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Predicting Community College Tuition and Enrollments and Simulating the Initial Effects of President Obama's American Graduation Initiative

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Abstract

This paper will identify the effects of supply and demand side factors on community college enrollment quantities and tuition prices and predict the initial effects of President Obama's American Graduation Initiative. This bill proposes $12 billion of government spending, through grants and financial aid, in order to increase the number of community college graduates by 5 million over the next ten years. Limitations regarding the endogeneity of government appropriations prevents the forecasting of government funding increases; however, the model predicts that financial aid increases from the American Graduation Initiative will increase community college enrollments by over half a million.

Keywords

Community college, Higher Education Policy

Cover Page Footnote

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CHAPTER ONE

INTRODUCTION

> Now is the time to build a firmer, stronger foundation for growth that will not only withstand future economic storms, but one that helps us thrive and compete in a global economy. It's time to reform our community colleges so that they provide Americans of all ages a chance to learn the skills and knowledge necessary to compete for the jobs of the future. (Obama, 2009)

A. Introduction

Determined to maintain United States' leadership in an increasingly competitive global economy, President Obama recently announced the *American Graduation Initiative*, a combination of federal funding to schools and financial aid to students, aimed at increasing community college enrollments by 5 million over the next decade. The initiative will provide extra funding to community colleges so that they can expand their academic services to attract more students and encourage completion of those enrolled. The plan will also increase the maximum Pell grant and education tax credits, in order to ease financial pressures on students. By shifting both the supply and demand curves, the community college market should reach a new equilibrium that increases enrollment quantity without compromising the low-cost promise of these public colleges. This paper will predict the results of this initiative, forecasting the effects of the government spending on tuition and enrollment in the market for community colleges.

Community colleges have contributed to the US workforce significantly throughout the last century. The development of these public, two-year, degree-granting institutions can be categorized into waves, each one responding to contemporary community needs. The most significant expansions of US community colleges occurred as reactions to the Great Depression of the early 1930s, the return of soldiers after World War II in the mid 1940s, and the education equality movements of the 1960s. More recently, globalization has driven many out of the manufacturing industry and back to school in order to learn new trades or improve job skills, resulting in a growing dependence on community colleges. Today, community college students comprise nearly half of the undergraduate population (American Association of Community Colleges, 2010). These institutions promise to provide low-cost, open access to all high school graduates and are committed to providing flexible full-time and part-time class options in diverse and practical subject areas (Kane & Rouse, 1999).

The undeniable benefits of a community college education keep these schools in high demand. In a recent speech, President Obama reported that jobs that require an associate's degree are predicted to grow twice as fast as those that require a high school diploma in the coming years. Furthermore, Kane and Rouse (1998) find that associate's degree holders make an average salary that is 10% more than high school graduates. However, rising enrollments can present difficult issues for these schools, especially when restricted by tuition price ceilings. In order to accommodate the demand shift yet preserve the low-cost policy, supply must also increase, largely through government funding or more efficient provision.

The recent public policy initiative and the current US recession motivate this study. President Obama has outlined a plan to increase enrollments at community colleges by 5 million; however, recent experience shows that increased demand for enrollments causes stress on these institutions. In recent months, community colleges across the country have reported all-time high enrollment numbers, as new students register in hopes of learning improved job skills or even a new career. The New York Times reports that faced with capacity constraints, community colleges are renting extra facilities, adding parking lots, and providing late night classes (Goodnough, 2009). Many schools have started waiting lists, decreased course offerings, and increased tuition fees in order to manage finances. Recognizing the issues associated with increased enrollments, exemplified by the recent economy, Obama's proposal includes a multi-billion dollar plan to allow for a smooth expansion of these schools.

To identify the effects of *The American Graduation Initiative* on college enrollment quantity and tuition price, two reduced form equations are used. The estimated coefficients allow for prediction of the changes in enrollments and tuition from the proposed increases in education funding. Enrollments are modeled as a function of the average tuition of community colleges and the average public four-year university tuition in the state to account for substitution between community colleges and between community colleges and four-year universities. Enrollment also depends upon the average state income and the average financial aid issued which both address a student's ability to afford education. Unemployment rate is another independent variable, capturing the opportunity cost of education. Skill premium will measure the average salary gains from some college education compared to only a

high school degree, which will capture the marginal return to a community college education. Other independent variables include the shares of the state population that are white, have a bachelor's degree and live in urban areas, which will account for environmental differences between states. Finally, government appropriations will represent the supply of funding to these schools. The equation for tuition will be modeled with the same independent variables.

I find that the variable representing government appropriations in the model is endogenous and therefore must be excluded from the final regression. Results show that household income, average state community college tuition, average state four-year college tuition, unemployment rate, financial aid offered, the percentage of the state that is white, and the percentage of the state living in urban areas are all associated with increases in demand and therefore increases in tuition and enrollments. Variables representing skill premium and the percentage of the state with a bachelor's degree are associated with a decrease in demand and therefore a decrease in enrollments and tuition. Coefficients on financial aid show that a 1% increase in aid is associated with a 0.10% increase in tuition and a 0.02% increase in enrollments. When these estimates are applied to the proposed education initiative, enrollments are predicted to increase by 542,000 and tuition by $112.07 by the end of the plan in 2020.

This paper is divided into six chapters. The first introduces the motivation of the research and some background information on community colleges and the proposed government initiative. Chapter 2 reviews existing literature on government subsidies for education and determinants of the community college market. Chapter 3

explains the data and empirical model used for the analysis. Chapter 4 reveals the results of each regression and their significance. Chapter 5 uses regression estimates to predict the impact of government funding from the *American Graduation Initiative* on enrollments and tuition in the community college market. The final chapter summarizes the findings and draws final conclusions of the study.

CHAPTER TWO

LITERATURE REVIEW

This chapter discusses the purpose and optimality of government subsidy to education and provides an overview of the market for community colleges by examining previous literature on the variables important to enrollments and tuition prices.

A. The Case for Government Subsidy

In the face of a multi-billion dollar plan like the *American Graduation Initiative*, it is imperative that lawmakers and taxpayers alike recognize the social value of government spending on education. Basic public finance justifies government spending for schools by the positive externalities associated with education. Education is associated with positive market outcomes, such as economic growth and productivity, as well as non market outcomes like democratization and social equality (McMahon, 2006). Without public subsidy for education, individuals who undervalue schooling will underinvest in education, leading to dead weight loss in the form of lost tax revenue, criminal justice costs, healthcare costs and lack of civic participation (McMahon, 2006). While it is hard for individuals to see beyond the personal payoffs of education, McMahon (2006) estimates that 37% of the net returns from education are in the form of positive externalities.

So what then, is the optimal government subsidy? Gruber (2007) explains that government subsidies should be used to lower the average costs of firms associated with positive externalities. The ideal subsidy would equal the marginal benefit from increasing the supply of a good associated with a positive externality. The new

equilibrium will fall at a point where social marginal cost equals social marginal benefit.

Easton and Rockerbie (2008) explore government subsidy in the context of the imperfectly competitive market for public higher education in Canada, where a price ceiling for tuition is decided by state legislatures. This model is applicable to the monopolistically competitive community college market in the United States, since there are many firms in this market that generally offer similar products in terms of courses and degrees. However, there might be certain non-price differences among schools that influence a student's decision to attend a particular school. Distance from the student's home is a key differentiating factor for community colleges, since students typically commute. In this monopolistically competitive market, each community college has a degree of power to change tuition prices depending on its funding needs. Each school however, must follow guidelines set by the state legislature which restrict tuition prices in order to maintain the low-cost goal of public education (Long, 2004).

Easton and Rockerbie (2008) compare the downward sloping demand curve for higher education with the U-shaped average cost curve for Canadian universities. They depict a rightward shift of the demand curve from D to D', due to any number of exogenous variables, which in turn increases enrollments from N_1 to N_2 and price from P_1 to P_2 (see Graph 1, p.43). The new equilibrium, however, could be associated with a tuition price above the state maximum, represented in the graph as P_3, in which case the government should intervene. The optimal government subsidy would be

enough to shift the average cost curve down to the recommended level of tuition, further increasing enrollments.

In terms of the *American Graduation Initiative*, the increase in demand due to financial aid and other enrollment incentives must be met with an increase in appropriations per student in order to align average cost with demand and recommended tuition price. This might involve significant government funding, but should increase overall enrollments in the market, while maintaining a reasonable tuition price. The optimal subsidy should also ensure that the social marginal benefit is equal to the social marginal cost (Gruber 2007).

B. Determinants of Community College Enrollments

It is important to understand the variables affecting the community college market and their relative importance before examining the effects of aid and appropriations on tuitions and enrollments. The following section reviews literature regarding enrollment factors for these schools. Due to the limited literature on the market for community colleges specifically, some articles focus on the overall market for higher education, which is generally comparable for these purposes. The literature finds enrollments to be related to government funding, economic indicators, and personal finances, as people base their decision to attend school on the availability of education, the attractiveness of alternatives, and their ability to afford school.

Pennington, McGinty, and Williams (2002) study the response of national community college enrollment demand to measures of economic stability, both at the national and personal levels using US census data. They study community college

enrollments per capita over a period of 31 years, from 1965-1996. The authors model enrollments per capita as a function of the national economic stability indicators including average unemployment rate, the consumer price index, and the gross domestic product. They also add personal economic indicators including dollars of disposable income, personal consumption expenditures, and average hourly earnings of production workers.

Pennington et al. (2002) use correlation analysis to find that per capita enrollment is negatively correlated with dollars of disposable income, gross domestic product, and personal consumption. Also, per capita enrollment is positively related to unemployment rate. This confirms the expectation that more people seek community college educations when the affordability is high and the opportunity cost is low. An important limitation of this study is that it addresses the national market for community colleges, which does not account for variations at the state level.

Betts and McFarland (1995) expand upon this study by examining the effects of the business cycle on the enrollment demand community colleges over time by census region. They analyze a group of 800 community colleges, using data divided by census region and year. The authors model the decision to enroll in community college upon graduation from high school as a function of the current unemployment rate, the expected earnings increase for community college graduates, and the 18 year old wage rate. They next add average community college fees, financial aid, and cost of 4 year schools as variables that affect the demand for community college enrollment after high school. They include demographic variables such as the youth population, minority population, and income per capita as these might affect demand

regardless of the state of the economy. Betts and McFarland (1995) use educational data from the Integrated Postsecondary Education Data System (IPEDS) and the labor market data from the Current Population Survey of the US Census Bureau, separated by census region. This study has a similar limitation to that of Pennington et al. (2002) because it overlooks state level variations by analyzing enrollments at a more general level.

These authors find a strong positive relationship between the community college enrollments and the unemployment rate in all census regions. They find that a 1% increase in the total adult unemployment rate leads to a 4% increase in enrollments. The authors find that the wages of 18 year old high school graduates, the tuition fees and the minority concentration had a significantly negative effect on enrollment, whereas the expected earnings increase with a degree and the expected costs of 4 year colleges had a significantly positive effect on community college enrollments. This shows that people look at the current cost of education, through direct costs, opportunity costs, and the costs of substitutes as well as the benefits, through the future gains of education while making the decision to enroll. Further, these authors observe a decrease in state appropriations in recessions and criticize states' failure to recognize the need for additional appropriations in economic downturns and call for increased funding to these public colleges in times of expanding demand. Obama's initiative should recognize this requirement for successful expansion and aim to provide the necessary supply side funding.

Like Betts and McFarland (1995), Dellas and Sakellaris (2003) study the demand for higher education and its relation to economic indicators. They study

enrollment decisions of all 18-22 year old high school graduates based on data from the US Current Population Survey from 1968 to 1998. After controlling for individual student characteristics and demographics, they looked at the students' enrollment in any type of public higher education. The authors use variables from both Betts and McFarland (1995) and Pennington et al. (2002) to model enrollments as a function of total unemployment rate and the growth rate of GNP. Again, this study is limited by its dependence on national statistics rather than state or school level data. Also, by grouping 2 and 4 year colleges together, they do not determine the specific community college market reaction to economic changes. Dellas and Sakellaris (2003) find that an increase in the unemployment rate by 1 percentage point increases college enrollments by 2%.

Next, Dellas and Sakellaris (2003) expand their study by using more specific state level data and a probit model to determine the probability that an individual would enroll in higher education. They use unemployment rate, cost of tuition, and average weekly earnings in manufacturing as determinants of enrollment. They find that a 1 percentage point increase in the unemployment rate increases the likelihood that a person will enroll by 0.28 percentage points. This finding supports previous studies on the relationship between unemployment and enrollment but expands upon them by isolating an individual's decision to enroll. They also find that a $1 increase in manufacturing wages decreases the probability of enrollment by 0.8 percentage points, confirming the effect of opportunity costs to the enrollment decision. They construct another variable, earnings differential, which indicated the expected payoff to wages of a college education. They find a 1% increase in the earnings increases the

likelihood to enroll by 0.32 percentage points. Interestingly, tuition was not statistically significant in this model. This differs from the findings of Betts and McFarland (1995) as well as Pennington et al. (2002); however, the authors conclude that students respond more to opportunity costs and future payoffs than current, direct costs.

Lehr and Newton (1978) add a state-specific study to the literature by examining the enrollment demand of first year college freshmen in Oregon over a period of 15 years and its relation to state economic factors. The authors look at the 40 public institutions in the state, including 7 public, 20 private, and 13 community colleges. They also use Oregon Student Resource Surveys to make student specific profiles in order to align student characteristics with the type of school they attend. First, they examine the influence of economic factors on student demand and model enrollment as a function of average state tuition, average per capita income and the annual unemployment rate. They find that the unemployment rate and per capita income are associated with increases in enrollment demand. These authors also find that tuition price has a negative effect on enrollments, as the direct costs discourage possible applicants. Interestingly, the price elasticity of enrollments was fairly low (0.65) whereas the income elasticity of enrollments was high (1.88). By comparing the elasticities of enrollment demand, these authors expand upon the conclusion of Betts and McFarland (1995) that tuition affects enrollments and show that people in Oregon are, in fact, less sensitive to the current price of education than they are to their ability to pay for it.

In a second regression, Lehr and Newton (1978) use the surveys to align student demographics with the types of schools they attended. The authors analyze student characteristics such as food stamp eligibility, parental income, and financial aid necessity and their school choice. They find that community colleges are more likely to have students with fewer financial resources than public and private colleges. These enrollees are most likely attracted to the low-cost, open enrollment policies of community colleges. When Lehr and Newton (1978) examine the elasticity of community college enrollment with regards to economic conditions, they find that the community college enrollments are more sensitive to unemployment rate, parental income, and tuition price than any other type of school, which is probably due to the typical demographic of community college students. This finding reinforces the importance of studying community colleges separately from 4 year institutions.

Berger and Kostal (2002) attempt to determine the factors affecting enrollment in higher education by combining supply side factors with demand side variables in a two-staged least squares analysis, which addresses the endogeneity of enrollments and tuition. They use panel data of public 2 and 4 year public colleges across 48 states from 1990-1995. They categorize this time period as one with increasing reliance on tuition and fees for funding and decreasing dependence on state appropriations and attempt to determine how enrollments changed as a result.

Like Dellas and Sakellaris (2003), they model the demand for enrollments as a function of direct costs, opportunity costs, the price of substitutes, and expected payoffs from receiving a degree. The dependent variable is total public college

enrollment as a fraction of the population aged 18-24. They expect enrollment to be a function of average 4 year public school tuition, average wage of production workers, average 4 year private school tuition, median household income, wage differences between production and non production workers, and unemployment rate. They control for environmental differences with variables that capture the shares of the population that are college educated, nonwhite, and live in an urban area.

The supply side equation determines the number of enrollment spaces available to students and is a function of the financial resources available to fund each student. The enrollment supply is a function of the average public 4 year college tuition, the state appropriations, grants to higher education, and other revenues (which include federal appropriations and grants). All revenues are measured in dollars per state resident to account for variation in state size. They also include faculty salary, administrative flexibility, density of colleges, and enrollment in private institutions as variables that might affect supply.

Through a simultaneous equation system, Berger and Kostal (2002) determine that enrollment demand is negatively related to public college tuition and positively related to average production wage, and college educated population. The regression shows that a $1000 increase in average tuition price leads to a decrease in enrollments by 6.3 percentage points. Also, a $1000 increase in average production wage leads to a 0.58 percentage point increase in enrollment rate. Here, the income effect outweighs the higher opportunity cost of enrollment. Interestingly, the authors do not find unemployment to be a significant factor in the demand for enrollment. This might be because they use total unemployment rate rather than an age specific rate, as young

people make the decision to go to college based on job prospects in their own age group. Furthermore, they do not find wage differential to be significant. This suggests that people do not enroll in college because of expected wage increases in the future. The authors note that the 5 year time period is probably too short to capture this effect.

On the supply side, Berger and Kostal (2002) find that state appropriations, other revenue sources, administrative flexibility and institution density are statistically significant. A $1000 increase in state appropriations per student leads to an increase in the enrollment rate of 5.1 percentage points, while a $1000 increase in other revenues per student leads to an increase in 4.1 percentage points. They find that a $100 increase in state appropriations leads to a 0.51 percentage point increase in the enrollment rate, which is a reasonable result. Interestingly, they do not find tuition to be a significant factor in the supply of enrollments but this might be because tuition is a fairly small segment of the funding.

In my equation for community college enrollment, I use many of the variables that Berger and Kostal (2002) find to be significant in their study. My model includes state appropriations, average household income, skill premium, and environmental variables regarding the shares of state populations that are educated, white, and live in urban areas.

Of particular interest to this research question is the effect of financial aid on enrollment decisions, since the *American Graduation Initiative* proposes considerable increases in student aid. St. John (1990) studies the effects of financial aid increases on a student's probability to enroll in any college. He uses the National Learning

Center's High School and Beyond survey which profiles a cohort of high school sophomores in 1980 and tracks each student's college enrollment decisions. He uses variables on socioeconomic background, high school achievement and involvement, postsecondary aspirations as well as the tuition and student aid package they reported from the college they selected. This research provides insight into decision making at the student level and benefits from its ability to follow a specific sample over time.

The author computes the change in probability of student enrollment for every dollar increase of aid. He finds that in the overall sample, a $100 increase in grant aid is associated with a 0.43 percentage point increase in probability of enrollment. However, when St. John (1990) separates the sample into income categories, but controls for the other variables, he finds that the probability of enrollment of a low-income student is significantly different than that of student with high family income. A $100 increase in grant aid is associated with a 0.88 percentage point increase in likelihood of enrollment for a student with family income below $15,000 (1982 dollars). This is compared to a 0.33 percentage point increase in probability of college attendance from a student with a family income of $25,000-$40,000 (1982 dollars). One issue with this study is that it does not focus on specifically 2 or 4 year colleges, nor does it consider whether the institution was public or private. However, these conclusions are especially meaningful in the community college market because these schools have large portions of low-income students. Since St. John (1990) finds that low-income students are more likely to decide to enroll when grant aid is increased, the community college market should see a significant increase in demand with an increase in the Pell grant.

Overall, the literature shows that enrollments for higher education depend on government funding, direct costs, opportunity costs and future salary expectations for students. Any shifts in the demand for enrollments will affect the equilibrium tuition price at these schools. Because community college students are extremely price sensitive (Lehr & Newton, 1978), it is important that government appropriations can offset the tuition increases associated with any increases in demand.

C. Determinants of Community College Tuition

Tuition levels in the market for public higher education largely reflect government funding at the state and local levels. Tuition recommendations are set by state governments and schools are discouraged to go above these price ceilings unless faced with cuts in appropriations (Long, 2004). Significant government funding allows community colleges to offer a low-cost option to state residents. The following studies find that government funding through financial aid and appropriations affect tuition levels at community colleges.

Kenton, Piper, Huba, Schuh and Shelley (2005) study community college funding from 1990-2000, a period of consistent decreases in state appropriations. They examine funding formulas across 11 Midwestern states and 212 colleges in an attempt to determine how states compensated for these lost funds. Using the IPEDS survey finance section, they separate the sources of funding into 12 groups, which include tuition and government appropriations. They track changes over time in the fraction of total revenues that come from each source. Their findings confirm that across the 11 states, state appropriations to community colleges fell; however, they

observe a statistically significant increase in revenues from tuition and fees across the decade. This increased reliance on tuition is especially problematic because, as Betts and McFarland (1995) show, community college students are especially sensitive to tuition prices.

In a second model, Kenton et al. (2005) compare changes within states in order to determine if community colleges in the same region have similar funding patterns. The authors find that the reliance on tuition and appropriations differs significantly among states, indicating that states make very different funding decisions. To account for the various funding formulas, I will use a fixed effects model to account for differences in state decision making that affect community college funding.

Koshal and Koshal (2000) study the relationship between government appropriations to colleges and tuition prices using data from 47 states in 1990. They hypothesize that state appropriations depend upon tuition and that tuition, in turn, depends on state appropriations. They use a simultaneous equation model to account for the two-way interaction, modeling tuition as a function of appropriations per student, state median family income, and out-of-state enrollments. They next model appropriations as a function of tuition, tax revenue per student, 2 year college enrollments, and Democrats in the state legislature. Koshal and Koshal (2000) find a clear relationship between state appropriations and tuition price, reporting that a $10 rise in tuition was associated with a decrease in state appropriations of $1.80. From the second equation they determined that a $100 increase in state appropriations is associated with a decrease in tuition by $40. In fact the endogenous appropriations

variable had the largest impact on tuition, indicating that government funding plays a definite role in tuition price setting. This agrees with the market for higher education outlined by Easton and Rockerbie (2008). As government appropriations increase, the average cost curve faced by colleges falls, thus decreasing tuition.

Government appropriations to colleges are typically used to cover operational costs, specific programs and projects; however, government grant aid is issued to students to be put towards tuition. The increasing prevalence of financial aid has raised concerns about colleges adjusting their prices in order to offset the revenue losses from these discounts. The Bennett Hypothesis suggests that federal aid subsidies only encourage colleges to inflate tuition prices. In an imperfectly competitive market, like that of community colleges, each participant is somewhat differentiated and therefore has some power to change tuition depending on the amount of financial aid issued.

To test the validity of the Bennett hypothesis, Singell and Stone (2007) analyze the tuitions of 1554 US public and private 4 year colleges from 1989-1996 compared to the average Pell grant aid students received.

The authors model tuition as a function of government appropriations, school characteristics and Pell grants per student, using an OLS, a fixed effects, and a fixed effects IV model. Their results mainly focus on the results of the fixed effects IV model due to concerns of endogeneity of the Pell grant in the fixed effects model. They separate their results into in-state public university students and out-of-state public university students, in order to observe any differences between the two.

They find that a $1000 increase in government appropriations is associated with a $3 decrease in tuition for in-state public school students, and a $5 decrease for out-of-state public school tuitions. This finding corroborates the negative relationship between appropriations and tuition found by (Koshal & Koshal, 2000); however, it also suggests that appropriations affect tuition to a much lesser extent.

The Pell grant results show that a $1000 increase in aid is associated with an $804 increase in tuition for out-of-state public university tuitions, but no significant change for in-state public school students. These results indicate that much of the discounts issued through financial aid manifest as an increase in tuition for out-of-state students. This is likely a result of state legislation that restricts the growth of in-state tuitions more significantly than out-of-state tuitions in order to provide low-cost education for state residents.

Long (2004) adds a state-specific study to the literature on the relationship between financial aid and tuition. She analyzes the impact of Georgia's HOPE scholarship, a state program that offered in-state students with a "B" average a full tuition scholarship at state universities. Using a differences-in-differences approach, she compares Georgian 4 year public schools to other similar southern universities before and after the implementation of the HOPE scholarship. The author uses a fixed effects model and controls for state and college characteristics.

Unlike Singell and Stone (2007), this study finds that tuitions did not increase after the institution of huge grant aid increases. In fact, Georgian schools appeared to experience a relative decrease in tuition of 3%. It is important to mention that the

state government was paying for the HOPE scholars' educations, and therefore had a large incentive to keep tuitions low during this period.

Long (2004) does find, however, that Georgian universities with HOPE scholars increased their room and board tuitions 5% faster than comparison schools after the inception of the scholarship. The increase in room and board charges were estimated at about 10% of the total financial aid scholarships issued. This shows that although public universities did not raise tuition, they did raise other fees which the students were responsible for paying. This confirms that schools increase other forms of revenue in order to offset aid discounts.

An overview of the literature on community college tuition levels and enrollment quantities reveal several variables that are important to determining supply and demand side factors in this market. I will use an assortment of variables that each of these studies found to be significant and apply them to my sample of community colleges. I will also consider the whether or not the Bennett Hypothesis holds with my empirical results, determining whether community colleges raise tuition when federal financial aid increases.

CHAPTER THREE

EMPIRICAL SECTION

This chapter describes the econometric model used to determine the effects of the independent variables on community college enrollments and tuition prices. The source and description of each dependent and independent variable is explained.

A. Data

Data on specific community college characteristics comes from the Integrated Postsecondary Education Data System (IPEDS) from the National Center for Education Statistics. Any variables aggregated at the school level on the survey were divided by the school's enrollments in the previous year. This made all variables in per student terms, which controlled for the size of the school. Enrollments from the previous year were used because current enrollment is an endogenous variable. This provides a slight measurement error; however, since enrollments are not likely to fluctuate significantly over the course of a year, it can be used with reasonable confidence.

All variables, except those originally in percentage terms, are transformed into log form in order to best compare across schools of various size and price. To avoid taking the log of zero, log (1+ variable) was taken for any variables that contained a value of zero. The time variable *t* represents the current year, from 2001-2008. Table 8 (p. 48) presents all of the variable names, a description of each, and the source from which they were taken. In this study, the dependent variable *lnenroll* will measure the log of total fall enrollment at a particular school, including full-time and

part-time students. The other dependent variable, *lntuit* will measure the log of the average pre-aid tuition at a particular school. In order to determine supply and demand effects on tuition the following model was used:

Equation 1. Community College Tuition Determinants

$$Lntuit_{it} = \beta_1 + \beta_3 lninci_{it} + \beta_4 log\_pubtuit_{it} + \beta_5 log\_aid_{it} + \beta_6 log\_app\_lag_{it} + \beta_7 unemp_{it} + \beta_8 skillpremassoc_{it} + \beta_9 white_{it} + \beta_{10} urban_{it} + \beta_{11} educ_{it} + \varepsilon_{it}$$

The supply and demand effects on community college enrollments were modeled with the following equation:

Equation 2. Community College Enrollment Determinants

$$Lnenroll_{it} = \alpha_1 + \alpha_2 log\_avetuit_{it} + \alpha_3 lninc_{it} + \alpha_4 log\_pubtuit_{it} + \alpha_5 log\_aid_{it} + \alpha_6 log\_app\_lag_{it} + \alpha_7 unemp_{it} + \alpha_8 skillpremassoc_{it} + \alpha_9 white_{it} + \alpha_{10} urban_{it} + \alpha_{11} educ_{it} + \sigma_{it}$$

Where ε_{it} and σ_{it} are the stochastic error terms, *i* is an individual institution, and *t* is the current year

Log_avetuit measures the log of the average tuition of community colleges in a state. This controls for the difference in price of community college substitutes. I expect this variable to be positively related to enrollments and tuition, since an increase in the price of other schools should increase the demand for one particular community college, shifting demand right and increasing enrollments and tuition.

Log_pubtuit measures the average 4 year public university tuition in a state. This variable controls for some of the substitution between community colleges and four year colleges in a state. I expect this regressor to be positively related to the dependent variables since an increase in 4 year tuition should cause some substitution towards community colleges, causing a rightward shift of the demand curve and an increase in enrollment and tuition.

Log_aid measures the average sum of federal, state and institutional aid per student issued at a particular college. This variable includes Pell Grants, and other need-based and merit-based assistance for students. Since financial aid is an incentive for people to go to school, I expect this variable to be positively associated with enrollments and tuition due to an increase in demand.

Log_app_lag measures the log of the average government funding appropriations issued to a school from the federal, state, and local governments in the previous fiscal year. Government funding to community colleges comes from appropriations and grants; however, the IPEDS survey did not specify the amount of grant funding that went towards financial aid given to students and the amount that went towards general funding for schools. In order to avoid correlation between these two variables, appropriations were used in the regression to represent the supply side variable, government funding. Additionally, appropriations were lagged one year because increased funding takes some time to manifest into increased facilities, equipment, and staff. I expect appropriations to shift the supply curve right since an increase in funding should allow school to accommodate more students. This shift is associated with an increase in enrollments and a decrease in tuition. As discussed later in this study, appropriations likely depend upon a particular school or state and therefore are endogenous. Since this variable might be determined within the system, it is incorrect to assume that appropriations cause changes in enrollments or tuitions when in fact the coefficient could be reporting a reverse causation.

Lninc measures the log of average state household income; *unemp* is the average state unemployment rate. I expect income and unemployment to be

associated with a rightward demand curve shift and an increase in enrollments and tuition. Measurements of income and unemployment are taken from the Statistical Abstract of the United States, Census Bureau.

The same source was used to collect data on the *white*, *urban* and *educ* variables which provided insight into environmental aspects of a state by measuring the percentage of the state population that was white, lived in urban areas, and had a bachelor's degree, respectively. I expect all three to be associated with a rightward shift of the demand curve and an increase in enrollments and tuition price.

The skill premium variable was taken from data in the Decennial Census on educational attainment and annual income. The variable was constructed by dividing the average state earnings for people with some college education below a bachelor's degree by the average state earnings for people with only a high school degree. This ratio serves as a measure of the marginal return to a community college degree, since a higher payoff to the later should cause students to substitute away from community colleges. One limitation of this variable is that it does not precisely measure the incomes of associate's degree holders, since this data was not available at the state level annually. Therefore people who had completed any type of schooling above a high school degree but below the bachelor's degree level were put in the same category of earnings. I expect skill premium to be positively related to enrollments and tuition, since it should shift the demand curve to the right in the market for community colleges.

B. Selection of the Sample and Descriptive Statistics

The sample was taken from the National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS). This data set combines mandatory yearly surveys from all post secondary institutions in the United States. A custom data set was created to include all two year public institutions in the 50 U.S. states from 2000-2008. The original sample was restricted to contain only the schools that had tuition costs greater than zero in the current year and previous year. It was important to exclude any schools that did not report tuition or that report zero tuition cost because this does not reflect a typical market structure, in which supply and demand variables affect price. Schools that reported zero tuition were located in California, or were tribal colleges where students pay only mandatory fees for public education. Another exclusion from the data set was the Community College of the Air Force because it has over 300,000 students and was a major outlier in the data set. This reduced the final number of observations to 10,225.

Table 1 (p.44) contains the descriptive statistics of all variables used. The mean tuition value among schools was $2,294 and the mean enrollment number was 6,122. Average state community college tuition averaged $2,310, while average state public university tuition was $1,000 more. The average financial aid distributed was $4,962. This is larger than the average tuition; however this is to be expected at community colleges where financial aid not only covers the cost of the education but also living expenses for students who leave the workforce to enroll in school. Lagged appropriations average $3,638 but have a standard deviation of over $8,000, indicating that funding varied significantly across schools. The average state

household income variable had a mean of $45,735 and had a standard deviation of over $7,000 indicating a fairly large income distribution across states and years. The mean skill premium with some college education was 1.16, confirming that any amount of higher education increased annual earnings on average. The variable for white population had a mean of 80%. The mean for urban population was 75.74%, signaling that nearly 3/4 of the population lives in an urban setting. Finally, the education variable showed that, on average, nearly 25% of the US population has at least a bachelor's degree.

C. Estimation Methods

I use two reduced form equations, one for tuition and one for enrollment, in order to avoid endogeneity between the two dependent variables. I use the same regressors for each equation; however omit *log_avetuit* only from Equation 1 because the average tuition of community colleges in the state is too highly correlated with the tuition at a particular school. This is because tuition is largely based on the amount of government funding the schools receive so this coefficient would be capturing the schools' common response to government funding cycles.

For each of the two equations, I ran both a fixed effects (FE) regression and an Ordinary Least Squares (OLS) pooled regression. Fixed effects are used to control for unobserved differences in schools, states and local economies throughout the observation period. W*hite, urban, educ* and *skillpremiumassoc* were dropped out of the fixed effects model because these variables did not change over time. The OLS pooled regression included these environmental variables but did not account for the unobserved differences in schools, states, or local economies.

The fixed effects model estimates enrollment and tuition equation separately for each school so that the intercepts for each may vary, independent of the regressors. This controls for time-invariant omitted variables pertaining to certain schools or their locations. It also means that coefficients can be interpreted as the effect of a regressor on tuition and enrollments at a particular school. The disadvantage of using a fixed effect model however, is that it cannot estimate the effects of significant variables that differ within the sample but do not change over time; in this case the environmental factors *urban*, *white*, *educ*, and *skillpremassoc*.

CHAPTER FOUR

EMPIRICAL RESULTS

This chapter presents the results of the empirical analysis. It is divided into four subsections. The first and second sections present the results of the original model, using tuition and enrollments as dependent variables, respectively. However the coefficients on these regressions are unreliable due to a probable endogoneous variable. The second two subsections attempt to rectify the results by excluding the endogenous variable, government appropriations per student lagged, from the tuition and enrollment models.

A. Original Model

Column 2 of Table 2 (p.45) illustrates the effects of the chosen variables on community college tuition in a fixed effects model. The variable for appropriations is positive and significant at the 5% level, showing that a 1% increase in government appropriations in the previous year is associated with a 0.01% increase in tuition in the current year. The estimator for appropriations has a sign opposite of what was expected. This suggests that appropriations and tuition move in the same direction, which might be the case when schools are in need of money for projects so they attract greater government funding as well as tuition revenue.

In this case, appropriations are endogenous, which would cause the estimated coefficient for appropriations to be biased. In order to test the endogeneity of the appropriations variable, I ran a separate fixed effects regression to see whether

appropriations depended on unemployment rate. I found a positive, significant relationship between the two variables, suggesting that appropriations distributed by the government depend on the state economic conditions. In economic downturns, governments allocate more funds to these schools. The appropriations variable is therefore determined within the model. Including this endogenous variable in the regressions might have biased all coefficients and therefore all of the estimates are unreliable. Columns 3 and 4 provide the results of the original model on tuition; however these results are not dependable either.

B. Revised Model: Regression on Tuition

In order to avoid endogeneity, the following regressions exclude appropriations as a variable. While this ignores appropriations as a determinant of supply or demand for community college enrollments, it removes the biased caused by the inclusion of an endogenous variable. Tables 4 and 5 contain revised models that produce more dependable estimates.

Column 2 of Table 3 (p.46) contains results of the updated fixed effects regression on tuition. It shows that an increase in state household income by 1% increases tuition in a community college by 1.21%. This result follows the reasoning that as incomes increase, demand in the market for community college increases, driving up tuition prices.

The average tuition of in-state public universities also has a positive coefficient, showing that a 1% increase in 4 year college leads to a 0.15% increase in community college tuition. This positive relationship shows the substitution between

community colleges and 4 year schools. As the price for public universities go up, the demand for community college increases since it is a less expensive alternative.

The regression also shows that a 1% increase in average financial aid received by students leads to a 0.10% increase in the tuition price at a school. This increase in tuition is driven by the increased demand from students who are receiving a greater discount. The coeffecient also shows that the tuition increase is small relative to the aid issued, so schools do not simply boost tuition by the amount that they issue students in the form of aid. Considering the average aid and tuitions, every $1 increase in aid loses an estimated 4.6 cents to tuition increases. This finding shows that the Benett Hypothesis does not hold for community colleges, since schools do not raise their tuition by nearly the same amount as the increase in federal aid.

The unemployment coefficient has the expected sign, showing that a 1 percentage point increase in state unemployment rates leads to a 0.02% increase in tuition prices. This price increase is again driven by increased demand for community colleges when unemployment goes up because the opportunity cost of schooling is low and there is an increased demand for skilled careers.

Table 3 (p.46), Column 1 contains the results of the OLS pooled regression on tuition prices which includes the environmental control variables. The magnitudes of the coefficients for the household income, public 4 year university tuition, average financial aid, and unemployment all increased from the fixed effects model. This is because when school, state and economic conditions are considered, these variables have a greater impact on demand and therefore, on tuition price. All of these variables maintain a high level of significance and have the same signs explained above.

The skill premium variable shows that a 1% increase in the skill premium for people with some college experience is associated with a -2.04% decrease in tuition. This is the opposite of what I expected, since a greater payoff to community college should increase the demand for this type education. This negative relationship might reflect that in local economies with a high skill premium for associate's degrees, there is probably an even higher payoff for bachelor's degrees. People might substitute away from community college in these areas towards 4 year degrees which could be even more valueable.

The coefficient on the education variable shows that when the state population with a bachelor's degree increases by one percentage point, community college tuition decreases by 0.02%. I had expected that as the educated population increased so would community college demand and therefore tuition price, but this result could be because areas with large populations of bachelor's degree holders have a stronger preference for bachelor's degrees rather than associate's degrees or that the local economy demands employees with bachelor's degrees. This would cause people to substitute away from community college towards a 4 year university.

The urban coefficient reveals that a 1 percentage point increase in a state's urban population increases tuition by 0.003%. This coefficient supports the hypothesis that states with large urban populations have more opportunites for degree holders; therefore the demand for community college increases, and the tuition price is driven upwards.

The white population in the state has a positive effect on tuition also, as a 1 percentage point increase in white population increases tuition by 0.54%. The

positive coefficient on *white* most likely reflects increased opportunity and propensity for non-minority populations to graduate high school and attend college. This might also reflect a higher parent wealth in white populations, making college a more affordable option.

C. Revised Model: Regression on Enrollment

Column 2 of Table 4 (p.46) provides the results of the revised fixed effects enrollment regression. Results show that as the average tuition of community colleges in the state increase by 1%, the predicted enrollments at a particular community college increase by 0.06%. This cross-price elasticity shows that schools within a state are somewhat substitutable, so a school with a lower relative price will attract students. This supports the theory that the market for 2 year colleges is monopolistically competitive. Public universities also appear to be a substitute for a community college, though to a lesser extent. An increase in public university tuition by 1% is associated with an increase in enrollments of 0.04%. So as universities become more expensive, students switch to community colleges as a less expensive alternative.

State household income has the largest effect on enrollments; as average state household income increases by 1%, enrollment in a community college is expected to increase by 0.33%. This is probably because college is a normal good, so people enroll in school more when their incomes go up.

Unemployment also has the expected positive relationship with enrollments; a 1 percentage point increase in unemployment rate leads to a 0.03% increase in

enrollments. This result reflects the low opportunity cost of schooling and the demand for skilled careers in states with high unemployment.

Finally, financial aid has a positive, significant effect on enrollments. The regression shows that a 1% increase in the average aid a school offers is associated with a 0.02% increase in its enrollments. This suggests that students base their enrollment decision on the extent to which the school will help them pay for not only tuition, but basic living expenses so that students can afford to go to school instead of work.

Table 4, Column 1 (p.46) shows the results of the revised OLS regression on enrollments, adding environmental variables. In this revised model, the coefficients for average state community college tuition, state household income, and unemployment are larger. This is because local economic conditions increase the importance of considering things like the price of subsitutes, one's ability to pay, and the opportunity cost of education when deciding to enroll in community college.

One discrepancy in this regression is that the coefficient for the average public tuition in a state changed signs to be negative. The results show that as tuition at public university goes up by 1%, community college enrollments decrease by 0.12%. This issue might be a result of an omitted variable that is negatively related to public tuition. A Democratic majority in the state government, for example, might have caused a negative bias in the estimator.

The skill premium for workers with some college experience is positively associated with enrollments, as expected. A 1% increase in the state's skill premium is associated with an increase in enrollments by 7.16%, which verifies the fact that

community college students typically enroll in school to increase their earnings beyond those of a typical high school graduate. It makes sense that in local economies where the payoff to community college in greater, the demand for enrollments is higher.

The environmental variables, *urban* and *white* both have positive coefficients in this regression. A 1% increase in the urban and white populations in a state is associated with a 0.01% and 1.33% increase in community college enrollments, respectively. The positive relationship between urban population and enrollments might be a reflection of the large number of opportunities for educated people in urban settings, which encourages students to enroll in degree programs. The positive coefficient on *white* most likely reflects increased opportunity and propensity for non-minority populations to graduate high school and attend college. The variable representing educated population in the state also has a positive coefficient, indicating that in more educated areas, people are more likely to enroll in community college. These areas are likely to have more jobs that require degrees, or other social pressures that encourage college enrollments.

CHAPTER FIVE

POLICY PREDICTIONS

This chapter discusses the effects of the financial aid portion of the proposed *American Graduation Initiative* on community college tuition and enrollments using estimated coefficients of the revised fixed effects regressions.

A. Policy Simulation

The multi-billion dollar *American Graduation Initiative* proposal being considered by the Senate aims to increase the number of American college graduates by 5 million in the next decade. The plan is largely a collection of federal grants to be issued to community colleges that exhibit marked success in producing graduates.

A second element of President Obama's proposal is an increase in financial aid for all students with demonstrated need. This aspect of the plan is more tangible for students considering enrolling in community college. Limitations of the original model do not allow for reliable estimates of the effects of increased government funding; however, the revised model can be used to predict the extent to which financial aid increases will affect community college enrollments and tuition.

The results of the revised fixed effects regressions for tuition and enrollments show the effects of a 1% increase of aid on each dependent variable. Using the estimated coefficients, I calculated the effect of a 24%, 28% and 31% increase in aid scheduled for 2009, 2010, and 2020, respectively (see Table 5, p.47). The prediction starts in 2009 because it is the first year of the $2500 American Opportunity Tax Credit (AOTC) and a significant Pell Grant increase. Also, complete data for this year

have not yet been collected reported. By increasing aid by $1200 in 2009, average tuition should increase by and estimated $59.87 and school average enrollments by 29.29 from the previous year.

The estimates for 2010 predict the effects on tuition and enrollments if, as the *American Graduation Initiative* proposes, Pell Grants increase by an additional $200 and the AOTC is made permanent. These financial aid increases are equivalent to a 28% increase in average financial aid from 2008. According to the regression estimates, this should increase average enrollments by 34.28 and average tuition price by $69.77 from 2008.

Finally, 2020 represents the end of the proposed *American Graduation Initiative*. The bill assumes that Pell Grants will increase annually throughout the decade, and end around $6,900. Between the Pell Grant and the AOTC, total financial aid would increase by $2250 from 2008. This increase would be associated with an average tuition increase of $112.07 and an average enrollment increase of 55.71 students. Across the entire sample of schools, this enrollment increase per school would be equivalent to an estimated 542,188 more enrollments in the community college market.

According to this estimation, financial aid effectively increases enrollments. The additional Pell Grants and AOTC aid alone would increase enrollments nearly half a million in this model, exceeding 10% of Obama's enrollment goal. The billions of dollars worth of appropriations outlined in the proposal are likely to increase this enrollments further to meet the targeted enrollment level.

One limitation of this policy simulation is that it assumes that tax credits have the same effect as financial aid on student enrollments. Table 6 (p.47) addresses this concern by calculating the effects of the Pell Grant increase alone. A smaller increase in financial aid would lead to an estimated 37.95 average enrollment increase and a 369,403 increase in the total market enrollments.

The policy simulation above may suffer from some problems associated from out of sample predictions. While the revised regression estimates had significant explanatory power in the original data sample, these coefficients will not necessarily be the same magnitude in future predictions. Therefore, external validity threatens the results of this simulation.

CHAPTER SIX

CONCLUSION

Using IPEDS panel data of US community colleges from 2001-2008, this study investigated the predicted effects of President Obama's *American Graduation Initiative* on enrollments and tuition. Since government appropriations might have biased original results due to endogeneity, this variable could not be estimated. A revised model finds that the proposed increases in student financial aid through Pell grants and the American Opportunity Tax Credit would increase average tuition by $112 and average enrollments by over 500,000 students across the market. This enrollment increase meets about 10% of the 5 million person goal set for 2010. However, previous literature predicts that state appropriations increase enrollments, therefore the proposed government spending towards community colleges is likely to make this estimate significantly greater.

This study suggests that financial aid is a valuable tool for manipulating college enrollments. When the governments believe there is underinvestment in education, this type of funding may serve as an instrument to boost attendance rates. This study suffered from bias related to endogenous and omitted variables; further research should control for these problems with a better specified model. A new model might more accurately predict the enrollment increase from the proposed government funding. It would also be informative to separate the effects of different uses of funding, for example towards purchasing equipment, expanding facilities, or refining training programs. The various uses of funding could then be compared to determine the most effective use of government spending, allowing for better

allocation of this money. Another study might also consider quantifying the benefits of these enrollment increases, and judging whether the government is providing an optimal subsidy in this market.

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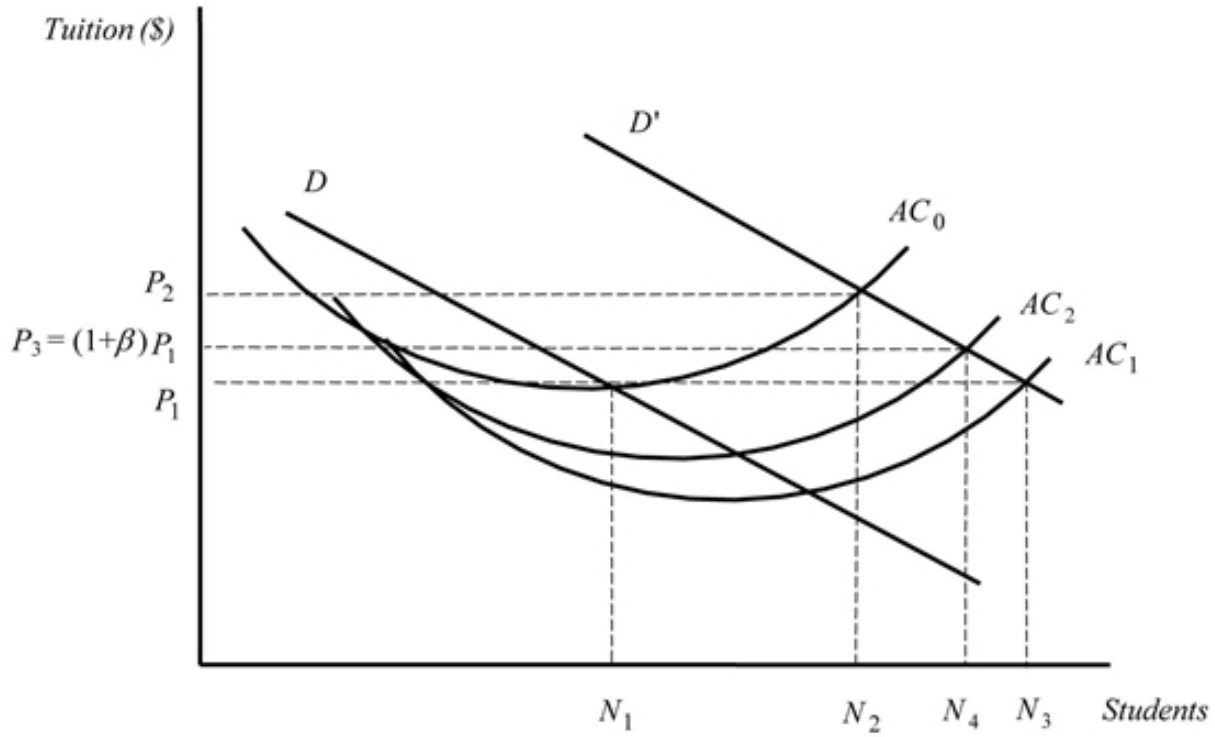
TABLES

Graph 1. Optimal Government Subsidy to Education



Source: Easton and Rockerbie (2008). Page 195.

Table 1. Descriptive Statistics of Variables

Variable	Mean
Dependant Variable	
Tuition	2294.8 (1393.75)
Enrollment	6122.04 (6084.12)
Independent Variable	
Average state community college tuition	2310.89 (1258.01)
Average public 4-year university tuition	3551.49 (1720.92)
Financial aid per student	4962.54 (1329.85)
Government appropriations per student	3638.05 (8543.84)
State household income	45735 (7042.04
Skill premium with some college	1.16 (0.04)
Percentage of state population white	80.0 (9.00)
Percentage of state population urban	75.74 (16.48)
Percentage of state population living in an urban area	24.96 (3.92)

Values in parentheses are standard deviations

Table 2. Original Model Regression Coefficients

Variable	**OLS (1)**	**FE (2)**	**OLS (3)**	**FE (4)**
Log average state community college tuition	NA	NA	0.27* (0.04)	0.01 (0.02)
State household income	1.56* (0.08)	0.66* (0.06)	0.60* (0.17)	0.25* (0.04)
Log public 4-year university tuition	0.19* (0.00)	0.15* (0.01)	-0.11* (0.01)	0.02* (0.01)
Log financial aid per student	0.23* (0.02)	0.07* (0.01)	0.07* (0.02)	0.02* (0.00)
Log government appropriations per student	-0.01 (0.01)	0.01* (0.00)	-0.01 (0.04)	0.01 (0.01)
State unemployment rate	0.09* (0.01)	-0.04* (0.01)	0.02* (0.01)	0.01* (0.00)
Skill premium with some college	-4.03* (0.27)	NA	3.63* (0.55)	NA
Percentage of state population with bachelor's degree	-0.02* (0.00)	NA	-0.00 (0.00)	NA
Percentage of state population white	0.02 (0.08)	NA	0.66* (0.16)	NA
Percentage of state population living in urban area	0.01* (0.00)	NA	0.01* (0.00)	NA
R^2	0.55	0.95	0.195	0.99
N	4386	4394	4384	4392

* Indicates significance at the 5% level

Table 3. Revised Model Tuition Regression Coefficients

Variable	**OLS (1)**	**FE (2)**
State household income	1.81* (0.07)	1.21* (0.05)
Log public 4-year university tuition	0.21* (0.00)	0.16* (0.01)
Log financial aid per student	0.15* (0.02)	0.10* (0.01)
State unemployment rate	0.09* (0.01)	0.02* (0.00)
Skill premium with some college	-2.05* (0.26)	NA
Percentage of state population with bachelor's degree	-0.02* (0.00)	NA
Percentage of state population white	0.53* (0.08)	NA
Percentage of state population living in urban area	0.00* (0.00)	NA

* Indicates statistical significance at the 5% level. R^2=.55, N=5120 R^2 =0.94, N=5994

Table 4. Revised Model Enrollment Regression Coefficients

Variable	**OLS (1)**	**FE (2)**
Log average state community college tuition	0.33* (0.03)	0.06* (0.01)
Log average state household income	1.12* (0.16)	0.33* (0.04)
Log public 4-year university tuition	-0.11* (0.01)	0.04* (0.01)
State unemployment rate	0.10* (0.02)	0.03* (0.00)
Log financial aid per student	0.06 (0.04)	0.02* (0.01)
Skill premium with some college	5.84* (0.51)	NA
Percentage of state population with bachelor's degree	-0.01* (0.00)	NA
Percentage of state population white	0.85* (0.15)	NA
Percentage of state population living in urban area	0.01* (0.00)	NA

* Indicates statistical significance at the 5% level. R^2=.22, N=5117 R^2 =0.98, N=5991

Table 6. Predicted Tuition and Enrollment Levels with Tax Credit and Pell Increase

Year	Aid Increase ($)	Percent Increase in Tuition	Tuition increase ($)	Percent Increase in Enrollments	Average Enrollment Increase	Total Enrollment Increase
2009	1200	2.42	59.87	0.48	29.39	285,989
2010	1400	2.82	69.77	0.56	34.28	333,654
2020	2250	4.53	112.07	0.91	55.71	542,188

Table 7. Predicted Tuition and Enrollment Levels with Pell Grant Increase Only

Year	Aid Increase ($)	Percent Increase in Tuition	Tuition increase ($)	Percent Increase in Enrollments	Average Enrollment Increase	Total Enrollment Increase
2009	500	1.01	24.99	0.2	12.24	119,162
2010	700	1.41	34.88	0.28	17.14	166,827
2020	1550	3.12	77.19	0.62	37.95	369,403

Table 8. Variable Descriptions and Sources

Variable	Description	Source
Dependent Variables		
Lnenroll	Log of total fall enrollment at a community college	IPEDS
Lntuit	Log of full-time in-state tuition	IPEDS
Independent Variables		
log_pubtuit	Log of average in-state 4 year public university tuition	IPEDS
log_avetuit	Log of average tuition of all community colleges in the state	IPEDS
log_aid	Total average federal grant aid, state grant aid, and institutional aid given to students at a particular community college	IPEDS
log_app_lag	Log of total federal, state, and local appropriations and grants to a school lagged one year	IPEDS
Lninc	Log of average state household income	Statistical Abstract Of US, Census Bureau
Unemp	Annual state unemployment rate	Statistical Abstract Of US, Census Bureau
Skillpremassoc	Average salary of state residents with some college education divided by average salary of state residents with high school degree only	Decennial Census 2000, US Census Bureau
White	Percentage of state population white	Statistical Abstract Of US, Census Bureau
Urban	Percentage of state population living in urban area in 2000	Statistical Abstract Of US, Census Bureau
Educ	Percentage of state population with a bachelor's degree in 2000	Statistical Abstract Of US, Census Bureau