about 1-2% (Bastian and Michelmore 2018), and increases the likelihood of reporting excellent or very good health in adulthood by about 3% (Braga et al 2020). Research also indicates that the EITC reduces early childbearing and marriage by age 21 by about 3% (Michelmore and Lopoo forthcoming).

There is also a growing literature on the effects of early life exposure to other social safety net programs on adulthood outcomes, such as the Supplemental Nutrition Assistance Program (SNAP, formerly food stamps), and the Head Start preschool program. Recent evidence suggests that being exposed to food stamps in early childhood (before age 6) is associated with increases in human capital and economic self-sufficiency in adulthood (ages 25-54), as well as increases in neighborhood quality (Bailey et al 2020a). Similarly, research indicates that children who were exposed to the Head Start preschool program were more likely to complete high school and earn a college degree (Bailey et al. 2020b). All of these positive effects suggest long-term cost savings through increases in tax revenue and potential decreases in dependence on other social welfare programs. If these effects generalize to exposure to an expanded CTC in childhood, we would expect similar long-term cost savings associated with an expanded CTC.

## IV. Simulating the Cost of Full Refundability

In this section we focus on estimating the fiscal cost of expanding the CTC to be fully refundable. Specifically, the policy we consider eliminates the income-based limits on refundability that characterized the pre-2021 CTC while maintaining the pre-2021 maximum credit amount of $2000 per child. In the next section, we consider alternative policies that would increase the maximum credit amount (as in the ARPA) as well as a universal child allowance that would be available to all tax units regardless of income.[9]

[9] We do not model the proposed expansion of the credit to 17 year-olds.

We distinguish three sources of these reforms' net fiscal cost: (1) direct costs from increased benefit amounts; (2) tax revenue changes from labor supply responses; and (3) long-term tax revenue changes driven by effects of the reform on children's longer-term earnings.

To estimate these costs, we rely on the 2018 ASEC supplement to the CPS. We use the relationship and household information in the CPS to construct tax units and use the income information to estimate tax liability for the tax unit for a single tax year. All analyses employ the CPS survey weights. We limit our analysis to tax units with one or more children below the age of 17.

### *A. Direct Costs*

Figure 1 shows CTC benefits by income for a single filer with one child (top panel) and two children (bottom panel) under alternative CTC designs. For simplicity, we assume the children are over the age of five. Comparing the pre-2021 CTC with a fully refundable CTC shows that the benefits of the reform are concentrated among families with low earnings, who, because of the limits on refundability, do not benefit from the pre-2021 CTC by the full credit amount or in some cases by any amount. One-child households with incomes below $24,350 would see a higher CTC under full refundability as would two-child households with income below $30,350. Households with income above this threshold would not be affected by making the CTC fully refundable.

The dashed orange line indicates how the CTC benefit structure would change if the ARPA reforms were made permanent. For single filers with one dependent, this expansion would raise the CTC benefit amount for those with income below $132,500, but households with income above this amount would receive the same benefit as in the pre-2021 benefit structure. For single filers with two dependents, the expansion would increase benefits for all those with income below $152,500. Finally, the red dashed line indicates the benefit structure of implementing a universal child allowance, which would raise the benefit amount for all households, regardless of income.

Although Figure 1 shows variation in the benefits of full refundability by income, it does so holding fixed several factors on which CTC eligibility depends – marital status and the number and ages of children in the tax unit. To capture the average benefit gain from a fully refundable CTC for all households by income, Figure 2 uses the CPS to estimate the average change in CTC benefits by making the CTC fully refundable for all households with children. We use NBER's TaxSim to calculate CTC benefits under the pre-2021 law. To calculate benefits under a fully refundable CTC, we replace the pre-2021 CTC with the maximum credit amount ($2,000) for each child in tax units below the phase-out range.

We find that approximately 30% of tax units with children would benefit from full refundability. On average, the reform benefits this group by $686, and among tax units that benefit, the average CTC increase is $2,255. Notably, 80% of the tax units that benefit from the reform have positive earnings. To estimate the total direct cost of making the pre-2021 CTC fully refundable, we sum the change in benefits for each tax unit in the CPS. The total direct cost of the policy is approximately $25.49 billion, reported in Column 1 of Table 1.

### *B. Labor Supply Effects*

Apart from the direct cost of the policy, expanding the CTC could affect revenue by altering individuals' decisions about whether and how much to work. This change could operate through either an income effect or a substitution effect.

#### *i. Income Effect*

With more income from an expanded CTC, individuals may choose to consume more leisure and therefore work less. If they work less, they may generate less tax revenue, effectively increasing the fiscal cost of the program. On the other hand, the additional income could increase work incentives by reducing common barriers to work, such as affording childcare, transportation, or job training. All considered, the magnitude and even direction of the effect of income on labor supply could vary by income and other circumstances.

To simulate the income effect of a fully refundable CTC, we abstract from much of this potential heterogeneity and use the estimated income elasticities from recent labor economics work on the topic, applying the same elasticity to the entire income distribution, but allowing for different elasticities by gender and marital status. In particular, for each tax unit in the CPS, we calculate the percent change in income that the additional benefit represents and obtain a predicted change in labor supply from the product of that quantity and the relevant elasticity for the household in question.

Slightly complicating this approach, however, is the fact that additional income may lead individuals to adjust their labor supply on either the intensive margin or extensive margin – that is, they may continue working but work fewer hours or they may stop working entirely. We account for each of these possibilities. First, we focus on the intensive margin response to additional income. We calculate the change in labor supply by scaling the percent change in income that the new CTC benefit represents for the household by the relevant intensive-margin elasticity from the literature. For married couples, we calculate labor supply changes separately for each spouse, using household adjusted gross income to calculate the percent change in income associated with the new CTC. We assume a constant wage rate, so that percent changes in labor supply translate into equal-sized percent changes in labor income.

To estimate the change in labor supply because of the new income from the expanded credit on the extensive margin, we again start from the percentage change in income associated with the new benefit and scale it by the relevant extensive margin income elasticity from the literature. This yields a percent change in the probability of employment. To model this effect on earnings, we assume that each individual in the CPS stops working with this derived probability, and has no earnings for the calendar year.

Following the National Academy of Sciences report (2019), we take the midpoint of the range of income elasticities from Blundell and Macurdy (1999) for our simulations. On the extensive margin, we use income elasticities of -0.05 for fathers, -0.12 for married mothers, and -0.085 for

single mothers. On the intensive margin, we use hours of work elasticities of -0.05 for fathers, -0.09 for married mothers, and -0.07 for single mothers.[10]

To estimate the total change in annual earnings from the fully refundable CTC's income effect, we combine the estimated intensive and extensive margin effects. This yields, for each individual, a change in annual earnings based on the percent change in their income that the benefit represents.[11] Using this predicted change in earnings, we next calculate the implied change in tax liability for each household using TaxSim. Finally, we estimate the total change in tax revenue for a year due to the expansion's income effect by summing the change in tax liability for each individual.

Panel A of Figure 3 shows the average change in annual tax liability arising from the income effect of the expanded CTC by adjusted gross income. Because the elasticities we draw from the literature are positive, our analysis implies the income effect causes a reduction in earnings for everyone who receives an expanded benefit. However, as the Figure shows, for low-earning individuals the average effect of the expansion on tax revenue is actually positive. The explanation for this is that the decline in earnings causes individuals to qualify for a lower EITC benefit,[12] thus reducing their overall refund amount and increasing the net revenue collected by the government. Thus, the income effect causes individuals to modestly reduce earnings but does not increase (and in fact reduces) the net fiscal cost of the CTC expansion.

ii. *Substitution Effects*

Next we turn to the change in labor supply from a fully refundable CTC induced by changes in the marginal tax rate schedule. By eliminating the phase-in of refundability by income, a fully refundable CTC would eliminate a provision pushing marginal tax rates negative, thereby increasing the marginal tax rate that individuals face. Whereas the pre-2021 CTC generated a negative marginal tax rate on earned income, the fully refundable CTC would generate a zero marginal tax rate. In this way, replacing the pre-2021 CTC with the fully refundable CTC would effectively raise the marginal tax rate on earned incomes among low-income earners.

To assess the substitution effect generated by the expansion, we simulate how changes in marginal tax rates will affect earnings, and as a result, tax revenue. To do this, for each tax filing unit, we first use NBER's TaxSim to calculate marginal tax rates under the pre-2021 CTC. We next calculate how marginal tax rates would change under the fully refundable CTC.

Figure 4 plots the change in marginal tax rate by earnings associated with the policy change for a single tax filer with one dependent, assuming all income comes from labor earnings. Since the fully refundable CTC eliminates the phase-in of the credit, tax filing units that were previously on the phase-in portion of the benefit schedule would experience an increase in their marginal

[10] We abstract from heterogeneity in the elasticity of labor supply response by income or race although it is of course possible that labor supply response elasticities could differ along these margins.
[11] We assume throughout that individuals do not reduce their incomes below zero.
[12] The EITC begins to phase out at approximately $20,000 of earnings, and completely phases out for households earning more than about $50,000, depending on the number of EITC qualifying children a household claims.

tax rates, which would reduce their net-of-tax return from working. For a single filer with one dependent and earnings between $2,500 and $11,800, the net-of-tax rate decreases by about 15%. For those with earnings between $18,650 and $24,600, the net-of-tax rate decreases by about 10%. A single filer with one dependent and earnings above $24,650 does not face a change in their net-of-tax rate, since they were receiving the full child tax credit under the pre-2021 law. Similarly, single filers with one dependent and earnings between $11,800 and $18,650 also experience no change in their net-of-tax rate of income because they received the full refundable portion of the pre-2021 CTC ($1400), but were not eligible for the full credit because they lacked positive tax liability.

To map these changes in marginal tax rates to changes in labor supply, we again turn to the empirical literature and use the midpoint of the elasticity ranges by gender and marital status reported by McClelland and Mok (2012): 0.2 for men (married and single) and single women, and 0.3 for married women.[13] These ranges include both individuals with and without children; we assume these elasticities apply to all individuals in our sample, which is exclusively parents. Multiplying the elasticities by the percent change in marginal tax rates yields a percent change in labor supply for each individual. Note that the total tax unit MTR change is the same for both spouses, but the elasticities could be different (e.g., by gender) so each individual might change their labor supply by a different percent. As above, we map the change in earnings into a change in tax revenue by recalculating tax liability for each tax unit assuming the new earnings level and compare it to tax liability before the labor supply adjustment.

The estimated change in tax revenue from the fully refundable CTC's substitution effect is presented in Panel B of Figure 3. As with the income effect, the reduction in earnings for low-income tax units under the pre-2021 CTC results in an average increase in tax revenue collected, since many of these filers are in the EITC phase-in range. Hence, even though it slightly reduces earnings, the net effect on fiscal cost is positive for very low-earning households. For individuals outside of the EITC phase-in range, the higher marginal tax rates generated from the fully refundable CTC do cause a reduction in tax revenue.

### *iii. Combined Income and Substitution Effects*

To calculate the total change in tax revenue from labor supply responses to the fully refundable CTC, we sum the estimated labor supply responses from the income and substitution effects. For each individual, we first calculate the total change in labor supply from these two effects. Next, we calculate federal tax liability at the new labor supply. Finally, the sum of the difference between the old and new tax liability is the overall change in annual revenue from the labor supply effects of the policy. Figure 5 summarizes this combined effect on labor supply. As described above, and detailed in Figure 6, for some income ranges, a reduction in labor supply actually translates into increased federal revenue by reducing EITC refunds. Overall though, we estimate that switching from the pre-2021 CTC to the fully refundable CTC would decrease federal income and payroll taxes by approximately $0.74 billion because of labor supply responses.

[13] This elasticity range reflects substitution effects pooled over both the intensive and extensive margins; see discussion in McClelland and Mok (2012).

### *C. Long-Term Earnings Effect*

In addition to shaping labor supply incentives for the taxpayers receiving the benefit, expanding the CTC could affect tax revenue in the longer-term by shaping the later-life earnings of children who receive benefits. Establishing a causal link between childhood family income and employment in adulthood is difficult, but quasi-experimental evidence based on social safety net expansions suggests that increases in family income in childhood lead to employment and earnings gains in adulthood (Aizer et al. 2016; Hoynes et al. 2016; Bastian and Michelmore 2018). In a review of this literature, Garfinkel et al. (2021) conclude that, on average, a $1,000 increase in household income in childhood is linked with an average increase in earnings in adulthood by a present discounted value of about $1,060. This increase in earnings could reduce the long-term costs of the CTC through higher tax revenue.

To estimate how these long-term earning changes would affect the net fiscal cost of a fully refundable CTC, we take the average of the long-term earnings effects summarized in Garfinkel et al. (2021) and assume that a $1,000 increase in household income leads to a 0.63% increase in annual earnings in adulthood. Because household income gains are likely to have a larger effect on children growing up in lower income families, we follow Garfinkel et al. (2021) and assign the full multiplier to families with income below $50,000, half of the multiplier to families with income between $50,001 and $100,000, and no multiplier to families with income above $100,000. With these assumptions in place, we predict an average increase in children's future annual earnings of 0.43% and about 1.02% for children in households with income less than $50,000.

Translating this increase in future income into a change in tax liability requires knowing the child's future earnings absent the expansion. To predict this quantity, we draw on Chetty et al. (2014), which calculates intergenerational income correlations based on tax return data of children born in the late 1970s and early 1980s. We use these correlations to derive the expected future earnings of children based on the income percentile of their parents (or other taxpayer with whom they live). We then compare the child's tax liability using TaxSim with and without the additional income attributable to the CTC expansion.[14] Because the earning changes –and hence the additional tax revenue – do not occur until future years when children enter the labor market, we follow Garfinkel et al. and discount the additional revenue.[15] The results of this exercise suggest that full refundability generates approximately $4.99 billion of additional tax revenue per year by increasing the future earnings of children living in households that receive the expanded credit, reducing the net fiscal cost of the reform by approximately 20% (to around $21.25 billion per year).

[14] The child's future tax liability depends not just on income but also on factors such as marital status and family size. To account for these factors, we estimate the joint probabilities of marital status and number of children among households in the CPS and randomly assign children in the future to be married or single and to have 0, 1, 2, or 3 children using these joint probabilities. Note that this approach implicitly assumes the CTC expansion would not affect fertility or marital patterns.

[15] Specifically, we assume (again following Garfinkel et al. 2021) that children's higher future earnings are not reflected for an average of 11 years. We assume a discount rate of 2% per year in our baseline analysis. We consider a discount rate of 3% per year in Table 2, below.

## V. Alternative CTC Expansion Policies

This section repeats the analyses in Section IV for two other CTC expansions. The first corresponds to the one-year policy enacted by the ARPA for 2021, which includes a higher maximum credit amount. The second corresponds to a universal child allowance, in that it would provide the same credit amount for all children, regardless of income.

### A. ARPA Design

This subsection repeats the analysis in the previous section for a CTC expansion modeled after the ARPA design, i.e., the version of the CTC that is in place for 2021. Like the full refundability policy studied above, the ARPA CTC provides the full credit amount to low- and middle-income children – i.e., there is no minimum earnings requirement and the benefit amount does not phase-in by income. However, in addition to making the benefit fully refundable, the reform also increases the maximum credit amount – to $3,000 per child aged 6 through 16 and $3,600 per child under the age of 6. Like the pre-2021 CTC, the ARPA CTC gradually phases out for higher income tax units. In particular, the expanded credit amount begins to phase out starting at $112,500 for head of household filers ($150,000 for married couples) at a rate of 5%. The remainder of the credit amount (the $2000 per child in place under the pre-2021 CTC), phases out at the same rate once a tax unit's AGI crosses $200,000 for unmarried parents and $400,000 for married couples. The design of the ARPA CTC is summarized in Figure 1.

Because the ARPA CTC makes the credit fully refundable, it generates the same income and substitution effects described above for the low- and middle-income tax units whose incomes placed them in the CTC phase-in range under prior law. Similarly, it also generates the same long-term revenue effects due to increasing transfers to children in these households. However, the magnitude of these effects are in some cases larger with the ARPA CTC than with full refundability due to the increase in credit amount. In addition, the ARPA's phase-out of the increased credit amount generates additional labor supply effects among higher-income filers not present with full refundability.

To calculate the direct cost of the ARPA CTC, we manually calculate the amount of CTC each household would qualify for under the ARPA design and compare it to the amount of pre-2021 CTC the household qualifies for, as calculated by TaxSim. Because of the higher maximum credit amount, the direct cost of the ARPA CTC is substantially larger than the full refundability expansion: approximately $96 billion per year (as shown in Column 1, Row 2 in Table 1).

Turning to the labor supply effects of the reform, the increase in the maximum credit amount does not alter the substitution effect generated from full refundability; under either reform, the CTC amount does not change based on income for low-earnings tax units. Hence, the ARPA CTC expansion would generate the same substitution effect for low-income households as depicted in Figure 3. However, unlike the full refundability reform, the ARPA CTC increases marginal tax rates on upper-middle income taxpayers due to the phase-out of the maximum credit amount. By reducing incentives to work for taxpayers in this phase-out range, this reform would modestly reduce tax revenue collected from that group.

Turning to the ARPA CTC's income effect, the larger credit amount induces a larger change in labor supply than the full refundability expansion. Still, the magnitudes of this effect on tax revenue are quite modest, again partly due to the fact that reductions in labor supply for taxpayers in the EITC phase-in range actually result in a net increase in tax revenue. Combining the income and substitution effects yields a net increase in the annual costs of the reform due to labor supply effects of $4.37 billion.[16]

Finally, to assess the effects on revenue from long-term changes in labor-supply due to the reform, we employ the same methodology described in the prior section. Because the ARPA CTC increases the benefit for low-income children by more than full refundability, it generates larger average increases in children's annual long-term earnings: 1.20% among all children and 2.42% among children in households with income less than $50,000. Accordingly, the ARPA CTC also generates larger increases in future tax revenue (approximately $15.50 billion in present discounted value per year). Combining the direct cost with the labor supply and long-term earnings effects described above yields a net fiscal cost of the ARPA CTC of approximately $85.23 billion (see Row 2 of Table 1)

B. Universal Child Credit

In this subsection we consider a universal child credit, by which we mean a flat per-child dollar amount regardless of income. In practice, implementing a universal CTC amounts to expanding the CTC by eliminating the refundability phase-in (like the other two proposals we consider) as well as the credit phase-out for high-income tax units. Thus, under the universal CTC we consider, each tax unit would qualify for a fully refundable CTC of $3,600 per child between the ages of 0 and 5 and $3,000 per child between the ages of 6 and 16.

Because it does not phase-out by income, the direct cost of the universal CTC exceeds that of the ARPA design; following the same methodology as above, we estimate it to be $108.86 billion (see Column 1, Row 3 of Table 1). For low- and middle-income taxpayers, the income and substitution effects of the universal CTC are the same as those of the ARPA CTC. Higher income taxpayers, however, face lower marginal tax rates under the universal CTC than under the ARPA design due to the lack of an income phase-out, implying that the former generates a smaller substitution effect than the latter. At the same time, high-income taxpayers who would be subject to the phase-out under the ARPA design face a larger income effect under the universal CTC, since they receive the full benefit amount. This income effect does not greatly shape labor supply, however, since even the expanded benefit amount constitutes a relatively small percent change in income for the high-income taxpayers at issue. We estimate that the net fiscal costs from labor supply changes induced by the universal CTC reform amount to approximately $1.73 billion per year.

Finally, because the universal CTC provides the same benefits to low- and middle-income children as the ARPA design, we estimate that it generates similar long-term effects on children's future labor supply and hence on tax revenue. Summing these components, we

[16] Our estimates of these effect imply approximately 386,000 parents exiting the workforce because of this reform.

estimate that the net fiscal cost of a universal CTC would be approximately $95.09 billion per year.

## VI. Alternative Assumptions for Cost Simulations

This section will replicate the analyses in Section IV and V using alternative modeling choices and behavioral parameters.

### A. Alternative Labor Supply Elasticities

In our baseline model, we chose the mid-point of ranges of income and substitution elasticities from the literature. Here, we illustrate how our cost estimates would change if we use the upper and lower bound elasticity estimates instead.

Column 1 of Table 2 presents revised estimates of fiscal cost using the lower bound elasticity estimates from the literature (substitution effect elasticities of 0.1 for fathers and single mothers, and 0.2 for married mothers; income effect elasticities of 0 on the extensive margin for all, and -0.01 for fathers and single mothers and -0.05 for married mothers on the intensive margin) to estimate labor supply responses. That is, we now assume parents will be less responsive to changes in income and marginal tax rates. For the fully refundable CTC, this reduces the expected decrease in tax revenue from $0.74 billion to $0.61 billion, slightly decreasing the net fiscal cost of the fully refundable CTC. For the ARPA and universal CTC simulations, using the lower bound labor supply elasticities reduces the loss in tax revenue to $2.33 billion and $0.48 billion, respectively. This compares to the $4.37 billion and $1.73 billion in expected losses of tax revenue generated from our main models for the ARPA and universal child benefit simulation, respectively.

Column 2 of Table 2 shows results using the upper bound elasticities for labor supply responses found in the literature (substitution effect elasticities of 0.3 for fathers and single mothers, and 0.4 for married mothers; income effect elasticities of -0.10 on the extensive margin for fathers and single mothers, and -0.15 for married mothers; and -0.29 for fathers and single mothers and 0.40 for married mothers on the intensive margin). Accordingly, this yields larger labor supply responses, which increases the costs of the fully refundable CTC slightly, but substantially increases the costs of the ARPA and universal CTC. For the fully refundable scenario, using the upper bound elasticities for labor supply responses decreases tax revenue by about $0.80 billion, compared to a $0.74 billion reduction in revenue in our main estimates. On the other hand, since the ARPA and universal CTC simulations affect the labor supply of higher-income tax units, assuming larger labor supply responses results in larger reductions in tax revenue than in our main specifications. In particular, we predict that the ARPA expansion would reduce annual tax revenue by about $9.53 billion (compared to $4.37 billion in the main model), while the universal child benefit would reduce annual tax revenue by $6.69 billion (compared to $1.73 billion in the main model).

### B. Separately Modeling the Extensive and Intensive Margin Substitution Effects.

Our baseline labor supply analysis incorporates income and substitution effects. The income effect is modeled separately using distinct elasticities for the intensive and extensive margins. The substitution effect also incorporates both intensive and extensive margin responses, in that the substitution elasticities we draw from (summarized by McClelland and Mok (2012)), are estimated based on individuals' earning responses on both the intensive and extensive margins. Although our approach should yield a similar overall reduction in work as modeling the intensive and extensive margins separately, it could imply different results for the distribution of earnings effects (and hence changes in tax liability) as well as the other outcomes such as the change in employment.

To assess the robustness of our findings to this difference in modeling approach, we estimate the percent change in the return to work for each individual under each of the reforms we consider, using the approach described in Corinth et al. (2021). As described above, each of the CTC expansions reduces the return to work (i.e., the difference in after-tax income between working and non-working) by eliminating the current phase-in structure of the CTC, which may generate reductions in labor supply on both the intensive and extensive margins. In the follow simulations, we separately estimate the intensive and extensive margin responses due to the substitution effect. Unlike Corinth et al., we continue to model the intensive margin of the substitution effect as well as the extensive margin.[17]

To fill in the required elasticities for this exercise, we consider two sources. First, we use the midpoints of the ranges described in McClelland and Mok (2012), matching our methodology for selecting elasticities in our baseline analysis. On the intensive margin, this implies an elasticity of 0.05 for fathers and single mothers, and 0.2 for married mothers. On the extensive margin, this implies an elasticity of 0.05 for fathers and single mothers, and 0.15 for married mothers. We also conduct additional simulations using the lower and upper bound estimates for the extensive margin, implying lower bound elasticities of zero for all groups, and upper bound elasticities of 0.10 for fathers and single mothers, and 0.30 for married mothers.

Our second approach is motivated by the observation in the literature, described above, that behavioral elasticities appear to have declined in magnitude in recent years as women have become more attached to the labor force. Consequently, applying the elasticities reported in papers studying responses from 30 years ago or more may overstate the magnitude of the labor supply response to the CTC expansion. To assess this possibility, we consider the most recent high-quality estimates of labor supply substitution elasticities of which we are aware, reported in Lin and Tong (2017), which studies behavioral responses to taxation from 2000-2009.[18] Although Lin and Tong study only married couples, we assume that single women and men have the same elasticities as married men – a consistent finding in the literature (McClelland and Mok

[17] Another difference from Corinth et al. (2021) is that we apply population average elasticities by gender and marital status, whereas they apply different elasticities for single mothers claiming the EITC versus everyone else. In principle, applying separate estimates for the two groups can yield more accurate results, but in practice there are few elasticity estimates available in the empirical literature for non-EITC claimants. And applying an EITC-specific estimate to EITC claimants while applying an overall population estimate to non-EITC claimants would bias upwards the behavioral response by effectively double-counting the contribution of EITC claimants.

[18] Specifically, we take the midpoint of the estimated elasticity range described in Lin and Ton (2017), Table 4.

(2012)). This approach yields intensive margin elasticities of 0.145 for married mothers and 0.055 for others (fathers and single mothers), and extensive margin elasticities of 0.09 for married mothers and 0.015 for others (fathers and single mothers).

The results of these analyses are presented in Columns 3 through 6 of Table 2. Both approaches lead to slightly larger estimates of the fiscal cost of the expansions, driven by larger cost contributions from labor supply adjustments. They also suggest a slightly larger reduction in employment than our baseline estimates; for example, under the ARPA expansion, these estimates suggest that 386,000 to 675,000 parents would choose to leave the labor force (approximately 0.7% to 1.2% of currently working parents).[19]

### C. Alternative Future Earning Assumptions

Column 7 of Table 2 reports the effect of adopting more conservative assumptions about the income ranges for which additional household income increases children's future earnings. Recall that in our baseline approach, following Garfinkel et al. (2021), we applied the full effect from the literature for households earning less than $50,000, 50% of the effect for households earning between $50,000 and $100,000, and no effect for households earning above $100,000. In contrast, Column 7 reports the results of assuming the full effect is limited to households earning less than $25,000, that households earning $25,000-$50,000 receive 50% of the effect, and that there is no effect on future earnings for children living in households with income above $50,000. This change in assumptions reduces the revenue effect from the change in long-term earnings across all three policies, but only modestly for the fully refundable CTC, since the additional income from that reform is concentrated among the lowest income households.

Finally, Column 8 of Table 2 applies a discount rate of 3% rather than 2% to the revenue generated from children's future earnings. As expected, this change modestly reduces the present discounted value of the future revenue, increasing the net fiscal cost of the reforms.

## VII. Administering an Expanded CTC

Questions remain about the best way to deliver the CTC (monthly, quarterly, or annually). Providing the benefit on a monthly basis would theoretically reduce income instability, which is associated with worse outcomes on a variety of dimensions for children including undermining health and food security (Wolf and Morrissey 2017) and lowered education attainment, particularly among moderate income families (Hardy 2014). Delivering the credit throughout the year – rather than at tax time, could allow the credit to be used to smooth income over the year, reducing extreme hardship. The IRS has limited experience delivering monthly tax credit payments.

[19] For the mid-point estimate of the extensive margin substitution elasticities from McClelland and Mok (Column 4 of Table 2), we predict that about 528,000 parents will exit the labor force.

More challenging than delivering the payments on a monthly (or even quarterly) basis would be ensuring that the benefit is paid to the adult(s) actively caring for the child. Traditionally, the tax system has operated on an annual reconciliation process after the tax year has ended and only one person may claim the CTC for a given child, even if multiple people care for that child.[20] Reconciling the correct caregiver on a monthly (or quarterly) basis would better ensure that the credit is delivered to the adult who is actively caring for the child – rather than the adult who cared for the child for the majority of the year—and presumably would be more likely to directly benefit the child. Splitting the credit across multiple tax units could affect a substantial number of families with children. In a recent survey of families with children with incomes less than $150,000, approximately 80 percent reported claiming a CTC (IPSOS 2021). The most common reason reported for not claiming a CTC (42 percent) was that another parent had claimed the payment instead. As children move between homes, particularly those who have low income, a way to split benefits among caregivers may need to be developed to make the CTC most effective.

Although family benefits are not generally split between multiple caregivers, there are other examples of splitting tax benefits among multiple households. Mortgage interest, for example, can be apportioned to multiple people who hold one mortgage. A system for splitting the CTC might allow the credit to better support children who are moving between households. Prior research shows that almost 6 percent of children overall change the adult with whom they live over the course of the year – a share that has been rising. Much higher levels of moving among households are reported among families with at least one child not biologically related to the parent(s) in the household (Maag, Peters, and Edelstein 2016). An important challenge for the IRS in administering a system that accounts for children moving households within a year is that the agency lacks administrative data documenting where children live or the identity of their primary caretaker, indeed, no government or private entity has these data.

In addition to creating rules for which taxpayers can claim which children for purposes of the credit, another administrative challenge for the IRS is to increase take-up of the CTC. No program has perfect take-up. Estimates of the CTC are not widely available, though a large share of families benefit from the program (90 percent in a typical year, 92 percent under the 2021 rules). Those least likely to participate are those who are not required to file a tax return (generally very low-income families who have not benefited much or at all from the CTC in years prior to 2021). To have the largest effect on poverty and other measures of well-being, increasing take-up of the CTC is essential.

## VIII. **Conclusion**

In this paper we estimated the net fiscal cost of various CTC expansions. Across expansions, the direct fiscal cost is by far the largest cost component. Labor supply responses of the households receiving an additional benefit from the expansion constitute a relatively small percentage of the net fiscal cost of any of the expansions we examined. We estimate larger fiscal savings stemming

[20] IRS Publication 501.

from increased future earnings of low-income children receiving larger CTC benefits because of the reform.

Estimates such as the ones reported here necessarily rely on a large number of assumptions relating to behavioral responses and other parameters, and in some cases we've relied on some simplifying assumptions. For example, we've assumed full take-up of the credit. Incomplete take-up is an important feature of transfer programs like the CTC, but we are not aware of take-up estimates for the CTC itself. We expect take-up to be relatively high under any of the expansions we consider, similar to the high take-up rates estimated for the EITC among households with children (e.g. Jones 2013). Along the same lines, we have not modeled the fiscal costs or savings from changes in the degree to which ineligible taxpayers claim the CTC despite lacking eligibility for it.

A second simplifying assumption in our analysis is that we have not modeled contributions to net fiscal costs arising from safety net programs outside of the tax code. Although CTC benefits do not directly affect eligibility for other social safety net programs, they can affect eligibility and participation indirectly by shaping labor supply. In particular, reductions in labor supply could increase fiscal costs associated with means-tested safety net programs whereas the long-term increases in child earnings could reduce the fiscal cost of such programs. Similarly, by improving low-income households' financial well-being, they may reduce participation in such programs, reducing these programs' costs.

Finally, in estimating how CTC reforms would affect the fiscal costs, we have focused on changes in labor supply – those of the taxpayers claiming the child and those of the children themselves via changes in human capital accumulation and earnings. At the same time, however, there are reasons to expect CTC expansions to reduce medium- and long-term federal spending through other mechanisms as well, such as through less crime (Akee et al. 2010), fewer children entering the foster care system (Berger et al. 2017), and reduced medical spending due to recipients' improved health (e.g., Hoynes et al. 2016; Evans & Garthwaite 2014; East 2018). Garfinkel et al. (2021) undertakes a fuller accounting of these additional channels; their analysis suggests that incorporating these additional channels would further reduce the net fiscal cost of expanding the CTC.

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**Table 1. Fiscal Cost of Child Tax Credit Expansion Policies**

| | Policy Elements | | | Cost Components ($ Billions) | | | |
|---|---|---|---|---|---|---|---|
| | | | | (1) | (2) | (3) | (4) |
| | Fully Refundable | Increased Max Credit | No Income Phase-Out | Direct Costs | Labor Supply Effects | Long-Term Earning Effects | Total Cost |
| Fully Refundable CTC | X | | | 25.49 | 0.74 | -4.99 | 21.25 |
| ARPA (2021 CTC) | X | X | | 96.36 | 4.37 | -15.50 | 85.23 |
| Universal CTC | X | X | X | 108.86 | 1.73 | -15.50 | 95.09 |

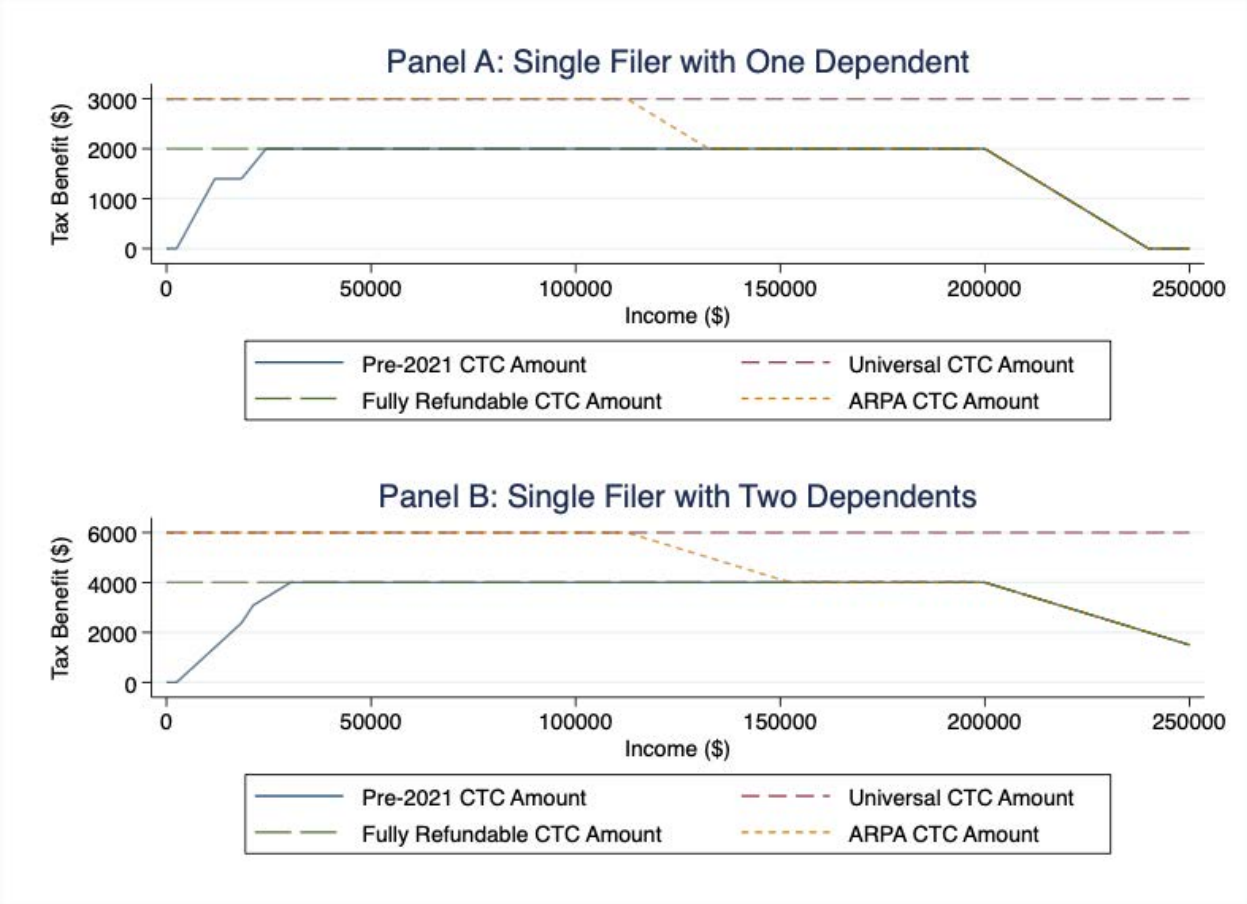
*Notes*: The table presents estimated cost components for various expansions of the CTC. Direct costs (Column 1) represent the additional CTC benefit that taxpayers receive. Labor supply effects (Column 2) represent the effect on tax revenue of labor supply changes induced from a change in marginal tax rate or the additional income provided under the expansion. Long-term labor effects (Column 3) represent the effect on tax revenue from changes in adulthood earnings of children growing up in tax units that receive additional benefits because of the expansion. The total cost of the expansion (Column 4) is calculated by summing Columns 1-3. The universal CTC is a flat benefit amount of $3,600 per child under the age of 6 and $3,000 per older child under the age of 17. The 2021 CTC is modeled after the CTC design in place for tax year 2021; it differs from the Universal CTC in that the benefits phase out by income. The Fully Refundable CTC is modeled after the CTC design that President Biden proposed for tax years following 2025; it is fully refundable, phases out by income, and has the same maximum credit amount as the pre-2021 CTC. All calculations are performed using survey weights from the 2018 ASEC supplement to the CPS.

**Table 2. Alternative Assumptions for Estimating Fiscal Cost (in billions) of CTC Expansion**

| | Labor Supply Effect (Alternate Elasticities) | | Labor Supply Effect (Separate Margins) | | | | Long-Term Labor Effects | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Elasticity Lower Bound | Elasticity Upper Bound | McClelland and Mok (2012) | | | Lin and Tong (2017) | Alternate Benefit Multiplier | Alternate Discount Rate |
| | | | Lower | Midpoint | Upper | | | |
| Fully Refundable CTC | 0.61 | 0.80 | 0.03 | 1.73 | 3.28 | 0.70 | -4.39 | -4.48 |
| ARPA (2021 CTC) | 2.33 | 9.53 | 2.20 | 4.26 | 6.27 | 2.88 | -9.57 | -13.92 |
| Universal CTC | 0.48 | 6.69 | 1.53 | 3.11 | 4.69 | 2.22 | -9.57 | -13.92 |

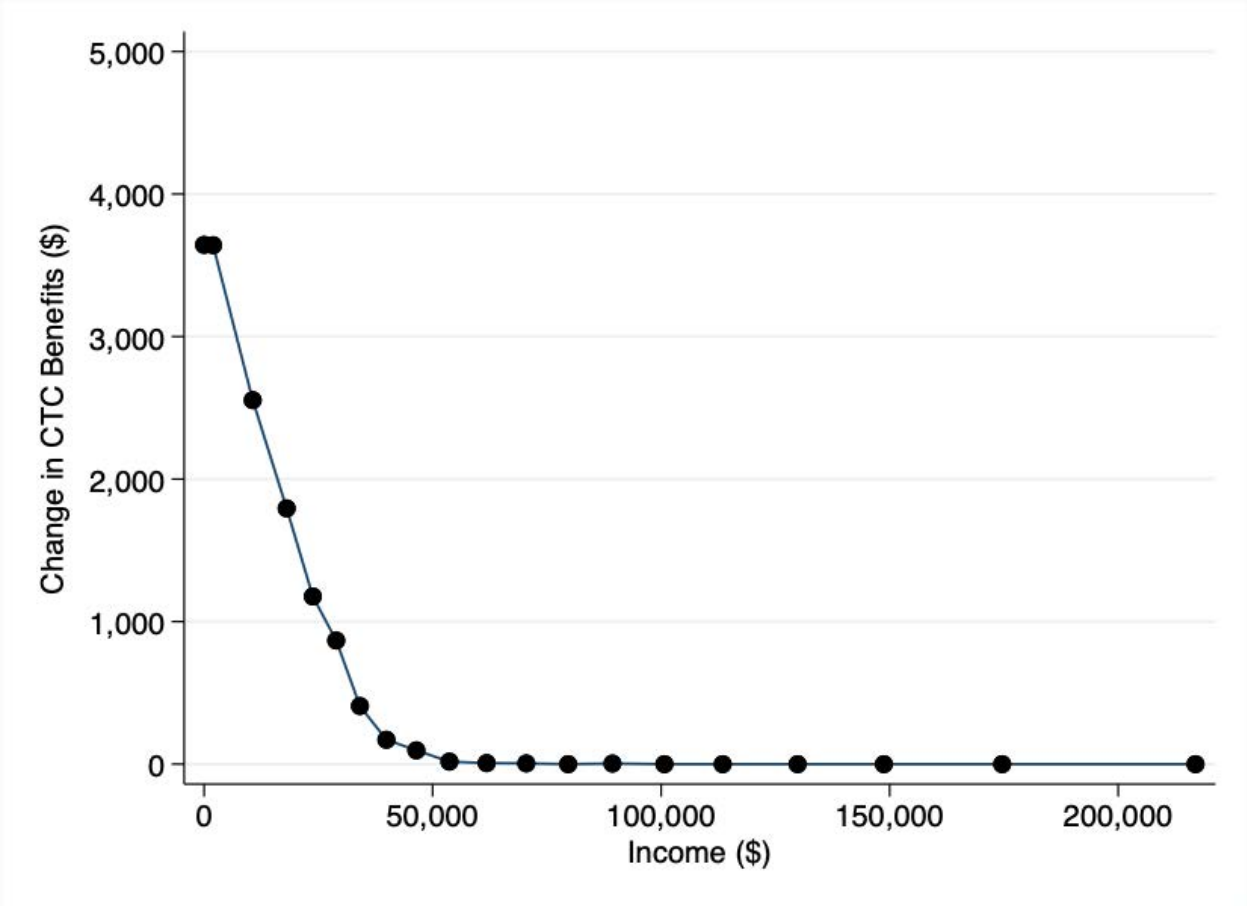
*Notes:* The table reports the estimated fiscal cost of various CTC expansions under alternative assumptions. The cost components and CTC expansions considered are described in the notes to Table 1. Columns 1-6 report the change in federal tax revenue due to labor supply changes using elasticities from the inelastic (Column 1) or elastic (Column 2) range of estimates described in Section VI.A, or from separately modeling the intensive and extensive margins of the substitution effect based on the methodology described in Section VI.B and the lower bound (Column 3), midpoint (Column 4), and upper bound (Column 5) of the corresponding elasticity estimates from McClelland and Mok (2012). Column 6 reports the change in tax revenue due to labor supply changes using more recent estimates of substitution elasticities from 2000-2009 from Lin and Tong (2017). Columns 7 and 8 report the change in federal tax revenue from children's future earnings, under the assumption that the effect of additional household income on children's future earnings fades more quickly as a household's income rises (Column 7) or using a 3% discount rate for the additional revenue from increases in children's future earnings (Column 8).

**Figure 1. Comparison of Child Tax Credit Designs**



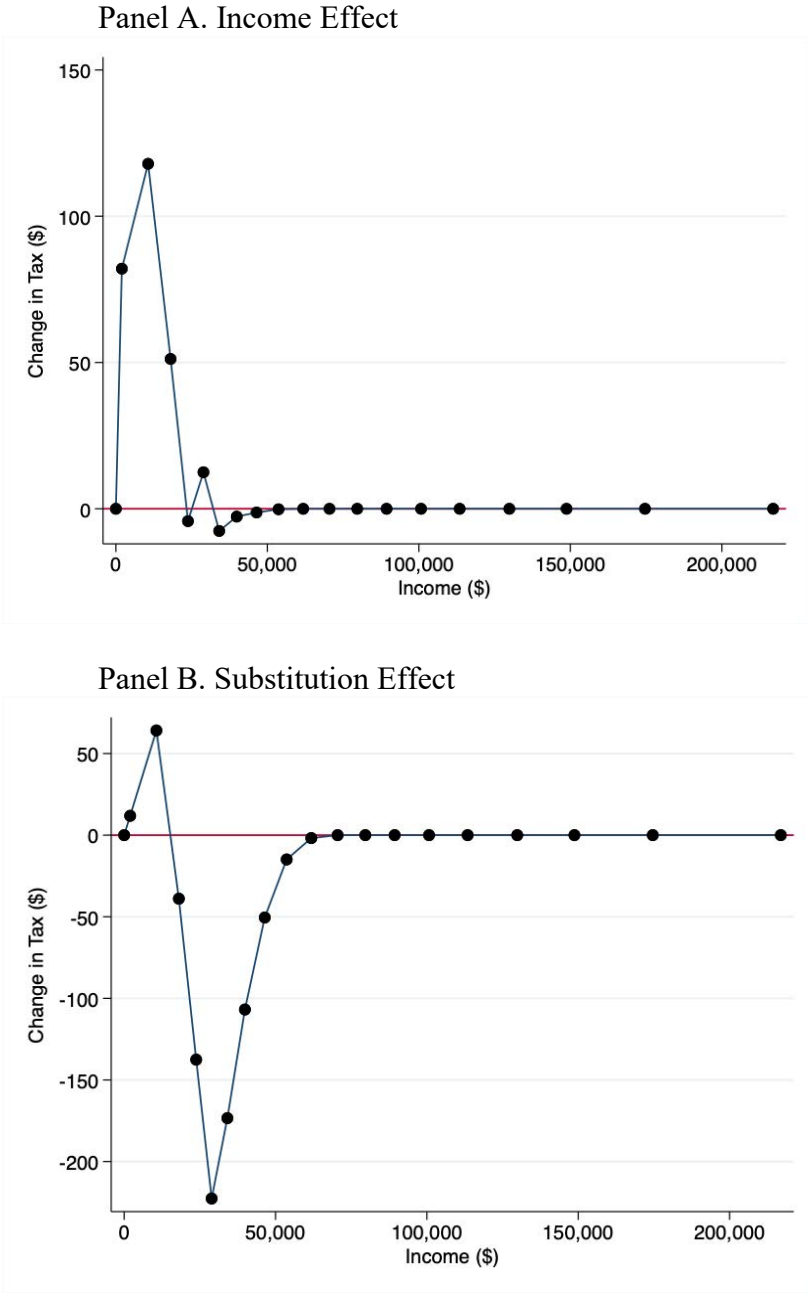

*Notes*: The figure shows the benefit a tax unit would receive from the pre-2021 CTC (solid blue line), the Fully Refundable CTC (dashed green line), the ARPA CTC (dashed orange line), and the universal CTC (dashed red line). Each tax unit is assumed to consist of a single parent with one child (Panel A) or two children (Panel B) between the ages of 6-17, to have income consisting solely of salary compensation, and to claim the standard deduction.

**Figure 2. Average Change in Benefits for Fully Refundable CTC by Income**




*Notes*: The figure shows the average change in CTC benefits by binned tax unit income of a change from the pre-2021 CTC to the Fully Refundable CTC. Each tax unit is assumed to claim the standard deduction.

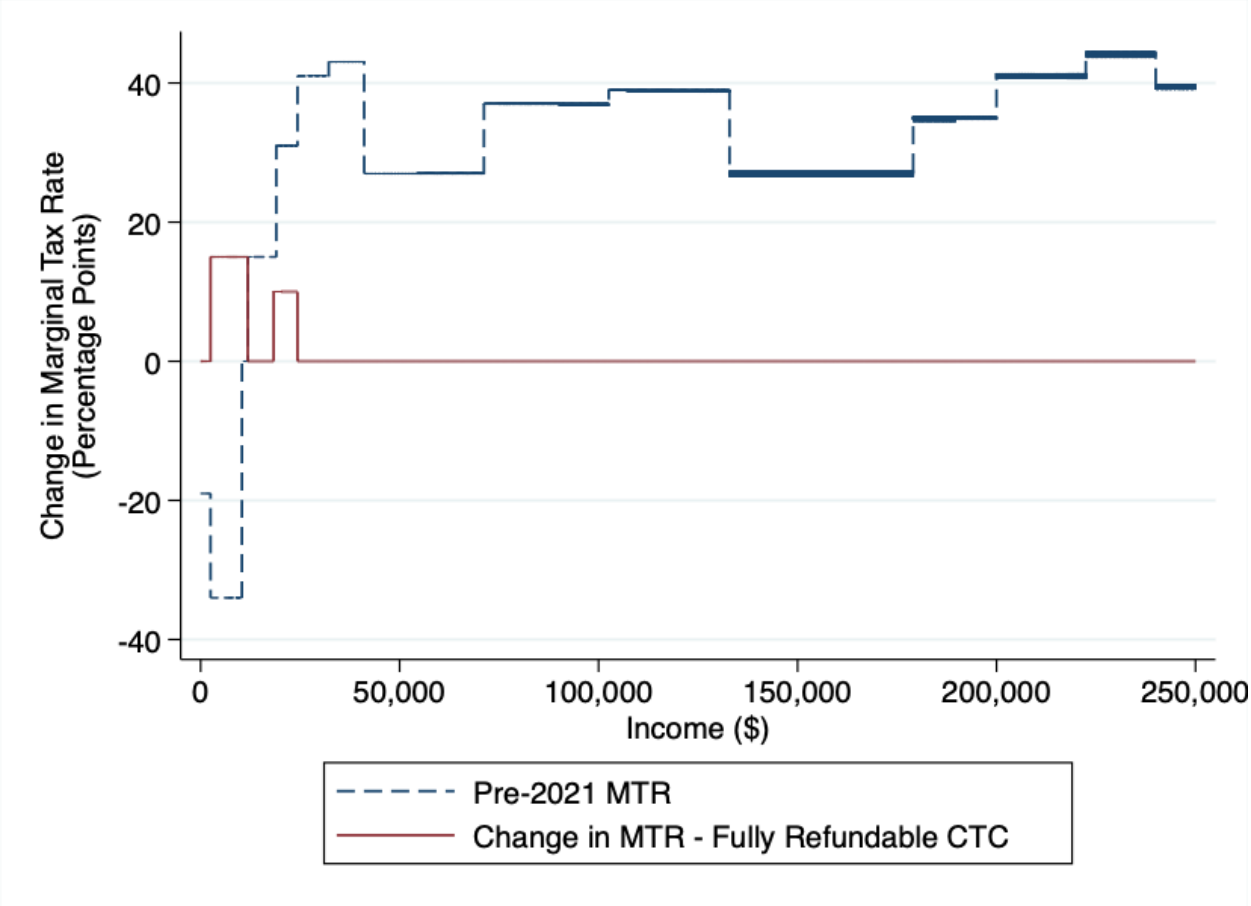
**Figure 3. Average Tax Change by Income from Fully Refundable CTC**




*Notes*: The figure shows the average change in tax liability by binned tax unit income of a change from the pre-2021 CTC to the Fully Refundable CTC due to the income effect (Panel A) and substitution effect (Panel B). Each tax unit is assumed to claim the standard deduction. In Panel A, each individual in a tax unit is assumed to adjust their income based on (1) the relevant income elasticity estimate based on the individual's gender and marital status, and (2) the percent change in household income that the expanded CTC represents. The intensive and extensive margin income effects are separately calculated, as described in the text. In Panel B, each individual in a tax unit is assumed to adjust their earnings based on (1) the relevant wage-elasticity estimate based on the individual's gender and marital status, and (2) the percent change in the marginal net-of-tax rate induced from the CTC expansion. In both panels, the change in tax revenue is calculated by comparing TaxSim's federal tax liability estimate for the tax unit

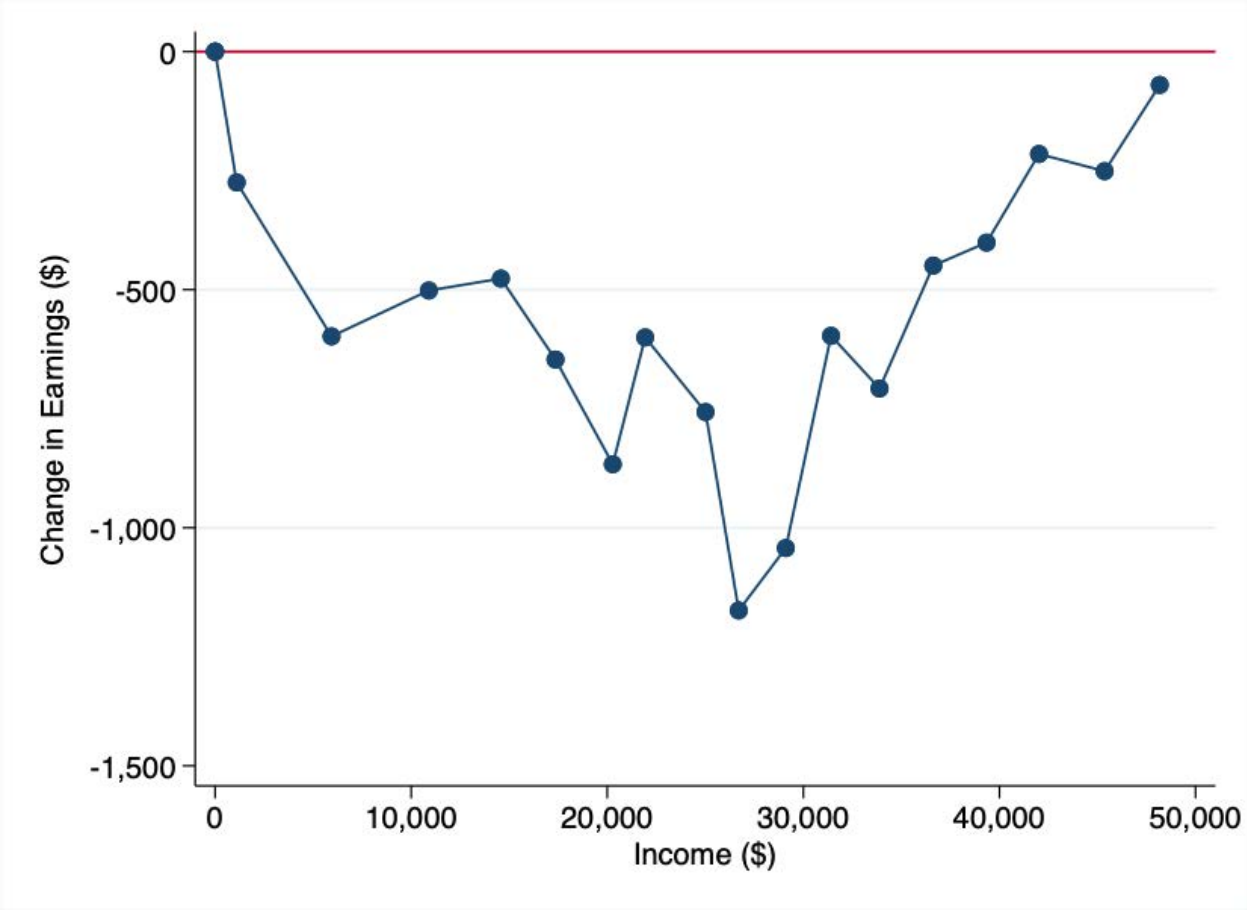
using the tax unit's pre-reform earnings with estimated federal tax liability after imposing the predicted changes in earnings based on the specified effect.

**Figure 4. Marginal Tax Rate Change from Fully Refundable CTC Reform by Income for Single Filer with One Child**



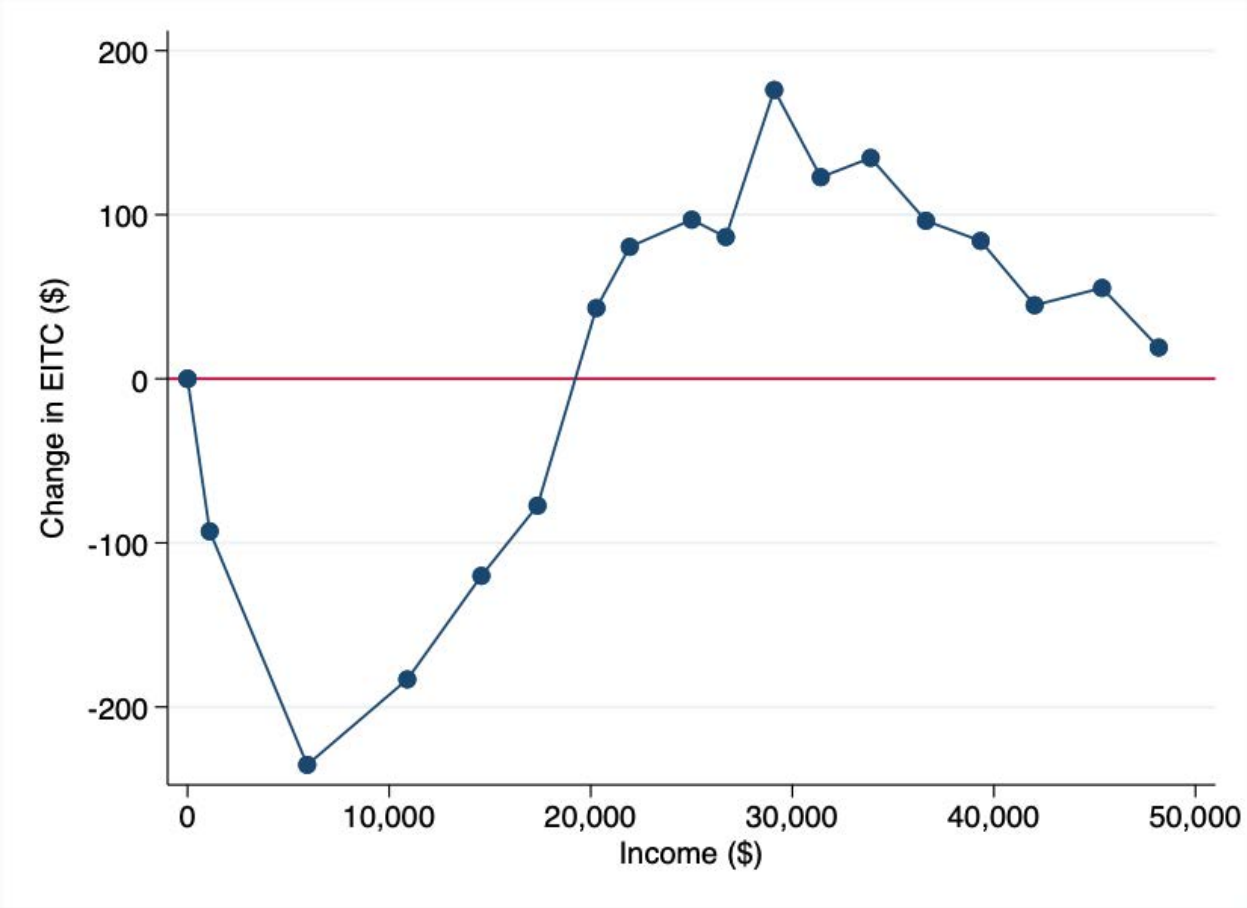

*Notes*: The figure shows the change in the marginal tax rate a tax unit would face from a change from the pre-2021 CTC to the Fully Refundable CTC, by earnings. Each tax unit is assumed to consist of a single parent with one child between the ages of 6-17, to have income consisting solely of salary compensation, and to claim the standard deduction. The marginal tax rate under the pre-2021 CTC is calculated from TaxSim. The marginal tax rate under the Fully Refundable CTC is calculated as described in the text.

**Figure 5. Average Earnings Change by Income from Fully Refundable CTC**




*Notes*: The figure shows the average estimated change in earnings by binned tax unit income of a change from the pre-2021 CTC to the fully refundable CTC due to the income and substitution effects. In calculating the income effect, each individual in a tax unit is assumed to adjust their income based on (1) the relevant income elasticity estimate based on the individual's gender and marital status, and (2) the percent change in household income that the expanded CTC represents. The intensive and extensive margin income effects are separately calculated, as described in the text. In calculating the substitution effect, each individual in a tax unit is assumed to adjust their earnings based on (1) the relevant wage-elasticity estimate based on the individual's gender and marital status, and (2) the percent change in the marginal net-of-tax rate induced from the CTC expansion. For married tax units, the displayed change in earnings is the sum of the change in earnings of each individual spouse.

**Figure 6. Average Change in EITC Benefits by Income from Fully Refundable CTC**




*Notes*: The figure shows the average change in EITC benefits by binned tax unit income from a change from the pre-2021 CTC to the fully refundable CTC due to the income and substitution effects. In calculating the income effect, each individual in a tax unit is assumed to adjust their income based on (1) the relevant income elasticity estimate based on the individual's gender and marital status, and (2) the percent change in household income that the expanded CTC represents. The intensive and extensive margin income effects are separately calculated, as described in the text. In calculating the substitution effect, each individual in a tax unit is assumed to adjust their earnings based on (1) the relevant wage-elasticity estimate based on the individual's gender and marital status, and (2) the percent change in the marginal net-of-tax rate induced from the CTC expansion. The change in EITC is calculated by comparing TaxSim's EITC estimate for the tax unit using the tax unit's pre-reform earnings with estimated EITC after imposing the predicted changes in earnings.