Modeling the 2021 Child Tax Credit in the CPS ASEC*

SEHSD Working Paper FY-2022-17

May 4, 2023

C. Adam Bee, US Census Bureau

Charles Hokayem, US Census Bureau

Daniel C. Lin, Freddie Mac

NOTE: This paper is a revised version of an earlier paper with the same title and SEHSD working paper number. That paper benchmarked closely related modeled advance CTC payments against published IRS tables, since aggregates of total CTC payments after reconciliation were not available in time for publication of the working paper in conjunction with the mid-September release of Income in the United States: 2021.

Abstract

The American Rescue Plan in 2021 greatly expanded the federal Child Tax Credit along several dimensions. This credit had been included in the Current Population Survey Annual Social and Economic Supplement (CPS ASEC) production tax model in previous years, but its expansion and enhanced refundability made it likely to have an expanded impact on poverty, especially among children, as measured by the 2021 Supplemental Poverty Measure. Anticipating this enhanced importance, a new item was added to the 2022 CPS ASEC questionnaire regarding advance receipt of the Child Tax Credit. This paper describes changes to the CPS ASEC Tax Model to reflect the Child Tax Credit expansion, including how the model imputes receipt and credit amount. We then evaluate the tax model output using information from individually linked IRS Form 1040 records, focusing on the formation of tax units and identification of dependents. Finally, we benchmark total imputed Child Tax Credit payments against published IRS tables.

* Daniel Lin contributed to this paper while he was employed by the US Census Bureau. We thank Kalee Burns, Liana Fox, Dave Hornick, Matthew Unrath, and Bruce Webster for reviews. Any opinions and conclusions expressed herein are those of the authors and do not represent the views of the US Census Bureau. The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data (Project No. P-7503840, Disclosure Review Board (DRB) approval numbers: CBDRB-FY22-394, CBDRB-FY23-SEHSD003-027).

1. Introduction

Since 1997 the Child Tax Credit (CTC) has been available to families to ease the financial burden of raising children.[1] The CTC is part of a package of programs to aid families including the Earned Income Tax Credit (EITC), Temporary Aid to Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), housing assistance, and Medicaid. Unlike most of these programs, the CTC is not limited to low-income families; those with higher income can also claim the credit. The credit has been linked to reducing poverty, lessening food hardship, and increased spending on expenditures associated with children (*e.g.*, Bastian 2022, Corinth *et al.* 2021, Perez-Lopez 2021, and Collyer *et al.* 2021).[2] In 2021 the American Rescue Plan Act significantly expanded the CTC in several ways. It increased the credit amount, expanded qualifying age eligibility, made the credit fully refundable, and directed half the anticipated credit to be paid in advance in monthly payments beginning July 2021.

The Census Bureau publications *Income in the United States: 2021* and *Poverty in the United States: 2021* are based on information collected in the Current Population Survey Annual Social and Economic Supplement (CPS ASEC). These publications report post-tax income and Supplemental Poverty Measure statistics, which are both based on income net of taxes and credits. In order to calculate these statistics, however, receipt and amounts of tax credits must first be imputed to survey respondents, since the CPS ASEC generally does not collect information about taxes paid or credits received. The CPS ASEC Tax Model imputes federal, state, and payroll tax liability and several tax credits, including the CTC.[3]

This paper documents how the CPS ASEC Tax Model changed to accommodate the 2021 expansions to the CTC and validates the model's imputations against individually linked Internal Revenue Service (IRS) Form 1040 records and published tables of aggregate payments. We find that while the tax model generates aggregate estimates of total CTC payments and counts of qualifying children that are qualitatively comparable to published IRS aggregates, this overall concordance masks substantial under-imputation of credits at the bottom of the income distribution, balanced by over-imputation to higher-income households. For example, total modeled CTC payments to families near poverty thresholds[4] are about 62 percent of SOI aggregates, suggesting that the estimated sizable impacts of CTC in the Supplemental Poverty Measure (*e.g.*, Burns and Fox 2022) may be significantly understated. We find suggestive evidence that, due to the credit's narrow phaseouts and most parents' relatively accurate income reporting, this misallocation may be mostly attributable to parents' reporting differing sets of children between survey household rosters and individual tax returns.

[1] The Child Tax Credit was created as part of the Taxpayer Relief Act of 1997, first applied to tax returns for the 1998 tax year, and first paid with refunds issued in 1999.
[2] Other recent research using the Current Population Survey to study the expansion of the Child Tax Credit includes Ananat *et al.* (2022), Enriquez *et al*. (2023), Hardy *et al*. (2023), and Maag *et al*. (2023).
[3] For more information on the methodology of the CPS ASEC Tax Model, refer to Lin (2022), which is available at <https://www.census.gov/content/dam/Census/library/working-papers/2022/demo/sehsd-wp2022-18.pdf>.
[4] Specifically, tax units with adjusted gross income from $20,000 to $29,999.

2. Background: The Child Tax Credit and Recent Changes in Tax Law

Prior to 2021 the CTC was last amended in the Tax Cuts and Jobs Act of 2017 (TCJA). The credit amount of $2,000 per qualifying child phased out by $50 for every $1,000 of income over $400,000 for joint filers and over $200,000 for all other filers. Before the 2017 TCJA, the CTC was not refundable, meaning that any filer with a tax liability less than the full value of their CTC only received the portion of the CTC that reduced their liability to zero. The TCJA, however, made portions of the CTC refundable. This refundable amount was called the Additional Child Tax Credit (ACTC), and that amount was phased in by 15 percent of earned income above $2,500, to a maximum refundable amount of $1,400 per qualifying child.

In March 2021 the American Rescue Plan Act (ARPA) temporarily expanded the CTC for tax year 2021.[5] It increased the credit amounts, established credits for children of different ages, made the credits fully refundable, and raised the age limit of qualifying children. Additionally, ARPA established monthly advance payments of the CTC, beginning July 2021 and totaling half of the projected CTC amounts for tax year 2021. Filers received the rest of their credit amounts upon filing their 2021 tax returns in 2022. The portion of the expanded credit that was paid out during 2021 is referred to as advance CTC. The following table, "Child Tax Credit Expansion Comparison," summarizes features of the expansion including eligibility criteria and amounts, comparing these features to the credit under the TCJA. We describe the eligibility features in more detail below.

Credit eligibility depended on citizenship, residence, income, and the presence of qualifying children. Filers were eligible for the CTC if they were US citizens, US nationals, or US resident aliens, and if they had a valid Social Security number (SSN) or individual taxpayer identification number (ITIN) before filing the 2021 tax return. However, nonresidents were not eligible for the expanded, refundable credit.[6] Married joint filers with adjusted gross income (AGI) under $150,000, head of household filers with AGI under $112,500, and individual filers using any other filing status with AGI under $75,000 were eligible for the full CTC amount.[7] ARPA increased the age limit of qualifying children from 16 to 17. The maximum CTC amount was $3,600 per qualifying child under 6 and $3,000 per qualifying child aged 6 to 17. A qualifying child for the CTC is defined by the IRS as someone who is the filer's child, stepchild, eligible foster child, sibling, half-sibling, step-sibling, or descendant; who can be claimed as a dependent under age 18 at the end of the reference tax year; who is a US citizen, US national, or US resident alien; who has a valid SSN or ITIN,[8] and who lived with the filer in the US for more than half the year.

The expanded CTC had two phaseout provisions. First, the credit was initially reduced by $50 for every $1,000 of the filer's AGI above the first income threshold until plateauing at $2,000 per qualifying

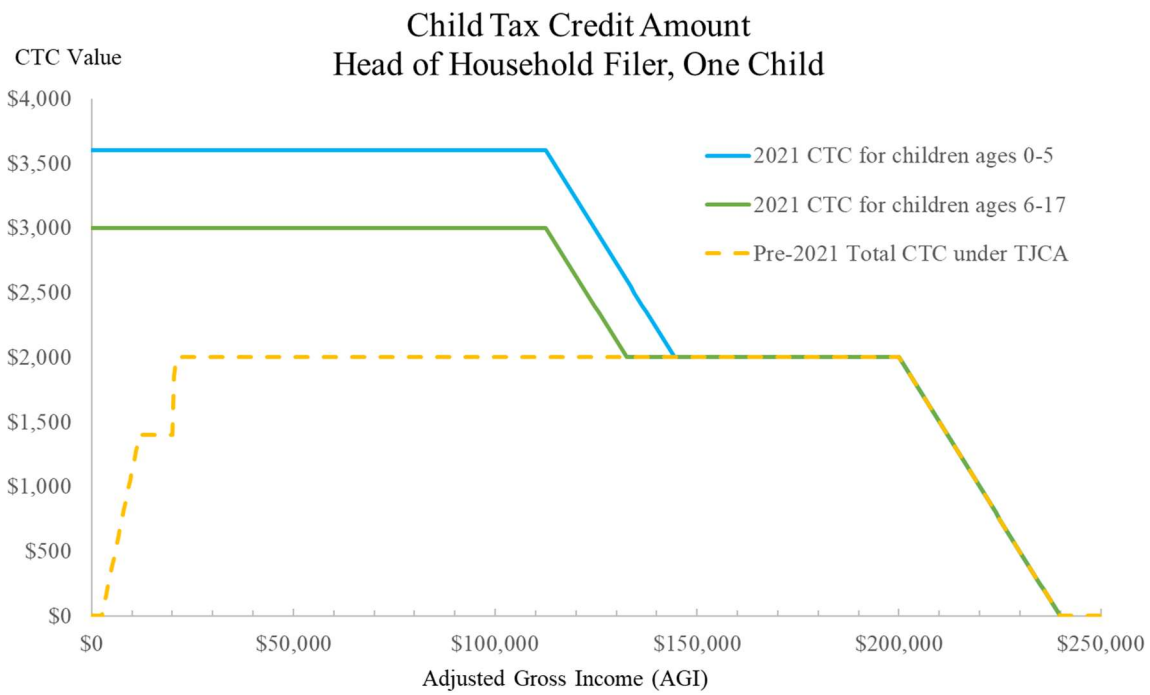
[5] Beginning with tax year 2022, the CTC reverted to the credit amount and parameters outlined in the TCJA.
[6] Information about residency is not available in the survey, so the CPS ASEC Tax Model assumes all respondents to be residents of the US. Nonresidents were still eligible for the previous version of the CTC.
[7] Widows had similar eligibility requirements as married joint filers.
[8] The Social Security Administration issues three types of Social Security cards: (1) an unrestricted card for US citizens and people lawfully admitted to the US on a permanent basis; (2) "VALID FOR WORK ONLY WITH DHS AUTHORIZATION" for people lawfully admitted to the US on a temporary basis with authorization to work; and (3) "NOT VALID FOR EMPLOYMENT" for people who are lawfully admitted to US without work authorization or people who need a Social Security number for federal benefits or services.

child. Second, the CTC was further reduced by $50 for every additional $1,000 of the filer's AGI above the second threshold, until reaching $0. The following figure illustrates the credit amount and phaseout thresholds for a head of household with one child under the TCJA and ARPA.

Child Tax Credit Expansion Comparison

Legislation	Tax Cuts and Jobs Act (2017)	American Rescue Plan Act (2021)
Date	November 2017	March 2021
Maximum credit amount	• $2,000 per qualifying child	• $3,600 per qualifying child under 6 • $3,000 per qualifying child aged 6 to 17
Maximum refundable portion	• $1,400 per qualifying child	• Fully refundable
Minimum income requirement	• $2,500 in earned income to receive refundable portion of CTC	• None
First income threshold for full payment amount	• Married, filing jointly*: $400,000 • Head of Household: $200,000 • Single or married filing separately: $200,000	• Married, filing jointly*: $150,000 • Head of Household: $112,500 • Single or married filing separately: $75,000
Second income threshold for phaseout		• Married, filing jointly*: $400,000 • Head of Household: $200,000 • Single or married filing separately: $200,000
Phaseout	• Payment reduced by $50 for every $1,000 over the income thresholds	• Payment reduced by $50 for every $1,000 over the first income thresholds down to $2,000 per child • Payment further reduced by $50 for every $1,000 over the second income thresholds**
Auto-payment recipients	• None, must claim on individual tax return.	• Tax year 2019 and 2020 filers

Sources: US Internal Revenue Service, <https://www.irs.gov/credits-deductions/individuals/child-tax-credit>, <https://www.irs.gov/credits-deductions/2021-child-tax-credit-and-advance-child-tax-credit-payments-frequently-asked-questions>, and <https://www.irs.gov/credits-deductions/2021-child-tax-credit-and-advance-child-tax-credit-payments-topic-h-reconciling-your-advance-child-tax-credit-payments-on-your-2021-tax-return>.
Notes: *Includes qualified widow/widower filers. **2021 CTC follows the same phaseout as in 2017 once payment is reduced to $2,000 per child.



Source: Authors' calculations, Internal Revenue Service.
Notes: The 2021 expanded Child Tax Credit was fully refundable. Total Child Tax Credit under the 2017 Tax Cuts and Jobs Act (TCJA) is the sum of the nonrefundable Child Tax Credit and the refundable Additional Child Tax Credit and assumes the maximum possible credit given head of household filers only take the 2020 standard deduction of $18,650 and no other tax credits. All versions of the Child Tax Credit followed a phaseout of $50 for each $1,000 in AGI over the thresholds in a stairstep fashion.

ARPA also authorized the IRS to issue advance payments of the CTC. The IRS used information from the 2019 or 2020 tax return to project eligibility for the CTC in 2021 and thus calculate advance payments.[9] The six monthly advance CTC payments were intended to sum to half of a filer's total expected CTC amount. The IRS began disbursing advance monthly CTC payments on July 15, 2021, and continued issuing those payments through December 2021.

Differences between IRS projections and actual CTC eligibility were reconciled upon filing the 2021 tax return. The remainder of the CTC, net these advance payments, was specified to be paid at tax filing. For many filers, the IRS was able to accurately forecast eligibility based on 2020 and 2019 tax returns, such that the remaining CTC amount claimed equaled half their total CTC amount. However, as Splinter (2022) and Maag *et al.* (2023) document, some filers experienced changes in income, filing status, or family situations, such as a qualifying child changing homes. Eligible filers who did not receive advance payments, or who otherwise received payments totaling less than half their total CTC amounts, were able to claim any remaining amount of their CTC on their 2021 tax returns.

Filers who received excess advance CTC payments over their actual CTC amount were required to repay the excess in their 2021 tax return unless their AGI was below certain thresholds. Married joint filers with AGI under $60,000, head of household filers with AGI under $50,000, and individual filers using any other filing status with AGI under $40,000 were protected from having to repay $2,000 per extra child (IRS

[9] Individuals who did not file a 2019 or 2020 tax return could sign up to receive advance CTC payments using the "Child Tax Credit Non-Filer Sign-Up Tool" on the IRS website: <https://www.irs.gov/credits-deductions/child-tax-credit-non-filer-sign-up-tool>.

projection minus actual) in excess advance CTC disbursements. Married joint filers with AGI over $120,000, head of household filers with AGI over $100,000, and individual filers using any other filing status with AGI $80,000 and over were required to fully repay any excess advance CTC they received. Filers with AGI between their respective two thresholds qualified for a prorated amount to be protected against the repayment of excess advance CTC.[10]

The reconciliation process generally helped the performance of CPS ASEC tax-modeled CTC because the total amount of advance payments plus the remainder were intended to generally sum to an amount that was based on 2021 information instead of tax year 2019 and 2020 information. Inversely, filers affected by the repayment protection pose an unusual complication for the CPS ASEC Tax Model, because they represent cases in which credits were paid (and kept) based on information from 2020 or 2019 rather than from 2021.

3. Data

2022 Current Population Survey Annual Social and Economic Supplement

The CPS ASEC is one of the largest and longest-running household surveys in the US; it is the source of the nation's income and poverty estimates. For the purposes of this study, the most relevant aspect particular to the 2022 CPS ASEC is that the Census Bureau added a new yes/no question about receipt of advance payments to the 2022 questionnaire, as follows:[11]

> *"In the spring of 2021, as part of the American Rescue Plan, the child tax credit was expanded and the IRS was instructed to pay out the benefit to parents, monthly, starting in July 2021. Since July, have you or anyone in your household received an Advance Child Tax Credit payment from the Federal Government?"*

Responses to this question indicate that 20.5 percent of US households received an advance payment, containing 33.0 percent of individuals and 67.5 percent of children aged 0 to 17. The household-weighted item nonresponse rate (imputation rate) for this question was 27.2 percent. As explained in the following section, the CPS ASEC Tax Model only used this yes/no response to assign receipt and amount of the advance payment; no other tax variable (including the total CTC value) was affected by this new question.

Administrative records: Form 1040 returns and Numident

In order to validate the CPS ASEC Tax Model, we link IRS Form 1040 records to individuals in ASEC household rosters who are also listed as the primary filer on any IRS Form 1040 individual tax return for tax year 2021 posted to IRS's database through June 5, 2022. We use these records to both compare the model's inputs to those in linked records, as well as compare imputed CTC values between the two data

[10] More details about repayment protection can be found on the IRS website: <https://www.irs.gov/credits-deductions/tax-year-2021-filing-season-2022-child-tax-credit-frequently-asked-questions-topic-c-reconciling-advance-child-tax-credit-payments-and-claiming-the-2021-child-tax-credit-on-your-2021-tax-return>.

[11] For more information on confidentiality protection, methodology, sampling and nonsampling error, and definitions, refer to <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar22.pdf>.

sources. Since CTC amounts are not directly available in the IRS Form 1040 records, we use filing status, AGI, and a list of the first four dependents listed on each return to impute CTC amounts.[12] We further link these records to the Social Security Administration 2022Q2 Numident file to assign ages to dependents as of December 31, 2021, and confirm their qualifying child status. We use these data to calculate a CTC amount for each 1040, which we subsequently compare to the survey-based CTC values from the tax model, as discussed below.

4. Modeling the Child Tax Credit

CPS ASEC Tax Model

Modeling CTC receipt and amounts requires four inputs for each tax unit: (1) tax filing status, (2) the number of qualifying children under 6, (3) the number of qualifying children aged 6 to 17, and (4) adjusted gross income. In this section we detail the methods by which the CPS ASEC Tax Model constructs each of these variables and thereby imputes CTC values.

Tax filing status and number of qualifying children: To identify CPS ASEC respondents' likely filing status as well as their likely number of qualifying children, it is necessary to construct likely tax units from the survey household rosters. The process of forming these tax units involves several steps, which are further detailed in Lin (2022). First, we sort individuals in the person-level file into three mutually exclusive subsets: (1) one for all married people; (2) one for all children; and (3) one for the "others." The first subset of all married people is defined as containing any record with a non-zero value for the spouse pointer variable. The second subset of all children is defined as containing any record with a positive value in the parent pointer variable.[13] The remaining persons – with no spouse or parents present – form the third subset of "others."

The second step involves making the following adjustments to those initial assignments. We ensure that the children-and-dependents subset only includes qualifying children or dependents as the IRS defines them: children aged 18 years or under, children under 24 and enrolled in school, or adult children with a disability.[14] Children who don't appear to be a qualifying child are moved to the "others" subset. We similarly reassign anyone under age 15 in the "others" subset (with no parent pointer) to the children subset.[15]

Third, dependents are linked to tax units. The child subset (2) is attached to the tax unit of their parent or parents, using the parent pointer variable. The numbers of qualifying children and qualifying dependents as defined for various federal and state deduction and credits, including the Child Tax Credit,

[12] Note that since we receive identifying information for only the first four dependents on each Form 1040 record, we are limited to counting four qualifying children at most on each linked Form 1040 record.
[13] The tax model only constructs single dependents and does not consider married dependents. People with non-zero spouse pointer and positive parent pointers are part of the first subset of married people.
[14] Since all inputs to the tax model are based on responses to the household survey, only resident children and dependents are included.
[15] Children under 15 with no parent pointer are assigned to be a dependent of the householder.

are calculated for each tax unit.[16] In the CPS ASEC Tax Model, qualifying children are always a subset of dependents, which may not always be true for actual tax units.[17, 18]

Fourth, the model assigns filing status. If the tax unit contains two spouses, then the filing status of the unit is defined as *Married, Filing Jointly*, and the spouse incomes are combined for the tax unit. The main filer is determined by the family relationship variable. The reference person is the main filer, and the spouse is attached to the main filer. We assume that all married couples file jointly, so we do not model the *Married, Filing Separately* filing status. If the tax unit contains a single person that has dependents, then the filing status is set to *Head of Household*. If the tax unit contains only a single person, then the filing status is set to *Single*. The survey data do not allow the identification of married separate filers, so the filing statuses in the ASEC Tax Model only consist of *Single*, *Head of Household*, and *Married, Filing Jointly*.

Adjusted gross income: Federal adjusted gross income (AGI) is computed as the sum of the following for the filer (and spouse, if married): wages and salaries, interest and dividend incomes, alimony income, business self-employment income, capital gains, IRA income, pension income, rent income, farm self-employment income, taxable unemployment compensation, and taxable social security benefits, and subtracted by one-half of self-employment taxes, self-employed health insurance, self-employed health savings, and IRA contributions.[19]

Several other tax changes enacted in 2021 were incorporated into the ASEC Tax Model for this year, such as the expansion of Earned Income Tax Credit (EITC), the expansion of Credit for Child and Dependent Care Expenses (CDC), the third Economic Impact Payment (EIP 3), state-level stimulus payments, the expiration of the federal unemployment compensation exclusion, and the suspension of the charitable contribution limit for itemizing deductions. The EITC for filers without qualifying children was expanded in these ways: the maximum credit increased from $538 to $1,502; the income threshold increased; the minimum age for filers was reduced to 19; and the maximum age of 65 was removed. The CDC became fully refundable (as it was previously a nonrefundable credit); its income threshold increased; and the maximum allowable credit was increased from $1,050 to $4,000 for one qualifying child and from $2,100 to $8,000 for two or more qualifying children.[20]

Filing requirements: Finally, the tax model determines whether each tax unit is likely to have filed a return. The tax model assumes a tax unit files a return if it meets at least one of the following requirements: (1) income above a filing threshold determined by age and filing status; (2) eligible for positive Earned Income Tax Credit (EITC); (3) positive self-employment income; (4) gross income less than $0; (5) self-employment income less than $0; (6) eligible for positive Child Tax Credit; (7) positive self-employment

[16] Refer to Section 2 for the definition of qualifying children for the Child Tax Credit, which the CPS ASEC Tax Model follows.
[17] For example, if a taxpayer did not pay more than half the cost of keeping up a home for the year, they cannot claim a dependent, but they could still claim a qualifying child for the Child Tax Credit.
[18] Some dependents, including children under age 18, may also be designated as filers, if they have negative incomes, unearned incomes over $1,150, or earned incomes over $12,950; and qualify under one of the above filing requirements.
[19] Some AGI and itemized deduction components are imputed from the IRS Statistics of Income microdata.
[20] The federal unemployment compensation exclusion, which excluded up to $10,200, was subtracted from AGI for tax year 2020. Though the federal exclusion ended in tax year 2021, many states that adopted this exclusion in tax year 2020 continued to exclude unemployment compensation from state taxable income for the tax year 2021.

income for either spouse; or (8) has total income above $2,000.[21] Tax units that do not satisfy any of these eight requirements are presumed non-filers. Note that since all tax units that appear eligible for a positive Child Tax Credit are modeled as filers, this step does not impact CTC receipt and amount.

Child Tax Credit Calculation

Given tax filing status, the number of qualifying children under 6, the number of qualifying children aged 6 to17, and adjusted gross income, the CPS ASEC Tax Model calculates the CTC amount and the amount of advance payments by following line-by-line the instructions on Schedule 8812 (Credits for Qualifying Children and Dependents) and associated Line 5 Worksheet (Figure 1). Schedule 8812 and the Line 5 Worksheet present the various phaseouts for the CTC based on filing status. For single filers, if their AGI is less than or equal to $75,000, then they receive the full amount of CTC: $3,000 per qualifying child aged 6 to 17 and $3,600 per qualifying child under 6. For married joint filers, if their AGI is less than or equal to $150,000, then they receive the full amount of CTC. For head of household filers, if their AGI is less than or equal to $112,500, then they receive the full amount of CTC. For the first phaseout, the payments are reduced by $50 for every additional $1,000 in AGI above the applicable threshold, plateauing at $2,000. For example, for filers with one qualifying child aged 6 to 17, CTC is reduced to $2,000 if their AGI is at least $95,000 for single filers, $132,500 for head of household filers, and $170,000 for married joint filers. The second phaseout begins at AGI of $400,000 for married joint filers and AGI of $200,000 for all other filers. For the second phaseout, the amounts are again reduced by $50 for every $1,000 of the amount by which the filer's AGI exceeds the applicable threshold from $2,000 to $0. For example, for filers with one qualifying child aged 6 to 17, CTC is reduced to $0 if their AGI is at least $440,000 for married joint filers and $240,000 other individual filers. These phaseouts are illustrated in the "Child Tax Credit Amount" figure in Section 2.

Though the total CTC amount is the variable used in Supplemental Poverty Measure calculations and tabulations, the model also calculates an amount for the advance CTC payment as half the modeled total CTC amount.[22] We then assign this advance CTC amount to filers who are in households that report receiving any advance CTC payment using the answer to the yes/no question added to the CPS ASEC.[23] If the CPS ASEC Tax Model assigns a CTC amount, but the household does not report receiving any advance CTC payment, then the advance CTC amount is set to zero. It is also possible for a household to report receiving advance CTC payments but appear to not have qualifying children within the survey household. For tax filing units within these households, their advance CTC payment and total CTC amount are zero. The answer to the yes/no question about receiving any advance CTC payment is not used in the tax model's calculation of any household's total CTC amount.

[21] Lin (2022) further discusses the tax model criteria for a tax unit filing a return including the low filing threshold of $2,000.

[22] The total estimated CTC amount variable (ACTC_CRD) is available on the 2022 ASEC public-use file. Historically, the ACTC_CRD was the refundable portion of CTC. This definition did not change for the 2022 CPS ASEC. Since in 2021 the CTC was fully refundable, ACTC_CRD reflected the entire CTC amount. Historically, CTC_CRD was the sum of the non-refundable portion of CTC and the credit for other dependents, so in the 2022 CPS ASEC it contains only the credit for other dependents.

[23] The advance CTC receipt variable used (HECTC_YN) is an edited survey variable which includes imputed values. The receipt variable and the estimated advance CTC payment amount variable (ADV_CTC) are available on the 2022 ASEC public-use file.

5. Validation Methods and Results

We take several approaches to validating the model results. For the first validation, we compare CTC amounts modeled from linked IRS Form 1040 records to amounts from the ASEC Tax Model. We link IRS Form 1040 records to individuals in ASEC household rosters who are also listed as the primary filer on any IRS Form 1040 record for tax year 2021, as described above. We sum the resulting imputed CTC payments from linked 1040s within ASEC tax units and compare those sums to the CTC amount from the ASEC Tax Model.[24] The results of this first validation exercise are summarized in Table 1.

Several encouraging facts can be gleaned from this comparison. First, 83.1 percent (+/- 0.4 percentage points[25]) of the person-weighted sample resides in tax units that agree between the two data sources on the extensive margin of CTC receipt. Second, among the 27.0 percent (+/- 0.3 percentage points) of people in tax units that have a positive CTC amount in both data sources, a majority (59.6 percent +/- 1.1 percentage points) have the exact same positive amount in both data sources. Among people with differing positive amounts, the tax model underestimates CTC for 17.6 percent (+/- 0.7 percentage points) of people and overestimates for 22.8 percent (+/- 0.8 percentage points).

Table 1 makes clear that CTC amounts modeled from the CPS ASEC survey information do not always match those modeled from the 1040s. Table 1 raises the question, however, as to which differences in model inputs give rise to the differences in CTC amounts shown in Table 1. The second validation exercise explores differences shown in Table 1 by comparing the two key inputs required to calculate the credit amount: adjusted gross income and number of qualifying children under age 18. We explore the correspondence in AGI by regressing Form 1040 AGI on ASEC-modeled AGI. We report results from those regressions in Table 2.

Results in Table 2 suggest that differences in AGI are unlikely to contribute much to the differences illustrated in Table 1. As was the case in the 2021 modeling of the Economic Impact Payments (Bee, Hokayem, and Lin, 2021), Table 2 shows that the CPS ASEC Tax Model captures much of the variation in Form 1040 AGI values: 48.3 percent of the variation in Form 1040 values in the $1-$200,000 range is explained by the CPS ASEC Tax Model (column 3).[26] Besides, as discussed above, the CTC benefit formula

[24] Note that since ASEC tax units do not always correspond to tax units observed on 1040s, some ASEC tax units will include multiple 1040 primary filers. The reverse does not hold, however: since the ASEC is a sample survey, persons listed on a 1040 but omitted from its linked ASEC roster have no chance of appearing on any other ASEC roster. By construction, each 1040 can be linked to at most one ASEC household. In some cases, this conceptual asymmetry will not matter. For example, if one linked 1040 includes all the children in the ASEC unit and the second includes none. Another example is when the various linked 1040s combine to include all the same children in the tax unit, and AGIs on the plateau of the phaseout in both data sources. In general, however, this asymmetry will tend to generate 1040-modeled CTC amounts that are too high, which should be kept in mind when interpreting the resulting comparisons. However, the weighted sample of linked 1040 primary filers is theoretically representative of the population of all civilian non-institutionalized 1040 primary filers, so this asymmetry is more relevant for the ASEC-tax-unit-level comparisons in Tables 1, 2 and 3, and less relevant for the aggregate comparisons in Table 4 and the appendix.

[25] Confidence intervals reflect the 90-percent confidence level.

[26] The R-squared of 0.483, which is subjectively relatively well fitted compared to most income models. It implies a correlation coefficient of 0.695.

phaseouts apply to relatively high and narrow ranges of AGI, such that there is limited scope for AGI to affect CTC amounts, especially among families with incomes near their respective poverty thresholds.

In Table 3 we explore the correspondence between qualifying children[27] identified on CPS ASEC household rosters and the numbers of qualifying children listed on Form 1040 records linked to anyone in the CPS ASEC tax unit as a primary filer. We present cross-tabulations of dependent counts between the two data sources. Cells on the diagonal show matching assignment of qualifying children aged 0 to 17 from the CPS ASEC Tax Model and tax year 2021 IRS Form 1040 records. About 48.4 percent (+/- 0.6 percentage points) of tax units with children from either data source have the same number in both sources. The first column and first row show error on the extensive margin: 16.2 percent (+/- 0.7 percentage points) of units with a child on a linked 1040 have no such child in the ASEC roster, and 35.9 percent (+/- 0.3 percentage points) of units with a child on the survey roster have no child in any linked 1040.[28] These discrepancies could be caused by children being claimed by different filers.

The comparisons in Tables 1, 2, and 3 reveal differences in individual assignment of CTC amounts, but it remains difficult to tell how those differences, in conjunction with other potential sources of survey error and non-representativeness, net out in the aggregate. It could be the case that some households are assigned CTC amounts that are slightly too high, others receive amounts too low, and that these errors generally cancel out. As a third and final validation exercise, Table 4 investigates this possibility, as it compares survey-weighted aggregate counts and amounts of modeled total CTC payments against benchmarks from two tables published by the Internal Revenue Service's Statistics of Income (SOI) program: Advance Child Tax Credit Statistics and Mid-July Filing Statistics by AGI.[29]

We combine the two SOI tables to make their statistics more conceptually comparable to those from the ASEC Tax Model. We construct the SOI aggregate CTC amount to be the sum of the advance CTC payments and the refundable CTC amounts.[30] We take the SOI aggregate count of CTC payments for each AGI category to be the higher of the count of tax units receiving advance CTC payments or the count of refundable CTC payments.[31] The number of qualifying children comes from the advance CTC payments table since SOI omits them from its Mid-July Filing Statistics. The underlying levels and standard errors

[27] Note that in both the tax model and in the linked data, "qualifying children" are identified as any dependents under age 18.
[28] These extensive margin error rates can be calculated from Table 3 as follows: 0.162=0.1103/(1-0.3196), 0.359=0.3196/(1-0.1103).
[29] The Advance Child Tax Credit Statistics table can be found at this website: <https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021> The Mid-July Filing Statistics by AGI table can be found at this website: <https://www.irs.gov/statistics/filing-season-statistics>. The Mid-July Filing Statistics table, which SOI published on September 8, 2022, incorporates the reconciliation of CTC amounts that occurred upon filing 2021 individual tax returns. The table contains information regarding tax year 2021 individual returns posted to the IRS database through July 28, 2022, and thus generally excludes taxpayers who requested a filing extension.
[30] SOI also separately tabulates nonrefundable CTC amounts, which were credited to those relatively few filers who were ineligible for the expanded, refundable CTC generally due to its citizenship and residency requirements.
[31] We take the maximum of the two counts because SOI only reports refundable CTC payments net of advance CTC payments already paid, such that it remains unclear how many tax units are in the union set of those who received advance CTC *or* a refundable CTC credit. In practice, however, this amounts to always using the count of advance CTC recipients, since that count is greater for each category.

are contained in Appendix Table 1. A prior version of this paper released in September 2022 included comparisons for advance CTC payments. Those comparisons are now in Appendix Tables 2, 3, 4, and 5.

Table 4 reveals that overall CPS ASEC Tax Model aggregates are qualitatively in line with SOI benchmarks, as differences in counts and amounts of payments are within 4 percent. These differences are statistically significant but encouraging.

The CPS ASEC Tax Model identifies 68.6 million CTC-qualifying children compared to the 62.0 million children that SOI counted for the advance payments. The number of qualifying children under advance CTC payments should theoretically be lower than the number qualifying for total CTC, though, and indeed Appendix Table 1 and Appendix Table 3 show that the total CTC payments more than doubled from total advance CTC payments. This more-than-doubling suggests more qualifying children were included in the total CTC payments.

However, the analysis in Table 4 also exposes marked discrepancies by income. First, we find the tax model assigns much higher CTC payments at the lowest category of the AGI distribution (negative to $10,000). There are many potential explanations for this result. For example, if lower-income households with children tended to under-report income in the survey, that would lead them to be miscategorized into the lower income category. Another potential explanation is discrepancies in filing status, as the lowest income households are the least likely to file, but the tax model assumes anyone eligible for a refundable credit will file.

Additionally, we find the tax model may substantially under-impute CTC payments to lower-income tax units in the $10,000 to $50,000 range, with ASEC/SOI amount ratios ranging from 0.49 among the "$10,000 under $20,000" to 0.82 in the "$40,000 under $50,000." This finding is especially concerning because these families are near their respective poverty thresholds, and one of the most important applications of the tax model is to allow analysts to measure the first-order impacts of the tax system on poverty. *Poverty in the United States: 2021* reports that the CTC lifted 5.3 million Americans out of poverty, including 2.9 million children, and Burns and Fox (2022) attribute 2.1 million of those to the CTC's expansion. The results in Table 4 imply that these qualitatively large estimates of CTC's anti-poverty impacts may be substantially understated.

Again, several explanations are consistent with this finding. It may be that the mismatch in dependents identified in Table 3 is correlated with income, as Unrath (2022) finds. Further, although we modified the SOI tables for comparability, the comparisons remain limited by several conceptual inconsistencies. The refundable CTC amounts in 2021 tax returns reflect the reconciliation by filers and the IRS with advance payments already paid during 2021. However, the SOI benchmarks include those who received excess advance payments and were covered by repayment protection, as described in Section 2. This deviation pushes the SOI benchmark to be conceptually larger than the CPS ASEC Tax Model CTC aggregates in the lower AGI levels.

Other conceptual differences include those common to most comparisons of CPS ASEC aggregates to tax aggregates. SOI totals include filers residing outside the US, on military bases, or in institutional quarters, which are excluded from the CPS civilian non-institutionalized universe. The SOI Mid-July Filing Statistics do not include very late filers (or non-filers who were in fact required to file) or those who received

an extension. SOI tabulations include filers with dependents residing outside the household, which are generally not included in CPS household rosters. While IRS defines age as of December 31 of the tax year, the CPS ASEC collects age at the time of the survey (February-April) in the following year.

6. Conclusion

This paper describes the changes to the CPS ASEC Tax Model to accommodate the expansion of the Child Tax Credit in 2021. It presents a comparison of the inputs used to calculate the total credit amount, as well as the portion paid in advance during 2021, using published SOI aggregates and linked individual tax returns. Data users interested in the total imputed CTC amount should use the ACTC_CRD variable. The ADV_CTC variable corresponds to the imputed advance CTC amount. Both variables are available on the 2022 CPS ASEC public-use file.[32] The total credit amount is reflected in many Census Bureau statistics and publications, including post-tax income in the report *Income in the United States: 2021* and the Supplemental Poverty Measure in the report *Poverty in the United States: 2021*.

While we find substantial agreement between ASEC-modeled and linked-1040 CTC receipt and amounts (Table 1), our comparisons of the inputs to the CTC calculation (in Tables 2 and 3) suggest dependent assignment may matter more than AGI measurement. These results mirror those of Unrath (2022), who finds similarly substantial dependent discrepancies, and complement those of Jones and Ziliak (2022) and Meyer *et al.* (2022), who emphasize the role of income misreporting in the EITC and CTC imputation error.

While comparisons of inputs help describe how the CPS ASEC may perform in its CTC modeling, by themselves they do not reveal how these inputs affect the final distribution of CPS ASEC CTC errors. Comparisons to SOI benchmarks (in Table 4), however, approximately maps those differences in inputs into the unobserved differences in CTC output values. ASEC aggregates correspond relatively well to SOI benchmarks, with small but statistically significant differences, but we find this is due to under-imputation among lower-income households balanced by over-imputation at the upper end.

Both the SOI tables and the CPS ASEC Tax Model reflect counts of qualifying children for the advance CTC that fall well short of the total number of children under 18 represented in the CPS ASEC as a whole, about 73.5 million.[33] Larrimore, Mortenson, and Splinter (2021, Figure 4) show that almost all eligible children were claimed on *some* Form 1040 individual return in 2010, though 1040 counts diverged somewhat from decennial counts for teenaged children. Jones and O'Hara (2016), as well as Larrimore, Mortenson, and Splinter (2017), describe how "doubled-up" households may often optimize their credits by assigning dependents to the individual tax return in the household that most reduces the total household tax burden. If the CPS ASEC simply had fewer total children than SOI, then the CPS ASEC Tax Model could never reach SOI benchmarks, and this shortfall could not be resolved by better assignment of qualifying children in the ASEC Tax Model. Since the CPS ASEC is weighted to target population controls

[32] The 2022 CPS ASEC public-use file can be found at <https://www.census.gov/data/datasets/time-series/demo/cps/cps-asec.html>.

[33] Though the tax model identifies 68.6 million children as qualifying for the total CTC, since about a third of children aged 0 to 17 were in households that reported not receiving advance payments, the tax model ends up with a much lower number of qualifying children (and therefore aggregate amount) for the advance CTC.

including the national age distribution, it is mechanically constructed to contain approximately the same number of children as in the population. If the weighted number of children captured by the ASEC in total is not the explanation for the disagreement, it suggests the Tax Model misassigns children to the wrong tax units. This misassignment may have limited impact on estimates of aggregate credit payments, but it could be very important for estimates of poverty rates and these credits' impacts on poverty. It may be possible for future iterations of the CPS ASEC Tax Model to impute dependent children to tax units even when none appear on the roster, and conversely impute the omission of children from the modelled filings of households that are projected to contain children claimed by filers outside those households.

An imputation that reassigns children among households would represent a departure from the current tax modeling paradigm (*e.g.*, TAXSIM, the Bakija tax model, TRIM3) that takes inputs such as income and household structure as reported, deterministically applying the official IRS tax calculation algorithms. It would also generate some inconsistency between the tax model and other parts of SPM, such as equivalence adjustment scaling factors based on reported household structures. Wheaton and Stevens (2016) show that the differences among various existing models are small given the same inputs, however, which suggests that further improvement in approaching IRS aggregate credits might need to come from improvement in model inputs such as counts of qualifying children.

In future research (currently in progress) we plan to more fully investigate reasons for misallocation of children among tax units (as well as other issues, such as assignment of filing status) and to identify avenues for improved modeling. This line of research will also further describe the differences in the tax model variables among the ASEC, the ASEC-linked 1040s, the universe of 1040s, and the SOI aggregates. Ultimately, obtaining reliable household-level values for credits like the Child Tax Credit is a crucial step toward evaluating the performance of the nation's tax system.

References

Ananat, Elizabeth, Benjamin Glasner, Christal Hamilton, and Zachary Parolin. 2022. "Effects of the Expanded Child Tax Credit on Employment Outcomes: Evidence from Real-World Data from April to December 2021." Available at https://www.nber.org/system/files/working_papers/w29823/w29823.pdf.

Bastian, Jacob. 2022. "Investigating the effects of the 2021 Child Tax Credit expansion on poverty and maternal employment." Working paper. Available at http://jacobbastian.squarespace.com/research.

Bee, Adam, Charles Hokayem, and Daniel Lin. 2021. "Imputing 2020 Economic Impact Payments in the 2021 CPS ASEC." SEHSD Working Paper No. FY 2021-18. Available at https://www.census.gov/content/dam/Census/library/working-papers/2021/demo/sehsd-wp2021-18.pdf.

Burns, Kalee, and Liana E. Fox. 2022. "The Impact of the 2021 Expanded Child Tax Credit on Child Poverty." SEHSD Working Paper No FY 2022-24. Available at https://www.census.gov/content/dam/Census/library/working-papers/2022/demo/sehsd-wp2022-24.pdf.

Collyer, Sophie, Thesia Garner, Neeraj Kaushal, Jiwan Lee, Jake Schild, Jane Waldfogel, and Christopher Wimer. 2022. "Effects of the Expanded Child Tax Credit on Household Expenditures: Preliminary Intent-to-Treat Estimates from the Consumer Expenditure Survey." Bureau of Labor Statistics Working Paper No. 549, April. Available at https://www.bls.gov/osmr/research-papers/2022/ec220040.htm.

Corinth, Kevin, Bruce D. Meyer, Matthew Stadnicki, and Derek Wu. 2021. "The Anti-Poverty, Targeting, and Labor Supply Effects of the Proposed Child Tax Credit Expansion." Becker Friedman Institute Working Paper #2021-115.

Creamer, John, Emily A. Shrider, Kalee Burns, and Frances Chen. 2022. *Poverty in the United States: 2021.* US Census Bureau Report Number P60-277, issued September 13, 2022. Available at https://www.census.gov/library/publications/2022/demo/p60-277.html.

Enriquez, Brandon, Damon Jones, and Ernest V. Tedeschi. 2023. "The Short-Term Labor Supply Response to the Expanded Child Tax Credit." National Bureau of Economic Research Working Paper No. 31110. Available at https://www.nber.org/system/files/working_papers/w31110/w31110.pdf.

Hardy, Bradley L., Sophie M. Collyer, and Christopher T. Wimer. 2023. "The Antipoverty Effects of the Expanded Child Tax Credit across States: Where Were the Historic Reductions Felt?" Brookings Hamilton Project report. Available at https://www.brookings.edu/wp-content/uploads/2023/02/20230301_ES_THP_CTCbyState.pdf.

Jones, Maggie R., and Amy B. O'Hara. 2016. "Do Doubled-Up Families Minimize Household-Level Tax Burden?" *National Tax Journal* 69(3): 613-640. doi: 10.17310/ntj.2016.3.05.

Jones, Maggie R., and James P. Ziliak. 2022. "The Antipoverty Impact of the EITC: New Estimates from Survey and Administrative Tax Records." *National Tax Journal* 75(3): 451-479. doi: 10.1086/720614.

Larrimore, Jeff, Jacob Mortenson, and David Splinter. 2017. "Whose Child Is This? Shifting of Dependents Among EITC Claimants Within the Same Household." *National Tax Journal* 70(4): 737-758.

Larrimore, Jeff, Jacob Mortenson, and David Splinter. 2021. "Household Incomes in Tax Data: Using Addresses to Move from Tax-Unit to Household Income Distributions." *The Journal of Human Resources* 56(2): 600-631. doi: 10.3368/jhr.56.2.0718-9647R1.

Lin, Daniel. 2022. "Methods and Assumptions of the CPS ASEC Tax Model." SEHSD Working Paper No. FY 2022-18. Available at https://www.census.gov/content/dam/Census/library/working-papers/2022/demo/sehsd-wp2022-18.pdf.

Maag, Elaine, Nikhita Airi, and Lillian Hunter. 2023. "Understanding Yearly Changes in Family Structure and Income and Their Impact on Tax Credits." Tax Policy Center Brief. Available at https://www.taxpolicycenter.org/publications/understanding-yearly-changes-family-structure-and-income-and-their-impact-tax-credits/full.

Meyer, Bruce D., Derek Wu, Grace Finley, Patrick Langetieg, Carla Medalia, Mark Payne, and Alan Plumley. 2022. "The Accuracy of Tax Imputations: Estimating Tax Liabilities and Credits Using Linked Survey and Administrative Data." In *Measuring Distribution and Mobility of Income and Wealth*, edited by Raj Chetty, John N. Friedman, Janet C. Gornick, Barry Johnson, and Arthur Kennickell. Pages 459-498. National Bureau of Economic Research. Available at https://www.nber.org/books-and-chapters/measuring-distribution-and-mobility-income-and-wealth/accuracy-tax-imputations-estimating-tax-liabilities-and-credits-using-linked-survey-and.

Perez-Lopez, Daniel. 2021. "Household Pulse Survey Collected Responses Just Before and Just After the Arrival of the First CTC Checks." *America Counts*, US Census Bureau. Available at https://www.census.gov/library/stories/2021/08/economic-hardship-declined-in-households-with-children-as-child-tax-credit-payments-arrived.html.

Semega, Jessica, and Melissa Kollar. 2022. *Income in the United States: 2021.* US Census Bureau Report Number P60-276, issued September 13, 2022. Available at https://www.census.gov/library/publications/2022/demo/p60-276.html.

Splinter, David. 2022. "Stimulus Checks: True-Up and Safe Harbor Costs." Joint Committee on Taxation working paper. Available at http://www.davidsplinter.com/Splinter-StimulusChecks.pdf.

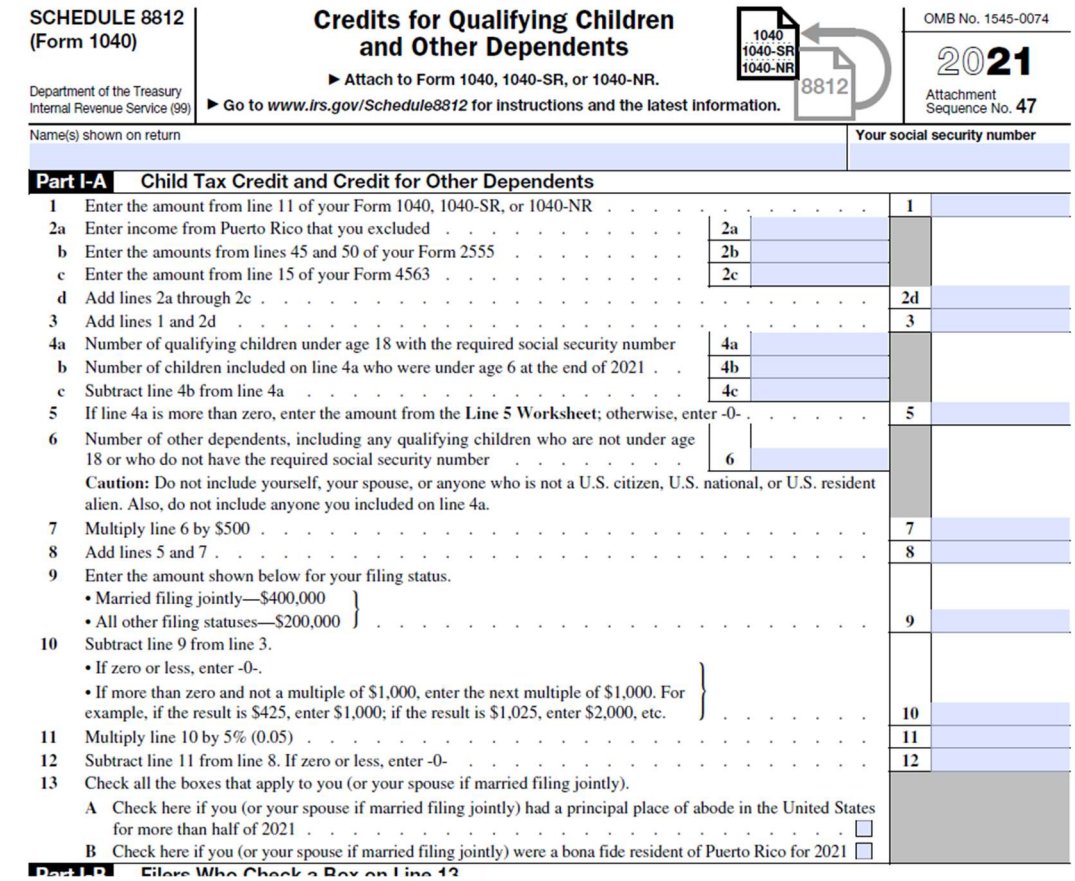
Unrath, Matthew. 2022. "Married… With Children? Assessing the Alignment Between Tax Units and Survey Households." Unpublished SEHSD working paper. Scheduled for presentation at National Tax Association 115th Annual Conference on Taxation (cancelled), November 2022.

Wheaton, Laura, and Kathryn Stevens. 2016. "The Effect of Different Tax Calculators on the Supplemental Poverty Measure." Urban Institute Research Report. Available at

https://www.urban.org/sites/default/files/publication/80256/2000774-The-Effect-of-Different-Tax-Calculators-on-the-Supplemental-Poverty-Measure.pdf.

Tables and Figures

Figure 1: Excerpt of Schedule 8812 Credits for Qualifying Children and Dependents and its associated Line 5 Worksheet



SCHEDULE 8812 (Form 1040)

Department of the Treasury
Internal Revenue Service (99)

Credits for Qualifying Children and Other Dependents

▶ Attach to Form 1040, 1040-SR, or 1040-NR.

▶ Go to *www.irs.gov/Schedule8812* for instructions and the latest information.

1040 1040-SR 1040-NR 8812

OMB No. 1545-0074

2021

Attachment Sequence No. 47

Name(s) shown on return | Your social security number

Part I-A Child Tax Credit and Credit for Other Dependents

1	Enter the amount from line 11 of your Form 1040, 1040-SR, or 1040-NR			1
2a	Enter income from Puerto Rico that you excluded	2a		
b	Enter the amounts from lines 45 and 50 of your Form 2555	2b		
c	Enter the amount from line 15 of your Form 4563	2c		
d	Add lines 2a through 2c			2d
3	Add lines 1 and 2d			3
4a	Number of qualifying children under age 18 with the required social security number	4a		
b	Number of children included on line 4a who were under age 6 at the end of 2021	4b		
c	Subtract line 4b from line 4a	4c		
5	If line 4a is more than zero, enter the amount from the **Line 5 Worksheet**; otherwise, enter -0-			5
6	Number of other dependents, including any qualifying children who are not under age 18 or who do not have the required social security number	6		
	Caution: Do not include yourself, your spouse, or anyone who is not a U.S. citizen, U.S. national, or U.S. resident alien. Also, do not include anyone you included on line 4a.			
7	Multiply line 6 by $500			7
8	Add lines 5 and 7			8
9	Enter the amount shown below for your filing status. • Married filing jointly—$400,000 • All other filing statuses—$200,000			9
10	Subtract line 9 from line 3. • If zero or less, enter -0-. • If more than zero and not a multiple of $1,000, enter the next multiple of $1,000. For example, if the result is $425, enter $1,000; if the result is $1,025, enter $2,000, etc.			10
11	Multiply line 10 by 5% (0.05)			11
12	Subtract line 11 from line 8. If zero or less, enter -0-			12
13	Check all the boxes that apply to you (or your spouse if married filing jointly).			
	A Check here if you (or your spouse if married filing jointly) had a principal place of abode in the United States for more than half of 2021 ☐			
	B Check here if you (or your spouse if married filing jointly) were a bona fide resident of Puerto Rico for 2021 ☐			

Part I-B Filers Who Check a Box on Line 13

Line 5 Worksheet

1.	Multiply Schedule 8812, line 4b, by $3,600	1.
2.	Multiply Schedule 8812, line 4c, by $3,000	2.
3.	Add line 1 and line 2	3.
4.	Multiply Schedule 8812, line 4a, by $2,000	4.
5.	Subtract line 4 from line 3	5.
6.	Enter the amount shown below for your filing status • Married filing jointly — $12,500 • Qualifying widow(er) — $2,500 • Head of household — $4,375 • All other filing statuses — $6,250	6.
7.	Enter the smaller of line 5 or line 6	7.
8.	Enter the amount shown below for your filing status • Married filing jointly or Qualifying widow(er) — $150,000 • Head of household — $112,500 • All other filing statuses — $75,000	8.
9.	Subtract line 8 from Schedule 8812, line 3 • If zero or less, enter -0- • If more than zero and not a multiple of $1,000, enter the next multiple of $1,000 For example, if the result is $425, enter $1,000; if the result is $1,025, enter $2,000, etc.	9.
10.	Multiply line 9 by 5% (0.05)	10.
11.	Enter the smaller of line 7 or line 10	11.
12.	Subtract line 11 from line 3. Enter on Schedule 8812, line 5	12.

Source: US Internal Revenue Service instructions.

Table 1. Differences in receipt and amount between CTC values from the ASEC tax model and from linked 1040s.

	Proportion of Population	Standard Error
Proportion of population in tax units with:		
Zero CTC in both CPS ASEC tax model and linked 1040 (if any)	56.06	0.15
False positive: ASEC model amount positive but 1040 zero	14.62	0.16
False negative: ASEC model amount zero but 1040 positive	2.33	0.06
Positive CTC in both data sources	27.00	0.19
Among those with positive CTC in both data sources:		
ASEC more than 1040 amount	22.81	0.51
ASEC equals 1040	59.61	0.66
ASEC less than 1040 amount	17.58	0.40

Sources: US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC) individually linked to tax year 2021 Internal Revenue Service Form 1040 records and 2022Q2 SSA Numident age records for dependents.
Notes: Proportions are weighted by CPS ASEC final person weights of CPS ASEC tax unit members.

Table 2. Regressing linked IRS Form 1040 tax year 2021 adjusted gross income (AGI) on CPS ASEC-modeled tax year 2021 AGI.

Coefficient (Std. err.) *t-statistic*	(1) Linear	(2) Linear, Restricted to AGI $1-$150k	(3) Linear, Restricted to AGI $1-$200k	(4) Cubic, Restricted to AGI $1-$150k
Constant	55,910 (3,750) *14.91*	17,480 (288.0) *60.70*	18,100 (292.2) *61.93*	21,530 (534.1) *40.30*
AGI/10k	4,892 (312.4) *15.66*	6,320 (55.70) *113.5*	6,577 (51.19) *128.5*	2,424 (372.6) *6.505*
AGI/10k squared	--	--	--	751.1 (71.33) *10.53*
AGI/10k cubed	--	--	--	-37.00 (3.663) *-10.10*
R-squared	0.007	0.443	0.483	0.447
N	51,000	32,000	34,000	32,000

Sources: US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC) individually linked to tax year 2021 IRS Form 1040 records.
Notes: The dependent variable is AGI from individually linked IRS Form 1040 records, from tax year 2021, linked to primary filers. The main independent variable is AGI as modeled in the CPS ASEC tax model, based on responses to the 2022 CPS ASEC regarding income received during the 2021 calendar year and household characteristics at the time of interview. Form 1040 records are linked via Protected Identification Key of the primary filer. AGI sample restrictions are applied to both the IRS amounts and the CPS ASEC-modeled amounts. Standard errors are in parenthesis, *t*-statistics in italics.

Table 3. Number of dependents under 18 at the ASEC tax-unit level, among those with at least one dependent in either data source.

Weighted proportions of tax units
Standard errors in parenthesis

Number of dependents in ASEC tax unit, according to ASEC tax model	Number of dependents aged 0-17 in all Form 1040 records linked to the ASEC tax unit					
	0	1	2	3	4+	Total
0	-- --	0.0727 (0.0019)	0.0273 (0.0013)	0.0083 (0.0008)	0.0020 (0.0004)	0.1103 (0.0022)
1	0.1643 (0.0022)	0.2196 (0.0014)	0.0112 (0.0031)	0.0019 (0.0005)	0.0004 (0.0002)	0.3973 (0.0040)
2	0.0996 (0.0028)	0.0310 (0.0032)	0.1788 (0.0008)	0.0056 (0.0003)	0.0008 (0.0002)	0.3157 (0.0040)
3	0.0372 (0.0015)	0.0044 (0.0006)	0.0145 (0.0010)	0.0641 (0.0019)	0.0017 (0.0003)	0.1219 (0.0026)
4+	0.0185 (0.0010)	0.0011 (0.0003)	0.0040 (0.0005)	0.0093 (0.0007)	0.0218 (0.0011)	0.0547 (0.0017)
Total	0.3196 (0.0034)	0.3288 (0.0034)	0.2358 (0.0032)	0.0892 (0.0021)	0.0266 (0.0012)	1.0000 --

Sources: US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC) individually linked to tax year 2021 Internal Revenue Service Form 1040 records and 2022Q2 SSA Numident age records for dependents.
Notes: This table omits the 76 percent of ASEC tax units that have no dependents in either the CPS ASEC tax model or any linked IRS Form 1040 record. The above cell proportions imply the following extensive margin error rates: 16.2 percent of units with a child on a linked 1040 have no child in the ASEC roster, and 35.9 percent of units with a child on the survey roster have no child on any linked 1040. Tax units are weighted by the weight of the first person listed in each tax unit (*i.e.*, the person record with the lowest value of A_LINENO). Standard errors are in parenthesis.

Table 4. ASEC/SOI ratios of Child Tax Credit by categories of adjusted gross income (AGI).

	Count of payments[1]	Total payment amount[2]	Count of qualifying children[3]	Mean payment
Overall	**0.98**	**1.02**	**1.11**	**1.04**
Under $10,000*	1.64	1.63	2.00	1.00
$10,000 under $20,000	0.45	0.49	0.54	1.08
$20,000 under $30,000	0.55	0.62	0.65	1.12
$30,000 under $40,000	0.71	0.77	0.80	1.08
$40,000 under $50,000	0.76	0.82	0.87	1.08
$50,000 under $75,000	0.99	1.06	1.11	1.07
$75,000 under $100,000	1.05	1.09	1.13	1.04
$100,000 under $200,000	1.29	1.35	1.41	1.05
$200,000 or more	1.62	1.77	1.70	1.09

Sources: Internal Revenue Service Statistics of Income (IRS SOI) tables with information through July 28, 2022 (https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021 and https://www.irs.gov/statistics/filing-season-statistics), US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the ratio of the CPS ASEC tax-modeled sum of the Child Tax Credit to its corresponding IRS SOI benchmark. The SOI benchmark is the combination of advance Child Tax Credit payments and total refundable Child Tax Credit. Underlying levels are listed in Appendix Table 1. Ratios may differ slightly from those implied by Appendix Table 1 due to use of unrounded SOI values.

*The "Under $10,000" AGI category is combined from SOI categories "no adjusted gross income" and "$1 under $10,000."

[1]The IRS SOI count of payments is the maximum of the count of advance Child Tax Credit payments and the count of the refundable Child Tax Credit payments from tax returns.

[2]The IRS SOI total payment amount is the sum of advance Child Tax Credit payments and the refundable Child Tax Credit payments from tax returns.

[3]The IRS SOI count of qualifying children is solely from those who received advance Child Tax Credit payments.

Appendix Table 1. Estimates of levels and standard errors of Child Tax Credit by categories of adjusted gross income (AGI).

Panel A. Levels

	CPS ASEC Tax Model			IRS SOI		
	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)	Count of payments (millions)[1]	Total payment amount ($ billions)[2]	Count of qualifying children (millions)[3]
Overall	**37.22**	**204.70**	**68.61**	**37.96**	**200.31**	**61.98**
Under $10,000*	4.30	25.35	7.90	2.62	15.51	3.95
$10,000 under $20,000	1.88	11.06	3.45	4.15	22.63	6.38
$20,000 under $30,000	2.61	15.26	4.79	4.73	24.72	7.42
$30,000 under $40,000	3.00	17.07	5.36	4.21	22.25	6.69
$40,000 under $50,000	2.39	14.05	4.42	3.12	17.05	5.09
$50,000 under $75,000	5.34	31.69	9.96	5.40	29.97	8.95
$75,000 under $100,000	4.04	23.49	7.39	3.86	21.62	6.52
$100,000 under $200,000	9.23	50.87	17.14	7.14	37.59	12.15
$200,000 or more	4.42	15.86	8.20	2.73	8.98	4.81

Sources: Internal Revenue Service Statistics of Income (IRS SOI) tables with information through July 28, 2022 (https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021 and https://www.irs.gov/statistics/filing-season-statistics), US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).
Notes: Each cell represents the aggregate sum of Child Tax Credit. The SOI benchmark is the combination of advance Child Tax Credit payments and total refundable Child Tax Credit. *The "Under $10,000" AGI category is combined from SOI categories "no adjusted gross income" and "$1 under $10,000." Counts and number of children are in millions. Credit amounts are in billions. Ratios in Table 4 are based on unrounded SOI statistics.

[1]The IRS SOI count of payments is the count of advance Child Tax Credit payments, which for all categories is larger than the count of the refundable Child Tax Credit payments from tax returns.

[2]The IRS SOI total payment amount is the sum of advance Child Tax Credit payments and the refundable Child Tax Credit payments from tax returns.

[3]The IRS SOI count of qualifying children is solely from those who received advance Child Tax Credit payments.

Panel B. Standard Errors

	CPS ASEC Tax Model		
	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)
Overall	**0.24**	**1.62**	**0.54**
Under $10,000*	0.11	0.71	0.22
$10,000 under $20,000	0.07	0.46	0.14
$20,000 under $30,000	0.08	0.54	0.17
$30,000 under $40,000	0.09	0.60	0.19
$40,000 under $50,000	0.07	0.52	0.16
$50,000 under $75,000	0.11	0.79	0.25
$75,000 under $100,000	0.09	0.58	0.18
$100,000 under $200,000	0.15	0.94	0.31
$200,000 or more	0.10	0.39	0.20

Sources: US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).
Notes: Each cell represents the standard error of the aggregate modeled sum of Child Tax Credit. Counts of payments and children are in millions. Credit amounts are in billions.

Appendix Table 2. ASEC/SOI ratios of advance Child Tax Credit payments by categories of adjusted gross income (AGI).

	Count of payments	Total payment amount	Number of qualifying children	Mean payment
Overall	**0.64**	**0.75**	**0.76**	**1.17**
Under $10,000*	0.93	1.25	1.23	1.34
$10,000 under $20,000	0.30	0.37	0.37	1.26
$20,000 under $30,000	0.36	0.42	0.43	1.18
$30,000 under $40,000	0.48	0.57	0.57	1.20
$40,000 under $50,000	0.52	0.61	0.61	1.18
$50,000 under $60,000	0.66	0.78	0.77	1.17
$60,000 under $75,000	0.69	0.82	0.81	1.19
$75,000 under $100,000	0.71	0.80	0.80	1.12
$100,000 under $200,000	0.90	1.03	1.01	1.15
$200,000 under $400,000	1.05	1.19	1.18	1.14
$400,000 or more	0.46	0.47	0.48	1.03

Sources: Internal Revenue Service Statistics of Income (IRS SOI) tables (https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021), US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the ratio of the CPS ASEC tax-modeled sum of the advance Child Tax Credit payments to its corresponding IRS SOI benchmark. Underlying levels are listed in Appendix Table 3. *The "Under $10,000" AGI category combines the SOI categories "no adjusted gross income" and "$1 under $10,000." Ratios may differ slightly from those implied by Appendix Table 3 due to use of unrounded SOI values.

Appendix Table 3. Estimates of levels and standard errors of advance Child Tax Credit payments by categories of adjusted gross income (AGI).

Panel A. Levels

	CPS ASEC Tax Model			IRS SOI		
	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)
Overall	**24.48**	**70.62**	**47.14**	**37.96**	**93.62**	**61.98**
Under $10,000*	2.44	7.83	4.88	2.62	6.26	3.95
$10,000 under $20,000	1.23	3.78	2.36	4.15	10.18	6.38
$20,000 under $30,000	1.70	5.02	3.16	4.73	11.83	7.42
$30,000 under $40,000	2.00	6.06	3.80	4.21	10.63	6.69
$40,000 under $50,000	1.61	4.90	3.09	3.12	8.07	5.09
$50,000 under $60,000	1.61	4.91	3.09	2.44	6.34	4.01
$60,000 under $75,000	2.04	6.40	4.02	2.97	7.81	4.94
$75,000 under $100,000	2.76	8.26	5.20	3.86	10.28	6.52
$100,000 under $200,000	6.42	18.32	12.30	7.14	17.71	12.15
$200,000 under $400,000	2.53	4.96	4.94	2.41	4.17	4.18
$400,000 or more	0.14	0.17	0.31	0.32	0.35	0.64

Sources: Internal Revenue Service Statistics of Income (IRS SOI) tables (https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021), US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).
Notes: Each cell represents the aggregate sum of the advance Child Tax Credit payments. The "Under $10k" AGI category is combined from SOI categories "no adjusted gross income" and "$1 under $10,000." Counts are in millions. Payment amounts are in billions. Ratios in Appendix Table 2 are based on unrounded SOI statistics.

Panel B. Standard Errors

	CPS ASEC Tax Model		
	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)
Overall	**0.22**	**0.73**	**0.55**
Under $10,000*	0.08	0.32	0.25
$10,000 under $20,000	0.05	0.19	0.14
$20,000 under $30,000	0.07	0.22	0.17
$30,000 under $40,000	0.07	0.25	0.19
$40,000 under $50,000	0.06	0.21	0.16
$50,000 under $60,000	0.06	0.22	0.17
$60,000 under $75,000	0.07	0.24	0.18
$75,000 under $100,000	0.08	0.24	0.18
$100,000 under $200,000	0.12	0.39	0.31
$200,000 under $400,000	0.07	0.15	0.19
$400,000 or more	0.02	0.03	0.11

Sources: US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).
Notes: Each cell represents the standard error of the aggregate modeled sum advance Child Tax Credit payments. Counts are in millions. Payment amounts are in billions.

Appendix Table 4. ASEC/SOI ratios of advance Child Tax Credit payments by filing status.

	Count of payments	Total payment amount	Count of qualifying children	Mean payment
Overall	**0.64**	**0.75**	**0.76**	**1.17**
Single or qualifying widow(er)[1]	--	--	--	--
Married filing jointly or separately[2]	0.79	0.88	0.88	1.11
Head of household	0.56	0.68	0.68	1.22

Sources: Internal Revenue Service Statistics of Income (IRS SOI) tables (https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021), US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the ratio of the CPS ASEC tax-modeled sum of the advance Child Tax Credit payments to its corresponding IRS SOI benchmark. Underlying levels are listed in Appendix Table 5. Ratios may differ slightly from those implied by Appendix Table 5 due to use of unrounded SOI values.

[1]The CPS ASEC Tax Model assigns single filer status such that it is most comparable to the sum of SOI single filers and SOI qualifying widow(er) filers. The CPS ASEC Tax Model does not assign children or dependents to single filers. Singles filers with dependents are reclassified as head of household filers.

[2]The CPS ASEC Tax Model assigns married filing jointly such that counts are most comparable to the sum of SOI married joint and one-half of SOI married separate filers, and the amounts are most comparable to the sum of SOI married joint and separate filers.

Appendix Table 5. Estimates of levels and standard errors of advance Child Tax Credit payments by filing status.

Panel A. Levels

	CPS ASEC Tax Model			IRS SOI		
	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)
Overall	**24.48**	**70.62**	**47.14**	**37.96**	**93.62**	**61.98**
Single or qualifying widow(er)[1]	-	-	-	-	-	-
Married filing jointly or separately[2]	15.97	46.80	31.94	20.21	53.20	36.20
Head of household	8.51	23.82	15.21	15.28	35.07	22.35

Sources: Internal Revenue Service Statistics of Income (IRS SOI) tables (https://www.irs.gov/statistics/soi-tax-stats-advance-child-tax-credit-payments-in-2021), US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the aggregate sum of the advance Child Tax Credit payments. Counts are in millions. Payment amounts are in billions. Ratios in Appendix Table 4 are based on unrounded SOI statistics.

[1]The CPS ASEC Tax Model assigns single filer status such that it is most comparable to the sum of SOI single filers and SOI qualifying widow(er) filers. The CPS ASEC Tax Model does not assign children or dependents to single filers. Singles filers with dependents are reclassified as head of household filers.

[2]The CPS ASEC Tax Model assigns married filing jointly such that counts are most comparable to the sum of SOI married joint and one-half of SOI married separate filers, and the amounts are most comparable to the sum of SOI married joint and separate filers.

Panel B. Standard Errors

	CPS ASEC Tax Model		
	Count of payments (millions)	Total payment amount ($ billions)	Count of qualifying children (millions)
Overall	**0.22**	**0.73**	**0.55**
Single or qualifying widow(er)	-	-	-
Married filing jointly or separately	0.18	0.59	0.47
Head of household	0.15	0.48	0.34

Sources: US Census Bureau 2022 Current Population Survey Annual Social and Economic Supplement (CPS ASEC).

Notes: Each cell represents the standard error of the aggregate modeled sum advance Child Tax Credit payments. Counts are in millions. Payment amounts are in billions.