ONLINE APPENDIX

Measuring Take-up of the California EITC with State Administrative Data

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A Representativeness of SNAP Population

We use the 2017 ACS 5-year sample to investigate how representative SNAP recipients are of the low-income population in California and the extent to which our estimates of take-up in the SNAP population might apply to all low-income households in the state. The ACS does not contain all the information needed to accurately estimate EITC eligibility, but we can compare the overall income, demographic, and household characteristics of SNAP enrollees (and those who reside with SNAP enrollees) to those who do not enroll in SNAP (and reside with no other SNAP enrollees).

First, we restrict the ACS sample to households who reside in California. Approximately 5.2 million individuals reside in a household with at least one SNAP recipient, versus 32.9 million in households without a SNAP recipient. We consider a subsample of these data, limited to those 18–64-year-old individuals with family income between $0 and $69,063 (the median family income among this population in 2017) and excluding those residing in group-quarters. Within this group, we contrast those who live in a household with someone claiming SNAP to those who do not (Appendix Table A.1). This sample includes 81% of those 18-64-year-olds in SNAP households and 46% of those in non-SNAP households.

Overall, adults between 18-64 years old in households with a SNAP recipient (hereafter referred to as SNAP families) tend to belong to larger families than those in households without SNAP recipients (non-SNAP families). SNAP families contain an average of 4.1 individuals, compared to 2.8 in non-SNAP families. The composition of those families is also different. SNAP families tend to contain more children and fewer elderly individuals. Adults in SNAP families are more likely to be Hispanic relative to those in non-SNAP households and to a lesser degree more likely to be non-White.

SNAP families also tend to have lower incomes than non-SNAP families. Median total family income among SNAP families is $11,886 lower than for non-SNAP families. This trend is similar for earned income ($11,917 lower) and wage income ($11,376 lower). Non-SNAP families are slightly more likely to have a positive amount of investment income than SNAP families and are also more likely to have investment income over the EITC cutoff. The lower total, earned, and wage income at the family level among SNAP families suggests a larger share of these families could be eligible for the federal and California EITC than non-SNAP families.

In Appendix Figure A.1, we compare the distribution of income among SNAP families versus non-SNAP families. The difference in the distribution of income between SNAP and non-SNAP families is similar across total, earned, and wage income. The lower means reported in Table A1 seems to be a product of this overall shift in the income distribution, although there is some small evidence of a slightly higher share of SNAP families having $0 in family income (though not wages).

These characteristics suggest that families in SNAP households are more likely to be eligible for the federal EITC and CalEITC, given their lower income and greater number of children. Of course, many eligible families do not

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appear in our SNAP data. It is also likely we miss many eligible non-claimants, because there are many more low-income individuals and families in the non-SNAP population, and the same families who would choose not to enroll in a program like SNAP might also be less inclined to file a return and claim the CalEITC.

Appendix Table A.1: Comparison of means between SNAP recipient and non-recipient families

	Non-recipients	Recipients	Total
Sample Size	9,677,982	2,345,127	12,023,109
Family composition			
Family size	2.8	4.1	3.0
Count of adults	2.0	2.3	2.0
Count of children	0.6	1.6	0.8
Count of elderly	0.2	0.1	0.2
Demographics (percent)			
Married	38%	34%	37%
Non-white	41%	44%	42%
Black	6%	10%	7%
Hispanic	44%	58%	46%
Income (median)			
Total family income	$35,886	$24,000	$33,094
Family earned income	$31,566	$19,649	$29,474
Family wage income	$28,957	$17,581	$25,885
Family investment income	$0	$0	$0
Income (percent)			
Positive investment income	7%	2%	6%
Investment income over the EITC cap	0%	0%	0%
$0 total family income	5%	4%	5%
$0 family earned income	14%	17%	14%
$0 family wage income	19%	22%	20%

Notes. Constructed using the 2017 ACS 5-Year Sample. Restricted to 18–64-year-olds with total family income between $0 and $69,063, constructed using ACS person-weights, excluding individuals in group quarters.

Appendix Figure A.1: Distribution of income sources for SNAP and non-SNAP families in California, 2017 5-year ACS sample
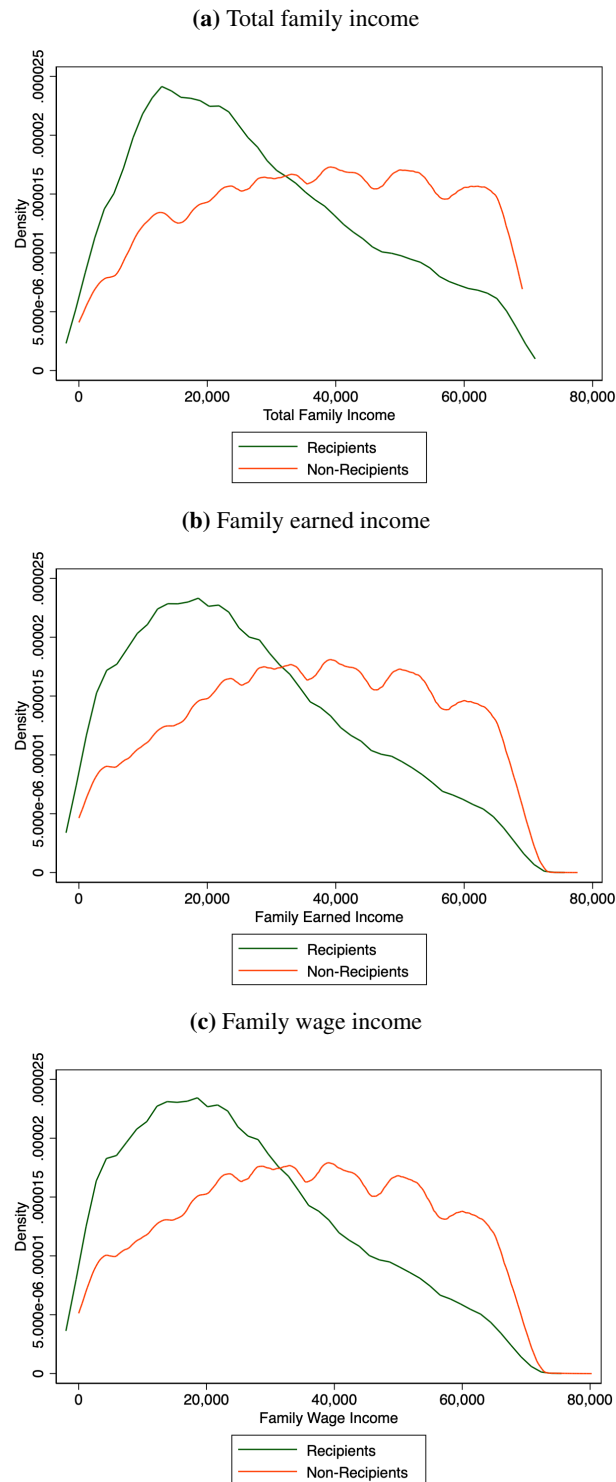
(a) Total family income

(b) Family earned income

(c) Family wage income

Notes. Constructed using the 2017 ACS 5-Year Sample, restricted to 18–64-year-olds with total family income between $0 and $69,063, using ACS person-weights, excluding individuals in group quarters. Each figure excludes individuals with negative income of the graphed type.

B   Comparison of e-filers with paper and web filers

The full set of state returns shared by the California Franchise Tax Board (FTB) consists of 33.8 million individuals across 16.6 million tax units. Appendix Table B.1 reports summary statistics for this population.

Our main analysis does not include the approximately 13% of California tax units who do not e-file. We exclude these paper filers because we are unable to observe their federal tax returns, and federal tax returns contain information necessary to determine both EITC eligibility and federal EITC receipt. Excluding paper filers does not impact our estimate of EITC eligibility among non-filers, because paper filers are included in the matching process between the tax and social service universe, meaning these filers are not inappropriately included in the non-filing population.

Based on the information we do have on paper filers,[2] we believe that excluding these tax units from our analysis leads us to underestimate the share of tax units that are eligible for but do not claim the CalEITC. Appendix Table B.2 compares means of tax filing characteristics between paper and e-filers. Overall, e-filers and paper filers appear similar. E-filers are slightly more likely to file as married filing jointly or as a head of household and have slightly more dependents. Paper and e-filers claim the CalEITC in roughly equal proportions, and e-filers are eligible for slightly higher CalEITC amounts on average. E-filers are slightly more likely to be on SNAP and are no-more likely to have an ITIN present on their tax return relative to paper filers. We also consider the split between e-filers and paper filers who are on SNAP in Appendix Table B.3.

However, there are two substantial differences that lead us to believe that the inclusion of paper and web filers would increase the rate of non-participation among tax filers. First, paper filers are much more likely to self-file tax returns, as opposed to filing with either a paid preparer or through a free tax preparation service like VITA. Among e-filers, 30% of tax units self-prepare their returns compared to 73% of paper or web filers. It seems reasonable that filing with the aid of a tax preparation service might increase the likelihood that a tax unit claims tax credits for which they are eligible – unless the extra fees that some paid preparers charge eligible filers dissuades some from claiming. Second, paper filers have lower wages and adjusted gross income than e-filers, making it more likely that they have income in the EITC-eligible range. Median AGI is $38,009 and median wages are $24,732 for paper filers, versus $42,823 and $31,482 for e-filers. Even if we limit the sample to tax units with a head or spouse on SNAP, these differences remain. These differences also remain, though the gap decreases, if we limit to the sub-population of tax units that claimed the CalEITC.

To test how these two factors combine to impact EITC non-claiming, we construct a measure of imputed CalEITC eligibility using only characteristics available from the primary state tax form (Schedule 540), which we can observe for all California filers. This measure of eligibility will be less accurate than our measure for e-filers alone. For example, it does not include non-wage earned income and investment income from the 1040 and does not incorporate our efforts to accurately estimate the number of qualified children. But it allows us to roughly compare eligibility rates between e-filers and paper filers using the same information. We only consider CalEITC eligibility, because we cannot accurately determine which paper filers claim the federal EITC without their 1040 information.

Roughly equal shares of e-filers (13%) and paper filers (14%) are likely to be eligible for the CalEITC, but paper filers are 13 percentage points less likely to claim the CalEITC, conditional on imputed eligibility. When limited to tax units on SNAP, that difference falls to 8 percentage points. Given these results, we anticipate that excluding paper returns likely results in an underestimate of the share of eligible tax units that do not claim the CalEITC.

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[2]Paper returns – or tax returns that are submitted by mail to the FTB and IRS – make up 94% of the filers that do not e-file. The remaining 6% are web filers or filers who make use of CalFile, a service where tax filers can submit their state tax return directly to the FTB. We refer to web and paper filers as paper filers in this section.

Appendix Table B.1: Summary statistics for tax filer sample

	By number of dependents				
	0	**1**	**2**	**3+**	**Total**
Count of Individuals	13,020,867	6,570,080	7,591,456	6,623,982	33,806,385
Count of Tax Units	10,310,603	2,802,932	2,171,327	1,340,842	16,625,704
Count of Tax Units That E-Filed	8,888,248	2,489,056	1,943,459	1,200,415	14,521,178
% E-Filed	86%	89%	90%	90%	87%
Statistics for E-Filers (Tax Unit Level)					
Filing Status					
Single	72%	11%	7%	6%	47%
Married Filing Jointly	26%	42%	61%	64%	37%
Married Filing Separately	1%	1%	1%	0%	1%
Head of Household	0%	45%	32%	29%	15%
EITC Claiming					
Fraction claiming Federal EITC	7.3	33.8	32.6	31.8	17.3
Mean Federal EITC claim (if positive)	$335	$2,315	$3,514	$3,836	$2,334
Fraction claiming CalEITC	7%	17%	13%	10%	9%
Mean CalEITC claim (if positive)	$76	$290	$527	$573	$266
Fraction claiming either EITC	8%	34%	33%	32%	17%
Mean total EITC (if positive)	$394	$2,452	$3,719	$4,014	$2,462
Income					
Mean earnings	$49,370	$73,348	$101,551	$83,189	$63,259
Mean AGI	$76,431	$90,430	$126,030	$106,207	$87,930

Notes. Universe is all state tax returns in tax year 2017. Other than row 1, all statistics are at the tax-unit level.

Appendix Table B.2: Comparison of means between e-filers and paper / web filers

	Tax Preparation Method		
	Paper or Web Filer	**E-Filer**	**Total**
Number of Tax Units	2,104,526	14,521,178	16,625,704
Filing Status			
Share MFJ	36%	37%	37%
Share HoH	12%	15%	14%
Share Single	50%	47%	48%
Mean Count of Dependents	0.6	0.7	0.7
EITC Information			
Share Claiming CalEITC	8%	9%	9%
Mean CalEITC Amount	$224	$266	$262
Share Imputed CalEITC Eligible	13%	13%	13%
Share Claiming CalEITC Among Eligible	41%	54%	52%
Income Information			
Mean Federal AGI	$64,855	$73,657	$72,543
Median Federal AGI	$38,218	$43,069	$42,478
Mean CA Wages	$47,108	$55,522	$54,457
Median CA Wages	$24,863	$31,644	$30,867
Other Characteristics			
Share on SNAP	5%	7%	7%
Filed with Paid Preparer	26%	68%	62%
Self-Prepared	73%	30%	36%
Filed with VITA	0%	2%	2%
Share with ITIN on Return	6%	6%	6%

Notes. Restricted to head filers on tax returns. For our EITC imputations, we use California wages and Federal AGI reported on the F540 to represent earned income and adjusted gross income, and we assume that no tax unit has investment income. In the income statistics reported above, we top code both California wages and Federal AGI at the 99th percentile (excluding $0s) to avoid the impact of potentially erroneous outliers. Including those outliers does not impact the median amounts but does increase the mean Federal AGI amount to $87,614 for e-filers and $155,117 for paper filers, and the mean California wage amount to $62,631 for e-filers and $396,269,984 for paper-filers.

Appendix Table B.3: Comparison of means between e-filers and paper / web filers, among tax units that claim CalEITC

	Paper or Web Filer	E-Filer	Total
	Tax Preparation Method		
Count of Tax Units	143,236	1,300,779	1,444,015
Income Information			
Mean Adjusted Gross Income	$9,859	$10,982	$10,870
Mean Earned Income	$9,781	$10,804	$10,702
Mean Wage Income	$6,872	$8,319	$8,175
Mean Investment Income	$47	$39	$40
Other Characteristics			
Count of Qualified Children	0.7	0.8	0.8
EITC Information			
Mean CalEITC Amount	$196	$239	$235
Federal EITC Amount	$1,881	$2,232	$2,197

Notes. Restricted to head filers on tax returns with positive CalEITC amounts reported on the Schedule 3514.

C   Eligibility Estimation

This appendix provides a detailed description of the methodology used to estimate take-up of the CalEITC among SNAP recipients in California in 2017. Participation is defined as the total number of claimants divided by the number of eligible households. We identify the numerator – actual claiming of the California EITC – using the state tax records. Claiming statistics are summarized in Appendix Table C.1. Our approach to determining eligibility (the denominator) varies across three populations: tax filers who claim the Federal EITC, tax filers who do not receive the federal EITC, and non-filers. As discussed in the main text, the groups differ in the degree to which we need to rely on the SNAP data to impute eligibility. For tax units who claim the federal EITC, we can rely entirely on information from their tax returns. We do not need to use the SNAP information at all. However, for non-filers, we almost entirely rely on the SNAP records. The main paper provides an overview of how we determine eligibility for each subgroup. In this section, we provide more detail about our methodology. Appendix Table C.2 provides a summary of the information we use to estimate each component for each population.

C.1   Among Federal EITC claimers

As described in the main paper, a qualifying child for the purposes of the EITC is a dependent under the age of 19 (or 24 if the dependent is a full-time student or any age if the dependent has a total or permanent disability) who resides with a primary filer for at least six months in the tax year and are near relations or adopted or foster child of the filer. Federal EITC claimants do report their count of qualifying children on the Schedule EIC, but we do not observe this information in our copies of filers' federal returns. Instead, given a tax unit's reported earnings, we determine the number of qualifying children that justify the Federal EITC amount claimed by the tax unit. In Appendix Table C.3, we show the relationship between the number of dependents and number of qualifying children. We present two additional pieces of evidence that help to demonstrate that this inference yields trustworthy estimates of each unit's number of qualifying children. First, we compare the count of qualifying children *inferred* from the federal claim amount to the *actual* number of qualifying children reported by tax units who claimed the CalEITC. [3] For nearly all units, the inferred number of qualifying children exactly matches the number reported on the Schedule 3514. Second, we compare actual CalEITC claims to predicted claim amounts, using the process described here, for the subset of federal EITC claimers who also claimed the CalEITC. We correctly predict the exact CalEITC claim amount for over 97% of CalEITC claimants. Refer to Appendix G for more information about this analysis.

C.1.1   Results

With each unit's inferred number of qualifying children, plus their filing status and reported California earned income, we can identify which appeared eligible for the CalEITC in tax year 2017. Of the 721,354 e-filed state tax returns containing a primary filer who enrolled in SNAP and included a federal EITC claim, 71% were eligible for the CalEITC (Appendix Table C.4). Of these eligible units, 40,366 (8%) did not claim the CalEITC. These tax units received an average federal EITC benefit of $3,794, but did not claim an average additional benefit of $235 from the CalEITC. The forgone CalEITC amount for this group totaled nearly $9.5 million, and if received, would have raised annual incomes in this population by 1.7%.[4]

Appendix Table C.4 also summarizes eligibility and take-up of the CalEITC among federal EITC claimants by tax unit type and income levels. A greater share of eligible households with dependents (8-10%), than those without (5%), failed to claim the CalEITC. Eligible households with no qualifying children forwent an average state credit of $65. Households with qualifying children forwent an average of $264.

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[3]We can observe the actual number of qualifying children claimed by these units on the form they submit to claim the state EITC (Schedule 3514). As noted above, we cannot use these counts for all tax units in this population, because we only observe them for those who claimed the CalEITC.

[4]We also identify a small number of tax units (0.05% of all SNAP units who claim the federal EITC) who do not appear to be eligible for the CalEITC, based on their reported state earnings and federal qualifying children, but who nevertheless claim it. This could indicate an incorrect claim but could also reflect inaccuracies in our simulation. The apparently ineligible claimants have relatively high earnings and an average CalEITC claim of $283.

The share of eligible households not claiming increases with total earnings: Only 5% of eligible participants with $5,000 to $10,000 in annual earnings did not claim the credit (average credit amount of $579), while 16% of participants in the $20,000-$25,000 income bracket did not claim the credit (average unclaimed credit amount of $28). This difference may be due to eligibility being less certain and the expected return being lower. While take-up was higher in the lower-income categories, there were still many eligible tax units who did not claim, and the average amounts at stake were substantially larger. Households with incomes below $10,000 and who failed to claim the CalEITC left an estimated $400 to $600 on the table.

C.2   Among Non-Fed EITC claimers

For filers who do not claim the Federal EITC, we cannot back out from their earnings and federal EITC amount their number of qualifying children. Rather, we rely on additional information on the SNAP cases to determine which dependents are qualifying children. Beginning with the list of dependents on the return, we interrogate which dependents might be a qualifying child for purposes of the EITC.[5] As mentioned above, qualifying children must be under 19 (under 24 for full-time students or any age for dependents with a total or permanent disability), must reside with a primary filer for at least six months of the year, must have a valid Social Security number (SSN), and the child can be claimed as a qualifying child on only one return. We observe some of this information in our SNAP records, meaning we can verify which dependents might in fact be qualifying children.

We are unable to identify students or observe disability status, so we only allow dependents age 18 and under to be potential qualifying children, provided that they satisfy the residency test.[6] We are able to observe whether a dependent has an SSN or an Individual Tax Identification Number (ITIN), and we use this to disqualify children without a valid SSN. Refer to Online Appendix E for more information about ITIN filers.[7]

To simulate the residency test, we observe the number of months in which dependents appeared on the same SNAP case as a given primary filer on their return.[8] For tax units with single or head of household filing status, or where both members of a married couple appear in the SNAP records, we use the number of months a child appeared on the same SNAP case with a primary filer as a proxy for residential arrangements. A dependent who shared a SNAP case with the a primary filer for at least six months is counted as meeting the residency test. If the child and parent were on SNAP for only part of the year, we assume they reside together in months in which neither was enrolled and we allow these months to count toward this six-month threshold. For married tax units in which only one member appears in the SNAP data, we cannot track the residency of the non-SNAP spouse, so we assume the child lives with that spouse and meets the residency test. Similarly, we assume that dependents who were not enrolled in SNAP are also qualifying children, since we cannot test whether they fail the residency test.[9] The effect of these rules is to only disqualify dependents as possible qualifying children if we can observe that they were in different SNAP cases than any primary filer on their return for more than six months in in the tax year.[10]

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[5]Although in principle a parent may have a qualifying child who does not qualify as a dependent — for example, a child may be the dependent of a non-custodial parent who provides substantial child support but would be claimable as a qualifying child by the custodial parent – we expect that this is rare and we do not attempt to model it. This rare circumstance might explain the few cases in which there are more inferred qualifying children in a tax unit than observed dependents.

[6]Of the 145,783 dependents under age 24 on a return with a SNAP-enrolled head or spouse and without a federal EITC claim, 5,691 (3.9%) are between the ages of 19 and 24.

[7]In some cases, returns claim more dependents than the number of SSNs we observe. Since we cannot link these additional unlisted dependents to SNAP participants, we do not allow them to count as qualifying children.

[8]Recall that we do not perform this exercise over the SNAP-enrolled dependents claimed by a primary filer who was not enrolled in SNAP in 2017.

[9]If a dependent was enrolled in Medicaid, in any program administered by CDSS, or in SNAP in any other year between 2005 and 2020, we are able to observe their age.

[10]Ultimately, data limitations introduce a trade-off in deciding which dependents might be qualifying children. We acknowledge that by allowing months in which a dependent is not enrolled in SNAP to count towards the residency test, we take the less conservative approach. In Appendix Table C.7, we report the same comparison as in Appendix Table C.6, except that we do not allow dependents enrolled in SNAP to count as qualifying children and we also disallow months in which dependents were not enrolled in SNAP to count toward the 6-month residency test. This results in our disqualifying many dependents who are claimed as qualifying children. Though allowing non-SNAP dependents to be qualifying children risks overstating EITC eligibility, restricting our analysis only to dependents observed in SNAP seems to severely understate the number of actual qualifying children. All that said, these assumptions do not meaningfully affect our results, because, as discussed below, most eligible tax units who fail to claim both the federal and state EITC are single adults without children, for whom this imputation does not matter.

Appendix Table C.5 compares the number of imputed EITC qualifying children to the number of dependents claimed on the tax return among units that did not claim the Federal EITC. Since our imputation method begins with the number of dependents and removes those who do not appear to be qualifying children, the number of qualifying children is never greater than the number of dependents. We find that the number of qualifying children equals the number of dependents for 56% of tax units with at least one dependent. For most units in which those are not equal, we assign just one fewer qualifying child than the number of dependents. Of the 42,227 dependents who we deem not to be qualifying children, 27,036 (18.6% of all dependents) fail the residency test, 17,913 (12.3% of all dependents) fail the age test, and 10,187 (7.0% of all dependents) fail the SSN test. A small number of dependents fail more than one test.

To assess the accuracy of our imputation method, we rerun our SNAP-based imputation process on the set of tax units that claimed both the federal EITC and state EITC, and for whom we can observe actual number of qualifying children. We then compare each tax unit's estimated number of qualifying children according to our SNAP records against the number reported on those unit's 3514 in Appendix Table C.6. In three-quarters of the cases, our inferred number matches the reported number exactly. When our imputation errs, it most often does so by underestimating the number of qualifying children, and therefore the family's EITC eligibility and/or credit.

C.2.1 Results

Confident in the imputation method for determining EITC qualifying children, we return to estimating eligibility for and take-up of the CalEITC for this population. Appendix Table C.8 summarizes our results. Over 300,000 tax units contain a primary filer who was enrolled in SNAP in 2017 and did not claim the federal EITC. Of these units, just over 100,000 (33%) were eligible for the CalEITC, and among these eligible units, nearly 98,000 (97%) did not claim it. Very few eligible households claimed the state EITC but not the federal EITC. The average forgone CalEITC amount for this group was $85, and totaled over $8.3 million. If received, these benefits would have raised annual incomes in this population by 1.1%.

The vast majority of eligible non-claimants were single filers without qualifying children. This fact help explains why these units did not claim the more valuable federal EITC; they were likely eligible, but only for a small credit amount. This fact should also allay concerns about how we address qualifying children for these units. Few of these units have any qualifying children. They're also a small population and have a small effect on our overall participation estimates.

Though there are far fewer eligible non-claimants among tax units with qualifying children, their average forgone credit was much higher. Participation rates tended not to vary too significantly with either tax unit composition or total tax unit earnings. Take-up ranged between 2 and 9%. Again, since most non-claimants were adults without qualifying children, the average forgone credit was fairly low regardless of income level.

C.3 Non-filers

Next, we describe how we determine eligibility among non-filers. This involves sorting SNAP recipients into reasonable tax units, identifying reasonable roles within those tax units, predicting filing status and number of qualifying children, and summing total earned income within tax units.

C.3.1 Reference cases

First, we assign each SNAP recipient to a single representative SNAP case. For the 95% of individuals who appear on only a single SNAP case in 2017, this assignment is straightforward. For the remaining 5%, we assign individuals to the case they appeared on most frequently. In the rare event of a tie, we use the most recent case. Hereafter, we refer to SNAP cases to which recipients are assigned as their *reference case*.

We construct simulated tax units from these reference cases. Some reference cases will include filers and non-filers. We construct one or more tax units from the non-filing members in each reference case. Some reference cases

may contain only children, who cannot file a tax return by themselves. Other reference cases may only contain non-filers, but include more individuals than could plausibly appear on a tax return together. Below, we discuss how we address these issues and transform these reference cases into likely tax units.

C.3.2 Assigning primary filer and dependent status

We assign each non-filing individual on a SNAP reference case to be a primary filer or dependent. We assign everyone under the age of 18 or over the age of 80 to be dependents. For those aged between 18 and 80, we predict whether they should be a dependent or a primary filer using other available information, including their earnings, age, sex, race, language spoken, disability status, number of months on SNAP, participation in other safety net programs, and whether they were observed as a primary filer on a tax return from the prior year. Specifically, we use the SNAP observations who do file returns to train a prediction model to classify observations as likely primary filers or dependents using these variables. We use cross-validation to select a threshold predicted probability of being a primary filer that maximizes out-of-sample accuracy.

Applying these same rules to SNAP recipients who do appear on a 2017 tax return, we find these procedures yield highly accurate assignments. In 2017, 99.4% of child SNAP recipients (aged 17 or younger) and 84.6% of elderly SNAP recipients (aged 81 years or older) who appeared on a tax return were dependents. There is no obvious break at 81, but the size of the population at that age is fairly small, making reliable imputation of an individual's tax status challenging. For those filers between 18 and 80 years old, we can assess the accuracy of the machine learning model we employ by testing how often we correctly assign individuals to the role of primary filer versus dependent. We restrict our focus to tax filers not used to create the machine learning model but who are used to find the optimal threshold predicted probability. We are able to correctly predict the status of 92.3% of individuals in this sample. Refer to Appendix F for a full description of this process.

C.3.3 Filing status

We then predict which recipients assigned to be primary filers would file as a single adult or married couple. This step is only relevant for the subset of reference cases with multiple adults predicted to be a primary filer, as those adults who are alone on a reference case must be single filers. To identify likely married couples, we first look to tax returns from the prior tax year. If two individuals on the same 2017 SNAP case filed as married filing jointly in tax year 2016, we assume they are still married and would still file as part of the same tax unit. For those remaining adults who do not appear on a tax year 2016 return, we use the relative age of each adult to decide whether the pair is likely a married couple. We marry two individuals in a reference case if they are each older than the 10th percentile of ages among married filers and if the age difference between them is between the 10th and 90th percentiles of within-couple age-differences (also among filers).[11] When there are multiple pairings that would satisfy this rule, we pair the adults who are closest in age. The effect of these rules is that anyone who can be paired to another reference case member of a plausible age is assumed to use a "married" filing status. Anyone who remains unpaired is assumed to use a "single" filing status. Overall, we impute that 13% of the primary filers in our non-filing sample are married.

Applied to the population of SNAP-enrolled primary filers, these rules correctly assign 89.0% of single primary filers to the marital status of single on their imputed tax return. Among the remaining 11% of single SNAP-enrolled primary filers, we incorrectly predicted 7% of them would be dependents, and the remainder would file as part of a married return. Our assignment rules performs worse in predicting married returns: only 71% of married filing jointly filers are assigned to be a primary filer of married imputed return. Most incorrectly-assigned married primary filers (27%) are set as single, with only 2% set as dependents. In 81% of cases where we incorrectly label a married primary filer as single we do not observe their spouse in the SNAP records. If we assume there is a similar share of mixed-SNAP status married couples among non-filing SNAP recipients, then we should expect a similar under-count

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[11]The 10th percentile of age among married primary filers is 26 and 27 for women and men, respectively. For women, the 10th and 90th percentile of within-couple age differences is 6 and 11 years, meaning women are permitted to marry individuals in their reference case who are 6 years younger or 11 years older than them. The percentiles for men are the inverse. Men are permitted to marry individuals in their reference case who are 11 years younger and 6 years older than them.

of married couples there. Under-counting married units likely biases our measure of EITC eligibility upwards, since some number of simulated eligible single filers might become ineligible if we combined their earnings with a spouse. It is possible that eligibility for the EITC could increase, but that would likely be a function of the qualifying children that are connected to the other adult, and not the marriage itself.

C.3.4 Assigning dependents

The next step is to assign dependents to imputed tax units. We only consider as candidate tax units those that contain an adult in the dependent's SNAP reference case and contain an adult with whom the dependent might have resided for at least six months in the tax year. To measure how long adults and children resided together, we count the number of unique months they shared a case in the calendar year, aggregate across multiple cases where needed, and also count months in which the dependent was not enrolled. The effect of this restriction is to rule out candidate tax units containing only adults with whom we can confidently infer from our SNAP records the child did not reside for more than half the year.

When there is only one such tax unit, the assignment is straightforward. When multiple candidate tax units satisfy these criteria, we assign dependents to tax units containing adults with whom the dependent appeared on the prior year's tax return. If there are still multiple candidate tax units, we assign child dependents to tax units with adults who are at least least 16 years older than the child, meaning they could plausibly be the child's parent. If there are still multiple such units, we assign child dependents to the unit with the youngest plausible parent, and in the event of further ties, to the unit with the highest earnings. In the case of adult dependents with multiple candidate tax units, we assign them to the unit with the highest earnings.

We are unable to assign imputed dependents to any imputed tax unit if their reference case lacks a plausible adult primary filer. This is not a trivial issue. Since these children could be claimed on some return and, if claimed, could deliver more significant refunds to EITC-eligible filers, failing to assign these children to any imputed tax unit is major limitation of our approach. Among non-filers, we are unable to assign 669,681 imputed dependents (out of a total of 986,358) to any imputed tax unit. Of these unassigned dependents, 58% are adults (who we predict would be adult dependents) and the remaining 42% are children.[12] For 99.9% of the unassigned dependents who are children, there are no potential tax filers on their reference case, and for 93%, there are no adults. The expectation is that many of these "child-only" reference cases represent households in which parents or guardians are not eligible for SNAP (or either the CalEITC or the Federal EITC) due to their immigration status.[13]

To test these hypotheses, We study the individuals who appeared on a reference case without a plausible adult filer according to our rules, but who were actually claimed on a state return. Of the more than 2.2 million individuals assigned to be dependents, we are unable to assign 894,379 dependents (698,840 of which are children) to an imputed tax unit – again, because 90% if these individuals are on reference cases without a likely primary filer. Over 92% of these unassigned dependents appear on tax returns in which no primary filer enrolled in SNAP. Of the dependent children on reference cases without a likely primary filer, 42% appear on a tax return with at least one individual with an ITIN. In other words, as expected, a large share of child-only reference cases represent households in which an adult is ineligible for SNAP because they do not have a valid SSN. In Appendix H, we report characteristics of the children from child-only reference cases who are not claimed by a filer with an ITIN. [14]

Even when we can match a child to a non-filing adult in their reference case, it's possible that that adult is not

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[12]A reasonable concern is whether our process of determining whether SNAP recipients are primary filers or dependents should simply label these lone adult dependents as single filers. Nearly all (96%) of these adults have no earnings, suggesting they would not file a return by themselves anyway. But as a robustness check, we reclassify these remaining adult non-filers to be single filers and find that 12,246 would be eligible for the CalEITC (with a mean credit amount of $73).

[13]Parents of young children with ITINs became eligible for the CalEITC and certain other tax credits in 2020. We discuss this issue further in Appendix E. We also discuss how many of these children were claimed on other returns in Appendix H.

[14]Hispanic children are over-represented in both the count of unassigned children and the count of unassigned children with ITINs present on their tax returns. Overall, 65% of children enrolled in SNAP and claimed on a return are identified as Hispanic, but Hispanic children comprise 78% of all SNAP-enrolled children claimed on a tax return who we cannot assign to an imputed tax unit. Further, 49% of Hispanic children who are not assigned to an imputed tax unit have at least one individual with an ITIN in their actual tax unit, while the average across all other races is 9.6%. It appears more likely that we will not be able to match a Hispanic child with their correct imputed tax unit because of issues related to documentation status, relative to children of other races.

the child's parent or guardian, or might not claim the child on their return if they were to file one. To identify how common this type of error is, we again turn to the SNAP recipients who do appear on a state tax return. We focus on the 1,278,052 dependents who (a) appear on a SNAP case, (b) are imputed to be dependents according to the process described in Appendix F, and (c) who are assigned to an imputed tax return. We calculate the share of these dependents who we assign an imputed tax unit containing a SNAP-enrolled adult who appeared on that child's actual tax return. We find that our procedures assign 75% of these dependents to the correct combination of primary filers on their return (i.e., to the correct single primary filer if they appeared as a dependent on a single return or the correct pair of primary filers if they were claimed on a MFJ return). For a further 10% of these dependents, we correctly match them to one but not both of the primary filers on their tax return. We fail to match a dependent to any primary filer who claimed them in 15% of cases. Similar to the issue of accurately matching dependents to any imputed tax return, the largest errors emerge when no primary filer was enrolled SNAP at any point in 2017. When we consider only tax units in which at least one primary filer was a SNAP recipient, we match dependents to at least one of them 97% of the time. Overall, for households where most or all individuals claim SNAP, we are very accurate in assigning dependents to the correct imputed tax unit. However, there are many dependents who will never be matched, as their appropriate primary filer is not present in the SNAP data.

C.3.5 Qualifying children

We determine which of the dependents assigned to each simulated tax unit might be a qualifying child using the same procedure described in Appendix C.2. Appendix Table C.9 compares the number of dependents in each imputed tax unit to the number of simulated qualifying children. The share of dependents who are qualifying children according to our procedure is similar to those reported for filing non-claimers of the federal EITC (Appendix Table C.5). Of the 40,828 non-filing dependents on an imputed tax unit who we deem not to be qualifying children, 19,863 (6%) fail the residency test and 22,136 (7%) fail the age test.

We described in Appendix C.2 how we assess the accuracy of these age and residency inferences. Appendix Table C.7 reports, among SNAP-enrolled who appeared on a state return with a CalEITC claim, how many were claimed as a qualifying child according to the Form 3514 versus how many appeared to be a qualifying child using our procedures. As discussed above, our method perfectly matches the number of qualifying children in 74% of tax units. In the cases where we incorrectly impute the number of tax units, we more often underestimate the number of qualifying children and therefore the family's EITC eligibility and likely credit amount.

C.3.6 Earned income

Within each imputed tax unit, we sum all adults' EDD wage earnings over the tax year, and we assume that this total reflects both the AGI and earned income that the tax unit would report on their return if they filed. We do not observe any other form of income, such as self-employment and investment income, for this population. This omission means we understate EITC-qualifying earnings. This might lead us to overestimate eligibility if non-filing households have both self-employment and wage earnings, and the combination pushes some households above the maximum eligible earnings limit. It is also possible, and perhaps more likely, that this omission results in our underestimating eligibility and overestimating take-up, because we assume many households with no wage earnings are ineligible, even though they might have some positive self-employment earnings which could make them eligible.

In Appendix I, we investigate this issue by replicating our analysis using data from tax year 2016, when filers were not permitted to claim the CalEITC using self-employment earnings. By comparing the number of claimers across the two years, we can infer how many households became newly eligible for the CalEITC thanks to their self-employment earnings, rather than ineligible due to the combination of their wage and self-employment earnings. We find that excluding self-employment income likely underestimates the number of eligible non-filers. Between 2016 and 2017, the number of eligible tax units who claimed the CalEITC and federal EITC and had earnings between \$1 and \$15,000[15] doubled, while the same pool of eligible non-filers grew at half that rate. Assuming that the filing and non-filing pool are reasonably similar in terms of the distribution of self-employment income, this implies that we

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[15]This restriction is made to exclude the effect of a simultaneous expansion of the CalEITC eligible earnings range.

are missing a number of non-filers whom we would impute to be eligible for the CalEITC if we could observe their self-employment income. We conclude that our estimates are an upper-bound on the take-up rate, at least with respect to not observing all eligible income, since observing more eligible non-filers would push down the take-up rate.

Few SNAP recipients have investment income. According to the 2017 ACS 5-year sample, only 2% of 18-64-year-old adults with below-median income enrolled in SNAP had positive investment income, and less than 1% had investment income above the eligibility threshold (compared to 7% and 2% for non-recipients, respectively). Among actual tax-units with a SNAP recipient, just above 1% had positive investment income in tax year 2017, and just below 1% were disqualified from receiving the EITC because their investment income was too high.

To test our assumption that the sum of EDD (or UI-covered) wages is a reliable measure of non-filers' true total earned income, we compare these sums to reported earned income on state returns among those who filed. For actual tax units containing only SNAP-enrolled primary filers (i.e., excluding married filing jointly households with only one primary filer enrolled in SNAP), we compare the sum of EDD wages for all primary filers to their total reported California wages and AGI. Appendix Figure C.1a presents the distribution of differences between California wages and total EDD wages at the tax unit-level. The median difference is $0, and the mean difference is $392. Appendix Figure C.1b presents the distribution of differences between AGI and total EDD wages at the tax unit-level. The median difference is $0, and the mean difference is $2,048. For 14.9% of these tax returns, the sum of EDD wages perfectly matches the wages reported on the 540 return. For 65%, the EDD wages are within $100 of the actual wages reported on the tax return. By the time we reach the $10,000 band, we capture 94% of tax returns. When we look at the difference between EDD wages and AGI, the differences are larger. We perfectly match for only 3% of tax returns, are within $1,000 for 49%, and are within $10,000 for 82% of tax units.[16]

Among the 18% of households in which the difference between AGI and total earned income is greater than $10,000, 28% report only self-employment income and have no reported EDD earnings. Our inability to measure earned income correctly for self-employed workers does not risk our overestimating EITC eligibility, since we would assume that these households have no earnings and we would classify all of them as ineligible. Appendix Figure C.2 plots the distribution of reported self-employment income among actual SNAP tax units. Seventeen percent of SNAP tax units reported positive self employment income in tax year 2017. Among those with self-employment earnings, the average amount was $9,236 and the median was $8,814. 10% (or more than half of those with any self-employment earnings) reported self-employment income less than $10,000. Ninety-five percent of these tax units had self-employment income below $20,500. The two clear masses of filers in Appendix Figure C.2 correspond to the kink points in the federal EITC schedule for filers with qualifying children in 2017.

C.3.7 Results

After assigning a filing status, number of qualifying children, and earned income to each simulated tax unit, we can finally test how many appear eligible for the state EITC. Appendix Table C.11 summarizes our estimates of eligibility for this population. We identify over 760,000 potential tax units from the non-filing SNAP population, and we estimate that nearly 270,000 of these households (35%) were eligible for the CalEITC but did not claim it. Their average forgone credit was $199. The total forgone credit amount for this population was $53.3 million and, if received, would have increased annual income for this population by 4%.

Appendix Table C.11 also presents estimates of eligibility and participation by filing status, number of qualifying children, and earnings levels. A large majority of the non-filers would likely be single filers without qualifying children if they filed return. Approximately 37% of these units are eligible for the CalEITC, but estimated CalEITC amounts are fairly small – just $87 on average. The numbers are similar for married couples, although there are far fewer. For tax units with qualifying children, CalEITC eligibility rates and amounts were notably higher. About two-fifths of single filers with qualifying children were eligible for the CalEITC and failed to claim on average $643. Nearly all households with very low earnings are estimated to be eligible for the CalEITC; only imputed tax units with heads outside the eligible age range are assumed to be ineligible. Most imputed tax units are ineligible because they have no

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[16]EDD wages are more likely to exceed than W2 pages is likely due to the fact that gross earnings recorded for purposes of UI includes employee contributions to employer-sponsored health insurance plans, while the net income reported reported on W2's does not.

observed earned income.

Recall that if these eligible units represent actual non-filers, as opposed to federal-only filers, their forgone CalEITC amounts likely understate the benefits of filing. Many of these units were likely eligible for the federal EITC and other tax credits, not to mention a refund on overly withheld income taxes.

Appendix Table C.1: Summary statistics for tax filer sample

	Total tax units	Federal EITC Claimants			CalEITC Claimants		
	Count	Count	Share	Amount	Count	Share	Amount
For all filers							
Total	1,035,623	732,832	71%	$3,109	485,562	47%	$402
By filing status and number of dependents							
Single							
No dependents	314,584	105,804	34%	$340	101,538	32%	$88
1 dependent	224,343	205,409	92%	$2,673	153,468	68%	$357
2 dependents	166,266	159,059	96%	$4,142	105,799	64%	$629
3+ dependents	99,134	94,597	95%	$4,613	53,862	54%	$671
Married							
No dependents	37,928	15,409	41%	$393	10,842	29%	$80
1 dependent	46,045	36,028	78%	$2,658	18,940	41%	$287
2 dependents	66,506	53,869	81%	$4,121	21,997	33%	$524
3+ dependents	80,817	62,657	78%	$4,382	19,116	24%	$555
By total earnings (thousands)							
$0-$5	144,482	85,170	59%	$1,016	78,084	54%	$481
$5-$10	179,489	137,680	77%	$2,148	130,975	73%	$743
$10-$15	211,213	174,030	82%	$3,620	159,837	76%	$304
$15-$20	158,678	111,553	70%	$4,675	87,220	55%	$122
$20-$25	116,237	83,079	71%	$4,213	29,240	25%	$31
$25-$30	78,715	59,202	75%	$3,525	100	0%	$374
$30+	146,809	82,118	56%	$2,268	106	0%	$444

Notes. Universe is e-filed tax returns with at least one primary filer who claimed SNAP. Column 1 reports the total number of tax units in each cell. Column 2 reports the count of those tax units that claimed the federal EITC. Column 3 reports what share of all returns in each cell claimed the federal EITC. Column 4 reports the average claimed amount of the federal EITC for each cell. Column 5 through 7 report the same statistics but for the state EITC.

Appendix Table C.2: Data sources for measuring three components of eligibility across three populations

	Eligibility components		
	Filing Status	**Earned income**	**Qualifying children**
Filers			
Fed EITC claimants	Filing status (540, Lines 1-5)	CA wages (540, Line 12) AGI (540, Line 13) Investment (1040, Lines 13, 14, 17) Self-employment (1040, Lines 12, 17, 27)	CA wages (540, Line 12) AGI (540, Line 13) Fed EITC amt (1040, Line 66a) Fed EITC amt (Sch 3514, Line 3)
Non Fed EITC claimants	Filing status (540, Lines 1-5)	CA wages (540, Line 12) AGI (540, Line 13) Investment (1040, Lines 13, 14, 17) Self-employment (1040, Lines 12, 17, 27)	CA wages (540, Line 12) AGI (540, Line 13) # of deps (540, Line 10) CalFresh casefiles
Non-Filers			
	CalFresh casefiles Participants' ages	EDD wages	CalFresh casefiles Participants' ages

Notes. Appendix Table C.2 summarizes the data sources we use to measure the three components of eligibility across our three populations. Forms and line numbers are applicable to 2017 returns. "CalFresh casefiles" refers to our ability to observe individuals sharing CalFresh cases with each other for a certain number of months in the tax year.

Appendix Table C.3: Relationship between the number of dependents and number of qualifying children among SNAP households claiming the federal EITC

Number of EITC qualifying children	Dependents claimed on tax return			
	0	**1**	**2**	**3+**
0	98.9%	2.1%	0.4%	0.1%
1	0.8%	97.4%	7.7%	1.6%
2	0.2%	0.4%	91.7%	8.7%
3+	0.1%	0.1%	0.3%	89.6%
N	118,820	237,766	209,638	155,130

Notes. Universe is all tax units that e-filed their returns, included at least one primary filer who claimed SNAP, and had a positive federal EITC claim. Cells represent column percentages.

Appendix Table C.4: Eligibility and take-up of the CalEITC among SNAP filers who claim the federal EITC

	Total tax units	CalEITC eligible		Eligible non-claimants		
	Count	Count	Share	Count	Share	Mean amt
For all filers						
Total	721,354	514,469	71%	40,366	8%	$235
By filing status and number of qualifying children						
Single						
0 QCs	107,181	106,242	99%	5,198	5%	$64
1 QC	213,410	169,477	79%	13,641	8%	$223
2 QCs	153,180	110,195	72%	9,799	9%	$327
3+ QCs	82,232	52,613	64%	5,215	10%	$311
Married						
0 QCs	16,121	11,775	73%	596	5%	$71
1 QC	37,830	21,062	56%	1,775	8%	$152
2 QCs	53,719	23,547	44%	2,182	9%	$248
3+ QCs	57,681	19,558	34%	1,960	10%	$229
By total earnings (thousands)						
$0-$5	80,007	75,524	94%	2,490	3%	$424
$5-$10	135,092	133,955	99%	6,315	5%	$579
$10-$15	172,809	169,616	98%	11,598	7%	$250
$15-$20	110,678	100,740	91%	14,255	14%	$122
$20-$25	82,424	34,634	42%	5,708	16%	$28
$25-$30	58,817	0	0%	0	.	.
$30+	81,527	0	0%	0	.	.

Notes. Universe is e-filed tax returns linked to at least one primary filer who claimed SNAP, and that included a claim for a non-zero federal EITC. The number of qualifying children in each tax unit was calculated using the process described in **??**. Column 1 reports the total number of tax units that meet those criteria. Column 2 reports the count of those tax units that were eligible for the California EITC. Column 3 reports what share of all returns were eligible for the CalEITC. Column 5 reports the number of eligible returns that did not claim the CalEITC, and Column 6 reports the share of eligible units that did not claim. Column 7 reports the average imputed amount among those non-claimers for each cell.

Appendix Table C.5: Relationship between the number of dependents and number of qualifying children among SNAP households who are not claiming the federal EITC

Number of EITC qualifying children	Dependents claimed on tax return			
	0	**1**	**2**	**3+**
0	100.0%	51.8%	21.3%	8.9%
1	0.0%	48.2%	18.7%	8.1%
2	0.0%	0.0%	59.9%	17.9%
3+	0.0%	0.0%	0.0%	65.2%
N	231,299	28,951	19,844	22,697

Notes. Universe is all tax units that e-filed their returns, included at least one primary filer who claimed SNAP, and did not report a positive federal EITC claim. Cells represent column percentages.

Appendix Table C.6: Relationship between number of inferred qualifying children from SNAP records and number of qualifying children reported on Schedule 3514 and total number of dependents, among SNAP households claiming federal EITC and positive CalEITC amounts

	Number of EITC QC (Inferred from CF Data)			
	0	1	2	3
Number of EITC QC (From Schedule 3514)				
0	64.9%	4.3%	4.0%	3.5%
1	25.5%	76.5%	2.4%	1.5%
2	7.6%	16.3%	79.6%	1.6%
3+	2.0%	2.9%	14.0%	93.4%
Dependents claimed on tax return				
0	60.1%	0.0%	0.0%	0.0%
1	27.2%	75.6%	0.0%	0.0%
2	9.8%	20.1%	81.8%	0.0%
3+	3.0%	4.3%	18.2%	100.0%
N	180,286	158,694	92,610	42,422

Notes. Universe is e-filed tax returns linked to at least one SNAP participant and a non-zero CalEITC claim on the Schedule 3514. Columns represent number of EITC qualifying children inferred using process described in Appendix C.2. Rows in Panel A are dependents reported on tax return. Rows in Panel B are number of QCs reported on Schedule 3514 for purposes of CalEITC claim.

Appendix Table C.7: Relationship between number of inferred qualifying children from SNAP records (in which we disqualify dependents who are not observed in SNAP records) and the number of qualifying children reported on Schedule 3514 and total number of dependents, among SNAP households claiming federal EITC and positive CalEITC amounts

	Number of EITC QC (Inferred from CF Data)			
	0	1	2	3+
Number of EITC QC (From Schedule 3514)				
0	52.6%	4.2%	4.0%	3.4%
1	31.9%	73.8%	2.0%	1.4%
2	11.8%	18.9%	78.0%	1.3%
3+	3.7%	3.1%	16.0%	93.8%
Dependents claimed on tax return				
0	47.9%	0.0%	0.0%	0.0%
1	32.9%	72.7%	0.0%	0.0%
2	14.2%	22.6%	79.8%	0.0%
3+	5.1%	4.7%	20.2%	100.0%
N	226,364	130,128	79,778	37,742

Notes. Universe is e-filed tax returns linked to at least one SNAP participant and a non-zero CalEITC claim on the Schedule 3514. Columns represent number of EITC qualifying children inferred using process described in Appendix C.2, amended to disqualify any dependents who cannot be matched to our SNAP records. Rows in Panel A are dependents reported on tax return. Rows in Panel B are number of QCs reported on Schedule 3514 for purposes of CalEITC claim.

Appendix Table C.8: Eligibility and take-up of the CalEITC among SNAP filers who did not claim the federal EITC

	Total tax units	CalEITC eligible		Eligible non-claimants		
	Count	Count	Share	Count	Share	Mean amount
For all filers						
Total	302,791	100,881	33%	97,999	97%	$85
By filing status and number of qualifying children						
Single						
0 QCs	223,357	96,644	43%	94,385	98%	$82
1 QC	9,480	1,292	14%	991	77%	$203
2 QCs	4,183	258	6%	153	59%	$366
3+ QCs	1,752	70	4%	51	73%	$439
Married						
0 QCs	29,170	2,317	8%	2,196	95%	$73
1 QC	10,035	133	1%	110	83%	$291
2 QCs	11,778	103	1%	72	70%	$493
3+ QCs	7,588	36	0%	23	64%	$710
By total earnings (thousands)						
$0-$5	59,312	32,563	55%	31,568	97%	$140
$5-$10	41,809	37,916	91%	36,990	98%	$81
$10-$15	37,183	29,414	79%	28,585	97%	$29
$15-$20	47,125	701	1%	594	85%	$84
$20-$25	33,158	287	1%	262	91%	$23
$25-$30	19,513	0	0%	0	.	.
$30+	64,691	0	0%	0	.	.

Notes. Universe is e-filed tax returns linked to at least one primary filer who claimed SNAP, and that do not include a claim for a non-zero federal EITC. The number of qualifying children in each tax unit was calculated using the process described in **??**. Column 1 reports the total number of tax units that meet those criteria. Column 2 reports the count of those tax units that were eligible for the California EITC. Column 3 reports what share of all returns were eligible for the CalEITC. Column 5 reports the number of eligible returns that did not claim the CalEITC, and Column 6 reports the share of eligible units that did not claim. Column 7 reports the average imputed amount among those non-claimers for each cell.

Appendix Table C.9: Relationship between the number of dependents and number of qualifying children among imputed tax unit constructed of SNAP households who did not file a state tax return.

	Dependents claimed on imputed tax return			
	0	**1**	**2**	**3+**
Number of EITC qualifying children				
0	100.0%	17.9%	6.3%	6.1%
1	0.0%	82.1%	9.0%	1.1%
2	0.0%	0.0%	84.6%	6.9%
3+	0.0%	0.0%	0.0%	85.9%
N	579,456	99,427	49,456	33,763

Notes. Universe is simulated tax returns including only non-filing SNAP participants. These tax units are constructed using the process described in **??** Cells represent column percentages.

Appendix Table C.10: Accuracy of tax unit imputation process for tax filing CalFresh recipients

Step in Imputation Process	Accuracy Rate	Definition of Accuracy
Assigning primary filers and dependents		Percent of CalFresh recipients who filed a tax return and who were used for cross-validation who were correctly assigned as either a primary filer or dependent.
Aged 0-17	99.4%	
Aged 18-80	92.3%	
Aged 81+	84.6%	
Filing status		Percent of CalFresh recipients who were primary filers on a state tax return who were correctly assigned to their appropriate filing status.
Correctly set as single	89.0%	
Correctly set as married	71.2%	
Correctly set overall	83.4%	
Assigning dependents to any imputed tax unit		Percent of CalFresh-enrolled dependents who are assigned to an imputed tax return.
Non-filers	31.4%	
Filers	59.4%	
Assigning dependents to their primary filer		Percent of assigned CalFresh-enrolled dependents matched with an adult on their tax return.
All primary filers	74.5%	
At least one primary filer	84.4%	
Qualifying children		Percent of state tax returns with the correct number of imputed qualifying children.
0 QC	69.4%	
1 QC	76.5%	
2 QC	79.9%	
3+ QC	93.0%	
Total	74.3%	
Earned income (wages)		Percent of state tax returns whose imputed earnings are within X dollars of the wages reported on their 540.
Perfect match	14.7%	
Within $200	64.8%	
Within $500	68.9%	
Within $1,000	74.1%	
Within $10,000	94.1%	
Earned income (AGI)		Percent of state tax returns whose imputed earnings are within X dollars of the AGI reported on their 540.
Perfect match	2.8%	
Within $200	36.1%	
Within $500	40.9%	
Within $1,000	56.4%	
Within $10,000	77.7%	

Notes. Appendix Table C.10 summarizes the accuracy of our process of imputing the structure and income of tax returns. For more detailed descriptions of the measures of accuracy references in this table, please refer to Appendix C.3.

Appendix Table C.11: Eligibility and take-up of the CalEITC among SNAP households who did not file a state tax return

|	Total tax units	CalEITC eligible		Eligible non-claimants		
	Count	Count	Share	Count	Share	Mean amount
For all filers						
Total	762,102	268,090	35%	268,090	100%	$199
By filing status and number of dependents						
Single						
0 QCs	569,710	208,204	37%	208,204	100%	$87
1 QC	80,701	27,830	34%	27,830	100%	$489
2 QCs	38,805	12,823	33%	12,823	100%	$820
3+ QCs	23,595	7,168	30%	7,168	100%	$921
Married						
0 QCs	32,767	6,446	20%	6,446	100%	$85
1 QC	5,749	1,906	33%	1,906	100%	$433
2 QCs	5,368	1,899	35%	1,899	100%	$810
3+ QCs	5,407	1,814	34%	1,814	100%	$867
By total earnings (thousands)						
$0	425,775	0	0%	0	.	.
$1-$5	166,408	163,723	98%	163,723	100%	$182
$5-$10	60,286	59,152	98%	59,152	100%	$314
$10-$15	37,615	36,962	98%	36,962	100%	$113
$15-$20	24,627	5,693	23%	5,693	100%	$118
$20-$25	17,546	2,560	15%	2,560	100%	$29
$25-$30	10,647	0	0%	0	.	.
$30+	19,198	0	0%	0	.	.

Notes. Universe is simulated tax returns including only non-filing SNAP participants. These tax units are constructed using the process described in **??**. The number of qualifying children in each imputed tax unit was calculated using the process described in Appendix C.3.5. Column 1 reports the total number of tax units that meet those criteria. Column 2 reports the count of those tax units that were eligible for the California EITC. Column 3 reports what share of all returns were eligible for the CalEITC. Column 5 reports the number of eligible returns that did not claim the CalEITC, and Column 6 reports the share of eligible units that did not claim. Column 7 reports the average imputed amount among those non-claimers for each cell.

Appendix Figure C.1: Distribution of differences between total EDD earnings and reported California Income among tax units with all primary filers enrolled in SNAP, TY 2017
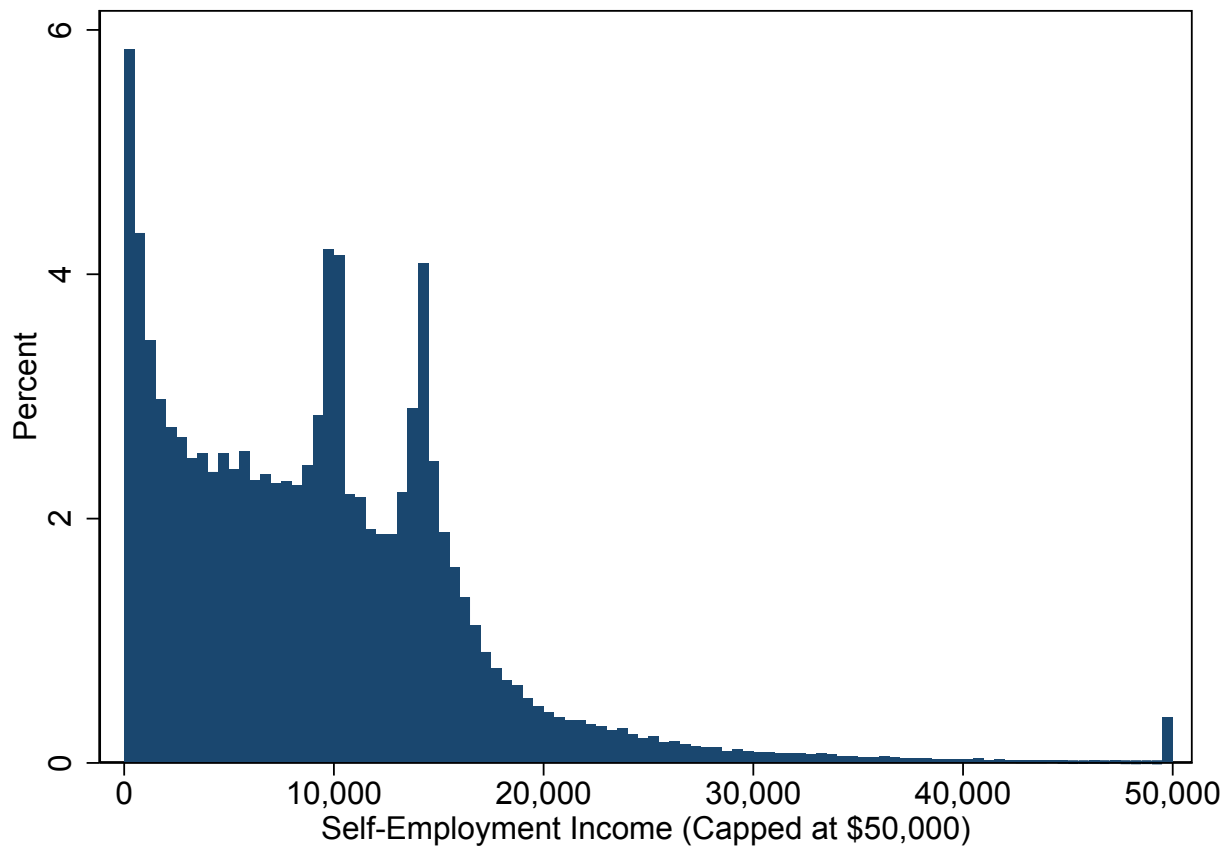
(a) 540 wages versus EDD wages
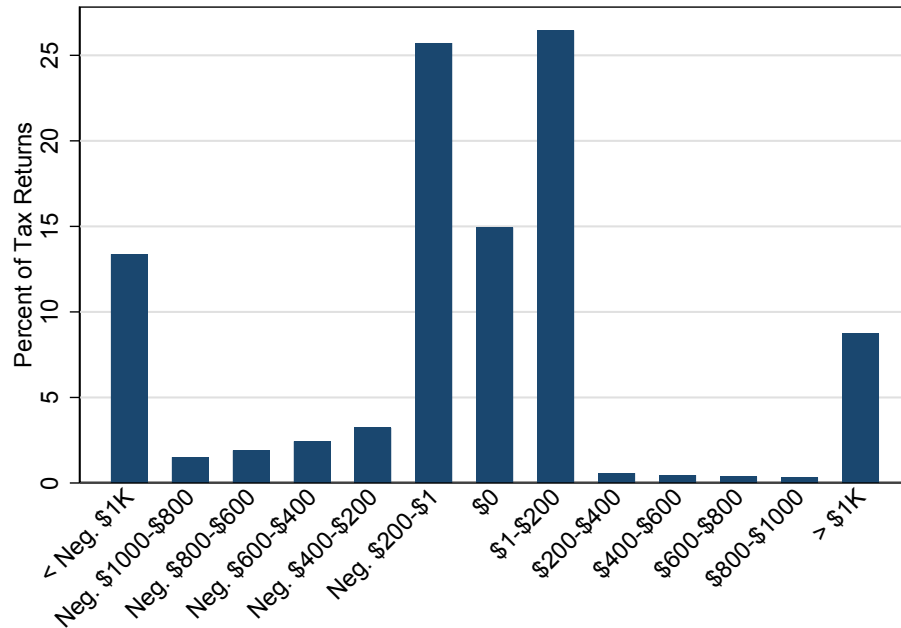
(b) AGI versus EDD wages
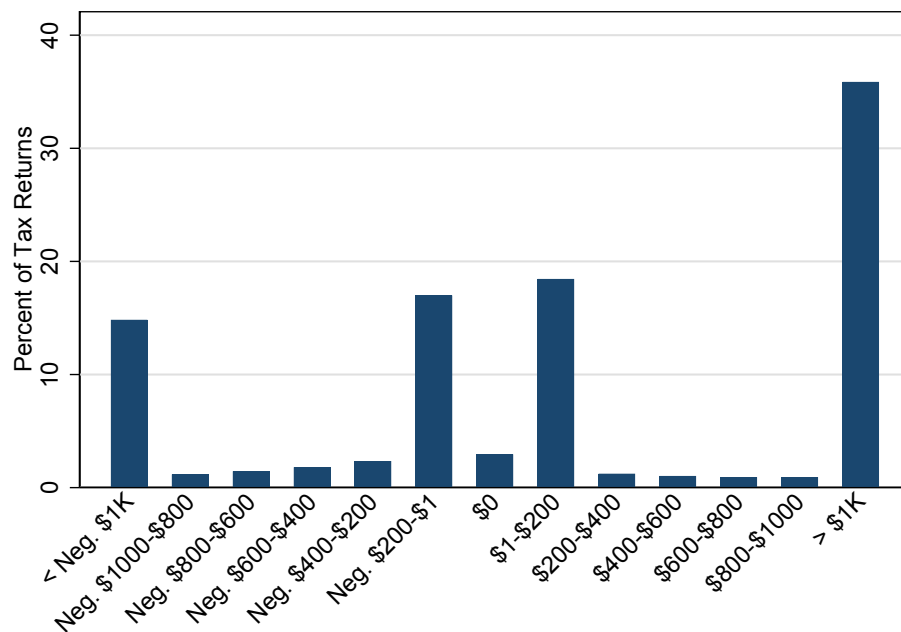
Notes. Universe is all tax returns with all primary filers are enrolled in SNAP. EDD wages are total of all 2017 quarterly wage earnings for head and spouse (if present) on return.

Appendix Figure C.2: Distribution of self-employment income among SNAP-enrolled tax units with positive self-employment income, TY 2017

D Take-up of the federal EITC

We measure take-up of the federal EITC among those who e-filed a state return. We are not able to produce a comprehensive estimate of federal EITC claiming among all SNAP-enrolled households, because we do not observe federal returns or federal EITC claims for those who do not submit a state return or filed a paper return.

We measure eligibility for the federal EITC within SNAP-enrolled e-filers in the same way that we measured eligibility for the CalEITC among those that did not claim the federal EITC (summarized in Appendix C.2). We use SNAP records to test which dependents might be qualifying children, and we use filing status and earned income reported on the state return. Appendix Table D.1 summarizes our estimates of eligibility and participation among all state returns with a SNAP-enrolled head or spouse. We present results separately for units that claimed the state EITC and those that did not. Over 1 million returns contained a SNAP filer or spouse. Among those, 80% were eligible to receive the federal EITC. Of those, 88% claimed the credit. Those who claimed the CalEITC were very likely to also claim the federal EITC. A large share of seemingly eligible households who failed to claim the state EITC also failed to claim the federal EITC. Altogether, over 97,000 tax units who were eligible did not claim the federal EITC, forgoing $385 on average and $37 million in total.

Appendix Table D.1: Simulated federal EITC eligibility among SNAP filers

	Total tax units	FedEITC eligible		Eligible non-claimants			
	Count	Count	Share	Count	Share	Mean amount	Total amount
Filers							
Claimed the CalEITC	485,562	482,509	99%	2,859	1%	$711	2,034,108
Did not claim the CalEITC	550,061	341,681	62%	94,261	28%	$375	35,371,763
Total	1,035,623	824,190	80%	97,120	12%	$385	37,405,871

Notes. This table summarizes rates of eligibility for the federal EITC among e-filed tax returns with a primary filer who claimed SNAP. Results are separated between units that included a SNAP claim and those that did not.

E Individuals without Social Security Numbers

E.1 Valid SSN rule

Individuals without a valid Social Security Number (SSN) can use an Individual Tax Identification Number (ITIN) when filing a tax return. Though individuals with ITINs are generally not eligible for tax-based benefits, they can receive refunds of overpaid income taxes. In 2017, 6% of all individuals who appeared on a California state tax return (1.9 million individuals, including 1 million dependents and 900,000 filers or spouses) filed using an ITIN. Of the 5.1 million individuals on tax returns that include at least one SNAP recipient, 7%, or 360,000, had an ITIN.

Only tax units in which both the head and spouse have a valid SSN can claim the federal EITC, and only dependents with a valid SSN can be a qualifying child. In 2017, eligibility for the California EITC was also restricted to tax units in which both head and spouse had a valid SSN, though ITIN filers became eligible for the CalEITC in 2020. Individuals with a valid SSN can enroll in SNAP even if another household member does not have a valid SSN, though the individual without a valid SSN cannot could toward the enrollees' household size and thus the calculation of their benefit amount.

We account for the 2017 SSN rules when assigning CalEITC eligibility to actual tax units. We disqualify any actual tax unit with a head or a spouse who has an ITIN, and we disregard dependents without a valid SSN when determining which might be a qualifying child. For non-filers, we assume that our simulated tax units would file returns according to the composition imputed to them. In other words, these simulated tax units would not include a head, spouse or dependent unobserved in the SNAP records who might not have a valid SSN.

Of the 394,000 SNAP recipients who are on a tax return with an individual with an ITIN,[17] 94% appear in our data as Hispanic, even though Hispanic individuals represent just 57% of all SNAP recipients who appear on a 2017 state return. This suggests that that Hispanic tax filers may be more likely to lose eligibility for the EITC due to the documentation status of someone in their tax unit, even conditional on participation in SNAP.

E.2 Impact of the modifying the SSN rule

In June 2020, California expanded eligibility for the CalEITC to ITIN filers with young children. To model the impact of this expansion, we consider the set of e-filers in 2017 (not limited to SNAP recipients) and count the number of households who might be eligible for the CalEITC if not for a filer or spouse having an ITIN.

We take as given the actual tax unit composition and the income reported on the tax return, as we do with our imputations described in the main part of the paper. However, since ITIN filers cannot claim either the federal or state EITC, we cannot use information from those claims to infer which dependents on the return might be qualifying children. We also cannot rely on SNAP casefiles for the residency test, since not all e-filers with an ITIN appear in our SNAP records. Instead, we assume that all dependents are qualifying children.

In 2017, 611,570 returns included a filer or spouse with an ITIN (Appendix Table E.1). Of these returns, we estimate that 71% would be eligible for the federal EITC and 18% for the CalEITC if not for the SSN test. On average, these tax units would qualify for, on average, $3,009 from the federal EITC and $288 from the CalEITC. We also report these statistics separately for single ITIN filers and married filers in which one or both filers have an ITIN. Eligibility rates for the federal and state EITC are highest for single filers, followed by married units in which both filers have an ITIN, and then mixed status couples. If these tax units were allowed to claim either credit, an additional 917,488 children would become eligible for the federal EITC and an additional 234,534 children would become eligible for the CalEITC. If these households were allowed to claim both credits, they would be eligible to receive nearly $47 million from the CalEITC and nearly $1.3 billion from the federal EITC.

The second group of tax units impacted by the repeal of either the federal or California SSN test are those in which all heads or spouses have SSNs, but at least one dependent has an ITIN. We observe 207,809 such tax units. If these dependents became eligible, 50% would be eligible for the federal EITC (up from 22%) and 13% would be eligible for the CalEITC (up from 8%). In total, an additional 176,179 children would become eligible for the federal EITC and

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[17]We can use the race/ethnicity data in our SNAP records to study which recipients are most likely to appear on tax returns with an ITIN filer. We can only observe the race of individuals who are enrolled in SNAP, so we cannot observe the race of the individuals who have an ITIN.

38,659 for the CalEITC ([Appendix Table E.2](#)). Their tax units would be eligible for an additional $302 million from the federal EITC and $9.7 million from the CalEITC. The average federal EITC amount for these households would be nearly $1,500 (up from $500), while the average CalEITC amount would be just $47 (up from $13).

Appendix Table E.1: Estimated EITC eligibility among tax units with a head or spouse with an ITIN

	CalEITC	Federal EITC	Either EITC
Count of tax units	611,570	611,570	611,570
Without SSN Test			
Single filers			
% eligible	36%	77%	77%
Number eligible	108,637	232,432	233,328
Mean EITC amount	$288	$3,009	$3,132
Total EITC amount	31,283,585	699,493,912	730,777,497
Married filing jointly, one filer has ITIN			
% eligible	10%	43%	43%
Number eligible	15,224	63,872	64,048
Mean EITC amount	$313	$2,870	$2,937
Total EITC amount	4,762,703	183,333,465	188,096,168
Married filing jointly, both filers have ITIN			
% eligible	18%	71%	71%
Number eligible	29,091	113,342	113,469
Mean EITC amount	$369	$3,435	$3,526
Total EITC amount	10,740,907	389,321,605	400,062,512

Notes. Universe is e-filed tax returns containing a head or spouse (if present) with an ITIN. We report four statistics (share and number eligible for either federal or state EITC, plus the mean and total amounts claimable) for three populations (single filers, married joint filers in which one spouse has an ITIN, and married joint filers in which both have an ITIN).

Appendix Table E.2: Estimated EITC eligibility among tax units containing only a dependent with an ITIN

	CalEITC	Federal EITC	Either EITC
Count of tax units	207,809	207,809	207,809
With SSN Test			
Mean count of QC	1	0.8	1
% Eligible	8%	22%	22%
Mean EITC Amount	$13	$470	$2,168
Total EITC Amount	2,700,356	97,652,210	100,352,566
Without SSN Test			
Mean count of QC	2	2.2	2
% Eligible	13%	50%	50%
Mean EITC Amount	$47	$1,457	$3,025
Total EITC Amount	9,703,655	302,808,748	312,512,403

Notes. Universe is e-filed tax returns containing a dependent with an ITIN, where both head and spouse (if present) have a valid SSN. Panel A reports average number of QCs, share eligible for either federal or state EITC, and the mean and total amounts claimed. Panel B reports same statistics assuming that dependents with an ITIN could be qualifying children. Dependents must still pass age test, but all are assumed to pass residency test.

F   Assigning non-filing SNAP recipients to be primary filers or dependents

As part of our construction of simulated tax units among non-filing SNAP recipients, we predict whether a given recipient is likely to appear as a primary filer (a head or spouse) or a dependent on their unit's return if one were to be filed. Below, we describe how we use information in our SNAP files to predict these roles for each individual.

First, we assign all individuals under the age of 18 or over the age of 80 to be dependents. Among SNAP recipients who appeared on tax returns, 99.4% of individuals under the age of 18 are dependents. Second, we assign all individuals over the age of 80 to be dependents as well. We do this because (1) the vast majority (80%) of SNAP recipients age 81 plus appear on a tax return as a dependent and (2) there are not enough individuals in this age bracket for our prediction method to produce reliable results.

Second, we take the pool of individuals between the ages of 18 and 80, and we predict whether each are a dependent or primary filer. While most of these working-age (or near working-age) individuals would likely be primary filers, a non-trivial share still appear as dependents in the tax records (Appendix Figure F.1). Some of these adults might be too young to work, might still be in school, or are working but still residing with parents. Others could be older, unable to work, are being cared for by working-age children, and might have disabilities or other challenges which prevent them from working and qualify as a dependent.

We predict which non-filing adults might be dependents by identifying how characteristics observed in our SNAP relate to whether filers appear as dependents or primary filers on their returns. We randomly assign 70% of individuals on SNAP who appear on a tax year 2017 return to a training dataset and assign the remaining 30% to a test dataset. Using the observations in our training set, we estimate a logistic regression, with an indicator for filer/dependent status as our outcome variable and the following regressors: indicators for whether English is their primary language, whether they can be merged to EDD earnings records, whether they receive cash assistance or SSI, whether the individual is incarcerated, is a senior, is a non-resident, is disabled; the size of the individual's reference case; and the individuals' age, interacted with their EDD wage income; number of unique SNAP cases over the course of the tax year; a categorical race variable number of months enrolled on SNAP; a binary sex variable; and the number of persons on the individual's reference case.

Using estimates from this model, we constructed a predicted probability that each observation is a primary filer or dependent. We apply the predicted probabilities for each individual to the test set in order to select two probability cutoffs that we use for our final filer or dependent determination. All individuals with a predicted probability over the cutoff are set as a primary filer. The first cutoff (50%) is the cutoff that minimizes error across the entire test dataset, with a prediction accuracy in the test set of 88%. The second set of cutoffs utilizes prior-year tax information for the test-set and allows the cutoff to vary across three groups: Individuals who were a primary filer on a tax return last year (a 4% cutoff), individuals who were a dependent last year (90%), and individuals who did not file last year (46%). With these cutoffs, we achieved an accuracy rate in the test set of 92%. This second version is used throughout the paper.

Appendix Figure F.1: Distribution of ages among dependents on SNAP tax units, TY 2017
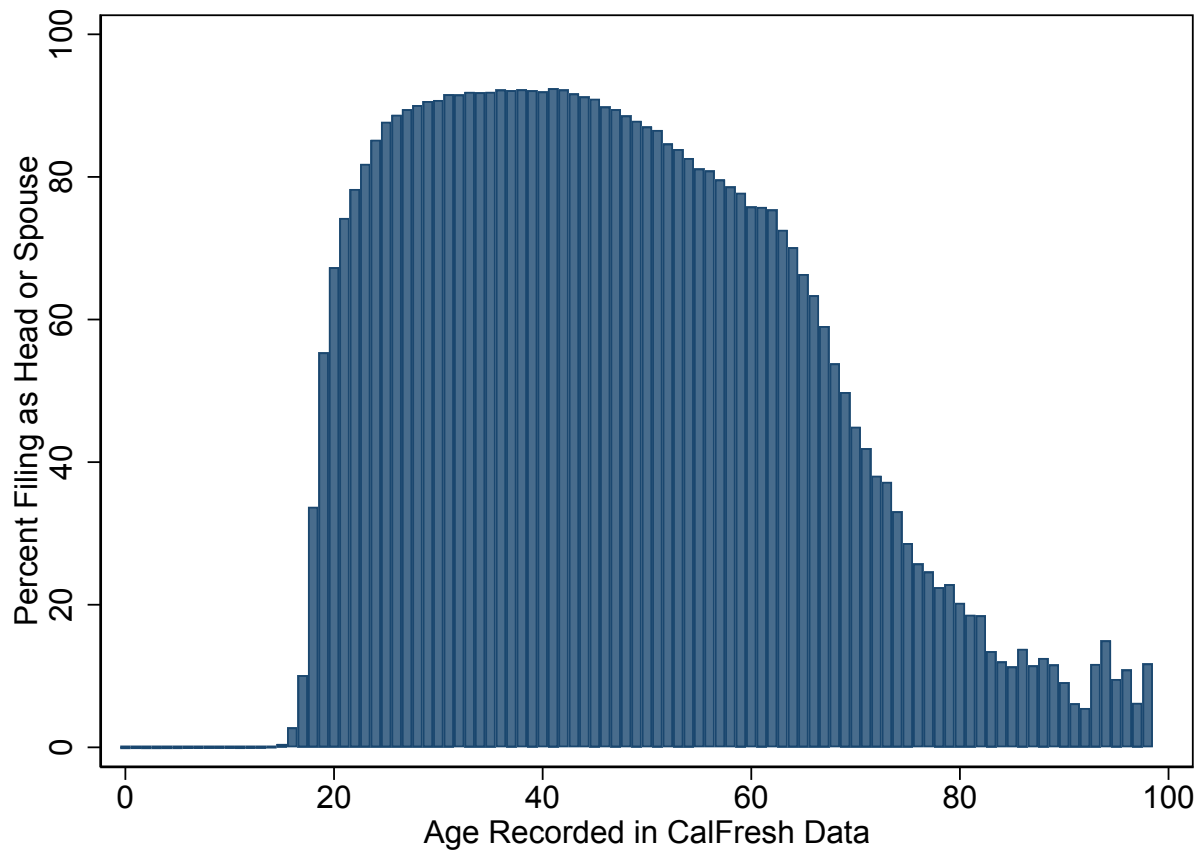
Notes. Universe is all individuals on tax year 2017 returns who also enrolled in SNAP that year. We group ages into one year bins, according to enrollees' reported date of birth, and report the share in each bin who appear on their tax return as head/spouse as opposed to dependent.

G Predicted versus actual CalEITC claims

To estimate eligibility for the CalEITC among SNAP tax filers who claimed the federal EITC, we use the value of each tax unit's federal EITC claim, plus their earned income, to infer their number of qualifying children. In this section, we present evidence to further validate the reliability of this inference by considering the tax units that claimed both the federal and state EITC and comparing our prediction of these units' CalEITC eligible claim amounts, using this inference procedure, to what they actually claimed.

Of the 752,597 tax units with a head or a spouse on SNAP and who claimed the federal EITC, we observe 489,679 units claiming the CalEITC (489,262 eligible claimants and 410 apparently ineligible claimants). Of these, we fail to exactly predict the credit amount received for just 14,019 units, or 2.86% of all claiming units. On average, our predicted credit amount exceeds the credit amount such units actually received by roughly $235 dollars, while the median difference between predicted and actual credit values is $83.

In order to explain the source of these errors, we experimented with systematically varying the inputs to our CalEITC predictions. We began by substituting each tax unit's earned income with their AGI in our credit calculator. The replacement of earned income with AGI allows us to match our predicted and the actual credit amount for 968 (7%) of the 14,019 tax units where we initially observed errors in our predictions. Though households are supposed to use their earned income to determine their correct eligible CalEITC amount, it is possible that a small number of preparers inputted the incorrect earnings variable.

For the remaining 13,051 units, we experimented with adjusting the number of qualifying children used in our credit amount predictions. We vary the possible number of qualifying children between 0 and 3 for each tax unit and calculate predicted credit amounts. This exercise allows us to recover the actual claimed amounts for an additional 10,925 units. For approximately 68% of these units, increasing or decreasing the count of qualifying child by one child yielded accurate predictions of actual credit amounts.[18]

Finally, we experiment with both substituting AGI for earned income and varying the number of qualifying children for the 2,126 tax units for whom the above substitutions did not produce a predicted credit equal to their actual credit. In doing so, we are able to match predicted and actual credit amounts for an additional 285 tax units.

Following the above exercises, we are left with only 1,841 tax units (approximately 0.38% of the full sample of tax units claiming the CalEITC) for which no combination of substitutions above yielded an exact match between predicted and actual credit amounts.

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[18]One possible explanation for this pattern of results is that these tax units may have had dependents who did not reside in the state of California for the requisite 6 months required to satisfy the state residency requirement of the CalEITC to be counted as qualifying children. Using SNAP records, however, we find no evidence that dependents in this subset of tax units were systematically less likely to appear in SNAP records, either on their own or matched with primary filers on their reference case, throughout the year than dependents on the broader sample of tax units included in this analysis. Likewise, such dependents were not more likely to fail at the age test requirement for the CalEITC as compared to the broader sample of dependents.

H   Alignment between SNAP cases and tax units

SNAP cases do not always align with tax units. Our process of constructing imputed tax units from SNAP records assumes that SNAP cases contain one or more tax units, and tax units do not stretch across SNAP cases. We believe this assumption is reasonable because the rules for determining the bounds of a SNAP case (those who eat and prepare meals together) are arguably more flexible and expansive than the ones used to determine a tax unit. At the same time, this assumption could be mistaken. For example, by emphasizing shared residence and resources, the rules for determining a SNAP case could be stricter than those for a tax unit. Plus, SNAP records may only capture residential arrangements for parts of the tax year.

In this section, we present evidence on the extent to which SNAP case compositions disagree with tax unit composition, and the limitations of our disambiguation approach to constructing tax units. Since the bulk of the EITC's value comes from the claiming of a child, we are most concerned with correctly assigning children to their parents using the SNAP records, and this analysis is focused on how well those SNAP cases align with actual claiming. We present evidence for three mutually exclusive populations, covering all children enrolled in SNAP in 2017: the children enrolled in a reference case with no adults; the children who appeared on a return and had at least one adult in their reference case; and he children who did not appear on a return and had at least one adult in their reference case.

Appendix Table H.1 considers the nearly 700,000 children assigned to a reference case without an adult. Roughly one-quarter (28%) were not claimed on a return.[19] However, the vast majority of these children (72%) were claimed by an adult on a return, even though they were enrolled by themselves or with another child in their SNAP case. We hypothesized that many of these children must have resided with an adult who was ineligible for SNAP due to their documentation status, and we do find that roughly half were claimed on a return by someone who filed with an ITIN. However, it's less clear why the other half of children (over 250,000) were claimed by an adults who were not enrolled in the child's SNAP case in 2017. In the following rows, we present evidence for two candidate explanations. First, we consider the possibility that children might have enrolled with the claiming adult in a different SNAP case, and we misidentified their reference case. We do this by limiting our attention to children who enrolled in only one SNAP case throughout the year. Second, we consider the possibility that children were enrolled in SNAP for just a few months, and resided with the claiming adult for much of the year while not enrolled in SNAP. We do this by limiting our attention to the children who were enrolled in SNAP all 12 months. Neither restriction affects the share of children claimed on a return by a non-ITIN filer.

Appendix Table H.2 considers the 1.25 million children enrolled in SNAP in California in 2017 who appeared on a state tax return and who had at least one adult on their reference case. We decompose these children into three groups: (1) children who appear on a return with all the adults who appeared on those children's reference case (Column 1); (2) children who appear on a return with at least one but not all adults who appeared on their reference case (Column 2); and (3) children who appear on a tax return containing no adults who appeared on the child's reference case, broken out by whether the return contained an adult who filed with an ITIN or not (Columns 3 and 4). Nearly two-thirds of filing children (roughly 800,000) appear on a return with all adults from their reference case. At the same time, one out of five children are claimed on a return by an adult who does not appear on their reference case. As with Appendix Table H.1, we focus in on subgroups of these children to test explanations for this misalignment between reference cases and tax units. First, we consider children enrolled in just a single SNAP case. Second, we consider children enrolled in a single SNAP case for all 12 months of 2017. Third, we consider children enrolled in a single case including two or more adults. Fourth, we consider children enrolled in a single case with an adult who is in the most plausible age range to be the child's parent (25 to 34 years older). We find that children with multiple adults in their reference case are less likely to have all these adults appear on their return, but are more likely to have at least one. Otherwise, these restrictions have limited effect to no effect on the distribution of children across these columns.

Appendix Table H.3 considers the 360,000 children enrolled in SNAP in California in 2017 who did not appear on a state tax return but had an adult in their reference case. We decompose these children into three groups: (1) children for whom no adult in their reference case appeared on a tax return (Column 1); (2) children for whom at least one

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[19]Recall that these children were excluded from our analysis if they did not appear on a return or were claimed on a return not including a SNAP-enrolled adult.

but not all adults on their reference case appeared on a return (Column 2); and (3) children for whom all adults on their reference case appeared on a return (Column 3). For nearly three-quarters of these children, no adults from their reference case appear on any return. However, for almost one-in-four of these children, at least one adult from their reference case does appear on a return. These shares remain unchanged after imposing the same restrictions that we used in Appendix Table H.2. If claimed, these children might have allowed these adults to claim valuable (or even more valuable) refunds. It's unclear whether this non-claiming reflects incomplete take-up or the consequence of the rules governing qualifying children.

A limitation of our data is that we do not have information on intra-household relationships. Knowing whether an adult in a SNAP case is in fact a child's parent would improve our prediction of whether that adult and child should appear on a tax return together. An important area for future work is using more data than those available here to better describe the relationships between adults and children who alternatively do or do not appear together in a safety net program, and do or do not appear together on a tax return.

Appendix Table H.1: Distribution of children across tax returns by whether there is an adult in their SNAP reference case

	All Children			**Children w/o Adults in Reference Case**			
	On tax return	Not on tax return	Total	On tax return w ITIN filer	On tax return w/o ITIN filer	Not on tax return	Total
All children							
Count	1,744,853	563,835	2,308,688	251,383	240,526	194,826	686,735
Percent	75.6%	24.4%	100.0%	10.9%	10.4%	8.4%	29.7%
Children enrolled in a single SNAP case							
Count	1,670,111	537,907	2,208,018	245,192	232,313	189,275	666,780
Percent	75.6%	24.4%	100.0%	11.1%	10.5%	8.6%	30.2%
Children enrolled in a single SNAP case for all 12 months							
Count	936,549	290,794	1,227,343	155,353	139,903	116,637	411,893
Percent	76.3%	23.7%	100.0%	12.7%	11.4%	9.5%	33.6%

Notes. Columns 1 and 2 report the number of all children enrolled in SNAP in 2017 who appear on a tax return (Col 1) or not (Col 2). Columns 4 to 6 report the same statistic, but zoom in on the population of children for whom there was no adult on their SNAP reference case. Among these children who also appear on a tax return, we report separately the number who appear on a return with an ITIN filer and those who do not.

Appendix Table H.2: Distribution of SNAP-enrolled children who appear on a state tax return by whether adults in their SNAP reference case appear on their return

	All adults	Some adults	No adults		Total
			No ITINs	1+ ITIN	
All children					
Count	807,070	164,803	255,492	25,579	1,252,944
Percent	64.4%	13.2%	20.4%	2.0%	100.0%
Children enrolled in a single SNAP case					
Count	773,007	157,416	237,698	24,485	1,192,606
Percent	64.8%	13.2%	19.9%	2.1%	100.0%
Children enrolled in a single SNAP case for all 12 months					
Count	399,169	83,464	144,064	14,596	641,293
Percent	62.2%	13.0%	22.5%	2.3%	100.0%
Children enrolled in a single SNAP case including 2+ adults in reference case					
Count	209,448	157,416	36,698	2,757	406,319
Percent	51.5%	38.7%	9.0%	0.7%	100.0%
Children enrolled in a single SNAP case including at least 1 adult 25-34 years old					
Count	356,239	86,223	92,512	4,794	539,768
Percent	66.0%	16.0%	17.1%	0.9%	100.0%

Notes. The universe of this table is all SNAP-enrolled children in California in 2017 who appeared on a state tax return and who had at least one adult on their reference case. Column 1 reports the number and share of these children who appear on a tax return containing all adults who appeared on the child's reference case. Column 2 reports the number and share of these children who appear on a tax return containing at least one but not all adults who appeared on the child's reference case. Columns 3 and 4 report the number and share of these children who appear on a tax return containing no adults who appeared on the child's reference case, including cases containing no adults, broken out by whether the return contained an adult who filed with an ITIN or not.

Appendix Table H.3: Distribution of SNAP-enrolled children who did not appear on a state tax return by whether adults in their SNAP reference case appear on any return

	No adults	Some adults	All adults	Total
All children				
Count	282,875	19,220	66,914	369,009
Percent	76.7%	5.2%	18.1%	100.0%
Children enrolled in a single SNAP case				
Count	266,109	18,281	64,242	348,632
Percent	76.3%	5.2%	18.4%	100.0%
Children enrolled in a single SNAP case for all 12 months				
Count	136,688	10,068	27,401	174,157
Percent	78.5%	5.8%	15.7%	100.0%
Children enrolled in a single SNAP case including 2+ adults in reference case				
Count	73,532	18,281	14,778	106,591
Percent	69.0%	17.2%	13.9%	100.0%
Children enrolled in a single SNAP case including at least 1 adult 25-34 years old				
Count	117,295	9,307	27,642	154,244
Percent	76.0%	6.0%	17.9%	100.0%

Notes. The universe of this table is all SNAP-enrolled children in California in 2017 who did not appear on a state tax return in TY2017 and and who had at least one adult on their reference case. Column 1 reports the number and share of these children who did appear on a tax return containing no adults who appeared on the child's reference case. Column 2 reports the number and share of these children who appear on a tax return containing at least one but not all adults who appeared on the child's reference case. Column 3 reports the number and share of these children who did appear on a tax return and all adults who appeared on the child's reference case appeared on a return.

I Results for Tax Year 2016

We observe SNAP enrollment and state tax data for California for tax years 2015 through 2017, so we are able to replicate every stage of our procedure for tax year 2016 as well. Note that since we rely on the prior year's tax filing information and we lack returns for tax year 2014, we cannot replicate our analysis for tax year 2015.

The CalEITC available to taxpayers in 2016 differed in two significant ways from the 2017 version we analyze in this paper. First, self-employment earnings were not counted as earned income for purpose of the CalEITC in 2016. Second, the maximum income tax units could report and still be eligible for the CalEITC increased from approximately $13,900 in 2016 to $22,300 in 2017. However, tax units in this expanded income range were only eligible for fairly small benefit amounts as shown in **??**.

The number of individuals claiming the CalEITC was substantially lower in 2016 than in 2017. There were 376,000 CalEITC claims in 2016 compared to 1,463,000 claims in 2017 (Davis and White, 2019). We observe a similar jump in claimants in our merged sample of SNAP filers. As reported in Appendix Table I.1, 172,092 SNAP-related tax units claimed the CalEITC in 2016, compared to 485,562 in 2017. Around one-third of the increase seems to be due to the expansion in the eligible range of earnings. Another one-quarter of the increase is due to filers claiming using self-employment income.[20]

We present take-up estimates for 2016 separately by the same three populations considered above: claimers of the federal EITC (Appendix Table I.2), federal EITC non-claimers (Appendix Table I.3), and non-filers (Appendix Table I.4). Appendix Table I.5 aggregates estimates from the three tables. Overall, the take-up rate among SNAP recipients in 2016 was 43%, over ten percentage points lower than in 2017. The number of eligible tax units more than doubled between 2016 and 2017 both for filers who claimed the federal EITC and those who did not. However, the share of eligible tax units who did not claim the credit was unchanged. Among non-filers, the count of eligible imputed tax returns also increased, but by a smaller amount, from 171,720 in 2016 to 268,113 in 2017. Finally, the mean CalEITC credit amount for 2016 was $295, over $100 higher than the mean amount for 2017. This is explained by the presence of more CalEITC recipients earning lower credit amounts on the expanded phase-out region in 2017.

The number of eligible filers grew faster over this period than the number of non-filers we impute to be eligible. The significant increase in the number of claimers with self-employment income suggests many more households became eligible for the CalEITC due to their self-employment income, rather than ineligible due to the combination of self-employment and wage income. Unless all of the newly eligible households filed and claimed, this suggests that there may be a number of non-filers with only self-employment income who could also be eligible which our estimate does not include. If that's the case, our estimate for the take-up rate in 2017 might represent an upper bound.

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[20]We estimate this number by counting the number of claimants in 2017 for whom the majority of their earnings came from self-employment and whose total earnings was below $15,000 in order to avoid double-counting with the group above.

Appendix Table I.1: Claiming of federal and state EITC among all SNAP tax units in TY 2016

	Total tax units	Federal EITC Claimants			CalEITC Claimants		
	Count	Count	Share	Amount	Count	Share	Amount
For all filers							
Total	1,031,215	725,152	70%	$3097	172,092	17%	$738
By filing status and number of dependents							
Single							
No dependents	308,617	101,613	33%	$335	37,127	12%	$126
1 dependent	222,666	201,847	91%	$2,649	52,001	23%	$663
2 dependents	163,374	154,660	95%	$4,109	42,617	26%	$1,086
3+ dependents	96,004	90,767	95%	$4,569	20,079	21%	$1,208
Married							
No dependents	37,236	15,327	41%	$392	2,699	7%	$116
1 dependent	48,393	38,048	79%	$2,640	4,510	9%	$625
2 dependents	70,232	57,136	81%	$4,094	7,263	10%	$1,029
3+ dependents	84,693	65,754	78%	$4,357	5,796	7%	$1,157
By total earnings (thousands)							
$0-$5	242,254	177,319	73%	$2,694	73,635	30%	$513
$5-$10	168,942	126,177	75%	$2,363	73,100	43%	$987
$10-$15	163,746	122,940	75%	$3,266	25,231	15%	$674
$15-$20	137,783	89,995	65%	$4,378	57	0%	$890
$20-$25	109,370	77,633	71%	$4,063	24	0%	$606
$25-$30	73,262	55,051	75%	$3,436	13	0%	$881
$30+	135,858	76,037	56%	$2,235	32	0%	$857

Notes. Universe is e-filed tax returns linked to at least one SNAP participant. Column 1 reports the total number of tax units in each cell. Column 2 reports the count of those tax units that claimed the federal EITC. Column 3 reports what share of all returns in each cell claimed the federal EITC. Column 4 reports the average claimed amount of the federal EITC for each cell. Column 5 through 7 report the same statistics but for the state EITC.

Appendix Table I.2: Eligibility and take-up of the CalEITC among SNAP filers who claim the federal EITC in 2016

	Total tax units	CalEITC eligible		Eligible non-claimants		
	Count	Count	Share	Count	Share	Mean amt
For all filers						
Total	716,819	181,677	25%	13,805	8%	$684
By filing status and number of qualifying children						
Single						
0 QCS	103,365	37,303	36%	1,060	3%	$99
1 QC	211,184	56,738	27%	4,302	8%	$495
2 QCs	149,665	46,364	31%	4,665	10%	$853
3+ QCs	78,687	19,807	25%	2,010	10%	$957
Married						
0 QCs	16,135	2,790	17%	101	4%	$77
1 QC	40,136	4,841	12%	347	7%	$442
2 QCs	57,247	7,888	14%	737	9%	$797
3+ QCs	60,400	5,946	10%	583	10%	$948
By total earnings (thousands)						
$0-$5	173,032	74,619	43%	3,757	5%	$466
$5-$10	124,585	78,370	63%	6,327	8%	$872
$10-$15	122,265	28,688	23%	3,721	13%	$583
$15-$20	89,407	0	0%	0	.	.
$20-$25	77,186	0	0%	0	.	.
$25-$30	54,794	0	0%	0	.	.
$30+	75,550	0	0%	0	.	.

Notes. Universe is e-filed tax returns linked to at least one primary filer who claimed SNAP, and that included a claim for a non-zero federal EITC. The number of qualifying children in each tax unit was calculated using the process described in **??**. Column 1 reports the total number of tax units that meet those criteria. Column 2 reports the count of those tax units that were eligible for the California EITC. Column 3 reports what share of all returns were eligible for the SNAP. Column 5 reports the number of eligible returns that did not claim the SNAP, and Column 6 reports the share of eligible units that did not claim. Column 7 reports the average imputed amount among those non-claimers for each cell.

Appendix Table I.3: Eligibility and take-up of the CalEITC among SNAP filers who did not claim the federal EITC in TY 2016

	Total tax units	CalEITC eligible		Eligible non-claimants		
	Count	Count	Share	Count	Share	Mean amount
For all filers						
Total	306,063	40,694	13%	39,836	98%	$127
By filing status and number of qualifying children						
Single						
0 QCs	222,884	39,617	18%	38,902	98%	$116
1 QC	11,135	354	3%	309	87%	$628
2 QCs	5,046	172	3%	158	92%	$1,036
3+ QCs	1,998	29	1%	27	93%	$1,289
Married						
0 QCs	28,989	371	1%	313	84%	$104
1 QC	10,786	56	1%	47	84%	$658
2 QCs	12,075	56	0%	48	86%	$989
3+ QCs	7,793	25	0%	22	88%	$1,030
By total earnings (thousands)						
$0-$5	64,935	28,611	44%	27,949	98%	$145
$5-$10	42,765	11,974	28%	11,780	98%	$80
$10-$15	40,806	109	0%	107	98%	$531
$15-$20	47,788	0	0%	0	.	.
$20-$25	31,737	0	0%	0	.	.
$25-$30	18,211	0	0%	0	.	.
$30+	59,821	0	0%	0	.	.

Notes. Universe is e-filed tax returns linked to at least one primary filer who claimed SNAP, and that did not include a federal EITC claim. The number of qualifying children in each tax unit was calculated using the process described in**??**. Column 1 reports the total number of tax units that meet those criteria. Column 2 reports the count of those tax units that were eligible for the California EITC. Column 3 reports what share of all returns were eligible for the CalEITC. Column 5 reports the number of eligible returns that did not claim the CalEITC, and Column 6 reports the share of eligible units that did not claim. Column 7 reports the average imputed amount among those non-claimers for each cell.

Appendix Table I.4: Eligibility and take-up of the CalEITC among non-filers in TY 2016

	Total tax units	CalEITC eligible		Eligible non-claimants		
	Count	Count	Share	Count	Share	Mean amount
For all filers						
Total	762,600	171,720	23%	171,720	100%	$303
By filing status and number of dependents						
Single						
0 QCs	538,831	115,863	22%	115,863	100%	$92
1 QC	93,453	25,140	27%	25,140	100%	$598
2 QCs	46,833	13,438	29%	13,438	100%	$964
3+ QCs	28,582	7,519	26%	7,519	100%	$1,071
Married						
0 QCs	34,189	4,723	14%	4,723	100%	$94
1 QC	7,093	1,557	22%	1,557	100%	$646
2 QCs	6,745	1,739	26%	1,739	100%	$1,038
3+ QCs	6,874	1,741	25%	1,741	100%	$1,212
By total earnings (thousands)						
$0	398,424	0	0%	0	.	.
$1-$5	178,793	138,700	78%	138,700	100%	$215
$5-$10	66,537	28,913	43%	28,913	100%	$664
$10-$15	42,570	4,107	10%	4,107	100%	$736
$15-$20	28,071	0	0%	0	.	.
$20-$25	18,615	0	0%	0	.	.
$25-$30	10,810	0	0%	0	.	.
$30+	18,780	0	0%	0	.	.

Notes. Universe is simulated tax returns including only non-filing SNAP participants. These tax units are constructed using the process described in Appendix C.3.5. The number of qualifying children in each imputed tax unit was calculated using the process described in Appendix C.3.5. Column 1 reports the total number of tax units that meet those criteria. Column 2 reports the count of those tax units that were eligible for the California EITC. Column 3 reports what share of all returns were eligible for the CalEITC. Column 5 reports the number of eligible returns that did not claim the CalEITC, and Column 6 reports the share of eligible units that did not claim. Column 7 reports the average imputed amount among those non-claimers for each cell.

Appendix Table I.5: Summing up CalEITC take-up among SNAP recipients in 2016

	Total	CalEITC eligible		Eligible non-claimants			
	Count	Count	Share	Count	Share	Mean amount	Total amount
Filers							
Fed EITC claimants	716,819	181,677	25%	13,805	8%	$684	9,436,792
Non Fed EITC claimants	306,063	40,694	13%	39,836	98%	$127	5,039,291
Imputed Non-Filers							
All	762,600	171,720	23%	171,720	100%	$303	52,087,935
Total	1,785,482	394,091	22%	225,361	57%	$295	66,564,018

Notes. This table compiles information from earlier tables; see those tables for details. The addition is the final column which reports the total unclaimed dollars for each population.

J Results by Race

Appendix Table J.1 presents estimates of eligibility and participation by the race of SNAP recipients.[21] Presenting results at the tax unit level would require that we ascribe results only to one of the actual or simulated primary filers of each tax unit. Instead, we present results at the individual level.[22] We also report our results separately for primary filers and for dependents.

Among filers, eligible Hispanic primary filers are less likely to claim the CalEITC than primary filers from other racial groups represented in our SNAP sample. Take-up is about 7 percentage points lower for Hispanic primary filers than White heads and spouses for example. Hispanic dependents in eligible tax units are also less likely to receive the CalEITC. Across other racial groups, share of eligible households not claiming the CalEITC is roughly equal (between 18% and 20% for primary filers and 7 to 9% for dependents).

A greater share of Black, Hispanic, and Native Hawaiian and Pacific Islander (NHPI) non-filing imputed primary filers appear eligible for the CalEITC than other imputed primary filers. Forty-two percent of Black, 38% of Hispanic, and 34% of NHPI non-filing imputed primary filers appeared eligible for the CalEITC, compared to 30% of White imputed primary filers. We observe similar gaps in participation among imputed dependents. Black, Hispanic and NHPI non-filers are also eligible for higher imputed CalEITC credit amounts. Notably, a much lower share of Asian non-filers appear eligible for the CalEITC (25% of primary filers and 28% of dependents).

Altogether, among primary filers, non-claiming is highest among individuals who identify as American Indian and Alaskan Native (AIAN), followed by Black, NHPI, and White individuals, whose non-claiming rates are fairly comparable. Claiming is highest among Asian and Asian/Pacific Islander individuals. Among dependents, non-participation rates are highest among those who identify as AIAN, as well as NHPI. Claiming rates are fairly comparable between Black, White individuals. Claiming is again highest among individuals who identify as Asian or Asian/Pacific Islander.

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[21]The race/ethnicity variable we use comes from the CDSS data. This variable combines concepts of race and ethnicity. It is also a combination of self-reporting and social worker visual identification (applicants are asked to provide their self-identified race/ethnicity, but if they do not mark anything the eligibility worker may enter a value based on their own visual assessment). In February 2020, CDSS issued guidance to limit all reporting on race and ethnicity to be self-reported. The demographic distribution of race/ethnicity in the CDSS data is comparable to the distribution of California households enrolled in SNAP by race/ethnicity from the American Community Survey (2019). We exclude the "two or more race" category due to small cell sizes.

Our analysis captures individuals in safety-net programs administered by CDSS who identify as American Indian and Alaska Native but do not live on tribal land and/or earn tribal income. Individuals who earn tribal income are exempt from state tax filing in California and may not appear as having received a payment automatically in our data. However, among those earners who qualify for safety-net programs, most are also likely eligible for tribal safety-net programs (such as the Food Distribution Program on Indian Reservations and Tribal TANF) and would not appear in the MEDS data.

CDSS reports nine ethnicities that are grouped by the US Census Bureau into an "Asian" category (Asian Indian, Cambodian, Chinese, Filipino, Japanese, Korean, Laotian, and Vietnamese), and three ethnicities that are grouped by the US Census Bureau as "Native Hawaiian and Other Pacific" (Guamanian, Hawaiian, and Samoan). Due to small cell sizes, we are unable to report each category uniquely, and use the US Census race/ethnicity categories to best capture the distinct take-up rates across all these categories. CDSS also has a separate category in the data named "Asian or Pacific Islander". We are unable to meaningfully distinguish between each community in that category and so we choose to report it separately.

[22]Accordingly, we do not total amounts of forgone EITC dollars to avoid double-counting.

Appendix Table J.1: CalEITC eligibility and participation by race

	AIAN	Asian	Asian/PI	Black	Hispanic	NHPI	Other / Un-known	White	Total
					By Race				
Within Actual Tax Units									
Heads and Spouses									
Number of individuals	6,067	77,418	14,496	135,964	554,410	3,955	132,741	255,134	1,180,185
% eligible	59%	57%	53%	68%	56%	55%	56%	56%	58%
% Non-claiming among eligible	18%	19%	18%	17%	25%	21%	19%	18%	21%
Mean unclaimed amount	$139	$108	$107	$118	$115	$127	$113	$113	$114
Dependents									
Number of individuals	4,412	51,566	10,878	130,346	614,925	3,977	116,712	179,740	1,112,556
% eligible	58%	53%	49%	69%	52%	48%	56%	55%	55%
% Non-claiming among eligible	8%	7%	7%	7%	11%	9%	7%	7%	9%
Mean unclaimed amount	$320	$227	$183	$249	$221	$256	$253	$271	$233
Within imputed tax units									
Heads and Spouses									
Number of individuals	8,812	32,732	7,671	137,018	260,570	3,409	93,753	267,367	811,332
% eligible	30%	19%	25%	42%	38%	34%	33%	30%	35%
% Non-claiming among eligible	100%	100%	100%	100%	100%	100%	100%	100%	100%
Mean unclaimed amount	$59	$41	$63	$87	$85	$89	$63	$56	$71
Dependents									
Number of individuals	2,864	8,599	2,955	56,260	135,730	1,494	33,808	74,951	316,661
% eligible	26%	23%	28%	37%	32%	37%	31%	29%	32%
% Non-Claiming among eligible	100%	100%	100%	100%	100%	100%	100%	100%	100%
Mean unclaimed amount	$160	$147	$197	$264	$227	$271	$209	$185	$219
Overall Take-Up Gap									
Heads and Spouses	53%	29%	34%	49%	43%	49%	42%	47%	44%
Dependents	29%	13%	20%	25%	22%	29%	20%	23%	22%

Notes. The universe for the top panel is e-filed tax returns linked to at least one primary filer who claimed SNAP. The universe for the bottom panel is simulated tax units only containing non-filing SNAP participants. Within each race category, we report the share of heads/spouses and dependents within each race category who were eligible for the CalEITC. Among those eligible, we also report the share that did not claim the CalEITC and the mean imputed amount for these eligible non-claimers. Column 1 reports statistics for American Indian and Alaskan Native enrollees. Column 2 reports statistics for Asian enrollees. Column 3 reports statistics for Asian and/or Pacific Islander enrollees. Column 4 reports statistics for Black enrollees. Column 5 reports statistics for Hispanic enrollees. Column 6 reports statistics for Native Hawaiian and/or Pacific Islander enrollees. Column 7 reports statistics for those whose race is reported as Other or Unknown. Column 8 reports statistics for White enrollees. We do not report statistics for the less than 1% of enrollees who are associated with different race categories across copies of our MEDS data. See Appendix J for more information about the data we use and how we group enrollees into these categories.

References

Davis, Charles, and Evan White. 2019. "Who Receives the Earned Income Tax Credit in California?" California Policy Lab.