The Labor Market Returns to a Private Two-Year College Education

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Abstract

A lengthy literature estimating the returns to education has largely ignored the for-profit sector. In this paper, we offer the first estimates of the earnings gains to private two-year and less-than-two-year colleges, the vast majority of which are for-profit institutions. We rely on data from both the 1997 and 1979 panels of the National Longitudinal Survey of Youth (NLSY) to implement an individual fixed effects estimation strategy that allows us to control for time-invariant unobservable characteristics of students. We find that students completing associate's degrees in private two-year colleges generate earnings gains of at least 13-14 percent post-degree, or 7 percent per year of education, gains similar to those experienced by public community college students in our sample. Our point estimates suggest that private sector students may earn an additional 3 percentage points per year over students in the public sector, although these effects are not statistically significant. Further, students who complete associate's degrees in either sector are about 10 percent more likely to be employed. Among a broader set of students who enroll in, but may or may not complete an associate's degree, we find a small decline in earnings but a higher likelihood of employment for students attending both types of institutions.

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I. Introduction

After several decades of strong growth and relatively little controversy in for-profit postsecondary education, a recent report by the Government Accountability Office has brought for-profit colleges into the spotlight. The report ignited a firestorm of media attention and debate by uncovering unscrupulous recruiting practices and fraud in federal financial aid programs at several large for-profit colleges (GAO 2010; Lewin 2010a, 2010b; Goodman 2010; Hechinger 2010). In response, the Department of Education has proposed controversial new rules for federal student aid eligibility, requiring institutions to show that graduates meet strict income-to-debt ratios and loan repayment rates to maintain eligibility (Federal Register 2010).

Central to the debate over the proposed regulations is the question of the quality of a for-profit education. Proponents of the rules claim that for-profit colleges leave students with insurmountable debt and few skills, while opponents argue that these institutions provide valuable job training for underserved students. Both sides rely heavily on anecdotal evidence and descriptive comparisons of earnings of graduates in the private and public sector. Without a better understanding of the causal effects of a for-profit education, it is difficult, if not impossible to assess the merits of the proposed reforms. Thus, the question of college quality is one of the most important for policymakers, taxpayers, and students alike.

Our study is the first to our knowledge to provide a credible assessment of college quality in the sector, by estimating the labor market returns, or earnings gains, to a for-profit education. Due to data constraints, we focus on private two-year colleges, the vast majority of which are for-profit. Also known as proprietary schools, career colleges, vocational institutes, technical colleges, occupational colleges, or simply for-profits, private two-year colleges offer short-term certificates and associate's degrees in fields ranging from computer programming to

hairdressing. Such colleges are an integral part of the two-year college market, which also includes public community colleges.

A long literature on returns has focused on estimating the earnings gains generated by a year of high school or four-year college (see reviews by Card 1999, 2001; Ashenfelter, Harmon, and Oosterbeek1999), and several studies have assessed the returns to public two-year community colleges (e.g., Kane and Rouse 1995, 1999; Jacobson, LaLonde, and Sullivan 2005; Jepsen, Troski, and Coomes 2010) yet no study has asked whether private two-year colleges generate similar returns.

Our study fills this gap in the literature, offering a first look at the labor market outcomes of students who attend private two-year institutions and evaluating whether these students' outcomes differ from those of public community college students'. To address this question, we must overcome a crucial endogeneity problem: students in private institutions may differ on both observable and unobservable dimensions from those in public institutions. If these differences are correlated with a student's choice of institution and her labor market success, simple OLS estimates of the impact of private two-year colleges on employment and earnings will be biased. We implement individual-level fixed effects to mitigate this problem. Unlike students in four-year colleges, two-year college students often work before, during, and after they attend college, allowing us to compare an individual student's earnings after attendance to her earnings before.[1] In so doing, the individual fixed effects can control for all time-invariant student characteristics that may bias cross-sectional estimates of returns.

Using the 1997 panel of the National Longitudinal Survey of Youth (NLSY), we find that students completing an associate's degree in either a public or private college experience a 13-14

[1] In order to observe earnings after attendance, we limit our sample to students who do not transfer to four-year institutions. This omission may result in some bias, a point we discuss in detail below.

percent increase in earnings, or about 7 percent per year of education. Our point estimates suggest that earnings for students in the private sector may be up to 3 percentage points higher per year of education (for a total of 10 percent per year), but these coefficients are imprecisely estimated and statistically insignificant. Still, if we take these higher point estimates as an upper bound on the returns to private two-year colleges, they remain lower than those reported in recent studies of the returns to community and four-year colleges using similar methods.

Further, we find that the earnings gains in both types of institutions are driven by degree completion: we find slight declines in earnings among students who enrolled in two-year colleges, regardless of whether they completed an associate's degree. However, these two-year college attendees are about 10 percent more likely to be employed after graduation, an effect that is similar for both private and public two-year college students. We subject our findings to a variety of robustness checks, for example controlling for potential experience, applying sampling weights, using alternate measures of earnings gains, and dropping the year of graduation. Across all of these specifications, private college students cannot be shown to have significant differential returns relative to their public sector counterparts, although the point estimates on private college attendance are generally positive.

We also extend our analysis to an older panel of individuals followed in the 1979 NLSY. Our definition of private college attendance is less precise in this data set, yet we again find no significant difference in earnings gains for private and public associate's degree holders. For this cohort, the point estimates on earnings for private college students are much smaller and again cannot be shown to be statistically significant.

Finally, we assess the returns to less-than-two-year vocational certificates and degrees. We find no significant differences between the returns to these certificates in the public and private

sectors although, as expected, these certificates and degrees generate lower returns on average than associate's degrees.

Given the high costs of a for-profit education, it may be concerning that private two-year college students do not generate significantly higher returns that their public sector counterparts. Further, if public community colleges generate additional value by encouraging and enabling students to transfer to four-year colleges, our results may substantially underestimate the return to the public sector. Yet, a back of the envelope student-level cost-benefit analysis suggests that the present value of the earnings gains from completing an associate's degree in a private two-year college just barely outweigh the costs for the average student. This calculation is quite sensitive to the assumed returns and interest rate on student loans.

We conclude that many for-profit two-year college programs are likely to be worth the large investment, but many others may not be. While we do not undertake a full social cost-benefit analysis that incorporates the costs to taxpayers in each sector, our findings suggest that if similar programs are offered in both the private and public sectors, many students may be better off at lower-cost public institutions.

II. Background

Over the past half-century, an expansive body of literature has developed to measure the returns to schooling. Reviews of the literature by Card (1999) and Ashenfelter, Harmon, and Oosterbeek (1999) report that one additional year of education causes earnings gains in the range of 6 to 9 percent, depending on the method, sample, and time frame of the analysis, while more recent and better identified analyses reveal much higher returns, averaging 10-15 percent per year (Card 2001, Goldin and Katz 2008). The vast majority of the research in this area has

focused on high school and four-year college-going, with relatively few studies emphasizing differences in various sectors and levels of schooling (Ashenfelter, Harmon, and Oosterbeek 1999).

A handful of studies examine two-year colleges, and those that do focus exclusively on public community colleges. Reviewing the literature on community college returns, Kane and Rouse (1999) find that a year at a community college generates returns between 4 and 6 percent just marginally below those for a four-year college and on average, students attending community colleges earn 9-13 percent more than their counterparts who do not attend any type of postsecondary education.

Central to the literature on returns is a debate over the accuracy of various methods to identify the causal effect of education on earnings. Students who enroll in college are likely to be very different on both observable and unobservable dimensions from those who do not. If these differences are correlated with subsequent earnings, OLS estimates of the returns to schooling will be biased. Unobserved innate ability is a central concern in the literature, as students with higher ability are likely to have both higher wages and higher levels of schooling. In the high school and four-year college literature, a myriad of studies using instrumental variables and sibling comparisons have attempted to address this endogeneity,[2] but few studies in the community college literature have implemented similar identification strategies. Marcotte, Bailey, Borkoski, and Kienzl (2005), Kane and Rouse (1995), Leigh and Gill (1997), Grubb (1993, 1995), Monk-Turner (1994), Heineman and Sussna (1977) estimate cross-sectional models comparing students attending community college to those who do not, generally controlling for ability with imperfect proxies, such as IQ scores.

[2] These methods may create additional biases, see Card (2001).

Recent studies on the returns to community college education have implemented more credible identification strategies. Jacobson, LaLonde, and Sullivan (2005) and Jepsen, Troski, and Coomes (2010) use an individual- or person-specific fixed effects approach (as in this paper) comparing the wages of displaced workers before and after they attend a public community college, thereby controlling for time-invariant individual characteristics that may bias cross-sectional estimates. Among displaced workers in Washington State, Jacobson et al. (2005) find returns of 9 percent per year of education for men and 13 percent for women, with much higher returns to quantitative and technically-oriented vocational coursework than less-quantitative coursework in the humanities, social sciences, and basic skills. Among all community college students in Kentucky, Jepsen et al. (2010) find slightly higher returns—about 40 percent for an associate's degree or diploma for women (implying 20 percent per year of education or higher, depending on program length) and 18-20 percent for men (implying 10 percent per year, or higher) for men completing degrees.

In this study, we follow Jacobson et al. (2005) and Jepsen et al. (2010), as well as earlier work by Angrist and Newey (1991) in implementing a similar individual fixed-effects approach.[3] We apply this approach to study the returns to private two-year colleges—colleges that have been left out of previous analyses—using as a comparison group students who pursue their degree in a public community college.

Private two-year colleges

Research on private two-year colleges is scarce, primarily due to a lack of data. Most studies of these colleges rely on a non-random sample of schools and students based on the U.S.

[3] This approach has also been used in many well-known studies in the broader labor economics literature. For example, Ashenfelter (1978) and Ashenfelter and Card (1985) use individual fixed effects to assess the impact of job training programs on earnings. Angrist & Newey (1991) and Freeman (1984) examine the impact of union status on earnings. See Angrist & Kreuger (1999) for an overview of the fixed effects strategy in labor economics.

Department of Education's Integrated Postsecondary Education Data System (IPEDS) and most are purely descriptive in nature (Apling 1993; Bailey, Badway, and Gumport 2001; Rosenbaum, Deil-Amen, and Person 2006; Turner 2006).[4] Administrative licensing data from California has added to our knowledge of these institutions in recent years and allowed for causal studies of institutional behavior (Cellini 2005, 2009, 2010), but in spite of these advances surprisingly little is known about private two-year colleges and their students. In a related paper, Cellini and Conger (2010) model the choice of enrollment in public versus private two-year colleges using two new sources of data: administrative data from the Florida Department of Education and the NLSY97—the data used here.

What we have learned from these studies and data sources is that there are more than 3,800 private two-year colleges in California alone, but most of these colleges are quite small. Average enrollment is just 350 students (Cellini 2009), a figure that pales in comparison to community colleges that average 6,000 students each nationwide (NCES 2007). Private two-year colleges are primarily organized as for-profit institutions: only 8 percent of California private two-year colleges are reported to receive non-profit or religious exemptions (Cellini 2009). Turner (2006) reports that for-profit colleges award a disproportionate share of all two-year associates' degrees and less-than-two-year certificates, particularly in pre-professional and vocational fields in which skills are easy to verify (e.g., by certification examinations) and physical plant requirements are modest. Private two-year colleges tend to offer more programs in fast-growing vocational fields, such as information technology and real estate (Cellini 2009), and award a much larger share of associates degrees in business and administrative services,

[4] The IPEDS severely undercounts the number of private two-year colleges in the U.S. For many years the survey relied on snowball sampling and did not require the participation of two-year private colleges. In recent years, greater efforts have been made to track down institutions receiving federal financial aid, but many colleges remain unaccounted for in the data (Cellini 2005).

engineering-related technologies, mechanics, and production trades than their public sector counterparts (Turner 2006).

Community colleges offer significantly more programs and award a much greater share of associate's degrees in the liberal arts than private colleges (Cellini 2009, Turner 2006), in part due to their role as transfer institutions. In most states, community colleges have clear articulation agreements with public four-year colleges, allowing students to transfer coursework easily, pursuing the first two years of their BA degree at a community college before transferring to a university. Nonetheless, only a small portion of community college students appears to take advantage of the opportunity: in California, the transfer rate is just four percent (CPEC 2005).

Despite these slight differences in focus, both public and private two-year colleges offer associate's degrees and certificates in a wide range of overlapping vocational and academic fields ranging from health and medicine to construction and transportation. For the most part, two-year college students are likely to find their needs met in both types of institutions. Moreover, public and private two-year colleges have been shown to compete for students, suggesting that they operate in the same product market (Cellini 2009).

The biggest difference between private and public two-year colleges is undoubtedly their price: required tuition and fees for public community colleges average just $2,017, while private two-year colleges charge $10,000 more, averaging $12,620 in 2006-07 (NCES 2007). Private two-year college students undoubtedly receive substantial federal, state, and private financial aid awards to bring costs down, but, as in the four-year college market, the price difference remains substantial (Cellini 2010).

Cellini and Conger (2010) find that students attending large aid-eligible private two-year colleges in Florida appear to be more disadvantaged than their counterparts at public community

colleges on a number of measures (e.g., free or reduced-price meal program eligibility, racial or ethnic minorities, English language learners, and students with disabilities are all more likely to attend private colleges). However, when looking at students attending a much broader range of institutions in the NLSY97, Cellini and Conger find that private college students are much more similar to public community college students, particularly when considering only students who do not transfer to four-year colleges. Among these students, those who attend private colleges tend to be older when they enter college and come from higher-income families than public two-year college students: both of these effects would bias our results in favor of finding higher returns for private college students. On the other hand, they also find that private college students have lower reading achievement test scores and are slightly more likely to female: both of these effects would bias our estimates downward.

III. Conceptual Framework

If the market for two-year college education is perfectly competitive, the public-private price differential should reflect differences in the quality of education. With many of the same programs available to them in the public sector, informed consumers should only attend private two-year colleges if the present value of future earnings gains from a private college is high enough to offset the opportunity cost of attendance, including the direct costs of education (e.g., tuition, fees, books, interest on debt) and foregone earnings.

There are two primary mechanisms through which two-year colleges can influence earnings and employment outcomes. The first is through the quality of instruction. Because private colleges are unrestricted by government bureaucracy, they may be able to attract more knowledgeable or dedicated faculty than community colleges. They may also be able to add and

modify courses more quickly to meet industry demands, build new classrooms or laboratories, or make other changes to enhance instruction. If instructional quality is indeed superior at private colleges, we would expect private two-year graduates to experience greater earnings gains that their public sector counterparts.

Private colleges may also impact earnings through career development services. In case studies comparing seven of the best private two-year colleges to community colleges in Illinois, Rosenbaum, Deil-Amen, and Person (2006) find that the private colleges they study provide students with extensive job placement services as well as frequent and mandatory advising. The colleges also engage in substantial outreach to build long-term relationships with local employers and teach "soft skills" to students in preparation for the workplace. These services are almost nonexistent in the public sector and may have an important impact on labor market outcomes.

Competition in the private sector provides the incentive to allocate resources to their most efficient use, whether those are student services or instructional resources, yet many observers have concerns over the quality of private two-year, and particularly for-profit institutions. The more complicated the skill, and the more difficult it is to verify skill acquisition, the less likely employers are to trust small mom-and-pop and online private colleges. Allegations of fraud and abuse in the sector have further contributed to a sense of mistrust in recent years and students may be basing their college choice decisions on misleading or inaccurate information.

Among other things, colleges have been accused of making misrepresentations about the salaries of graduates, tuition costs, time-to-degree, and the transferability of coursework (e.g., GAO 2010; Lewin 2010a, 2010b; Hechinger 2005, 2010; Goodman 2010; Arenson 2005, 2006; Hefftor 2007; Moore 1995). For example, one for-profit college recruiter told an undercover investigator that he could expect earnings of over $100,000- $250,000 for a barber certificate,

when 90 percent of barbers make less than $43,000 per year. And at several colleges students were told tuition costs based on 9 months of coursework, when the programs in question required 12 months of coursework (GAO 2010).

While the extent of such fraud and abuse is still unclear, if students are misled into believing their costs will be lower and earnings potential will higher than what they experience in reality, we would expect to observe relatively low earnings gains that may not fully offset the cost of attendance. Further, in the presence of widespread improprieties, or simply pervasive rumors of fraud, employers may be hesitant to hire students coming out of for-profit institutions. In that case, we would expect earnings gains from private two-year colleges to be low, and perhaps lower than their more trusted—and regulated—public sector counterparts. Two-year private graduates would also be less likely to be employed or employed full-time, as compared to public community college graduates.

IV. Estimation

In our first set of estimates, we estimate log weekly earnings and other employment outcomes (i.e., log hourly wages, log hours worked per week, and indicators for whether the individual was employed and whether she was employed full-time), y_{it}, for individual *i* in year *t* as a function of two-year college completion, private college attendance, and individual characteristics as specified in equation (1):

$$y_{it} = \beta_0 + \beta_1(Private_i * Post_{it}) + \beta_2(Post_{it}) + \beta_3 X_{it} + d_t + \varepsilon_{it} \quad (1).$$

The variable $Post_{it}$ identifies the timing of each student's degree completion. It equals 1 in the year the individual receives their degree or certificate, and remains 1 in all subsequent years. We interact this variable with $Private_i$, a dummy for whether the individual received their degree

from a private two-year college. The result is that the variable of interest ($Private_i * Post_{it}$) equals 1 for private two-year college students in each year after degree completion and 0 otherwise. We add calendar year fixed effects, d_t, to control for inflation and other time-varying effects that are common across individuals. Finally, we control for individual characteristics X_{it}, including sex, race (black, white, American Indian, Asian, and other), region (Northeast, North Central, South, and West), and age. We add both age and age squared, but our preferred estimates employ age fixed effects to allow for more flexible controls for these young workers. We estimate simple OLS regressions, incrementally adding more detailed controls, such as students' scores in math knowledge and paragraph comprehension on the Armed Services Vocational Aptitude Battery (ASVAB) exam; whether the student is foreign-born; whether English is the primary language spoken at home; and household income.

Even with these controls, OLS estimates of equation (1), comparing individuals with different levels or types of schooling, are plagued by well-known endogeneity problems. Cross-sectional estimates will be biased if omitted variables, such as innate ability, are correlated both with wages and the choice of schooling. In the case of public and private two-year colleges, innate ability is only one of the omitted variables we might be concerned about. A student's motivation, location, social network, information about educational options, or knowledge of the local labor market may cause additional biases in cross-sectional estimates.

Previous studies of the returns to education have used a range of methods to mitigate the endogeneity problem, including proxy variables, propensity score matching, instrumental variables, and sibling or twin comparisons, yet few of these studies can adequately control for all

unobservable characteristics of individuals that might be correlated with schooling and wages.[5] In this study we implement a stronger identification strategy, employing fixed effects for each individual in the sample.[6] Unlike high school and four-year college students, two-year college students typically work either before or during their coursework, making it possible to observe earnings before and after attendance. We can therefore estimate:

$$y_{it} = \beta_0 + \beta_1(Private_i * Post_{it}) + \beta_2(Post_{it}) + \beta_3 X_{it} + d_t + d_i + \varepsilon_{it} \qquad (2)$$

where d_i is a vector of dummy variables for each individual. The individual fixed effects absorb the effects of all time-invariant individual characteristics, leaving age as our only control in X_{it}.[7] The primary advantage of the individual fixed effects approach is that in addition to controlling for observable time-invariant characteristics, it also controls for unobservable time-invariant characteristics of the individual that might bias cross-sectional estimates. These include innate ability, motivation, and other correlated idiosyncrasies. The model is identified off of changes in individual earnings before and after college attendance.

The individual fixed effects approach goes a long way in mitigating endogeneity from omitted variables, but it is possible that time-varying individual-level unobservables remain. In particular, it is possible that student migration, information, or social networks may change over time. If these are correlated with college choice and earnings, our estimates may still be biased.

[5] We also implemented two different propensity score matching models. The first was based on cross-sectional differences in average earnings between public and private college students. The second compared earnings before and after college attendance for both groups in a difference-in-difference approach (Heckman, Ichimura, Smith, and Todd 1998). In both, individuals were matched on race, sex, and region. Results were similar to the individual fixed effects results—we found no statistically significant differences in earnings for public and private two-year college students. Since individual fixed effects rely on weaker identifying assumptions, we focus on this approach in the paper.

[6] Our strategy is similar to that of Jacobson, LaLonde, and Sullivan (2005) who use individual fixed effects to examine the returns to different types of coursework in a public community college. It is worth noting, however, that in their preferred specification, Jacobson, LaLonde, and Sullivan include individual-specific time trends. We are not able to implement this approach due to our small sample size.

[7] Again, we report specifications that use age and age squared, but our preferred estimates include dummy variables for each age.

However, given that we control for age, individual fixed effects and year fixed effects, any bias resulting from time-varying individual-specific unobservables is likely to be small.

Two other potential limitations of the fixed effects approach are worth mentioning. First, estimates will be inconsistent if pre-education earnings influence a student's choice between a private or public college. This issue is particularly problematic in the job training literature, as individuals with negative earnings shocks are more likely to enroll in training than individuals in untreated control groups.[8] In our analysis, however, our use of public community college students as controls for private college attendees mitigates this problem. The pre-education earnings of public and private students are similar and we have no reason to believe that students with negative earnings shocks would be more or less likely to choose the private sector.[9]

Relately, our estimates may be biased if both the returns to education and selection into private colleges are heterogeneous by demographic, family, or other individual characteristics (Card 1999, 2001). We find relatively few differences between public and private college students in our descriptive statistics. We discuss these differences in section V.

A second problem identified by Freeman (1984) and Griliches and Hausman (1986) is that fixed effects may exacerbate bias from classical measurement error. The nature of the longitudinal data used in fixed effects analyses means that individuals misclassified in one period will be misclassified in later periods, amplifying the attenuation bias of fixed effects estimates relative to cross-sectional OLS. In the presence of sizable measurement error, our fixed effects estimates will provide a lower bound on the returns to a private two-year college education.[10]

[8] See Ashenfelter (1978), Ashenfelter and Card (1985), and Heckman and Hotz (1989) for more discussion.
[9] Average weekly earnings in the years before receiving an associate's degree are $289 for public community college students and $273 for private college students. A t-test for difference in means finds no statistically significant difference between the wages across the two groups.
[10] For an overview of issues related to fixed effects estimation in labor economics, see Angrist and Krueger (1999).

V. Data

To implement our analysis, we draw on the National Longitudinal Surveys of Youth (NLSY), two major nationally representative panel surveys that follow the same individuals annually. We focus on the 1997 panel for our main regressions and then present additional results using the 1979 panel. Each panel created a baseline survey of youth to track throughout secondary school, college and beyond. Both panels contain in-depth questions on educational attainment, earnings, and other related topics, but only the 1997 panel asks specifically whether a student's college was public or private.

National Longitudinal Survey of Youth 1997

The NLSY 1997 is based on a representative sample of 8,984 youths who were 12-18 years old when they were first surveyed in 1997. The youths are interviewed each year and currently data are available through 2008. We thus have a group of individuals ranging from age 23 to 29 by 2008.

To identify the effects of private two-year colleges on earnings, we restrict our analysis to two specific samples of individuals. Given our focus on the returns to two-year college degrees, in both samples we drop individuals who went on to receive a BA or higher degree and anyone who completed 16 or more years of schooling even if they do not have a BA. This is necessary to ensure that we observe earnings for individuals both before and after they complete their two-year program. By restricting our focus to two-year college students who do not transfer to four-year colleges in the time period we observe, we are limiting the analysis to a pool of individuals more similar to each other relative to four-year college students (Cellini and Conger 2010).

Our first sample, hereafter referred to as the "completers" sample, focuses on students who completed an associate's (AA) degree.[11] Our second sample, the "attendees" sample, includes both the completers and students who reported enrolling in an AA program but not receiving a degree in the time period we observe (we refer to these students as "non-completers").[12] Due to the nature of our two samples, the definition of the variable $Post_{it}$ in equation (1) varies slightly for each. For the completers sample, $Post_{it}$ represents the effect of completing an AA degree. For the attendees sample, $Post_{it}$ represents the effect of either enrollment in or completion of an associate's degree program.[13] Since we are not able to determine how long non-completers were enrolled, for these students $Post_{it} = 1$ in the first year we observe attendance and every year thereafter. Finally, given the large number of two-year institutions offering vocational degree programs or certificates, we present alternate specifications that add individuals who received a vocational degree or certificate to our completers sample. We describe this analysis further below.

We use a strict definition of private college to ensure that our measure captures the sector of the institution (public or private) where an individual received her degree. For each college that an individual attends, the NLSY 1997 asks whether the college was public. Using this information, we first identify students enrolling in a private college if the respondent ever

[11] We denote any associate's degree as an "AA" throughout, following the notation typically used for an associate's of arts degree. However, we acknowledge that some students we identify may have obtained associate's of science (AS) degrees. We are not able to differentiate these students.

[12] We refer to this group as "non-completers" because it is made up of two groups of students: those who dropped out of an AA program and those who are still enrolled but have not yet completed. Our data does not allow us to distinguish between these two groups.

[13] We also estimate models adding controls for completers in the attendees sample and simply omitting completers. These estimates yield results that are consistent with the findings reported above (available on request). However, we caution that completion itself may be endogenous to institution-type.

reported attending a non-public college.[14] However, since an individual could attend both public and private colleges, we only code as private those individuals who do not report attending a public college in the year the degree was received.[15] As noted above, our variable of interest, $(Private_i * Post_{it})$, is coded as 0 in years before degree completion (or first attendance for the attendees sample), becomes 1 in the year the individual receives an associate's degree from (or first attends) a private college and remains 1 for all subsequent years.

Following the returns literature (e.g., Angrist and Krueger 1991), our main dependent variable is the log of weekly earnings—the product of the individual's hourly wage and average hours worked per week. In the NLSY 1997, individuals report their wages and hours for up to ten jobs, but the number of people reporting wages for more than five jobs is less than one percent over our 11-year period. Hence, we focus on average weekly earnings across the first five jobs. We also report results using measures of weekly earnings based on the first reported job and all reported jobs. We further limit our analysis to students who are 16 years or older to avoid capturing wages in informal early jobs (e.g., babysitting, paper route). Because we use the log of earnings, observations reporting zero earnings are treated as missing and dropped from the analysis. Our estimates therefore reflect returns conditional on employment.[16] We observe earnings for at least 3 years before degree completion and 3 years after degree completion for the vast majority of individuals in the completers sample. Moreover, these averages are similar across public and private college students. Since we observe post-degree wages for a short time

[14] We acknowledge that our definition of private college relies on students' self-reported assessment of college type. To the extent that students are unclear about the sector of their college, a small amount of (presumably) random measurement error may be introduced, thereby attenuating our estimates.
[15] Other definitions of private college attendance yield similar results (available on request).
[16] We also estimated regressions where we substituted $1 for individuals with missing weekly earnings. The estimates on private college were smaller in magnitude, but statistically insignificant, similar to our main findings.

period, our findings may underestimate the returns to both public and private colleges if earnings are more responsive to degree completion in the long run.

In addition to weekly earnings, we examine several other labor market outcomes. We first decompose weekly earnings and estimate the effects on log hourly wages and log hours worked per week across the first five jobs. We also estimate the effects of private and public two-year college education on full-time employment and any employment, this time including observations with missing earnings data. Our measure of full-time employment equals one if an individual reports working 35 or more hours per week, and a dummy for any employment if an individual reports non-zero weekly earnings per week.

Although we focus on regressions with individual fixed effects, we also present OLS regressions that exploit cross-sectional variation across individuals. In the OLS regressions, we include several observable individual characteristics that may be correlated with whether an individual chooses to attend a public or private two-year college. Following Cellini and Conger (2010), we construct dummies for an individual's gender, race, foreign-born status and whether they are a non-English speaker. We also include controls for math and reading comprehension test scores, and household income.

Table 1 reports the means for the main variables used in our analysis by sample. We also present the means separately for individuals pursuing their education in public and private institutions and assess the differences in means with t-tests reported in column (4). We follow 711 individuals in our completers sample of which 175, or 25% earned their associate's degree from a private two-year college. Among the completers in the top panel, average weekly earnings are slightly higher for individuals from private colleges ($397 compared to $379), but the difference is not statistically significant. Among the other employment outcomes we

examine, only the likelihood of any employment can be shown to be significantly higher for private college students. On observable demographic characteristics, private college degree holder are more likely to be female, Asian, and have higher household income compared to public college degree holders, but on all other dimensions the groups look remarkably similar.

In the attendees sample, we add 1,714 individuals who enrolled in two-year associate's degree programs but did not complete their degree, for a total of 2,425 individuals. Compared to the completers, a smaller proportion of the sample enrolled in private colleges at 17 percent. As in the completers sample, most employment outcomes are statistically similar across the two groups. Public sector students earn $346 per week compared to $350 per week among the private college students. The public and private college attendees reveal more differences in demographic characteristics than the completers sample. Private college attendees are more likely to be non-white, female, and have lower reading test scores, and again they show higher household income compared to public community college students. The patterns for income in both samples are noteworthy, as other descriptive assessments of student characteristics using the IPEDS and administrative data on Title-IV eligible schools find that private college students have lower income than their public sector counterparts. This pattern may be attributable to the fact that the NLSY97 captures students in a much broader set of institutions than reflected in other data sets, including institutions that are not eligible for federal financial aid programs.[17] While these means are informative, we turn to the regressions in the next section to estimate the returns to private two-year colleges in our two samples.

National Longitudinal Survey of Youth 1979

[17] See Cellini and Conger (2010) for more discussion of the NLSY97 and other data sources on private two-year colleges.

Although we focus primarily on the NLSY 1997, we also present estimates from the NLSY 1979. This survey is based on a representative sample of 12,686 young men and women who were 14-22 years old when they were first surveyed in 1979. The respondents were interviewed annually through 1994 and have been interviewed on a biennial basis since, with the latest round in 2006. As in the 1997 NLSY, the 1979 survey identifies students who obtain an associate's degree, but unlike the newer cohort, the 1979 participants were never asked whether the college they attended was public or private. To get around this problem, we create two different definitions of private college attendance based on a variable identifying the "type of school" where a student attended vocational or technical training.

Under the first definition (hereafter referred to as "definition A") we identify students attending private colleges if they report receiving training in a "vocational/technical institute" in the year they receive their associate's degree. While some states may indeed have public vocational/technical colleges, we contend that—particularly with the wording of "institute"—the majority are likely to be private. The second definition (definition B) is slightly broader, including students identifying their type of school as a vocational/technical institute, business college, nurses program, barber/beauty school, flight school, or correspondence. We omit students who identify the type of school as company training or apprenticeships (the only remaining options). All other students who have completed associate's degrees and do not identify one of the aforementioned schools are considered public community college students.

We acknowledge that our definitions of private college attendance for the 1979 cohort are imperfect proxies and may introduce substantial measurement error. Some students, particularly those in academic programs, may not consider their associate's degree to be vocational or technical training, causing them to skip this question. Others may have obtained additional

vocational or technical training beyond their associate's degree and that may be the type of training identified in this question.[18] Still others may have labeled their community college a "vocational/technical institute" according to the definitions above. Further, because the "type of school" listed often reflects training for a particular occupation (e.g., flight school), our estimates may more accurately reflect returns to these occupations, regardless of sector. Random misclassification and measurement error will attenuate our estimates of the returns to private colleges, while the bias generated from our occupation-specific definition will depend on whether these particular occupations generate higher or lower returns than average. Despite these difficulties, we present results for an analogous sample of associate's degree completers in the 1979 NLSY. When compared to the results using the 1997 cohort, the 1979 cohort can provide some limited insight into the differences in returns over time and at later stages in life.[19]

Summary statistics for the 830 associate's degree completers in the NLSY79 are shown in table 2. Our definitions of private college result in 19 percent (under definition A) and 34 percent (under definition B) of the sample in private institutions—roughly in line with the 25 percent in the NLSY97. In contrast to the NLSY97, however, private college students in the NLSY79 work significantly fewer hours than their public counterparts and are more likely to be white. Our definition of private college has important implications for gender composition: adding nursing and beauty schools to definition B in the lower panel recodes many women in the sample from public to private.

Vocational Degrees and Certificates

[18] However, because our private college definition is based only on the "type of school" identified in the year the student receives their degree, any additional training would have to have taken place in the same year to be captured in our estimates.

[19] In specifications not reported here (available on request), we constrain our NLSY79 sample to match the age profile in the NLSY79 (ages 16-29). Our results are unchanged.

Finally, to better capture students obtaining vocational/technical training under our private college definitions in the 1979 NLSY, and as a final extension, we add students completing vocational degrees or certificates to both our 1979 and 1997 completers samples. We assess both the difference in returns between students obtaining associate's degrees and those obtaining these shorter-term (typically one-year or less) certificates/degrees in either sector, as well as the difference between private and public vocational degree/certificate completion. However, we caution that our definition of private college attendance for vocational degree/certificate holders is again, extremely imprecise in both samples. For both the 1997 and 1979 samples, we must rely on the same variable describing the "type of school" where an individual received training that we use for the NLSY79: vocational certificates are not captured in the education portion of the questionnaire in either survey.[20] We rely on the same definitions (A and B) of private college attendance described above for the 1979 cohort.

Our new "AA plus voc-tech" sample includes an additional 884 certificate students in the 1979 NLSY cohort, of which 211 are coded as attending private institutions under definition A and 380 are coded as private under definition B. In 1997 NLSY, the AA plus voc-tech sample adds 1,912 students. Under definitions A and B, we identify 665 and 803 students obtaining vocational degrees/certificates in private institutions in the 1997 NLSY, respectively.

VI. Results

Table 3 presents our first set of findings on log weekly earnings for students who completed their two-year college training and received an associate's degree. Specifications (1) to (5) are

[20] 40 people with vocational degrees did identify the type of college in the education variables in the NLSY97, but for the other vocational degree holders we rely on the "type of school" variable to identify public or private college as described above.

standard OLS models, exploiting cross sectional variation across individuals, as in equation (1). Specification (1) includes only age and age squared along with year fixed effects, as in all the models. Specification (2) employs the more flexible age fixed effects. Specifications (3) to (5) incrementally add fixed effects for sex, race and region, proxies for ability such as math and reading test scores, foreign-born status, English language ability, and household income.[21] As reported in the second row of the table, the OLS specifications indicate that receiving an associate's degree at any type of institution generates earnings gains of roughly 11 to 14 percent. This finding is statistically robust to the inclusion of all the covariates increasing from 11 percent in specification (1) to 13 percent in specification (5) which includes all the controls. This estimate is comparable to other cross-sectional estimates in the literature on returns to two-year colleges (e.g., Kane and Rouse 1995, 1999).

The first row in table 3 tests whether the two-year college returns differ for individuals that received their degree from a private two-year college. Relative to a public community college, receiving a degree from a private two-year college appears to increase earnings by an additional 6 to 9 percent in the OLS models. However, this effect is less robust than the impact of receiving a two-year degree, decreasing in magnitude and significance with the inclusion of additional covariates. In specification (5), which includes all of the covariates, private college earnings are no longer statistically different from public colleges. The consistently weaker findings with the additional observable controls suggest that other unobservable individual characteristics are perhaps also correlated with both earning a degree from a private college and weekly earnings.

[21] The sample size changes across specifications due to a large amount of missing data for these control variables, particularly household income.

Given the endogeneity problems of omitted variables inherent in cross-sectional estimates, we turn to our preferred individual fixed effects estimates in specifications (6) and (7), which compare earnings for the same individual before and after they receive their degree, according to equation (2) above. Specification (6) includes age and age squared, while specification (7) includes the more flexible age fixed effects. Both specifications also include year fixed effects.

The returns to receiving an associate's degree, regardless of institution in the individual fixed effects estimates are similar to the OLS estimates. The estimates in specifications (6) and (7) average 13 percent and are statistically significant at the 1 percent level. However, a two-year college education in the private sector can no longer be shown to have higher returns than a public sector education. Using a consistent sample, the magnitude of the interaction between private college and post-degree drops from 9 percent (specifications 1 and 2) to 6 percent with the fixed effects (specifications 6 and 7), and the standard errors increase substantially.

Hence, the returns to private colleges could be higher than community colleges but we cannot differentiate this point estimate from zero with a high degree of confidence. It may be the case that, after controlling for time-invariant individual characteristics, the effect of attending a private institution is no different from attending a public community college, as the coefficient cannot be shown to be statistically different from zero. However, it may also be the case that after including the fixed effects, we do not have sufficient power to detect the difference. If the latter is the case, a maximal interpretation of our results suggests that private two-year college students may earn on average 6 percentage points more than students obtaining associate's degrees in the public sector.

In table 4, we further explore the effects of private colleges on other employment outcomes such as hourly wage, hours worked per week, full-time and any employment, using our preferred

individual fixed effects regression with age and year fixed effects. For comparison, we show the results on weekly earnings in specification (1). Specifications (2) and (3) suggest the effects of receiving an associate's degree arise from both higher hourly wages (6 percent higher) and more hours worked per week (8 percent higher) although the estimate on wages is only significant at the 10 percent level. Again, we are unable to detect a statistically significant differential effect on either wages or hours worked for private college students. The point estimate on hourly wages suggests they may be 4 percentage points higher for private college students, but again we cannot say with confidence whether this estimate is significantly different from zero. The estimate on hours worked is very small in magnitude and imprecisely estimated. Specifications (4) and (5) are linear probability models for full-time and any employment, and similar to earnings, there are no differential effects on these outcomes.[22] In fact, the point estimate on (Private*Post) for any employment is negative. Earning a two-year degree in any type of institution, however, confers significant gains. Individuals are 12 percent more likely to be employed full-time post-degree and 10 percent more likely to be employed with positive earnings post-degree.

Table 5 extends our analysis to the attendees sample, considering both the completers and individuals that enrolled in a two-year associate's degree program but never received a degree in the 11 years we observe. For this sample, enrolling in a two-year college in either sector does not generate significant labor market returns: in fact, individuals earn about 4 percent lower weekly earnings post-attendance. We might expect this apparent decline to be driven by reductions in hours worked if some students who remain in school cut back on their hours of work to pursue their degree, but the results in specifications (2) and (3) suggest otherwise. Most of the decline in

[22] We also estimate probit models using individual fixed effects and find no significant effects of attending private colleges on full-time or any employment.

earnings is due to a reduction in hourly wages, rather than in hours worked. Further, in this sample individuals are more likely to be employed following attendance (specification (5)), suggesting that many students may be dropping out and pursuing low-skilled jobs. As in the completers sample, there are no differential effects on employment for private college attendees compared to public college attendees, but unlike the completers sample, we find point estimates very close to zero in all specifications.

Our findings thus far suggest no significant differential returns to private two-year colleges. Degree completers in either type of institution earn 13-14 percent more post-degree, or about 7 percent per year of education. However, if the point estimates are to be believed, private college students may earn up to an additional 3 percentage points per year of education. Even with this generous interpretation, these estimates are lower than those found in the most recent studies of community college students using similar methods (Jepsen et al. 2010, Jacobson et al. 2005) and generally lower than recent estimates of returns to other types of education (Card 2001, Goldin and Katz 2008). Still, they remain within the range of estimates found in cross-sectional studies (Kane and Rouse 1995, 1999) and the returns literature more generally (Card 1999, 2001). On the margin of employment, we find that associate's degree holders in either sector are 10 percent more likely to be employed. In contrast to previous studies (Kane and Rouse 1995, 1999), we find that attendees who do not complete degrees do not enjoy any boost in earnings and actually experience declines in earnings, although there appear to be some beneficial effects of attendance on the likelihood of employment.

Alternative Specifications

In Table 6, we subject our findings on weekly earnings to several robustness checks. Given the NLSY97 draws on a particular sample of individuals, specification (1) weights the

observations using the sampling weights provided by the NLSY in our preferred specification with individual, age, and year fixed effects. Specification (2) includes a measure of potential experience, defined as age-schooling-6. Specification (3) drops the year of graduation because there may be some confounding effect depending on which month the degree was earned. As shown, the estimates on post-degree are similar to those reported in table 3 and there are no statistically significant effects on the interaction between private and post-degree. The effects of an associate's degree are also similar to those reported earlier, although we do find a larger effect of an associate's degree in specification (3) where we drop the year of graduation. This 23 percent increase can be viewed as an upper bound on the returns to an AA degree in our sample.

In specification (4), we restrict our focus to the 175 individuals that earned their degree from a private college. Unlike the other specifications, this regression is a simple before and after comparison of earnings, and cannot distinguish between the effect of earning a two-year degree and earning that degree from a private college. Without a comparison group against which to measure expected earnings gains in the absence of the "treatment" of attending a private two-year college, this estimate is likely to overstate the returns to a private two-year college.[23] Earning an associate's degree from a private college confers a 15 percent return, which is comparable to the 13 percent return estimated using the sample including both public and private college individuals.

Specifications (5) and (6) use alternate definitions of weekly earnings to address concerns that our estimates may be relying on our construction of earnings (specifically, the average over the first five reported jobs). Specification (5) focuses on the earnings from the 1st job and specification (6) focuses on earnings averaged over all the jobs worked during the year. The

[23] See Ashenfelter and Card (1985) for more discussion of this point.

results on these alternate earning measures are very similar to those reported in table 3. The earnings gain post-degree is 15 percent higher for the first job and 13 percent higher for the average earnings across all reported jobs. Although the point estimates on the interaction again suggest the possibility of higher earnings for private students, again we cannot reject the null hypothesis that these estimates are statistically different from zero. We also subjected the other employment outcomes to these robustness tests and the results were unchanged.[24]

National Longitudinal Survey of Youth 1979

We next turn to the students in the 1979 cohort of the NLSY in table 7. Corroborating the patterns found for the 1997 cohort, we find no differential effects of private two-year college graduation on weekly earnings, hourly wages, or hours worked per week using either private college definition. Our estimates are again quite imprecise, but in contrast to the younger cohort, point estimates on $(Private_i * Post_{it})$ for these outcomes are negative in all but one specification. Estimates of earnings gains to an associate's degree in either type of institution are slightly higher than those found in the NLSY97—about 17 percent (specification (1)). Associate's degree holders in this sample are about 7 percent more likely to be employed and work full-time (specifications (4) and (5)). In contrast with the NLSY97, we find that private two-year college graduates in this sample are about 10 percent more likely to be employed than students graduating from community colleges (specification (5)). For all of our NLSY79 results, we again urge caution in interpretation due to our imprecise definition of private college attendance.

Vocational Degrees and Certificates

Finally, we add students completing vocational degrees and certificates to both of the NLSY completers samples in tables 8 and 9. Thus, these samples include individuals that received

[24] These results are available upon request.

either a two-year associate's degree or a vocational degree/certificate. The variable $Post_{it}$ now captures the post-degree effects of either an associate's degree or a vocational degree. To identify any differential return to vocational degrees and certificates in either type of institution, we add an additional interaction term ($Voc_i * Post_{it}$) to the model. Finally, we include an additional interaction term ($Private_i * Voc_i * Post_{it}$) to identify any differential returns to vocational degrees/certificates from private institutions.

The results for the NLSY79 are reported in table 8 and for NLSY97 in table 9. In the top panel of both tables, where our definition of private college attendance is based on vocational/technical institutes only (definition A), we find no significant differences in the earnings gains, hours, or wages of students attending private institutions compared to public in either cohort. However, as might be expected, vocational degrees/certificates bring much lower earnings gains than associate's degrees in either type of institution, as shown in the lower rows of each panel. For example, the earnings gain post-vocational degree/certificate is just 5.7 percent compared to 17.6 percent for associate's degree completers in the NLSY97.

We do observe some differences between the NLSY79 and NLSY97 among private vocational degree/certificate completers. In the bottom panel of table 8, for our broader definition of private college attendance (definition B) including business schools, nursing schools, cosmetology, flight schools, and correspondence courses, NLSY79 students obtaining vocational degrees/certificates in these institutions have marginally higher earnings, although these are only significant at the 10 percent level. Virtually all of this difference is attributable to higher hourly wages. We do not find comparable effects on earnings among NLSY97 individuals, but these individuals are 5 to 6 percent more likely to be employed full-time (specification (5) in table 9).

Finally, obtaining an AA or a vocational degree/certificate in the private sector appears to increase the likelihood of any employment by about 5 percentage points over the public sector (specification 5 under definition B) for the NLSY79, but again we do not find similar positive effects for the NLSY97. We caution again, however, that our definitions of private college for vocational degree/certificate holders are imprecise and may be capturing the returns to the occupations represented in the "type of school" variable rather than to the private and public sector.

VII. Concluding Remarks

This study takes a first step in assessing the quality of private (mostly for-profit) two-year college education, comparing the earnings gains of students attending these institutions to students attending public community colleges. Using an individual fixed effects approach and data from the 1997 NLSY, we cannot reject the hypothesis that students in private and public schools earn similar returns: completing an associate's degree in either type of institution yields earnings gains of about 13-14 percent or 7 percent per year of education, and both types of institutions increase the likelihood of employment by about 10 percent (or 5 percent per year). In our most generous interpretation, however, private two-year college students may see gains roughly 3 percentage points higher per year than public sector students—up to 10 percent per year. Still, even our largest estimates of returns are somewhat lower than those reported in the most recent studies of earnings gains to other types of institutions, but they remain within the range of estimates in the broader literature.

Assessing the effects of two-year college attendance on a broader set of students who enroll in, but do not necessarily complete an associate's degree, reveals that these students experience

declines in earnings of about 4 percent but a higher likelihood of employment than students that complete degrees. These results are consistent across sectors and suggest that a substantial number of students may be dropping out of two-year programs and accepting low-skilled jobs.

Several caveats are in order. First and most importantly, our analysis excludes students who later transfer to four-year degree programs. If, as anecdotal evidence suggests (Hechinger 2005), students in public community colleges are more likely to transfer to four-year institutions, the returns to the public sector may be substantially understated and community college students may indeed experience larger earnings gains than their private counterparts in the long run. Second, the NLSY97 data relies on a small sample of young workers and may not reflect earnings gains over an entire career. Further, the data do not allow us to distinguish between the returns to for-profit and not-for-profit private two-year colleges (though there are relatively few not-for-profit institutions at this level) nor between institutions that are eligible for federal financial aid and those that are not.

In spite of these limitations, if we accept that the returns to education are roughly equal or slightly larger for private sector students who do not transfer, then our results beg the question as to whether the higher price of for-profit colleges can be justified. From a student's perspective, it would seem that given roughly similar returns, the much lower-cost community college would likely be a better choice. It may be the case that students are unaware of the options available at local community colleges (Cellini 2009) and we cannot rule out that aggressive recruiters in the private sector might mislead student into believing that the earnings gains will be higher than in the public sector. On the other hand, students may simply value other attributes of for-profit colleges. For example, for-profits may have better student services, such as on-site childcare that

may not be reflected in earnings gains. Further, some programs may be offered in the private sector that are not offered in the public sector.

The more important question, then, is not why a student might choose a private college, but whether the student's earnings gains are sufficient to offset the cost of education in the private sector. Despite its higher cost, a private sector education may still be worthwhile if the present value of the student's lifetime earnings fully offset the foregone earnings and direct costs of education (e.g., tuition, fees, books, and interest on debt) that the student incurs from attending.

In table 10 we present a back-of-the-envelope cost-benefit analysis for the average student. Under the most plausible assumptions in our base case analysis, we estimate that the earnings gains generated by completing an associate's degree in a for-profit college are 13.4 percent (from table 3, col. 7, row 2). Foregone earnings for a high school graduate with no college are assumed to be $31,300 per year (BLS 2010). The direct upfront costs of obtaining an associates' degree in a for-profit institution are assumed to be $19,681.[25] As 98 percent of students in for-profit associate's degree programs take on loans (Finaid.org 2010), we also add the cost of interest to our calculation. We assume that the student repays the $19,681 over 10 years at a rate of 9.8 percent in our base case.[26] All future costs and benefits are discounted assuming a 3 percent social discount rate.

Our analysis suggests that for the average student, the benefits are almost exactly equal to the costs, with a net present value of just $980 over a student's lifetime. However, our results are

[25] This figure represents the average debt for associate's degree students in for-profit institutions (finaid.org 2010). We believe this amount reflects a reasonable estimate of the cost of tuition, fees, books, and other education-related expenses not covered by grants, that students would not have accrued if they had not attended college.

[26] We arrive at this value by first calculating a "best case" interest rate assuming that all student debt is financed through federal student loan programs: we use 6.8 percent to reflect the current fixed rate on Stafford Loans (U.S. Department of Education). Our "worst case" interest rate adds 6 percentage points to reflect what we believe to be a very conservative rate on private loans (or alternatively, a mix of higher rates on private loans along with a combination of subsidized and unsubsidized federal loans). Our base case uses the average of the two.

quite sensitive to our assumptions about the return and the interest rate. In our best-case scenario, an interest rate of 6.8 percent and earnings gains of 19.3 percent (table 3, col.7, row 1 + row 2) could raise the benefits above the costs by about $44,000, while a worst-case analysis suggests that costs would exceed benefits by $7,000 assuming a 12.8 percent earnings gain (table 3, col. 6, row 2) and a 12.8 percent interest rate. The costs could be pushed much higher still if students face higher interest rates or finance their education solely with private loans (e.g., students in schools that are not eligible for federal financial aid programs).

Our cost-benefit analysis is, admittedly, quite simplistic and we caution that we do not attempt to value the full social costs and benefits of a for-profit two-year education. Importantly, we omit the costs to taxpayers of subsidizing student loans and providing grants to students to attend for-profit colleges. We also omit the social benefits of education, such as decreased crime or improved civic engagement. Future research should assess these additional costs and benefits and compare the full social costs and benefits of a for-profit education to the costs and benefits of educating a student in public community colleges. Such an analysis would provide policymakers with important information about the efficiency of investments in each sector.

This study is just a first step toward understanding educational quality in the for-profit sector. More studies using alternative data sources and methods are needed to definitively assess student outcomes in for-profit postsecondary institutions. Future studies should examine four-year college transfer rates and assess whether returns differ by occupation, institution size, financial aid eligibility, and other characteristics of institutions and individuals. For now, however, our estimates demonstrate that private two-year colleges on average generate positive earnings gains that are similar or perhaps even higher in magnitude to those experienced by students in the public sector. These institutions may indeed be worth the high price for some students—

particularly those that cannot find their needs met in the public sector. However, in light of the much higher cost of a degree in the private sector, it is likely that many other students who can find similar programs in the public sector would be better served in lower-cost community colleges.

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Table 1. Summary Statistics for NLSY 1997

Completers Sample: Individuals with AA Degree (& no BA)

	All	Public	Private	t-statistic
Weekly Earnings	$383	$379	$397	-0.5
Avg Wage	$12.19	$12.10	$12.47	-0.4
Avg Hrs Worked/Week	30.9	30.8	31.0	-0.4
Full Time Employment	35.3%	34.9%	36.8%	-1.4
Any Employment	79.2%	78.5%	81.2%	-2.5
Age	20.80	20.81	20.80	0.1
Male	46.5%	47.7%	42.8%	3.7
White	58.5%	58.3%	59.3%	-0.7
Black	27.3%	27.9%	25.7%	1.8
American Indian, Eskimo, Aleut	0.9%	0.9%	0.6%	1.4
Asian, Pacific Islander	1.0%	0.8%	1.7%	-2.7
Other Race	12.3%	12.1%	12.7%	-0.7
Foreign Born	5.6%	5.9%	4.8%	1.8
Non English	5.7%	5.5%	6.3%	0.8
Math Scores (ASVAB)	0.70	0.70	0.72	0.9
Reading Scores (ASVAB)	0.71	0.71	0.71	0.5
Household Income	$58,793	$57,832	$61,883	-1.9
No. of Individuals	711	536	175	

Attendees Sample: Individuals Who Attended an AA Degree Program (& no BA)

	All	Public	Private	t-statistic
Weekly Earnings	$347	$346	$350	-0.3
Avg Wage	$10.85	$10.76	$11.27	-1.1
Avg Hrs Worked/Week	31.3	31.4	30.9	2.6
Full Time Employment	35.7%	35.7%	35.4%	0.5
Any Employment	76.3%	75.6%	79.5%	-5.6
Age	20.78	20.78	20.82	-0.8
Male	46.6%	47.1%	44.2%	3.4
White	55.7%	56.5%	52.0%	5.2
Black	28.9%	28.5%	30.7%	-2.9
American Indian, Eskimo, Aleut	0.9%	1.0%	0.5%	3.1
Asian, Pacific Islander	1.4%	1.4%	1.2%	1.0
Other Race	13.2%	12.7%	15.5%	-4.6
Foreign Born	6.6%	6.7%	6.3%	0.9
Non English	6.1%	6.1%	6.1%	0.0
Math Scores (ASVAB)	0.71	0.71	0.72	-1.1
Reading Scores (ASVAB)	0.71	0.72	0.67	4.4
Household Income	$56,056	$55,387	$59,281	-3.0
No. of Individuals	2,425	2,013	412	

Notes: See text for detail on samples. Individuals in the samples are age 16 or older. Weekly earnings, hourly wage and hours worked per week are means across the first five jobs worked in the year.

Table 2. Summary Statistics for NLSY 1979, Completers Sample

Private College Definition A: Vocational/Technical Institute

	All	Public	Private	t-statistic
Weekly Earnings	$402	$397	$420	-1.1
Avg Wage	$10.08	$9.91	$10.73	-1.7
Avg Hrs Worked/Week	34.0	34.2	33.2	2.5
Full Time Employment	27.3%	26.9%	28.8%	-2.3
Any Employment	40.3%	39.4%	44.2%	-5.2
Age	28.6	28.7	28.3	2.8
Male	43.5%	41.7%	50.8%	-9.8
White, Non-Hispanic	58.2%	56.6%	65.0%	-9.3
Black, Non-Hispanic	25.1%	26.6%	19.1%	9.8
Hispanic	16.7%	16.9%	15.9%	1.4
No. of Individuals	830	667	163	

Private College Definition B: Voc/Tech Institute, Barber/Beauty School, Nursing School, Flight School, or Correspondence Course

	All	Public	Private	t-statistic
Weekly Earnings	$402	$403	$400	0.2
Avg Wage	$10.08	$10.10	$10.04	0.2
Avg Hrs Worked/Week	34.0	34.5	33.0	4.8
Full Time Employment	27.3%	27.8%	26.2%	2.4
Any Employment	40.3%	40.1%	40.8%	-0.9
Age	28.6	28.7	28.4	2.8
Male	43.5%	45.4%	40.0%	7.0
White, Non-Hispanic	58.2%	57.1%	60.3%	-4.1
Black, Non-Hispanic	25.1%	24.8%	25.6%	-1.2
Hispanic	16.7%	18.1%	14.1%	7.0
No. of Individuals	830	540	290	

Notes: See text for detail on samples. Individuals in the samples are age 16 or older and have completed an associate's degree, but not a bachelor's degree. Weekly earnings, hourly wage and hours worked per week are means across the first five jobs worked in the year.

Table 3. Returns to Private Two-Year College for AA Completers, Log Weekly Earnings (1st 5 jobs), NLSY97

	Completers Sample: Individuals with an AA (& no BA)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Private*Post	0.0916***	0.0921***	0.0808**	0.0870**	0.0614	0.0567	0.059
	[0.0350]	[0.0351]	[0.0351]	[0.0394]	[0.0439]	[0.0483]	[0.0484]
Post	0.110***	0.116***	0.106***	0.135***	0.126***	0.128***	0.134***
	[0.0284]	[0.0288]	[0.0287]	[0.0329]	[0.0353]	[0.0368]	[0.0370]
Age & Age Squared	Yes	No	No	No	No	Yes	No
Age FE	No	Yes	Yes	Yes	Yes	No	Yes
Male, Region & Race FE	No	No	Yes	Yes	Yes	No	No
Ability (ASVAB scores)	No	No	No	Yes	Yes	No	No
Foreign Born, Non-English	No	No	No	Yes	Yes	No	No
Household Income	No	No	No	No	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	No	No	No	No	No	Yes	Yes
No. Obs.	5,803	5,803	5,752	4,433	3,070	5,803	5,803
No. Individuals						710	710

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: Log weekly earnings are the natural log of mean earnings across the first five jobs worked in the year. Private = 1 if the individual attended a private institution. Post = 1 in the year of degree completion and every year thereafter. Estimates are conditional on employment (obs with missing earnings are dropped).

Table 4. Effects of Private Two-Year Colleges on Wages, Hours, and Employment, NLSY97

	Completers Sample: Individuals with an AA (& no BA)				
	Log Wkly Earn	Log Hourly Wages	Log Hrs/Week	FT Employment	Any Employment
	(1)	(2)	(3)	(4)	(5)
Private*Post	0.059	0.0386	0.00687	0.0216	-0.0126
	[0.0484]	[0.0392]	[0.0349]	[0.0343]	[0.0277]
Post	0.134***	0.0567*	0.0781***	0.120***	0.105***
	[0.0370]	[0.0314]	[0.0227]	[0.0230]	[0.0193]
Age & Year FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
No. Obs.	5,803	5,803	5,803	7,328	7,328
No. Individuals	710	710	710	711	711

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: Weekly earnings, hourly wage, and hours worked per week are means across the first five jobs worked in the year. Private = 1 if the individual attended a private institution. Post = 1 in the year of degree completion and every year thereafter. Cols. (1)-(3) are conditional on employment (obs. with missing earnings are dropped).

Table 5. Effects of Private Two-Year Colleges on Earnings and Employment for AA Attendees, NLSY97

	Attendees Sample: Individuals Who Attended an AA Degree Program (& no BA)				
	Log Wkly Earnings	Log Hourly Wages	Log Hrs/Week	FT Employment	Any Employment
	(1)	(2)	(3)	(4)	(5)
Private*Post	0.000810	-0.00463	0.00405	0.00332	-0.0202
	[0.0323]	[0.0249]	[0.0224]	[0.0199]	[0.0187]
Post	-0.0362**	-0.0277**	-0.0169	0.00296	0.106***
	[0.0174]	[0.0130]	[0.0126]	[0.0116]	[0.0108]
Age & Year FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
No. Obs.	18,928	18,928	18,928	24,822	24,822
No. Individuals	2,414	2,414	2,414	2,425	2,425

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: Weekly earnings, hourly wage, and hours worked per week are means across the first five jobs worked in the year. Private = 1 if the individual attended a private institution. Post = 1 in the first year the student reported attendance and every year thereafter. Cols. (1)-(3) are conditional on employment (obs. with missing earnings are dropped).

Table 6. Alternative Specifications and Earnings Measures, Completers Sample, NLSY97

	Log Weekly Earnings, 1st 5 jobs				Log Weekly Earn 1st job only	Log Weekly Earn all reported jobs
	(1)	(2)	(3)	(4)	(5)	(5)
Private*Post	0.0512	0.0556	0.054	0.148***	0.0909	0.0597
	[0.0541]	[0.0503]	[0.0568]	[0.0516]	[0.0587]	[0.0483]
Post	0.142***	0.147***	0.231***		0.152***	0.134***
	[0.0372]	[0.0392]	[0.0430]		[0.0420]	[0.0370]
Age & Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample Weights	Yes	No	No	No	No	No
Experience	No	Yes	No	No	No	No
Drop Yr. of Graduatio	No	No	Yes	No	No	No
Privates Only	No	No	No	Yes	No	No
No. Obs.	5,803	5,419	5,165	1,465	5,645	5,803
No. Individuals	710	709	705	175	710	710

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: In cols. (1)-(4) log weekly earnings is the natural log of the means across the first five jobs worked in the year. Col. (5) uses the first job only and col. (6) uses all jobs (10 max). Private = 1 if the individual attended a private institution. Post = 1 in the year of degree completion and every year thereafter. Estimates are conditional on employment (obs. with missing earnings are dropped). Sample weights are the cumulative cases weights provided in the NLSY97. Experience = age-schooling-6.

Table 7. Effects of Private Two-Year Colleges on Earnings and Employment for AA Completers, NLSY79

	Completers Sample: Individuals receiving an AA (& no BA) in 1979 NLSY				
	Log Weekly Earnings	Log Hourly Wage	Log Hrs Worked/Week	Full Time Employment	Any Employment
	(1)	(2)	(3)	(4)	(5)
Private College Definition A: Individuals Attending Training in a Vocational/Technical Institute (n=151)					
Private*Post	0.0126	-0.0331	-0.00746	0.0482	0.0934**
	[0.0710]	[0.0543]	[0.0410]	[0.0339]	[0.0373]
Post	0.165***	0.0708***	0.0867***	0.0698***	0.0679***
	[0.0385]	[0.0271]	[0.0260]	[0.0142]	[0.0153]
Definition B: Individuals Attending Training in a Voc/Tech Institute, Barber/Beauty School, Nursing Program, Flight School, or Correspondence Course (n=273)					
Private*Post	-0.0479	-0.0387	-0.0309	0.0531**	0.1000***
	[0.0621]	[0.0452]	[0.0360]	[0.0259]	[0.0264]
Post	0.167***	0.0718***	0.0878***	0.0690***	0.0664***
	[0.0385]	[0.0272]	[0.0260]	[0.0142]	[0.0152]
Age FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
No. Obs.	7,279	7,279	7,279	18,054	18,054
No. Individuals	817	817	817	830	830

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: Weekly earnings, hourly wage, and hours worked per week are means across the first five jobs worked in the year. Private = 1 if the individual attended a private institution. Post = 1 in the year of degree completion and every year thereafter. Cols. (1)-(3) are conditional on employment (obs. with missing earnings are dropped).

Table 8. Effects of Private Two-Year Colleges on Earnings and Employment for AA\VocTech Completers, NLSY79

	AA Plus Vocational Degree/Certificate Completers Sample in 1979 NLSY				
	Log Weekly Earnings	Log Hourly Wage	Log Hrs Worked/Week Full Time Employment		Any Employment
	(1)	(2)	(3)	(4)	(5)
Private College Definition A: Individuals Attending Training in a Vocational/Technical Institute (n=376)					
Private*Post	0.0545	-0.00375	-0.000731	0.0408*	0.0545*
	[0.0784]	[0.0565]	[0.0514]	[0.0233]	[0.0324]
Private*Voc*Post	0.0465	0.0960	-0.0205	0.0426	0.0643
	[0.107]	[0.0806]	[0.0689]	[0.0405]	[0.0440]
Post	0.212***	0.138***	0.0831**	0.0790***	0.0534***
	[0.0444]	[0.0268]	[0.0329]	[0.0140]	[0.0164]
Voc*Post	-0.205***	-0.171***	-0.0416	-0.0338	-0.0195
	[0.0752]	[0.0596]	[0.0498]	[0.0320]	[0.0346]
Definition B: Individuals Attending Training in a Voc/Tech Institute, Barber/Beauty School, Nursing Program, Flight School, or Correspondence Course (n=681)					
Private*Post	-0.0242	-0.0425	-0.00372	0.0303	0.0501**
	[0.0646]	[0.0476]	[0.0408]	[0.0186]	[0.0238]
Private*Voc*Post	0.150*	0.133**	0.0413	0.0553*	0.0371
	[0.0856]	[0.0664]	[0.0565]	[0.0302]	[0.0335]
Post	0.219***	0.143***	0.0856***	0.0797***	0.0525***
	[0.0447]	[0.0271]	[0.0330]	[0.0140]	[0.0165]
Voc*Post	-0.247***	-0.195***	-0.0638	-0.0446	-0.0169
	[0.0783]	[0.0637]	[0.0501]	[0.0329]	[0.0349]
Age FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
No. Obs.	6,223	6,223	6,223	19,253	19,253
No. Individuals	1,602	1,602	1,602	1,712	1,712

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: Weekly earnings, hourly wage, and hours worked per week are means across the first five jobs worked in the year. Private = 1 if the individual attended a private institution. Post = 1 in the year of degree completion and every year thereafter. Voc = 1 if the student completed a vocational degree or certificate program. Cols. (1)-(3) are conditional on employment (obs. with missing earnings are dropped).

Table 9. Effects of Private Two-Year Colleges on Earnings and Employment for AA\VocTech Completers, NLSY97

	AA Plus Vocational Degree/Certificate Completers Sample in 1997 NLSY				
	Log Weekly Earnings	Log Hourly Wage	Log Hrs Worked/Week Full Time Employment		Any Employment
	(1)	(2)	(3)	(4)	(5)
Private College Definition A: Individuals Attending Training in a Vocational/Technical Institute (n=665)					
Private*Post	0.057	0.0216	0.0179	0.0397	-0.00433
	[0.0477]	[0.0390]	[0.0333]	[0.0329]	[0.0269]
Private*Voc*Post	-0.0111	0.00289	0.00564	-0.0328	0.0631*
	[0.0564]	[0.0448]	[0.0387]	[0.0383]	[0.0324]
Post	0.176***	0.0824***	0.0955***	0.113***	0.0664***
	[0.0307]	[0.0254]	[0.0198]	[0.0192]	[0.0155]
Voc*Post	-0.119***	-0.0514*	-0.0653***	-0.0452**	-0.0373**
	[0.0333]	[0.0268]	[0.0222]	[0.0210]	[0.0180]
Definition B: Individuals Attending Training in a Voc/Tech Institute, Barber/Beauty School, Nursing Program, Flight School, or Correspondence Course (n=803)					
Private*Post	0.0708	0.0394	0.0135	0.0403	-0.00272
	[0.0476]	[0.0389]	[0.0331]	[0.0324]	[0.0265]
Private*Voc*Post	-0.0558	-0.0217	-0.0125	-0.0504	0.0567*
	[0.0557]	[0.0443]	[0.0382]	[0.0375]	[0.0318]
Post	0.171***	0.0771***	0.0966***	0.113***	0.0660***
	[0.0307]	[0.0255]	[0.0199]	[0.0194]	[0.0156]
Voc*Post	-0.105***	-0.0451*	-0.0591***	-0.0382*	-0.0392**
	[0.0338]	[0.0272]	[0.0225]	[0.0215]	[0.0185]
Age FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
No. Obs.	20,369	20,369	20,369	27,159	27,159
No. Individuals	2,612	2,612	2,612	2,623	2,623

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Notes: Weekly earnings, hourly wage, and hours worked per week are means across the first five jobs worked in the year. Private = 1 if the individual attended a private institution. Post = 1 in the year of degree completion and every year thereafter. Voc = 1 if the student completed a vocational degree or certificate program. Cols. (1)-(3) are conditional on employment (obs. with missing earnings are dropped).

Table 10. Student-Level Cost-Benefit Analysis of AA Degree Completion in a Private Two-Year College

BENEFITS		RANGE
PV of gains in lifetime earnings for private college AA completers	**$90,122**	
Return to completing private degree, from table 3	13.40%	[12.8, 19.3]
Annual average earings for those with only a high school diploma	$31,300	
Years of work	35	
Discount rate	3%	
Total Benefits	**$90,122**	**[$86,086, $129,802]**

COSTS		RANGE
PV of foregone earnings	**$61,688**	
Annual average earings for those with only a high school diploma	$31,300	
Years of earnings foregone	2	
Discount rate	3%	
Tuition, fees, and other educational expenses	**$19,681**	
PV of interest on loan	**$5,470**	
Principal	$19,681	
Interest rate	9.80%	[6.8, 12.8]
Origination fee	1%	
Years to repay	10	
Discount rate	3%	
Total Costs	**$89,141**	**[$85,615, $92,950]**
NET PRESENT VALUE	**$980**	**[-$6,864, $44,187]**

Notes: The range represents the range of values of our most sensitive parameters that we use to calculate a best- and worst-case scenario. The assumptions used in each calculations are listed below the cost/benefit. Tuition, fees, and other educational expenses are assumed to be equal to the average amount borrowed by associate's degree students in for-profit institutions (finaid.org). Our best case interest rate assumes a student borrows only from federal student loan programs at a fixed interest rate of 6.8% as in the Stafford Loan Program (U.S. Department of Education). Our worst case interest rate adds 6 percentage points to reflect what we believe to be a reasonable rate on private loans (finaid.org). Our base case takes the average of the two. Earnings data are from the Bureau of Labor Statistics.