The Effects of Free Community College Proposals on College Enrollment and Bachelor's Degree Attainment

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In times of technological growth and an increased demand for skilled labor such as we are experiencing now, the public eye turns toward education as the means to create a more efficient and effective workforce. Community colleges offer a more affordable path toward getting a start in higher education than four-year institutions. However, there is debate over the effectiveness of this path. We use student-level as well as institutional-level data to provide preliminary estimates of how the recently passed Oregon Promise legislation, designed to make a community college education more affordable for everyone, will affect the enrollment in institutes of higher education as well as the prospects of students eventually attaining a Bachelor's degree. We tentatively find that the increase in enrollment in community colleges will be limited only by the $10 million budget for the Oregon Promise bill, and somewhat more conclusively that the decreased tuition will increase bachelor's degree attainment by approximately 0.17 percent for the students who attend community colleges. However, our analysis is subject to several limitations, including our relatively small sample size for Oregon data and the likely non-constant asymptotic behavior of the price elasticity of demand for community college education for the extremely small values of the net cost that we are working with.

Introduction

Much is discussed regarding the importance of a college education to the individual (Braum et al., 2013). Additionally, in the modernizing economy, a populace with a high level of education has important payoffs for society. Unfortunately, the financial burden of college is becoming increasingly problematic for college attendance rates (McPherson et al., 1991). In order to remedy this, many forms of financial assistance and alternative college paths have been introduced. One alternative path that is gaining attention as of late is the two-year track community college system.

The importance of the difference in cost between community colleges and four-year track institutions is increasing. College tuition prices are increasing across the board, from public two-years to public four-years to private four-years (Braum et al., 2015). The cost of tuition and fees for in-state students at public four-year colleges has risen 13 percent over the past five years. In Oregon, costs have risen 14 percent. During the same time period, in most places, median family incomes have stagnated or decreased. This means that college costs are becoming an increasing amount of a household's expenses. The dramatic increase in the costs of college, with faltering real incomes, at the same time that highly educated job skills are of increasing importance to both the individual and society, is a troubling picture. With college tuition and fees requiring an increasing share of a decreasing income, community college is becoming a very important institution to offer higher education at a price that lower income and middle class families can reasonably manage.

While degree attainment rates are significantly lower at community colleges compared to four-year colleges, a different type of student often utilizes community colleges, most notably because they have lower costs of attendance and more flexible scheduling. Community colleges are best viewed as an alternative to a direct from high school to job market path instead of as an alternative to a four-year college. Considering the significantly lower cost, community colleges are a beneficial choice for prospective students in terms of future earnings (Kolesnikova, 2010) as well as overall socio-economic status.

Considering the stagnation of median real income across the United States and the increasing cost of college as a proportion of family income, cheaper paths towards higher education, such as community college, are becoming more viable and more important for students and society as a whole.

In the 2015 legislative assembly, the state of Oregon passed Senate Bill 81, dubbed the "Oregon Promise" or the "Free Community College Bill." This bill allots $10 million to subsidizing tuition for recent high school graduates who choose to attend community colleges in the 2016-2017 school year. The Oregon Promise is what's known as a "last dollar" program. After a student has already accepted all state and federal grant aid, the State will pay for the remainder of the community college tuition, up to $4,900, and with a minimum of $1,000 for eligible students. The only financial contribution required of the student is a $50 copay per term. We will be analyzing the effects of community college tuition subsidies in general and use our findings to make a statement about the Oregon Promise and its effectiveness as a program, as well as its viability for larger implementation.

Impact of College

In the United States, barring some special circumstance, citizens are required to attend school from kindergarten through twelfth grade. After receiving a high school diploma or graduate equivalency diploma, the path becomes less clear. For many, the next path is to attend college and work towards achieving further academic credentials. The type, scale and purpose of colleges differ, but the most advocated option of late has been a four-year track to a Bachelor's degree at a university. The social pressure to attend college and to attain a degree is justified. Research shows that median lifetime earnings of those who have Bachelor's degrees is 65 percent higher than the median lifetime earnings of those with a high school diploma (Braum et al., 2013). In addition to lifetime earnings, the job market employment rate increases dramatically with education. The employment rate for working age adults without a high school diploma was 53 percent in 2012 and 67 percent for those with a high school diploma. During

the same time frame, the employment rate for those with an Associate's degree (a common 2 year track credential) was 77 percent, and it was 82 percent for those with a Bachelor's degree.

College graduates enjoy benefits beyond higher salary and employment rates. Health insurance coverage for full-time workers with a Bachelor's degree or advanced degree covered 14-18 percent more of the costs associated with medical care than those with a high school diploma and 35-39 percent more than full-time workers with less than a high school diploma (Braum et al., 2013). Exercise rates positively correlate with education level, while at the same time, smoking rates and obesity rates negatively correlate with education level; the effect is pronounced. More subjectively, highly educated workers report having higher levels of job satisfaction. It is because of statistics like these that level of college education is seen as a primary indicator for success in the job market and a significant indicator of health effects and the ability to enjoy the non-monetary benefits of employment.

In tandem with the benefits of a college education that are realized by individuals in the job market, fostering a highly educated populace creates numerous benefits for the society as a whole. The demand for high skilled labor has been consistently increasing for the past several decades (Berman et al., 1994), and consistent with the changes in sectors that are experiencing rapid growth, it will continue to increase in the foreseeable future. Maintaining a populace that continues to be competitive in the shifting global economy is paramount to continued prosperity. The bulk of high skilled labor is developed in an academic environment, and most high skilled labor jobs require some level of academic achievement beyond a high school education.

Citizens with a higher level of education attainment have proven to simultaneously decrease their burden on public and government supplied goods and services (Braum et al., 2013). Education level is negatively correlated with reliance on public assistance programs such as Medicaid, the Supplemental Nutrition Assistance Program, and government funded school lunches. More education substantially increases voting rates and increases the civic

involvement overall. On average, highly educated people spend more time with their children than less educated people, and people who have a Bachelor's degree are about a third as likely to live under the poverty line compared to high school graduates.

While workers with a higher education generally have higher lifetime earnings compared to less educated workers, they also pay more to the government in taxes but still maintain a higher after-tax income (Braum et al., 2013). The median tax payment for full-time workers with a Bachelor's degree was $11,400 in 2011 compared to $6,400 for high school graduates and $4,100 for full-time workers with less than a high school diploma. For advanced degree holders, the median tax payment in 2011 was over $20,000. While paying more in taxes, Bachelor's degree holders had median after-tax earnings of $45,100 in 2011, compared to $29,000 for high school diploma holders. This illustrates the monetary benefit of a college education to the individual while also showing the monetary benefit society as a whole derives from a more educated workforce in addition to the social, health, and political benefits of a highly educated populace.

While college education is seen as positive for all people, for individuals who are of a lower socio-economic status, post-high school education is a significant indicator of social mobility. Evidence shows that people who come from lower socio-economic backgrounds have the most to gain from a college degree, in terms of both monetary gains and status related occupational destination (Brand et al., 2010). This is determined by looking at the occupational destinations for both college-educated workers as well as non-college-educated workers along the socio-economic origins spectrum. The difference of occupational destination between college-educated and non-college-educated workers decreases the further up the socio-economic origins spectrum an individual comes from.

Data show that the benefit of a college education, when realized against the cost of said education, is significantly large (Braum et al., 2013). However, even considering this net benefit as well as the increased benefit to those with lower socio-economic origins, those who stand the most to gain from a college

education are the least likely to attend college and graduate (Brand et al., 2010). While some of this occurrence is due to social and informational factors (Hoxby et al., 2013), much is due to financial constraints (McPherson et al., 1991). The persistence of this trend has led to many changes in how college education is addressed. The creation of institutions geared towards students that do not fit within a structured four-year track university, such as community colleges, flexibly scheduled classes and graduation tracks, and online distance education have allowed greater access to higher education. In addition, financial aid, scholarship, and loan packages have been increasingly important in creating a highly educated workforce. The ramifications of specific untraditional education approaches are judged on a case-by-case basis but the importance of addressing the issue of access with the increasing costs of education is becoming more and more pronounced.

The Community College Route

A common method that has been used to offer greater access to higher education is through community colleges, sometimes referred to as junior colleges. Community colleges are often state sponsored, locally focused colleges that specialize in vocational training programs and 2 year track general education programs that can result in an Associate's degree or credentials for transfer to a four-year track university to attain a Bachelor's degree. Community colleges are a widely utilized option because they are usually substantially cheaper, closer, have more flexible class scheduling, and have a less selective admissions processes than four-year track university options (Kolesnikova, 2010).

In the 2006-2007 academic year, community college students paid an average of $2,017 in tuition and fees. This is a substantial savings compared to the average for public four-year universities at $5,685 and the average for private four-year universities at $20,492 (Kolesnikova, 2010). For some, community college offers a path towards a terminal degree or credentials in the form of an Associate's degree or trade certificate. For others, community college offers a starting place to eventually transfer into a four-year institution with transferrable

college credits. Under any of these scenarios, the financial savings that come with beginning at a community college are substantial. This is some of the reasoning for why over 40 percent of college students in the United States are enrolled in the community college system.

Community colleges have gained increasing attention because research is showing that they attract a different student demographic than four-year track institutions (Kane et al., 1999). Students who attend community college are more likely than four-year institution students to be the first in their family to attend college and are more likely to identify with a race that is non-white. Community college students are on average older and are twice as likely as four-year college students to list work as their primary activity. 31 percent of community college students attend school full time, in contrast to 63 percent of four-year track students (Kolesnikova, 2010). It is believed that this difference in enrollment status is largely due to the larger number of community college students who work full time compared to students at other institutions. Community college students also tend to be from a lower socioeconomic background than students who attend four-year track institutions. The attraction of non-traditional students to community colleges suggests that they are less an alternative to students who would otherwise be choosing to attend a four-year institution. Instead, prior research suggests that community colleges are used as an alternative to direct employment after high school track, or they are attended in addition to work.

Due to differences in the institutions as well as in the characteristics of their students, degree attainment for those who begin college at a community college is significantly lower. Looking at students entering college in 1982, 53.7 percent of two-year track college entrants attained no degree within ten years, a significant amount of them completing less than two semesters (Kane et al., 1999). In the same survey, they found that 29.4 percent of four-year track college entrants did not attain a degree within ten years. Of those who attained a degree within ten years, 15.6 percent of two-year track college entrants received a Bachelor's degree or higher while 58.9 percent of four-year track college entrants received a Bachelor's degree or higher. While the difference in degree attainment

between students who start in two-year and those who start is four-year is large, the difference could be more about aspirations and less about ability or institutional factors. Of all two-year track college entrants surveyed, only 17.9 percent agreed that a Bachelor's degree or higher was the lowest level of education with which they would be satisfied. Out of all four-year track college entrants surveyed, 56 percent agreed that a Bachelor's degree or higher was the lowest level of education with which they would be satisfied.

Since community colleges offer education for many different types of students and many different educational paths, it is difficult to evaluate their effectiveness with the same metrics that four-year track colleges are judged because these colleges are generally designed to create a direct path towards a Bachelor's degree or higher. When factoring in aspirational differences, differences in socio-economic backgrounds, full-time work status, and other differences between community college students and other types of students it is unreasonable to expect similar outcomes. Many community colleges are also focused specifically on vocational training and terminal Associate's degrees, not on getting students prepared to transfer to a four-year school.

Prior research often supports the argument that community colleges offer affordable and agreeable paths towards a Bachelor's degree, with the tools that allow students to gain credits that they will eventually transfer to a four-year institution (Kolesnikova, 2010). These findings take into account the cost differences between two-year track institutions and four-year track institutions. In addition, community colleges offer a variety of other educational paths including a path towards an Associate's degree, work-related certification, and other options for many types of potential students. However, conclusions on the benefits of attending community college are far from unanimous. Prior research has also found that there are significant decreases in degree attainment levels that are unexplained by demographic characteristics (Reynolds, 2012). This research also concludes that there is a significant negative effect on labor market outcomes from attending community college that are not offset by the reduction in cost of attendance.

In their paper "Where to attend? Estimating the effects of beginning college at a two-year institution" C. Lockwood Reynolds uses a simple cost-benefit analysis to determine if attending a two-year college is a rational choice given their described drawbacks; mainly labor market outcomes and degree attainment levels. Reynolds concludes that, given the lower completion rates and labor market prospects, an individual starting higher education at a community college would be better off going to a four-year institution instead. With a Bachelor's degree being their only measure of successful completion, the difference in degree attainment levels is the main factor given for drawing this conclusion. However, given the short-term cost reduction of a community college education and a discount rate of 0.889 for men and 0.911 for women, the reduced likelihood of attaining a Bachelor's degree may be worth the risk to some.

The differences in degree attainment levels between two-year and four-year institutions, while considering the cost, is a point of major contention when deciding the value of a community college education compared to its alternatives. While degree attainment levels, as well as the cost of attendance, are lower at community colleges, the benefit of a community college education can be unclear. More research is needed to determine the effect of beginning higher education at a community college on degree attainment and labor market outcomes as well as a more complete analysis of the costs and benefits associated with beginning higher education at a community college.

Price Effects and Financial Aid

A college education is an expensive purchase for many families. For the families that stand to benefit the most from a college education, this expense is an even greater proportion of their household income (Brand et al., 2010). In order to increase public education through intervention, information on price effects and elasticity, current financial aid systems, and public debt burden must be understood and accounted for. The way consumers interact with the colleges when taking cost into account determines their response to changes in cost of

attendance both from the institution as well as in the form of a financial aid package.

The cost of attendance and the opportunity costs of limiting work availability are significant factors in determining a person's ability and willingness to attend college. Additionally, the cost of attendance to the individual is a significant factor in determining if a student graduates with a degree, and their level of degree attainment (Dynarski, 1999). Specifically, while statistics do differ, a lot of research suggests that a $1,000 increase in financial aid, or a decrease of $1,000 in tuition costs, will result in a 3.7-3.8 percent increase in attendance. Similar research suggests years of schooling completed increases by 0.16 years for every $1,000 increase in financial aid, or a decrease of $1,000 in tuition costs to the student.

Since a college education is an increasingly important level of attainment (Braum et al., 2013) and the financial burden of a college education is simultaneously increasing (Braum et al., 2015), financial aid is playing an important role in determining the level of education an individual attains, particularly for lower income students. Financial aid is a major contributor to lowering, or offsetting/delaying, the cost of attendance. Scholarships, educational tax credits and deductions, institutional grants, state grants, Pell grants, and federal student loans all represent forms of financial aid. Scholarships, institutional grants, educational tax credits and deductions, and Pell grants essentially represent subsidies that do not have to be repaid. Federal student loans are government-supplied loans for education that have long term repayment plans with interest.

Most financial aid is determined either by a merit based system, where previous achievement determines aid offers, or by need, where financial situations determine aid offers (Braum et al., 2015). Financial aid packages can also be determined by a combination of merit and financial need. During the 2011-2012 academic year, students who attended non-profit four-year track institutions received an average of $22,830 in grant financial aid, with 56 percent of the grant aid coming from their institution and 24 percent coming from the

federal government. In the 2014-2015 academic year, 35 percent of United States undergraduate students received Pell grants; with an average grant $3,673 and a maximum grant of $5,730. 75 percent of Pell grant recipients from 2013 to 2014 came from households with an income under $40,000. Pell grants represent a significant portion of need-based aid available to U.S. undergraduates.

Due to the nature of the tax credits, educational tax credits and deductions are less utilized by lower income families than other forms of financial aid. In 2013, roughly 25 percent of tax credits and deductions were used by families with incomes under $25,000, and roughly 25 percent were used by families with incomes over $100,000 (Braum et al., 2015). For this reason, educational tax credits and deductions are not seen as need-based financial aid.

In the 2014-2015 academic year, 36 percent of U.S. undergraduates took out federal student loans through either the Stafford Subsidized Loan Program or the Stafford Unsubsidized Loan Program (Braum et al., 2015). The average loan taken out of the subsidized program was $3,750 and the average loan taken out of the unsubsidized program was $4,125. Student loans have been an important institution for displacing the financial burden of college to a time later in life where a person's income is hopefully greater.

Even considering the financial aid available to many undergraduate students, student debt continues to be an issue that is faced by many students and graduates (Dynarski, 1999). The burden of student debt is a hindrance to college attendance, student retention, degree attainment, and future prospects. In 2013-2014, 61 percent of graduates from four-year track institutions graduated with student debt. These students borrowed an average of $26,900 during their undergraduate study (Braum et al., 2015). This financial burden has been increasing and often burdens students well into the future, regardless of whether they eventually acquire a degree.

With the increasing costs of attending college, and the social reliance on higher education in the modern economy, student aid plays an important role in granting access to college for students in disadvantaged socioeconomic classes.

Even considering the aid available and the importance placed on financial need based aid, funding of higher education is still problematic. Many students are crowded out of aid contention and many more graduate with student debt that can burden graduates and non-graduates alike with financial constraints that take years to repay at the wages they eventually receive. Research shows that decreasing the cost of education significantly increases attendance and degree attainment. Expanding aid options and lowering tuition costs through various mechanisms prove to help students attend college, graduate with advanced degrees, and avoid massive burdens of debt.

Data

The majority of the data we used came from the BPS (Beginning Postsecondary Students) 04-09 Longitudinal Study. BPS is a nationally representative survey of students who are beginning their postsecondary education, and it tracks them for six years. Many different types of data are collected about the students and the institutions they are attending. With the spotlight on community colleges, we focused our analysis on the students who started their education at a two-year or less-than-two-year institution. Our first order of business was to estimate the likelihood of a first-year community college student attaining a Bachelor's degree as a function of the net cost of their education. The Oregon Promise will be effectively reducing this net cost, hopefully increasing enrollment and increasing the educational credentials of the population. The BPS study followed students for six years, tracking their achievement and educational attainment, as well as a great deal of demographic information and institutional characteristics, so with the data we have, we are constrained to a six-year period, 150 percent of standard completion time, for estimation purposes.

The data consists of responses from 16684 students, and 7987 of them attended a community college as their first institution. Among these students, 778 of them attained a bachelor's degree within a six-year period. At first, these numbers seem discouraging, with less than 10 percent of beginning community

college students attaining a bachelor's degree, but the first consideration that needs to be made is that it is highly unlikely that all students that start at a community college are there with the intention of getting a bachelor's degree, and there are many fields in which a two-year or less-than-two-year certification are sufficient to succeed or to move on to a more specialized trade school. However, for the first portion of this analysis, we will constrain our focus to the rate of Bachelor's degree attainment for all students, so we can use that metric to measure the increase in total educational levels with community college tuition waivers in place.

We also used data from the College Scorecard. This database is a collection of institutional level data from postsecondary institutions in the United States and US Territories that is eligible to receive federal financial aid. In contrast to the BPS data, which looks at information at the student level, the College Scorecard data is at the institutional level. Along with providing general data for the cost of different schools, this allows us to make inferences about the enrollment at different institutions based on changes in observable characteristics, most notably with changes in the tuition offered on a yearly basis. We can use this to estimate the effect on enrollment that would come about by a decrease in the cost of attending schools.

Methodology

In order to establish the causal effect of a change in net cost on college enrollment and Bachelor's degree attainment, we first used the BPS data and ran a logistic regression of Bachelor's Degree Attainment on a net cost variable that measures the tuition and fees less the grants offered for each student. In this regression, we controlled for a wide variety of other demographic and institutional characteristics, including the location of schools and the degree intentions of students in their first year[1]. Using a logistic regression allows us to estimate the probability of success for the binary variable that represents Bachelor's degree attainment. This allows us to isolate the effects of an increase in net cost of

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[1] Table 1 in the appendix shows the regression results

attendance on the likelihood of a beginning community college student attaining a Bachelor's degree. Focusing on Bachelor's degree attainment allows us to quantify the level of higher education attained by students who are at postsecondary institutions. Interpreting the coefficients in a logistic regression is not quite as simple as it is in a linear regression, so we use the Stata command `margins` to get the probability of a student earning a Bachelor's degree if all observations were treated as if they started at a two-year or less-than-two-year school. In the same way, we can look at the probability of Bachelor's degree attainment if all observations were treated as if they started at a four-year school. This gives us a tentative estimate of the average difference in probability between the same students going to a two-year and going to a four-year when controlling for many different demographic and institutional characteristics. In this case, even though two-year schools and four-year schools have very different characteristics, I left in the institutional characteristics as a way to account for revealed preferences.

These data suggest that the marginal benefit of starting at a four-year school vs a less-than-four-year school in terms of Bachelor's degree attainment is approximately 0.218, that is, for all of the students in the sample group, the results of the regression suggests that the increase in the probability of Bachelor's degree attainment is 21.8 percent for students who start at a four-year school as opposed to a two-year school. We then estimated the attainment rate for four-year students if they had started at a two-year school and came up with a probability of approximately 0.313, which is much greater than the observed attainment rate of students who started at a two-year, approximately 0.097. This disparity is echoed in our following prediction of attainment for two-year students if they had chosen to go to a four-year school, 0.284, much lower than the observed rate of students who started at a four-year, 0.635. Clearly, our model predicts that the demographic characteristics of students who choose to attend certain institutions are important deciding factors in their success[2].

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[2] See results after Table 1

This information raises the question of why. Why would the State of Oregon choose to invest in community colleges if there is strong evidence to suggest that starting at a two-year institution is detrimental to the probability of attaining a Bachelor's degree? There are two possible (but certainly not mutually exclusive) answers to this question. First, the purpose of community colleges is not always further educational attainment beyond their two-year or less-than-two-year credentials. There are many fields for which an associate's degree or a trade certification is sufficient to produce a favorable labor market outcome. In fact, many programs offered by community colleges have no four-year equivalents. In addition to this, a student may choose to selectively take community college courses with no intention of pursuing a degree; they might be taking courses purely for their own personal benefit. We do have a variable for students' degree goals, so our analysis might be more telling if we remove the students who report that they are not pursuing any degree from our estimations of Bachelor's degree attainment. However, if we do that, we are excluding a group of people who would still benefit from the free community college proposal, so it makes sense from a policy analysis perspective to keep them in, even though they will lower our attainment estimations. Second, the price of attending community college is much lower than that of attending a four-year school, so while the probability of attaining a four-year degree among those students is lower, providing similar last-dollar subsidies for students at four-year colleges would be much more expensive, meaning that either fewer students could be served or the proportion of tuition that could be covered under such a program would be much lower.

When considering the prospect of tuition subsidies for community colleges, the primary consideration that needs to be made is the number of people that will be induced to enroll in higher education who would otherwise choose not to. In order to isolate this, the effects on enrollment in postsecondary institutions need to be analyzed. We typically think of a decrease in cost being associated with an increase in demand, so intuitively, it would seem to be the case that lowering the cost of attendance for community colleges by effectively

eliminating their tuition would increase enrollment by some amount dependent on the tuition elasticity of demand for community colleges, under the assumption that higher education is a normal good. Joseph T. Crouse, in his article, "Estimating the Average Tuition Elasticity of Enrollment for Two-Year Public Colleges," estimated that for a $100 increase in tuition at two-year institutions at the mean, the enrollment decreased by approximately 0.883 percent, a much higher responsiveness than has been previously estimated for four-year institutions.

The average cost of in-state tuition for community colleges in 2013 in the United States was $3548.44 and the median was $3456 (we restricted our sample to institutions with "Community College" or "Junior College" in their IPEDS reported name). Using the College scorecard data, we would like to estimate our own tuition elasticity of demand for community colleges and compare it with Crouse's estimate. We created a time series data set using the data from 2001 through 2013 and ran a regression of the log of undergraduate enrollment on the log of in-state and out-of-state tuition over the set of community colleges. Using this data, we estimated a tuition elasticity of demand for community colleges of -0.200, which is quite close to the -0.207 estimated by Crouse[3]. He also got more specific and estimated that the responsiveness of enrollment to tuition was greater in the Western United States, with an estimated elasticity of -0.822, so we can use this to evaluate the effects of the tuition waivers in Oregon. The Oregon free community college bill would reduce tuition at community colleges to $50 a term, or $150 a year, a decrease of 96.40 percent from the 2015 statewide average of $4,169 in tuition, so our estimate of the increase in enrollment using the estimated elasticity of -0.822 is 79.24 percent, which was derived linearly from the decrease in enrollment. The total enrollment for community colleges in Oregon was 102,973 in 2014[4], and due to the increasing trend in community college enrollment and the lack of available 2015 enrollment data, we can use this as a lower bound for enrollment in 2015.

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[3] See Table 2
[4] Enrollment data for 2014 is from the American Association of Community Colleges

We are already dealing with very large increases, and it is unlikely that the elasticity will remain constant in the extremes, so using 2014 enrollment as a lower bound for enrollment may bring us closer to the true increase than using actual enrollment data which is not available at the time of this paper. Under these assumptions, this suggests that the increase in enrollment would be approximately 81,595 students, putting total enrollment at 184,568. However, this naïve estimate of increased enrollment hinges on the idea that the elasticity is constant along the entirety of the demand curve, an assumption not likely to be true. This result is almost certainly an overestimate of the effect of decreasing tuition.

One important thing that needs to be considered is the potential for the increase in enrollment at community colleges to come from four-year institutions. This effect will likely not be large, due to the differences in demographics between the students who choose to go to a four-year college and those who choose to go to a two-year college, but using the BPS data, we can do some rough estimations of the size of the effect. In order to estimate the effect of the decrease in tuition on the enrollment at four-year institutions, we first ran a linear regression of the net cost of education on an indicator variable for whether they started at a two-year college and a variety of student and institutional characteristics to determine what each student is likely to pay based on their demographics and preferences[5]. We then restricted the observations to only two-year students and used the new regression for these data to predict the cost that four-year students would have paid if they had attended a two-year university[6]. We then did the opposite to determine the price that a two-year student would have paid had they attended a four-year institution. To determine what type of institution a student would choose to attend, we ran a logistic regression on the binary variable for starting at a two-year institution on the estimated two-year and four-year costs for each student, along with a long list of control variables, again with many of the observed institutional characteristics still included to account for

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[5] See Table 4
[6] See Table 5

the revealed preferences of the students. This allowed us to estimate the probability of four year students choosing instead to attend a two-year institution if we lowered the net cost of two-year attendance to $150 per year, and that value came out to be 0.0067[7]. That is, 0.67 percent of students who chose to attend a four-year institution would be induced to change their preferences and attending a two-year school. This makes sense with our earlier statement that the effect is not likely to be a large one, and we can use this to estimate the number of students who would have chosen to switch their enrollment preferences, again with the 2014 enrollment data. The number of students enrolled in a four-year institution in 2014 was 146,486, so we would estimate that 981 students would be induced to change their enrollment preferences from four-year institutions to two-year institutions, leaving the remaining estimated increase of 80614 to be from individuals who would otherwise have chosen not to attend college that may be induced to attend community college, even though that does not make sense with the monetary limitations of the bill. With the minimum amount of funding per student of $1000, the maximum number of students that can be helped is 10,000, meaning that the increase in enrollment due to the bill is effectively capped at that level, and more than 90 percent of the increase can be attributed to individuals who would otherwise have not chosen to attend college.

The total budget for Oregon's Senate Bill 81, the free community college proposal, is $10 million, and we can use $1000 as a lower bound for the amount per student that will be given out under the Oregon Promise, allowing us to calculate a lower bound on the increase in the probability of Bachelor's degree attainment that it will have for the average student who receives aid from that program. Using the BPS data, we used our regression of Bachelor's degree attainment on net cost of attendance and other student and institutional characteristics to estimate that the marginal increase in probability of attainment for a decrease in net cost of $1000 is 0.29 percent over the whole sample[8]. This includes students from all over the United States and all types of institutions.

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[7] See Table 6 and following results
[8] See Table 7 and following results

However, there are just not enough observations from Oregon or from the far West as a whole to draw conclusions about the regional differences. If we restrict the subsidy to students at two-year institutions, as the Oregon free community college proposal does, we get the marginal effect equal to 0.17 percent. However, if we allow the subsidy to only go to students at four-year institutions, the marginal effect increases to 0.43 percent.

Conclusion

The effects of Oregon's Senate Bill 81 on college enrollment and degree attainment have yet to be determined, but using individual student-level data, we estimate that tuition waivers for community colleges will increase community college enrollment by as much as the funding can handle and increase Bachelor's degree attainment among students who start their postsecondary education at two-year institutions by 0.17 percent. The effect on Bachelor's degree attainment is relatively small on a student-level basis, but it is significant at the 1 percent level in the models we estimated. On the other end of the spectrum, we estimated that the same money could be distributed equivalently to students who started at four-year institutions, and that would result in an increase in Bachelor's degree attainment among them by 0.43 percent[9]. This would seem to suggest that the money would be better spent at four-year institutions. While we have estimated that the benefits of the $10 million dollar allocation of resources toward funding community colleges are not as great as they might have been at four-year institutions, our results cannot be fully interpreted as conclusive. With the amount of data we have, we could not estimate regional differences in the increased probability in attainment, and we were limited in scope to the six-year outcome, whereas it may take people longer than that to get their degree due to financial or personal reasons, especially for those attending community colleges, a group more likely to also be juggling work and

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[9] See Table 7 and following results

school and may need to take more breaks in their enrollment. More research needs to be done to make any concrete statements about the relative magnitude of the effects, but our results do suggest that tuition waivers are an effective way to increase public education, even if only slightly.

Appendix

Table 1

```
Logistic regression                        Number of obs   =      12962
                                           Wald chi2(88)   =    3867.59
                                           Prob > chi2     =     0.0000
Log pseudolikelihood = -4851.7355          Pseudo R2       =     0.4355
```

BDAtt	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
TwoYrStart	-1.830874	.2760378	-6.63	0.000	-2.371898	-1.28985
NetCost	.0209936	.0059271	3.54	0.000	.0093767	.0326105
Income	.0024672	.0006528	3.78	0.000	.0011878	.0037466
SubLoan	.0241573	.0192478	1.26	0.209	-.0135677	.0618823
UnsubLoan	-.0161395	.0059699	-2.70	0.007	-.0278402	-.0044387
age	.0177706	.0089693	1.98	0.048	.000191	.0353501
tesatder	.0011008	.0001137	9.68	0.000	.000878	.0013237
hcgparep	.0915089	.0150813	6.07	0.000	.0619501	.1210678
Enrollment	.0012192	.0030304	0.40	0.687	-.0047203	.0071587
ACPT04	.0319905	.0153008	2.09	0.037	.0020015	.0619795
singlpar	-.6049829	.2165728	-2.79	0.005	-1.029458	-.1805079
usborn	.2296064	.2005602	1.14	0.252	-.1634843	.6226972
primlang	-.3089629	.1334852	-2.31	0.021	-.5705891	-.0473368
immigra	-.121098	.0851336	-1.42	0.155	-.2879568	.0457607
disable	-.5603578	.0974786	-5.75	0.000	-.7514123	-.3693032
depnum	.1329428	.0776896	1.71	0.087	-.019326	.2852115
Dependent	.2149767	.0709692	3.03	0.002	.0758796	.3540737
samestat	-.025723	.0861319	-0.30	0.765	-.1945384	.1430923
homedist	-.0000315	.0000518	-0.61	0.543	-.0001331	.00007
distall	.1068206	.1754828	0.61	0.543	-.2371193	.4507605
remetook	-.0457818	.0650144	-0.70	0.481	-.1732077	.0816442
hbcu	-.2546083	.168733	-1.51	0.131	-.5853188	.0761022
hurenr	-.4312786	.2146279	-2.01	0.044	-.8519416	-.0106157
DGOALY1						
Associate^s degree	.0271169	.1948426	0.14	0.889	-.3547676	.4090013
Bachelor^s degree	1.43025	.1659561	8.62	0.000	1.104982	1.755518
No degree	.4816264	.2287525	2.11	0.035	.0332797	.9299731
gender						
Female	.4178862	.0574424	7.27	0.000	.3053011	.5304713
race						
Black or African American	-.3328584	.0938992	-3.54	0.000	-.5168975	-.1488193
Hispanic or Latino	-.4707324	.1080792	-4.36	0.000	-.6825637	-.2589011
Asian	-.0226754	.1619501	-0.14	0.889	-.3400917	.294741
American Indian or Alaska Native	-.099451	.2858647	-0.35	0.728	-.6597355	.4608334
Native Hawaiian / other Pacific Islander	-.035037	.549362	-0.06	0.949	-1.111767	1.041693
Other	-.2220093	.2126029	-1.04	0.296	-.6387034	.1946848
More than one race	-.4864157	.1519717	-3.20	0.001	-.7842748	-.1885565
CITIZEN2						
Resident alien	.2575323	.2087282	1.23	0.217	-.1515675	.6666321
Foreign or international student	.6085932	.411899	1.48	0.140	-.198714	1.4159
miltype						
Active duty	-.7492254	.6446419	-1.16	0.245	-2.0127	.5142494
Reserves	-.8539279	.2856303	-2.99	0.003	-1.413753	-.2941028
Veteran	1.317436	.3003407	4.39	0.000	.7287795	1.906093
smarital						
Married	-.2485736	.2144737	-1.16	0.246	-.6689344	.1717872
Separated	-.1275926	.4881936	-0.26	0.794	-1.084434	.8292493
pareduc						
High school diploma or equivalent	-.2722649	.1482227	-1.84	0.066	-.562776	.0182462
Vocational or technical training	-.1948623	.1895108	-1.03	0.304	-.5662967	.1765721
Less than two years of college	-.2612772	.1653739	-1.58	0.114	-.5854041	.0628496
Associate^s degree	-.0844475	.1656838	-0.51	0.610	-.4091819	.2402868
2 or more years of college but no degree	-.3576657	.1771705	-2.02	0.044	-.7049134	-.0104179
Bachelor^s degree	-.0018377	.152572	-0.01	0.990	-.3008734	.297198
Master^s degree or equivalent	.1607044	.158834	1.01	0.312	-.1506045	.4720134
First-professional degree	.0313929	.2084071	0.15	0.880	-.3770776	.4398634
Doctoral degree or equivalent	.2095505	.2005657	1.04	0.296	-.1835511	.6026521
SELECTV2						
Very selective	1.078007	.2228263	4.84	0.000	.6412759	1.514739
Moderately selective	.685455	.2108507	3.25	0.001	.2721952	1.098715
Minimally selective	.2817029	.2226137	1.27	0.206	-.1546118	.7180177
Open admission	.1243986	.2392627	0.52	0.603	-.3445476	.5933448
twoyrcat						

```
     Community development and career insts |   1.235781   .2917217     4.24   0.000    .6640172    1.807545
          Community connector institutions  |   1.106814   .2122186     5.22   0.000    .6908732    1.522755
    Community mega connector institutions   |   1.197455   .2148603     5.57   0.000    .7763366    1.618573
            Allied health institutions      |   2.055098    .894657     2.30   0.022    .3016027    3.808594
                 Connector institutions     |   .9836423   .3096049     3.18   0.001    .3768279    1.590457
               Certificate institutions     |  -1.304676   .6951399    -1.88   0.061   -2.667125    .0577731
          Career connector institutions     |  -.1810087   .5578602    -0.32   0.746   -1.274395    .9123773
                                          |
                                   locale |
                           Mid-size city  |  -.0335861   .0754596    -0.45   0.656   -.1814842    .1143119
               Urban fringe of large city |   .0441171   .0867146     0.51   0.611   -.1258404    .2140746
           Urban fringe of mid-size city  |   .0126418   .1188631     0.11   0.915   -.2203257    .2456092
                               Large town |   -.029132   .1467718    -0.20   0.843   -.3167995    .2585355
                               Small town |   .1175714   .1004966     1.17   0.242   -.0793983    .3145411
                                    Rural |   .0453006   .1851506     0.24   0.807   -.3175879     .408189
                                          |
                                   obereg |
               Mid East (DE DC MD NJ NY PA) |   .3840841   .1225744     3.13   0.002    .1438427    .6243255
             Great Lakes (IL IN MI OH WI)  |   .0399383   .1185686     0.34   0.736   -.1924519    .2723284
             Plains (IA KS MN MO NE ND SD) |   .2077652   .1274453     1.63   0.103    -.042023    .4575533
    SE (AL AR FL GA KY LA MS NC SC TN VA WV)|    .039626   .1164112     0.34   0.734   -.1885357    .2677878
                      Southwest (AZ NM OK TX)|   .0486048   .1394234     0.35   0.727   -.2246601    .3218697
       Rocky Mountains (CO ID MT UT WY)     |  -.2104348   .1807067    -1.16   0.244   -.5646133    .1437438
           Far West (AK CA HI NV OR WA)     |   .1833234    .131336     1.40   0.163   -.0740904    .4407372
                                          |
                                 localres |
                             Off campus   |  -.3650706   .0902549    -4.04   0.000   -.5419669   -.1881743
                      Living with parents |  -.5210693   .0769464    -6.77   0.000   -.6718816   -.3702571
                                          |
                                 MAJORS12 |
                               Humanities |  -.0709168   .1010092    -0.70   0.483   -.2688912    .1270576
               Social/behavioral sciences |   .4621659   .1191036     3.88   0.000    .2287271    .6956046
                            Life sciences |   .1762065   .1304732     1.35   0.177   -.0795161    .4319292
                        Physical sciences |   .1638761   .2969918     0.55   0.581   -.4182171    .7459694
                                     Math |   .3969417   .3800237     1.04   0.296    -.347891    1.141774
              Computer/information science |  -.2315108   .1673522    -1.38   0.167   -.5595151    .0964934
     Engineering/engineering technologies  |   .2653267   .1294299     2.05   0.040    .0116487    .5190047
                                Education |   .1737367   .1021035     1.70   0.089   -.0263824    .3738558
                      Business/management |   .0522279   .0881969     0.59   0.554   -.1206349    .2250908
                                   Health |  -.2587917   .0914021    -2.83   0.005   -.4379365   -.0796468
                      Vocational/technical |  -.0498443   .1976311    -0.25   0.801   -.4371941    .3375055
           Other technical/professional    |   .1776142   .0981256     1.81   0.070   -.0147084    .3699368
                                          |
                                    _cons |  -3.233443   .5084576    -6.36   0.000   -4.230001   -2.236884
------------------------------------------------------------------------------------------------------------
```

```
. margins, at(TwoYrStart=(0 1))

Predictive margins                              Number of obs    =       12962
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()

1._at        : TwoYrStart       =            0

2._at        : TwoYrStart       =            1

------------------------------------------------------------------------------
             |            Delta-method
             |    Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         _at |
          1  |  .4732161   .0191216    24.75   0.000     .4357386    .5106937
          2  |  .2035642   .0251995     8.08   0.000     .1541741    .2529543
------------------------------------------------------------------------------

. margins if TwoYrStart==0, at(TwoYrStart=(0 1))

Predictive margins                              Number of obs    =        6674
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()

1._at        : TwoYrStart       =            0

2._at        : TwoYrStart       =            1

------------------------------------------------------------------------------
             |            Delta-method
             |    Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         _at |
          1  |   .651783   .0050528   128.99   0.000     .6418797    .6616864
          2  |  .3127958   .0484442     6.46   0.000      .217847    .4077446
------------------------------------------------------------------------------

. margins if !TwoYrStart==0, at(TwoYrStart=(0 1))

Predictive margins                              Number of obs    =        6288
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()

1._at        : TwoYrStart       =            0

2._at        : TwoYrStart       =            1

------------------------------------------------------------------------------
             |            Delta-method
             |    Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         _at |
          1  |  .2836876   .0383897     7.39   0.000     .2084452    .3589299
          2  |  .0876272   .0032661    26.83   0.000     .0812257    .0940288
------------------------------------------------------------------------------

             |       TwoYrStart
      BDAtt  |        0          1 |     Total
-----------+---------------------+----------
         0  |    3,176      7,209 |    10,385
         1  |    5,521        778 |     6,299
-----------+---------------------+----------
     Total  |    8,697      7,987 |    16,684

. margins, dydx(NetCost)

Average marginal effects                        Number of obs    =        6288
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()
dy/dx w.r.t. : TwoYrStart

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  TwoYrStart | -.2182761   .0329471    -6.63   0.000    -.2828512    -.153701
------------------------------------------------------------------------------
```

Table 2

```
Linear regression                              Number of obs    =        544
                                               F(34, 508)       =          .
                                               Prob > F         =          .
                                               R-squared        =     0.7628
                                               Root MSE         =     .54009

------------------------------------------------------------------------------------------
                                 |               Robust
                          lnugds |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------------+--------------------------------------------------------
                       lnNetPrice |   .0302632   .081845     0.37   0.712   -.1305331    .1910594
                  lntuitionfee_in |  -.2004139   .0878901   -2.28   0.023   -.3730866   -.0277412
                 lnCompletionRate |  -.1377388   .0572139   -2.41   0.016   -.2501438   -.0253338
                        lninexpfte |  -.2636412   .1112339   -2.37   0.018   -.4821763   -.0451061
                             hbcu |  -.4173111   .2652075   -1.57   0.116   -.9383495    .1037274
                                 |
                          region |
         Mid East (DE DC MD NJ NY PA) |   .4792231   .1048171    4.57   0.000    .2732946    .6851515
            Great Lakes (IL IN MI OH WI) |   .1909796   .1091011    1.75   0.081   -.0233653    .4053245
            Plains (IA KS MN MO NE ND SD) |   .2314551   .1040297    2.22   0.027    .0270736    .4358365
SE (AL AR FL GA KY LA MS NC SC TN VA WV) |   .2048414   .1005146    2.04   0.042    .0073658    .4023169
                Southwest (AZ NM OK TX) |   .1987981   .1469046    1.35   0.177   -.0898172    .4874133
          Rocky Mountains (CO ID MT UT WY) |   .0076771   .1443458    0.05   0.958   -.2759111    .2912654
            Far West (AK CA HI NV OR WA) |   .0237944   .1242569    0.19   0.848   -.2203262     .267915
Outlying Areas (AS FM GU MH MP PR PW VI) |   .5496384   .3070528    1.79   0.074   -.0536114    1.152888
                                 |
                           locale |
      City: Midsize (> 100,000 < 25..) |  -.2323845   .1447468   -1.61   0.109   -.5167606    .0519917
            City: Small (< 100,000) |  -.5631047   .1446292   -3.89   0.000   -.8472498   -.2789597
   Suburb: Large (outside principal city..) |  -.2071398   .1411274   -1.47   0.143    -.484405    .0701254
     Suburb: Mid (outside principal city..) |  -.4358594   .1615812   -2.70   0.007   -.7533089   -.1184098
   Suburb: Small (outside principal city..) |  -.8973314   .1829033   -4.91   0.000   -1.256671   -.5379915
     Town: Fringe (<= 10 miles from urban..) |  -.7661881   .2159903   -3.55   0.000   -1.190532   -.3418439
 Town: Distant (> 10 miles and up to 3..) |  -.8320696   .1489718   -5.59   0.000   -1.124746   -.5393929
       Town: Remote (>= 35 miles from urban..) |  -1.040004   .1543625   -6.74   0.000   -1.343272   -.7367369
    Rural: Fringe (<= 5 miles from urban..) |  -.9276812   .1476728   -6.28   0.000   -1.217806   -.6375566
      Rural: Distant (> 5 miles but <= 25..) |  -1.079333   .1720125   -6.27   0.000   -1.417277   -.7413897
     Rural: Remote (> 25 miles from urban..) |  -1.310361    .337982   -3.88   0.000   -1.974376   -.6463468
                                 |
                          ccbasic |
  Associate's--Public Rural-serving Medium |   .8007546   .0670928   11.94   0.000     .668941    .9325682
   Associate's--Public Rural-serving Large |   1.363102    .104227   13.08   0.000    1.158333    1.567871
   Associate's--Public Suburb-Single Campus |   1.055856   .1182126    8.93   0.000    .8236098    1.288101
    Associate's--Public Suburb-Multicampus |   1.476091   .1242504   11.88   0.000    1.231983    1.720199
   Associate's--Public Urban- Single Campus |   1.396186   .1402744    9.95   0.000    1.120597    1.671776
     Associate's--Public Urban- Multicampus |   1.486434   .1462846   10.16   0.000    1.199037    1.773832
       Associate's--Private Not-for-profit |  -1.901805   .5241122   -3.63   0.000   -2.931499   -.8721104
           Associate's--Private For-profit |  -1.372814   .2655707   -5.17   0.000   -1.894167   -.8506623
   Associate's--Public 2-year under 4-year |   .5119322   .1704685    3.00   0.003    .1770221    .8468423
    Associate's--Public 4-year Associate's |   .0817029   .1774976    0.46   0.645   -.2670169    .4304227
                   Tribal Colleges |  -.9971241    .207633   -4.80   0.000   -1.405049   -.5891991
                                 |
                            _cons |   11.05565   1.356205    8.15   0.000    8.391185    13.72011
------------------------------------------------------------------------------------------
```

Table 3

```
Linear regression                               Number of obs =   12962
                                                F( 87, 12874) =   98.58
                                                Prob > F      =  0.0000
                                                R-squared     =  0.4916
                                                Root MSE      =  4.3307

------------------------------------------------------------------------------------------
                       |              Robust
              NetCost  |    Coef.    Std. Err.      t    P>|t|    [95% Conf. Interval]
-----------------------+------------------------------------------------------------------
             TwoYrStart | -1.417673   .3228287    -4.39   0.000   -2.050466   -.7848813
                Income |  .0217722   .0013446    16.19   0.000    .0191367    .0244078
               SubLoan |  .0038887   .0360332     0.11   0.914   -.0667416     .074519
             UnsubLoan |  .1784828     .01361    13.11   0.000    .1518053    .2051604
                   age | -.0017427   .0056407    -0.31   0.757   -.0127993    .0093138
              tesatder |  .0003194    .000114     2.80   0.005     .000096    .0005428
              hcgparep | -.0107703   .0146427    -0.74   0.462   -.0394721    .0179315
            Enrollment | -.0871775   .0059004   -14.77   0.000   -.0987431   -.0756118
                ACPT04 |  .1130966    .033696     3.36   0.001    .0470474    .1791457
              singlpar |  .2643147   .1311483     2.02   0.044    .0072446    .5213849
                usborn |  .4181383   .2889545     1.45   0.148   -.1482554     .984532
              primlang |  .3748589   .1856927     2.02   0.044    .0108737     .738844
               immigra | -.0102772    .117775    -0.09   0.930   -.2411336    .2205793
               disable | -.0284354    .120308    -0.24   0.813   -.2642568    .2073861
                depnum | -.0369208   .0446685    -0.83   0.409   -.1244777    .0506361
             Dependent | -.4399482   .1124274    -3.91   0.000   -.6603225    -.219574
              samestat |  3.742819    .195212    19.17   0.000    3.360174    4.125463
              homedist |  .0005607   .0001417     3.96   0.000     .000283    .0008384
               distall |  -.014801   .1818414    -0.08   0.935   -.3712371    .3416352
              remetook |  .0055643   .0797689     0.07   0.944   -.1507945    .1619231
                  hbcu | -.8244705   .1966262    -4.19   0.000   -1.209887    -.439054
                hurenr |  .5883951   .2186078     2.69   0.007    .1598915    1.016899
                       |
               DGOALY1 |
    Associate^s degree | -.0775382   .1297815    -0.60   0.550   -.3319291    .1768527
     Bachelor^s degree | -.1305452   .1307013    -1.00   0.318   -.3867392    .1256488
             No degree |  -.694697   .1872617    -3.71   0.000   -1.061758   -.3276363
                       |
                gender |
                Female | -.1144552   .0894798    -1.28   0.201   -.2898488    .0609384
                       |
                  race |
Black or African American | -.5902602  .1050284   -5.62   0.000   -.7961315   -.3843888
     Hispanic or Latino |  .1457454   .1447798     1.01   0.314   -.1380444    .4295352
                 Asian |  .2072347   .2941501     0.70   0.481    -.369343    .7838124
American Indian or Alaska Native | -1.715985  .2608806  -6.58   0.000    -2.22735   -1.204621
Native Hawaiian / other Pacific Islander | .3815639  .7139927   0.53   0.593   -1.017968    1.781096
                 Other | -.3466693    .337485    -1.03   0.304    -1.00819    .3148514
     More than one race | -.2376061   .2572007    -0.92   0.356   -.7417575    .2665453
                       |
              CITIZEN2 |
        Resident alien |  .1119408   .2652868     0.42   0.673   -.4080608    .6319423
Foreign or international student | -3.476085  .7740469  -4.49   0.000   -4.993331   -1.958838
                       |
               miltype |
           Active duty |  .3130274   .8317933     0.38   0.707   -1.317411    1.943466
              Reserves |  .0329405   .4207224     0.08   0.938   -.7917378    .8576188
               Veteran |  .0479845   .2151904     0.22   0.824   -.3738206    .4697896
                       |
              smarital |
               Married | -.0950645   .1274556    -0.75   0.456   -.3448964    .1547674
             Separated |  .2744959   .2175724     1.26   0.207   -.1519783    .7009702
                       |
               pareduc |
High school diploma or equivalent | -.0946435  .1144987  -0.83   0.408   -.3190779    .1297909
Vocational or technical training | -.1502916  .1771439  -0.85   0.396   -.4975199    .1969367
Less than two years of college | -.1414748   .1476665  -0.96   0.338   -.4309231    .1479734
     Associate^s degree | -.1994941   .1554178    -1.28   0.199   -.5041361    .1051478
2 or more years of college but no degree | -.0920611  .1640046  -0.56   0.575   -.4135344    .2294123
     Bachelor^s degree |  .2825619   .1427309     1.98   0.048     .002788    .5623357
Master^s degree or equivalent |  .7442785  .1763069   4.22   0.000    .3986908    1.089866
First-professional degree |  2.035796   .3706941    5.49   0.000    1.309181    2.762411
Doctoral degree or equivalent |  1.91446   .3448535    5.55   0.000    1.238496    2.590424
                       |
              SELECTV2 |
        Very selective |  1.236742   .3771787     3.28   0.001    .4974156    1.976068
   Moderately selective | -2.172524   .3264771    -6.65   0.000   -2.812468   -1.532581
    Minimally selective | -3.048314   .3360644    -9.07   0.000    -3.70705   -2.389578
        Open admission | -2.623527   .3433107    -7.64   0.000   -3.296467   -1.950587
                       |
               twoyrcat |
Community development and career insts | -2.50779  .1871007  -13.40   0.000   -2.874536   -2.141045
Community connector institutions | -2.739631  .1462118  -18.74   0.000   -3.026228   -2.453034
```

```
Community mega connector institutions |   -2.329635    .1642157    -14.19    0.000    -2.651522    -2.007748
          Allied health institutions |   -2.474906    1.046579     -2.36    0.018    -4.526356    -.4234572
               Connector institutions |   -1.329921    .2707779     -4.91    0.000    -1.860686    -.7991559
             Certificate institutions |   -.1140936    .4621949     -0.25    0.805    -1.020064     .7918769
         Career connector institutions |    1.362332    .2651748      5.14    0.000     .8425496     1.882114
                                       |
                               locale  |
                       Mid-size city   |   -1.256062    .1195295    -10.51    0.000    -1.490357    -1.021766
          Urban fringe of large city   |   -.8667157    .1302217     -6.66    0.000    -1.121969    -.6114619
       Urban fringe of mid-size city   |   -1.990126    .2062496     -9.65    0.000    -2.394406    -1.585846
                         Large town    |   -2.031448    .2027161    -10.02    0.000    -2.428802    -1.634095
                         Small town    |   -1.324081    .1601606     -8.27    0.000     -1.63802    -1.010143
                              Rural    |   -1.818136    .1733448    -10.49    0.000    -2.157917    -1.478354
                                       |
                               obereg  |
           Mid East (DE DC MD NJ NY PA) |   -2.312392    .2819125     -8.20    0.000    -2.864983    -1.759802
          Great Lakes (IL IN MI OH WI) |   -2.782238    .2632884    -10.57    0.000    -3.298322    -2.266153
           Plains (IA KS MN MO NE ND SD) |    -3.03316    .2702269    -11.22    0.000    -3.562844    -2.503475
 SE (AL AR FL GA KY LA MS NC SC TN VA WV) |   -4.056177    .2628093    -15.43    0.000    -4.571323    -3.541032
             Southwest (AZ NM OK TX)    |   -3.818873    .2662014    -14.35    0.000    -4.340667    -3.297079
     Rocky Mountains (CO ID MT UT WY)   |   -4.381259    .3097461    -14.14    0.000    -4.988407     -3.77411
             Far West (AK CA HI NV OR WA) |   -2.657183    .2871092     -9.25    0.000     -3.21996    -2.094406
                                       |
                             localres  |
                         Off campus    |   -.7564327    .1378256     -5.49    0.000    -1.026591     -.486274
                 Living with parents   |   -.5443138    .1300585     -4.19    0.000    -.7992478    -.2893798
                                       |
                             MAJORS12  |
                          Humanities   |   -.2461942    .1763037     -1.40    0.163    -.5917755     .0993871
            Social/behavioral sciences |   -.4521697    .2171386     -2.08    0.037    -.8777936    -.0265457
                      Life sciences    |    -1.05886    .2543156     -4.16    0.000    -1.557357    -.5603642
                  Physical sciences    |   -1.302394     .467717     -2.78    0.005    -2.219188    -.3855988
                              Math     |   -1.608395    .7515213     -2.14    0.032    -3.081488    -.1353021
          Computer/information science |   -.2255835    .1959191     -1.15    0.250    -.6096139      .158447
 Engineering/engineering technologies  |   -.7711974     .227729     -3.39    0.001     -1.21758    -.3248149
                         Education     |   -.5847054    .1407868     -4.15    0.000    -.8606684    -.3087423
                Business/management    |   -.5180816    .1281489     -4.04    0.000    -.7692725    -.2668908
                            Health     |   -.4959274    .1062203     -4.67    0.000     -.704135    -.2877198
                Vocational/technical   |   -.3524532    .2201851     -1.60    0.109    -.7840487     .0791424
         Other technical/professional  |   -.4612737    .1336708     -3.45    0.001    -.7232883     -.199259
                                       |
                               _cons   |    5.018635    .6713337      7.48    0.000     3.702721     6.334548
---------------------------------------------------------------------------------------------------------------
```

Table 4

```
Linear regression                               Number of obs =    6288
                                                F( 82,  6205) =   39.22
                                                Prob > F      =  0.0000
                                                R-squared     =  0.5278
                                                Root MSE      =  2.0393
```

NetCost	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
Income	.0089651	.0009503	9.43	0.000	.0071021	.010828
SubLoan	.2601744	.0414893	6.27	0.000	.1788411	.3415078
UnsubLoan	.2876014	.0239201	12.02	0.000	.2407097	.334493
age	.0071732	.0046652	1.54	0.124	-.0019722	.0163186
tesatder	.0001024	.00008	1.28	0.201	-.0000544	.0002592
hcgparep	.0255633	.010464	2.44	0.015	.0050503	.0460763
Enrollment	-.0101963	.0086653	-1.18	0.239	-.0271833	.0067906
ACPT04	.013654	.0252337	0.54	0.588	-.0358127	.0631208
singlpar	-.1986871	.1057812	-1.88	0.060	-.4060549	.0086807
usborn	.1004285	.188638	0.53	0.594	-.2693673	.4702243
primlang	.3287542	.1238442	2.65	0.008	.0859767	.5715316
immigra	-.0599913	.0744785	-0.81	0.421	-.2059949	.0860123
disable	-.1532702	.0809361	-1.89	0.058	-.3119331	.0053926
depnum	-.0563559	.037515	-1.50	0.133	-.1298983	.0171866
Dependent	-.0349383	.0720979	-0.48	0.628	-.1762751	.1063985
samestat	.9523655	.1935612	4.92	0.000	.5729184	1.331813
homedist	.0003071	.000214	1.43	0.151	-.0001125	.0007266
distall	-.1590251	.1133186	-1.40	0.161	-.3811688	.0631185
remetook	.0211037	.0500561	0.42	0.673	-.0770237	.1192311
hbcu	-.0600093	.1148515	-0.52	0.601	-.285158	.1651394
hurenr	.2095115	.1416242	1.48	0.139	-.0681209	.4871439
DGOALY1						
Associate^s degree	-.1568105	.1129762	-1.39	0.165	-.3782831	.064662
Bachelor^s degree	-.0987004	.1087963	-0.91	0.364	-.3119789	.1145781
No degree	.0634577	.1637261	0.39	0.698	-.2575022	.3844176
gender						
Female	.1117292	.0588268	1.90	0.058	-.0035918	.2270501
race						
Black or African American	-.1328012	.0773418	-1.72	0.086	-.284418	.0188156
Hispanic or Latino	.2919749	.0981998	2.97	0.003	.0994692	.4844806
Asian	.424701	.2372585	1.79	0.073	-.0404078	.8898099
American Indian or Alaska Native	-.7748136	.2094504	-3.70	0.000	-1.185416	-.3642114
Native Hawaiian / other Pacific Islander	-.2972806	.3438153	-0.86	0.387	-.9712777	.3767165
Other	.0586298	.1876214	0.31	0.755	-.3091731	.4264327
More than one race	-.2114527	.1848509	-1.14	0.253	-.5738244	.150919
CITIZEN2						
Resident alien	.1771232	.1791798	0.99	0.323	-.1741314	.5283778
Foreign or international student	.4641189	.557867	0.83	0.405	-.6294937	1.557731
miltype						
Active duty	.5444269	.3145013	1.73	0.083	-.0721045	1.160958
Reserves	.4380971	.4976161	0.88	0.379	-.5374028	1.413597
Veteran	.2474995	.1482481	1.67	0.095	-.043118	.538117
smarital						
Married	-.2158597	.1101536	-1.96	0.050	-.4317989	.0000796
Separated	-.0075884	.2127342	-0.04	0.972	-.4246211	.4094443
pareduc						
High school diploma or equivalent	.0348064	.0923856	0.38	0.706	-.1463014	.2159142
Vocational or technical training	.1069681	.137063	0.78	0.437	-.1629187	.3768549
Less than two years of college	.0036641	.1180314	0.03	0.975	-.2277183	.2350465
Associate^s degree	.1182656	.1120796	1.06	0.291	-.1014493	.3379805
2 or more years of college but no degree	.0839592	.1354854	0.62	0.535	-.1816392	.3495576
Bachelor^s degree	.2942019	.112976	2.60	0.009	.0727298	.515674
Master^s degree or equivalent	.3695825	.1354268	2.73	0.006	.104099	.6350659
First-professional degree	.7791559	.3579845	2.18	0.030	.0773823	1.48093
Doctoral degree or equivalent	.2300945	.2727406	0.84	0.399	-.3045715	.7647606
SELECTV2						
Not public or private nfp 4-year	0	(omitted)				
twoyrcat						
Community development and career insts	-2.19963	.1488987	-14.77	0.000	-2.491523	-1.907737
Community connector institutions	-2.627288	.1503527	-17.47	0.000	-2.922031	-2.332545
Community mega connector institutions	-2.831637	.2069932	-13.68	0.000	-3.237416	-2.425859
Allied health institutions	-2.123222	1.057246	-2.01	0.045	-4.195792	-.0506534
Connector institutions	-1.218175	.2481315	-4.91	0.000	-1.704598	-.7317511
Certificate institutions	.3322928	.4021168	0.83	0.409	-.4559955	1.120581
Career connector institutions	1.130172	.2554987	4.42	0.000	.6293064	1.631039

```
                                      |
                               locale |
                       Mid-size city  |  -.1523743   .0855943   -1.78   0.075   -.3201688    .0154202
             Urban fringe of large city |   .0733004   .0956561    0.77   0.444   -.1142187    .2608196
          Urban fringe of mid-size city |  -.5143337   .1621564   -3.17   0.002   -.8322164    -.196451
                          Large town  |  -.5812739   .1470798   -3.95   0.000   -.8696012   -.2929466
                          Small town  |   -.717477   .1082552   -6.63   0.000   -.9296946   -.5052594
                               Rural  |  -.4162442    .134825   -3.09   0.002   -.6805479   -.1519405
                                      |
                               obereg |
         Mid East (DE DC MD NJ NY PA) |  -.3338951   .2127255   -1.57   0.117   -.7509108    .0831205
        Great Lakes (IL IN MI OH WI)  |  -.8985757   .2043893   -4.40   0.000   -1.299249    -.497902
       Plains (IA KS MN MO NE ND SD)  |  -.6758058   .2025281   -3.34   0.001   -1.072831   -.2787807
SE (AL AR FL GA KY LA MS NC SC TN VA WV) |   -1.10104   .1987966   -5.54   0.000   -1.490751   -.7113302
               Southwest (AZ NM OK TX) |  -1.117708   .2049234   -5.45   0.000   -1.519429   -.7159868
     Rocky Mountains (CO ID MT UT WY) |  -1.642021   .2633527   -6.24   0.000   -2.158284   -1.125759
          Far West (AK CA HI NV OR WA) |  -.6135082   .2193821   -2.80   0.005   -1.043573   -.1834432
                                      |
                             localres |
                          Off campus  |   .0341241   .2162953    0.16   0.875   -.3898896    .4581378
                 Living with parents  |  -.0119763   .2101757   -0.06   0.955   -.4239934    .4000408
                                      |
                              MAJORS12 |
                          Humanities  |   .2410301   .1156141    2.08   0.037    .0143864    .4676738
             Social/behavioral sciences |   .0594675   .1483279    0.40   0.688   -.2313066    .3502415
                        Life sciences |  -.0659871   .1927594   -0.34   0.732   -.4438622    .3118881
                   Physical sciences  |   .9930787   .5494695    1.81   0.071   -.0840717    2.070229
                                Math  |   -.114027   .3030415   -0.38   0.707   -.7080934    .4800394
          Computer/information science |  -.0788044   .1410962   -0.56   0.577   -.3554017    .1977929
 Engineering/engineering technologies |   .2634579   .1909861    1.38   0.168    -.110941    .6378568
                           Education  |   .0259487   .0888706    0.29   0.770   -.1482685    .2001659
                 Business/management  |  -.0283021   .0907005   -0.31   0.755   -.2061065    .1495024
                              Health  |  -.0470084   .0769732   -0.61   0.541   -.1979026    .1038858
                 Vocational/technical  |   .0357184   .1773649    0.20   0.840   -.3119782    .3834151
         Other technical/professional |   .1450712   .1044527    1.39   0.165   -.0596923    .3498348
                                      |
                               _cons  |    2.53426   .5051095    5.02   0.000     1.54407    3.524449
-------------------------------------------------------------------------------------------------------

. sum TwoYrNetCost if TwoYrStart

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
 TwoYrNetCost |      6767    1.886689    2.149704  -1.312173   16.23483

. sum nnTwoYrNetCost if TwoYrStart

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
 nnTwoYrNet~t |      6767    1.927507     2.10799          0   16.23483

. sum NetCost if TwoYrStart

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     NetCost |      7448    1.953073     3.01939          0     29.925
```

Table 5

```
Linear regression                                Number of obs =    6674
                                                 F( 83,  6589) =      .
                                                 Prob > F       =      .
                                                 R-squared      = 0.4482
                                                 Root MSE       = 5.4992


--------------------------------------------------------------------------------------------------------
                                      |            Robust
                            NetCost   |    Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------------------------+-----------------------------------------------------------------
                             Income   |  .0264678   .0018664    14.18   0.000     .022809    .0301266
                            SubLoan   | -.0403972   .0472955    -0.85   0.393    -.1331117    .0523174
                          UnsubLoan   |  .1481171    .015802     9.37   0.000      .11714    .1790942
                                age   | -.0122737   .0205129    -0.60   0.550    -.0524857    .0279382
                           tesatder   |  .0008344   .0003486     2.39   0.017     .000151    .0015178
                           hcgparep   | -.0725504   .0409864    -1.77   0.077    -.1528969    .0077962
                         Enrollment   | -.0924468   .0071544   -12.92   0.000    -.1064717   -.0784219
                             ACPT04   |  .0929963   .0427056     2.18   0.029     .0092795    .1767131
                            singlpar  |  .2464132   .4513295     0.55   0.585    -.6383389    1.131165
                             usborn   |  .6545492   .5232078     1.25   0.211    -.3711077    1.680206
                            primlang  |  .2597155   .3666365     0.71   0.479    -.4590109     .978442
                            immigra   | -.0142936     .22653    -0.06   0.950    -.4583659    .4297787
                             disable  |  .2149283   .2528762     0.85   0.395     -.280791    .7106476
                             depnum   |  -.145147     .17888    -0.81   0.417    -.4958097    .2055158
                          Dependent   | -.7109457   .2133724    -3.33   0.001    -1.129225   -.2926666
                           samestat   |  4.403577   .2412845    18.25   0.000     3.930581    4.876573
                           homedist   |  .0004593   .0001533     3.00   0.003     .0001587    .0007599
                            distall   |  .1367147   .4125842     0.33   0.740     -.672084    .9455134
                           remetook   | -.0648919   .1610435    -0.40   0.687    -.3805893    .2508056
                               hbcu   | -.1553686   .3091125    -0.50   0.615    -.7613293    .4505921
                             hurenr   |  .9168672   .5476076     1.67   0.094    -.1566211    1.990356
                                     |
                            DGOALY1   |
                   Associate^s degree |  .5122127   .6022091     0.85   0.395    -.6683123    1.692738
                   Bachelor^s degree  |  .2552888   .5698214     0.45   0.654    -.8617459    1.372323
                          No degree   | -1.327324   .6522934    -2.03   0.042     -2.60603    -.048617
                                     |
                             gender   |
                             Female   | -.4127124   .1494422    -2.76   0.006    -.7056676   -.1197572
                                     |
                               race   |
           Black or African American | -1.253545   .2284413    -5.49   0.000    -1.701364   -.8057257
                  Hispanic or Latino  | -.2115344   .3101361    -0.68   0.495    -.8195016    .3964328
                              Asian   |  .0888961   .4412483     0.20   0.840    -.7760936    .9538858
      American Indian or Alaska Native| -2.007281   .5611238    -3.58   0.000    -3.107265   -.9072963
 Native Hawaiian / other Pacific Islander| 1.104017  1.600572     0.69   0.490    -2.033624    4.241657
                              Other   | -.7431119   .6284595    -1.18   0.237    -1.975096    .4888724
                  More than one race  | -.2507828   .4654109    -0.54   0.590    -1.163139    .6615733
                                     |
                           CITIZEN2   |
                     Resident alien   | -.3648928   .5288943    -0.69   0.490    -1.401697    .6719115
      Foreign or international student | -3.715533  1.194146    -3.11   0.002    -6.056446   -1.374621
                                     |
                            miltype   |
                        Active duty   |  1.683184   1.589689     1.06   0.290    -1.433122    4.799491
                           Reserves   |  .2442839   .6167892     0.40   0.692    -.9648227    1.453391
                            Veteran   |  -.597869   .9304468    -0.64   0.521    -2.421846    1.226108
                                     |
                           smarital   |
                            Married   |  .4663179   .4241277     1.10   0.272    -.3651099    1.297746
                          Separated   |  .5415426   .6942581     0.78   0.435    -.8194283    1.902513
                                     |
                            pareduc   |
       High school diploma or equivalent|  .4442471 .3502209     1.27   0.205    -.2422993    1.130793
       Vocational or technical training|  .3600135  .4370518     0.82   0.410    -.4967486    1.216776
         Less than two years of college|  .4114045  .3850962     1.07   0.285    -.3435088    1.166318
                  Associate^s degree  |  .3684497   .3989556     0.92   0.356    -.4136325    1.150532
 2 or more years of college but no degree| .6328105 .4014039     1.58   0.115    -.1540714    1.419692
                   Bachelor^s degree  |  .9615445   .3645483     2.64   0.008     .2469117    1.676177
          Master^s degree or equivalent| 1.493661  .3864008     3.87   0.000     .7361898    2.251131
            First-professional degree |  2.604526   .5377907     4.84   0.000     1.550282    3.658771
          Doctoral degree or equivalent|  2.767437  .5254263     5.27   0.000     1.737431    3.797443
                                     |
                           SELECTV2   |
                      Very selective  |  .1485656   .4315204     0.34   0.731    -.6973542    .9944853
                 Moderately selective | -2.787877   .3789415    -7.36   0.000    -3.530725   -2.045028
                  Minimally selective | -3.748609   .3763228    -9.96   0.000    -4.486323   -3.010894
                      Open admission  | -3.154495   .3791717    -8.32   0.000    -3.897794   -2.411195
                                     |
                            twoyrcat   |
       Community connector institutions| -3.28766   .8174337    -4.02   0.000    -4.890095   -1.685225
  Community mega connector institutions| -3.784622  .780573     -4.85   0.000    -5.314798   -2.254446
           Allied health institutions | -9.182061  1.15047     -7.98   0.000    -11.43736   -6.926767
              Connector institutions  |  4.455688  2.870406     1.55   0.121    -1.171237    10.08261
```

```
            Certificate institutions |    .854449    1.787481     0.48   0.633    -2.649592     4.35849
                                      |
                               locale |
                        Mid-size city |  -1.738288    .1995689    -8.71   0.000    -2.129508   -1.347068
          Urban fringe of large city |  -1.328796    .2465435    -5.39   0.000    -1.812101   -.8454906
       Urban fringe of mid-size city |  -2.582101    .3008353    -8.58   0.000    -3.171836   -1.992367
                           Large town |  -2.528956    .2955692    -8.56   0.000    -3.108367   -1.949544
                           Small town |  -1.605359    .2726436    -5.89   0.000    -2.139829   -1.070889
                                Rural |  -3.816768    .4238596    -9.00   0.000     -4.64767   -2.985866
                                      |
                               obereg |
            Mid East (DE DC MD NJ NY PA) |  -2.818531    .3872305    -7.28   0.000    -3.577628   -2.059434
            Great Lakes (IL IN MI OH WI) |   -3.29577    .3724484    -8.85   0.000     -4.02589   -2.565651
            Plains (IA KS MN MO NE ND SD) |   -3.83733    .3778258   -10.16   0.000    -4.577991   -3.096669
  SE (AL AR FL GA KY LA MS NC SC TN VA WV) |   -5.47869    .3666684   -14.94   0.000    -6.197479   -4.759901
               Southwest (AZ NM OK TX) |  -4.993206    .3998148   -12.49   0.000    -5.776972   -4.209439
        Rocky Mountains (CO ID MT UT WY) |  -5.277005    .4303646   -12.26   0.000    -6.120659   -4.433351
            Far West (AK CA HI NV OR WA) |  -3.348476    .4223721    -7.93   0.000    -4.176462    -2.52049
                                      |
                             localres |
                           Off campus |  -.9622156    .1985939    -4.85   0.000    -1.351524   -.5729072
                  Living with parents |  -.3314298    .1727716    -1.92   0.055    -.6701181    .0072585
                                      |
                             MAJORS12 |
                            Humanities |  -.6587283     .287094    -2.29   0.022    -1.221526    -.095931
            Social/behavioral sciences |  -.8713352    .2917513    -2.99   0.003    -1.443262   -.2994081
                        Life sciences |  -1.474136    .3328469    -4.43   0.000    -2.126624   -.8216485
                    Physical sciences |  -2.093804     .588438    -3.56   0.000    -3.247333   -.9402744
                                 Math |    -2.5094    1.062474    -2.36   0.018    -4.592193   -.4266064
          Computer/information science |  -.7111792    .4013077    -1.77   0.076    -1.497872    .0755139
  Engineering/engineering technologies |  -1.404505    .3225647    -4.35   0.000    -2.036836   -.7721735
                            Education |  -.9922608    .2324493    -4.27   0.000    -1.447937   -.5365848
                  Business/management |   -.902429    .2283827    -3.95   0.000    -1.350133   -.4547248
                               Health |  -1.301537    .2251262    -5.78   0.000    -1.742857   -.8602165
                  Vocational/technical |  -.2860925    .6217843    -0.46   0.645    -1.504991    .9328063
          Other technical/professional |   -.957413    .2467743    -3.88   0.000    -1.441171   -.4736554
                                      |
                                 _cons |   5.767677    1.279353     4.51   0.000     3.259731    8.275624
-------------------------------------------------------------------------------------------------------

      Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
  FourYrNetC~t |      7233     6.067266    4.859133   -6.987596   27.96433

. sum nnFourYrNetCost if !TwoYrStart

      Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
  nnFourYrNe~t |      7233     6.144278    4.745015           0   27.96433

. sum NetCost if !TwoYrStart

      Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
       NetCost |      8056     6.195302    7.463177           0     39.034
```

Table 6

```
Logistic regression                        Number of obs   =      14000
                                           Wald chi2(89)   =    2728.17
                                           Prob > chi2     =     0.0000
Log pseudolikelihood = -1125.0642          Pseudo R2       =     0.8840
```

TwoYrStart	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
nnTwoYrNetCost	1.919652	.9988659	1.92	0.055	-.0380896	3.877393
nnFourYrNetCost	-.0308442	.0915954	-0.34	0.736	-.2103679	.1486796
Income	-.0203497	.0088798	-2.29	0.022	-.0377539	-.0029456
SubLoan	-.8070484	.262186	-3.08	0.002	-1.320924	-.2931732
UnsubLoan	-.6141572	.2871627	-2.14	0.032	-1.176986	-.0513287
age	-.0234065	.0117065	-2.00	0.046	-.0463508	-.0004621
tesatder	-.0006077	.0002042	-2.98	0.003	-.0010079	-.0002075
hcgparep	-.0480994	.0348096	-1.38	0.167	-.116325	.0201262
Enrollment	.0401289	.0156424	2.57	0.010	.0094703	.0707875
ACPT04	-.1729078	.0476191	-3.63	0.000	-.2662396	-.0795761
singlpar	.3134287	.2955271	1.06	0.289	-.2657938	.8926513
usborn	-.934292	.3810103	-2.45	0.014	-1.681059	-.1875255
primlang	-.6499652	.3893271	-1.67	0.095	-1.413032	.1131018
immigra	.3517664	.1710627	2.06	0.040	.0164898	.6870431
disable	.3019281	.2213555	1.36	0.173	-.1319208	.7357769
depnum	.076189	.0905375	0.84	0.400	-.1012613	.2536393
Dependent	.0423669	.1809245	0.23	0.815	-.3122386	.3969724
samestat	-2.271479	.9880567	-2.30	0.022	-4.208034	-.334923
homedist	-.0002995	.0003204	-0.94	0.350	-.0009274	.0003283
distall	.3335463	.4459734	0.75	0.455	-.5405455	1.207638
remetook	.4246549	.1759637	2.41	0.016	.0797725	.7695373
hbcu	.126295	.4407494	0.29	0.774	-.737558	.990148
hurenr	-.9130038	.3438368	-2.66	0.008	-1.586911	-.2390961
DGOALY1						
Associate^s degree	-2.259288	.2630828	-8.59	0.000	-2.77492	-1.743655
Bachelor^s degree	-2.331598	.2112185	-11.04	0.000	-2.745579	-1.917618
No degree	-2.169688	.4100564	-5.29	0.000	-2.973384	-1.365992
gender						
Female	-.1672827	.1843032	-0.91	0.364	-.5285103	.1939449
race						
Black or African American	.2997794	.214593	1.40	0.162	-.1208151	.7203738
Hispanic or Latino	-.6138753	.3566302	-1.72	0.085	-1.312858	.085107
Asian	-1.215217	.4983076	-2.44	0.015	-2.191881	-.2385517
American Indian or Alaska Native	.3767408	.8032203	0.47	0.639	-1.197542	1.951024
Native Hawaiian / other Pacific Islander	.88176	.7757415	1.14	0.256	-.6386654	2.402185
Other	-.6997822	.4306076	-1.63	0.104	-1.543758	.1441931
More than one race	.4915079	.4309601	1.14	0.254	-.3531585	1.336174
CITIZEN2						
Resident alien	-.4488398	.3668454	-1.22	0.221	-1.167843	.2701639
Foreign or international student	-.4375687	.9603975	-0.46	0.649	-2.319913	1.444776
miltype						
Active duty	-.3787965	.6391039	-0.59	0.553	-1.631417	.8738241
Reserves	-1.438509	.6508161	-2.21	0.027	-2.714085	-.1629328
Veteran	-1.02696	.3839259	-2.67	0.007	-1.779441	-.2744791
smarital						
Married	.7778021	.3173221	2.45	0.014	.1558622	1.399742
Separated	.3614371	.357842	1.01	0.312	-.3399203	1.062794
pareduc						
High school diploma or equivalent	-.1254326	.2123932	-0.59	0.555	-.5417157	.2908504
Vocational or technical training	-.3930921	.3618972	-1.09	0.277	-1.102398	.3162134
Less than two years of college	-.1762231	.2734028	-0.64	0.519	-.7120828	.3596366
Associate^s degree	-.0009269	.3180261	-0.00	0.998	-.6242466	.6223928
2 or more years of college but no degree	.1460245	.3442634	0.42	0.671	-.5287195	.8207684
Bachelor^s degree	-.6284072	.3700824	-1.70	0.090	-1.353755	.096941
Master^s degree or equivalent	-.7797268	.4596375	-1.70	0.090	-1.6806	.1211461
First-professional degree	-1.655537	.8669695	-1.91	0.056	-3.354766	.0436917
Doctoral degree or equivalent	-.2121786	.5929442	-0.36	0.720	-1.374328	.9499706
SELECTV2						
Very selective	-6.284922	.5769266	-10.89	0.000	-7.415677	-5.154166
Moderately selective	-5.99501	.3828463	-15.66	0.000	-6.745375	-5.244645
Minimally selective	-6.3798	.6059424	-10.53	0.000	-7.567425	-5.192175
Open admission	-6.281087	.5922097	-10.61	0.000	-7.441797	-5.120378
twoyrcat						
Community development and career insts	8.180833	2.306582	3.55	0.000	3.660014	12.70165
Community connector institutions	7.408299	2.573411	2.88	0.004	2.364506	12.45209
Community mega connector institutions	8.056876	2.800196	2.88	0.004	2.568593	13.54516

```
         Allied health institutions |   7.547079   2.223777    3.39   0.001    3.188557    11.9056
             Connector institutions |   6.983994    1.39852    4.99   0.000    4.242944   9.725043
           Certificate institutions |   1.930411    .815094    2.37   0.018    .3328565   3.527966
        Career connector institutions |    4.09672   1.509058    2.71   0.007     1.13902   7.054419
                                     |
                              locale |
                      Mid-size city |   .2213516   .2386229    0.93   0.354   -.2463407   .6890438
          Urban fringe of large city |   .1824488    .216447    0.84   0.399   -.2417795    .606677
       Urban fringe of mid-size city |   1.243691   .6014958    2.07   0.039    .0647813   2.422601
                          Large town |   .7755953   .7824788    0.99   0.322   -.7580349   2.309226
                          Small town |   2.045359   .7088813    2.89   0.004    .6559772   3.434741
                               Rural |    1.50309   .5358027    2.81   0.005    .4529361   2.553244
                                     |
                              obereg |
            Mid East (DE DC MD NJ NY PA) |  -.8631786   .5424242   -1.59   0.112    -1.92631   .1999532
          Great Lakes (IL IN MI OH WI) |   .7767409   .9809299    0.79   0.428   -1.145846   2.699328
         Plains (IA KS MN MO NE ND SD) |   .0287891   .8247646    0.03   0.972    -1.58772   1.645298
 SE (AL AR FL GA KY LA MS NC SC TN VA WV) |    .243762   1.171883    0.21   0.835   -2.053087   2.540611
               Southwest (AZ NM OK TX) |   1.538957   1.187384    1.30   0.195   -.7882726   3.866186
        Rocky Mountains (CO ID MT UT WY) |   .3856028   1.701919    0.23   0.821   -2.950098   3.721304
          Far West (AK CA HI NV OR WA) |  -.2525502   .7476786   -0.34   0.736   -1.717973   1.212873
                                     |
                            localres |
                          On campus |   .7652084   .3974667    1.93   0.054   -.0138121   1.544229
                         Off campus |   1.338875   .3234045    4.14   0.000    .7050133   1.972736
                 Living with parents |    1.69271   .3066907    5.52   0.000    1.091608   2.293813
                                     |
                             MAJORS12 |
                          Humanities |  -.3618141   .3760096   -0.96   0.336   -1.098779   .3751511
           Social/behavioral sciences |  -.0397519   .4274153   -0.09   0.926   -.8774704   .7979667
                       Life sciences |  -.1118276   .4142047   -0.27   0.787   -.9236539   .6999987
                   Physical sciences |  -.3510977   1.281464   -0.27   0.784   -2.862721   2.160525
                                Math |  -.5707041   .8993324   -0.63   0.526   -2.333363   1.191955
          Computer/information science |  -.6486247   .2627409   -2.47   0.014   -1.163587   -.133662
 Engineering/engineering technologies |  -.7444092   .4325934   -1.72   0.085   -1.592277   .1034583
                           Education |   .7000935    .310825    2.25   0.024    .0908876   1.309299
                 Business/management |  -.5614171   .1944513   -2.89   0.004   -.9425347   -.1802995
                              Health |   .4183716   .2311653    1.81   0.070    -.034704   .8714472
                  Vocational/technical |   .4936986   .3831374    1.29   0.198   -.2572369   1.244634
           Other technical/professional |  -.6800718     .27151   -2.50   0.012   -1.212222   -.147922
                                     |
                               _cons |    -.14169   2.609866   -0.05   0.957   -5.256934   4.973554
--------------------------------------------------------------------------------------------------
```

```
. margins if TwoYrStart

Predictive margins                              Number of obs   =       6767
Model VCE    : Robust

Expression   : Pr(TwoYrStart), predict()

------------------------------------------------------------------------------
             |            Delta-method
             |    Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |   .959489   .0015862   604.92   0.000     .9563802    .9625978
------------------------------------------------------------------------------

. margins if !TwoYrStart

Predictive margins                              Number of obs   =       7233
Model VCE    : Robust

Expression   : Pr(TwoYrStart), predict()

------------------------------------------------------------------------------
             |            Delta-method
             |    Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |   .037901    .001616    23.45   0.000     .0347337    .0410683
------------------------------------------------------------------------------

. margins if !TwoYrStart, at(nnTwoYrNetCost=.15)

Predictive margins                              Number of obs   =       7233
Model VCE    : Robust

Expression   : Pr(TwoYrStart), predict()
at           : nnTwoYrNet~t     =          .15

------------------------------------------------------------------------------
             |            Delta-method
             |    Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |  .0067285   .0024428     2.75   0.006     .0019407    .0115162
------------------------------------------------------------------------------
```

Table 7

```
Logistic regression                      Number of obs   =      12962
                                         Wald chi2(90)   =    2786.54
                                         Prob > chi2     =     0.0000
Log pseudolikelihood = -1025088.7        Pseudo R2       =     0.4386
```

BDAtt	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
TwoYrStart	-1.423811	.3724303	-3.82	0.000	-2.153761	-.6938606
NetCost	-.0262266	.010017	-2.62	0.009	-.0458596	-.0065936
Tuition	.055073	.0094094	5.85	0.000	.0366308	.0735151
Income	.0028135	.0007741	3.63	0.000	.0012962	.0043307
SubLoan	-.0320184	.0254942	-1.26	0.209	-.0819861	.0179494
UnsubLoan	-.0187562	.0080088	-2.34	0.019	-.0344531	-.0030593
CREDHRS2	.0103289	.0022044	4.69	0.000	.0060083	.0146495
age	.0121708	.0119545	1.02	0.309	-.0112596	.0356012
tesatder	.0010211	.0001495	6.83	0.000	.000728	.0013142
hcgparep	.0745788	.0193797	3.85	0.000	.0365953	.1125623
Enrollment	.0079417	.0041767	1.90	0.057	-.0002445	.016128
ACPT04	.0248945	.021496	1.16	0.247	-.0172369	.0670259
singlpar	-.7737792	.2946172	-2.63	0.009	-1.351218	-.19634
usborn	.0584994	.2755097	0.21	0.832	-.4814897	.5984885
primlang	-.4276605	.1650164	-2.59	0.010	-.7510866	-.1042344
immigra	-.055837	.1180328	-0.47	0.636	-.287177	.1755029
disable	-.5688551	.1342317	-4.24	0.000	-.8319444	-.3057657
depnum	.1246976	.1292415	0.96	0.335	-.1286111	.3780063
Dependent	.2321253	.091408	2.54	0.011	.0529688	.4112818
samestat	-.089819	.1166349	-0.77	0.441	-.3184191	.1387812
homedist	-.0000655	.0000613	-1.07	0.286	-.0001856	.0000547
distall	.3762692	.2347405	1.60	0.109	-.0838137	.8363521
remetook	-.0583923	.0858756	-0.68	0.497	-.2267053	.1099208
hbcu	.0204192	.2099742	0.10	0.923	-.3911227	.4319611
hurenr	-.3194005	.2737001	-1.17	0.243	-.8558428	.2170417
DGOALY1						
Associate^s degree	-.014666	.2366596	-0.06	0.951	-.4785103	.4491782
Bachelor^s degree	1.502386	.2027859	7.41	0.000	1.104933	1.899839
No degree	.6093606	.2857003	2.13	0.033	.0493983	1.169323
gender						
Female	.4237821	.0738105	5.74	0.000	.2791161	.568448
race						
Black or African American	-.352071	.1313213	-2.68	0.007	-.6094559	-.094686
Hispanic or Latino	-.5727367	.1378607	-4.15	0.000	-.8429387	-.3025348
Asian	.0841953	.2120492	0.40	0.691	-.3314134	.499804
American Indian or Alaska Native	-.3962065	.3125535	-1.27	0.205	-1.0088	.2163871
Native Hawaiian / other Pacific Islander	.8316989	.6745253	1.23	0.218	-.4903464	2.153744
Other	-.1360533	.2559773	-0.53	0.595	-.6377596	.3656531
More than one race	-.4405532	.1966254	-2.24	0.025	-.8259319	-.0551744
CITIZEN2						
Resident alien	.2892028	.2574082	1.12	0.261	-.215308	.7937136
Foreign or international student	.6946409	.4935569	1.41	0.159	-.2727128	1.661995
miltype						
Active duty	-1.277492	.6757674	-1.89	0.059	-2.601972	.0469873
Reserves	-.6798595	.3714174	-1.83	0.067	-1.407824	.0481052
Veteran	1.302612	.3998923	3.26	0.001	.518837	2.086386
smarital						
Married	-.1460607	.279556	-0.52	0.601	-.6939803	.4018589
Separated	-.4943735	.5958657	-0.83	0.407	-1.662249	.6735017
pareduc						
High school diploma or equivalent	-.1665594	.1960491	-0.85	0.396	-.5508085	.2176897
Vocational or technical training	-.1021682	.2373107	-0.43	0.667	-.5672886	.3629522
Less than two years of college	-.0656085	.2220565	-0.30	0.768	-.5008312	.3696143
Associate^s degree	.1739697	.2175824	0.80	0.424	-.2524841	.6004234
2 or more years of college but no degree	-.1795711	.2366091	-0.76	0.448	-.6433164	.2841742
Bachelor^s degree	.2613709	.2017426	1.30	0.195	-.1340373	.6567792
Master^s degree or equivalent	.3782294	.2068177	1.83	0.067	-.0271258	.7835846
First-professional degree	.2051046	.299643	0.68	0.494	-.3821849	.7923941
Doctoral degree or equivalent	.1050903	.2517622	0.42	0.676	-.3883544	.5985351
SELECTV2						
Very selective	.8237553	.2868176	2.87	0.004	.2616031	1.385908
Moderately selective	.4616222	.2688022	1.72	0.086	-.0652204	.9884648
Minimally selective	.1417962	.2851786	0.50	0.619	-.4171436	.7007361
Open admission	-.0983007	.3017999	-0.33	0.745	-.6898176	.4932161
twoyrcat						
Community development and career insts	.634886	.375311	1.69	0.091	-.1007101	1.370482

```
              Community connector institutions |    .7312255    .2998381     2.44   0.015     .1435536    1.318897
         Community mega connector institutions |    .7646229    .2980193     2.57   0.010     .1805158     1.34873
                    Allied health institutions |    1.046267    .6043891     1.73   0.083    -.1383135    2.230848
                        Connector institutions |     .076312    .4967024     0.15   0.878    -.8972069    1.049831
                      Certificate institutions |   -1.153417    .7185058    -1.61   0.108    -2.561662    .2548289
                 Career connector institutions |   -1.116258    .6158781    -1.81   0.070    -2.323357    .0908411
                                               |
                                        locale |
                                 Mid-size city |    .1117485    .0985961     1.13   0.257    -.0814963    .3049933
                     Urban fringe of large city |    .1836794    .1153765     1.59   0.111    -.0424545    .4098132
                  Urban fringe of mid-size city |    .2252109    .1659845     1.36   0.175    -.1001126    .5505345
                                    Large town |     .25671    .1840236     1.39   0.163    -.1039696    .6173896
                                    Small town |    .2906574    .1308136     2.22   0.026     .0342675    .5470472
                                         Rural |    .0892448     .214105     0.42   0.677    -.3303934    .5088829
                                               |
                                        obereg |
                  Mid East (DE DC MD NJ NY PA) |    .5457929    .1767653     3.09   0.002     .1993393    .8922464
                  Great Lakes (IL IN MI OH WI) |    .1082565    .1644414     0.66   0.510    -.2140428    .4305558
                  Plains (IA KS MN MO NE ND SD) |    .3611642    .1796666     2.01   0.044     .0090241    .7133044
       SE (AL AR FL GA KY LA MS NC SC TN VA WV) |    .2013859    .1592164     1.26   0.206    -.1106725    .5134444
                           Southwest (AZ NM OK TX) |    .1682445    .1891563     0.89   0.374     -.202495     .538984
            Rocky Mountains (CO ID MT UT WY) |    .0049759    .2195057     0.02   0.982    -.4252472    .4351991
                  Far West (AK CA HI NV OR WA) |    .3522064    .1831228     1.92   0.054    -.0067076    .7111204
                                               |
                                      localres |
                                    Off campus |   -.3050771    .1168329    -2.61   0.009    -.5340655   -.0760887
                           Living with parents |   -.4604035     .099483    -4.63   0.000    -.6553866   -.2654204
                                               |
                                       MAJORS12 |
                                    Humanities |   -.0950414    .1251836    -0.76   0.448    -.3403968     .150314
                     Social/behavioral sciences |     .637147    .1530999     4.16   0.000     .3370767    .9372174
                                  Life sciences |     .059308    .1682683     0.35   0.724    -.2704917    .3891078
                              Physical sciences |    .0411227    .3420478     0.12   0.904    -.6292787     .711524
                                          Math |    .2472563    .4547925     0.54   0.587    -.6441207    1.138633
                     Computer/information science |    .0004607     .202579     0.00   0.998    -.3965869    .3975083
          Engineering/engineering technologies |    .3088419    .1579165     1.96   0.050    -.0006686    .6183525
                                     Education |    .3144228      .14358     2.19   0.029     .0330112    .5958345
                            Business/management |    .0689619     .115641     0.60   0.551    -.1576903    .2956142
                                        Health |   -.1775653    .1224715    -1.45   0.147    -.4176051    .0624745
                           Vocational/technical |   -.0666587    .2689592    -0.25   0.804     -.593809    .4604917
                  Other technical/professional |    .4069303    .1319007     3.09   0.002     .1484097    .6654509
                                               |
                                         _cons |   -3.886266    .6642438    -5.85   0.000     -5.18816   -2.584372
------------------------------------------------------------------------------------------------------------------
```

```
. margins, dydx(NetCost)

Average marginal effects                          Number of obs   =      12962
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()
dy/dx w.r.t. : NetCost

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     NetCost |  -.0028539   .0010908    -2.62   0.009    -.0049919   -.0007159
------------------------------------------------------------------------------

. margins if TwoYrStart, dydx(NetCost)

Average marginal effects                          Number of obs   =       6288
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()
dy/dx w.r.t. : NetCost

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     NetCost |  -.0017097   .0006578    -2.60   0.009    -.0029989   -.0004204
------------------------------------------------------------------------------

. margins if !TwoYrStart, dydx(NetCost)

Average marginal effects                          Number of obs   =       6674
Model VCE    : Robust

Expression   : Pr(BDAtt), predict()
dy/dx w.r.t. : NetCost

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     NetCost |  -.0043394   .0016564    -2.62   0.009    -.0075859   -.0010928
------------------------------------------------------------------------------
```

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