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THE IMPACT OF THE HOPE SCHOLARSHIP CREDIT ON TUITION AND ENROLLMENT OF POSTSECONDARY EDUCATIONAL INSTITUTIONS

A DISSERTATION

PRESENTED FOR THE

DOCTOR OF PHILOSOPHY

DEGREE

UNIVERSITY OF MISSISSIPPI
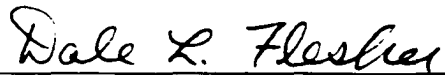
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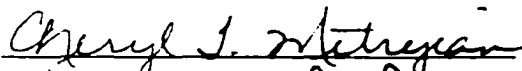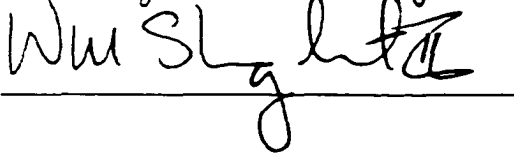
I am submitting herewith a dissertation written by Marilyn Young entitled "The Impact of the Hope Scholarship Credit on Tuition and Enrollment of Postsecondary Educational Institutions." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Accountancy.

_____
Dr. Tonya Flesher, Major Professor

We have read this dissertation
And recommend its acceptance:

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Accepted for the Council:

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Dean of The Graduate School

DEDICATION

This dissertation is dedicated to my parents. Without their support (emotional, clerical and financial), I would not have been able to complete this project. Thanks for all of your help.

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ABSTRACT

The Hope Scholarship Credit is a nonrefundable income tax credit available to eligible students for up to $1,500 of tuition costs incurred in each of the first two years of postsecondary education. Enacted as part of the Taxpayer Relief Act of 1997, the stated purpose of the Hope Scholarship Credit is to improve access to higher education by reducing the out-of-pocket tuition costs incurred by middle-income taxpayers.

Prior literature suggests that education policy initiatives such as the Hope Scholarship Credit are ineffective because they create incentives for colleges and universities to raise tuition and capture the benefits of the program. This theory, known as the Bennett Hypothesis, is the basis of this dissertation. Accordingly, this study tests two research questions: 1) Has tuition increased in the year following the enactment of the Hope Scholarship Credit, and 2) Has enrollment changed in the year following the enactment of the Hope Scholarship Credit?

This dissertation uses data from 400 U.S. colleges and universities over ten academic years, 1988-89 to 1997-98, to quantify the trends in the market for higher education over the decade preceding the enactment of the Hope Scholarship Credit. The research design of the study is a two-stage least squares regression model, where tuition is the dependent variable in the first stage and enrollment is the dependent variable in the second stage. The regression coefficients from the models are then used to predict tuition and enrollment during the academic year following the enactment of the Hope Scholarship Credit. The impact of the Hope Scholarship Credit is estimated by comparing

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predicted versus actual tuition charges and enrollments at the sample institutions using t-tests.

The results of this dissertation support the Bennett Hypothesis. That is, in the face of additional subsidies for higher education, colleges raised tuition prices thereby redistributing income from middle-income families to administrators and faculty members. For each type of institution included in the sample, there was a statistically significant increase in tuition over the level predicted from the trend analysis. However, there is no evidence that enrollment changed significantly in the 1998-99 academic year.

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CHAPTER I - INTRODUCTION

Today more than ever before in the history of the United
States, education is the fault line, the Great Continental
Divide between those who will prosper and those who will
not in the new economy. You will see that if all Americans
have access to education, it is no longer a fault line, it is a
sturdy bridge that will lead us all together, from the old
economy to the new.

President Bill Clinton
1996 Campaign Speech
(Education Week on the Web)

If access to education is indeed the bridge that will lead students into the new

economy, Congress intended to pave the bridge with the provisions of the Taxpayer

Relief Act of 1997. This act created tax incentives for education including: the Hope

Scholarship Credit, the Lifetime Learning Credit, an above-the-line deduction for interest

paid on higher education loans, and the Education ("Roth") Individual Retirement

Account. While collectively these provisions are an attempt by the federal government to

improve access to college by making higher education more affordable, this dissertation

will focus only on the Hope Scholarship Credit.

The Hope Scholarship Credit

The Hope Scholarship Credit is a nonrefundable income tax credit available to

eligible students for qualified tuition costs incurred in the first two years of postsecondary

education [Internal Revenue Code (I.R.C.§25A)]. For tax years 1998 through 2002, the

credit is the sum of: 1) 100% of the first $1,000 of qualified tuition and related expenses

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paid by the taxpayer during the year, plus 2) 50% of the next $1,000 of expenses.[1] Thus, for tax years 1998-2002, the maximum allowable credit per student per year is $1,500 [I.R.C. §25A(b)(1)]. This maximum credit corresponds to the average annual tuition charge at two-year community colleges at the time of the enactment of the Taxpayer Relief Act of 1997 (College Board, 1998, p. 7, See Appendix F Average Tuition and Fees 1971-72 to 1998-99). In addition, Congress imposed income limitations on eligibility for the credit. The Hope Scholarship Credit is phased-out for single taxpayers with modified adjusted gross incomes of $40,000-$50,000, and married taxpayers with $80,000-$100,000 of income [I.R.C. §25A(d)(2)].[2] Further, because the Hope Scholarship Credit is nonrefundable, low-income taxpayers that do not have a positive tax liability will not benefit from the new tax credit. Hence, the objective of the Hope Scholarship Credit is to make the first two years of postsecondary education tuition-free for middle-income taxpayers.

For purposes of the credit, an "eligible student" is defined as an individual who is enrolled in a degree, certificate, or other program leading to a recognized educational credential at an institution that is eligible to participate in the U.S. Department of Education student aid programs [I.R.C. §25A(d)(3)]. In addition, the student must be enrolled in at least one-half of the normal full-time course load for at least one academic term that begins during the tax year [I.R.C. §25A(b)(2)(B)].

Qualified tuition and related expenses are defined as tuition and fees required for enrollment at a qualified institution for the taxpayer, the taxpayer's spouse, or the

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[1] For academic years beginning after 2002, the $1,000 limit will be indexed for inflation in $100 increments [I.R.C. §25A (h)(1)(A)].

taxpayer's dependents [I.R.C. §25A(f)(1)(A)]. The credit is not allowed for non-tuition costs incurred for books, student activity fees, insurance premiums, or other expenses not related to the individual's course of study [I.R.C. §25A(f)(1)(C)]. In addition, the taxpayer cannot claim a credit for tuition costs that are covered by a scholarship, financial aid, or any other financial assistance that is not included in gross income [I.R.C. §25A(g)(2)]. Thus, only the student's out-of-pocket tuition costs are eligible for the credit.

The enactment of the Hope Scholarship Credit raises two important questions related to higher education policy. 1) Can federal subsidies correct tuition inflation and problems of access to higher education? 2) Are federal tax credits an effective means of distributing federal subsidies for higher education? This research study was designed to provide evidence to answer these two questions.

Underlying Theory – The Human Capital Model & The Theory of Externalities

The theoretical motivation behind the Hope Scholarship Credit is that everyone in society benefits from the education of one person. Hence if access to higher education is limited by inflated tuition costs, then all of society will suffer the consequences. In the economics literature, researchers have attempted to quantify the demand for higher education, and to develop theories for predicting how much a student will be willing to pay for a college degree.

One such theory is the Human Capital Model. This theory was formalized by Theodore Schultz in the 1960s, and popularized by Gary Becker in the 1980s (Breneman,

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[2] For academic years beginning after 2002, the adjusted gross income limits will be indexed for inflation in

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1994, p. 23). Under this model, higher education is viewed as an investment, analogous to the investment in physical capital in the sense that it generates a stream of future benefits. Similar to other economic models that seek to explain voluntary behavior, the human capital model assumes that investments in higher education should be made when the marginal benefit exceeds the marginal cost. The controversial issue surrounding the human capital model is who should pay for the investment, the individual or society, and consequently who benefits from the return on investment. Clearly, the individual student will benefit from a lifetime of increased wages, but there are benefits to society as well that the student may not incorporate in the decision to attend college.

The human capital model is based generally on the demand theory of economics. Demand theory suggests that the quantity of a particular good or service consumed by an individual will be a function of the price of the good, the money income of the buyer, the prices of related goods (substitutes and complements), and the tastes and preferences of the buyer (Leslie and Brinkman, 1987, p.181). In a competitive economy, the price that a consumer is willing to pay will be equal to the marginal benefit of the good or service. The application of this theory to higher education suggests that individuals will choose to invest in a college education when the expected stream of lifetime earnings exceeds the stream of anticipated educational costs by a margin that is sufficient to yield a rate of return greater than the anticipated returns from other alternative investments (Leslie and Brinkman, 1988, p. 6).

Accordingly, researchers have used the demand theory of economics to hypothesize the following relationships between tuition costs and enrollment rates:

$1000 increments [I.R.C. 25A(h)(2)(A)].

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1) Enrollment at colleges and universities will be negatively associated with tuition prices charged to students, and

2) Enrollment will be positively associated with amounts spent on student financial aid programs, since student aid can be viewed as reducing the net price or, alternatively, increasing the student's money income (Leslie and Brinkman, 1987, p. 181).

Demand theory assumes that the full costs and benefits of the investment decision accrue to the individual consumer. However, the application of demand theory to higher education is complicated by the presence of positive externalities. When the activity of one person affects the welfare of another in a way that is not reflected in market prices, that effect is called an externality (Rosen, 1995, p. 91). Externalities can be positive or negative. That is, one person's activity can harm or benefit another. Most researchers agree, however, that education produces only positive benefits. Examples of the positive externalities of higher education could include faster economic growth, increased productivity, and political stability (Saxton, 1997).

The theory of externalities suggests that the presence of these social benefits keeps the market for higher education from operating efficiently because students do not incorporate the social benefits into their decisions to attend college. If students only consider their individual private benefits, they then underestimate the true value of a college education. To the extent that students ignore the social benefits, they collectively demand a sub-optimal level of higher education and, consequently, the market fails to supply the quantity of postsecondary education that is best for society (Rosen, p.91).

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The remedy for this market failure, according to the theory of externalities, is government subsidies to encourage students to consume the socially optimal amount of higher education. In theory, the value of the subsidy should equal the amount of the market's underestimation of the social benefits. Thus, the subsidies correct the market failure by providing the student with incentives to internalize the external social benefits of attending college (Rosen, p. 91). However, a weakness of this theory is that assigning an objective dollar value to the social benefits and determining the socially optimal supply of higher education is problematic.

Proponents of the theory of externalities have used the human capital model to justify public subsidies for higher education (Breneman, 1994, p. 23). The central question is, who should pay for higher education, the student or society? If the majority of the benefits accrue to the student in the form of higher wages, then the student should bear the majority of the costs of attending college. However, if the majority of the benefits accrue to the public, then society should bear the majority of the cost. Based on the estimates of the benefits to society, the federal government has established a system of student financial aid programs and government appropriations to postsecondary institutions to minimize the tuition charged to students, and hence let the general taxpayer shoulder some of the financial burden for higher education. Examples of these government programs include the GI Bill enacted in 1943, programs created in the Higher Education Act of 1965, and the Pell Grant program enacted in 1974. Because an objective estimate of the benefits to society cannot be made, policymakers have appeared to assume that a potentially incorrect level of subsidy is better than no subsidy at all.

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Thus, education policy has been driven by the notion that government subsidies should continue to increase until the market for higher education operates efficiently.

Supporters of the Hope Scholarship Credit point to the sharp increase in tuition costs at colleges and universities over the last two decades as evidence of a market inefficiency that justifies tax relief for parents and students. From 1980 to 1998, the average inflation-adjusted tuition cost at public four-year universities rose by 109%, and it rose by 122% at public two-year colleges. Tuition at private four-year universities increased by 113% over the same period. These price increases over the last two decades represent increases that are twice and sometimes three times the increase in the Consumer Price Index. The rise in tuition prices appears even more alarming given the stagnant growth in family income. Since 1981, the average median family income has risen by only 12% (The College Board, 1998, p. 3).

In addition, the market demand for a college education has driven up the salaries earned by college graduates. In 1979, the average male college graduate earned 49% more than the average high school graduate (Kane, 1997, p. 336). By 1993, the gap had widened to 90%; resulting in average monthly incomes of $1,380 for the high school graduate and $2,625 for the college graduate (U.S. Bureau of the Census, 1993, P70-51). With tuition costs rising faster than the rate of inflation, policymakers supported the new tax incentives for higher education out of a concern that the middle class is being priced out of the market for postsecondary education. If middle class parents cannot afford education beyond high school for their children, then the gap in earnings threatens their children's ability to attain middle class status in adulthood.

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A Competing Theory - The Bennett Hypothesis

The human capital model and the theory of externalities provide one explanation for the current state of financing of higher education. The implication is that the level of government subsidies for higher education is too low to fully correct the perceived market inefficiencies. Thus, additional subsidies are needed. However, there is a competing explanation for the recent trends in tuition prices. In 1987, Secretary of Education William Bennett insisted that funding for federal student aid should be cut because the main effect of student aid is simply to cause schools to raise their prices. Bennett advanced his argument in an article in the *New York Times* entitled "Our Greedy Colleges" (Bennett, 1987). The reasoning of his argument can be summarized as follows:

> The escalation in college costs is occurring because it enables the people
> who run colleges to extract profits from an ostensibly nonprofit
> system and redistribute them as they wish....Washington's shift
> to "need-based" programs in the late 1970s effectively allowed
> higher educators to tap federal funds simply by raising their fees.
> (Brimelow 1987, p.148)

This view, which came to be known as the "Bennett Hypothesis," was very controversial because it challenged the widely accepted human capital argument that society should bear a substantial portion of the cost of higher education. On the basis of the Bennett Hypothesis, the Reagan administration proposed cuts to federal grant programs and increases in loans on the belief that the financing of higher education is an individual rather than a public responsibility (St. John, 1994, p.2).

The reasoning of the Bennett Hypothesis provides a basis for challenging some of the arguments supporting the human capital model, and thus the enactment of the Hope Scholarship Credit. First, proponents of new tax incentives for higher education assume

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that additional subsidies will encourage enrollment because tuition costs will be unaffected by the subsidies. In the last two decades when funding for federal financial aid programs has increased, tuition costs have also increased. Anecdotally, this suggests that subsidies for education can be inflationary. Further, the Hope Scholarship Credit is targeted only at middle-income taxpayers. Thus, if tuition costs increase in the years following the enactment of the credit, then middle-income taxpayers will not be helped by the credit and college will become more expensive for groups who do not qualify for the credit, that is, upper income and lower income taxpayers.

In addition, arguments in favor of increased government subsidies are predicated on the assumption that the current federal financial aid programs do not provide adequate subsidies for education. Yet, according to the College Board, "for most Americans, college remains accessible, especially with the availability of more than $60 billion in financial aid" (College Board Online, 1997). Once the financial aid is distributed, one-half of all students receive some form of assistance. More than one-half of all the students attending four-year institutions pay less than $4,000 per year in tuition and fees, and almost three-quarters face tuition charges of less than $8,000. Only 6% of college students attend universities charging $20,000 or more per year (The College Board, 1998, p. 3). While some policymakers call the current state of financing higher education a crisis, Donald Stewart, president of the College Board, warned that "focusing too much on the highest priced institutions overstates the problem and unduly alarms the public" (The College Board Online, 1997).

Finally, the argument in favor of additional subsidies for higher education is based on the assumption that money is the only barrier to earning a college degree.

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While financial considerations may represent a barrier to entry initially, money alone does not guarantee that a student will successfully complete the degree requirements. The National Center for Education Statistics has found that the following non-monetary factors are significant predictors of a student's success in college: the parents' educational attainment, the student's degree objective (degree v. non-degree courses of study), the type of postsecondary institution attended, the timing of enrollment (the fall semester following high school graduation v. delaying enrollment), and enrollment intensity and continuity (Clotfelter, 1991 p. 107 and National Center for Education Statistics, 1997). In other words, money is not the only factor. Open access to postsecondary institutions does not guarantee that a student who enrolls will graduate. Consequently, the gap in earnings between college and high school educated adults will not be bridged by extending government subsidies to students who are not prepared to complete postsecondary degree requirements.

Statement of Research Problem and Hypotheses

The stated purpose of the Hope Scholarship Credit is to make the first two years of postsecondary education tuition-free for the average student. However, if tuition prices continue to rise faster than the rate of inflation, then the Hope Scholarship Credit will not necessarily fulfill the goal of open access for the first two years of college. The purpose of this dissertation is to measure the effects of the Hope Scholarship Credit on tuition prices and enrollment. This study will not only update prior studies on the effects of tuition costs on enrollment, but also apply accepted methodologies from these prior

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studies to quantify the impact of the new tuition tax credit on enrollment. It is hypothesized, *a priori*, that the tuition tax credit will be cost-inflationary. That is, the nature and the structure of the Hope Scholarship Credit will encourage colleges and universities to raise tuition charges to capture the benefits of the new federal subsidies. It is expected that the results of this study will support the Bennett Hypothesis.

Research Design and Methodology

This dissertation uses data from postsecondary institutions over ten academic years, 1988-89 to 1997-98, to quantify the trends in the market for higher education over the decade preceding the enactment of the Hope Scholarship Credit. To test the hypothesis that the new tax credit will be inflationary, a sample of 400 colleges and universities was drawn from *Peterson's Four-Year Colleges* and *Peterson's Two-Year Colleges*. The purpose of the study is to measure the impact of the Hope Scholarship Credit on the average household; therefore the sample institutions were not selected at random. Rather, the colleges and universities with the largest undergraduate enrollments for the 1997-98 academic year in each state were used in the data analysis, as these institutions are the most representative of the population of students and households in the state at the time of the enactment of the Hope Scholarship Credit. To control for the intrastate competition among colleges and universities, the two largest institutions from each group in each state are included in the sample. Thus, the sample is composed of the two largest public four-year universities, public two-year universities, private four-year colleges with a religious affiliation, and private four-year colleges with no religious affiliation in each state.

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The research design of the study is a two-stage least squares regression model. The first stage of the study specifies a model to predict the tuition costs of the sample universities. The independent variables include: full-time equivalent (FTE) enrollment at the postsecondary institution, median household income within the state, state appropriations per FTE public student, student-faculty ratios of the university, the percentage of the faculty with an earned doctorate, the presence of an undergraduate program in engineering, the number of graduate students, and the number of volumes in the school's library. These variables were chosen to capture the importance of state income levels and institutional quality measures in predicting the tuition cost at postsecondary institutions. In addition, indicator variables for geographic regions are included in the tuition model to account for differences in the cost of living among the regions of the country.

The second stage of the study uses the predicted tuition costs from the first stage to predict FTE enrollment. In addition to the predicted tuition costs, the independent variables for the second model include: median household income, the average ACT score at the college or university, the ratio of students accepted to the number of applications received by the institution, the average financial aid award per student, the percentage of the state's population that has earned a college degree, the percentage of the state's population between the ages of 18 and 24, the percentage of faculty with an earned doctorate, the student-faculty ratio, and the number of volumes in the library. To control for the population differences among the geographic regions of the country, regional indicator variables are also included in the enrollment stage of the model.

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The two-stage least squares regression model is estimated for each type of institution separately. Then, the four-year colleges are combined into one model to estimate the average effects of the Hope Scholarship Credit on all four-year institutions. As the two-year colleges possess characteristics that are not comparable to the four-year colleges, they are not included in the combined model.

Using the results of the regression models, the impact of the Hope Scholarship Credit on tuition prices and enrollment is estimated. First, the regression weights from the tuition model are used to predict tuition prices for the academic year following enactment of the Hope Scholarship Credit. The predicted values are then compared with the actual tuition prices for the 1998-99 academic year. The significance of the difference between the actual and predicted values is assessed using t tests. The predicted value is used as a proxy for the tuition price that would have been charged if the Hope Scholarship Credit had not been enacted. The actual tuition price represents tuition prices after the enactment of the Hope Scholarship Credit. If actual tuition prices are significantly greater than predicted tuition prices, then the Bennett Hypothesis is supported and the main effect of the Hope Scholarship Credit is an increase in tuition prices.

The enrollment model is then used to predict enrollment for the year following the enactment of the tuition tax credit. Enrollment is predicted using the regression weights from the trend analysis. The impact of the Hope Scholarship Credit on enrollment is measured by comparing the predicted values for the enrollment model to the actual enrollment for the 1998-99 academic year. The significance of the mean difference between actual and predicted enrollment is again assessed by performing t tests. If the mean difference between the actual and predicted values for enrollment is statistically

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equivalent, then the Hope Scholarship Credit has had no impact, at least in the short run, on enrollment.

Results

The results of this study support the Bennett Hypothesis. That is, in the face of additional subsidies for higher education, colleges and universities raised tuition prices, thereby redistributing income from students to administrators and faculty members. For each type of institution included in the sample (public two-year colleges, public four-year colleges, private religiously-affiliated colleges, and private non-religiously affiliated colleges) there was a statistically significant increase in tuition over the level predicted from the trend analysis. Hence, the main effect of the Hope Scholarship Credit appears to be tuition inflation. In addition, this hypothesis holds for every region of the country. For public two-year colleges and public four-year colleges, the increase in tuition charges for 1998-99 was less than the amount of the credit. Thus, the Hope Scholarship Credit provided some financial relief to eligible students of these colleges; however, the amount of the tax benefit was less than $1,500. The tuition increases for the private colleges in the sample was more dramatic. Both private religiously affiliated colleges and private non-religiously affiliated colleges raised tuition prices, on average, by more than the amount of the Hope Scholarship Credit. Thus, private colleges fully captured the benefit of the new tuition tax credit. Private college students that were eligible for the Hope Scholarship Credit did not see a reduction in their tuition price in real terms and students that were not eligible for the credit paid significantly more in tuition in 1998-99.

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There is no evidence provided from the results of this study that enrollment was dramatically changed in the year following the enactment of the Hope Scholarship Credit. The mean difference between actual and predicted enrollment was statistically insignificant for all types of institutions and in all regions of the country. Thus, there is no evidence that the Hope Scholarship Credit improved access to higher education in the 1998-99 academic year.

Contributions of the Study

With the enactment of the Hope Scholarship Credit, the federal government is attempting to improve access to higher education by making the first two years of postsecondary education more affordable for middle-income taxpayers. The total price tag for this benefit is estimated to be $7 billion per year from 1998 to 2002 (McPherson and Schapiro, 1997, p. 564). If the new tax credit is successful in reducing the cost of higher education and increasing enrollment, then $7 billion may be a bargain, a reasonable price to pay to ensure that more students attend college. However, if colleges and universities raise tuition costs to capture the benefit of the new tax law, then the credit will neither control tuition costs nor improve access. Indeed, it may actually increase the cost of attending college for upper and lower income taxpayers. In this instance, the Hope Scholarship Credit will represent a waste of federal dollars.

In December 1998, Secretary of Education Richard Riley sent a letter to college presidents urging them not to raise tuition prices (Burd, 1998). The contribution of this study is to provide evidence of the college presidents' compliance with the secretary's wishes. If the results of this study show that postsecondary institutions have raised

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tuition prices, then the Hope Scholarship Credit should be amended or repealed because it has failed to accomplish its stated objective. Alternatively, if the results of this study show that tuition prices have remained unchanged, and that enrollment has increased after the enactment of the Hope Scholarship Credit, then this study would provide evidence that the tax code is an effective method of distributing federal subsidies for higher education.

Limitations of the Study

The results of the study are limited by the availability of data after the enactment of the Hope Scholarship Credit. The dissertation measures the effects of the Hope Scholarship Credit in the year following its enactment, and one academic year may not be enough time to observe the effects of the credit on tuition and enrollment at colleges and universities. However, the public debate over the Hope Scholarship Credit began during the 1996 presidential campaign, a full year before its enactment. Thus, it is hoped that the lag between the announcement of the proposed tuition tax credit and its enactment has been sufficient to produce a market reaction to the new tax law. ———

Organization

The organization of this dissertation is as follows. Chapter II is a literature review of research studies measuring the impact of federal financial aid on tuition prices and enrollment as well as studies measuring the effectiveness of federal tax credits on a tax-preferred behavior. A history of financial aid is also included in Chapter II. The research design and methodology of the study are discussed in Chapter III. Chapter IV presents

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the results of the study and Chapter V discusses the conclusions and limitations of the study, as well as the tax policy implications of the findings.

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CHAPTER II - LITERATURE REVIEW

During the 1994-95 academic year, public colleges and universities (two-year and four-year schools combined) spent $119.3 billion. Private universities spent $69.8 billion during the same academic year (National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 32). The burden of financing higher education is a shared burden among state governments, the federal government, the postsecondary institution, alumni and other donors, and the student. (See Appendix B for Total Expenditures of Public and Private Colleges and Universities: 1929-30 to 1996-97.) The following table shows the relative contributions of these parties to the financing of higher education (See Appendix D for the Percentage of Higher Education Revenue, By Source for Selected Academic Years: 1939-93).

Table 1 – Sources of Revenue for Public and Private Universities: 1994-95

Source of Revenue	Public Universities	Private Universities
Tuition	18.4%	42.4%
Federal Government	11.1%	14.4%
State Government	35.9%	2.1%
Local Government	4.0%	0.6%
Private Sources	4.0%	8.8%
Endowment Income	0.6%	4.7%
Sales and Services	23.1%	22.2%
Other	3.1%	4.7%

(Digest of Education Statistics 1997)

As Table 1 illustrates, state governments shoulder the biggest share of the burden for financing public higher education. State legislatures appropriate general revenue funds to public universities to reduce the tuition charged to the student. At private universities the student bears the biggest share of the burden, and state government

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contributions are minimal. For both public and private universities, the federal government funds financial aid programs that provide assistance to needy students. Thus, the federal government will pay all, or a portion, of the tuition for students who qualify for financial assistance under federal financial aid programs. Examples of these programs include Pell Grants, Supplemental Opportunity Grants, and the College Work-Study Program. Each of these programs distributes federal dollars directly to the student or to the university at the time the student enrolls in college.

The Hope Scholarship Credit represents an additional federal subsidy for higher education. It is unique because for the first time the federal government is using the tax code to distribute this kind of targeted financial aid. Previous tax provisions for higher education have been limited to deductions for unreimbursed business expenses, when the pursuit of additional education was deemed an ordinary and necessary business expense [I.R.C. Reg.§1.162-5(a)]. That requirement is met when the expenditure is incurred to maintain or improve the taxpayer's existing skills, or meets the employer's requirements or minimum standards for the job [I.R.C. Reg.§1.162-5(a)(1),(2)]. This provision provides a miscellaneous itemized deduction, subject to a 2% of adjusted gross income floor [I.R.C. Reg.§1.162-6]. This tax provision does not target financial assistance to taxpayers in a particularly disadvantaged income group, but rather provides a tax deduction independent of the taxpayer's financial status. Indeed, this provision is highly restrictive, as the taxpayer must itemize, and total costs have to exceed 2% of adjusted gross income to produce a tax benefit. In addition, the federal tax code excludes some scholarship and financial aid dollars from gross income (I.R.C. §117) as well as amounts received from employer-provided educational assistance programs (I.R.C. §127).

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The Hope Scholarship Credit is a nonrefundable tax credit and therefore can only be used to offset the tax liability of a student or parent; and it cannot generate a refund for the taxpayer. Hence, the Hope Scholarship Credit does not make funds available to the student at the time of enrollment, but rather at the time the tax return is filed. For example, a student entering college in the fall semester would have to pay tuition costs to the college in August and January, but would not receive the tax benefit until the tax return is filed the following April. Further, the income limitations and the nonrefundable nature of the tax credit create uncertainty in the amount of the marginal tax benefit for middle-income families. Families with adjusted gross incomes approaching $80,000 may see their tax benefit evaporate because of the phase-out provision of the credit. Similarly, families near the lower end of the middle-income classification may see their tax benefit reduced because their total tax liability is less than $1,500. The differences between the structure and timing of traditional federal financial aid programs and the Hope Scholarship Credit potentially limit the new tax law's effectiveness.

The following is a review of the literature regarding the effects of subsidies on higher education. The first section traces the history of financial aid programs for American colleges and universities. The second section discusses the results of studies of the effects of government subsidies on tuition and enrollment at public and private universities. The third section discusses specific variables that have been found to be significant in predicting of enrollment and tuition at colleges and universities. The final section discusses the results of studies of the effectiveness of tax credits to motivate a tax-preferred behavior.

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History of Financial Aid for Higher Education

Private Scholarships for the "Best of the Poorest"

By 1700, virtually all the modern concepts of financial aid for higher education were in place in the United States (Keene, Adams, and King, 1975, p.14). Harvard University (formerly Harvard College), established in 1636, awarded the earliest scholarships on record. The first scholarship, the Lady Anne (Radcliffe) Mowlson Scholarship, was established in 1643, and included provisions that financial need should be used as a criterion for choosing the recipient of the scholarship. Lady Mowlson established the scholarship by contributing one hundred pounds of English currency to Harvard College and directed the institution to aid the best of the poorest students admitted to the college. The following is an excerpt from the original scholarship:

> ...I haue receiued of the Lady Ann Mowlson of London, widdow, the full
> and intire somme of (one) hundred pownds current English mony the which
> she hath freely giuen to Harvards Colledge in New England to be imp(roved)
> by the feofree of the said colledge for the time being to the best yearly revenew
> that may be thought fitt in theire wisdomes, which yearly revenew according
> to her good and pious intention is to be and remaine as a perpetuall stipend
> for and towards the yearly maintenance of some poor scholler which shalbe
> admitted into said colledge by the said feofees or the major part of them
> the which the poore is to injoy the said yearly stipend only till such time
> as such poore scholler doth attaine to the degree of Master of Arts and
> no longer, and then the said yearly stipend shall by the said feofees by
> bestowed upon another poore scholler of the said colledge which the said
> feofees shall think most deserueing, and soe the said stipend to goe in
> succession from (one) poor scholler to another therfor and towards theire
> yearly maintenance in perpetuum in manner and forme as
> afforesaid. (Keene, Adams, and King, p.15)

In addition to financial need, the Lady Mowlson Scholarship included other characteristics that are important to modern financial aid programs. The scholarship

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required an annual review of financial need, the annual stipend was terminated at the time the recipient obtained a degree, and the college was given the responsibility of selecting the recipient. Further, the Lady's contribution to the college was in the form of an endowment. The original contribution was to be maintained, and only the revenue earned from the principal was to be distributed to the recipient.

In 1659, Robert Keayne established another scholarship at Harvard College. The stated purpose of his gift to the college was as follows:

> My desire is that the godliest and most hopeful of the poorer sorts
> of Scholars, may have an addition to that which their parents allow
> them of Twenty or Forty shillings per year a piece while they abide
> in College, or till some Providence may help their supplies otherwise....
> (Keene, Adams, and King, p. 15-16)

Keayne extended the sentiment of the Mowlson scholarship by adding the concept of parental responsibility for a child's college education. In Keayne's scholarship the determination of financial aid was to be made by calculating as the difference between a college expense budget and the parent's ability to pay. Keayne also included language in his scholarship to the effect that his gift was not to be used to construct buildings or to make repairs to buildings because, in his opinion, that was the responsibility of the government (Keene, Adams, and King, p.16).

Over the next two hundred years, the concepts of the Mowlson Scholarship and the Keayne Scholarship spread to other colleges and universities, even though financial aid was not generally an organized part of higher education. There is also evidence during this time that colleges and universities developed systems of student loans and work-study programs in addition to scholarships. A 1659 graduate of Harvard had worked his way through college by waiting tables and serving in the kitchen of the

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university. Further, a soldier killed in battle during the Civil War left the following instructions in his journal:

> If I should die in the United States service, one hundred dollars
> of my back pay must be sent to Proffessor E.I. Hovey of Wabash
> College, Crawfordsville, Indiana, to be paid by him to the American
> Education Society for value received by me from said Society.
> (Keene, Adams, and King, p.17)

The principal motivation behind the development of scholarships, student loans, and work-study programs during this period was survival. The individual colleges and universities had to assume a role in generating financial resources for students or face extinction. During the more extreme periods of financial distress, college professors were underpaid or not paid at all in an effort to minimize tuition charges to students (Keene, Adams, and King, p.18).

Government Subsidies for Higher Education

Over time the federal government began gradually to expand its role in the provision of higher education. In 1787, Congress passed the Northwest Ordinance, which provided grants of land to the states to finance the establishment of seminaries for learning (Carnegie Council on Policy Studies, 1975, p.7). The passage of this law was a significant first step towards the government provision of postsecondary education, but it had a limited impact on higher education. The primary purpose of the early colonial colleges was to educate young men to be cultured gentlemen and effective leaders in the community (Keene, Adams, and King, p. 9). Thus, higher education was not viewed as a universal right but rather a privilege for an elite few.

The Morrill Acts, passed by Congress in 1862 and 1890, broadened the role of the federal government and changed the organization of higher education from a

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predominantly private enterprise to a government-sponsored enterprise. The first act in 1862 set aside public lands for the establishment of land-grant colleges (Keene, Adams, and King, p. 18). The second act in 1890 provided for annual appropriations of tax dollars to the land grant colleges. In conjunction with these two federal acts, the individual institutions redefined the college curriculum in ways that made higher education more appealing to the average citizen. Specifically, these land grant colleges legitimized the study of agriculture, mechanical arts, and military science in higher education. In addition, the annual contribution of federal dollars to these colleges kept tuition charges low relative to their private college counterparts; thus began the first organized government financial aid program (Keene, Adams, and King, p. 18).

After the passage of the first Morrill Act, state governments became more proactive in providing assistance to students and institutions of higher education. In the years following the Civil War, many states administered tuition scholarship programs for veterans. Gradually the states began making public funds more widely available. In 1919, New York started an open competition for a state funded scholarship, and in 1933 Wisconsin became the first state to offer a student loan program (Keene, Adams, and King, pp. 18-19).

The passage of the Morrill Acts and the increased state financial aid programs would have likely had a significant impact on the ability of private institutions to compete in the higher education market had it not been for the *Dartmouth College* case of 1819. In this case, the Supreme Court ruled that state governments do not have authority over private colleges and universities. Specifically, the Court viewed the assumption of such authority as a breach of contract. If the Court had ruled in favor of the states it is likely in

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the wake of the Morrill Acts that the state governments would have taken over the existing private colleges and made them public institutions. Instead the Court's ruling established two parallel systems of higher education (Quigley and Rubinfeld, 1993, pp. 245-246).

The increase in government spending on higher education helped fuel an increase in enrollment at public and private institutions. (See Appendix A for Enrollment in Public and Private Universities: 1869-70 to 1994-95.) However, these early egalitarian policies towards higher education did not change the perception that public colleges were an inferior good, cheaper both in price and in quality than their private counterparts (The Economics of Higher Education, 1966, p. 9).

The most "pervading set of divergent beliefs in American higher education policy is the set of differences resulting from the following question: Is higher education a privilege or a right?" (King, Adams and King, p. 9). In the pre-World War II period, government policies and student demand responses reflected beliefs that higher education was a privilege, an optional part of a student's education. The student body of nineteenth century colleges was not representative of the general population, but rather was composed predominantly of white males. The primary purpose of postsecondary institutions prior to World War II was to promote Christianity, to teach classical subjects in a disciplined manner, and to train teachers, ministers and other professionals (Clotfelter, et al., 1991, p. 32). "An unstated but very real aim [of universities] was the maintenance of a numerically tiny social elite against the hostile pressures of Jacksonian egalitarianism" (Veysey, 1973, p. 1). Early government subsidy programs marginally increased enrollment, but higher education policy was colored by a privileged view of a

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college degree (King, Adams, and King, pp. 9-10). It was not until World War II that federal government policy evolved to regard a college education as a right.

World War II and the Enactment of the GI Bill

In 1943, at the height of the Second World War, the federal government expressed its demand for a better-educated workforce by enacting the Student War Loans program. This program made federal funds available to upperclassmen and graduate students in certain science and health programs in return for their participation in the war effort after graduation. During the two years of its existence, the Student War Loans program provided financial assistance to approximately 11,000 students (Keene, Adams, and King, p.19).

One year later, Congress passed the Serviceman's Readjustment Act of 1944, commonly referred to as the GI Bill. This Act represented "the most extensive venture into government aid for students in our history" (Rivlin, 1961, p. 64). No federal legislation has had a longer lasting or more profound impact on higher education. This legislation set aside federal funds to pay for war veterans to earn a college degree. The motivation behind the bill was part gratitude and part necessity. With millions of servicemen returning from the war, Congress was looking for a methodical way to reabsorb these veterans into the economy. During the twelve years of the original program, the GI Bill paid $14 billion in educational and employment benefits to over seven million veterans. In addition, state governments supplemented the GI Bill with tuition scholarships for veterans at public institutions (Keene, Adams, and King, p. 19).

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The GI Bill dramatically changed both the supply and the demand for higher education. Colleges and universities expanded their facilities to handle the sharp increase in enrollment. In 1920, there were 989 four-year colleges and universities and 52 two-year colleges in the United States. By 1950, there were 1,327 four-year colleges and universities, and the number of two-colleges had increased ten-fold to 524 institutions (Clotfelter et al., p. 32). In the fall of 1939, there were approximately 1.4 million students enrolled in postsecondary institutions. By the fall of 1949, enrollment had nearly doubled to 2.7 million (National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 3). During the same time period, total expenditures of educational institutions more than tripled. In 1939, total expenditures for postsecondary institutions were $758 million; by 1949 total expenditures had risen to nearly $2.7 billion, measured in 1996-97 constant dollars (National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 32). In the 1947-48 academic year, payments under the GI Bill accounted for one-quarter of all educational and general income received by colleges and universities (Clotfelter, p. 32). The increase in enrollment forced colleges and universities to change their focus from educating an elite few to servicing the general population.

The GI Bill also had a dramatic impact on the perceived value of a college education. Before the war a college degree was viewed as a luxury item, available only to the more elite segments of society. The GI Bill brought higher education to the masses and changed an entire generation's expectation of the value of a college degree. These war veterans in turn raised their children, the baby boom generation, not only to expect to earn a college degree but also to expect the federal government to pay for it. Thus, the

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passage of the GI Bill converted a college education from a luxury item into a perceived necessity, if not an entitlement.

The Post-World War II period

The post-World War II period saw more aggressive, proactive policies initiated by the federal government to ensure open access to higher education, not just to veterans, but to all students. The American Council on Education sponsored a report in 1946 that began with the following question, "Is higher education in the United States to be limited to those with wealth?" (Clotfelter, p. 89) The sentiment behind the question demonstrated the changing public policy towards higher education. Indeed, the Commission was organized to consider the role of higher education in promoting the social goal of equal opportunity. Consequently, the Truman Administration proposed generous programs to ensure that postsecondary educational opportunities would not be limited only to those with wealth. The most notable proposal set forth by Truman's Commission on postsecondary education, the Zook Commission, was tuition-free education "available in public institutions to all youth for the freshman and sophomore years or the traditional 2-year junior college course" (Carnegie Foundation for the Advancement of Teaching, 1975, p.1).

The concept of "two years of free access" to higher education in the United States pre-dated the war, and had its origins in the development of public junior colleges in the early years of the twentieth century. Even though proposals of this type were not new, they had never garnered widespread public support because of the relative political strength of private institutions. In 1947, private institutions accounted for about one-half of all enrollment in postsecondary institutions. The early years of the GI Bill saw an

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increase in enrollment that was evenly distributed between public and private institutions (Carnegie Foundation for the Advancement of Teaching, p.23). In 1939, there were 797,000 students enrolled in public institutions, and 698,000 students attending private institutions. By 1949, public enrollment had risen to 1.4 million, and private enrollment had risen to 1.3 million (National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 3). Further, in the years following the enactment of the GI Bill, the tuition at private colleges was a little more than twice that of public universities. In the 1930s, the average private tuition cost had been more than three times the tuition at public institutions (The Economics of Higher Education, 1966, p. 7). (See Appendix C for Major College Costs: 1928-1964.)

When the Truman Administration proposed two years of free access to public colleges and universities, the Association of American Universities organized its own commission to study the financing of higher education. The Association's commission, comprised primarily of representatives from private universities, concluded "we, as a nation should call a halt at this time to the introduction of new programs of direct federal aid to colleges and universities" (The Economics of Higher Education, p. 51). The narrowing of the tuition gap coupled with the enrollment statistics led Congress to defeat the Zook Commission's proposal because it did not want to hurt the private institutions' ability to compete in the higher education market (Carnegie Foundation for the Advancement of Teaching, p. 23).

In the early 1950s, postsecondary institutions were struggling to keep pace with the rapid increase in demand, and policymakers turned their attention to the developing inflation in tuition prices (Keene, Adams, and King, p. 19). The general concept of open

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access to higher education was still a popular notion, but the cost was becoming prohibitive. During this time period, a significant school of thought emerged recommending raising tuition prices, even at public universities, to cover the increasing cost of higher education, and reserving public subsidies for lower income college students who could not otherwise afford a college education (Carnegie Foundation for the Advancement of Teaching, p. 5).

In the midst of the growing debate to restrict public subsidies, the Soviet Union successfully launched Sputnik. The United States government once again expressed its demand for a more educated population by passing the National Defense Educational Act of 1958. This act created fellowships for doctoral studies in defense-related disciplines and a national defense student loan program that provided an important new source of financial aid at the undergraduate level of public and private colleges (Breneman, p. 22).

The Early 1960s: Public v. Private Colleges

In the early 1960s, the federal government continued to make funds available to postsecondary institutions to help them keep pace with the growing demand for a college education. But during the 1950s public college enrollment had continued to grow while private enrollment remained flat. In the fall of 1959, 2.2 million students were enrolled in public universities, and only 1.4 million students were enrolled in private colleges (National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 3). The increased enrollment at public universities strengthened the political power of these institutions relative to private institutions and intensified the competition among postsecondary institutions for federal funds.

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The shift in political power was followed by a shift in the view of direct federal aid to postsecondary institutions. Organizations, like the Association of American Universities that had once rejected the need for additional federal direct aid, now were embracing new federal dollars for higher education. The National Science Foundation, in its 1960 report, expressed its desire for increased funding: "The situation appears to call for general aid to United States universities...in order to increase the overall strength of their departments and to provide greater flexibility in their administration" (The Economics of Education, p. 51).

Fredrick L. Hovde, chairman of President Kennedy's Task Force on Education and president of Purdue University, testified before the House Education Committee "that the highest priority need of colleges and universities... is for general support and particularly for faculty salaries" (The Economics of Higher Education, p. 51). Congress responded by enacting twenty new programs allocating federal funds to higher education, totaling several billion dollars, but no federal dollars were allocated for general support or faculty salaries.

One of the programs, the Higher Education Facilities Act of 1963, authorized grants and loans to colleges for the construction of facilities for secular education. As evidence of the increasing competition between public and private colleges, the Secretary of Health, Education, and Welfare for the state of Connecticut filed suit to stop the distribution of grants under the Higher Education Facilities Act to four private religiously affiliated colleges in Connecticut. In *Tilton v. Richardson*, the State of Connecticut claimed that federal funds distributed under the Higher Education Facilities Act to private church-related colleges violated the Establishment Clause of the U.S. Constitution.

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The Establishment Clause of the First Amendment of the Constitution states that "Congress shall make no law respecting an establishment of religion or prohibiting the free exercise thereof...." [Tuition Tax Credits: Hearings Before the Subcommittee on Taxation and Debt Management of the Senate Committee on Finance, 97th Congress, 1st Session, p. 8 (1981), (hereinafter Hearings)]. This clause was written as a reaction to pre-Revolutionary colonial practices of imposing taxes on citizens to pay for ministers' salaries and for the construction and maintenance of church buildings. The Founders found this practice abhorrent because they were keenly aware of the dangers of government interference in the religious lives of its citizens. Accordingly, they believed that the government should pursue a course of neutrality toward religion. Thus, the First Amendment created a constitutionally erected "wall of separation" between Church and State (Hearings, p. 8).

As much of the private education in America is supported or administered by religious organizations, the Establishment Clause places Congress and state legislatures in a difficult position with respect to education policy. Attempts by lawmakers to improve the quality of education through government appropriations cannot simultaneously "respect" the establishment of religion (Hearings, p. 9).

The Supreme Court did not rule in *Tilton v. Richardson* until 1971. The Court held that the construction grants paid to the four Connecticut church-related colleges did not violate the Establishment Clause because the Act specifically prohibited the schools from using the funds to construct facilities that were intended for religious education or worship (403 U.S. 672). The Supreme Court defended its decision by stating:

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a) there is less danger here than in church-related primary and secondary schools dealing with impressionable children that religion will permeate the area of secular education, since religious indoctrination is not a substantial purpose or activity of these church-related colleges, b) the facilities provided here are themselves religiously neutral, with correspondingly less need for government surveillance, and c) the government aid here is a one-time, single-purpose construction grant with only minimal need for inspection (403 U.S. 673).

The growing competition between private and public colleges and court challenges under the Establishment Clause led Congress to turn its attention away from aid to institutions and toward student financial aid policies. The prosperity of the post-World War II era had increased the gap between the rich and poor, and the increased demand for higher education had inflated tuition prices. These conditions influenced policymakers to once again consider the question raised by the American Council on Education in 1946: "Is higher education in the United States to be limited to those with wealth?" The response by the Johnson Administration was the Higher Education Act of 1965, enacted as part of the War on Poverty (Clotfelter, 1991, p. 98).

The Higher Education Act of 1965

The Higher Education Act of 1965 was intended to broaden access to higher education by targeting financial aid to lower- and middle-class students who could not afford college without financial assistance. Specifically, the act created a system of grants that did not have to be repaid by the student, the Educational Opportunity Grants Program (currently the Supplemental Educational Opportunity Grants (SEOG) program), and loans that did have to be repaid, the Guaranteed Student Loan Program. The grant program authorized the distribution of federal funds to cover the tuition costs of needy

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students. Under the loan program, the federal government would insure banks against default risk and subsidize the interest payments of students. Like the Keayne Scholarship of 1659, these programs awarded aid based on the difference between a college expense budget and the family's ability to pay. In addition, the Higher Education Act created a federally funded College Work-Study program that allowed students to hold jobs on campus to earn extra money to help cover college costs (Hearings, p. 9).

The passage of the Higher Education Act was a watershed event for education policy because it firmly established the federal government's role in providing subsidies to needy students. Previous education policy had focused on equal access by subsidizing postsecondary institutions, which kept tuition charges low for all students. But this legislation called for the distribution of subsidies directly to the needy student. Thus, this legislation created a system of tuition charges that was based on the student's ability to pay, and the federal government would restrict the distribution of its most generous subsidies to those students with the greatest financial need. In addition, this legislation created additional competition among colleges and universities, because in order for the college to benefit under this new program, it had to attract and enroll the needy student.

The 1970s and the Pell Grant Program

This student-aid-based policy was greatly expanded with the enactment of the Higher Education Amendments of 1972. This act authorized the creation of the Basic Educational Opportunity Grant Program (later renamed the Pell Grant program) that set forth, as a matter of right, that each citizen was entitled to a minimum federal subsidy (minus family support) towards the cost of a college education. This program was the boldest application to date of the human capital model and the theory of externalities, and

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once again the intention was to open wide the doors of colleges and universities. However, in order to control the total cost of the program, the maximum grant awarded under the program was limited to the lesser of 50% of the total cost of attending the college of the student's choice, or $1,400 (Carnegie Foundation for the Advancement of Teaching, 1975a, p. 25). Unlike the Educational Opportunity Grants Program that did not contain a statutory maximum grant, the growth in the Pell Grant program would not be sensitive to tuition increases by the institution (McPherson and Schapiro, 1991, p. 68). Rather, the growth in revenue to colleges and universities would be tied to enrolling lower-income students.

The Pell Grant program was added to the other programs created by the Higher Education Act of 1965. Since its inception, the award maxima in the Pell Grant program have been below the student charges of almost all private colleges and many public institutions (McPherson and Schapiro, p. 68). Hence, the Pell Grant program upheld the notion of a shared burden for higher education. The federal government would subsidize a portion of a lower income student's costs, but the student would be responsible for the unsubsidized portion. If the total cost of attending college exceeded the Pell Grant award and family contributions, then the campus financial aid officer could award the student additional financial aid, that is, Supplemental Educational Opportunity Grants, Guaranteed Student Loans, or a College Work-Study job (Clotfelter, 1991, p. 91).

From the early 1960s to the late 1970s, the federal government significantly altered the nature and scope of federal subsidies for higher education. In the periods leading up to the 1960s the federal government focused on direct subsidies to colleges and universities. During the 1960s, the federal government began focusing on student

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financial aid. Once these programs were enacted, they had a far-reaching impact. The total amount of student aid grew tenfold (in constant dollars) between 1963 and 1980. In addition to the increase in the amount of funding for these programs, the percentage of students who benefited also increased. The percentage of high school seniors who received some form of financial aid offer from a college or university increased from 24 percent in 1972 to 36 percent in 1980 (Clotfelter, 1991, p. 98).

The 1980s and 1990s

Despite the wide array of financial aid options available to students after the enactment of the Higher Education Amendments of 1972, enrollment at postsecondary institutions remained flat during the 1970s and 1980s. In 1971, before the enactment of the Pell Grant program, 25.7 percent of 18-24 year olds were enrolled in a postsecondary institution. In 1980, despite the generous increases in federal financial aid programs, the enrollment percentage remained unchanged. (See Appendix E for Enrollment Rates of 18-to-24 year olds: 1967-1996.) Experts disagree on how to interpret these statistics. Supporters of the human capital model and the theory of externalities argue that these programs were never funded at levels sufficient to influence the enrollment rates. Proponents of the Bennett Hypothesis argue that the presence of these subsidies inflated the tuition price, and thus there was no increase in enrollment.

Since William Bennett guided the education policy of the 1980s, there was not an expansion of federal financial aid programs during this period. Indeed, there was a reduction of grant programs in real terms, and an increase only in loan programs. In 1979, Pell Grant Awards represented 31 percent of federal student aid, and guaranteed loans represented 49 percent. Ten years later (in 1989), Pell Grant awards represented 24

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percent of federal student aid, and guaranteed student loans represented 65 percent (McPherson and Schapiro, 1991b, p. 27). (See Appendix G for Federally Supported Student Financial Aid Spending: 1963-64 to 1988-89.) Thus, the Reagan Administration compelled students to bear a greater portion of the cost of higher education. During this time period, enrollment rates increased but so did the inflation-adjusted tuition cost. While the increased enrollment during the Reagan Administration could have predicted some increase in tuition prices to cover increases in operating costs, it could not explain increases at two and three times the Consumer Price Index (The College Board, 1998, p. 3). By the mid-1990s, the increases in tuition prices threatened not only to deny access to higher education to lower income students, but also to middle-income students. Thus, the time was ripe for additional federal programs for higher education.

The Hope Scholarship Credit

In the midst of the 1996 presidential campaign candidates Bill Clinton (Democrat) and Robert Dole (Republican) both offered tax cuts as the answer to sustained economic growth. To counter Dole's proposal for across-the-board tax cuts, Clinton argued that tax cuts should serve a social purpose. As the campaign progressed, tax cuts for tuition costs resonated with voters of both parties. Dole favored education subsidies in the form of tuition vouchers for primary and secondary education. Although the proposal was popular with voters, these "school choice" proposals carry tough challenges under the Establishment Clause. Clinton, on the other hand, focused on higher education (Education Week on the Web).

In June 1996, Clinton introduced the Hope Scholarship Credit. The proposal called for a $1,500 tax credit for the first year of postsecondary education. Under the

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original proposal, if the student earned a "B" average in the first year of coursework, then the student could take the credit for tuition costs incurred in the second year. The amount of the credit, $1,500, corresponded to the national average tuition charge at community colleges (College Board, 1998, p. 7, See Appendix F Average Tuition and Fees 1971-72 to 1998-99). Thus, the Hope Scholarship Credit, fifty years after the Zook Commission of the Truman administration, once again proposed that the first two years of postsecondary education should be tuition-free. However, the original Hope Scholarship Credit proposal contained a quality provision that limited its applicability to those students who earn at least a B average.

The announcement of the proposal corresponded with hearings in the House of Representatives on the rising cost of higher education. The representatives heard from student after student who complained of the enormous debt that they would have to carry into their working careers simply for choosing to attend college. College presidents who testified at the hearings urged the students and the representatives to see tuition costs as a lifetime, rather than a four-year investment (Kane, 1997, p. 336). In the climate of election-year politics, the college presidents were a voice crying in the wilderness.

After the election, President Clinton fulfilled his campaign promise and a modified version of the Hope Scholarship Credit became law in August 1997. Pursuant to I.R.C. Section 25A, added by the Taxpayer Relief Act of 1997, the Hope Scholarship Credit is a nonrefundable income tax credit available to eligible students for qualified tuition costs incurred in the first two years of postsecondary education. For tax years 1998 through 2002, the credit is the sum of: 1) 100% of the first $1,000 of qualified tuition costs and related expenses paid by a taxpayer during the year, plus 2) 50% of the

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next $1,000 of expenses. Thus, the maximum allowable credit per student per year is $1,500.

Contrary to the original proposal, the law does not place an academic performance restriction on eligibility for the credit. The purpose of maintaining a B average was to reward and encourage quality in education. However, Congress dropped that portion of the proposal because of the obvious administrative problems with verifying a student's grade point average. Congress did impose income limitations on eligibility for the credit. The Hope Scholarship Credit is phased-out for single taxpayers with modified adjusted gross incomes of $40,000-$50,000, and married taxpayers with $80,000-$100,000 of income [I.R.C. §25A(d)(2)]. In addition, the amount of the credit will be indexed for inflation beginning in 2002 [I.R.C. §25A(h)(2)(A)]. Thus, the Hope Scholarship Credit was billed as tax relief for middle-income taxpayers.

Empirical Studies of the Impact of Tuition Increases on Enrollment Rates

Experts disagree on whether the Hope Scholarship Credit will indeed improve access to education by reducing the net tuition cost to middle-income students. At the center of the debate is the relationship between government subsidies for higher education and enrollment rates. Many researchers over the last thirty years have attempted to measure the effects of tuition increases and government subsidies on enrollment rates at colleges and universities. The results of these studies are mixed. Some studies provide evidence in support of the human capital model of higher education and the theory of externalities. That is, increases in the funding of federal financial aid programs have had a positive impact on enrollment rates. Other studies have found

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support for the Bennett Hypothesis that federal financial aid programs have inflated tuition costs and, therefore, had a minimal effect on enrollment rates.

The sheer number of these studies has consequently spawned a great number of published literature reviews that attempt to summarize the findings of related groups of studies. The early work in this area concentrated on the impact of price increases on enrollment rates. The common measurement in the literature quantifying these effects is the price elasticity of demand, defined as the percentage change in the quantity of higher education demanded attributable to a one percent change in tuition cost (Rosen, 1995, p. 581). These price elasticities are commonly estimated using ordinary least squares regression coefficients, where the percentage of the college-age population enrolled in postsecondary institutions is the dependent variable and the tuition rate is one of many independent variables. Later studies expanded these earlier works to include the effects of student financial aid programs as an independent variable in the prediction of enrollment rates. The following is a survey of selected meta-analyses and individual studies.

The seminal literature review in the area of student enrollment responses to price changes was published in 1975 by Jackson and Weathersby. Their study not only examined the results of seven prior studies, but also attempted to standardize the results of diverse methodologies employed by the studies surveyed. They named the standardized statistic the Student Price Response Coefficient, and used this metric to estimate the effects of tuition increases on a hypothetical first-time student from a family earning $12,000 in 1974 and facing a college cost of $2,000 per year. Based on their calculations, a $100 (or five percent) increase in tuition would be associated with a one

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percent decline in the enrollment rate of the 18-24-year-old population. The Jackson and Weathersby study was well-received and praised for its novel approach towards standardizing student demand responses to price changes in higher education. However, subsequent researchers found significant errors in Jackson and Weathersby's methodology.

Weinschrott (1977) wrote the harshest criticism. He identified three fatal weaknesses in the Jackson and Weathersby study:

1) They compared time-series and cross-sectional results;

2) Some of the studies included in their review were supply-side studies designed to measure institutional responses to price changes, while others were demand-side studies designed to measure student responses; and

3) The studies included in the survey used variables that were not consistently defined.

Further, Weinschrott challenged the mathematical reasoning that Jackson and Weathersby used to combine the results of these disparate studies into one standardized statistic. Collectively, these errors led Weinschrott to declare the findings of the Jackson and Weathersby study "meaningless."

Other researchers respected Jackson and Weathersby's attempt to standardize the literature, while recognizing the mathematical errors in the study. In 1978, McPherson extended Jackson and Weathersby to three studies of the demand response to price changes at private four-year universities. In his analysis, McPherson corrected some, but not all, of the computational errors of Jackson and Weathersby and still found price

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responses similar to those they had reported. This result led McPherson to conclude that Weinschrott's criticism was overstated.

In 1987 Leslie and Brinkman published a comprehensive meta-analysis of demand response studies that is credited with settling the debate over the appropriateness of the standardization procedures. Their review covered 25 studies, and their Student Price Response Coefficient incorporated the mathematical corrections outlined in the previous literature. They attempted to replicate the Jackson and Weathersby study by using their improved Student Price Response Coefficient to estimate the effects of a price increase on a hypothetical first-time student facing educational costs of $3,240, measured in 1982 dollars. The studies in the review included results from private and public schools, two-year and four-year institutions, nation- and statewide populations, as well as experimental and hypothetical scenarios. In short, by 1987 researchers had looked at the question of student demand responses to price changes at postsecondary institutions from a variety of different angles. Leslie and Brinkman found that once the findings of these diverse studies were standardized, there was remarkable consistency in the results.

According to their calculations, the price elasticity of demand at the mean is 0.7. That is, a one percent increase in tuition cost would be associated with a 0.7 percent drop in the national enrollment rate of 18-24-year-olds. Among the Leslie and Brinkman studies, the modal student demand elasticity was 0.6, and the results of the majority of the studies fell within the 0.5 and 0.8 range. Even though Jackson and Weathersby's work was flawed, Leslie and Brinkman concluded that mathematical errors that they committed offset one another. Hence, Leslie and Brinkman had employed a mathematically superior methodology, but their results were close to those of the Jackson and Weathersby study.

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The results of these studies support the applicability of the demand theory to the market for higher education, and by extension lend some support to the human capital model for higher education. As the price of tuition increases, the quantity demanded of education on average declines. Hence these findings suggest that inflationary education policies will not improve enrollment rates at colleges and universities. Thus, if student financial aid policies lower the perceived level of tuition costs of students, then enrollment rates should rise. However, if student financial aid polices actually inflate tuition prices, as the Bennett Hypothesis would predict, then enrollment rates should fall.

While many researchers have attempted to measure the effects of tuition price changes on enrollment rates, few studies by comparison have considered the influence of student aid on the demand for higher education. In 1980, Berne studied the applicants to two New York community colleges. Using cross-sectional regression analysis for the academic year 1975-76, Berne compared the effects of changes in tuition costs with changes in student-aid awards. The results of his study suggest that students are more sensitive to changes in tuition rates than they are to changes in the level of financial aid grants. That is, a reduction in tuition costs would increase enrollment rates more than an equal increase in financial aid. Berne's results imply that the reverse would also be true. An increase in tuition costs would reduce enrollment rates more than the same reduction in financial aid.

Leslie and Brinkman (1987) offer the following explanation for Berne's results. Tuition charges are more certain than the price minus family contribution formula calculated by a financial aid officer. At the time students choose to attend college, they often do not know how much, if any, financial aid will be awarded to them. Further, the

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amount of financial aid may vary significantly among institutions. For example, a student facing annual tuition of $1,200 at a public university may be granted $500 of financial aid, and the same student facing $6,000 of annual tuition at a private university may be granted $2,500 of financial aid. In the words of Leslie and Brinkman, "the students' calculus is complex" (p. 196). Thus, it is simpler for the student to evaluate colleges based on certain tuition charges rather than uncertain financial aid awards.

Manski and Wise developed a model in 1983, based on the college choices of a sample of 1972 high school graduates, to predict the effects of increases in the Pell Grant program on enrollment rates. The Pell Grant program reached its peak in the 1979-80 academic year, when the total awards accounted for 80% of the $3 billion in need-based federal financial aid. According to the Manski and Wise model, the Pell Grant system as it existed in 1979-80 should have boosted enrollment rates by 21%. However, between 1978 and 1980 the percentage of 18-24-year-olds enrolled in postsecondary education grew by a negligible 0.4%. The results of this study would suggest that Pell Grants do not have the ability to influence enrollment rates significantly.

However, McPherson and Schapiro (1991b) attempted a more complete analysis of the effects of student aid on enrollment rates using data from population subgroups over a ten-year period, 1974-1984. They divided the data into groups of low-, middle-, and upper-income levels. In addition, they analyzed the effects of student aid on private and public universities' enrollment rates both separately and in combination. The results of the study suggest that lower-income students are indeed more price sensitive than middle- and upper-income students.

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McPherson and Schapiro found that an increase in the net education cost has a negative and statistically significant effect on the enrollment rates of lower-income students. These results hold for the combined sample of public and private universities, as well as for the private university subgroup. In addition, they found that net cost did not have a consistent effect on the enrollment rates of middle-income students, and there was actually a consistently positive effect on the enrollment rates of upper-income students. That is, as net cost increases, the enrollment rate of upper-income students also increases. They interpreted this latter result as an institutional supply effect; the high demand in this income group may lead to higher education costs at the universities they attend.

McPherson and Schapiro concluded that changes in the net education cost facing lower-income students have significant effects on their enrollment behavior. In addition, they caution that this result would have been obscured if the income populations were aggregated rather than divided into subgroups. They used these findings to explain the enrollment-rate trends of the last thirty years. Based on their analysis, the lack of a coordinated effort between the federal and state government higher education policies have led to tuition increases that are greater than the rate of inflation. According to the McPherson and Schapiro study, these increases would not have significantly influenced the enrollment decisions of middle- or upper-income students, but they would have discouraged lower-income students from applying to college. Thus, the overall enrollment rates have increased, but fewer lower-income students are attending college.

Specifically, McPherson and Schapiro point to the Reagan administration's cutbacks in federal financial aid programs as the principal cause of tuition inflation over

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the last twenty years. This would suggest that tuition and financial aid are linked in just the opposite way from that predicted by the Bennett Hypothesis. They theorize that decreases in federal student aid may raise the prices some schools charge because the college is attempting to replace the lost revenue. If the college raises the tuition charge to all students, then it would have additional resources to grant needy students institutional aid to make up for the reduced government subsidy. Thus, colleges in the 1980s employed a cross-subsidization strategy to reduce the educational costs of lower-income students by raising the tuition of middle- and upper-income students (McPherson and Schapiro, 1991b, p.13).

The results of the Berne study, and that of McPherson and Schapiro, are most often used to justify additional subsidies for lower income students. In summary, they conclude that there is not enough evidence to accept the hypothesis that federal financial aid programs have failed to affect enrollment rates because the funding for these programs did not keep pace with cost-of-living increases during the 1970s and 1980s. Hence, they claim that it is inaccurate to assert that financial aid has no effect on the enrollment rates of lower income students until these programs are funded with a constant level of subsidy, in real terms, over a significant period of time.

However, McPherson and Schapiro concede that it is possible that the Bennett Hypothesis can explain some of the increases in tuition prices over the last thirty years.

> Certainly, the nation's experience with medicare and other federal programs has increased everyone's awareness that government subsidies can sometimes contribute substantially to price increases. Yet, it would be remarkable if literally all federal aid were simply absorbed in aid-induced tuition increases.... But it would be just as

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remarkable if schools' decisions about pricing and the allocation of their own aid funds were entirely independent of federal student aid policy. (McPherson and Schapiro, 1991b, p. 13)

In 1992, Rose and Sorenson studied the McPherson and Schapiro cross-subsidization theory that colleges raised tuition charges to replace the reduction in federal financial aid programs, and thus lowered the educational costs of needy students. They designed a model and showed that cross-subsidization can, under fairly general conditions, reduce the average net price paid by all needy students. They then tested their model using data from 502 private universities for the 1985-86 academic year. Their empirical analysis showed that while institutions that appear to inflate their tuition charges do make larger financial aid awards, the awards are not large enough to reduce the average net price paid by needy students. Further, they found that universities that inflate their tuition prices are not more generous per tuition dollar than those universities that charge average or relatively low tuition. Thus, they conclude that private colleges that raise tuition prices are pursuing activities that benefit college administrators and members of the faculty, not needy students.

The results of this study cast doubts on the altruistic motives assigned to postsecondary institutions by McPherson and Schapiro, and provide evidence supporting the Bennett Hypothesis. The significance of these findings is that the institutional environment plays an important role in the success of financial aid programs. Rose and Sorenson compared the budgets of the universities in their sample and found that universities that inflated their tuition prices had a higher level of administrative and instructional costs, and enrolled greater percentages of graduate students. Presumably

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these areas represent the most important priorities of the institutions, and additional sources of revenue will be diverted to pursue these priorities. Even though the data in this study were limited to private institutions, it is not unreasonable to assume that public institutions may react in similar ways.

Collectively, the results of these studies of the impact of tuition increases on enrollment rates would predict that the Hope Scholarship Credit will not be effective in increasing access to education. First, the Hope Scholarship Credit is targeted to middle-income taxpayers. Based on the results of McPherson and Schapiro, middle-income students' demand for higher education is relatively insensitive to price. Thus, as a group, they would attend college with or without the tax credit. The Hope Scholarship Credit will merely subsidize a group that is not price sensitive, so enrollment rates should not be affected by the presence of the credit. Further, the Bennett Hypothesis would predict that the new tax law would represent an open invitation for colleges and universities to raise their tuition prices by the amount of the credit. Based on the results of Rose and Sorenson, the motivation behind this tuition increase would be to expand the administrative budgets of the university.

Significant Variables in the Prediction of Enrollment and Tuition

The common methodology for studying the effects of tuition increases and government subsidies on enrollment rates of colleges and universities is ordinary least squares regression, where the dependent variable is the enrollment rate of the college-age population and the tuition charge is one of many independent variables. While the previous section discussed the broad results of meta-analyses and individual studies of

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the student financial aid literature, this section will focus on the significance of specific variables in the prediction of enrollment rates and tuition charges.

Enrollment Variables

Consistent with the demand theory of economics, researchers have found price and quality variables to be significant predictors of enrollment rates at colleges and universities. Clotfelter (1991, pp. 40-48) and Manski and Wise (1983, pp. 79-80) describe the population of college students using the following characteristics: socioeconomic status and aptitude.

Parents' income and parents' educational attainment are commonly used as measures of socioeconomic status. These variables collectively measure the value the student's family places on a college degree as well as the family's ability to pay for higher education. Clotfelter (1991) and Manski and Wise (1983) have found a positive correlation between these socioeconomic variables and enrollment rates. The higher the parents' income, the more likely their children will attend college. Similarly, parents who have earned a college degree are more likely to send their children to college than parents who have not earned a college degree. In addition, the percentage of 18-24 year-olds in the sample population is commonly included in the regression model to account for the size of applicant pool for colleges and universities [Quigley and Rubinfeld (1993), Clotfelter (1991) and Manski and Wise (1983)].

Researchers have also found aptitude to be a significant predictor of college enrollment. Aptitude is commonly measured in the literature using standardized test scores, either the Scholastic Aptitude Test (SAT) or the American College Test (ACT) [Clotfelter (1991) and Greene (1994)]. The relationship between aptitude and enrollment

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is consistently positive. The higher the score on the standardized test, the higher the student's aptitude, and the more likely the student will be to enroll in college. However, standardized test scores are also used to measure the quality of the postsecondary institution. The higher the average student's test score, the higher the perceived quality of the institution, and the more selective the institution's admission policies are likely to be. Thus, the higher the average test score of an institution's student body, the lower the probability that a prospective student will be admitted to that institution (Manski and Wise, 1983, pp. 79-80).

A similar measure of quality for colleges and universities is the ratio of the number of students admitted to the number of applicants received by an institution (Manski and Wise). The higher the ratio the more open the enrollment policy of the college and the lower the perceived quality of the institution. Thus, the less selective the college is the greater the likelihood the student can enroll in the institution.

In addition, researchers have found a difference in the enrollment patterns of four-year and two-year universities. Upper-income students are more than twice as likely to enroll in a four-year university (private or public) than lower-income students (Clotfelter, 1991, p. 42). The differences among types of institutions reflect the significance of price in predicting enrollment. Quigley and Rubinfeld (1993) and Hoenack and Weiler (1979) have found that a state's unemployment rate is positively correlated with enrollment rates of two-year colleges. They explain this relationship as a measure of the value of a college education to the lower-income student. The higher the unemployment rate the greater the perceived value of a college education, and thus the more likely a student will

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enroll in a postsecondary institution. Higher unemployment rates also reduce the opportunity cost of college enrollment.

Tuition Variables

When the Supreme Court ruled in the *Dartmouth College* case that state governments did not have authority over private colleges, the Court ensured that the supply of higher education would be provided by two parallel systems, a private system and a public system. The presence of these two systems, and the resulting competition between them, has forced the creation of postsecondary institutions that serve distinct constituencies. Private colleges generally have higher tuition charges, serve upper-income students, and compete on the basis of educational quality. Public two-year colleges generally have lower tuition charges, serve lower-income students, and compete on the basis of price. Public four-year universities serve the general population, provide a comprehensive education, and charge tuition prices that are lower than their private counterparts (The College Board, 1998). The differences among the types of postsecondary institutions have motivated many researchers to investigate the factors that are significant in predicting tuition at colleges and universities.

The most distinctive difference among the institutions is the perceived quality of the educational experience. As higher quality is associated with higher operating costs, institutions that pursue higher quality generally charge higher tuition. Litten and Hall (1989) surveyed high-ability students and their parents to measure their perceptions of educational quality. They found that students most often associated small class sizes, number of course offerings, and well-equipped libraries with quality. In the survey, Litten and Hall defined class size by the student-faculty ratio, and the quality of the library

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facilities by the number of volumes in the library. Alternatively, their parents placed a greater emphasis on the teaching and research ability of the faculty as the measure of quality. Litten and Hall used the educational attainment of the faculty as the measure of both teaching and research ability.

Other researchers have confirmed the significance of these quality variables in regression models where tuition is the dependent variable. Getz and Siegfried (1991) measured quality as the student-faculty ratio, and found a significant positive correlation between the ratio and tuition prices. A lower student-faculty ratio implies a smaller average class size and this improves the perceived quality of the institution. But providing the student with a smaller class size increases the operating costs, *ceteris paribus*, and increases the tuition charge at the institution. In addition, Getz and Siegfried found that institutions that offer undergraduate programs in engineering and business have higher tuition prices than institutions that do not offer these majors. The faculty in these areas command higher salaries relative to liberal arts faculty and thus the presence of these programs increase operating costs and tuition prices. Similarly, Quigley and Rubinfeld (1993) and Rose and Sorenson (1992) have found that the presence of graduate and professional programs is positively correlated with tuition prices. Further, Seneca and Taussig (1987) found that the percentage of an institution's faculty that has earned a doctorate is positively correlated with tuition price. They explain this relationship as another measure of quality. More educated faculty are paid higher salaries. This increases operating costs and tuition prices.

Another important distinction among the types of colleges and universities is the presence of public subsidies. Private colleges do not receive the level of state

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government appropriations given to public institutions and thus must charge higher tuition prices to fully cover their operating costs. Quigley and Rubinfeld (1993) found that the level of public subsidies, measured as state appropriations per public student, was a significant predictor of tuition charges at both public and private institutions in the state. They explain the significance of the public subsidies' influence on private colleges' tuition as a measure of competition. As there is a degree of substitutability between the public and private four-year institutions, increases in government appropriations per public student tend to lower the tuition charges relative to their private college counterparts. Thus, the private college must be sensitive to the tuition charged by the rival public colleges in order to compete (McPherson, 1993, p. 194).

Quigley and Rubinfeld (1993) also found that the tax base, measured as median family income, was significant in predicting the tuition charges at public and private institutions. They explain the significance of this variable as a measure of the average family's ability to pay for higher education. As there are significant differences in the income levels and cost of living among regions in the country, the significance of the tax base variable leads to significant differences in tuition prices among regions in the country (The College Board, 1998).

Finally, public four-year universities charge in-state resident students tuition prices that are less than the tuition charged to non-resident students. Greene (1994) studied the factors that influence the choice of tuition levels charged by public institutions to non-residents. According to Greene, the wide variation in the ratios of in-state to out-of-state tuition charges among public institutions is evidence that some states choose to subsidize their own residents with tuition from non-residents. Using a public

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choice framework, Greene hypothesized that state legislatures, when setting the non-resident tuition rate, must balance the political pressure from in-state residents against the possibility of attracting high ability non-residents to its public universities. The state legislator's re-election possibilities are maximized when education policy favors the in-state residents. However, the state's long-run productivity can be improved by attracting high ability non-residents who choose to live and work in the state after graduation.

Accordingly, Greene specified a model to predict the average non-resident tuition charged by public four-year universities. The independent variables in the model included the tax price, the employment and enrollment growth rate in each state, the resident tuition charges for each institution in the sample and an index of the average tuition charge of private colleges in the state. In addition, Greene included a migration index, the ratio of non-resident to resident enrollment in each state. The findings of the study suggest that the tax price, the in-state resident tuition price, and the migration index significantly influence non-resident tuition. Greene concluded that the state's own resident tuition and its relative strength in attracting non-resident students do lead to higher non-resident tuition charges. Alternatively, when state residents face substantial fiscal gains from attracting high ability out-of-state students, who could become high-income residents in the future, these states tend to reduce non-resident tuition at their public universities.

Conclusion

In summary, the results of these studies suggest that enrollment is significantly influenced by socioeconomic status and the selectivity of the institution. In the enrollment studies, parents' income and educational attainment are commonly used as

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measures of socioeconomic status, and researchers have found a significantly positive correlation between these factors and enrollment. Similarly, the average SAT/ACT score of the student body and the ratio of students admitted to total applications, both measures of selectivity, tend to be negatively correlated with enrollment. However, the relative strength of these relationships differs among the types of institutions. Private universities depend on selectivity to attract high ability students. Two-year public colleges compete on the basis of price, and their enrollments are significantly influenced by the unemployment rate in the area. Four-year public universities fall somewhere in between private universities and two-year colleges. They offer a comprehensive education at a lower tuition charge than private universities; thus price and selectivity variables are both significant in the prediction of enrollments at these public institutions. The difference among the types of institutions is further evidence of the influence of tuition price on enrollment.

The results of the studies of tuition show that income levels, the amount of state government appropriations, and the quality of the institution are significant predictors of tuition charges. Income levels, measured as median family income, are positively correlated with tuition levels, and government subsidies are negatively correlated with tuition charges at both public and private institutions. The differences in income levels among regions of the country tends to produce significantly different tuition charges among regions. In addition, postsecondary institutions that provide a higher quality of educational experience tend to have higher operating costs and thus have higher tuition charges. Quality measures that are significant predictors of tuition include: student-faculty ratios, percentage of faculty with an earned doctorate, the presence of

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undergraduate programs in engineering or business, the presence of graduate and professional programs, and the number of volumes in the library. Further, non-resident tuition is significantly influenced by the tax price to in-state residents, the state's success in attracting non-resident students, and the in-state tuition charge.

The enrollment and tuition studies, taken together, provide evidence of the simultaneous relationship between the price and quantity of higher education. Tuition price variables are significant in the prediction of enrollment rates, and enrollment variables are significant in the prediction of tuition.

Effectiveness of Tax Credits as Federal Subsidies

The enactment of the Hope Scholarship Credit marks a significant shift in education policy. For the first time, the federal government is using the tax code to distribute targeted subsidies for higher education. Previous tax law relating to college expenses has been limited to exclusions for scholarships received (I.R.C. §117), amounts received from employer provided educational assistance programs (I.R.C. §127), and deductions for tuition costs that are ordinary and necessary to a trade or business (I.R.C. Reg.§1.162-5). One principal concern over the Hope Scholarship Credit is whether the tax code is the appropriate tool for providing subsidies for higher education. Economic theory suggests that good tax laws are those that adhere to three basic principles: economic efficiency, administrative simplicity, and fairness (Stiglitz, 1988, p. 390).

Tax laws are economically efficient if they are nondistortionary (Stiglitz, p. 391). Optimally, the tax law should raise revenue without changing the relative prices of goods, services, or factors of production (Saxton, 1997). If, after the enactment of a new tax

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law, relative prices are unchanged, then the tax law is said to be neutral. However, to the extent that relative prices are altered after the enactment of the tax law, then the law distorts economic decisions. If the Bennett Hypothesis is valid, then colleges and universities will raise tuition charges to capture the benefit of the new tax law. If tuition increases follow the enactment of the Hope Scholarship Credit, then the new law is economically inefficient and represents a circular policy effort to control tuition costs. In other words, high tuition costs are offset by a tax credit that will lead to higher tuition costs.

The principle of administrative simplicity dictates that tax laws should raise revenue at the least possible cost (Stiglitz, 1988, p. 391). To the extent that tax laws are used to accomplish social goals, administrative simplicity also requires cost minimization. The Hope Scholarship Credit accomplishes the goal of financial assistance to college students at a much lower cost than the current financial aid programs. As the Hope Scholarship Credit does not require an application process and verification of family income and assets, using the tax code for education subsidies is superior to the financial aid programs that are administered through the federal and state departments of education. However, the financial assistance will not be as timely as other financial aid programs (McPherson and Schapiro, 1997, p. 564).

The Hope Scholarship Credit is a nonrefundable tax credit. Traditionally, federal financial aid programs have provided assistance to the student at the time the student enrolls at a postsecondary institution. However, under the new tax law, the taxpayer will only benefit after filing a tax return with a positive tax liability. This time lag between enrolling in college and realizing the tax benefit is reduces the credit's impact on the

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student's perception of the cost of attending college. Thus, to the extent that the beneficiaries of the tax law are price sensitive, the method of distribution of the federal subsidy will tend to diminish its effectiveness.

There are two measures of fairness in tax law: vertical and horizontal equity. Vertical equity is a measure of overall progressivity; that is, as an individual's ability to pay increases, so does the tax burden. A tax system is horizontally equitable if individuals, who are the same in all relevant aspects, bear the same tax burden (Stiglitz, 1988, pp. 399-400). On the surface, the Hope Scholarship Credit is vertically equitable because the law phases out the credit for taxpayers with higher adjusted gross incomes, and therefore a greater ability to pay for higher education. As the credit applies to all higher education tuition costs, without respect to type of institution, the law is also horizontally equitable.

Beneath the surface, there are aspects of the Hope Scholarship Credit that are unfair. First, the credit is nonrefundable. To benefit from the new tax law, the student's family must have a tax liability (I.R.C. §25A). Thus, lower income families, those that do not have a tax liability, will not be helped by the tax credit. In addition, the allowable credit is reduced by financial aid and scholarships received by the student [I.R.C. §25A(g)(2)]. This condition also limits the applicability of the credit to lower income students. These two limitations on eligibility for the credit reduce vertical equity because lower income students are precluded from benefiting from the credit. Horizontal equity is also compromised because the tax credit is only available to the families of individuals who choose to attend college.

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The Hope Scholarship Credit was enacted to mitigate the effects of the sharp rise in tuition costs by subsidizing the first two years of postsecondary education. The principal advantage of using the tax code to distribute federal subsidies for higher education is administrative simplicity. Nonetheless, this advantage must be weighed against the possible disadvantages of economic inefficiency and inequity. In the short run, the credit may temporarily relieve some of the financial burden placed on middle-income families. However, in the long run, these additional federal subsidies may increase tuition costs and make college even more expensive for middle-income students. While this was clearly not the intention of the supporters of the Hope Scholarship Credit, it is yet one more example of how good politics often makes bad economics.

The Targeted Jobs Credit

Researchers have attempted to measure the effectiveness of tax credits to achieve social goals. In 1980, O'Neil studied the impact of the targeted jobs credit on the hiring decisions of 699 employers in metropolitan areas of Colorado. The targeted jobs credit was enacted by Congress in 1979 as an effort to reduce the unemployment rate of traditionally difficult to place job applicants: Vietnam veterans, disadvantaged youth, vocational rehabilitation participants, public assistance recipients, and convicted felons. Under the provisions of the tax law, employers were granted a tax credit for hiring members of these disadvantaged groups [I.R.C. §51(a),(b)]. Congress hoped that reducing the unemployment rate of these disadvantaged groups would reduce federal outlays for welfare payments and food stamps by an amount that exceeded the revenue the Treasury would forgo by allowing the tax credit.

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O'Neil used a survey research method to determine whether the targeted jobs credit would encourage an employer to hire an applicant from one of the targeted groups. It was hypothesized that the targeted jobs credit would not have any significant impact on the employment decision process. Further, it was expected that when the employer utilized the targeted jobs credit, it produced a windfall tax benefit which rewarded the employer for hiring an applicant who would have been hired without the tax credit. The results of the study confirm the presence of a windfall tax benefit, since 44% of the employment decisions resulted in windfall gains. In addition, 39% of the decisions were not influenced at all by the targeted jobs credit. Congress allowed the targeted jobs credit to expire on December 31, 1994.

The Work Opportunity Tax Credit

A similar tax credit, the Work Opportunity Tax Credit, was passed in 1996 as part of the Clinton administration's Welfare Reform Act. Under this act, Congress offered employers a tax credit for hiring welfare recipients [I.R.C. §51(a)]. The provisions of the law allowed the employer to credit up to 35% of the wages paid to a former welfare recipient provided the welfare recipient had been employed for at least 400 hours [I.R.C. §51(b)]. The maximum allowable credit was $2,100 per employee [I.R.C. §51(b)]. The motivation behind the law was similar to the targeted jobs credit. The more welfare recipients who find jobs, the less the federal government will have to pay for welfare programs. President Clinton sold his new tax credit program as a "significant incentive" to employers to hire welfare recipients (Sharpe, 1997, p. A1).

In a 1997 *Wall Street Journal* article, executives of Aramark and Marriott discussed their dissatisfaction with the Work Opportunity Tax Credit. Joseph Neubauer,

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Chief Executive Officer of Aramark, expressed his skepticism about the power of the tax credit to change hiring practices. According the Neubauer, if the government wants to encourage businesses to hire welfare recipients, it should give employers easy access to them and should teach them good work habits. "The tax incentives are a slight plus, but it doesn't affect what we do day to day. What motivates us is that we need more people" (Sharpe, 1997, p. A1)

Nonetheless, Aramark executives hired a consultant to help the company take advantage of the new program and sent out memos to its 3,700 managers to strongly encourage them to hire welfare recipients. According to John Murphy, vice president of benefits and compensation, the experience of Aramark's cafeteria at Emory University was typical of the company-wide frustration with the credit. Of the 46 welfare recipients hired by the manager at Emory's cafeteria, the wages paid to only three employees resulted in credits for Aramark. The 43 employees who did not produce tax credits for Aramark were disqualified for a variety of reasons. Some were fired for poor performance on the job before they had worked 400 hours. Others just stopped showing up for work. In some cases Aramark failed to properly complete the paper work to certify the employee's wages as eligible for the credit. In one case, the employee was disqualified because he was arrested for violating his parole before he had worked the requisite 400 hours. For the company as a whole, Aramark hired 859 employees that were potentially eligible for the credit and the wages paid to 237 of those employees produced tax credits for the company (Sharpe, 1997, p. A8).

Janet Tully, the director of community employment training for Marriott International Inc., also expressed her disappointment and frustration with the Work

Opportunity Tax Credit. Marriott hired welfare recipients directly from non-profit community groups and put them through an extensive training program to get them ready for their job assignments. Despite the training, Marriott was unable to keep the majority of the welfare recipients employed for 400 hours (Sharpe 1997, p. A8).

As originally enacted, the Work Opportunity Tax Credit was scheduled to expire on September 30, 1997. However, Congress extended the expiration date to June 30, 1998 in the Taxpayer Relief Act of 1997, and further extended the expiration date to December 31, 2001 in the Tax Relief Extension Act of 1999.

The Historic Rehabilitation Tax Credit

The Economic Recovery Tax Act (ERTA) of 1981 created the Historic Rehabilitation Credit, a tax credit for expenditures incurred for the restoration of historic properties (I.R.C. §47). The motivation behind the credit was to encourage individuals and businesses to invest in economically disadvantaged areas and to restore certified historic structures. Congress hoped that the new tax credit would spur investment in inner cities and revitalize these economically depressed areas.

Under the law's original provisions, taxpayers were allowed a tax credit equal to 10% of the expenditures incurred to restore nonresidential buildings and residential rental property, other than certified historic structures, originally placed in service before 1936 [I.R.C. §47(a)(1), (c)(1)(B)]. In addition, taxpayers were allowed a tax credit for 25% of the expenditures incurred for the restoration of certified historic structures [I.R.C. §47(a)(2)]. Congress specifically excluded the cost of acquiring the property, the cost of facilities related to the building (i.e., a parking lot), and the cost of enlarging an existing building from the definition of qualified rehabilitation expenditures [I.R.C. §47(c)(2)(B)].

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To qualify for the credit the taxpayer must have "substantially rehabilitated" the property, meaning that total qualified rehabilitation expenditures for the project exceeded the property's original adjusted basis or $5,000 [I.R.C. §47(c)(1)(C)].

Westphal (1987) studied the effects of the original historic rehabilitation credit on restoration expenditures from 1977 to 1985. The study employed a project-based database from the National Trust for Historic Preservation. Using regression analysis, Westphal measured the influence of economic and non-economic factors on total historic rehabilitation spending. The results of the study suggest that the historic rehabilitation tax credit did not significantly influence restoration expenditures. Specifically, the average project size for the rehabilitation of certified historic properties declined after the enactment of the tax credit. In addition, the amount of spending per square foot on restoration projects was not significantly influenced by either the 10% or the 25% historic rehabilitation credit.

Smith (1990) conducted a similar study to measure the effects of the historic rehabilitation credit on two urban areas in Virginia, Richmond and Alexandria. Smith interviewed a sample of thirty developers engaged specifically in historic restoration projects. Using data gathered from his interviews, he then specified a regression model to measure the influence of tax and non-tax factors on historic restoration activity in the two cities. Using regression model predictions, Smith hypothesized that the strong financial incentives associated with historic rehabilitation projects after the tax credit should have greatly increased the spending on these projects in the two cities in the sample. However, Smith found that non-tax factors, such as new building construction in the area and availability of public parking spaces, were more influential in predicting

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historic preservation expenditures than tax factors. Smith concluded that non-tax factors "converge to impede the effectiveness of the tax credits" in influencing the investment in historic restoration projects.

The Residential Energy Tax Credit

Over the past thirty years, Congress has enacted several provisions to allow tax credits for costs incurred for energy conservation and the development of energy efficient technologies. Congress has enacted many credits of this type and then allowed them to expire. In the Economic Recovery Tax Act of 1981 Congress created a tax credit for expenditures incurred for capital improvements made to households to increase their energy efficiency. Under the provisions of the tax credit, a taxpayer could credit a maximum of $2,000 incurred for the purchase of energy conservation property and a maximum of $10,000 incurred for the purchase of renewable energy source property [I.R.C. §23 (repealed)].

Walsh (1987) studied the effectiveness of this tax credit in influencing household expenditures for energy efficient capital improvements. Using data from the 1982 Residential Energy Consumption Survey, Walsh developed a two-period utility maximization model to quantify the theoretical influence of the energy tax credit, the price of energy, and other non-economic factors on the demand for household conservation expenditures. Walsh hypothesized that the tax credits would lead to more widespread conservation activity. The results of the regression analysis did not support his hypothesis. Walsh concluded the tax credits had an insignificant influence on the magnitude of the conservation expenditures for the sample period. Rather, he concluded the price of energy and the influence of other non-economic factors led to more

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widespread or extensive energy conservation improvement activity. The residential energy tax credit was repealed by the Revenue Reconciliation Act of 1990.

Conclusion

The results of these studies suggest that tax credits represent weak incentives for influencing behavior. Indeed the conclusions reached in each of the studies of tax credits reflect the sentiment of Joseph Neubauer, Chief Executive Officer of Aramark, that tax credits do not "affect what we do day to day." Thus, tax credits seem to represent windfall gains, subsidizing behavior that would occur without tax credits. Based on this body of research, it is not likely that the Hope Scholarship Credit will increase college enrollments. Rather, it is likely to subsidize only the tuition costs of students who would have attended college without the credit.

Providing windfall gains to families whose children would attend college regardless of tax incentives is not inconsistent with the stated motivations of the Hope Scholarship Credit. Unlike the Pell Grant program or the programs enacted under the Higher Education Act of 1965, this credit was enacted as middle-income tax relief and, according to McPherson and Schapiro, middle-income students have a relatively inelastic demand. However, the potential inflationary nature of the Hope Scholarship Credit compromises the ability of this credit to even deliver windfall gains, except to the administrators and faculty of the schools that raise their tuition charges to capture the credit. McPherson and Schapiro explain increases in the tuition charges of colleges over the last two decades as cross-subsidization strategies to replace cutbacks in federal dollars to postsecondary institutions and to reduce the tuition charged to lower income students.

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But, Rose and Sorenson found evidence that is consistent with the Bennett Hypothesis; colleges raise tuition levels to fund higher administrative budgets and graduate programs. If the Bennett Hypothesis is valid and colleges and universities respond to the new tax law by raising tuition prices, then middle-income families will not benefit from the tax credit. Further, an increase in tuition prices would also make college more expensive for lower- and upper-income families who are precluded from benefiting from the credit. In summary, based on the results of the studies contained in this chapter, the most likely effect of the Hope Scholarship Credit is an increase in tuition costs and a flat college enrollment response.

CHAPTER III– METHODOLOGY

The purpose of this study is to measure the impact of the Hope Scholarship Credit on tuition charges and enrollment rates at postsecondary institutions of higher learning. This study is designed to provide additional evidence about the effectiveness of federal subsidies for higher education and the effectiveness of using federal tax credits to control tuition prices and encourage college enrollment. Specifically, this study seeks to answer the following two research questions:

1) Have tuition costs increased in the academic year following the enactment of the Hope Scholarship Credit?

2) Has enrollment changed in the academic year following the enactment of the Hope Scholarship Credit?

Based on the results of the research studies contained in the literature review, it is hypothesized that tuition costs will rise in response to the new tax law, and that enrollment will remain unchanged. The remainder of this chapter discusses the research design and methodology of the study; the empirical results are reported in Chapter IV.

Research Design

As William Bennett guided education policy in the 1980s, Congress has not initiated new programs since the 1970s. The Hope Scholarship Credit, and the other provisions for higher education included in the Taxpayer Relief Act of 1997, are the most significant federal programs for higher education since the Pell Grant Program. Consequently, most of the literature on the effectiveness of federal subsidies on tuition

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and enrollment at colleges and universities use data for periods that began in the early 1970s (pre-Pell Grant) and end in the mid-1980s.

The first objective of this research study is to update these previous studies using data from the academic year 1988-89 through 1997-98, the period in which Congress enacted the Hope Scholarship Credit. The methodology is a time-series, two-stage least squares regression model. The purpose of the two-stage design is to control for the interrelationship of price and quantity. That is, tuition prices affect college enrollment (demand), and college enrollment affects tuition prices (supply). Thus, the time-series analysis is conducted in two-stages. The first stage will specifies a model to predict tuition prices. The second stage uses the results from the first stage to predict enrollment.

A sample of 400 postsecondary institutions drawn from *Peterson's Four-Year Colleges*, and *Peterson's Two-Year Colleges* is used to provide the data for the models. The sample includes private and public institutions, and two-year and four-year institutions. As the purpose of the study is to measure the impact of the Hope Scholarship Credit on the average household, the sample institutions are not drawn at random. Rather, the largest institutions from each group in the 1997-98 academic year (the year of the enactment of the Hope Scholarship Credit) in each state are sampled, as these institutions are most representative of the population of students and households in each state. Undergraduate enrollment is used as the measure of size for the sample selection. Thus, the sample of institutions contains the two largest of each state's public four-year universities, public two-year colleges, private institutions without a religious affiliation, and private institutions with a religious affiliation. (See Appendix H for the sample of postsecondary institutions.) These criteria were adopted to construct a representative

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sample of the four distinct types of institutions within a state. As these institutions service distinct constituencies of students and households, it is assumed, *a priori*, that tuition costs and enrollments at these different institutions may be driven by different variables. For example, tuition costs and enrollment at private colleges should be more responsive to measures of quality than is the case for public universities. Alternatively, enrollment at two-year colleges is likely to be more sensitive to tuition cost and local unemployment rates than institutional quality variables. The two categories of private institutions were chosen to capture the differing missions of these two types of universities. The private, non-religiously affiliated institutions are likely to compete exclusively on the basis of the quality of education provided to students. Private, religiously affiliated universities are likely to be more altruistic in their pricing schemes.

Stage 1: Tuition Prices

For purposes of the data analysis, each category of postsecondary institutions will first be analyzed separately because averaging using all types of institutions may obscure significant relationships and differences among the types of colleges. Then, the four-year colleges will be combined into a single model and analyzed. As public two-year universities do not offer students a comprehensive education, these institutions will be excluded from the combined model. The following section discusses the tuition model specifications for each type of institution and the combined four-year college model.

Two-Year College Tuition Model

It is expected that two-year college tuition will be significantly influenced by enrollment levels, state economic variables, and institutional quality variables.

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Accordingly, the hypothesized reduced-form model for predicting two-year college tuition is presented below.

PUBLIC TWO-YEAR TUITION = a_1 + a_2(FTE Enrollment) + a_3(Median Household Income) + a_4(Annual Change in State Appropriations per Public FTE Student) + a_5(Percentage of Faculty with an Earned Doctorate) + a_6(Student-Faculty ratio) + a_7(Volumes in the Library) + a_8(Number of Majors) + a_9 (Percentage of Nonresident Students) + a_{10} (Region) + a_{11} (Year) + error

The FTE (Full-Time Equivalent) Enrollment variable is included in the model to capture the influence of demand on the price of higher education at the sample of two-year colleges. FTE enrollment is a measure used for determining comparable enrollment at institutions with part-time students (Breneman and Finn, 1978, p.457). It is assumed, *a priori*, that the sign of the enrollment variable could be positive or negative, as operating costs for higher education represent a step function. Larger enrollments can produce economies of scale that lower the operating cost per student. However, at some point on the cost function, adding an additional student can increase operating costs because, for example, additional course sections would have to be offered to accommodate the additional student. Hence, an increase in enrollment could increase operating costs, forcing the institution to raise tuition to cover the higher operating costs. The data for this variable were available from *Peterson's Two-Year Colleges*, 1988-1997.

The Annual Change in State Appropriations per FTE public student and the Median Household Income variables are included in the model to account for the influence of the state's economy on the tuition of two-year community colleges. The

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Annual Change in State Appropriations per FTE student was calculated using the total state appropriations for higher education divided by the total FTE enrollment in public postsecondary institutions in the state [Quigley and Rubinfeld (1993) and McPherson (1993)]. Total state appropriations were available from the U.S. Bureau of the Census, *Survey of Government Finances*, for years 1987-1997. The total FTE enrollment for each state was available from the U.S. Bureau of the Census, *Statistical Abstract of the United States*, 1988-1998. The annual change in state appropriations was measured as the difference between the current year's state appropriations per FTE student and the previous year's state appropriations per FTE student for each year in the sample period. It was expected that the sign of the annual change in state appropriations per FTE public student would be negative. That is, the greater the annual changes in state appropriations the lower the tuition at the sample two-year college.

The Median Household Income variable was included in the model to account for the average household's ability to pay for higher education in each state. The data for this variable was available from the U.S. Census Bureau, *Historical Income Tables – Households, Table H-8B, Median Income of Households by State: 1984 to 1998*. Assuming that two-year college tuition is an income normal good, the predicted sign of the variable is positive. That is, the higher the median household income in a state, the higher prices the market can bear for two-year college tuition. All variables that are measured in dollar amounts (Tuition, Median Household Income, and the Annual Change in State Appropriations per FTE Student) will be measured in 1998-99 constant dollars deflated by the CPI (Consumer Price Index) used by the College Board (The College Board, 1998, p.19).

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The Percentage of Faculty with an Earned Doctorate, the Student-Faculty Ratio, the Number of Volumes in the Library, and the Number of Majors offered were included in the model as institutional quality variables [Litten and Hall (1989), Getz and Siegfried (1991), Quigley and Rubinfeld (1993), Rose and Sorenson (1992), and Seneca and Taussig (1987)]. The data for each of these variables are available from *Peterson's Two Year Colleges*, 1988-1997. It was assumed that higher quality institutions would have higher tuition prices, *ceteris paribus*. Accordingly, there was an expected positive relationship between the percentage of faculty with an earned doctorate and two-year college tuition. There was an expected negative relationship between the student-faculty ratio and two-year college tuition. That is, smaller class sizes should lead to higher tuition prices. In addition, there was an expected positive relationship between the number of volumes in the library and the number of majors offered and the dependent variable. The greater the size of the library and the number of course offerings, the higher the operating cost of the institution and thus the higher the tuition price.

The percentage of nonresident students was included in the model to test Greene's theories of the influence of out-of-state students on resident tuition. Under Greene's theories, a postsecondary institution can choose one of two pricing strategies. The college can lower non-resident tuition relative to in-state resident tuition to attempt to attract high ability out-of-state students. Under this strategy, the state is hoping that the high ability out-of-state student will decide to live and work in the state after graduation. Alternatively, if the institution raises nonresident tuition relative to in-state tuition, the institution can subsidize resident students with non-resident tuition. Thus, the influence

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of the percentage of nonresident students can be positive or negatively related to in-state tuition.

It is expected that the state economic variables will be more significant than the institutional quality variables in the prediction of tuition at public two-year institutions. In addition to these independent variables, there are indicator variables for the regions and the years of the sample period. The College Board has divided the states into six regions: Southwest, South, West, Middle States, Midwest, and New England (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region was used as the base variable in the model. In addition, annual indicator variables were included in the model, with the 1988-89 academic year used as the base year.

Public Four-Year University In-State Tuition Model

It is expected that enrollment, state economic variables, and institutional quality variables would drive public four-year university tuition. However, it is further expected that the quality variables would be more important in the prediction of public four-year tuition than in the prediction of two-year college tuition. Accordingly, the hypothesized model for predicting the tuition of public four-year state universities is as follows:

PUBLIC FOUR-YEAR IN-STATE TUITION = a_1 + a_2(FTE Enrollment) + a_3(Median Household Income) + a_4(Annual Change in State Appropriations per Public FTE Student) + a_5(Percentage of Faculty with an Earned Doctorate) + a_6(Student-Faculty ratio) + a_7(Presence of Undergraduate Program in Engineering) + a_8(Number of Graduate Students) + a_9(Number of Volumes in the Library) + a_{10}(Percentage of Non-Resident Students)+ a_{11}(Region) + a_{12}(Year) + error

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FTE enrollment is included in the public four-year state university tuition model to capture the influence of student demand on tuition prices. As increased enrollments can either increase operating costs of the sample institution or alternatively enhance the economies of scale of offering courses and student services, the sign of the FTE enrollment variable could be positive or negative. The data for this variable are available from *Peterson's Four-Year Colleges*, 1988-1997.

Median Household Income and the Annual Change in State Appropriations per FTE student are included in the model to capture the influence of the state's economy on public four-year university tuition. The Median Household Income variable was included in the model to account for the average household's ability to pay for higher education in each state. The data for the Median Household Income variable were available from the U.S. Census Bureau, *Historical Income Tables – Households, Table H-8B, Median Income of Households by State: 1984 to 1998*. Assuming that four-year college tuition is an income normal good, the predicted sign of the variable is positive. That is, the higher the median household income in a state, the higher prices the market can bear for four-year public university tuition. All variables that are measured in dollar amounts (Tuition, Median Household Income, and the Annual Change in State Appropriations per FTE Student) will be measured in 1998-99 constant dollars deflated by the CPI used by the College Board (The College Board, 1998, p.19).

The Annual Change in State Appropriations per FTE student was calculated using the total state appropriations for higher education divided by the total FTE enrollment in public postsecondary institutions in the state [Quigley and Rubinfeld (1993) and

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McPherson (1993)]. Total state appropriations were available from the U.S. Bureau of the Census, *Survey of Government Finances*, for years 1987-1997. The total FTE enrollment for each state was available from the U.S. Bureau of the Census, *Statistical Abstract of the United States*, 1988-1998. The annual change in state appropriations was measured as the difference between the current year's state appropriations per student and the previous year's state appropriations per student for each year in the sample period. It is expected that the sign of the annual change in state appropriations per FTE public student will be negative. That is, the greater the annual changes in state appropriations per student the lower the tuition at the sample four-year state university.

The Percentage of Faculty with an Earned Doctorate, the Student-Faculty Ratio, the Presence of an Undergraduate Program in Engineering, the Number of Graduate Students, and the Number of Volumes in the Library are included in the model to account for the relative institutional quality of the sample four-year public universities [Litten and Hall (1989), Getz and Siegfried (1991), Quigley and Rubinfeld (1993), Rose and Sorenson (1992), and Seneca and Taussig (1987)]. The data for each of these variables are available from *Peterson's Four Year Colleges*, 1988-1997. It is assumed that higher quality universities will charge higher tuition prices. There is an expected positive relationship between the percentage of faculty with an earned doctorate and tuition prices. A higher percentage of doctorally qualified faculty will be associated with a larger faculty salary budget, and thus higher tuition. There is an expected negative relationship between the student-faculty ratio and tuition prices. Lower student-faculty ratios would imply a smaller class size at the sample public four-year university, and thus

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higher tuition costs to cover the increased operating costs associated with the smaller classes.

The presence of a undergraduate program in engineering is included in the model as an indicator variable where universities that offer a major in engineering would be coded as one, and all other universities as a zero. As engineering faculty command higher salaries than liberal arts faculty, there is an expected positive relationship between the presence of an undergraduate program in engineering and tuition prices. Even though prior research has found that the presence of undergraduate programs in business are positively correlated with tuition prices [Getz and Siegfried (1991)], this variable is omitted from this study because of the expected uniformity among the sample colleges. As the data for this model were drawn from the largest public four-year institutions in each state, it was expected that each of the sample universities would offer an undergraduate program in business.

The Number of Graduate Students is included in the model to account for the increase in perceived quality and operating costs associated with offering graduate programs. While prior research has found a significant positive relationship between the number of graduate programs and tuition [Quigley and Rubinfeld (1993) and Rose and Sorenson (1992)], the number of graduate students was used in this study because it provided a more reliable measure of the effect of graduate programs on tuition. Among the sample universities, there was a lack of uniformity in measuring the number of graduate programs. Thus, the number of graduate students was used as a proxy for the number of graduate programs at the sample institution. There is an expected positive relationship between the number of graduate students and tuition prices of the sample

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four-year public universities. In addition, there is an expected positive relationship between the Number of Volumes in the Library and tuition prices. Based on the results of Litten and Hall (1989), the number of volumes in the library is a signal of institutional quality. Thus, greater library holdings will increase operating costs, and thus tuition prices.

The Percentage of Nonresident Students was included in the model to capture the influence of out-of-state students on in-state tuition charges. The data for this variable are available from *Peterson's Four Year Colleges*, 1988-1997. According to Greene (1994), a postsecondary institution can choose one of two pricing strategies for balancing in-state and out-of-state tuition charges. The college can lower non-resident tuition relative to in-state resident tuition to attempt to attract high ability out-of-state students. Under this strategy, the state is hoping that the high ability out-of-state student will decide to live and work in the state after graduation. Alternatively, if the institution raises nonresident tuition relative to in-state tuition, the institution can subsidize resident students with non-resident tuition. Thus, the influence of the percentage of nonresident students can be positively or negatively related to in-state tuition.

Finally, indicator variables are included in the model for regions and years in the sample period. The six regions included in the model are the Southwest, South, West, Middle States, Midwest, and New England (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region was used as the base variable. In addition, annual indicator variables were included in the model, with the 1988-89 academic year used as the base year.

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Public Four-Year Non-Resident Tuition

In addition to the Public Four-Year University In-State Tuition model presented above, a second model for non-resident tuition at public four-year institutions was calculated. The model uses the same independent variables as the in-state tuition model. The only difference between the models is the dependent variable. This model is an extension of the Greene study (1994), and was used to measure the increase in out-of-state tuition after the enactment of the Hope Scholarship Credit. All dollar amounts used in the model will be measured in 1998-99 constant dollars using the CPI index used by the College Board (The College Board, 1998, p.19). The hypothesized model for Public Four-Year Non-Resident Tuition is as follows.

PUBLIC FOUR-YEAR NON-RESIDENT TUITION = a_1 + a_2(FTE Enrollment) + a_3(Median Household Income) + a_4(Annual Change in State Appropriations per Public FTE Student) + a_5(Percentage of Faculty with an Earned Doctorate) + a_6(Student-faculty ratio) + a_7(Presence of Undergraduate Program in Engineering) + a_8(Number of Graduate Students) + a_9(Number of Volumes in the Library) + a_{10}(Percentage of Non-Resident Students)+ a_{11}(Region) + a_{12}(Year) + error

Private College Tuition

Similar to the public four-year university model, it is expected that enrollment, state economic variables, and institutional quality variables will significantly influence the tuition prices of private colleges. However, it is also expected that quality variables will be more important in the prediction of private college tuition than in the prediction of either two-year college or public four-year university tuition. All dollar amounts used in

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the model (Tuition, Median Household Income, and the Annual Change in State Appropriations per FTE Student) are measured in 1998-99 constant dollars using the CPI index used by the College Board (The College Board, 1998, p.19). The hypothesized model for Private College Tuition is as follows.

PRIVATE COLLEGE TUITION = a_1 + a_2(FTE Enrollment) + a_3(Median Household Income) + a_4(Annual Change in State Appropriations per Public FTE Student) + a_5(Percentage of Faculty with an Earned Doctorate) + a_6(Student-faculty ratio) + a_7(Presence of Undergraduate Program in Engineering) + a_8(Number of Graduate Students) + a_9(Number of Volumes in the Library) + a_{10}(Region) + a_{11}(Religious Affiliation) + a_{12}(Year) + error

Similar to the previous models for predicting public four-year university tuition, private college tuition is hypothesized to be a function of FTE enrollment, state economic variables, and institutional quality variables. FTE enrollment is included in the model to account for the influence of student demand on private college tuition. It is expected that FTE enrollment could be positively or negatively related to tuition. Increased enrollment could increase operating costs, and thus increase the tuition price paid by students. Alternatively, increased enrollment could create economies of scale that lower the operating cost per student and reduce the tuition price paid by students. The data for this variable were available from *Peterson's Four-Year Colleges*, 1988-1997.

The Median Household Income and the Annual Change in State Appropriations per Public FTE student are included in the model to capture the influence in state's economy on private college tuition. There is an expected positive relationship between median household income and tuition. Higher median household incomes imply a higher

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ability to pay for higher education. Thus, as median household income increases, tuition should also increase. The data for this variable are available from U.S. Census Bureau, *Historical Income Tables – Households, Table H-8B, Median Income of Households by State: 1984 to 1998.*

Alternatively, the Annual Change in State Appropriations per Public FTE student is included in the private college tuition model to account for the competition between publicly funded colleges in the state and privately supported colleges [Quigley and Rubinfeld (1993) and McPherson (1993)]. The Annual Change in State Appropriations per FTE student was calculated using the total state appropriations for higher education divided by the total FTE enrollment in public postsecondary institutions in the state [Quigley and Rubinfeld (1993) and McPherson (1993)]. Total state appropriations were available from the U.S. Bureau of the Census, *Survey of Government Finances*, for years 1987-1997. The total FTE enrollment for each state was available from the U.S. Bureau of the Census, *Statistical Abstract of the United States,* 1988-1998. The annual change in state appropriations was measured as the difference between the current year's state appropriations and the previous year's state appropriations for each year in the sample period. It is expected that the sign of the annual change in state appropriations per FTE public student would be negative. If increases in state appropriations decrease the tuition of public colleges in the state, it is expected this could create pressure on private universities to lower their tuition charges relative to their public college competitors in the state.

The Percentage of Faculty with a Earned Doctorate, the Student-Faculty Ratio, the Presence of an Undergraduate Degree in Engineering, the Number of Graduate

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Students, and the Number of Volumes in the Library are included in the private college tuition model to account for the relative institutional quality among the private colleges in the sample [Litten and Hall (1989), Getz and Siegfried (1991), Quigley and Rubinfeld (1993), Rose and Sorenson (1992), and Seneca and Taussig (1987)]. It is expected that higher quality will be associated with higher tuition prices at the sample colleges. The data for each of these variables are available from *Petersons Four Year Colleges*, 1988-1997. There is an expected positive relationship between the percentage of faculty with an earned doctorate and tuition prices. A higher percentage of doctorally qualified faculty will be associated with a larger faculty salary budget, and thus higher tuition. There is an expected negative relationship between the student-faculty ratio and tuition prices. Lower student-faculty ratios imply a smaller class size at the sample public four-year university, and thus higher tuition costs to cover the increased operating costs associated with the smaller classes.

The presence of an undergraduate program in engineering is included in the model as an indicator variable where universities that offer a major in engineering would be coded as one, and all other universities as a zero. As engineering faculty command higher salaries than liberal arts faculty, there is an expected positive relationship between the presence of an undergraduate program in engineering and tuition prices. Even though prior research has found that the presence of undergraduate programs in business are positively corrrelated with tuition prices [Getz and Siegfried (1991)], this variable is omitted from this study because of the expected uniformity among the sample colleges. As the data for this model were drawn from the largest private institutions in each state, it

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was expected that every college in the sample would have an undergraduate program in business.

The Number of Graduate Students is included in the model to account for the increase in perceived quality and operating costs associated with offering graduate programs. Accordingly, there is an expected positive relationship between the number of graduate students and tuition prices of the sample four-year public universities. In addition, there is an expected positive relationship between the Number of Volumes in the Library and tuition prices. Based on the results of Litten and Hall (1989), the number of volumes in the library is a signal of institutional quality. Thus, greater library holdings will increase operating costs, and thus tuition prices.

In addition, there are indicator variables included in the model for regions, years, and religious affiliation. The regions included in the model are the Southwest, South, West, Middle States, Midwest, and New England. (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region was used as the base variable. In addition, annual indicator variables were included in the model, with the 1988-89 academic year used as the base year. The religious affiliation variable is included in the model to account for the differing missions among private institutions. The variable is a dummy variable where 0 indicates a private institution with a religious affiliation and 1 indicates an institution that does not have a religious affiliation. It is expected that the quality variables will be more significant than the economic variables in the prediction of private college tuition.

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Four Year College Combined Tuition Model

The final tuition model is a four-year college combined tuition model. The purpose of this model is to estimate the average impact of the Hope Scholarship Credit on the all four-year universities, private and public. The four-year college combined model includes the public four-year state universities, the private religiously affiliated colleges, and the private non-religiously affiliated colleges from the sample. The independent variables from the separate institutional models are used in the combined model. Thus, it is expected that the tuition prices of the four-year colleges in the sample will be a function of enrollment, state economic variables, and institutional quality variables. All dollar amounts used in the model are measured in 1998-99 constant dollars using the CPI index used by the College Board (The College Board, 1998, p.19). The hypothesized model for predicting tuition prices is as follows:

FOUR-YEAR COLLEGE COMBINED TUITION = a_1 + a_2(FTE Enrollment) + a_3(Median Household Income) + a_4(Annual Change in State Appropriations per Public FTE Student) + a_5(Percentage of Faculty with an Earned Doctorate) + a_6(Student-Faculty ratio) + a_7(Presence of Undergraduate Program in Engineering) + a_8(Number of Graduate Students) + a_9(Number of Volumes in the Library) + a_{10}(Region) + a_{11}(Type of Institution) + a_{12}(Year) + error

The FTE enrollment variable is included in the model to capture the influence of demand on the price of higher education at the sample universities. It is assumed, *a priori*, that the sign of the enrollment variable could be positive or negative, as operating costs for higher education represent a step function. The greater the enrollment, presumably the lower the operating cost per student and the lower the tuition charge for

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each student. However, at some point on the cost function, adding an additional student will increase operating costs because, for example, additional course sections would have to be offered or additional dorm rooms will have to be provided. Hence, the increased enrollment could increase operating costs, and the institution may have to raise tuition charges to cover the higher operating costs. The data for the enrollment variable were available from *Peterson's Four-Year Colleges*, 1988-1997.

The remaining independent variables included in the model can be divided into two broad categories: state economic variables and institutional quality variables. The economic variables are Median Household Income and Annual Change in State Appropriations per Student. The Median Household Income in each state is available from U.S. Census Bureau, *Historical Income Tables – Households, Table H-8B, Median Income of Households by State: 1984 to 1998*. This measure is consistent with previous studies that have found a significant relationship between median family income and tuition prices [Quigley and Rubinfeld, (1993)]. Assuming that postsecondary education is an income normal good, the predicted sign of the variable is positive, that is, the higher the median household income in a state, the higher price the market can bear for tuition.

The Annual Change in State appropriations per FTE public student will be calculated using the total state appropriations for higher education divided by the total FTE enrollment in public postsecondary institutions in the state [Quigley and Rubinfeld (1993) and McPherson (1993)]. The source for the numerator, total state appropriations, is available from the *U.S. Bureau of the Census*, "Survey of Government Finances," for years 1988-1997. The total FTE enrollment for each state was available from the U.S. Bureau of the Census, *Statistical Abstract of the United States*, 1988-1998. The

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independent variable used in the tuition model is the annual change in state appropriations, measured by the difference between the current year's state appropriations per student and the previous year's state appropriations per student. The predicted sign of the variable is negative, that is, the greater the annual change in state appropriation per FTE student the lower the tuition charges at the postsecondary institution.

The Student-Faculty Ratio, the Percentage of Faculty with an Earned Doctorate, the Presence of an Undergraduate Program in Engineering, the Number of Graduate Students, and the Number of Volumes in the Library are included in the model as quality variables [Litten and Hall (1989), Getz and Siegfried (1991), Quigley and Rubinfeld (1993), Rose and Sorenson (1992), and Seneca and Taussig (1987)]. The data for these variables are available from *Petersons Four Year Colleges*, 1988-1997. There is an expected negative relationship between the student-faculty ratio and tuition. The lower the student-faculty ratio, the more personal instruction each student will receive, and thus the higher the perceived quality of education. Thus, lower ratios should lead to higher tuition charges. Alternatively, there is an expected positive relationship between the percentage of faculty with an earned doctorate and the tuition price. As doctorally qualified faculty command a higher salary than non-doctorally qualified faculty, operating costs will increase as the percentage of faculty with a earned doctorate increases. It is expected that the increases in the faculty salary budget will be funded, at least partially, through tuition increases. Similarly, engineering faculty command higher salaries than liberal arts faculty, so there is an expected positive relationship between the presence of an undergraduate program in engineering and tuition prices. Even though

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prior research has found that the presence of undergraduate programs in business are positively correlated with tuition prices [Getz and Siegfried (1991)], this variable is omitted from this study because of the expected uniformity among the sample colleges. As the data for this study are provided from the largest public and private institutions in each state, it is expected that every college in the sample will offer a business degree. Similarly, there is an expected positive relationship between the number of graduate students and tuition prices. Finally, the number of volumes in the school's library should also increase the operating cost of the college and increase the tuition price.

In addition, there are indicator variables included in the model for regions, years, and type of institution. The regions included in the model are the Southwest, South, West, Middle States, Midwest, and New England regions (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region was used as the base variable. In addition, annual indicator variables were included in the model, with the 1988-89 academic year used as the base year. The type of institution variable is included in the model to account for the differing missions among the four-year colleges. The public four-year colleges were used as the base variable.

Measuring the Impact of the Hope Scholarship Credit on Tuition

Using the regression beta weights for each of the variables in the model for the academic years 1988-89 through 1997-98, the tuition price for the academic year 1998-99 will be predicted for each type of institution as well as the combined four-year model. The impact of the Hope Scholarship Credit on tuition prices will be measured by comparing the predicted tuition costs from the models to the actual tuition prices at each

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of the institutions in the sample. The predicted tuition cost will be used as a proxy for tuition prices had the tuition tax credit not been enacted. The actual tuition costs will represent the tuition prices after the enactment of the tax credit. The significance of the difference between the predicted and actual tuition prices in the 1998-99 academic year will be evaluated using t tests. If the actual price is significantly greater than the predicted tuition price, then the Hope Scholarship Credit has been cost-inflationary. That is, tuition prices have risen above the level expected without the credit.

Stage 2: Enrollment

The predicted tuition prices from Stage 1 of the models will be used in Stage 2 to predict FTE enrollment at the sample institutions. As there is potential simultaneity between tuition and enrollment, the two-stage least squares regression design was used to control the interrelationship between price and demand for higher education. As the enrollment models represent the second stage of the tuition models, the following section discusses the models for predicting enrollment for each type of institution as well as a four-year combined model.

Two-Year College Enrollment Model

FTE enrollment of public two-year colleges is modeled as a function of tuition, institutional quality, and state demographic variables. Similar to the tuition models, all dollar amounts used in the model are measured in 1998-99 constant dollars using the CPI index used by the College Board (The College Board, 1998, p.19). The hypothesized model for predicting two-year college FTE enrollment is as follows.

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PUBLIC TWO-YEAR ENROLLMENT = a_1 - a_2(Predicted Tuition) + a_3(Median Household Income) + a_4(% of State's Population Aged 18-24 Years Old) + a_5(Average Financial Aid Award per Student) + a_6(Number of Volumes in the Library) + a_7(Number of Majors Offered) + a_8(State Unemployment Rate) + a_9(Region) + a_{10}(Year) + error

Predicted tuition is included in the model to account for the possible simultaneity between the price and demand for higher education. There is an expected negative relationship between predicted tuition and enrollment. That is, as tuition increases FTE enrollment should fall at the sample two-year colleges. The Average Financial Aid Award per student is included in the model to account for the ability of the two-year college to lower the tuition for eligible students through financial aid awards. The data for this variable is available from *Petersons Two Year Colleges*, 1988-1997. There is an expected positive relationship between the average financial aid award and FTE enrollment. That is, the more generous is the institution in providing financial aid, the greater the expected enrollment at the sample two-year institution. In addition, the Median Household Income variable is included in the model to account for the state's ability to pay for higher education. Clotfelter (1991) and Manski and Wise (1983) have found a positive relationship between parents' income and college enrollment. Hence, there is an expected positive relationship between the median household income and FTE enrollment of two-year colleges. The data for this variable is available from U.S. Census Bureau, *Historical Income Tables – Households, Table H-8B, Median Income of Households by State: 1984 to 1998.*

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The remaining independent variables in the model are divided into two categories: institutional quality variables (Number of Volumes in the Library and Number of Majors Offered) and state demographic variables (Percentage of College Graduates in the State, and the State Unemployment Rate). There is an expected positive relationship between quality and FTE enrollment. That is, greater numbers of volumes in the library and numbers of majors offered will enhance an institution's ability to attract students. The data for these variables are available from *Peterson's Two Year Colleges*, 1988-1997.

The Percentage of College Graduates in the State is included in the enrollment model to account for the value that the state places on higher education. Clotfelter (1991) and Manski and Wise (1983) have found that parents who have earned a college degree are more likely to send their children to college than parents that have not earned a college degree. Thus, there is an expected positive relationship between the percentage of college graduates in the state and FTE enrollment. The data for this variable is available from the U.S. Bureau of the Census, *Current Population Reports*, Series P-20-476, 1988-1997.

Based on the results of the Quigley and Rubinfeld (1993) and Hoenack and Weiler (1979) studies, the state unemployment rate is included the public two-year enrollment model to account for the opportunity cost of attending college. For lower income students, if the unemployment rate is high, there is a relatively low opportunity cost of attending college if the student cannot find employment. Thus, higher unemployment rates imply a higher value for a college education and will increase enrollment. The data for this variable is available from the *Bureau of Labor Statistics Data*, 1988-1997.

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In addition, indicator variables for regions and years are included in the model. The regions are the Southwest, South, West, Middle States, Midwest, and New England regions (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region was used as the base variable. In addition, annual indicator variables were included in the model, with the 1988-89 academic year used as the base year.

Public Four-Year University FTE Enrollment Model

It is expected that FTE enrollment of public four-year universities would be a function of tuition, institutional quality, and state demographic variables. All dollar amounts used in the model are measured in 1998-99 constant dollars using the CPI index used by the College Board (The College Board, 1998, p.19). The hypothesized model for predicting public four-year FTE enrollment is as follows.

PUBLIC FOUR-YEAR ENROLLMENT = a_1 - a_2(Predicted Tuition) + a_3(Median Household Income) + a_4(Average Financial Aid Award per Student) +a_5(% of College Graduates in the State) + a_6(Percentage of 18-24 Year Olds in the State) + a_7(Percentage of Faculty with an Earned Doctorate) + a_8(Number of Volumes in the Library) + a_9(Average ACT Score of the Institution) +a_{10}(Region) + a_{11}(Year) + error

Predicted tuition is included in the model to account for the simultaneity between tuition and enrollment. That is, tuition will affect enrollment, and enrollment will influence tuition. There is an expected negative relationship between tuition and

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enrollment, as higher tuition will discourage price sensitive students from enrolling at one of the sample four-year public universities. Based on the findings of Clotfelter (1991) and Manski and Wise (1983), Median Household Income is included in the model to capture the average household's ability to pay for higher education in a state. The data for this variable are available from U.S. Census Bureau, *Historical Income Tables – Households, Table H-8B, Median Income of Households by State: 1984 to 1998*. There is an expected positive relationship between median household income and enrollment because higher income implies a higher ability to pay. Similarly, there is an expected positive relationship between the Average Financial Aid Award per Student and enrollment. Higher average financial aid awards lower the tuition price facing students and thus make higher education more affordable. The data for this variable are available from *Petersons Four Year Colleges*, 1988-1997.

The remaining independent variables in the model are divided into two categories: state demographic variables (Percentage of College Graduates in the State and Percentage of 18-24 Year Olds in the State) and institutional quality variables (Percentage of Faculty with an Earned Doctorate, Number of Volumes in the Library, and the Average ACT Score of the Institution). The state demographic variables are included in the model to control for the influence of the state's population on four-year public university enrollment. There is an expected positive relationship between the state demographic variables and public four-year college FTE enrollment. The Percentage of College Graduates in the State is included in model to account for the value that the state places on higher education. The data for this variable are available from the U.S. Bureau of the Census, *Current Population Reports*, Series P-20-476, 1988-1997. The Percentage of 18-

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24 Year-Olds in the state was included in the model to control for the number of traditional college age students residing in each state. The data for this variable are available from the U.S. Bureau of the Census, *Current Population Reports*, Series P-25, No. 1044, 1988-1997.

Similarly, there is an expected positive relationship between the institutional quality variables (Percentage of Faculty with an Earned Doctorate, Number of Volumes in the Library, and the Average ACT Score of the Institution) and FTE enrollment. That is, increases in the quality measures of an institution will enhance the institution's ability to attract students. The data for these variables are available from the *Petersons Four Year Colleges*, 1988-1997.

In addition, indicator variables for regions and years are included in the model. The regions are the Southwest, South, West, Middle States, Midwest, and New England regions (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region is used as the base variable. In addition, annual indicator variables were included in the model, with the 1988-89 academic year used as the base year.

Private College FTE Enrollment

FTE enrollment of private universities is modeled as a function of tuition, institutional quality, and state demographic variables. All dollar amounts used in the model are measured in 1998-99 constant dollars using the CPI index used by the College Board (The College Board, 1998, p.19). It is expected that institutional quality variables should be more important in the prediction of enrollment than the tuition and state

demographic variables. The hypothesized model for predicting private college FTE enrollment is as follows.

PRIVATE ENROLLMENT = a_1 - a_2 (Predicted Tuition) + a_3 (Median Household Income) + a_4(Average Financial Aid Award per Student) + a_5 (% of College Graduates in State) + a_6 (% of 18-24 Year-Olds in the State) + a_7 (Number of Volumes in the Library) + a_8 (Average ACT Score of the Institution) + a_9 (Student-Faculty Ratio) + a_{10}(Percentage of Faculty with an Earned Doctorate) + a_{11} (Religious Affiliation) + a_{12} (Region) + a_{13} (Year) + error

Predicted tuition is included in the model to account for the interrelationship between price and demand for higher education. For the private colleges in the sample, there is an expected negative relationship between predicted tuition and enrollment. That is, higher tuition charges are expected to reduce enrollment at the sample private colleges. The Median Household Income variable is included in the model to control for the average household's ability to pay for higher education in the state. Clotfelter (1991) and Manski and Wise (1983) have found a positive relationship between parents' income and college enrollment. Hence, there is an expected positive relationship between the median household income and FTE enrollment of private colleges. The data for this variable are available from U.S. Census Bureau, "*Historical Income Tables –*

Households, Table H-8B, Median Income of Households by State: 1984 to 1998."

Similarly, there is an expected positive relationship between the Average Financial Aid Award per Student and enrollment. Higher average financial aid awards lower the tuition

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price facing students and thus make higher education more affordable. The data for this variable are available from *Peterson's Four Year Colleges*, 1988-1997.

The remaining independent variables included in the model are divided into two categories: state demographic variables (Percentage of College Graduates in the State and Percentage of 18-24 Year Olds in the State) and institutional quality variables (Number of Volumes in the Library, Average ACT Score of the Institution, the Student Faculty Ratio, and the Percentage of Faculty with an Earned Doctorate). There is an expected positive relationship between the state demographic variables and private college FTE enrollment. The Percentage of College Graduates in the State is included in the model because the National Center of Education Statistics (1997) has found a significant positive relationship between the educational attainment of a state's population and undergraduate enrollment. The Percentage of 18-24 year olds in the state is included in the model to control for the differences in the population of college-age students among the states.

The institutional quality variables are included in the model to account for the varying reputations for prestige among the private college sample. The Student-Faculty Ratio, the Percentage of Faculty with an Earned Doctorate, the Number of Graduate Students, and the Number of Volumes in the Library have been found to be significant predictors of undergraduate enrollment [Litten and Hall (1989), Getz and Siegfried (1991), Quigley and Rubinfeld (1993), Rose and Sorenson (1992), and Seneca and Taussig (1987)]. In addition, the average ACT score of the institution is included in the model as a measure of selectivity in admissions. Overall, there is an expected negative relationship between the institutional quality variables and private college enrollment.

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Higher institutional quality standards may attract more applications for enrollment at the sample institution, but strict admissions policies at higher quality institutions may also keep enrollment levels relatively low compared to the demand for admission. Thus, higher institutional quality implies more selective admissions standards.

The remaining independent variables in the model are indicator variables for the year, region and religious affiliation. The 1988-89 academic year was used as the base year for the model. The regions are the Southwest, South, West, Middle States, Midwest, and New England. (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region is used as the base level variable. Similar to the private tuition model, the private enrollment model contains a dummy variable for religious affiliation. The variable is given a value of 0 for institutions that have a religious affiliation and 1 for private institutions without a religious affiliation.

Four-Year College Combined Enrollment Model

The final enrollment model is a four-year college combined enrollment model. The purpose of this model is to estimate the average impact of the Hope Scholarship Credit on all four-year universities, public and private. The four-year college combined model includes the public four-year state universities, the private religiously affiliated colleges, and the private non-religiously affiliated colleges from the sample. The four-year college combined enrollment model uses the same independent variables from the separate institution models to predict FTE enrollment. Thus, it is expected that four-year college enrollment will be a function of tuition prices, state economic variables, and institutional quality variables. All dollar amounts used in the model are measured in

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1998-99 constant dollars using the CPI index used by the College Board. The hypothesized model for predicting enrollment is as follows:

FOUR-YEAR COLLEGE COMBINED ENROLLMENT = $a_1 - a_2$(Predicted Tuition) + a_3(Average Financial Aid Award per Student) + a_4(% of College Graduates in State) + a_5(% of 18-24 Year-Olds in the State) + a_6(Ratio of Students Accepted to Applications Received) + a_7(Average ACT Score of the Institution) + a_8(Number of Volumes in the Library) + a_9(Percentage of Faculty with an Earned Doctorate) + a_{10}(Student-Faculty Ratio) + a_{11}(Type of Institution) + a_{12}(Region) + a_{13}(Year) + error

The predicted tuition variable and the average financial aid award per student are included in the model to capture the influence of price on enrollment. The predicted tuition for each year of the sample was calculated from the first stage of the two-stage least squares regression analysis. The predicted rather than the actual tuition price is used to control for the simultaneity between price and quantity demanded. Based on the theory of demand, there is an expected negative relationship between tuition charges and enrollment rates. That is, as the predicted tuition price increases the average enrollment should fall. Similarly, the average financial aid award per student lowers the total tuition price facing the student, so there is an expected positive relationship between the average financial aid award and average enrollment. The data for this variable are available from *Petersons Four Year Colleges*, 1988-1997.

The percentage of the state's population that has earned a college degree is included in the model to capture the value the state's population places on a college

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education. As parents' educational attainment is a leading predictor of a student's success in college [Clotfleter (1991) and Manski and Wise (1983)], this variable is included to measure the collective likelihood that the households in the state will encourage their children to attend college. This variable is also included as a proxy for income levels in the state, as there is a significant positive correlation between income levels and educational attainment (U.S. Bureau of the Census, 1993, P70-51). There is an expected positive relationship between the percentage of the population that has earned a college degree and the average enrollment. That is, the more educated the population, the greater the enrollment at the state's colleges and universities. In addition, enrollment will be constrained by the population of college-age citizens [Quigley and Rubinfeld (1993), Clotfelter (1991) and Manski and Wise (1983)]. Accordingly, the percentage of the state's population that is between 18 and 24 years old is included in the model, and there is an expected positive relationship between this percentage and enrollment. The data for these variables are available from the U.S. Bureau of the Census, *Current Population Reports*, Series P-20-476, 1988-1997 and *Current Population Reports*, Series P-25, No. 1044, 1988-1997.

The average ACT score of the institution and the ratio of students accepted to the number of applications received are included in the model to account for the selectivity of the university's enrollment policies [Clotfelter (1991), Greene (1994, and Manski and Wise (1983)]. It is assumed that the higher the average ACT score, the more selective the university, and the more limitations the university would place on enrollment. Thus, there is an expected negative relationship between the average ACT score and enrollment. Alternatively, there is an expected positive relationship between the ratio of

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students accepted for enrollment to the number of applications received and FTE enrollment. A higher ratio would be associated with more open enrollment policies. The data for these variables are available from *Petersons Four Year Colleges, 1988-1997*.

In addition, the Number of Volumes in the Library, the Percentage of Faculty with an Earned Doctorate, and the Student-Faculty Ratio are included in the model to measure the influence of institutional quality on four-year college undergraduate enrollment. Overall, there is an expected negative relationship between the institutional quality variables and enrollment. Higher institutional quality standards may attract more applications for enrollment at the sample institution, but strict admissions policies at higher quality institutions may also keep enrollment levels relatively low compared to the demand for admission. Thus, higher institutional quality implies more selective admissions standards. The data for each of the institutional quality variables are available from *Peterson's Four Year Colleges*, 1988-1997.

The remaining independent variables in the model are indicator variables for years in sample, regions of the country and the type of institution. The base year for the annual indicator variable is the 1988-89 academic year. The regions included in the model are Southwest, South, West, Middle States, Midwest, and New England. (The College Board, 1998, pp. 10-11). (See Appendix J for a List of States by College Board Region.) The Southwest region is used as the base variable. Finally, there are three types of institutions included in the four-year college combined model: public state universities, private religiously affiliated colleges, and private non-religiously affiliated colleges. The public-state universities served as the base level type of institution for the four-year college combined enrollment model.

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<u>Measuring the Impact of the Hope Scholarship Credit on Enrollment</u>

Using the regression beta weights for each of the variables in the model for the academic years 1988-89 through 1997-98, the enrollment for the academic year 1998-99 for each institution will be predicted. The impact of the Hope Scholarship Credit on enrollment will be measured by comparing the predicted enrollment from the trend analysis to the actual enrollment at each of the institutions in the sample. The predicted enrollment will be used as a proxy for enrollment if the tuition tax credit had not been enacted. The actual enrollment will represent the enrollment after the enactment of the tax credit. The significance of the difference between the predicted and actual enrollment in the 1998-99 academic year will be measured using t tests. If the actual enrollment is significantly different from the predicted enrollment, then the Hope Scholarship Credit has affected enrollment. However, if there is not a significant difference, then the Hope Scholarship Credit has not affected enrollment.

Conclusion

The purpose of this study is to measure the impact of the Hope Scholarship Credit on tuition prices and enrollment in the year following its enactment. The study is designed to be comprehensive, including institutions from all states and of all types to increase the study's external validity. In addition, the study's regression models include independent variables that are supported by prior literature as significant in the prediction of tuition and enrollment. These variables were chosen to increase the study's internal validity and produce results that provide credible evidence of the effects of the new tax

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credit on tuition and enrollment. Based on the results of the studies included in the literature review, the most likely effect of the Hope Scholarship Credit is a rise in tuition costs and a flat enrollment response. Thus, it is expected that the results of this study will support the Bennett Hypothesis.

The results of this study are subject to two important limitations. First, the source of the data for the sample institutions is *Peterson's* annual college guides for 1988 through 1998. The reliability of the data is limited by the self-reporting nature of the college guide data, and thus may be biased. The data were carefully screened to mitigate the effects of this limitation, however. A second limitation is that the effects of the Hope Scholarship Credit were measured using the data for the 1998-99 academic year, the year following the enactment of the Taxpayer Relief Act of 1997. Thus, this study only measures the short-run effects of the new tuition tax credit. It is possible that one year is not enough time for the new tax law to produce changes in the tuition levels or enrollment rates of the sample colleges and universities. As the Hope Scholarship Credit was proposed and subjected to public debate during the 1996 presidential campaign, it is hoped that the one-year lag between the proposal and the enactment of the Hope Scholarship Credit mitigates the effects of this limitation.

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CHAPTER IV – RESULTS

The purpose of this research study is to measure the effect of the Hope Scholarship Credit on tuition charges and enrollment rates at postsecondary institutions of higher learning in the 1998-99 academic year, the year following the enactment of the credit. As described in the methodology chapter, this research study tests the following research questions:

1) Have tuition costs increased in the academic year following the enactment of the Hope Scholarship Credit?

2) Has enrollment changed in the academic year following the enactment of the Hope Scholarship Credit?

It is expected, *a priori*, that the results of this study would support the Bennett Hypothesis. That is, colleges and universities will capture all or part of the Hope Scholarship Credit through tuition increases and that enrollment will be unaffected because the target of the credit is middle-income students who have an inelastic demand for higher education. This chapter discusses the results of the study.

The Sample

To test the research questions a sample of 400 postsecondary educational institutions was drawn from *Peterson's Four-Year Colleges* and *Peterson's Two-Year Colleges*. The sample includes private and public institutions, as well as four-year and two-year institutions. As the purpose of the study is to measure the impact of the Hope Scholarship Credit on the average household, the sample institutions were not drawn at random. Rather, the institutions with the largest undergraduate enrollments, in the 1997-

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98 academic year, in each state and the District of Columbia, were used in the data analysis, as these institutions are the most representative of the population of students and households in each state. To control for political and academic competition among postsecondary institutions in each state, the two largest institutions in each group were included in the sample. Thus, the sample of institutions contains the two largest of each state's public four-year universities, public two-year colleges, private institutions without a religious affiliation, and private institutions with a religious affiliation. (See Appendix H-1 for the sample of four-year colleges and Appendix H-2 for the sample of two-year colleges.)

As noted in Appendices H-1 and H-2, Alaska, Arkansas, Mississippi, Montana, Oklahoma, and Wyoming do not have any private non-religious colleges, and Nevada, New Mexico, and Wyoming do not have any private religiously affiliated colleges. In addition, Wyoming has only one public four-year university. The lack of participation in the four educational institution groups of this study in these states reduced the sample size from 400 colleges to 381 colleges.

After the two largest colleges from each group were selected for the sample, the data for the ten-year trend analysis for the tuition and enrollment models were gathered. Colleges and universities that did not report complete tuition and enrollment data for all of the sample period were deleted. Seven two-year colleges and sixteen four-year institutions were removed from the sample for incomplete data.[3] Thus, the final sample

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[3] The two-year colleges removed from the sample were: University of Maine (Augusta), University of Kentucky (Jefferson), New England Technical Institute, Tulsa Community College, Trident Technical College, Tidewater Community College, and Southern West Virginia. The four-year universities removed from the sample were: Colorado State University, University of Hawaii (Hilo), University of District of Columbia, William Carey College, University of the State of New York Regents College, College of

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used in the data analysis contained 93 two-year colleges and 265 public and private four-year universities. Collectively, the undergraduate enrollments of the final sample institutions represent 24% of the total undergraduate enrollment nationwide. (See Appendix I for a Comparison of Undergraduate Enrollment at Sample Colleges to Total Undergraduate Enrollment by State, 1997-98.)

The Results

The research design of this study is a two-stage least squares regression trend analysis, predicting tuition in the first stage and undergraduate enrollment in the second stage. The trend analysis covered ten academic years beginning with 1988-89 and ending with 1997-98, the year the Hope Scholarship Credit was enacted. The regression coefficients from the trend analysis were then used to predict tuition and undergraduate enrollment for the 1998-99 academic year, the year following the enactment of the Hope Scholarship Credit. Actual tuition and undergraduate enrollment in the 1998-99 academic year were then compared to the tuition charges and undergraduate enrollments predicted by the models. Finally, t-tests were preformed to assess the significance of the difference between actual and predicted levels of tuition and enrollment.

The data analysis was first performed on the sample of two-year colleges, four-year public universities, and private colleges separately. Then data analysis on a combined four-year model, including four-year public universities, private religious

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Charleston, Johnson and Wales University (South Carolina), Champlain College, Norwich University, City University, College of West Virginia, Albertson College, Clarkson College, Westminister College of Salt Lake, Sinte Gleska, Northwest University-Texas Campus.

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universities and private non-religious universities was performed. The following sections

discuss the results of the data analysis.

Two-Year Colleges

The following figures illustrate the trend in the mean tuition and enrollment levels

of two-year colleges over the sample period.

Figure 1 – Mean Tuition of Two-Year Colleges by Year in Current and 1988 Constant Dollars
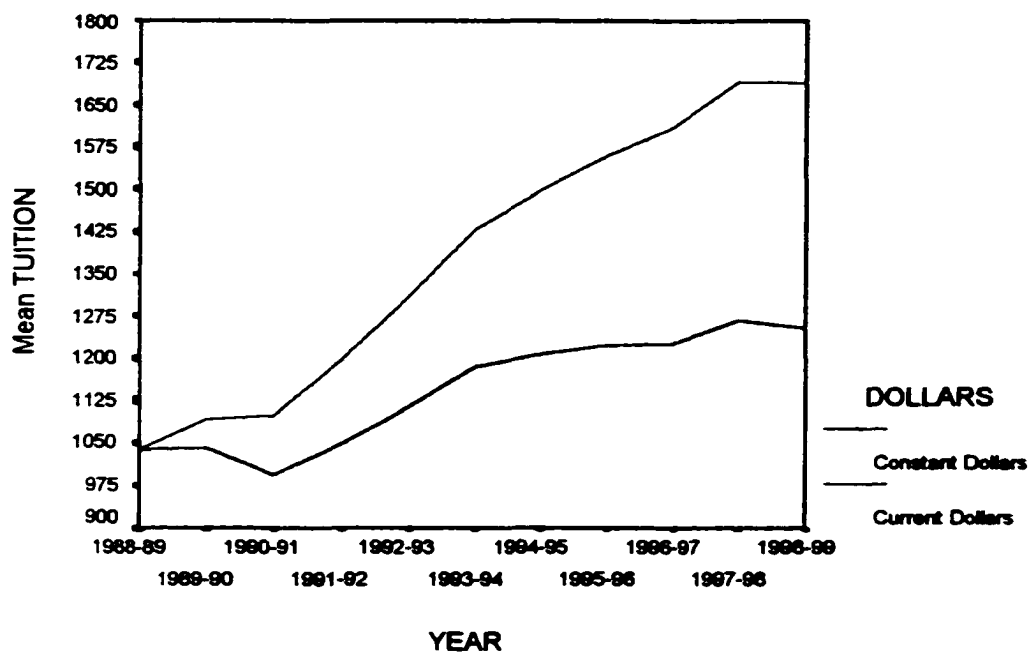
The purpose of Figure 1 is to illustrate how quickly current two-year college

tuition costs have outpaced inflation over the sample period. Accordingly, the inflation-

adjusted tuition costs in Figure 1 are measured in 1988 constant dollars. The upward

trend in the average tuition charged by two-year community colleges reveals that over the

sample period current dollar tuition rose faster than the rate of inflation. The stated

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purpose behind the Hope Scholarship Credit was to make the first two years of postsecondary education tuition-free. While the national average tuition at two-year colleges may have been $1500 at the time of the enactment of the Hope Scholarship Credit, Figure 1 shows that by the 1998-99 academic year the sample mean tuition at the public two-year colleges had risen to $1690, in then-current dollars.

The dependent variable for the first stage of the regression analysis is measured in 1998 constant dollars. Accordingly, Figure 2 shows the mean tuition costs by year and region in 1998 dollars. (See Appendix K, Figure 22 for the Mean Tuition of Two-Year Colleges by Year in 1998 Constant Dollars.) One weakness of the Hope Scholarship Credit is that the amount of the credit may not be appropriate for all regions of the country. The $1500 credit may have represented the national average tuition cost, but, by definition, in some regions of the country the average tuition cost was greater than $1500, and in other regions the mean tuition cost was less. As Figure 2 illustrates, the mean tuition cost over the last ten years is not the same across regions of the country.

The implication of the trends in Figure 2 is that after the enactment of the Hope Scholarship Credit, in some regions of the country the first two-years of postsecondary education may indeed have been tuition-free for families eligible for the credit. However, for residents of the New England, Midwest and Middle States, community college tuition was not fully subsidized.

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Figure 2 – Mean Two-Year College Tuition by Year and Region in 1998 Constant Dollars

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   H                                                                    Middle States
   c
   a                                                                    ────
   Φ                                                                    Midwest
   Σ  1000
                                                                        ────
                                                                        New England

                                                                        South

   0                                                                    ────
      1988-89     1990-91     1992-93     1994-95     1996-97  1998-99   Southwest
           1989-90     1991-92     1993-94     1995-96     1997-98       West

                            YEAR
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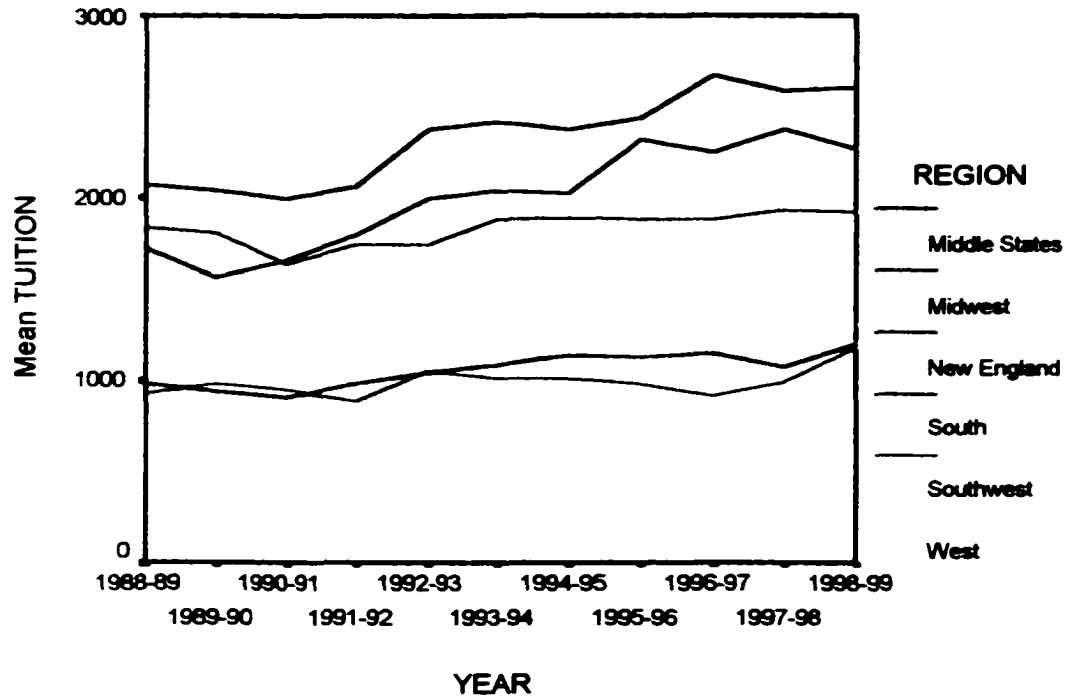
Figures 3 and 4 illustrate the trends in two-year public college enrollments over the sample period. Similar to the trends of the tuition models, the regional Figure shows a more complete picture of enrollment patterns than looking only at national averages. New England's community colleges on average tend to be smaller than colleges in the other five regions, and enrollment patterns in New England have remained relatively flat over the sample period. In addition, these smaller New England community colleges tend to be more expensive than the other regions, except the Middle State community colleges.

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Figure 3 - Mean Two-Year College FTE Enrollment by Year

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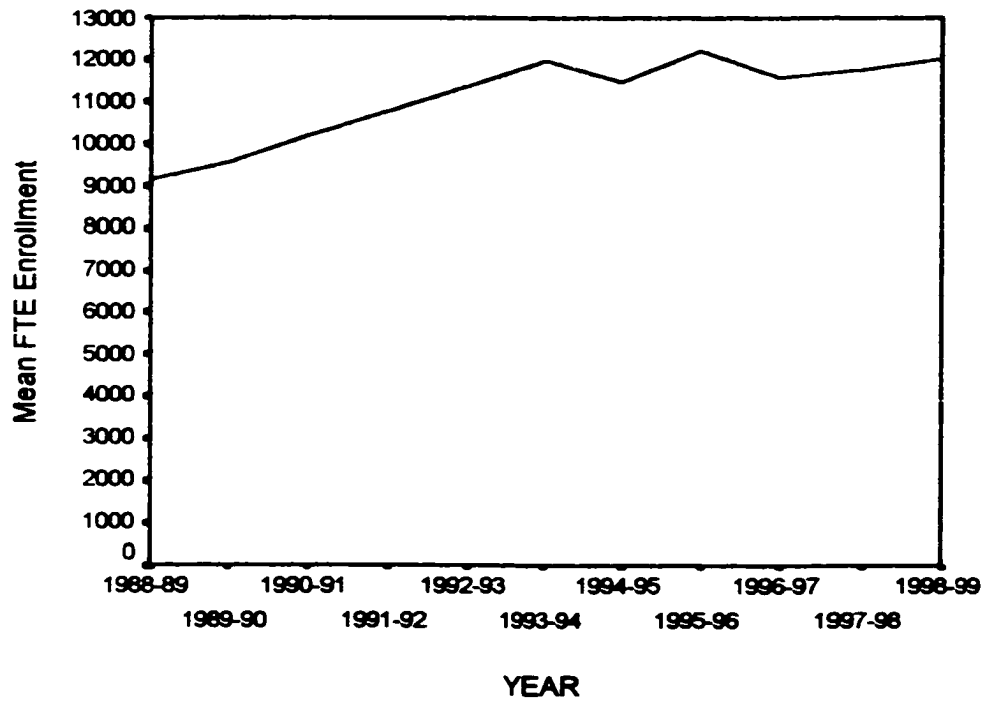
Figure 4 – Mean Two-Year College FTE Enrollment by Year and Region
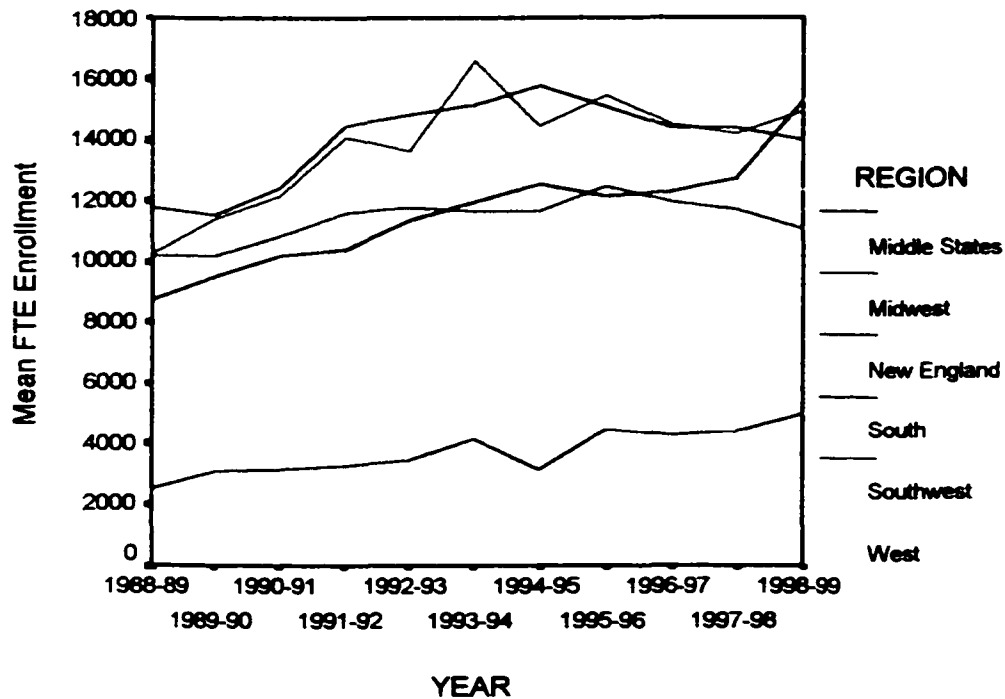
Using the tuition and enrollment data as the dependent variables, the two-stage

least squares regression models were estimated. The two-stage least squares regression

design was chosen to control for the simultaneity between tuition and enrollment. Thus,

full-time equivalent (FTE) enrollment was used in the prediction of tuition in the first

stage. Using the regression coefficients from the first stage, predicted values for tuition

were estimated and these predicted tuition values were included in the second stage of the

model where enrollment was the dependent variable.

The independent variables for the first stage of the model include institutional

quality proxies and state economic variables in the prediction of tuition. The measures of

educational quality used in the prediction of community college tuition were the

percentage of faculty with an earned doctorate, the student-faculty ratio, the percentage of

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non-resident students, the number of volumes in the library, and the number of majors offered at the sample institution. It was expected *a priori* that higher quality community colleges would have higher tuition charges. The economic variables included in the first stage were the annual change in state government appropriations for higher education over the sample period, and the state median household income. There was an expected negative relationship between state appropriations and community college tuition. Alternatively, there was an expected positive relationship between median household income and tuition.

In the second stage of the model, institutional quality and state economic and population variables were combined with predicted tuition from the first stage to predict enrollment at the sample two-year colleges. The institutional quality variables for the enrollment stage were the average financial aid award per student, the number of volumes in the library, and the number of majors offered. It was expected that there would be a positive relationship between the quality variables and enrollment. The state economic and population variables included the state unemployment rate, the state's median household income and the percentage of the state's population aged 18-24 years old. There was an expected negative relationship between the state unemployment rate and enrollment, and an expected positive relationship between median household income and enrollment. In addition, it was expected that there would be a positive relationship between the population of 18-24 year olds in the state and two-year college enrollment.

In addition, indicator variables for the year and region were included in both stages of the model. The base levels for the indicator variables were the 1988-89 academic year and the Southwest region of the country. The following table reports the

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results of the two-stage least square regression data analysis for the sample of 93 two-year state community colleges.

Table 2 – Regression Coefficients for Two-Stage Least Squares Models for Tuition and Enrollment for Two-Year Community Colleges

	Stage 1: Tuition	Stage 2: Undergraduate Enrollment
Intercept	1067.483	-5618.349
FTE Enrollment	.0201 (5.161)**	
Median Household Income	-.0060 (-1.161)	.285 (7.266)**
Change in State Appropriations	-.121 (-2.885)**	
Percentage of Faculty with an Earned Doctorate	7.491 (3.959)**	
Student-Faculty Ratio	-9.774 (-3.641)**	
Volumes in the Library	-.00174 (-2.692)**	.100 (28.075)**
Number of Majors	-1.978 (-1.938)*	67.591 (8.968)**
Percentage of Non-Resident Students	15.697 (3.488)**	
Predicted Tuition		16.254 (17.186)**
State Unemployment Rate		89.894 (.626)
Percentage of State's Population Aged 18-24		-129,007.6 (-5.131)**
Average Financial Aid Award per Student		-.162 (-1.128)**
Year 1989	-39.063 (.390)	505.369 (.689)
Year 1990	-71.213 (-.713)	1208.383 (1.631)*
Year 1991	-95.266 (-.934)	789.522 (1.029)
Year 1992	-14.347 (-.142)	-861.767 (-1.092)
Year 1993	42.093 (.401)	-1738.794 (-2.166)**
Year 1994	55.439 (.536)	-2711.566 (-3.341)**
Year 1995	104.193 (1.026)	-2887.632 (-3.539)**
Year 1996	150.513 (1.513)	-4392.151 (-5.298)**

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Year 1997	174.134	-4924.655
	(1.750)*	(-5.819)**
South	114.553	-5522.417
	(1.120)	(-7.575)**
West	186.077	-7116.855
	(1.789)*	(-9.467)**
Midwest	946.933	-17942.53
	(9.730)**	(-16.320)**
Middle States	1419.940	-31098.56
	(11.330)**	(-19.833)**
New England	1138.365	-27067.27
	(8.879)**	(-20.029)**
R^2	.406	.772
Durbin-Watson	1.440	1.908

Notes: Amounts in parentheses represent t-statistics associated with the regression coefficients. Asterisks indicate significance at the 5%(**) and 10% (*) level. All dollar amounts in the model were measured using 1998 constant dollars.

The results of the significance tests of the regression coefficients for Stage 1 of the model indicate a significant relationship between the quality of an institution and the tuition charged to students. The higher the percentage of faculty with an earned doctorate, the higher the tuition cost on average. Similarly, smaller average class size leads to higher tuition on average. The ability of the community college to attract non-resident students also leads to higher tuition costs. However, some of the quality relationships were not in the hypothesized direction. There was a significant negative relationship between tuition and volumes in the library and number of majors. While increases in the size of the library or the number of course offerings increase the operating costs of the two-year institution, a prospective student may not be willing to pay more in tuition for these additional services.

The results of the significance tests of the economic variables in the model reveal two important findings. First, the significant negative relationship between tuition and the change in state appropriations indicates that increases in the amount of state-funded

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subsidies to two-year colleges reduces the tuition charge to students. Second, the relationship between tuition and median household income is not statistically significant. This result supports the growing disconnect between income levels and tuition at colleges and universities over the last ten years.

The indicator variables for year and region were included in the model using the 1988-89 academic year and the Southwest region as base variables. Thus, the significance of the individual year and region variables should be measured relative to the base variables. Other things being the same, there was not a statistically significant increase in real tuition costs at two-year community colleges over the 1988-89 academic year until 1997-98. In addition, the positive sign and statistical significance of each of the regional variables indicates that tuition costs in the West, Midwest, Middle States, and New England are significantly higher than those in the Southwest region.

Overall, the first stage model accounts for 41% of the variation in tuition prices at the sample two-year colleges. The low Durbin-Watson statistic for the first stage would indicate signs of either heteroskedasticity or autocorrelation in the data. However, White's test for heteroskedasticity and Cochrane-Orcutt's regression for autocorrelation produced coefficients similar to those reported in Table 2. Thus, despite the low Durbin-Watson statistic, there does not appear to be a violation of the regression assumptions.

It was hypothesized that two-year college enrollment in Stage 2 would be a function of tuition prices, state economic variables, and institutional quality variables. The results of the significance tests of the regression coefficients of the enrollment model reveal a statistically significant positive relationship between tuition and enrollment of two-year colleges. This would imply that higher tuition prices at two-year colleges

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would lead to higher enrollment. Previous research has found that lower income students are more than twice as likely to enroll in a two-year college than upper or middle-income students (Clotfelter, 1991, p. 42). Thus, the population of two-year college students is more likely to be price sensitive than students at four-year colleges. Indeed, the calculated price elasticity of demand at the mean for the sample institutions is 3.0, indicating that a one percentage point increase in tuition prices would reduce enrollment by three percentage points. The positive relationship between tuition and enrollment in stage two of the model is inconsistent with the demand theory of economics, and would suggest that the tuition price of the two-year college is not an appropriate indicator of two-year college enrollment. Rather, a more accurate measure may be the tuition price of the two-year college relative to the tuition price of other universities in the area. Future research should test the accuracy of this variable in predicting two-year college tuition.

Only one of the state economic variables was a significant predictor of two-year college enrollment. Median household income was significantly positively related to two-year college enrollment. This variable was included in the model to capture the average household's ability to pay for postsecondary education. Thus, as the ability to pay increases in the state, more students will attend two-year colleges. Unlike the results of Quigley and Rubinfeld (1993) and Hoenack and Weiler (1979), there was not a significant relationship between the state's unemployment rate and enrollment. For lower income students, if the unemployment rate is high, there is a relatively low opportunity cost of attending college if the student cannot find employment. Quigley and Rubinfeld (1993) and Hoenack and Weiler (1979) have found that a state's unemployment rate is positively correlated with enrollment rates of two-year colleges. They explain this

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relationship as a measure of the value of a college education to the lower-income student. The higher the unemployment rate the greater the perceived value of a college education, and thus the more likely a student will enroll in a postsecondary institution. Thus, as the unemployment rate increases, so does the value of a college education, and the enrollment of two-year colleges increases. However, over the sample period of this study the national average unemployment rate ranged from 5.1% in 1988 to 4.7% in 1997. Thus, the relatively flat unemployment rate over the sample period was unable to explain the variation in two-year college enrollment in this study.

There was also a significant positive relationship between the institutional quality variables and two-year college enrollment. Thus, increases in the library holdings and the number of majors will increase enrollment. Even though two-year college students may be more price sensitive than four-year college undergraduates, the significance of these variables implies that two-year college students are not completely insensitive to the quality of the institution.

Some relationships in the enrollment model are not as easy to interpret. There was a significant negative relationship between the average financial aid award and enrollment. This would imply that increases in the average financial aid award would suppress two-year college enrollment. Given that previous research has found that two-year college students tend to be more price sensitive than four-year college students, it is unlikely this negative relationship accurately depicts the role of financial aid in two-year college enrollment (Clotfelter, 1991). This unlikely result may be attributable to the unreliability of the self-reporting nature of the college guide data. Over the sample period, the data for this variable for some of the colleges was inconsistent. An attempt

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was made to smooth unreasonable annual fluctuations in the financial aid variable, but the unreliability of the measurement could have produced the unexpected relationship between financial aid and enrollment. An alternative explanation could be that relatively low tuition charged by community colleges may make financial aid an unimportant factor of a student's enrollment decision.

There was also a significant negative relationship between the percentage of the state's population aged 18-24 years old and enrollment. This relationship suggests that a one-percentage point increase in the state's college-aged population would depress average community college enrollment by 129,008 students. This finding may reflect an inability of the community colleges to compete with four-year colleges, or that the community colleges cater to a different constituency than their four-year counterparts. As the state's population of college-aged residents increases, these additional students may enroll at a four-year institution rather than a community college, or not attend college at all. Alternatively, the primary constituency of two-year colleges may not be traditional 18-24 year old students, but rather older, non-traditional students. Hence, an increase in the state's college-aged population may not necessarily translate to increased enrollment at two-year colleges.

Finally, the indicator variables in the model show that, compared to 1988-89 enrollment levels, there has been a steady decline in enrollment since 1991-92, *ceteris paribus*. While Figure 3 shows merely the descriptive trend of the mean full-time equivalent enrollment, the results of stage 2 of the regression model show that after controlling for socioeconomic, regional and population variables, enrollment declined each year from 1992-1997. The significance of the regional variables suggests that, on

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average, the Southwest region has significantly higher enrollments than the other five regions.

Overall, stage 2 of the model explains 77.2% of the variation in two-year college enrollment. The Durbin-Watson statistic of 1.908 does not imply the presence autocorrelation. Nonetheless, White's test for heteroskedasticity and Cochrane-Orcutt's regression were performed on stage 2 of the model and both produced regression coefficients similar to those reported in Table 2.

After the regression coefficients for both tuition and enrollment were estimated, these coefficients were used to predict tuition and enrollment for the 1998-99 academic year. The following table shows a comparison of predicted tuition and enrollment to actual tuition and enrollment for 1998-99.

Table 3 – Comparison of Actual to Predicted Tuition and Enrollment for Two-Year Colleges, 1998-99

	Tuition	Enrollment
Actual Mean	$1,689	12,046 students
Predicted Mean	$1,542	11,911 students
Mean Difference	$147	135 students

For both tuition and enrollment, t-tests were performed to measure the significance of the mean difference. The null hypothesis for both tests was that the mean difference was not significantly different from zero. The mean difference of $147 for tuition was statistically significant ($t = 2.011$, $p = .047$), and thus the null hypothesis is rejected. Actual tuition costs rose by more than expected in the year following the enactment of the Hope Scholarship Credit. Community colleges, on average, captured approximately 10% of the $1,500 credit in the 1998-99 academic year. However, the

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mean difference of 135 students between actual and predicted enrollment was not statistically significant (t = .222, p = .825). The null hypothesis is not rejected; there was not a change in enrollment in the year following the enactment of the Hope Scholarship Credit.

Finally, the overall mean difference in tuition and enrollment was subdivided by region. The following tables summarize the actual and predicted tuition and enrollment by region.

Table 4 – Comparison of Actual and Predicted Tuition for Two-Year Colleges by Region, 1998-99

Region	Tuition		
	Actual	**Predicted**	**Mean Difference**
Southwest	Mean = 1183 Std. Dev. = 468 N = 7	Mean = 973 Std. Dev. = 227 N = 7	Mean = 210 Std. Dev. = 354 N = 7
South	Mean = 1204 Std. Dev. = 378 N = 17	Mean = 1064 Std. Dev. = 242 N = 17	Mean = 140 Std. Dev. = 439 N = 17
West	Mean = 1312 Std. Dev. = 487 N = 24	Mean = 1191 Std. Dev. 238 N = 24	Mean = 121 Std. Dev. = 537 N = 24
Midwest	Mean = 1925 Std. Dev. = 701 N = 25	Mean = 1840 Std. Dev. = 224 N = 25	Mean = 85 Std. Dev. = 674 N = 25
Middle States	Mean = 2605 Std. Dev. = 1376 N = 10	Mean = 2411 Std. Dev. = 324 N = 10	Mean = 194 Std. Dev. = 674 N = 10
New England	Mean = 2270 Std. Dev. = 1243 N = 10	Mean = 1980 Std. Dev. = 207 N = 10	Mean = 290 Std. Dev. = 1104 N = 10

The mean difference between actual and predicted tuition costs was positive in all regions. The largest increase, $290, occurred in the New England states and the smallest increase, $85, occurred in the Midwest. An ANOVA test was used to measure the

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significance of the difference between actual and predicted tuition costs among regions. The overall F statistic was not significant (F = .342, p = .882). In addition, Least Significant Difference (LSD) post-hoc tests revealed no significant differences between pairwise comparisons of regions. Thus, the mean difference was evenly distributed among regions of the country, and the significance of the overall mean difference of $147 was not driven by extreme increases in the actual tuition costs in any one region.

Table 5 - Comparison of Actual and Predicted Enrollment for Two-Year Colleges by Region, 1998-99

Region	Enrollment		
	Actual	**Predicted**	**Mean Difference**
Southwest	Mean = 14,937 Std. Dev. = 13,567 N = 7	Mean = 14,000 Std. Dev. = 8,185 N = 7	Mean = 937 Std. Dev. = 6,178 N = 7
South	Mean = 13,995 Std. Dev. = 11,992 N = 17	Mean = 15,013 Std. Dev. = 11,726 N = 17	Mean = -1,018 Std. Dev. = 5,411 N = 17
West	Mean = 12,380 Std. Dev. = 10,858 N = 24	Mean = 12,089 Std. Dev. = 6,100 N = 24	Mean = 291 Std. Dev. = 6,679 N = 24
Midwest	Mean = 11,103 Std. Dev. = 8,600 N = 25	Mean = 11,792 Std. Dev. = 7,116 N = 25	Mean = -689 Std. Dev. = 4,971 N = 25
Middle States	Mean = 15,288 Std. Dev. = 10,516 N = 10	Mean = 13,866 Std. Dev. = 4,478 N = 10	Mean = 1,422 Std. Dev. = 8,793 N = 10
New England	Mean = 5,024 Std. Dev. = 4,169 N = 10	Mean = 3,089 Std. Dev. = 3,070 N = 10	Mean = 1,935 Std. Dev. = 2,985 N = 10

The result of the ANOVA test for enrollment revealed insignificant differences between the actual and predicted enrollment among the regions. The overall F statistic

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was not significant (F = .527, p = .756). In addition, LSD post hoc tests revealed no significant differences between pairwise comparisons of regions.

In summary, these findings suggest that in all regions of the country two-year colleges raised tuition costs in the academic year following the enactment of the Hope Scholarship Credit, and this increase in tuition had no significant impact on enrollment. The increase in tuition costs did not fully erase the benefit of the credit, but these findings suggest that the actual benefit was reduced to approximately $1,350 rather than the $1,500 credit enacted by Congress.

Four-Year Public Universities

The following Figures illustrate the trend in the mean tuition and enrollment levels of four-year public colleges over the sample period. The purpose of Figure 5 is to illustrate how quickly current four-year college tuition costs have outpaced inflation over the sample period. Accordingly, the inflation-adjusted tuition costs in Figure 5 are measured in 1988 constant dollars.

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Figure 5 – Mean In-State Tuition of Four-Year Public Universities by Year in Current and 1988 Constant Dollars
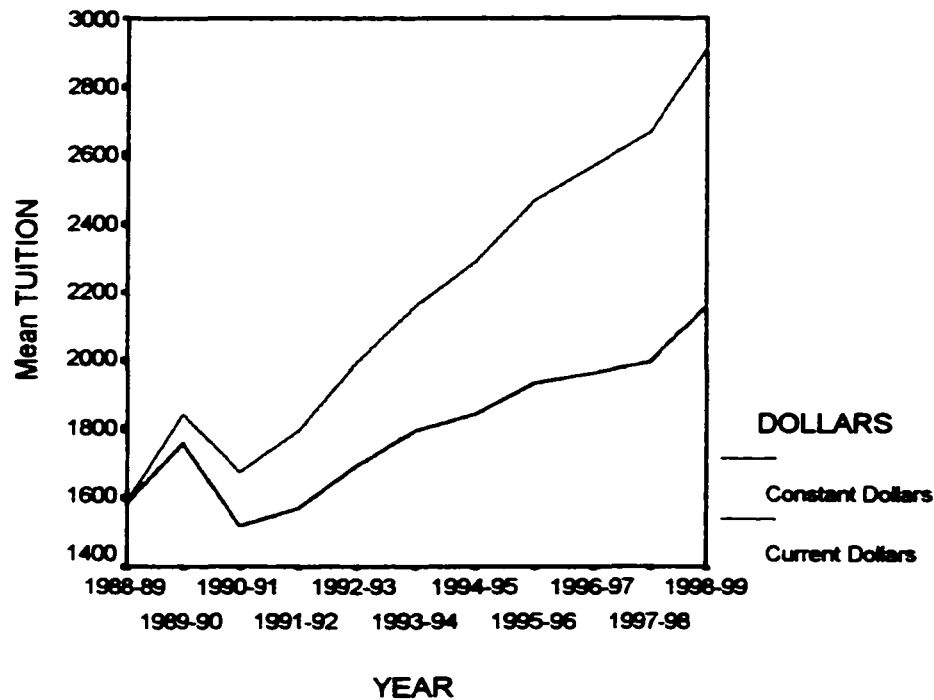
The overall eleven-year trend of tuition costs of four-year public universities in Figure 5 reveals a steady rise in real terms since the 1990-91 academic year. The sharpest increase over the sample period occurred between the 1997-98 and 1998-99 academic years.

The dependent variable for stage 1 of the two-stage least squares regression analysis is measured in 1998 constant dollars. Accordingly, Figure 6 illustrates the mean tuition costs of four-year public in-state tuition costs by year and region in 1998 constant dollars. (See Appendix K, Figure 23 for the Mean In-State Tuition of Public Four-Year Universities by Year in 1998 Constant Dollars.)

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Figure 6 – Mean In-State Tuition of Four-Year Public Universities by Year and Region in 1998 Constant Dollars
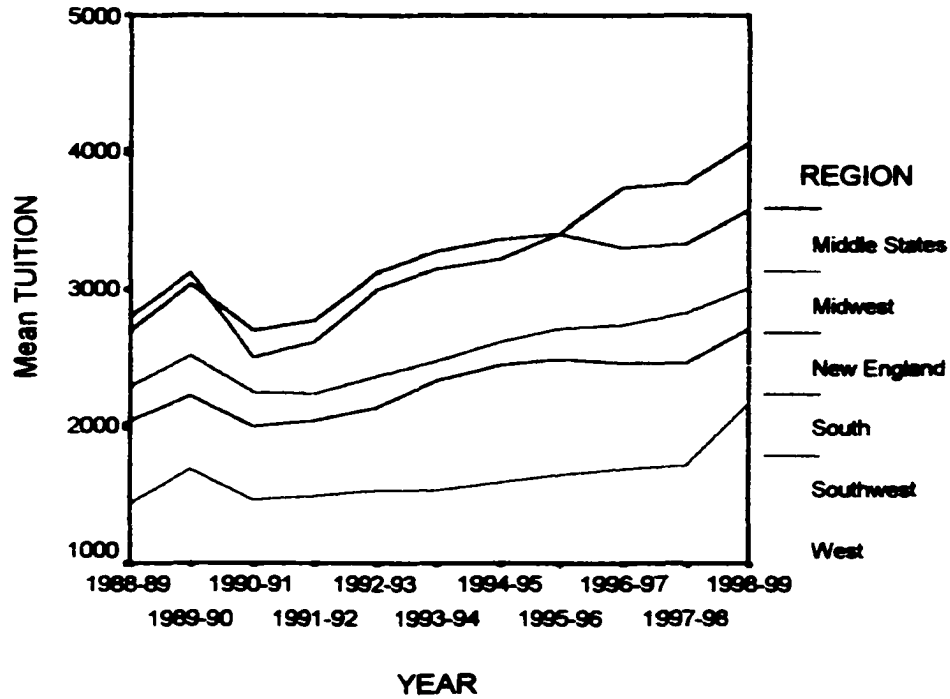
The regional trends in Figure 6 show that New England and Middle State public four-year universities have the highest tuition charges, and Western and Southwestern schools the lowest. The following Figures illustrate the trends in FTE enrollment of public four-year universities over the sample period.

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Figure 7 - Mean Four-Year Public University FTE Enrollment by Year
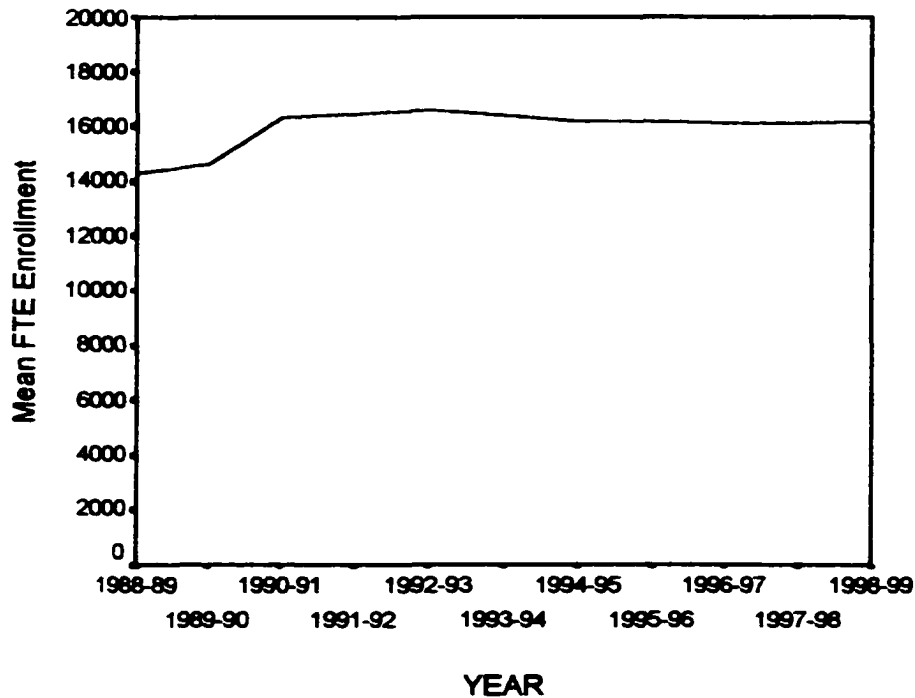
Enrollments in four-year public universities peaked in 1990-91 and subsequently

flattened out over the remaining years in the sample period. This trend in the sample data

mirrors the national trend. That is, between 1988 and 1998 the percentage of 18-24 year-

olds dropped from 11% of the population to 9%. The regional trends illustrated in Figure

8 reflect stability within the regions. The Midwestern and Southwestern schools on

average have the largest enrollments, while schools in New England tend to have smaller

enrollments.

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Figure 8 – Mean FTE Enrollment of Four-Year Public Universities by Region
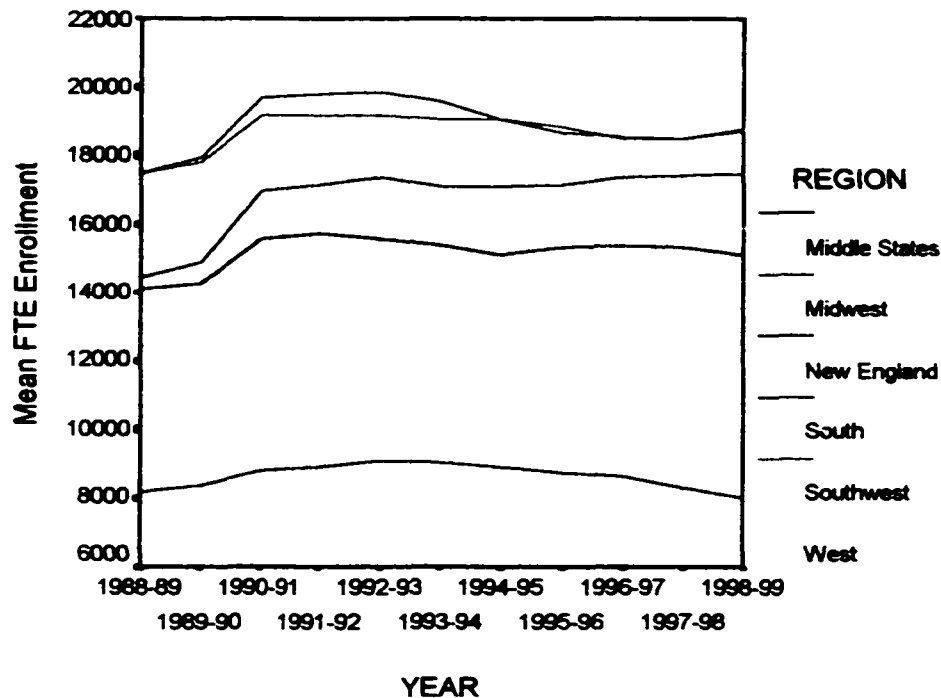
Using the tuition and enrollment data as dependent variables, the two-stage least squares regression models were estimated for the sample of four-year public colleges. The two-stage least squares regression design was chosen to control for the simultaneity between tuition and enrollment. Thus, full-time equivalent (FTE) enrollment was used in the prediction of tuition in the first stage. Using the regression coefficients from the first stage, predicted values for tuition were calculated and these predicted tuition values were included in the second stage of model where enrollment was the dependent variable.

In the first stage of the model, institutional quality proxies and state economic variables were used to predict tuition. The institutional quality variables included the

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percentage of faculty with an earned doctorate, the student-faculty ratio, the number of volumes in the library, the presence of an undergraduate program in engineering, the percentage of non-resident students, and the number of graduate students. It was expected, *a priori*, that there would be a positive relationship between the quality of a public four-year institution and the tuition charge. The state economic variables included in the first stage were the state median household income and the annual change in state government appropriations for higher education. It was expected that median household income would be positively associated with tuition and that the change in state appropriations would be negatively associated with tuition. In addition, the percentage of non-resident students is included in the model to control for the influence of the institution's non-resident pricing strategy on in-state tuition (Greene, 1994).

In the second stage of the model, institutional quality and state economic and population variables were combined with the predicted values for tuition from the first stage to predict undergraduate enrollment. The institutional quality variables were the average ACT score of the student body, percentage of faculty with an earned doctorate, and number of volumes in the library. It was expected that higher quality institutions would be more selective in their enrollment policies. Thus, quality would be negatively related to enrollment within a relative range. The state economic and population variables included in the model were the percentage of college graduates in the state, the percentage of the state's population between 18 and 24 years old, and the median household income. It was expected that there would be a positive relationship between the population variables and enrollment, and a positive relationship between median household income and enrollment. Also included in the model was the average financial

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aid award per student. This variable was included as an additional measure of the tuition price facing the average prospective student of the sample four-year state university. It was expected that increases in the average financial aid award per student would lead to increases in enrollment.

In addition, indicator variables for the years of the sample period and the regions of the country were included in both stages of the model. The base levels for the indicator variables were the 1988-89 academic year and the Southwest region of the country. The following table reports the results of the models for the sample of 97 four-year public universities.

Table 6 - Regression Coefficients for Two-Stage Least Squares Models for In-State Tuition and Enrollment for Four-Year Public Universities

	Stage 1: Tuition	Stage 2: Undergraduate Enrollment
Intercept	177.307	3141.293
FTE Enrollment	.0091 (1.687)*	
Median Household Income	.00072 (.142)	
Change in State Appropriations	.0111 (.221)	
Percentage of Faculty with an Earned Doctorate	11.542 (4.196)**	95.663 (4.092)**
Student-Faculty Ratio	-26.107 (-4.047)**	
Volumes in the Library	.00012 (4.910)**	.00273 (15.766)**
Presence of an Undergraduate Engineering Program	330.289 (5.323)**	
Percentage of Non-Resident Students	11.944 (5.877)**	
Number of Graduate Students	-.0327 (-2.350)**	
Predicted Tuition		-1.539 (-1.846)*
Average ACT Score		175.938 (1.315)
Average Financial Aid Award per Student		.0571 (.466)

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Year 1989	198.201 (2.031)**	276.963 (.365)
Year 1990	-74.987 (-.761)	1293.741 (1.725)*
Year 1991	-46.731 (-.467)	1191.287 (1.586)
Year 1992	101.836 (.994)	1161.281 (1.544)
Year 1993	225.829 (2.154)**	792.276 (1.033)
Year 1994	313.181 (2.976)**	424.715 (.540)
Year 1995	374.837 (3.608)**	226.768 (.282)
Year 1996	389.823 (3.751)**	36.405 .045
Year 1997	397.892 (3.827)**	-172.340 (-.211)
South	725.50 (7.585)**	-.679 (-.001)
West	414.683 (4.050)**	-2058.467 (-2.558)**
Midwest	790.258 (8.472)**	464.954 (.470)
Middle States	1554.029 (12.772)**	7.847 (.005)
New England	1516.494 (12.076)**	-3869.818 (-2.432)**
R^2	.460	.538
Durbin-Watson	1.176	1.851

Notes: Amounts in parentheses represent t-statistics associated with the regression coefficients. Asterisks indicate significance at the 5%(**) and 10% (*) level. All dollar amounts in the model were measured using 1998 constant dollars.

The significance tests of the regression coefficients for stage 1 of the model indicate significant relationships between the institutional quality variables and tuition levels at public four-year universities. Significant positive relationships were found between the percentage of faculty with an earned doctorate, the number of volumes in the library, and the presence of an undergraduate program in engineering and the tuition cost. As each of these quality variables influence the total operating costs of the university, increased investment in doctorally qualified faculty, library holdings, and an

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undergraduate engineering program will increase tuition charged to students. In addition, there was a significant negative relationship between the student-faculty ratio and tuition. Thus, smaller class sizes lead to higher tuition costs.

There were also significant relationships between the composition of the institution's student body and tuition costs. There was a significant positive relationship between the FTE undergraduate enrollment and tuition costs. As undergraduate enrollment increases, operating costs increase, and thus tuition costs rise. In addition, the percentage of non-resident students was also positively associated with tuition costs. Thus, in-state tuition increases as the percentage of non-residents increases. Greene (1994) explains this pricing strategy by four-year public universities. When state residents face substantial fiscal gains from attracting high ability non-resident students, who could become high-income residents in the future, state universities tend to reduce non-resident tuition. There is not enough evidence in this study to conclude that this is indeed the strategy followed by the sample institutions. However, it is one possible explanation for the positive relationship. There is also a significant negative relationship between the number of graduate students and tuition costs. While offering graduate programs may increase operating costs at the sample institutions, granting graduate teaching assistantships may reduce a university's faculty salary budget, as the institution can pay a graduate assistant substantially less than a faculty member for teaching undergraduate courses. The significant negative relationship in this study suggests that the benefits to the university associated with offering graduate programs are greater than the costs. Thus, an increase in the number of graduate students decreases tuition costs.

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The most interesting finding in the tuition model is the insignificance of the

median household income and change in state appropriation variables. This result

supports the findings of the College Board (1998) that tuition costs over the last two

decades have grown faster than the rate of inflation while family income has remained

stagnant. Thus, there has been a growing disassociation between statewide income levels

and tuition costs at public four-year institutions. In addition, the insignificance of the

change in state appropriations suggests that state legislatures have pursued an education

policy that shifts the cost of higher education from the taxpayers generally to students

specifically.

An analysis of the indicator variables shows that tuition costs were significantly

higher than 1988-89 tuition levels in 1989-90 and in every year since the 1993-94

academic year. In the early years of the sample period, the increase in tuition costs, in

real terms, was statistically insignificant. According to the model, increases in tuition

costs began to outpace inflation in the 1993-94 academic year, *ceteris paribus*. In

addition, all regions have significantly higher tuition costs than the Southwest region. The

regional indicator variables reveal that the highest tuition charges are in the Middle States

and New England regions, with tuition costs there averaging approximately $1,500 over

the Southwest regional institutions. The lowest tuition charges are found in the

Southwest and West regional institutions, and the South and Midwest regional schools

are moderately priced relative to the other regions.

Overall, Stage 1 explains 46% of the variation in tuition prices among the sample

institutions. However, the low Durbin-Watson statistic is evidence of possible

autocorrelation in the data. White's test was performed to test for heteroskedasticity and

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a Cochrane-Orcutt regression was performed to test for autocorrelation. The results of these tests produced regression coefficients similar to those reported in Table 6. Hence, there does not appear to be a violation of regression assumptions.

The results of the significance tests of stage 2 show that tuition prices and institutional quality variables significantly influence FTE enrollment of public four-year universities. There is a significant negative relationship between tuition and enrollment. That is, as the tuition price of public four-year universities increases, enrollment, on average, will decline. In addition, the percentage of faculty with an earned doctorate and the number of volumes in the library both positively influence FTE enrollment. Together the significance of the tuition and institutional quality variables imply that while four-year public university students are price sensitive, they are not insensitive to the quality of the educational experience offered by the sample four-year public institutions.

There is a positive, but not statistically significant, relationship between the average ACT score of the student body and enrollment. The mean ACT of the sample institutions was 22.03, with a minimum value of 16 and a maximum value of 28. Within that range lie ACT scores that are presumably attainable by the average student. Thus, the average ACT score of the student body does not aid in the explanation of the variance in enrollment among four-year public college students.

The population and socioeconomic variables, as well as the average financial aid award per student, originally included in the hypothesized model were eliminated from the results in Table 6 because of high Variance Inflation Factors (VIFs). Hence, the percentage of the state's population with a college degree, the percentage of the state's population between 18-24 years old, the median household income, and the average

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financial aid award were not significant predictors of enrollment of public four-year universities and their inclusion in the model introduced multicollinearity. Thus, these variables were removed from the model.

Collectively, the significance of the indicator variables for the years of the sample period suggests that enrollment has remained statistically flat over the ten-year sample period. Only the 1990 coefficient was significant, meaning that there was a statistically significant increase in FTE enrollment in the 1990-91 academic year over the base year. The significance of the regional indicator variables suggests that, on average, only the West and New England regions have significantly lower enrollments at their public four-year colleges than the Southwest region. Alternatively, the size of the public four-year universities of the Middle States, Midwest, and South regions are not significantly different from the Southwest region.

Overall, the second stage of the model explains 53.8% of the variation in FTE enrollment of the sample four-year state universities. Even though the Durbin-Watson statistic does not indicate the presence of autocorrelation among the data, White's test and a Cochrane-Orcutt regression was performed. These tests produced regression coefficients similar to those reported in Table 6.

After the regression coefficients of both stages of the public four-year university models were estimated these coefficients were used to predict tuition and enrollment for the 1998-99 academic year. The following table shows a comparison of the predicted tuition and enrollment to actual tuition and enrollment for 1998-99.

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Table 7 – Comparison of Actual to Predicted Tuition and Enrollment for Public Four-Year Universities, 1998-99

	Tuition	Enrollment
Actual Mean	$2,941	16,177 students
Predicted Mean	$2,609	16,407 students
Mean Difference	$332	-230 students

For both tuition and enrollment, t-tests were performed to measure the significance of the mean difference. The null hypothesis for both tests was that the mean difference was not significantly different from zero. The mean difference of $332 for tuition was statistically significant (t = 4.047, p < .0001), and thus the null hypothesis was rejected. Actual tuition costs rose by more than expected in the year following the enactment of the Hope Scholarship Credit. Four-year public universities captured approximately 22% of the $1500 credit in the 1998-99 academic year. However, the mean difference of 230 students for enrollment was not statistically significant (t = -.424, p= .672), and the null hypothesis was not rejected. There was an insignificant decline in enrollment of four-year public universities in the year following the enactment of the Hope Scholarship Credit.

The overall mean difference between actual and predicted tuition and enrollment was analyzed by region. The following tables summarize the analysis.

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Table 8 – Comparison of Actual and Predicted Tuition for Public Four-Year Universities by Region, 1998-99

Region	Tuition		
	Actual	**Predicted**	**Mean Difference**
Southwest	Mean = 2176 Std. Dev. = 344.18 N = 8	Mean = 1804 Std. Dev. = 227 N = 8	Mean = 372 Std. Dev. = 411 N = 8
South	Mean = 2712 Std. Dev. = 722 N = 20	Mean = 2455 Std. Dev. = 301 N = 20	Mean = 257 Std. Dev. = 746 N = 20
West	Mean = 2450 Std. Dev. = 600 N = 21	Mean = 2211 Std. Dev. = 356 N = 21	Mean = 239 Std. Dev. = 489 N = 21
Midwest	Mean = 3019 Std. Dev. = 927 N = 26	Mean = 2721 Std. Dev. = 436 N = 26	Mean = 298 Std. Dev. = 803 N = 26
Middle States	Mean = 4076 Std. Dev. = 1117 N = 10	Mean = 3376 Std. Dev. = 404 N = 10	Mean = 700 Std. Dev. = 993 N = 10
New England	Mean = 3582 Std. Dev. = 1549 N = 12	Mean = 3222 Std. Dev. = 448 N = 12	Mean = 360 Std. Dev. = 1327 N = 12

The mean difference between actual and predicted tuition was positive in all regions. The largest increase, $700, occurred in the Middle States region and the smallest increase, $239, occurred in the West region. An ANOVA test was used to measure the significance of the influence of regional effects on the mean difference between the actual and predicted tuition. The overall F statistic was not significant (F = .508, p = .770). In addition, Least Significant Difference (LSD) post-hoc tests revealed no significant differences between pairwise comparisons of regions. Thus, the overall mean difference was evenly distributed among regions of the country, and the overall mean difference of $332 was not driven by extreme increases in the actual tuition costs in any one region.

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Table 9 — Comparison of Actual and Predicted Enrollment for Public Four-Year Universities by Region, 1998-99

Region	Enrollment		
	Actual	**Predicted**	**Mean Difference**
Southwest	Mean = 18,782 Std. Dev. = 10,842 N = 8	Mean = 19,240 Std. Dev. = 5,748 N = 8	Mean = -458 Std. Dev. = 7,163 N = 8
South	Mean = 17,519 Std. Dev. = 4,872 N = 20	Mean = 17,286 Std. Dev. = 3,458 N = 20	Mean = 233 Std. Dev. = 4,444 N = 20
West	Mean = 15,907 Std. Dev. = 7,302 N = 21	Mean = 15,446 Std. Dev. = 5,146 N = 21	Mean = 461 Std. Dev. = 5,586 N = 21
Midwest	Mean = 18,727 Std. Dev. = 8,373 N = 26	Mean = 19,584 Std. Dev. = 6,497 N = 26	Mean = -857 Std. Dev. = 5,625 N = 26
Middle States	Mean = 15,134 Std. Dev. = 8,462 N = 10	Mean = 15,318 Std. Dev. = 4,418 N = 10	Mean = -184 Std. Dev. = 7,505 N = 10
New England	Mean = 8,017 Std. Dev. = 4,112 N = 12	Mean = 8,761 Std. Dev. = 2,809 N = 12	Mean = -744 Std. Dev. = 2,402 N = 12

The results of the ANOVA test for enrollment revealed no significant differences between actual and predicted enrollment among regions ($F = .188$, $p = .966$). In addition, LSD post hoc tests revealed no significant differences between pairwise comparisons of regions.

The calculated price elasticity of demand at the mean for the sample of four-year universities is -.63, indicating that the demand for a four-year state university education is slightly inelastic (i.e., less than one in absolute value). Hence, a one-percent increase in tuition costs would lower undergraduate enrollment by .63. In summary, the results of the data analysis of public four-year universities suggest that on average state institutions

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raised tuition by $332 more than expected, and enrollment was not changed in the year following the enactment of the Hope Scholarship Credit. Further, regional effects did not influence differences between actual and predicted tuition and enrollment levels.

Four-Year Public Non-Resident Tuition

The following Figures illustrate the trend in non-resident tuition of public-four year universities over the sample period.

Figure 9 – Mean Non-Resident Tuition by Year in Current and 1988 Constant Dollars
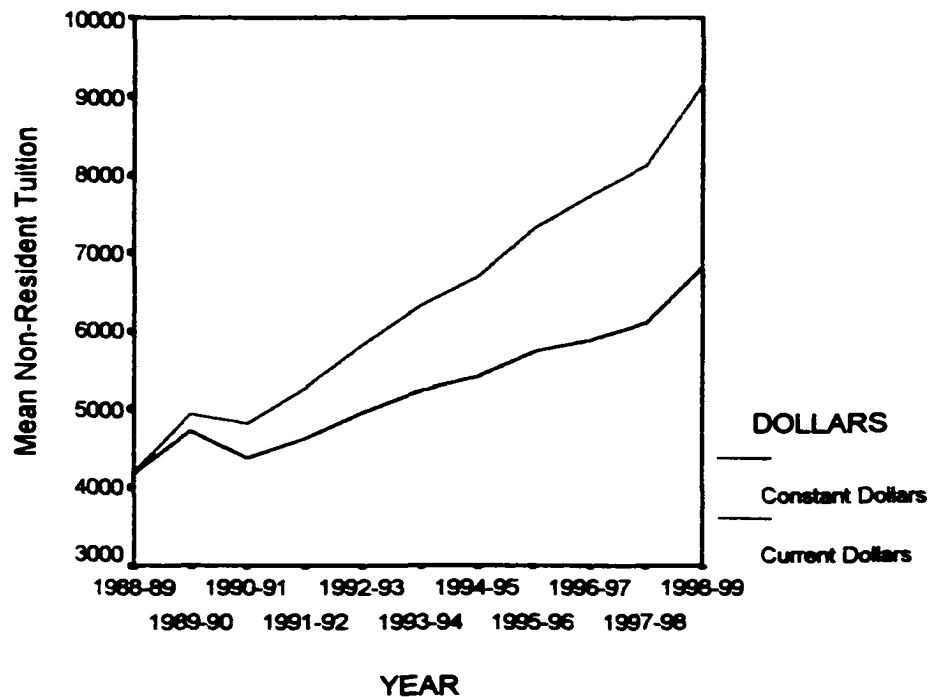
The purpose of Figure 9 is to illustrate how quickly actual non-resident tuition costs have outpaced inflation over the sample period. Hence, the inflation-adjusted dollars in Figure 9 are measured in 1988 constant dollars. However, the dependent

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variable of stage 1 of the regression analysis is measured in 1998 constant dollars.

Accordingly, Figure 10 illustrates the mean non-resident tuition by year and region in

1998 constant dollars. (See Appendix K, Figure 24 for the Mean Non-Resident Tuition

by Year in 1998 Constant Dollars.)

Figure 10 – Mean Non-Resident Tuition by Year and Region in 1998 Constant Dollars
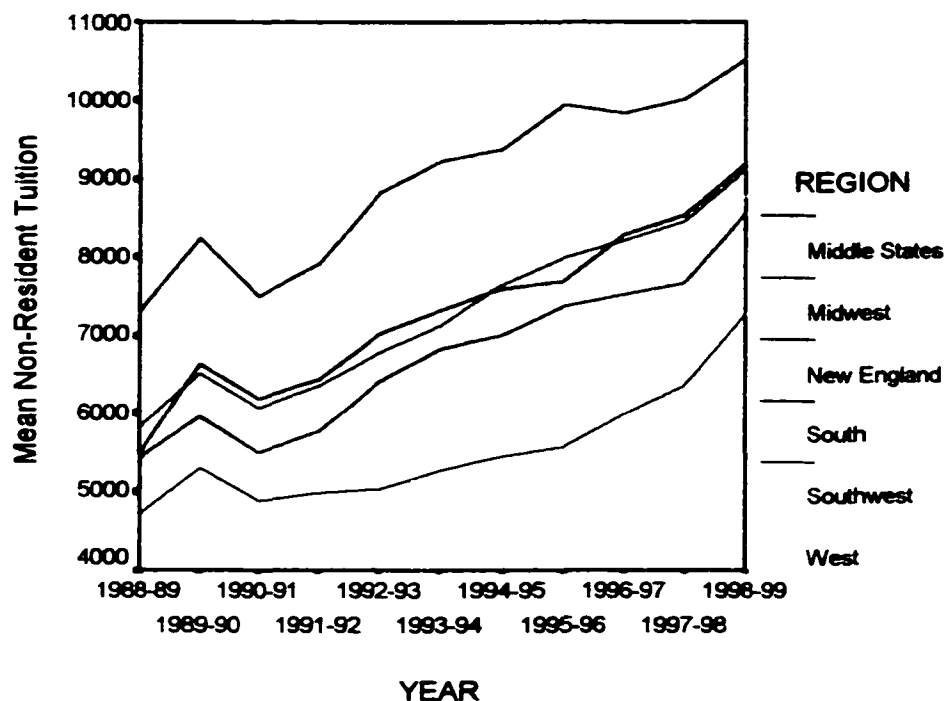
Non-resident tuition at four-year public universities steadily rose in real terms

since the 1990-91 academic year, with a sharp increase in tuition in the 1998-99

academic year. Regionally, New England's state universities on average have the highest

non-resident tuition charges and the Southwestern universities enjoy the lowest non-

resident tuition charges.

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Using the tuition data as the dependent variable, the first stage of the regression model was estimated. The same independent variables were used in the non-resident tuition model that was used to predict in-state tuition for public four-year tuition in the previous section. There was not enough data collected in this study to estimate the second stage of the model. The following table reports the regression coefficients of the non-resident tuition model estimated from the sample of 97 public four-year colleges.

Table 10 - Regression Coefficients for Non-Resident Tuition of Four-Year Public Universities

	Stage 1: Non-Resident Tuition
Intercept	-2397.46
FTE Enrollment	.07285 (6.079)**
Median Household Income	.04783 (4.187)**
Change in State Appropriations	.305 (2.711)**
Percentage of Faculty with an Earned Doctorate	37.865 (6.164)**
Student-Faculty Ratio	-63.596 (-4.414)**
Volumes in the Library	.00014 (2.538)**
Presence of an Undergraduate Engineering Program	621.063 (4.482)**
Percentage of Non-Resident Students	60.565 (13.344)**
Number of Graduate Students	.06103 (1.965)**
Year 1989	648.36 (2.975)**
Year 1990	47.859 (.218)
Year 1991	383.917 (1.718)*

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Year 1992	850.37
	(3.718)**
Year 1993	1198.78
	(5.120)**
Year 1994	1422.99
	(6.054)**
Year 1995	1635.46
	(7.048)**
Year 1996	1796.99
	(7.741)**
Year 1997	1968.01
	(8.475)**
South	1207.31
	(5.651)**
West	1023.68
	(4.477)**
Midwest	953.92
	(4.579)**
Middle States	1158.04
	(4.261)**
New England	3464.25
	(12.351)**
R^2	.616
Durbin Watson	1.804

Notes: Amounts in parentheses represent t-statistics associated with the regression coefficients. Asterisks indicate significance at the 5%(**) and 10% (*) level. All dollar amounts in the model were measured using 1998 constant dollars.

The mean percentage of non-resident students for the sample of 97 public four-year institutions was 18.49%, with a minimum value of 1% and a maximum value of 61%. Thus, on average, 18.49% of a state university's student body is subjected to a higher non-resident tuition charge. The results of the significance tests of the coefficients of the nonresident tuition model reveal relationships similar to those found in the in-state tuition model. Both quality and economic variables are significant predictors of non-resident tuition.

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There were significant positive relationships between the number of volumes in the library, the presence of an undergraduate program in engineering, and the percentage of faculty with an earned doctorate and the non-resident tuition charge. Similarly, there was a significant negative relationship between the student-faculty ratio and non-resident tuition charges. Thus, state universities pass on the cost of increased library holdings, undergraduate programs in engineering, doctorally qualified faculty, and smaller class sizes not only to resident students but also to non-resident students. However, the effect of these relationships is more dramatic in the non-resident model. For example, a one-percentage point increase in the percentage of faculty with an earned doctorate will increase in-state tuition by approximately $12 ($11.542) and non-resident tuition by approximately $38 ($37.865).

Total undergraduate enrollment and the percentage of non-resident students were also significant predictors of non-resident tuition. These relationships are similar to the in-state tuition model. As total undergraduate enrollment increases, non-resident tuition increases. Greene (1994) suggests that public four-year universities choose to subsidize their own residents with tuition collected from non-residents, and he concluded that an institution's relative strength in attracting non-resident students can lead to higher non-resident tuition charges. The positive relationship between the percentage of non-resident students and non-resident tuition provides support for Greene's theory.

There is also a significant positive relationship between the number of graduate students and non-resident tuition. This relationship is particularly interesting given the significant negative relationship between the number of graduate students and in-state tuition costs. This suggests that public four-year universities in the sample use non-

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resident tuition to subsidize the cost of increases in graduate programs. Hence, as graduate student enrollment increases, non-resident tuition increases.

Unlike the in-state tuition model, the economic variables were significant predictors of non-resident tuition. There was a significant positive relationship between median household income and non-resident tuition. Similarly, the change in state appropriations was positively associated with non-resident tuition. Taken together these relationships further support Greene's (1994) conclusions that public four-year universities use non-resident tuition to subsidize resident students. An increase in median household income suggests a higher tax base and greater availability of funds for state appropriations for higher education. However, the positive relationship between changes in state appropriations and non-resident tuition suggests that when a state legislature decides that additional funds for higher education are needed, the in-state taxpayer and the out-of-state student will share the financial burden. Thus, when the change in state appropriations is positive, non-resident tuition will also increase.

Finally, the indicator variables for years in the sample period show a significant increase in non-resident tuition costs over the 1988-89 levels in each year after the 1991-92 academic year. Thus, non-resident tuition costs, similar to in-state tuition charges, have grown faster than the rate of inflation since 1991-92. In addition, the regional indicator variables support Figure 10. That is, the South and Southwest region have the lowest non-resident tuition charges, *ceteris paribus*.

Using the regression coefficients from Table 9, the non-resident tuition charges for the 1998-99 academic year for each of the sample four-year public institutions were

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estimated. The following tables show a comparison of predicted and actual non-resident tuition.

Table 11 – Comparison of Actual to Predicted Non-Resident Tuition for Public Four-Year Universities, 1998-99

	Non-Resident Tuition
Actual Mean	$8,967
Predicted Mean	$7,673
Mean Difference	$1,294

A t-test was performed to measure the significance of the mean difference between the actual and predicted non-resident tuition cost. The null hypothesis of the t-test was that the mean difference was not significantly different from zero. The mean difference of $1,294 was statistically significant ($t = 7.433$, $p < .0001$), and the null hypothesis is rejected. Actual non-resident tuition rose by more than expected in the year following the enactment of the Hope Scholarship Credit. Non-resident students of public four-year universities, on average, will see the benefit of the Hope Scholarship Credit reduced from $1,500 to $206.

The following table shows the mean difference between actual and predicted non-resident tuition costs by region.

Table 12 – Comparison of Actual and Predicted Non-Resident Tuition for Public Four-Year Universities by Region, 1998-99

Region	Non-Resident Tuition		
	Actual	Predicted	Mean Difference
Southwest	Mean = 7268 Std. Dev. = 1453 N = 8	Mean = 6144 Std. Dev. = 1182 N = 8	Mean = 1154 Std. Dev. = 1150 N = 8

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South	Mean = 8562	Mean = 7358	Mean = 1204
	Std. Dev. = 1730	Std. Dev. = 1240	Std. Dev. = 1497
	N = 20	N = 20	N = 20
West	Mean = 8786	Mean = 7330	Mean = 1456
	Std. Dev. = 2207	Std. Dev. = 1392	Std. Dev. = 1516
	N = 21	N = 21	N = 21
Midwest	Mean = 9137	Mean = 7862	Mean = 1275
	Std. Dev. = 3031	Std. Dev. = 1827	Std. Dev. = 2048
	N = 26	N = 26	N = 26
Middle States	Mean = 9190	Mean = 7739	Mean = 1451
	Std. Dev. = 2546	Std. Dev. = 1502	Std. Dev. = 1559
	N = 10	N = 10	N = 10
New England	Mean = 10539	Mean = 9373	Mean = 1166
	Std. Dev. = 3138	Std. Dev. = 1618	Std. Dev. = 2265
	N = 12	N = 12	N = 12

The mean difference between the actual and predicted non-resident tuition was positive in all regions. The largest increases, $1,456 and $1,451, occurred in the West and Middle State regions, and the smallest increases, $1,166 and $1,154, occurred in the New England and Southwest regions. For the in-state tuition models the largest increase occurred in the Middle States and the smallest increase occurred in the West. An ANOVA test was used to measure the significance of the difference between actual and predicted non-resident tuition costs among regions. The overall F statistic was not significant ($F = .086$, $p = .994$). In addition, LSD post hoc tests revealed no significant differences between pairwise comparisons of regions. Thus, the overall mean difference was evenly distributed among regions of the country, and that difference is not driven by extreme increases in the actual non-resident tuition costs in any one region.

In summary, these findings suggest that public four-year universities raised non-resident tuition in all regions in the year following the enactment of the Hope Scholarship Credit. On average, the increase in non-resident tuition was $1,294. Thus, non-resident

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students of public four-year universities who are eligible for the Hope Scholarship Credit only saw a $206 decrease in net tuition costs in the 1998-99 academic year.

Private Universities

The sample of private universities included 91 institutions with a religious affiliation and 77 having no religious affiliation. The following Figures illustrate the trend in mean tuition and enrollment levels of private colleges over the sample period.

Figure 11 – Mean Tuition of Private Religious Colleges by Year in Current and 1988 Constant Dollars
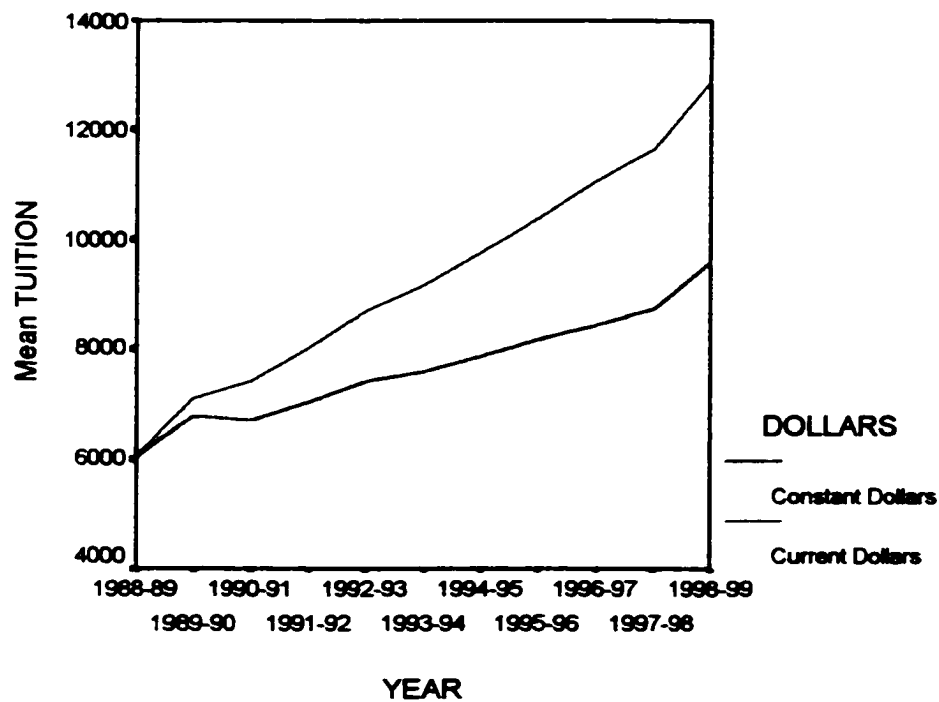
Figure 12 – Mean Tuition of Private Religious Colleges by Year and Region in 1998 Constant Dollars
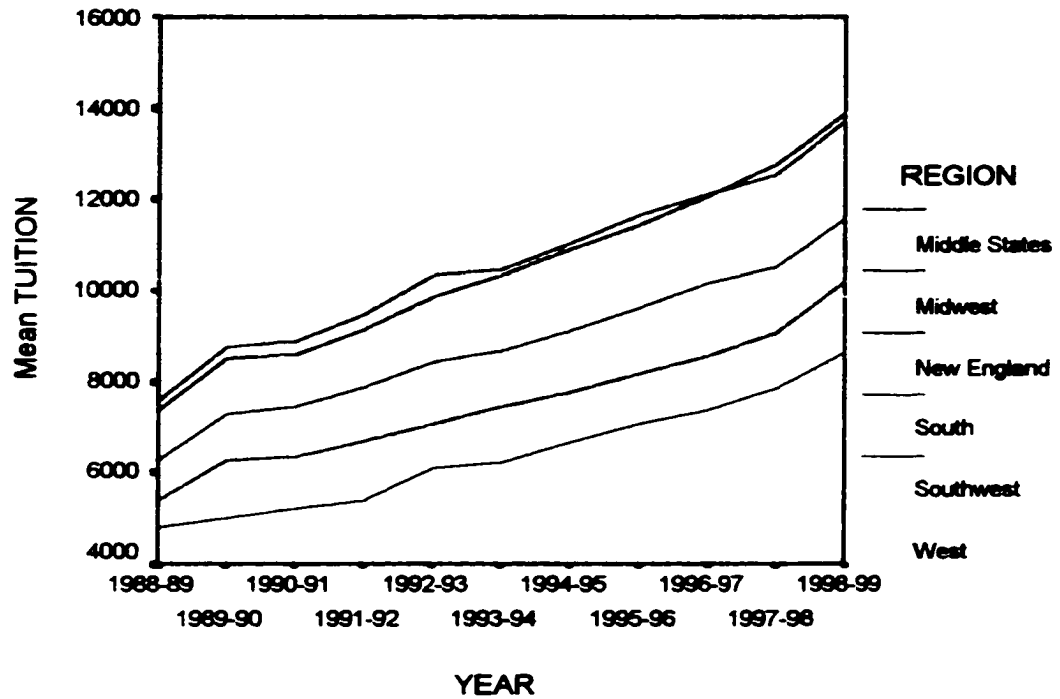
The purpose of Figure 11 is to illustrate how quickly private religious college tuition has outpaced inflation over the sample period. Hence, the inflation-adjusted tuition in Figure 11 was measured in 1988 constant dollars. As the dependent variable for the first stage of the regression analysis was measured in 1998 constant dollars, Figure 12 illustrates the mean tuition costs of private religious colleges by year and region in 1998 constant dollars. (See Appendix K, Figure 25 for the Mean Tuition of Private Religious Colleges by Year in 1998 Constant Dollars.)

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Figure 13 – Mean Tuition of Private Non-Religious Colleges by Year in Current and 1988 Constant Dollars
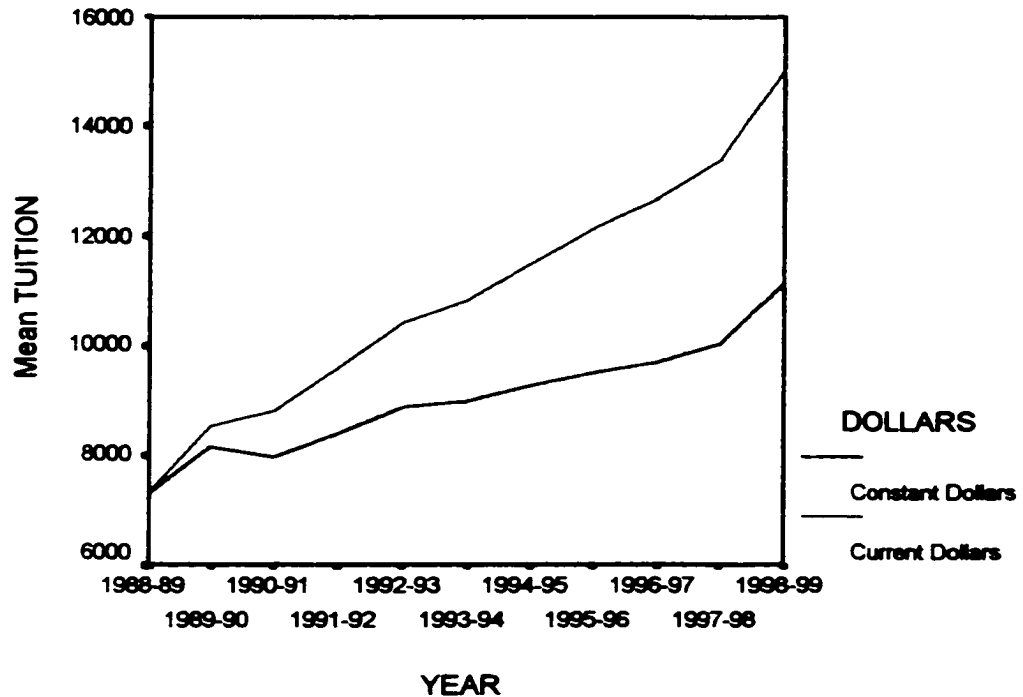
The purpose of Figure 13 is to illustrate how quickly private non-religious college tuition has outpaced inflation over the sample period. Hence, the inflation-adjusted tuition in Figure 13 was measured in 1988 constant dollars. As the dependent variable for the first stage of the regression analysis was measured in 1998 constant dollars, Figure 14 illustrates the mean tuition costs of private religious colleges by year and region in 1998 constant dollars. (See Appendix K, Figure 26 for the Mean Tuition of Private Non-Religious Colleges by Year in 1998 Constant Dollars.)

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Figure 14 – Mean Tuition of Private Non-Religious Colleges by Year and Region in 1998 Constant Dollars
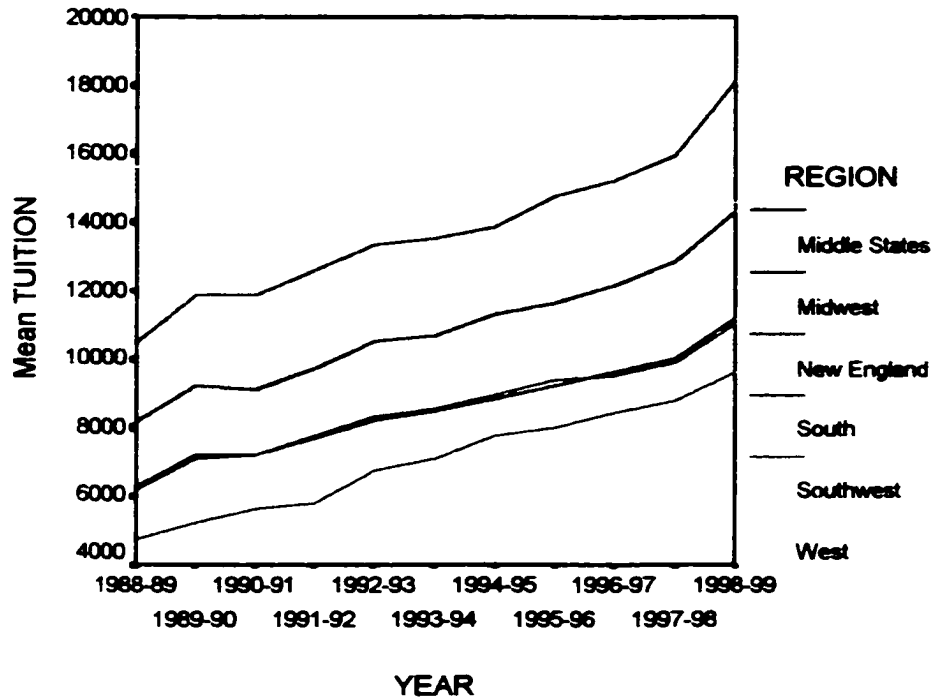
Over the sample period, the mean annual tuition of private religious colleges doubled (from $6,000 to $12,000) in current dollars. The New England and Middle State regions have the most expensive tuition charges, on average, and the Southwest region enjoys the least expensive religious postsecondary education. The mean annual tuition of private non-religious colleges also doubled (from $7,500 to $15,000) in current dollars between 1988 and 1998. Again, the New England region has the most expensive private non-religious colleges, and the Southwest region has the least expensive.

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Figure 15 – Mean Private Religious College FTE Enrollment by Year

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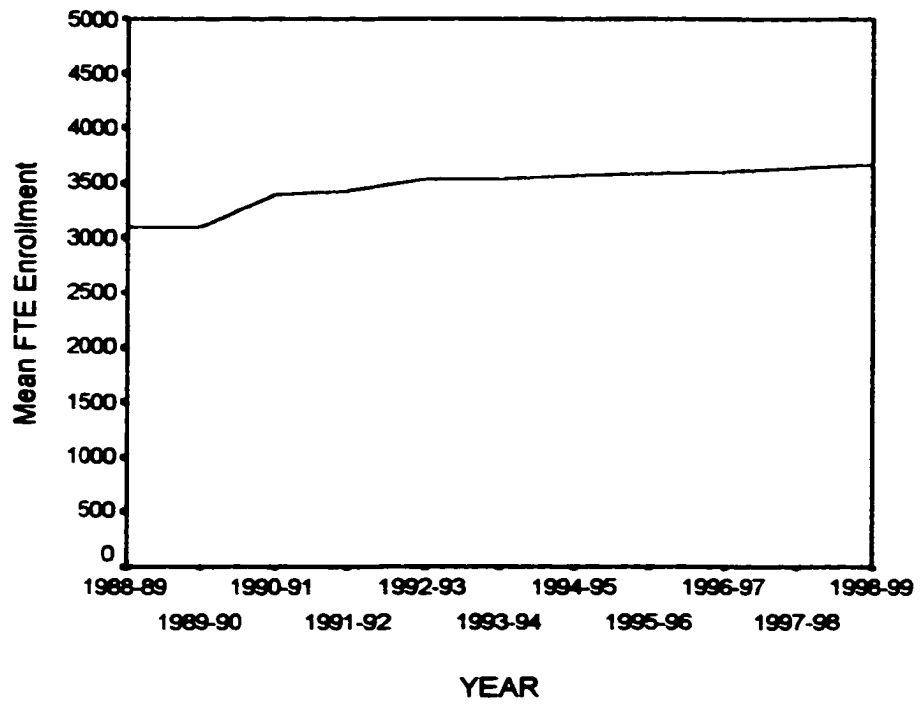
Figure 16 – Mean FTE Enrollment of Private Religious College by Year and Region

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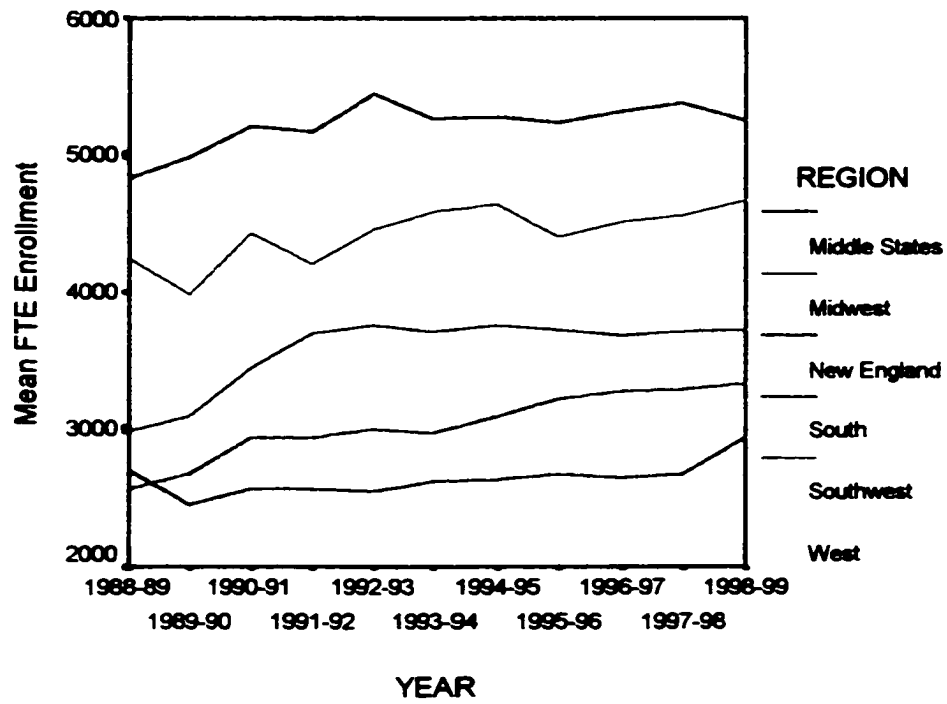
Figure 17 – Mean FTE Enrollment of Private Non-Religious Colleges by Year

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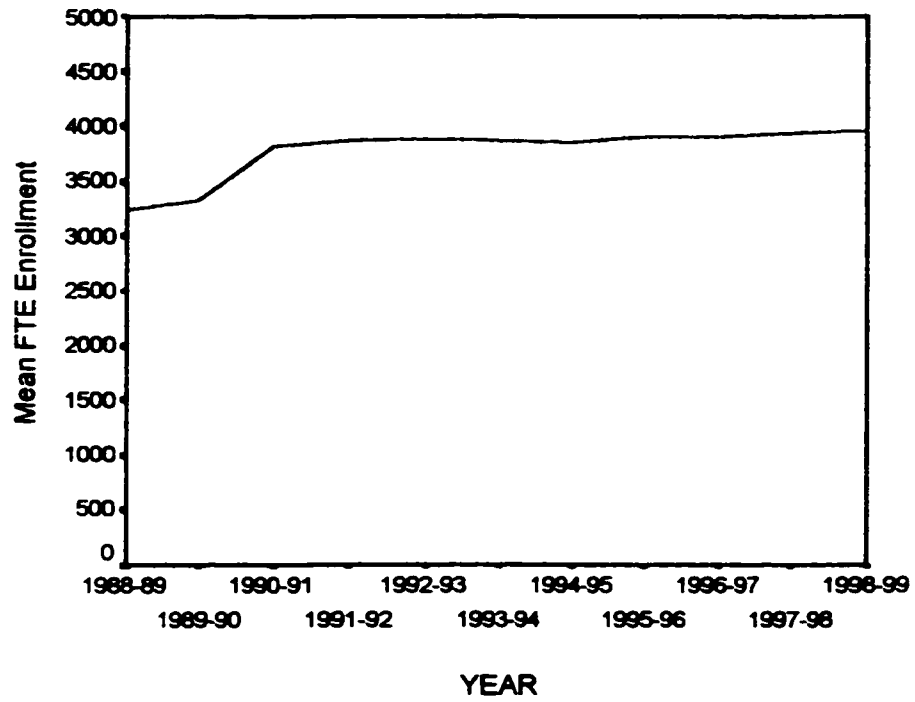
Figure 18 – Mean FTE Enrollment of Private Non-Religious Colleges by Year and Region
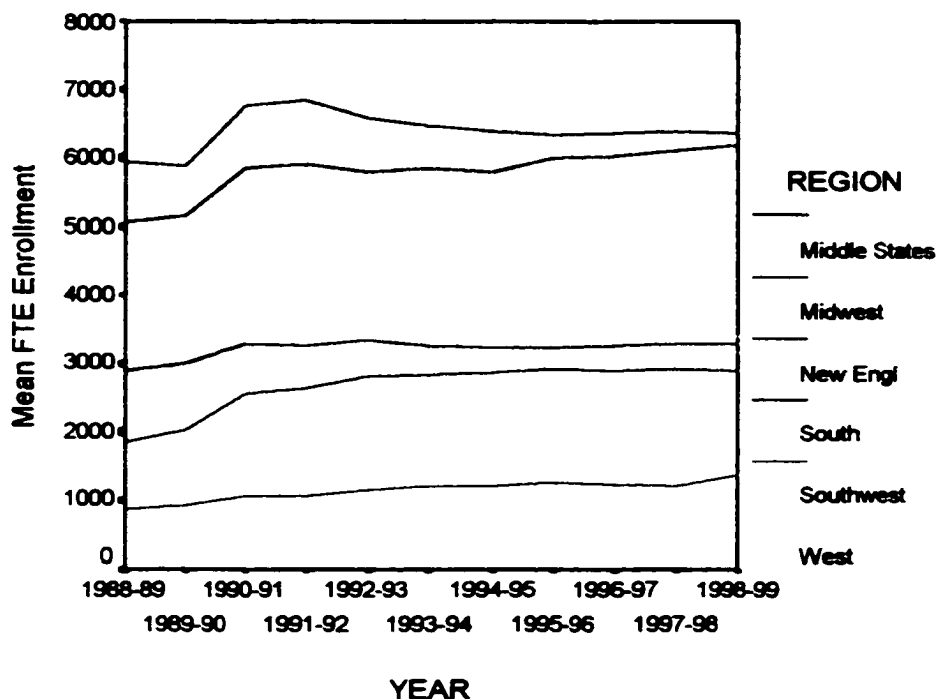
Undergraduate enrollment for both groups of private colleges grew over the sample period. For private religious colleges, enrollment increased, on average, by 600 students. For private non-religious colleges, the increase was approximately 800 students. According to the regional Figures, the largest religious colleges are located in the Middle State region, and the largest non-religious colleges are in the New England region. However, the New England private religious colleges are smaller than the other regions, and the Southwest region has the smallest private non-religious colleges.

The tuition and enrollment data were used as the dependent variables in the two-stage least squares regression model. Similar to the public four-year model, the two-stage least squares design was used to control for the simultaneity of tuition and enrollment. Thus, enrollment was used as an independent variable in the tuition model,

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and predicted tuition from the first stage was entered as an independent variable in the second stage.

In the first stage, institutional quality proxies and state economic variables were used to predict private college tuition. The institutional quality variables were the percentage of faculty with an earned doctorate, the student-faculty ratio, the number of volumes in the library, the presence of an undergraduate engineering program, and the number of graduate students. Similar to the public colleges, a positive relationship was expected between quality and tuition of the private colleges. The state economic variables included in the model were the state median household income and the annual change in state government appropriations over the sample period. It was expected, *a priori*, that the economic variables would be positively associated with tuition costs.

In the second stage of the model, institutional quality variables and state population and economic variables were combined with predicted tuition from the first stage to predict enrollment. The institutional quality variables included in the second stage were the average ACT score of the student body, the percentage of faculty with an earned doctorate, the student-faculty ratio, and the number of volumes in the library. It was expected that higher quality institutions would have more restrictive enrollment policies. The state population and economic variables included in the model were the percentage of a state's population aged 18-24 years old, the percentage of college graduates in the state, and the median household income. There was an expected positive relationship between the population and economic variables and the enrollment of private colleges. In addition, the average financial aid award per student was included in the

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model as an additional measure of the tuition price facing the average prospective student.

In addition, indicator variables were included in both stages of the model for the years in the sample period, the regions of the country, and the presence of a religious affiliation for the private college. The 1988-89 academic year served as the base year for the annual indicator variables, the Southwest region was the base level for the regional indicator variables, and the private religious colleges were the base level for the religious affiliation indicator variable. The following table reports the regression coefficients for both stages of the model.

Table 13 - Regression Coefficients for Two-Stage Least Squares Models for Tuition and Enrollment for Private Universities

	Stage 1: Tuition	Stage 2: Undergraduate Enrollment
Intercept	1590.37	-12823.83
FTE Enrollment	-.265 (-9.716)**	
Median Household Income	.0301 (1.956)**	
Change in State Appropriations	.284 (1.629)	
Percentage of Faculty with an Earned Doctorate	92.089 (24.847)**	
Student-Faculty Ratio	-142.25 (-7.302)**	237.075 (10.397)**
Volumes in the Library	.00053 (6.686)**	
Presence of an Undergraduate Engineering Program	768.399 (4.123)**	
Number of Graduate Students	.392 (10.264)**	
Religious Affiliation	1061.39 (7.389)**	-247.063 (-1.576)
Predicted Tuition		.0923 (2.278)**
Percentage of College Graduates in State		95.775 (4.688)**

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		76,217.72
Percentage of State's Population Aged 18-24		76,217.72 (6.219)**
Average Financial Aid Award per Student		.05001 (1.744)*
Year 1989	830.741 (2.763)**	138.171 (.407)
Year 1990	592.685 (1.971)**	710.598 (2.073)**
Year 1991	1001.619 (3.292)**	766.912 (2.234)**
Year 1992	1261.682 (4.076)**	1041.096 (2.970)**
Year 1993	1238.895 (3.937)**	1166.433 (3.270)**
Year 1994	1430.157 (4.561)**	1218.897 (3.287)**
Year 1995	1642.361 (5.310)**	1242.748 (3.324)**
Year 1996	1782.818 (5.743)**	1374.946 (3.558)**
Year 1997	2068.105 (6.643)**	1369.75 (3.448)**
South	651.065 (1.989)**	-254.455 (-.703)
West	1428.57 (4.170)**	-358.946 (-.947)
Midwest	2123.244 (6.760)**	171.105 (.474)
Middle States	1928.066 (5.119)**	907.972 (2.135)**
New England	4936.383 (13.364)**	-109.077 (-.239)
R^2	.667	.303
Durbin Watson	1.854	1.720

Notes: Amounts in parentheses represent t-statistics associated with the regression coefficients. Asterisks indicate significance at the 5%(**) and 10% (*) level. All dollar amounts in the model were measured using 1998 constant dollars.

The tuition stage of the model produced more satisfactory results than the enrollment stage. In the tuition stage both quality and economic variables were found to be significant predictors of private college tuition. There were significant positive relationships between percentage of faculty with an earned doctorate, number of volumes in the library, and the presence of an undergraduate program in engineering, and the dependent variable. In addition, there was a significant negative relationship between the

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student-faculty ratio and the private tuition cost. Like the public university models, these findings suggest that private institutions will pass the cost of the investment in these areas onto the student through higher tuition costs.

There was also a significant positive relationship found between median household income and private college tuition. This finding suggests that private institutions are sensitive to their economic surroundings. Thus as the state's median household income rises, so does the family's ability to pay for higher education, and private tuition rises. However, the private institutions appear to be insensitive to the level of state appropriations to public universities. Contrary to the findings of Quigley and Rubinfeld (1993) and McPherson (1993), the relationship between the change in state government appropriations per student and private college tuition was not statistically significant.

The two variables included in the model to control for the private college's student body were also significant predictors of tuition. The negative association between undergraduate enrollment and tuition suggests there are economies of scale at the sample private colleges. As illustrated in Figures 15 and 17, the mean full-time equivalent enrollment at the private colleges fell between 3,000 and 4,000 students over the sample period. Within this limited range, it appears that adding an additional student lowers the overall operating cost per student, and tuition falls. Alternatively, there is a positive relationship between the number of graduate students and tuition. Thus, the cost of expanding enrollment in graduate programs is passed onto undergraduate students through higher tuition charges.

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The significance of the indicator variables supports the trends illustrated in Figures 11-14. In every year since 1988, private college tuition has been significantly higher than the amount charged in the 1988-89 academic year. Each region in the sample has significantly higher private college tuition than the Southwest region and, on average, private non-religious colleges charge $1,061 more in tuition than private religious colleges.

Overall, the tuition stage of the model accounted for 66.7% of the variance in tuition costs among the sample of private colleges. To test for a possible violation of regression assumptions, White's test for heteroskedasticity and a Cochrane-Orcutt regression to correct for autocorrelation were performed. These tests produced regression coefficients similar to those reported in Table 13.

In stage 2 of the model, tuition, institutional quality variables, and state population variables were all significant predictors of undergraduate private college enrollment. There was a significant positive relationship between the predicted tuition variable and private college enrollment. This positive relationship was also found in the two-year college enrollment model. However, unlike the population of two-year college students, prior research has found that private college students display an inelastic demand for higher education and are therefore not price sensitive [(Clotfelter, 1991, p.42) and McPherson and Schapiro (1991b)]. While the positive relationship between two-year college tuition and enrollment appears unrealistic and inconsistent with the demand theory of economics, this positive relationship may not be unreasonable among the private colleges. In the private college sample, higher tuition may be a signal of higher quality. Thus, higher tuition may actually attract more students. McPherson and

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Schapiro (1991b) interpret this positive relationship between tuition and enrollment as an institutional supply effect; that is, high demand among prospective private school students may lead to higher educational costs at private colleges. In addition, the average financial aid award per student was also positively associated with undergraduate private college enrollment. Thus, if the institution lowers the net tuition cost facing a prospective student, enrollment will increase.

Both the percentage of college-aged students in the state and the percentage of college-educated adults in the state are positively associated with private college enrollment. Thus, the greater the number of 18-24 year olds and the more educated the state's adult population, the more likely that private college undergraduate enrollment will increase. The institutional quality variables were also significant but only one was in the hypothesized direction. The number of volumes in the library is positively associated with private college enrollment. Thus, more library holdings signal a higher quality institution and attract more undergraduates. However, there was also a significant positive relationship between the student-faculty ratio and undergraduate enrollment. This would imply that larger class sizes attract more students. The average student-faculty ratio among the sample private colleges was 14:1, ranging from a minimum value of 4:1 and a maximum value of 29:1. As larger class sizes are generally associated with a lower quality educational experience, the positive relationship between the student-faculty ratio and undergraduate enrollment is inconsistent with the hypothesized model.

The indicator variables for years in the sample period show that since 1990, there has been a significant increase in enrollment over base year levels. The only significant regional indicator variable was the Middle State region, indicating that this region has a

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significantly higher enrollment than the Southwest region. The insignificance of the

religious affiliation indicator variable indicates that the sizes of the religious and non-

religious private colleges in the sample are statistically the same, *ceteris paribus*.

Three variables were removed from the hypothesized model because of high VIF

scores. These variables were the Median Household Income in each state, the Average

ACT score of the sample institution, and the Percentage of Faculty with an Earned

Doctorate. Thus, to avoid multicollinearity these variables were eliminated from the

enrollment model.

Overall, stage 2 of the model explains 30.3% of the variation in the undergraduate

enrollment of private colleges. The Durbin-Watson statistic of 1.720 is relatively low

given the number of independent variables and the sample size, and therefore tests for

heteroskedasticity and autocorrelation were performed. Both White's test for

heteroskedasticity and Cochrane-Orcutt's regression produced regression coefficients

similar to those reported in Table 13.

The regression coefficients of both stages of the model were used to estimate the

tuition and enrollment of the sample colleges for the 1998-99 academic year. The

following tables report the comparison of actual and predicted tuition and enrollment for

1998-99.

Table 14 – Comparison of Actual to Predicted Tuition and Enrollment for Private Universities, 1998-99

	Tuition	Enrollment
Actual Mean	$13,875	3805 students
Predicted Mean	$11,990	3822 students
Mean Difference	$1,885	-17 students

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For both the tuition and the enrollment models, t-tests were performed to measure the significance of the mean difference. The null hypothesis for both tests was that the mean difference was not significantly different from zero. The mean difference of $1,885 for the tuition was statistically significant (t = 6.748, p < .0001), and the null hypothesis was rejected. Actual tuition costs rose by more than predicted in the year following the enactment of the Hope Scholarship Credit. However, the mean decline in enrollment (17) was not statistically significant (t = -.070, p = .944). Hence, the null hypothesis is not rejected; there was not a statistically significant change in enrollment in the 1998-99 academic year.

Tables 15 and 16 report the individual mean differences in tuition and enrollment for the two different groups of private colleges.

Table 15 – Comparison of Actual to Predicted Tuition and Enrollment for Private Religious Universities, 1998-99

	Tuition	Enrollment
Actual Mean	$12,917	3676 students
Predicted Mean	$11,192	3698 students
Mean Difference	$1,725	-22 students

The $1,725 difference between actual and predicted tuition was statistically significant (t = 5.939, p < .0001), and the -22 student difference in enrollment was not statistically significant (t = -.077, p = .938). For private religious colleges, tuition significantly increased in the 1998-99 academic year and enrollment remained essentially unchanged.

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Table 16 – Comparison of Actual to Predicted Tuition and Enrollment for Private Non-Religious Universities, 1998-99

	Tuition	Enrollment
Actual Mean	$15,005	3,958 students
Predicted Mean	$12,932	3,968 students
Mean Difference	$2,073	-10 students

Similar to the results for the private religious colleges, the mean difference in tuition of $2,073 was statistically significant (t = 4.105, p < .0001), and the mean difference in enrollment is not statistically significant (t = -.026, p = .979).

The following tables show the mean differences by region for tuition and enrollment for both groups of private colleges.

Table 17 – Comparison of Actual and Predicted Tuition for Private Religious Universities by Region, 1998-99

Region	Tuition		
	Actual	Predicted	Mean Difference
Southwest	Mean = 9945 Std. Dev. = 1713 N = 6	Mean = 8958 Std. Dev. = 2193 N = 6	Mean = 987 Std. Dev. = 1316 N = 6
South	Mean = 11696 Std. Dev. = 5101 N = 19	Mean = 9408 Std. Dev. = 2679 N = 19	Mean = 2288 Std. Dev. = 3001 N = 19
West	Mean = 11341 Std. Dev. = 5231 N = 19	Mean = 10730 Std. Dev. = 2526 N = 19	Mean = 611 Std. Dev. = 3959 N = 19
Midwest	Mean = 13279 Std. Dev. = 3016 N = 26	Mean = 11200 Std. Dev. = 2401 N = 26	Mean = 2079 Std. Dev. = 1761 N = 26
Middle States	Mean = 15958 Std. Dev. = 3508 N = 10	Mean = 12741 Std. Dev. = 1950 N = 10	Mean = 3217 Std. Dev. = 2254 N = 10
New England	Mean = 15756 Std. Dev. = 2602 N = 11	Mean = 14870 Std. Dev. = 1152 N = 11	Mean = 886 Std. Dev. = 2202 N = 11

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The mean difference between actual and predicted tuition of private religious colleges is positive in all regions. The largest increase of $3,217 occurred in the Middle States and the smallest increase of $611 occurred in the West. An ANOVA test was used to test the significance of the influence of regional effects on the mean difference between actual and predicted tuition. The overall F statistic was not significant (F = 1.800, p = .122). In addition, LSD post-hoc tests revealed one significant pairwise comparison, the mean increase in the West region was significantly different from the Middle State region (p = .016).

Table 18 – Comparison of Actual and Predicted Enrollment for Private Religious Universities by Region, 1998-99

Region	Enrollment		
	Actual	Predicted	Mean Difference
Southwest	Mean = 4682 Std. Dev. = 3448 N = 6	Mean = 3984 Std. Dev. = 1589 N = 6	Mean = 698 Std. Dev. = 2515 N = 6
South	Mean = 3332 Std. Dev. = 1578 N = 19	Mean = 3337 Std. Dev. = 1736 N = 19	Mean = -5 Std. Dev. =1292 N = 19
West	Mean = 3214 Std. Dev. = 6485 N = 19	Mean = 3257 Std. Dev. = 1909 N = 19	Mean = -43 Std. Dev. = 4862 N = 19
Midwest	Mean = 3735 Std. Dev. = 2559 N = 26	Mean = 3997 Std. Dev. = 918 N = 26	Mean = -262 Std. Dev. = 2098 N = 26
Middle States	Mean = 5252 Std. Dev. = 2953 N = 10	Mean = 4940 Std. Dev. = 761 N = 10	Mean = 312 Std. Dev. = 2855 N = 10
New England	Mean = 2943 Std. Dev. = 2280 N = 11	Mean = 3091 Std. Dev. = 992 N = 11	Mean = -148 Std. Dev. = 1507 N = 11

The results of an ANOVA test for the influence of regional effects on the mean

difference in enrollment was not significant (F = .145, p =.981). The LSD post-hoc tests

revealed no significant differences in pairwise comparisons between regions.

Table 19 – Comparison of Actual and Predicted Tuition for Private Non-Religious Universities by Region, 1998-99

Region	Tuition		
	Actual	**Predicted**	**Mean Difference**
Southwest	Mean = 11039 Std. Dev. = 4645 N = 4	Mean = 8350 Std. Dev. = 4323 N = 4	Mean = 2689 Std. Dev. = 4595 N = 4
South	Mean = 12884 Std. Dev. = 6511 N = 16	Mean = 12012 Std. Dev. = 2184 N = 16	Mean = 872 Std. Dev. = 5030 N = 16
West	Mean = 16726 Std. Dev. = 5465 N = 13	Mean = 12909 Std. Dev. = 3715 N = 13	Mean = 3817 Std. Dev. = 3413 N = 13
Midwest	Mean = 12661 Std. Dev. = 6557 N = 22	Mean = 11555 Std. Dev. = 3674 N = 22	Mean = 1106 Std. Dev. = 3792 N = 22
Middle States	Mean = 16392 Std. Dev. = 7718 N = 11	Mean = 15089 Std. Dev. = 4357 N = 11	Mean = 1303 Std. Dev. = 4585 N = 11
New England	Mean = 20797 Std. Dev. = 6872 N = 11	Mean = 16561 Std. Dev. = 4862 N = 11	Mean = 4236 Std. Dev. = 5047 N = 11

The ANOVA test for the influence of regional effects on the mean difference

between actual and predicted tuition of private non-religious colleges produced

insignificant results. The overall F statistic was not significant (F = 1.501, p = .201), and

the LSD post-hoc tests produced no significant pairwise comparisons between regions.

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Table 20 – Comparison of Actual and Predicted Enrollment for Private Non-Religious Universities by Region, 1998-99

Region	Enrollment		
	Actual	Predicted	Mean Difference
Southwest	Mean = 1383 Std. Dev. = 962 N = 4	Mean = 2762 Std. Dev. = 1634 N = 4	Mean = -1379 Std. Dev. = 704 N = 4
South	Mean = 3298 Std. Dev. = 2218 N = 16	Mean = 3048 Std. Dev. = 1204 N = 16	Mean = 250 Std. Dev. = 250 N = 16
West	Mean = 3407 Std. Dev. = 4080 N = 13	Mean = 4143 Std. Dev. = 2895 N = 13	Mean = -736 Std. Dev. = 3119 N = 13
Midwest	Mean = 2907 Std. Dev. = 2124 N = 22	Mean = 2907 Std. Dev. = 1488 N = 22	Mean = 0 Std. Dev. = 2100 N = 22
Middle States	Mean = 6202 Std. Dev. = 4533 N = 11	Mean = 6569 Std. Dev. = 2883 N = 11	Mean = -367 Std. Dev. = 4568 N = 11
New England	Mean = 6366 Std. Dev. = 5938 N = 11	Mean = 5068 Std. Dev. = 3613 N = 11	Mean = 1298 Std. Dev. = 6763 N = 11

The ANOVA test for the influence of regional effects on the mean difference between actual and predicted enrollment for private non-religious colleges produced insignificant results. The overall F statistic was not significant (F = .554, p = .735), and the LSD post-hoc tests revealed no significant pairwise comparisons between regions.

In summary, private colleges collectively raised tuition by an average of $1,885 in the year following the enactment of the Hope Scholarship Credit. Specifically, private religious colleges raised tuition on average by $1,725 and private non-religious colleges raised tuition by $2,073. For students of these institutions, the benefit of the Hope Scholarship Credit was completed eradicated through tuition increases, leaving them

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worse off than before the enactment of the tuition credit. However, the tuition increases did not have a statistically significant impact on enrollment.

The Combined Sample of Four-Year Colleges

The following Figures illustrate the trends in tuition and enrollment of the combined sample of 97 public, 91 private religious and 77 private non-religious universities.

Figure 19 – Mean Tuition of Four-Year Combined Sample of Colleges by Year in Current and 1988 Constant Dollars
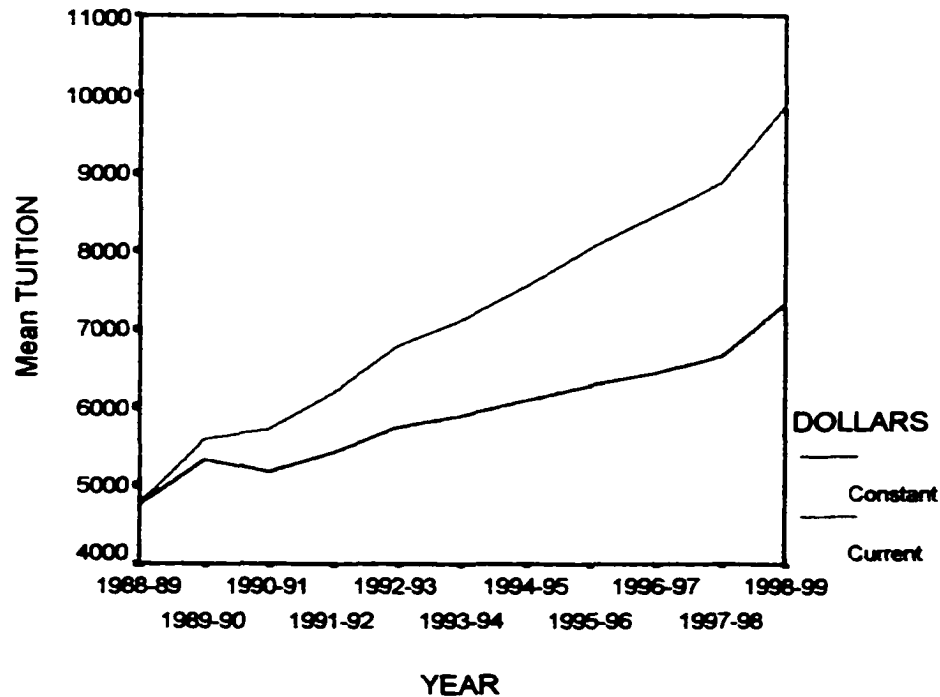
The purpose of Figure 19 is to illustrate the rise in actual tuition costs over the inflation-adjusted tuition costs over the sample period. Hence, the inflation-adjusted tuition in Figure 19 is measured in 1988 constant dollars. However, the dependent variable for the first stage of the regression model for the combined four-year sample was

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measured in 1998 constant dollars. Figure 20 illustrates the mean tuition costs of the

four-year sample institutions by year and region in 1998 constant dollars. (See Appendix

K, Figure 27 for the Mean Tuition of the Four-Year Combined Sample of Colleges by

Year in 1998 Constant Dollars.)

Figure 20 – Mean Tuition of Four-Year Combined Sample of Colleges by Year and Region in 1998 Constant Dollars
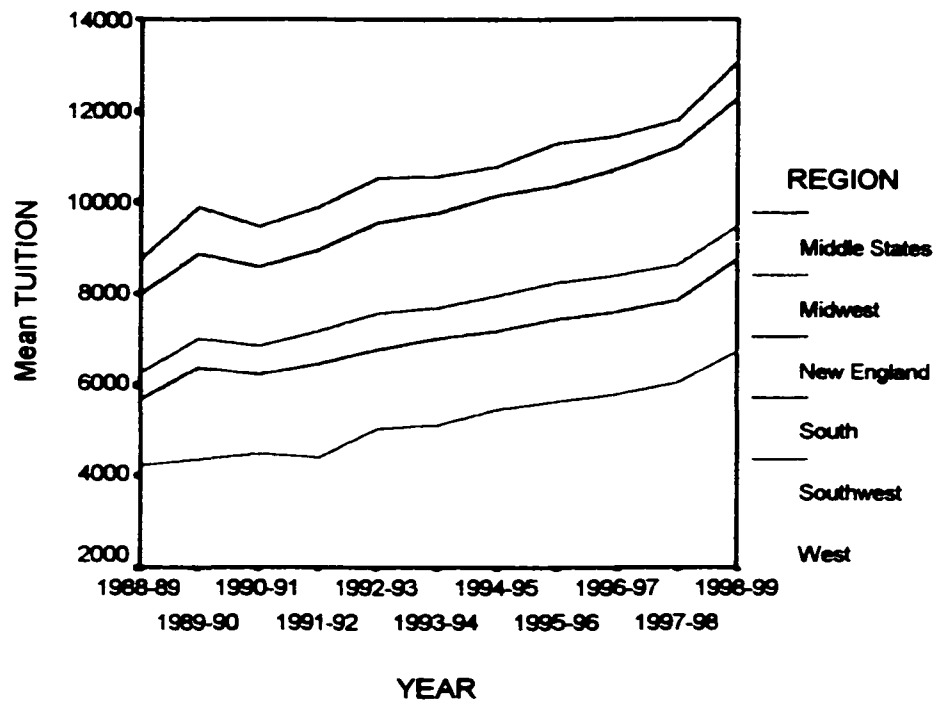
The trends in the combined models support the findings of the individual models.

Over the sample period, the mean tuition cost nationwide has been growing faster than

the rate of inflation and there is a discernable increase in tuition following the enactment

of the Hope Scholarship Credit. In addition, there is a noticeable regional variation in

tuition costs. The New England and Middle State regions have the most expensive

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tuition charges while the Southwest enjoys the lowest. However, in all regions the mean

tuition cost increased from the 1997-98 to the 1998-99 academic year.

Figure 21 – Mean Four-Year College Enrollment by Year
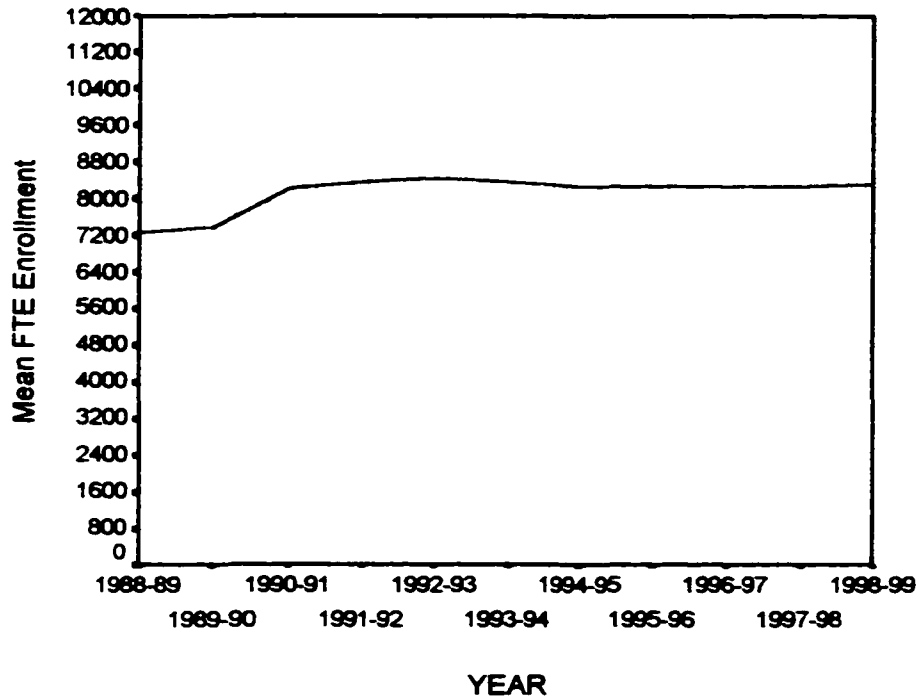
YEAR

The enrollment trends for the combined sample show an increase in the mean

FTE between 1988 and 1991, and then enrollment flattens out in the subsequent years of

the sample period. This trend can be partially explained by population trends over the

last decade. Between 1988 and 1998 the percentage of 18-24 year olds in the population

has fallen from 11% to 9%. Thus the pool of traditional college-aged students is

shrinking, and the mean undergraduate enrollment is stagnant. The regional enrollment

Figure shows that the colleges in the Southwest region, on average, have the largest

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undergraduate enrollments, while the New England schools have the smallest

enrollments.

**Figure 22 – Mean FTE Enrollment of Four-Year Combined Sample of Colleges by
Year and Region**
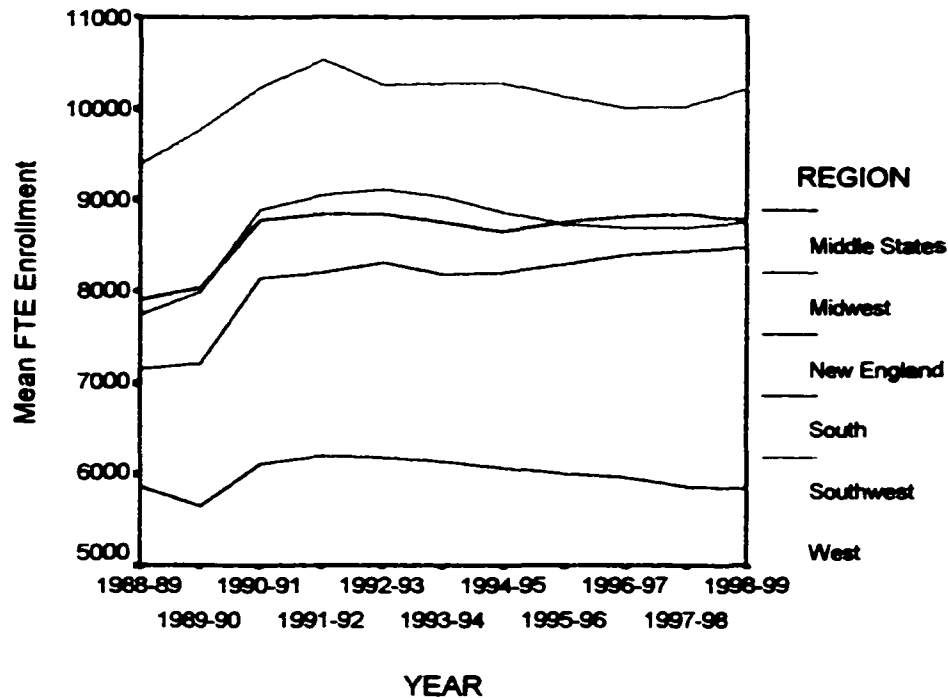
The tuition and enrollment data from the combined sample were used as

dependent variables in the two-stage least squares regression models. Similar to the

previous models, the two-stage least squares design was chosen to control for the

simultaneity between tuition and enrollment. Thus, FTE enrollment was included in the

prediction of tuition in the first stage of the model. Then, using the regression coefficients

from the first stage of the model, predicted values for tuition were calculated and these

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predicted values were entered as an independent variable in the second stage of the model where enrollment was the dependent variable.

In the first stage of the model, institutional quality and state economic variables were used as independent variables in the prediction of tuition. The institutional quality variables included the percentage of faculty with an earned doctorate, the student-faculty ratio, the number of volumes in the library, the presence of an undergraduate program in engineering, the percentage of non-resident students, and the number of graduate students. It was expected that higher quality would be associated with higher tuition charges. The state economic variables included in model were the state's median household income and the annual change in state government appropriations. It was expected that median household income would be positively associated with tuition, and that the change in state government appropriations would be negatively associated with tuition.

In the second stage of the model, institutional quality and state population variables were combined with predicted tuition values from the first stage to predict the undergraduate enrollment of the sample four-year institutions. The institutional quality variables were the average ACT score of the student body, the percentage of applications accepted, the number of volumes in the library, the percentage of faculty with an earned doctorate, and the student-faculty ratio. It was expected that higher quality institutions would be more selective in their enrollment policies. The population variables were the percentage of college graduates in the state and the percentage of the state's population aged 18-24 years old. These population variables were expected to be positively associated with enrollment. In addition, the average financial aid award per student was

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included in the model along with the predicted tuition values to control for the effect of price on enrollment. Hence, it was expected that predicted tuition would be negatively associated with enrollment. However, to the extent that the average financial aid award lowers the tuition price facing a prospective student, then enrollment will rise. Thus, there was an expected positive relationship between the average financial aid award per student and enrollment.

In addition, indicator variables were included in both stages of the model for the years in the sample period, the regions of the country, and the type of institution. The base year for the annual indicator variables was the 1988-89 academic year, and the Southwest region was the base level for the regions of the country. There were three types of four-year institutions included in the model: public universities, private universities with a religious affiliation, and private universities with no religious affiliation. Public four-year universities served as the base level for the institutional indicator variable. The following table reports the regression coefficients of the tuition and enrollment models for the combined sample of 265 four-year institutions (97 public, 91 private religious and 77 private non-religious universities).

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Table 21 - Regression Coefficients for Two-Stage Least Squares Models for Tuition and Enrollment of Four-Year Universities

	Stage 1: Tuition	Stage 2: Undergraduate Enrollment
Intercept	-5689.157	-5085.347
FTE Enrollment	-.129 (9.248)**	
Median Household Income	-.00379 (-.348)	
Change in State Appropriations	.02855 (.241)	
Percentage of Faculty with an Earned Doctorate	94.690 (31.380)**	118.806 (24.853)**
Student-Faculty Ratio	-105.292 (-7.998)**	104.965 (4.885)**
Volumes in the Library	.00023 (4.240)**	.00263 (38.952)**
Presence of an Undergraduate Engineering Program	990.475 (7.760)**	
Number of Graduate Students	.197 (7.172)**	
Private Religious University	8572.97 (49.614)**	
Private Non-Religious University	9881.22 (56.526)**	
Predicted Tuition		-.9459 (-48.606)**
Percentage of Applicants Accepted		7.217 (1.963)**
Percentage of College Graduates in State		87.884 (3.972)**
Percentage of State's Population Aged 18-24		28058.24 (2.240)**
Year 1989	572.189 (2.643)**	635.816 (1.799)*
Year 1990	371.229 (1.714)*	1071.322 (2.990)**
Year 1991	587.048 (2.679)**	1323.767 (3.699)**
Year 1992	708.717 (3.179)**	1465.227 (4.022)**
Year 1993	662.464 (2.924)**	1267.062 (3.420)**
Year 1994	752.172 (3.331)**	1155.65 (3.008)**
Year 1995	896.158 (4.029)**	1267.288 (3.292)**
Year 1996	981.626 (4.407)**	1340.777 (3.391)**

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Year 1997	1160.465 (5.198)**	1449.264 (3.617)**
South	415.158 (1.859)*	46.686 (.132)
West	985.322 (4.179)**	-303.476 (-.834)
Midwest	1544.245 (7.188)**	1546.144 (4.530)**
Middle States	1962.724 (7.491)**	1572.252 (3.833)**
New England	3746.767 (14.387)**	1247.497 (3.051)**
R^2	.804	.750
Durbin Watson	1.825	1.733

Notes: Amounts in parentheses represent t-statistics associated with the regression coefficients. Asterisks indicate significance at the 5%(**) and 10% (*) level. All dollar amounts in the model were measured using 1998 constant dollars.

The results of the tuition model for the combined sample show that both institutional quality and the composition of the student body are significant predictors of tuition. However, the economic variables are not significant. The percentage of faculty with an earned doctorate, number of volumes in the library, and the presence of an undergraduate degree in engineering were all significant and in the hypothesized positive direction. Thus, increased spending in any one of these areas will cause tuition to increase, *ceteris paribus*. In addition, the student-faculty ratio was significant and in the hypothesized negative direction. This suggests that when class size is reduced, tuition will rise.

The variables that describe the student body were also found to be significant predictors of tuition. The significant negative relationship between FTE enrollment and tuition suggests that there are economies of scale in undergraduate enrollment. Thus, enrolling an additional student within a relevant range will lower the average operating cost per student and tuition will fall. The significant positive relationship between the

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number of graduate students and tuition suggests that undergraduates pay for the expansion of graduate programs.

The insignificance of the economic variables supports the College Board's (1998) findings that tuition growth has outpaced inflation and median household income growth has been stagnant. Because these two variables are not moving in the same direction, there has been a growing disconnect between income levels and tuition charges. Further, if median household income is stagnant, then the income tax base is also stagnant, and state appropriations for higher education funded by the income tax cannot keep pace with the growth in operating costs of state institutions. The insignificance of these variables suggests that over the last decade rising operating costs has been passed onto students directly through higher tuition rather than charging the general taxpayer by increasing state appropriations.

The significance of the annual indicator variables mirrors the pattern of tuition increases illustrated in Figure 19. That is, the mean tuition cost for every year in the model is significantly higher than the base year, the 1988-89 academic year. The regional indicator variables confirm the relationships in Figure 20. All regions in the model have a mean tuition cost significantly greater than the Southwest base region. Finally, the type of institution indicator variables shows that, on average, private religious college tuition is $8,572 greater than state universities, and private non-religious college tuition is $9,881 greater than state universities.

Overall, the first stage of the model accounts for 80.4% of the variation in tuition prices among the sample colleges. Even though the Durbin-Watson statistic of 1.825 is acceptable based on the number of independent variables and large sample size, White's

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test for heteroskedasticity and Cochrane-Orcutt's regression were performed to test for a possible violation of the regression assumptions. The results of these tests produced regression coefficients similar to those reported in Table 21. Thus, the predictive ability of the model is not biased by heteroskedasticity or autocorrelation.

The results of the second stage of the model indicate that tuition charges, institutional quality and state population variables are all significant predictors of FTE undergraduate enrollment. There is a significant negative relationship between predicted tuition and enrollment. This finding is consistent with the demand theory of economics. That is, as the tuition prices of four-year colleges increase, enrollment will decline.

The percentage of a state's population that is 18-24 years old and the percentage of a state's population that is college educated are both positively associated with undergraduate enrollment. Thus if the state's population of traditional college-aged students increases or decreases, undergraduate enrollment will rise or fall respectively. Similarly, the greater the percentage of college-educated adults in a state, the greater the undergraduate enrollment of the state's public and private universities. Presumably this positive relationship is the result of college-educated parents raising their children with an expectation of attending college.

The institutional quality variables are also positively associated with FTE undergraduate enrollment. This finding implies that increases in the numbers of volumes in the library and the percentage of faculty with an earned doctorate can attract more students. In addition, the student-faculty ratio and the percentage of applications accepted are also positively associated with enrollment. These variables were included in the model to control for the size of the sample institution. Thus, higher student-faculty

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ratios and a greater percentage of applications accepted will lead to higher enrollment, *ceteris paribus.*

The significance of the indicator variables for years in the sample period reveals that FTE undergraduate enrollment at four-year colleges from 1989-90 through 1997-98 was significantly higher than 1988-89 levels. The regional indicator variables show that the South and the West regional institutions have average enrollments that are statistically the same as those in the Southwestern regions. However, institutions in the Middle States, the Midwest, and New England are significantly larger than the institutions in the Southwestern region.

Three variables were removed from the hypothesized model for high Variance Inflation Factors (VIFs). These variables were the average financial aid award per student, the average ACT score, and the indicator variable for type of institution. To avoid problems of multicollinearity these variables were eliminated from the data analysis.

Overall, stage 2 of the four-year combined model explains 75% of the variation in the FTE undergraduate enrollment among the sample colleges. However, the low Durbin-Watson statistic indicates the possibility of autocorrelation in the data. White's test for heteroskedasticity and Cochrane-Orcutt's regression were performed to test for possible violations of regression assumptions. These tests produced regression coefficients similar to those reported in Table 21. Hence, the predictive ability of the model is not biased by heteroskedasticity or autocorrelation.

The regression coefficients from Table 21 were used to estimate tuition and enrollment for the 1998-99 academic year for each of the four-year colleges in the

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sample. The following tables show the comparison between actual and predicted tuition and enrollment for 1998-99.

Table 22 – Comparison of Actual to Predicted Tuition and Enrollment for Four-Year Universities, 1998-99

	Tuition	Enrollment
Actual Mean	$9,872	8334 students
Predicted Mean	$8,665	7540 students
Mean Difference	$1,207	794 students

For both tuition and enrollment, t-tests were performed to measure the significance of the mean difference. For both tests, the null hypothesis was that the mean difference was not significantly different from zero. The mean difference of $1,207 for tuition was statistically significant ($t = 5.808$, $p < .0001$). Thus, the null hypothesis was rejected. Actual tuition increased by more than expected in the year following the enactment of the Hope Scholarship Credit. In addition, the mean difference of 794 students was also statistically significant ($t = 3.086$, $p = .002$). The null hypothesis of the enrollment t-test is therefore rejected. However, this significant enrollment effect should be interpreted with caution. The average enrollment of the sample public four-year universities in 1998-99 was 16,176 students. The average enrollment of the sample private religious colleges was 3,676 students, and the average enrollment of sample private non-religious colleges was 3,958 students. The dramatic variation in the size of the four-year colleges led to large errors in the prediction of enrollment for the 1998-99 academic year. In addition, the indicator variable for the type of institution was eliminated from the four-year combined enrollment model because inclusion of the variable introduced multicollinearity into the data analysis. Given that there was not a

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significant enrollment effect in the individual institution models, the significant difference between actual and predicted enrollment for the combined four-year model says more about the inappropriateness of combining these institutions into one enrollment model than the effects of the Hope Scholarship Credit in the year following its enactment.

The following tables summarize the mean difference in tuition and enrollment by region.

Table 23 – Comparison of Actual and Predicted Tuition for Four-Year Universities by Region, 1998-99

Region	Tuition		
	Actual	Predicted	Mean Difference
Southwest	Mean = 6735 Std. Dev. = 4743 N = 18	Mean = 5892 Std. Dev. = 4482 N = 18	Mean = 843 Std. Dev. = 2252 N = 18
South	Mean = 8774 Std. Dev. = 6501 N = 55	Mean = 7741 Std. Dev. = 4719 N = 55	Mean = 1033 Std. Dev. = 3563 · N = 55
West	Mean = 9139 Std. Dev. = 7123 N = 53	Mean = 7975 Std. Dev. = 4831 N = 53	Mean = 1164 Std. Dev. = 3543 N = 53
Midwest	Mean = 9490 Std. Dev. = 6232 N = 74	Mean = 8456 Std. Dev. = 4350 N = 74	Mean = 1034 Std. Dev. = 2779 N = 74
Middle States	Mean = 12279 Std. Dev. = 7554 N = 31	Mean = 10529 Std. Dev. = 5390 N = 31	Mean = 1750 Std. Dev. = 3669 N = 31
New England	Mean = 13090 Std. Dev. = 8497 N = 34	Mean = 11456 Std. Dev. = 5006 N = 34	Mean = 1634 Std. Dev. = 4300 N = 34

The mean difference between actual and predicted tuition was positive in all regions, with the largest difference in the Middle States and the smallest difference in the Southwest. An ANOVA test was used to measure the significance of regional effects.

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The overall F statistic was not significant (F = .374, p = .866), and LSD post-hoc tests produced no significant pairwise comparisons between regions.

Table 24 – Comparison of Actual and Predicted Enrollment for Four-Year Universities by Region, 1998-99

Region	Enrollment		
	Actual	**Predicted**	**Mean Difference**
Southwest	Mean = 10216 Std. Dev. = 10759 N = 18	Mean = 9371 Std. Dev. = 8749 N = 18	Mean = 845 Std. Dev. = 4238 N = 18
South	Mean = 8481 Std. Dev. = 7621 N = 55	Mean = 7431 Std. Dev. = 6906 N = 55	Mean = 1050 Std. Dev. = 2736 N = 55
West	Mean = 8291 Std. Dev. = 8815 N = 53	Mean = 7376 Std. Dev. = 7655 N = 53	Mean = 915 Std. Dev. = 4341 N = 53
Midwest	Mean = 8756 Std. Dev. = 9069 N = 74	Mean = 8117 Std. Dev. = 8474 N = 74	Mean = 639 Std. Dev. = 3603 N = 74
Middle States	Mean = 8776 Std. Dev. = 7141 N = 31	Mean = 8401 Std. Dev. = 6257 N = 31	Mean = 375 Std. Dev. = 5361 N = 31
New England	Mean = 5841 Std. Dev. = 4745 N = 34	Mean = 4965 Std. Dev. = 6074 N = 34	Mean = 876 Std. Dev. = 5805 N = 34

The mean difference between the actual and predicted enrollment was positive in all regions. There was not a significant regional effect in the mean differences (F = .133, p = .985), however. In addition, LSD post hoc tests revealed no significant pairwise comparisons between regions.

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Summary of Findings

The results of this study support the Bennett Hypothesis, that is, in the face of additional federal subsidies for higher education, colleges and universities will raise tuition to extract some of the economic rents from the federal program, thereby redistributing income from students to administrators and faculty members. This hypothesis holds for each type of institution included in the study as well as in each region of the country. While the stated purpose of the Hope Scholarship Credit was to make the first two years of postsecondary education tuition-free, the results of this study cast doubts on the Credit's ability to relieve the financial pressure placed on middle-income families from the recent trend of tuition inflation. The following table summarizes the mean difference between the actual and predicted tuition for each type of college included in the sample.

Table 25 – Summary of the Mean Differences between Actual and Predicted Tuition by Type of Institution, 1998-99

	Mean Difference between Actual and Predicted Tuition	Percentage Increase of Actual Tuition over Predicted Tuition	Remaining benefit from the Hope Scholarship Credit
Two-Year Colleges	$147	9.53%	$1,353
Public Four-Year Colleges (In-State Tuition)	$332	12.73%	$1,168
Public Four-Year Colleges (Non-Resident Tuition)	$1,294	16.86%	$206
Private Religious Colleges	$1,725	15.41%	-$225
Private Non-Religious Colleges	$2,073	16.03%	-$573
Combined Sample of Four-Year Universities	$1,207	13.93%	$293

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For each type of institution the tuition increases in the 1998-99 academic year were statistically significant. The remaining benefit after the tuition increases for each type of institution was calculated by subtracting the mean difference in tuition cost from the $1,500 maximum allowable benefit of the Hope Scholarship Credit. Eligible families with college students attending two-year and four-year public universities will see a reduction in their tuition bill as a result of the new credit. However, the amount of the benefit will be less than $1,500. On average, two-year colleges captured 10% of the credit ($147) and four-year colleges captured 22% of the credit ($332) through tuition increases. For students that pay non-resident tuition, the public universities captured 86% of the tax credit ($1,294), leaving eligible non-resident students with only a $206 decrease in net tuition in 1998-99.

The real losers in the 1998-99 academic year are students of private colleges. On average, these institutions have fully captured the benefit of the new credit and tuition is actually higher after the credit than it would have been without the new tax law. In addition, families that are not eligible for the credit will be paying significantly more in tuition at all types of institutions in 1998-99.

There is no evidence provided from the results of this study that enrollment was dramatically changed in the year following the enactment of the Hope Scholarship Credit. This finding is not surprising, given that the intended target of the credit is middle-income students who tend to have an inelastic demand for higher education. The following table summarizes the mean difference between actual and predicted enrollment for each type of institution for 1998-99.

Table 26 – Summary of the Mean Differences between Actual and Predicted Enrollment by Type of Institution, 1998-99

	Mean Difference between Actual and Predicted Enrollment
Two-Year Colleges	135 students
Public Four-Year Colleges	-230 students
Private Religious Colleges	-22 students
Private Non-Religious Colleges	-10 students
Combined Sample of Four-Year Colleges	794 students

The mean difference in enrollment was statistically insignificant for all types of institutions except for the four-year combined model. However, the significant increase in four-year college enrollment contradicts the results of the individual institution models and may be attributable to inappropriately combining very diverse types of institutions in the same model. That is, averaging the enrollment of large public state universities with smaller private colleges masks the effects of the Hope Scholarship Credit on the enrollment of the individual institutions. Hence, the individual institution models appear more reliable than the combined four-year model.

Among the four-year colleges, there was a negative, yet statistically insignificant, mean difference between actual and predicted enrollment. The drop in enrollment of the public state universities and the private colleges may be more attributable to population effects than to tax law. Between 1988 and 1998, the population percentage of 18-24 year olds dropped from 11% to 9%. In addition, the mean difference was negative for each type of four-year college and positive for the two-year colleges, so it is also possible that there was a migration effect. That is, students that would have attended a four-year college in 1998-99, *ceteris paribus*, decided instead to enroll at a two-year college.

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However, the positive mean difference between actual and predicted enrollment of the two-year colleges was also statistically insignificant.

This research study was designed to answer two research questions. 1) Have tuition costs increased in the academic year following the enactment of the Hope Scholarship Credit? The results of this study provide evidence that the answer to the first research question is affirmative. Tuition costs of two-year and four-year public universities and private religious and non-religious universities all increased significantly in the 1998-99 academic year. In addition, the tuition increases occurred in all six regions of the country. 2) Has enrollment changed in the academic year following the enactment of the Hope Scholarship Credit? The findings in this study suggest that enrollment did not change significantly in the first year of the new tax credit.

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CHAPTER V – CONCLUSIONS AND LIMITATIONS

In August 1997, Congress enacted the Hope Scholarship Credit along with a host of other provisions for higher education. The new tuition tax credit offers middle-income taxpayers a nonrefundable tax credit for up to $1,500 toward out-of-pocket tuition costs incurred in each of the first two years of postsecondary education. The stated purpose of the Hope Scholarship Credit was to improve access to higher education by reducing its cost. As the amount of the credit was set equal to the average annual two-year college tuition bill in the 1997-98 academic year, the intention of the new tax credit was to make the first two years of postsecondary education tuition free for middle-income families.

The Human Capital Model and the theory of externalities provide the motivation behind tax policies like the Hope Scholarship Credit. Because tuition costs have increased faster than the rate of inflation over the past two decades, it is assumed that there is a market inefficiency and the result will be a sub-optimal demand for higher education. Underlying this observation is the assumption that there are potentially qualified students who would attend college if they could somehow capture the full social benefits of postsecondary education. But, because tuition costs exceed the sum of the private and social benefits, these students do not go to college. The continuation of this argument is that if these students do not attend college, then all of society will suffer. The remedy for the perceived market inefficiency is government subsidies, such as the Hope Scholarship Credit. The subsidy is supposed to correct the market failure by providing the student with incentives to internalize the external social benefits of attending college. Hence, the tuition tax credit lowers the tuition cost for the potential student, and the market for higher education operates more efficiently.

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The primary weakness behind the Human Capital Model and the theory of externalities when they are applied to higher education is the assumption that colleges and universities will maintain a constant tuition charge in the face of additional government subsidies. Former Secretary of Education William Bennett is credited with exposing this weakness. The Bennett Hypothesis asserts that funding for federal student aid should be cut because the main effect of such aid is tuition inflation, which allows colleges to extract rents from the federal government subsidy programs. If the Bennett Hypothesis is correct, then higher education subsidies such as the Hope Scholarship Credit represent circular logic. That is, high tuition costs will be offset by a tuition tax credit that will lead to higher tuition costs.

The purpose of this study was to measure the effects of the Hope Scholarship Credit on tuition and enrollment in the 1998-99 academic year, the year following the enactment of the new tax credit. Using the Bennett Hypothesis as the underlying theory, the study was designed to test the following two research questions: 1) Did tuition costs increase in the academic year following the enactment of the Hope Scholarship Credit? 2) Did enrollment change in the academic year following the enactment of the Hope Scholarship Credit?

The research questions were tested using an original sample of 400 colleges. The sample consisted of the two largest public two-year colleges, public four-year colleges, private religious colleges, and private non-religious colleges in each state. The size of the institution was measured by undergraduate enrollment in the 1997-98 academic year. After the data were screened, the final sample consisted of 93 public two-year colleges,

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97 public four-year colleges, 91 private religious colleges, and 77 private non-religious colleges, for a total of 358 postsecondary institutions.

The research design of the study was a ten-year trend analysis using a two-stage least squares regression model, with tuition as the dependent variable in the first stage and undergraduate enrollment as the dependent variable in the second stage. The sample period was the 1988-89 academic year through the 1997-98 academic year, the year the Hope Scholarship Credit was enacted by Congress. The regression coefficients of the two-stage model were used to predict tuition and enrollment of the sample colleges for the 1998-99 academic year. The actual tuition and enrollment were then compared to the tuition and enrollment predicted by the model. The predicted values were used as proxies for the tuition and enrollment levels that would have existed if the Hope Scholarship Credit had not been introduced. The significance of the mean differences between actual and predicted tuition and enrollment was measured using t-tests.

The results of the study provide evidence in support of the Bennett Hypothesis. Since the stated purpose of the Hope Scholarship Credit was to make the first two years of postsecondary education tuition-free, the amount of the credit was determined by the national average tuition cost of public two-year colleges for the 1997-98 academic year, or $1,500. However, there was a statistically significant increase in the tuition charges of public two-year colleges in the year following the enactment of the credit. For the sample of two-year public colleges included in this study, actual average tuition cost for 1998-99 was $1,689 while the tuition cost predicted from the ten-year trend analysis was $1,542. Hence, if Congress had not enacted the credit, then public two-year colleges would be charging approximately $1,500 in tuition, but after the credit tuition is now

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approximately $1,700. This means that the first two-years of postsecondary education will not be tuition-free even for those families that qualify for the credit. In addition, families that do not quality for the tax credit, either because the family does not have a positive tax liability or the family has an adjusted gross income greater than $100,000 ($50,000 for single taxpayers), are paying significantly more for tuition after the enactment of the Hope Scholarship Credit. Further, since the amount of the credit will not be indexed for inflation until academic years beginning after 2002, any increases in tuition between 1999 and 2002 will continue to erode the value of the benefit offered by the new tax credit.

The results were even more dramatic for the four-year public and private colleges included in the sample. Public four-year colleges increased in-state tuition by $332 more than expected and non-resident tuition by $1,294 more than predicted from the ten-year trend analysis. The actual average in-state tuition charge for the sample public four-year universities was $2,941, and the predicted in-state tuition charge from the trend analysis was $2,609. Thus, without the credit average in-state tuition would have been approximately $2,600, but with the credit average tuition rose to approximately $2,900. For families that qualify for the Hope Scholarship Credit and pay in-state tuition at a public four-year university, their average tuition cost was reduced to $1,441 ($2,941-$1500). However, families that pay in-state tuition and do not qualify for the credit paid $332 more in tuition than they would have without the enactment of the new tuition tax credits.

In addition, the public four-year colleges captured nearly all of the benefit of the Hope Scholarship Credit from families that pay non-resident tuition. Without the Hope

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Scholarship Credit, the average predicted non-resident tuition price would have been $7,673, but the actual average non-resident tuition price was $8,967. For families that pay non-resident tuition and qualify for the Hope Scholarship Credit, their tuition bill was reduced to $7,467 ($8,967-$1,500). However, for families that do not qualify for the credit, their tuition bill was increased by $1,294 more than it would have been without the new tax law.

The biggest losers from the new tax law are students enrolled in private institutions. Both the religious and non-religious private institutions included in the sample fully captured the benefit of the Hope Scholarship Credit through tuition increases. Private religious colleges increased tuition by $1,725 more than would be expected from the ten-year trend analysis. Without the tuition tax credit, private religious college tuition would have been $11,192, but with the credit tuition costs rose to $12,917. Thus, for families that pay private religious college tuition and qualify for the credit, their tuition bill was actually $225 ($1,725-$1,500) more than it would have been without the enactment of the new tax law. For families that did not qualify for the credit, tuition was $1,725 more than it would have been without the credit.

Private non-religious colleges increased tuition by $2,073 more than predicted from the ten-year trend analysis. Without the tuition tax credit, private non-religious college tuition would have been $12,932, but with the credit tuition rose to $15,005. Thus, families that qualify for the credit paid $573 ($2,073 - $1,500) more in tuition in 1998-99, and families that did not qualify for the credit paid $2,073 more in tuition than they would have paid without the tuition tax credit.

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The second stage of the model predicts that the Hope Scholarship Credit led to an insignificant change in enrollment. The mean difference between actual and predicted enrollment for two-year colleges was 135 students. For four-year state universities the mean difference was –230 students. For private religious colleges, the mean difference was –254 students and it was –215 students for private non-religious colleges. For each of these types of institutions, the mean difference was not statistically significant. Hence, the average enrollment in the year following the enactment of the Hope Scholarship Credit is statistically the same as enrollment levels before the tuition tax credit. As the stated purpose of the Hope Scholarship Credit is to improve access to higher education, it does not appear that the new credit motivated more students to attend college in the year following its enactment.

However, the mean difference of 794 students for the combined model of four-year college was statistically significant. As the mean difference between actual and predicted enrollment for the individual types of institutions was not statistically significant, it is unlikely that there was a statistically significant increase in the average enrollment of all four-year colleges in the year following the enactment of the Hope Scholarship Credit. Rather, it is more likely that the significant mean difference is the result of combining two very different types of institutions, large public state universities and small private colleges, in the same regression model. Thus, the results of the individual institution models appear to be more reliable than the four-year combined model.

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Limitations of the Study

The results of the study are limited by the self-reporting nature of the college guide data. For most of the variables the self-reported data appeared consistent and reasonable over the sample period. However, the financial aid data reported in *Peterson's Four-Year College Guide* and *Peterson's Two-Year College Guide* and used in the enrollment model appeared inconsistent and subject to unreasonable fluctuations from year to year. An attempt was made to smooth out the ten-year trend for financial aid by replacing unreasonable amounts with linearly interpolated, inflation-adjusted averages for the sample institutions. Nonetheless, the financial aid variable was not a significant predictor of the enrollment in public four-year colleges or of private college enrollment, and there was a significant negative relationship between the average financial aid award and enrollment of two-year public colleges. The unreliability of these data weakens the predictive ability of the enrollment model, and thus the conclusions drawn about the effect of the Hope Scholarship Credit on enrollment in the 1998-99 academic year.

An additional limitation to the study was the time period for measuring the effects of the Hope Scholarship Credit. It was expected, *a priori*, that a single year might not be enough time to measure the market's reaction to the Hope Scholarship Credit. The significance of the mean difference between actual and predicted tuition in the year following the enactment of the tuition tax credit suggests that one year was plenty of time for college administrators to incorporate the new tax law into their tuition pricing decisions. However, a single year's results cannot paint a complete picture of the effects of the Hope Scholarship Credit.

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Tax Policy Implications

The enactment of the Hope Scholarship Credit marks a significant shift in tax policy. For the first time, the federal government is using the tax code to distribute targeted subsidies for higher education. Previous tax provisions related to college expenses have been limited to exclusions for scholarships received (I.R.C. § 117), amounts received from employer-provided educational assistance programs (I.R.C. §127), and deductions for employee tuition costs that are ordinary and necessary to a trade or business (I.R.C. Reg. §1.162-5). These prior tax laws extended tax benefits for higher education independently of a taxpayer's financial status. However, this new tax credit is unique because it distributes financial aid for higher education only to middle-income taxpayers. Since middle-income students have been found to have an inelastic demand for higher education, the Hope Scholarship Credit, at best, can only provide windfall gains. That is, the credit subsidizes the tuition of students that would have attended college without the credit.

Economic theory suggests that good tax laws are those that adhere to three basic principles: economic efficiency, administrative simplicity, and fairness (Stiglitz, 1988, p.390). Based on these criteria, the results of this study suggest that the tax code is not an appropriate tool for distributing this type of targeted financial aid. Tax laws are economically efficient if they do not distort the relative price of goods, services, or factors of production (Saxton, 1997). The statistically significant increase in tuition costs at all four types of institutions in the year following the enactment of the Hope Scholarship Credit is evidence of the economic inefficiency of the new tax law. Indeed,

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the new tax law is not only inefficient but also inconsistent with its stated purposes. High tuition prices are being offset by a tax credit that has led to even higher tuition bills.

Administrative simplicity requires that tax benefits be offered at a minimum cost. While other federal financial aid programs require a complicated application process to verify family assets and income, eligibility for the Hope Scholarship Credit is based solely on a family's adjusted gross income from their current year's tax return. Thus, compared to other federal financial aid programs, the Hope Scholarship Credit appears administratively simple.

However, the new tax law does not make funds available to a student at the time of enrollment in the way that traditional federal financial aid programs do. Instead, the tax benefit takes the form of a reduced liability when the family files its tax return, typically in the year after the tuition costs have been paid. Further, because the Hope Scholarship Credit is nonrefundable, it can only offset a positive tax liability and cannot produce a refund for the taxpayer. Thus, even though the new tax law is administratively simple, the time lag between enrolling in college and realizing the tax benefit from the Hope Scholarship Credit reduces the present value of the subsidy.

Finally, fairness in tax law is measured by vertical and horizontal equity. Vertical equity refers to the overall progressivity of a tax provision; that is, as the taxpayer's ability to pay increases so does the tax liability. Tax laws are horizontally equitable if individuals who are the same in al! relevant respects face the same tax liability. On the surface, the Hope Scholarship Credit appears vertically and horizontally equitable for families that have children attending college because the tax benefit is phased-out for

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high-income taxpayers and the credit extends to all tuition costs without respect to the type of institution.

The results of this study suggest that the equitable appearance of the Hope Scholarship Credit is deceiving. The tax credit benefits only those families that incur out-of-pocket tuition costs, have adjusted gross incomes less than $80,000 ($40,000 for single taxpayers), and have a positive tax liability. Thus, not every student attending college will benefit from the new tuition tax credit. Yet, there was a statistically significant increase in tuition costs of all four types of institutions included in the study, and the increases were disproportionate among the institutions. Only eligible families with students attending public two-year or four-year institutions will receive any benefit from the credit. The private colleges, on average, raised tuition by more than the credit and completely captured the windfall gains of the Hope Scholarship Credit.

The eligibility requirements of the Hope Scholarship Credit coupled with the significant tuition increases in the year following the enactment of the credit make the new tax credit neither horizontally nor vertically equitable. Because the Hope Scholarship Credit is nonrefundable, lower income students (those that do not have a tax liability) do not receive a benefit from the tuition tax credit. Further, since all types of colleges and universities included in the sample raised their tuition prices in the year following the enactment of the credit, all students who are not eligible for the credit are paying significantly more in tuition costs. This means that the enactment of the Hope Scholarship Credit effectively raised the tuition bills of both lower income students that do not have a tax liability and upper income students whose family adjusted gross incomes exceed the statutory phase-out limit. In addition, families that meet the eligibility

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requirements of the Hope Scholarship Credit and pay private college tuition, either to a religious or a non-religious institution, are paying more in tuition than they would have paid if the credit had not been enacted.

The total price tag for the Hope Scholarship Credit is estimated to be $7 billion per year from 1998 to 2002. The results of this study suggest that the new tuition tax credit is a waste of federal dollars. On its face, it fails to accomplish the stated purpose of making the first two years of postsecondary education tuition-free, and beneath the surface the credit has effectively raised the college tuition price for all non-eligible families. Thus, the credit has neither controlled tuition cost-inflation nor is it likely to improve access to higher education. Further, since the credit will not be indexed for inflation until academic years beginning after 2002, any increase in tuition costs between 1999 and 2002 will continue to reduce the benefit to eligible families.

The results of this study suggest that the real winners from the new tax law are colleges and universities who can, and have, extracted additional rents from the federal government through tuition increases in the year following the enactment of the tuition tax credit. This outcome is not foreseeable under the theory of externalities or the Human Capital Model. Indeed, the primary weakness of these theories is that they ignore the institutional environment within which tax provisions such as the Hope Scholarship Credit are enacted. Rather, these theories assume that the tax provisions enter a vacuum after they are enacted and do not alter the surrounding environment.

The motivations behind the theory of externalities and the human capital model are noble. But, tax policy should not be driven by good intentions that carry bad consequences. Specifically, improving access to higher education by making college

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more affordable for middle-income students cannot be accomplished with a price-inflationary tuition tax credit. In summary, the short-term political gains of pandering to middle-income parents of college students should be weighed against the long-term cost of higher tuition for all college students.

Suggestions for Future Research

This study has focused on the effects of the Hope Scholarship Credit on college tuition and enrollments in the year following its enactment. However, the Hope Scholarship Credit and the other tax provisions for higher education enacted in the Taxpayer Relief Act of 1997 have potentially altered other aspects of the environment of the postsecondary institutions. Future research should investigate these additional effects.

Through tuition increases, the Hope Scholarship Credit has served to temporarily relieve budget constraints of postsecondary institutions and can produce a ripple effect throughout the institution. For example, in the wake of the enactment of the Hope Scholarship Credit, why should a college increase spending on scholarships or other institutional financial aid? In other words, why should a college use state or private money for programs that the federal government could pay when captured through tuition increases? If a postsecondary institution increased tuition and reduced spending on institutional aid, then students are even worse off than the results of this study suggest. In addition, the Hope Scholarship Credit has potentially altered the structure of tuition prices. The Hope Scholarship Credit is only allowable for out-of-pocket tuition costs, and student activity fees are specifically excluded from the credit. For example, The

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University of Mississippi officially dropped the "activity fee" for students and folded these amounts into "tuition" charges on the student's bill beginning in the fall of 1997. Future research should investigate these changes in the structure of tuition costs of higher education.

In addition, this study has focused only on the Hope Scholarship Credit, but the Taxpayer Relief Act of 1997 included several other tax provisions for higher education. These other provisions include the Lifetime Learning Credit, an above-the-line deduction for interest paid on student loans, and the Education ("Roth") Individual Retirement Accounts. Collectively these provisions, along with the Hope Scholarship Credit, are intended to make higher education more accessible by making the cost of attending college more affordable. However, they each have the potential to alter the environment of the financing of higher education.

The Lifetime Learning Credit is a nonrefundable $1,000 income tax credit for qualified tuition and fees paid to an educational institution that is eligible to participate in Department of Education student aid programs. The definition of qualified tuition and fees is the same as the Hope Scholarship Credit. Unlike the Hope Scholarship Credit, the Lifetime Learning Credit is not restricted to tuition costs incurred in the first two years of postsecondary education. Rather, the Lifetime Learning Credit is allowed for an unlimited number of years and may be used for undergraduate, graduate, and professional degree expenses. In addition, the Lifetime Learning Credit may be claimed for any course at a college that helps an individual improve his or her job skills, such as a credit or noncredit course that qualifies as continuing professional education. The Lifetime Learning Credit may be taken for tuition costs incurred after June 30, 1998, but it cannot

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be taken in the same year as the Hope Scholarship Credit for the same student. The amount of the Lifetime Learning Credit will be increased to $2,000 beginning in 2003. (I.R.C. § 25A)

The Lifetime Learning Credit carries the same price-inflationary incentives as the Hope Scholarship Credit. If a law student were willing to pay $10,000 per year in tuition without the credit, the same law student should be willing to pay $11,000 after the credit. This research study could be extended to graduate and professional schools to investigate the inflationary nature of the Lifetime Learning Credit.

The above-the-line deduction for interest paid on student loans makes the guaranteed student loan programs more expensive for the federal government by the amount of the foregone individual income tax receipts. This new tax provision could influence the interest charged on student loans. If the federal government lowered the guaranteed student loan interest rate, this would reduce the individual income tax benefit and reduce the guaranteed balances for defaulted loans. Both effects would lower the total cost of the new tax provision for the federal government. Alternatively, if the interest rate on student loans increased, the cost of attending college could be greater than it was before the new tax provisions and the real winners would be banks and other financial institutions that accept student loans. Future research should investigate the student loan interest rates before and after the Taxpayer Relief Act of 1997.

The Education Individual Retirement Account (IRA) allows an unlimited number of contributors to make non-deductible contributions totaling $500 per child per year until the child reaches age 18. When the beneficiary of the IRA enrolls in college, distributions from the IRA to the beneficiary can be excluded from the beneficiary's

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gross income provided the distribution does not exceed qualified higher education expenses. According to I.R.C. §530, qualified higher education expenses include tuition, fees, books, supplies, room and board, and equipment. While the IRA covers more expenses than the Hope Scholarship Credit, the Code precludes taxpayers from taking the Hope Scholarship Credit or the Lifetime Learning Credit in a year that income is excluded for Education IRA distributions. In addition, the $500 contributions are phased-out for adjusted gross income over $160,000 ($110,000 for single taxpayers). That is, when the taxpayer's AGI is over the limit, the taxpayer will not be allowed to make a contribution into the Education IRA account. For parents of children who were already attending college in 1997 when the Education IRAs were created, the Hope Scholarship Credit and the Lifetime Learning Credit provided greater benefits. Thus, the intended beneficiaries of the Education IRAs are middle-income parents of young children who will have years to save for their children's college education. However, since the contributions provide no immediate financial benefit and the tax law now offers two tuition tax credits, it is questionable how many parents will take advantage of the new IRAs. Future research should investigate the real benefit of these Education IRAs in terms of numbers of accounts and amounts invested. As there are many federal financial programs that currently offer grants and loans to lower and middle-income students, parents face an interesting dilemma regarding financing their child's education. Should they make non-deductible contributions to an Education IRA or forego the contributions and hope that their child will qualify for a federal grant or a guaranteed student loan? In addition, will the contributions to the Education IRA actually hurt a needy student by precluding him or her from receiving federal financial aid dollars?

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Finally, a non-education tax provision enacted in 1997 appears to contain the same flaws as the Hope Scholarship Credit. The Adoption Credit is a nonrefundable $5,000 credit for out-of-pocket qualified adoption expenses incurred in tax years beginning after 1996. The amount of the credit is $6,000 for parents adopting a child with special needs. Qualified adoption expenses include reasonable and necessary adoption fees, court costs, attorney fees, and other expenses that are directly related to the legal adoption by the taxpayer of an eligible child. An eligible child is defined as one who is under 18 years old or is mentally or physically incapable of self-care (I.R.C. §22). This credit carries the same incentives for adoption agencies that the Hope Scholarship Credit carries for colleges and universities. That is, the adoption agency can raise adoption fees and extract rents from the federal government. Anecdotally, there is already evidence of price inflation in the adoption industry. The AGAPE adoption agency in Nashville, Tennessee has recently raised adoption fees from $4,000 per child to $9,000 per child. Mercifully, the Adoption Credit for non-special needs children will expire December 31, 2001. Future research should investigate the price inflation in the adoption industry by comparing adoption fees before and after the enactment of the Adoption Credit, including the periods after the credit expires. If adoption fees do not go down after the credit expires, then the main effect of the adoption credit could be to increase the prices of all adoptions.

Contributions of the Study

The results of this study contribute additional evidence to the conclusions found in the tax credit literature. That is, tax credits represent weak incentives for influencing

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behavior. The findings in this study support the findings of the O'Neil (1980) study of the targeted jobs credit, Westphal's (1987) and Smith's (1990) studies of the historic rehabilitation tax credit, and the Walsh (1987) study of the residential energy tax credit. The conclusion of each of these studies was that tax credits merely provide windfall gains, that is, they subsidize behavior that would have occurred without the credit. Providing windfall gains to middle-income families and students is completely consistent with the purpose of the Hope Scholarship Credit. But, since the sample colleges and universities raised tuition costs in the year following the enactment of the Hope Scholarship Credit, then the windfall gains accrued in part to the postsecondary educational institutions rather than to middle-income families.

In addition, the results of this study provide evidence in support of the Bennett Hypothesis. That is, the main effect of federal financial aid programs is tuition-inflation. These findings, similar to Rose and Sorensen (1992), cast doubts on the altruistic motives assigned to colleges and universities by McPherson and Schapiro (1991b). They argue that there is not enough evidence to accept the Bennett Hypothesis because the federal government has not funded the federal financial aid programs with a constant subsidy in real terms over a significant period of time. But it is difficult to accept McPherson and Schapiro's argument when increases in federal funding, like the enactment of the Hope Scholarship Credit, lead to higher tuition costs. The results of this study would predict that maintaining a constant level of subsidy over a significant time period would only lead to sustained tuition-inflation.

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Conclusion

The Clinton Administration recognized the possibility that colleges could capture the benefits of the new tax law and in December 1998, Secretary of Education Richard Riley sent a letter to college presidents urging them not to raise tuition prices (Burd, 1998). The results of this study suggest that the Secretary's letter arrived too late, as the colleges had already significantly raised tuition prices for the 1998-99 academic year. Thus, the windfall gains will be shared by the middle-income families and the colleges.

However, the Secretary's letter may have influenced tuition pricing in the 1999-2000 year. The College Board's *Trends in College Pricing 1999*, shows a 5% increase in tuition costs between the 1998-99 and 1999-2000 academic years. This rate of increase is being touted as the lowest in the last four years. This translates into a $73 increase in tuition for two-year college students, a $109 increase for four-year public university students, and a $671 increase for private college students. These increases may appear small, but since the amount of the Hope Scholarship Credit will not be indexed for inflation until academic years beginning after 2002, any increase in tuition further reduces the benefit to middle-income families.

The purpose of this study was to measure the effects of the Hope Scholarship Credit on tuition and enrollment for 1998-99. The results of the study suggest that the Hope Scholarship Credit will not solve the problem of tuition inflation because the incentives are too strong for colleges and universities to capture the windfall gains of the new credit by raising tuition prices. The results of this study could inform the debate over both tax and education policy. While enacting incentives to make higher education more accessible to qualified students is a noble cause, policies such as the Hope

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Scholarship Credit will not solve the problem. Indeed, as the results of this study

suggest, these policies can actually exacerbate the problem.

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APPENDICES

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Appendix A – Enrollment in Public and Private Universities: 1869-70 to 1994-95 (In Thousands)

Academic Year	Total Enrollment	Public Colleges	Private Colleges
1869-70	52	Not Available	Not Available
1879-80	116	Not Available	Not Available
1889-90	157	Not Available	Not Available
1899-1900	238	Not Available	Not Available
1909-10	355	Not Available	Not Available
1919-20	598	Not Available	Not Available
1929-30	1,101	Not Available	Not Available
1939-40	1,494	797	697
1949-50	2,659	1,355	1,304
1959-60	3,640	2,181	1,459
1964-65	5,280	3,468	1,812
1965-66	5,921	3,970	1,951
1966-67	6,390	4,349	2,041
1967-68	6,912	4,816	2,096
1968-69	7,513	5,431	2,082
1969-70	8,005	5,897	2,108
1970-71	8,581	6,428	2,153
1971-72	8,949	6,805	2,144
1972-73	9,215	7,071	2,144
1973-74	9,602	7,420	2,182
1974-75	10,224	7,989	2,235
1975-76	11,185	8,835	2,350
1976-77	11,012	8,653	2,359
1977-78	11,286	8,847	2,439
1978-79	11,260	8,786	2,474
1979-80	11,570	9,037	2,533
1980-81	12,097	9,457	2,640
1981-82	12,372	9,647	2,725
1982-83	12,426	9,696	2,730
1983-84	12,465	9,683	2,782
1984-85	12,242	9,477	2,765
1985-86	12,247	9,479	2,768
1986-87	12,504	9,714	2,790
1987-88	12,767	9,974	2,793
1988-89	13,055	10,161	2,894
1989-90	13,539	10,578	2,961
1990-91	13,819	10,845	2,974
1991-92	14,359	11,310	3,049
1992-93	14,487	11,386	3,103
1993-94	14,305	11,189	3,116
1994-95	14,279	11,134	3,145

National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 3.

Appendix B – Total Expenditures of Public and Private Colleges and Universities: 1929-30 to 1996-97 (In millions of current dollars)

Academic Year	Total	Public	Private
1929-30	$632	$292	$340
1939-40	758	392	366
1949-50	2,662	1,430	1,232
1951-52	2,874	1,565	1,309
1953-54	3,414	1,912	1,502
1955-56	4,180	2,348	1,832
1957-58	5,530	3,237	2,293
1959-60	7,147	3,904	3,244
1961-62	8,830	4,919	3,911
1963-64	11,615	6,558	5,057
1965-66	15,634	9,047	6,588
1967-68	20,575	12,570	7,824
1969-70	25,276	16,234	9,041
1970-71	27,541	18,028	9,513
1971-72	29,722	19,538	10,184
1972-73	31,923	21,144	10,779
1973-74	35,026	23,542	11,484
1974-75	39,818	26,966	12,852
1975-76	43,605	29,736	13,869
1976-77	47,223	31,997	15,226
1977-78	50,498	34,031	16,467
1978-79	55,296	37,110	18,187
1979-80	62,465	41,434	21,031
1980-81	70,524	46,559	23,965
1981-82	77,315	50,813	26,502
1982-83	83,356	54,338	29,018
1983-84	89,597	58,124	31,473
1984-85	98,257	63,705	34,553
1985-86	107,685	70,069	37,616
1986-87	116,774	74,552	42,222
1987-88	125,376	79,859	45,516
1988-89	137,506	87,107	50,398
1989-90	150,555	96,387	54,169
1990-91	163,722	104,433	59,288
1991-92	171,732	108,667	63,065
1992-93	181,735	115,169	66,566
1993-94	189,730	119,573	70,157
1994-95	189,100	119,300	69,800

National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 32.

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Appendix C – Major College Costs in Constant Dollars (Converted to 1964 Prices): 1928-1964

Academic Year	Public Institutions (In State) (1)			Public Institutions (Out of State) (1)			Private Institutions (2)		
	Tuition & Fees	Room & Board	Total	Tuition & Fees	Room & Board	Total	Tuition & Fees	Room & Board	Total
1928	$168	$651	$819	$267	$651	$918	$449	$798	$1,247
1932	257	878	1,135	429	878	1,307	716	1,087	1,703
1936	268	741	1,009	471	741	1,212	696	944	1,640
1940	282	798	1,080	504	798	1,302	746	949	1,695
1948	189	615	804	390	615	1,005	574	699	1,273
1952	196	664	860	424	64	1,088	724	731	1,455
1956	215	682	897	475	682	1,157	731	752	1,483
1960	260	725	985	590	725	1,315	942	807	1,749
1964	294	751	1,044	960	752	1,442	1,200	849	2,049
Change (in percent) 1928-64	+75	+15	+27	+159	+15	+57	+167	+6	+64
Change (in percent) 1932-64	+14	-14	-8	+61	-14	+10	+68	-22	+20

1. Includes 20 large and 12 small public institutions that have reported student data cost data in each edition of *American Universities and Colleges* since 1928.
2. Includes 99 private institutions regularly reporting student cost data, in the following categories: 14 large universities, 14 medium-size universities, 30 coeducational liberal arts colleges, 20 men's colleges and 21 women's colleges.

The Economics of Higher Education, 1966, p.7

Appendix D – Percentage of Higher Education Revenue, By Source, for Selected Academic Years: 1939-93

Academic Year	Gross Tuition Paid by Students	Federal Government Appropriations	State Government Appropriations	Endowment Earnings & Gifts
1939-40	38%	07%	34%	21%
1949-50	40%	12%	32%	12%
1959-60	26%	23%	34%	13%
1965-66	26%	25%	33%	09%
1969-70	25%	22%	38%	08%
1975-76	26%	20%	43%	08%
1979-80	26%	19%	43%	09%
1985-86	29%	16%	41%	10%
1989-90	31%	16%	37%	10%
1991-92	34%	16%	35%	10%
1992-93	35%	16%	33%	10%

Note: Both veteran's educational benefits and Social Security benefits paid to qualified college students are not included in the federal column. In addition, the federal column represents direct appropriations to the institutions and does not include federal financial aid programs.

McPherson and Schapiro, 1997, p.558

Appendix E – Enrollment Rates of 18-to-24 Year Olds: 1967 – 1996

Year	Enrollment as a Percentage of 18-to-24 Year Olds	Enrollment as a Percentage of High School Graduates
1967	25.5	33.7
1968	26.0	34.2
1969	27.3	35.0
1970	25.7	32.7
1971	26.2	33.2
1972	25.5	31.1
1973	24.0	28.9
1974	24.6	29.8
1975	26.3	31.4
1976	26.7	32.3
1977	26.1	31.4
1978	25.3	30.0
1979	25.0	29.9
1980	25.7	30.5
1981	26.2	31.3
1982	26.6	31.6
1983	26.2	31.3
1984	27.1	31.8
1985	27.8	32.5
1986	27.9	32.7
1987	29.7	35.4
1988	30.2	36.0
1989	30.9	36.5
1990	32.1	37.7
1991	33.3	39.3
1992	34.4	42.0
1993	34.0	41.6
1994	34.6	42.3
1995	34.3	42.3
1996	35.5	43.4

National Center for Education Statistics, *Digest of Education Statistics 1997*, Table 186.

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Appendix F – Average Tuition and Fees 1971-72 to 1998-99 (In Constant Dollars)

Academic Year	Private Four Year	Public Four Year	Public Two Year
1971-72	7,218	1,491	761
1972-73	7,236	1,552	888
1973-74	6,962	1,533	959
1974-75	6,671	1,361	873
1975-76	6,686	1,274	721
1976-77	7,046	1,716	787
1977-78	7,035	1,707	797
1978-79	7,047	1,639	779
1979-80	6,780	1,551	746
1980-81	6,814	1,515	737
1981-82	7,133	1,576	753
1982-83	7,714	1,714	786
1983-84	8,166	1,841	847
1984-85	8,573	1,895	901
1985-86	9,180	1,977	961
1986-87	9,769	2,075	968
1987-88	9,929	2,092	1,041
1988-89	10,778	2,125	1,076
1989-90	11,134	2,180	1,081
1990-91	11,382	2,325	1,077
1991-92	11,586	2,488	1,207
1992-93	11,965	2,673	1,278
1993-94	12,285	2,829	1,390
1994-95	12,716	2,935	1,421
1995-96	12,904	2,969	1,405
1996-97	13,345	3,055	1,505
1997-98	13,909	3,139	1,581
1998-99	14,508	3,243	1,633

The College Board, 1998, Table 5

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Appendix G – Federally Supported Student Financial Aid Spending: 1963-64 to 1988-89 (in Constant 1988 Dollars)

| Academic Year | Federal Student Financial Aid Programs (in millions) | | | | | |
	Pell Grant	Supplemental Education Opportunity Grants	College Work-Study	Guaranteed Student Loans	Other	Total
1963-64	0	0	0	0	441	441
1970-71	0	409	692	3,095	734	4,930
1975-76	2,060	442	649	2,786	1,053	6,990
1977-78	3,100	476	916	3,391	1,316	9,199
1979-80	4,082	543	970	6,397	1,176	13,168
1980-81	3,427	528	948	8,901	1,110	14,914
1981-82	2,992	471	812	9,305	949	14,529
1982-83	2,964	420	754	7,965	1,068	13,171
1983-84	3,316	429	811	8,623	1,258	14,437
1984-85	3,453	426	734	9,272	1,388	15,273
1985-86	3,922	451	721	9,156	1,418	15,668
1986-87	3,716	432	679	8,991	1,733	15,551
1987-88	3,894	436	661	9,482	3,296	17,769
1988-89	4,460	393	706	9,168	3,642	18,369

Note: Other includes amounts of student aid awarded under the State Student Incentive Grants Program, Supplemental Loans for Students, and Parent Loans for Undergraduate Students. The Total Column does not include specially directed aid such as Social Security or Veterans benefits.

Clotfelter, 1991, p.99.

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Appendix H-1 Sample of Four-Year Colleges for Research Study

Type of Postsecondary Education Institution:
State – Four-year public universities
Private – R – Private four-year universities that have a religious affiliation
Private – NR – Private four-year universities that do not have a religious affiliation

Four-Year Schools by State	Type of Institution	Undergraduate Enrollment
Alabama		
Auburn University	State	18396
University of Alabama, Tuscaloosa	State	14087
Samford University	Private - R	2918
Miles College	Private - R	1234
Tuskegee University	Private - NR	2875
Talladega College	Private - NR	642
Alaska		
University of Alaska, Anchorage	State	12397
University of Alaska, Fairbanks	State	5197
Alaska Pacific University	Private - R	261
Sheldon Jackson College	Private - R	223
No private non-religious college	————	————
Arizona		
Arizona State University	State	30680
University of Arizona	State	25293
Grand Canyon University	Private - R	2119
Southwestern College	Private - R	185
Embry-Riddle Aeronautical University	Private - NR	1435
Prescott College	Private - NR	398
Arkansas		
University of Arkansas	State	11991
Arkansas State University	State	8762
Harding University	Private - R	3540
Ouachita Baptist University	Private - R	1604
No private non-religious college	————	————
California		
University of California, L.A.	State	23914
San Diego State University	State	23847
University of San Diego	Private - R	4299
Santa Clara University	Private - R	4230
Stanford University	Private - NR	6550
University of Southern California	Private - NR	14631
Colorado		
University of Colorado, Boulder	State	19845

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Colorado State University	State	18451
Colorado Christian University	Private - R	2641
Regis University	Private - R	1160
University of Denver	Private - NR	2949
The Colorado College	Private - NR	2052
Connecticut		
University of Connecticut, Storrs	State	11336
Central Connecticut State University	State	7798
Fairfield University	Private - R	3100
Sacred Heart University	Private - R	2122
Yale University	Private - NR	5401
University of Hartford	Private - NR	5354
Delaware		
University of Delaware	State	14829
Delaware State University	State	3030
Wesley College	Private - R	1,325
Wilmington College	Private - NR	2500
Goldey-Beacom College	Private - NR	1,480
District of Columbia		
University of the District of Columbia	State	7,113
Georgetown University	Private - R	6,338
American University	Private - R	5,040
Howard University	Private - NR	7,668
George Washington University	Private - NR	6,581
Florida		
University of Florida	State	30,711
University of South Florida	State	24,313
Barry University	Private - R	4,773
Bethune-Cookman College	Private - R	2,335
University of Miami	Private - NR	8,377
Embry-Riddle Aeronautical University	Private - NR	3,930
Georgia		
University of Georgia	State	22,946
Georgia State University	State	16,320
Emory University	Private - R	5,400
Mercer University	Private - R	4,175
Morehouse College	Private - NR	2,929
Savannah College of Art and Design	Private - NR	2,672
Hawaii		
University of Hawaii, Manoa	State	12,216
University of Hawaii, Hilo	State	2,870
Brigham Young University, Hawaii Campus	Private - R	2,287
Chaminade University of Honolulu	Private - R	2,098
Hawaii Pacific University	Private - NR	7,158
Idaho		
Boise State University	State	13,154
Idaho State University	State	10,126

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Northwest Nazarene College	Private - R	1,118
Boise Bible College	Private - R	113
Albertson College of Idaho	Private - NR	651
Illinois		
University of Illinois, Urbana	State	26,738
Southern Illinois University at Carbondale	State	17,725
Depaul University	Private - R	10,438
Loyola University Chicago	Private - R	7,669
Northwestern University	Private - NR	7,645
Columbia College	Private - NR	7,510
Indiana		
Purdue University	State	28,567
Indiana University Bloomington	State	25,451
University of Notre Dame	Private - R	7,700
Indiana Wesleyan University	Private - R	3,899
Butler University	Private - NR	3,165
Taylor University	Private - NR	1,866
Iowa		
Iowa State U of Science & Tech	State	20,503
The Unversity of Iowa	State	16,566
St. Ambrose University	Private - R	1,820
Luther College	Private - R	2,409
Drake University	Private - NR	3,630
Upper Iowa University	Private - NR	630
Kansas		
University of Kansas	State	18,652
Kansas State University	State	16,935
Kansas Newman College	Private - R	1,930
Baker University	Private - R	1,439
Friends University	Private - NR	846
Kentucky		
University of Kentucky	State	17,036
University of Louisville	State	14,798
Bellarmine College	Private - R	1,764
Cumberland College	Private - R	1,517
Berea College	Private - NR	1,524
Centre College	Private - NR	968
Louisiana		
Louisiana State University	State	21,413
University of Southwestern Louisiana	State	15,281
Loyola University, New Orleans	Private - R	3,375
Xavier University of Louisiana	Private - R	2,624
Tulane University	Private - NR	6,402
Maine		
University of Southern Maine	State	8,055
University of Maine	State	7,850
Saint Joseph's College	Private - R	1,105

Colby College	Private - NR	1,764
Husson College	Private - NR	1,717
Maryland		
University of Maryland, University College	State	23,758
Towson State University	State	13,063
Vincennes University	Private - R	
College of Notre Dame of Maryland	Private - R	2,519
Johns Hopkins University	Private - NR	3,606
Villa Julie College	Private - NR	1,844
Massachusetts		
University of Mass, Amherst	State	18,209
University of Mass, Lowell	State	6,500
Boston College	Private - R	8,958
Merrimack College	Private - R	2,804
Northeastern University	Private - NR	19,780
Boston University	Private - NR	15,414
Michigan		
Michigan State University	State	32,318
University of Michigan, Ann Arbor	State	23,590
University of Detroit Mercy	Private - R	4,484
Calvin College	Private - R	3,993
Baker College of Flint	Private - NR	4,039
Lawrence Technological University	Private - NR	3,310
Minnesota		
University of Minnesota, Twin Cities	State	23,689
St. Cloud State University	State	12,958
University of St. Thomas	Private - R	5,066
Concordia College	Private - R	1,255
Minneapolis College of Art and Design	Private - NR	541
Carleton College	Private - NR	1,698
Mississippi		
Mississippi State University	State	11,548
University of Southern Mississippi	State	10,230
Mississippi College	Private - R	2,092
William Carey College	Private - R	1,902
No private non-religious college	———	———
Missouri		
University of Missouri, Columbia	State	17,165
Southwest Missouri State University	State	7,400
Lindenwood College	Private - R	2,891
St. Louis University	Private - R	6,038
Washington University	Private - NR	5,443
Webster University	Private - NR	3,784
Montana		
Montana State University, Bozeman	State	10,462
The University of Montana, Missoula	State	9,853
Carroll College	Private - R	1,352

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University of Great Falls	Private - R	1,147
No private non-religious college	——	——
Nebraska		
University of Nebraska, Lincoln	State	18,954
University of Nebraska, Omaha	State	12,221
Creighton University	Private - R	3,679
Nebraska Wesleyan University	Private - R	1,562
Bellevue University	Private - NR	2,205
Clarkson College	Private - NR	362
Nevada		
University of Nevada, Las Vegas	State	15,313
University of Nevada, Reno	State	8,558
No private religious college	——	——
Sierra Nevada College	Private - NR	600
New Hampshire		
University of New Hampshire	State	10,649
Keene State College	State	3,924
Saint Anselm College	Private - R	1,928
Rivier College	Private - R	1,726
Dartmouth College	Private - NR	4,285
Franklin Pierce College	Private - NR	1,327
New Jersey		
Kean College of New Jersey	State	9,134
Rutgers, State Univ of NJ, Rutgers College	State	10,317
Saint Peter's College	Private - R	3,437
Seton Hall University	Private - R	4,717
Princeton University	Private - NR	4,593
Fairleigh Dickinson University	Private - NR	3,934
New Mexico		
University of New Mexico	State	15,056
New Mexico State University	State	11,872
No private religious college	——	——
College of Santa Fe	Private - NR	1,290
College of the Southwest	Private - NR	538
New York		
State U of NY at Buffalo	State	15,571
Queens College of the City Univ of NY	State	13,442
St. John's University	Private - R	12,108
Fordham University	Private - R	5,822
U of the State of NY, Regents College	Private - NR	18,432
New York University	Private - NR	17,063
North Carolina		
North Carolina State University	State	18,965
University of North Carolina, Chapel Hill	State	15,363
Duke University	Private - R	6,326
Campbell University	Private - R	5,832
Johnson C. Smith University	Private - NR	1,427

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North Dakota		
University of North Dakota	State	9,351
North Dakota State University	State	8,627
University of Mary	Private - R	1,718
Jamestown College	Private - R	1,094
Medcenter One College of Nursing	Private - NR	83
Ohio		
Ohio State University	State	35,486
University of Akron	State	20,037
Baldwin Wallace College	Private - R	4,028
University of Dayton	Private - R	6,511
Franklin University	Private - NR	3,669
Case Western Reserve University	Private - NR	3,679
Oklahoma		
University of Oklahoma	State	15,732
Oklahoma State University	State	14,640
Oral Roberts University	Private - R	3,001
University of Tulsa	Private - R	2,945
No private non-religious college	———	———
Oregon		
University of Oregon	State	13,874
Oregon State University	State	11,096
University of Portland	Private - R	2,078
Willamette University	Private - R	1,727
Lewis & Clark College	Private - NR	1,842
Reed College	Private - NR	1,306
Pennsylvania		
Penn State University, Park Campus	State	33,163
Temple University	State	16,982
Duquesne University	Private - R	5,751
Villanova University	Private - R	6,771
University of Pennsylvania	Private - NR	11,024
Drexel University	Private - NR	6,805
Rhode Island		
University of Rhode Island	State	10,136
Rhode Island College	State	6,331
Salve Regina University	Private - R	1,433
Providence College	Private - R	3,589
Johnson & Wales University	Private - NR	7,266
Brown University	Private - NR	5,963
South Carolina		
University of South Carolina	State	15,747
Clemson University	State	12,717
Charleston Southern University	Private - R	2,060
Benedict College	Private - R	2,138
Furman University	Private - NR	2,461
Johnson & Wales University	Private - NR	1,246

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South Dakota		
South Dakota State University	State	7,356
University of South Dakota	State	5,215
Augustana College	Private - R	1,589
Mount Marty College	Private - R	895
Sinte Gleska University	Private - NR	653
Tennessee		
University of Tennessee, Knoxville	State	18,825
Middle Tennessee State University	State	15,890
Belmont University	Private - R	2,553
Lee College	Private - R	2,477
Vanderbilt University	Private - NR	5,877
Lincoln Memorial University	Private - NR	1,581
Texas		
University of Texas, Austin	State	35,789
Texas A & M University	State	34,342
Texas Christian University	Private - R	5,810
Baylor University	Private - R	10,500
Rice University	Private - NR	2,631
Northwood University, Texas Campus	Private - NR	354
Utah		
University of Utah	State	19,979
Utah State University	State	16,703
Brigham Young University	Private - R	27,706
Westminster College of Salt Lake	Private - NR	1,492
Vermont		
University of Vermont	State	7,375
Castleton State College	State	1,494
Saint Michael's College	Private - R	1,817
Trinity College of Vermont	Private - R	913
Champlain College	Private - NR	2,127
Middlebury College	Private - NR	2,097
Virginia		
Virginia Polytechnic Institute & State U	State	20,525
George Mason University	State	13,832
Liberty University	Private - R	5,314
University of Richmond	Private - R	3,586
Hampton University	Private - NR	5,711
Washington and Lee University	Private - NR	1,645
Washington		
University of Washington	State	25,228
Washington State University	State	16,686
Seattle University	Private - R	3,272
Pacific Lutheran University	Private - R	3,087
University of Puget Sound	Private - NR	2,768
City University	Private - NR	4,314
West Virginia		

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West Virginia University	State	14,897
Marshall University	State	10,876
West Virginia Wesleyan College	Private - R	1,531
Wheeling Jesuit College	Private - R	1,313
The College of West Virginia	Private - NR	1,983
The University of Charleston	Private - NR	1,376
Wisconsin		
University of Wisconsin – Madison	State	26,910
University of Wisconsin – Milwaukee	State	15,272
Marquette University	Private - R	7,474
Cardinal Stritch College	Private - R	3,161
Milwaukee School of Engineering	Private - NR	2,537
Beloit College	Private - NR	1,271
Wyoming		
University of Wyoming	State	8,820
No private religious college	————	————
No private non-religious college	————	————

Source: Peterson's Four-Year Colleges, 1998

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Appendix H-2 Sample of Two-Year Institutions for Research Study

Two–Year Colleges by State	Type of Institution	Enrollment
Alabama		
John C. Calhoun State Community College	Two-Year	7,278
Southern Union State Community College	Two-Year	6,499
Alaska		
U of A, Anchorage, Kenai Pen. College	Two-Year	1,813
U of A, Prince William Sound Comm. Coll.	Two-Year	1,508
Arizona		
Pima Community College	Two-Year	27,960
Mesa Community College	Two-Year	23,108
Arkansas		
Westark Community College	Two-Year	5,432
Phillips Comm College of the U. of Arkansas	Two-Year	2,287
California		
Santa Rosa Junior College	Two-Year	27,885
Long Beach City College	Two-Year	25,100
Colorado		
Community College of Denver	Two-Year	11,897
Front Range Community College	Two-Year	11,027
Connecticut		
Manchester Community Tech. College	Two-Year	5,400
Norwalk Community-Technical College	Two-Year	5,357
Delaware		
Delaware Tech & Comm, Stanton/Willmington	Two-Year	6,706
Delaware Tech & Comm, Jack F Owens	Two-Year	3,221
Florida		
Miami-Dade Community College	Two-Year	51,019
Broward Community College	Two-Year	25,273
Georgia		
DeKalb College	Two-Year	15,690
DeKalb Technical Institution	Two-Year	4,347
Hawaii		
University of Hawaii, Kapiolani Comm. Coll.	Two-Year	7,283
University of Hawaii, Leeward Comm. Coll.	Two-Year	5,987
Idaho		
College of Southern Idaho	Two-Year	5,502
North Idaho College	Two-Year	3,644
Illinois		
College of DuPage	Two-Year	33,920
Belleville Area College	Two-Year	14,646
Indiana		
Vincennes University	Two-Year	6,500

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Ivy Tech State College - Central Indiana	Two-Year	5,355
Iowa		
Kirkwood Community College	Two-Year	10,594
Des Moines Area Community College	Two-Year	10,287
Kansas		
Johnson County Community College	Two-Year	15,073
Barton County Community College	Two-Year	10,000
Kentucky		
U of K, Jefferson Community College	Two-Year	9,273
U of K, Lexington Community College	Two-Year	5,505
Louisiana		
Delgado Community College	Two-Year	14,112
Bossier Parish Community College	Two-Year	4,706
Maine		
University of Maine, Augusta	Two-Year	3,589
Southern Maine Technical College	Two-Year	2,412
Maryland		
Montgomery College, Rockville Campus	Two-Year	13,144
Anne Arundel Community College	Two-Year	11,278
Massachusetts		
Springfield Technical Community College	Two-Year	6,211
Middlesex Community College	Two-Year	5,945
Michigan		
Oakland Community College	Two-Year	24,941
Macomb Community College	Two-Year	24,500
Minnesota		
Normandale Community College	Two-Year	7,365
Century Community and Technical College	Two-Year	7,000
Mississippi		
Hinds Community College	Two-Year	10,726
Mississippi Gulf Coast Community College	Two-Year	9,687
Missouri		
St. Louis Community College, Meramec	Two-Year	13,570
St. Louis Community College, Forest Park	Two-Year	8,197
Montana		
Flathead Valley Community College	Two-Year	1,142
Montana State U Coll of Tech - Great Falls	Two-Year	1,020
Nebraska		
Metropolitan Community College	Two-Year	10,759
Southeast Community College, Lincoln	Two-Year	5,305
Nevada		
Community College of Southern Nevada	Two-Year	24,678
Truckee Meadows Community College	Two-Year	9,338
New Hampshire		
New Hampshire Technical Institute	Two-Year	1,453
New Hampshire Comm Tech College, Nashua	Two-Year	1,035
New Jersey		

Camden County College	Two-Year	12,669
Bergen Community College	Two-Year	12,296
New Mexico		
Albuquerque Technical Vocational Inst.	Two-Year	15,555
San Juan College	Two-Year	4,231
New York		
Nassau Community College	Two-Year	20,620
Borough of Manhattan C.C of City U of NY	Two-Year	16,186
North Carolina		
Central Peidmont Community College	Two-Year	15,420
Wake Technical Community College	Two-Year	7,330
North Dakota		
North Dakota State College of Science	Two-Year	2,581
Bismarck State College	Two-Year	2,406
Ohio		
Sinclair Community College	Two-Year	19,360
Cuyahoga Comm College Western Campus	Two-Year	11,207
Oklahoma		
Tulsa Community College	Two-Year	20,000
Oklahoma City Community College	Two-Year	10,215
Oregon		
Portland Community College	Two-Year	27,594
Chemeketa Community College	Two-Year	9,003
Pennsylvania		
Community College of Philadelphia	Two-Year	18,713
Community College of Allegheny	Two-Year	
Rhode Island		
Community College of Rhode Island	Two-Year	11,717
New England Institute of Technology	Two-Year	2,200
South Carolina		
Midlands Technical College	Two-Year	9,728
Trident Technical College	Two-Year	9,079
South Dakota		
Southeast Technical Institute	Two-Year	2,830
Lake Area Technical Institute	Two-Year	1,044
Tennessee		
State Technical Institute of Memphis	Two-Year	10,195
Chattanooga State Technical Comm Coll	Two-Year	9,335
Texas		
Houston Community College System	Two-Year	35,585
Austin Community College	Two-Year	26,000
Utah		
Salt Lake Community College	Two-Year	21,348
Utah Valley State College	Two-Year	14,756
Vermont		
Community College of Vermont	Two-Year	3,907
Vermont Technical College	Two-Year	848

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Virginia		
Northern Virginia Community College	Two-Year	37,307
Tidewater Community College	Two-Year	16,199
Washington		
North Seattle Community College	Two-Year	15,387
Olympic College	Two-Year	12,038
West Virginia		
West Virginia University at Parkersburg	Two-Year	3,439
Southern West Virginia Comm & Tech College	Two-Year	3,014
Wisconsin		
Milwaukee Area Technical College	Two-Year	23,099
Madison Area Technical College	Two-Year	19,050
Wyoming		
Laramie County Community College	Two-Year	4,282
Casper College	Two-Year	3,960

Source: Peterson's Two-Year Colleges, 1998

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Appendix I – Comparison of Undergraduate Enrollment at Sample Colleges to Total Undergraduate Enrollment by State, 1997-98

State	Undergraduate Enrollment at Sample Colleges	Total Undergraduate Enrollment	Sample Undergraduate Enrollment / Total Undergraduate Enrollment
Alabama	55,995	219,000	0.2557
Alaska	23,012	29,000	0.7935
Arizona	111,574	277,000	0.4028
Arkansas	32,613	101,000	0.3229
California	121,928	1,883,000	0.0648
Colorado	69,513	243,000	0.2861
Connecticut	45,715	155,000	0.2949
Delaware	33,433	45,000	0.7430
District of Columbia	34,523	74,000	0.4665
Florida	148,882	641,000	0.2323
Georgia	75,524	318,000	0.2375
Hawaii	40,444	61,000	0.6630
Idaho	31,627	60,000	0.5271
Illinois	127,404	721,000	0.1767
Indiana	82,039	286,000	0.2868
Iowa	71,027	177,000	0.4013
Kansas	65,633	172,000	0.3816
Kentucky	52,954	178,000	0.2975
Louisiana	67,141	204,000	0.3291
Maine	28,049	56,000	0.5009
Maryland	67,044	261,000	0.2569
Massachusetts	86,453	410,000	0.2109
Michigan	121,542	547,000	0.2222
Minnesota	52756	275,000	0.1918
Mississippi	45,448	126,000	0.3607
Missouri	70,104	291,000	0.2409
Montana	24,786	43,000	0.5764
Nebraska	54,686	119,000	0.4595
Nevada	52,847	73,000	0.7239
New Hampshire	25,719	64,000	0.4019
New Jersey	62,329	328,000	0.1900
New Mexico	49,173	104,000	0.4728
New York	122,944	1,028,000	0.1196
North Carolina	74,651	373,000	0.2001
North Dakota	25,838	41,000	0.6302
Ohio	106,209	538,000	0.1974
Oklahoma	67,690	177,000	0.3824
Oregon	64,487	165,000	0.3908

Pennsylvania	104,191	622,000	0.1675
Rhode Island	50,873	72,000	0.7066
South Carolina	54,986	174,000	0.3160
South Dakota	20,505	35,000	0.5859
Tennessee	65,886	247,000	0.2667
Texas	153,465	955,000	0.1607
Utah	99,414	152,000	0.6540
Vermont	19,887	35,000	0.5682
Virginia	103,840	354,000	0.2933
Washington	69,448	292,000	0.2378
West Virginia	38,197	86,000	0.4442
Wisconsin	97,627	299,000	0.3265
Wyoming	16,762	31,000	0.5407
United States	3,388,817	14,217,000	0.2384

Source: Peterson's Four-Year Colleges, Peterson's Two-Year Colleges, and U.S. Bureau of the Census, Statistical Abstract of the United States, 1998.

Appendix J – List of States by College Board Regions

Southwest	Midwest
Arkansas	Illinois
New Mexico	Indiana
Oklahoma	Iowa
Texas	Kansas
	Michigan
South	Minnesota
Alabama	Missouri
Florida	Nebraska
Georgia	North Dakota
Kentucky	Ohio
Louisiana	South Dakota
Mississippi	West Virginia
North Carolina	Wisconsin
South Carolina	
Tennessee	**Middle States**
Virginia	Delaware
	District of Columbia
West	Maryland
Alaska	New Jersey
California	New York
Colorado	Pennsylvania
Hawaii	
Idaho	**New England**
Montana	Connecticut
Nevada	Maine
Oregon	Massachusetts
Utah	New Hampshire
Washington	Rhode Island
	Vermont

Source: "Trends in College Pricing," The College Board, 1998

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Appendix K – Mean Tuition Figures for Two-Year Public Colleges, Four-Year Public Universities, Four-Year Private Colleges, and the Combined Four-Year Universities in 1998 Constant Dollars

Figure 23 – Mean Tuition of Two-Year Colleges by Year in 1998 Constant Dollars

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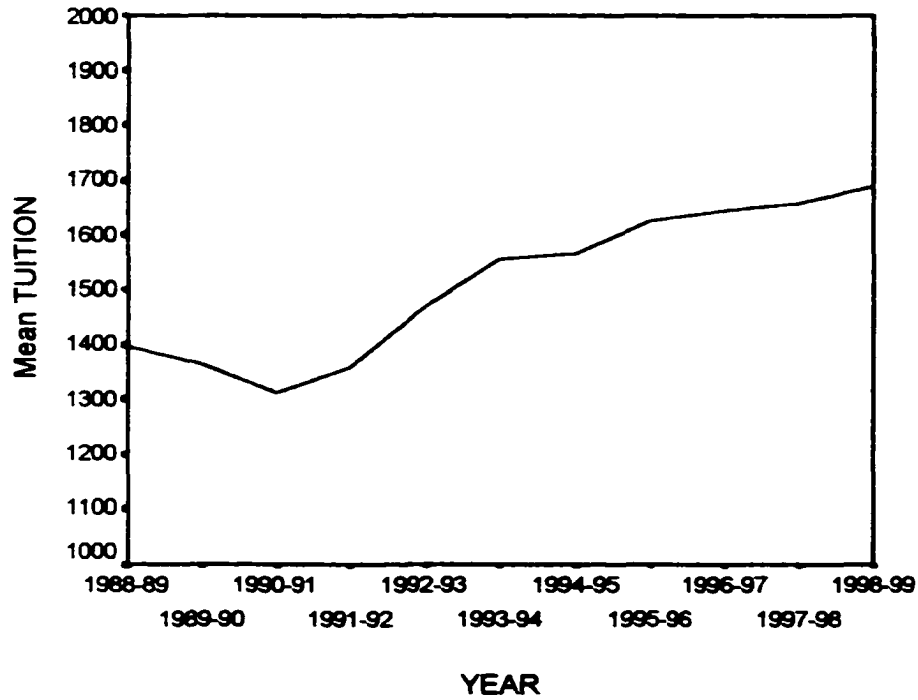
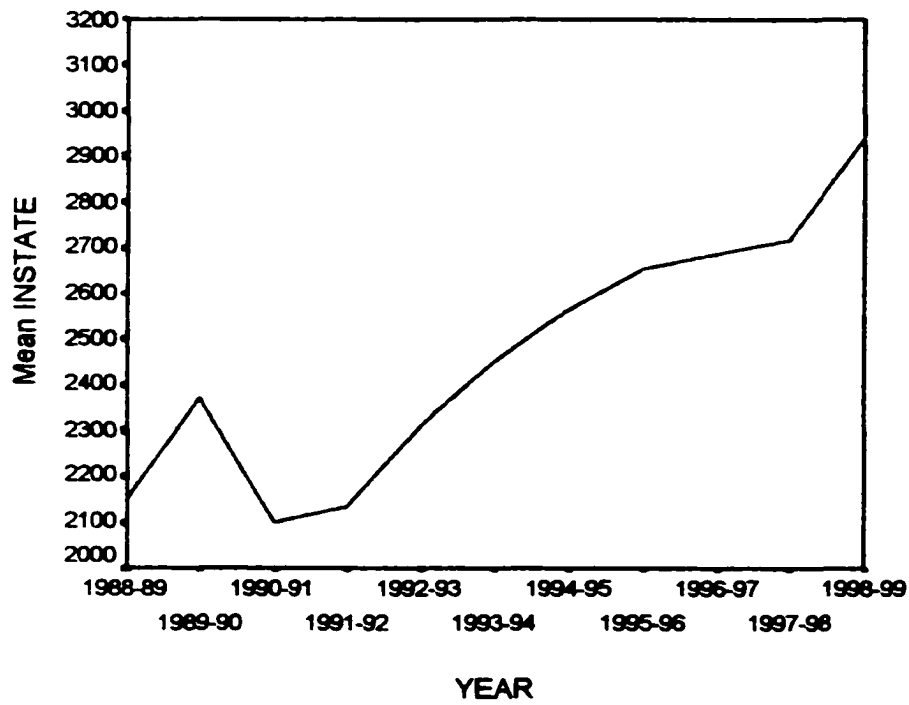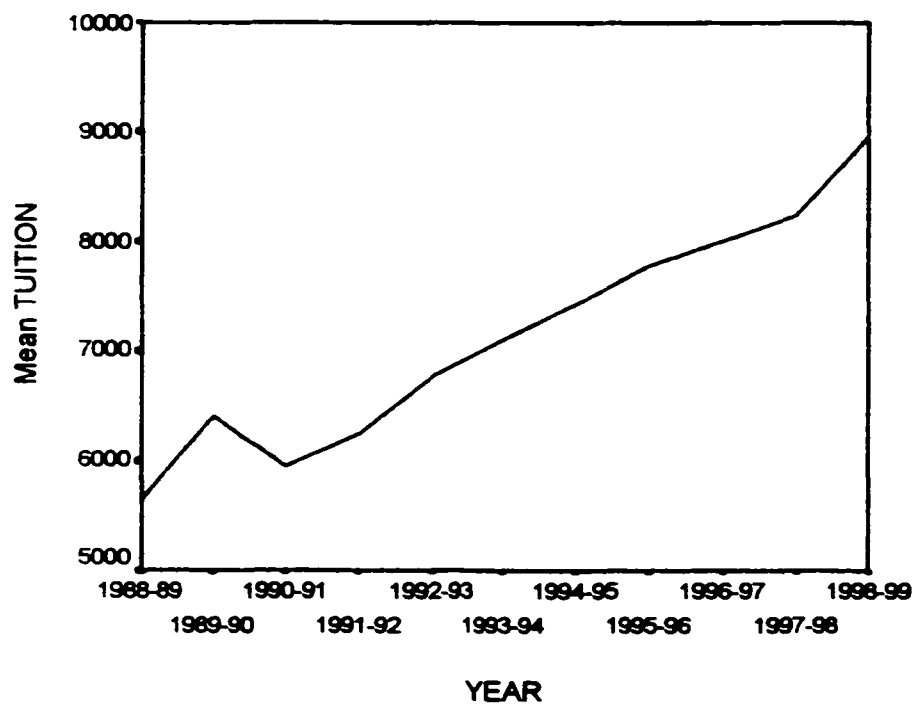**Figure 24 – Mean In-State Tuition of Public Four-Year Universities by Year in 1998 Constant Dollars**

YEAR

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Figure 25 – Mean Non-Resident Tuition of Four-Year Public Universities by Year in 1998 Constant Dollars
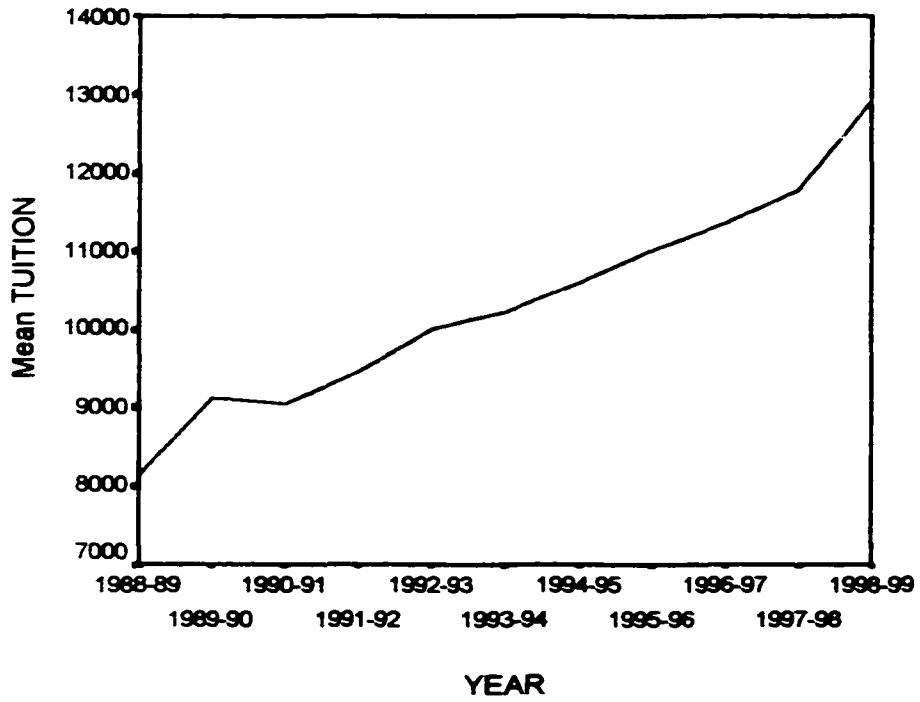

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Figure 26 – Mean Tuition of Private Religious Colleges by Year in 1998 Constant Dollars

Figure 27 – Mean Tuition of Private Non-Religious Colleges by Year in 1998 Constant Dollars
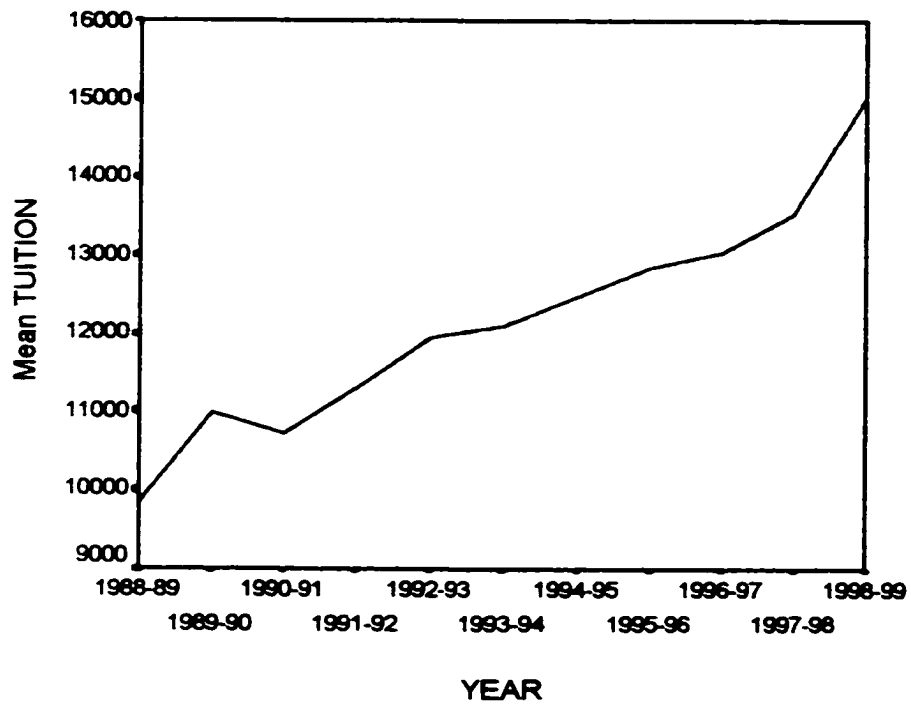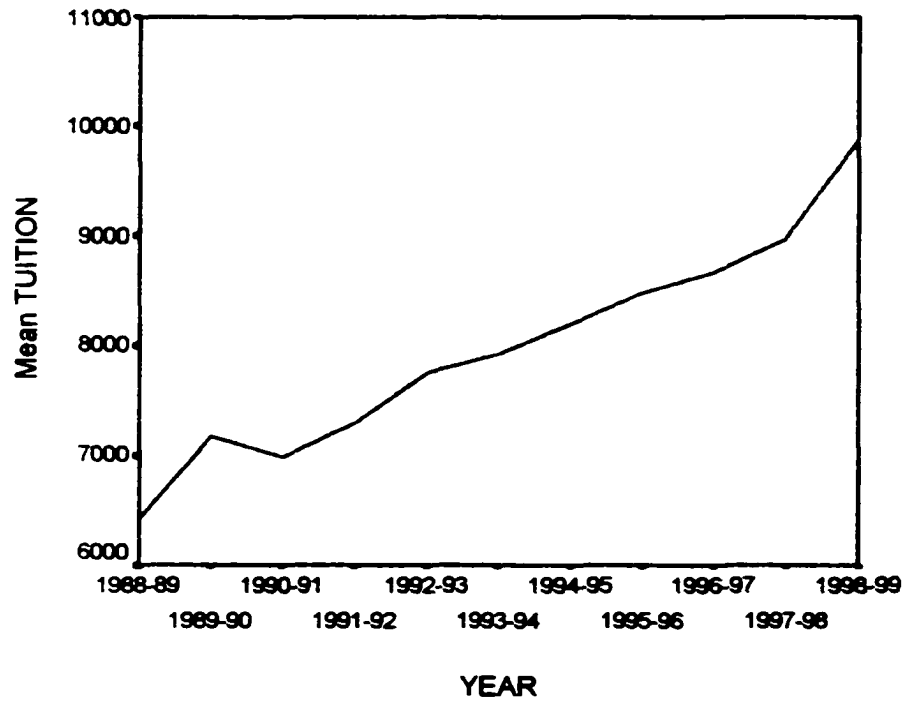

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Figure 28 – Mean Tuition of Four-Year Combined Sample of Colleges by Year in 1998 Constant Dollars

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VITA

Marilyn Young was born in Nashville, TN on August 23, 1968. She attended elementary school and high school in Nashville. In 1986, she enrolled at the University of Alabama (Tuscaloosa). She graduated from the University of Alabama in December 1989 with a Bachelor of Science degree majoring in Accounting. The following year Marilyn entered the Master of Tax Accounting program at the University of Alabama, graduating in December 1990.

She worked in professional positions in both public and private accounting before entering the doctoral program at the E.H. Patterson School of Accountancy at the University of Mississippi in 1996. Marilyn received a Doctor of Philosophy in Accountancy in May 2000. She is a Certified Public Accountant.