Gainfully Employed?
Assessing the Employment and Earnings of For-Profit College Students Using Administrative Data

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October 2016

ABSTRACT

We draw on population-level administrative data from the U.S. Department of Education and the Internal Revenue Service to quantify the impact of for-profit college attendance on the employment and earnings of over 1.4 million students. We characterize both the within-student earnings effects and joint distributions of earnings effects and increases in student debt. Our descriptive analysis of degree-seeking students suggests that on average associate's and bachelor's degree students experience a decline in earnings after attendance, relative to their own earnings in years prior to attendance. Master's degree students and students who complete their degrees appear to experience better outcomes, with positive earnings effects. Our difference-in-difference analysis of certificate students suggests that despite the much higher costs of attendance, earnings effects are smaller in the for-profit sector relative to the effects for comparable students in public community colleges—a result that holds for all but one of the top ten fields of study. In absolute terms, we find no evidence of improved earnings post-enrollment for students in any of the top ten for-profit fields and we can rule out that average effects are driven by a few low-performing institutions.

We would like to thank Leah Brooks, Latika Chaudhary, Dylan Conger, John Earle, Brent Evans, Sarena Goodman, Ted Joyce, Janet McCubbin, and seminar participants at AEFP, the City University of New York, the Federal Reserve Board of Governors, George Mason University, George Washington University, the D.C. Education Economics Working Group, the University of Virginia, the U.S. Department of Labor, and the U.S. Treasury for helpful comments. We thank Jerry Wei and Rachel Schwartz for excellent research assistance. Stephanie Cellini gratefully acknowledges support from the Smith Richardson Foundation. The views expressed in this paper are those of the authors and do not necessarily represent the views of the U.S. Treasury Department.

For-profit colleges have changed the landscape of higher education in the United States. Since 2000, enrollment in federal-aid eligible for-profit colleges has tripled, fueled by growing numbers of students seeking postsecondary credentials, the availability of federal student aid, and the low cost of providing online education. Today, for-profit postsecondary institutions serve over 2 million students (National Center for Education Statistics (NCES) 2014, Table 330.20).[1]

The rapid growth of the for-profit sector brought with it increased attention from policymakers, the media, the education community, and students themselves. In recent years, investigations into unscrupulous recruiting practices, fraud in federal financial aid programs, low graduation rates, and high student loan default rates have led to declining enrollments, high-profile bankruptcies, school closures, and loss of federal aid for some for-profit institutions (e.g., GAO 2010; Lewin 2010; Goodman 2010; U.S. Senate Committee on Health, Education, Labor, and Pensions 2012, Federal Student Aid 2015). The Obama Administration responded with new regulations designed to hold for-profit colleges accountable for student outcomes. The "Gainful Employment" (GE) regulations will for the first time link federal student aid eligibility to program-level measures of student debt and earnings (Federal Register 2010, 2014). The debate over the merits of GE and the future of the for-profit industry depend crucially on the quality and cost of a for-profit college education.

In this paper, we are the first to use population-level administrative data on the enrollment, earnings, and debt of for-profit students to assess the quality of education in

[1] In addition to the 2 million students in federally-aided institutions, Cellini and Goldin (2014) estimate that about 670,000 additional students are served by non-federally-aided institution in the U.S. and not included in the Department of Education's counts.

the sector. Our data come from the U.S. Department of Education (DoED) and include nearly all federally-aided students who exited a for-profit postsecondary institution between 2006 and 2008. The data also include information on students in non-degree certificate programs in the public sector who exit during this period but they do not include students enrolled in degree programs public institutions. We merge these data with tax data from the Internal Revenue Service (IRS) for the years 1999-2014 to assess the labor market outcomes of students.

Because the vast majority of for-profit students work before attending, we can implement an individual fixed effects model. For degree-seeking students, we compare each student's own earnings before attendance to their earnings after, thereby controlling for time-invariant confounding factors that would bias cross-sectional estimates. For certificate students, we can go one step further toward identifying causal effects, as our data include non-degree students in the public sector. In the case of certificate students, we implement a difference-in-differences model. To account for heterogeneity in student demographics and programs of study across sectors we also report results that rely on inverse probability weighting to create a control group of students at public institutions that appear similar to students who attend for-profit schools.

The tax data allow for more accurate measures of employment and earnings than the self-reported survey data used in most previous studies of the sector. The DoED data allow us to examine the outcomes of the full set of for-profit students, including older (non-traditional) students, who have been missing from previous studies. With nearly 835,000 degree students and 567,000 certificate students, our data allows for sufficient power to explore heterogeneity of returns by gender, completion status, state, and field of study. We

further compare the distribution of earnings effects to measures of average student debt to provide what we believe to be the most comprehensive picture of for-profit student outcomes in the literature.

Across nearly all degrees and certificates, our results reveal disappointing outcomes for for-profit students. Certificate, associate's, and bachelor's degree students generally experience *declines* in earnings in the 5 to 6 years after attendance relative to their own earnings in the years before attendance. These negative average effects are largely generated by the high proportion of students do not complete their program of study. Although we cannot control for the endogeneity of degree completion, we find that graduates fare better, experiencing positive earnings effects. Master's students also see small positive earnings gains in most specifications.

Among certificate students, we find that for-profit students experience lower earnings effects than their public sector counterparts, a result that holds even after accounting for differences in student demographics and programs of study using inverse probability weights. Separate analyses of the ten most popular fields of study reveal that for-profit students experience higher returns than public students in only one field (cosmetology), yet none of the top ten fields can be shown to generate positive total earnings gains for for-profit students.

The negative earnings effects we find are troubling given the debt that students incur to attend for-profit institutions. Examining the distribution of average annual earnings effects and average annual debt payments reveals that the vast majority of for-profit students experience both higher debt and lower earnings after attendance, relative to the years before attendance. Finally, among certificate students we find that despite differences in

public support for higher education across states, in all 50 states public institutions reveal higher earnings and lower debt than local for-profit institutions.

Despite the advantages of using population-level administrative data, there are key limitations to our study. First, the results for degree-students are entirely descriptive. Among this group, the DoED data do not include information on students in the public sector. Second, even in the case of certificate students where there is a comparable control group in the public sector, the results require strong assumptions for causal interpretation. Third, the data we analyze are limited to students who leave college from 2006 to 2008 at the start of the Great Recession. Therefore, our findings are likely to be partially explained by overall weakness in the labor market. Fourth, our estimates include just 5-6 years of earnings and may not reflect patterns earnings effects over a longer period. Despite these limitations, we believe that our analysis reflects the most comprehensive examination of for-profit student outcomes to date.

Section 1 provides background on the for-profit sector and describes estimates of earnings effects in the literature. Section 2 describes the data. Section 3 provides descriptive evidence on the outcomes of students enrolled in degree programs in the for-profit sector. Section 4 describes our empirical approach in generating our difference-in-difference estimates for certificate students. Section 5 presents the results for certificate students, and Section 6 concludes.

1. Background

For-Profit Colleges

The academic literature on for-profit colleges is relatively thin, in large part because data on the sector has been scarce and because the dramatic growth of the sector is a relatively recent phenomenon.[2] Descriptive studies of the sector have shown that for-profit postsecondary institutions enroll disproportionate shares of students who are low-income, over age 25, women, minority, GED recipients, and single-parents (Deming, Goldin, and Katz 2012). Given these student demographics and the high costs of attendance, it is not surprising that for-profit students are more likely to borrow and borrow more than students in other sectors (Cellini and Darolia 2015). Further, Looney and Yannelis (2015) find that the increase in student loan defaults in recent years is associated with rising numbers of borrowers in for-profit colleges.

There is some evidence that for-profit colleges can be more responsive to student and employer demands. Rosenbaum, Person, and Del-Amien (2006) find that for-profit schools may have better counseling compared to community colleges. Deming, Goldin, Katz and Yuchtman (2015) show that the for-profit sector has been quicker to adopt on-line learning technologies for undergraduate education compared to less selective public colleges. Yet, for-profit colleges need to be concerned for their bottom line and the interests of shareholders, and this may create an incentive to increase the net price for students. Tuition at a two-year for-profit college is more than four times that of the average public community college: $14,193 per year vs. $3,370 (NCES 2014, Table 330.10). Cellini and

[2] Until the late 1990s, surveys done by the U.S. Department of Education did not require for-profit institutions to respond and most student surveys did not collect information on the control of the institution that a student attended. What we do know from the existing data sources is that vocational proprietary schools have existed in the United States for at least a century (Deming, Goldin, and Katz 2012) and they witnessed a spurt of growth in the 1980s before regulations on federal student aid shut down many campuses in the early 1990s (Darolia 2013). Since then, enrollments for-profit colleges have surged, thanks to new technology and easy access to federal student aid. The same forces have driven for-profits to take on new forms. Today, the largest enrollment growth is in large multi-campus chains and online institutions (Deming, Goldin, and Katz 2012).

Goldin (2014) show that for-profits that participate in federal student aid programs charge a tuition premium that is roughly equal to the average per-student value of federal student aid. Title IV federal student aid[3] accounts for a large share of revenue at for-profit institutions (on average 70 percent) with some schools approaching the maximum allowable level of 90 percent.[4]

The high costs of for-profit institutions, coupled with questions over their use and abuse of federal aid, have raised concerns about the sector and contributed to efforts to regulate them. Under the Gainful Employment (GE) regulations, nearly every for-profit college program will be held accountable for student outcomes, [5] along with most community college certificate programs[6] —about 8,000 programs in total. Under the new regulations, programs would lose eligibility for federal grants and student loans if graduates' loan payment-to-earnings ratios are above 12 percent of annual income or 30 percent of discretionary income for two out of three years (Fain 2014).[7] In a statement released at the time of the final rule, the Department of Education estimated that about 1,400 programs would not meet the new standards. These potentially failing programs

[3] Title IV refers to Title IV of the Higher Education Act of 1965. Title IV includes the Pell Grant, Academic Competitiveness Grant, SMART Grant, Federal Supplemental Educational Opportunity Grant, Direct Loans, Federal Family Education Loans, Perkins Loans, and Federal Work-Study. Revenues generated through the GI Bill and other programs for military students are not counted under 90-10.
[4] Authors' tabulation of 2013-14 data from U.S. Department of Education (2016).
[5] The only two types of programs in for-profits that are not counted as gainful employment are: 1) preparatory coursework needed prior to enrolling in a program, and 2) bachelor's degrees in liberal arts that have been offered since 2007 and regionally accredited since 2009 (U.S. Department of Education, Gainful Employment Operations Manual 2014).
[6] The only non-degree programs in public and non-profit institutions that are not counted as gainful employment are: 1) preparatory coursework needed prior to enrolling in a program, 2) programs of two or more years that are designed to be fully transferrable to a bachelor's degree, and 3) teacher's certification coursework that does not lead to a certificate from the institution (U.S. Department of Education, Gainful Employment Operations Manual 2014).
[7] To the extent schools lose Title IV eligibility overall, students will not be able to claim education tax credits for their otherwise eligible expenses.

enrolled roughly 840,000 students and it was estimated that 99 percent of these students were in for-profit institutions (U.S. Department of Education 2014).

Assessing the Returns to a For-Profit Education

A vast literature estimating the returns to college education has generally focused on four-year public and non-profit institutions. These studies typically find that the earnings effects generated by four-year college attendance averages about 10 to 15 percent per year (e.g., Card 2001; Goldin and Katz 2008; Oreopolous and Petronijevic 2013).[8] Returns appear to be similar for community college associate's degree programs—generally between 7 and 15 percent per year (e.g., Jacobson, LaLonde, and Sullivan 2005; Marcotte, Bailey, Borkoski, and Kienzl 2005; Jepsen, Troske, and Coomes 2014). Evidence on certificate programs is more limited. Focusing on Career Technical Education (CTE) certificates and associate's degrees in California's community college system Stevens, Kurlaneder, and Grosz (2015) estimate returns ranging from zero to roughly 16 percent per year depending on the field of study.[9]

In contrast to the large literature on returns to public and non-profit colleges, there are relatively few papers that estimate the returns to for-profit college attendance. Most rely on small samples of young workers and survey data.[10] Cellini and Chaudhary (2012) find

[8] In the late 1990s, reviews of the high school and four-year college returns literature by Card (1999) and Ashenfelter, Harmon, and Oosterbeek (1999) reported that one additional year of education (at any level) resulted in earnings gains in the range of 6 to 9 percent. Focusing on the literature on community colleges, Kane and Rouse (1995a, 1999) found that a year of community college attendance generated returns between 4 and 8 percent, just marginally below the average return to a four-year college attendance.

[9] For example, they find that graduates of health certificate programs generate returns as high as 31 percent total (or 16 percent annually) for a certificate requiring 30-60 credits (or 1-2 years of coursework). Non-health fields tend to have lower, but still positive, annual returns roughly in the range of 5-15 percent, with one exception: information technology certificates appear to have returns very close to zero (Stevens, Kurlaender, and Grosz 2015, Table 2).

[10] Grubb (1993) and Chung (2008) draw on very small samples of for-profit students of an earlier generation in the National Longitudinal Surveys of 1972 and the National Educational Longitudinal Survey of 1988, respectively. Both find limited evidence of positive effects of for-profit training, particularly for women and

that for-profit associate's degree students experience earnings gains of about 4 percent per year of education or about 10 percent total—lower than similar estimates for community colleges. Deming, Goldin, and Katz (2012) look at beginning postsecondary students and find that for-profit students (in all types of degree programs) earn about 8 percent less than observationally similar students in other sectors, but differences are smaller and not significant when conditioning on employment. Lang and Weinstein (2013) also look at traditional-aged students and report non-trivially negative estimates of the returns to certificate programs in for-profit colleges.[11] Associate's degree students in for-profit colleges appear to experience larger earnings gains than their public sector counterparts, a finding which the authors attribute to greater transfer and eventual bachelor's degree attainment by community college students. Mueser and Jepsen (2015) report a decline in the probability of employment, but very high earnings gains (of 24 percent and 31 percent, respectively) for certificate and associate's degree students in proprietary schools using a sample that also includes older students.

Hoxby (2015) makes use of population-level tax data and enrollment information from the College Board to examine the returns to postsecondary education for traditional-aged students who take college entrance exams. While the focus of this work is not primarily the for-profit sector, Hoxby (2015) finds that value-added earnings measures of for-profit students are lower than those of public and non-profit students based on pair-wise comparisons. Moreover, she finds more variance in earnings gains among for-profit

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certificate programs, but generally show no significant differences in returns to the for-profit students relative to students in other sectors. Note also that another related paper by Grubb (1993b), using the same data and methods to estimate returns to community colleges was found to be severely flawed by Kane and Rouse (1995b).

[11] Lang and Weinstein (2013) also report large differences in earnings gains by field of study, with business and health (except nursing) having lower than average returns and vocational fields (e.g., computers and construction) with higher returns, but no results can be distinguished from zero at conventional levels.

students than in other sectors, suggesting large differences in college quality within the sector.

Some recent work exploits experimental settings to estimate the effects of for-profit attendance. Darolia, Koedel Martorell, Wilson, and Perez-Arce (2015) and Deming, Yuchtman, Abulafi, Goldin, and Katz (2016) submit fictitious resumes to real job openings and track call backs. These results suggest that employers do not have a perception that for-profit institutions are of higher quality, relative to comparable public institutions, or in some cases, to no college attendance at all. While suggestive that the returns to for-profit education will not be higher than that of comparable public education, these studies are unable to quantify earnings effects.

This study builds on the literature that examines the for-profit sector in several ways. First, we bring a much larger data set to bear on the question compared to most of the earlier work in the area. Our data from include about 1.4 million individuals—the universe of federally-aided for-profit students who drop-out or complete their program between 2006 and 2008. Second, we use administrative data on earnings from the IRS, which should be less susceptible to measurement error relative to the survey data used in most prior studies of for-profit education. Our data are also more complete than other administrative sources, such as unemployment insurance (UI) records that are typically collected for a single state and may not include information on the self-employed and federal employees, among others (U.S. Department of Labor 2016). Third, we believe our results present the first estimates of returns for graduate students in the for-profit sector. Fourth, the large number of students in our data allows us to estimate separate and more precise effects by gender, age, completion, state, program, and more detailed fields of study

than any previous work. Fifth, rather than focusing solely on young workers, traditional-aged students, or first-time college-goers, our data include individuals of all ages who attend for-profit institutions. Finally, we can observe student debt and can therefore compare earnings gains relative to student debt burdens.

2. Data

Our data include all students receiving federal student aid and participating in programs that are deemed "Gainful Employment" (GE) programs. All programs in for-profit institutions are considered GE programs, with only one exception: bachelor's degree programs in liberal arts that have been in existence since 2007 and regionally accredited since 2009.[12] Degree programs in public institutions are exempt from GE making it difficult to construct a comparison group of public sector students for our degree-seeking sample of for-profit students. However, non-degree programs (i.e., certificate programs) in public institutions are subject to GE, so we can use community college students as controls for our for-profit certificate students to implement a difference-in-difference design.

We observe almost all students who completed or dropped out of GE programs in fiscal years 2006 (Oct. 1, 2006-Sept. 30, 2007) and 2007 (Oct. 1, 2007-Sept. 30, 2008). Importantly, the data exclude students who re-enroll in GE programs in the following three fiscal years, since these students are not counted in official GE calculations. Also missing from our data are students who do not participate in federal student aid programs under

[12] The DoED data also include information on post-baccalaureate certificates, first professional degrees, and doctoral programs, but these all comprise very small shares of for-profit enrollment (0.2%, 0.1%, and 1.1%, respectively), so we exclude them from the analysis.

Title IV of the Higher Education Act.[13] This restriction may be particularly problematic for our analysis of certificate students in light of substantial differences in federal student aid receipt across sectors, a point we return to below.

Despite these potential drawbacks, the data provide a wealth of other information about each student's educational experience in GE programs. We have access to each student's exact program start and end dates, the 6-digit Classification of Instructional Program (CIP) code for the program they enrolled in (e.g., cosmetology), the type of credential they were working toward (e.g., associate's degree or certificate), date of birth, and gender. We also have information on net tuition paid and student loan debt taken on while enrolled in a GE program. Debt measures are broken down into federal, private, and institutional sources and are measured at the date of exit regardless of repayment status.

We merge the DoED data with tax data from the IRS to obtain our measures of employment and earnings. We observe wages from W2 forms, self-employment income from Schedule SE, and use the F1040 form for information on marital status and household size. To explore prior and subsequent college enrollment, we use information from the 1098-T tax form which is sent to any student who pays tuition at an institution of higher education in the calendar year.[14] Our tax data are available for the years 1999-2014, so we

[13] Both of these limitations result from how DoED implements the GE rules, which apply only to persons who do not re-enroll and who receive Title IV aid.

[14] Unlike the detailed DoED data, the 1098-T does not indicate the program of study, but can be used to assess college enrollment in the available years. However, because we only observe the years 1999-2014, we cannot use the 1098-T data to accurately identify a control group of individuals who did not pursue any post-secondary education. With the exception of very young students, we cannot distinguish between individuals who do not enroll in college and those who have completed their post-secondary education prior to 1999.

observe about 5-6 years of earnings post-graduation (or dropout) and about 6 years pre-enrollment for most students.

To create the analysis samples, we drop any individuals who die during the sample period and those who enroll before age 18 or after age 50. We also drop person-year observations of earnings below age 18 and above age 55 to avoid informal earnings of teenagers and potential retirees. Finally, we drop all person-year observations during GE enrollment in order to generate a clean comparisons of outcomes across pre- vs. post-enrollment years.

Our dependent variables include the likelihood of any employment (defined as wages plus positive self-employment income), the level of annual earnings in dollars (defined as W2 wage income plus positive self-employment income), and the natural log of annual earnings (conditional on positive earnings). Our dollar measure of earnings includes observations with zero earnings and therefore captures both employment and earnings effects, while the log specification captures only earnings for those who work.

3. Descriptive Evidence of the Returns to For-Profit Degree Programs

We first analyze the outcomes of degree-seeking students in for-profit programs. As shown in the bottom rows of Table 1, our sample includes about 439,000 students exiting associate's degree programs, 280,000 students exiting bachelor's degree programs, and 116,000 students exiting master's degree programs. We find that women are disproportionately represented and 50 percent of students have children across all degree

types. Program completion rates are around 30 percent for both associate's and bachelor's degree students, but rise to 60 percent in master's programs. Important for our estimation strategy, a large fraction of the sample is employed prior to enrollment. On average, tuition at for-profit colleges ranges from just over $8,500 for associate's degree students to more than $15,000 for bachelors' degree students. Students help cover these costs in various ways, including using education tax credits and student loans. Use of tax credits is fairly common, ranging from one-third of all associate's degree students to more than forty percent of masters' students.[15] Use of student loans is even more common, with about 88 percent of associates' and bachelors' students borrowing, with average total debt of $8,000 and $13,000 respectively. Student loan take-up is slightly lower for masters' degree students at about 80 percent, but average debt levels are higher at more than $18,000. Across all degrees, federal Title IV loans comprise the vast majority of student debt. A meaningful share of associate's and bachelor's degree students have other loan types, including private student loans and school-based student loans, which typically have higher interest rates and less favorable terms relative to Title IV loans.

Estimation

To assess the causal impact of attending a for-profit institution on subsequent outcomes, we would ideally like students to be randomly assigned to programs and schools across sectors. Lacking random assignment, a reasonable control group could potentially generate close-to-causal estimates—we take this approach for certificate students below.

[15] Education tax credits include the American Opportunity Tax Credit and the Lifetime Learning Tax Credit. In a small number of cases the value of the credit reflects both GE enrollment and other enrollment within the tax-filing unit (for example if the spouse of the GE student is also enrolled in college). As a result, the value of the credit may slightly overstate the amount of credit attributable to GE enrollment.

In the case of degree-seeking for-profit students, we not only lack random assignment, but we also lack a control group in the public sector. For these students we are limited to a single-difference specification, as follows:

$$y_{it} = \beta_0 + \beta_1(Post_{it}) + d_t + d_a + d_i + \varepsilon_{iat} \qquad (1)$$

We estimate labor market outcomes (working, earnings levels, and log earnings), y_{it}, for student *i* in year *t*. The variable $Post_{it}$ identifies the post-education time period for each student. It switches from 0 to 1 in the year after an individual completes or withdraws from a gainful employment program. It remains 1 in all subsequent years.

We add age fixed effects, d_a, to capture differences in work experience across the lifecycle.[16] We include year fixed effects, d_t, to capture changes in macroeconomic conditions from year-to-year. We also include individual fixed effects, d_i, that control for time-invariant unobservable characteristics that are correlated both with earnings and the decision to attend a for-profit institution. To the extent that these factors do not change over time, our fixed effects will provide adequate controls for these potentially confounding omitted variables. Standard errors are clustered at the state-year level.

The key identifying assumption of the fixed effects approach is that conditional on observables, no other factors that affect earnings contemporaneously with college attendance. This assumption is quite strong, so we consider our estimates purely descriptive for this set of students. In particular, the year fixed effects cannot net out the effects of the Great Recession in our single-difference estimates. As a result, we consider these estimates lower bounds.

[16] Because the age distribution is thin over age 45, we aggregate the fixed effects for ages 46-50 and 51-55.

To gain further insight into the reduced form effects in equation (1) we take advantage of our large sample of students to run the same specifications for subsamples of men, women, graduates, dropouts, and students of different ages. We also explore heterogeneity at the institution level. It is often claimed that the poor reputation of for-profit colleges is driven by the bad behavior or poor outcomes among a few institutions. We test this perception by running separate regressions with a comparable specification to equation (1) for each institution with more than 30 students.[17] Finally, based on these institution-level estimates we show the joint distribution of annual earnings effect and annual debt payments.

Results

Table 2 presents the results of the single-difference analysis for degree-seeking students.[18] Bachelor's and associate's degree students appear to experience small negative employment and earnings effects: less than a one percentage point decline in the probability of employment and a loss of about $600-$700 of earnings. Master's students fare better, experiencing no change in employment, but an increase of $946 on average after attendance.

The results in Table 2 document mean differences in outcomes, which may obscure heterogeneity across schools and students. Table 3 shows results for sub-samples of men, women, graduates, and dropouts. Men seem to do worse than women in associate's and bachelor's programs, but better in master's programs. Although we caution that degree completion is endogenous and our estimates are therefore likely to represent an upper

[17] Specifically, we include both individual fixed effects and year fixed effects, but replace the age controls with age and age-squared terms.
[18] See Appendix Figure 1 for plots of mean earnings and residuals for for-profit degree students.

bound because of positive selection, it appears that graduates of degree programs experience positive employment and earnings effects. Bachelor's and associate's degree completers see a 4-5 percentage point gain in employment and about a $3,500-4,000 unconditional earnings gain. Master's graduates see an earnings gain of $6,000. Conditional on employment, the log earnings results show gains between 25 and 29 log points (28 to 33 percent) across all degrees. Based on average duration of attendance in our sample,[19] these figures imply an upper-bound per-year gain of about 11 percent for associate's degree programs, 7 percent for bachelor's programs, and 9 percent for master's programs. Dropouts from associate's and bachelor's programs experience small negative effects, perhaps suggesting that employers view dropping out as a negative signal about worker productivity. Master's degree dropouts, however, continue to see small positive earnings effects around $1,000.

We further break down our sample by age at exit to look specifically at the earnings effects for younger and older workers in Panel A of Table 4.[20] We find that for associate's and bachelor's degrees, students ages 26-35 generate the smallest declines in earnings, while younger and older students experience relatively worse outcomes. The results for master's degree students are more complicated and potentially biased. Many younger master's students are enrolled in bachelor's programs immediately prior to attendance so that earnings prior to GE enrollment may not be the proper counterfactual. Since we do not control for prior enrollment in our baseline estimates, the results for young students are likely to be biased upwards, as these students likely have low earnings while pursuing

[19] Associate's degree graduates attend for an average of 2.63 years, bachelor's graduates for 3.72, and master's students for 3.00 years.
[20] We show only annual earnings in dollars for brevity.

their bachelor's degree. Subsequent enrollment could also be problematic, biasing single difference estimates of earnings effects downward.

To address these possibilities, we drop person-year observations with any other enrollment in the years before or after GE program attendance based on attendance measured in the tax data (1098-T) in Panel B of Table 4.[21] The assumption underlying this approach is that earnings in these years do not accurately reflect the full earnings potential of the student. Dropping these years will result in estimates that contain the effects of any prior or subsequent education as part of the before-after gain or loss we calculate. When we remove the years of pre- and post-enrollment our results are qualitatively similar, although lower, than our baseline findings for associate's and bachelor's degrees. Master's degree earnings effects drop substantially (to around $234) and can no longer be shown to be significantly different from zero in this specification.

We next compare heterogeneity across institutions using separate institution-level regressions for each school with 30 or more students enrolled.[22] We plot the full distribution of the *POST* coefficient on earnings in the left-hand side panels of Figure 1A. These figures plot both the school-weighted and enrollment-weighted distributions of the earnings effects for each degree type. Students appear clustered around zero earnings effect for both associate's and bachelor's degrees and slightly above zero for master's programs. In all cases the earnings effects distributions suggest that some institutions are

[21] We drop 728,124 person-year observations (14 percent) in the associate's degree sample, 680,710 person-years (21 percent) in the bachelor's degree sample, and 405,916 person-years (28 percent) in the master's degree sample.

[22] Based on the restriction of 30 students per school (6-digit OPEID) we retain 99.82 percent of associate's degree students and 85.28 percent of associate's degree institutions; 99.92 percent of bachelor's degree students and 82.72 percent of bachelor's degree institutions; 99.71 percent of master's degree students and 65.21 percent of master's degree institutions.

associated with meaningful earnings effects, but that the largest institutions appear to offer negligible earnings effects.

Absent a suitable control group it is difficult to interpret the labor market outcomes of degree-seeking for-profit students. One way to benchmark the earnings effects is to compare them to average annual debt payments. In the right-hand panels of Figures 1A-1C, we plot the enrollment-weighted school-level average annual earnings effects (from the left-hand side panels) against average annualized debt, assuming a standard 10-year repayment and a 5.42 percent interest rate.[23] In these panels, each data point represents an institution and the diameter of the circles reflects the enrollment at each institution. These panels suggests that for all three degree types, the majority of students experience small or negligible earnings effects but also take on additional debt. Across all degree types, there are meaningful shares of students that experience earnings losses and additional debt in the upper left quadrant. For bachelor's degree students, there are relatively more observations with negative earnings effects and additional debt, compared to those whose earnings effects appear larger than the additional debt burden. Among master's students, the opposite is true, as relatively more students appear to have earnings effects that are large compared to the additional debt amounts.

4. Difference-in-Difference Evidence of the Returns to For-Profit Certificate Programs

[23] The interest rate represents the six-year average interest rate of Federal Direct Unsubsidized loans between 2004-2009 and is the same one used to calculate median annual loan payment for bachelor's degree students under the Gainful Employment regulation (Federal Register 2014, p. 65038).

One limitation of our sample is that the Department of Education collects information only on students receiving aid under Title IV. This restriction has little effect on for-profit certificate students, since 85 percent receive federal aid. In contrast, only about 20 percent of community college certificate students receive federal aid.[24] However, given the characteristics of aided- and non-aided students across sectors (see Appendix Table 1), we find that the set of Title IV participating public sector students are the closest comparison to federally-aided for-profit students.[25]

Columns (1)-(4) of Table 5 show the sample means of for-profit and public certificate students in our data. We find important differences in student characteristics. Public sector students are slightly older and more likely to be married than for-profit students, but overall, their demographics are quite similar. The two groups differ more when measuring earnings and debt. Average earnings in the pre-enrollment years are under $11,000 for for-profit students and about $14,500 for community college students (all dollar amounts in $2012). Use of education tax credits is comparable across public and private students, with between 20 and 25 percent of students helping to finance their attendance with these credits. Where public and for-profit students differ most strikingly is in student loan take-up. Eighty-three percent of for-profit students take out loans compared to less than a quarter of Title IV-eligible community college certificate students. Average debt amounts are more than four times higher in the for-profit sector ($5,300 vs. $1,300). The vast majority of student loan dollars flow through federal student aid

[24] Authors tabulations of the 2008 National Postsecondary Student Aid Survey NPSAS using Powerstats.
[25] In Appendix Table 1, we report statistics from the 2008 National Postsecondary Student Aid Survey (NPSAS) to assess the comparability of Title IV participants and non-participants across sectors. We find much narrower differences in demographics (e.g., age, marital status, gender, parental education, race), work behavior, and income between sectors when considering only Title IV students.

programs under Title IV for both sectors. However, for-profit students are much more likely to take on private and institutional loans than public sector students. Differences in the costs of attendance likely drive much of the difference in debt. Average tuition for certificate programs in for-profit institutions is just over $8,100 compared to just under $720 at public institutions. Finally, as found in previous studies (e.g., Deming, Goldin, Katz 2012), completion rates are much higher in the for-profit sector than in the public sector, at 60 percent compared to 37 percent. Enrollment duration is also slightly shorter in the for-profit sector (0.69 years vs. 0.93 years).[26]

One potential driver of the differences in demographics, enrollment duration, and completion between the sectors is the mix of programs offered in each. In Table 6, we document the ten fields of study (based on the 4-digit Classification of Instructional Program (CIP))[27] with the highest enrollment in the for-profit and public sectors. In the for-profit sector, health and medical assisting services, cosmetology, and health administration programs have the largest enrollment shares and together, the top ten for-profit fields account for more than 83 percent of for-profit certificate enrollment. Six of the top ten for-profit fields also rank in the top ten in the public sector. There are also some notable differences in the composition of the top ten fields. Therapeutic services (i.e., massage); dental support services; culinary arts; and heating, ventilation, air conditioning (HVAC) services are all in the top ten of for-profit college programs, but do not make the

[26] Certificate programs can vary in length from a few months to two years. We do not have information on the number of credit hours needed for the certificates in our data, but we assume that much of the variation in certificate length is determined by the field of study, so estimates by field should reduce differences certificate duration across sectors.
[27] We collapse the 6-digit CIP codes to the 4-digit level for ease of interpretation and to maintain sample size.

list in the public sector, although there are still sizable numbers of public sector students in each these fields.[28]

Given these differences in programs and students across sectors, we generate an inverse-probability weighted sample of public sector students to get a closer comparison. We adopt this approach to guard against the possibility that our estimated returns are driven by differences in returns that arise from these demographic patterns and not from differences in the type of institution attended. Weights are calculated based on 4-digit CIP code, gender, age, and family characteristics (married and number of children).[29] These weights allow us to construct a sample of students from public institutions that closely match the characteristics of students and programs in the for-profit sector.

Summary statistics for the weighted sample are included in columns (5) and (6) of Table 5. The weighted sample of public sector students looks similar to the for-profit sample on many dimensions. Figure 2A presents the unweighted distribution of fields of study by 4-digit CIP code. The lighter grey line for public students diverges from the darker line of the for-profits in several areas. After weighting, the grey line is much more closely aligned with the for-profit fields of study, as shown in Figure 2B.

Estimation

We estimate the following difference-in-difference model for certificate students:

$$y_{it} = \alpha_0 + \alpha_1(Post_{it}) + \alpha_2(Post_{it} * For\text{-}Profit_i) + d_t + d_a + d_i + \varepsilon_{it} \qquad (2)$$

[28] Complete descriptions for each CIP code can be found at: https://nces.ed.gov/ipeds/cipcode/. See Table 6 for the number of students in each field. Of the four for-profit fields that do not make the public top ten list, dental support has the most public sectors students in our sample (5,257) and therapeutic the least (1,773).
[29] See Appendix 2 for details.

For-profit is an indicator for whether a student enrolled in a for-profit college and zero if the student enrolled in a public college.[30] The coefficient α_2 measures the differential effect of for-profit attendance on earnings, relative to community college students, after attendance relative to before. The total (or absolute) effect of for-profit attendance (relative to not attending) is given by $\alpha_1 + \alpha_2$.

We run our difference-in-difference model on the full sample of certificate students, using both unweighted and weighted public sector students. We further explore the reduced form effect of attendance over time by adding interactions for 1-2 years, 3-4 years, 5-6 years, and 7+ years post-exit in some specifications.[31] As in our analysis of degree-seeking students, we assess heterogeneity in returns by splitting the sample by gender, program completion, and age, but we also add sample splits for the top ten for-profit certificate fields of study. We again run institution-level models and generate comparisons with student debt for institutions that enroll at least 30 students.

The key identifying assumption of the difference-in-difference approach is that the public and for-profit students experience similar pre-enrollment earnings trends. We examine these trends visually in Figure 3 (A-D). Figure 3A shows the mean earnings of the for-profit and community college students, with the unweighted sample on the left and weighted on the right. While public students have much higher levels of pre-enrollment earnings in both figures (and the weighting brings the means closer together), the trends look a bit less parallel in the weighted figure. In particular, public sector students appear to experience a very slight a decline in earnings in the years immediately preceding

[30] We drop about 2,600 students who exit from both a for-profit and community college certificate program in our sample years. See Appendix Table 2 for a full list of sample restrictions.
[31] We use two-year bins, since one-year bins are not identified given that we have just two exit year cohorts and year fixed effects.

enrollment (Ashenfelter 1978). More relevant, however, are the residuals that are plotted in Figures 3B-3D.[32] In Figures 3B and 3C trends appear parallel, but in Figure 2D, for employment, the trends diverge and cross in year *t-2*.

We examine these trends more formally in Table 7, by adding interactions for each set of two pre-period years (the omitted category is the two years immediately prior to enrollment). Here, it becomes clear that our assumption of parallel pre-trends does not hold for employment. The pre-period employment effects in Table 7 and the residuals shown in Figure 3D suggests that the negative differential effect arises because of a steep decline in the residuals of public students in the year prior to enrollment. This pattern suggests that the differential earnings effects of for-profit students (α_2) in the post-period would be inflated. We therefore interpret these parameters as upper-bound effects. For annual earnings, however, we find no significant differences in pre-enrollment trends. The same is true of the natural log of earnings in the unweighted sample (column (5)). However, the weighted sample shows significant differences for log earnings in the pre-enrollment period. Keeping these differences in mind, we focus more on the annual earnings measures below but continue to report effects on working and log earnings.

5. Results

We present the results of our difference-in-differences model for the weighted and unweighted samples in Table 8. The top row reports the community college effect (α_1), while the second row reports the differential effect of for-profit attendance relative to the

[32] We estimate the residuals from regressions that include only the control variables.

public sector (α_2). The last row sums the two to obtain the total (or absolute) effect of for-profit attendance.

In the first row, note that public community college certificate students see no effect on employment, but sizable positive annual earnings effects of about $3,900. Among individuals who are working, the results for public sector log earnings suggest a meaningful increase of about 18 log points (20 percent). Weighting the community college students to account for differences in fields of study and demographics, these effects are reduced to around $1,500 in earnings levels, and about 11 log points conditional on working. These estimates fall in the mid-range of estimates of the returns to certificates for non-health fields reported by Stevens, Kurlaender, and Grosz (2015, Table 2).

In the second row, we assess our outcome of interest, the differential returns experienced by for-profit certificate students. In the case of earnings outcomes in Columns (3)-(6) we find that for-profit students have unambiguously lower earnings effects relative to community college students. In the unweighted sample, these differential effects are large and statistically significant. The estimated differential effect on earnings is about -$5,500 and is nearly -21 log points (-23 percent) conditional on working. In the weighted sample, the point estimates on annual earnings suggest that earnings effects from attendance are about -$2,500 lower for for-profit students relative to community college students and at least 11 log points lower, conditional on employment in the log specifications. Our estimates suggest students who attend for-profit certificate programs see an average total earnings effect of about -$920 per year (or -7 percent on a base of

$12,500 in Table 5) in the 6 (or so) years after attendance, relative to their own earnings in the years before attending. [33]

Exploring earnings effects over time in the post-education period, Figures 4A-4C show the coefficients of interactions of *Post*For-Profit* with indicators for the number of years post-exit in two-year increments for the weighted sample.[34] Across all outcomes, the differential effects appear to decline very slightly over time.

Heterogeneity in Returns

To unpack the reduced form effects and gain additional insight into our baseline results, we first examine heterogeneity in returns by gender and completion. In Table 9 we find that the differential effect of for-profit attendance on earnings is larger for males (-$3,150) compared to females (-$2,140). This pattern holds despite the relatively larger differential effect on working for males (3.1 log points) compared to females (1.6 log points). [35]

It is possible that the low earnings effects that we find for the full sample could be driven by very low completion rates. About 40 percent of for-profit students fail to complete their certification, as noted above in Table 5, and about 60 percent of students drop out of public certificate programs. If anything, these patterns suggest that our results thus far, not conditioning on program completion, should be biased in favor of for-profit

[33] We explore self-employment as an outcome in Appendix Table 3. Once we weight by field and demographics, we find no significant differences in the likelihood of being self-employed across sectors and just $53 more of self-employment earnings among for-profit students.
[34] See Appendix Figure 2 for the analogous unweighted figures.
[35] We examine heterogeneous earnings effects for online for-profit institutions and those that are part of multi-institution chains in Appendix Table 4. Relative to our baseline results and to their non-online and non-chain counterparts, both online and chain for-profit colleges appear to perform worse overall and have larger negative differential effects.

students. In Table 10, we disaggregate our sample into those who complete degrees and those who do not.

As we expect, students who complete certificates have much better outcomes relative both to the full sample and to dropouts, although we again caution that we cannot control for the positive selection of graduates in both sectors. In the third row of Panel A, graduates experience positive total earnings and employment effects after completing their certificates. They are about 6 percentage points more likely to be employed after their education relative to before. Annual earnings effects are about $1,300 in the weighted sample and our conditional estimates yield an upper bound on total returns of 12-15 log points.

Despite these positive total effects, for-profit graduates still fall short of their public sector counterparts when it comes to earnings effects. We continue to find large negative earnings differentials in both the dollar and log earnings specifications. In contrast to graduates, for-profit college dropouts experience substantial declines in earnings and employment in absolute terms, as shown in Panel B of Table 10. They experience total earnings declines of about $2,100 (unconditional) and 9 log points (conditional). Public college dropouts appear to experience reasonable positive earnings effects, although these effects are smaller relative to public sector students who graduate.

Breaking results down by age group in Table 11 reveals similar returns to certificates for all age groups. Students ages 36 and over appear to have slightly better (less negative) differential and absolute returns than the other age groups, but the differences are fairly small in the weighted sample. As was the case for degree programs,

prior or subsequent enrollment in other institutions complicates the measurement of earnings effects, especially for younger workers who may be enrolled immediately preceding their GE enrollment spell. Prior enrollment could be particularly problematic for our difference-in-difference estimates if public and for-profit students have differential pre-period enrollment trends. Figure 5A shows the mean enrollment in another postsecondary institution based on data from IRS form 1098-T by sector. Here we see that public sector certificate students are not only more likely to have prior enrollment, but they also appear to experience faster enrollment growth in the years leading up to their entry into a GE certificate program. To address this issue, we drop all enrollment years in any institution in the pre- or post-GE years and re-check the pattern of annual earnings residuals in Figure 5B for the weighted sample.[36] Despite differential enrollment patterns, the pattern of earnings residuals in the pre-period is remarkably similar to the pattern for the full sample that does not account for previous enrollment and suggests that our assumption of parallel pre-period trends in earnings still holds. Still, we estimate earnings effects while dropping years of other enrollment in Panel B of Table 11.[37] In general, results are attenuated relative to the baseline findings: differential effects are smaller (-$1,600 in the weighted sample vs. -$2,500 in Table 8) but the results are qualitatively similar.

To explore heterogeneity in returns by field, we report the relative and total earnings effects for the top ten most popular for-profit certificate programs in Figures 6A and 6B, respectively. In seven of the ten fields (including all health-related fields), for-

[36] Unweighted trends in residuals and for other outcomes are also very similar to the full sample.
[37] We drop 1,490,226 person-year observations (15 percent) of the certificate sample.

profit students fare significantly worse than their public sector counterparts. Two fields (culinary arts and vehicle maintenance) have similar returns across sectors. Only cosmetology programs appear to generate higher returns in the for-profit sector. The most likely explanation may be that several for-profit schools are directly linked to high-end salons and enjoy name-brand recognition (e.g., The Aveda Institute and Paul Mitchell: The School).

Figure 6B reveals a different story when looking at absolute earnings effects in the for-profit sector. Here, both cosmetology and therapeutic services reveal large and significant declines in earnings after attendance. However, it is undoubtedly the case that these declines are overstated due to the high proportion of income from tips in these fields that are notoriously underreported in the tax data.[38] For-profit programs in vehicle maintenance and health diagnostics also reveal large declines in earnings post-attendance, despite less (or no) reliance on tipped income. All other fields show no significant differences in earnings after attendance.

Despite relatively weak returns in the for-profit sector on average, it is possible that some for-profit certificate programs help students realize meaningful earnings effects or, alternatively, that a few low-performing institutions are pulling down average estimates. We explore this possibility using estimated effects from a single difference regression at the school-level, similar to those reported in Figure 1. Figure 7A presents the distribution of the institution-level estimated returns for the for-profit and weighted public certificate

[38] Tipped income may lead to understated absolute earnings effects, but to the extent that both public and for-profit students in the fields of cosmetology and therapeutic services are similarly reliant on tips, we expect our weighted estimates and our field-specific relative returns to be accurate.

students for schools that enroll at least 30 students.[39] The distribution of institution-level for-profit returns shows a smaller variance and a much thinner right-hand tail than public sector with a large peak at roughly zero return. However, the figure also suggests that there are some institutions where students receive positive earnings effects after attendance. The left-hand tails of the two distributions are similar, suggesting similar effects from "bad apple" schools in both sectors.

The scatterplot in Figure 7B shows the joint distribution earnings returns (from 7A) and annual debt payments by sector. We construct this figure by plotting mean returns and mean annualized debt payments, estimated at the school level, in 50 equally sized groups for each sector. At each point, debt is higher at for-profit institutions, relative to public institutions. In addition, the average return is typically higher at each point for public students. For example, in the top two percent of schools in the public sector the average return is roughly $18,000 with annual debt payments of $250, compared to an average return of about $12,000 with debt payments of $750 per year at the top two percent of for-profit schools.

To better understand heterogeneity in returns by field of study, we run separate difference-in-differences regressions for all 4-digit CIP code fields with at least 30 students in each sector.[40] Figure 8A shows the results of the CIP4 level regressions. In this figure, we scale each point according to enrollment in the field, and plot differential earnings against differential debt payments. The figure reveals that the vast majority (79 percent) of

[39] Based on the restriction of at least 30 students per institution we retain 79% of schools and 99% of students.
[40] Based on the restriction of at least 30 students per CIP code we retain roughly 33 percent of CIP codes but over 96 percent of students.

students are in fields in the upper left quadrant with lower returns and higher debt than the same fields in the public sector. For example, criminal justice and mechanical engineering both stand out for having much higher debt than public sector programs, but criminal justice reveals a greater (negative) earnings differential. Just under 20 percent of students are in fields that have higher returns and higher debt in the upper right quadrant—the largest being photography and vehicle maintenance.

The lower returns and higher debt of for-profit students relative to public sector students is more extreme when we perform the analysis at the state level. We show these results in Figure 8B.[41] Given the heterogeneity in public support for higher education across states, we might expect some differences in returns or debt. Rather, we find that every single state is in the upper left quadrant with lower returns and higher debt in for-profits relative to the public sector. Notably, we find that Arizona has the largest public-private earnings differential and Virginia the smallest, while California has the largest debt differential and North Dakota the smallest.

6. Conclusion

Analyzing population-level administrative data on enrollment and earnings, we quantify the labor market impacts of for-profit college attendance. For the average student, our results suggest that for-profit education does not have a meaningful private return to the student in first the 5-6 years after attendance despite a sizable increase in student debt. Our correlational estimates for bachelor's and associate's degree students suggest that attending a for-profit college results in a *decline* in earnings, relative to that students' own

[41] Appendix Table 5 includes results that add state fixed effects and state-by-year fixed effects. In both cases, results are very similar to our baseline estimates.

earnings before attending. Certainly some of this effect comes from the weak labor market during the Great Recession, an impact we cannot net out for degree-seeking students.

We attempt to control for the impact of the recession and other confounding factors with a difference-in-differences research design in the case of certificate programs, where we have information on public students who attend comparable programs. These results suggest that despite the much higher costs of attending a for-profit institution, the average for-profit student experiences lower earnings effects relative to public sector students.

We find that this result holds even after re-weighting the public sector data to account for differences in program of study and observable student demographics. In only one of the top ten for-profit fields—cosmetology—do for-profit students out-earn their public sector counterparts. In absolute terms, we find no evidence of increased earnings for students in any of the top ten fields and large negative effects in several fields. Further, our school-level regressions reveal that the weak performance of the for-profit sector is not limited to a few poor-performing institutions, rather the majority of schools appear to have negligible average earnings effects.

Of course, for some students, for-profit colleges may still be worthwhile. Among master's degree students, we observe a positive correlation between earnings and attendance. And although we cannot control for the positive selection of graduates, the 60 percent of students who complete for-profit college certificate programs and the roughly 30 percent who complete associate's and bachelor's degree programs appear to experience positive earnings gains. In addition, the school-level analyses suggest that there are some for-profit schools where students realize positive returns. We suggest that future studies

of the sector do more to address the endogeneity of program completion and further explore differences in quality within the for-profit sector.

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Appendix 1. Inverse Probability Weights

The weight for community college (CC) student *i*, is calculated as:

$W_{CCi} = 1/(1 - \hat{P}_{FP})$, where $\hat{P}_{FP}$ is the predicted probability of enrolling in a for-profit college based on the following linear probability model:

$$P_{FPi} = \gamma_0 + \gamma_1 CIP4 + \gamma_2 Male + \gamma_3 \boldsymbol{Age} + \gamma_4 married + \gamma_5 \boldsymbol{Kids} + \varepsilon_i$$

Here, *CIP4* is the 4-digit CIP code indicating a student's field of study (e.g., cosmetology or nursing). We also include an indicator for male, a vector of indicators for age in 5-year bins, an indicator for being married, and a vector of indicators for 0, 1, 2, and 3 or more children (all measured at school entry).

Table 1. Summary Statistics, For-Proft Degree Students

	Associate's Degree		Bachelor's Degree		Master's Degree	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	mean	sd	mean	sd	mean	sd
Age	27.6	8.36	29.7	8.84	34.7	8.35
Male	0.40	0.49	0.46	0.50	0.35	0.48
Married	0.24	0.43	0.33	0.47	0.48	0.50
Has children	0.54	0.50	0.51	0.50	0.51	0.50
Number of children (if >0)	1.76	0.88	1.79	0.90	1.81	0.89
Pre-enrollment earnings ($)	14,317	13,939	23,177	21,646	35,876	26,976
Pre-enrollment employment	0.85	0.27	0.89	0.24	0.93	0.19
Tuition	8,528	13,235	15,010	21,408	10,128	12,780
Claims education tax credit	0.33	0.47	0.38	0.49	0.43	0.50
Value of tax credit ($)	293	610	429	718	495	740
Has student loan debt	0.87	0.33	0.88	0.34	0.79	0.41
Total debt amount ($)	8,174	9,652	13,395	15,501	18,359	16,791
Has Title IV student loan debt	0.77	0.42	0.74	0.44	0.72	0.45
Title IV debt amount ($)	5,718	6,337	10,017	11,730	18,021	16,800
Has private student loan debt	0.19	0.39	0.21	0.41	0.03	0.16
Private debt amount ($)	1,932	5,732	2,769	8,215	133	871
Has school student loan debt	0.28	0.44	0.33	0.47	0.13	0.34
School debt amount ($)	523	9,652	608	1,330	203	660
Program completion	0.28	0.45	0.30	0.46	0.59	0.49
Years enrolled	1.28	0.67	1.81	1.35	1.75	1.12
Enrolled <= 1 year	0.79	0.41	0.63	0.48	0.53	0.50
1 year< Enrolled <=2 years	0.17	0.38	0.15	0.36	0.31	0.46
2 years< Enrolled <=3 years	0.03	0.17	0.12	0.32	0.10	0.30
Enrolled > 3 years	0.01	0.10	0.10	0.30	0.06	0.24
Observations	5,159,673		3,286,449		1,463,357	
Individuals	438,965		279,795		115,548	
Institutions	473		162		69	

Notes: Demographics are measured in the first year of enrollment, earnings/work are averaged across all years prior to enrollment, debt is measured in the year of exit. Number of institutions is at the 6-digit OPEID level. All dollar values are in $2014.

Table 2. Employment and Earnings Effects of For-Profit Degree Students

A. Associate's Degree	(1) Employment	(2) Annual Earnings ($)	(3) Ln Annual Earnings
Post-Education	-0.008**	-697**	-0.015
	[0.002]	[133]	[0.008]
Observations	5,159,673	5,159,673	4,392,945
Individuals	438,965	438,965	435,952
B. Bachelor's Degree			
	Employment	Annual Earnings ($)	Ln Annual Earnings
Post-Education	-0.012**	-593**	-0.039**
	[0.002]	[173]	[0.008]
Observations	3,286,449	3,286,449	2,924,476
Individuals	279,795	279,795	278,260
C. Master's Degree			
	Employment	Annual Earnings ($)	Ln Annual Earnings
Post-Education	-0.006	946**	0.003
	[0.003]	[267]	[0.013]
Observations	1,463,357	1,463,357	1,369,711
Individuals	115,548	115,548	115,278

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects as described in equation (1). All years enrolled in a Gainful Employment program are dropped.

Table 3. Employment and Earnings Effects of For-Profit Degree Students, by Sex and Completion Status

A. Associate's Degree	(1) Employment	(2) Annual Earnings ($)	(3) Ln Annual Earnings
Females: Post-Education	-0.005*	-460**	-0.009
(N=262,267)	[0.002]	[117]	[0.010]
Males: Post-Education	-0.013**	-943**	-0.022
(N=176,698)	[0.003]	[207]	[0.012]
Completers: Post-Education	0.051**	3,463**	0.287**
(N=126,814)	[0.012]	[745]	[0.047]
Dropouts: Post-Education	-0.011**	-758**	-0.040**
(N=318,465)	[0.002]	[110]	[0.009]

B. Bachelor's Degree	Employment	Annual Earnings ($)	Ln Annual Earnings
Females: Post-Education	-0.006*	-322*	-0.040**
(N=152,100)	[0.003]	[158]	[0.010]
Males: Post-Education	-0.018**	-846**	-0.036**
(N=127,695)	[0.003]	[236]	[0.012]
Completers: Post-Education	0.042*	4,179*	0.252*
(N=86,551)	[0.021]	[1,698]	[0.108]
Dropouts: Post-Education	-0.010**	-497**	-0.042**
(N=196,927)	[0.002]	[130]	[0.008]

C. Master's Degree	Employment	Annual Earnings ($)	Ln Annual Earnings
Females: Post-Education	-0.006	748*	0.001
(N=75,043)	[0.004]	[341]	[0.016]
Males: Post-Education	-0.005	1,294*	0.006
(N=40,505)	[0.004]	[503]	[0.018]
Completers: Post-Education	0.030	6,286*	0.275*
(N=69,413)	[0.021]	[3,003]	[0.114]
Dropouts: Post-Education	-0.003	983**	0.008
(N=48,890)	[0.004]	[272]	[0.014]

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. Each cell represents the results of a separate regression for each sub-sample and outcome. All regressions include age, year, and individual fixed effects, as described in equation (1). All years enrolled in a Gainful Employment program are dropped.

Table 4. Earnings Effects of For-Profit Degree Students, by Age and Other Enrollment

A. Age Group Subsamples	(1) Associate's	(2) Bachelor's	(3) Master's
Age 25 and Under	-1,152**	-2,111**	5,024**
	[140]	[202]	[705]
Observations	1,934,715	889,452	88,510
Individuals	200,161	90,736	7,257
Age 26-35	-190	274	267
	[189]	[210]	[400]
Observations	2,080,901	1,394,479	689,603
Individuals	152,036	106,957	51,876
Age 36 and Over	-831**	151	996*
	[179]	[215]	[397]
Observations	1,144,057	1,002,518	685,244
Individuals	88,209	83,067	56,803

B. Dropping Years of Other Enrollment	Associate's	Bachelor's	Master's
Post-Education	-852**	-1,108**	234
	[135]	[195]	[348]
Observations	4,431,549	2,605,739	1,057,441
Individuals	437,705	278,370	114,907

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (1). All years enrolled in a Gainful Employment (GE) program are dropped in all models. Panel A breaks the sample down by age in the year of GE program exit. Panel B drops all years in which

Figure 1A. Institution-Level Distribution of Earnings and Debt, Associate's Degree Students

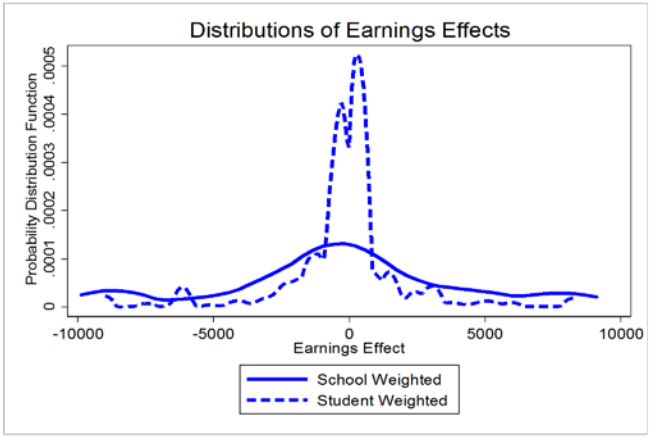


Figure 1B. Institutution-Level Distribution of Earnings and Debt, Bachelor's Degree Students

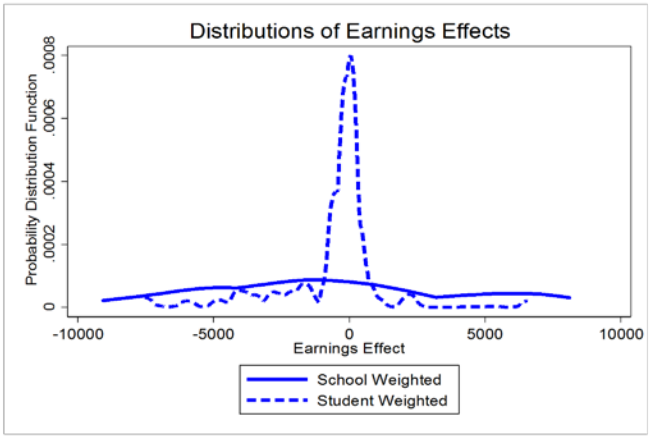
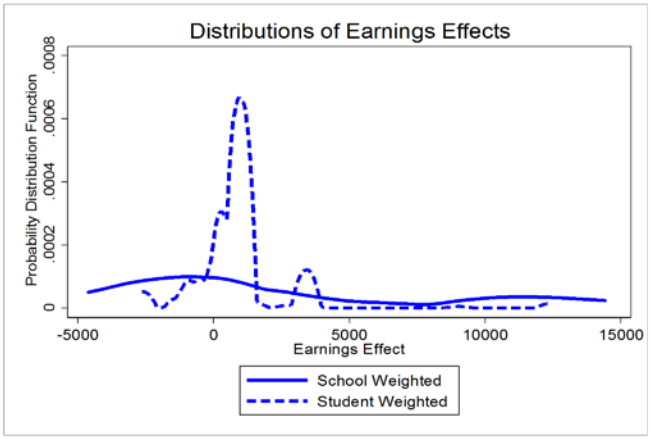
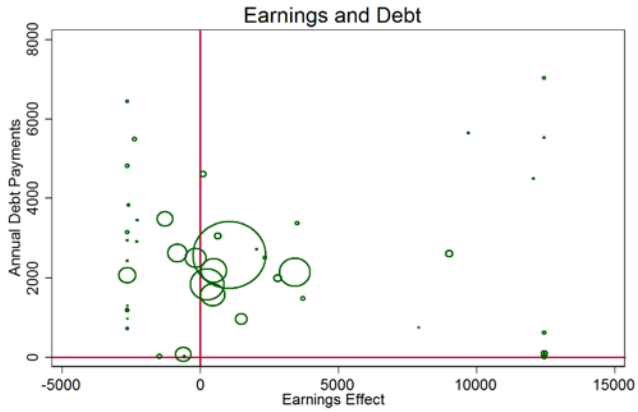


Figure 1C. Institution-Level Distribution of Earnings and Debt, Master's Degree Students





Notes: Left-hand panels show the probability distribution functions of earnings effects estimated in separate regressions for each institution with enrollment >30 students. To mitigate the effect of outliers we recode all values less than (more than) the bottom (top) 1% at the 1% (99%) value of earnings. All specifications include individual fixed effects, year fixed effects, and age and age-squared terms. Student-weighted distributions are scaled by enrollment. The right-hand panels plot student-weighted earnings effects against average annual debt for each institution with >30 students. Circles are scaled by enrollment. Debt at exit is ammortized assuming 10-year repayment and an interest rate of 5.42 percent.

Table 5. Summary Statistics, Certificate Students

	For-Profit		Unweighted Public		Weighted Public	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	mean	sd	mean	sd	mean	sd
Age	27.7	7.78	29.2	8.45	28.3	7.96
Male	0.29	0.46	0.37	0.48	0.31	0.46
Married	0.20	45.00	0.29	0.45	0.22	0.52
Has children	0.62	0.48	0.57	0.49	0.60	0.49
Number of children (if >0)	1.75	0.67	1.79	0.88	1.77	0.88
Pre-enrollment earnings ($)	12,546	14,514	16,293	17,779	14,541	15,862
Pre-enrollment employment	0.80	0.40	0.85	0.35	0.85	0.36
Tuition	8,118	16,238	719	7,169	712	7,051
Claims education tax credit	0.20	0.40	0.25	0.43	0.24	0.44
Value of tax credit ($)	132	378	284	593	277	588
Has student loan debt	0.83	0.38	0.24	0.43	0.25	0.43
Total debt amount ($)	5,339	4,895	1,259	3,011	1,243	2,921
Has Title IV student loan debt	0.70	0.46	0.22	0.41	0.22	0.42
Title IV debt amount ($)	4,061	3,894	1,101	2,615	1,087	2,565
Has private student loan debt	0.18	0.38	0.01	0.11	0.01	0.11
Private debt amount ($)	757	2,187	61	667	57	631
Has school student loan debt	0.26	0.44	0.04	0.20	0.05	0.22
School debt amount ($)	520	1,403	97	689	98	664
Program completion	0.59	0.49	0.38	0.48	0.39	0.49
Years enrolled	1.08	0.28	1.31	0.82	1.31	0.83
Enrollmed <=1 year	0.94	0.24	0.82	0.36	0.82	0.38
1 year< Enrolled <=2 years	0.06	0.23	0.10	0.31	0.11	0.31
2 years< Enrolled <=3 years	0.00	0.06	0.04	0.19	0.04	0.19
Enrolled > 3 years	0.00	0.04	0.04	0.24	0.03	0.18
Observations	6,595,978		3,299,399		3,299,399	
Individuals	566,671		278,044		278,044	
Institutions	1,666		1,283		1,283	

Notes: Demographics are measured in the first year of enrollment, earnings/work are averaged across all years prior to enrollment, debt is measured in the year of exit. Number of institutions is at the 6-digit OPEID level. All dollars are in $2014.

Table 6. Percentage of Certificate Students Top 10 Fields of Study, by Sector

For-Profit			Public		
Field	N	%	Field	N	%
Health & Medical Assisting	151,587	25.5	*Practical Nursing*	53,266	18.1
Cosmetology	111,116	18.7	Criminal Justice	15,621	5.3
Health Administration	59,756	10.1	*Health & Medical Assisting*	14,096	4.8
Vehicle Maintenance	48,778	8.2	*Vehicle Maintenance*	14,052	4.8
Therapeutic Services	43,232	7.3	*Cosmetology*	12,992	4.4
Practical Nursing	21,227	3.6	Business Support	12,589	4.3
Dental Support	21,179	3.6	*Health Diagnostics*	12,333	4.2
Health Diagnostics	15,171	2.6	*Health Administration*	11,732	4.0
Culinary Arts	11,920	2.0	Human Development	11,344	3.8
HVAC Repair	8,878	1.5	Accounting	10,083	3.4
Total in Top 10 Fields	492,844	83.0	**Total in Top 10 Fields**	168,108	57.1

Notes: Fields listed in rank order of total enrollment for each sector based on 4-digit CIP codes. Fields in italics appear in the top ten in both sectors. 4-digit CIP codes for top ten for-profit fields are as follows: Health & Medical Assisting = 5108, Cosmetology = 1204, Health Administration = 5107, Vehicle Maintenance = 4706, Therapeutic Services = 5135, Nursing = 5139/5116, Dental Support = 5106, Health Diagnostics = 5109, Culinary Arts = 1205, HVAC Repair = 4702. Complete descriptions for each CIP code can be found at: https://nces.ed.gov/ipeds/cipcode/.

Figure 2A. Unweighted Density of Certificate Students, by 4-digit CIP Code and Sector

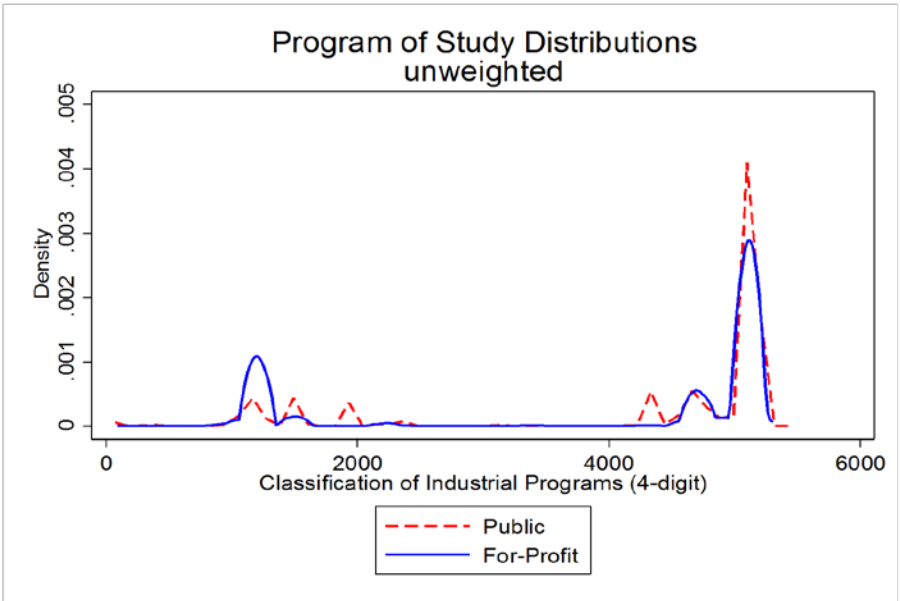
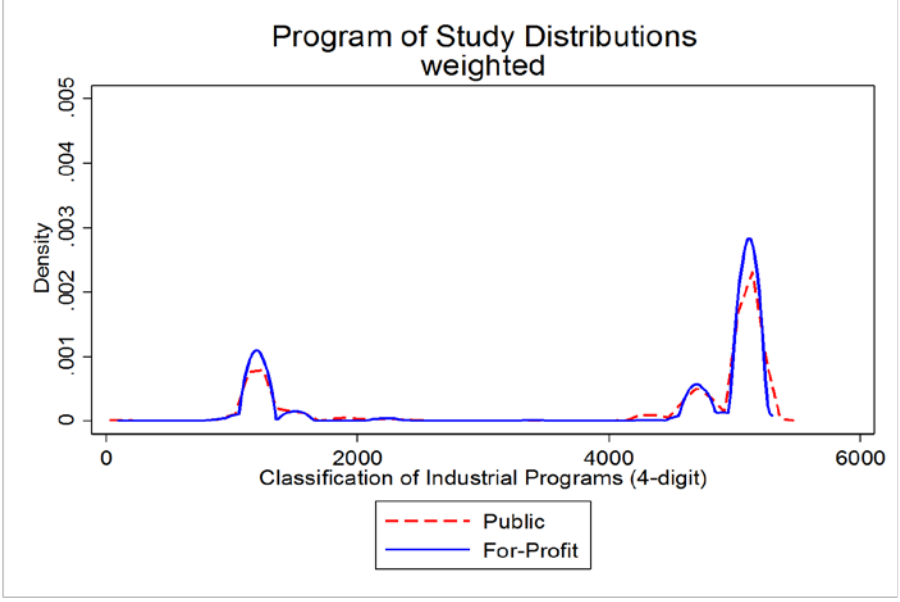
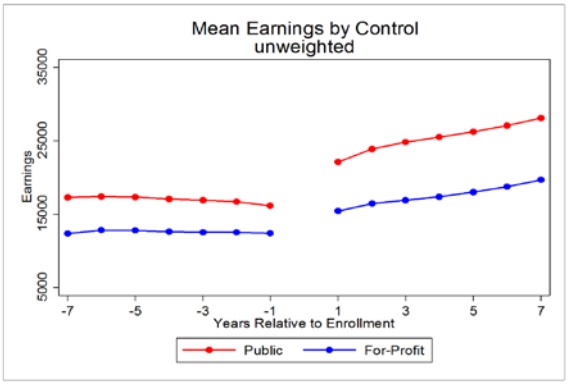


Figure 2B. Weighted Density of Certificate Students, by 4-digit CIP Code and Sector



Note: Inverse probability weights are calculated using indicators for 4-digit classification of instructional program (CIP) code, male, age at entry (in 5-year bins), number of children (0, 1, 2, 3+), married. See appendix for details.

Figure 3A. Mean Earnings Over Time for For-Profit and Public Certificate Students, Weighted and Unweighted



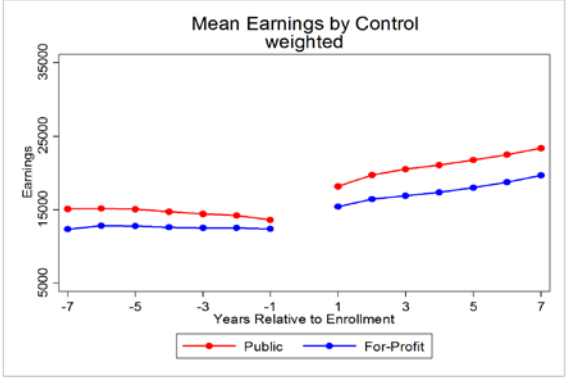


Figure 3B. Earnings Residuals Over Time for For-Profit and Public Certificate Students, Weighted and Unweighted

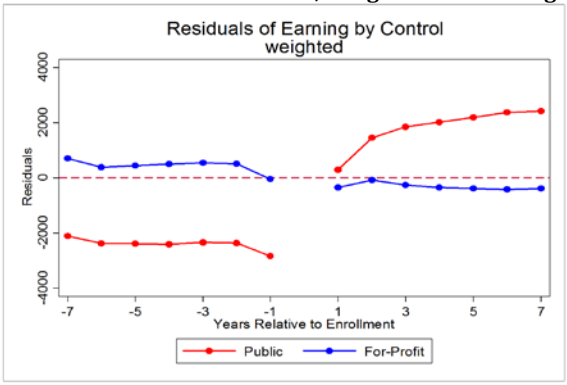
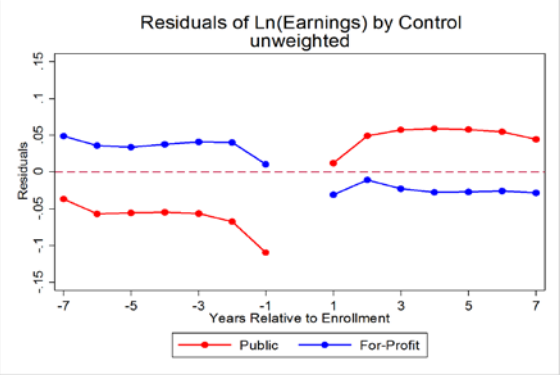


Figure 3C. Ln(Earnings) Residuals Over Time for For-Profit and Public Certificate Students, Weighted and Unweighted



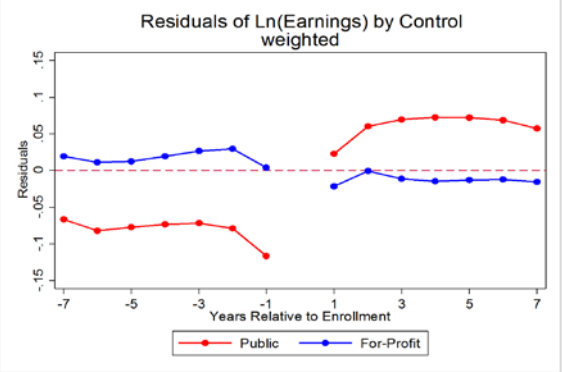
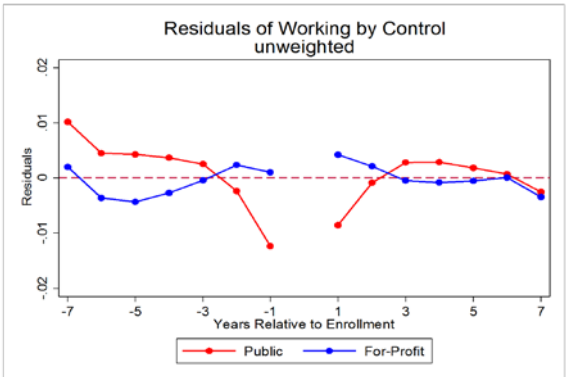
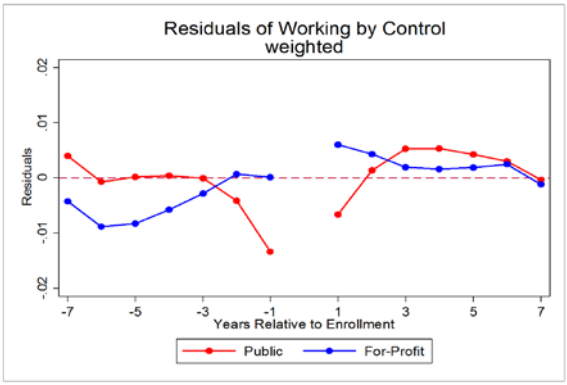


Figure 3D. Employment Residuals Over Time for For-Profit and Public Certificate Students, Weighted and Unweighted





Notes: Residuals calculated based on regressions including age, year, and individual fixed effects. All years enrolled in a Gainful Employment program are dropped.

Table 7. Pre-Enrollment Employment and Earnings Trends of Certificate Students

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Education*For-Profit						
*t-3 and t-4	-0.015**	-0.022**	401	-247	-0.006	-0.040**
	[0.003]	[0.003]	[216]	[169]	[0.009]	[0.009]
*t-5 and t-6	-0.019**	-0.032**	570	-439	-0.001	-0.053**
	[0.004]	[0.005]	[310]	[234]	[0.011]	[0.010]
*t-7 and earlier	-0.018*	-0.034**	855	-368	0.002	-0.066**
	[0.007]	[0.007]	[477]	[342]	[0.015]	[0.012]
Observations	9,895,377		9,895,377		8,195,795	
Individuals	844,715		844,715		838,196	

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects. All years enrolled in a Gainful Employment program are dropped. Omitted category is t-1 and t-2.

Table 8. Employment and Earnings Effects of Certificate Students, Full Sample

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
Post-Education	0.004	-0.007	3,926**	1,544**	0.179**	0.105**
	[0.003]	[0.004]	[371]	[263]	[0.018]	[0.015]
Post-Educ*For-Profit	0.002	0.020**	-5,555**	-2,463**	-0.205**	-0.107**
	[0.003]	[0.003]	[276]	[198]	[0.009]	[0.008]
Total Effect	0.006*	0.013**	-1,629**	-919**	-0.026	-0.002
	[0.003]	[0.003]	[316]	[225]	[0.017]	[0.014]
Observations	9,895,377		9,895,377		8,195,795	
Individuals	844,715		844,715		838,196	

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment program are dropped.

Figure 4A. Time Pattern of Relative Employment Effects

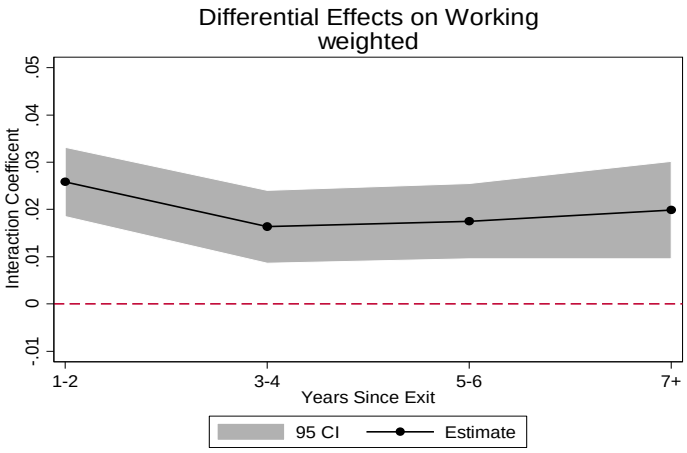


Figure 4B. Time Pattern of Relative Earnings Effects ($)

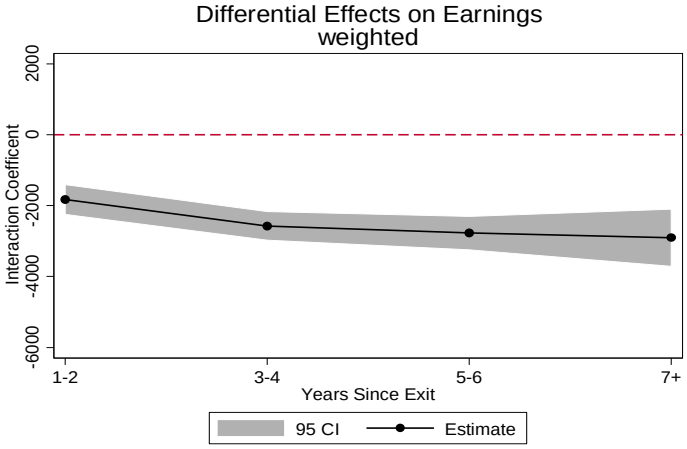
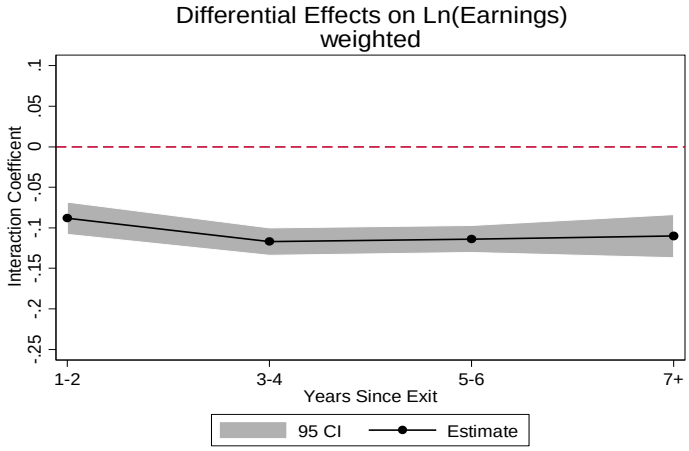


Figure 4C. Time Pattern of Relative Ln(Earnings) Effects



Notes: Figures plot coefficients of interactions of *Post*For-Profit* with indicators for the number of years post-exit in two-year increments for the weighted sample. All regressions include age, year, and individual fixed effects. Shaded areas represent 95 percent confidence intervals based on standard errors clustered at the state-year level.

Table 9. Employment and Earnings Effects of Certificate Students, by Sex

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
A. Females						
Post-Education	0.014**	0.003	3,697**	1,326**	0.165**	0.086**
	[0.004]	[0.004]	[326]	[214]	[0.016]	[0.014]
Post-Educ*For-Profit	-0.003	0.016**	-5,231**	-2,141**	-0.196**	-0.089**
	[0.003]	[0.003]	[237]	[156]	[0.009]	[0.008]
Total Effect	0.011**	0.019**	-1,534**	-814**	-0.030*	-0.003
	[0.003]	[0.003]	[273]	[183]	[0.015]	[0.013]
Observations	6,749,657		6,749,657		5,562,086	
Individuals	570,386		570,386		565,697	
B. Males						
Post-Education	-0.015**	-0.028**	4,137**	2,185**	0.207**	0.153**
	[0.004]	[0.005]	[487]	[390]	[0.023]	[0.022]
Post-Educ*For-Profit	0.014**	0.031**	-5,577**	-3,149**	-0.222**	-0.153**
	[0.005]	[0.005]	[357]	[282]	[0.012]	[0.010]
Total Effect	-0.0008	0.003	-1440**	-964**	-0.016	0.0007
	[0.004]	[0.004]	[433]	[342]	[0.022]	[0.021]
Observations	3,145,720		3,145,720		2,633,709	
Individuals	274,329		274,329		272,499	

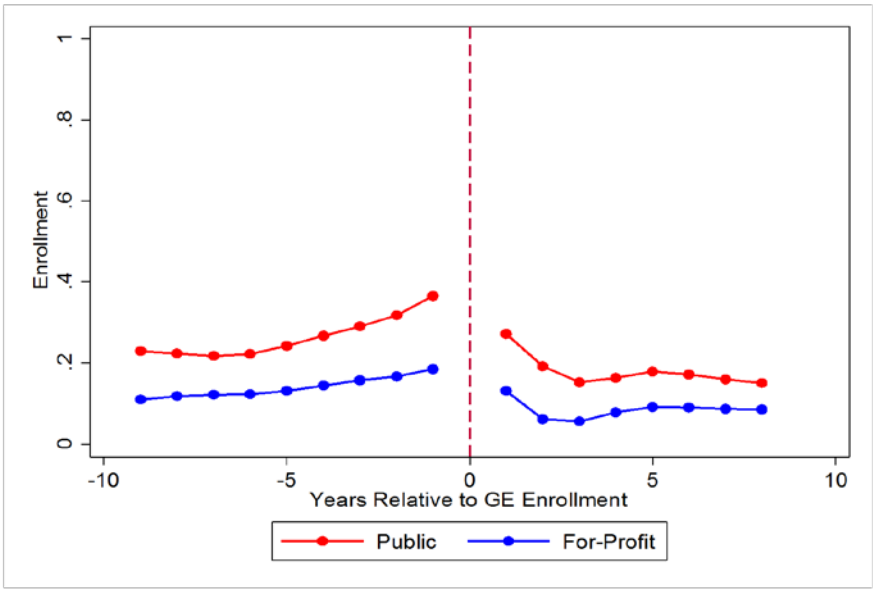
Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment program are dropped.

Table 10. Employment and Earnings Effects of Certificate Students, Diff-in-Diff, by Completion

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
A. Graduates						
Post-Education	0.049**	0.042**	7,991**	4,510**	0.403**	0.291**
	[0.007]	[0.007]	[291]	[220]	[0.015]	[0.014]
Post-Educ*For-Profit	0.006	0.022**	-7,399**	-3,192**	-0.281**	-0.141**
	[0.004]	[0.004]	[184]	[151]	[0.007]	[0.008]
Total Effect	0.055**	0.064**	592*	1,319**	0.122**	0.150**
	[0.006]	[0.006]	[252]	[191]	[0.014]	[0.013]
Observations	5,161,183		5,161,183		4,346,561	
Individuals	450,274		450,274		445,294	
B. Drop-Outs						
Post-Education	0.005	-0.009**	3,062**	1,212**	0.110**	0.055*
	[0.003]	[0.004]	[561]	[400]	[0.032]	[0.026]
Post-Educ*For-Profit	-0.032**	-0.010**	-5,764**	-3,308**	-0.216**	-0.143**
	[0.004]	[0.004]	[465]	[307]	[0.016]	[0.012]
Total Effect	-0.027**	-0.020**	-2,702**	-2,096**	-0.107**	-0.089**
	[0.003]	[0.003]	[477]	[348]	[0.029]	[0.025]
Observations	4,734,194		4,734,194		3,849,234	
Individuals	406,607		406,607		402,899	

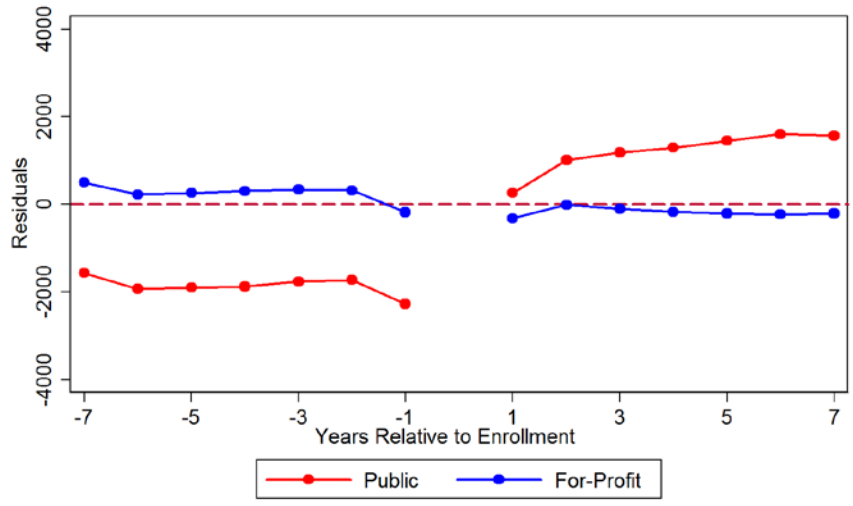
Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment program are dropped.

Figure 5A. Mean Enrollment in Other Institutions, by Sector



Notes: Y-axis shows proportion of individuals with other enrollment in the years before and after Gainful Employment program enrollment. Enrollment measured by IRS form 1098-T indicating any tuition paid.

Figure 5B. Residuals of Annual Earnings ($), Dropping Other Enrollment



Notes: Residuals calculated based on regressions including age, year, and individual fixed effects. Years enrolled in a Gainful Employment program are dropped, as are all years in which IRS form 1098-T was issued indicating any tuition paid.

Table 11. Earnings Effects ($) of Certificate Students, by Age and Enrollment

A. Age Group Subsamples	(1) Unweighted		(2) Weighted
Age 25 and Under			
Post-Education	4,140**		1,529**
	[368]		[244]
Post-Educ*For-Profit	-5,901**		-2,565**
	[345]		[230]
Total Effect	-1,761**		-1,036**
	[270]		[193]
Observations		4,164,965	
Individuals		437,320	
Age 26-35			
Post-Education	4,682**		1,630**
	[534]		[380]
Post-Educ*For-Profit	-6,370**		-2,580**
	[369]		[247]
Total Effect	-1,688**		-950**
	[458]		[333]
Observations		3,621,274	
Individuals		257,457	
Age 36 and Over			
Post-Education	2,577**		1,383**
	[414]		[323]
Post-Educ*For-Profit	-3,877**		-2,081**
	[178]		[159]
Total Effect	-1,300**		-699*
	[392]		[300]
Observations		2,109,138	
Individuals		151,702	

B. Dropping Years of Other Enrollment	Unweighted		Weighted
Post-Education	2,955**		824**
	[325]		[211]
Post-Educ*For-Profit	-4,182**		-1,579**
	[210]		[147]
Total Effect	-1,227**		-755**
	[267]		[171]
Observations		8,405,151	
Individuals		842,958	

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment (GE) program are dropped in all models. Panel A breaks the sample down by age in the year of GE program exit. Panel B drops all years in which form IRS 1098 was issued, indicating any tuition paid at another institution.

Figure 6A. Relative Earnings Gains ($) of For-Profit Certificate Students in Top 10 Fields

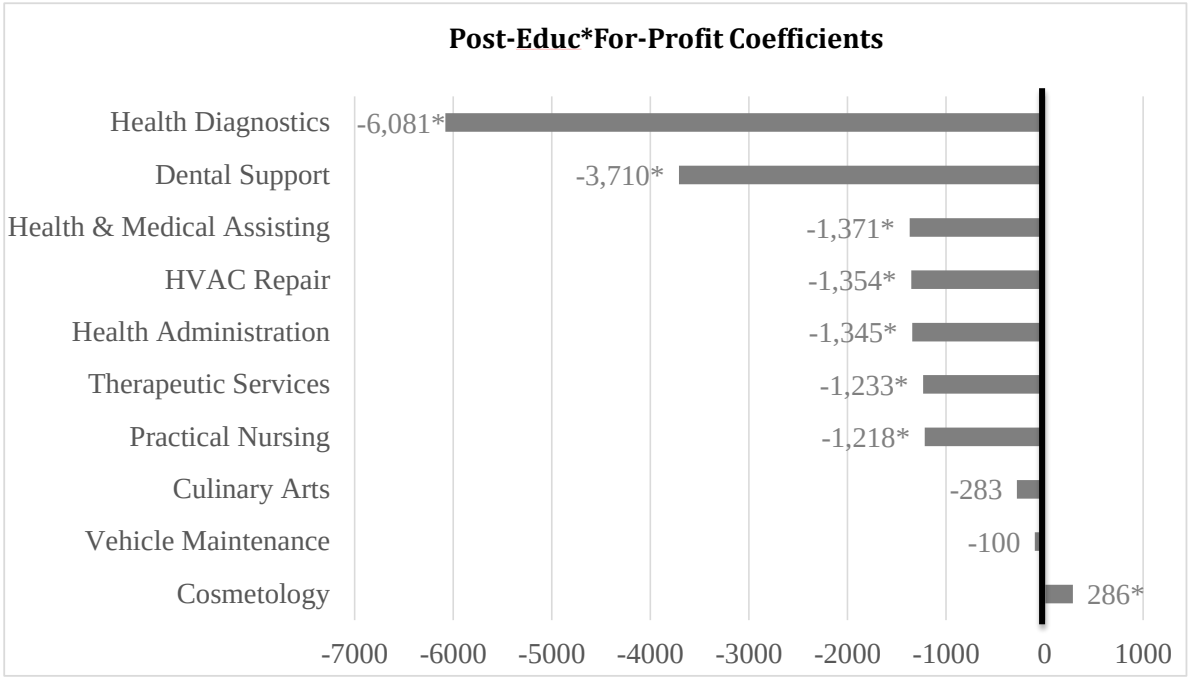
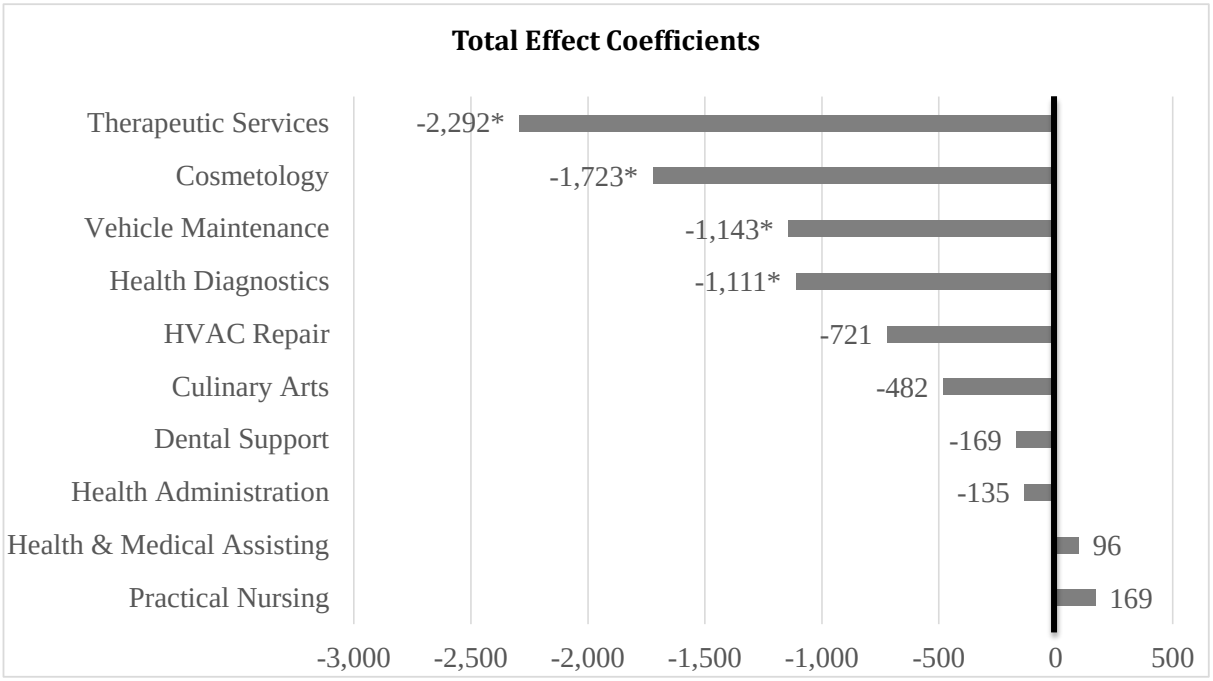
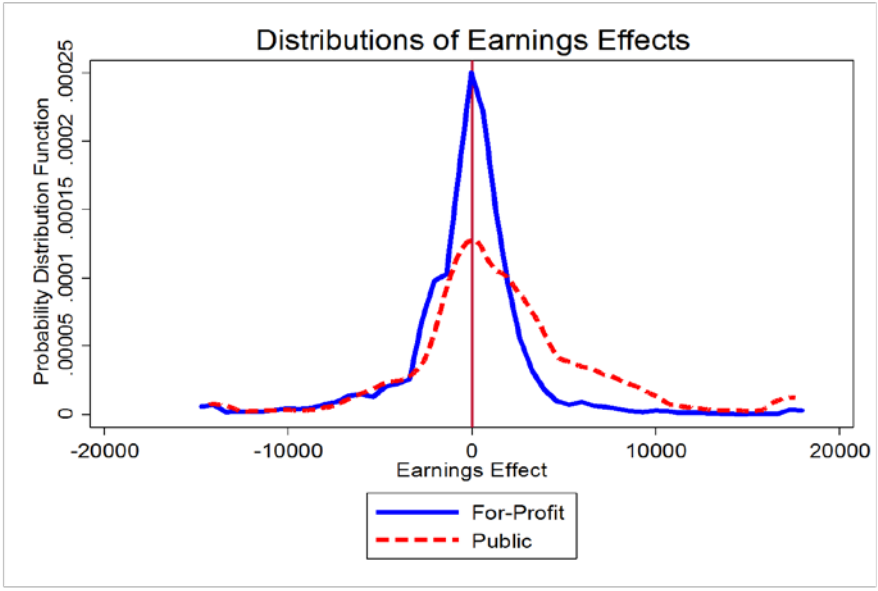


Figure 6B. Absolute Earnings Gains ($) of For-Profit Certificate Students in Top 10 Fields



Notes: * Denotes significance at the 5% level or higher. Estimates are from separate regressions for subsamples of students in each field. All regressions include age, year, and individual fixed effects, as described in equation (2). For a listing of the number of for-profit students in each field, see Table 6.

Figure 7A. Institution-Level Distribution of Earnings for Certificate Students, by Sector

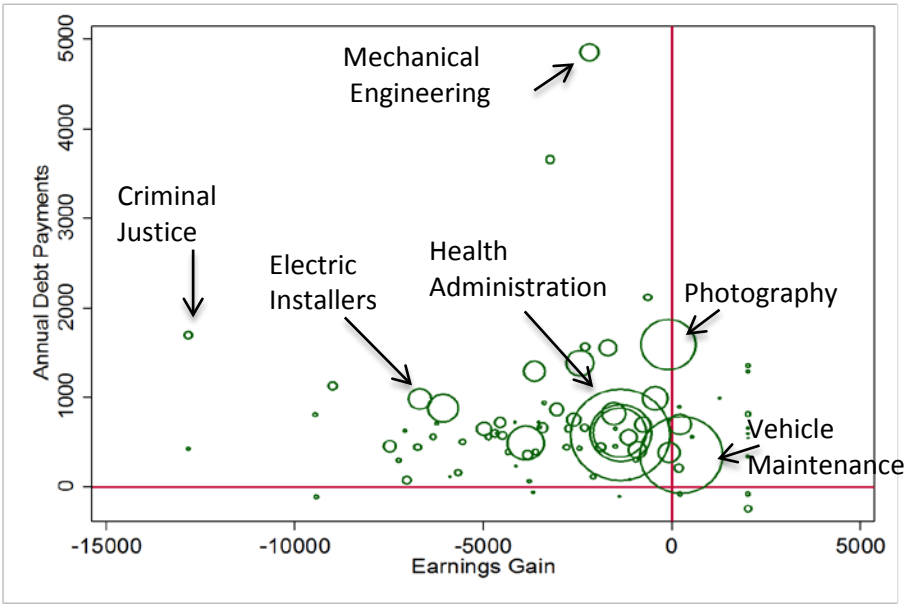


Notes: Figure shows probability distribution functions of earnings effect estimated in separate single difference regressions for each institution with enrollment >30 students, using the weighted public sample. We recode observations less than (more than) the bottom (top) 1% to the 1% (99%) values. All specifications include individual fixed effects, year fixed effects, and age and age-squared terms.

Figure 7B. Institution-Level Debt vs. Earnings for Certificate Students, by Sector

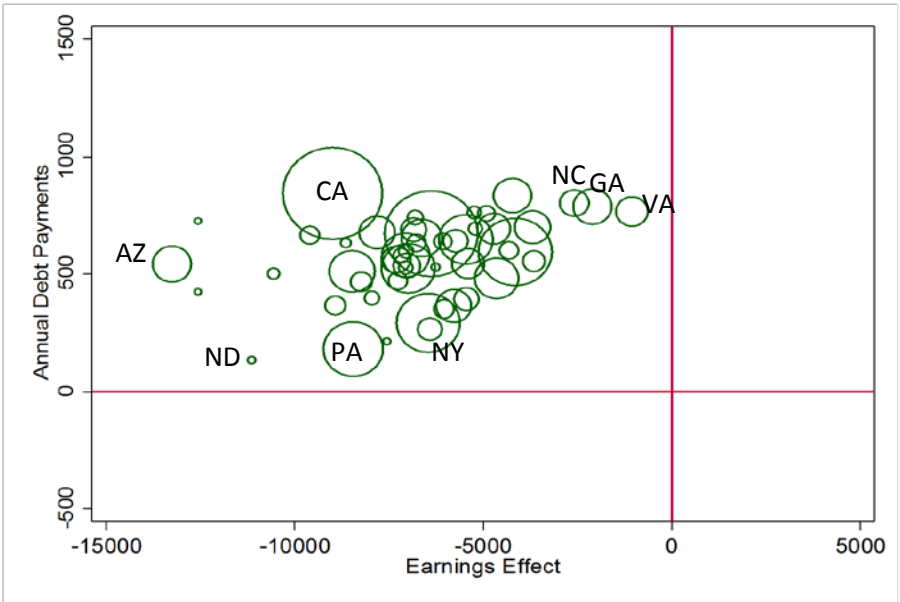
Notes: Figure plots 50 equally-sized groups (student-weighted) based on separate earnings effects for public and for-profit schools. We show mean earnings effects estimated from seprate single difference regressions against mean debt for each group. Debt at exit is ammortized assuming 10-year repayment and an interest rate of 5.42 percent.

Figure 8A. Differential Earnings and Debt, by 4-Digit CIP field



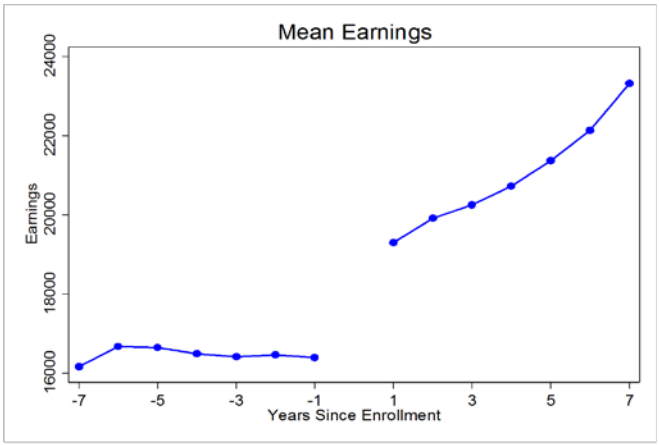
Notes: Differential earnings effects are generated with separate regressions for each 4-digit CIP code and plotted against the difference in debt payments between public and for-profit students. The size of the circles reflect for-profit enrollment in each field.

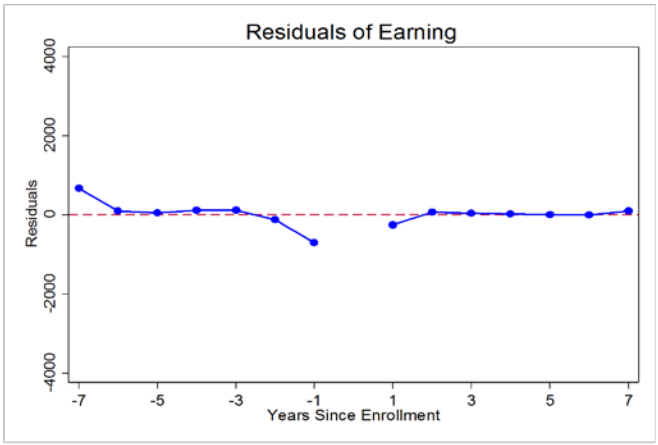
Figure 8B. Differential Earnings and Debt, by State



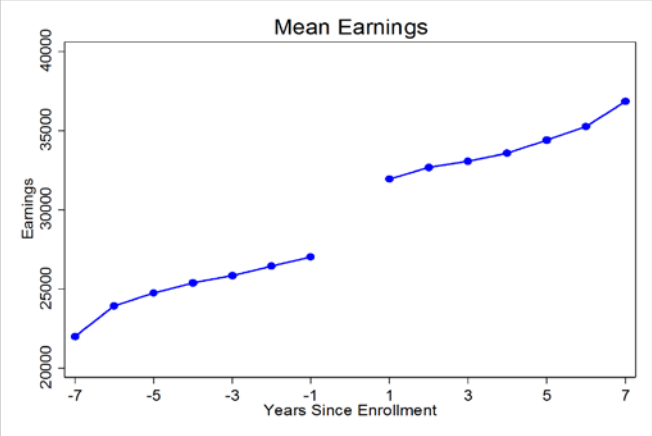
Notes: Differential earnings effects are generated with separate regressions for each state and plotted against the difference in debt payments between public and for-profit students. The size of the circles reflect for-profit enrollment in each state.

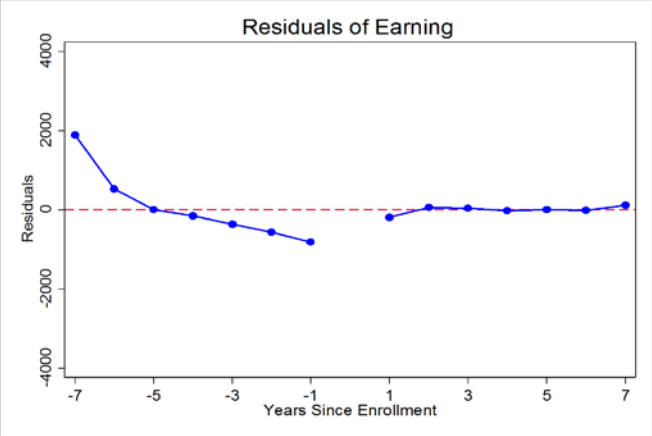
Appendix Figure 1A. Mean and Residual Earnings Over Time, Associate's Students



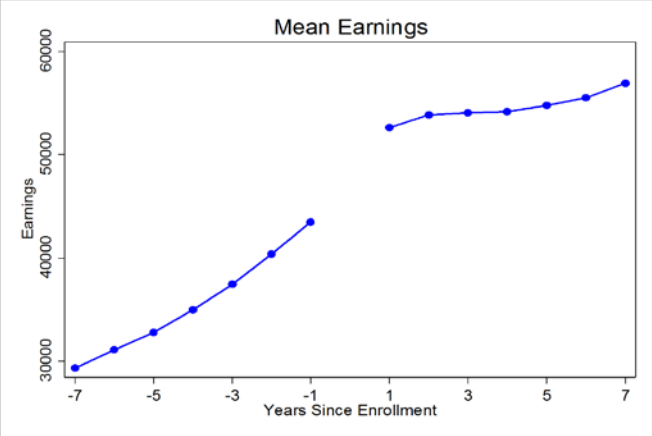


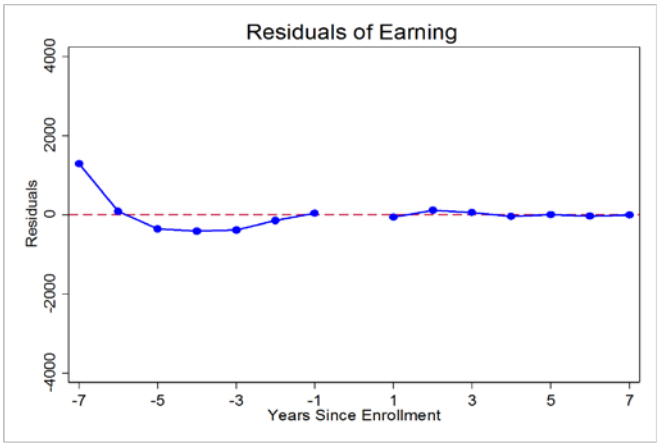
Appendix Figure 1B. Mean and Residual Earnings Over Time, Bachelor's Students





Appendix Figure 1C. Mean and Residual Earnings Over Time, Master's Students





Notes: Residuals calculated based on regressions including age, year, and individual fixed effects. All years enrolled in a Gainful Employment program are dropped.

Appendix Table 1. Certificate Students with and without Title IV Aid, National Postsecondary Student Aid Survey (NPSAS) 2008

	Title IV Students		Non-Title IV Students	
	Public	For-Profit	Public	For-Profit
A. Demographics				
Age as of 12/31/07	28.1	26.4	32.6	26.6
Independent (%)	73.2	69.5	74.0	60.0
Female (%)	71.2	73.0	44.5	77.2
English Primary Language (%)	87.3	81.3	87.7	82.6
Married (%)	27.9	24.1	35.8	24.2
Military or Vet (%)	3.4	3.2	3.5	2.6
Parent has BA+ (%)	15.5	17.4	31.1	24.0
Non-White Race/Eth (%)	55.3	58.5	37.8	48.1
Lives off-campus (%)	97.0	99.8	98.9	99.2
Single Parent (%)	37.3	32.6	20.2	22.1
B. Income and Work				
Balance Due on all Credit Cards ($)	1,569	2,064	1,862	2,536
Parents' Income if Dependent	45,638	43,296	78,554	82,808
Hours worked per week while enrolled	23.8	19.9	27.4	17.5
Earnings from work while enrolled ($)	8,604	7,700	15,834	7,500
C. Financial Aid				
Applied for Federal Aid (%)	100	100	14	32
Total amount of aid from any source ($)	4,166	9,390	588	2,641
Total all loans (with 0s, no PLUS) ($)	1,646	6,344	125	1,949
Total all grants (with 0s) ($)	2,101	2,281	370	488
Weighted NPSAS Sample Size (in 1,000s)	112.7	623.5	528	108.9

Note: Authors' tabulations of 2008 NPSAS data in Powerstats (https://nces.ed.gov/datalab/).

Appendix Table 2. The Effect of Sample Restrictions on Sample Size and Count of Certificate Students

	Full Sample		For-Profit		Public	
	Observations	Persons	Observations	Persons	Observations	Persons
Exit Gainful Employment Program 2006-2008	**13,030,089**	**925,780**	**8,714,432**	**610,870**	**4,315,657**	**317,502**
Drop Persons who exit from both For-Profit and Public Institutions	12,992,791	923,188	8,683,451	608,278	4,309,340	314,910
Drop Persons who die 2014 or earlier	12,858,933	913,697	8,599,564	602,452	4,259,369	311,245
Drop Persons who Enter School Ages less than 18 or older than 50	12,392,817	880,851	8,358,150	585,727	4,034,667	295,124
Drop Observations Ages less than 18, greater than 55	10,221,272	879,806	6,794,166	585,257	3,427,106	294,549
Drop Persons who Enroll more than 5 years	10,101,600	863,883	6,790,303	584,756	3,311,297	279,127
Drop Observations from non-US States, or with State missing	9,895,377	844,715	6,595,978	566,671	3,299,399	278,044
Analysis Sample	**9,895,377**	**844,715**	**6,595,978**	**566,671**	**3,299,399**	**278,044**
Present in Pre-Enrollment Years Only	702	585	169	144	533	441
Present in Post-Enrollment Years Only	435,007	64,012	288,637	42,931	146,370	21,081
Present in Pre- and Post-Enrollment Years	9,459,668	780,118	6,307,172	523,596	3,152,496	256,522

Notes: Observations are at the person-year level spanning the years 1999-2014 and exclude years of enrollment in the Gainful Employment program. For observations with missing information on state, we attempt to impute state based on leading/lagging observations for the same person using up to +/-7 years prior to sample restriction.

Appendix Table 3. Self-Employment of Certificate Students

	Any Self-Employment		Self-Employment Earnings ($)	
	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)
Post-Education	0.013**	0.025**	-120**	-15
	[0.003]	[0.004]	[34]	[43]
Post-Educ*For-Profit	0.011**	-0.006	209**	53*
	[0.003]	[0.003]	[21]	[22]
Total Effect	0.025**	0.019**	88.96**	38.35
	0.003	0.004	32.51	39.02
Observations	9,895,377		8,401,601	
Individuals	844,715		844,714	

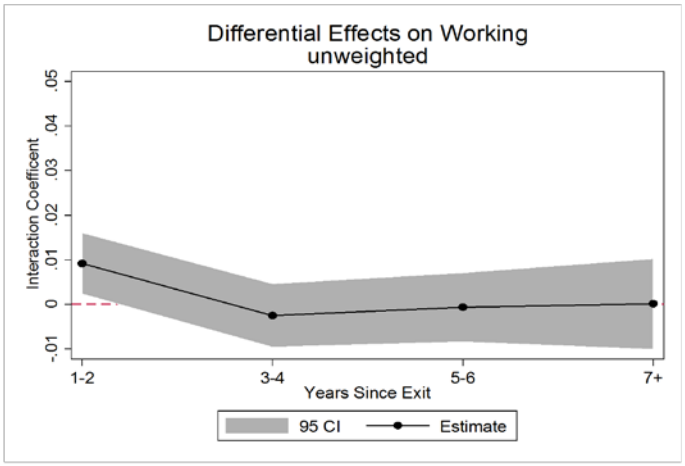
Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment program are dropped. "Any self-employment" is defined as any non-zero earnings reported on IRS Schedule SE. Earnings are gains reported on Schedule SE.

Appendix Table 4. Earnings Effects ($) for Certificate Students in Online and Chain For-Profit Institutions

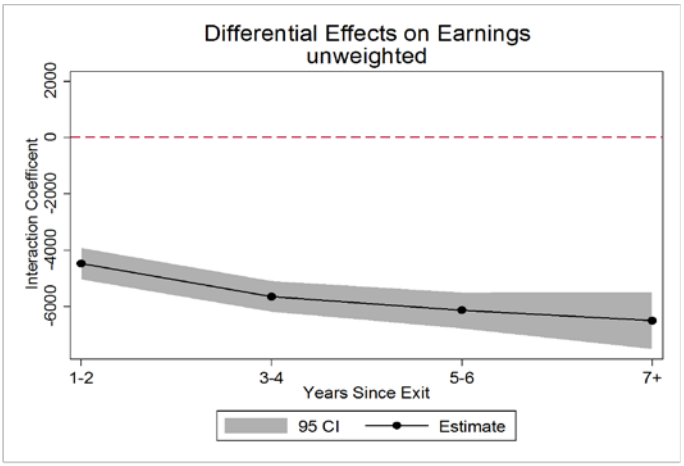
	Online = 1		Online = 0	
	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)
A. Online				
Post-Education	2,398**	1,219*	3,723**	1,501**
	[707]	[487]	[411]	[288]
Post-Educ*For-Profit	-7,234**	-4,090**	-5,615**	-2,508**
	[324]	[235]	[278]	[199]
Total Effect	-4,837**	-2,870**	-1,891**	-1,007**
	[752]	[528]	[373]	[263]
Observations	3,409,644		7,872,483	
Individuals	287,128		669,296	
B. Chains	**Chain = 1**		**Chain = 0**	
Post-Education	3,738**	1,466**	2,998**	1,343**
	[406]	[287]	[569]	[382]
Post-Educ*For-Profit	-5,648**	-2,535**	-5,372**	-2,260**
	[283]	[201]	[263]	[194]
Total Effect	-1,910**	-1,069**	-2,374**	-917*
	365	261	566	383
Observations	8,322,063		4,649,675	
Individuals	712,246		392,090	

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment program are dropped. Online and chain designations are based on the 2012 IPEDS. Online = 1 for for-profit colleges in which at least 50% of students were enrolled exclusively online, and 0 otherwise. Chain = 1 for for-profit colleges that belong to a "multi-insitution system, governing board, or corporate structure," and 0 otherwise. All community colleges are included in all sub-samples due to a very small number of majority online public intitutions and a very large number of multi-institution public college systems.

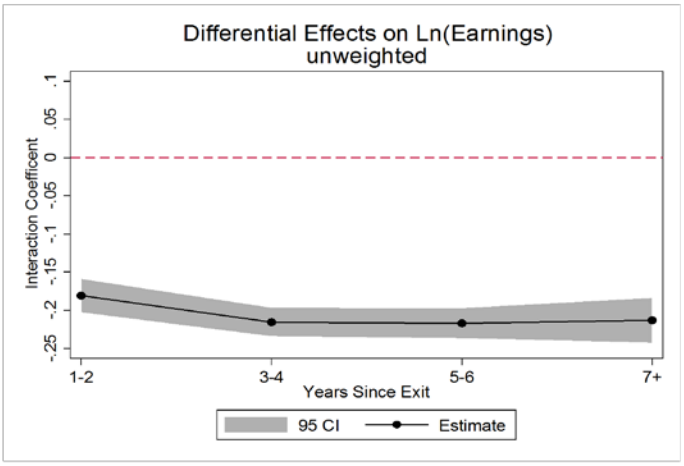
Appendix Figure 2A. Time Pattern of Relative Employment Effects



Appendix Figure 2B. Time Pattern of Earnings ($) Effects



Appendix Figure 2C. Time Pattern of Relative Ln(Earnings) Effects



Notes: Figures plot coefficients of interactions of *Post*For-Profit* with indicators for the number of years post-exit in two-year increments for the unweighted sample. All regressions include age, year, and individual fixed effects. Shaded areas represent 95 percent confidence intervals based on standard errors clustered at the state-year level.

Appendix Table 5. Earnings Effects ($) for Certificate Students with Geographic Controls

	Baseline Earnings ($)		State Fixed Effects		State*Year Fixed Effects	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
Post-Education	3,926**	1,544**	3,921**	1,542**	4,401**	2,165**
	[371]	[263]	[371]	[263]	[340]	[251]
Post-Educ*For-Profit	-5,555**	-2,463**	-5,549**	-2,457**	-6,346**	-3,397**
	[276]	[198]	[277]	[198]	[213]	[168]
Total Effect	-1,629**	-919**	-1,628**	-915**	-1,945**	-1,231**
	[316]	[225]	[315]	[225]	[305]	[224]
Observations	9,895,377		9,895,377		9,895,377	
Individuals	844,715		844,715		844,715	

Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (2). All years enrolled in a Gainful Employment program are dropped. Columns (1) and (2) show baseline specifications from Table 8. Columns (3) and (4) add state fixed effects. Columns (5) and (6) add state-by-year fixed effects.