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Authors

Torres, D Diego
Rochmes, Jane
Harding, David J

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Enrollment and Degree Completion at For-Profit Colleges versus Traditional Institutions

D. Diego Torres, Rice University

Jane Rochmes, University of Michigan

David J. Harding, University of California at Berkeley

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Introduction

On September 30, 2010, the Senate Committee on Health, Education, Labor, and Pensions (HELP), under the leadership of Chairman Tom Harkin and Ranking Member Michael B. Enzi, convened the third in a series of hearings examining the efficacy of federal investment in for-profit education (*The Federal Investment in For-Profit Education: Are Students Succeeding*, 2010). While the specific aim of this gathering was to answer the question of whether students at for-profit postsecondary institutions are succeeding, much of the testimony centered on the well-publicized faults associated with the for-profit education industry. After much back-and-forth and no small amount of contentious debate, Senator Richard Burr attempted to get to the heart of the matter by directly questioning the panelists

about which was more important, the graduation rate of a particular institution type or whether the institution is for-profit or not-for-profit. With some hesitation and a couple of attempts to put forward caveats and qualifications, each of the witnesses answered that graduation rates were more important than institutional sector. This seemed the answer that Burr had anticipated as the senator went on to highlight graduation rates at two- and four-year institutions in his home state of North Carolina.

According to the data Senator Burr cited, of North Carolina's 26 two-year institutions that had a graduation rate exceeding 50 percent after three years, 20 were for-profit while the remaining 6 were community colleges. Of the 94 two-year institutions in North Carolina that had a three-year graduation rate below 50 percent, 88 were community colleges and 6 were for-profit schools. Citing statistics for North Carolina's four-year institutions, only 9 of the state's 58 four-year colleges and universities had a graduation rate greater than 50 percent after 4 years. After six years this number had improved slightly to 19 institutions, but still over half of North Carolina's four-year postsecondary institutions failed to graduate more than 50 percent of their students after eight years.

Senator Burr's primary point seemed to be that, regardless of sector, a large percentage of students fail to complete their degree programs. In absolute terms, then, it can be argued that graduation rates in all sectors of postsecondary education are suboptimal. In relative terms, however, the two-year for-profit schools appear to be outperforming their nonprofit counterparts, and not only in the state of North Carolina. Nationwide, the three-year graduation rate of first-time college students

seeking a certificate or associate's degree at two-year institutions is 3 times greater in the for-profit sector than in the public nonprofit sector (60.3 percent compared to 20.4 percent) and 1.2 times greater than in the private nonprofit sector (60.3 percent compared to 51 percent; U. S. Department of Education [DoE], 2011). The six-year graduation rate of first-time college students seeking an associate's degree was 19.5 percent at 2-year for-profit schools and 14.4 percent at community colleges (Radford et al., 2010).

Regarding comparisons of graduation rates of students attending four-year institutions, for-profits still do better relative to both public and private colleges with respect to conferring associate's degrees after six years (15 percent compared to about 4 percent). When it comes to graduation rates that focus on the traditional undergraduate terminal degree of four-year schools, however, only 15.7 percent of for-profit students earned a bachelor's degree after six years compared to 60 percent of public university students and 65 percent of private nonprofit university students (Radford et al., 2010).

While these numbers seem, *prima facie*, to offer substantive evidence that the for-profit sector is the more likely route to a degree, it is important to highlight that they do not take into account the characteristics of students that could be driving the differences seen between the various postsecondary sectors. Not adjusting for the individual-level factors that are also linked to educational attainment, for instance, can lead to misstatements about the impact of the for-profit sector. Moreover, to understand differences in graduation rates, we must understand the factors that lead some, and not others, to enroll in for-profit colleges

and universities. It is additionally necessary to appreciate the fact that the college attendance patterns of individuals are more complex than many published statistics suggest. This is due primarily to the fact that many studies of for-profit colleges measure graduation rates based upon only the first college sector attended; they do not capture changes in attendance from one college sector type to another.

The goals of this chapter are twofold. First, we examine who attends the for-profit sector. Understanding differences in student characteristics between sectors is crucial for understanding differential graduation rates between sectors. We describe overall attendance in the various sectors, differences in sector attendance by respondents' sex, race/ethnicity, and parental education, and the extent of cross-enrollment at more than one sector. Our ability to measure this overlap in sector attendance is uniquely valuable, as for-profit students commonly attend other college types at some point in their college careers. We also use statistical models to identify the student characteristics that most strongly predict for-profit college attendance.

Second, accounting for the extent to which those who choose to attend the for-profit sector also choose to attend other sectors, we address how well for-profit institutions are doing at graduating their students compared to more traditional institutions. By measuring the cumulative time spent enrolled in each sector and comparing the likelihood that students attain either an associate's or a bachelor's degree, we examine whether for-profit institutions are more or less likely than other types of colleges to advance their students to a degree.

For-Profit Graduation Rates and the Attainment Gap

Whether for-profit institutions are succeeding at graduating their students is important, not least because these schools serve a considerably larger share of students who would either not attend college in the first place or who, even when they do, have the greatest risk of noncompletion (Adelman, 1999, 2006; Horn, Kojaku, & Carroll, 2001). For example, 40 percent of students attending for-profit two-year schools are racial minorities compared to only 25 to 34 percent at community colleges (Cellini, 2005; Cominole et al., 2007). Holding constant choice of major and transfer to a four-year institution, the same difference in proportions of for-profit attendance relative to attendance in other sectors holds with respect to economic disadvantage (Cellini & Conger, 2010). Compared to community colleges, specifically, for-profits have nearly triple the proportion of students who qualify for Pell Grants (72 percent compared to 26 percent), a measure of low income status. The proportion of for-profit two-year students who are the first in their families to attend college is 55 percent; the corresponding number for community colleges is 42 percent. And 50 percent of for-profit students are both low-income and first generation compared to 26 percent of community college students (Cominole et al., 2007).

Four-year for-profit schools also attract traditionally underserved communities. According to Cominole et al. (2007), 50 percent of for-profit students attending four-year schools are black or Hispanic compared to about one-third in the public and private sectors. Fifty-three percent are first generation compared to 18 and 22 percent in the private and public sectors. Forty-four percent are both

low-income and first generation. Only 11 percent of private university students and 12 percent of public university students are both low-income and first generation (Cominole et al., 2007).

Regarding the social factors that are risk factors for non-completion of a degree, the DoE lists seven that appear to have the greatest effect: they are (1) delayed enrollment in college after high school, (2) not having a high school diploma, (3) enrolling part-time rather than full-time in college, (4) being financially independent, (5) having dependent children, (6) being a single parent, and (7) working a full-time job while enrolled in college (Cominole et al., 2007). Among four-year postsecondary schools, for-profits have a larger percentage of students who have at least one of these risk factors, 78 percent versus 24 percent in the public sector and 21 percent in the private sector. Fifty-two percent of for-profit students had at least three risk factors compared to 6 percent of public students and 9 percent of private students.

A number of hypotheses have been offered to explain why the for-profit sector might be attractive to more disadvantaged students. First, for-profits invest a lot of time and effort into student services and they make it easier for students to schedule courses around their busy lives (Berg, 2005; Rosenbaum et al., 2006; Ruch, 2001). Because of this, for-profit schools may do a much better job than public and nonprofit schools of retaining students until degree completion. Also, whereas traditional institutions often include coursework in the liberal arts, for-profits focus on providing students with the skills needed in the labor market, which may be particularly appealing to students from disadvantaged backgrounds (Ruch, 2001;

Berg, 2005). Frequent start dates and help navigating financial aid may also be attractive draws.

All of this, and the exponential growth rate of for-profit attendance among underrepresented communities, raises the question of whether the rise of the for-profit sector has the potential to reverse what has been a widening gap in degree attainment by race and income over the past four decades (Engle & Lynch, 2009). More specifically, to the degree that these institutions disproportionately enroll low-income, minority, and first generation students, higher graduation rates may indicate that for-profit education is as viable a route, if not a better one, to closing the degree attainment gap as community colleges were perceived to be in an earlier period (Breneman & Nelson, 1981). This last point is particularly salient given the different assumptions on which for-profit and traditional public two-year institutions are built. Whereas the best for-profit schools do not assume that the populations they serve come to the table with the attributes necessary for long-term success, community colleges operate on the belief that they do (Stephan, Rosenbaum, & Person, 2009). The result is a difference in the degree of assistance students receive in acquiring the information, skills, and motivation they need to achieve the degree they seek.

Prior Research

Previous studies examining the effectiveness of two-year private institutions have found that their students are more likely to graduate than students of traditional two-year public institutions, or community colleges. Person and

Rosenbaum (2006) used data from the Beginning Postsecondary Students Longitudinal Study (BPS), a longitudinal sample of first-time beginning college students, to compare degree completion rates at two-year public and what they term “private colleges,” which, due to small sample sizes, include for-profit and traditional private nonprofit schools. They found that, among degree-seekers who began college at a two-year institution for the first time in the 1995-1996 academic year, 42 percent of private college students completed their associate’s degree within 150 percent of normal time to degree; only 8 percent of community college students did so. This unadjusted rate favoring private colleges was mirrored in logistic regression analyses controlling for a host of student characteristics, including sex, race/ethnicity, age, high school GPA, parent education, enrollment status in college (whether full-time or part-time), occupational major (as reported in the fall of 1995), and whether the institution offered job placement services. A private college student was 6.18 times more likely than his community college peers to obtain an associate’s degree within three years of starting college. However, a serious drawback to the Person and Rosenbaum (2006) sample seems to be the fact that nearly 60 percent of students lacked data on high school achievement, a potentially important control variable.

In another empirical study examining degree outcomes, Stephan, Rosenbaum, and Person (2009) used propensity score matching methods on National Educational Longitudinal Study (NELS) data to understand the chances of degree attainment a private college student (again, a combined category of for-profit and traditional private nonprofit students due to small sample sizes) would

have had if he had enrolled in a community college. They found that, with respect to attaining an associate's degree or higher, the typical private college and community college student benefited from attending private schools. Students whose first college enrollment was a private school could expect to attain a degree at a rate 24 percent greater than similar students whose first college enrollment was in a community college. The estimated impact of attending a private school for a student who actually first enrolled in a community college was a 20 percent greater likelihood of degree attainment. However, it is difficult to draw conclusions about the for-profit sector from this study since the authors' sample of private college students was also comprised of those attending private nonprofit two-year schools; the for-profit sample was barely 3 percent of the overall sample. Another important limitation of Stephan et al.'s (2009) study is that it only accounts for the institutional sector of the first college a student attended and ignores the fact that both for-profit and community college students tend to switch frequently among sector types. Not having accounted for this "swirling," as it's called in the literature (see Goldrick-Rab, 2006; McCormick, 2003; Sturtz, 2006), likely means considerable measurement error is present in the authors' results. In particular, as we show below, a large proportion of for-profit students have also attended community colleges.

Providing evidence specific to the for-profit sector, Deming, Goldin, and Katz (2012) use a later wave of BPS data to examine mean differences in associate's and bachelor's degree receipt between public and for-profit postsecondary institutions. The authors estimated unadjusted gaps and then analyzed how the gaps changed when they adjusted for a variety of student characteristics, including, but not limited

to, sex, race/ethnicity, citizenship, whether born in the United States, whether English was the native language, household size, marital status, single parenthood, parental education, degree expectations, and individual adjusted gross income. While the unadjusted mean for associate's degree receipt was greatest at for-profit two-year institutions by six percentage points, this gap shrank to 4 percentage points when controlling for student characteristics in an ordinary least squares regression (OLS), and further to only 2 percentage points when propensity score matching was employed. The unadjusted 40 percentage point mean difference in bachelor's degree receipt favoring public over for-profit four-year schools was reduced to between 11.5 (propensity score matching) and 19 (OLS) percentage points. The results suggest that associate's degree attainment rates may be overstating the potential benefits of attending a for-profit, and bachelor's degree attainment rates may be understating the potential drawback of for-profits. Again, one should be cautious given the limitations of the data. Not only is the Deming et al. (2012) data restricted to examining the first sector type a student attended, it also is limited to first-time college students; as a result, many who are returning students are excluded from their analyses.

In sum, based on prior research, it appears that at the two-year level, those students actually attending true for-profit colleges may earn associate's degrees at a moderately better rate than their community college peers, but the difference between the two sectors is statistically insignificant. Public four-year students, on the other hand, may attain bachelor's degrees at a rate far surpassing their for-profit counterparts. Even this, however, is unclear given limitations of the data,

particularly the exclusion of returning students and the failure to take into account student mobility across sectors.

The Current Study

The question of whether for-profit students are succeeding is of vital importance given the continued widening of the degree attainment gap between minorities (primarily blacks and Hispanics) and whites, and between the economically disadvantaged and the economically advantaged (Engles & Lynch, 2009). Where the traditional public and private two- and four-year schools do not presently attract and graduate in large numbers those who would most benefit from achieving a college education (Brand & Xie, 2010), the for-profit sector could ostensibly serve as a viable alternative, creating a new path out of poverty and into the middle class. And given the slow growth of the public and nonprofit sectors compared to the for-profit sector (Fischer & Hout, 2006), the for-profit sector has the potential to more deftly meet the growing U.S. demand for higher education. If for-profit students are succeeding, and if they are outpacing their public and private counterparts with regard to likelihood of degree attainment, whether at two-year or four-year schools, or both, the combination of completers in all sectors may go a long way in allowing the United States to meet the needs of a highly skilled and knowledge-based economy.

Answering the question with certainty, however, has been difficult. There are three primary reasons for this. First, there is a dearth of high quality peer-reviewed research on for-profit institutions and their students (Breneman, Pusser,

& Turner, 2006; Kinser, 2006). Much of the research available has been conducted by those within the for-profit industry (e.g., Ruch, 2001; Berg, 2005). Second, to the degree that individual-level data on for-profit students exists, either the samples are too small (e.g., National Educational Longitudinal Studies) or students are not followed over time (e.g., National Postsecondary Student Aid Study), which makes it difficult to adequately assess the effects of for-profit attendance. Third, when students are followed over time (e.g., Beginning Postsecondary Study), only the first institution attended is analyzed. Students most likely to attend for-profit colleges often also attend college in other sectors or choose for-profits after struggling in other sectors. As a result, they are likely underrepresented in these studies. What is needed is a more complete understanding of the factors that both select individuals into particular sectors or degree programs and that assist or hinder them in earning the degree sought.

This chapter contributes to the literature on educational attainment at for-profits using data that allows us to address several of the limitations just highlighted. Utilizing a nationally representative cohort of individuals for whom there is information on all of their college enrollments, we track respondents monthly from the time they are eligible to begin postsecondary education through nearly ten years of young adulthood. We account for simultaneous enrollment at multiple colleges as well as whether a student is registered as part-time or full-time and the type of degree they report pursuing. Having monthly enrollment data on multiple schools allows us to accurately capture enrollment despite student “swirl” (Goldrick-Rab, 2006; McCormick, 2003; Sturtz, 2006). That is, rather than having

our analyses limited to the effect of the sector of the first institution type attended, we can analyze the time to degree more accurately even when a student shifts from sector to sector over time. Monthly enrollment data also allow us to better capture enrollment in for-profit institutions, which are less likely to adhere to a conventional semester or trimester calendar. Additionally, data on a nationally representative birth cohort allow us to include students who leave and then return to school; we are not only analyzing first-time attenders. Also, other data often exclude current non-attenders who eventually enroll in college. We include these individuals as an important comparison group to for-profit students since one of the claims is that for-profit institutions serve those not typically served by other institutions. Our research objectives are twofold. We first aim to answer the question of who attends for-profits. Understanding that, we will then examine how cumulative enrollment within the for-profit sector affects degree attainment compared to cumulative enrollment in other sectors. In other words, we plan to compare how efficiently enrollment in various sectors leads to degree completion, taking into account full-time and part-time status.

Data and Methods

Sample

We use data from the National Longitudinal Survey of Youth 1997 Cohort (NLSY97), which interviewed a nationally representative sample of 8,984 youth who were age 12 to 16 in 1997, including oversamples of black and Hispanic youth. Although respondents have been followed annually up to the present day, we draw

on data up to and including the 2008 wave only. In addition to the public-use data, which allow us to track monthly enrollment in multiple colleges for each respondent in the NLSY97, we also utilize restricted-use data obtained under contract with the Bureau of Labor Statistics that allow us to identify the sector of each postsecondary school attended. Distinct advantages of these data over other longitudinal datasets are the presence of more than 600 individuals who attended the for-profit sector at some point during their college careers and the ability to follow individuals over time through monthly enrollments in multiple schools in multiple sectors. Finally, the NLSY97 includes detailed information on the backgrounds of respondents and their parents, as well as degree outcomes and timing.¹

Of the total 8,984 respondents in the NLSY97 at study inception, there were 1,364 who never report receiving a high school diploma or general equivalency diploma (GED). These individuals were removed from our analytic sample if they never reported any postsecondary attendance, as they are arguably not reasonable comparisons for those enrolling in college.

Analytic methods

Our analysis proceeds in two parts. The goal of the first part is to examine student enrollment in the for-profit sector as compared to students who enroll in other sectors as well as individuals who have a high school diploma or GED but who have never enrolled in college. Our focus is on how the characteristics of students vary across sectors, taking into account attendance in multiple sectors. It is important to verify that patterns of selection into for-profit colleges that others have

documented are also present in the NLSY97 data and to understand these patterns in order to take them into account when examining differences across sectors in degree completion in the second part of our analysis. For this analysis we set our analytic data with the unit of analysis as individuals and model whether they have ever enrolled in different sectors. We estimate four binary logit regression models in which the outcome is one for any individual who has ever enrolled in a for-profit college for an associate's or bachelor's degree, whether or not they have enrolled in another sector as well. In the first model, the outcome is zero for individuals who have ever enrolled in a community college but not in a for-profit college. In the second model, it is zero for individuals who have ever enrolled in a public 4-year college but have not enrolled in a for-profit college. In the third model, the outcome is zero for individuals who have ever enrolled in a private nonprofit 2-year or 4-year college but not in a for-profit college. In the fourth model, the outcome is zero for individuals who have never enrolled in college but who have a GED or high school degree. We use as predictors in these models all baseline characteristics discussed below.

The goal of the second part of our analysis is to examine differences in degree attainment across sectors. Because some respondents have yet to graduate from college at the final data collection point in the 2008 wave, we employ discrete-time hazard models (Singer & Willett, 2003) to estimate the time to completion separately for associate's and bachelor's degree receipt. For this analysis, we structure our analytic data such that respondents are only considered "at-risk" of attending college—and hence, receiving a degree—if they have received a high

school diploma or GED. Past the point when “risk” begins, what we will refer to as our baseline, all individuals contribute a row for every month they remain in the study until graduation from college, attrition from the NLSY97, or the end of the observation period.² The model is formally specified as

$$\text{logit}(Y_t) = \beta_0 + \beta_1^C X_t^C + \beta_2^C X_t^{2C} + \beta_2 B, \quad (1)$$

where Y_t is the estimated probability of degree completion in month t . Our primary interest is in student enrollment in a specific college sector in pursuit of a specific degree (AA or BA), represented by X_t^C and X_t^{2C} , indicating respectively, cumulative months enrolled and cumulative months enrolled-squared at degree sought-college type combination c at time t . B is a set of baseline covariates. Positive values of β_1^C suggest that additional months enrolled in a specific college type seeking a specific degree increases the probability of degree completion, while values of β_2^C (the coefficient on the squared term) denote the acceleration or deceleration over time in the probability of degree completion. To account for multiple observations per respondent over time, we use person-clustered standard errors.

Missing values of the independent variables were imputed using the predictive mean matching method (PMM; Little, 1988) in Stata’s `-mi impute-` command.³ We do not need to impute values for college enrollment as enrollment information is collected retrospectively for all students, regardless of whether they were interviewed in a specific NLSY survey wave.

Variables

The dependent variables in this study are (1) receipt of associate's degree and (2) receipt of bachelor's degree. These dummy variables reflect, in continuous month format, when the associate's and bachelor's degrees were received, where 1 denotes that the relevant degree was earned in the present month and 0 that it was not. The date of receipt for each degree is recorded for all respondents regardless of whether or not they were interviewed in a given wave. If a respondent acquired more than one degree of the same level, only the earliest valid date of degree receipt is used. For all respondents, then, the pattern of the dependent variables is one in which all the months from high school graduation or GED receipt up to and excluding the month of attainment of a specific degree level is coded 0; the month of degree receipt is coded 1.

Our key independent variables are the cumulative months spent pursuing a particular degree type (associate's or bachelor's) at a particular institution type (public four-year, public two-year, private nonprofit, for-profit, or international/other university). Thus, it is the combination of the degree type sought *and* where it was sought that defines our independent variables. Including those who have never attended college in a given month, there are ten sector categories: (1) non-attender, (2) pursuing an associate's degree at a public four-year school, (3) pursuing a bachelor's degree at a public four-year school, (4) pursuing an associate's degree at a community college, (5) pursuing a bachelor's degree at a community college, (6) pursuing an associate's degree at a private two- or four-year school, (7) pursuing a bachelor's degree at a private two- or four-year school, (8) pursuing an associate's degree at a for-profit two- or four-year school,

(9) pursuing a bachelor's degree at a for-profit two- or four-year school, and (10) pursuing any degree type at a non-U.S. or unidentifiable university.

We also include a number of baseline covariates. These measures include race/ethnicity, sex, secondary school type (whether public or other, where other is predominantly parochial/private), high school GPA, a variable denoting whether a respondent received a GED, parental educational attainment (categorized as "less than high school," "high school," "some college," and "bachelor's degree or higher"), family type (whether headed by both biological parents, coded 0, or some other type, coded 1), whether a respondent ever took the Scholastic Aptitude Test (SAT) or the American Collegiate Test (ACT), the natural log of gross family income, household size, urbanicity (urban versus rural), and census region of residence. We also control for Armed Services Vocational Aptitude Battery (ASVAB) percentile score, available for most NLSY97 respondents as an age-adjusted measure of cognitive ability and job trainability based on four subtests designed to assess mathematical knowledge, arithmetic reasoning, word knowledge, and paragraph comprehension. Finally, we adjust for the age at which respondents become at-risk for college attendance, whether they were married at this point (coded 1 if yes, 0 if no), number of own or adopted children in the household, the number of hours they worked in the month prior to the baseline month, and the natural log of their hourly pay in that month.

Results

Descriptive Statistics and Patterns of College Sector Attendance

Table 1 shows weighted descriptive statistics of the baseline covariates for all survey participants at-risk of attending college. The majority of the 7,620 respondents were white, as we would expect in a nationally representative sample. While the weighted means for blacks and Hispanics reflect their respective proportions in the larger population, they suggest that our specification of the analytic sample did not disproportionately exclude members of these subgroups from the analysis. About a third of respondents came from families where the highest degree of at least one parent was a bachelor's or higher—33.6 percent compared to 9.2, 30, and 27.2 percent, respectively, for families where the highest level of education of any parent was less than high school, high school, or some college. More respondents came from homes headed by both biological parents as opposed to some other family structure (55.6 percent compared to 44.4 percent). In the full NLSY sample of 8,984 respondents, greater than 10 percent of NLSY97 parents had less than a high school education, while the remaining 90 percent were divided fairly evenly among high school completers, college attenders (including those with less than a bachelor's degree), and college attenders with a bachelor's degree or higher. Family structure was more evenly divided between two-parent and other family structure types in the full sample.

The vast majority of respondents attended public high schools rather than a parochial, private, or other secondary school type. Just fewer than five in ten respondents had ever taken one of the two major college entrance exams. The mean age of the respondents at the point they became at-risk of college attendance was just above 18 years. The means for high school GPA and the ASVAB percentile score

were at about the national average. The ratio of urban to rural respondents in our sample was about 2 to 1, with the majority of respondents coming from the South, followed in succession by the Midwest, West, and Northeastern regions of the United States. Only a handful of individuals were married or had children at baseline. Monthly work hours and hourly wages were relatively low but showed considerable variation, which is to be expected in such a young sample.

Figure 1 presents two graphical representations that are analogous to a 4×2 sector attendance-by-degree sought table. It shows two ways of looking at the data. The upper graph corresponds to column proportions of the total number of person-months in pursuit of either the associate's or bachelor's degree accumulated by students within each of the four U.S. postsecondary sectors. The lower graph corresponds to the row proportions of the total number of person-months that students within each sector spent pursuing either an associate's or bachelor's degree. The upper graph reveals that the majority of time spent pursuing an associate's degree, which was almost 85 percent of the more than 55,000 total person-months, was accumulated by those who attended the public 2-year sector while the majority of time spent pursuing the latter degree, approximately 67 percent of the 132,000 total person-months, was accumulated by those who attended the public 4-year sector. Focusing on the for-profit share of accumulated person-months, specifically, the graph shows that it was three times greater among those who sought an associate's (8.72 percent) rather than a bachelor's degree (2.72 percent). Those in the for-profit sector accumulated more person-months seeking an associate's degree than those in either the private or public 4-year sector. Contrastingly, the

accumulation of person-months of attendance was the smallest among for-profit attenders than among students who attended any of the other three sectors.

Turning to the lower graph of Figure 1, the share of accumulated person-months toward an associate's degree was nearly 85 percent compared to only about 15 percent among public 2-year attenders. The share of accumulated person months toward a bachelor's degree was approximately 97 percent compared to about 3 percent among public 4-year attenders. The proportion of person-months having sought a bachelor's versus an associate's degree was similar among attenders at public 4-year and private institutions. Finally, the lower graph of Figure 1 reveals a more even split in the proportion of for-profit person-months accumulated between the two intent categories, "Sought AA" and "Sought BA." About 57 percent of for-profit person-months were accumulated having sought an associate's degree and about 43 percent were accumulated having sought a bachelor's degree.

Next we examined the patterns of attendance and graduation rates across the various sectors of postsecondary education. Figure 2 shows the proportions of respondents who ever attended each of four types of institutions: community colleges, traditional public four-year colleges and universities, private schools, and for-profits. Attendance at any institution type was not exclusive, so respondents are often represented in multiple categories in the data. The most common type of institution attended was community colleges and public four-year schools, the more traditional sectors of the education industry. Much smaller proportions of students spent time in private and for-profit schools.

When sector attendance was broken down by sex (Figure 3), two things became apparent. First, there were larger proportions of females than males in all sectors. Second, the biggest difference in sector attendance between the sexes occurred at public two- and four-year schools. The gender gap in attendance did shrink somewhat in the private sector, but only in the for-profit sector did males appear to come close to being represented in the same proportion as females.

Racial differences in sector attendance were much greater than sex differences, particularly between whites and blacks, whites and Hispanics, other race individuals and blacks, and other race individuals and Hispanics (Figure 4). While whites and other race individuals were more likely than either blacks or Hispanics to attend public four-year or private institutions, they were less likely than members of these groups to attend the for-profit sector. Both blacks and whites, however, attended the community college sector less often than their Hispanic and other race peers. This indicates that for-profits do indeed disproportionately serve underrepresented racial/ethnic groups like blacks and Hispanics, but so do community colleges.

An examination of Figure 5 reveals, similarly, that those from low education households were more likely than their peers from homes with more educated parents to attend for-profit schools. They were at least as likely to attend community college as their counterparts from more educated households, but much less likely to attend the private sector. Conversely, respondents from highly educated homes attended public four-year and private schools in higher

proportions than degree-seekers from homes where the highest level of education was reported as some college or high school or less.

Table 2 presents the extent of attendance overlap among postsecondary sectors. The percentages in each cell beneath the second through fifth columns represent the proportion of students who reported ever attending a row sector (as shown in the leftmost column) who also reported attending the sector to which the column refers. We note the small number of students who reported ever attending a for-profit college relative to those who reported ever attending other school types. But striking was the large percentage of for-profit students who reported also attending another sector (see the row denoting for-profit attendance). That greater than half of all those who reported ever attending a for-profit also reported at some point attending a public 2-year school could, in some ways, be an indication of the degree of similarity among students who attend these two sectors. No other sector overlap proportion came close to mirroring this 50 percent. Nearly a fifth and more than a quarter of for-profit students also reported enrollment in the public four-year and private two- or four-year sectors, respectively. Although it is significant that more than 10 percent of community college students and about 14 percent of private students also spent time at a for-profit college, this represented a much smaller degree of overlap between all other sectors and the for-profit sector (see the column denoting for-profit attendance). It seems likely that this pattern is due to the smaller size of the for-profit sector relative to the other institutional sectors. However, that there was some degree of non-overlap is consistent with the idea that

there is something about the model of the for-profit postsecondary sector that is attractive to a nontraditional student.

Patterns of Selecting into For-Profit Colleges

Understanding differences in degree completion across sectors first requires understanding differences in student characteristics across sectors. What are the characteristics of students who select into for-profit postsecondary institutions? We ran logistic regression analyses to test the importance of a variety of individual characteristics in predicting the likelihood of attending a for-profit college relative to ever attending each of the other sectors and to never attending college. The results are shown in Table 3. Each of the four columns of results represents a separate logistic regression in which individuals who had ever attended a for-profit college were coded 1 and individuals in the comparison group who had not attended a for-profit college were coded 0. For the purposes of these models, an individual who had ever attended both a for-profit college and the other type of institution in the binary comparison was coded as having attended a for-profit.

Considering race/ethnic differences in the odds of attending a for-profit school versus attending some other institution type net of the other baseline covariates in the model, we found that, relative to whites, blacks were 1.47 times ($e^{0.385}$) more likely to attend a for-profit than a community college. There was no statistically significant difference in the odds of attending a for-profit compared to a community college between whites and Hispanics; both groups were equally likely to attend either sector. Those classified as “other race,” though, were 1.70 times

($e^{0.529}$) more likely than whites to go to a for-profit college than to a community college. All nonwhite racial/ethnic groups had greater odds of attending a for-profit college than not attending postsecondary school. Blacks, Hispanics, and other race individuals were, respectively, 2.44 times ($e^{0.892}$), about 1.49 times ($e^{0.396}$), and 3.05 times ($e^{1.115}$) more likely than whites to attend a for-profit than to never attend college at all. Relative to whites, other race individuals were more likely, and blacks and Hispanics were less likely, to attend a for-profit college compared to either a public 4-year or private 2- or 4-year college, though these differences were not statistically significant. While there was no difference between for-profit and community college students with regard to high school GPA or ASVAB score, those with higher GPAs and ASVAB scores were less likely to attend for-profits than public 4-years and private colleges but more likely to attend for-profits than to not attend college at all. Possessors of GEDs or those without a high school diploma were less likely than their diploma-holding counterparts to attend college at all, but when they did, they had greater odds of attending a for-profit than either a public four-year or private two- or four-year institution. There was no difference in the odds of attending a for-profit versus a community college for these individuals. The same trend was at work with respect to the baseline covariate denoting number of children in the home. Those from two-parent families were more likely to attend public 4-year and private institutions than for-profits, but family structure was unrelated to attendance at a for-profit compared to a community college or compared to not attending college at all. There was no effect of a respondent's household size or gross family income at baseline on the probability of for-profit

attendance once the other covariates in the model were controlled. Rural students were no more or less likely than urban students to attend a for-profit relative to a community college, public 4-year, or private institution, but rural students were less likely than urban students to attend a for-profit relative to not attending college at all. Relative to students from the Northeast, students from the Midwest region were less likely to attend a for-profit than to not attend college at all. Students from the South were less likely than students from the Northeast to attend a for-profit than a community college, but were more likely to attend a private school than a for-profit and less likely to attend a for-profit than to not attend college at all. Relative to students from the Northeast, students from the West were more likely to attend a private college than a for-profit college. These geographic associations may reflect the differential availability of for-profit schools in various parts of the country.

Descriptive Statistics on Degree Attainment by Sector

Table 4 shows unadjusted degree attainment rates of NLSY97 respondents after 4, 6, and 8 years from baseline (receipt of high school diploma or GED). In the first panel, we show that, relative to the other sectors, a greater percentage of those who had ever attended a for-profit institution received an associate's degree by each time point. The second panel shows the corresponding unadjusted bachelor's degree attainment rates. Here, clearly it is the public four-year and private schools that had higher rates of graduation while the rates for for-profits and community colleges were roughly similar to one another. Much of the information shown in Table 4 comports with the unadjusted graduation rates reviewed in the

introduction. For-profits appear to do a better job relative to other sectors at producing associate's degree holders, yet they fail to keep up with traditional public four-year and private colleges and universities at producing bachelor's degree holders. The difference with our data, however, is that individuals who ever attended one sector might also be counted as having ever attended another sector; hence, degree attainment rates are an effect of both attendance in the one sector and the tendency of those in that sector to move among sectors, or to "swirl."

We finally present graphs showing the cumulative probability of both associate's degree and bachelor's degree receipt by cumulative months enrolled in each sector. Differences across sectors in the average length of a college term—and thus variability in term end points when a degree could plausibly be earned—likely contribute to the cumulative probability lines for the for-profit and private sectors being less smooth than the line for community colleges. However, most important in interpreting these graphs is the relative positioning of the sectors over time, and we focus on the cumulative probability of degree receipt at comparison points relative to "normal" degree completion time. Not accounting for characteristics that vary among individuals, Figure 6 reveals that, beyond about the thirteenth month of cumulative enrollment, for-profit students had a higher probability of receiving an associate's degree than their community college or private school peers. This probability rose rather dramatically for for-profit students relative to students in the other two sectors so that by the end of the eighteenth cumulative month of enrollment, or the equivalent of two academic years of schooling, it exceeded 30 percent. The corresponding rate in the community college and private school sector

was closer to 10 percent. At 27 months of cumulative enrollment, or the equivalent of 150 percent of the time it should take to attain an associate's degree, the difference in the cumulative probability of degree receipt favored for-profit over community college students by 45 percentage points (about 70 percent compared to 25 percent).

Figure 7 shows the cumulative probability of bachelor's degree receipt by institutional sector. Here, as we saw in Figure 6, for-profit students appeared to have an increasing advantage relative to students in the public four-year and private sectors when it comes to the likelihood of attaining a degree. In the 36 months of cumulative enrollment that it should take to complete a bachelor's degree, for-profit students had a cumulative probability of attaining the degree that was about twice that for individuals in the other two sectors (about 40 percent compared to about 20 percent). At 150 percent of normal time to bachelor's degree completion, i.e., 54 months, for-profit students still had a higher cumulative probability of degree receipt over public four-year students, but their advantage over private sector students had disappeared. The difference between these results and those from Table 4 (which indicated a considerable disadvantage among for-profit students in bachelor's degree receipt) is that additional months of enrollment in Figure 7 capture students who had continued to attend college for a bachelor's degree, suggesting that probability of continuation in enrollment may be a key difference between for-profits and other institutions when it comes to bachelor's degrees, a point relevant for future research that we return to in the conclusion of this chapter.

We advise a degree of caution when interpreting the lines in Figures 5 and 6. Since neither graph adjusts for differences in student characteristics or specific characteristics of sector types that make them different, the trends for any of the lines could be over- or understating sector differences in students' likelihood of degree receipt. Regarding student-level characteristics, in particular, none of the lines accounts for differences in demographic realities such as the timing of family formation, extent of participation in the labor force, financial liabilities arising from the emancipation and complete independence from parents, or other factors that might interrupt normal time to degree completion.

Discrete-Time Hazard Models of Degree Attainment by Sector

For each of the two outcomes, associate's degree receipt and bachelor's degree receipt, five logistic discrete-time hazard models were run. First, we used only the linear and quadratic functional forms of cumulative months of attendance in any of five postsecondary school types (public four-year, public two-year, private two- or four-year, for-profit two- or four-year, and international/other school) to predict degree receipt, conditional on degree sought. These models show essentially descriptive results of how months of enrollment in each sector are related to degree attainment controlling only for enrollment in other sectors. A second model added baseline covariates to adjust for differences in who attends each sector and pursues each degree. For ease of interpretation, the coefficients for the controls were excluded from the tables showing this second set of models. For those interested in full results, we provide full tables in Appendix A. Finally, in

order to examine differences by race, gender, and parental education in the effects of sector on degree receipt, we also estimated models that included, in turn, the interactions between 1) race and cumulative months within each sector, 2) sex and cumulative months within each sector, and 3) parental educational attainment and cumulative months within each sector. These interaction models are provided in Appendix B.

Associate's degree attainment

Models 1 and 2 for associate's degree receipt are shown in Table 5. The first column of Model 1 shows that each additional month spent pursuing an associate's degree at a public 2-year, private nonprofit, or for-profit college is associated with a greater likelihood of receiving an associate's degree. The coefficient was greatest in the for-profit sector relative to the other postsecondary institution types, though for each of the three sectors, the trend appeared to be one of declining returns the longer one spent in school. That is, the likelihood of associate's degree receipt for each additional month of schooling was strongest in the earlier months of an individual's college career, while the odds of finishing college over the longer run were somewhat diminished. A test of the equality of coefficients in Model 1 revealed that, between for-profit and community college students, for-profit students had significantly greater odds of completing an associate's degree for every month of schooling ($\chi^2 = 24.73, p < 0.001$). The coefficient for cumulative months in private two- and four-year schools was nearly identical to that for cumulative months in for-profit schools, and there was no statistically significant difference

between students in the two sectors with respect to their likelihood of degree attainment ($\chi^2 = 0.06, p = 0.807$). We note, however, that the standard error was much larger for cumulative months in a private school than for cumulative months in a for-profit school, most likely due to the small sample size of students pursuing associate's degrees at private nonprofit colleges, which is quite small compared to the sample size of students pursuing associate's degrees at for-profit colleges.

The second column of Model 1 shows the likelihood of associate's degree completion when the degree sought is actually the baccalaureate. While the coefficient for each additional month of schooling was still statistically significant for for-profits, the sign is reversed. As we would expect, the more months students pursuing bachelor's degrees spend in college, the less likely they are to receive an associate's degree. The coefficient for cumulative months in a private college or university suggested the same thing. Because many community colleges in the United States often have matriculation agreements with traditional public four-year institutions, many of their finishing students transfer with an associate's degree in hand. We would therefore expect to see a positive effect of additional time pursuing a bachelor's degree at a public 2-year college on associate's degree attainment, which is what we see in the second column of Model 1 of Table 5.

Model 2 of Table 5 adjusted for student characteristics. For all sectors, including public four-year colleges and universities, there was a strong, positive impact of cumulative months spent pursuing an associate's degree on associate's degree receipt. For every month a student spends in a for-profit school, he multiplies his odds of earning an associate's degree by nearly 1.5 times ($e^{0.394}$). This

effect is not only statistically significant within Model 2, but it is also statistically significantly higher than the odds shown in Model 1, net of the differences in student characteristics ($\chi^2 = 14.93, p < 0.001$). The squared term for for-profits, however, suggested that this increased odds of associate's degree attainment declines over time. The effect of additional months in school on associate's degree attainment still favored for-profit students over community college students, and it was statistically significant ($\chi^2 = 42.92, p < 0.001$). Consistent with the results shown under Model 1 of Table 5, which suggested no significant difference in the likelihood of associate's degree attainment between for-profit and private school students pursuing associate's degrees, Model 2 of Table 5 revealed the same thing; the likelihood of associate's degree attainment did not differ between students in the two sectors ($\chi^2 = 1.64, p = 0.199$). Interestingly, the coefficient for cumulative months spent pursuing an associate's degree in a public four-year postsecondary institution, statistically insignificant in Model 1, was now not only statistically significant but slightly larger than double the size.

When we included interactions between both the linear and quadratic functional forms of cumulative months within each sector and race/ethnicity, sex, and parental educational attainment, we found few statistically significant differences between the different groups on associate's degree attainment. While we do not discuss those models, we do present the tables in Appendix B for those interested in seeing the results.

Bachelor's degree attainment

Model 1 of Table 6 shows the logistic regression coefficients for the likelihood of attaining a bachelor's degree by cumulative months within sector, separately for those pursuing an associate's and for those pursuing a bachelor's. Controls were excluded from the model. Immediately obvious is the lack of any statistically significant impact on the likelihood of earning the baccalaureate among for-profit students, regardless of the degree being sought. This contrasts rather glaringly with the increased odds of bachelor's degree attainment for additional months spent in school by community college students pursuing associate's degrees. This may reflect the fact that a core mission of most community colleges remains preparing students for transfer to a four-year institution.

Among those pursuing a bachelor's degree, the likelihood of bachelor's degree attainment was greatest for those at traditional public four-year and private two- and four year postsecondary institutions. For each month an individual remained in the former, he multiplied his odds of earning a bachelor's degree by about 1.17 times ($e^{0.153}$). Students at private colleges multiplied their odds by 1.15 times ($e^{0.136}$). Only the coefficient for cumulative months in a public four-year school was significantly different from the coefficient for cumulative months in a for-profit school ($\chi^2 = 4.25, p < 0.05$).

Model 2 of Table 6 included student background controls. Additional months spent pursuing an associate's degree did not lead to a higher likelihood of bachelor's degree attainment among for-profit students, or among public four-year and private two- and four-year students. Only among community college students pursuing associate's degrees was the likelihood of bachelor's degree receipt higher as a

function of time spent in school. This mirrors the results under Model 1, though the positive change in the coefficient from 0.074 to 0.111 represented a statistically significant difference in the odds between the two models ($\chi^2 = 10.61, p < 0.01$). Granting a decline over time in the positive odds of bachelor's degree attainment suggested by the squared term for cumulative months in a public two-year, the community college student still had a 1.12 times ($e^{0.108}$) greater odds of earning a bachelor's degree for each month spent pursuing an associate's degree.

While the coefficient for cumulative months in a for-profit under the second column of Model 2 was now positive given the added controls, it nonetheless remained small and statistically insignificant. Again, it was only those students at traditional public baccalaureate and private institutions who increased their likelihood of degree completion with each additional month of schooling pursuing bachelor's degrees. Each month of additional schooling was associated with 1.13 ($e^{0.126}$) and 1.13 ($e^{0.123}$) greater odds of bachelor's degree attainment, respectively, for public four-year and private two- and four-year baccalaureate students.

When we modeled demographic differences in bachelor's degree attainment rates by including interactions between cumulative months within each sector/degree sought combination and 1) race/ethnicity, 2) gender, and 3) parental educational attainment, we found few statistically significant interaction effects worth exploring at length for students pursuing a bachelor's degree. One notable result from these models, however, was that, relative to whites and "other race" individuals attending a for-profit college, black students attained a bachelor's

degree from a for-profit college at a significantly faster rate, controlling for baseline covariates (see Table B2 for all interaction models).

Discussion

The aim of this chapter was to answer two questions. First, who attends for-profit postsecondary institutions, taking into account attendance in other sectors? Second, for those who attend for-profit postsecondary institutions, how does their enrollment in that sector translate into degree attainment? In response to the first question, it is evident that for-profit colleges and universities are attractive to students who might not otherwise pursue a degree. As our results examining predictors of attendance at the various sectors revealed, the students who have the highest odds of attending for-profits relative to the other school types are racial minorities, those with a GED instead of a high school diploma, those from a family not headed by both biological parents, and those with a higher number of children. Blacks and those classified as “other race” are more likely than their white counterparts to attend a for-profit school compared to a community college, but all racial minorities have a greater likelihood than whites of attending a for-profit college compared to never attending a postsecondary institution at all. We also presented overlap statistics revealing that large percentages of those who reported ever attending a for-profit also reported attending each of the other three sector types. While very few of those who ever reported attending the more traditional public and private sector schools also reported attending a for-profit school, they did report attending another of the traditional sector schools in large numbers. And

descriptive graphs demonstrated that, while individuals whose parents' highest education level was high school or less were *as likely* to attend community college as their peers from higher educated homes, they were *moderately more likely* to attend the for-profit sector than these same individuals.

In response to the second question, our discrete-time hazard models revealed that, controlling for attendance in other sectors, attendance in the for-profit sector is associated with an increased likelihood of associate's degree receipt over time for those actually seeking an associate's degree. This holds net of the effect of individual student characteristics such as race, sex, parental educational attainment, high school GPA, and family income, among other things. The difference in the odds of associate's degree attainment among those pursuing an associate's degree at community colleges and for-profits is statistically significant and favors for-profits in the absence of controls. Adding controls, the statistically significant difference favors for-profits over all other sectors: public four-year schools, community colleges, and private two- and four-year schools. However, the for-profit student seeking a bachelor's degree is less likely to attain an associate's degree, whereas a comparable community college student actually has an increased likelihood of attaining an associate's degree even when pursuing a bachelor's.

Although attendance in other sectors—notably public four-year and private nonprofit colleges—significantly increases the odds of attaining a bachelor's degree, there is no evidence that attendance in the for-profit sector is beneficial to the likelihood of achieving a bachelor's degree, regardless of the degree sought. This pattern is net of attendance in other sectors and of individual-level characteristics.

Prior research indicates that those least likely to attend college benefit the most from it (Brand and Xie, 2009). To the degree that for-profits are effective at both attracting and graduating even a fraction of those who are least likely to attend college, they may be a viable alternative to the traditional model of postsecondary education for addressing the attainment gap. For-profit education is but one route, but it is one that appears to be doing a decent job at increasing minority degree attainment. This is not to discount the past and present failings of the for-profit sector, which have been addressed elsewhere, but, given the general failure of the traditional sectors to close the attainment gap or to graduate large percentages of their students (particularly more disadvantaged students), the for-profit sector appears to be charting a path to success for some of the more vulnerable segments of the United States population, at least with regard to associate's degrees. Indeed, an important puzzle for future research is why students at for-profits appear to be more successful at attaining associate's degrees than community college students but less successful at attaining bachelor's degrees than students at private nonprofit and public 4-year colleges and universities.

We note a few limitations of the present study that should prompt caution in interpreting the results. First, some of the degree sought-sector type combinations, as well as some subgroups of respondents, have small sample sizes. One should thus be concerned about the reliability of subgroup comparisons and aware of the possibility that a true effect exists where none was found, or, alternatively, that no true effect exists where one was found. However, we reiterate that our data contains one of the largest samples of for-profit students that we have encountered

in existing longitudinal research, and that we believe these data more accurately capture enrollment in for-profit colleges than data used in other studies, which only capture the sector of first enrollment.

Second, we unfortunately cannot measure within-sector variation. Not accounting for those factors that make schools within the same sector different—e.g., selectivity, location, resources, academic counseling services, etc.—means that we may miss differences that make some schools unreasonable comparisons for the for-profit sector, or may not be able to distinguish more successful for-profit institutions from less successful ones. In other words, we do not incorporate data on the mechanisms behind the associations we find.

Third, our data represent a particular historical moment in the evolution of the for-profit sector and a particular cohort of young people transitioning to adulthood. Much of the enrollment and degree completion captured in our data occurred in the early- and mid-2000s, before the financial crisis and the great recession, and before the most recent wave of public scrutiny of for-profit colleges. Although only time will tell, it seems that there are important shifts in the for-profit sector underway. For example, Corinthian Colleges, one of the largest for-profit college corporations appears to be shutting down after financial and regulatory problems (Perez-Pena 2014).

Fourth, we may lack important data on the factors that affect students' choice of college sector. Although we control for many student characteristics, it is possible that there is unobserved selection in who attends each college sector. That is, perhaps some variable we fail to account for, such as student motivation, is related

to both sector choice and degree receipt; if this is so, that omitted variable could drive our results, rather than sector. Finally, we do not take into account that characteristics of individuals change over time during the course of college enrollment. Many students, particularly those in the nontraditional for-profit sector, are working, forming families, raising children, or engaging in a host of other activities that could affect their time to degree. Simply controlling for these factors as they change over time can lead to biased estimates (Robins, Hernan, & Brumback, 2000). However, properly accounting for such time-varying confounding in the context of multiple outcomes and ten treatment categories is a complex and difficult undertaking that is beyond the scope of the current chapter. For that reason, we chose to restrict our predictor set to factors measured either at NLSY97 inception or when a respondent became at-risk of college entrance.

In conclusion, for-profit students do appear to be succeeding when success is defined as associate's degree attainment. For-profit institutions do a better job than institutions in other sectors of graduating their students with associate's degrees, even when models are adjusted for compositional differences in the type of students that attend each sector. The impact that such a trend has in people's lives cannot be discounted given what we know are the economic returns to increased education (Park, 2011). Importantly, though, the literature is mixed on the market value of the degrees being offered, particularly with respect to the differential economic returns to associate's degree attainment by sector and the different costs of attendance by sector born by the student. Research by Lang and Weinstein (2012), for instance, shows that the premium of increased education favors, by a statistically significant

margin, degree attainment in the not-for-profit versus the for-profit sector. Controlling for a host of characteristics, this premium amounted to a \$3,000 higher income in 2009 for associate's degree holders from the nonprofit sector. However, using somewhat different methods, and accounting for major, Lang and Weinstein (2013) found no statistically significant difference in the economic returns to receiving an associate's degree between the for-profit and nonprofit sectors. In fact, when looking just at degrees in business, registered nursing, and the health-assisting field, for-profit associate's degree recipients fared better than their community college counterparts. Given both the limitations of their data (the authors used the BPS in both studies), already addressed with respect to previous research, and the two foregoing conflicting studies, future research will need to continue to attempt to understand whether there are indeed differences in the quality of degrees among the postsecondary sectors and whether any disparity leads to different outcomes regarding incomes. Relatedly, it will be necessary in future research to track individuals' enrollments in all sectors and not merely only in the first. Issues of persistence within a sector (with respect to students) and retention (with respect to schools) are also important dynamics to be understood in future research on the time that it takes one to earn a degree.

Notes

¹We have compared the demographic characteristics of for-profit students in the 2004 wave of the NLSY97 to benchmark data from the 2004 NPSAS, finding roughly comparable distributions on descriptive statistics such as race, gender, and family background. Detailed results are available from the authors upon request.

²In models of associate's degree receipt, receipt of either an associate's or bachelor's degree concludes the risk period. By attrition we mean the failure to be interviewed in the most recent survey round or in the most recent two or more survey rounds uninterrupted. For instance, if an individual was not interviewed in the 2000 survey round or any round thereafter, that individual has been deemed to have dropped out of the survey. The same person would not be a leaver if that person were interviewed in the latest round that comprises our data. Finally, for the small proportion of NLSY97 respondents who enrolled in college at 17, we begin their data then rather than at age 18. It is typical in longitudinal surveys such as the NLSY97 for some subjects to drop out prior to either the outcome event occurring or before the study ends. This censoring due to attrition, when it is correlated with covariates and degree completion, can lead to biased estimates. We therefore construct censoring weights to adjust for attrition owing to time-varying factors (Robins, Rotnitzky, and Zhao, 1995; Robins, 1999; Robins, Hernan, and Brumback, 2000). The censoring weight is quantified as

$$cw_t = \prod_1^t \frac{\Pr(C_t=0 | B, X_{t-1})}{\Pr(C_t=0 | B, X_{t-1}, V_{t-1})} , \quad (2)$$

where the numerator is the predicted probability of remaining uncensored up to month t given baseline covariates, treatment status in the previous month, and the

one-month lag of the time-varying variables. The denominator represents the probability of remaining uncensored up to month t , given baseline covariates, treatment status in the previous month, time-varying covariates (age, work hours, wages, marital status, and number of dependents), and the one-month lag of these time-varying variables. This procedure allows us to observe the associations that would have been seen had no respondents left the study, assuming that any attrition related to our outcome (degree receipt) is accounted for by the above time-varying covariates. (Attrition due to baseline covariates is handled by the baseline covariates entered directly into the regression model.) The intuition is that these censoring weights give greater weight to months for which the probability of remaining uncensored is low for a given respondent and a smaller weight to months for which a person has a high probability of remaining uncensored. Normally, the numerator of the inverse probability of being censored would be 1. However, the above formula produces a lower variance in the resulting weight. The product of the wave 1 sampling weight and the censoring weight are included in our logit models.

³A combination of nonparametric and parametric techniques, PMM is preferable to linear regression for imputing missing values of a continuous variable because it produces values that are within the range of the observed data (Schenker & Taylor, 1996). Not only are the predicted values more appropriate if there is concern that the assumption of normality is violated (Horton & Lipsitz, 2001), they are also robust to deviations from linearity (Schenker & Taylor, 1996). While some have argued that no more than three to five imputed datasets are needed for efficient estimates (Rubin, 1987; Schafer & Olsen, 1998), others advocate for a great deal

more, perhaps twenty or more datasets (Graham, Olchowski, & Gilreath, 2007). Meeting halfway between these two stances, the analyses here are based on ten imputed datasets.

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Table 1. Weighted characteristics of NLSY97 respondents at baseline ($n = 7,620$).

	Mean	SD	Min	Max	# Missing & Imputed
Race					
White	0.682	0.466	0	1	0
Black	0.146	0.353	0	1	0
Hispanic	0.119	0.324	0	1	0
Other race	0.053	0.223	0	1	0
Sex					
Female	0.495	0.500	0	1	0
Male	0.505	0.500	0	1	0
Parent's education					
Less than high school	0.092	0.290	0	1	268
High school	0.300	0.458	0	1	268
Some college	0.272	0.445	0	1	268
Bachelor's degree or higher	0.336	0.472	0	1	268
Family structure					
Both biological parents	0.556	0.497	0	1	22
Other family structure	0.444	0.497	0	1	22
Gross family income (natural log of 1997 dollars)	10.504	1.370	0	12.415	1987
Household size	4.429	1.414	1	16	0
Type of high school attended					
Public school	0.901	0.299	0	1	15
Parochial/Private/Other	0.099	0.299	0	1	15
Took ACT or SAT	0.454	0.498	0	1	
High school GPA	2.916	0.587	0.15	4.17	2131
ASVAB percentile	53.572	27.956	0	100	1427
Residence area					
Urban	0.690	0.462	0	1	0
Rural	0.310	0.462	0	1	0
Region					
Northeast	0.187	0.390	0	1	0
Midwest	0.270	0.444	0	1	0
South	0.333	0.471	0	1	0
West	0.209	0.407	0	1	0
Age (in years)	18.406	0.675	15.083	25	19
Married	0.009	0.099	0	1	22
Number of children	0.042	0.241	0	4	706
Monthly hours worked	84.49	77.472	0	360	146
Hourly pay (natural log)	1.33	0.969	-3.51	7.78	95

Table 2. Percent of overlap between two postsecondary sectors.

Sectors ever attended:	<u>Percent who also attended:</u>			
	Public 4-Year	Public 2-Year	Private	For-Profit
Public 4-Year (<i>n</i> = 2,508) 32.91%	--	37.53	11.28	4.00
Public 2-Year (<i>n</i> = 2,832) 37.17%	35.96	--	12.44	10.56
Private (<i>n</i> = 1,061) 13.92%	31.05	26.97	--	13.89
For-Profit (<i>n</i> = 616) 8.08%	18.78	51.79	27.29	--

Note: The percent of overlap refers to the proportion of students who attended a sector in the leftmost column who also attended a different sector among the last four columns. Percentages in the leftmost column represent the proportion of students in the overall sample who ever attended the respective sector.

Table 3. Predictors of attending a for-profit college relative to ever attending other sectors and never attending college (logit coefficients).

	Compared to Public 2-Year (<i>n</i> = 2492)	Compared to Public 4-Year (<i>n</i> = 2511)	Compared to Private 2- or 4- Year (<i>n</i> = 1237)	Compared to Never Attending (<i>n</i> = 2710)
Race (Ref = White)				
Black	0.385* (0.156)	-0.189 (0.175)	-0.425 (0.221)	0.892*** (0.162)
Hispanic	0.055 (0.167)	-0.003 (0.180)	-0.107 (0.224)	0.396* (0.178)
Other race	0.529* (0.243)	0.255 (0.245)	0.402 (0.301)	1.115*** (0.304)
Male	-0.007 (0.119)	-0.065 (0.126)	0.006 (0.149)	-0.512*** (0.126)
Attended public school	-0.354 (0.183)	-0.209 (0.196)	0.012 (0.213)	-0.111 (0.193)
Took ACT or SAT	0.025 (0.113)	-0.291* (0.121)	-0.395** (0.147)	0.519*** (0.119)
High school GPA	-0.106 (0.124)	-0.808*** (0.139)	-0.647*** (0.165)	0.480*** (0.126)
ASVAB percentile	0.002 (0.003)	-0.011*** (0.003)	-0.010** (0.004)	0.016*** (0.003)
GED or no diploma	0.212	1.554***	1.196**	-0.603**

	(0.216)	(0.334)	(0.398)	(0.208)
Parent's education (Ref = less than high school)				
High school	-0.290 (0.200)	-0.046 (0.221)	0.130 (0.288)	0.054 (0.200)
Some college	-0.252 (0.207)	-0.052 (0.224)	0.039 (0.292)	0.460* (0.203)
Bachelor's degree or higher	-0.439* (0.220)	-0.616** (0.235)	-0.615* (0.306)	0.866*** (0.220)
Family structure	0.071 (0.119)	0.198 (0.129)	0.195 (0.163)	-0.132 (0.133)
Gross family income (log of 1997 dollars)	0.026 (0.037)	0.009 (0.041)	-0.085 (0.074)	0.136** (0.052)
Household size	-0.066 (0.042)	-0.041 (0.044)	-0.070 (0.050)	-0.090 (0.046)
Rural (vs. urban)	-0.024 (0.139)	-0.079 (0.147)	-0.155 (0.175)	-0.296* (0.139)
Region (Ref = Northeast)				
Midwest	-0.300 (0.177)	-0.165 (0.187)	0.128 (0.209)	-0.302 (0.188)
South	-0.456** (0.171)	0.026 (0.182)	0.744*** (0.200)	-0.433* (0.175)
West	-0.357* (0.139)	0.213 (0.147)	1.011*** (0.175)	-0.138 (0.139)

	(0.180)	(0.189)	(0.221)	(0.196)
Age relative to 18th birthday	-0.016 (0.011)	-0.022 (0.012)	0.011 (0.030)	-0.034** (0.011)
Age-squared	-0.000 (0.000)	-0.000 (0.000)	0.001 (0.001)	-0.000 (0.000)
Currently married	0.363 (0.576)	-0.453 (0.758)		0.133 (0.470)
Number of children	-0.214 (0.273)	0.954** (0.332)	0.833 (0.472)	-0.297 (0.238)
Number of children squared	0.402* (0.180)	0.058 (0.205)	-0.186 (0.298)	0.242 (0.124)
Monthly hours worked	-0.001 (0.001)	0.001 (0.002)	0.002 (0.002)	-0.004** (0.001)
Monthly hours worked squared	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Log of hourly pay	0.100 (0.094)	-0.000 (0.109)	0.040 (0.133)	0.295** (0.100)
Log of hourly pay squared	-0.098 (0.054)	0.015 (0.074)	-0.035 (0.065)	-0.226*** (0.065)
Constant	-1.031** (0.362)	-0.768 (0.432)	-0.115 (0.632)	-2.139*** (0.341)

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Each column represents a separate model

of a binary comparison in which individuals who ever attended a for-profit college were coded 1 and students who only fell into the comparison category were coded 0.

Table 4. Degree attainment rates after 4, 6, and 8 years by sector ever attended by degree type (associate's or bachelor's).

Ever Attended Sector	Percent Receiving Associate's Degree			Percent Receiving Bachelor's Degree		
	After 4 years	After 6 years	After 8 years	After 4 years	After 6 years	After 8 years
Any college type	7.8	10.8	12.3	16.7	35.0	38.7
For-Profit	13.8	20.4	23.9	9.7	17.8	20.7
Public 2-Year	11.8	16.8	19.0	5.6	16.8	20.1
Public 4-Year	7.3	10.0	11.1	19.7	50.1	56.3
Private	5.9	8.4	9.5	36.4	56.2	60.7

Note: Rates are measured from study baseline (see text for definition).

Table 5. Logistic regression coefficients for likelihood of attaining an associate's degree by cumulative months within sector by degree being sought. ($n = 7,610$; 594,772 person-months)

Cumulative months within sector	<u>Model 1</u>		<u>Model 2</u>	
	Pursuing Associate's Degree	Pursuing Bachelor's Degree	Pursuing Associate's Degree	Pursuing Bachelor's Degree
Public 4-year	0.061 (0.052)	0.007 (0.017)	0.128* (0.052)	-0.004 (0.017)
Squared	0.0016 (0.001)	-0.0003 (0.000)	0.0005 (0.002)	0.0002 (0.000)
Public 2-year	0.223*** (0.013)	0.057* (0.024)	0.243*** (0.014)	0.061* (0.024)
Squared	-0.002*** (0.000)	-0.0003 (0.001)	-0.002*** (0.000)	0.0004 (0.001)
Private	0.358*** (0.045)	-0.076 (0.050)	0.325*** (0.050)	-0.067 (0.056)
Squared	-0.005*** (0.001)	0.0006 (0.001)	-0.003* (0.002)	0.0005 (0.002)
For-Profit	0.346*** (0.024)	-0.174* (0.081)	0.394*** (0.025)	-0.104 (0.069)
Squared	-0.005*** (0.001)	0.004** (0.002)	-0.005*** (0.001)	0.004** (0.001)

Notes: Models 1 and 2 each include the college sector variables listed as well as an international/other school type variable, which is rarely attended and omitted from the table for simplicity. Model 2 controls for race/ethnicity, sex, type of high school attended, whether respondent took the ACT or SAT, high school GPA, ASVAB percentile, GED receipt, parental educational attainment, family structure, natural log of gross family income, household size, region, whether respondent was married at baseline, respondent's number of own or adopted children, respondent's monthly hours worked, and the natural log of respondent's hourly pay rate. Both the baseline and time-varying value of age and age-squared are also entered. Models are weighted by sampling weights and by inverse probability of attrition over time. Person-clustered standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6. Logistic regression coefficients for likelihood of attaining a bachelor's degree by cumulative months within sector by degree being sought. ($n = 7,617$; 625,167 person-months)

Cumulative months within sector	Model 1		Model 2	
	Pursuing Associate's Degree	Pursuing Bachelor's Degree	Pursuing Associate's Degree	Pursuing Bachelor's Degree
Public 4-year	0.048 (0.051)	0.153*** (0.009)	0.094* (0.045)	0.126*** (0.008)
Squared	-0.001 (0.003)	-0.0001*** (0.000)	-0.002 (0.002)	-0.0004*** (0.000)
Public 2-year	0.0740*** (0.020)	-0.007 (0.032)	0.111*** (0.018)	-0.0127 (0.023)
Squared	-0.001 (0.001)	0.0002 (0.002)	-0.001** (0.001)	0.002 (0.001)
Private	-0.170 (0.141)	0.136*** (0.012)	-0.0308 (0.085)	0.123*** (0.012)
Squared	0.007 (0.004)	-0.0002 (0.000)	0.003 (0.003)	-0.00007 (0.000)
For-Profit	-0.180 (0.167)	0.048 (0.050)	-0.097 (0.093)	0.052 (0.045)
Squared	0.005 (0.003)	0.001 (0.001)	0.003 (0.002)	0.002 (0.001)

Notes: Models 1 and 2 each include the college sector variables listed as well as an international/other school type variable, which is rarely attended and omitted from the table for simplicity. Model 2 controls for race/ethnicity, sex, type of high school attended, whether respondent took the ACT or SAT, high school GPA, ASVAB percentile, GED receipt, parental educational attainment, family structure, natural log of gross family income, household size, region, whether respondent was married at baseline, respondent's number of own or adopted children, respondent's monthly hours worked, and the natural log of respondent's hourly pay rate. Both the baseline and time-varying value of age and age-squared are also entered. Models are weighted by sampling weights and by inverse probability of attrition over time. Person-clustered standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

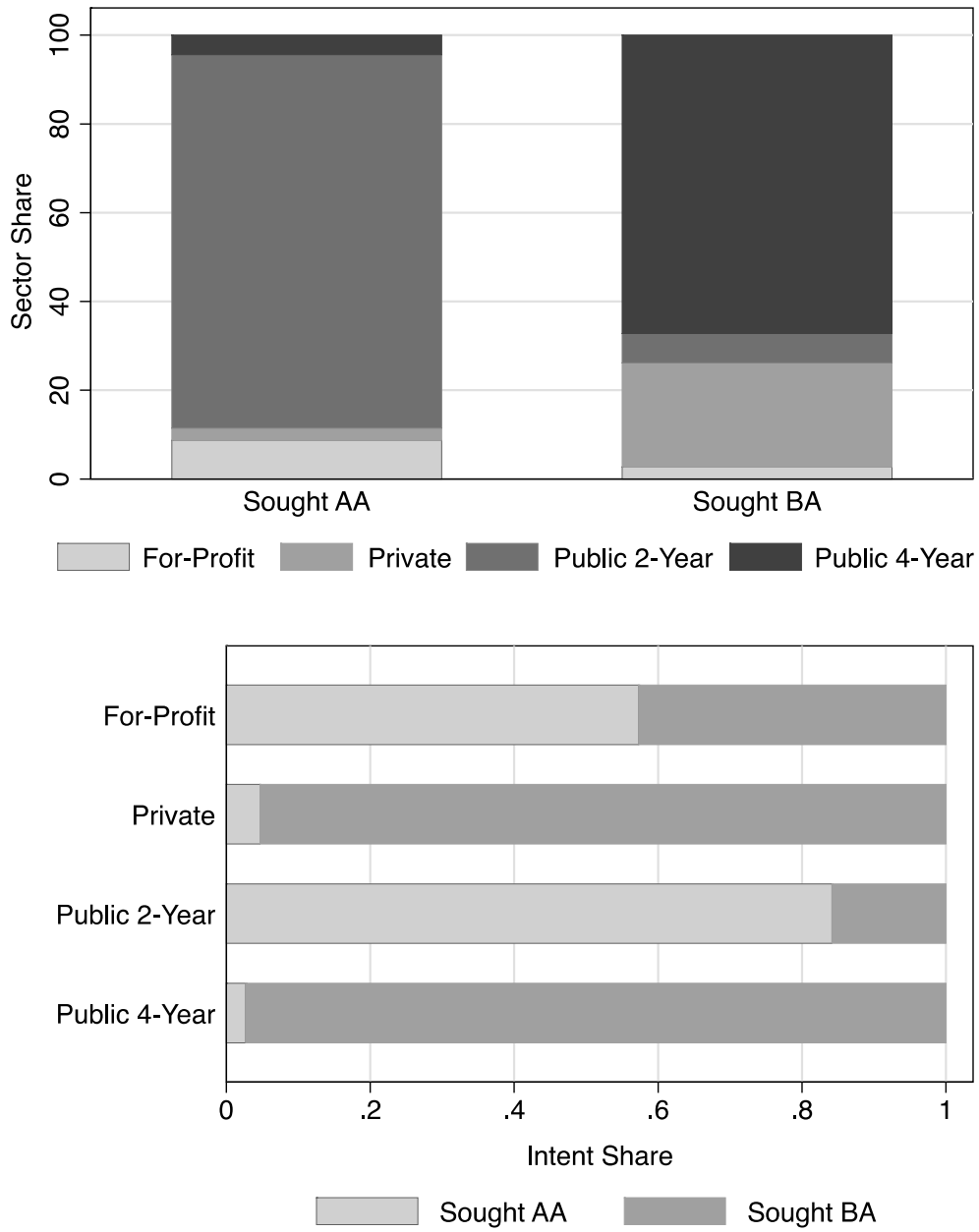


Figure 1. Sector share-by-intent and intent share-by-sector (person-months).

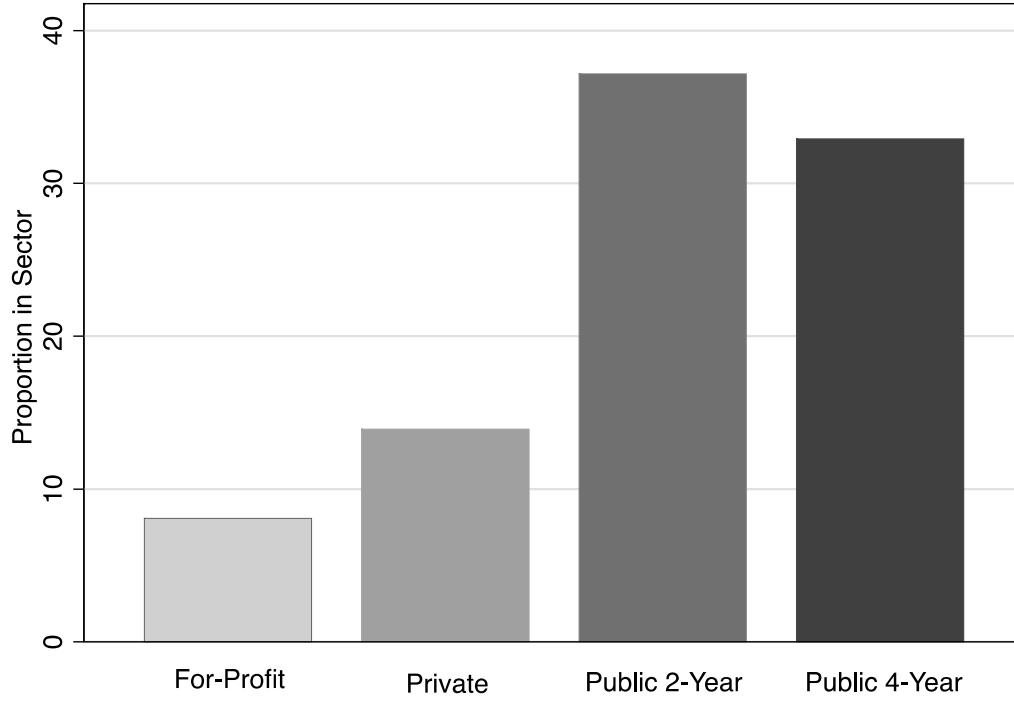


Figure 2. Proportion of NLSY97 respondents ever attending each sector.

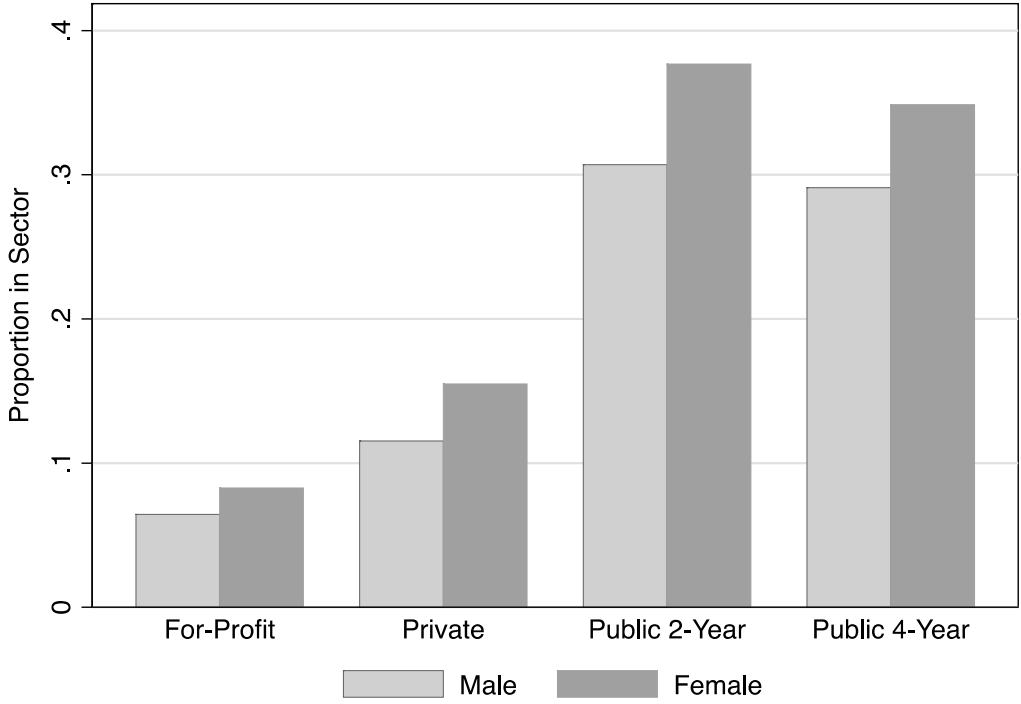


Figure 3. Proportion of NLSY97 respondents ever attending each sector by sex.

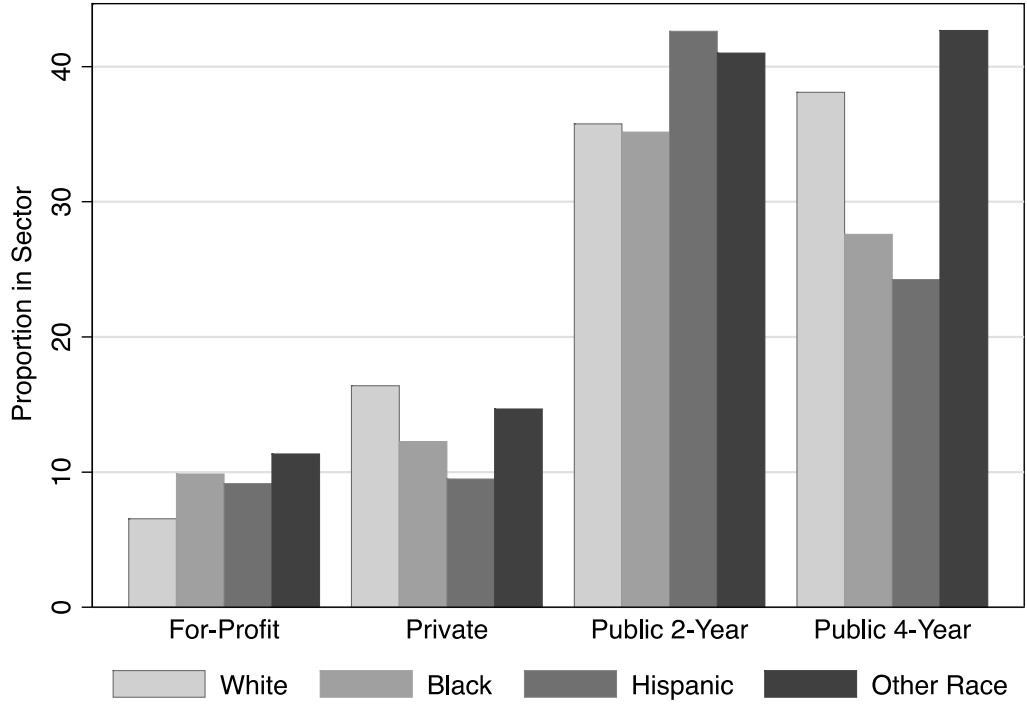


Figure 4. Proportion of NLSY97 respondents ever attending each sector by race/ethnicity.

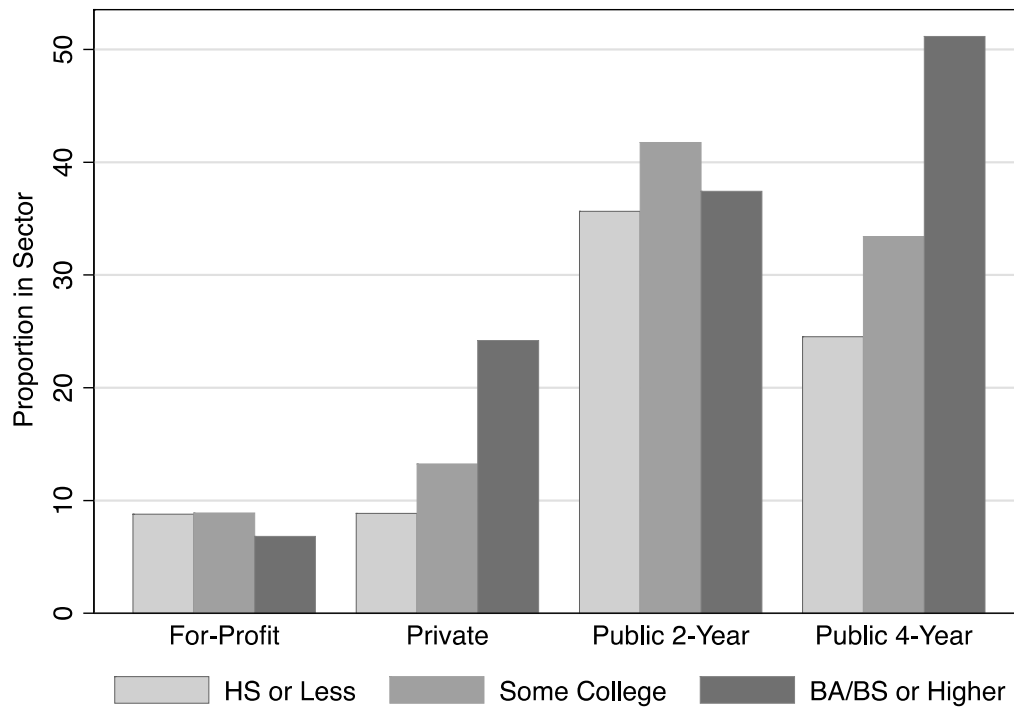


Figure 5. Proportion of NLSY97 respondents ever attending each sector by parental educational attainment.

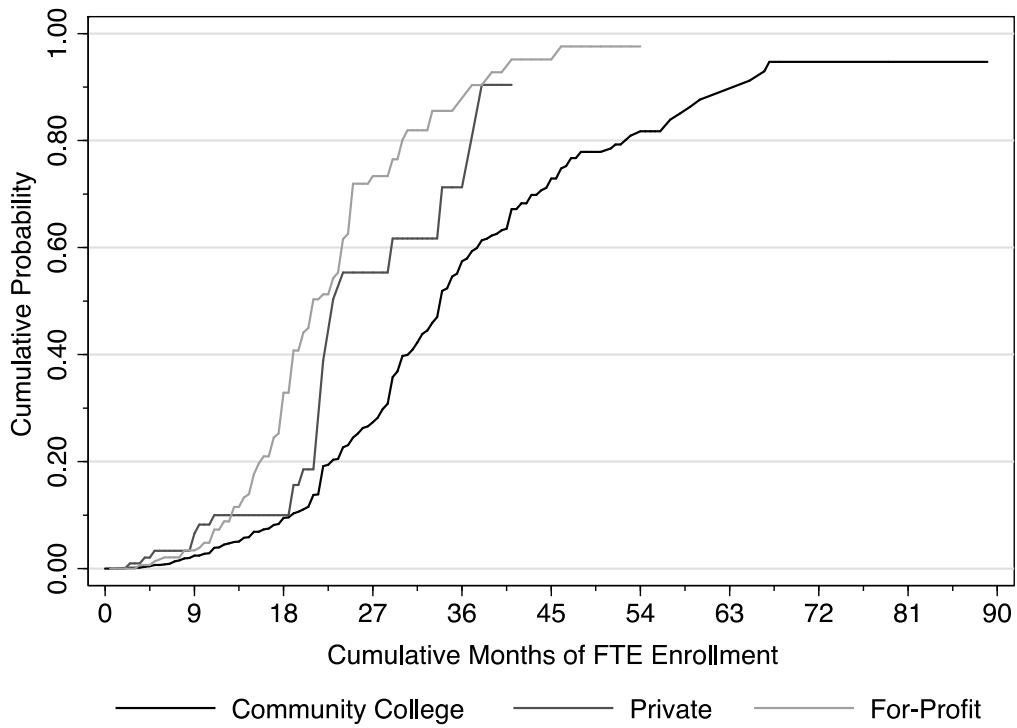


Figure 6. Cumulative probability of associate's degree receipt by institutional sector type (unadjusted Kaplan-Meier failure estimate).

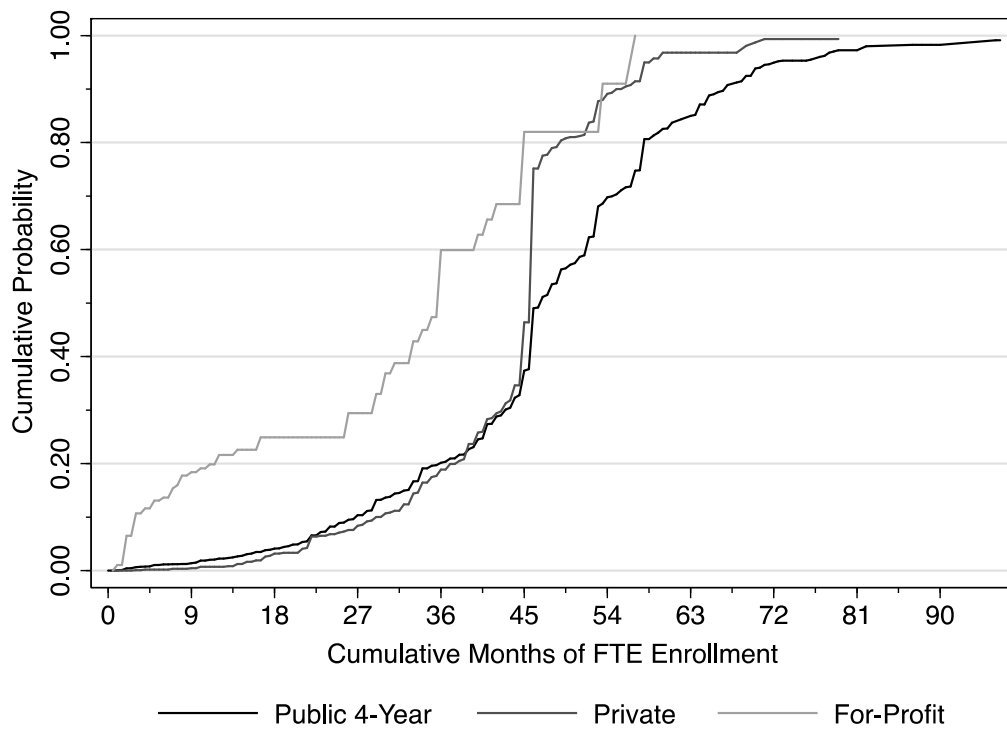


Figure 7. Cumulative probability of bachelor's degree receipt by institutional sector (unadjusted Kaplan-Meier failure estimate).

Appendix A

Table A1. Full model results for Table 5: Logistic regression coefficients for likelihood of attaining an associate's degree by cumulative months within sector by degree being sought. (n = 7,610; 594,772 person-months)

	Model 1		Model 2	
<i>Time-varying variables</i>				
Age (relative to 18th birthday)			-0.016	(0.006)**
Age-squared (relative to 18th birthday)			-0.000	(0.000)
Cumulative months pursuing an associate's degree at				
Public 4-year	0.061	(0.052)	0.128	(0.052)*
Public 4-year-squared	0.002	(0.001)	0.001	(0.002)
Public 2-year	0.223	(0.013)***	0.243	(0.014)***
Public 2-year-squared	-0.002	(0.000)***	-0.002	(0.000)***
Private	0.358	(0.045)***	0.325	(0.050)***
Private-squared	-0.005	(0.001)***	-0.003	(0.002)*
For-profit	0.346	(0.024)***	0.394	(0.025)***
For-profit-squared	-0.005	(0.001)***	-0.005	(0.001)***
Cumulative months pursuing a bachelor's degree at				
Public 4-year	0.008	(0.017)	-0.004	(0.017)
Public 4-year-squared	-0.000	(0.000)	0.000	(0.000)
Public 2-year	0.057	(0.024)*	0.061	(0.024)*
Public 2-year-squared	-0.000	(0.001)	0.000	(0.001)
Private	-0.076	(0.050)	-0.067	(0.056)
Private-squared	0.001	(0.001)	0.000	(0.002)
For-profit	-0.174	(0.081)*	-0.104	(0.069)
For-profit-squared	0.005	(0.002)**	0.004	(0.001)**
Cumulative months pursuing a degree at				
International institution	0.399	(0.127)**	0.443	(0.120)***
International institution-squared	-0.015	(0.005)**	-0.017	(0.005)**
<i>Time-invariant baseline variables</i>				
Race (Ref = white)				
Black			-0.386	(0.207)
Hispanic			-0.283	(0.199)
Other race			0.015	(0.255)
Male			-0.089	(0.132)
Attended public school			-0.112	(0.221)
Took ACT or SAT			0.096	(0.132)

High school GPA	0.519	(0.163)**
ASVAB percentile	0.002	(0.003)
GED or no diploma	-0.560	(0.359)
Parent's education (Ref = less than high school)		
High school	0.462	(0.274)
Some college	0.287	(0.277)
Bachelor's degree or higher	0.590	(0.281)*
Family structure	0.009	(0.136)
Gross family income (log of 1997 dollars)	-0.020	(0.046)
Household size	0.056	(0.049)
Rural (vs. urban)	0.411	(0.142)**
Region (Ref = Northeast)		
Midwest	-0.003	(0.211)
South	0.044	(0.203)
West	0.212	(0.214)
Age	0.013	(0.015)
Age-squared	-0.000	(0.000)
Currently Married	-0.132	(0.675)
Number of children	0.064	(0.326)
Number of children-squared	0.083	(0.186)
Monthly hours worked	-0.002	(0.002)
Monthly hours worked-squared	0.000	(0.000)
Log of hourly pay	0.214	(0.104)*
Log of hourly pay-squared	-0.076	(0.067)
Constant	-8.842	(0.124)***
	-8.762	(0.498)**

Notes: Both models are weighted by the product of the sampling weights and by inverse probability of attrition over time. Person-clustered standard errors are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A2. Full model results for Table 6: Logistic regression coefficients for likelihood of attaining a bachelor's degree by cumulative months within sector by degree being sought. (n = 7,610; 594,772 person-months)

	Model 1		Model 2	
<i>Time-varying variables</i>				
Age (relative to 18th birthday)			0.060	(0.008)***
Age-squared (relative to 18th birthday)			-0.001	(0.000)***
Cumulative months pursuing an associate's degree at				
Public 4-year	0.048	(0.051)	0.094	(0.045)*
Public 4-year-squared	-0.001	(0.003)	-0.002	(0.002)
Public 2-year	0.074	(0.020)***	0.111	(0.018)***
Public 2-year-squared	-0.001	(0.001)	-0.002	(0.001)**
Private	-0.170	(0.141)	-0.031	(0.085)
Private-squared	0.007	(0.004)	0.003	(0.003)
For-profit	-0.180	(0.167)	-0.097	(0.093)
For-profit-squared	0.005	(0.003)	0.003	(0.002)
Cumulative months pursuing a bachelor's degree at				
Public 4-year	0.153	(0.009)***	0.126	(0.008)***
Public 4-year-squared	-0.001	(0.000)***	-0.000	(0.000)***
Public 2-year	-0.007	(0.032)	-0.013	(0.023)
Public 2-year-squared	0.000	(0.002)	0.002	(0.001)
Private	0.136	(0.012)***	0.123	(0.012)***
Private-squared	-0.000	(0.000)	-0.000	(0.000)
For-profit	0.048	(0.050)	0.052	(0.045)
For-profit-squared	0.001	(0.001)	0.002	(0.001)
Cumulative months pursuing a degree at				
International institution	0.109	(0.025)***	0.089	(0.028)**
International institution-squared	-0.000	(0.000)	0.000	(0.000)
<i>Time-invariant baseline variables</i>				
Race (Ref = white)				
Black			-0.427	(0.145)**
Hispanic			-0.366	(0.144)*
Other race			0.045	(0.162)
Male			-0.164	(0.074)*
Attended public school			-0.017	(0.112)
Took ACT or SAT			0.072	(0.077)
High school GPA			0.365	(0.090)***
ASVAB percentile			0.007	(0.002)***

GED or no diploma	-0.707	(0.600)
Parent's education (Ref = less than high school)		
High school	0.123	(0.232)
Some college	0.265	(0.228)
Bachelor's degree or higher	0.212	(0.229)
Family structure	-0.063	(0.090)
Gross family income (log of 1997 dollars)	0.049	(0.040)
Household size	0.026	(0.033)
Rural (vs. urban)	-0.066	(0.085)
Region (Ref = Northeast)		
Midwest	-0.229	(0.107)*
South	-0.148	(0.114)
West	-0.152	(0.123)
Age	-0.043	(0.041)
Age-squared	-0.001	(0.001)
Currently Married	-0.188	(0.764)
Number of children	-0.288	(0.318)
Number of children-squared	0.262	(0.130)*
Monthly hours worked	0.000	(0.001)
Monthly hours worked-squared	0.000	(0.000)
Log of hourly pay	0.012	(0.059)
Log of hourly pay-squared	-0.021	(0.031)
Constant	-8.818	(0.164)***
	-10.088	(0.672)***

Notes: Both models are weighted by the product of the sampling weights and by inverse probability of attrition over time. Person-clustered standard errors are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix B

Table B1. Logistic regression coefficients for likelihood of attaining an associate's degree by cumulative months within sector by degree being sought by race/ethnicity, gender, and parent's education. (n = 7,610; 594,772 person-months)

	Cumulative Months × Race/Ethnicity	Cumulative Months × Gender	Cumulative Months × Parent's Education
<i>Time-invariant baseline variables</i>			
Race (Ref = white)			
Black		-0.482 (0.208)*	-0.483 (0.214)*
Hispanic		-0.374 (0.208)	-0.258 (0.205)
Other race		-0.090 (0.259)	0.042 (0.255)
Male	-0.056 (0.135)		-0.069 (0.139)
Attended public school	-0.047 (0.229)	-0.187 (0.221)	-0.142 (0.223)
Took ACT or SAT	0.058 (0.135)	0.058 (0.136)	0.070 (0.134)
High school GPA	0.576 (0.166)**	0.500 (0.163)**	0.553 (0.165)**
ASVAB percentile	0.003 (0.003)	0.002 (0.003)	0.001 (0.003)
GED or no diploma	-0.697 (0.388)	-0.703 (0.381)	-0.851 (0.441)
Parent's education (Ref = less than high school)			
High school	0.269 (0.253)	0.375 (0.263)	
Some college	0.064 (0.256)	0.182 (0.271)	
Bachelor's degree or higher	0.452 (0.265)	0.513 (0.277)	
Family structure	0.004 (0.136)	0.011 (0.134)	0.051 (0.137)
Gross family income (log of 1997 dollars)	-0.033 (0.041)	-0.037 (0.044)	-0.014 (0.040)
Household size	0.073 (0.049)	0.071 (0.049)	0.047 (0.049)
Rural (vs. urban)	0.413 (0.142)**	0.406 (0.143)**	0.390 (0.145)**
Region (Ref = Northeast)			
Midwest	0.034 (0.217)	-0.044 (0.213)	-0.044 (0.210)
South	0.119 (0.207)	0.026 (0.203)	0.023 (0.201)
West	0.268 (0.216)	0.163 (0.217)	0.157 (0.215)
Age	0.017 (0.013)	0.005 (0.019)	0.020 (0.014)
Age-squared	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Currently married	-0.134 (0.653)	0.016 (0.658)	-0.077 (0.664)

Number of children	0.165	(0.339)	0.023	(0.308)	0.049	(0.326)
Number of children squared	0.019	(0.204)	0.139	(0.155)	0.079	(0.177)
Monthly hours worked	-0.001	(0.002)	-0.002	(0.002)	-0.001	(0.002)
Monthly hours worked squared	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Log of hourly pay	0.224	(0.106)*	0.214	(0.109)	0.201	(0.111)
Log of hourly pay squared	-0.054	(0.061)	-0.069	(0.067)	-0.085	(0.070)
<i>Time-varying variables and interactions</i>						
Age (relative to 18th birthday)	-0.016	(0.006)**	-0.016	(0.006)**	-0.019	(0.006)**
Age-squared (relative to 18th birthday)	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Cumulative months pursuing an associate's degree at						
Public 4-year	0.145	(0.062)*	0.145	(0.086)	0.125	(0.178)
Public 4-year-squared	0.000	(0.002)	0.001	(0.003)	-0.007	(0.009)
Public 2-year	0.256	(0.016)***	0.257	(0.017)***	0.254	(0.025)***
Public 2-year-squared	-0.002	(0.000)***	-0.003	(0.000)***	-0.003	(0.001)***
Private	0.325	(0.063)***	0.251	(0.086)**	-0.440	(0.237)
Private-squared	-0.002	(0.002)	-0.001	(0.003)	0.036	(0.010)***
For-profit	0.412	(0.032)***	0.403	(0.032)***	0.477	(0.093)***
For-profit-squared	-0.006	(0.001)***	-0.006	(0.001)***	-0.009	(0.004)*
By race (Ref = white)						
Public 4-year × black	-0.107	(0.136)				
Public 4-year-squared × black	0.009	(0.005)				
Public 2-year × black	-0.021	(0.022)				
Public 2-year-squared × black	0.000	(0.001)				
Private × black	0.006	(0.107)				
Private-squared × black	-0.002	(0.003)				
For-profit × black	-0.118	(0.097)				
For-profit-squared × black	0.004	(0.004)				
Public 4-year × Hispanic	0.091	(0.145)				
Public 4-year-squared × Hispanic	-0.008	(0.006)				
Public 2-year × Hispanic	-0.033	(0.022)				
Public 2-year-squared × Hispanic	0.000	(0.001)				

Private × Hispanic	-0.042	(0.210)		
Private-squared × Hispanic	0.001	(0.006)		
For-profit × Hispanic	-0.022	(0.055)		
For-profit-squared × Hispanic	0.001	(0.002)		
Public 4-year × male			-0.049	(0.108)
Public 4-year-squared × male			-0.000	(0.003)
Public 2-year × male			-0.022	(0.018)
Public 2-year-squared × male			0.001	(0.000)
Private × male			0.113	(0.105)
Private-squared × male			-0.003	(0.003)
For-profit × male			-0.052	(0.052)
For-profit-squared × male			0.003	(0.002)
By parent's education (Ref = less than high school)				
Public 4-year × high school			0.138	(0.189)
Public 4-year-squared × high school			0.004	(0.009)
Public 2-year × high school			0.003	(0.029)
Public 2-year-squared × high school			0.000	(0.001)
Private × high school			-1.023	(0.789)
Private-squared × high school			0.043	(0.035)
For-profit × high school			-0.046	(0.101)
For-profit-squared × high school			0.003	(0.004)
Public 4-year × some college			-0.277	(0.242)
Public 4-year-squared × some college			0.024	(0.012)*
Public 2-year × some college			-0.017	(0.026)
Public 2-year-squared × some college			0.001	(0.001)
Private × some college			0.796	(0.253)**
Private-squared × some college			-0.040	(0.011)***
For-profit × some college			-0.180	(0.106)
For-profit-squared × some college			0.008	(0.004)
Public 4-year × bachelor's degree or higher			0.008	(0.199)
Public 4-year-squared × bachelor's degree or higher			0.009	(0.009)
Public 2-year × bachelor's degree or higher			0.020	(0.028)
Public 2-year-squared × bachelor's degree or higher			-0.000	(0.001)

Private × bachelor's degree or higher				0.830	(0.256)**
Private-squared × bachelor's degree or higher				-0.041	(0.011)***
For-profit × bachelor's degree or higher				-0.084	(0.118)
For-profit-squared × bachelor's degree or higher				0.006	(0.005)
Cumulative months pursuing a bachelor's degree at					
Public 4-year	-0.007	(0.021)	0.007	(0.019)	0.020 (0.109)
Public 4-year-squared	0.000	(0.001)	0.000	(0.000)	-0.002 (0.004)
Public 2-year	-0.002	(0.032)	0.038	(0.033)	0.259 (0.083)**
Public 2-year-squared	0.003	(0.001)**	0.002	(0.001)	-0.007 (0.005)
Private	-0.011	(0.052)	-0.021	(0.085)	-0.119 (0.233)
Private-squared	-0.001	(0.002)	-0.002	(0.004)	-0.003 (0.013)
For-profit	-0.114	(0.088)	-0.137	(0.131)	-0.162 (0.359)
For-profit-squared	0.004	(0.002)*	0.003	(0.003)	0.006 (0.009)
By race (Ref = white)					
Public 4-year × black	-0.006	(0.038)			
Public 4-year-squared × black	0.000	(0.001)			
Public 2-year × black	0.095	(0.080)			
Public 2-year-squared × black	-0.002	(0.003)			
Private × black	-0.059	(0.092)			
Private-squared × black	0.003	(0.002)			
For-profit × black	0.615	(0.177)***			
For-profit-squared × black	-0.030	(0.010)**			
Public 4-year × Hispanic	0.070	(0.069)			
Public 4-year-squared × Hispanic	-0.002	(0.002)			
Public 2-year × Hispanic	0.197	(0.063)**			
Public 2-year-squared × Hispanic	-0.007	(0.002)**			
Private × Hispanic	0.020	(0.483)			
Private-squared × Hispanic	-0.017	(0.030)			
For-profit × Hispanic	-0.130	(0.245)			
For-profit-squared × Hispanic	0.002	(0.006)			
Public 4-year × male			-0.024	(0.042)	
Public 4-year-squared × male			-0.000	(0.002)	

Public 2-year × male	0.047	(0.048)	
Public 2-year-squared × male	-0.002	(0.001)	
Private × male	-0.043	(0.115)	
Private-squared × male	0.003	(0.004)	
For-profit × male	-0.075	(0.182)	
For-profit-squared × male	0.006	(0.004)	
By parent's education (Ref = less than high school)			
Public 4-year × high school			-0.013 (0.116)
Public 4-year-squared × high school			0.003 (0.004)
Public 2-year × high school			-0.308 (0.096)**
Public 2-year-squared × high school			0.011 (0.005)*
Private × high school			0.144 (0.247)
Private-squared × high school			0.003 (0.013)
For-profit × high school			0.267 (0.404)
For-profit-squared × high school			-0.012 (0.012)
Public 4-year × some college			-0.013 (0.113)
Public 4-year-squared × some college			0.002 (0.004)
Public 2-year × some college			-0.148 (0.095)
Public 2-year-squared × some college			0.008 (0.005)
Private × some college			0.060 (0.281)
Private-squared × some college			0.003 (0.014)
For-profit × some college			-0.180 (0.423)
For-profit-squared × some college			0.003 (0.010)
Public 4-year × bachelor's degree or higher			-0.033 (0.113)
Public 4-year-squared × bachelor's degree or higher			0.002 (0.004)
Public 2-year × bachelor's degree or higher			-0.184 (0.092)*
Public 2-year-squared × bachelor's degree or higher			0.006 (0.005)
Private × bachelor's degree or higher			0.103 (0.239)
Private-squared × bachelor's degree or higher			0.003 (0.013)
For-profit × bachelor's degree or higher			0.181 (0.378)
For-profit-squared × bachelor's degree or higher			-0.005 (0.009)

Cumulative months pursuing degree at

International institution	0.397	(0.172)*	0.493	(0.135)***	-6.096	(3.434)
International institution-squared	-0.012	(0.006)*	-0.016	(0.005)**	0.061	(3.460)
By race (Ref = white)						
International institution × black	1.386	(0.431)**				
International institution-squared × black	-0.170	(0.039)***				
International institution × Hispanic	0.773	(0.349)*				
International institution-squared × Hispanic	-0.125	(0.040)**				
International institution × male			0.079	(0.393)		
International institution-squared × male			-0.028	(0.030)		
By parent's education (Ref = less than high school)						
International institution × high school					6.808	(3.919)
International institution-squared × high school					-0.102	(6.153)
International institution × some college					6.924	(3.652)
International institution-squared × some college					-0.136	(.)
International institution × bachelor's degree or higher					6.564	(3.976)
International institution-squared × bachelor's degree or higher					-0.075	(2.409)
Constant	-8.806	(0.475)***	-8.791	(0.515)***	-8.352	(0.437)***

Notes: The sample size for those classified as “other race” is too small to model interactions, so the main effects of college attendance can be considered to apply to both whites and other race individuals. All models are weighted by sampling weights and by inverse probability of attrition over time. Person-clustered standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table B2. Logistic regression coefficients for likelihood of attaining a bachelor's degree by cumulative months within sector by degree being sought by race/ethnicity, gender, and parent's education. (n = 7,610; 594,772 person-months)

	Cumulative Months × Race/Ethnicity		Cumulative Months × Gender		Cumulative Months × Parent's Education	
<i>Time-invariant baseline variables</i>						
Race (Ref = white)						
Black			-0.502	(0.145) ^{***}	-0.520	(0.148) ^{***}
Hispanic			-0.423	(0.146) ^{**}	-0.387	(0.145) ^{**}
Other race			0.023	(0.161)	0.052	(0.163)
Male	-0.161	(0.075) [*]			-0.141	(0.073)
Attended public school	-0.017	(0.114)	-0.007	(0.110)	0.000	(0.109)
Took ACT or SAT	0.069	(0.078)	0.071	(0.078)	0.082	(0.078)
High school GPA	0.385	(0.091) ^{***}	0.389	(0.091) ^{***}	0.376	(0.092) ^{***}
ASVAB percentile	0.008	(0.002) ^{***}	0.007	(0.002) ^{**}	0.007	(0.002) ^{**}
GED or no diploma	-0.642	(0.594)	-1.299	(0.987)	-0.706	(0.623)
Parent's education (Ref = less than high school)						
High school	0.189	(0.231)	0.133	(0.229)		
Some college	0.329	(0.229)	0.256	(0.225)		
Bachelor's degree or higher	0.258	(0.230)	0.192	(0.226)		
Family structure	-0.081	(0.092)	-0.042	(0.090)	-0.035	(0.094)
Gross family income (log of 1997 dollars)	0.048	(0.040)	0.055	(0.041)	0.066	(0.045)
Household size	0.023	(0.033)	0.024	(0.033)	0.020	(0.033)
Rural (vs. urban)	-0.070	(0.084)	-0.067	(0.084)	-0.088	(0.085)
Region (Ref = Northeast)						
Midwest	-0.238	(0.110) [*]	-0.227	(0.108) [*]	-0.198	(0.109)
South	-0.164	(0.116)	-0.122	(0.115)	-0.090	(0.112)
West	-0.145	(0.124)	-0.168	(0.124)	-0.130	(0.125)
Age	-0.040	(0.043)	-0.047	(0.043)	-0.030	(0.041)
Age-squared	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)
Currently married	-0.139	(0.770)	0.223	(0.763)	-0.177	(0.717)
Number of children	-0.236	(0.310)	-0.697	(0.463)	-0.178	(0.325)
Number of children squared	0.230	(0.137)	0.395	(0.138) ^{**}	0.219	(0.134)

Monthly hours worked	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
Monthly hours worked squared	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Log of hourly pay	0.007	(0.059)	0.008	(0.059)	0.009	(0.058)
Log of hourly pay squared	-0.019	(0.031)	-0.016	(0.029)	-0.021	(0.030)
<i>Time-varying variables and interactions</i>						
Age (relative to 18th birthday)	0.056	(0.008) ^{***}	0.056	(0.008) ^{***}	0.051	(0.008) ^{***}
Age-squared (relative to 18th birthday)	-0.001	(0.000) ^{***}	-0.001	(0.000) ^{***}	-0.001	(0.000) ^{***}
Cumulative months pursuing an associate's degree at						
Public 4-year	0.095	(0.043) [*]	0.123	(0.065)	0.154	(0.162)
Public 4-year-squared	-0.002	(0.002)	-0.004	(0.003)	-0.005	(0.011)
Public 2-year	0.122	(0.021) ^{***}	0.111	(0.024) ^{***}	0.099	(0.024) ^{***}
Public 2-year-squared	-0.002	(0.001) ^{**}	-0.001	(0.001) [*]	-0.000	(0.000)
Private	-0.014	(0.110)	0.165	(0.109)	-0.173	(0.175)
Private-squared	0.003	(0.004)	-0.009	(0.007)	0.015	(0.008)
For-profit	-0.161	(0.171)	0.253	(0.118) [*]	-11.735	(2.062) ^{***}
For-profit-squared	0.004	(0.003)	-0.015	(0.009)	0.250	(0.013) ^{***}
By race (Ref = white)						
Public 4-year × black	0.070	(0.132)				
Public 4-year-squared × black	-0.007	(0.006)				
Public 2-year × black	-0.081	(0.037) [*]				
Public 2-year-squared × black	0.002	(0.001) [*]				
Private × black	0.080	(0.152)				
Private-squared × black	-0.004	(0.006)				
For-profit × black	0.370	(0.218)				
For-profit-squared × black	-0.014	(0.009)				
Public 4-year × Hispanic	-0.072	(0.083)				
Public 4-year-squared × Hispanic	0.003	(0.003)				
Public 2-year × Hispanic	0.004	(0.035)				
Public 2-year-squared × Hispanic	0.000	(0.001)				
Private × Hispanic	0.049	(0.223)				
Private-squared × Hispanic	-0.006	(0.010)				

For-profit × Hispanic	0.469	(0.193)*		
For-profit-squared × Hispanic	-0.018	(0.007)**		
Public 4-year × male			-0.062	(0.082)
Public 4-year-squared × male			0.003	(0.004)
Public 2-year × male			0.024	(0.031)
Public 2-year-squared × male			-0.001	(0.001)
Private × male			-0.105	(0.122)
Private-squared × male			0.010	(0.007)
For-profit × male			-0.422	(0.186)*
For-profit-squared × male			0.023	(0.009)*
By parent's education (Ref = less than high school)				
Public 4-year × high school			-0.035	(0.172)
Public 4-year-squared × high school			0.002	(0.011)
Public 2-year × high school			0.011	(0.037)
Public 2-year-squared × high school			-0.001	(0.001)
Private × high school			-1.065	(0.378)**
Private-squared × high school			0.046	(0.017)**
For-profit × high school			11.775	(2.065)***
For-profit-squared × high school			-0.250	(.)
Public 4-year × some college			-0.088	(0.192)
Public 4-year-squared × some college			0.003	(0.012)
Public 2-year × some college			0.051	(0.035)
Public 2-year-squared × some college			-0.002	(0.001)*
Private × some college			0.730	(0.209)***
Private-squared × some college			-0.044	(0.012)***
For-profit × some college			11.683	(2.064)***
For-profit-squared × some college			-0.246	(0.013)***
Public 4-year × bachelor's degree or higher			-0.085	(0.172)
Public 4-year-squared × bachelor's degree or higher			0.004	(0.011)
Public 2-year × bachelor's degree or higher			0.011	(0.036)
Public 2-year-squared × bachelor's degree or higher			-0.001	(0.001)
Private × bachelor's degree or higher			0.292	(0.189)
Private-squared × bachelor's degree or higher			-0.016	(0.009)

For-profit × bachelor's degree or higher				12.184	(.)
For-profit-squared × bachelor's degree or higher				-0.282	(.)
Cumulative months pursuing a bachelor's degree at					
Public 4-year	0.133	(0.009)***	0.137	(0.010)***	0.134 (0.020)***
Public 4-year-squared	-0.000	(0.000)***	-0.001	(0.000)***	-0.001 (0.000)
Public 2-year	-0.010	(0.027)	-0.002	(0.031)	0.000 (0.166)
Public 2-year-squared	0.002	(0.001)	0.001	(0.001)	0.001 (0.012)
Private	0.123	(0.013)***	0.130	(0.014)***	0.024 (0.083)
Private-squared	0.000	(0.000)	-0.000	(0.000)	0.003 (0.002)
For-profit	0.039	(0.062)	0.160	(0.053)**	-0.012 (0.112)
For-profit-squared	0.002	(0.001)	-0.001	(0.001)	0.004 (0.003)
By race (Ref = white)					
Public 4-year × black	-0.022	(0.013)			
Public 4-year-squared × black	0.000	(0.000)			
Public 2-year × black	-0.015	(0.169)			
Public 2-year-squared × black	-0.004	(0.013)			
Private × black	-0.013	(0.028)			
Private-squared × black	0.000	(0.001)			
For-profit × black	0.126	(0.110)			
For-profit-squared × black	-0.002	(0.003)			
Public 4-year × Hispanic	-0.008	(0.013)			
Public 4-year-squared × Hispanic	-0.000	(0.000)			
Public 2-year × Hispanic	0.050	(0.059)			
Public 2-year-squared × Hispanic	-0.002	(0.002)			
Private × Hispanic	0.024	(0.024)			
Private-squared × Hispanic	-0.001	(0.000)			
For-profit × Hispanic	0.088	(0.090)			
For-profit-squared × Hispanic	-0.002	(0.002)			
Public 4-year × male			-0.015	(0.008)*	
Public 4-year-squared × male			0.000	(0.000)	
Public 2-year × male			-0.008	(0.046)	
Public 2-year-squared × male			-0.000	(0.002)	

Private × male			-0.009	(0.017)		
Private-squared × male			0.000	(0.000)		
For-profit × male			-0.264	(0.100)**		
For-profit-squared × male			0.007	(0.002)**		
By parent's education (Ref = less than high school)						
Public 4-year × high school					-0.014	(0.022)
Public 4-year-squared × high school					0.000	(0.000)
Public 2-year × high school					0.033	(0.172)
Public 2-year-squared × high school					0.001	(0.012)
Private × high school					0.120	(0.084)
Private-squared × high school					-0.004	(0.002)
For-profit × high school					0.176	(0.129)
For-profit-squared × high school					-0.004	(0.003)
Public 4-year × some college					0.011	(0.021)
Public 4-year-squared × some college					-0.000	(0.000)
Public 2-year × some college					-0.007	(0.172)
Public 2-year-squared × some college					0.001	(0.012)
Private × some college					0.108	(0.084)
Private-squared × some college					-0.003	(0.002)
For-profit × some college					0.111	(0.128)
For-profit-squared × some college					-0.003	(0.003)
Public 4-year × bachelor's degree or higher					0.004	(0.020)
Public 4-year-squared × bachelor's degree or higher					0.000	(0.000)
Public 2-year × bachelor's degree or higher					-0.023	(0.168)
Public 2-year-squared × bachelor's degree or higher					0.002	(0.012)
Private × bachelor's degree or higher					0.103	(0.083)
Private-squared × bachelor's degree or higher					-0.003	(0.002)
For-profit × bachelor's degree or higher					0.136	(0.137)
For-profit-squared × bachelor's degree or higher					-0.004	(0.003)
Cumulative months pursuing degree at						
International institution		0.106	(0.030)***	0.073	(0.040)	0.233 (0.131)
International institution-squared		-0.000	(0.000)	0.001	(0.001)	-0.003 (0.004)

By race (Ref = white)					
International institution × black	1.262	(0.370)***			
International institution-squared × black	-0.535	(0.082)***			
International institution × Hispanic	-0.029	(0.069)			
International institution-squared × Hispanic	0.001	(0.001)			
International institution × male			0.025	(0.053)	
International institution-squared × male			-0.001	(0.001)	
By parent's education (Ref = less than high school)					
International institution × high school					-0.142 (0.144)
International institution-squared × high school					0.004 (0.004)
International institution × some college					-0.118 (0.170)
International institution-squared × some college					0.003 (0.004)
International institution × bachelor's degree or higher					-0.163 (0.135)
International institution-squared × bachelor's degree or higher					0.004 (0.004)
Constant	-10.234	(0.679)***	-10.493	(0.717)***	-9.894 (0.636)***

Notes: The sample size for those classified as “other race” is too small to model interactions, so the main effects of college attendance can be considered to apply to both whites and other race individuals. All models are weighted by sampling weights and by inverse probability of attrition over time. Person-clustered standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.