



The Effects of Need & Merit Grant Aid on Graduation Rates: A Regression Discontinuity Analysis

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What We Studied

Over the previous two decades, state lawmakers have made two fundamental changes to how they finance their public universities. They have shifted more of the costs of higher education to students and their families through higher tuition rates; and created new grant programs that are not solely based on financial need but require prior demonstration of college readiness. We know from prior evaluations of these new state-created grant programs that grant aid has a positive effect on graduation rates. However, no existing study has yet to offer a definitive estimate of effect size on graduation rates using data that best reflects the new normal of high tuition rates at public universities. The purpose of this evaluation is to fill this void by performing a regression discontinuity analysis that measures the effect of a need and merit-based grant program in 31 Texas public universities for student cohorts that entered college from 2004 to 2009. This study finds that receiving grant aid causes 4-year graduation rates to increase by 6% points and 6-year graduation rates to increase by 14 to 24% points. The results suggest that during times of austere public budgets states may be able to significantly increase graduation rates by targeting their financial aid dollars to students who demonstrate both financial need and academic preparation.

Approximately 1.8 million first-time undergraduate students enrolled each year in a four-year college during the previous two decades. Approximately 40 percent of these students dropped out before earning their degree (Dunlop Velez, 2014). In a survey of students who left college without a degree, the top reason they gave for dropping out was having unmet financial need. Sixty percent of students who did not graduate reported that combining work and school in their first year in college was "too stressful" (Johnson & Rochkind, 2009). These students wanted to earn a college education. Many put forth great effort in juggling school and work. Yet they fell short in financing a human capital investment that would have increased their expected lifetime earnings by approximately \$865,183 had they gone from having some college to completing a bachelor's degree (Day & Newburger, 2002).

Based on this economic theory, we would expect grant aid to facilitate college completion through four mechanisms. First, grant aid reduces the direct cost of college, thereby increasing the net benefit of college and preference for college. Second, for college students with financial need, the population of interest of this study, grant aid reduces the amount of time needed to work while enrolled in college, thereby providing the grant-aid awardee more free time. Time not spent working while in college, increases the preference for college because the freed time can be used to improve a student's academic performance, making academic achievement easier. The freed time can also be spent on other activities that reduce the stress associated with college, once again increasing the preference of college. Third, time freed up because of grant aid can also be used to enroll in more courses per semester, thereby shortening a student's time to degree and reducing the opportunity cost of deferred work due to college.

We would also expect grant aid to reduce the need for student debt. And, because students with financial need face credit limits and may also have a limited tolerance for debt, grant aid would increase the share of students pursuing graduate degrees following their undergraduate education. Grant aid would also increase the likelihood of graduate

education by increasing the share of students completing a bachelor's degree. Finally, the economic theory of human capital investment asserts a student's decision to acquire additional education increases their productivity and therefore the student's future earnings.

TEXAS Grant

In 1999, the Texas legislature established the Towards Excellence, Access and Success (TEXAS) grant program with the passage of House Bill 713. Starting with an initial investment of \$38 million in fiscal year 2000, the legislature increased TEXAS Grant funding, reaching \$367 million in fiscal year 2015. Yet, only 57 percent of those who applied for financial aid and who were eligible for a TEXAS Grant received one during the study period (General Appropriations Acts of 1999 and 2013).

This study tested the above theoretical implications for grant aid by answering the following research questions. (1) Did receiving an initial TEXAS Grant increase persistence? (2) Did receiving an initial TEXAS Grant increase course enrollment? (3) Did receiving an initial TEXAS Grant reduce the need for employment while in college? (4) Did receiving an initial TEXAS Grant increase the share of students earning a bachelor's degree? (5) Did receiving an initial TEXAS Grant decrease time to degree? (6) Did receiving an initial TEXAS Grant increase the share of students earning graduate degrees? (7) Did receiving an initial TEXAS Grant decrease student loans or other types of aid, respectively? (8) Did receiving an initial TEXAS Grant increase student earnings post college?

A student who received an initial TEXAS Grant was guaranteed to have their tuition and mandatory fees covered by a combination of state and university funds in their first year. After the first year, awardees were required to demonstrate sufficient academic progress and ongoing financial need. Students lost their TEXAS Grant eligibility if their college GPA dropped below a 2.5, if they earned less than 24 semester credit hours (SCH) per year, if they failed to earn credit in 70 percent of their enrolled classes, or if their Estimated Family Contribution (EFC) rose above \$4,000.

To qualify for a TEXAS Grant, students were required to meet the following criteria: (1) hold Texas residency; (2) earn a high school diploma classified as college preparatory (in public schools their formal names are Recommended and the more rigorous Distinguished diplomas); (3) enroll in college within 16 months of high school graduation; (4) enroll in at least 9 semester credit hours of college courses; (5) complete a financial aid application; and (6) have an EFC of \$4,000 or less.

How We Analyzed the Data

This investigation's study sample included students who enrolled in a Texas public university for the first time in the fall semesters of 2004 to 2013. The study sample was further restricted to students who met all the eligibility requirements for receiving a TEXAS Grant other than the financial need criterion defined by the \$4,000 EFC cap. The \$4,000 EFC cutoff point allowed for a fuzzy regression discontinuity research design.

I estimated TOT effect sizes by using an instrumental variable regression analysis of linear probability models. I chose not to use logistic or probit models to ease the interpretation of results. The linear probability models estimated had limited risk of producing results outside of the zero to 100 percent probability distribution range because expected means were found in the middle of the range where the probability distribution is nearly linear in shape (von Hippel, 2015).

What We Discovered

Other Student Aid in First Year of College

This study found that universities supplant other types of financial aid with TEXAS Grant dollars when students receive their first grant award. Receiving an initial TEXAS Grant reduced a student's amount of other grant aid and work-study aid in year one by \$631 and \$107, respectively. Students also used TEXAS Grant dollars to replace student loan dollars. Receiving a TEXAS Grant caused students to reduce their student loan dollars in year one by \$2,493. This continued year to year. Ultimately, receiving an initial TEXAS Grant caused students to reduce their total student debt

by \$6,500. This was a reduction in student debt of 24 percent relative to the control group's average student debt of \$27,373. TEXAS Grant effects on other funding sources resulted in relieving financial constraints of awardees not by \$6,938 but \$3,707 in year one. Given that a TEXAS Grant covers all tuition and fees, an average value of \$6,938 per year for up to five years, we would have expected TEXAS Grants to have a larger impact on student debt. However, as described above, its financial impact was significantly reduced by a high level of attrition in TEXAS Grant renewal awards. Only 63 percent of initial awardees renewed their grant in year two. This figure dropped to 33 percent in year three, 23 percent in year four, and 9 percent in year five.

Enrollment and Persistence

Receiving an initial TEXAS Grant produced no statistically significant effect on persistence conditioned on enrollment in the prior year. However, it produced an impact on continuous annual enrollment for the first four years of college. Receiving an initial TEXAS Grant increased the probability of continuous enrollment through year four by 5.4 percentage points. TEXAS Grant aid produced a positive effect on semester credit hours enrolled (SCH), but not at a statistically significant level until year three and four of college. In summary, receiving a TEXAS Grant increased cumulative course enrollment by 2.84 SCH in year three and 5.2 SCH in year four.

Working while Enrolled in College

Receiving an initial TEXAS Grant reduced the amount of time students spent employed outside of work-study aid in the first year of college. Receiving an initial TEXAS Grant reduced earnings from October to March by \$402 in year one and \$450 in year two. These effects represented negative growth rates of 30 percent and 18 percent relative to expected control group earnings, respectively.

Bachelor's Degree Completion

Receiving an initial TEXAS Grant caused students to graduate sooner and increased the overall completion rate. Initial TEXAS Grant awardees completed college at levels higher than their control group counterparts. The grant effect size peaked at the five-year graduation rate then declined as more control-group students graduated with each passing year. Grant aid effects were 5.80, 9.56, 6.73, 6.14, and 3.13 percentage points for completion by year four, five, six, seven, and eight post college entry, respectively. Effects were statistically significant at five, six, and seven years post college entry and marginally statistically significant at four years post college entry. The loss of statistical significance in the eight-year graduation rate was likely due to a declining sample size and declining statistical power. Statistical significance was not reached with effect sizes less than five percentage points.

The magnitude of grant effects on degree completion were meaningful when compared to graduation rates of the control group. Receiving an initial TEXAS Grant freshmen year increased graduation rates relative to the control group by 18.2, 17.2, 10.8, 9.3, and 4.7 percent, respectively.

Annual Work and Earnings

Receiving an initial TEXAS Grant produced no statistically significant effects on the probability of employment during any quarter of years one to ten post college entry. However, in general, effect signs were negative during the expected college years and positive post expected college graduation. A similar pattern emerged with grant effects on annual earnings. In general, students who received an initial TEXAS Grant exhibited a negative effect on annual earnings during college, but a positive effect post expected college graduation. Receiving an initial TEXAS Grant decreased annual earnings by \$617 in year one and increased annual earnings by \$1,961 in year five post college entry. These effects were marginally statistically significant. All others were not.

Graduate Degree

Receiving an initial TEXAS Grant caused students to increase their likelihood of earning a graduate degree by 4.6 and 6.3 percentage points in year nine and ten post college entry. These effects represented relative growth rates of 51 and 65 percent from the expected graduate degree attainment rate of the control group in year nine and year ten post college entry, respectively.

Policy Recommendations

The findings support the expectations derived from the economic theory of human capital investment. Grant aid lowers the cost of continuing a college student's education, thereby increasing the student's preference and ability to complete a bachelor's degree. This study finds that a key mechanism that causes this result is grant aid's effect on time spent working while enrolled in college.

An initial TEXAS Grant causes the average student to spend less time working during the first two years of college. Based on a minimum wage of eight dollars per hour, these effects translate to 50 and 56 fewer hours spent working from October to March in year one and two, respectively. If we apply these effects to the entire academic year, the 59 effect of an initial TEXAS Grant on hours employed is 75 and 84 fewer hours in a student's first and second academic year, respectively. This is a significant amount of time that can be used to study for classes, enroll in more classes, or engage in campus life or other activities that make college enjoyable. Moreover, the grant effect on bachelor's degree completion is similar in other states.

The convention in grant aid impact studies is to express the impact on bachelor's degree graduation rates per \$1,000 of grant aid. Following this convention, TEXAS Grants produces an impact on bachelor's degree completion per \$1,000 of 0.50 percentage points by year eight post college entry. This estimate is approximately equal to the estimate derived by the meta-analysis. In the meta-analysis, \$1,000 of grant aid causes an increase in bachelor's degree completion within 11 years equal to 0.46 percentage points. The meta-analysis found significant heterogeneity in the studies analyzed. Therefore, the weighted average effect size should be considered a baseline estimate for comparison purposes, not a reflection of an underlying general effect of grant aid.

TEXAS Grant's effect on annual earnings is negative during expected college years and positive post expected college graduation but with mostly non-statistically significant effect sizes. What explains this pattern of effects on earnings?

The negative effects during the college years are the result of grant aid substituting for earnings from employment. The substitution effect becomes clear after removing the quarters that overlap the summer months and focusing on the fourth and first quarter of calendar year. The effects are also strongest in year one and two when most awardees are receiving grant aid.

The positive effects on earnings post college are weak likely for two reasons. First, TEXAS Grants causes three to six percent more college students to complete college. Its larger effect for the awardees group relative to the control group is on shortening their time to degree by one to two years on average. Consequently, effects on earnings post college primarily represent a comparison between two groups of college with one having one to two more years of work experience. Second, receiving an initial TEXAS Grant increases the likelihood students return to school to earn a graduate degree by year nine and ten post college entry. This explains why we see the effect on earnings begin to decline in year six, reach a low point in year eight, then rise and reach its largest effect size in year 10.

Receiving an initial TEXAS Grant increases the likelihood of earning a graduate degree by 6.3 percentage points by year 10 from college entry. This represents a growth of 65 percent relative to the control group's expected outcome of 9.7 percentage points. This is a tremendous boost in graduate degree attainment for students from low-income families. This finding is affirmed by the impact studies of the West Virginia Promise Scholarship (Scott-Clayton & Zafar, 2016) and Cal Grants (Bettinger, Gurañtz, Kawano, & Sacerdote, 2016). The merit-based West Virginia Promise Scholarship increased graduate degree completion by three to four percentage points by year 10 post college entry, while Cal Grants improved graduate degree attainment for a low-GPA study sample by 6.1 percentage points.

Future research with data that follow students after year 10 should examine how the TEXAS Grant effect on graduate degree attainment improves earnings.

In conclusion, states seeking to raise their educational attainment rates and raise earnings should advance policies that reduce the cost of college for students who have demonstrated prior academic readiness but lack the financial resources to pay for college. Need-based grant programs that include merit-criteria like TEXAS Grants are an effective and cost-efficient policy tool for lowering the price of college for students who need help.

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