



First Degree Earns: The Impact of College Quality on College Completion Rates

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Introduction

In our paper, *First Degree Earns: The Impact of College Quality on College Completion Rates*, we provide the first clear causal evidence on the impact of college quality on students' postsecondary enrollment decisions and rates of degree completion. Through a merit aid program, Massachusetts high school students with sufficiently high test scores were granted tuition waivers at in-state public colleges of lower quality than the average alternative college available to such students. We compare students just above and below the scholarship eligibility threshold, yielding two main findings. First, students are remarkably willing to forgo college quality for relatively small amounts of money. Second, choosing a lower quality college significantly lowers on-time completion rates, a result driven by high skilled students who would otherwise have attended higher quality colleges. For the marginal student, enrolling at an in-state public college lowered the probability of graduating on time by more than 40 percent. The low completion rates of scholarship users imply the program had little impact on the in-state production of college degrees. More broadly, these results suggest that the critically important task of improving college

quality requires steps beyond merely changing the composition of the student body.

Background

There have been troubling trends in U.S. college completion rates over the past few decades. Among students entering college, completion rates are lower today than they were in the 1970s, driven largely by the low completion rates of men and students from lower socioeconomic backgrounds. Poor academic preparation of high school students is thought to play some role, but much more is explained by the changing characteristics of colleges themselves, particularly the resources available at such institutions. Much of the literature on the impact of college quality on degree completion focuses on the community college sector, reaching conflicting conclusions about whether access to and quality of community colleges affects educational attainment. The central challenge of estimating the impact of college quality on college completion is the fact that different kinds of students select institutions of different quality. It is rare to find a situation in which two nearly identical groups of students choose different types of colleges to attend. We have, however,

Rappaport Institute/Taubman Center Policy Briefs are short overviews of new and notable research on key issues by scholars affiliated with the Center. This policy brief is based on the 2012 working paper First Degree Earns: The Impact of College Quality on College Completion Rates.

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Sarah Cohodes

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found such a situation. The policy we exploit is a Massachusetts merit aid program called The Adams Scholarship, which had a value high enough to induce substantial variation in college choice but low enough that the induced shift in college quality was vastly more important than the money itself.

The Adams Scholarship

All Massachusetts public high school 10th graders take the Massachusetts Comprehensive Assessment System (MCAS), which includes an English language arts portion and a mathematics portion. In 2004, then-Governor Mitt Romney proposed the John and Abigail Adams Scholarship Program, which would waive tuition at in-state public colleges for any student whose total MCAS score placed him or her in the top 25 percent of students statewide. Romney's primary goals were to keep highly talented students in state and improve the quality of the state's public postsecondary institutions. Amidst fears that the affluent would be the primary beneficiaries of the plan, the rules were changed so that Adams

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scholars had score in the top 25 percent of their school district's distribution, as well as an advanced score in either English or math and at least a proficient score in both areas. The graduating class of 2005 was the first to receive the scholarships according to these eligibility criteria and the program has continued in this form to the present day.

Adams Scholarship winners are automatically notified in the fall of their senior year. The scholarship waives tuition at any of fifteen (two-year) community colleges, nine (four-year) state colleges, or four University of Massachusetts (U. Mass.) campuses. At nearly all public Massachusetts colleges, tuition has remained constant in nominal terms over the past decade, but mandatory fees have risen dramatically. Thus, for the first class of Adams scholars in fall 2005, the tuition waiver was annually worth \$1,714 if used at U. Mass. Amherst or \$910 if used at Bridgewater State College. Given mandatory fees of \$7,566 at U. Mass. Amherst and \$4,596 at Bridgewater State - fees that don't include room, board, and other expenses - the Adams Scholarship thus respectively represented a 17-18 percent reduction in the direct cost of attendance. By the fall of 2010, fees had risen by roughly a third, so that the Adams Scholarship represented only a 13-15 percent reduction in the cost of attendance. The Adams Scholarship thus lowers the cost of college attendance by less than 20 percent and is worth at most \$6,856 over four years (4*\$1,714), a small amount of financial aid relative to the total costs of college attendance.

Data and Descriptive Statistics

The Massachusetts Department of Elementary and Secondary Education provided the data, which include demographic information, test scores and Adams Scholarship status for all Massachusetts public high school students expected to graduate from high school from 2005-2010. For each student, we know every college enrollment spell through 2011, including the specific college attended, dates of attendance, and college location and type, as well as if graduation occurs. We separate colleges into Adams eligible institutions (U. Mass. campuses, state colleges and community colleges), private in-state institutions, and out-

of-state institutions. For each student and type of college, we construct two primary outcome indicators, one for enrolling full-time by the fall following high school graduation and one for earning a college degree within four years of high school graduation.

Our first simple analysis of the data finds that Adams eligible students are less likely than Adams ineligible students to be low income, black or Hispanic, or enrolled in special education. We also find that 82 percent of Adams eligible students enroll in college full-time by the fall following their high school graduation. Of these, 30 percent enroll in-state at public colleges, 22 percent enroll in-state at private colleges, and 31 percent enroll out of state. More than half of the in-state public enrollment occurs at U. Mass. campuses. Perhaps the most striking fact in the data is the large gap between college enrollment rates and graduation rates. In the full sample, only 30 percent of students graduate within four years, relative to the 63 percent who enroll, a completion rate of 48 percent (.30/.63). This on-time completion rate is substantially lower at in-state public colleges than at private and out-of-state alternatives.

Next, we construct a college “quality” variable using each college’s SAT math 75th percentile, admissions rate, instructional expenditures per student and student-faculty ratio. The first two capture some aspect of the type of student attending the campus, while the last two measure the resources available to students on that campus. We find that U. Mass. campuses and state colleges are 0.4 and 0.9 standard deviations lower in quality than the average college attended by Massachusetts high school graduates, while in-state private and out-of-state colleges are 0.2 standard deviations higher in quality.

Why students would choose to attend one of the U. Mass. campuses or state colleges given

these large quality differences? In the fall of 2004, the total annual costs of enrolling in a U. Mass. campus and state college, including room, board and books, were roughly \$18,000 and \$14,000 respectively. Grant aid and loans brought those net prices to under \$11,000 and \$8,000. In contrast, the total costs of in-state private and out-of-state colleges were \$38,000 and \$35,000, with net prices of \$23,000 and \$21,000. For students enrolling in four-year colleges, Massachusetts public institutions were less than half as expensive as the alternatives and thus are quite attractive to students, particularly those facing financial constraints.

Results

To measure the impact of winning the Adams Scholarship on students’ college enrollment and completion, we compare two groups of students to each other. The first group had MCAS scores just high enough to qualify for the scholarship. The second group had MCAS scores that were slightly too low to qualify. These two groups of students have nearly identical academic skills, family backgrounds and other characteristics. The only difference between them is that the former won the scholarship and the latter did not. Any differences in outcomes we observe must therefore be attributable to the scholarship itself. We focus our analysis on the graduating high school classes of 2005-2007, whom we can observe for at least four years after high school. We also limit most of the analysis to four-year colleges, as these high-skilled students do not attend two-year colleges in large numbers.

Enrollment

Panel A of Table 1 shows our estimates of the impact of scholarship eligibility on enrollment in various types of colleges. Column (1) shows that the scholarship induced 7.9 percent of students near the threshold to attend in-state

Table 1: On-Time Enrollment and Graduation Within Four Years, Four-Year Colleges

	(1) In state, public	(2) In state, U. Mass.	(3) In state, state coll.	(4) In state, private	(5) Out of state	(6) In state	(7) Four-year college	(8) Two-year college
(A) Enrolled on time								
Adams eligible	0.079***	0.057***	0.023***	-0.020***	-0.050***	0.060***	0.010	0.013***
	(0.008)	(0.006)	(0.005)	(0.007)	(0.008)	(0.008)	(0.008)	(0.004)
\bar{y}	0.241	0.146	0.095	0.163	0.299	0.403	0.702	0.061
(B) Graduated on time								
Adams eligible	0.020***	0.012***	0.008***	-0.011**	-0.032***	0.009	-0.022***	0.003
	(0.005)	(0.004)	(0.003)	(0.005)	(0.007)	(0.006)	(0.008)	(0.003)
\bar{y}	0.105	0.070	0.036	0.102	0.195	0.207	0.402	0.021
N	57,839	57,839	57,839	57,839	57,839	57,839	57,839	57,839

Notes: Heteroskedasticity robust standard errors clustered by 10th grade school district are in parentheses (* $p < .10$, ** $p < .05$, *** $p < .01$). All models include student demographic characteristic controls. The sample consists of the high school classes of 2005-2007. In columns (1)-(7), outcomes are defined as one only for four-year colleges. Panel A defines on-time enrollments as enrollment by the fall following high school graduation. Panel B defines on-time graduation as college graduation within four years of high school graduation. Listed below each coefficient is the mean of the outcome for students just below the Adams cutoff.

four-year public institutions, the majority of whom enrolled at a U. Mass. campus. Columns (4) and (5) reveal that 2.0 percent (one fourth) of these students would have attended in-state four-year private colleges while 5.0 percent (more than one half) would have attended out-of-state colleges. Columns (6) and (7) reveal that the scholarship thus raised in-state enrollment by 6.0 percentage points but had no statistically significant impact on overall enrollment rates at four-year colleges. Column (8) shows a small rise in the number of students enrolling in two-year colleges. To summarize, receipt of the Adams Scholarship induces a substantial number of students to choose in-state public four-year colleges over private and out-of-state alternatives, and attracts a small number of students into the two-year sector who would not otherwise have enrolled in college at all. Overall, the scholarship does keep students in state who would otherwise have left, but also shifts some students from in-state private colleges. There is no impact on

overall four-year college enrollment.

Completion

Even more interesting is Panel B, which shows the impact of the scholarship on on-time graduation rates. Column (1) is striking. Of the 7.9 percent of students induced by the scholarship to enroll at in-state four-year public colleges, only 2.0 percent graduate within four years, a ratio of 25 percent. Within the U. Mass. sector that ratio is an even lower, with only 1.2 percent of students graduating even though 5.7 percent were induced to enroll. This ratio of 21 percent is less than half that of the average U. Mass. student at the eligibility threshold, who has a 48 percent (0.070/0.146) chance of graduating within four years. This suggests that the marginal student induced to switch to a U. Mass. campus by the Adams Scholarship is much less likely to graduate on time than the average student with similar test scores who chooses a U. Mass. campus.

The fact that U. Mass. campuses and other

in-state public colleges have such low on-time completion rates implies two further facts about the policy's effects. First, as seen in column (6), though the scholarship successfully increased the fraction of students enrolling in-state for college by a substantial 6.0 percentage points, it increased the fraction of students completing college in state and within four years by only 0.9 percentage points. Raising local college completion rates is more difficult than raising local college enrollment rates. An evaluation of this program based on short-run effects would judge it much more favorably than a longer-run evaluation, pointing the importance of follow-up studies that look

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beyond immediate effects of such programs.

The second and more striking fact, seen in column (7), is that scholarship eligibility lowered the fraction of students completing four-year colleges on time by 2.2 percentage points. Given that we are comparing students of similar academic skill, we can rule out differences in such skill as an explanation for differences in completion rates. The only explanation must be that the choice of college itself affected completion rates. In fact, this estimated negative effect likely understates the true impact of college choice, given that the value of the Adams Scholarship itself should have mitigated financial constraints that may be responsible for some fraction of the failure to graduate on time. The offer of aid should have left students strictly better, or at least no worse, off. Instead, by inducing them to switch into lower quality Massachusetts public colleges,

the scholarship hurt their longer-run outcomes.

College Quality

The most plausible explanation for the negative impacts on on-time graduation is that the scholarship induced students to forgo college quality for a relatively small tuition subsidy. We find that scholarship eligibility induced 2.1 percent of students to forgo colleges in Barron's highest two categories of "most" and "highly competitive" colleges. A further 1.5 percent chose to forego the third category of "very competitive" colleges as a result of the scholarship. Students did not simply switch into the public sector from private or out-of-state colleges of similar quality. More than half of the students induced to switch colleges would have enrolled in more selective alternatives in the absence of the scholarship. Other measures of college quality - graduation rates, SAT scores, selectivity, instructional expenditures and student-faculty ratio - point to a similar pattern. By forgoing college quality, students ended up on campuses that were on average less expensive than the ones they otherwise would have attended. Given the change in college quality and the value of the scholarship, we estimate that students are willing to sacrifice 0.6 standard deviations in college quality per \$1,000 a year of financial aid. This implies that students are surprisingly willing to forgo college quality for relatively small amounts of financial aid.

College Quality and Completion

We also directly estimate the impact of college quality on students' on-time completion rates. Our analysis finds the marginal student induced by the scholarship to attend in-state public college, attending such a college lowered the probability of graduating on time by a remarkable 28 percentage points, or more than 40 percent. For these marginal students, attending a college with a four-year graduation rate one percentage point higher would translate into a 1.6 percentage point

increase in the probability of graduating on time. Differences in college-level graduation rates translate more than one-for-one into individual-level graduation rates for this subset of students. Using other measures of college quality yields similar results, suggesting that attending a college with more academically skilled students or more resources increases the probability of graduating on time.

We also take advantage of a unique feature of this policy design to provide further evidence that a reduction in college quality is responsible for students' decreased four-year completion rates. Because part of scholarship eligibility is determined by school district-level 75th percentile cutoffs, the total MCAS score determining one component of the eligibility threshold varies by district. In other words, students at the eligibility threshold in low-scoring districts have lower test scores than students at the threshold in high-scoring districts. For each graduating high school class, we thus divide students into two groups, those from the highest-scoring school districts and those from the lowest-scoring school districts. We find that only students from high-scoring districts are forgoing higher quality colleges and that only they are suffering in terms of on-time completion rates. Students from low-scoring districts do not forgo any college quality as a result of the scholarship and do not show lower completion rates. The overall decrease in on-time graduation previously estimated is thus driven entirely by students from the highest-scoring districts.

This provides further evidence that college quality is the key channel through which graduation rates are affected. High-skilled students who would otherwise have gone to higher quality colleges are induced to enroll in the lower quality U. Mass. Campuses and state colleges. The result is no impact on overall enrollment rates but a decrease in on-time

graduation rates due to the sacrifice of college quality. Low-skilled students would, in the absence of the scholarship, have enrolled in colleges of similar quality to Massachusetts public colleges or in no college at all. The scholarship does not induce a loss of college quality for them and thus has no impact on their on-time graduation rates.

Implications for Massachusetts

Because the Adams scholarship comes in the form of a tuition waiver, the costs of the program are determined by the revenue foregone by Massachusetts public colleges when such waivers are granted to enrolled students. We estimate this number by

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multiplying the number of scholarship eligible students at each campus with the tuition at that campus, and find that the annual cost to the state was on the order of \$25 million. To date, the state has spent upwards of \$100 million on the program.

These expenditures have led to an eight percentage point increase in enrollment in Massachusetts' four-year public colleges, as hoped for by Governor Romney and other proponents of the policy. However, our estimates suggest at most a two percentage point increase in in-state graduation rates, suggesting that three quarters of the induced enrollment did not translate into in-state completion. This gap is due in small part to the scholarship's shifting of students from in-state

private colleges but in larger part to the fact that students induced into Massachusetts public colleges do not finish college at all.

If we assume that two percentage point estimate applies to the entire distribution of student eligible for the scholarship, or about 15,000 students per year, then the scholarship is producing roughly 300 more four-year college graduates in Massachusetts per year for \$25,000,000. This translates to a cost per additional in-state graduate of over \$80,000, which suggests the state is spending large amounts of money for relatively little net benefit or even net harm to its students.

Conclusion

We draw three broad conclusions from our findings. First, our estimates suggest that students have a poor understanding of the importance of college quality. According to calculations based on the American Community Survey in Massachusetts, the lifetime earnings difference between those holding only B.A.s and those with only some college is about \$970,000. Students induced to attend in-state public colleges by the Adams Scholarship lower their chance of graduating by 28 percentage points, thus incurring an expected lifetime earnings penalty of about \$250,000.

Alternatively, research estimates that a one standard deviation decrease in college quality is associated with a 4.2 percent decrease in earnings, or about \$100,000 for Massachusetts B.A. holders with average lifetime earnings of \$2.5 million. Students induced to attend in-state public colleges by the Adams Scholarship lower their college quality by 0.7 standard deviations, thus incurring an expected lifetime earnings penalty of \$70,000. The earnings penalty, whether computed from reduced college completion or lower college quality, far outweighs the value of the tuition waiver, which at most can be worth about \$7,000 for

students attending the most expensive U. Mass. campuses for a full four years. It is possible that some students were so myopic or financially constrained that switching into the public sector was a rational decision. More likely, the marginal student did not understand that sacrificing college quality would lower her own chance of earning a college degree.

Second, this poor understanding of the importance of college quality suggests a possible scope for policy interventions to make certain information about colleges both more readily available and more salient. Tools like the U.S. Department of Education's "College Navigator" allow students to compare characteristics across institutions. It would be useful to require such tools, which often present users with hundreds of statistics about a given college, to give more weight to variables like graduation rates.

Third and finally, the harm done to students by exposure to colleges with relatively little funding and low graduation rates highlights the critical importance of improving such institutions. Governor Romney attempted to improve Massachusetts' public colleges by changing the composition of the student body. The evidence here suggests that approach did not succeed. Students exposed to those colleges because of the Adams Scholarship had worse long-run outcomes than those not exposed. Whether college quality operates through access to coursework, campus resources, peer effects, or other channels is beyond the scope of this paper. These results do, however, suggest that improving college quality requires steps beyond merely changing the composition of the student body. Deeper exploration of the factors preventing on-time completion is needed, particularly for postsecondary systems with such obvious challenges.

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