TY2021 and TY2022 Education Tax Credit Underclaims for Filers and Nonfilers

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The views expressed in this paper are those of the authors and do not necessarily represent the views of the IRS.

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1. Introduction

Over the course of the last several decades, Congress has given the Internal Revenue Service (IRS) responsibility for administering a range of credits and deductions for individuals and businesses. The IRS conducts numerous education and outreach programs as well as releases other resources designed to help taxpayers understand and claim these tax benefits. However, many individuals and families remain unaware of particular credits and deductions or face barriers that deter them from claiming the full amount for which they are eligible. As part of its strategic operating plan, the IRS has pledged to help taxpayers understand and claim appropriate credits and deductions.[1]

Credits and deductions are provisions that reduce the amount of taxes a taxpayer needs to pay or otherwise increase the amount that can be refunded based on certain eligibility criteria. Taxpayers can receive three general types of credits and deductions:

- A tax deduction reduces the amount of income subject to tax.
- A non-refundable tax credit is a credit that reduces the amount of tax liability, but the amount of the credit may not exceed the taxpayer's tax liability. (For example, if a taxpayer is eligible for a non-refundable tax credit of $1,500 and has $1,000 in tax liability, the credit reduces the taxpayer's liability by only $1,000.)
- A refundable tax credit is a credit that reduces the amount of tax liability and, if the amount of the credit exceeds the taxpayer's tax liability, the amount of the credit that exceeds the taxpayer's tax liability can be given as a refund to the taxpayer, even in cases where the taxpayer does not have any tax liability. (For example, if a taxpayer is eligible for a refundable tax credit of $1,500 and has $1,000 in tax liability, the credit reduces the taxpayer's liability by $1,000, and the taxpayer will have an additional $500 refunded.)

To design better strategies to support eligible taxpayers in claiming credits and deductions, the IRS and decision makers first need to understand where taxpayers are not fully claiming credits and deductions and the barriers that may impact claiming behavior. To ground these discussions, the IRS has begun developing approaches to measure uptake by eligible taxpayers and to estimate the share of eligible taxpayers who do not claim credits and deductions for which they are eligible. In the inaugural year of releasing aggregate estimates of the tax credits and deductions gap— the amount of credits and deductions for which taxpayers are eligible but did not claim, irrespective of whether those taxpayers filed tax returns— the IRS focused on a subset of fully or partially refundable credits for individuals. This working paper is part of that series of working papers and focuses on education credits, the American Opportunity Tax Credit (AOTC) and the Lifetime Learning Credit (LLC). The IRS invites comments and recommendations on ways to improve the methodology used to measure the credits and deductions gap for these credits.

As this work continues in the coming years, the IRS plans to expand the set of credits and deductions examined and continue to refine the methodologies used to estimate the credits and deductions gap. This work will feed into other efforts by the IRS to increase awareness of credits and deductions and remove barriers to claiming. Overall, this will inform and complement other IRS's efforts to prevent inadvertent errors, fraud, and abuse.

[1] Internal Revenue Service. "Internal Revenue Service Inflation Reduction Act Strategic Operating Plan, FY2023 – 2031." Page 36 https://www.irs.gov/pub/irs-pdf/p3744.pdf

We estimate the tax benefit gap for the education tax credits in terms of the number of students for whom there is an education credit underclaim, number of tax returns for which there is an education credit underclaim, and the amount of the underclaim. Education credit underclaims may arise from three broad groups of students: 1) eligible students that appear on a return with an education credit claim for another student but there is no credit claimed for them ("partial claimants"); 2) eligible students that appear on return without an education credit ("non-claimants"); and 3) eligible students that do not appear on a return ("non-filers"). We do not estimate underclaims for students who have credit claims, rather we assume that existing education credit claims are for the correct education credit and for the correct amount. Because tax return data does not provide complete information to identify AOTC eligibility, we consider a range of underclaim estimates with differing AOTC eligibility assumptions. As a preview of our results, we find that 47% of students claim any education credit and when considering only students who are eligible for an education tax credit the claim rate increases to a range of 62% to 67%. This is in line with Herlache et al. (2021) who estimate an AOTC take-up rate of around 47% for all students and Cronin & Gray-Hancuch (2024) who find 45% of undergraduate students have any education credit. Several papers estimate education-credit take up rates on smaller subsets of taxpayers. Guyton et al. (2017) find that take-up rates range from 65% for independent students to 77% for high-school seniors and take-up rates increase with income. Cronin & Gray-Hancuch estimate a 60% AOTC take-up rate for students that look AOTC eligible, while Bulman & Hoxby (2015) consider a range of eligibility assumptions and note that take-up rates increase with income.

This paper adds to the existing literature by estimating claim participation rates and credit underclaims for Tax Years 2021 and 2022 for both AOTC and LLC using administrative data. Our analysis is based upon the population of students and the tax returns on which they appear rather than a sample. We also profile non-claimants and partial claimants along dimensions including geography, preparation method, filing status, student age, income, and past credit claims, and look at reasons why a tax return without any claim or only a partial claim is not eligible for an education tax credit. In line with Cronin & Gray-Hancuch (2024), we further demonstrate that as many as one-third of non-claimants may not claim a credit due to a lack of understanding of how to treat scholarships as income in order to maximize the amount of education tax credits the tax unit is eligible to claim.

For TY2022, in dollar terms we find $12.7 billion in total education credit claims and total education credit underclaims that range from $3.2 billion to $8.9 billion, with a middle of the road underclaims estimate of $6.3 billion.[2] The estimated credit participation rate among tax credit eligible tax return filers ranges from 62% to 67% depending upon AOTC eligibility assumptions. Likewise, for TY2021 we find $13.5 billion in total education credit claims and a middle underclaims estimate for filers of $6.6 billion, and an estimated participation rate for eligible filers that ranges from 62% to 66%. Nonfilers represent 15.5% of students with any estimated underclaim in TY2021 and 20.1% in TY2022.[3]

This paper proceeds as follows. Section 2 discusses credit eligibility rules for both the AOTC and LLC and presents historical data on credit claims. We discuss how we identify and construct a dataset of students from administrative tax return data and present data on existing education credit claims in Section 3. We identify potential apparently-eligible partial claimants and nonclaimants and estimate dollars of credit underclaims in Section 4. In Section 5, we combine estimates on claims and underclaims to generate

[2] Estimated education credit claims are "as reported" on tax returns, pre-audit, and do not include any adjustments for incorrect claims.

[3] Some of this difference across tax years could be due to timing. At the time of analysis, less time had passed for TY2022 filing and some of the F1098-T students who do not match to a tax return may be eventual late filers.

participation rates for students that appear on filed tax returns. Section 6 examines potential barriers to claiming an education credit looking at tax return preparation methods as well as reasons why a nonclaimant may not be eligible for any education credit. Non-filer underclaim methodology estimates are presented in Section 7. Finally, Section 8 combines the filer and non-filer estimates and concludes.

2. Education credit eligibility rules

The Internal Revenue Code contains two tax credits for higher education tuition expenses, the American Opportunity Tax Credit ("AOTC") and the Lifetime Learning Credit ("LLC"). Table 1 compares key differences for the two credits in credit amounts, qualified expenses, and eligibility requirements. The AOTC is available for 100% of the first $2,000 of qualified expenses and 25% of the next $2,000 of qualified expenses, for a maximum of $2,500. Forty percent of the otherwise available AOTC is refundable up to a maximum of $1,000. The LLC is available for 20% of the first $10,000 of qualified expenses and no portion of this credit is refundable. As of tax year 2021, both credits have the same income limitations. Taxpayers who are married filing joint returns may claim the full credit with modified adjusted gross income ("AGI") up to $160,000, then the credit begins to phase-out and reaches $0 for taxpayers with $180,000 modified AGI[4]. These amounts are cut in half to $80,000 and $90,000 for taxpayers who do not file Married Filing Jointly.

Table 1. Tax Credits for Higher Education

	American Opportunity Tax Credit (AOTC)	Lifetime Learning Credit (LLC)
Credit Amount	100% of first $2,000; 25% of next $2,000	20% of $10,000
Refundability	40% refundable	Not refundable
Income limitation	$160k - $180k for joint filers; $80k - $90k else	$160k - $180k for joint filers; $80k - $90k else
Qualified expenses	Tuition, fees, and course materials	Tuition and fees
Calculation	Applied on a per student basis with a maximum of $2,500 for any eligible student	Applied on a per return basis with a maximum of $2,000 per tax return
Years Eligible	First 4 years of postsecondary education	No limit on number of years
Enrollment Status	At least half-time; degree seeking	No minimum enrollment or degree seeking requirement
Felony for controlled substances	Not eligible	Eligible

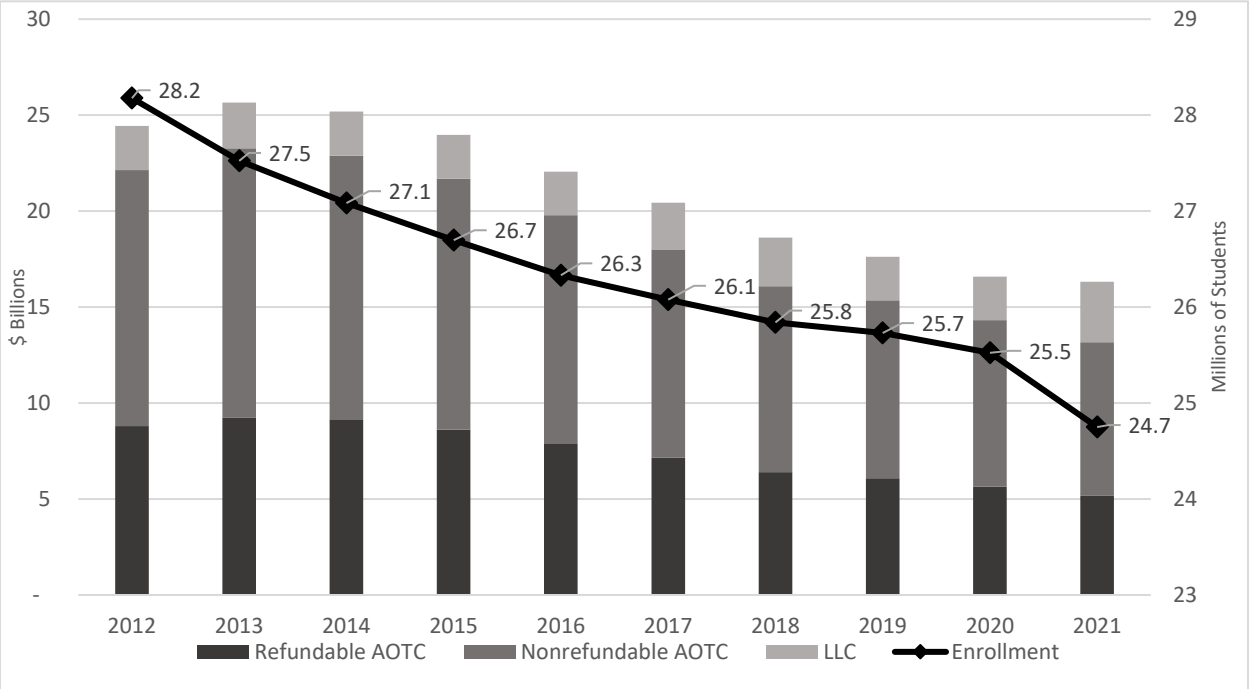
Generally, qualified expenses for the AOTC include tuition, fees, and course materials while LLC qualified expenses only include tuition and fees. The AOTC is calculated on a per student basis with a maximum of $2,500 for any eligible student on a return. The LLC is applied on a per return basis with a maximum of $2,000 per tax return. AOTC eligible students are in their first 4 years of postsecondary education, enrolled at least half-time, in a degree seeking program, and have no felony conviction for controlled substances. The LLC has no such limitations on student eligibility. All AOTC eligible students are also LLC

[4] Modified AGI for education credits is AGI plus any foreign earned income exclusion, foreign housing exclusion, foreign housing deduction, and any exclusion of income by bona fide residents of American Samoa or Puerto Rico.

eligible. An individual student may only claim one tax credit for higher education in a tax year. A tax return may claim both education tax credits if they are claimed for different students on the return.

Both education tax credits are calculated on Form 8863, where the AOTC is separated into a refundable and nonrefundable portion. Figure 1 depicts estimated dollar amounts for the refundable and nonrefundable portions of the AOTC as well as the LLC over time from the IRS Statistics of Income (SOI) as well as student enrollment. [5] SOI line count estimates are based upon a sample of tax returns and are released annually in Publication 4801.[6] Education credit claims have steadily declined since tax year 2013. Student enrollment has also declined over this time period from 28.2 million students in academic year 2011-2012 to 25.5 million students in academic year 2019-2020.

Figure 1. Tentative Education Tax Credit Amounts and Annual Student Enrollment, Tax Years 2012-2021, (Billions of Dollars Claimed and Enrollment in Millions of Students)



Source: SOI Individual Line Count Estimates and Department of Education, NCES 12-month academic year enrollment at degree granting institutions.

3. Identifying Students in Administrative Tax Data

While education credits are claimed on a tax return, eligibility is dependent on each student's circumstances. We use administrative tax data to identify students and calculate education credit claims

[5] (U.S. Department of Education, National Center for Education Statistics)
[6] (Statistics of Income, Internal Revenue Service, Department of Treasury, 2012 - 2021) available at https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-line-item-estimates-publications-4801-and-5385 Each education credit component represents a specific line on F8863: Refundable AOTC is Line 8, Nonrefundable AOTC is Line 9, and LLC is Line 18.

and underclaims by joining data from three separate tax forms: F1040, F8863, and F1098-T. We calculate education credit claims and underclaims at the student level, as the taxpayer is instructed to do on F8863, and aggregate the student level claims and underclaims back to the tax return. We can identify students in tax data in two ways: 1) students who receive a F1098-T tuition statement from an education institution; and 2) a taxpayer reported student listed on the F8863 with an education credit claim. Note that students with an education credit claim on F8863 may not always have a F1098-T (more on this later) and students with a F1098-T may not have any education credit claim. We construct a data set of students in a series of steps outlined in Table 2 and discussed in turn.

Table 2. Identifying Students on Individual Tax Returns (Counts in Thousands)

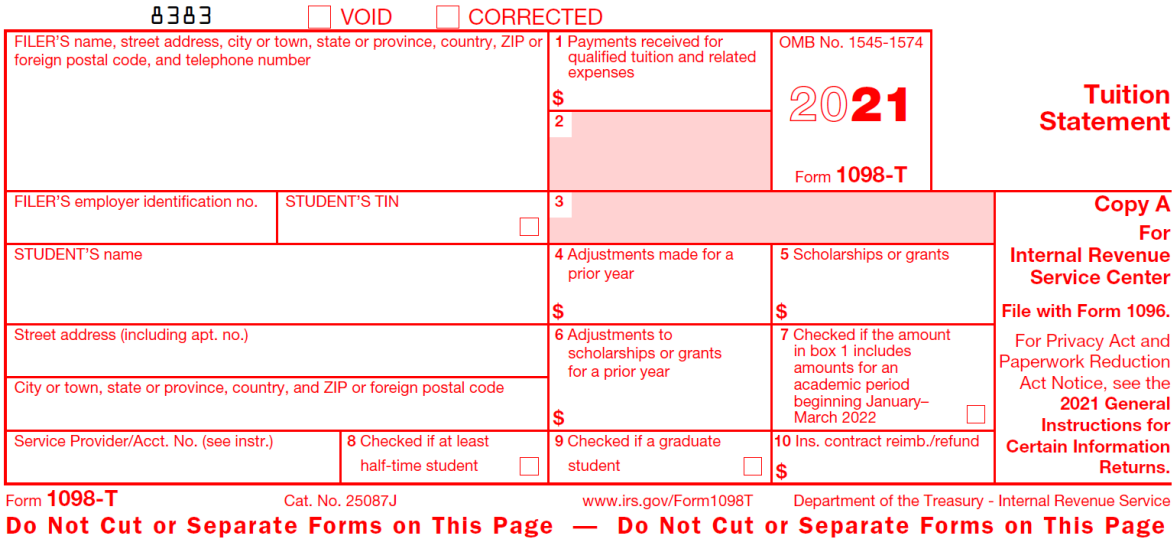
	TY2021	TY2022
Step 1: Students with F1098-T Tuition Statements		
F1098-T Tuition Statements	23,390	22,944
Unique Students	21,571	21,053
Match to a person on a F1040	20,043	19,248
Step 2: Tax Returns with F8863 Education Credits		
F8863 Filings	9,104	8,609
And has at least one student with a F1098-T	8,247	7,647
And has no students with a F1098-T	857	962
Step 3: Identify Persons on Individual Returns and link to F1098-Ts and F8863s		
F1040 Filings	160,059	156,104
Number of Persons on those F1040 Returns	301,761	295,520
Persons who match to F1098-T	24,009	23,214
And the person appears on a return with a F8863	9,080	8,439
And the person appears on a return with no F8863	14,929	14,776
Step 4: Apportion F8863 return level credits to students on a return		
Number of Returns with F8863	9,104	8,609
Number of Students on those Returns	10,048	9,514
Student has a 1098t	9,080	8,439
Student has no 1098t	969	1,076
Number of Students with a tentative credit	9,600	9,032
Student has a 1098t	8,631	7,956
Student has no 1098t	969	1,076
Number of Returns with total education credit claims > $0	9,036	8,462
Number of Students with total education credit claims > $0	9,545	8,946
Step 5: Students on a Return with no F8863		
Number of students	14,929	14,776
Number of unique students	12,737	12,482

Step 1: Students with F1098-T Tuition Statements

Education institutions provide a tuition statement, Form 1098-T (Figure 2), to students and to the IRS. Tuition statements provide some of the necessary information for calculating education tax credits. Each

F1098-T provides data on the amount of tuition paid and scholarships or grants administered through the school as well as indicators for if the student was enrolled at least half time and for if the student was a graduate student. After removing duplicate filings and filings with an invalid taxpayer identification number (TIN), we are left with 22.944 million F1098-T filings for TY2022 representing 21.053 unique students. 8.2% of these unique students (1,717 million) received a F1098-T from more than one institution. Following the same procedure as Cronin & Gray-Hancuch (2024), we reconcile this F1098-T data with enrollment data from the Department of Education during academic year 2020-2021 (the most recent year available) and find that 14.2% of students did not receive a F1098-T.[7]

Figure 2. Form 1098-T Tuition Statement



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FILER'S name, street address, city or town, state or province, country, ZIP or foreign postal code, and telephone number	1 Payments received for qualified tuition and related expenses $	OMB No. 1545-1574 2021 Form 1098-T	Tuition Statement
	2		
FILER'S employer identification no. / STUDENT'S TIN ☐	3		Copy A For Internal Revenue Service Center
STUDENT'S name	4 Adjustments made for a prior year $	5 Scholarships or grants $	File with Form 1096.
Street address (including apt. no.)	6 Adjustments to scholarships or grants for a prior year $	7 Checked if the amount in box 1 includes amounts for an academic period beginning January–March 2022 ☐	For Privacy Act and Paperwork Reduction Act Notice, see the 2021 General Instructions for Certain Information Returns.
City or town, state or province, country, and ZIP or foreign postal code			
Service Provider/Acct. No. (see instr.) / 8 Checked if at least half-time student ☐	9 Checked if a graduate student ☐	10 Ins. contract reimb./refund $	

Form 1098-T Cat. No. 25087J www.irs.gov/Form1098T Department of the Treasury - Internal Revenue Service

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As noted by Ackerman et al. (2014), Bulman & Hoxby (2025), and Cronin & Gray-Hancuch (2024) among others, educational institutions may not issue a F1098-T for valid reasons and the student may still be eligible for an education tax credit. A school may choose not to submit a F1098-T if the tuition paid is $0. When the tuition paid is $0 because the student received scholarships or grants to offset the tuition, the school may choose not to submit a F1098-T, and the student may still be credit eligible because the student may choose to count the scholarship or grant against other components of the cost of attendance and claim a credit on the remaining tuition expenses. Cost of attendance for student financial aid purposes includes all costs to attend school. In addition to tuition and fees, cost of attendance includes: books, course materials, supplies, and equipment; cost of housing and food (or living expenses); transportation expenses; loan fees (excluding any loan fees for non-federal student loans); miscellaneous expenses (including a reasonable amount for the documented cost of a personal computer); allowance for childcare or other dependent care; costs related to a disability; and reasonable

[7] As done by Cronin & Gray-Hancuch (2024) for TY2017, we start with Department of Education academic enrollment for degree seeking students during academic year 2020-2021. We add a Department of Education estimate of nondegree seeking students and subtract an estimate of non-resident aliens. This gives an estimate of U.S. citizens and resident aliens at Title IV institutions equal to 24.2 million students. To this estimate we use the authors adjustment of 11% to increase the academic year estimates to represent a calendar year. Finally, we subtract our count of F1098-T students that are enrolled in multiple institutions to arrive at a calendar year 2021 enrollment of 25.156 million students. This enrollment estimate includes 3.6 million more students than appear in F1098-T data for tax year 2021.

costs for eligible study abroad programs.[8] IRS Publication 970 includes several examples of how a taxpayer may choose to count scholarships against the cost of attendance first and receive a tax credit on the remaining tuition dollars.[9] Cronin & Gray-Hancuch (2024) describe this complexity around calculating education credits when the student receives scholarships as a reason why some students do not claim an education credit.

Table 3 contains counts and amounts for F1098-T line items for unique students in tax years 2021 and 2022. We use the half-time enrollment and graduate student indicators to classify each F1098-T as either likely AOTC (enrolled at least half-time and not a graduate student) or likely LLC (enrolled less than half-time or a graduate student). These classifications are not perfectly aligned with AOTC and LLC eligibility rules and we will go into detail in section 4.2 about how well these rules line up with education credit claims. For TY2022, we classify 69.5% of the 21 million unique students as having a likely AOTC F1098-T and 34.5% as having a likely LLC F1098-T. Note that students with multiple F1098-Ts may have both a likely AOTC F1098-T and a likely LLC F1098-T. For example, a student who completes their undergraduate studies in May of one year and begins graduate school in August of the same year could have one likely AOTC F1098-T from the undergraduate institution and a likely LLC F1098-T from the graduate school. Tuition Statements do not include textbook expenses, drug felony information, year of postsecondary education, or degree seeking status.

Step 2: Tax Returns with F8863 Education Credits

Taxpayers claim education tax credits using F8863 "Education Credits" (included in the appendix). The taxpayer begins on page 2 of the form where they are asked to provide the SSN for each student and answer a series of questions to determine AOTC and LLC eligibility. Based upon the answers to these eligibility questions, the taxpayer then calculates either a tentative AOTC for each individual student or a combined amount of eligible LLC tuition across all eligible LLC students on the return. Tentative AOTC credit amounts are summed up and entered on page 1, where the income limitations are applied, and the credit is split into a refundable and nonrefundable portion. Eligible LLC tuition amounts are also entered on page 1, income limitations are applied, and the income limited credit is combined with the nonrefundable portion of the AOTC to get a combined nonrefundable education credit. The taxpayer is directed to a credit limit worksheet to calculate the portion of the nonrefundable education credits to enter on line 19.[10] This nonrefundable education credit after the credit limit worksheet is entered on Schedule 3, line 3. Finally, Schedule 3 nonrefundable credits are entered on the Form 1040 line 20, combined with the nonrefundable portion of the child tax credit (line 19), and subtracted from tax liability.

We create a calculator to compute each line of the F8863 as well as the final portion of nonrefundable education credits able to be claimed against tax liability for each tax return. Table 4 contains some of these key lines for tax years 2021 and 2022.[11] In TY2022, 8.4 million tax returns claimed $12.7 billion in

[8] (US Department of Education, 2024)

[9] (Internal Revenue Service, Department of the Treasury, 2022)

[10] The credit limit worksheet determines the amount of nonrefundable credit the taxpayer can claim against tax liability. Allowable nonrefundable education credits are limited to tax liability before credits (F1040, line 18) less the following tax credits: foreign tax credit, credit for child and dependent care expenses, retirement savings contribution credit, and partner's additional reporting year tax from Form 8978.

[11] We limit our sample to taxpayers with valid taxpayer identification numbers ("TINs") who had a return posted by 12/31/2023 for TY2021 and by 04/30/2024 for TY2022.

Table 3. Form 1098-T Tuition Statement Counts and Amounts

	TY 2021		TY 2022	
	Count (K)	Amount ($M)	Count (K)	Amount ($M)
Total number of unique students	21,571	-	21,053	-
Number of 1098ts Received	23,390	-	22,944	-
Line 1 - Qualified tuition	21,236	227,558	20,727	228,762
Line 2 - Prior year tuition adjustments	1,059	1,615	1,023	1,740
Line 5 - Scholarships or Grants	12,528	105,337	12,416	108,133
Line 6 - Prior year scholarship adjustments	385	713	344	628
Line 7 - Tuition includes amount for academic period beginning next calendar year	3,902	-	3,762	-
Line 8 - Half time student indicator	18,362	-	18,020	-
Line 9 - Graduate student indicator	3,904	-	3,860	-
Line 10 - Insurance contract reimbursement / refund	1	12	6	45
Number of students that look AOTC eligible	14,932	-	14,634	-
Number of 1098ts	15,719	-	15,408	-
Line 1 - Qualified tuition	14,485	167,461	14,163	168,581
Line 2 - Prior year tuition adjustments	699	1,001	647	1,008
Line 5 - Scholarships or Grants	10,120	87,821	10,010	90,075
Line 6 - Prior year scholarship adjustments	247	412	212	362
Line 7 - Tuition includes amount for academic period beginning next calendar year	2,875	-	2,799	-
Line 8 - Half time student indicator	14,932	-	14,634	-
Line 9 - Graduate student indicator	-	-	-	-
Line 10 - Insurance contract reimbursement / refund	1	2	2	7
Number of students that look LLC eligible	7,382	-	7,262	-
Number of 1098ts	7,670	-	7,536	-
Line 1 - Qualified tuition	6,751	60,097	6,563	60,181
Line 2 - Prior year tuition adjustments	360	614	376	732
Line 5 - Scholarships or Grants	2,408	17,516	2,406	18,057
Line 6 - Prior year scholarship adjustments	138	301	132	266
Line 7 - Tuition includes amount for academic period beginning next calendar year	1,026	-	963	-
Line 8 - Half time student indicator	3,430	-	3,386	-
Line 9 - Graduate student indicator	3,904	-	3,860	-
Line 10 - Insurance contract reimbursement / refund	1	10	3	38

education credits -- $5.0 billion in refundable AOTC and $7.6 billion in nonrefundable education credits.[12]. While total education credits have decreased from TY2021 to TY2022, continuing the downward trend shown in Figure 1, average credit amounts are similar between the two years.

Line 7 contains a checkbox for taxpayers to indicate when they are not eligible for the refundable portion of the AOTC. Instead, these taxpayers may claim the full amount of any AOTC as a nonrefundable credit. A taxpayer is ineligible for a refundable AOTC if any they meet all three of the following conditions: 1) under age 18 at the end of the taxable year; or age 18 at the end of the taxable year and earned income is less than one-half of support; or over age 18 and under age 24 at the end of the taxable year and earned income is less than one-half of support; 2) at least one of the taxpayer's parents is alive at the end of the taxable year; and 3) the taxpayer is not filing a joint return. Around 2% of returns in our data with a tentative AOTC check this box.

Table 4. F8863 Calculations for selected line items

	TY 2021			TY 2022		
	Count (K)	Dollars ($M)	Avg ($)	Count (K)	Dollars ($M)	Avg ($)
Line 1 - Tentative AOTC	6,164	13,630	2,211	5,964	13,313	2,232
Line 7 - Tentative AOTC after Income Limit	6,163	13,285	2,156	5,963	12,944	2,171
Line 7 - Checkbox	138	-	-	121	-	-
Line 8 - Refundable AOTC	6,039	5,216	864	5,801	5,045	870
Line 9 - Nonrefundable AOTC	6,163	8,069	1,309	5,910	7,782	1,317
Line 12 - Tentative LLC Amount	3,086	3,170	1,027	2,782	2,887	1,038
Line 18 - LLC after Income Phaseout	3,085	3,081	999	2,780	2,792	1,004
Line 19 - Nonrefundable Education credits after credit limit worksheet	7,946	8,245	1,038	7,345	7,691	1,047
Nonrefundable Education Credits Claimed on F1040	7,943	8,239	1,037	7,287	7,628	1,047
Refundable AOTC + Nonrefundable Education Credits Claimed on Return	9,036	13,455	1,489	8,462	12,674	1,498

Table 5 distributes the total education credit claims across AGI for both tax years. Average credit claims increase with income, reflecting the fact that higher income taxpayers are more likely to have enough tax liability to claim the full size of any nonrefundable credit. Appendix 3 contains a distribution for the education credit components: refundable AOTC, nonrefundable AOTC, and LLC.

Step 3: Identify Persons on Individual Returns and link to F1098-Ts and F8863s

We join the F1098-Ts to persons who appear on a F1040 tax return. For tax year 2021, our data includes 160 million F1040 filings representing 301.7 million individual persons. We match a F1098-T to 24 million persons on a return. This number is larger than the number of unique students with a F1098-T (21.6 million) and reflects the fact that many students appear on multiple tax returns. A student may appear on their parents' tax return as a dependent and on a separate return as a primary taxpayer. A student

[12] See Appendix 2 for a comparison of our estimates to the SOI line count estimates for TY2021 (the latest year available).

may be erroneously claimed on two or more tax returns as well. We are careful when calculating underclaims to ensure we only assign an underclaim to an individual student once. We can further separate persons on a return with a F1098-T into those who appear on a return with a F8863 for Education Credits (9.1 million) and those who do not (14.9 million).

Table 5. Total Estimated Education Credit Claims Distributed by AGI

AGI	Number (k)	# Distribution	Amount ($m)	$ Distribution	Average $
		TY 2021			
<= 0	84	0.9%	77	0.6%	917
1 to 25k	2,503	27.7%	2,417	18.0%	965
25k to 50k	2,461	27.2%	3,860	28.7%	1,569
50k to 75k	1,336	14.8%	2,279	16.9%	1,705
75k to 100k	894	9.9%	1,514	11.2%	1,694
100k to 200k	1,758	19.5%	3,309	24.6%	1,883
> 200k	0	0.0%	0	0.0%	
Total	9,036	100.0%	13,455	100.0%	1,489
		TY 2022			
<= 0	89	1.1%	83	0.7%	932
1 to 25k	2,275	26.9%	2,220	17.5%	976
25k to 50k	2,279	26.9%	3,626	28.6%	1,591
50k to 75k	1,277	15.1%	2,185	17.2%	1,711
75k to 100k	828	9.8%	1,384	10.9%	1,672
100k to 200k	1,715	20.3%	3,177	25.1%	1,853
> 200k	0	0.0%	0	0.0%	
Total	8,462	100.0%	12,674	100.0%	1,498

Step 4: Apportion F8863 return level credits to students on a return

Education credit claims in the data available for this project are recorded at the return level. But because credit eligibility depends on characteristics of an individual student, we want to apportion the return level credits to the individual students on the return. We identify students in two ways: by the presence of a F1098-T or from being listed as a student on F8863. For tax year 2021, our dataset includes 9.104 million returns with a F8863 for education credits representing 10.0 million students. 9.1 million of these students have a F1098-T (90.4%) and 969 thousand do not (9.6%).

To apportion the return level credits to students we begin with the series of eligibility questions on page 2 of F8863 in Figure 3. The data used for this project contains answers for up to three students per tax return.[13] An AOTC eligible student is one with less than 4 prior AOTC claims (Q23 = No), who is enrolled at least half-time in a degree seeking program (Q24 = Yes), who is in the first four years of postsecondary

[13] Forty-four percent of returns in our data have a single student and 79% have 3 or fewer students. For the 21% of returns with more than 3 students, we only observe the answers to these questions for three students.

education (Q25 = No), and who has no felony convictions for possession or distribution of a controlled substance (Q26 = No). An LLC eligible student has any other combination of answers to the eligibility questions.

Figure 3. F8863 Student Education Credit Eligibility Questions for TY2021 and TY2022

23	Has the Hope Scholarship Credit or American opportunity credit been claimed for this student for any 4 tax years before 2020?	☐ Yes — **Stop!** Go to line 31 for this student.	☐ No — Go to line 24.
24	Was the student enrolled at least half-time for at least one academic period that began or is treated as having begun in 2020 at an eligible educational institution in a program leading towards a postsecondary degree, certificate, or other recognized postsecondary educational credential? See instructions.	☐ Yes — Go to line 25.	☐ No — **Stop!** Go to line 31 for this student.
25	Did the student complete the first 4 years of postsecondary education before 2020? See instructions.	☐ Yes — **Stop!** Go to line 31 for this student.	☐ No — Go to line 26.
26	Was the student convicted, before the end of 2020, of a felony for possession or distribution of a controlled substance?	☐ Yes — **Stop!** Go to line 31 for this student.	☐ No — Complete lines 27 through 30 for this student.

To apportion credits, we classify each student as either AOTC or LLC eligible according to the answers to Q23 – Q26. Then we implement a series of iterative rules. First, if only one student on a return has indicators for a type of a credit (AOTC or LLC), that student gets the full amount of the credit claimed on the return up to the maximum allowable credit per student for AOTC. If the student checkboxes indicate eligibility for one type of credit but the only credits claimed on the return are for the other education tax credit and the return has no other students, we give the student the other type of credit in amounts equal to what was claimed by the return. This rule apportions 89.4% of AOTC credit dollars and 96.6% of LLC dollars in TY2022 (and 89.6% of AOTC dollars and 96.5% of LLC dollars in TY2021).

Second, we divide any remaining unmatched credit amounts claimed on a return across students with a particular type of credit proportionally according to their share of overall tuition on F1098-Ts. For example, consider a return with two AOTC eligible students where F1098-T tuition amounts are $4,000 for student 1 and $2,000 for student 2. We assign two-thirds ($4,000 / $6,000) of the return level AOTC credits to student 1 and one-third to student 2. We only consider a maximum of $4,000 tuition for AOTC eligible students as that is the maximum amount of tuition that can be used for the credit. At this point, we also apportion any remaining unmatched AOTC credits to student with matched credits that are less than the per student maximum AOTC amount. The idea for this rule is that these amounts should reflect unobserved qualified textbook expenses for students where qualified tuition is smaller than the amount used to calculate the AOTC credit on the return. This rule apportions an additional 8.6% of AOTC credits and 2.2% of LLC credit dollars.

Finally, we divide remaining unmatched credit amounts evenly over students listed on a F8863 who do not yet have any credits assigned after the prior steps. This rule apportions an additional 2.0% for AOTC and 0.5% for LLC credit dollars in TY2022. We are left with approximately 17 thousand students on returns that have education credits who have no education credit assigned. These are students identified by a F1098-T who we do not see on an F8863 in our data.[14] We assume the remaining unmatched return credit dollars go with these students. Table 6 shows the result of this apportioning for total education credit claims and for the individual components for TY2021 and TY2022. For TY2022, 8.5 million returns

[14] Recall that the data available for this project includes F8863 information for up to three students per tax return.

have positive education credit claims covering 8.9 million individual students and for TY2021 9.036 million returns have education credit claims covering 9.5 million individual students.

Table 6. Return Level Education Tax Credits Apportioned to Students on the Return

	Return Level Claims		Apportioned To Students	
	Returns (thousands)	Amounts ($ millions)	Returns (thousands)	Amounts ($ millions)
	TY2021			
Total Education Credits	9,036	13,455	9,545	13,436
Refundable AOTC, Line 8 F8863	6,039	5,216	6,371	5,215
Nonrefundable AOTC, Line 9 F8863	6,163	8,069	6,496	8,068
Nonrefundable LLC, Line 18 F8863	3,085	3,081	3,104	3,061
Nonrefundable Education Credits Claimed	7,943	8,239	8,423	8,221
	TY2022			
Total Education Credits	8,462	12,674	8,946	12,656
Refundable AOTC, Line 8 F8863	5,801	5,045	6,127	5,044
Nonrefundable AOTC, Line 9 F8863	5,910	7,782	6,236	7,780
Nonrefundable LLC, Line 18 F8863	2,780	2,792	2,796	2,773
Nonrefundable Education Credits Claimed	7,287	7,628	7,733	7,612

Step 5. Students on a Return with no F8863

The fifth and final step considers F1098-T students who appear on tax returns with no education credit claim (14.8 million students in TY2022). For students who appear on multiple returns, we remove instances where the student is a dependent filer. We are left with 12.5 million students identified by a F1098-T who appear on a F1040 with no education credit claims for TY2022 (12.7 million students for TY2021).

The TY2022 total population of students on tax returns is 21.99 million (22.8 million in TY2021). This is the total number of Step 4 students on F8863 returns (9.5 million) plus the Step 5 total number of students on returns with no F8863 (12.5 million). This population is not a distinct set of students as some students do appear on multiple returns with F8863 filings. We are careful not to assign a credit claim or a credit underclaim to any student more than once even when they appear on multiple tax returns.

4. Identifying apparently-eligible underclaimants

4.1 Classifying Students

We want to identify students in our data who might have a credit underclaim. We do not estimate underclaims for students who have credit claims, rather we assume that existing education credit claims

are for the correct education credit and for the correct amount.[15] We consider for potential underclaims any student on a return who does not have an education credit and who does not have any education credit claim on any other tax return. To do this, we separate student filers into three broad buckets. Group 1 contains students who have an identified education credit claim (42%). Group 2 contains students identified by a F1098-T who do not have an education credit but who appear on a return with an education credit claim for another student (2%). Group 3 contains students identified by a F1098-T with no credit claims who appear on a tax return that also has no other education credit claims (56%). Potentially eligible underclaimant students are in Groups 2 and 3.

Group 1 represents claimant students (9.6 million in TY2021 and 9.0 million in TY2022). To get a set of nonclaimant students we further subdivide Groups 2 and 3. From Group 2, we remove 17 thousand students on returns with unmatched credits under the assumption that those return level unmatched credits should go with these students. We remove an additional four thousand students in TY2021 (three thousand in TY2022) who appear on a different tax return with an education credit claim. This leaves 428 thousand students in TY2021 (463 thousand in TY2022) with no education credit claim who appear on a tax return with education credit claims for at least one other student. These are the Group 2 students who might have an underclaim. Likewise, from Group 3 we remove 1.8 million students in TY2021 (1.7 million in TY2022) who appear on a different return with an education credit claim leaving 10.97 million potential nonclaimants in TY2021 (10.8 million in TY2022). Underclaims for students in Group 2, who appear on a return with an education credit claim for at least one other student, may occur for different reasons than for students in Group 3, who appear on a return with no education credit claims.

We look at tax return observable characteristics of student claimants and nonclaimants in Table 7a and 7b. Each tax year is presented as a separate panel. We separate student claimants by F1098-T presence, and we also separate student nonclaimants by whether or not they appear on a tax return with any education credit claims for other students. In TY2021, 3.8% of student nonclaimants appear on a return with an education credit claim for at least one other student. Students without any F1098-T are older (average age 31) than students with a F1098-T (average age 26). Student nonclaimants on returns with another education credit are younger and more likely to be a dependent than both student claimants and student nonclaimants on a return with no education credit claims.

Tables 7a and 7b also contains statistics on prior education credit claims. We look at F8863 filings for tax years 2012-2022 and use the credit eligibility questions to identify if a student has an AOTC or LLC claim for each tax year. Considering all students in our data for TY2021, 49% had a prior AOTC claim and 16% had a prior LLC claim while 54% had any prior education credit claim. Student claimants are more likely to have a prior education credit claim (72.7% for students with a F1098-T and 64.7% for students with no F1098-T) than student nonclaimants (47.1% for students on returns with any education credit and 38.9% for students on returns with no education credit claims). Students with a prior claim are more likely to have had a prior AOTC claim than a prior LLC claim. We also look at the proportion of students with four or more prior AOTC claims (11%). These students are ineligible for a current year AOTC but could still be eligible to claim an LLC.

[15] Prior work (IRS Research, Applied Analytics & Statistics, 2018) estimated $0.9 billion in AOTC underclaims for TY2012. LLC underclaims totaled $0.5 billion and often arose from taxpayers who incorrectly claimed the AOTC when they were instead eligible for the LLC.

Table 7a. Classification and Characteristics of Students on Tax Returns, Tax Year 2021

	Student Claimants		Student Nonclaimants on Returns with Claims	Student Nonclaimants on Returns with No claim	Total
Return Has Credit	x	x	x		
Student Has F1098-T	x		x	x	
Student Has Credit	x	x			
Potential Underclaims			x	x	
Number of Students (thousands)	8,631	969	428	10,972	20,999
			Filing Status		
Single	43.5%	45.9%	2.0%	37.3%	39.5%
Head of Household	14.4%	27.7%	18.6%	17.4%	16.7%
Married, filing joint	42.0%	26.3%	79.2%	42.5%	42.3%
Married, filing separate	0.0%	0.0%	0.0%	2.6%	1.4%
Married, filing separate with spouse exemption	0.0%	0.0%	0.0%	0.0%	0.0%
Widower	0.1%	0.1%	0.2%	0.1%	0.1%
			Type of Person on Return		
Primary	58.4%	71.8%	21.9%	52.1%	55.0%
Spouse	10.4%	8.1%	17.5%	9.5%	9.9%
Dependent 1 - 4	31.2%	20.0%	60.6%	38.4%	35.1%
			Student Age		
<18	1.1%	3.4%	11.8%	4.4%	3.2%
18	5.8%	3.8%	11.4%	8.4%	7.2%
>18 - <= 23	44.5%	26.6%	38.4%	43.5%	43.0%
>= 24	48.5%	66.2%	38.4%	43.8%	46.6%
Average Age	26	31	23	26	26
			Prior Education Credit Claims, 2012 - 2021		
Any Prior AOTC Claim	66.1%	59.8%	41.4%	34.6%	48.8%
Any Prior LLC Claim	22.2%	14.5%	14.3%	11.1%	15.9%
Any Prior Education Credit Claim	72.7%	64.7%	47.1%	38.9%	54.1%
Four or more Prior AOTC Claims	16.0%	17.3%	8.9%	6.9%	11.1%

Table 7b. Classification and Characteristics of Students on Tax Returns, Tax Year 2022

	Student Claimants		Student Nonclaimants on Returns with Claims	Student Nonclaimants on Returns with No claim	Total
Return Has Credit	x	x	x		
Student Has F1098-T	x		x	x	
Student Has Credit	x	x			
Potential Underclaims			x	x	
Number of Students (thousands)	7,956	1,076	463	10,817	20,312
			Filing Status		
Single	42.5%	44.9%	5.5%	34.0%	37.3%
Head of Household	15.1%	31.9%	19.5%	18.0%	17.7%
Married, filing joint	42.3%	23.2%	74.7%	45.3%	43.6%
Married, filing separate	0.0%	0.0%	0.0%	2.5%	1.3%
Married, filing separate with spouse exemption	0.0%	0.0%	0.0%	0.0%	0.0%
Widower	0.1%	0.1%	0.2%	0.2%	0.1%
			Type of Person on Return		
Primary	57.1%	72.5%	23.2%	48.5%	52.5%
Spouse	10.0%	7.3%	15.0%	9.3%	9.6%
Dependent 1 - 4	32.9%	20.2%	61.8%	42.3%	37.9%
			Student Age		
<18	1.2%	3.6%	11.3%	4.6%	3.4%
18	6.0%	3.9%	11.5%	8.7%	7.5%
>18 - <= 23	45.2%	26.7%	41.6%	43.8%	43.4%
>= 24	47.7%	65.7%	35.6%	42.8%	45.8%
Average Age	26	31	23	26	26
			Prior Education Credit Claims, 2012 - 2021		
Any Prior AOTC Claim	65.9%	56.7%	42.0%	33.7%	47.7%
Any Prior LLC Claim	24.7%	13.5%	14.8%	12.6%	17.4%
Any Prior Education Credit Claim	73.4%	61.4%	47.8%	38.5%	53.6%
Four or more Prior AOTC Claims	16.2%	17.0%	8.7%	6.9%	11.1%

4.2 Data Limitations and Basic Approach to Estimate Underclaims

Tax data does not provide complete information to determine AOTC eligibility for nonclaimants. Without the F8863 eligibility questions, we do not know if the student is degree seeking, if the student is in the first four years of school, or if the student has a felony conviction for a controlled substance. There is no information reporting on textbook expenditures.

Another important limitation of this analysis is that we do not observe students without a credit claim who have no F1098-T. As previously discussed, institutions may not issue a F1098-T when the student pays no tuition because the amount is fully covered by scholarships or grants. The student may still be eligible for a credit if they choose to count the scholarship or grant funds against room and board expenses first. As shown on Table 7, 10% of TY2021 students with an education credit claim in our data do not have a F1098-T (12% in TY2022). Cronin & Gray-Hancuch (2024) estimate that 14% of students did not receive a F1098-T in TY2017.

We assign a type (AOTC or LLC) to each F1098-T using the graduate student and half-time enrollment indicators. Students not enrolled in graduate school and enrolled at least half-time are assigned likely AOTC while students who are enrolled in graduate school or enrolled less than half-time are assigned likely LLC. This assignment is not perfect and likely overstates the number of students with AOTC tuition. Table 8 shows how these assignments align with education credit claims for student claimants with an available F1098-T. For students with only AOTC classified tuition, 85% have an AOTC claim. For students with an AOTC claim, 92% have at least one F1098-T classified as AOTC. Likewise, for students with only LLC classified tuition, 81% have an LLC claim and 68% of LLC claimants have at least one F1098-T classified as LLC.

Table 8. F1098-T Tuition Type versus Education Credit Claims, TY2021 and TY2022
Students with Education Credit Claim and With F1098-T Tuition > $0, Counts in thousands

	TY2021			TY 2022		
	Has AOTC Claim	Has LLC Claim	Total	Has AOTC Claim	Has LLC Claim	Total
Has AOTC tuition	5,006	890	5,896	4,670	780	5,450
Has LLC tuition	430	1,840	2,270	398	1,682	2,080
Has Both tuition	267	90	357	242	74	316
Total	5,702	2,821	8,523	5,310	2,536	7,846

Table 8 suggests that using the graduate student and half-time indicators to predict credit eligibility for nonclaimants will do fairly well to predict aggregate underclaims, but this method is likely to overstate AOTC claims and to understate LLC claims. We consider three sets of AOTC eligibility assumptions for underclaims estimates: an upper-bound estimate using the most permissive AOTC eligibility assumptions, a lower-bound estimate using the most restrictive AOTC eligibility assumptions, and a more middle of the road approach. For all three estimates, we follow this basic algorithm: calculate possible AOTC and LLC credits for each student nonclaimant according to F8863 lines 27-31 making sure that each student only gets one credit; aggregate estimated student credits up to the tax return and run through a F8863 calculator with return level income phaseouts and credit limitations; apportion used return level credits back to each individual student. We remove any students with filing status married filing separate as these returns are ineligible to claim education credits. We also exclude student nonclaimants who file

from U.S. territories as bona fide residents of the U.S. territories are generally not eligible to claim an education credit on U.S. tax return.

We use the tuition amounts from F1098-T to estimate qualified expenditures. We do not adjust these amounts by any scholarships that may be reported as taxpayers may choose to include scholarship income in taxable income and claim a credit for the remaining tuition that was not covered by a scholarship.[16]

4.3 Upper-bound Approach

For the most permissive AOTC eligibility approach, we assume that any student not in grad school who is enrolled at least half-time claims the AOTC. All other students claim the LLC. We include rules like those behind the F8863 "line 7 checkbox" to deny AOTC refundability to certain ineligible students. We do not observe if a student provides 50% of their own support and consequently cannot implement those tests. We deny refundability to 1) any student who is a primary filer and under 18 years of age and 2) any student who is a primary filer, with filing status other than married, filing joint who is between the ages of 18 and 23 (inclusive). The top panel of Table 9 contains upper-bound underclaims estimates for both TY2021 and TY2022. We estimate total upper-bound underclaims of $6.3 billion in TY2022 for 5.4 million tax returns ($7.0 billion over 5.4 million returns in TY2021). Approximately forty percent of these total education credit underclaims arise from the refundable portion of the AOTC ($2.7 billion in both tax years). This panel also shows that not all tentative nonrefundable education credits are able to be claimed by the taxpayer. In TY2021, tentative nonrefundable education credits total $8.97 billion ($7.2 billion tentative AOTC + $1.8 billion tentative LLC) but only $4.3 billion of these credits are able to be claimed against tax liability.

We test this upper-bound approach by estimating claims for students with both a credit claim and a F1098-T to see how well the predictions align with the actual claims. For TY2022, this procedure overestimates the number of actual AOTC claims by 8.5% and underestimates the number of actual LLC claims by 18%.

4.4 Lower-bound Approach

For an extreme lower-bound, we implement the most restrictive set of AOTC eligibility rules – we assume that all nonclaimants are ineligible for the AOTC and only eligible to claim the LLC. As shown in Table 1, AOTC eligibility criteria are more restrictive than LLC eligibility criteria. Generally, any student in our sample with a F1098-T should be LLC eligible. Under this lower-bound approach, we estimate $2.95 billion in underclaims across 4.1 million returns for TY2022 ($3.5 billion in underclaims across 5.0 million returns in TY2021). As was also the case in the upper-bound estimates, taxpayers are not able to use the full amount of tentative nonrefundable credits, $6.4 billion in TY2022.

[16] See (Internal Revenue Service, Department of the Treasury, 2022) for detailed examples of how a taxpayer may elect to do this.

Table 9. Underclaims Estimates for Filers TY 2021 and TY 2022

	TY 2021				TY 2022			
	Students (K)	Returns (K)	Amount ($M)	Ret Avg	Students (K)	Returns (K)	Amount ($M)	Reg Avg
				Upper-bound				
Ref AOTC	3,442	3,281	2,727	831	3,364	3,195	2,664	834
Nonref AOTC	4,916	4,754	7,194	1,513	4,600	4,429	6,602	1,490
Nonref LLC	2,364	2,334	1,774	760	2,215	2,186	1,703	779
Nonref Credits	5,255	5,045	4,313	855	4,320	4,143	3,633	877
Education Credits	6,053	5,806	7,040	1,213	5,602	5,362	6,297	1,174
				Middle Approach				
Ref AOTC	1,975	1,864	1,594	855	2,027	1,907	1,631	805
Nonref AOTC	3,397	3,285	5,384	1,639	3,224	3,103	4,969	1,601
Nonref LLC	3,873	3,804	3,101	815	3,581	3,516	2,903	826
Nonref Credits	5,244	5,035	3,994	793	4,321	4,145	3,419	825
Education Credits	5,670	5,435	5,589	1,028	5,007	4,790	5,049	1,054
				Lower-bound				
Ref AOTC	-	-	-	-	-	-	-	-
Nonref AOTC	-	-	-	-	-	-	-	-
Nonref LLC	7,258	6,993	6,773	969	5,794	6,520	6,375	978
Nonref Credits	5,225	5,017	3,493	696	4,312	4,137	2,951	713
Education Credits	5,225	5,017	3,493	696	4,312	4,137	2,951	713

4.5 Middle Approach

Finally, we consider a middle-of-the-road approach to AOTC eligibility. We start with the upper-bound F1098-T credit assignments according to the graduate student and half-time enrollment indicators. We include the same line 7 checkbox rules and we add two additional rules: we deny AOTC to any student with at least four prior observed AOTC claims and we deny AOTC to any student older than age 25. The AOTC is only available for the first four years of postsecondary education. While AOTC eligible students may be older than 25, we observe that 75% of AOTC claimants are age 25 or under.

Under this middle approach, underclaims for filers total $5.0 billion in TY2022 over 4.8 million returns ($5.6 billion over 5.4 million returns in TY2021). For TY2022 this middle approach estimate is 20% smaller ($1.3 billion) than the upper-bound estimate. Table 10 shows an AGI distribution for total education credit underclaims under this approach. Average credit claims increase with AGI. One explanation for this is that higher income taxpayers are more likely to have enough tax liability to use the full amount of any tentative nonrefundable education credit.

Table 10. Middle Approach Underclaims Estimates for Filers by AGI

AGI	Number (k)	# Distribution	Amount $M	$ Distribution	Average $
			TY 2021		
<= 0	31	0.6%	30	0.5%	944
1 to 25k	1,411	26.0%	848	15.2%	601
25k to 50k	1,776	32.7%	1,952	34.9%	1,099
50k to 75k	860	15.8%	1,102	19.7%	1,282
75k to 100k	522	9.6%	623	11.2%	1,194
100k to 200k	835	15.4%	1,034	18.5%	1,239
> 200k	0	0.0%	0	0.0%	0
Total	5,435	100.0%	5,589	100.0%	1,028
			TY 2022		
<= 0	27	0.6%	26	0.5%	963
1 to 25k	1,131	23.6%	724	14.3%	640
25k to 50k	1,484	31.0%	1,648	32.6%	1,110
50k to 75k	784	16.4%	969	19.2%	1,236
75k to 100k	498	10.4%	593	11.7%	1,192
100k to 200k	866	18.1%	1,090	21.6%	1,258
> 200k	0	0.0%	0	0.0%	0
Total	4,790	100.0%	5,049	100.0%	1,054

5. Education Credit Participation Rates

Underclaims arise from two sets of students: students on returns with an existing education credit claim and students on a return with no education credit claim. Thus, we have returns that are classified as both Claimants (because the tax return has an education credit claim for at least one student on the return) and Nonclaimants (because the tax return has at least one student identified by a F1098-T with no education credit claim). Table 11 breaks out total underclaims estimates across these two different sets of tax returns (Claimants with an Underclaim and Nonclaimants with an Underclaim).

We estimate participation rates for filers both in terms of number of claimants and in amount of credits claimed as in Table 12. The credit participation rate for filers is equal to Claims / Total Eligible Population where the Eligible Population equals Claims + Underclaims. The participation rate for number of claimants ranges from 62.6% to 65.9% in TY2021, depending on AOTC eligibility assumptions, and the credit dollar participation rate ranges from 65.7% to 79.5%. This reflects the fact that the average underclaim amount ($1,028) is smaller than the average education credit for claimants ($1,489). Numbers shown are for TY2021 “middle approach” but the same is true for TY2022 and across all three sets of AOTC eligibility assumptions.

Table 11. Number and Amount of Education Tax Credit Underclaims for Filers

	TY 2021			TY 2022		
	Number of Tax Units (thousands)	Underclaim Amount (millions)	Claimed Amount (millions)	Number of Tax Units (thousands)	Underclaim Amount (millions)	Claimed Amount (millions)
			Panel A. Upper-bound			
Filers, Total	5,805	7,040	640	5,362	6,297	610
Non-claimants	5,447	6,513	0	4,982	5,742	0
Claimants	358	527	640	381	555	610
			Panel B. Middle			
Filers, Total	5,435	5,589	640	4,790	5,049	610
Non-claimants	5,091	5,155	0	4,428	4,584	0
Claimants	344	434	640	362	465	610
			Panel C. Lower-bound			
Filers, Total	5,017	3,493	640	4,137	2,951	610
Non-claimants	4,699	3,256	0	3,811	2,707	0
Claimants	318	236	640	326	244	610

Table 12. Education Credit Participation Rates for Filers

	Number of Claims (thousands)		Amount of Claims ($ billions)	
	TY2021	TY2022	TY2021	TY2022
Claims	9,104	8,609	13.5	12.7
Underclaims				
Upper-bound	5,435	5,362	7.1	6.3
Middle	5,017	4,790	5.6	5.0
Lower-bound	4,702	4,137	3.5	3.0
Total Eligible (Claims + Underclaims)				
Upper-bound	14,539	13,971	20.6	19.0
Middle	14,121	13,398	19.1	17.7
Lower-bound	13,806	12,746	17.0	15.7
Participation Rate (Claims / Total Eligible)				
upper	62.6%	61.6%	65.7%	66.8%
middle	64.5%	64.3%	70.7%	71.5%
lower	65.9%	67.5%	79.5%	81.1%

Figures 4 and 5 look at education credit underclaims by state for TY2022. Figure 4 shows underclaim counts and Figure 5 shows underclaim dollars. Under both metrics, the largest concentration of underclaims are in the most populous states: California, Texas, Florida and New York.

Figure 4. TY2022 Education Credit Underclaimants by State

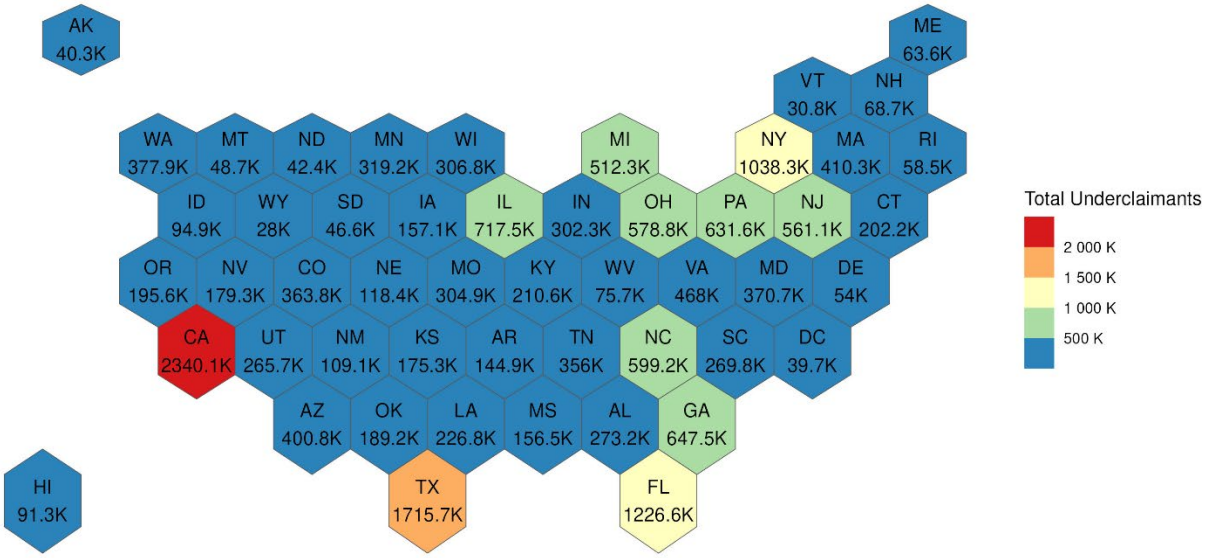
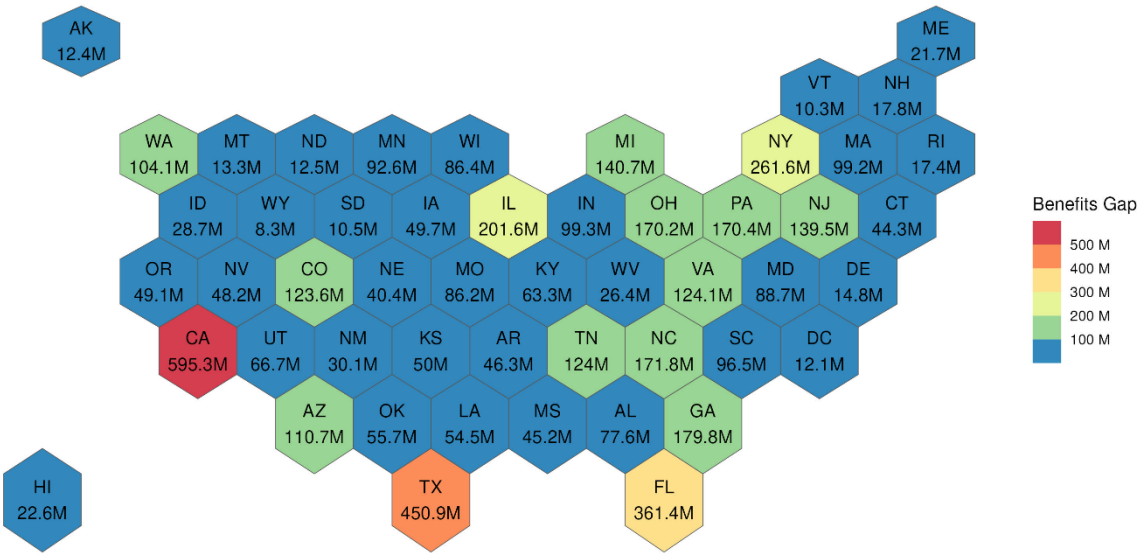


Figure 5. TY2022 Education Credit Underclaims by State



6. Understanding potential barriers to claiming the credit

Information frictions due to complex rules are often cited as a potential barrier to benefits up-take.[17] Education credit eligibility rules are complex. Tables 13a and 13b present participation rates by four tax return preparation methods: paid preparer, self-prepared on paper, software, and VITA/TCE Prepared. Underclaim counts on this table come from the "middle" approach of AOTC eligibility assumptions. Regarding the tables below, a Claimant is a return with an F8863. A Claimant return may have a potential underclaim if there is a student on the return, as identified by an F1098-T, who does not have any education credit claim. Out of the 405 thousand Claimant returns with a potential underclaim in TY2021, we estimate that 344 thousand have an education credit underclaim. Non-claimant returns have no education credit claims. Out of the 9,892 thousand non-claimant returns, we estimate that 5,091 thousand have an education credit underclaim under the middle approach. Altogether in TY2021, we identify 19.0 million tax returns with students and 14.2 million returns have either a claim or an underclaim, which leads to the overall participation rate of 64%.

Self-Prepared paper filed returns have the lowest credit-take up rates (43% in TY2021 and 35% in TY2022), indicating that a lack of information may hinder credit take-up. We do not find large differences in take-up rates across the three preparation methods that include preparation assistance for either tax year.

Table 13a. Tax return filers with students by education credit claim status and preparation method, TY 2021 (thousands)

	Returns	Paid Preparer	Self-Prepared	Software	VITA, TCE Prepared
Claimant	9,104	4,278	77	4,686	64
No potential underclaim	8,699	4,056	70	4,514	59
Potential underclaim	405	221	7	173	4
Underclaim > $0	344	189	6	145	4
No Underclaim	62	32	2	28	1
Non-claimant	9,892	4,584	181	5,059	68
Underclaim > $0	5,091	2,177	103	2,768	43
No Underclaim	4,801	2,406	78	2,291	25
Returns with Students	18,996	8,861	258	9,745	132
Education credit eligible returns	14,195	6,455	180	7,454	107
Credit participation rate for eligible returns	64%	66%	43%	63%	60%

[17] See (Currie, 2006), (Bhargava & Manoli, 2015), and (Cronin & Gray-Hancuch, 2024) among others.

Table 13b. Tax return filers with students by education credit claim status and preparation method, TY 2022 (thousands)

	Returns	Paid Preparer	Self-Prepared	Software	VITA, TCE Prepared
Claimant	8,609	4,076	45	4,418	70
No potential underclaim	8,174	3,826	33	4,250	65
Potential underclaim	435	250	12	168	6
Underclaim > $0	362	211	9	138	4
No Underclaim	73	39	2	30	1
Non-claimant	9,680	4,538	143	4,921	77
Underclaim > $0	4,428	1,904	82	2,396	45
No Underclaim	5,253	2,634	61	2,525	33
Returns with Students	18,289	8,614	188	9,339	148
Education credit eligible returns	13,036	5,980	127	6,814	115
Credit participation rate for eligible returns	66%	68%	35%	65%	61%

Tables 13a and 13b show that nearly half of non-claimant returns have no underclaim and 15% of claimant returns with a potential underclaim have no underclaim. On Tables 14a and 14b, we explore some reasons that a return with a potential underclaim may not be eligible for an education credit claim. In TY 2021, we identify 10.3 million returns with a potential education credit claim, and we estimate 4.9 million of those returns have no underclaim under the middle approach for AOTC eligibility.

Table 14a. Individual tax return filers with potential underclaims and possible reasons for no underclaim, TY2021 (Thousands of Returns)

	Returns	F1098-T tuition = $0	Income over phaseout	Not enough tax liability	Return LLC already maxed out
Claimants w/ potential Underclaim	405	3	4	10	21
And actual underclaim	344				
And no underclaim	62	3	4	10	21
Non-claimants	9,892	653	2,622	1,559	-
And actual underclaim	5,091				
And no underclaim	4,801	653	2,622	1,559	-
Total Potential Underclaims	10,297				
Total With No Underclaim	4,862	656	2,626	1,569	21

Table 14b. Individual tax return filers with potential underclaims and possible reasons for no underclaim, TY2022 (Thousands of Returns)

	Returns	F1098-T tuition = $0	Income over phaseout	Not enough tax liability	Return LLC already maxed out
Claimants w/ potential Underclaim	435	4	4	22	19
And actual underclaim	362				
And no underclaim	73	4	4	22	19
Non-claimants	9,680	680	2,908	1,720	-
And actual underclaim	4,428				
And no underclaim	5,253	680	2,908	1,720	-
Total Potential Underclaims	10,115				
Total With No Underclaim	5,326	684	2,912	1,742	19

Thirteen percent of these returns with no underclaim, or 656 thousand, have reported F1098-T equal to $0 and that is why they do not qualify for a credit under our methodology. Potential AOTC recipients may have textbook expenditures that we do not see on tax return data that could make them eligible. Over half of these credit ineligible non-claimant returns have income amounts that are larger than the allowable limits. For tax years 2021 and 2022, both the AOTC and LLC begin to phase-out at $180,000 for married taxpayers filing a joint return and phases out entirely at $200,000. This phase-out range is reduced to $90,000 - $100,000 for other filing statuses. About a third of ineligible non-claimants do not have enough tax liability to claim a nonrefundable credit. A taxpayer may be ineligible for the ATOC but eligible for the LLC but lacks enough tax liability to claim the non-refundable LLC. Finally, 21 thousand of the claimant returns with a potential underclaim have a student that appears to be eligible for the LLC but the return has already claimed an LLC for the maximum amount. This represents one-third of apparently ineligible claimant returns with a potential underclaim.

Lastly, we look at the proportion of underclaimant students where scholarship amounts on the F1098-T are larger than tuition amounts. These students may not claim a credit because they misunderstand how scholarship income interacts with education credit calculations. As outlined in Pub 970 and thoroughly discussed by (Cronin & Gray-Hancuch, 2024), students may choose to count any scholarships received against the full cost of attendance and claim a credit for the remaining tuition amounts. We find that around a third of underclaimant students have reported scholarship amounts that are greater than tuition amounts, and this proportion increases to 40-46% for students with an AOTC underclaim and ranges from 14-32% for students with an LLC underclaim. For F1098-T recipients with reported scholarships greater than or equal to reported tuition paid, (Cronin & Gray-Hancuch, 2024) estimate an AOTC take-up rate that is roughly one-half of the overall AOTC take-up rate for apparently eligible students age 18-21 years old.

7. Education Credit Underclaims for Nonfilers

Education credit underclaims can arise from both tax return filers and non-filers. Student non-filers can be identified by a F1098-T that does not match to any filed tax return. Additional complexities arise

around determining the appropriate tax unit and filing status for student non-filers. This section discusses the methodology and underclaims estimates for non-filers.

The estimate of education credit underclaims for non-filers starts with the list of recipients of Forms 1098T who were not on a tax return either as a primary, secondary or dependent for the tax year in question. An approximation to the tax unit composition and filing status for the return that the nonfiling student would have appeared on if they had filed is made by linking these individuals to tax returns from three adjacent tax years (2022, 2020 and 2019 for the tax year 2021 estimate and 2023, 2021 and 2020 for the tax year 2022 estimate). In tax year 2021 about 80% of individuals could be matched to a return as a primary, secondary or dependent or a combination of these in one of the three years. This percentage dropped to about 76% for the tax year 2022 estimate. If a Form 1098T matches to more than one of the three adjacent tax years, then the match to the return from the prior tax year is used first, then the subsequent tax year; and then finally, the return from two tax years prior.[18] When the student appears as both a primary and dependent on a tax return, the return where the individual matches to a dependent is used. The nonfiling Form 1098T recipients who do not appear on a neighboring year tax return are assumed to be single and not able to be claimed as a dependent.

Once the primary, secondary and dependents and filing status are identified for the estimated tax return, students matched to the same primary taxpayer are combined into the same estimated tax return. Then the primary and secondary (if married filing joint) on the return is/are matched to all the information returns with income. This income information is then compiled into a mock tax return and fed into a tax calculator which allows the estimation of adjusted gross income, tax before credits, tax after credits and then refundable and nonrefundable education credits.

These estimations require making the assumption not only that the composition of the tax return that would have made the education credit claim is the same as the one identified from a neighboring year, but also that the sum of the income found on information returns for the primary taxpayer (and secondary, if present) on the return accurately represents the income on the tax return that would have been filed. Form 1099NEC nonemployee compensation is used for net self-employment income. In many cases, of course, this estimation of income is incomplete or inaccurate since not all types of income is reported to third parties and offsets are usually not reported. All estimated tax returns are given the standard deduction and no adjustments to income or nonrefundable credits are allotted except the subtraction of one half of estimated self-employment income taxes and child tax credits calculated based on the number of children meeting the age requirement.

Three different estimates of education credit underclaims are made: One middle ground estimate and a lower and upper bound estimate. The middle ground estimate uses the mock tax return to estimate filing status, adjusted gross income and tax after credits and assumes that all the primary taxpayers who are under 24 years old are eligible to claim the AOTC as long as they pass the other tests (i.e. the Form 1098T indicates that they are at least a half time student and not a graduate student and also it is evident from filings going back to tax year 2012 that they have not already been claimed in four tax years for refundable education credits).

[18] For the tax year 2021 estimates, the tax return or returns for TY 2020 are used first, then TY 2022 and then TY 2019. For the tax year 2022 estimates, the tax return or returns for TY 2021 are used first, then TY 2023 and then TY 2020.

A second, upper-bound estimate does not use the return line items calculated based on information return income but instead assumes that the amount of nonrefundable credits that can be claimed is not limited by tax owed (because tax liability is assumed to be $20,000 for all observations) and that adjusted gross income is below the phaseout threshold. All taxpayers, including those under 24 years of age, are assumed to be eligible to claim refundable education credits if they meet the other tests listed above.

Finally, a third, lower-bound estimate is made which assumes that none of the taxpayers are eligible to claim refundable education credits (which would be the case, for instance, if they were not pursuing a degree) and calculates the nonrefundable credit amount based on an estimate of qualified educational expenses from the Form 1098T and the income and tax calculated based on income from information returns for the primary and secondary taxpayers from the neighboring year tax unit.

For all these estimates, the amount of qualified tuition on the Form 1098T is used as the estimate of qualified educational expenses for the purpose of calculating the amount of education credit that can be taken. In addition, all the returns with filing status married filing separate (based on the neighboring tax year return) are considered not eligible to claim education credits.

Based on these assumptions, the estimates of the total underclaims of education credits associated with the approximately 1.5 million nonfiling students on Forms 1098T in tax year 2021 are $226 million, $1.0 billion and $2.1 billion for the lower-bound, middle ground and upper-bound estimates, respectively. In the lower-bound estimate, there are about 0.5 million underclaims of education credits and in the upper -bound estimate about 1.2 million. For the middle ground estimate, about 68.5% of the underclaims are refundable credits and 31.5% are non-refundable. In addition, about 74.1% of the nonfiling students who are estimated to be eligible to claim education credits, appear to be eligible to claim AOTC based on their Form 1098T and income.

In tax year 2022, the approximately 1.8 million nonfiling Form 1098T recipients are associated with total underclaims of education credits amounting to an estimated $258 million, $1.3 billion and $2.6 billion for the lower-bound, middle ground and upper-bound estimates, respectively. The number of nonfiling students failing to make education credit claims is estimated to range from about 0.5 million to 1.5 million with a middle ground estimate of about 1.2 million. For the middle ground estimate, about 70.8% of the underclaims are refundable credits and about 29.2% of the underclaims are non-refundable. In addition, about 78.1% of the nonfiling students who are estimated to be eligible to claim education credits are found to be eligible to claim AOTC.

Table 15a. Counts of Underclaims of Education Credits for Nonfilers, TY 2021 (thousands of returns)

	Lower-Bound	Middle Ground	Upper-Bound
Education Credits	496	996	1,213
AOTC	0	737	807
LLC	496	258	406
Refundable Credits	0	737	807
Non-Refundable Credits	496	460	1,123
Total Nonfiler F1098Ts	1,500		

Table 15b. Amounts of Underclaims of Education Credits for Nonfilers, TY 2021 ($ Millions)

	Lower-Bound	Middle Ground	Upper-Bound
Education Credits	226	1,025	2,142
AOTC	0	944	1,736
LLC	226	82	406
Refundable Credits	0	704	772
Non-Refundable Credits	226	323	1,370

Table 16a. Counts of Underclaims of Education Credits for Nonfilers, TY 2022 (thousands of returns)

	Lower-Bound	Middle Ground	Upper-Bound
Education Credits	545	1,204	1,465
AOTC	0	940	1,005
LLC	545	264	460
Refundable Credits	0	940	1,005
Non-Refundable Credits	545	499	1,337
Total Nonfiler F1098Ts	1,838		

Table 16b. Amounts of Underclaims of Education Credits for Nonfilers, TY 2022 ($ Millions)

	Lower-Bound	Middle Ground	Upper-Bound
Education Credits	258	1,267	2,600
AOTC	0	1,177	2,136
LLC	258	90	464
Refundable Credits	0	897	962
Non-Refundable Credits	258	370	1,638

8. Discussion and Concluding Remarks

Table 17 combines underclaim counts and dollar amount estimates for both filers and nonfilers for all three approaches: upper-bound, middle, and lower-bound. Under the preferred middle approach, non-filers represent 20.1% of the total estimated education credit underclaim dollar amount in TY2022 (15.5% in TY2021).

Adding total education credit claims to total education credit underclaims gives the total amount of potential education credits. For TY2021 using the middle approach, this amount totals $20.1 billion ($13.5 billion in claims + $ 6.6 billion in underclaims). The credit participation rate across both filers and nonfilers is then 67% ($13.5 / $20.1). For TY22 the total amount of potential claims under the middle approach is $19.0 billion and the participation rate across filers and nonfilers is 66.7% ($12.7 / $18.9).

Table 17: Number and Amount of Education Tax Credit Underclaims for Filers and Nonfilers

	TY 2021			TY 2022		
	Number of Tax Units (thousands)	Underclaim Amount (millions)	Claimed Amount	Number of Tax Units (thousands)	Underclaim Amount (millions)	Claimed Amount
			Panel A. Upper-bound			
Filers, Total	5,805	7,040	640	5,363	6,297	610
Non-claimants	5,447	6,513	0	4,982	5,742	0
Claimants	358	527	640	381	555	610
Non-filers	1,213	2,142	0	1,465	2,600	0
Total Underclaims	7,018	9,182	640	6,828	8,897	610
			Panel B. Middle			
Filers, Total	5,435	5,589	640	4,790	5,049	610
Non-claimants	5,091	5,155	0	4,428	4,584	0
Claimants	344	434	640	362	465	610
Non-filers	996	1,025	0	1,204	1,267	0
Total Underclaims	6,431	6,614	640	5,994	6,316	610
			Panel B. Lower-bound			
Filers, Total	5,017	3,492	640	4,137	2,951	610
Non-claimants	4,699	3,256	0	3,811	2,707	0
Claimants	318	236	640	326	244	610
Non-filers	496	226	0	545	258	0
Total Underclaims	5,513	3,718	640	4,682	3,209	610

We find that around one-third of apparently-eligible education tax credits are not claimed on tax returns in tax years 2021 and 2022. Future work plans include profiling students underclaimants to identify opportunities for outreach. In particular, we plan to look for underclaim clusters by return geography and by educational institution. We continue to explore other rules for determining AOTC eligibility using available tax administration data.

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Appendix

Appendix 1. F8863 Education Credits, TY2022

Form **8863**

Department of the Treasury
Internal Revenue Service

Education Credits
(American Opportunity and Lifetime Learning Credits)

Attach to Form 1040 or 1040-SR.
Go to *www.irs.gov/Form8863* for instructions and the latest information.

OMB No. 1545-0074

2022

Attachment Sequence No. **50**

Name(s) shown on return

Your social security number

CAUTION

Complete a separate Part III on page 2 for each student for whom you're claiming either credit before you complete Parts I and II.

Part I Refundable American Opportunity Credit

1	After completing Part III for each student, enter the total of all amounts from all Parts III, line 30		1	
2	Enter: $180,000 if married filing jointly; $90,000 if single, head of household, or qualifying surviving spouse	2		
3	Enter the amount from Form 1040 or 1040-SR, line 11. But if you're filing Form 2555 or 4563, or you're excluding income from Puerto Rico, see Pub. 970 for the amount to enter instead	3		
4	Subtract line 3 from line 2. If zero or less, **stop**; you can't take any education credit	4		
5	Enter: $20,000 if married filing jointly; $10,000 if single, head of household, or qualifying surviving spouse	5		
6	If line 4 is: • Equal to or more than line 5, enter 1.000 on line 6 • Less than line 5, divide line 4 by line 5. Enter the result as a decimal (rounded to at least three places)		6	.
7	Multiply line 1 by line 6. **Caution:** If you were under age 24 at the end of the year **and** meet the conditions described in the instructions, you **can't** take the refundable American opportunity credit; skip line 8, enter the amount from line 7 on line 9, and check this box ☐		7	
8	**Refundable American opportunity credit.** Multiply line 7 by 40% (0.40). Enter the amount here and on Form 1040 or 1040-SR, line 29. Then go to line 9 below.		8	

Part II Nonrefundable Education Credits

9	Subtract line 8 from line 7. Enter here and on line 2 of the Credit Limit Worksheet (see instructions)		9	
10	After completing Part III for each student, enter the total of all amounts from all Parts III, line 31. If zero, skip lines 11 through 17, enter -0- on line 18, and go to line 19		10	
11	Enter the smaller of line 10 or $10,000		11	
12	Multiply line 11 by 20% (0.20)		12	
13	Enter: $180,000 if married filing jointly; $90,000 if single, head of household, or qualifying surviving spouse	13		
14	Enter the amount from Form 1040 or 1040-SR, line 11. But if you're filing Form 2555 or 4563, or you're excluding income from Puerto Rico, see Pub. 970 for the amount to enter instead	14		
15	Subtract line 14 from line 13. If zero or less, skip lines 16 and 17, enter -0- on line 18, and go to line 19	15		
16	Enter: $20,000 if married filing jointly; $10,000 if single, head of household, or qualifying surviving spouse	16		
17	If line 15 is: • Equal to or more than line 16, enter 1.000 on line 17 and go to line 18 • Less than line 16, divide line 15 by line 16. Enter the result as a decimal (rounded to at least three places)		17	.
18	Multiply line 12 by line 17. Enter here and on line 1 of the Credit Limit Worksheet (see instructions)		18	
19	**Nonrefundable education credits.** Enter the amount from line 7 of the Credit Limit Worksheet (see instructions) here and on Schedule 3 (Form 1040), line 3		19	

For Paperwork Reduction Act Notice, see your tax return instructions. Cat. No. 25379M Form **8863** (2022)

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

CAUTION ***Complete Part III for each student for whom you're claiming either the American opportunity credit or lifetime learning credit. Use additional copies of page 2 as needed for each student.***

Part III Student and Educational Institution Information. See instructions.

20 Student name (as shown on page 1 of your tax return)

21 Student social security number (as shown on page 1 of your tax return)

22 Educational institution information (see instructions)

a. Name of first educational institution	**b.** Name of second educational institution (if any)
(1) Address. Number and street (or P.O. box). City, town or post office, state, and ZIP code. If a foreign address, see instructions.	**(1)** Address. Number and street (or P.O. box). City, town or post office, state, and ZIP code. If a foreign address, see instructions.
(2) Did the student receive Form 1098-T from this institution for 2022? ☐ Yes ☐ No	**(2)** Did the student receive Form 1098-T from this institution for 2022? ☐ Yes ☐ No
(3) Did the student receive Form 1098-T from this institution for 2021 with box 7 checked? ☐ Yes ☐ No	**(3)** Did the student receive Form 1098-T from this institution for 2021 with box 7 checked? ☐ Yes ☐ No
(4) Enter the institution's employer identification number (EIN) if you're claiming the American opportunity credit or if you checked "Yes" in (2) or (3). You can get the EIN from Form 1098-T or from the institution. __ __ – __ __ __ __ __ __ __	**(4)** Enter the institution's employer identification number (EIN) if you're claiming the American opportunity credit or if you checked "Yes" in (2) or (3). You can get the EIN from Form 1098-T or from the institution. __ __ – __ __ __ __ __ __ __

23 Has the American opportunity credit been claimed for this student for any 4 prior tax years? ☐ Yes — **Stop!** Go to line 31 for this student. ☐ No — Go to line 24.

24 Was the student enrolled at least half-time for at least one academic period that began or is treated as having begun in 2022 at an eligible educational institution in a program leading towards a postsecondary degree, certificate, or other recognized postsecondary educational credential? See instructions. ☐ Yes — Go to line 25. ☐ No — **Stop!** Go to line 31 for this student.

25 Did the student complete the first 4 years of postsecondary education before 2022? See instructions. ☐ Yes — **Stop!** Go to line 31 for this student. ☐ No — Go to line 26.

26 Was the student convicted, before the end of 2022, of a felony for possession or distribution of a controlled substance? ☐ Yes — **Stop!** Go to line 31 for this student. ☐ No — Complete lines 27 through 30 for this student.

CAUTION *You **can't** take the American opportunity credit and the lifetime learning credit for the **same student** in the same year. If you complete lines 27 through 30 for this student, don't complete line 31.*

American Opportunity Credit

27	Adjusted qualified education expenses (see instructions). **Don't enter more than $4,000**	**27**	
28	Subtract $2,000 from line 27. If zero or less, enter -0-	**28**	
29	Multiply line 28 by 25% (0.25)	**29**	
30	If line 28 is zero, enter the amount from line 27. Otherwise, add $2,000 to the amount on line 29 and enter the result. Skip line 31. Include the total of all amounts from all Parts III, line 30, on Part I, line 1	**30**	

Lifetime Learning Credit

31	Adjusted qualified education expenses (see instructions). Include the total of all amounts from all Parts III, line 31, on Part II, line 10	**31**	

Appendix 2. F8863 Calculations for selected line items as compared to SOI Line Count Estimates, TY2021

	Population Estimate		SOI Line Count Estimate	
	Count (K)	Dollars ($M)	Count (K)	Dollars ($M)
Line 1 - Tentative AOTC	6,164	13,630	6,163	13,541
Line 7 - Tentative AOTC after Income Phaseout	6,163	13,285	6,159	13,176
Line 7 - Checkbox	138			
Line 8 - Refundable AOTC	6,039	5,216	6,027	5,170
Line 9 - Nonrefundable AOTC	6,163	8,069	6,159	8,005
Line 12 - Tentative LLC Amount	3,086	3,170	3,191	3,230
Line 18 - LLC after Income Phaseout	3,085	3,081	3,190	3,144
Line 19 - Nonrefundable Education credits after credit limit worksheet	7,946	8,245	8,123	8,280

Appendix 3. Middle Approach Underclaims Estimates for Filers by AGI Credit Component

AGI	*TY 2021*				*TY2022*			
	Count (k)	Count %	Amount $M	Amount %	Number (k)	Count %	Amount $M	Amount %
				Refundable AOTC, F8863 Line 8				
<= 0	31	1.7%	29	1.8%	26	1.3%	25	1.5%
1 to 25k	424	22.7%	371	23.3%	415	21.8%	365	22.4%
25k to 50k	524	28.1%	462	29.0%	518	27.2%	457	28.0%
50k to 75k	312	16.7%	275	17.3%	330	17.3%	292	17.9%
75k to 100k	202	10.8%	163	10.2%	213	11.2%	172	10.5%
100k to 200k	371	19.9%	293	18.4%	406	21.3%	320	19.6%
> 200k	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	1,864	100.0%	1,594	100.0%	1,907	100.0%	1,631	100.0%
				Nonrefundable AOTC, F8863 Line 9				
<= 0	59	1.8%	108	2.0%	37	1.2%	65	1.3%
1 to 25k	1,537	46.8%	2935	54.5%	1,298	41.8%	2451	49.3%
25k to 50k	778	23.7%	1,194	22.2%	786	25.3%	1,213	24.4%
50k to 75k	333	10.1%	457	8.5%	359	11.6%	497	10.0%
75k to 100k	205	6.2%	250	4.6%	216	7.0%	264	5.3%
100k to 200k	371	11.3%	440	8.2%	406	13.1%	480	9.7%
> 200k	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	3,285	100.0%	5,384	100.0%	3,103	100.0%	4,969	100.0%
				Lifetime Learning Credit, F8863 Line 18				
<= 0	85	2.2%	101	3.3%	53	1.5%	68	2.3%
1 to 25k	1,313	34.5%	1,304	42.1%	1,148	32.7%	1,191	41.0%
25k to 50k	1,044	27.4%	780	25.2%	977	27.8%	750	25.8%
50k to 75k	545	14.3%	396	12.8%	533	15.2%	387	13.3%
75k to 100k	329	8.6%	215	6.9%	316	9.0%	206	7.1%
100k to 200k	487	12.8%	304	9.8%	490	13.9%	303	10.4%
> 200k	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	3,804	100.0%	3,101	100.0%	3,516	100.0%	2,903	100.0%
				Nonrefundable Education Credits				
<= 0	1	0.0%	711	17.8%	2	0.0%	593	17.3%
1 to 25k	1,095	21.7%	477	11.9%	793	19.1%	359	10.5%
25k to 50k	1,728	34.3%	1,489	37.3%	1,295	31.2%	1,190	34.8%
50k to 75k	856	17.0%	827	20.7%	711	17.2%	677	19.8%
75k to 100k	521	10.3%	460	11.5%	482	11.6%	422	12.3%
100k to 200k	833	16.6%	741	18.5%	862	20.8%	770	22.5%
> 200k	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	5,035	100.0%	3,994	100.0%	4,145	100.0%	3,419	100.0%