The Impact of Federal Tax Credits for Higher Education Expenses

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1. INTRODUCTION

During the past several decades, changes in the American economy have favored college graduates, and higher education has become increasingly important (Murphy and Welch, 1993; Juhn, Murphy, and Pierce, 1993). After accounting for inflation, the incomes of those with a Bachelor's degree grew 14.6 percent from 1975 to 1998 while those with only a high school degree experienced a 2.1 percent decrease.[1] As a result, access to postsecondary education has become an important national issue with the federal government focusing its efforts on financial aid policies designed to help students afford college expenses. Programs have included grants, such as the Pell Grant, subsidies for working students, and loans like the Perkins and Stafford Loans. However, with the Tax Relief Act of 1997, the government introduced a new form of aid to college students — federal tax credits for higher education expenses. The passage of the Hope (hereafter referred to as HOPE) and Lifetime Learning Tax Credits (LLTC) marked a shift in the manner that governmental support would be distributed to postsecondary students and their families.

When first introduced by former President Clinton during a June 1996 commencement speech at Princeton University, the tax credits were touted as a step towards making "the 13th and 14th years of education as universal to all Americans as the first 12 are today" (Greenwood, 1996). However, the proposal also reflected Clinton's intention to provide targeted tax relief to the middle class (Purdum, 1996). As a model for the proposal, Clinton used the Georgia Hope Scholarship. This politically popular program had been instrumental in getting Governor Zell Miller re-elected by appealing to the concerns of middle class voters (Applebome, 1996).[2] In a similar fashion, Clinton set program earnings limits that targeted middle-income families and promoted the credits as a reward to students who worked hard in school. Furthermore, as a credit, the proposal was viewed to be more helpful to the typical middle class family than a tax deduction (Purdum, 1996).[3] To justify the middle-income target, government officials assert that the tax credits serve a need since the

[1] Source: U.S. Census Bureau, March CPS.
[2] The Georgia Hope Scholarship provides full tuition, fees, and a book allowance to Georgia residents with a B average who attend an in-state public college. Those students choosing to attend an in-state private college are given comparably-valued compensation. Benefits were limited to families with less then $60,000 of income during the first year and $100,000 during the second year. Although the original tax credit proposal also included a GPA requirement, this criteria was eliminated before the policy was signed into law.
[3] Deductions tend to disproportionately favor upper-income families since they are more likely to itemize their taxes.

middle-class makes up a large proportion of college participants but is excluded from other federal grant programs (Stoll and Stedman, 2001).

As with any other financial aid program, tax expenditures for higher education are considered a human capital investment expected to yield both private and social benefits including higher individual incomes, greater productivity, and lower crime rates. However, the particular attraction of using tax credits rather than traditional grants or loans to promote college participation at least partly develops from the fact that federal budget rules favor tax expenditures over discretionary spending programs (Kane, 1999). As such, this was not the first time tax credits had been considered to support college costs. During the mid-1960s and early-1970s, Congress had considered a couple of proposals.[4] However, tax credits for higher education were finally passed during a time when the government sought to reduce taxes: the creation of the HOPE and LLTC were part of the largest American tax cut in fifteen years (Gray, 1997). After years of debating incremental changes to other federal financial aid programs, the tax side of the budget served to dramatically increase support for postsecondary education.

According to the Department of Education (DOE), the program is projected to eventually benefit 13.1 million students (5.9 million from HOPE and 7.2 million from LLTC) at a cost of $9.7 billion.[5] As shown in Figure 1, this estimate is roughly equal to the total amount spent at the time on the Pell Grant and Federal Family Education Loans combined, the two primary Federal financial aid programs. It also exceeds the amount spent on each of the three largest primary and secondary education programs (Title I, Head Start, and the School Lunch Program). Furthermore, the expected size of the program is only 20 percent less than expenditures on welfare (TANF/AFDC). Although participation during the first three years of the program have not met the projections of the DOE, the total amount of tax credits has increased steadily each year from $3.4 billion in 1998, the first year of the program, to $4.9 billion in 2000, an increase of 44 percent.[6]

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[4] Former President Johnson defeated the tax credits proposal by creating the Guaranteed Student Loan program in 1965, and former President Carter counteracted with the Middle Income Student Assistance Act in 1978 (Hauptman and Rice, 1997).

[5] Source: Education Department estimates based on State-level enrollment, Pell Grant recipient data, and the President's fiscal year 2000 budget policy.

[6] Calculations by author using data from the Internal Revenue Service, Information Services, Martinsburg Computing Center, Master File Service Support Branch.

The distribution of financial aid through the tax code is different from other forms of college assistance in several important ways. First, credits for tuition expenses in the current year do not accrue until the following year. Due to this timing, the delay between tuition payment and receipt of the tax credit could be up to 15 months.[7] This aspect of the program differs greatly from most other forms of aid, which are realized at the time of attendance, and this feature could have serious implications for how the aid affects college access. If the primary reason individuals do not enroll in college is due to liquidity constraints, the inability to secure present-day funding, then this aid will not increase access. For this reason, critics suggested that the credits would only benefit students likely to attend college regardless of aid rather than individuals on the margin of enrolling.

The timing of the tax credits also creates a disconnect between the aid and activity (college enrollment). This increases the likelihood that the tax credits will not be used for postsecondary expenses. If students do not internalize the future payment as aid for present-day college expenses, then when they finally receive the support a year later, the tax credit may be viewed as income to be spent on other expenses. Likewise, for students who have already graduated by the time they receive the credit, the support is too late to influence the educational investment.

On the other hand, the timing of the aid may also be a beneficial feature. Other forms of aid, particularly grants, might encourage individuals not well-suited for college to enroll since the person is not fully responsible for the expenses incurred. This is an adverse selection problem. However, the tax credits are unlikely to encourage frivolous investments in higher education due to the delay in receiving the support. Furthermore, the disconnect between the aid and college enrollment might also prevent postsecondary institutions from responding in ways detrimental to students. Critics suggest that postsecondary institutions may respond to the increase in financial aid by raising their prices. However, due to the timing of the credits, colleges may be less likely to do this since students' present-day ability to pay has not increased.

A second important feature of tax credits is that there is no cap on the cost of the credits in terms of foregone tax revenue. Changes in individual behavior and/or state or institutional policy could quickly increase the estimated costs. For example, if a behavioral response to the program

[7] This assumes that tuition is paid in January of one year and taxes are filed in April of the following year (Conklin and Finney, 1999).

increased college enrollment significantly, there would be no limit to the amount of credits that could be claimed. Other governmental aid programs have experienced exceptional cost increases due to an unexpected response. For example, in New Mexico, the number of beneficiaries for the Lottery Success Scholarship so exceeded initial projections that the state was unable to meet the demand of students and benefits had to be reduced due to insufficient funds (Selingo, 1999).[8] However, there is no similar budget constraint in terms of the higher education tax credits to limit the amount of benefits. Finally, since the higher education credits are tax expenditures, they are not subject to review in the annual Federal appropriations process or the periodic reauthorization all federal programs undergo. Therefore, the regular examination of federal financial aid programs by the government will not include this very large program (Conklin and Finney, 1999).

This chapter examines the distribution and impact of the HOPE and LLTC on taxpayers, students, and institutions. By reviewing the literature and analyzing several datasets on tax returns, individual behavior, and institutional activities, I examine three major questions. First, how have the tax credits been distributed by income? Are they really a transfer to the middle class? Moreover, do a significant proportion of eligible families claim the credit or are the information and transaction costs of distributing aid through tax credits exceedingly high? While no program is likely to reach all eligible students, the higher education tax credits provide a new opportunity to test how effective it is to deliver aid in the form of tax credits as opposed to traditional grants or loans. Second, how have the credits affected the college decisions of individuals? Have they prompted individuals to attend college who would not have otherwise? Have the credits encouraged students to choose more expensive colleges? Finally, how have postsecondary institutions responded to the tax credits? Have they altered their pricing or financial aid policies in reaction to the introduction of the federal aid? What role have state governments had in the actions of their public colleges and universities? While many studies have tried to predict the likely impact of these higher education credits, this will be among the first to use data from the period of enactment to estimate the actual results.

The chapter is organized in the following way. Section 2 describes the tax credits with information on recipient eligibility, the expenses covered, and other details. Section 3 examines how

[8] While the scholarship had 8,000 recipients in 1998-99, the total rose to 12,000 in 1999-2000, and was expected to be 16,000 the following year. In 2000-2001the $16 million in lottery revenue available to fund the scholarship was

the benefits of the HOPE and LLTC were distributed by income and state of residence from 1998 to 2000. Section 4 considers the effect the tax credits have had on student enrollment. Section 5 analyzes the impact on postsecondary institutions and states. Section 6 summarizes the results and concludes.

2. A DESCRIPTION OF THE TAX CREDITS

Before 1997, subsidies for higher education through the tax system were limited to postsecondary expenses for employment-related training (Cronin, 1997). These expenses counted as an itemized deduction but did not cover training for the preparation of a new career. Additionally, the tax code allowed parents to claim exemptions for children up to the age of 24 if they were full-time college students and excluded interest on U.S. savings bonds redeemed to pay for tuition expenses. The only other special consideration given to higher education by the tax code was the exclusion of financial aid as income. This includes scholarship and fellowship income, Veteran's education benefits, and Employer-Provided Educational Assistance. However, the Taxpayer Relief Act of 1997 broadly expanded the treatment of higher education expenses with the Hope and Lifetime Learning Tax Credits. Table 1 summarizes the details about each credit.

The two tax credits complement each other by targeting different groups of students. While HOPE may only be used for a student's first two years of post-secondary education, the LLTC is available for unlimited years to those taking classes beyond their first two years of college including college juniors and seniors, graduate students, and working adults pursuing lifelong learning.[9] For each credit, the expenses covered are tuition and required fees at an educational institution eligible for aid administered by the DOE. This amount is net grants, scholarships, and other tax-free educational assistance including Pell Grants, employer-provided education assistance, and Veteran's educational assistance. HOPE provides a credit equal to 100 percent of the first $1,000 plus 50 percent of the next $1,000 of tuition paid during the tax year (a maximum credit of $1,500). The

insufficient to cover the $21.6 million in costs.

[9] To be eligible for HOPE, an individual must not have completed the first two years of college before the beginning of the tax year in question. Regardless of whether a student was full- or part-time, one may only take HOPE for two years. HOPE also requires that the student not have a felony drug conviction.

student must be enrolled at least half-time and pursue a degree or other recognized educational credential in order to be eligible for HOPE. In contrast, individuals do not need to enrolled at least half-time or pursue an educational credential in order to be eligible for the LLTC thereby making the credit available to adults taking an occasional college course. The credit is equal to 20 percent on the first $5,000 of out-of-pocket tuition expenses (a maximum credit of $1,000), and beginning in 2003, the LLTC will cover up to $10,000 in expenses (a maximum credit of $2,000).[10]

Figure 2 displays how the benefits for each tax credit compare to college expenses. The average cost of a public, two-year college during the 1997-98 school year would yield a $1,284 HOPE or $313 LLTC benefit. The average costs of other types of schools would yield the maximum credit.[11] HOPE may be claimed on payments made after December 31, 1997 for college enrollment after that date while the LLTC could be claimed on expenses incurred as early as July 1, 1998 for college or vocational school enrollment beginning on or after July 1, 1998. Families are able to claim the Lifetime Learning tax credit for some members and HOPE credit for others in the same year. However, the same student can not take both credits.

The benefits of the tax credits phase out for higher-income taxpayers. The phase out begins at an adjusted gross income (AGI) of $80,000 for a joint return ($40,000 for single filers) with no benefit for families with incomes above $100,000 ($50,000 for single filers).[12] With these relatively high thresholds, tax credits for higher education expenses have the most extensive eligibility of any federal program. Data on tax returns from 1997 suggest that two-thirds of returns during that tax year would have been eligible based on filing status (joint or single) and AGI ($10,000 to $100,000 for joint filers; $10,000 to $50,000 for single filers).[13] In comparison, Pell Grants are strictly limited

[10] Several criteria originally included in the proposal were eliminated before enactment (Cronin, 1997). This includes indexing the credit to inflation and requiring students to maintain a B-minus average in order to receive the HOPE. Additionally, the original proposal also allowed adults to deduct up to $10,000 per year ($5,000 in 1997 and 1998) for those enrolled at least half-time or for courses to improve job skills.

[11] For the 1997-98 school year, the mean tuition cost (enrollment weighted) for a public, two-year college was $1,567, $3,111 for a public, four-year college, $7,079 for a private, two-year college, and $13,785 for a private, four-year college. Source: College Board (2001b).

[12] AGI is total income minus deductions for items such as alimony, student loans, IRAs, and medical savings accounts. For most taxpayers, AGI is equal to total income. In 1998, only 17.6 percent of returns had any of the above deductions. The average deduction adjusted their AGI calculation by $2,343 (Campbell, Parisi, and Balkovic, 2000).

[13] Source: Internal Revenue Service, Information Services, Martinsburg Computing Center. The proportion of the population eligible based on AGI might be higher since presumably some married persons filed separately when they might have been eligible had they filed jointly.

to families with incomes below $40,000. Nearly 90 percent of Pell Grant funds are awarded to families with incomes under $30,000 and 54 percent of those families have incomes under $10,000 (Kane, 1999a).[14]

3. THE DISTRIBUTION OF THE TAX CREDITS

The first major question that needs to be answered to understand the effect of the HOPE and LLTC is how the benefits have been distributed. Which groups have benefited the most from the credits? Is the policy progressive or regressive? As intended by Clinton, have middle-income families been the largest beneficiaries of the tax credits? This section examines these issues using data from the Internal Revenue Service for 1998, 1999, and 2000, the first three years of the tax credits.

3.1 Factors that Influence the Distribution of Benefits

From the first announcement of the tax credit proposal, many have hypothesized about the potential distribution of benefits based on the policy's criteria. One important feature of the tax credits is that they are not refundable. To receive a benefit, individuals must have income sufficient to produce positive federal income tax liability. Furthermore, if a family claims other tax credits or deductions, then this will reduce its ability to benefit from HOPE or the LLTC.[15] Therefore, many lower-income groups are ineligible to receive a tax benefit (Kane, 1997; McPherson and Schapiro, 1997). This fact, coupled with the income caps that prevent individuals from the most affluent backgrounds from collecting the credit, suggest that the tax credits primarily benefit students from middle- and upper-income families.

The middle-class nature of the tax credit is confirmed when consulting the federal tax forms. Figure 3 summarizes the important income benchmarks. This is compared to the 1997 family income distribution, the year prior to policy enactment (before individuals had incentives to adjust

[14] Eligibility for Pell depends on an individual's Expected Family Contribution, which is a function of income and expected college costs.
[15] Other tax credits reduce a family's tax liability dollar-for-dollar. Likewise, tax deductions reduce a family's AGI, the basis on which tax liability is calculated.

their earnings in order to be eligible for the credits). A dependent student from a married family of four needs at least $17,900 in family income to overcome the standard deductions and exemptions necessary to have tax liability.[16] To receive the maximum LLTC ($1,000), this student's family income must be at least $24,550, or $27,900 to receive a maximum HOPE ($1,500). This suggests that the bottom 30 percent of the 1997 income distribution was ineligible to take the full HOPE benefit due to insufficient tax liability based on the benchmarks of a dependent student. Beginning in 2003, the maximum LLTC will increase to $2,000 dictating that families must make at least $31,250 to receive the full credit.[17] The bottom thresholds are lower for independent students due to a smaller standard deduction and less exemptions. Independent students must have an income of at least $6,950 to have some tax liability, $13,600 to be eligible for the full LLTC, and $16,950 for the full HOPE. Due to the income phase-out of eligibility the top 20 percent of the 1997 income distribution would have been ineligible to take either the full or any credit. For single filers, the cutoff is even lower making an even larger portion of the distribution ineligible.

Figure 3 compares the eligibility benchmarks to the family income distribution of the whole population, and thus the group of potential beneficiaries if they elect to enroll in college. However, the earnings of families with children actually in college tend to be larger. According to data from the 1999-2000 National Postsecondary Student Aid Study (NPSAS), only 13 percent of families with dependent students had 1998 incomes below $20,000, the level too low for the full HOPE credit (the benchmark for a full credit is $27,900).[18] However, far more families with dependent children in college have incomes above the phase-out levels. Forty-four percent made over $40,000 (the beginning of the phase-out amount for single filers) and 27 percent made more than $80,000 (the beginning of the phase-out amount for joint filers). Sixteen percent made over $100,000 in 1998 rendering them ineligible for any credit whether filing single or joint. The conclusions are similar for

[16] This calculation is for the minimum income possible using the 1998 standard deduction for a "Married filing jointly" return ($7,100) and the exemption amount ($2,700 multiplied by the number of exemptions for incomes below $93,000). The minimum will be higher if a family itemizes deductions or takes a credit for dependent care expenses (line 41), elderly or disabled (line 42), children under age 17 (line 43), adoption (line 45), or foreign taxes (line 46). See Form 1040 for 1998 for more details.

[17] A return's taxable income must be at least $6,650 for a tax of $1,000, $10,000 for a tax of $1,500, and $13,350 for a tax of $2,000. See the 1998 IRS Tax Table.

[18] Due to the categories of the income variables in the National Postsecondary Student Aid Survey, more precise calculations of the income distribution below the exact benchmarks could not be made. Source: U.S. Department of Education, National Center for Education Statistics, 1999-2000 National Postsecondary Student Aid Study.

independent students.[19] Twenty percent made less than $10,000 in 1998 leaving them without enough tax liability to make them eligible for a full HOPE credit. Twenty-four percent of independent students made more than $50,000 making them ineligible for any credit as a single filer.

Due to other features of the tax code, even eligible middle-income families may not be able to reap the full benefit of the tax credits. Claiming HOPE could subject many middle-income families to the alternative minimum tax (AMT). Although it was designed to ensure that wealthy taxpayers who shelter their incomes from taxation pay a minimum amount, Knight (1997) suggests that families with incomes as low as $41,350 might be penalized and not receive the full benefit of the credit. In an article for *The Washington Post*, Crenshaw (1997) calculated that a family earning $64,100 per year with two kids in college would normally pay $6,743 in taxes if filing jointly. If the family claims HOPE for one and LLTC for the other (total $2,500), their tax liability would be reduced to $4,243. However, under the AMT calculation, the family's tax liability is $4,966, a $723 reduction in the value of the tax credits.

A second important determinant of the distribution of benefits is the amount of tuition expenses incurred by different groups. Therefore, the distribution of benefits is affected by where individuals attend college. Because low-income students tend to be concentrated at lower-priced colleges, such as public two-year and four-year schools, their likelihood of receiving the full tax benefit is further reduced. In addition, since the credit is based on tuition expenses net grants, the HOPE and LLTC interact with other forms of financial aid. Most notably, this includes the Pell Grant, a means-tested federal aid program for students without a baccalaureate degree. Table 2 summaries the interaction between the tax credits and Pell Grant for different levels of family income. Using the mean tuition levels of different types of colleges, Hauptman and Rice (1997) estimate that families with incomes below $20,000 will be eligible for the Pell Grant but not the tax credits.[20] Therefore, the interaction between the Pell Grant and higher education tax credits further raises the income benchmarks necessary for many individuals to claim the HOPE or LLTC. According to figures from the NPSAS data, 13 percent of dependent students and 39 percent of

[19] A student is defined as "Independent" if he meets one of the following criteria: is over the age of 24; a veteran; an orphan or ward of the court; a person with legal dependents other than a spouse; married and not claimed by his parents; or a graduate student and not claimed by his parents. A single, undergraduate student may be designated as independent if he are not claimed as a dependent by his parents and has been self sufficient for at least two years.

independent students were ineligible for the tax credits in 1998 due to insufficient tax liability. In terms of the general population, this benchmark makes the bottom twenty percent of the income distribution ineligible. Among female-headed households, half would not qualify for a tax credit.[21] In contrast, families with incomes of at least $50,000 would only be able to receive tax credits. Families between these benchmarks receive a combination of the two types of aid depending on the Pell Grant award and college price.

The most important criterion is, of course, college attendance. Since attendance rates differ by income and race, it is clear that the distribution of benefits is unlikely to be equal across groups even without the importance of the factors discussed above. Among dependent students age 18 to 24, only 38.3 percent with family incomes in the bottom quartile participated in college in 1997. In contrast, 78.5 percent of dependent students in the top quartile attended college (Jamieson, Curry, and Martinez, 2001). However, since one goal of the credits is to encourage participation in higher education, the incidence of the HOPE and LLTC depends on their impact on college enrollment. If they encourage postsecondary attendance for certain individuals or groups, the relative benefits by income group or state could change. This possible effect is investigated in the next section.

3.2 Credit Beneficiaries by Income

Due to the time delay associated with data, little analysis has been done nationally on the beneficiaries of the tax credits. However, Hoblitzell and Smith (2001) examine usage of the credits in the University of California (UC) system by evaluating data collected on nearly 3,500 students. They find that more than 45 percent of families that claimed a tax credit earned less than $50,000 per year, and 22 percent earned less than $20,000 annually. The estimated aggregate amount in tax credits ($80 million) was about 85 percent of the $95 million UC students receive in Pell Grants, the largest federal grant program. Among the 1,282 undergraduate students, 13 percent claimed HOPE (with a mean of $1,119 and 52 percent claiming the maximum) and 14 percent claimed the LLTC (with a mean of $661 and 28 percent claiming the maximum). Of the 543 graduate students in the survey, 32 percent claimed the LLTC (with a mean of $743 and 43 percent claiming the maximum).

[20] This assumes full-time enrollment by a college freshman from a married family of four.

However, students in the UC system tend to be more affluent than the general population of college students. While the median income of respondents to the UC survey was $48,670 in 1999, the median U.S. income was $41,994 (U.S. Bureau of the Census, 2000). Furthermore, Hoblitzell and Smith estimate that only 37 percent of UC students were eligible for the credits in 1999 compared to over half of all college students based on 1999-2000 NPSAS data. These differences make the Hoblitzell and Smith study difficult to generalize for the nation as a whole and for the population of college students.

Data from the Internal Revenue Service provide a national picture of the number of families benefiting from the higher education tax credits. The number and amount of credits taken are shown for the first three years of the program in Tables 3a, 3b, and 3c. During tax year 2000, nearly 6.7 million credits were claimed amounting to almost $4.9 billion. Over five percent of returns claimed either the HOPE or LLTC, and the mean tax credit was $731. Comparing these figures to those from the two previous tax years, it is evident that usage of the credits has grown. While the mean has remained stable ($726 to $731), the number and total amount of credits grew 44 and 45 percent, respectively, from 1998 to 2000. Most of this growth occurred between the first and second year of the credits (1998 to 1999). Experience with other federal benefit programs suggests take-up rates will continue to increase. Participation in the Earned Income Tax Credit, another benefit program that is distributed through the tax system, continued to grow from 70 percent in 1984 to an estimated 80 to 86 percent in 1990 even after a number of policy changes (Scholtz, 1994).

Usage of the HOPE and LLTC varied considerably by AGI. As discussed above, almost no individual below $10,000 claimed a credit (one percent) due to insufficient tax liability and the interaction of the tax credit with other forms of aid. In contrast, 7.3 percent returns with an income between $30,000 and $50,000 claimed an education credit while 8.5 percent of families with incomes between $50,000 and $75,000 received a benefit. This pattern is also likely to be a function of the different types of families in each AGI group (single adults versus parents with children old enough to be in college). Individuals with incomes between $50,000 and $75,000 claimed the largest average credit ($902).

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[21] The median income of female-headed household in 1997 was $21,023. Source: U.S. Census Bureau (1999) "Current Population Reports, P60-200."

Not all taxpayers correctly claimed an education tax credit. Although they are not eligible for the higher education tax credits, in tax year 2000, 2,965 credits were claimed by returns with over $100,000 in income.[22] Experience from the Earned Income Tax Credit suggests that possibly many more families improperly claimed the credit. Holtzblatt (1991) and McCubbin (1999) found that a significant fraction of taxpayers received the EITC when not technically eligible. Taxpayers will adopt a strategy by weighing the tradeoff between the benefit to misreporting income or expenses and the corresponding risk of detection and penalty (Allingham and Sandmo, 1972). However, since the higher education tax credits are not refundable like the EITC, the number of improper claims will be limited to those with sufficient tax liability.

To get a sense of the distribution of costs (tax liability) and benefits (tax credits) by income, the bottom two rows of Table 3a display the proportion of credits an AGI group claimed divided by the proportion of returns under $100,000 submitted by that group. Stated another way, this is an AGI group's share of benefits divided by its share of the tax burden. Using the number of returns and credits, families with an AGI between $20,000 and $29,999 had the same proportion of the education credits as they did returns. Families with incomes below this amount claimed relatively fewer credits while returns with higher AGIs claimed a larger share of credits than their proportion of the tax returns. This suggests that usage of the credits is skewed towards higher incomes. However, when comparing the total monetary amount of credits claimed to the tax liability for the group, the result reverses. Families with AGIs below $50,000 claim relatively more in higher education credits than they pay in taxes.

Instead of comparing across income, Tables 4 and 5 compare the benefits of the tax credits to federal tax liability within an AGI group. The last row in Table 4 compares the total amount in tax credits claimed by a group to its total federal tax liability. For example, the 0.48 for all returns means that the total monetary amount in higher education tax credits was 0.5 percent of the total federal tax liability of returns for the 2000 tax year. The percentage ranges from 0.7 to 3.8 for groups eligible for the tax credit suggesting that the national mean (0.5 percent) is heavily skewed by individuals with over $100,000 in income. The amount of tax credits claimed when compared to tax liability is largest for individuals with an AGI between $10,000 to $19,999. The benefits were nearly

[22] These returns are not included in the subsequent analysis.

four percent as large as the group's total tax liability. Likewise, the total amount in credits was 2.3 percent of the total tax burden for returns between $20,000 and $29,999. This ratio is smallest for families with incomes above $50,000.

Table 5 makes the same comparison but instead uses the mean credit (for returns with a credit greater than zero) and tax liability. For example, returns between $10,000 and $19,999 had on average $1,056 in federal tax liability. Moreover, those that claimed a credit in that group received an average benefit of $621. This suggests that the mean amount of tax benefits from the HOPE and LLTC covered 58.8 percent of the tax liability for members of this group that claimed a credit.[23] This ratio is lower for groups with higher AGI. In summary, the credit covers more of the tax liability of low-income claimants than that of individuals with higher incomes.

In order to fully understand the incidence of the tax credit, it is necessary to consider the federal tax liability of a family over time. Using the earnings profiles estimated with CPS data by Murphy and Welch (1990), I approximate that individuals with twenty years of work experience (about the age to have college-age children) earn about 33 times that amount over the course of their working life.[24] Therefore, federal tax liability was multiplied by this number to get a return's lifetime tax burden. Furthermore, families are likely to receive the education credit for multiple years, and perhaps for multiple children. Assuming a family has two children that attend college for four years each, the mean education credit was multiplied by eight. The results of these calculations are shown in the last several rows of Table 5. For families that earn less than $20,000, the tax credits (under the above assumptions) make up about 14 percent of their lifetime tax liability. The percentage is less than one-third of that for returns with incomes above $30,000. For example, the total amount of education credits taken by a family with an AGI between $50,000 to $74,999 would only amount to 3 percent of its lifetime tax liability. However, this rough calculation is not a good approximation for low-AGI returns if the taxpayer is actually a student. In this case, the incomes and tax liabilities are extremely likely to grow over time, and the assumption of multiplying by 33 will not be accurate.

3.3 Are Eligible Families taking the Credit?

[23] This calculation implicitly assumes that returns which claim education credits have the mean characteristics of their AGI group.

Although many families are eligible for the aid, this does not necessarily mean that they will claim the tax credit due to a lack of information about the benefit. As with any financial aid policy, awareness of the subsidy is essential to having the desired impact. Previous studies have found that individuals eligible for other types of financial aid programs do not necessarily apply (Orfield, 1992). During tax year 1998, the Federal Office of Management and Budget found that only 36 percent of eligible families claimed the credit. That yielded 49 percent of the eligible amount to be claimed (Riley, 2000).

Lack in knowledge about the tax credits was also found to be a problem for students in the University of California (UC) system. Hoblitzell and Smith (2000) found that of the UC undergraduates that did not claim a credit, 34 percent admitted that they did not know about the benefit even after major efforts by the university system to inform students about the aid. A follow up study in 2001 found this had fallen to 29 percent. Another ten percent did not claim the credit due to the process being too complicated or not offering enough of a benefit to make the process worthwhile. Hoblitzell and Smith (2001) still found widespread usage of the credit. Based on their limited sample, they estimate that 48,000 of the 58,000 UC main campus students eligible for the credit did submit a claim (83 percent). However, Hoblitzell and Smith assume that the actions of the 41 percent of students that responded to their survey are reflective of the entire student body. Therefore, this is an upper bound of the actual use of the tax credits since nonrespondents are less likely to have made a claim than respondents.

When the actual beneficiaries are compared to government predictions about beneficiaries, it is clear that many eligible families did not claim the HOPE or LLTC. Of the 13.1 million projected recipients, only 6.7 million returns claimed a credit. Since one return can claim multiple credits (e.g. a HOPE for one child and a LLTC for another), it is better to compare the projected and actual amount of credits claimed. Although the DOE expected that $9.7 billion in credits would be awards, during tax year 2000, returns only claimed $4.9 billion in credits, 50.5 percent of the projected amount. Since there has been considerable growth in the number and amount of credits claimed since inception, part of this gap could be due to a transition period in which individuals begin to learn about the aid.

[24] This assumes individuals work for forty years. See the diagrams in Murphy and Welch (1990).

Awareness of the tax credits, however, does not guarantee that a full credit may be taken. As discussed above, a family must have sufficient tax liability in order to take the maximum credit. This means that individuals must have enough income, minus tax deductions, to generate enough tax liability, net other credits, to cover their claim for an education tax credit. Many returns do not have any remaining tax liability after taking tax credits and the AMT into account. These returns are defined as "nontaxable." Unless a family's tax liability is exactly equal to the amount they claimed in education tax credits, these nontaxable returns indicate the number of returns that were unable to take the entire education credit due to insufficient tax liability, perhaps in conjunction with the use of other credits. In general, 44.0 percent of all returns with AGIs between $5,000 and $100,000 are designated as "nontaxable" due to taking some tax credit. The mean is slightly larger for returns that claim education credits (46.0 percent).

Table 6 displays by AGI group the mean amount in credits and the percentage of returns deemed nontaxable in 1999 (Campbell and Parisi, 1999). As many as half of all returns that claimed the education tax credits qualified as nontaxable. On average, nontaxable returns claimed larger credits than taxable returns. For example, nontaxable returns with an AGI between $50,000 and $75,000 had an average claim of $1,870 (due to claiming both a HOPE and LLTC) while the taxable returns had a mean claim of $964.[25]

3.4 The Distribution of Credits across States

The distribution of education credits not only varies across income groups. States varied in the amount by which they benefited from the tax credits. To determine which states have reaped the most in credits, the 1999 data was analyzed by state. Table 7 displays the number and amount of credits claimed by state. While the mean credit claimed by state is similar to the national mean, there was incredible variation between states. The mean credit for a state ranged from $522 (New Mexico) and $926 (Pennsylvania). When compared to the DOE projections, further dissimilarities become evident. States like New Jersey claimed nearly 90 percent of the expected amount in tax credits

[25] When released, the Individual Tax Returns microdata will allow additional analysis of whether the education credits were used alone or with other tax credits.

during the second year of the program. Meanwhile, New Mexico and the District of Columbia had only a quarter of the expected credits.

A number of state characteristics are likely to affect the degree to which it benefited from the introduction of the higher education tax credits. The earnings distribution of its residents will determine eligibility by income. The relative size of its population of college-age individuals and the rate of postsecondary attendance will also affect usage of the credits. Finally, since the HOPE and LLTC are awarded based on net tuition expenses, the cost of the colleges a state's residents attend will be influential.[26] Table 8 summarizes the mean levels of these factors grouped by the percentage of a state's returns that claimed a credit in 1999. The states that had the largest percentage of returns claim a credit had on average a larger proportion of its population between the ages of 18 and 24, the tradition age of college students, and a higher mean tuition price at its public, two-year colleges. The states with the smallest percentage of returns with a credit had the largest mean proportion of eligible returns as determined by AGI, but fewer residents enrolled in college and a lower average tuition price at its community colleges.

Usage is most strongly correlated with the percentage enrolled in college (0.70) and the percentage age 18 to 24 (0.40); the mean public two-year tuition level is also positively correlated with usage (0.26). The efforts of state governments and colleges to inform their students of the tax credits could also help explain differences in usage. For example, as discussed by Hoblitzell and Smith (2001), the UC system has actively tried to inform students and parents about the availability of the credit.

3.5 Summary of the Distribution of Benefits

As suspected by many researchers, primarily middle-income individuals and families claimed the education tax credits. Nearly half of the credits claimed in 2000 where by returns with an AGI between $30,000 and $75,000 although this group makes up only 35 percent of the eligible returns. A report from the Congressional Research Service acknowledges that the credits were enacted to

[26] For most students, this will be the cost of an in-state college. Eighty-one percent of first-time freshman in 1996 attended an in-state college. The proportion is higher for older students including undergraduate upperclassmen, graduate students, and nontraditional students. Source: U.S. Department of Education, National Center for

"preserve and enhance" access for middle and upper-middle income families (Stoll and Stedman, 2001). Nonetheless, when the amount in credits is compared to federal tax liability, the greatest beneficiaries are those with incomes between $10,000 and $30,000.

With the intended goal of preserving and increasing access to college in the midst of rising costs, it is important to evaluate the effects of the HOPE and LLTC on student college behavior. The next section considers whether the tax credits had any affect on college enrollment or whether the aid was just a transfer to the middle class without an effect on attendance.

4. EFFECTS OF TAX CREDITS ON STUDENT BEHAVIOR

With the introduction of the HOPE and LLTC, government officials expressed a desire to increase access to higher education, especially for the first two years. While it has been found that the tax credits help to subsidize the educational costs of families in the middle-income brackets, the next question is whether this support increased college attendance as intended. The credits could affect postsecondary enrollment in several ways. First, they may encourage individuals to attend college who would not have otherwise thereby increasing total enrollment. Additionally, the credits could induce infra-marginal students, those who would have attended college regardless, to increase their expenditures on postsecondary education. This could come in the form of attending a more expensive college, enrolling full-time rather than part-time, or completing more years of education.

Although numerous studies have examined the effect of changes in financial aid policies, none of the existing literature is based on tax credits for higher education or anything similar. As such, this study is among the first to analyze how tax credits for higher education expenditures affected the college enrollment decisions of individuals. This section begins by reviewing the literature on the effects of financial aid on enrollment and discussing the possible effects of the tax credits on enrollment. Then it examines some of these issues using data from the Current Population Surveys.

Education Statistics, Integrated Postsecondary Education Data System (IPEDS), "Residence of First-Time Students" survey, 1996.

4.1 How do Students Respond to Financial Aid Programs?

Much of the economic literature on the determinants of college attendance focuses on how price affects enrollment. While theory predicts that college demand is negatively related to the cost of education, many studies have tested for the sign and magnitude of the effect of tuition price. Leslie and Brinkman (1989) review studies from the 1970s and 1980s and conclude that a $1,000 (2001 dollars) change in college costs is associated with a four percentage-point difference in college enrollment rates. More recent studies have found similar results. Several exploit state cross-sectional differences to estimate the effect of price. Kane (1995) uses the October Current Population Survey (CPS) to link individual enrollment decisions to the mean tuition costs of a state. He finds that states with higher public tuition levels had lower college entry rates and estimates a price effect similar in magnitude to that found by Leslie and Brinkman. Cameron and Heckman (1999) find a slightly larger effect of six percentage-points using the 1979 National Longitudinal Survey of Youth (NLSY).

College price studies based upon cross-sectional variation in state-level tuition data are primarily identified by fixed differences between states. These estimates could be misleading because it is difficult to distinguish the impact of tuition from any other characteristic of the state that has remained constant over time. Therefore, other work exploits changes in financial aid policy to examine the effect of college costs on enrollment. Dynarski (forthcoming) investigates how the elimination of the Social Security Student Benefit Program in 1982 affected attendance. She finds that the enrollment of the affected group dropped by more than a third with the loss of $1,000 in aid translating into a decreased probability of attending college by 3.6 percentage points. This increase in price was also found to reduce the years of completed schooling by a tenth of a year.

The introduction of the Georgia HOPE Scholarship provides further opportunity to exploit a natural experiment. Dynarski (2000) examines the impact of the program on college entry for 18-19 year olds using 1989 to 1997 data from the October CPS. She finds that the HOPE program raised college-attendance rates between 7 and 8 percent points. This translates into a three percentage-point impact on college enrollment for every $1,000 (2001 dollars). Cornwell, Mustard, and Sridhar (2001) find slightly smaller estimates of an enrollment effect using institutional data on enrollment.

Likewise, Kane (2002) analyzes the effect of the Cal Grant program and finds large enrollment impacts from eligibility (four to six percentage points). While most studies have focused on recent high school graduates, Seftor and Turner (2002) examine the impact of college costs on nontraditional students with the introduction of the Pell Grant in 1972. They conclude older students are more responsive to price after finding elasticities larger than those estimated for younger individuals (between –0.14 to –0.34).

College prices have also been found to affect choices between institutions. Long (2002a) exploits extensive match-specific information between individuals and colleges and approximates the nearly 2,800 alternatives available to potential students. Using the conditional logistic choice model and controls for college expenditures, student body characteristics, and distance, she estimates that an individual is 55 percent less likely to attend a college that costs $1,000 more (2001 dollars), all else equal. For her sample of students from the National Education Longitudinal Study (NELS), this magnitude is enough to move the most preferred college to the fifth position for the average individual. For a simulation that cut the price difference between public and private colleges by half, Long find that up to 25 percent fewer students are predicted to attend public, four-year colleges.

4.2 How might the Tax Credits affect college enrollment behavior?

Although the estimates from the literature are helpful in understanding the importance of price in college decisions, none are based on policies similar to the higher education tax credits. The manner of disbursement (through the tax code), the timing of the benefits (up to 15 months later), and the eligibility constraints of the HOPE and LLTC make them entirely unique. However, researchers have theorized about their possible effects on postsecondary investments.

The first major issue is whether the tax credits increased college enrollment. College access is of the greatest concern among low-income individuals. In 1997, while 89 percent of high school graduates age 18 to 24 from the top quartile of the income distribution participated in college, only 53 percent from the bottom quartile did so (Mortenson, 1999). However, since the tax credits are nonrefundable and many low-income individuals are not eligible for the credits, many do not expect enrollment to increase for this group (Kane, 1997, 1998 and 1999; Wolanin, 2001). However, the elasticity of college attendance is likely to be reasonably high for the middle class since they are less

likely to be liquidity constrained and have a high overall propensity to attend college. In her analysis of the Georgia HOPE Scholarship, Dynarski (1999) found middle- and upper-income students had the largest enrollment responses. Likewise, if nontraditional students are especially responsive to college costs as found by Seftor and Turner (2002), the tax credits may increase the enrollment of older students.

While commentators do not expect a substantial enrollment response, some suggest that students may be induced to choose more costly colleges. The reason stems from the potential price and income effects created by the tax credits. As shown in Figure 4, the HOPE and LLTC not only reduce the price of college for recipients, they also alter the marginal cost for students to increase their expenditures. Before the creation of the tax credits, each additional dollar of tuition cost the student an additional dollar (as shown by the diagonal, dashed line). However, with the credits, an additional dollar of expense may not cost the student anything. For example, the marginal cost to a HOPE recipient for increases in college tuition is zero for those who pay less than $1,000. To illustrate this point, suppose a school charged $500 in tuition. Its students would be eligible for $500 in HOPE aid, and therefore, be able to attend for free. However, the same would be true if the school increased its price to $1,000. As shown on Figure 4, the cost of college net the HOPE is zero until $1,000. Another way to state this is that the marginal subsidy for colleges that cost less than or equal to $1,000 is 100 percent. The marginal tuition subsidy for HOPE recipients rises to 50 percent for those paying between $1,000 and $2,000. For recipients of the LLTC, the marginal subsidy is 20 percent up to $5,000 meaning the individual is only responsible for 80 cents for each additional dollar charged. Because of these price effects, individuals have clear incentives to attend more expensive schools or spend more on college courses.

Additionally, the tax credits effectively increase an eligible family's college budget. As a result, those eligible for the full HOPE tax credit are now able to afford $1,500 more in college expenditures while those with the LLTC receive $1,000 more in aid. This is the income effect generated by the tax credits. Depending on the preferences of the individuals, all or only part of this income gain may be spent on a more expensive school. If they are not spent on postsecondary education, the HOPE and LLTC could have a consumption effect. Since the tax credits do not impact the marginal cost of tuition above $5,000 for recipients of the LLTC and $2,000 for recipients

of the HOPE, they may not lead to sizable increases in college expenditures by families already spending more than $5,000 (Kane, 1998). Finally, the tax credits could prompt individual to substitute for other types of financial aid. For example, since the tax credits do not have to be repaid, they may be preferred over loans.

While the tax credits could encourage enrollment, the delay between the activity and receipt of the aid may reduce the likelihood of any effect. Assuming tuition is paid in January of one year and taxes are filed in April of the following year, it could take up to 15 months to receive a tax credit (Conklin and Finney, 1999). This makes the tax credits a distinctive form of financial aid as most other programs provide support at the time of attendance. Because of this disconnect, it is more likely that the tax credits will be used for expenses other than higher education than other types of aid. Furthermore, credits do not help individuals for whom liquidity is the reason they do not attend college.

4.3 Predictions from the Price Sensitivity Literature

Given the known responses of students to other financial aid policies, one may estimate the possible enrollment effects of the tax credits. Using the 1992-93 NPSAS, Cronin (1997) calculates that the enrollment response by 2002 could be expected to be between 150,000 to 1.4 million additional students with the likely response closer to the low end of the range. However, these calculations are based on the earlier version of the tax credit proposal which included an up to $10,000 tax deduction for older students rather than the LLTC which eventually passed.

To get an approximation of the expected effect of the tax credits on attendance I use estimates found in the literature on the effect of college costs. Assuming the four percentage-point impact per $1,000 in cost, the mean education credit claimed during tax year 2000 ($731) translates to into a 2.9 percentage-point effect. Before the enactment of the policy (fall 1997), 15.4 million students were enrolled in college (Martinez and Day, 1999). This constitutes approximately 36.9 percent of traditionally-aged students (age 18 to 24), 11.8 percent of those age 25 to 29, and 5.7 percent aged 30 to 34. Applying the estimated impact of a $731 credit, an additional 1.1, 0.34, and 0.17 percent of individuals aged 18 to 24, 25 to 29, and 30 to 35, respectively, should enroll in college. This translates into 101,244 additional students aged 18 to 24, 7,500 aged 25 to 29, and

1,897 aged 30 to 34 for a total of 110,641. Next one must take into account that not everyone is eligible for the aid. Given that approximately two-thirds of individuals are eligible for the credit based on 1997 tax returns, the estimated impact is approximately 74,000 new students age 18 to 34. The policy could have an additional effect on older students by subsidizing occasional courses.

As shown in Figure 4, the tax credits could also affect individual choices between colleges. Because of the incentives created by the tax credits, this may especially be true for individuals who would have other attended colleges that cost less than $2,000 (for potential recipients of the HOPE) or less than $5,000 (for potential LLTC recipients). For example, a person previously spending $500 might choose to take additional courses or attend a college that charged $1,000. In some instances, the credits reduce the cost gap between competing colleges. For example, before the credits, a $1,000 and $3,000 college cost a difference of $2,000. However, if the person received a HOPE, then the difference would only be $1,500 (the new prices would be $0 and $1,500, respectively). This decline in the price gap between colleges is an additional reason some individuals choose institutions that are more expensive than they would otherwise. The College Board (2001b) estimates that 21 percent of full-time undergraduates at four-year colleges paid less than $2,000 in 2000-2001. This translates into approximately 1.6 million students (NCES, 2000). Applying the estimates from Long (2002a), the reduction in the price gap between two colleges due to the tax credits could cause up to one-quarter, or 400,000 students, to switch to more expensive schools. The total number is likely to be higher for part-time students since a larger proportion of these students spend less than $2,000.

These rough calculations are based on estimates from traditional financial aid programs. However, there are important distinctions between tax credits and other types of aid that could cause these estimates to not accurately depict the possible impact on the behavior of students. To test for actual enrollment effects, the next section begins to analyze microdata from the period.

4.4 Empirical Strategy

To evaluate the enrollment effects of the HOPE and LLTC, I use the Current Population Survey (CPS). The CPS is a national household survey that gathers school enrollment information each October. Using the information available on family background, I identify the individuals likely

to be eligible for a HOPE or LLTC and link this to their enrollment decisions. In order to test for a possible effect, I compare how the attendance decisions of those eligible for the credits changed after the policy change. For a control group, I use individuals not eligible for the aid. This Differences-in-Differences analysis technique has been employed to study other financial aid programs, in particular with this data.[27] Using logistic regression models, I estimate the following equation:

$$(1) \qquad Enroll_i = \alpha + \beta_1 (Tax\ Credit_i * After_i) + \beta_2\ Tax\ Credit_i + \beta_3\ After_i + \varepsilon$$

where *i* is the i^{th} individual. The parameter β_1 is the reduced-form enrollment effect of the tax credits. It measures whether individuals eligible for the credit acted differently from others after the enactment of the aid policy. The variables "Tax Credit" and "After" are dummy variables equal to one if the person qualifies to take either the HOPE or LLTC or if the year is 1998 or after; otherwise the variables are equal to zero.[28] Due to the fact that this paper relies on serially correlated outcomes, the standard errors are adjusted using clustering methods.[29]

Because enrollment patterns differ by race, gender, age, and other demographics, these background characteristics are controlled for in the analysis. Additionally, I use state-level information about annual unemployment rates, per capita income, and the percent of the population with a baccalaureate degree to account for differences in economic conditions, levels of wealth, and preferences for education across the country.

The CPS is the best available resource to study the enrollment effects of the tax credits because it has a large, annual sample of individuals. For this analysis I use the data from 1990 to 2000. However, there are several important limitations to this dataset relating to the income variables. First, information about family income is categorical making it difficult to define the eligibility benchmarks exactly. This grouping also makes it impossible to put family income in constant dollars over time. Second, the income variable is capped at $75,000, which makes defining

[27] See Dynarski (2000) and Kane (1995).
[28] Although the tax credits bill was signed in August 1997, credits could not be claimed for enrollment activity until 1998.
[29] See Bertrand, Duflo, and Mullainathan (2001) for a discussion of how serial correlation affects the standard errors of difference-in-differences estimation.

eligibility for joint returns difficult.[30] Finally, parental income is only available for young adults that appear on their parents' CPS record. This will occur if the individual lives at home or is away at college. Therefore, the probability that a young person will have accurate family income information is a function of their propensity to attend college.

4.5 Analysis of the Enrollment Effects

To discern whether the tax credits had an effect on college enrollment, I test for three possible responses. First, did the likelihood to attend college increase for individuals eligible for a credit? This is a test of the credits' impact on general postsecondary access. Second, did the proportion of college students who were enrolled at four-year colleges rise? This is a way to examine whether students were induced to spend more on higher education after the creation of the credits. And third, did the percentage of college attendants that were full-time rather than part-time students increase? To measure eligibility, I alternate between three different measures: (i) eligibility for any credit; (ii) the monetary amount of the maximum credit a person qualifies for; and (iii) the amount of the credit available if the person paid the mean cost of his state public two-year college. The third definition is an approximation of what a marginal student who decides to attend a community college would receive. Since the credits differ in their target groups and generosity, I examine the behavior of several age groups. Younger students (age 18 and 19) are more likely to be affected by the HOPE while older students are eligible for the LLTC.

The following analysis reports the results as odds ratios so that values less than one should be interpreted as having a negative relationship with the dependent variable. Additionally, several of the models exclude from the sample three states with large financial aid programs that preclude many students from receiving the tax credit (Georgia, Florida, and New Mexico). Each state has a scholarship program that covers full tuition at public colleges within the state for many students. In this circumstance, students would not be eligible to receive any additional aid from the federal government. In the following tables, the coefficient of interest (β_1) is bolded.

[30] To account for this, I summed the weekly earnings of everyone in a household. If this amount was greater than $100,000 as an annual income, the household was designated as ineligible. While weekly earnings information was not available for the entire sample, when compared to the categorical family income variable, the amounts were similar for the upper income groups.

Tables 9a, 9b, and 9c display estimates of the tax credit effect on the propensity to enroll in college. For Table 9a, I use whether an individual qualifies for any credit as the measure of eligibility. Overall, I estimate that individuals eligible for the credit are more likely to attend college, but generally, there is no differential increase in enrollment after the introduction of the tax credits. In fact, specification 2 estimates that the propensity to enroll actually decreased for those eligible for any credit. Table 9b investigates if there is any affect on the enrollment decisions of individuals by calculating the maximum monetary amount a student is eligible for based on credit criteria (in hundreds of dollars). In this case, all but one of the estimates is statistically insignificant and all are basically equal to one. Likewise, in Table 9c the results are not statistically different from zero. In this case, eligibility is defined by using the mean tuition cost of public two-year colleges in the state of residence. In summary, the models indicate that there was no differential enrollment effect for individuals eligible for the tax credits.

Rather than affecting access, the tax credits may encourage individuals to buy more education. To test this proposition, Tables 10a and 10b test how the likelihood of attending a four-year institution, conditional on attending college, is affected by the policy change. If the tax credits encouraged students to attend more expensive colleges, then one would expect for the proportion of students at four-year colleges to increase. In Table 10a, the tax credits are estimated to have had a positive effect on the likelihood of enrolling at a four-year college, particularly for students between the ages of 20 and 24. The estimates suggest that the tax credits have increased the likelihood of attending a four-year college over a two-year college by 17 to 20 percent. Table 10b tests for whether the size of the credit affects this likelihood. While most of the results are statistically different from zero, the effect of an additional one hundred dollars in credits on the propensity to attend a four-year college is very small.

The HOPE and LLTC could also affect whether a person attends college full- or part-time. If the credits encourage individuals to spend more on college, the proportion of students that are full-time could increase. Tables 11a and 11b test for this reaction. In the first table, eligibility is measured by qualifying for any credit based on income. None of the results are statistically significant or the expected positive outcome. Likewise, in Table 11b, in which the variable of interest is the maximum credit a person is eligible for, the results are not statistically significant from

zero.

4.6 Conclusions on the Student Effect

In summary, although the tax credits were promoted as a means to increase college access, this analysis found little to no enrollment response. During the three years after policy enactment, general enrollment did not appear to increase nor did the proportion of students that were full-time. On the other hand, there is some evidence that the proportion of students at four-year institutions did increase among 20 to 24 years olds. The lack of finding a substantial response in student enrollment conforms to many of the forecasts by researchers and critics. The principal benefactors of the tax credits are not likely to be marginal students, and the disconnect between the aid and college attendance is likely to limit the effect of the credits on enrollment.

However, the October CPS has several serious limitations for this type of analysis. Due to the categorical definitions of family income, eligibility is most certainly measured with error. Particularly at the higher income levels, it is likely that some students were mislabeled since the data does not allow one to distinguish incomes above $75,000. Moreover, assumptions had to be made about dependent versus independent student status based on age and single versus joint filing status based on family type. For these reasons, some individuals were likely labeled as eligible when in actuality they were not, and vice versa. Further analysis of these issues using more detailed datasets is necessary to be more confident of the results. Beyond better income information, it would also be useful to have more data on college enrollment behavior. For example, knowing how many credit hours a person completed would help answer questions about the intensity of enrollment. Information on which institution the individual attended and the receipt of other financial aid would help researchers to understand how the tax credits influence college choices and the possible substitution of the credits for other types of aid. A panel dataset would allow one to observe how these factors changed after the introduction of the credits for students already in college. In addition, longitudinal data would allow one to track how students' decisions change after transforming from being eligible for the HOPE (the first two years of college) to instead qualifying for the LLTC. Additional questions exist on a possible consumption effect, but further information on family income and expenditures is necessary for this analysis. It is also worth noting that it may be too soon

to witness an enrollment effect. As take up rates for the tax credits increase, more individuals may be influenced by the support in ways discernable by quantitative research.

5. INSTITUTIONAL IMPACT OF THE TAX CREDITS

While most of the literature on the impact of financial aid policy focuses on the reactions of individuals, researchers have long theorized that the policies may also impact the behavior of postsecondary institutions. Most notably, William Bennett surmised in 1987 that the rise in college tuition prices was due to increases in the availability of government financial aid.[31] Researchers have tested the Bennett Hypothesis by examining whether increases in aid translate into increases in tuition prices. McPherson and Schapiro (1991) use annual institutional data to relate changes in the Pell Grant to institutional behavior. They find that increases in government aid are coupled with increases in institutional scholarship spending at private colleges contrary to the predictions of Bennett. In contrast, Li (1999) finds some support for the Bennett Hypothesis using the master files of the Pell Grant Information System to track Pell recipients and the tuition levels of their respective colleges. One possible reason for these conflicting results stems from the difficulty in isolating the effect of government aid on tuition pricing from other factors. It is unclear whether changes in tuition are due to changes in aid or other general trends in higher education. Long (2002b) is able to circumvent the issue by examining the effect of the Georgia Hope Scholarship on in-state institutions. She finds that most four-year colleges in Georgia did experience relative increases in either list tuition or room and board fees with reductions in institutional aid. The net effect was to increase costs to students by as much as $0.25 for each dollar of aid. This highlights the importance of the design of a program in ensuring that students, rather than institutions, realize the full benefit and that students who do not receive the aid are not unintentionally negatively affected.

This section exploits variation in the incentives colleges at different tuition levels have to examine the institutional effects of the tax credits. Since the incentives are strongest for public institutions, I also examine the actions of states in terms of support for postsecondary institutions.

[31] From 1975-76 to 1985-86, the mean public four-year tuition increased 55.1 percent in real terms (after accounting for inflation). Private four-year tuition levels increases 37.3 percent. Source: College Board (2001b).

5.1 How might the Tax Credits Impact Postsecondary Institutions?

Due to the price and income effects created by the tax credits, colleges may have the incentive to increase their prices up to the amount of the aid. The strongest incentives are for colleges that charge tuition below $1,000. As described in the previous section, the marginal cost to a student of a college charging below this amount is zero (see Figure 4). For example, if a school charges $500 in tuition, its first- and second-year students would be eligible for $500 in tax credits, and therefore, be able to attend for free. However, the same would be true if the school increased its price to $1,000. With the HOPE the marginal tuition subsidy is between 50 to 100 percent for institutions charging less than $2,000. It is an additional 20 percent for students past the second year at institutions charging less than $5,000 due to the LLTC. Another possible institutional reaction to the tax credits could be to re-label room and board charges and other fees as tuition charges because the former do not constitute "qualified" expenses (Kane, 1999). For instance, a college with tuition at $1,000 and room and board charges of $4,000 might be induced to raise the tuition price to $2,000 and lower the room and board charge to $3,000.

Since states control many postsecondary institutions (i.e. public colleges), increases in tuition costs may ultimately come from the government. The incentives to increase tuition prices are strongest for states that heavily subsidize public tuition levels to below $2,000. As Kane (1999b) highlights, "To not do so would mean forgoing rather generous new federal subsidies for state taxpayers" (1999, p. 148). While price increases might understandably affect a college's standing relative to competing institutions, state governments are best able to prevent a loss of students. This is because they are able to coordinate the price increases of a large set of colleges. Together with the fact that public colleges are already far less expensive than private schools, individual public colleges face little risk of losing students. However, such price increases may deter students from enrolling in college at all if the tax credits are not perceived by students to offset the additional costs. This is an especially troublesome prospect for students ineligible for the aid due to lack of tax liability.

The incentive to raise tuition prices is also strong for states with large financial aid programs. Since eligibility is based on tuition expenses net grants and scholarships, residents in states with generous programs may not qualify for the full tax credit due to receiving state support. In this case,

the eligibility of residents would increase as tuition was increased. State and institutional aid would also be affected if colleges and states perceive the credits as substitutes for other types of aid. This reaction was found when examining the institutional impact of the Georgia HOPE Scholarship on institutional aid awards at private colleges in Georgia (Long, 2002).

In fact, many states did react to the introduction of the tax credits by considering ways to capture the federal resources available through the new tax credits. In a report from California's Legislative Analyst's Office, Hill (1998) notes that the credits "create opportunities to increase the effective federal subsidy of California's higher education programs." She argues that due to California's low-cost community colleges, many other states will have higher per-student subsidies (estimated to be $360 in California while $1,250 in other states). "Due to interactions between the credits and recent state fee reductions, the state is unintentionally sending monies intended for students back to the federal government." Furthermore, by reducing the price differential between the state's community colleges, California State University system, and the University of California system, Hill suggests that HOPE could "unintentionally shift enrollment away from our community colleges to the universities, at potentially great cost to the state and at cross purposes to the state's higher education master plan." For these reasons, Hill suggests increasing fees at public colleges in California. She asserts that the tax credits would offset the increase for richer students while financial aid could be given to offset the effect for low-income students. According to her calculations, an increase from $360 to $1,000 at the community colleges would increase funding to these schools by over $100 million annually without impacting the California state budget.

Wolanin (2001) notes other states that responded to the introduction of the tax credits. Budget analysis by the Arkansas legislature recommended that the state reconsider its tuition policies in light of the tax credits. Minnesota, North Carolina, and Washington took similar actions to consider how to devise state financial aid programs while taking into account the HOPE support. Another example is New York, which provides need-based aid through its Tuition Assistance Program. Under this program, New York families with a student in a four-year public college would not be eligible for the maximum HOPE unless their taxable income is $45,000 or higher. In comparison, most families would be eligible for the full credit if their taxable income is at least

$30,000. As a result, the New York State Higher Education Services Corporation recommended studying whether federal funds could be substituted for state funds (New York State, 1998).

If colleges do raise their prices in response to the policy, the tax credit could become in a transfer from the federal government to schools and state governments rather than families. However, some question whether postsecondary institutions would respond to the introduction of the tax credits. Since the strongest incentives to raise tuition prices are for community colleges (i.e. schools with lower tuition levels), and these schools predominantly serve low-income populations not eligible for the tax credit, some suggest that tuition inflation is an unlikely response to the credits (Kane, 1999; Cronin, 1997).

The HOPE and LLTC could affect postsecondary institutions in ways other than pricing. The tax credits may give institutions the incentive to find ways to grant half-time degree credit to middle-income taxpayers (Kane, 1999; Cronin, 1997). One possibility is for colleges to create leisure-oriented courses for college credit that would attract taxpayers eligible for the tax credits. For example, colleges could offer $1,000 whale-watching tours with no cost to HOPE-eligible students as long as participants receive half-time credit to a degree (Kane, 1999). This potential abuse mirrors issues raised with the Pell Grant program, however the risk may be greater given the larger number of eligible aid recipients.

Distributing aid through the tax system also creates a number of expensive regulatory requirements for colleges and universities. Higher education institutions must supply the IRS with the names, addresses, and Social Security numbers of all of their students as well as whether the students are enrolled at least half-time, a stipulation of eligibility for the HOPE credit. Additional requirements may be imposed to include information on those who claim a student as a dependent for federal income tax purposes and who may claim HOPE (Wolanin, 2001). The National Association of College and University Business Officers estimated that compliance with this full set of requirements would have cost institutions $137 million in 1999 (NACUBO, 1998). Furthermore, the IRS estimates the current reporting burden on institutions to produce needed information is 2.4 million hours (Federal Register, 2000). For tax year 1999, the UC system alone spent nearly $1 million to provide its 371,000 student with the Form 1098, the tuition payment statement necessary to claim a tax credit (Hoblitzell and Smith, 2001). These costs of compliance are an additional

reason colleges might increase tuition prices.

5.2 Empirical Strategy

In order to test for the possible effects of the tax credits on pricing and state support, I examine how these factors have evolved over time. By noting the policy change between the 1997-98 and 1998-99 school years, I first examine whether the introduction of the HOPE and LLTC caused discontinuities in tuition pricing or state appropriations for colleges that charged less than $1,000.[32] In order to account for any general trends that have affected all American universities, colleges in different tuition categories will be used as a control group. The difference between schools is considered the effect of the tax credits.[33] Using ordinary least squares estimation, this difference-in-differences calculation can be made:

$$(2) \qquad y_i = \alpha + \delta_1 \, (\text{Low-Tuition}_i * \text{After}_i) + \delta_2 \, (\text{Low-Tuition}_i) + \delta_3 \, (\text{After}_i) + \varepsilon_i$$

where *i* is the i^{th} college, and y is either list college price or state appropriations per student.. The parameter δ_1 is the reduced-form effect of the tax credits – it measures whether colleges with a tuition below $1,000 acted differently from other schools after the enactment of the aid policy. The variables "Low-Tuition" and "After" are dummy variables equal to one if the college charges less than $1,000 for in-state list tuition or the year is 1998 or after; otherwise the variables are equal to zero. Additional analysis will be done on colleges that charge less than $2,000. Due to the fact that this paper relies on serially correlated outcomes, the standard errors are adjusted using clustering methods.[34]

As discussed above, the reactions of institutions in different states may vary given the incentives created by the tax credits. For example, states that have large financial aid programs may

[32] Although the law was passed in 1997, it was not signed until August 1997, a time when tuition rates for the 1997-98 school year were already set. This notion is supported by the timing of state reports in reaction to the credits (e.g. the New York State Higher Education Services Corporation preliminary report is dated March 1998). Furthermore, individuals were only able to claim the credits for higher education expenses incurred after January 1, 1998 for the HOPE and after July 1, 1998 for the LLTC.

[33] In order for the tax credits to be used as an appropriate natural experiment, it must be an exogenous policy. Stated another way, if the tax credits were created in response to the power and preferences of states or postsecondary institutions, the measured responses could reflect some endogenous effect. However, given the reaction of many states and institutions, there is little concern that the reactions of the colleges might be biased in some way.

be more likely to raise the prices of their public colleges than other states. To test for this possibility, the analysis employs a differences-in-differences-in-difference (DDD) technique to distinguish the reactions of colleges in high-aid versus low-aid states. The DDD calculation can be made:

$$(3) \quad y_i = \alpha + \delta_1 (\text{Low-Tuition}_i * \text{After}_i) + \delta_2 (\text{Low-Tuition}_i) + \delta_3 (\text{After}_i) + \delta_4 (\text{Low-Tuition}_i * \text{After}_i * \text{High-Aid}_i) + \delta_5 (\text{High-Aid}_i) + \delta_6 (\text{High-Aid}_i * \text{Low-Tuition}_i) + \delta_7 (\text{High-Aid}_i * \text{After}_i) + \varepsilon_i$$

where High-Aid_i is a dummy variable equal to one if the state has a large financial aid program. The parameter δ_4 is the differential effect of the tax credits on colleges in high-aid versus low-aid states.

Since no private colleges charge less than $2,000 in list tuition, the sample is limited to public colleges and universities. Moreover, since institutions that charge above and below $1,000 are different in ways likely to affect tuition pricing and trends, other control variables are included. First, the market segment of the college and its likely competitors could affect its pricing and expenditures. The most selective colleges offer more institutional financial aid and spend more on instruction than less selective schools, and each group faces different competitive pressures from other institutions. For this reason, the models take into consideration the selectivity level of the college. Second, the preferences, wealth, and economic conditions of a particular state are likely to affect the general offerings and prices of colleges within the state. To account for these factors, the analysis controls for state characteristics such as annual per capita income, the percent of the population with a bachelor's degree in 1999, and the annual unemployment rate. Controls for region are also included. Finally, the amount of state support awarded by the state legislature is highly influential in the decisions of public colleges and universities, particularly in terms of tuition price.[35] Therefore, the models also control for the annual amount of state appropriations per student at each school.

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[34] See Bertrand, Duflo, and Mullainathan (2001) for a discussion of how serial correlation affects the standard errors of difference-in-differences estimation.

[35] The correlation between the mean tuition cost of four-year, public colleges and the mean amount of state appropriations received by such schools was –0.7 from 1977 to 1997 (NCES data). In practice, schools are generally discouraged by legislatures from increasing the tuition above a certain percentage each year. However, substantial increases are allowed when state appropriations are reduced thereby implicitly linking the subsidy and tuition level.

The data for this analysis come from several sources. First, the Integrated Postsecondary Education Data System (IPEDS) provides the necessary institutional detail. This data set documents extensive information on postsecondary institutions within the United States including revenue sources (e.g. state appropriations), list tuition price, and enrollment figures. In order to capture the 1998 inception of the tax credits, I use IPEDS data from the 1993-94 school year to the 1999-2000 school year (the most recent year institutional financial data is available).[36] All figures were inflated to 2000 dollars using the CPI-U. A second source, Barron's *Profiles of American Colleges*, provides selectivity groupings for institutions based on student body grades and test scores as well as admission policies. Data on state characteristics such as the annual unemployment rate, per capita income, and the percent of the population with a bachelor's degree were taken from U.S. Census Bureau and the Bureau of Labor Statistics. Considerable effort was made to have a complete and balanced panel of data. To avoid estimating results driven by yearly fluctuations in composition of the sample rather than a true effect, I imposed a restriction that at least six of the seven possible years of data had to available for each institution.

5.3 Did the Tax Credits affect Tuition Levels?

The largest incentives to increase tuition price exist for colleges that charge less than $1,000 and $2,000 in tuition. Table 12 summarizes the marginal costs to students at schools in these two treatment groups. The control groups are colleges that charge more than $2,000. However, before analyzing the impact of the tax credits on colleges, it is first important to note how colleges of different tuition levels are dispersed around the country. The lower part of Table 12 displays the number of colleges by level and tuition price among the eight Census regions of the United States. Due to the varying levels of state support for public colleges in different regions of the country, estimation of the relative impact of the tax credits on colleges less than $1,000 or $2,000 to those above that amount is a comparison of colleges in the Southeast, Far West, Southwest regions to those

[36] This time span is used for several reasons. First, other D-in-D studies have used similar series of data to study the effects of a financial aid policy. Both Hansen's (1983) and Kane's (1996)'s before and after Pell studies use 3 years of data before the policy change and 4 years after. Furthermore, this time span reflects the American economic expansion of the 1990s and is less likely to be tainted by nationwide business cycles than a longer series of data. Finally, using this time span maximizes the number of institutions that can be used as a constant sample.

in Mideast and Great Lakes regions.[37] The following results are in logs so that the results can be interpreted as percentages.

Table 13 examines the effect of the tax credits on tuition costs at and state appropriations to public two-year colleges that charged less than $1,000 before the policy change (treatment group #1 in Table 12). The models compare the relative tuition growth of these colleges to those that charge more than $2,000. The samples are limited to public two-year colleges since no public four-year institutions charged less than $1,000. Schools with tuition between $1,000 and $2,000 are excluding during this part of the analysis because they also have incentives to raise price.[38] The first models (specifications 1 through 3) use list tuition price as the dependent variable. When just including year fixed effects, the estimate suggests that public two-year colleges that charged less than $1,000 experienced nine percent more growth in tuition prices than other public two-year colleges. This result decreases once accounting for differences across states and regions, but is still statistically significant at 6.4 percent. Given the pattern of two-year public colleges by cost across regions, these results reflect the actions of colleges in the Southeast and Far West relative to colleges in the Mideast and Great Lakes regions. However, when state appropriations per student are also taken into account, the statistical significance of this result disappears suggesting that the relative tuition growth was due to declining support from the state at these schools.[39] To test this hypothesis of declining support, specifications 4 and 5 use state appropriations per student as the dependent variable. However, there is no support for this notion as the results are statistically insignificant although once controlling for state differences, the sign of the result is negative.

Tables 14a and 14b examine the response of institutions that charged between $1,000 and $2,000 before the policy change (treatment group #2) using public institutions that charge more than

[37] The regions are: New England (CT, ME, MA, NH, RI, VT), Mid East (DE, DC, MD, NJ, NY, PA), Great Lakes (IL, IN, MI, OH, WI), Plains (IA, KS, MN, MO, NE, ND, SD), Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV), Southwest (AZ, NM, OK, TX), Rocky Mountains (CO, ID, MT, UT, WY), Far West (AK, CA, HI, NV, OR, WA).

[38] Colleges that charged between $2,000 and $5,000 before the policy change also have *weak* incentives to raise prices due to the LLTC. As shown in Table 12, the marginal cost to students at these schools is 80 percent in comparison to zero and 50 percent at the cheaper colleges. Furthermore, due to the distribution of public college prices, examining this group separately would leave no control group for the analysis (very few public colleges charge more than $5,000 in tuition).

[39] Note that the number of observations drops once adding a control for state appropriations. This is due to the fact that many institutions only have six of the seven possible years of information on state support. In particular, 26.5 percent of public institutions are missing state appropriations data for 1998-99.

$2,000 as a control group. In Table 14a, specifications 1, 2, and 3 group the public two-year and four-year colleges together. I find no differential effect when controlling for year fixed effects, college selectivity, state characteristics, and region. Allowing for different effects by level of college also yields no statistically significant effect (specifications 2 and 3). However, once looking at the colleges separately by level, public four-year colleges are found to have experienced relative decreases in tuition price contrary to what theory predicts. Tuition levels at colleges that cost between $1,000 and $2,000 in 1997 grew ten percent less than at other public four-year colleges. Meanwhile, as shown in Table 14b, these colleges experienced a 6.6 percent relative increase in state appropriations per student (specification 5). The distribution pattern of colleges across regions suggests these results are due to comparing four-year public colleges in the Southeast and Southwest to others in the Southeast as well as Mideast and Great Lakes regions. Public two-year colleges in this tuition range do not appear to have experienced differential trends from the control group, particularly when controlling for state characteristics.

In summary, the analysis suggests that colleges that charged less than $1,000 before the policy change did experience relative increases in tuition price as theory would predict. Moreover, there is some support that they also experienced reductions in state support for college. Conversely, public four-year colleges charging between $1,000 and $2,000 experienced relative increases in state support after the tax credits were enacted. Since these results are largely driven by differences *across* regions given the distribution of college prices geographically, it is useful to also examine trends *within* states and regions. Unfortunately, samples sizes preclude testing this hypothesis within states or for most regions. However, the Southeast, Southwest, and Far West regions have enough colleges in each tuition category to examine this notion. Table 15 displays the results.

Specifications 1 and 2 compare colleges within the Southeast region. Colleges that charged less than $1,000 experienced relative increases in tuition prices (specification 1) and declines in state appropriations per student (specification 2) as theory would predict. However, colleges that charged between $1,000 and $2,000 before policy enactment did not experience the opposite trends as found in Tables 14a and 14b. Also in accordance with theory, these institutions realized relative increases in tuition price, and these increases were less than the magnitude experienced by the colleges that had charged less than $1,000 (11 percent compared to 32 percent). A similar pattern is found within the

Southwest region (specifications 3 and 4). However, in this case, colleges that charged between $1,000 and $2,000 experienced relative declines in state support that were less than those realized by cheaper colleges. While the trends in the Southeast and Southwest are what one might predict based on theory, the complete opposite pattern was found within the Far West region. Colleges in the lowest tuition group experienced 12-percent relative growth in state appropriations while colleges in the $1,000 to $2,000 range realized a 16.6 percent realize increase in tuition prices. This suggests a shift in support towards the least expensive colleges.

These regional patterns further illustrate the wide variance in state policies toward public postsecondary institutions. While some regions seemed to have responded to the tax credits by shifting state appropriations and public tuition prices in directions that would maximize the ability to capture federal funds, others followed dissimilar missions focusing continued support on the least expensive colleges. One possible reason for the latter strategy is that students who are too poor to receive a tax credit attend the cheapest schools. Therefore, states in the Far West (California, in particular) may actively be trying to maintain access to them. These states may even be redistributing funds to the inexpensive colleges from schools with more recipients.

5.4 The Effect on Colleges in States with Large Aid Programs

Another group that has the incentive to raise tuition prices is states that have large financial aid programs. Table 16 separates colleges into two groups based on the amount of grant aid awarded by states during the 1997-98 school year. States are considered to have large aid programs if they are in the top eight in terms of total money spent or the amount per student. This definition seems appropriate given the drop off in amounts afterwards. However, the state aid programs in Georgia, Florida, and New Mexico offer aid generous enough that recipients are not eligible for the tax credits. For example, the Georgia HOPE Scholarship covers the entire tuition price of an in-state public college. Therefore, raising tuition prices would only cost the state additional funds without garnering added Federal support from the tax credits. Moreover, in each of these states significant portions of the student-residents receive the aid so that there are few non-recipients of the state aid to receive the tax credits. Due to the nature of these aid programs, these three states are excluded from the group. The resulting list of states with large aid programs is: New York, Illinois, California, Pennsylvania,

New Jersey, Ohio, Minnesota, and Vermont. Table 16 also displays how colleges in this group are distributed by tuition level.

Table 17 examines the tuition response of all public colleges in states with large aid programs. Controlling for college level, selectivity, and year fixed effects, specification 1 estimates that tuition prices in these "high aid" states grew 11.8 percent faster than schools in other states. This positive result conforms with predictions based on the incentives created by the tax credits for state with large aid programs. Once controlling for state characteristics and region, this effect drops to seven percent but is still statistically significant. To determine whether this effect is due to changes in state appropriations to the colleges, specification 3 includes the additional control. The result remains robust and increases to 8.4 percent. Finally, specification 4 allows for the effect of the tax credits to vary by college level, but no differential effect is found for two-year colleges.

Specification 5 estimates the DDD model by interacting the state aid dummy variable with the treatment groups that were examined above as defined by tuition levels. The results further suggest that high aid states followed different strategies than low aid states. In low aid states, tuition prices grew 24 percent faster for colleges that charged less than $1,000 (treatment group #1) and 6 percent faster for colleges that charged between $1,000 and $2,000 (treatment group #2) than the control group (colleges that charged more than $2,000). However, although tuition prices in high aid states (treatment group #3) grew 18 percent faster than those in low aid states, these relative increases were not experienced at the least expensive schools. Prices at colleges that charged less than $1,000 decreased in comparison with the control group. This may reflect that fact that states with large aid programs have strong preferences for increasing or maintaining college access and therefore did not target the most affordable colleges when reacting to the tax credits.

Table 17b separates the analysis by college level. Again, in all models, colleges in states with large aid programs are estimated to have experienced relative increases in tuition. Even after controlling for state appropriations, public four-year and two-year colleges in these states realized relative growth of 17.9 (specification 2) and 6.6 (specification 5) percent, respectively. Although the interaction with tuition level is not statistically significant for four-year colleges, the results are similar to those found for all public colleges when limiting the sample to two-year institutions. Colleges in the lowest tuition groups in states with large aid programs experienced relative

reductions in tuition prices with the larger decreases realized by colleges that charged less than $1,000 in 1997. Meanwhile, colleges in these tuition groups in low aid states experienced relative tuition growth.

Tables 18a and 18b perform the same analysis using state appropriations as the dependent variable. As predicted by theory, the results almost entirely mirror those from Tables 17a and 17b. Overall, state appropriations fell at public colleges in states with large financial aid systems, but they increased at colleges in the lowest tuition group.

Table 19 takes a look at what happened to room and board fees. Colleges have incentives to re-label room and board charges and other fees as tuition charges since the former do not constitute "qualified" expenses. While these incentives may be the strongest for colleges that charge less than $1,000, schools at this level do not tend to have on-campus housing. However, variation across states in their aid programs allows me to test for any effect here.[40] As shown in the two regression models, there does not appear to be any differential growth or reduction in the room and board charges of colleges in this situation.

To sum up, colleges in states with large aid programs appear to have responded to the tax credits in ways that theory would dictate. The exceptions are at the least expensive colleges in those states. Given the composition of the states in this "high-aid" group, it is possible that the variable is really detecting a differential response to the tax credits in large states. To test this hypothesis, the sample was limited to the top fifteen states in population, and the models were re-estimated. For this analysis the sample size dropped from 1,251 to 709 public colleges. Even with this restriction, the above results remained the same suggesting that they are not due to the reactions of large states.

6. CONCLUSIONS

The 1997 passage of the Hope and Lifetime Learning Tax Credits significantly increased federal support for higher education. However, the introduction of the tax credits also marks a new direction for financial aid. The distinctive features of this program set it apart from other financial

[40] Room and board information is missing for many institutions due to a lack of residential options for students at all schools.

aid programs both in terms of its broadly defined eligibility requirements and the timing of the support in relation to attendance. As a result, the distribution of the credits, their impact on enrollment, and their influence on the behavior of postsecondary institutions and states are unique when compared to other federal initiatives.

What was intended to be a transfer to the middle class has indeed benefited middle-income families. Insufficient tax liability due to low income levels, competing tax credits and deductions, and the interaction with other aid programs prevents many low-income individuals from qualifying for the aid. Conversely, income ceilings prevent high-income families from benefiting. As shown by IRS data on individual tax returns, proportionately more of the tax credits were claimed by returns with an AGI above $30,000. Although they make up only 13 percent of returns, families with AGIs between $50,000 and $75,000 claimed 22 percent of all education credits during tax year 2000 and realized the largest credit on average.

However, the delivery of financial aid through the tax system suffers from some of the same information problems that plague other programs such as the Pell Grants. Usage during the first three years was far below projections. Moreover, a study of UC students found concerns about the complexity of the system and value of completing the necessary forms when the perceived benefit was small (Hoblitzell and Smith, 2001). However, participation continues to climb, and if the experience with the EITC is any indication, take up rates could become higher than for other forms of aid.

Although one goal of the tax credits was to increase access to higher education, this study found no evidence of increased postsecondary enrollment among eligible students. However, there is some support for the notion that the credits encouraged students to attend more expensive colleges as the proportion of students at four-year institutions increased. Nonetheless, limitations of the data used for the analysis prompts the need for further research in this area.

On the other hand, large institutional and state responses were found when examining the pricing trends of public colleges. Many states appear to have responded to incentives to increase the prices of colleges at which students face a low marginal cost due to the tax credits. The exception was states with large financial aid programs and presumably strong preferences for college access. Colleges in these states did experience large relative growth in prices so they could capture some of

the federal funds, but these increases do not appear to have occurred at the least expensive colleges. These results document the importance of considering how a federal program affects the behavior of states and institutions in ways that might undermine the original policy.

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Table 1: Summary of the Federal Tax Credits

	Hope Tax Credit (HOPE)	Lifetime Learning Tax Credit (LLTC)
Targeted Group	• Students in their first two years of postsecondary education	• College juniors and seniors • Graduate and professional degree students • Adults who want to go back to school, change careers, or upgrade skills
Recipient Eligibility	• Available for the first two years of postsecondary education • Student must be pursuing a degree or other recognized educational credential • Student must be enrolled at least half time for at least one academic period • Student must not have a felony drug conviction on his/her record	• Available for any postsecondary education • Available for an unlimited number of years • Students do not need to pursue a degree or other recognized education credential • Available for one or more courses • Felony drug conviction rule does not apply
Amount	• 100% for the first $1,000 of tuition and required fees; 50% on the second $1,000 (Up to $1,500 credit *per eligible student*)	• 20% for the first $5,000 of tuition and required fees each year through 2002 (Up to $1,000 credit *per return*) • Starting in 2003 credit covers up to $10,000 of expenses (maximum of $2,000 credit)
Claimant	• Taxpayers can claim a credit for his or her own tuition expense or for the expenses of his or her spouse or dependent children	• Maximum credit is determined on a per-taxpayer (family) basis, regardless of the number of post-secondary students in family
Timeline	• Available for payments made after December 31, 1997 for enrollment after that date (i.e. a high school senior going into his freshman year of college in September 1998, could be eligible for as much as a $1,500 credit)	• Can claim the credit for amounts paid on or after July 1, 1998 for college or vocational school enrollment beginning on or after July 1, 1998
Expenses Covered	• Tuition and required fees at an educational institution eligible for aid administered by the DOE minus grants, scholarships, and other tax-free educational assistance (including Pell Grants, employer-provided education assistance, and Veteran's educational assistance) • Note: The expenses covered do not include the cost of insurance, medical expenses (including student health fees, room and board, transportation, or living expenses)	
Income Eligibility	• Phased out for joint filers with $80,000 to $100,000 of modified AGI • Phased out for single filers with $40,000 to $50,000 modified AGI • Individuals must modify their AGI to include income earned abroad • Can not claim the credit if married filing separate returns	
Other Details	• Families are able to claim the Lifetime Learning tax credit for some members and HOPE credit for others in the same year. However, the same student can not take both credits.	

Notes: Summarized by the author from: U.S. Department of Treasury, Internal Revenue Service (1998c) *Tax Benefits for Higher Education.* Publication 970.

Table 2: Pell Grants, Loan Subsidies, and the Higher Education Tax Credits, 1997

Family Income	Two-year Public Institutions Tuition = $1,500 Total Cost of Attendance = $4,500		Four-year Public Institutions Tuition = $3,000 Total Cost of Attendance = $10,000		Four-year Private Institutions Tuition = $13,000 Total Cost of Attendance = $20,000	
	Pell Grant	Tax Credit	Pell Grant	Tax Credit	Pell Grant	Tax Credit
10,000	3,000	0	3,000	0	3,000	0
20,000	3,000	0	3,000	0	3,000	0
30,000	2,450	0	2,450	550	2,450	1,500
40,000	950	550	950	1,500	950	1,500
50,000	0	1,250	0	1,500	0	1,500
60,000	0	1,250	0	1,500	0	1,500
70,000	0	1,250	0	1,500	0	1,500
80,000	0	1,250	0	1,500	0	1,500
90,000	0	625	0	750	0	750
100,000	0	0	0	0	0	0

Notes: Summarized from Hauptman and Rice (1997) and the Brown Center of Education Policy, The Brookings Institution. Calculations are for full-time freshman, and income is defined as AGI for joint filers with two dependents. Pell Grants are for families of four with one child in college. Eligibility for tax credit is determined by calculating tuition less all grants, scholarships, and other tax-free educational assistance. Tax credit is $0 if family income is less than $30,000 or net tuition is negative.

Table 3a: Higher Education Tax Credits, 2000

	All Returns	Size of Adjusted Gross Income					
		Below $10,000	$10,000 to $19,999	$20,000 to $29,999	$30,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999
Number of returns	130,122,204	25,947,174	23,678,120	18,533,555	23,878,431	17,263,552	8,547,241
	Higher Education Tax Credits						
Number of Credits	6,698,163	258,220	1,110,604	1,054,598	1,736,226	1,472,598	1,062,644
Amount of Credits (thousands)	$4,896,215	59,744	689,679	772,886	1,300,231	1,328,260	718,376
% of Group that Claim a Credit	5.15	1.00	4.69	5.69	7.27	8.53	12.43
	Higher Education Tax Credits Beneficiaries						
Mean Education Credit	$731	231	621	733	749	902	676
% of Education Credits Claimed	---	3.86	16.58	15.74	25.92	21.99	15.86
	Share of Benefits compared to Share of Costs						
Share of Credits (#) ÷ Share of Returns (#)	---	0.18	0.83	1.00	1.28	1.50	2.19
Share of Credits ($) ÷ Share of Returns ($)	---	3.42	3.41	1.72	1.06	0.67	0.57

Notes: Calculations by author using IRS data. Source: Internal Revenue Service, Information Services, Martinsburg Computing Center, Master File Service Support Branch.

Table 3b: Higher Education Tax Credits, 1999

	All Returns	Size of Adjusted Gross Income					
		Below $10,000	$10,000 to $19,999	$20,000 to $29,999	$30,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999
Number of returns	127,667,890	26,559,779	24,104,823	18,392,185	23,356,750	16,585,331	7,840,255
	Higher Education Tax Credits						
Number of Credits	6,293,257	256,435	1,012,410	942,949	1,613,629	1,461,293	1,003,858
Amount of Credits (thousands)	$4,582,262	57,539	602,818	658,305	1,200,017	1,355,245	705,623
% of Group that Claim a Credit	4.93	0.97	4.20	5.13	6.91	8.81	12.80
	Higher Education Tax Credits Beneficiaries						
Mean Education Credit	$728	224	595	698	744	927	703
% of Education Credits Claimed	---	4.08	16.09	14.99	25.65	23.23	15.96

See the notes for the next table.

Table 3c: Higher Education Tax Credits, 1998

	All Returns	Size of Adjusted Gross Income					
		Below $10,000	$10,000 to $19,999	$20,000 to $29,999	$30,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999
Number of returns	124,770,662	26,289,293	24,625,806	18,292,760	23,108,693	15,886,502	7,221,303
	Higher Education Tax Credits						
Number of Credits	4,652,596	185,999	675,633	647,673	1,203,273	1,186,887	753,125
Amount of Credits (thousands)	$3,376,647	40,045	411,495	430,119	843,528	1,092,185	559,273
% of Group that Claim a Credit	3.73%	0.71	2.74	3.54	5.21	7.47	10.43
	Higher Education Tax Credits Beneficiaries						
Mean Education Credit	$726	215	609	664	701	920	743
% of Education Credits Claimed	---	4.00	14.52	13.92	25.86	25.51	16.19

Notes: Calculations by author using IRS data. Source: Internal Revenue Service, Information Services, Martinsburg Computing Center, Master File Service Support Branch.

Table 4: Tax Credits Relative to Tax Liability for All Individuals, 2000 (amounts in thousands)

	All Returns	Size of Adjusted Gross Income					
		Below $10,000	$10,000 to $19,999	$20,000 to $29,999	$30,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999
Salaries and Wages	$4,444,134,480	102,596,808	269,239,213	375,166,537	763,909,100	842,702,257	575,691,877
Deductions (standard & itemized)	$1,313,115,729	118,861,032	148,130,360	126,327,090	201,691,291	200,796,432	133,620,789
Taxable Income (income – deductions)	$4,510,367,610	15,797,752	114,306,435	238,991,172	593,307,519	734,353,450	535,083,911
Higher Education Tax Credits	$4,896,215	59,744	689,679	772,886	1,300,231	1,328,260	718,376
Federal Tax Liability	$1,019,928,541	4,236,231	18,264,729	34,275,965	91,388,580	123,438,299	103,771,900
100 * HE Tax Credits ÷ Federal Tax Liability	0.48%	1.41	3.78	2.25	1.42	1.08	0.69

Notes: Calculations by author. Source: Internal Revenue Service, Information Services, Martinsburg Computing Center. This table presents aggregates of all returns filed and processed through the Individual Master File (IMF) system during Calendar Year 2000. Details may not add to totals because of rounding.

Table 5: Tax Credits Relative to Tax Liability calculated at the Means, 2000

Calculated for an individual at the means of his AGI group

	All Returns	Size of Adjusted Gross Income					
		Below $10,000	$10,000 to $19,999	$20,000 to $29,999	$30,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999
Salaries and Wages	$40,208	4,992	13,965	23,156	35,741	54,188	74,356
Deductions (standard & itemized)	$10,091	4,581	6,256	6,816	8,447	11,631	15,633
Taxable Income (income – deductions)	$42,719	1,846	6,113	13,243	25,014	42,629	62,680
Mean Higher Education Tax Credits	$731	231	621	733	749	902	676
Federal Tax Liability	$9,724	401	1,056	2,031	3,913	7,176	12,154
100* Mean HE Tax Credits ÷ Mean Fed Tax Liability	7.52%	57.67	58.79	36.08	19.14	12.57	5.56
Lifetime Credits Taken (multiply mean credit by 8)	$5,848	$1,848	$4,968	$5,864	$5,992	$7,216	$5,408
Lifetime Tax Liability (multiply liability by 33)	$320,892	$13,233	$34,848	$67,023	$129,129	$236,808	$401,082
100 * Lifetime Credits ÷ Lifetime Tax Liability	1.82%	13.97	14.26	8.75	4.64	3.05	1.35

Notes: Calculations by author. Source: Internal Revenue Service, Information Services, Martinsburg Computing Center. This table presents aggregates of all returns filed and processed through the Individual Master File (IMF) system during Calendar Year 2000. Details may not add to totals because of rounding. To determine the "Lifetime Credits Taken," the mean tax credits amount is multiplied by eight assuming a family with two children who each attend college for four years. To determine the "Lifetime Tax Liability," the Federal Tax Liability is multiplied by 33 as suggested by Murphy and Welch (1990) in their examination of earnings profiles.

Table 6: Taxable versus Nontaxable Returns claiming Education Credits, 1999

AGI	Mean Credit: Taxable Returns	Mean Credit: Nontaxable Returns	% of Returns Nontaxable
Under $10,000	$143	$211	16.01%
$10,000 under $20,000	559	669	36.41
$20,000 under $30,000	733	750	43.48
$30,000 under $40,000	689	1,148	47.41
$40,000 under $50,000	671	1,361	49.23
$50,000 under $75,000	964	1,870	49.84
$75,000 under $100,000	694	1,115	50.00

Notes: Calculations by author using IRS data in Campbell and Parisi (1999). Nontaxable returns are defined as having no tax liability after all credits and the alternative minimum tax is applied.

Table 7: Tax Credit Beneficiaries by State, 1999

	Actual Beneficiaries, 1999 (Calculated from IRS Data)			Expected Beneficiaries (Government Projection)		Actual ÷ Expected	
	Number of Credits	Total Amount in Credits (000s)	Mean Credit per Return	Number of Beneficiaries	Total Amount in Credits (000s)	Number of Credits	Total Amount in Credits
State Mean (standard dev.)	122,889 (135,449)	89,585 (94,995)	729.72 (94.93)	256,843 (326,552)	190,037 (241,675)	50.26% (10.09%)	50.11% (14.25%)
State Median	76,754	53,938	718.50	165,000	122,000	48.81%	47.53%
Alabama	82,364	$59,784	725.85	197,000	146,100	41.81	40.92
Alaska	18,201	12,042	661.61	36,000	26,800	50.56	44.93
Arizona	111,589	65,229	584.55	307,000	227,000	36.35	28.74
Arkansas	44,416	28,936	651.48	91,000	67,700	48.81	42.74
California	761,335	437,633	574.82	2,073,000	1,533,800	36.73	28.53
Colorado	117,836	77,102	654.32	238,000	176,400	49.51	43.71
Connecticut	76,754	62,945	820.09	126,000	91,300	60.92	68.94
D.C.	17,160	13,190	768.65	68,000	50,400	25.24	26.17
Delaware	12,884	10,676	828.62	32,000	23,600	40.26	45.24
Florida	279,815	187,764	671.03	667,000	493,800	41.95	38.02
Georgia	126,343	86,845	687.37	284,000	210,600	44.49	41.24
Hawaii	32,970	23,689	718.5	58,000	42,100	56.84	56.27
Idaho	30,810	21,086	684.39	51,000	37,500	60.41	56.23
Illinois	296,538	230,383	776.91	659,000	487,700	45.00	47.24
Indiana	126,587	103,124	814.65	260,000	192,400	48.69	53.6
Iowa	93,591	71,596	764.99	150,000	110,800	62.39	64.62
Kansas	75,866	45,965	605.87	177,000	131,000	42.86	35.09
Kentucky	75,124	53,938	717.99	128,000	95,000	58.69	56.78
Louisiana	75,173	53,022	705.33	153,000	113,600	49.13	46.67
Maine	27,072	24,677	911.53	47,000	35,200	57.6	70.11
Maryland	130,800	102,148	780.95	272,000	201,100	48.09	50.79
Massachusetts	159,943	131,250	820.6	359,000	265,700	44.55	49.4
Michigan	242,468	183,024	754.84	503,000	371,900	48.2	49.21
Minnesota	139,901	116,919	835.73	257,000	190,600	54.44	61.34
Mississippi	38,743	26,443	682.52	100,000	74,000	38.74	35.73
Missouri	131,567	89,951	683.69	276,000	204,500	47.67	43.99
Montana	22,078	16,613	752.47	35,000	26,100	63.08	63.65
Nebraska	53,418	36,115	676.08	122,000	90,600	43.79	39.86
Nevada	41,268	23,430	567.75	78,000	57,900	52.91	40.47
New Hampshire	32,436	27,959	861.97	52,000	38,800	62.38	72.06
New Jersey	203,613	177,066	869.62	266,000	197,100	76.55	89.84
New Mexico	33,864	17,681	522.12	97,000	71,700	34.91	24.66
New York	463,733	398,610	859.57	757,000	561,700	61.26	70.96
North Carolina	161,914	100,846	622.84	351,000	259,400	46.13	38.88
North Dakota	21,180	16,097	760.01	30,000	22,400	70.6	71.86
Ohio	243,587	208,568	856.24	478,000	354,200	50.96	58.88
Oklahoma	69,332	41,828	603.3	165,000	122,000	42.02	34.29
Oregon	78,571	52,580	669.2	183,000	135,700	42.93	38.75
Pennsylvania	281,336	260,510	925.97	472,000	349,600	59.61	74.52
Rhode Island	28,899	21,371	739.51	65,000	48,000	44.46	44.52
South Carolina	75,242	51,567	685.35	152,000	112,600	49.50	45.80
South Dakota	23,840	19,606	822.4	34,000	25,200	70.12	77.80
Tennessee	107,602	77,624	721.4	211,000	156,100	51.00	49.73
Texas	401,699	276,129	687.4	893,000	661,200	44.98	41.76
Utah	71,213	50,396	707.68	118,000	87,600	60.35	57.53
Vermont	13,760	12,671	920.86	35,000	26,300	39.31	48.18
Virginia	166,751	113,155	678.59	325,000	235,600	51.31	48.03
Washington	139,153	97,873	703.35	243,000	179,900	57.26	54.4
West Virginia	33,404	24,907	745.63	71,000	52,400	47.05	47.53
Wisconsin	160,729	118,104	734.8	265,000	195,900	60.65	60.29
Wyoming	12,847	8,157	634.93	32,000	23,300	40.15	35.01

Source of Beneficiaries data: Internal Revenue Service, Information Services, Martinsburg Computing Center, Master File Service Support Branch. Source of Projections data: Education Department estimates based on State-level enrollment, Pell Grant recipient data, and the President's fiscal year 2000 budget policy.
Notes: Details may not add to totals because of rounding. Classification by State was usually based on the taxpayer's home address. However, some taxpayers may have used the address of a tax lawyer or accountant or the address of a place of business.

Table 8: Tax Credit Usage by State Characteristics, 1999

				Variation by State Likely to affect Tax Usage (means)			
				% of Returns Eligible by AGI	% Age 18 to 24 (2000)	% Enrolled in College	Mean Public, 2-year Tuition (1997)
Highest Usage (5.32% to 7.75% of Returns)				66.30%	10.11%	5.83%	$1,728
Alaska	Iowa	Nebraska	South Dakota				
Arizona	Kansas	New Hampshire	Utah				
Colorado	Michigan	New York	Wisconsin				
Hawaii	Minnesota	North Dakota	Wyoming				
Idaho	Montana	Rhode Island					
Medium Usage (4.62% to 5.25% of Returns)				64.45%	9.49%	5.88%	$1,660
California	Illinois	New Jersey	Vermont				
Connecticut	Maryland	Oklahoma	Virginia				
D.C.	Massachusetts	Oregon	Washington				
Delaware	Missouri	Pennsylvania					
Lowest Usage (3.31% to 4.55% of Returns)				67.18%	9.74%	4.71%	$1,304
Alabama	Kentucky	Nevada	South Carolina				
Arkansas	Louisiana	New Mexico	Tennessee				
Florida	Maine	North Carolina	Texas				
Georgia	Mississippi	Ohio	West Virginia				
Indiana							
Correlation with % of Returns that claimed a Credit				.0660	.3998	.6989	.2592

Sources: Internal Revenue Service and U.S. Bureau of the Census (2000) *Statistical abstract of the United States*.
Notes: Usage is defined as the percent of Tax Returns in 1999 that claimed the credit. The total number of eligible returns is the number of single returns with an AGI between $10,000 and $50,000 and the number of joint returns and head of household returns between $10,000 and $100,000.

Table 9a: The Likelihood of Attending Any College – Any Credit
Dependent Variable: Enrolled in College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)		Nontraditional Students	All Ages
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)	Age 25-40	Age 18 – 40
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.9058 (1.11)	0.9961 (0.09)	0.8779 (1.44)	0.9926 (0.17)	0.9631 (0.88)	1.0218 (0.73)
Eligible for Any Credit?	1.1125** (2.14)	1.1012** (3.65)	1.0951* (1.74)	1.1029** (3.54)	0.9698 (1.18)	1.0362* (1.80)
After * Any Credit	**0.8773** **(1.57)**	**0.9208*** **(1.85)**	**0.9186** **(1.01)**	**0.9261** **(1.62)**	**1.0279** **(0.89)**	**0.9644** **(1.29)**
Observations	23,950	97,255	23,106	90,854	296,089	394,365
Pseudo R-squared	0.17	0.20	0.17	0.19	0.05	0.17

** Statistically Significant at 5% level * Statistically Significant at 10% level
See the notes to Table 9c.

Table 9b: The Likelihood of Attending Any College
Monetary amount of the Maximum Credit Eligible (hundreds)
Dependent Variable: Enrolled in College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)		Nontraditional Students	All Ages
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)	Age 25-40	Age 18 – 40
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.9028 (1.29)	0.9817 (0.44)	0.8831 (1.52)	0.9763 (0.55)	0.9763 (0.62)	1.0272 (0.95)
Maximum Credit	1.0000 (0.63)	1.0001** (2.99)	1.0000 (0.27)	1.0001** (2.74)	1.0000 (0.03)	1.0001** (6.22)
After * Max Credit	**0.9999*** **(1.88)**	**0.9999** **(1.31)**	**0.9999** **(1.37)**	**0.9999** **(1.06)**	**1.0000** **(0.54)**	**0.9999** **(1.63)**
Observations	24,307	98,883	23,446	92,362	299,627	399,551
Pseudo R-squared	0.17	0.19	0.17	0.19	0.05	0.17

** Statistically Significant at 5% level * Statistically Significant at 10% level
See the notes to Table 9c.

Table 9c: The Likelihood of Attending Any College
Credit available if enrolled at the State's Public Two-year Mean College
Dependent Variable: Enrolled in College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)		Nontraditional Students	All Ages
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)	Age 25-40	Age 18 – 40
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.8834*	0.9848	0.8677**	0.9816	0.9963	1.0407
	(1.76)	(0.38)	(1.98)	(0.44)	(0.09)	(1.38)
Max Credit @	1.0000	1.0001**	1.0000	1.0000*	1.0000	1.0001**
Public 2-year	(0.50)	(2.14)	(0.21)	(1.95)	(0.49)	(4.11)
After * Max	**0.9999**	**0.9999**	**0.9999**	**0.9999**	**1.0000**	**0.9999****
2-year Credit	**(1.62)**	**(1.44)**	**(1.17)**	**(1.26)**	**(0.51)**	**(2.22)**
Observations	24,307	98,883	23,446	92,362	299,627	399,551
Pseudo R-squared	0.17	0.19	0.17	0.19	0.05	0.17

** Statistically Significant at 5% level * Statistically Significant at 10% level

Source: October CPS data 1990-2000. Odds ratios are reported with robust z statistics in parentheses. Each model contains year fixed effects and controls for gender, race (dummy variables for black, asian, and hispanic), age, marital status, level of education, a dummy variable for being employed, family income, the annual state unemployment rate, the annual per capita income of the state of residents, and the percentage of the state with a baccalaureate degree.

Table 10a: The Likelihood of Attending a Four-year College conditional on being Enrolled Eligible for Any Credit

Dependent Variable: Enrolled in a 4-year College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)		Nontraditional Students	All Ages
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)	Age 25-40	Age 18 – 40
	(1)	(2)	(3)	(4)	(5)	(6)
After	7.5760** (14.97)	9.3086** (17.08)	7.6287** (14.72)	9.6062** (16.85)	5.5325** (15.27)	5.4914** (20.94)
Eligible for Any Credit?	0.8378** (2.44)	0.9843 (0.32)	0.8411** (2.28)	0.9732 (0.52)	0.8218** (3.62)	0.9544 (1.35)
After * Any Credit	**1.0438 (0.47)**	**1.1716** (2.31)**	**1.0685 (0.73)**	**1.1938** (2.43)**	**1.0441 (0.55)**	**1.1971** (3.13)**
Observations	14,748	40,527	14,304	38,067	22,003	63,162
Pseudo R-squared	0.30	0.35	0.30	0.35	0.14	0.22

** Statistically Significant at 5% level * Statistically Significant at 10% level

See the notes to Table 10b.

Table 10b: The Likelihood of Attending a Four-year College conditional on being Enrolled Monetary amount of the Maximum Credit Eligible (in hundreds)

Dependent Variable: Enrolled in a 4-year College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)		Nontraditional Students	All Ages
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)	Age 25-40	Age 18 – 40
	(1)	(2)	(3)	(4)	(5)	(6)
After	8.3229** (14.83)	9.5650** (16.96)	8.4510** (14.75)	9.9098** (16.67)	5.7069** (15.79)	5.8960** (21.54)
Maximum Credit	0.9838** (3.39)	0.9832** (4.67)	0.9836** (3.33)	0.9830** (4.35)	0.9830** (3.94)	0.9942** (2.07)
After * Max Credit	**0.9999 (0.96)**	**1.0002** (2.89)**	**1.0000 (0.74)**	**1.0002** (2.87)**	**1.0000 (0.07)**	**1.0001* (1.95)**
Observations	14,937	41,118	14,484	38,614	22,258	64,025
Pseudo R-squared	0.30	0.35	0.30	0.36	0.14	0.22

** Statistically Significant at 5% level * Statistically Significant at 10% level

Source: October CPS data 1990-2000. Odds ratios are reported with robust z statistics in parentheses. Each model contains year fixed effects and controls for gender, race (dummy variables for black, asian, and hispanic), age, marital status, level of education, a dummy variable for being employed, family income, the annual state unemployment rate, the annual per capita income of the state of residents, and the percentage of the state with a baccalaureate degree.

Table 11a: The Likelihood of Attending Full-time conditional on being Enrolled
Eligible for Any Credit

Dependent Variable: Enrolled in a 4-year College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)	
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)
	(1)	(2)	(3)	(4)
After	0.7335**	0.9531	1.1278	0.9245
	(3.24)	(0.68)	(0.81)	(1.08)
Eligible for Any Credit?	1.1801**	0.9652	1.0870	0.9723
	(2.39)	(0.60)	(0.68)	(0.44)
After * Any Credit	0.9569	0.9791	0.9485	0.9801
	(0.40)	(0.27)	(0.36)	(0.24)
Observations	18,312	41,159	13,907	38,664
Pseudo R-squared	0.28	0.15	0.10	0.15

** Statistically Significant at 5% level * Statistically Significant at 10% level

See the notes to Table 11b.

Table 11b: The Likelihood of Attending Full-time conditional on being Enrolled
Monetary amount of the Maximum Credit Eligible (hundreds)

Dependent Variable: Enrolled in a 4-year College (odds ratios reported with robust Z statistics in parentheses)

	Age of Traditional College Students		Traditional College Students (excluding states with full-tuition pgms)	
	Age 18-19	Age 18-24	Age 18-19 (No GA,FL,NM)	Age 18-24 (No GA,FL,NM)
	(1)	(2)	(3)	(4)
After	0.7046**	0.9398	1.0242	0.9109
	(4.18)	(0.95)	(0.16)	(1.39)
Maximum Credit	1.0000	0.9999*	0.9999	0.9999
	(0.18)	(1.72)	(1.04)	(1.52)
After * Max Credit	1.0000	1.0000	1.0001	1.0000
	(0.13)	(0.05)	(0.76)	(0.07)
Observations	18,568	41,767	14,080	39,228
Pseudo R-squared	0.28	0.15	0.10	0.15

** Statistically Significant at 5% level * Statistically Significant at 10% level

Source: October CPS data 1990-2000. Odds ratios are reported with robust z statistics in parentheses. Each model contains year fixed effects and controls for gender, race (dummy variables for black, asian, and hispanic), age, marital status, level of education, a dummy variable for being employed, family income, the annual state unemployment rate, the annual per capita income of the state of residents, and the percentage of the state with a baccalaureate degree.

Table 12: Public Colleges by 1997 Tuition Level (pre-policy change)

	Treatment Group #1	Treatment Group #2	Control Groups		
List In-State Tuition (1997)	**≤ $1,000**	**$1,001 – $2,000**	**$2,001 – $5,000**	**$5,001 – $7,500**	**$7,501 – $10,000**
HOPE: Marginal Cost to Student	0%	50%	100%	100%	100%
LLTC: Marginal Cost to Student	80%	80%	80%	100%	100%
			Public Two-year Colleges		
New England	--	6	20	1	--
Mideast	--	6	80	--	--
Great Lakes	--	11	85	9	--
Plains	1	37	27	--	--
Southeast	85	143	1	--	--
Southwest	34	52	9	--	--
Rocky Mt	--	29	2	--	--
Far West	50	42	--	--	--
Total	170	326	224	10	--
			Public Four-year Colleges		
New England	--	1	28	4	1
Mideast	--	--	65	25	1
Great Lakes	--	--	72	2	--
Plains	--	4	47	--	--
Southeast	--	32	107	3	--
Southwest	--	24	29	--	--
Rocky Mt	--	8	19	--	--
Far West	--	18	31	--	--
Total	--	87	398	34	2

Source: IPEDS data. The regions are: New England (CT, ME, MA, NH, RI, VT), Mid East (DE, DC, MD, NJ, NY, PA), Great Lakes (IL, IN, MI, OH, WI), Plains (IA, KS, MN, MO, NE, ND, SD), Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV), Southwest (AZ, NM, OK, TX), Rocky Mountains (CO, ID, MT, UT, WY), Far West (AK, CA, HI, NV, OR, WA).

Table 13: Public Two-year Institutions with Tuition ≤ $1,000 (Treatment Group #1)
Compared to Public Two-year Colleges with Tuition > $2,000

	Dependent Variable Log (List In-state Tuition Price)			Dependent Variable Log (State Approp. per Student)	
	Basic Model	Adding Geogr. Controls	Adding State Approp.	Basic Model	Adding Geogr. Controls
	(1)	(2)	(3)	(4)	(5)
After	-.1254** (.0193)	-.1121** (.0191)	-.0815** (.0209)	-.0750** (.0200)	-.0021 (.0215)
Tuition ≤ $1,000	-1.5028** (.0288)	-1.3754** (.0647)	-1.2143** (.0510)	.4609** (.0592)	1.1841** (.2292)
After * Tuition ≤ $1,000	**.0898** (.0318)**	**.0644** (.0314)**	**.0135 (.0314)**	**.0286 (.0251)**	**-.0243 (.0256)**
Log State Appropriations			-.0739** (.0267)		
Year Fixed Effects	yes	yes	yes	yes	yes
State Characteristics	no	yes	yes	no	yes
Region Controls	no	yes	yes	no	yes
Number of Colleges	404	404	404	404	404
Observations	2,798	2,798	2,599	2,628	2,628
R-squared	.8163	.8670	.8802	.1423	.4497

** Statistically Significant at 5% level * Statistically Significant at 10% level

Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 14a: Public Two-year Institutions with Tuition $1,001 – $2,000 (Treatment Group #2)
Compared to Public Colleges with Tuition > $2,000
Dependent Variable = Log (List In-state Tuition Price)

	All Public Colleges			Public Four-year Colleges		Public Two-year Colleges	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
After	-0.1646** (0.0126)	-.1984** (.0167)	-.1966** (.0167)	-.1879** (.0165)	-.1902** (.0165)	-.1253** (.0186)	-.0914** (.0204)
Tuition $1,001 – $2,000	-0.3957** (0.0205)	-.3859** (.0206)	-.3654** (.0183)	-.2838** (.0204)	-.2846** (.0202)	-.5150** (.0356)	-.4828** (.0283)
After * Tuition $1,001 – $2,000	**-0.0262 (0.0217)**	**-.0323 (.0415)**	**-.0426 (.0414)**	**-.1012** (.0385)**	**-.0983** (.0386)**	**-.0377 (.0279)**	**-.0422 (.0299)**
Two-year College	-0.1066** (0.0236)	-.1289** (.0240)	-.1778** (.0228)				
After * Two-year		.0959** (.0257)	.1184** (.0269)				
After * Two-year * Tuition Group		**-.0464 (.0523)**	**-.0295 (.0522)**				
Log State Appropriations			-.0839** (.0203)		-.0369 (.0295)		-.1150** (.0251)
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes
State Characteristics	yes	yes	yes	yes	yes	yes	yes
Region Controls	yes	yes	yes	yes	yes	yes	yes
Number of Colleges	1,081	1,081	1,081	521	521	560	560
Observations	7,470	7,470	7,144	3,574	3,553	3,896	3,591
R-squared	0.6885	.6898	.7030	.6135	.6142	.6619	.6897

** Statistically Significant at 5% level * Statistically Significant at 10% level
Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 14b: Public Two-year Institutions with Tuition $1,001 – $2,000 (Treatment Group #2)
Compared to Public Colleges with Tuition > $2,000
Dependent Variable = Log (State Appropriations per FTE Student)

	All Public Colleges			Public Four-year Colleges		Public Two-year Colleges	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
After	-.0162** (.0077)	-.0260** (.0089)	-.0111 (.0106)	.0105* (.0062)	-.0312** (.0093)	-0.0448** (0.0179)	.0154 (.0169)
Tuition $1,001 – $2,000	.2514** (.0310)	.1093** (.0440)	.1124** (.0445)	.0934** (.0439)	-.0246 (.0435)	0.3363** (0.0410)	.0892 (.0970)
After * Tuition $1,001 – $2,000	**.0480** (.0127)**	**.0491** (.0128)**	**-.0504 (.0394)**	**.0537** (.0181)**	**.0656** (.0186)**	**0.0594** (0.0200)**	**.0056 (.0188)**
Two-year College	-.5105** (.0494)	-.4417** (.0524)	-.4450** (.0528)				
After * Two-year			-.0495** (.0236)				
After * Two-year * Tuition Group			**.1648** (.0584)**				
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes
College Selectivity	yes	yes	yes	yes	yes	no	no
State Characteristics	no	yes	yes	no	yes	no	yes
Region controls	no	yes	yes	no	yes	no	yes
Number of Colleges	1,081	1,081	1,081	521	521	560	560
Observations	7,239	7,239	7,239	3,626	3,626	3,613	3,613
R-squared	.4065	.4477	.4486	.1424	.2463	0.1335	.2515

** Statistically Significant at 5% level * Statistically Significant at 10% level
Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 15: Changes in Tuition and State Appropriations within Region
Compared to Public Colleges with Tuition > $2,000

Dependent Variable	Southeast Region		Southwest Region		Far West Region	
	Log List Tuition	Log State Approp.	Log List Tuition	Log State Approp.	Log List Tuition	Log State Approp.
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Group #1						
After *	**.3154****	**-.0497***	**.1469****	**-.0955****	**-.0760**	**.1212****
Tuition ≤ $1,000	**(.0519)**	**(.0260)**	**(.0732)**	**(.0419)**	**(.0688)**	**(.0503)**
Treatment Group #2						
After * Tuition	**.1100****	**.0199**	**-.0008**	**-.0858****	**.1655****	**-.0200**
$1,001 – $2,000	**(.0505)**	**(.0194)**	**(.0782)**	**(.0416)**	**(.0540)**	**(.0394)**
Year Fixed Effects	yes	yes	yes	yes	yes	yes
College Selectivity	yes	yes	yes	yes	yes	yes
State Characteristics	yes	yes	yes	yes	yes	yes
Number of Colleges	371	371	148	148	141	141
Observations	2,588	2,502	1,022	954	916	952
R-squared	.7724	.3955	.5932	.4658	.9029	.5404

** Statistically Significant at 5% level * Statistically Significant at 10% level

Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 16: The Distribution of College by State Aid Type

	Treatment Group #3		Control Group	
	High State Aid		**Not High Aid**	
	Public 4-Year Colleges	Public 2-Year Colleges	Public 4-Year Colleges	Public 2-Year Colleges
≤ $1,000	0	40	0	130
$1,001 – $2,000	15	5	72	321
$2,001 – $5,000	111	138	287	86
$5,001 – $7,500	25	10	9	0
>$7,500	2	0	0	0
Total	153	193	368	537

Source: NASSGAP 29th Annual Survey, IPEDS data, and the National Center for Education Statistics. "High State Aid" is defined as being ranked as one of the top eight states in 1997-98 in total grant aid or per student aid (see below). However Georgia, Florida, and New Mexico are excluded because they each have large aid programs that cover full tuition for a significant proportion of their students. Therefore, these states do not have the incentive to raise tuition prices as they would have to pay for them out of their own aid program.

The "High Aid" states in terms of total expenditures are New York ($649 million), Illinois ($311 million), California ($286 million), Pennsylvania ($252 million), Georgia ($209 million) New Jersey ($161 million), Ohio ($140 million), and Florida ($135 million). The "High Aid" states in terms of per student expenditures are Georgia ($683), New York ($634), New Jersey ($495), Illinois ($429), Pennsylvania ($428), New Mexico ($394), Minnesota ($357), and Vermont ($342). These benchmarks were chosen due to the natural break in the amounts of the next highest states. (The next highest state in total amount is North Carolina with $105 million. The next highest state in per student expenditures is Indiana with $292.50.)

Table 17a: The Tuition Response in States with Large Aid Programs – All Public Colleges
Dependent Variable = Log (List Tuition Price)

	Basic Model	Adding Geogr. Controls	Adding State Approp.	Interaction with Two-year Dummy Var.	Interaction with other Treatment Groups
	(1)	(2)	(3)	(4)	(5)
Treatment Group #3					
High State Aid	.4029**	-.0659*	-.0844**	-.0764*	.1227**
	(.0383)	(.0371)	(.0374)	(.0397)	(.0219)
After * High State Aid	.1179**	.0713**	.0840**	.0676**	.1819**
	(.0197)	(.0184)	(.0195)	(.0277)	(.0235)
After * Two-year				.1133**	
				(.0255)	
After * High Aid				.0244	
* Two-year				(.0384)	
Treatment Group #1					
After *					.2411**
Tuition ≤ $1,000					(.0298)
Treatment Groups #1 & #3					
After * High Aid					-.5447**
* Tuition ≤ $1,000					(.0414)
Treatment Group #2					
After *					.0614**
Tuition $1,001 – $2,000					(.0283)
Treatment Groups #2 & #3					
After * High Aid					-.0186
* $1,000 - $2,000					(.0790)
Year Fixed Effects	yes	yes	yes	yes	yes
Two-year College	yes	yes	yes	yes	yes
College Selectivity	yes	yes	yes	yes	yes
State Characteristics	no	yes	yes	yes	yes
Region controls	no	yes	yes	yes	yes
Log State Appropriations	no	no	yes	yes	yes
Number of Colleges	1,251	1,251	1,251	1,251	1,251
Observations	8,641	8,641	8,641	8,641	8,641
R-squared	.3524	.6251	.6360	.6377	.8441

** Statistically Significant at 5% level * Statistically Significant at 10% level

Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 17b: The Tuition Response in States with Large Aid Programs
Dependent Variable = Log (List Tuition Price)

	Public Four-Year Colleges			Public Two-Year Colleges		
	With Basic Controls	Adding State Approp.	Interaction with other Groups	With Basic Controls	Adding State Approp.	Interaction with other Groups
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment Group #3						
High State Aid	.0630*	.0606*	.1126**	-.1911**	-.2180**	.0844**
	(.0323)	(.0324)	(.0312)	(.0512)	(.0525)	(.0370)
After * High State Aid	.1799**	.1786**	.1373**	.0478**	.0656**	.2593**
	(.0226)	(.0232)	(.0256)	(.0232)	(.0265)	(.0572)
Treatment Group #1						
After * Tuition ≤ $1,000						.2760**
						(.0586)
Treatment Groups #1 & #3						
After * High Aid * Tuition ≤ $1,000						-.6153**
						(.0668)
Treatment Group #2						
After * Tuition $1,001 - $2,000			-.0749*			.1288**
			(.0415)			(.0586)
Treatment Groups #2 & #3						
After * High Aid * $1,000 - $2,000			.0000			-.1353*
			(.0000)			(.0708)
Year Fixed Effects	yes	yes	yes	yes	yes	yes
College Selectivity	yes	yes	yes	no	no	no
State Characteristics	yes	yes	yes	yes	yes	yes
Region controls	yes	yes	yes	yes	yes	yes
Log State Appropriations	no	yes	yes	no	yes	yes
Number of Colleges	521	521	521	730	730	730
Observations	3,574	3,553	3,553	5,067	4,688	4,688
R-squared	.5644	.5649	.6305	.5776	.5989	.8515

** Statistically Significant at 5% level * Statistically Significant at 10% level

Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 18a: Changes in Appropriations in States with Large Aid Programs – All Public Colleges
Dependent Variable = Log (State Appropriations per Student)

	Basic Model	Adding Geogr. Controls	Interaction with Two-year Dummy Var.	Interaction with other Treatment Groups
	(1)	(2)	(3)	(4)
Treatment Group #3				
High State Aid	-.2741**	-.0489	.1467**	.0649
	(.0333)	(.0468)	(.0550)	(.0502)
After * High State Aid	-.0179	-.0541**	-.0954**	-.0651**
	(.0139)	(.0146)	(.0170)	(.0155)
After * Two-year			.0135	
			(.0115)	
After * High Aid * Two-year			.0546**	
			(.0256)	
Treatment Group #1				
After * Tuition ≤ $1,000			.0020	
			(.0205)	
Treatment Groups #1 & #3				
After * High Aid * Tuition ≤ $1,000			.1739**	
			(.0518)	
Treatment Group #2				
After * Tuition $1,001 – $2,000			.0267**	
			(.0135)	
Treatment Groups #2 & #3				
After * High Aid * $1,000 - $2,000			-.0142	
			(.0333)	
Year Fixed Effects	yes	yes	yes	yes
Two-year College	yes	yes	yes	yes
College Selectivity	yes	yes	yes	yes
State Characteristics	no	yes	yes	yes
Region controls	no	yes	yes	yes
Number of Colleges	1,251	1,251	1,251	1,251
Observations	8355	8355	8355	8355
R-squared	.3389	.3979	.4143	.4439

** Statistically Significant at 5% level * Statistically Significant at 10% level

Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 18b: Changes in Appropriations in States with Large Aid Programs
Dependent Variable = Log (State Appropriations per Student)

	Public Four-Year Colleges		Public Two-Year Colleges	
	With Basic Controls	Interaction with other Groups	With Basic Controls	Interaction with other Groups
	(1)	(2)	(3)	(4)
Treatment Group #3				
High State Aid	-.0614	-.0499	-.0095	.2005**
	(.0542)	(.0571)	(.0685)	(.0840)
After * High State Aid	-.0928**	-.0870**	-.0145	-.0621**
	(.0182)	(.0187)	(.0198)	(.0283)
Treatment Group #1				
After *				-.0649**
Tuition ≤ $1,000				(.0305)
Treatment Groups #1 & #3				
After * High Aid				.1570**
* Tuition ≤ $1,000				(.0580)
Treatment Group #2				
After *		.0532**		-.0252
Tuition $1,001 - $2,000		(.0215)		(.0253)
Treatment Groups #2 & #3				
After * High Aid		.0002		.0712
* $1,000 - $2,000		(.0364)		(.0828)
Year Fixed Effects	yes	yes	yes	yes
College Selectivity	yes	yes	no	no
State Characteristics	yes	yes	yes	yes
Region controls	yes	yes	yes	yes
Log State Appropriations	no	yes	no	yes
Number of Colleges	521	521	730	730
Observations	3,626	3,626	4,729	4,729
R-squared	.2509	.2524	.3029	.3494

** Statistically Significant at 5% level * Statistically Significant at 10% level

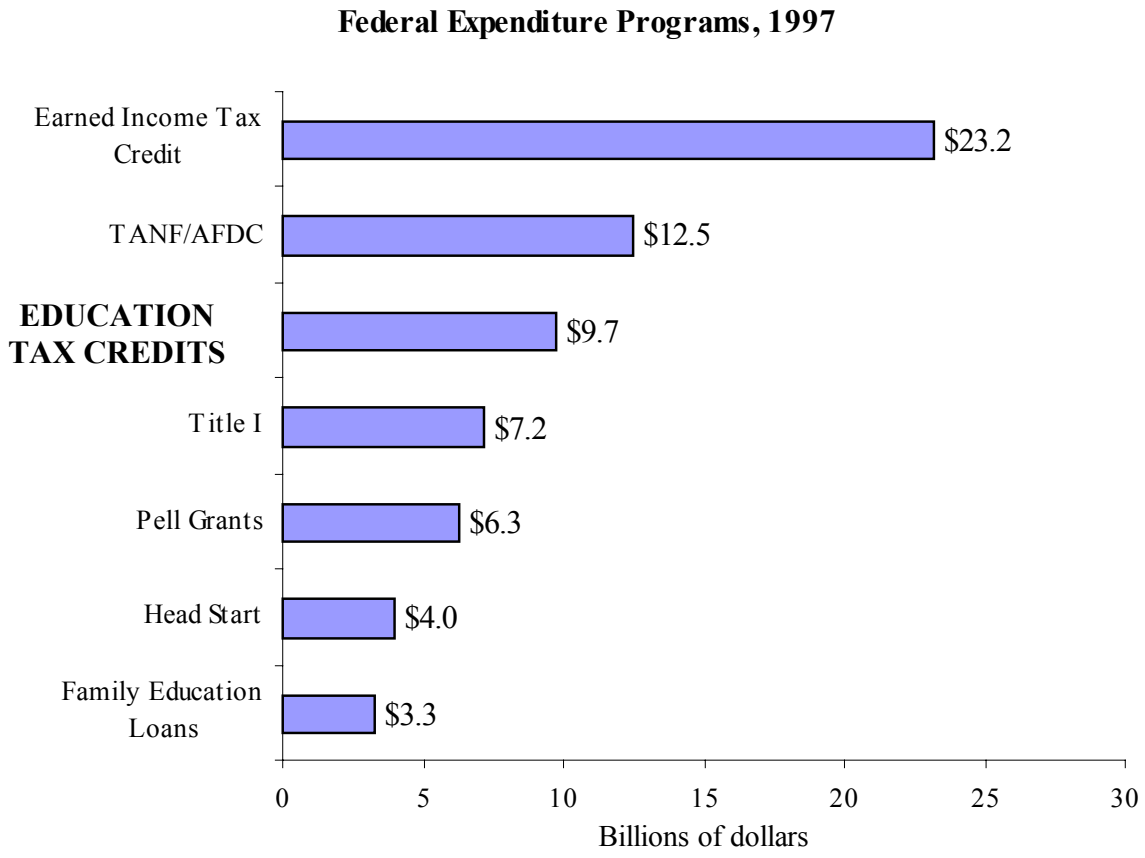
Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Table 19: The Response of States with Large Aid Programs (Treatment Group #3)
Public Four-Year Colleges
Dependent Variable = Log (Room and Board Charges)

	Basic Model	Adding Geographic Controls
	(1)	(2)
After	.0676**	.0460**
	(.0064)	(.0073)
High State Aid	.2273**	.0473*
	(.0216)	(.0261)
After * High State Aid	**-.0088**	**-.0130**
	(.0090)	**(.0098)**
Year Fixed Effects	yes	yes
College Selectivity	yes	yes
State Characteristics	no	yes
Region controls	no	yes
Number of Colleges	360	360
Observations	2,493	2,493
R-squared	.3342	.6137

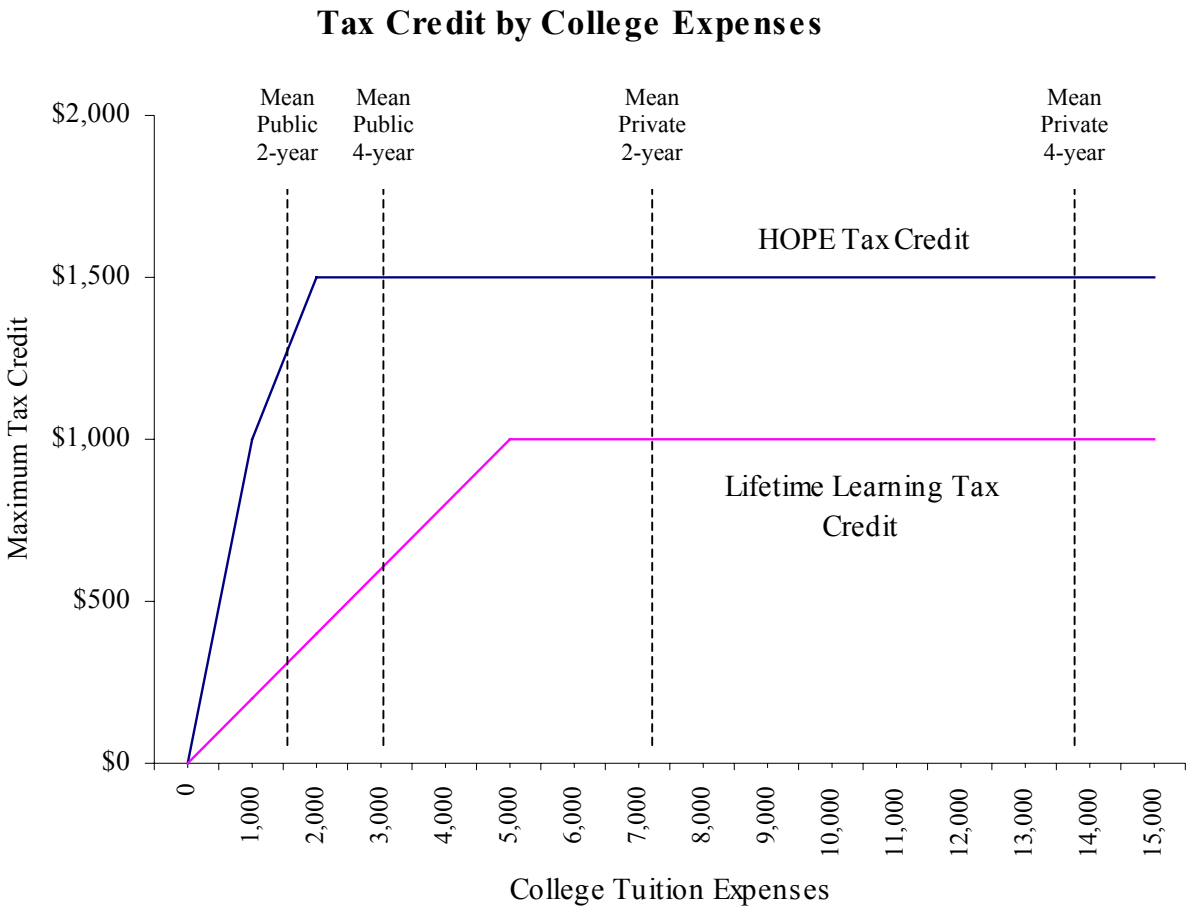
** Statistically Significant at 5% level * Statistically Significant at 10% level
Notes: IPEDS data from 1993-94 to 1999-2000. Robust standard errors are shown in parentheses. College selectivity measures consist of dummy variables for the Barron's groupings. The state characteristics include the annual unemployment rate, annual per capita income, and 1990 percent of the population with a bachelor's degree.

Figure 1



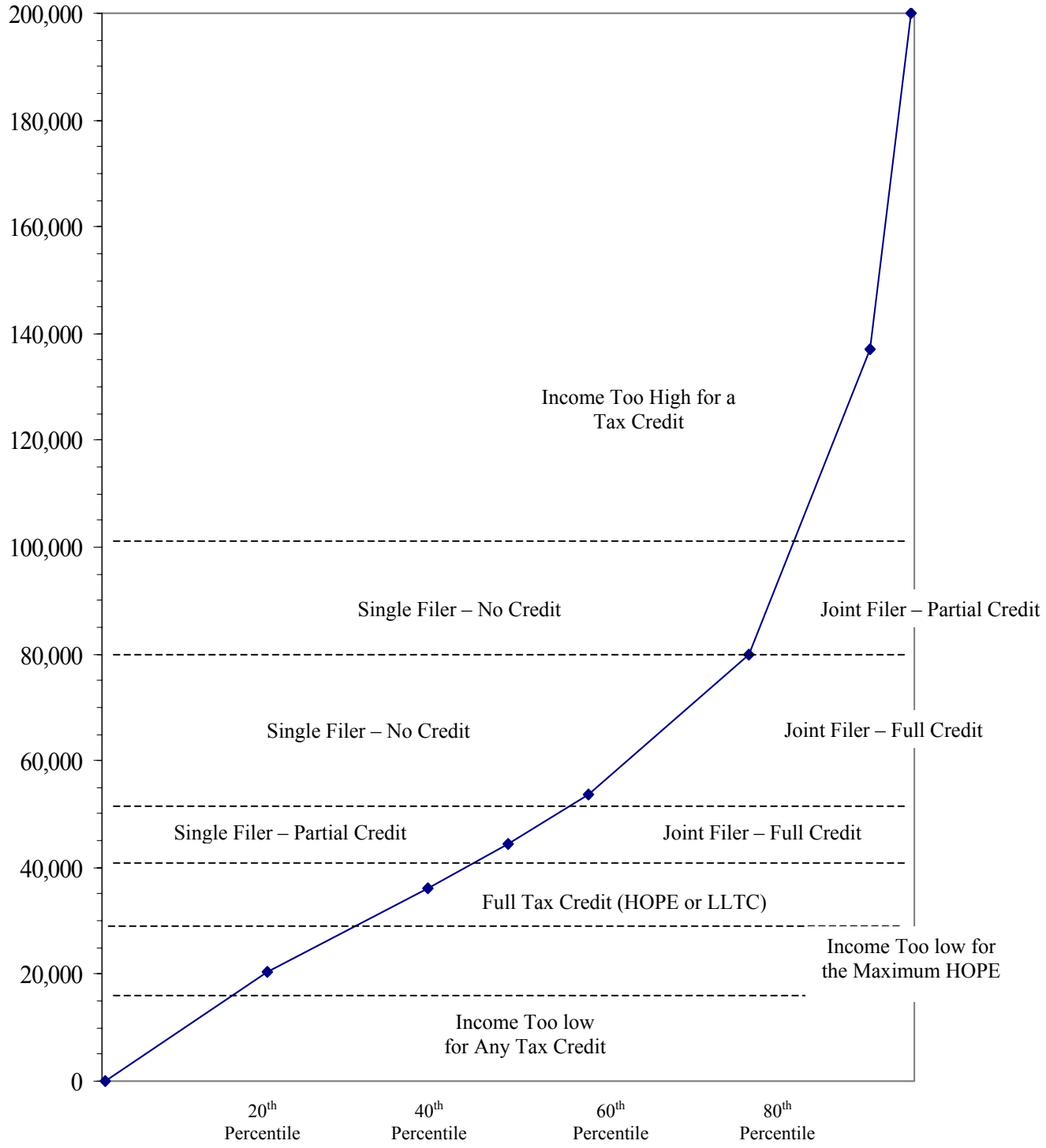
Sources: The expenditure on higher education tax credits is a projection by the Department of Education based on State-level enrollment, Pell Grant recipient data, and the President's fiscal year 2000 budget policy. Information on the other programs is from the College Board (2001a), NCES (1998) and U.S. Census Bureau (2000).

Figure 2



Notes: Source of tax credit information: U.S. Department of Treasury, Internal Revenue Service (1998c) *Tax Benefits for Higher Education.* Publication 970. In 2003, the maximum LLTC will increase to $2,000. For the 1997-98 school year, the mean tuition cost (enrollment weighted) for a public, two-year college was $1,567, $3,111 for a public, four-year college, $7,079 for a private, two-year college, and $13,785 for a private, four-year college (College Board, 2001b).

Figure 3: Tax Credit Benefit by 1997 Family Income Distribution



Notes: Figures for dependent students assumes a family of four with married parents filing jointly. Income benchmarks calculated from the 1998 Form 1040 (Individual Income Tax Return) Instructions, Publication 970, and 1998 Tax Tables. The income distribution was drawn using information on the distribution quintiles and median from the U.S. Census Bureau (1999) "Current Population Reports, P60-200". Income was top-coded at $200,000 for this figure.

Figure 4: College Expenses Net the Tax Credits