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Collegiate Attainment: Understanding Degree Completion

John Bound and Sarah Turner*

Collegiate attainment has not kept pace with increases in the demand for skilled workers in the United States. The widely-noted increase in the wage premium to college completion since the 1970s has led to a substantial expansion in the number of students attending college, although the number of students *completing* college has not increased commensurately.¹ In fact, among those aged 25–34, the share of high school graduates who had enrolled in college increased from just under 50 percent to over 68 percent between 1975 and 2009, while the percent of those enrolled who completed a four-year degree actually fell slightly, from 54.7 percent to 53.2 percent.² Moreover, students who do complete degrees now do so at a slower rate than those in earlier generations.³

While overall college completion rates have stagnated, gaps in collegiate attainment by parental circumstances actually have widened, with the persistently low college graduation rate among low-income students contributing to the stagnation in the growth of the supply of college-educated workers in recent decades.⁴ Moreover, changes in degree attainment have not been uniform across different types of colleges and universities. College completion rates have declined, and time to degree has increased most markedly, among students begin-

ning their studies at community colleges and public institutions outside the most selective flagship universities.

Broadly speaking, collegiate attainment is determined by the interaction of student attributes (the “demand side”) and institutional characteristics (the “supply side”). Our analyses consider how these different factors affect degree completion and time to degree receipt. *Both* student characteristics and institutional resources play a substantial role in the determination of these college outcomes.

Evidence on Determinants of Degree Attainment

On the demand-side, the pre-collegiate preparation of potential college students often is cited as one of the most significant barriers to degree completion. Given substantial increases in college going, one might hypothesize that if students with weaker preparation were induced to attend college, they would finish college at a lower rate and a slower pace, and it is probable that a lower proportion of students would finish college.

Using data from two longitudinal surveys—the National Longitudinal Survey of the High School Class of 1972 (NLS72) and the National Educational Longitudinal Study (NELS: 88)—to measure degree attainment, we find that students with relatively low academic achievement in both cohorts are unlikely to complete the BA degree.⁵ There is no question that the cross-cohort increase in the share of students with weak preparation affected the aggregate college completion rate; we estimate that about one third of the cross-cohort decline in completion rates can be explained by the change in student preparation.⁶

While models of educational attain-

ment typically consider a perfectly elastic supply side of the education market, evidence of substantial stratification in degree outcomes and resources has motivated us to consider the distribution of resources as a way of explaining changes in degree attainment. In the United States, there is considerable (and increasing) stratification in the level of resources provided by colleges and universities, and many of these resources come from public and private subsidies beyond tuition.⁷ Limited changes in enrollment in response to increased demand, particularly at the most selective and resource-intensive colleges and universities, demonstrate that the supply-side of the higher education market is not perfectly elastic.⁸

Substantial differences in institutional resources by broad type of institution—distinguishing institutions by selectivity, public control, and two-year versus four-year degree programs—are closely coupled with differences in college completion rates. Students from the 1992 high school cohort first attending selective private colleges and universities graduated at a rate over 90 percent; those attending open-access public four-year institutions completed at a rate less than 57 percent; while those starting at community colleges completed at a rate of only 17.6 percent. Still, for these students, median expenditures per student were 2.7 times greater at the private universities than at the open-access public universities, and 5.2 times greater than at community colleges. To be sure, these observed differences also incorporate differences in student attributes, although the differences in completion rates by institutional type and resources per student, adjusted for student achievement, remain quantitatively large. After adjusting for student achievement, we predict a completion rate advantage (relative to attend-

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ing a less selective public) of 35 percentage points for attending a highly selective private school and a completion rate advantage of about 24 percentage points for attending a top-50 public university. The penalty in the likelihood of completion that is associated with attending a community college is about 32 percentage points.

Significant changes in the distribution of students among different types of institutions—with students attending college more recently concentrated among public universities outside the flagship universities and community colleges—and erosion in resources per student at these institutions are quantitatively important in explaining the decline in college completion rates.

While the median college entrant experienced a decline in resources between the high school class of 1972 and the high school class of 1992, students at private colleges and universities were likely to experience a notable *increase* in instructional expenditures per student. Also, while the college completion rate fell overall during these years, this aggregate result combines the rise in completion rates at relatively resource-intensive institutions (private colleges and top public universities) and the fall in completion rates for students starting at less selective public four-year colleges and community colleges. Finally, the distribution of students among institutions shifted dramatically over this interval with a relative increase in the share of students beginning at community colleges and a decline in the share of students beginning at the more selective four-year institutions.⁹ Our estimates suggest that these changes on the supply-side of the market can explain the majority of observed decline in completion rates.

It is important to emphasize that the demand-side and supply-side explanations just described are not mutually exclusive: less-prepared students sort into the most elastic sectors of higher education with the fewest resources. In essence, increased demand for college crowds more students (and more of the less prepared students) into community colleges and non-top 50 public universities. Therefore, demand increases not only lower the resources per student at these institutions, but also cause higher dispersion in resources across the sectors of higher

education. While those institutions with the greatest resources are unlikely to expand enrollment along with increases in student demand, the open-access public institutions and community colleges are relatively elastic in supply.

Understanding Increased Time to Degree Attainment

Among those students who do complete college degrees, the time needed for degree completion has increased markedly in recent decades. For those completing a bachelor's degree, time to degree has increased by about one third of a year, with the proportion of completers finishing in four years has fallen from 57.8 percent to 43.6 percent. While declining achievement of entering students accounts for some of the decline in completion rates, it accounts for little of the observed change in time to degree because the most poorly prepared students are unlikely to complete college at all.

Extended time to degree is most pronounced among students starting their studies at public colleges and universities, particularly outside the flagship universities. Erosion of resources per student in the public sector partly explains extended time to degree: for example, limited course offerings, particularly for “gateway” courses that are prerequisites for degree progress, leave some students with less than full loads or enrolling in courses that do not meet degree requirements.

Widely-noted increases in college costs, with real tuition costs at four-year universities rising by more than 250 percent over three decades, also may limit the progression through degree programs, especially if credit constraints lead students to increase employment at the cost of reductions in the rate of credit attainment. There is no question that the number of hours worked by college students has increased in recent decades. Between 1972 and 1992, average weekly hours worked (unconditional) among those enrolled in college increased by about 2.9 hours, from 9.5 to 12.4, as measured for 18–21 year old college students in the October Current Population Survey, with a further increase to 13.2 hours per week evident in 2005. Estimating the effect

of working while in school on collegiate attainment is difficult because the decision to work and the choice of hours of employment are endogenous, but the available evidence suggests that credit constraints and rising college costs are strongly linked to the extension of time to degree.

Research Opportunities and Unanswered Questions in the Economics of Higher Education

Looking forward, we know that college completion is a critical input for individual labor market success and economic growth. However, the question of whether reasoned investments at the post-secondary level can appreciably change the number of college graduates entering the labor force is more complicated. Substantial further investments to increase college enrollment are not likely to have an appreciable effect on the number of college graduates. While the numbers are not zero, we find little evidence of large numbers of students well-prepared to complete college who are not already enrolling. Where there are substantial potential opportunities to improve outcomes, they are at the margin of college choice and in the pathway to degree attainment. With aggregate completion rates a little above 50 percent, there appear to be ample opportunities to increase persistence to degree completion. Plainly there are large differences in degree completion associated with collegiate resources and, as the stratification in collegiate resources has increased in recent decades, so too has the difference among institutions in degree outcomes.

Our review of the evidence suggests a number of unexplored areas for economic research related to college choice, in-college attainment, and the supply-side determinants of stratification and resources per student. First, with respect to college choice, it is well-documented that many students—particularly those from the least advantaged circumstances—who appear well-prepared to benefit from resource-intensive college experiences, instead attend colleges and universities with low funding levels and

poor graduation prospects. While it is widely suggested that there is a “market failure” in the college choice process, the barriers to optimal choice are poorly understood. Second, how in-college experiences and the organization of the college “production function” affect attainment remain questions that are not well-addressed in the current research literature. Variation in completion rates is associated with institutional resources, but it is far from clear “how” and “why” resources affect collegiate attainment. There is also much to learn, both substantively and methodologically, from recent efforts concentrated on in-depth longitudinal experiences, such as the work of Stinebrickner and Stinebrickner.¹⁰

Finally, the unique mixed-market institutional structure of higher education in the United States—with a combination of non-profit, for-profit, and public providers and a mix of funding from student, philanthropic, state, and federal sources—presents many challenges for textbook models of organizational behavior and industrial organization. Both theoretical innovations and empirical evidence can be brought to explaining the nature of competition in the higher education market, the level of stratification among institutional offerings, and student outcomes. As we emphasized here and in other work, the stratification of resources in higher education has increased dramatically in the last three decades among U.S. institutions.¹¹ These substantial changes in the distribution of resources likely have important implications for degree receipt and future returns, especially given that a substantial share of enrollment expansion has occurred at community colleges and open-access public institutions.

Indeed, given the importance of market structure in determining the distribution of resources among students, there are rich opportunities for applied theoretical work that builds on the framework set forth in papers like Rothschild and White, which incorporates market imperfections such as limited access to credit markets and information barriers.¹² The questions of “who pays?” and “who benefits?” were first asked in higher edu-

cation nearly four decades ago, but the answers remain somewhat elusive. Better economic analysis and additional evidence on these questions holds the promise of increasing collegiate attainment and improving the allocation of resources.¹³ The current challenge is to identify innovative, evidence-based reform initiatives to increase the productivity and the rate of degree attainment in higher education, rather than meeting national targets of degree attainment by lowering standards, which would ultimately limit the capacity of these institutions to function effectively as engines of economic growth.

¹ D. Autor, *The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings*, Washington, D.C.: Center for American Progress and The Hamilton Project, 2010; C. Goldin and L. Katz, *The Race between Education and Technology*, Cambridge, MA: Harvard University Press, 2008.

² Figures are from CPS Historical Time Series Table A-1. Years of School Completed by People 25 Years and Over, by Age and Sex: Selected Years 1940 to 2009. At <http://www.census.gov/hhes/socdemo/education/data/cps/historical/index.html>.

³ J. Bound, M. Lovenheim, and S. Turner, “Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources,” NBER Working Paper No. 15566, December 2009, and *American Economic Journal: Applied Economics*, 2(3), (2010), pp. 129–57.

⁴ W. Bowen, M. Chingos, and M. McPherson, *Crossing the Finish Line: Completing College at America’s Public Universities*, Princeton: Princeton University Press, 2009; C. Goldin and L. Katz, *The Race between Education and Technology*, Cambridge, MA: Harvard University Press, 2008.

⁵ In the bottom quartile of the test score distribution, the likelihood of attending college increases from 21.7 percent to 44.0 percent, which is consistent with a larger percentage of less-prepared students attending college in the later cohort in order to take advantage of the rising returns to education. However, among this group, only 5.6 percent in the initial period of observation receive a B.A., and this

percent falls yet further to 5.0 percent for the later cohort. Focusing on college attendees, the likelihood of completing a B.A. declined from 25.8 percent to 11.4 percent across cohorts for those in the bottom quartile of math test scores, while the graduation rate for the best prepared students actually increased somewhat (from 66.8 percent to 73 percent).

⁶ J. Bound, M. Lovenheim, and S. Turner, “Increasing Time to Baccalaureate Degree in the United States,” NBER Working Paper No. 15892, April 2010.

⁷ G. Winston, “Subsidies, Hierarchy, and Peers: The Awkward Economics of Higher Education,” *Journal of Economic Perspectives* 13(1), (1999), pp. 13–36; J. Bound and S. Turner, “Cohort Crowding: How Resources Affect Collegiate Attainment,” NBER Working Paper No. 12424, August 2006, and *Journal of Public Economics*, 91(5–6), (2007), pp. 877–99.

⁸ J. Bound and S. Turner, “Cohort Crowding: How Resources Affect Collegiate Attainment.”

⁹ Between college entrants from the high school class of 1972 and the high school class of 1992, the share starting at community colleges increased from 31.2 percent to 43.71, the share beginning at public four-year institutions declined from 46.7 percent to 37.6 percent, and the share beginning at private four-year institutions declined from 22.1 percent to 18.7 percent. In J. Bound, M. Lovenheim, and S. Turner, “Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources,” *op cit*.

¹⁰ R. Stinebrickner and T. Stinebrickner, “Learning About Academic Ability and the College Drop-Out Decision,” NBER Working Paper No. 14810, August 2009; “The Effect of Credit Constraints on the College Drop-Out Decision: A Direct Approach Using a New Panel Study,” NBER Working Paper No. 13340, August 2007, and *American Economic Review* 98(5), (2008), pp. 2163–84; and “Working during School and Academic Performance,” *Journal of Labor Economics*, 21(2), (2003), pp. 449–72.

¹¹ C. Hoxby, “The Changing Selectivity of American Colleges and Universities: Its Implications for Students, Resources, and Tuition,” NBER Working Paper No. 15546, October 2009, and *Journal of Economic*

Perspectives, 23(4), (2009), pp. 95–118; J. Bound, B. Hershbein, and B. Long, “Playing the Admissions Game: Student Reactions to Increasing College Competition,” NBER Working Paper No. 15272, August 2009; C. Hoxby, “How the Changing Market Structure of U.S. Higher Education

Explains College Tuition,” NBER Working Paper No. 6323, December 1997.

¹² M. Rothschild and L. White, “The Analytics of the Pricing of Higher Education and Other Services in Which the Customers Are Inputs,” *Journal of Political Economy*, 103(3), (1995), pp. 573–86.

¹³ L. Hansen and B. Weisbrod, “The Distribution of Costs and Direct Benefits of Public Higher Education: The Case of California,” *Journal of Human Resources*, 4(2), (1969), pp. 176–91.

The Economic Institutions of Water

Gary Libecap*

There is increasing concern about the availability of fresh water worldwide as demand grows and as supplies become more uncertain because of climate change.¹ With rising per capita incomes and growing populations, human consumption of water is rising while the demands for water for agriculture, manufacturing, recreation, and the environment also are increasing.

More than other natural resources, water is allocated and used through an institutional framework that is important for analyzing “the economics of water.” In the United States and elsewhere, property rights to water generally are not well defined because of the high resource costs involved and the political costs associated with equity and the demands for public goods. Accordingly, markets are less active than one might expect for this critical and increasingly valuable asset.² Decisions about water often are made through judicial, legislative, and bureaucratic processes, without direct price and cost considerations, which results in waste and misallocation.

My research has examined water rights, exchange negotiations, markets, and regu-

lation in the semi-arid U.S. West in order to better understand the institutional constraints that influence water distribution, use, and investment. In many cases there are important historical legacies that affect how those institutions have developed and operate today.

Limited Markets

Although the western United States has some of the most active water markets in the world, large price differences between agricultural water, where as much as 80 percent of annual consumption takes place, and urban water illustrate the potential for further gains from trade. Additionally, as Grafton, Landry, O’Brien, and I show, water markets are much more active in the Murray-Darling River Basin of south eastern Australia than in the U.S. West.³ So, what impedes the development of water markets?

As I indicated in a recent paper, it is difficult to assemble price comparisons needed to gauge the potential for trade in water because of segmented local markets, limited comparable observations of transactions within and across sectors, high shipping or conveyance costs, diverse regulatory regimes, and variation in quality.⁴ Available price data thus must be viewed with caution. Even so, the differences often are striking. For instance, in the Reno/Truckee Basin of Nevada the median price for 1,025 agriculture-to-urban water rights sales between

2002 and 2009 (2008 prices) was \$17,685/AF as compared to \$1,500/AF for 13 agriculture-to-agriculture sales.⁵ In the South Platte Basin of Colorado the median price for agriculture-to-urban sales was \$6,519/AF as compared to \$5,309/AF for agriculture-to-agriculture sales.⁶

Aggregating transactions across markets and time can compensate for the limited number of similar transactions within local markets, further illustrating the potential gains from trade and revealing how activity varies across the states and across time. Until my work with Brewer, Glennon, and Ker, though, there had been no comprehensive examination of water rights, trading, and the type of contracts used in the U.S. West.⁷ We developed a dataset of 3,232 water transactions (short- and long-term leases and sales) across 12 western states from 1987–2005. This dataset subsequently has been updated through 2008 with 4,220 observations, of which 2,765 have price information.⁸ The data reveal that median prices between 1987 and 2008 were \$74/AF for agriculture-to-urban leases as compared to \$19/AF for agriculture-to-agriculture leases; median prices were \$295/AF for agriculture-to-urban sales as compared to \$144/AF for agriculture-to-agriculture sales.⁹

Every western state allows for water trading, but patterns vary sharply. Colorado dominates in terms of total market transactions, but California, Texas, Arizona, and Nevada also have active markets. Within California, the state’s institutional and regu-

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