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The Effects of Institutional Inputs on Time to Degree for Traditional and Nontraditional College Students

This research brief uses Texas data to analyze factors that influence the time it takes for college students to earn a postsecondary degree.

Introduction: Time to degree is a key factor in institutional productivity and managing the costs of college for students and families. While there is a robust body of research addressing baccalaureate degree completion and persistence, much less is known about the factors that drive time to degree. Most importantly, the institutional factors that affect time to degree have been largely unexamined, with a primary focus on the characteristics of students. As a result, it is unclear if students or institutions should be the target of policy interventions.

This study examines student-level and institutional-level factors that contribute to timely— or not so timely—completion. The study uses a discrete-time hazard model to analyze statewide longitudinal student-level data from Texas along with institutional data. Results suggest time to degree is a complex phenomenon, and both student and institutional factors are significantly associated with time to degree. We find differential effects of institutional factors on the probability of graduating on time, graduating late, and dropping out of

Key Findings

- Average time to degree is 59 months.
- On-time graduates come to college with advantages of income, race/ethnicity, parent's education, and better academic preparation.
- While disadvantaged populations are less likely to graduate on-time, there is no difference among subpopulations for late graduation.
- Some strategies used by low-income students may slow completion but enable persistence, including transferring to a university and part-time enrollment.
- Full-time faculty-student ratio is positively associated with on-time graduation for all student subpopulations.
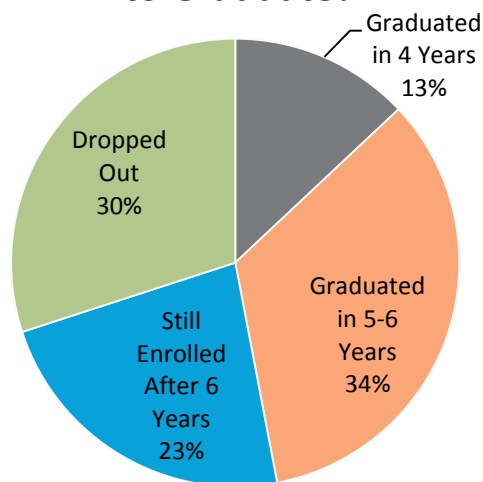
college, which suggest that policy changes designed to reduce time to degree may have perverse effects on overall graduation rates.

Data: This study uses administrative data from the Texas Higher Education Coordinating Board (THECB) provided through the University of Texas Education Research Center (UT ERC). The data set includes college application, enrollment, and graduation records for all students who applied to or attended public colleges and universities in Texas from 2004-2011. We follow two cohorts of students who began college in 2004 and 2005 through 2011. Student-level data are merged with Integrated Postsecondary Education Data System (IPEDS) data for all public two-year and four-year institutions in the state over the same period.[1] This dataset includes students who attended 34 public four-year universities and 65 public community and technical colleges in Texas.

Sample: We use complete data for more than 200,000 students across up to 21 trimesters, resulting in over 1.8 million student-trimester observations. Only 13 percent of students in the dataset graduated within four years of enrollment. An additional 34 percent graduated in five to six years. Thirty percent of the dataset dropped out without a degree, and the remaining 23 percent were still enrolled in college in 2011. Graduation rates in the sample are lower than prior studies because we retain students on nontraditional pathways including students first attending two-year institutions or enrolling part-time.

How Long Does it Take Students to Graduate?

Based on Academic Year 2004 and 2005 starting cohorts.
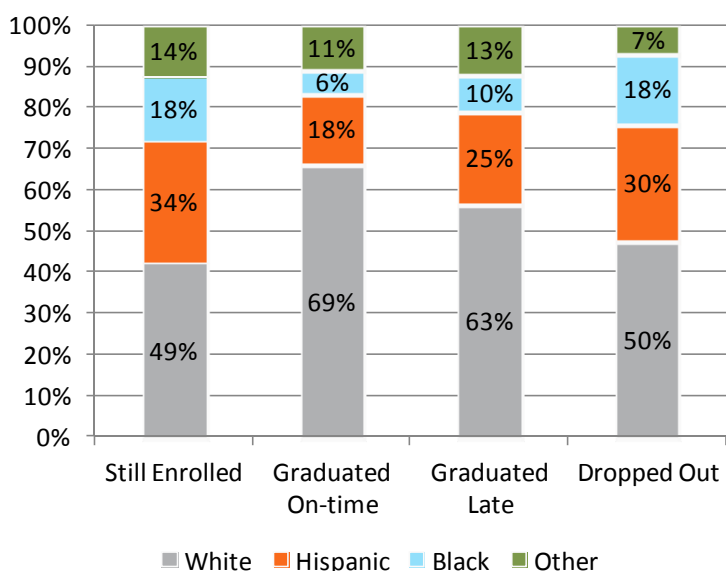Source: Texas Higher Education Coordinating Board

We examine the effects of the following student and institutional factors on time to degree:

Student Factors	Institutional Factors
• Age • Gender • Race • Income • Parent education • SAT • Graduating class rank • Started at a 2-year college • Part-time status • Simultaneous enrollment • Major • Developmental education	• Full-time faculty • Part-time faculty • Expenditures on instruction, student services, and research • Higher education sector • Minority student population

Descriptive Outcomes: Students who graduated on time are younger and more likely to be white, female, high income, and have parents with college degrees. Minorities are particularly underrepresented as on-time graduates. Minorities, males, and those in lower income brackets are more likely to graduate late. However, both Hispanics and Blacks are over-represented in the still enrolled group. Blacks are overrepresented among dropouts.
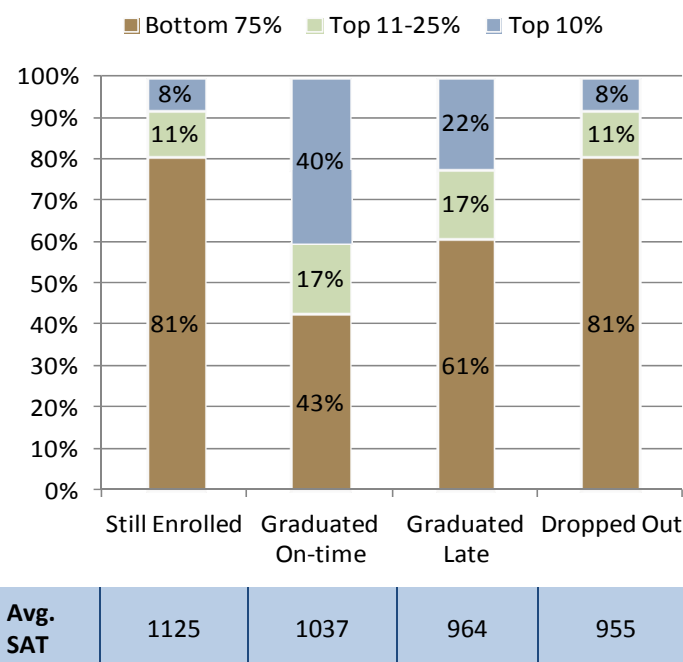
Outcomes by Race/Ethnicity

On-time graduates have the highest average SAT scores and class rank, followed by late graduates. Over 40 percent of on-time graduates and 22 percent of late graduates were in the top 10 percent of their high school class, compared to only 8 percent of those still enrolled and dropouts. Non-traditional paths through college are very common. Forty-five percent of students started at a two-year college, and students

average 4.7 part-time semesters. Thirty-percent of students were, at some time, enrolled in multiple institutions. Those who begin at two-year colleges are underrepresented as on-time graduates and overrepresented as still enrolled. Those who simultaneously enroll are over-represented in on-time and late graduation.

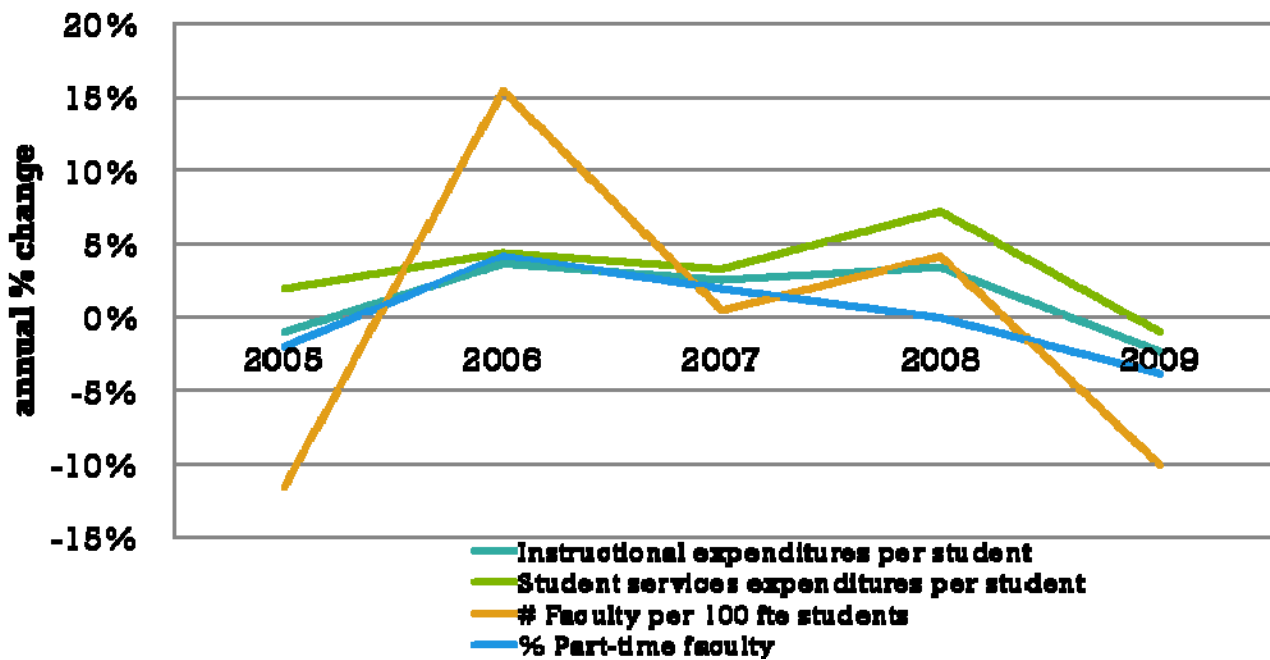## Outcomes by HS Graduating Class Rank and SAT Score

Avg. SAT	1125	1037	964	955

Institutional inputs changed due to state policy shifts during the study period. We see annual increases in inputs from 2005 to 2008, with a large spike in inputs in 2006. In 2009, all inputs were suddenly reduced after many years of annual increases due to statewide budget cuts in response to the financial crisis. The faculty-

student ratio is the most sensitive input with a 15 percent growth spike in 2006, followed by a 10 percent decline in 2009.

Inputs at Texas Public Colleges and Universities (2005-2009)

Results: Using a multinomial logistic regression to compare the outcomes of on-time graduation, late graduation, and dropping out compared to still being enrolled, we find that females are more likely than males to graduate on time, but females and males have similar probabilities of dropping out. Male graduation rates catch up with female rates through late graduation. Similarly, Hispanics are less likely than Whites to graduate on-time compared to remaining enrolled, but equally likely to graduate late or dropout. Blacks are less likely than Whites to graduate on time or late, but are equally likely to dropout. Racial and gender differences in graduation are largely due to staying enrolled longer, rather than an increased propensity to dropout.

High school performance is a strong predictor of on-time graduation. Top 10 percent graduates are more than twice as likely to graduate on-time and only half as likely to dropout compared to those in the bottom 75 percent. The odds of on-time completion are positively associated with increases in SAT scores as well, but the effects are more modest.

Starting at a two-year college has a large, negative effect on graduating on time, but only a small negative effect on graduating late and very little effect on dropping out, compared to remaining enrolled. Enrolling part-time also

increases the likelihood of remaining enrolled, compared to all other outcomes. Beginning at a two-year college and part-time enrollment are not paths to timely graduation, but they are strategies to stay enrolled instead of dropping out.

Simultaneous enrollment to gain extra credits slightly increases the likelihood of graduating whether on-time or late, and also significantly reduces the likelihood of dropping out. It is likely that students who enroll at two schools at once are highly motivated to graduate and may be more price-sensitive.

Next we examine whether institutional inputs also influence time to degree. Importantly, our estimation strategy cannot assess causality. Compared to remaining enrolled, full-time faculty-student ratio is positively associated with on-time graduation. However, this ratio is also negatively associated with graduating late, compared to remaining enrolled. Part-time faculty are positively associated with on-time graduation and negatively associated with late graduation. Part-time faculty are also positively associated with dropping out.

Instructional expenditures are positively associated with graduation but only through late graduation. Instructional expenditures, holding faculty-student ratios constant, are not associated with an increased probability of graduating on time. Student services expenditures are likely to be higher on campuses with a high probability of dropping out. Although we find no effect on the probability of overall graduation, there is a positive association with graduating late.

Percent Increase/Decrease in Odds of Outcome for Institutional Variables

Institutional Inputs	Outcome 1: Graduate On Time	Outcome 2: Graduate Late (vs. Still Enrolled)	Outcome 3: Dropout
Full-time faculty per 100 FTE students	15%	-7%	-11%
% Part-time faculty	38%	-73%	68%
Instructional expenditures per student (log)	3%	59%	-14%
Student services expenditures per student (log)	-15%	14%	11%
No research expenditures	-84%	-66%	130%
% Minority Students	-78%	-8%	95%
Number of students	200,815	200,815	200,815
Pseudo R-Squared	.30	.30	.30

Conclusion: Our results confirm theoretical predictions that both student characteristics and institutional inputs are independently associated with time to degree. We find considerable evidence of institutional tradeoffs between higher graduation rates and reduced time to completion. Efforts to shift resources toward areas positively associated with four-year graduation may inadvertently decrease overall graduation rates by limiting opportunities to graduate at a slower pace, with the largest impact on campuses with high minority enrollment. This is particularly true for the use of part-time faculty and additional instructional resources while keeping full-time faculty-student ratios constant.

In addition, we find that nontraditional pathways through undergraduate education are quite common and are associated with time to degree. Only one-third of students in the sample have a traditional enrollment pathway that begins in a four-year institution and does not involve simultaneous enrollment or transfer. Two-thirds of our sample formally transferred, earned credits at multiple institutions, or frequently enrolled part-time. Students in Texas appear to use simultaneous enrollment as a way to accelerate graduation. Enrolling part-time and beginning at a two-year college are not pathways to graduating in four years, but they allow students to graduate eventually and avoid dropping out. These new findings suggest that

studies that focus only on traditional students provide a limited picture of obstacles to graduation. Policymakers also need to consider the context of nontraditional students.

While our models cannot illustrate causality of institutional inputs, our estimates of the effects of institutional inputs on time to degree reveal institution-level factors that contribute to graduating on time, and also identify obstacles to eventual graduation for those who do not complete on time. Our results suggest that full-time faculty are positively associated with the probability of on-time graduation with no significant negative effect on graduating late or dropping out. The relationship between part-time faculty and graduation is more complex. Reliance on part-time instructors is a growing trend in higher education, and greater focus on the positive and negative uses of part-time faculty across institutional settings is warranted.
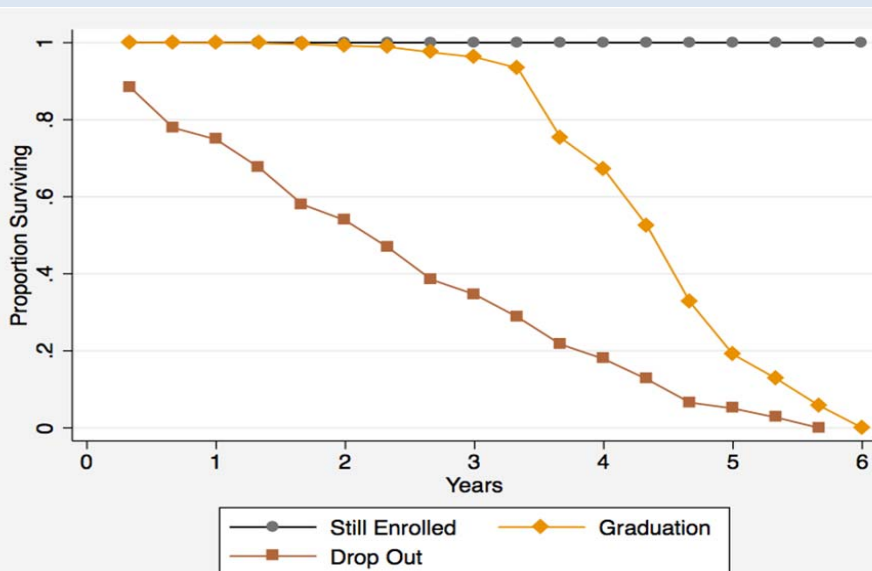
Instructional expenditures have mixed effects on time to degree. In general, increased instructional expenditures, controlling for faculty-student ratios, are associated with a reduced likelihood of graduating on time, particularly at four-year universities. However, instructional expenditures are positively associated with graduating late and do not increase the likelihood of dropping out. This result could reflect the

higher costs for students who delay graduation while accruing more credits or an ineffectiveness of instructional funds used for resources other than full-time faculty.

The association between student services expenditures and time to degree is also complex, as institutions will expand programs in response to problems with degree completion and dropping out. What is apparent in our results is that student services expenditures are negatively associated with time to degree. More interesting is the finding of similar effects of student services on time to degree across pathways. There is some indication that student services increase the probability of eventually graduating for students, but only for those who begin at four-year universities. This result suggests that two-year colleges could benefit from better alignment of both instruction and support services for students with a long-term goal of obtaining a four-year degree.

Survival Graph for Graduation and Dropout, Compared to Still Enrolled

This chart illustrates the probability of graduation for students entering Texas public higher education in 2004 or 2005 over a six-year year period. The likelihood of graduation in the first four years of enrollment is close to zero. Between three and four years after enrollment, the likelihood of graduation begins to increase. As expected, we see sharp declines in the proportion of the sample that is still enrolled as students graduate in the periods just prior to four years, five years, and six years of enrollment.

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