

# MAINE STATE LEGISLATURE

The following document is provided by the  
**LAW AND LEGISLATIVE DIGITAL LIBRARY**  
at the Maine State Law and Legislative Reference Library  
<http://legislature.maine.gov/lawlib>



Reproduced from electronic originals  
(may include minor formatting differences from printed original)



JANET T. MILLS  
GOVERNOR

STATE OF MAINE  
MAINE REVENUE SERVICES  
OFFICE OF TAX POLICY  
24 STATE HOUSE STATION  
AUGUSTA, MAINE  
04333-0024

ADMINISTRATIVE & FINANCIAL SERVICES

KIRSTEN LC FIGUEROA  
COMMISSIONER

OFFICE OF TAX POLICY

MICHAEL J. ALLEN  
ASSOCIATE COMMISSIONER

March 3, 2022

Sen. Joseph Rafferty, Chair  
Rep. Michael Brennan, Chair  
Members Joint Standing Committee on Education and Cultural Affairs

Sen. Ben Chipman, Chair  
Rep. Maureen Terry, Chair  
Members Joint Standing Committee on Taxation

Dear Honorable Members of the Joint Standing Committees on Education and Taxation:

Pursuant to 20-A M.R.S. §12545, attached is a report prepared by Hannah Acheson-Field, an independent researcher, regarding the implementation of Maine's Educational Opportunity Tax Credit (EOTC), including statistics on credits claimed. Ms. Acheson-Field's biography is attached, and this research has been reviewed by the Office of Tax Policy, the State Economist, and the Department of Labor as required.

Ms. Acheson-Field's report, "Implementation of the Educational Opportunity Tax Credit" concludes that, "that take-up of the EOTC has expanded considerably since it was first implemented in 2008, but there are many eligible filers who do not claim the credit." For example, Ms. Acheson-Field estimates that for graduates from Maine's public institutions of higher education who are single filers, take-up was approximately 30 percent for filers with an associate's degree and 40 percent for filers with a bachelor's degree.

Ms. Acheson-Field also found that there are "important differences in EOTC usage by education level, degree type, degree discipline, and income" and has identified "factors that may contribute to low take-up and different take-up rates within groups, including an administratively burdensome application process and a lack of awareness about the credit."

To avoid confusion, I should verify: This is the report of an independent consultant regarding currently enacted law and was not created in conjunction with – nor available for review in formulating – proposals currently under consideration by the Legislature.

Please feel free to contact me if you have any questions about this report.

Sincerely,

Michael J. Allen

Cc: Kirsten LC Figueroa

Amanda Rector, State Economist

Mark McInerney, Director, Center for Workforce Research and Information, ME DOL

Julie Jones, Tax Committee Analyst, OFPR

Hillary Risler, Education and Cultural Affairs Committee Analyst, OPLA

# Implementation of the Maine Educational Opportunity Tax Credit

Hannah Acheson-Field

February 2022

## Abstract

---

In 2008, Maine implemented the Educational Opportunity Tax Credit (EOTC), a tax credit available to Maine residents who graduated with an eligible degree and who are paying towards their student debt. In this paper, I provide more information about how this program has been implemented. My data sources include a rich panel dataset of Maine taxpayers linked to administrative data from the University of Maine System (UMS) and Maine Community College System (MCCS); semi-structured interviews with financial aid officers at Maine colleges and universities; and documents provided by Maine Revenue Services (MRS). I explore how the number of credits, total dollar amount of all EOTC credits, average EOTC credit amount, and take-up have changed since 2008. Overall, I find that in the early years of the EOTC, from 2008 to 2011, the number of credits, overall cost of the program, and take-up were all low. Since 2012, the number of EOTC credits has expanded considerably. However, take-up, the share of eligible filers who apply for and receive the EOTC, remains low. In 2018, it was about 40 percent UMS bachelor's degree recipients and 30 percent for UMS/MCCS associate's degree recipients who are single filers. This low take-up is likely driven by a lack of awareness about the EOTC, complicated eligibility criteria, and complicated application criteria.

# Table of Contents

---

Abstract .....	ii
Figures.....	v
Tables .....	vi
Acknowledgments.....	vii
Abbreviations .....	viii
1. Introduction.....	1
2. Data Sources and Methods.....	4
Data Sources and Methods for EOTC Implementation.....	4
Data Sources and Methods for Descriptive and Take-Up Analysis .....	4
Limitations.....	5
3. EOTC Implementation Findings.....	7
Program Eligibility .....	8
Application process .....	9
How Filers Learn about the EOTC.....	9
EOTC Sample and Take-up Findings .....	11
Key finding 1: Prior to 2012, the number of EOTC credits administered each year, the total amount spent on credits, and the average credit amount have all increased substantially.....	11
Key Findings 2: Despite substantial increases since the early years of the EOTC, take-up still remains low.....	12
Key finding 3: The average amount of refundable EOTC credits are higher than non-refundable EOTC credits, and since 2015, the majority of EOTC credits administered have been refundable credits.....	13
Key finding 4: There are large differences between associate and bachelor’s degree recipients in terms of average credit amount and take-up .....	13
Key finding 5: There are several observable characteristics that predict whether a filer claims the EOTC. These include having a bachelor’s degree and having a STEM degree. ....	14
4. Conclusion .....	17
Appendix A: Tables and Figures .....	20
Appendix B: Technical Data and Methods Appendix .....	32
Tax Data .....	32
Summary .....	32
Dataset Construction .....	33
Education Data .....	35
Summary .....	35
Dataset Construction .....	35
Merging Education Data to Tax Data.....	36
IPEDS Data .....	37
Summary .....	37

Dataset Construction .....	38
Data Tables .....	38
Methods-Regression Analysis .....	44
Appendix C: Interview Methods and Full Summary .....	46
Sample and Methods .....	46
Findings .....	47
Interview Protocol .....	49
Background Questions: .....	49
Student trajectories: .....	49
Student loans: .....	49
Educational Opportunity Tax Credit: .....	50
References .....	51

## Figures

---

Figure 1. Number of EOTC Credits and Total Amount Spent on Credits, by Tax Year .....	20
Figure 2. Total Amount Spent of EOTC Credits (2019 USD), by Tax Year and Refundability..	23
Figure 3. Average Amount of EOTC Credits (2019 USD), by Tax Year and Refundability.....	23
Figure 4. Take-up Estimates, by Degree Type, 2010-2018 .....	24
Figure 5. Average Amount of EOTC Credits, by Refundability and Degree Type, 2019.....	27
Figure 6. Number of Years Recipients Received EOTC Credits.....	31
Figure B.1. Data Sources and Variables Given and Variables Derived .....	32



## Tables

---

Table 1. Data Used to Estimate EOTC Eligibility .....	20
Table 2. Eligibility guidelines for individual credits, by year .....	21
Table 3. Maximum Credit Amount (Nominal USD), by Tax Year .....	22
Table 4. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year .....	22
Table 5. Take-up Estimates, by Degree Type.....	24
Table 6. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Only .	25
Table 7. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Associate’s .....	25
Table 8. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Bachelor’s .....	26
Table 9. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Graduate .....	26
Table 10. Demographic Characteristics for EOTC Recipients, 2009-2019.....	27
Table 11. Regression Results, Full Sample, 2018 .....	28
Table 12. Regression Results, Associate’s Degrees, 2018 .....	29
Table 13. Regression Results, Bachelor’s Degrees, 2018 .....	30
Table B.1 Criteria used in each Match between Education Records and Tax Data .....	37
Table B.2 Number of Tax Filers, by Tax Year and Overall .....	38
Table B.3 Number of Tax Filers in UMS/MCCS, Total and Matched to Tax Data.....	39
Table B.4 Sample size and Share of Sample by Key Categorical Variables, 2018.....	40
Table B.5 Descriptive Statistics for Key Continuous Variables, 2018.....	42
Table 1. Number of Colleges and Universities in Sample and Interviewed.....	46

## Acknowledgments

---

Michael Allen and David Gunter at the Office of Tax Policy at Maine Revenue Services facilitated data access, helped develop this work, and answered many of my questions about the EOTC. From the University of Maine System and Maine Community College System, I would like to thank Thomas Connolly, Amy Homans, Sally Meredith, Rosa Redonnett, Diane Vickrey, and Bob Zuercher for granting access and/or preparing administrative data files. Mark McInerney also assisted with data access. Additionally, the financial aid officers who spoke with me provided important context about the EOTC. My conversations with current and former state legislators, Justin Alford, Nathan Libby, and Matt Pouliot as well as with others familiar with the program, James Myall, Amanda Rector, Anya Trundy, and Nathan Wildes, were extremely helpful. I would also like to thank my dissertation committee Kathryn Edwards, Lindsay Daugherty, and Peter Bahr, for helping me develop this paper. I am also grateful for funding from the RAND Center for Causal Inference, the Susan Way Smith Dissertation Award, the James Q. Wilson Dissertation Award, and Maine Revenue Services.

## Abbreviations

---

ACS	American Community Survey
AGI	Adjusted Gross Income
EOTC	Educational Opportunity Tax Credit
IPEDS	Integrated Postsecondary Education Data System
MCCS	Maine Community College System
STEM	Science, technology, engineering, and mathematics
UMS	University of Maine System

# 1. Introduction

---

The tax code can be an efficient way to transfer money to large segments of the population. Tax credits, especially refundable credits, instead of deductions are typically the most progressive way to redistribute wealth through the tax code (Batchelder, Goldberg and Orszag, 2006).<sup>1</sup> The Earned Income Tax Credit (EITC) and Child Tax Credit (CTC) are both large Federal programs and important facets of the social safety net that are administered through the tax code. Additionally, there are two tax credits in the Federal tax code—the American Opportunity Tax Credit and the Lifetime Learning Tax Credit—that offset eligible postsecondary education tuition and fees.

At the same time, implementing policies through the tax code also are administratively complex for both the agency (e.g., Internal Revenue Service and state equivalents) and the filer, particularly filers who are exempt from filing income tax returns. With many public programs, take-up, or the share of eligible individuals who apply for and receive the benefit, is incomplete because of limited awareness of the program and high transaction costs (e.g., burdensome application processes) needed to receive the credit (Finkelstein and Notowidigdo, 2019). In their book *Administrative Burden: Policymaking by Other Means*, Pamela Herd and Donald Moynihan summarize these themes as follows:

“Citizens are better off when public programs are designed to be simple, accessible, and respectful of the citizens they encounter. Most people would agree that if the public sector provides a service, it should be one that is visible enough to be seen [and] simple enough to comply with” (Herd and Moynihan, 2018, pg. 13)

This paper focuses on how a tax credit in Maine has been designed and implemented. The Department of Economic and Community Development projected a need for 75,000 new workers, driven by 65,000 retirements by 2029 (Johnson, 2019). In 2008, Maine implemented the Educational Opportunity Tax Credit (EOTC), a tax credit available to Maine residents who graduated with an eligible degree and who are paying towards their student debt. In 2019, Maine Revenue Services administered approximately 14,000 EOTC tax credits to approximately 19,000

---

<sup>1</sup> Non-refundable credits cannot exceed an individual’s or couple’s (if filing jointly) tax liability credits whereas refundable credits can exceed an individual or couple’s tax liability.

filers, and from 2008 to 2019, just under 27,000 filers received the EOTC for at least one year.<sup>23</sup> In 2019, these 14,000 credits amounted to about \$30M (Figure 1). For context, state appropriations for the University of Maine System (UMS) and Maine Community College System (MCCS) were \$229M and \$76M, respectively, in the 2020-2021 fiscal year, so the EOTC represents about 10 percent of funding for public universities in Maine (Maine State Legislature Office of Fiscal and Program Review, 2019). This is a relatively large program for a small state. As a result, any information about how the program is being implemented and the types of people who are claiming the credit are important in determining how the program should be structured and administered in the future.

There are two aims of this paper. First, I provide more information about how the EOTC has been implemented, including the program design, application process, and eligibility. To describe the program, I drew on discussions with stakeholders in Maine, including current and former legislators and staff at Maine Revenue Services; interviewed financial aid officers at Maine colleges and universities; and reviewed documents provided by Maine Revenue Services. I also conducted semi-structured interviews with financial aid officers at approximately 36 percent of colleges and universities in Maine. These interviews provide context for how the EOTC has been marketed and challenges that they perceive students face when filing for the EOTC. I also conducted informal discussions with other stakeholders in Maine and gathered documents used by Maine Revenue Services when administering the EOTC.

Then, I examine take-up of EOTC credits, including what percentage of eligible filers received the credits and how the number of EOTC credits, total dollar amount, and average EOTC credit amount have changed since the EOTC program was first administered in 2008. To describe take-up, I drew on a panel dataset of all Maine tax filers from 2003-2019 that includes information from Maine and Federal tax returns. I also link the tax records to administrative data provided by the University of Maine System (UMS) and Maine Community College System (MCCS), which includes information including degree type, degree discipline/major, and graduation year for graduates from 2008 to 2019.

Overall, I find that in the early years of the EOTC, from 2008 to 2011, the number of EOTC credits, overall cost of the program, and take-up were all low. Since 2012, the number of EOTC credits administered each year has expanded considerably. In 2009, MRS administered 51 credits totaling \$15,600 USD (2019 USD). In 2019, MRS administered 14,341 credits totaling approximately \$30M. In 2009, I estimate that 0.8 percent of eligible filers applied for and

---

<sup>2</sup> For the purposes of this report, I consider that a maximum of one credit can be associated with any given tax return even though one individual may file multiple EOTC worksheets and receive a larger credit if they have multiple eligible degrees. A married couple may receive a larger credit if both spouses have eligible degrees. Similarly, there is no way to determine whether a married filer received the tax credit based on their degree eligibility or their spouse's degree eligibility.

<sup>3</sup> The true number is 26,978 and includes joint filers who may benefit from the credit based on their spouse's eligibility.

received the EOTC whereas in 2018, I estimate that 38 percent of eligible filers applied for and received the EOTC. For context, this is far lower than take-up for the Federal tax credits—credits that are far easier to claim than the EOTC—for higher education, which is about 86 percent (U.S. Government Accountability Office, 2012). I provide several explanations for why take-up remains low. First, many filers likely do not know about the program. Second, there are likely other filers—who know about the program—but do not complete the application process because it is administratively burdensome or do not know if they are eligible.

This paper is structured as follows. In section 2, I describe my data sources and methods and provide more information on both in Appendices B and C. In section 3, I describe EOTC implementation in detail. Specifically, I focus on program goals, program eligibility, the application process, and how students learn about the EOTC (e.g., marketing efforts). In section 3, I describe the number of EOTC credits and who receives them, including take-up, a measure of the percentage of eligible filers who receive the EOTC. Section 4 is my conclusion, and I provide several recommendations to improve the EOTC.

## 2. Data Sources and Methods

---

In this section, I discuss my data sources and methods for both my findings regarding EOTC implementation and my descriptive analysis regarding the number of EOTC credits administered, amount spent on EOTC credits, and take-up analysis.

### Data Sources and Methods for EOTC Implementation

My primary data sources for EOTC program background and implementation include stakeholder discussions and document review. I spoke with a variety of stakeholders including staff at Maine Revenue Services and current and former members of the state legislature to better understand the history, goals, eligibility criteria, and application process. I also conducted 30- to 60-minute-long semi-structured interviews with financial aid officers at ten out of twenty-eight colleges or universities in Maine (about thirty-six percent). Financial aid officers are typically responsible for issuing financial aid packages, communicating with other offices (e.g., admissions), managing and complying with Federal aid programs (e.g., Pell grants and Federal student loans), and answering student inquiries. As a result, they can speak to challenges students typically face regarding several aspects of the EOTC. I took notes and recorded each interview, and I used recordings to clarify any section of my notes that were not clear. I used Dedoose, a qualitative coding software, to code interview data based on topic. For each topic, I then summarized relevant themes and findings. Appendix C provides more information about these interviews including my sample and the interview protocol I used. I also reviewed publicly available documents, such as EOTC guidance for filers, and documents provided by Maine Revenue Services, such as guidelines on current and former eligibility.

### Data Sources and Methods for Descriptive and Take-Up Analysis

My primary quantitative dataset is a rich panel dataset of all graduates of the University of Maine System (UMS) and Maine Community College System (MCCS) comprised of administrative postsecondary education records linked to tax data. This dataset includes information about all tax filers in Maine from 2003-2019 and all graduates from UMS and MCCS from 2008-2019. Information from the tax data includes annual gross income, the number of dependents, whether an individual has student loan debt, and whether a filer received the EOTC in a given tax year. For graduates from UMS and MCCS, I also observe information about a graduate's degree type, degree discipline, college/university they attended, and graduation year. I provide more information about this dataset in Appendix B.

I use simple descriptive statistics to describe various measures regarding the EOTC, including: (1) the total number of EOTC credits MRS administers each year;<sup>4</sup> (2) the percentage of eligible individuals receiving an EOTC credit; (3) the total dollar amount of credits awarded; and (4) the average dollar amount of each credit awarded. The total amount spent on EOTC credits is the sum of all EOTC credits MRS administers each year—it does not include other costs, like marketing or staff costs to administer the EOTC.

I estimate EOTC take-up, or the percentage of filers who apply for and receive the EOTC divided by the total number of eligible filers, using the UMS/MCCS tax and education panel dataset. Eligibility is complicated to estimate because EOTC eligibility has changed over time. I explain eligibility in detail in the next section. Individuals are eligible if they live in Maine, work in Maine, are paying towards their student debt, and have an eligible degree. I proxy for working in Maine if a filer has positive wages reported on a W2 or are self-employed.<sup>5</sup> Having an eligible degree is based on graduation year, college location (e.g., college in Maine or outside of Maine), and degree type (e.g., associate's, bachelor's, graduate degree).<sup>6</sup> I also use a linear regression to determine what observable characteristics predict whether a tax filer will claim the EOTC or, conditional on claiming the EOTC, the amount of their EOTC credit. I provide more detail about my regression specification and covariates I include in the model in Appendix B.

## Limitations

There are several important limitations. First, I interview financial aid officers to better understand challenges students face when filing the EOTC and how students hear about the EOTC. Certainly, financial aid officers interact with students. However, a more direct way to understand student or alumni perceptions of the EOTC would have been to interview students directly. I chose to interview financial aid officers for practical reasons: contact information for financial aid officers is typically publicly available, and as a result, is easier to obtain a representative sample.

---

<sup>4</sup> Because joint filers receive one EOTC credit each year, the number of affected filers each year is different from the number of credits administered each year. I am careful to clarify the difference.

<sup>5</sup> It is difficult to identify whether an employer was based in Maine because the employer's address on a W2 is not always the same as the location at which the employee works. As a result, I assume that all EOTC filers with a W2 worked in a Maine-based location. If state of employment were a reliable field in the data, I may expect take-up estimates to increase slightly because we are decreasing our eligible pool of filers. Indeed, I did run this analysis both ways and found that when incorporating state provided on a W2, take-up estimates increased by several percentage points in any given year.

<sup>6</sup> Additionally, one component of eligibility prior to 2016 included a filer's residency while they were in college. Prior to 2016, filers were eligible only if they were Maine residents while they were in college. I proxy for this by determining whether they were claimed as a dependent on a Maine tax return the year in which they were 17. Because I only observe tax data back until 2003, I can only use this information for filers born after 1986. In order to include this estimate, I estimate two versions of take-up. The first does not include the college residency requirement and includes filers of all ages. The second includes only filers who were 25 or younger at their college graduation, and I include the college residency requirement.



Second, I also limit my sample to estimate take-up and the regressions in two ways. First, I limit my take-up estimates just to graduates of UMS/MCCS because I only observe EOTC degree requirements for UMS/MCCS graduates, not all filers. Second, I limit my take-up estimates to include only single filers. EOTC credits are provided based on each tax return, and married filers can earn an EOTC credit based on either their education background or their spouse's or both. There is no way to distinguish eligibility among spouses. On the one hand, we may expect married filers to have higher take-up. For example, they likely have higher household incomes than single filers and as a result may be more likely to work with an accountant or be savvy tax filers. On the other hand, if their incomes are higher, they be less concerned with obtaining a tax credit. Single filers are more mobile, so if the state is concerned with retaining UMS/MCCS graduates, single filers are likely a more important population to learn about (Goworowska and Gardner, 2012).<sup>7</sup>

Third, I am not able to directly measure the relationship between program design and implementation and take-up. I do provide several explanations, but these are typically suppositions rather than evidence based conclusions.

---

<sup>7</sup> In 2019, UMS/MCCS graduates accounted for 53 percent of EOTC credits and single filers accounted for 62 percent of all filers. As a result, I estimate my take-up sample is estimated on about 33 percent of the full EOTC eligible population in 2019. This share is likely higher in earlier years. For example, using similar logic, I estimate my UMS/MCCS single sample to represent 42 percent of all eligible filers in 2013. UMS/MCCS represent 62 percent of all credits, and credits to single filers represent 68 percent of credits. Even though these are estimates are for a relatively small share of the population, they are nevertheless useful to analyze.

### 3. EOTC Implementation Findings

---

In this section, I describe program goals, program eligibility, the application process, and how students learn about the EOTC. I find that there are several goals of the EOTC, several of which support different populations. I find that program eligibility is complex and that the administrative burden is high to file the EOTC, especially the first year an individual files for the credit. I also find that graduates hear about the credit in numerous ways and that the legislature has authorized a modest marketing budget since 2016.

#### Program Goals

When the EOTC started, the legislation explicitly stated five goals for the EOTC. Additionally, over time, EOTC policies have changed in ways that would suggest there may be other goals of the program as well. The legislation for the EOTC specifies five goals of the EOTC:

- A. Promote economic opportunity for people in this State by ensuring access to the training and higher education that higher-paying jobs require;
- B. Bring more and higher-paying jobs to this State by increasing the skill level of this State's workforce;
- C. Offer educational opportunity and retraining to individuals impacted by job loss, workplace injury, disability or other hardship;
- D. Keep young people in this State through incentives for educational opportunity and creation of more high-paying jobs; and
- E. Accomplish all of the goals in this subsection with as little bureaucracy as possible.<sup>8</sup>

Broadly, these five goals typically fall into two categories: 1) support residents as they pursue higher education and enter the workforce and 2) increase the number of highly skilled workers in Maine. Indeed, policy makers in Maine typically cite two goals: 1) increase college attainment in Maine and 2) increase the number and share of highly skilled workers in Maine.

Over time, the EOTC has expanded in ways that would suggest there may also be other goals. For example, in 2013, STEM degree holders became eligible for refundable credits. For filers with a bachelor's degree, refundable credits are typically worth about \$1,000 more than non-refundable credits, suggesting that a goal of the program may be to prioritize STEM degree completion or to prioritize STEM workers in Maine (Table 8). In tax year 2016, the EOTC expanded eligibility to include Maine residents who graduated from colleges outside of Maine or

---

<sup>8</sup> The full legislation is available here: <https://legislature.maine.gov/statutes/20-A/title20-Asec12542.html>

who were not Maine residents during college and graduated after 2015. This change suggests that—in addition to using the EOTC as a retention tool for young people—a goal of the program may be to attract college graduates from outside of Maine (i.e., use the program as a recruitment tool). Indeed, a 2019 report written by the Maine Department of Economic and Community Development projected that Maine needed to add 75,000 new workers, driven in large part by an estimated 65,000 retirements (Johnson, 2019) and cited the EOTC as one of several ways to meet this goal.

Notably, these goals—whether explicitly stated in the legislation or not—are all somewhat different from each other and support different populations. For example, some goals specify that the EOTC should support students and other goals suggest that the EOTC should support workers or the Maine workforce in several different ways.

## Program Eligibility

Program eligibility has changed since the program started in 2008 and over time has grown more complicated. The following eligibility has remained constant since the program started in 2008: tax filers must live in Maine, work in Maine, and have made payments on student loans for eligible degrees. Tax filers are not eligible if they do not have student debt; this means that if a student financed their education through other means (e.g., family support, working, grants and scholarships), they do not qualify. They also are not eligible if they did not graduate, so students that accrued student debt but did not complete their degree are not eligible for the EOTC.

The definition of an eligible degree has changed over time. Table 2 lays out these differences and shows the year in which policies changed. Starting in 2013, the EOTC changed from a non-refundable to a refundable credit for filers who had obtained a STEM bachelor's or associate's degree. Starting in tax year 2016, the program expanded to include two new populations: 1) graduate degree recipients from Maine colleges who graduated in 2016 or later and 2) associate's and bachelor's degree recipients who graduated in 2016 or later from institutions outside of Maine and/or lived outside of Maine while they were in college. After 2016, the only non-eligible degrees were graduate degrees earned from non-Maine institutions. In 2016, non-STEM associate's degrees also became eligible to receive a refundable credit. For degrees earned in 2016 or later, almost all degrees are eligible (one exception is graduate degrees earned from non-Maine institutions). Since 2008, there were also several smaller changes to eligibility, such as restrictions on the number of college credits that could be taken at colleges out of state. These changes impact smaller numbers of filers, and I do not focus on them when I estimate eligibility. I provide the full list of eligibility criteria used by Maine Revenue Services in Table 2 (Maine Revenue Services, 2020).

## Application Process

EOTC recipients complete the “Educational Opportunity Tax Credit Worksheet for Maine Resident & Part-year Resident Individuals,” as part of their Maine state tax return.<sup>9</sup> The form is five pages (three of which are instructions) and collects information on type of degree, degree discipline, college or university, and state of college or university. Regarding student loan information, borrowers must enter the amount of loan payments *due* and *paid* for each month and information about whether their loans are consolidated with other educational loans. Consolidated loans are eligible, but the credit amount is prorated based on the proportion of the consolidated loan that is initially from a loan from an EOTC-eligible degree. If individuals carry student debt from multiple degrees (e.g., a bachelor’s degree and a graduate degree), they must complete the form multiple times. The maximum amount of the credit is based on the average amount of in-state tuition and mandatory fees in UMS or MCCS (multiplied by four for bachelor’s and graduate degrees and two for associate’s degrees) with the Federal interest rate set each year for subsidized Stafford loans on a 10-year repayment plan. Table 3 shows the maximum credit amount available to filers in any given tax year; it varies based on degree type. The maximum credit for associate’s degrees is far lower than for bachelor’s and graduate degrees; it has always been under \$1,000 for associate’s degree recipients, whereas it has been around \$4,000 for bachelor’s and graduate degree recipients.

The first year an individual claims the EOTC, they must also submit a complete copy of their university transcript, documentation of eligible educational loans, and documentation of their monthly payments.<sup>10</sup> From 2008-2011, applicants were required to mail a paper tax return with the supporting documentation. Since 2012, applicants could claim the EOTC as part of their electronically filed return (Maine Revenue Services, 2020). Additionally, any portion of non-refundable credits that are not claimed can be carried forward for up to ten years. The application process is administratively burdensome, especially in the earliest years of the program when only paper returns were accepted. I discuss the implications for this complexity in Section 7.

## How Filers Learn about the EOTC

Filers likely learn about the EOTC in five ways: 1) promotion materials provided by Live and Work in Maine, an organization funded by the state to promote the EOTC; 2) media coverage; 3) college or university financial aid offices; 4) tax filing software; and 5) word of mouth. First, there is a small budget allocated to market the EOTC. The Finance Authority of Maine (FAME) administers the grant to Live and Work in Maine, a non-profit that was founded in 2015 and first received state funds in 2016 to market the program. The state budget for EOTC

---

<sup>9</sup> The 2020 form is available here: [https://www.maine.gov/revenue/sites/maine.gov/revenue/files/inline-files/20\\_eotc\\_indv\\_pmts\\_by\\_indv\\_downloadff.pdf](https://www.maine.gov/revenue/sites/maine.gov/revenue/files/inline-files/20_eotc_indv_pmts_by_indv_downloadff.pdf)

<sup>10</sup> 2020 Educational Opportunity Tax Credit Worksheet, 36 M.R.S. § 5217-D

marketing efforts was \$20,000 in 2016 but was recently increased to \$50,000. Live and Work in Maine operates a website describing the EOTC and eligibility criteria. Marketing the EOTC is one part of their mission. They also

partner with employers, communities, nonprofits and individuals to develop and execute programming, events, marketing campaigns, and/or other initiatives to support the Maine employment brand, raise awareness of Maine as a career destination, and ultimately attract and retain the talented individuals Maine employers need to continue thriving into the future (Live and Work in Maine, 2021).

Second, the EOTC has also garnered press attention from out of state, much of which has been after 2015. For example, it has been featured on National Public Radio's Planet Money, and PBS News Hour (Gonzalez and Malone, 2019; Sreenivasan, 2018).

Third, some students likely learn about it from their colleges and universities. Most financial aid officers that I interviewed described that they promoted the EOTC by including information in exit materials or trainings, including it on their website (either internal or external), including it in email communications, or discussing it informally with students. Most financial aid officers noted that they included information about the EOTC in student communications when students graduate typically as part of college-provided loan exit-counseling or in emails or packets they send to students around graduation. All students with Federal loans are required to undergo loan exit counseling provided by the U.S. Department of Education. Several financial aid officers noted that their office provides supplemental loan exit counselling, and when they do, most noted that they include information about the EOTC as part of supplemental exit counseling. One financial aid officer also noted that they included the EOTC on their Instagram account. Two of the financial aid officers noted that they do not promote the EOTC.

Fourth, students likely learn about it when they file their taxes, either through accountants, if they have a personal accountant, or more likely, through tax preparation software, like H&R Block and TurboTax. Fifth, filers likely hear about it through word of mouth. This method has likely increased as the number of filers receiving credits has increased, but there is little way to quantify word of mouth.

## 4. EOTC Sample and Take-up Findings

---

In this section, I present my key findings. For each of these findings, I also present explanations for each finding. Many of these explanations draw on information about the implementation of the EOTC that I presented in the previous section.

**Key finding 1: Since 2012, the number of EOTC credits administered each year, the total amount spent on credits, and the average credit amount have all increased substantially.**

Table 4 shows the number of EOTC credits, total amount spent on EOTC credits, and the average amount spent on credits from 2008 to 2019. In the early years of the EOTC, the state awarded very few credits each year. From tax years 2008 to 2011, there were fewer than one thousand EOTC credits provided each year. In 2008 and 2009, when the EOTC was new and few people likely knew about the program, MRS provided 16 and 51 credits, respectively. Starting in 2012, the EOTC started to expand each year, and in 2019, MRS provided 14,341 EOTC credits. In any given year, a new cohort of graduates becomes eligible, expanding the eligible pool of applicants.

In Table 4 and Figure 2, the total amount spent on credits is the sum of all EOTC credits filers received—it is not the full cost to administer or market the program. Prior to 2012, the total amount spent on credits was less than \$1M, but starting in 2012, the total amount started to increase significantly (Table 4; Figure 2). In 2019, the total amount spent on credit was \$30M. These changes were likely because of an increase every year in the number of credits and an increase every year in the average credit amount.

Table 2 and Figure 3 show the average amount for all tax years. Early on, EOTC recipients received relatively small credits. The average credit is the total amount of EOTC credits divided by the total number of EOTC credits. In the earlier years, the amount that each EOTC recipient received was relatively low, even when considering that these tables and figures control for inflation. For example, in 2008, the average credit amount was \$559, and in 2009 the average credit amount was \$306. Until tax year 2012, the average credit amount was less than \$1,000. In 2019, the average credit amount was much larger: \$1,699 for a non-refundable credit, \$2,245 for a refundable credit, and \$2,100 overall.

There are several possible explanations for these findings. First, in the early years of the program, it is likely that awareness of the credit was low. Press coverage about the EOTC and marketing efforts by Opportunity Maine starting in 2015 have likely increased awareness of the EOTC, and as more filers use the EOTC, their peers may also learn more about it through word

of mouth. See the “How Filers Learn about the EOTC” section for more information. Second, only loans with an effective date after September 1<sup>st</sup>, 2007 are eligible for the EOTC. As a result, early cohorts of filers could apply for the EOTC for a portion of their loans. Third, prior to 2012, the administrative burden was higher for filers—graduates were not able to file electronically and had to physically mail all materials to Maine Revenue Services. Additionally in 2008 and 2009, graduates were required to complete a student opportunity contract with their university’s office of financial aid. In these years, this paperwork was used to calculate the maximum EOTC credit a student could receive. Fourth, the way the program is structured allows for no limit on the number of years individuals are eligible as long they continue to pay off student debt for an eligible degree. Therefore, in each tax year, a new cohort of graduating students becomes eligible, likely partially explaining an increase in the number of credits. Finally, the average amount of refundable EOTC credits is higher than non-refundable EOTC credits. Refundable credits were not administered prior to 2013, and since 2015, the majority of EOTC credits administered have been refundable credits.

## Key Findings 2: Despite substantial increases since the early years of the EOTC, take-up still remains low.

Table 5 and Figure 4 shows take-up estimates for all degree types combined and for associate’s, bachelor’s, and graduate degrees.<sup>11</sup> Overall, take-up was low in the early years of the EOTC and increased steadily from 2010 to 2016. Since 2016, it has continued to increase but at a slower pace. For example, in 2009 and 2010, I estimate take-up to be .8 percent and 5.1 percent for bachelor’s degree recipients, respectively, suggesting that in the early years very few eligible filers applied for and received the EOTC. Since 2016, take-up has hovered between 35 and 42 percent overall for bachelor’s degree recipients.

One possible explanation for the increase in take-up over time is increased knowledge and awareness of the EOTC and changes in eligibility. These reasons are similar to why the overall number of EOTC credits administered have increased. Take-up likely remains low overall for three reasons: 1) eligible filers do not know about the EOTC; 2) the eligibility requirements are complicated, dissuading otherwise eligible filers from applying; or 3) the administrative burden (e.g., application process) is high, so eligible filers are dissuaded from applying. Indeed, most financial aid officers I interviewed noted that few students brought up the EOTC in conversation, suggesting limited awareness. They also noted that they hesitated to give students advice about the EOTC because they did not have accounting backgrounds and instead referred students to MRS. These findings are consistent with the literature. Indeed, information complexity, limited

---

<sup>11</sup> In Table 5, estimate 1 includes all UMS/MCCS graduates who are single filers. Estimate 2 limits this population to only include those who graduated at age 25 or prior and were born after 1986, and it restricts eligibility prior to 2016 to only those who were claimed as a dependent in Maine at age 17 to proxy for those who were Maine residents while they were in college.

awareness of the public program, and complicated administrative or application processes have all contributed to incomplete take-up of other public programs (Finkelstein and Notowidigdo, 2019; Bhargava and Manoli, 2015).

### **Key finding 3: The average amount of refundable EOTC credits is higher than non-refundable EOTC credits, and since 2015, the majority of EOTC credits administered have been refundable credits.**

In 2013, STEM associate's and bachelor's degree recipients became eligible for a refundable credit, and in 2016, non-STEM associate's degree recipients also became eligible for a refundable credit. Non-refundable credits cannot exceed a filer or couple's tax liability, but a refundable credit can exceed a filer's tax liability. In 2019, the average non-refundable credit was worth \$1,699 whereas the average refundable credit was worth \$2,245 (Table 2). In 2013, the first year refundable credits were offered, 44 percent of EOTC credits were refundable, but that share has increased since then. In 2019, 58 percent of EOTC credits administered were refundable (Table 2).

It is not surprising that the average refundable credit is higher than the average non-refundable credit. Non-refundable credits are capped at an individual's tax liability, whereas refundable credits are not. In 2016, all associate's degree recipients became eligible for refundable credits, likely explaining the increase in refundable credits in recent years.

### **Key finding 4: There are large differences between associate's and bachelor's degree recipients in terms of average credit amount and take-up**

First, the average credit varies substantially by degree type. Table 7, Table 8, and Figure 5 show the number of EOTC credits, total credit amount, and average credit amount for UMS/MCCS associate's and bachelor's degrees, respectively. In 2019, the average size of a credit to an associate's degree recipient in UMS/MCCS was \$1,352 whereas it was \$2,227 for a bachelor's degree recipient, amounting to about a \$900 difference. The difference between the amount of a refundable credit between associate's and bachelor's degree recipients is even higher; the difference is approximately \$1,400. Regarding take-up, take-up is highest among bachelor's degrees, ranging from 40 to 46 percent since 2016. It is lowest among associate's degrees, ranging from 26 to 30 percent since 2016.

The difference between average credit amount between bachelor's and associate's degrees is likely driven by two factors: 1) differences in maximum amount and 2) different average debt amounts. The maximum credit for associate's degrees has ranged from \$780 to \$924 (nominal USD) whereas it has been over \$4,000 for bachelor's degree recipients. Associate's degrees also paid, on average, lower student loan interest (Table B.5). In 2018, the mean student loan interest



that associate's degree recipients from UMS/MCCS paid was \$1,208 whereas it was \$1,937 for bachelor's degree recipients. Regarding differences in take-up, associate's degree recipients receive lower credits, so they may have a lower propensity to file for an EOTC credit. At the same time, their incomes are typically less than bachelor's degree recipients, so a smaller credit may be meaningful.<sup>12</sup> Additionally, bachelor's degree earners earned higher incomes, and as a result may be better resourced, more well-informed about tax policy and financial aid opportunities, and may be more likely to hire personal accountants, who may be familiar with the EOTC.

**Key finding 5: There are several observable characteristics that predict whether a filer claims the EOTC. These include having a bachelor's degree and having a STEM degree.**

I find that several characteristics predict whether a filer is more likely to claim the EOTC. These characteristics are both statistically significant and meaningful in magnitude. I find that UMS bachelor's degree recipients are more likely to claim the EOTC compared to their peers with an associate's degree or graduate degree from UMS/MCCS. For example, in 2018 filers with a bachelor's degree represented about 74 percent of single EOTC filers compared to about 56 percent of overall graduates (Table 10; Table B.4). Indeed, when controlling for relevant characteristics, filers with a bachelor's degree are 12 percent points more likely to claim the EOTC, compared to associate's and graduate degrees (Table 11). I also find that women are less likely to claim the EOTC than men. For example, in 2018, women made up 43 percent of single EOTC recipients but 58 percent of UMS/MCCS graduates (Table 10; Table B.4). When controlling for relevant characteristics, including the amount of student debt, women are about 4 percentage points less likely to claim the EOTC than men. Third, filers with a STEM degree are more likely to claim the EOTC. This is especially true among bachelor's degree recipients: filers with a UMS bachelor's STEM degree are about 18 percentage points more likely to file for the EOTC than filers with a UMS bachelor's non-STEM degree (Table 12). In 2018, about 43.7 percent of single EOTC filers with a UMS/MCCS bachelor's degrees held a STEM degree compared to 31 percent of all filers (Table 10; Table B.4). Among UMS/MCCS associate's degrees, this trend still holds, but the effect is smaller: STEM degrees with an associate's degrees are about 5 percentage points more likely to claim the EOTC (Table 13). In 2018, about 32.7 percent of single EOTC filers with a UMS/MCCS associate's degrees held a STEM degree compared to 24 percent of all filers (Table 10; Table B.4). Regarding a filer's adjusted gross income, I find that a 50 percent increase in adjusted gross income equates to a 3-percentage point

---

<sup>12</sup> Among graduates from UMS/MCCS from 2008 to 2019, the mean household adjusted gross income for associate's degree holders was \$56,624 compared to \$60,694 for filers with a UMS/MCCS bachelor's degrees in 2019. The median incomes were \$47,409 and \$49,036, respectively.

increase in claiming the EOTC. There are also several other observable characteristics that are statistically significant but are less meaningful in magnitude. These characteristics include age, amount of student loan interest, and parents' adjusted gross income at age 17. I exclude these characteristics from my discussion because the effect of these covariates on claiming the EOTC is small.<sup>13</sup>

To summarize, men are more likely to claim the EOTC compared to women, bachelor's degree filers from UMS/MCCS are more likely to claim the EOTC compared to associate's and graduate degree graduates from UMS/MCCS, STEM degrees are more likely to claim compared to their non-STEM counterparts, and that filers with higher incomes are more likely to claim the EOTC. One plausible explanation is that filers who receive higher credits may be more likely to apply for the EOTC. Because I control for student loan interest and income in the regressions, both of which are important factors in determining the size of the EOTC, it is unlikely that this explains many of these differences. One exception is among filers with STEM and non-STEM degrees, which I describe below. However, there are likely several other important explanations.

The reasons why demographics and degree type might be related to take-up vary. Possible explanations include:

- *Differences by sex:* Women tend to be more risk averse (Croson and Gneezy, 2009) and tend to comply with the tax code more often (Kastlunger et al., 2010). By filing for the EOTC, they are still complying with the tax code, if they are eligible. One explanation may be that because the eligibility criteria is complex, filers may be unsure whether they qualify. As a result, women may be less likely to file for the EOTC if they are unsure whether they qualify, whereas men may be more likely to apply for an EOTC credit even if they are not sure whether they are eligible.
- *Differences among filers with STEM degree:* These differences can partially be explained by eligibility for a refundable credit. Refundable credits are typically larger than non-refundable credits. For example, UMS/MCCS bachelor's degree recipients with a non-refundable credit received about \$1,000 less than those eligible for a refundable credit (Table 8). Indeed, the share of single EOTC filers with a bachelor's degree has increased over time, perhaps driven by changes in refundability (Table 10). There may be other qualities that I do not observe that may make filers with a STEM degree more likely to file for the EOTC. For example, they may be more analytical, and as a result, may be more likely to read through the EOTC's complicated eligibility criteria.
- *Differences by degree type:* Filers with a bachelor's degree have higher student loan debt and earn higher incomes. On average, bachelor's degree recipients also receive higher

---

<sup>13</sup> For example, a 50 percent increase in student loan debt equates to a .8 percentage point increase in claiming the EOTC. A 50 percent increase in parents' AGI at age 17 equates to a .5 percentage point increase in claiming the EOTC. Age is interesting: in most specifications as age increases, the likelihood of claiming the EOTC decreases. In several, the effect is negative. The magnitude of the effect of age on claiming the EOTC is also small, so overall, I consider age to have no consistent, meaningful effect on claiming the EOTC.

credits (Table 7 and Table 8). Because I control for student loan interest and income in these regressions, it is unlikely that bachelor's degree recipients are more likely to file solely because they receive a larger credit. Instead, there may also be unobservable characteristics that explain these differences.

- *Differences by income:* Filers with higher adjusted gross incomes are typically eligible for higher non-refundable credits, but credit amount likely does not explain differences in claiming the EOTC. Instead, these differences may be because of unobservable characteristics. For example, filers with higher incomes may have more complicated tax returns, and as a result, be more accustomed to looking for tax credits or deductions. Filers with higher incomes may also be more likely to seek professional tax guidance (e.g., use a personal accountant).

## 5. Conclusion

---

In this paper, I describe the implementation and take-up of the Maine EOTC, a tax credit that aims to attract individuals to Maine and increase postsecondary attainment. I also explore some possible explanations for how the EOTC's design and implementation might be related to various measures of take-up (e.g., number of individuals claiming a credit, total amount of dollars awarded).

One important finding is that take-up of the EOTC has expanded considerably since it was first implemented in 2008, but there are a large number of eligible filers who do not claim the credit. For example, I estimate that for UMS/MCCS graduates who are single filers, take-up was approximately 30 percent for filers with an associate's degree and 40 percent for filers with a bachelor's degree. I also find that there are important differences in EOTC usage by education level, degree type, degree discipline, and income. I identify possible implementation factors that may contribute to low take-up and different take-up rates within groups, including an administratively burdensome application process and a lack of awareness about the credit.

There are several ways in which Maine might make changes to the design and implementation of the EOTC to increase take-up and better meet the EOTC's goals. I briefly describe four recommendations below.

### Recommendation 1: Clarify the goals of the EOTC

Clarifying the goals of the EOTC is necessary in determining whether and how to restructure the EOTC. In the "Program Implementation" section, I describe that there are several different program goals, some of which are explicitly stated in legislation while others are not. These goals typically fall into two main categories: 1) increase college attainment in Maine and 2) increase the number and share of highly skilled workers in Maine. However, the design of the EOTC suggests that there may have been other implicit goals. For example, the design of the EOTC to offer a refundable credit only to filers with a STEM bachelor's degree suggests that the legislature might have prioritized STEM degrees. If a goal of the EOTC is to prioritize workers in particular sectors, it may be appropriate to limit the EOTC to specific degrees or occupations. However, there are tradeoffs, as this may complicate the eligibility criteria and application process for the EOTC. The EOTC also limits eligibility to degrees obtained after 2007, suggesting that a goal of the EOTC is to specifically recruit younger workers to the state. If Maine also values attracting or supporting older graduates, it may make sense to expand eligibility criteria for certain graduation cohorts.

In addition, the EOTC could be modified to address other goals. The requirement that a filer must have graduated with a degree is appropriate for a goal focused on college attainment. But if a goal of the EOTC is to assist Maine residents as they pay back their student debt, it may be

appropriate to provide debt relief to many filers who accrued debt but did not graduate from college.

#### Recommendation 2: Simplify or eliminate eligibility and refundability criteria

In the early years of the EOTC, evolving eligibility requirements and variation in the refundability of the EOTC for individuals made it complicated for individuals to understand and for the state to implement. Since that time, the state has expanded and simplified eligibility, which may be valuable in supporting take-up, but eligibility criteria still varies based on graduation date and refundability varies based on degree discipline and degree type.<sup>14</sup> Clarifying goals of the EOTC (see recommendation #1) will be important in redefining eligibility criteria. First, I recommend specifying a single graduation year cutoff for all degree types and residency statuses. For example, provide the EOTC to all filers with a degree granted after a certain year regardless of degree type. Second, Maine might consider revisiting residency and college location requirements. Currently filers who graduated prior to 2016, must have been a Maine resident during college and attended a college or university in Maine. Depending on goals of the EOTC, I recommend eliminating it as a requirement or making this a requirement for all otherwise eligible filers. Third, Maine could consider making refundable credits available to all eligible filers or to no eligible filers. A second option may include providing the same credit amount to all filers, regardless of the amount of student loan debt they paid in a given year.

#### Recommendation 3: Simplify the application process

There are several administratively burdensome aspects of the application process. Filers must provide a copy of a university transcript and must document the amount of student debt they pay each month. I describe this process in more detail in the “Program Overview” section. Depending on the program goals and if/how eligibility process is simplified, the application process could also be simplified. For example, if eligibility expands to all filers with student debt regardless of whether they graduated or their graduation year, providing a copy of a transcript may not be necessary.

#### Recommendation 4: Increase the marketing budget and outreach activities

EOTC take-up is low, in part, because there is limited awareness of the EOTC. In the “Program Overview” section I discuss how filers hear about the EOTC in depth. Live and Work in Maine, a non-profit that tasked to market the program, receives \$50,000 per year to market the program. This marketing budget is relatively small: it represents about .02 percent of the \$30M sent to tax filers on all credits. An increase in the marketing budget would still be a modest cost, compared to the cost of credits administered, but could have a large impact. With an increased

---

<sup>14</sup> Since 2016, the college and university location and residency during college requirements were eliminated for bachelor’s and associate’s degrees who graduated after 2016. Currently, STEM bachelor’s degrees and associate’s degrees are eligible for a refundable credit.

marketing budget, the organization tasked to market the program could expand outreach activities. Examples include close partnerships with student organizations and more centralized and frequent contact with high school guidance counselors and financial aid officers. Financial aid officers noted that they hesitated to answer questions about the EOTC because they were not tax professionals.

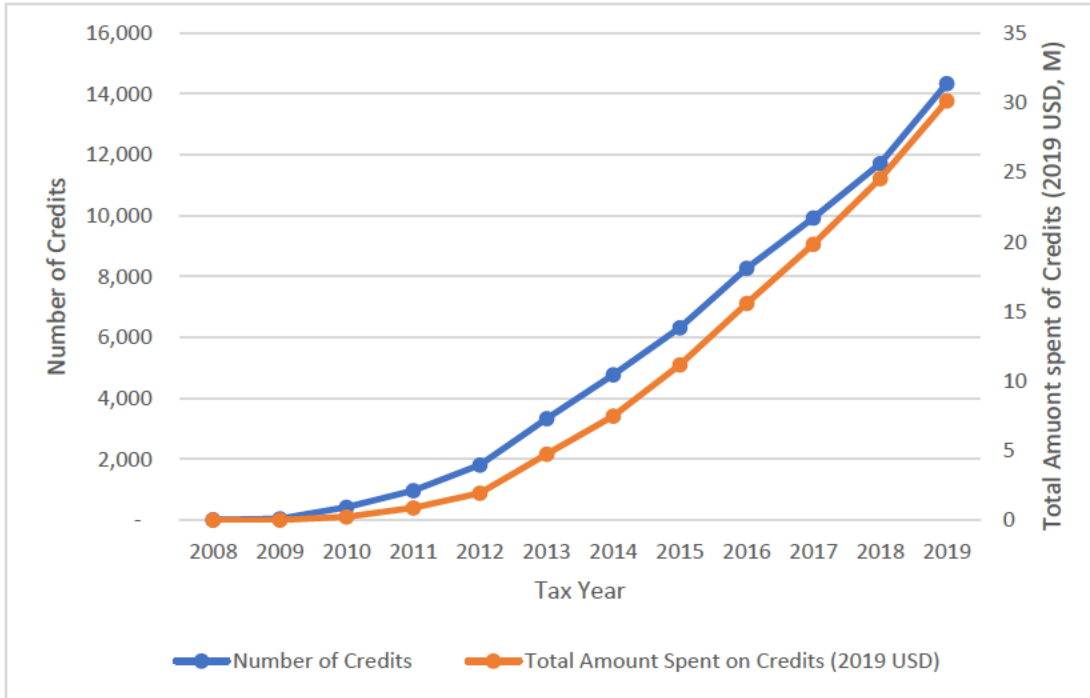
#### Recommendation 5: Consider an Alternative Economic Incentive

Depending on the goals of the program, alternative economic incentives may produce better outcomes, especially if a goal of the EOTC is to boost college attainment rates in Maine. One option may be to credit tuition payments for the tax year they are paid instead of only providing a credit after a student graduates based on student debt. Federal higher education tax credits, the American Opportunity Tax Credit and the Lifetime Learning Credit, are structured in this way and are based on tuition and certain expenses paid and not student debt paid. However, several studies have found that these tax credits do not increase higher education outcomes, in part, because students and families receive this financial support when they file taxes and not when they pay tuition and expenses (Bulman and Hoxby, 2015; Hoxby and Bulman, 2016). An even more direct mechanism may be to provide a grant-based mechanism, perhaps through a scholarship program, which would provide students financial support before or as tuition is due or as they are paying expenses related to college. Grant based mechanisms typically do increase college enrolment and completion rates (Nguyen, Kramer and Evans, 2019), but it would be a significant departure from the current structure of the EOTC and would focus more on students and not on workers.

With any of these recommendations, there are tradeoffs, which is why clarifying the goals of the EOTC will help guide future changes. Overall, the EOTC may be more effective if there is simpler eligibility and refundability criteria, a simpler application process, and increased awareness of the credit (i.e., an increased marketing budget or centralized outreach programs).

## Appendix A: Tables and Figures

**Figure 1. Number of EOTC Credits and Total Amount Spent on Credits, by Tax Year**



SOURCE: Author analysis of Maine tax data provided by Maine Revenue Services

**Table 1. Data Used to Estimate EOTC Eligibility**

Eligibility criteria	Data used to estimate
Live in Maine	Filed a Maine tax return as a full year or partial resident
Working	Positive wages reported on a W-2 or self-employed
Paying towards their student debt	Whether they paid student loan interest as reported on a 1098-E
Eligible degree	Graduation year, degree type, college location always Maine b/c sample is UMS/MCCS
Maine resident in college	Whether they were claimed as a dependent in Maine at age 17

NOTES: In this analysis, I do include the eligibility criteria, "working in Maine," because employer address on a W-2 does not always reflect the state in which an employee works. Instead, it could reflect the employer's headquarter location or the address of a payroll processing company.

**Table 2. Eligibility guidelines for individual credits, by year**

Requirement	08	09	10	11	12	13	14	15	16	17	18	19
<b>Residency</b>												
Maine resident during tax year	X	X	X	X	X	X	X	X	X	X	X	X
Maine resident while attending Maine college	X	X	X	X	X	X	X	X				
<b>Employment</b>												
Work for employer located in Maine	X	X	X	X	X	X	X					
Work for employer located in Maine unless deployed for military service						X	X					
Must work in Maine (except, may work outside Maine for up to 3 months OR deployed for military service)								X	X	X	X	X
Must work in Maine (except, may work outside Maine for up to 3 months OR work at least part-time on a vessel at sea)									X	X	X	X
Self-employed eligible in Maine								X	X	X	X	X
<b>Degrees</b>												
Earned associate's degree or bachelor's degree from an accredited Maine community college, college or university after 2007	X	X	X	X	X	X	X	X	X	X	X	X
OR												
Earned non-Maine associate's degree or bachelor's degree after 2015									X	X	X	X
OR												
Earned Maine graduate degree after 2015									X	X	X	X
100% of coursework toward degree after 2007 performed at Maine community college, college or university	X	X	X	X	X							
Allow up to 30 credit hours earned after 2007 at non-Maine college if transfer to Maine college occurred after 2012						X	X	X				
Allow all Maine and non-Maine coursework completed after 2007									X	X	X	X
Student Opportunity Contract Required	X	X										
<b>Student Loans</b>												
Loans for coursework (for degree program) performed after 2007	X	X	X	X	X	X	X	X	X	X	X	X
Loan term minimum of 8 years	X	X	X	X	X							
Allow refinanced or consolidated loans only when refinanced or consolidated with other eligible loans	X	X	X	X	X	X	X					
Allow refinanced or consolidated loans when eligible loans refinanced or consolidated with other education loans in proportion to the portion of loan payments that are eligible								X	X	X	X	X
<b>Refundability</b>												
Credit nonrefundable	X	X	X	X	X							
STEM associate's and bachelor's degrees refundable						X	X	X	X	X	X	X
ALL associate's degrees refundable									X	X	X	X

SOURCE: Maine Revenue Services, Income/Estate Tax Division



**Table 3. Maximum Credit Amount (Nominal USD), by Tax Year**

Graduation year	Associate's, Credit Amount	Bachelor's, Credit Amount	Graduate, Credit Amount
2008	Varied*	Varied*	Not eligible
2009	Varied*	Varied*	Not eligible
2010	\$864	\$4,116	Not eligible
2011	\$816	\$4,128	Not eligible
2012	\$780	\$4,104	Not eligible
2013	\$780	\$4,272	Not eligible
2014	\$792	\$4,356	Not eligible
2015	\$840	\$4,524	Not eligible
2016	\$840	\$4,476	\$3,900
2017	\$816	\$4,368	\$3,804
2018	\$888	\$4,524	\$3,936
2019	\$924	\$4,404	\$4,056
2020	\$924	\$4,404	\$4,092

SOURCE: 2020 Educational Opportunity Tax Credit Worksheet, available here:

[https://www.maine.gov/revenue/sites/maine.gov/revenue/files/inline-files/20\\_eotc\\_indv\\_pmts\\_by\\_indv\\_downloadff.pdf](https://www.maine.gov/revenue/sites/maine.gov/revenue/files/inline-files/20_eotc_indv_pmts_by_indv_downloadff.pdf)

NOTES: \*In 2008 and 2009, the benchmark amount was based off an amount provided by the college or university's financial aid office.

**Table 4. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year**

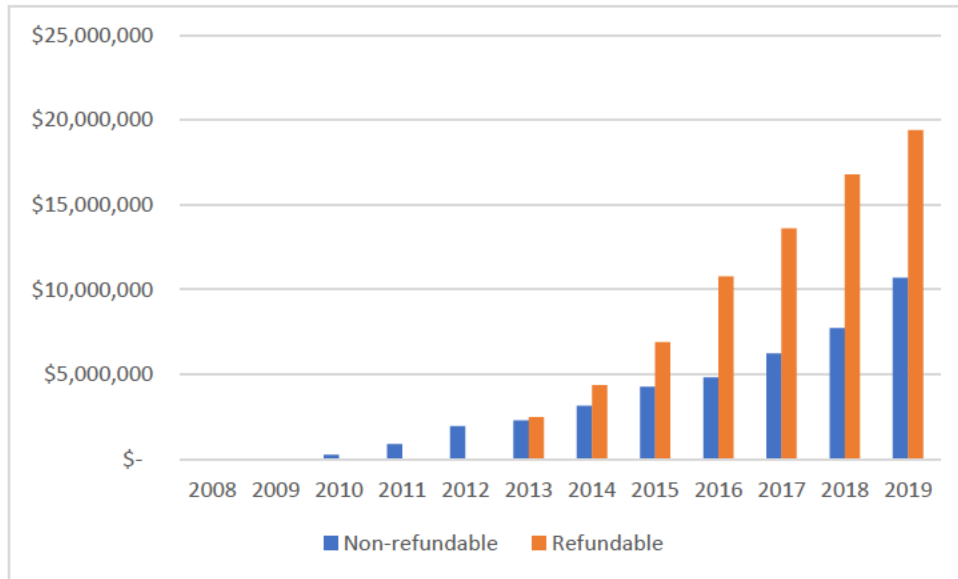
Tax Year	Non-Refundable			Refundable			Any EOTC Credit		
	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount
2008	16	\$8.9	\$559	-	-	-	16	\$8.9	\$559
2009	51	\$15.6	\$306	-	-	-	51	\$15.6	\$306
2010	426	\$256.1	\$601	-	-	-	426	\$256.1	\$601
2011	971	\$885.5	\$912	-	-	-	971	\$885.5	\$912
2012	1,818	\$1,948	\$1,072	-	-	-	1,818	\$1,948	\$1,072
2013	2,155	\$2,276	\$1,056	1,422	\$2,482	\$1,745	3,344	\$4,758	\$1,423
2014	2,698	\$3,141	\$1,164	2,266	\$4,353	\$1,921	4,777	\$7,494	\$1,569
2015	3,188	\$4,256	\$1,335	3,337	\$6,901	\$2,068	6,321	\$11,156	\$1,765
2016	3,450	\$4,802	\$1,392	5,213	\$10,780	\$2,068	8,283	\$15,583	\$1,881
2017	4,080	\$6,219	\$1,524	6,289	\$13,608	\$2,164	9,929	\$19,827	\$1,997
2018	4,780	\$7,734	\$1,618	7,498	\$16,804	\$2,241	11,718	\$24,538	\$2,094
2019	6,303	\$10,709	\$1,699	8,645	\$19,410	\$2,245	14,341	\$30,119	\$2,100

SOURCE: Author analysis of Maine Revenue Services data

NOTES: The number of any EOTC credits may double count filers that may have received both a non-refundable and refundable credit. Filers could receive both if they have two or more qualifying degrees or if their spouse is also eligible for a credit. This table only includes EOTC credits worth over \$10 and less than \$80,000 (a credit over

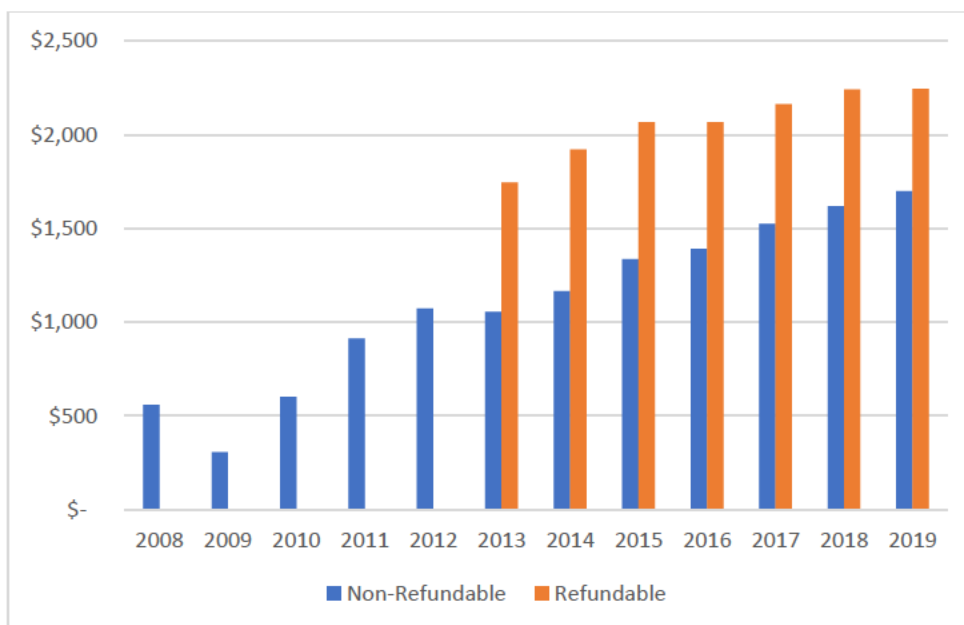
~\$4,000 is possible with multiple degrees between spouses or from previous non-refundable credits carried forward in future tax years).

**Figure 2. Total Amount Spent of EOTC Credits (2019 USD), by Tax Year and Refundability**



SOURCE: Author analysis of Maine Revenue Services data

**Figure 3. Average Amount of EOTC Credits (2019 USD), by Tax Year and Refundability**



SOURCE: Author analysis of Maine Revenue Services data

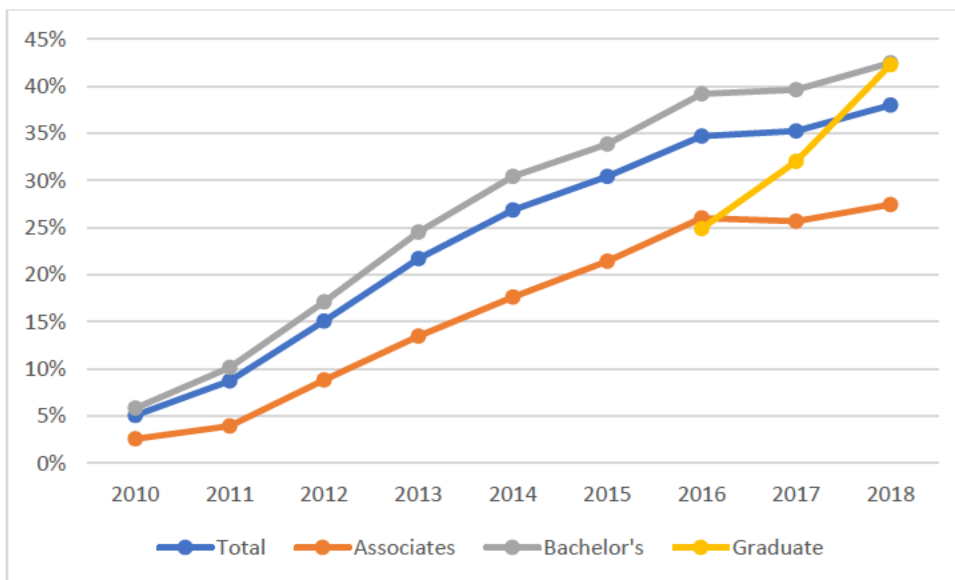
**Table 5. Take-up Estimates, by Degree Type**

Tax Year/ Estimate #	Total		Associate's		Bachelor's		Graduate	
	Est. 1	Est. 2	Est. 1	Est. 2	Est. 1	Est. 2	Est. 1	Est. 2
2009	0.8%	-	-	-	0.9%	-	-	-
2010	5.1%	-	2.6%	-	5.8%	-	-	-
2011	8.7%	13.3%	3.9%	-	10.1%	16.2%	-	-
2012	15.1%	21.7%	8.8%	10.5%	17.1%	25.4%	-	-
2013	21.7%	30.7%	13.5%	17.1%	24.5%	35.1%	-	-
2014	26.9%	38.2%	17.6%	22.7%	30.4%	43.5%	-	-
2015	30.4%	43.0%	21.4%	28.9%	33.9%	47.5%	-	-
2016	34.7%	38.6%	26.0%	27.7%	39.2%	42.1%	24.9%	32.7%
2017	35.3%	39.1%	25.7%	27.9%	39.6%	42.8%	32.0%	38.9%
2018	38.0%	42.1%	27.5%	30.0%	42.5%	46.2%	42.3%	45.3%

SOURCE: Author estimates of MRS/UMMS/MCCS data.

NOTES: Eligible population includes UMS/MCCS graduates who are single filers. Estimate 2 also only includes filers who graduated from UMS/MCCS at age 25 or later and who were born after 1986, so these estimates are limited to 2011 and later. Certain years for associate's degrees are omitted because of small sizes. Graduate degrees became eligible in 2016.

**Figure 4. Take-up Estimates, by Degree Type, 2010-2018**



SOURCE: Author estimates of MRS/UMMS/MCCS data.

NOTES: This graph uses estimate 1. Eligible population includes UMS/MCCS graduates who are single filers. Certain years for associate's degrees are omitted because of small sizes. Graduate degrees became eligible in 2016.

**Table 6. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Only**

Tax Year	Non-Refundable			Refundable			Any EOTC Credit		
	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount
2008	-	-	-	-	-	-	-	-	-
2009	25	\$9.7	\$390	-	-	-	25	\$9.7	\$390
2010	257	\$146.9	\$572	-	-	-	257	\$146.9	\$572
2011	586	\$513.8	\$877	-	-	-	586	\$513.8	\$877
2012	1,120	\$1,151	\$1,027	-	-	-	1,120	\$1,151	\$1,027
2013	1,342	\$1,326	\$988	871	\$1,513	\$1,737	2,069	\$2,839	\$1,372
2014	1,699	\$1,880	\$1,107	1,387	\$2,645	\$1,907	2,971	\$4,525	\$1,523
2015	1,974	\$2,532	\$1,283	2,004	\$4,114	\$2,053	3,829	\$6,646	\$1,736
2016	2,094	\$2,745	\$1,311	2,995	\$5,998	\$2,003	4,835	\$8,744	\$1,808
2017	2,358	\$3,426	\$1,453	3,555	\$7,399	\$2,081	5,636	\$10,824	\$1,921
2018	2,646	\$4,115	\$1,555	4,122	\$8,861	\$2,150	6,431	\$12,977	\$2,018
2019	3,322	\$5,345	\$1,609	4,619	\$9,886	\$2,140	7,567	\$15,231	\$2,013

SOURCE: Author analysis of Maine Revenue Services data

NOTES: The number of any EOTC credits does not double count filers that may have received both a non-refundable and refundable credit. Filers could receive both if they have two or more qualifying degrees or if their spouse is also eligible for a credit. I omit tax year 2008 because of small cell sizes. This table only includes EOTC credits worth over \$10 and less than \$80,000 (a credit over ~\$4,000 is possible with multiple degrees between spouses or from previous non-refundable credits carried forward in future tax years).

**Table 7. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Associate's**

Tax Year	Non-Refundable			Refundable			Any EOTC Credit		
	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount
2008	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-
2010	41	\$17.8	\$435	-	-	-	41	\$17.8	\$435
2011	86	\$46.1	\$536	-	-	-	86	\$46.1	\$536
2012	210	\$153.0	\$729	-	-	-	210	\$153.0	\$729
2013	261	182.0	\$450	163	\$162.5	\$997	404	\$344.5	\$853
2014	352	\$284.0	\$442	318	\$327.4	\$1,030	642	\$611.5	\$952
2015	460	\$421.6	\$469	469	\$499.7	\$1,065	899	\$921.3	\$1,025
2016	284	\$281.7	\$238	969	\$1,077	\$1,111	1,182	\$1,358	\$1,149
2017	298	\$397.1	\$287	1,156	\$1,373	\$1,188	1,385	\$1,771	\$1,278
2018	359	\$526.7	\$331	1,313	\$1,589	\$1,210	1,590	\$2,116	\$1,331
2019	445	\$680.5	\$356	1,556	\$1,905	\$1,225	1,913	\$2,586	\$1,352

SOURCE: Author analysis of Maine Revenue Services data

NOTES: The number of any EOTC credits does not double count filers that may have received both a non-refundable and refundable credit. Filers could receive both if they have two or more qualifying degrees or if their spouse is also eligible for a credit. I omit tax years 2008 and 2009 because of small cell sizes. This table only includes EOTC credits worth over \$10 and less than \$80,000 (a credit over ~\$4,000 is possible with multiple degrees between spouses or from previous non-refundable credits carried forward in future tax years).

**Table 8. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Bachelor's**

Tax Year	Non-Refundable			Refundable			Any EOTC Credit		
	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount
2008	-	-	-	-	-	-	-	-	-
2009	22	8.7	\$397	-	-	-	22	8.7	\$397
2010	220	130.8	\$594	-	-	-	220	130.8	\$594
2011	505	469.8	\$930	-	-	-	505	469.8	\$930
2012	938	1,024	\$1,092	-	-	-	938	1,024	\$1,092
2013	1,118	1,184	\$1,059	740	\$1,402	\$1,895	1,731	2,587	\$1,494
2014	1,394	1,634	\$1,172	1,131	\$2,413	\$2,134	2,434	4,047	\$1,663
2015	1,594	2,185	\$1,371	1,611	\$3,745	\$2,324	3,079	5,930	\$1,926
2016	1,887	2,530	\$1,341	2,156	\$5,161	\$2,394	3,849	7,691	\$1,998
2017	2,150	3,100	\$1,442	2,557	\$6,349	\$2,483	4,483	9,449	\$2,108
2018	2,364	3,660	\$1,548	2,988	\$7,645	\$2,558	5,079	11,304	\$2,226
2019	2,943	4,680	\$1,590	3,264	\$8,474	\$2,596	5,907	13,154	\$2,227

SOURCE: Author analysis of Maine Revenue Services data

NOTES: The number of any EOTC credits does not double count filers that may have received both a non-refundable and refundable credit. Filers could receive both if they have two or more qualifying degrees or if their spouse is also eligible for a credit. I omit tax years 2008 because of small cell sizes. This table only includes EOTC credits worth over \$10 and less than \$80,000 (a credit over ~\$4,000 is possible with multiple degrees between spouses or from previous non-refundable credits carried forward in future tax years).

**Table 9. Number of EOTC Credits, Total Amount Spent on EOTC Credits (2019 USD, K), and Average Amount Spent (2019 USD) on EOTC Credits, by Tax Year, UMS/MCCS Graduate**

Tax Year	Non-Refundable			Refundable			Any EOTC Credit		
	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount	# EOTC Credits	Total Amount (K)	Average Amount
2008	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-
2010	19	\$12.0	\$634	-	-	-	19	\$12.0	\$634
2011	51	\$42.2	\$827	-	-	-	51	\$42.2	\$827
2012	92	\$90.3	\$981	-	-	-	92	\$90.3	\$981
2013	111	\$107.5	\$969	54	\$74.6	\$1,381	152	\$182.1	\$1,198
2014	140	\$162.1	\$1,158	82	\$130.4	\$1,590	211	\$292.4	\$1,386
2015	146	\$223.6	\$1,532	126	\$217.5	\$1,726	257	\$441.1	\$1,716
2016	187	\$254.5	\$1,361	159	\$311.9	\$1,962	326	\$566.4	\$1,737
2017	247	\$405.8	\$1,643	184	\$370.0	\$2,011	397	\$775.8	\$1,954
2018	320	\$539.0	\$1,684	223	\$479.5	\$2,150	493	\$1,019	\$2,066
2019	449	\$817.9	\$1,822	233	\$501.3	\$2,151	616	\$1,319	\$2,141

SOURCE: Author analysis of Maine Revenue Services data

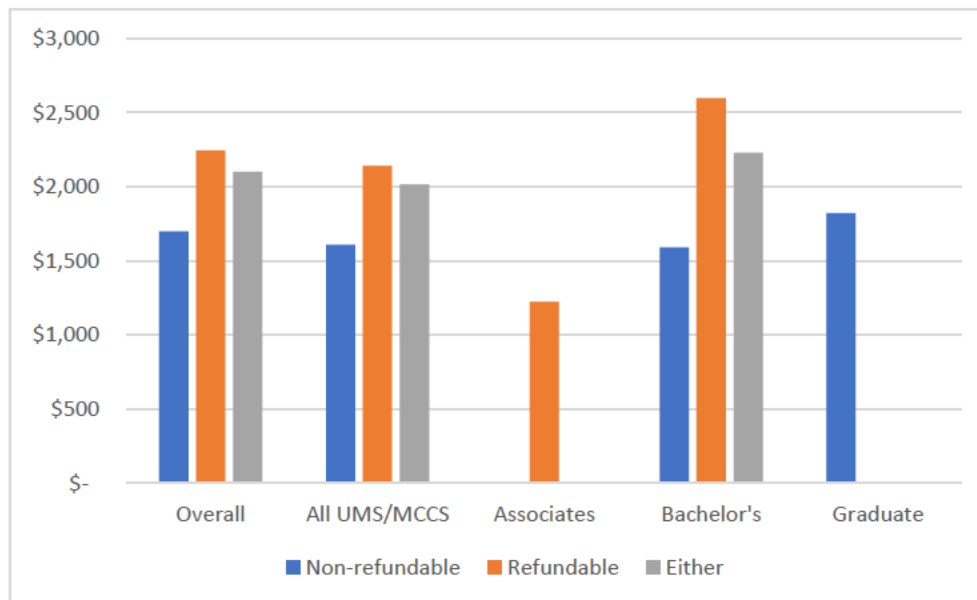
NOTES: The number of any EOTC credits does not double count filers that may have received both a non-refundable and refundable credit. Filers could receive both if they have two or more qualifying degrees or if their spouse is also eligible for a credit. I omit tax years 2008 and 2009 because of small cell sizes. Graduate degrees were not eligible for the EOTC prior to 2016, so any counts prior to 2016 are because a filer had another qualifying associate's or bachelor's degree or filer's spouse was eligible or the filer was eligible. This table only includes EOTC credits worth over \$10 and less than \$80,000 (a credit over ~\$4,000 is possible with multiple degrees between spouses or from previous non-refundable credits carried forward in future tax years).

**Table 10. Demographic Characteristics for EOTC Recipients, 2009-2019**

Tax Year	% Female	% Age 25 or Less	% ME dependent	% Single Filer	% Associate's	% Bachelor's	% Graduate	% STEM, Associate's	% STEM, Bachelor's
2008	-	-	-	-	-	-	-	-	-
2009	47.1%	62.7%	-	80.4%	-	-	-	-	-
2010	44.3%	69.0%	85.9%	77.2%	14.6%	85.4%	-	48.5%	39.4%
2011	41.3%	62.8%	87.4%	71.7%	13.3%	86.7%	-	40.6%	37.3%
2012	41.5%	55.2%	88.7%	70.1%	17.2%	82.8%	-	40.9%	35.1%
2013	44.0%	44.9%	88.4%	68.4%	17.9%	82.1%	-	36.5%	39.5%
2014	43.9%	36.8%	88.0%	66.8%	19.4%	80.6%	-	36.7%	40.8%
2015	43.2%	31.4%	86.2%	64.7%	21.0%	79.0%	-	37.0%	40.1%
2016	41.8%	28.5%	83.2%	62.9%	20.5%	74.2%	5.3%	33.1%	41.5%
2017	42.2%	26.5%	80.5%	61.9%	20.0%	74.4%	5.6%	31.3%	42.7%
2018	42.6%	25.6%	77.5%	61.8%	20.5%	73.5%	6.0%	32.7%	43.7%
2019	44.0%	24.3%	74.9%	61.9%	21.2%	72.4%	6.4%	31.5%	43.7%

NOTES: The ME dependent represents whether someone was listed as a dependent on a Maine tax return the year they were 17. This represents the number of ME dependents divided by the number that were not claimed on a tax return at age 17. It does not include anyone who was born between 1986 because I do not observe them in the tax data at age 17. The associate's, bachelor's, and graduate degree columns are estimates. They are based on UMS/MCCS graduates who ever earned a specific degree at UMS/MCCS; some may be earning the EOTC based on a different degree. The degree type and STEM columns are based on single filers only.

**Figure 5. Average Amount of EOTC Credits, by Refundability and Degree Type, 2019**



SOURCE: Author analysis of Maine Revenue Services data

NOTES: In 2019, associate's degree recipients received refundable credits and graduate degree recipients received non-refundable credits.

**Table 11. Regression Results, Full Sample, 2018**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	-0.00559** (0.001)	-0.00447** (0.001)	-0.00818** (0.001)	-0.00474** (0.001)	0.00495* (0.002)	-0.00617** (0.001)	-0.00516** (0.002)
Log of student loan interest, in 2019 USD	0.06977** (0.003)	0.06832** (0.003)	0.05878** (0.003)	0.06147** (0.003)	0.07703** (0.004)	0.04958** (0.003)	0.05278** (0.004)
Female	-0.04894** (0.008)	-0.04086** (0.009)	-0.03505** (0.008)	-0.05175** (0.008)	-0.05914** (0.011)	-0.02896** (0.008)	-0.04201** (0.011)
Filing status, Head of household	-	-0.05069+ (0.030)	-	-	-	-0.06801* (0.029)	-0.10406* (0.051)
Filing status, Married filing separately	-	0.00660 (0.025)	-	-	-	-0.02433 (0.024)	-0.00511 (0.038)
Filing status, Qualifying widower	-	-0.29974 (0.323)	-	-	-	-0.40416 (0.311)	-
Has dependents	-	-0.04515 (0.029)	-	-	-	-0.03076 (0.028)	0.00228 (0.047)
Log of Federal adjusted gross income, in 2019 USD	-	-	0.17594** (0.006)	-	-	0.17749** (0.006)	0.20783** (0.009)
Ever obtained an Associate's degree	-	-	-	-0.00655 (0.017)	-	0.00373 (0.017)	-0.03355 (0.024)
Ever obtained a Bachelor's degree	-	-	-	0.12066** (0.018)	-	0.12251** (0.017)	0.11720** (0.026)
Ever received a graduate degree after 2015	-	-	-	-0.02934 (0.021)	-	-0.02739 (0.020)	-0.04092 (0.030)
Was a dependent in ME at age	-	-	-	-	-	-	-
Log of parent's AGI at age 17, in 2019 USD	-	-	-	-	0.04423** (0.009)	-	0.02924** (0.009)
Log of median AGI in zip code at age 17, in 2019 USD	-	-	-	-	-0.08842** (0.027)	-	-0.10884** (0.026)
Number of dependents in family at age 17	-	-	-	-	-0.00175 (0.007)	-	-0.00376 (0.007)
Constant	0.04962+ (0.027)	0.03153 (0.027)	-1.64325** (0.067)	-0.00212 (0.032)	0.19410 (0.290)	-1.73764** (0.069)	-1.22613** (0.291)
Observations	11,904	11,904	11,848	11,904	6,757	11,848	6,729
R-squared	0.055	0.059	0.112	0.069	0.057	0.129	0.144

NOTES: Standard errors in parentheses \*\* p<0.01, \* p<0.05, + p<0.1. Sample includes UMS/MCCS associate's and bachelor's degrees earned after 2007 and graduate degrees earned after 2015.

**Table 12. Regression Results, Associate's Degrees, 2018**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	-0.00201** (0.001)	-0.00134+ (0.001)	-0.00344** (0.001)	0.00366 (0.002)	0.00268 (0.003)	0.00055 (0.002)	0.00229 (0.004)
Log of student loan interest, in 2019 USD	0.05138** (0.005)	0.05068** (0.005)	0.04688** (0.005)	0.05025** (0.005)	0.06203** (0.007)	0.04538** (0.005)	0.05693** (0.007)
Female	-0.02057 (0.014)	-0.01057 (0.014)	-0.01451 (0.014)	-0.01346 (0.014)	0.03768+ (0.020)	0.00229 (0.014)	-0.00569 (0.020)
Filing status, Head of household	-	-0.02791 (0.041)	-	-	-	-0.05006 (0.040)	0.01776 (0.073)
Filing status, Married filing separately	-	0.03265 (0.044)	-	-	-	0.01381 (0.043)	0.07472 (0.083)
Has dependents	-	-0.04361 (0.040)	-	-	-	-0.03839 (0.039)	-0.09912 (0.069)
Log of Federal adjusted gross income, in 2019 USD	-	-	0.11571** (0.011)	-	-	0.11188** (0.011)	0.11971** (0.016)
STEM Degree	-	-	-	0.06839** (0.015)	-	0.05062** (0.015)	0.04940* (0.024)
Age at graduation, Associate's degree	-	-	-	0.00716** (0.003)	-	-0.00401 (0.003)	0.00889+ (0.005)
Log of parent's AGI at age 17, in 2019 USD	-	-	-	-	0.02066 (0.015)	-	0.01334 (0.015)
Log of median AGI in zip code at age 17, in 2019 USD	-	-	-	-	0.18284** (0.053)	-	0.15671** (0.053)
Number of dependents in family at age 17	-	-	-	-	-0.01344 (0.011)	-	-0.01458 (0.011)
Constant	-0.02822 (0.038)	-0.03791 (0.038)	1.16430** (0.110)	-0.02743 (0.038)	1.53490** (0.555)	1.13888** (0.112)	0.32660 (0.587)
Observations	3,687	3,687	3,674	3,687	1,897	3,674	1,891
R-squared	0.032	0.036	0.063	0.039	0.048	0.071	0.086

NOTES: Standard errors in parentheses \*\* p<0.01, \* p<0.05, + p<0.1. Sample includes UMS/MCCS associate's degrees and earned after 2007.

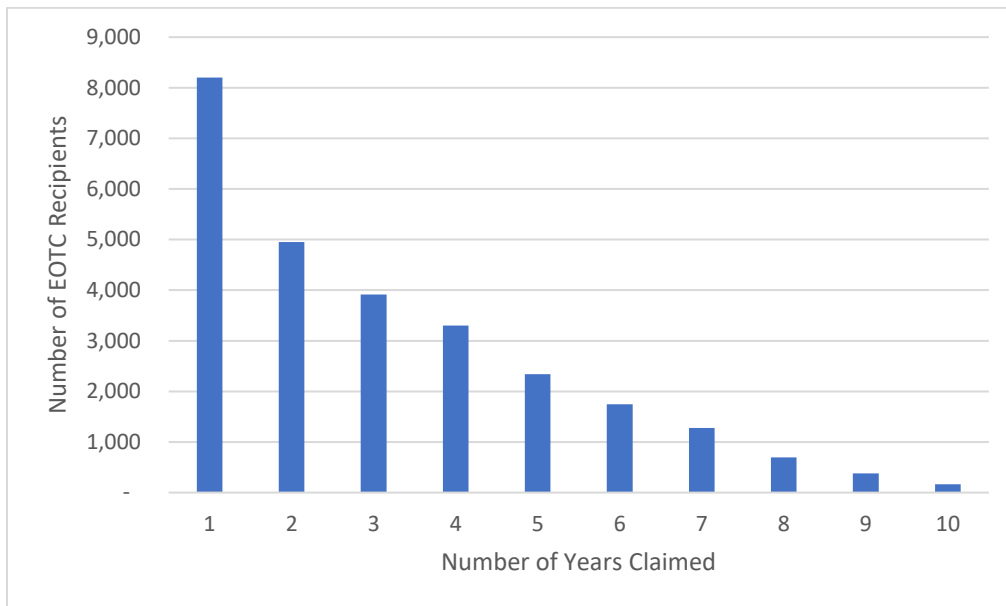


**Table 13. Regression Results, Bachelor's Degrees, 2018**

VARIABLES	(1)	(2)	(3)	(4)	(6)	(7)	(8)
	All	All	All	All	All	All	All
Age	-0.00648** (0.001)	-0.00526** (0.001)	-0.00958** (0.001)	0.00353* (0.002)	0.00586* (0.002)	-0.00614** (0.002)	0.00290 (0.003)
Log of student loan interest, in 2019 USD	0.06695** (0.004)	0.06613** (0.004)	0.05291** (0.004)	0.06383** (0.004)	0.07065** (0.005)	0.05083** (0.004)	0.05192** (0.005)
Female	-0.06738** (0.010)	-0.06070** (0.010)	-0.04898** (0.010)	-0.04108** (0.010)	-0.07633** (0.014)	-0.02288* (0.010)	-0.02858* (0.013)
Filing status, Head of household	-	-0.06315 (0.040)	-	-	-	-0.08438* (0.038)	-0.15791* (0.063)
Filing status, Married filing separately	-	-0.01189 (0.029)	-	-	-	-0.03740 (0.028)	-0.02863 (0.041)
Filing status, Qualifying widower	-	-0.32900 (0.335)	-	-	-	-0.35247 (0.318)	-
Has dependents	-	-0.03280 (0.038)	-	-	-	-0.03561 (0.036)	0.02158 (0.057)
Log of Federal adjusted gross income, in 2019 USD	-	-	0.20111** (0.008)	-	-	0.18090** (0.008)	0.20317** (0.011)
STEM Degree	-	-	-	0.21815** (0.011)	-	0.16504** (0.011)	0.18478** (0.014)
Age at graduation, BA degree	-	-	-	-0.01180** (0.002)	-	-0.00128 (0.002)	-0.01598** (0.004)
Was a dependent in ME at age	-	-	-	-	-	-	-
Log of parent's AGI at age 17, in 2019 USD	-	-	-	-	0.04593** (0.011)	-	0.03137** (0.010)
Log of median AGI in zip code at age 17, in 2019 USD	-	-	-	-	-0.09886** (0.031)	-	-0.11178** (0.029)
Number of dependents in family at age 17	-	-	-	-	-0.00042 (0.008)	-	-0.00327 (0.008)
Constant	0.13913** (0.036)	0.11367** (0.036)	-1.78328** (0.081)	0.08408* (0.035)	0.34511 (0.337)	-1.68054** (0.084)	-0.96151** (0.337)
Observations	8,597	8,597	8,556	8,597	5,129	8,556	5,107
R-squared	0.050	0.053	0.120	0.093	0.048	0.148	0.165

NOTES: Standard errors in parentheses \*\* p<0.01, \* p<0.05, + p<0.1. Sample includes UMS bachelor's degrees and earned after 2007.

**Figure 6. Number of Years Recipients Received EOTC Credits**



SOURCE: Author analysis of Maine Revenue Services data

# Appendix B: Technical Data and Methods Appendix

In the Data and Methods section in the main document, I provide a summary of each data source. This section provides additional information on dataset construction: Maine and Federal tax data, University of Maine System (UMS) and Maine Community College System (MCCS) administrative data, and the Integrated Postsecondary Education Data System (IPEDS). Figure B.1 shows each of these data sources, along with variables that were in each dataset and variables that I constructed from each data set.

**Figure B.1. Data Sources and Variables Given and Variables Derived**

Maine tax returns	Federal tax returns	UMS/MCCS	IPEDS				
<b>Years available:</b> - 2003-2019	<b>Years available:</b> - 2003-2018 (1098-E,W2s) 2019 (1040)	<b>Years available:</b> - 2008-2020	<b>Years available:</b> - 2000-2019				
<b>Variables given:</b> - SSN - Name - Date of birth - Adjusted gross income (AGI) - Filing status - Return type - EOTC amount - EOTC type	<b>Variables given:</b> - SSN - Name - Date of birth - Adjusted gross income (AGI) - Detailed income sources - Filing status - Number of dependents - Amount of student loan interest	<b>Variables given:</b> - Name - Date of birth - College/university - Graduation year - Degree type - Degree discipline	<b>Variables given:</b> - College/university - Carnegie classification - Admissions rate - Net price - In-state tuition				
<b>Variables derived:</b> - Gender (from name) - Move status (from tax return type and address)	<b>Variables derived:</b> - Parents' AGI at age 17 - Zip code's AGI at age 17	<b>Variables derived:</b> - STEM/Non-STEM degree	<b>Variables derived:</b> - None				
<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;"><b>Linking variables</b></td> <td style="width: 25%;">SSN</td> <td style="width: 25%;">Name/DOB</td> <td style="width: 25%;">College/university</td> </tr> </table>				<b>Linking variables</b>	SSN	Name/DOB	College/university
<b>Linking variables</b>	SSN	Name/DOB	College/university				

I then provide several tables with descriptive statistics and information about each data source. At the end of this section, I describe my regression specification in more detail than I describe in the main document.

## Tax Data

### Summary

I created an individual level panel dataset of all Maine tax filers from 2003-2019. This data came from five primary sources: Maine individual income tax returns (1040ME), Federal individual income tax returns (1040), Federal W2s, Federal student loan interest statement (1098-E), and Federal Tuition Statements (1098-T). It includes data for all Maine tax filers, including part-year residents and non-residents, and Federal returns for these Maine tax filers. It does not include Federal tax returns for tax payers who do not file Maine tax returns.

From the tax data, I can observe the following: annual gross income, wages, sex (inferred from first name), tax filing status (akin to marital status), the number of dependents, whether an individual was a partial year resident (akin to whether someone moved to/from Maine), whether

an individual has student loan debt, and whether an individual paid tuition or had tuition paid on their behalf in a given year. Regarding the EOTC, I can observe the type of and amount of the credit an individual or couple received. Additionally, I can observe information about their parents (or whomever claimed them as a dependent). For this, I link parental information, including AGI and median AGI in their zip code at age 17, during the tax year in which an individual was 17. Because I only observe tax years beginning in 2003, I can only observe parental information for tax filers born after 1986.

There are several important limitations to this data. First, we only observe individuals who file Maine tax returns. Therefore, if someone leaves Maine, I cannot observe any information after that. In other words, this is a better dataset to understand the behavior of individuals who grew up in Maine and stay in Maine because we can observe their behavior consistently. Second, we do not observe everyone in Maine for several reasons. If someone does not appear in the tax data, it can be for several reasons. They may have not earned enough to be required to file taxes or they may have moved. Usually if someone has moved, we can capture this based on whether they were a partial year resident on their previous tax return. Third, regarding the EOTC, if a couple is married and filing jointly, we can observe the amount of credit they received, but we do not know whether they received the credit based on the primary or secondary filer's (or both) education and debt background. When estimating take-up and eligibility, this can pose a challenge. As a result, I focus some of my analysis on single filers. In the following section, I provide more detail about how I constructed this dataset.

### *Dataset Construction*

I downloaded annual data from the ME-1040, Federal 1040, Federal W2, Federal 1098-T, and Federal 1098-E using Cognos, a database software used by Maine Revenue Services to pull IRS data. Each row in the ME-1040 and Federal-1040 represents one tax return, so if spouses are filing jointly, they are listed on the same row with a primary SSN and a secondary SSN. For the ME-1040 and Federal-1040, I separate spouses each into their own row maintaining their marital status and household income. One complication with this is that some married couples file the Federal-1040 with one spouse as the primary filer but the ME-1040 with the other spouse as the primary filer. I reconcile this by mapping primary and secondary SSNs to each other. The W2, 1098-T, and 1098-E data is provided at the form-SSN-tax year level. For example, if someone received two W2s in a given tax year, they would be listed in the data in that tax year twice. For these forms, I combine them into the SSN-tax year level and add relevant data (e.g., total W2 income, total tuition paid, total loan interest paid). There are some instances in the Federal or state 1040 returns that are not matched in the W2s, 1098-Es, and 1098-Ts. This is because not all filers receive these forms. This is especially true for the 1098-E and 1098-Ts. There are also a small number of cases where the 1098-Es, 1098-Ts, and W2s are not matched. For the 1098-Es and 1098-Ts, this may be because the forms are provided to students who are not filing yet. For

the W2s, this may be because some people may be working but not earning enough to warrant filing taxes.

I derived many variables from the tax data with little to no cleaning or manipulation. There are several exceptions. First, I derive sex using first name. I use the R package “gender,” which uses social security datasets to determine the likelihood that someone with a given first name is male or female. I limit birth years between 1920 and 2000 because the majority of taxpayers in the panel and even more of the graduates from MCCA and UMS were born between these two years. The “gender” package cannot determine the gender of all names. I label these tax filers with a “Missing” gender. Second, I derived whether someone moved into or out of Maine based on whether they filed a partial-year tax return and the state listed in their address. If someone filed a partial year tax return with a Maine address, I assume they moved *to* Maine. If someone filed a partial year tax return with a non-Maine address, I assume they moved *from* Maine. Third, I derived whether someone was self-employed based on whether they filed one or more Schedule C forms and whether their Schedule C gross receipts were higher than \$1,000. This is not a perfect indicator for self-employment because their Schedule C income may not be their primary income source, but in our case, I care only whether someone meets the definition for self-employment for the EOTC. MRS provides no definition for self-employment. MRS provides no definition of self-employment regarding the EOTC, so it is likely self-reported. I use the self-employment variable only in our take-up analysis, and even then primarily for a robustness check. Fourth, for the EOTC variables, I manipulate the amount of the non-refundable credit someone receives based on all schedule A credits and their total tax. I need to do this because the amount of a non-refundable credit is limited by their tax liability and the amount of total tax. For example, if someone would theoretically qualify for a \$2,000 non-refundable EOTC but has a \$2,000 tax liability but received \$1,000 in another credit, the amount of their EOTC would be \$1,000. For the EOTC variables, I also create indicator variables for whether they received the non-refundable, refundable, or either credit.

I also am able to link parents to children in certain cases. Because I observe tax records back to 2003, I can observe dependent information if a tax filer was born prior to 1986 and their parents filed Maine tax returns. Using this information, I determine a tax filer’s household income at the age of 17, the number of other dependents in their household at age 17, their parents’ filing status at age 17, and the median household income in their zip code at age 17. One limitation with the dependent data is that because I only observe dependent information for those before 1986, I can only run certain sets of analysis on this younger population, usually representing students of more traditional ages for college students.

## Education Data

### *Summary*

I also use data collected by the University of Maine System (UMS) and Maine Community College System (MCCS). From the University of Maine System, I received information on approximately 77,000 conferred degrees from 2008 through July 2021.<sup>15</sup> This information includes: award year, award type, award discipline (e.g., CIP code), education institution within UMS, and most recent previous education institution attended (either a high school or other university). The dataset also includes name, birth date, phone number, email address, and most recent address available; I use this information, especially name and birth date, to link individuals with the tax data. From the Maine Community College System, I received information on approximately 47,000 conferred degrees from 2000 through 2021.<sup>16</sup> I use the same information from MCCS as UMS, excluding phone number and most recent education institution provided. I was able to match 96 percent of associate's, 91 percent of bachelor's, and 93 percent of graduate degrees.

The data is limited based on what education institutions define as “directory information”—information that universities can share at their discretion, including for research purposes that benefits the institution and their students. Graduates can opt out, in which case their information is not included in the file. I estimate that a small share of students opt out. UMS provided this information: approximately 1,100 graduates opted out of sharing their information (of 77,000 whose information UMS/MCCS was able to provide).

### *Dataset Construction*

The primary variables I used in my analysis were: name and birth date, which I used to merge the education data onto the tax data; CIP code, which I use to determine whether they received a STEM degree; award level (associate's, bachelor's, or graduate), institution. To convert CIP code to an indicator for a STEM discipline, I use the definition provided by list of CIP codes provided by U.S. Department of Homeland Security's Immigration and Customs Enforcement (ICE).<sup>17</sup> MRS also classifies several other degrees that are not included in the ICE list as STEM. For some degrees, such as psychology, MRS classifies it as a STEM degree some of the time, but not others, likely distinguished by whether they received a Bachelor of Arts or a Bachelor of Science degree. I include four additional CIP codes because these accounted for large numbers of recipients and they were consistently classified as STEM. The additional

---

<sup>15</sup> The number of conferred degrees will be slightly larger than my sample because I remove certificate and post-baccalaureate degrees and multiple instances of the same degree conferred to the same person.

<sup>16</sup> The number of conferred degrees will be slightly larger than my sample because I remove certificate and post-baccalaureate degrees and multiple instances of the same degree conferred to the same person.

<sup>17</sup> A full list is available here: <https://www.ice.gov/sites/default/files/documents/stem-list.pdf>.

degrees I included are nursing (CIP code 51.3801), economics (CIP code 45.0601), clinical nurse leader (51.3820), and radiologic technology (CIP code 51.0911). I also merge on institution-level characteristics from the IPEDS data, including admissions rate, enrollment rate, Carnegie classification,<sup>18</sup> total enrolled students by each education level, net price in 2018 (tuition and fees minus grants and loans)<sup>19</sup>, and in-state undergraduate tuition in 2018.

## Merging Education Data to Tax Data

I use six combinations of first name, last name, middle initial, and birth date to link the UMS and MCS education records to the tax data. I first use the most restrictive matching criteria, using first name, last name, middle name, and birth date. I then accept only those records for which there were a one to one match between the education records and tax data. I then repeat this process, using slightly less restrictive matching criteria at each point. I need to use less restrictive matching criteria for several reasons. First, there are typos or data entry error for which to account. This is likely more common with names although I did notice several likely errors in birth date (e.g., September 28<sup>th</sup> in the tax data vs September 27<sup>th</sup> in the education data). I converted all names to lowercase and removed all spaces and punctuation. Second, the tax data is missing birth date from 2003-2008 and secondary filer's birth date sporadically in later years. Third, I need less restrictive criteria to account for name changes, especially among women who change their name when they get married. Table B.1 shows the criteria used in each successive match and the share of matched education records that were obtained in each iteration. Most (82 percent) of records were matched using first name, last name, middle initial, and birth date or first name, last name, and birth date. Some of the later matches may seem not very restrictive, but far fewer graduates were matched in these categories. However, there were certainly graduates that are matched to the tax data incorrectly, but these incorrect matches likely happen rarely because I only keep these matches when there is a one to one match. Additionally, I hand-checked approximately twenty records using additional criteria, such as comparing zip code distance between the education records and tax data, checked for typos, comparing the W2 employer to degree discipline. I found that nearly all of these matches seemed to be of the same people, even records that were linked in later iterations. I also compared the records that were matched in the more restrictive iterations (iterations 1 and 2) with the less restrictive iterations (iterations 3 to 6). I find that they vary in ways that I would expect: there are less restrictive iteration has a higher share of women, a higher share of married filers, and a higher share of

---

<sup>18</sup> Carnegie classification describes the type of institution, ranging from “Associate’s colleges” up through “Doctoral/research universities—extensive.” It also includes specific institutions including “Schools of law” and “Tribal colleges.” More information is available here: <https://carnegieclassifications.iu.edu/>.

<sup>19</sup> The net price is “the average yearly price actually charged to first-time, full-time undergraduate students receiving student aid at an institution of higher education after deducting such aid.” More information is available here. <https://nces.ed.gov/ipeds/report-your-data/faq-average-net-price>

older filers. This makes sense: women are more likely to change their name when they get married, so there may be challenges matching on last name. Even though these populations differ, it is important to include the less restrictive matches in the overall analysis.

**Table B.1 Criteria used in each Match between Education Records and Tax Data**

Iteration #	First name	Last name	Middle initial	Birth date	Share of Matched Identified in Iteration
1	X	X	X	X	58%
2	X	X		X	24%
3		X		X	4%
4	X		X	X	8%
5	X			X	5%
6	X	X	X		1%

## IPEDS Data

### *Summary*

I link institutional characteristics for each college and university in Maine using the integrated postsecondary education data system (IPEDS). IPEDS is a data system run by the U.S. Department of Education that provides institutional level data, including basic information about the college and university, enrollment and completions data, indicators of quality (e.g., admission rate and enrollment rate), and finance data. I link the following characteristics by education institution to our panel dataset of tax data and education data: admissions rate, enrollment rate, Carnegie classification,<sup>20</sup> total enrolled students by each education level, net price in 2018 (tuition and fees minus grants and loans)<sup>21</sup>, and in-state undergraduate tuition in 2018.

<sup>20</sup> Carnegie classification describes the type of institution, ranging from “Associate’s colleges” up through “Doctoral/research universities—extensive.” It also includes specific institutions including “Schools of law” and “Tribal colleges.” More information is available here: <https://carnegieclassifications.iu.edu/>.

<sup>21</sup> The net price is “the average yearly price actually charged to first-time, full-time undergraduate students receiving student aid at an institution of higher education after deducting such aid.” More information is available here. <https://nces.ed.gov/ipeds/report-your-data/faq-average-net-price>



## Dataset Construction

I downloaded IPEDS data on the public facing site.<sup>22</sup> I downloaded complete survey data files by clicking the “Survey Data” dropdown menu and then the “Complete data files” link. These data files are organized into categories (e.g., 12-month Enrollment, Finance). I downloaded the “Admissions and Test Scores,” “Fall Enrollment,” “Student Financial Aid and Net Price,” “Graduation Rates,” and “Institutional Characteristics” data files from 2000 through the most recent year available. I downloaded these files in January 2021, and the most recent year available was 2019 for all data files except fall enrollment, with data available up through 2018. Additionally, IPEDS occasionally will update data files up to about a year they initially release the data. As a result, I typically report only 2018 data in my analysis.

Each data file is reported at the institution level, and I reconcile any differences over time in variable conventions in each data file. I then combine all sub-files to obtain an institution-year dataset. I also create a state-year dataset. To get a state-year dataset, I add enrollment and completion data over all institutions and take a weighted average for all other continuous variables (e.g., tuition, aid, and net price).

## Data Tables

This section provides tables summarizing our sample across data sources and provides descriptive statistics for variables used frequently in my analysis.

Table B.2 shows the number of tax filers from 2003-2019 overall and then those matched to the UMS/MCCS data overall and separated by degree. The number of tax filers has increased steadily from about 900,000 in 2003 to 1,039,000 in 2019, with a dip from 2008 to 2012 during the recession. For the education records, I observe higher numbers of tax filers, in large part because I use education records from 2008 onwards. I observe some UMS/MCCS graduates from 2003 to 2008, and these are likely represented students who worked during high school or college or students who were older and/or working when they started their degree program. Recall that I count spouses as separate filers, so Table B.2 represents the number of filers not the number of tax returns.

**Table B.2 Number of Tax Filers, by Tax Year and Overall**

Tax year	Number of filers (Thousands), total	Number of filers (Thousands), matched to UMS/MCCS data	Number of filers associate’s (Thousands), total	Number of bachelor’s (Thousands), total	Number of graduate (Thousands), total
2003	912.2	23.8	9.0	11.4	5.3
2004	924.5	27.1	10.1	13.5	5.7

<sup>22</sup> The IPEDS public facing site is here: <https://nces.ed.gov/ipeds/use-the-data>.

2005	933.0	30.9	11.3	16.0	6.2
2006	942.0	34.8	12.6	18.5	6.7
2007	960.4	39.0	14.0	21.2	7.3
2008	950.7	42.1	15.0	23.2	7.6
2009	929.2	43.2	15.4	23.8	7.8
2010	930.3	46.1	16.5	25.7	8.1
2011	933.2	48.9	17.6	27.5	8.2
2012	932.4	51.3	18.4	29.1	8.4
2013	967.2	53.4	19.4	30.2	8.5
2014	965.9	55.3	20.3	31.4	8.5
2015	976.5	57.0	21.1	32.4	8.5
2016	995.6	57.7	21.4	32.7	8.5
2017	1,011.6	57.9	21.7	32.7	8.4
2018	1,025.0	57.2	21.5	32.3	8.2
2019	1,039.0	56.2	21.4	31.6	7.9
Unique number of filers	1,951.3	72.5	25.2	42.3	10.6

SOURCE: Author analysis of Federal and state income tax returns and data provided by UMS and MCCS.

Table B.3 shows the total number of records in the UMS/MCCS data and the number of records in the UMS/MCCS data that was matched to the tax data. I matched about 96 percent of UMS/MCCS graduates with an associate’s degrees, 91 percent of UMS/MCCS graduates with a bachelor’s degrees, and 93 percent of UMS/MCCS graduates with a graduate degree to the tax data.

**Table B.3 Number of Tax Filers in UMS/MCCS, Total and Matched to Tax Data**

Tax year	Total in Ed Data	Total Matched	Share matched
Associate’s	26.4	25.2	95.5%
Bachelor’s	46.6	42.3	90.9%
Graduate	11.5	10.6	92.5%

SOURCE: Author analysis of data provided by UMS and MCCS.

Table B.4 shows the sample size and share of the sample broken out by key categorical variables in tax year 2018. This sets a baseline understanding of our samples and indicates that the composition of each sample is similar to what I would expect. Overall, the composition of our samples varies in ways that I would expect. For example, the share of female tax filers who received any degree from UMS/MCCS is higher than the share of female tax filers in the sample of all tax filers. A higher share of filers with an associate’s or bachelor’s degree from UMS/MCCS are single than the general population of Maine taxpayers, likely an indication of their education level and age. There are also far more non-resident filers in the general

population of Maine filers (8 percent) compared to those receiving degrees from UMS/MCCS (1.1 to 2.8 percent). The Maine dependency variable is an interesting and important variable for my analysis. For those born before 1986, I cannot observe whether they were a dependent in Maine (i.e., grew up in Maine). There is a higher share of filers in the general population of tax filers who were born before 1986 (72 percent) compared to the share of filers who received any degree from UMS/MCCS (30.5 percent to 69.8 percent).

**Table B.4 Sample size and Share of Sample by Key Categorical Variables, 2018**

Variable Name	Variable Label	All Maine taxpayers	Ever received EOTC	Any UMS/MCCS degree	UMS/MCCS Associate's	UMS/MCCS Bachelor's	UMS/MCCS Graduate's
Sample size	Sample size	1,024,990	25,444	57,207	21,533	32,277	8,215
Sex	Male	47%	47%	40%	42%	40%	31%
Sex	Female	50%	52%	58%	56%	58%	67%
Sex	Missing	3%	2%	2%	2%	2%	2%
Filing status	Single	37%	43%	49%	47%	54%	32%
Filing status	Married filing jointly	55%	51%	42%	41%	38%	59%
Filing status	Head of household	7%	3%	8%	11%	6%	7%
Filing status	Married filing separately	1%	2%	2%	1%	2%	3%
Filing status	Qualifying widower	<1%	<1%	<1%	<1%	<1%	<1%
Residency	Resident	89%	96%	95%	97%	93%	95%
Residency	Non-resident	8%	1%	2%	1%	3%	2%
Residency	Part-year resident	3%	3%	3%	2%	4%	3%
Residency	Missing	<1%	<1%	<1%	<1%	<1%	<1%
Maine address	Non-Maine address	12%	4%	7%	5%	9%	8%
Maine address	Maine address	88%	96%	93%	95%	91%	92%
Move status	Stayed in Maine	97%	97%	97%	98%	96%	97%
Move status	Moved to Maine	2%	2%	1%	1%	2%	1%
Move status	Moved out of Maine	1%	1%	2%	1%	2%	2%
Move status	Missing	<1%	<1%	<1%	<1%	<1%	<1%
Federal AGI	Less than \$0	1%	<1%	<1%	<1%	<1%	<1%
Federal AGI	\$0 to \$9,999	12%	2%	7%	7%	8%	3%
Federal AGI	\$10,000 to \$24,999	15%	8%	16%	18%	17%	8%

Federal AGI	\$25,000 to \$49,999	22%	26%	30%	32%	31%	20%
Federal AGI	\$50,000 to \$74,999	15%	22%	18%	19%	18%	17%
Federal AGI	\$75,000 to \$99,999	11%	18%	12%	12%	12%	16%
Federal AGI	\$100,000 to \$149,999	12%	18%	12%	10%	11%	22%
Federal AGI	\$150,000 to \$199,999	5%	4%	3%	2%	3%	7%
Federal AGI	Greater than \$200,000	7%	2%	2%	1%	2%	6%
Maine dependent	Not a Maine dependent at age 17	15%	19%	16%	15%	18%	11%
Maine dependent	Maine dependent at age 17	13%	53%	44%	43%	51%	19%
Maine dependent	Not applicable-born before 1986	72%	28%	40%	42%	31%	70%
Address	In-state address	-	-	-	97%	92%	92%
Address	Out-of-state address	-	-	-	3%	8%	8%
STEM degree	Non-STEM	-	-	-	76%	70%	83%
STEM degree	STEM	-	-	-	24%	31%	17%
College or university	Central Maine Community College	-	-	-	17%	-	-
College or university	Eastern Maine Community College	-	-	-	15%	-	-
College or university	Kennebec Valley Community College	-	-	-	11%	-	-
College or university	Northern Maine Community College	-	-	-	7%	-	-
College or university	Southern Maine Community College	-	-	-	31%	-	-
College or university	Washington County Community College	-	-	-	2%	-	-
College or university	York County Community College	-	-	-	5%	-	-
College or university	U of Maine	-	-	-		38%	41%
College or university	U of Maine at	-	-	-	9%	11%	

	Augusta						
College or university	U of Maine at Farmington	-	-	-		11%	2%
College or university	U of Maine at Fort Kent	-	-	-	1%	4%	-
College or university	U of Maine at Machias	-	-	-	<1%	2%	-
College or university	U of Maine at Presque Isle	-	-	-	1%	4%	-
College or university	U of Southern Maine	-	-	-	<1%	30%	57%

SOURCE: Author analysis of data provided by UMS and MCCS. We use tax year 2018 instead of 2019 because it is the most recent year for which all tax data was available at the time of analysis.

Table B.5 shows descriptive statistics for key continuous variables. Again, these descriptive statistics for each sample vary in ways in which I would expect. For example, for filers who were born after 1986, their parents' adjusted gross income at age 17 was higher for filers with UMS/MCCS degrees than all Maine tax filers. Interestingly, filers in the general population appear to be paying higher levels of student loan interest than filers who received any degree from UMS/MCCS. This is likely because of a few reasons. First, students who attend UMS/MCCS, which are both public institutions likely borrow less than private institutions. Second, the general population includes students who did not graduate, a group with typically higher loan default rates than students who graduate.

**Table B.5 Descriptive Statistics for Key Continuous Variables, 2018**

Sample	Mean	Median	Count	Standard Deviation
Age				
All Maine taxpayers	48.9	50	969,798	21.0
Ever received EOTC	31.2	29	25,232	8.2
Any UMS/MCCS degree	33.4	31	57,200	10.5
Associate's	33.8	31	21,532	10.9
Bachelor's	31.6	29	32,273	9.1
Graduate	39.5	37	8,213	10.9
Federal adjusted gross income, 2019 USD				
All Maine taxpayers	\$144,853	\$49,815	1,024,990	\$4,312,375
Ever received EOTC	\$73,775	\$64,087	25,444	\$54,975
Any UMS/MCCS degree	\$62,908	\$46,812	57,207	\$448,746
Associate's	\$54,102	\$43,067	21,533	\$57,611
Bachelor's	\$61,217	\$44,389	32,277	\$572,102
Graduate	\$91,897	\$77,688	8,215	\$328,937

Parents' adjusted gross income at age 17, 2019 USD				
All Maine taxpayers	\$92,996	\$70,867	137,357	\$268,841
Ever received EOTC	\$95,065	\$86,106	13,464	\$87,856
Any UMS/MCCS degree	\$97,002	\$82,613	25,165	\$124,979
Associate's	\$81,665	\$73,198	9,250	\$81,055
Bachelor's	\$102,884	\$87,662	16,576	\$123,732
Graduate	\$121,586	\$96,002	1,583	\$236,533
Median adjusted gross income in zip code, 2019 USD				
All Maine taxpayers	\$40,620	\$37,829	137,357	\$17,210
Ever received EOTC	\$40,330	\$37,807	13,464	\$10,762
Any UMS/MCCS degree	\$40,494	\$37,796	25,165	\$11,836
Associate's	\$39,306	\$37,030	9,250	\$10,528
Bachelor's	\$41,007	\$38,152	16,576	\$12,298
Graduate	\$41,985	\$38,574	1,583	\$14,219
F1040 wages, 2019 USD				
All Maine taxpayers	\$51,499	\$31,416	915,033	\$128,009
Ever received EOTC	\$68,397	\$60,126	23,680	\$42,594
Any UMS/MCCS degree	\$54,893	\$43,141	53,643	\$48,850
Associate's	\$49,176	\$39,409	20,199	\$40,312
Bachelor's	\$52,839	\$41,656	30,317	\$45,157
Graduate	\$79,174	\$65,753	7,613	\$68,799
F1040 adjusted gross income, 2019 USD				
All Maine taxpayers	\$81,924	\$49,152	915,033	\$550,105
Ever received EOTC	\$72,381	\$61,893	23,680	\$55,060
Any UMS/MCCS degree	\$60,741	\$45,607	53,643	\$81,472
Associate's	\$53,275	\$41,863	20,199	\$53,303
Bachelor's	\$57,199	\$43,260	30,317	\$61,381
Graduate	\$94,665	\$76,496	7,613	\$156,541
F1098E Student Loan Interest, 2019 USD				
All Maine taxpayers	\$191	\$0	1,024,990	\$1,370
Ever received EOTC	\$1,467	\$557	25,444	\$2,824
Any UMS/MCCS degree	\$710	\$0	57,207	\$1,986
Associate's	\$376	\$0	21,533	\$1,258
Bachelor's	\$886	\$0	32,277	\$2,203
Graduate	\$1,095	\$0	8,215	\$2,765
F1098E Student Loan Interest, Excluding those without Interest, 2019 USD				
All Maine taxpayers	\$1,969	\$966	99,619	\$3,977
Ever received EOTC	\$2,280	\$1,344	16,369	\$3,247

Any UMS/MCCS degree	\$1,798	\$1,039	22,595	\$2,835
Associate's	\$1,208	\$707	6,710	\$2,018
Bachelor's	\$1,937	\$1,186	14,757	\$2,929
Graduate	\$2,705	\$1,651	3,327	\$3,812
F1098T Tuition, 2019 USD				
All Maine taxpayers	\$10,071	\$4,751	74,862	\$13,366
Ever received EOTC	\$7,539	\$4,524	4,976	\$9,722
Any UMS/MCCS degree	\$6,664	\$4,487	16,670	\$7,440
Associate's	\$4,533	\$3,180	6,698	\$5,328
Bachelor's	\$7,957	\$6,160	9,671	\$7,921
Graduate	\$7,607	\$5,033	2,105	\$8,090
F1098T Scholarships, 2019 USD				
All Maine taxpayers	\$5,353	\$1,747	74,862	\$9,143
Ever received EOTC	\$3,084	\$509	4,976	\$5,632
Any UMS/MCCS degree	\$3,425	\$1,442	16,670	\$5,077
Associate's	\$3,143	\$1,612	6,698	\$4,312
Bachelor's	\$3,515	\$1,310	9,671	\$5,214
Graduate	\$3,563	\$1,341	2,105	\$5,923

SOURCE: Author analysis of data provided by UMS and MCCS.

NOTES: For F1098T tuition and scholarships, tax filers are only included if they were matched to a 1098T. For F1098E student loan interest, tax filers are included regardless of whether they were matched to a 1098E.

## Methods-Regression Analysis

I use a linear regression to determine what observable characteristics predict whether a tax filer will claim the EOTC or, conditional on claiming the EOTC, the amount of their EOTC credit. My specification is as follows:

$$(1) \quad Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_i + \epsilon_i$$

where  $Y_i$  is the outcome and each  $\beta_i$  is the coefficient associated with each covariate from 1 to  $n$ .  $\epsilon_i$  is an error term.  $Y_i$  is 1 if an individual  $i$  claimed the EOTC and 0 otherwise. I include the following covariates in these models: sex, age, filing status, whether they have dependents, the natural logarithm of the amount of student loan interest, the natural logarithm of their Federal adjusted gross income, and their degree type (e.g., associate's, bachelor's, graduate). In several models, I also include information about the filer when they were 17. These covariates include the logarithm of their parents' adjusted gross income at age 17, the logarithm of the median adjusted gross income in their zip code at age 17, and the number dependents in their family at age 17. I also run models where the sample just includes graduates with a specific degree type (e.g., associate's, bachelor's, graduate). In these models, I include whether a filer graduated in a STEM discipline and their institution. I run the model on data from 2018, and I use a linear

regression for simplicity in interpretation. However, I also test the sensitivity with other models, including a logistic regression and a model including data from 2008 to 2018. I also run a second set of models, where the sample is only filers who received the EOTC, and  $Y_i$  is the amount of credit an individual  $i$  received.<sup>23</sup>

---

<sup>23</sup> The coefficients that I include are sex, age, filing status (e.g., marital status), whether a filer has dependents, the natural logarithm of their household's adjusted gross income, the natural logarithm of the amount of student debt they paid, whether they were a dependent in Maine at age 17, the logarithm of their parents' AGI at age 17, and the logarithm of the median AGI in their zip code at age 17.



## Appendix C: Interview Methods and Full Summary

---

This appendix summarizes interviews that I conducted with financial aid officers regarding their perceptions about the Educational Opportunity Tax Credit (EOTC). Topics of these interviews include the extent to which financial aid officers use the EOTC as a way to recruit or retain students, the extent to which students know and consider the EOTC as they make decisions, the extent to which financial aid officers market and promote the EOTC, and their suggestions to improve the EOTC. I first describe the sample and methods and then discuss the preliminary findings. I also include the interview protocol in the last section.

### Sample and Methods

I conducted interviews with financial aid officers at ten out of twenty-eight (about thirty-six percent) colleges or universities in Maine. Financial aid officers are typically responsible for issuing financial aid packages, communicating with other offices (e.g., admissions), managing and complying with Federal aid programs (e.g., Pell grants and Federal student loans), and answering student inquiries. As a result, they can speak to challenges students typically face regarding several aspects of the EOTC. Additionally, in tax years 2008 and 2009, financial aid offices played a formal role in EOTC implementation: they assisted students in filling out the student opportunity contract and determining the benchmark loan payment.

I initially contacted financial aid officers at all twenty-eight colleges or universities in Maine with a 2018 enrollment over 100 students. At each college or university, I either emailed the director of financial aid, or if a direct email was not available, I emailed the college or university's financial aid alias. In each email, I included a pdf describing the study and also indicated that participation was voluntary. I attempted to reach each financial aid officer three times over email and once over the phone, and I conducted the interview in February and March of 2021. Table C.1 shows the sector of each college or university and the number of colleges or universities I interviewed. Overall, I interviewed a roughly equal share of colleges or universities in each sector (college type), suggesting that the findings from these interviews will be broadly generalizable across Maine colleges and universities.

**Table C.1. Number of Colleges and Universities in Sample and Interviewed**

Sector	Number of Colleges in Maine <sup>a</sup>	Number of Colleges Interviewed
Private not-for-profit, 4-year or above	10	3
Public or private, 2-year <sup>b</sup>	8	3
Public, 4-year or above	10	4

Total	28	10
-------	----	----

NOTES: <sup>a</sup> The sample includes colleges with over 100 students enrolled in 2018.

<sup>b</sup> The public or private, 2-year category includes public, 2-year colleges and private for-profit, 2-year colleges.

Each interview lasted thirty to sixty minutes, and I include the interview protocol in the last section of this document. I took notes and recorded each interview, and I used recordings to clarify any section of my notes that were not clear. I used Dedoose, a qualitative coding software, to code interview data based on topic. For each topic, I then summarized relevant themes and findings and selected any quotations that were particularly instructive. Because I had a small sample of colleges or universities, I did not analyze themes by the college or university sector (e.g., private not-for-profit, 4-year or above; public or private, 2-year; and public, 4-year or above).

## Findings

### Financial aid officers rarely use the EOTC to recruit or retain students

Most financial aid officers indicated that the admissions office at their college or university does not use the EOTC as a tool to recruit students, and several financial aid officers were unsure if their admissions office used it as a tool to recruit students. Several financial aid officers noted that they may bring up the EOTC in initial conversations with students or parents, but they noted that this happens rarely and only if students are concerned about the amount of debt included in their financial aid package.

None of the financial aid officers indicated that they perceived the EOTC to impact student decision making regarding re-enrollment or completion, nor do they bring up the EOTC in conversations with students that may be deciding whether to re-enroll. One financial aid officer noted: “I don’t think it’s something I hear about that students are thinking about... I think students just find it to be a nice benefit after.”

Financial aid officers offered several reasons for its limited use as a tool to retain students. First, financial aid officers perceived there to be other factors that affect a student’s decision to re-enroll, including academic preparation, homesickness, mental illness, other personal circumstances (e.g., child care, family pressure to work), difficulty with online education, and a lack of social support. One financial aid officer at a community college perceived because most students at their college borrowed low amounts, it has little effect. Some financial aid officers also noted that they were hesitant to discuss the EOTC with students because the tax credit is complicated and that they are not tax professionals.

From a financial perspective, we take a hands off approach when it comes to taxes. We would never want to give tax advice that is incorrect. We typically say to talk to a tax professional.

Financial aid officers perceive that few students know about the EOTC and perceive it to factor little in student decision making

Most financial aid officers perceived that students, even as they are about to graduate, do not know about the EOTC. One financial aid officer noted that this is especially true for students of traditional age (typically 18-24) and another noted this is especially true for first-generation college students. This perception is based in large part on the number of times students bring up the EOTC in conversation with their office. One financial aid officer noted:

I don't think students know about it at all, particularly more traditional aged students who are not filing taxes on their own. They likely would have little insight on how it works. The more adult population might know more about it.

One financial aid officer noted that students email or call their office periodically—though infrequently—about the EOTC, especially during tax season. This officer noted that they may receive “a half dozen or a dozen” calls per year. They noted that many of these students graduated in 2008 or 2009 and are required to provide their college or university’s loan benchmark payment. Several financial aid officers noted that they receive a few inquiries around tax season from students.

Most financial aid officers market the EOTC, but do so minimally

Most financial aid officers promoted the EOTC by including information in exit materials or trainings, including it on their website (either internal or external), including it in email communications, or discussing it informally with students. Most financial aid officers noted that they included information about the EOTC in student communications when students graduate typically as part of college-provided loan exit-counseling or in emails or packets they send to students around graduation. All students with Federal loans are required to undergo loan exit counseling provided by the U.S. Department of Education. Several financial aid officers noted that their office provides supplemental loan exit counseling, and when they do, most noted that they include information about the EOTC as part of supplemental exit counseling. One financial aid officer also noted that they included the EOTC on their Instagram account. Two of the financial aid officers noted that they do not promote the EOTC.

Many financial aid officers provided suggestions regarding marketing and communication

When asked for suggestions to improve the EOTC, most financial aid officers offered suggestions relating to marketing and communication. One financial aid officer noted, “It’s a good program, but it hasn’t done a lot in terms of promoting itself.” Regarding specific examples to improve marketing and communication, one financial aid officer suggested including student testimonies on marketing materials in an attempt to make the tax credit more concrete. Another noted that their office used to receive brochures, which she appreciated. As financial aid officers, several noted that they hesitated answering questions directly about the EOTC because they were not tax professionals.

One financial aid officer had a suggestion, unrelated to marketing, and instead, suggested that the credit be refundable for all students: “It would be fabulous if everyone got the refund [refundable credit] and not just people with STEM [degrees]. Everyone deserves it.”

## Interview Protocol

### *Background Questions:*

1. What is your role and title? What roles and responsibilities fall under your purview? How long have you been in your position?
2. In what capacity do you interact with students? In what capacity do you interact with a student’s parents or family?
  - a. What topics do you discuss with students? With parents/families?
  - b. At what stage do these conversations typically occur (i.e. first semester, Fall, near graduation)?
  - c. On average, how many times would a typical student interact with your office of the course of their time enrolled?

### *Student trajectories:*

1. To what extent do students understand the cost of tuition and fees? [Prompt: do they overestimate or underestimate the full cost]. Probe on sub-populations.
2. At what point do financial pressures have the largest impact on student decision-making? (i.e. decision to enroll, re-enroll, graduate, or transfer)? Please explain.
3. Other than financial pressures, what factors do you perceive as barriers for student enrollment and persistence? Probe on sub-populations.
4. To what extent do students stay in Maine after graduation? Probe on sub-populations.

### *Student loans:*

1. To what extent are students concerned with student debt? Has this changed over time? Does this vary at each stage (i.e. first semester vs. near graduation)? Probe on sub-populations.
2. Do you offer non-Federal (private, state) student loans as part of financial aid packages? If yes, what percentage of students use private student loans? Probe on sub-populations.
3. Do you offer in-person student loan exit counseling?
  - a. If yes, what topics do you discuss in these sessions? What are the most frequent questions or topics students bring up in these sessions?
  - b. If no, do students seek out informal conversations with your office? If so, what are the most frequent questions or topics students bring up in these sessions?
  - c. [Probe if not mentioned: Do you discuss the EOTC?]

*Note: For each question, that indicates probe on sub-populations, ask if there is a difference based on major (STEM vs. Non-STEM), residency (in-state vs. out of state students), age (age 18-25 or 25+), and degree type (Associate's, Bachelor's, Graduate).*

***Educational Opportunity Tax Credit:***

1. To what extent does your college/university use the EOTC as a tool to attract students (i.e. as an admissions tool?). If not, why not? Probe on sub-populations.
2. To what degree does the EOTC influence decisions about reenrollment? In what ways does the EOTC influence a student's likelihood of graduation?
3. To what extent does your office promote the EOTC? Has this changed over time? [Probe: Why or why not do you promote the EOTC?]
4. To what extent do students know about the EOTC? How has this changed over time? Probe on sub-populations.
5. What do you like about the EOTC? Do you have suggestions for how the EOTC could be improved? To what extent do students express concern with the EOTC? Probe on sub-populations.
6. Were there other large changes to higher ed policy from 2008-2020?

## References

---

- Batchelder, Lily L, Fred T Goldberg, and Peter R Orszag, "Efficiency and Tax Incentives: The Case for Refundable Tax Credits," *Stanford Law Review*, Vol. 59, 2006, pp. 23-76.
- Bhargava, Saurabh, and Dayanand Manoli, "Psychological Frictions and the Incomplete Take-Up of Social Benefits: Evidence from an IRS Field Experiment," *American Economic Review*, Vol. 105, No. 11, 2015, pp. 3489-3529.
- Bulman, George B., and Caroline M. Hoxby, "The Returns to the Federal Tax Credits for Higher Education," *National Bureau of Economic Research*, 2015.
- Crosen, Rachel, and Uri Gneezy, "Gender Differences in Preferences," *Journal of Economic Literature*, Vol. 47, No. 2, 2009, pp. 448-474.
- Finkelstein, Amy, and Matthew J. Notowidigdo, "Take-Up and Targeting: Experimental Evidence from SNAP\*," *The Quarterly Journal of Economics*, Vol. 134, No. 3, 2019, pp. 1505-1556.
- Goworowska, Justyna, and Todd K Gardner, "Historical Migration of the Young, Single, and College Educated: 1965 to 2000," *U.S. Census Bureau Population Division Working Paper*, April 2012, 2012.
- Johnson, Heather, *Maine Economic Development Strategy 2020-2029: A Focus on Talent and Innovation*, 2019, 2019.
- Kastlunger, Barbara, Stefan G. Dressler, Erich Kirchler, Luigi Mittone, and Martin Voracek, "Sex differences in tax compliance: Differentiating between demographic sex, gender-role orientation, and prenatal masculinization (2D:4D)," *Journal of Economic Psychology*, Vol. 31, No. 4, 2010, pp. 542-552.
- Live and Work in Maine, "About," 2021. As of 11 Nov:  
<https://liveandworkinmaine.com/about/>
- Maine Revenue Services, *Documents or emails provided by Maine Revenue Services*, 2020.
- Maine State Legislature Office of Fiscal and Program Review, *Total Appropriations & Allocations All Funds 2020-2021 Biennium*, 2019.
- Nguyen, Tuan D., Jenna W. Kramer, and Brent J. Evans, "The Effects of Grant Aid on Student Persistence and Degree Attainment: A Systematic Review and Meta-Analysis of the Causal Evidence," *Review of Educational Research*, Vol. 89, No. 6, 2019, pp. 831-874.

U.S. Government Accountability Office, *Improved Tax Information Could Help Families Pay for College*, 2012. <https://www.gao.gov/products/gao-12-560>

## **HANNAH ACHESON-FIELD**

Hannah Acheson-Field is a policy researcher at the RAND Corporation, an objective policy research institute headquartered in Santa Monica, CA. She has co-authored over fifteen policy research reports on topics including K-12 education, higher education, workforce development, and military personnel. Previously, she worked at the U.S. Government Accountability Office, where she assisted in several Federal policy evaluation efforts. Prior to joining RAND, she worked for the IDA Science and Technology Policy Institute (STPI), a non-partisan and non-profit research institute where she primarily studied the science and engineering workforce. She is completing her Ph.D. in policy analysis at the Pardee RAND Graduate School, holds a M.S. in policy analysis from the Pardee RAND Graduate School, and a B.S. in computational biology from Brown University.