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GAINFULLY EMPLOYED? ASSESSING THE EMPLOYMENT AND EARNINGS OF FOR-PROFIT COLLEGE STUDENTS USING ADMINISTRATIVE DATA

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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 one million students. Using a matched comparison group difference-in-differences design, we find that certificate-seeking students in for-profit institutions are 1.5 percentage points less likely to be employed and, conditional on employment, have 11 percent lower earnings after attendance than students in public institutions. These results hold for both men and women and for seven of the top ten fields of study. We find that earnings and employment outcomes are particularly poor for students attending for-profit colleges that offer the majority of their courses online and for multicampus chains. We find that for-profit students experience small, statistically insignificant gains in annual earnings after attendance compared to a matched control group of young individuals who do not attend college. A back-of-the-envelope comparison of these earnings gains to average debt burdens suggests that for-profit certificate programs do not pay off for the average student.

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I. Introduction

For-profit postsecondary institutions have changed the landscape of higher education in the United States. Since 2000, enrollment in federally aided for-profit colleges has more than 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 colleges serve about 1.6 million students and comprise about eight percent of all postsecondary enrollment (National Center for Education Statistics (NCES) 2017, Table 303.20).[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). In 2014, the Obama Administration implemented 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 use population-level administrative data on the enrollment, earnings, and debt of for-profit college students to assess the quality of education in the sector. Our data come from the U.S. Department of Education (DoED) and include nearly all federally-aided students

[1] These figures count students in federally-aided institutions. Cellini and Goldin (2014) estimate that about 670,000 additional students are served by non-federally-aided for-profit institution in the U.S. and not included in the Department of Education's counts.

who exited a for-profit postsecondary institution between 2006 and 2008. 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.

We focus on estimating the earnings impacts of students in for-profit certificate programs. We implement a difference-in-difference design using two different matched comparison groups. Our preferred estimates compare the earnings before and after attendance of students attending for-profit vs. public institutions, after matching by demographics, prior earnings, field of study, geography, and age group. We also generate a control group of young individuals who do not attend college in the time period we study to measure employment and earnings relative to no college.

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 over 840,000 for-profit certificate students, our data allows for sufficient power to explore heterogeneity of returns by gender 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.

We find that for-profit certificate students experience lower earnings and employment post-college than their public sector counterparts, a result that holds even after accounting for differences in student demographics and fields of study. Relative to their matched public sector counterparts, for-profit students are 1.5 percentage points less likely to be employed and, conditional on employment, have 11 percent lower earnings after attendance than students in

public institutions. Combining employment and earnings effects in measures of unconditional annual earnings, we find that for-profit students earn about $2,100 less per year post-college than public sector students. Separate analyses of the ten most popular fields of study reveal that for-profit students experience similar or lower returns than public students in all fields except cosmetology. We also find evidence of lower returns for students pursuing certificates in online institutions and those that are part of multi-campus chains, suggesting that the types of institutions with the most enrollment growth in the last twenty years (Deming et al. 2012) have relatively weak outcomes.

The negative earnings differentials we find are troubling given the much higher debt incurred by for-profit students relative to students in the public sector. 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. We also find that despite differences in public support for higher education across states, in all 50 states and Washington, DC students in public institutions have higher earnings and lower debt that their counterparts in for-profit institutions.

Our results reveal that most certificate students would be better off in public institutions. However, a separate question is whether students attending for-profit institutions would be better off attending no college at all. To address this issue, we generate a plausible comparison group of young individuals who do not appear to have enrolled in any college over the time period we study. Relative to these individuals, for-profit certificate students are 2.8 percentage points more likely to be employed, but conditional on employment, their earnings are 4.5 percent lower than individuals with no college. Unconditional annual earnings differentials, although small and positive, cannot be shown to be different from zero for the full sample, but effects are larger and

significant for men. Comparing average earnings gains to average debt in a back-of-the-envelope calculation, suggests that gains are not enough to offset debt and interest payments, leaving the average for-profit certificate student with a net loss of about $1,200 over her lifetime.

Despite the advantages of using population-level administrative data, there are key limitations to our study. Notably, even with our matched control groups and individual fixed effects, our results require some assumptions about the dynamics of college choice for causal interpretation. Second, the data we analyze are limited to students who leave college from 2006 to 2008 at the start of the Great Recession. Therefore, although our control groups also experience the effects of a weak labor market, we consider our findings lower bounds and may not be representative of student experiences in other years. Fourth, our estimates include just 5-6 years of post-college earnings and may not reflect earnings effects over the lifetime. Despite these limitations, we believe that our analysis represents the most comprehensive examination of for-profit student outcomes to date.

Section II provides background on the for-profit sector and describes estimates of earnings effects in the literature. Section III describes the data. Section IV outlines our empirical methods. Section V reports summary statistics and tests the identifying assumptions of our model. Section VI presents the results of our analyses. Section VII concludes.

II. Background

A. For-Profit Colleges

The academic literature on for-profit colleges is relatively thin compared to the large body of research on more traditional public and non-profit institutions. Data on the for-profit sector has

been scarce and 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 online learning technologies for undergraduate education compared to less selective public colleges and Gilpin, Stoddard, and Saunders (2015) document that for-profits respond to local labor market demand. 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 nearly five times that of the average public community college: $14,472 per year vs. $3,038 (NCES 2017, Table 330.10). Cellini and Goldin (2014) show that for-profits that participate in federal student aid programs charge a tuition premium that is roughly equal to the

[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 have experienced several cycles of scandal and regulation over the years (Darolia 2013, Whitman 2017). In the early 2000s, enrollments for-profit colleges surged, possibly due to new technology and easy access to federal student aid, with fastest enrollment growth in large multi-campus chains and online institutions (Deming, Goldin, and Katz 2012). Since 2010, enrollment in for-profit colleges has declined, but enrollment remains around 1.6 million students (NCES 2017).

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. In recent years, two large for-profits chains, ITT Tech and Corinthian Colleges, faced federal investigations and ultimately closed. Under the Obama Administration's 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. If the regulations are enforced under the new administration, programs will 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] The Department of Education's first GE data release indicated that more than 800 programs would not meet the new standards--98 percent of them in for-profit institutions (U.S. Department of Education 2017).

College closings and restrictions on federal aid bring with them concerns over the fate of current and future for-profit students. Whether students will switch to other institutions or forego

[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.

their college education has important welfare implications. New research sheds light on this issue, finding that when enrollment declined in for-profit institutions facing DoED sanctions in the 1990s, enrollment in local public institutions increased by about the same amount (Cellini, Darolia, and Turner 2016). The results suggest that public and for-profit two-year institutions are substitutes and suggest that public sector students may be appropriate comparisons for for-profit students.

B. 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

[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).

samples of young workers and survey data.[10] Cellini and Chaudhary (2012) find that for-profit associate's degree students experience earnings gains of about 4 percent per year of education or about 10 percent relative to high school graduates—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) lack a comparison group and report a decline in the probability of employment, but very high earnings gains relative to students' own prior earnings.[12]

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

[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 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.

[12] Hoxby (2015) does not focus specifically on for-profit students, but reports that among traditional-aged students who take college entrance exams, value-added earnings measures are lower for the for-profit sector relative to the public and non-profit sectors.

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 include about 1.4 million individuals in total—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, the large number of students in our data allows us to estimate separate and more precise effects by gender, state, and field of study than any previous work. Fourth, 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 borrowing and can therefore compare earnings gains relative to student debt burdens.

III. 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.[13] 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.[14] 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 for this group of students.

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.[15]

Also missing from our data are students who do not participate in federal student aid programs under Title IV of the Higher Education Act.[16] This restriction has little effect on for-profit certificate students, since 85 percent receive federal aid, but it is more problematic for public sector students, since only about 20 percent of community college certificate students

[13] 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.

[14] Although we lack a reasonable control group for for-profit students seeking bachelors, associate's degrees, and master's degrees, we present descriptive evidence on returns to these degrees in Appendix Table A1 using a single-difference design. These estimates cannot control for the effects of the Great Recession, we therefore consider them to be merely suggestive. Further, master's degree students were likely enrolled in bachelor's degree programs in the years prior to their master's program enrollment, potentially biasing results upward. Details of the degree-seeking student sample, methods, and results are available on request.

[15] We do not have access to data on students who re-enroll within three years. A student is counted as "withdrawn" if he or she stopped attending the program for more than a regularly scheduled vacation period without completing the program or if he/she is on a leave of absence (Federal Student Aid 2011, p. 126). Further, the DoED data do not allow us to observe enrollment in other non-GE institutions. In analyses not reported (available on request) we identify and drop years of other enrollment based on data from the 1098-T form. Results are similar for certificate students.

[16] 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.

receive federal aid.[17] However, given the characteristics of aided- and non-aided students across sectors, we find that the set of Title IV participating public sector students are a fairly close comparison to federally-aided for-profit students.[18]

Despite these potential drawbacks, the data provide a wealth of other information about students' educational experiences. 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 listed tuition and student loan debt taken on while enrolled in a GE program. Debt is 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 number of dependents. We also use information from the 1098-T—a form sent to any student who pays tuition at an institution of higher education—in an attempt to identify a comparison group of individuals who do not attend any postsecondary education.[19] Our tax data are available for the years 1999-2014, so we observe about five or six years of earnings post-graduation (or dropout) and about six years pre-enrollment for most students.

[17] Authors tabulations of the 2008 National Postsecondary Student Aid Survey NPSAS using Powerstats.
[18] In Appendix Table A2, 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.
[19] 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.

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 enrollment in order to generate a clean comparisons of outcomes across pre- vs. post-enrollment years.[20]

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.

IV. 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, we implement an individual fixed effects approach to control for time-invariant individual characteristics in conjunction with a matching strategy to generate a comparison group of similar students. We compare the pre-post enrollment earnings differential of for-profit students with the pre-post earnings differential of three different comparison groups.

[20] Appendix Table A3 documents the impact of the sample restrictions on the number of certificate students in each sector.

We begin with the comparison group of all Title IV-eligible public sector certificate students. We then implement our difference-in-difference strategy on a more restricted matched sample of public and for-profit students in our preferred estimates. Finally, we generate a control group of young workers who never attended any college. We describe the construction of these samples in detail below. For each, we estimate the following general difference-in-difference model:

$$y_{it} = \alpha_0 + \alpha_1(Post_{it}) + \alpha_2(Post_{it} * \textit{For-Profit}_i) + d_t + d_a + d_i + \varepsilon_{it} \qquad (1)$$

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 zero to one in the year after an individual completes or withdraws from a gainful employment program. It remains one in all subsequent years. *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.[21] 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 $\alpha_1 + \alpha_2$, although we caution that this single-difference effect should not be interpreted causally.

We add age fixed effects, d_a, to capture differences in work experience across the lifecycle.[22] We include year fixed effects, d_t, to capture changes in macroeconomic conditions from year-to-year. Importantly, 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

[21] 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 A3 for a full list of sample restrictions.
[22] Because the age distribution is thin over age 45, we aggregate the fixed effects for ages 46-50 and 51-55.

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.

We run our difference-in-difference model on three samples. First we include the full sample of public and for-profit certificate students. This approach compares the within-person earnings gains of students in each sector. However, selection into college type, field of study, and local labor market conditions may still confound causal estimation. In our preferred specification, we go a step further to generate propensity scores based on up to seven years of prior earnings and demographic characteristics (e.g., married, number of children, male, married, years prior to enrollment). We identify a matched control for each for-profit student within gender-age-CIP-zip cells. That is, each for-profit student is matched with one public sector student with similar prior earnings and demographics in the same cell.[23] We restrict our analysis to gender-age-CIP-zip cells with at least one student in each sector. Zipcode is defined at the 3-digit level (i.e., roughly equivalent to a county), CIP is at the 4-digit level, [24] and age is in ten-year bins based on the age at the time of first enrollment. For example, our matched public sample compares women who enrolled in their 30s in Washington, DC health administration programs across the two sectors and compares those that are most closely matched on prior earnings and demographics.[25]

We extend our analysis to explore the reduced form effect of attendance over time by adding interactions for each year post-exit. The large number of students in our data set allows us to further assess heterogeneity in returns by splitting the sample by gender, prior employment, institutional characteristics, and for the top ten for-profit fields of study.

[23] We use nearest-neighbor matching with replacement. We also remove observations above the 99-percentile score among for-profits and below the 1-percentile score among public students.
[24] We collapse the 6-digit CIP codes to the 4-digit level for ease of interpretation and to maintain sample size.
[25] Appendix Table A4 explores the robustness of different matching methods. Omitting the CIP code in the match in Panel B results in larger negative for-profit earnings differentials, while omitting zip codes in Panel D yields lower differentials.

Our matched sample will come close to generating causal estimates the differential earnings effects relative to public sector attendance. However, they are less informative in assessing earnings effects relative to no college attendance. To do this, we rely on a third—but even more restricted—sample. In this case, we drop all public sector students and generate a comparison group of individuals who never attend college in the period we observe. To identify these students, we first use the tax data to identify students who were 18 years old between 1999 and 2014, since we cannot observe complete enrollment histories for older individuals. We then drop students who were issued a 1098-T form indicating any college tuition paid, as our primary proxy for college attendance. Our analysis is complicated by the fact that students who pay no tuition but nonetheless attend college will be included in our control group. To mitigate this possibility, we further drop any students that we observe receiving Title IV aid. However, we note that students attending college on a "full-ride" scholarship (e.g., athletic, institutional, or private scholarships) and pay no tuition remain in our control group and may bias our estimates. We further eliminate any individuals who are incarcerated or receiving disability income. Since we cannot observe high school completion, we caution that our final "no college" control group includes high school dropouts as well as students who finished high school.

We generate a falsified date of "enrollment" and "exit" for our no-college comparison group that matches the distribution of for-profit students. We further restrict our analysis to students who enter college (or falsely "enter") at age 22 or later to retain ample years of pre-period earnings for this young group and to more closely match the age distribution of our full sample of for-profit students. We employ a matching strategy similar to that used for the public students based on prior earnings and demographics, matched within gender-age-zip cells. We omit 4-digit

CIP fields, since CIP is not relevant for the no-college group and we match on exact age since these students are all very young.

V. Summary Statistics and Tests of Identifying Assumptions

Table 1 shows the sample means of our three samples. Prior to weighting, we find important differences in student characteristics in the full sample in columns (1) and (2). Public sector students are slightly older and more likely to be married than for-profit students, but other demographics are quite similar. The two groups differ more when measuring earnings and debt. Average earnings in the pre-enrollment years are about $12,500 for for-profit students and about $16,300 for community college students (all dollar amounts in $2014). 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). 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 $720 at public institutions. Finally, as found in previous studies (e.g., Deming, Goldin, Katz 2012), completion rates are higher in the for-profit sector than in the public sector, at 59 percent compared to 38 percent. Enrollment duration is also slightly shorter in the for-profit sector (1.08 years vs. 1.31 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 2, we document

[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.

the ten fields of study (based on the 4-digit CIP codes) 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 list in the public sector, although there are still sizable numbers of public sector students in each these fields.[27]

Given these differences in programs and students across sectors, as noted above, we generate a matched 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 and programmatic patterns and not from differences in the type of institution attended. Further, we restrict matches to cells defined by age at entry, gender, 3-digit zip code, and 4-digit CIP code to ensure that the matches are made in similar fields of study in the same geographic areas. Summary statistics for the matched sample are included in columns (3) and (4) of Table 1. Not surprisingly, the matched sample of public sector students looks nearly identical to the for-profit sample on many dimensions including age (24), and proportion male (.24), married (.18), number of children (1.75), as well as pre-enrollment earnings (about $10,500) and employment (.77).

[27] Complete descriptions for each CIP code can be found at: https://nces.ed.gov/ipeds/cipcode/. See Table 2 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 (5,199) and therapeutic the least (1,745).

Columns (5) and (6) show the means of our younger sample of matched for-profit and "no college" students. The means for age and male are identical, but there are notable differences in the likelihood of marriage and children, with the most sizable difference being in the number of children (1.75 for the for-profit students vs. 3 for the no college comparison group). Earnings and employment are also slightly different with for-profit students having higher earnings ($8,200 vs. $7,000) and a greater likelihood of employment (.75 vs. .64). Given these differences, we focus more closely on the matched public comparison throughout.

The key identifying assumption of the difference-in-difference approach is that for-profit students and the relevant comparison group experience similar pre-enrollment earnings trends. We examine these trends visually in Figure 1 for our main samples. Figures 1A and 1B show the mean earnings and probability of employment, respectively, for the full sample. Public students have higher levels of pre-enrollment earnings, but earnings trends appear fairly similar in Figure 1A. Employment trends in Figure 1B are more concerning, with a notable upward trend for for-profit students that does not mirror the trend in the public sector. Importantly, this difference disappears when considering the matched sample in Figures 1C and 1D: pre-period trends for both employment and earnings for the matched sample in Figures 1C and 1D are nearly identical.[28]

VI. Results

A. Returns Relative to Public College

[28] We formally test for differential pre-trends for the matched public sample in Appendix Table A5. We find a significant but very small difference in pre-trends in annual earnings of $95 for for-profit students (but we find no difference in trends for employment or log earnings). Nonetheless, the direction of the trend suggests a bias in favor of for-profit students, which is the opposite of our findings below. We show pre-trends for the matched no-college sample in Appendix Table A6. Here, trends are significantly different for for-profit students for both employment and log earnings, but both are in the opposite direction of our findings.

We present the results of our difference-in-differences model for the full sample and matched sample of public certificate students in Table 3. 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 public sector (α_2).

For the full sample in Panel A, we first 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 percent.[29] For public students in our matched sample in Panel B, annual earnings gains are reduced to $1,069. In general, our results for public sector students fall in the mid-range of estimates of the returns to certificates in California community colleges reported by Stevens, Kurlaender, and Grosz (2015, Table 5).

In the second row, we assess our outcome of interest, the differential returns experienced by for-profit certificate students. For the full sample, we find no difference in the probability of employment for for-profit students in Panel A, column (1) relative to public sector students. In contrast, both of our earnings outcomes reveal large negative differentials relative to public sector students ($5,555 less and 21 percent lower in columns (2) and (3), respectively).

We report our preferred estimates that match students on prior earnings and demographics within gender-age-CIP-zip cells in Panel B. Here, for-profit students appear to fare worse than their public sector counterparts on all three outcomes. For-profit students are about 1.5 percentage points less likely to be employed than students in the public sector (col. 1) and their annual earnings are $2,144 lower (col. 2). Conditional on working, for-profit students see

[29] Note that our results for Ln(Annual Earnings) are technically in log points, however, they closely approximate percentages for small values (as we find here), so we refer to them as percentages for simplicity.

earnings that are about 11 percent lower than their public counterparts (col. 3). Adding the coefficients on annual earnings for a descriptive estimate of total effects, reveals in a net decline in earnings after attendance of about $1,075 for for-profit students, relative to their own prior earnings. We caution that this total effect includes the impact of the Great Recession, which is netted out in our estimates of differential effects.

Exploring earnings effects over time in the post-education period, Figures 2A-2C show the coefficients of interactions of *Post*For-Profit* with indicators for the number of years post-exit for the matched sample. Across all outcomes, the differential effects appear to decline over time. If we believe that the first year post-exit represents the most direct or immediate impact of the institution, we see slightly better outcomes in that year than in others. However, even the most promising outcome, employment (Figure 2A) reveals differential employment effects very close to zero and a large confidence interval.

B. 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 for the matched public sample. In Table 4, we find that women enrolled in for-profits see more negative employment and earnings outcomes than men. For example, for-profit women's earnings are about $2,200 lower than their public sector counterparts' in the same field of study, age group, and zip code, while men see only a $1,800 for-profit penalty (col. 2).[30],[31],[32]

[30] It is possible that the low earnings effects that we find for for-profit students could be driven by very low completion rates. However, because completion rates are higher in for-profits than in public institutions (see Table 1), our results thus far, not conditioning on program completion, should be biased in favor of for-profit students. Although completion is an endogenous outcome, we explore completion as a mediator in Appendix Table A7, adding an interaction term for graduates of certificate programs in a triple difference design. Notably, for-profit

We next examine heterogeneous earnings effects by institutional characteristics in Table 5. In Panel A, we split for-profit institutions into those that indicate in the 2012 IPEDS that 50 percent or more of their students attend courses exclusively online and those that do not. We match each student with their nearest neighbor in the full set of community colleges. Although we have relatively few students in online institutions, we find that the public-private differential increases for online students. Students in these "mostly online" institutions have markedly worse outcomes than students attending brick and mortar colleges.

In Panel B, we do the same exercise, but split for-profit institutions according to whether they report being part of multi-campus governing structures in the IPEDS, as a proxy for chain institutions. Here we observe worse performance among the chain for-profits: annual earnings declines are nearly double in magnitude for chains (about -$2,400 vs. -$1,200). Employment outcomes are negative for chains (-2.5 percentage points), but show a positive differential for independent institutions (2.0 percentage points).

Our main matched estimates control for differences in the distribution of field of study across sectors to generate average effects, but we further explore heterogeneity across the top ten for-profit fields of study in Figure 3. In seven of the ten fields (including all health-related fields), for-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. An explanation

dropouts see much worse outcomes than public sector dropouts, with earnings that are $3,400 less. Graduates of for-profit programs have earnings that are about $2,500 lower than public graduates.

[31] Students in both sectors may receive employer support for their training and it could be that raises or promotions are tied to educational attainment. In results not reported (available on request), we explore differences in returns for students who were working in the year prior to attendance and those who were not to explore differences by (possible) employer support. Across both groups and all outcomes, for-profit students fare worse than public sector students with only small and inconsistent differences by prior employment.

[32] Appendix Table A8 reports considers differences in self-employment across sectors. We find no significant differences in the likelihood of being self-employed or in self-employment earnings across sectors.

may be that several for-profit schools are directly linked to high-end salons and enjoy name-brand recognition. On the other hand, summing coefficients in these models yields negative total returns for for-profit cosmetology programs, perhaps due to tip income that goes unreported in the tax data.

Despite relatively weak returns in the for-profit sector on average, it is possible that some for-profit certificate institutions 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. Figure 4 presents the distribution of the institution-level estimated returns for the for-profit and matched public certificate students for schools that enroll at least 20 students. The distribution of institution-level for-profit returns shows a smaller variance and a much thinner and shorter right-hand tail than the public sector, with a high peak at roughly zero return. The figure also suggests that there are some for-profit institutions where students receive positive earnings effects after attendance, but public institutions clearly have much more mass in the right-hand tail while for-profits have more mass below zero. Nonetheless, the left-hand tail of the for-profit sector is fairly thin, suggesting that "bad apple" schools are not driving the earnings differentials we observe.

In Figure 5 we compare the school-level earnings gains from Figure 4 to estimates of annual debt payment by sector. Annual debt estimates are based on students' debt load at exit annualized over a standard ten year repayment assuming an interest rate of 5.24 percent.[33] We construct this figure by plotting mean returns and mean annualized debt payments, estimated at

[33] The interest rate represents the six-year average interest rate of Federal Direct Unsubsidized loans between 2004 and 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).

the school level, in 50 equally sized groups for each sector. Relative to public institutions, debt is higher at for-profit institutions at every point in the distribution and the average return is typically lower.

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, as show in Figure 6. Given the heterogeneity in tuition and public support for higher education across states, we might expect some differences in returns or debt, particularly if for-profit tuition is relatively stable across states. Rather, we find that every single state has 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.[34]

C. Returns Relative to No College

Thus far we have considered primarily the relative impacts of for-profit education against a counterfactual of public sector attendance. To address the returns relative to not attending any college, we compare for-profit students to our young "no college" comparison group described above. Results are reported in Table 6.

Relative to the group of high school students and dropouts, for-profit certificate students are 2.8 percentage points more likely to be employed. Annual earnings differentials, though small and positive ($356), cannot be shown to be significantly different for for-profit students

[34] In results not shown (available on request), we test for differential effects in 3-digit zip codes that suffered higher unemployment during the Great Recession using on average unemployment rates from 2007-2011 from the American Community Survey (ACS). We find that for-profit students saw similar differentials in the 2nd-5th quintiles of recession severity (similar in magnitude to our baseline results, about -$2,000 in annual earnings) and slightly less negative differentials in the first quintile ($-979).

relative to the no college group. Conditional on working, for-profit students fare worse than students who remained in the labor force with no college: for-profit students experience a negative differential effect of about 4.5 log points. Taken together, our results suggest that relative to no college, for-profit certificate programs modestly increase the likelihood of employment, but appear to do little to raise earnings.

Table 7 explores heterogeneity in returns relative to the no college group by sex. In columns (1), (3), and (5), women generally appear to fare slightly worse on all outcomes than the sample average in Table 6, while males do better than the average in columns (2), (4), and (6). Notably, men see a 5 percentage point increase in the likelihood of employment, which appears to drive a positive annual earnings differential of $1,356, relative to the matched no college group. Log earnings for men remain lower than the high school group, suggesting that even for males, for-profit attendance impacts earnings primarily through the employment margin. The difference in results by gender may be driven by differences across fields of study chosen by men and women, as we are unable to match on fields for the no college group.

Considering the results of the no-college comparison in relation to debt can shed light on whether for-profit attendance passes a back-of-the-envelope benefit-cost test from the average student's perspective. Although we cannot rule out zero earnings gains in our main specification in Table 6, if we assume average earnings gain (including employment effects) of $356 annually, we can calculate lifetime earnings gains and compare this estimate to student debt to assess the benefits versus costs of for-profit attendance. Assuming 35 years of earnings for the average student[35] and a five percent discount rate, the average student's lifetime earnings gain from

[35] Average age in the year prior to enrollment is 24 (see Table 1), so we assume students start working upon exit at about age 25 and work until age 60 for a total of 35 years.

attendance would be $5,829. Comparing this to the average student loan balance $5,489 (from Table 1) paid off at an interest rate of 5.24% over ten years,[36] yields a total of about $7,000 in debt and interest paid.[37] Based on these assumptions, for-profit attendance does not pass a benefit-cost test and leaves the average student with a loss of about $1,200 over her lifetime. Looking at these figures another way, the break-even debt load at the time of exit would be about $4,600 under the same assumptions. Of course, these estimates are extremely sensitive to our assumptions, and we ignore other important costs and benefits of education (e.g., foregone earnings while enrolled). We therefore caution that despite this average, we cannot rule out sizable negative or positive net private benefits of attendance.

Nonetheless, for men, a for-profit certificate is much more likely to be worthwhile as the $1,300 annual earnings gain would be more than enough to offset their total debt and interest, under the assumptions used above.[38] In contrast, for the 70 percent of for-profit students that are women, it is unclear that taking on any amount of debt for a for-profit certificate is likely to pay off due to the small negative point estimates in Table 7. However, we again suggest that these results be interpreted with caution given the limitations of this young sample, the quality of the match, our insignificant results, and the assumptions required for our benefit-cost calculations.

VII. Conclusion

Drawing on population-level administrative data on for-profit college students, we assess the employment and earnings outcomes of these students relative to both public community college students and a comparison group of young individuals who do not attend college. We attempt to

[36] As noted previously, 5.24 is the six-year average interest rate of Federal Direct Unsubsidized loans between 2004 and 2009.
[37] Author's calculation using the Federal Student Aid repayment calculator: https://studentloans.gov/myDirectLoan/mobile/repayment/repaymentEstimator.action.
[38] Debt at exit for male for-profit students in the matched no college sample is $6,246 (and $5,162 for women).

control for the impact of the Great Recession and other confounding factors with a matched control group difference-in-differences research design.

Across the board, our results show that despite the much higher costs of attending a for-profit institution, the average for-profit certificate student experiences lower earnings effects relative to public sector students. For-profit colleges outperform public institutions in only one of the top ten for-profit fields—cosmetology. Further, students in online and chain for-profit institutions and appear to fare worse than students in more traditional campus-based and independent institutions. Our institution-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.

Our findings suggest that the average for-profit student would be better served in a public institution, but our results relative to no college attendance are more mixed. Comparisons of for-profit students to a matched comparison group of young individuals who report no college attendance suggest no gain in earnings, but a slight increase in the likelihood of employment, on average. Men see positive earnings gains relative to non-attendance, while the 70 percent of for-profit students who are women see virtually no gain relative to their no-college counterparts. Back-of-the-envelope benefit-cost calculations suggest that for the average student, the earnings gains to for-profit certificate programs are not high enough to offset the cost of student debt. We suggest that future studies on for-profit returns focus on addressing the endogeneity of program completion, generating causal impacts of attendance for degree-seeking students, and exploring differences in quality within the for-profit sector.

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Table 1. Summary Statistics, Certificate Students

	Full Sample		Matched with Public		Matched with "No College"	
	For-Profit	Public	For-Profit	Public	For-Profit	No College
Variable means (st. dev)	(1)	(2)	(3)	(4)	(5)	(6)
Age	27.7	29.2	24.2	24.1	24.2	24.2
	(7.78)	(8.45)	(6.42)	(6.46)	(1.69)	(1.71)
Male	0.29	0.37	0.24	0.24	0.30	0.30
	(0.46)	(0.48)	(0.43)	(0.43)	(0.46)	(0.46)
Married	0.20	0.29	0.18	0.19	0.15	0.22
	(0.45)	(0.45)	(0.39)	(0.39)	(0.36)	(0.41)
Has children	0.62	0.57	0.56	0.60	0.43	0.73
	(0.48)	(0.49)	(0.50)	(0.49)	(0.50)	(0.45)
Number of children (if >0)	1.75	1.79	1.74	1.75	1.56	3.02
	(0.67)	(0.88)	(0.86)	(0.89)	(0.73)	(1.45)
Pre-enrollment earnings ($)	12,546	16,293	10,619	10,441	8,229	7,017
	(14,514)	(17,779)	(12,669)	(12,482)	(9,975)	(9,566)
Pre-enrollment employment	0.80	0.85	0.77	0.76	0.75	0.64
	(0.40)	(0.35)	(0.42)	(0.43)	(0.43)	(0.48)
Tuition charged	8,118	719	8,522	656	8,595	
	(16,238)	(7,169)	(14,929)	(5,549)	(15,526)	0
Has student loan debt	0.83	0.24	0.83	0.23	0.85	
	(0.38)	(0.43)	(0.37)	(0.42)	(0.36)	0
Total debt amount ($)	5,339	1,259	6,091	1,205	5,489	
	(4,895)	(3,011)	(5,769)	(3,075)	(4,693)	0
Program completion	0.59	0.38	0.59	0.40	0.40	
	(0.49)	(0.48)	(0.49)	(0.49)	(0.49)	0
Years enrolled	1.08	1.31	1.67	1.94	1.69	
	(0.28)	(0.82)	(0.61)	(1.07)	(0.66)	0
Observations	6,595,978	3,299,399	3,158,623	3,117,506	849,099	748,733
Individuals	566,671	278,044	274,084	274,084	88,476	88,301
Institutions	1,666	1,283	1,596	1,124	1,503	

Notes: Standard deviations in parentheses. 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 2. Percentage of Certificate Students Top 10 Fields of Study, by Sector

For-Profit			Public		
Field	N	%	Field	N	%
Health & Medical Assisting	148,881	26.2	*Practical Nursing*	52,970	20.0
Cosmetology	105,947	18.6	Criminal Justice	14,122	5.3
Health Administration	58,304	10.3	*Health & Medical Assisting*	14,099	5.3
Vehicle Maintenance	46,706	8.2	*Vehicle Maintenance*	13,645	5.2
Therapeutic Services	42,284	7.4	*Cosmetology*	12,526	4.7
Dental Support	20,871	3.7	*Health Diagnostics*	12,108	4.6
Practical Nursing	20,245	3.6	*Health Administration*	11,898	4.5
Health Diagnostics	13,551	2.4	Business Support	11,751	4.4
Culinary Arts	10,287	1.8	Precision Metal Working	9,521	3.6
HVAC Repair	8,413	1.5	Human Development	9,415	3.6
Total in Top 10 Fields	475,489	83.7	**Total in Top 10 Fields**	162,055	61.3

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/.

Table 3. Employment and Earnings Outcomes of For-Profit Certificate Students Relative to Public Students

	Employment	Annual Earnings ($)	Ln Annual Earnings
A. Full Sample	(1)	(2)	(3)
Post-Education	0.004	3,926**	0.179**
	[0.003]	[371]	[0.018]
Post-Education*For-Profit	0.002	-5,555**	-0.205**
	[0.003]	[276]	[0.009]
Mean	0.86	16,923	9.34
Observations	9,895,377	9,895,377	8,195,795
Individuals	844,715	844,715	838,196

	Employment	Annual Earnings ($)	Ln Annual Earnings
B. Matched Public Sample	(1)	(2)	(3)
Post-Education	-0.002	1,069*	0.168*
	[0.018]	[445]	[0.068]
Post-Education*For-Profit	-0.015*	-2,144**	-0.113**
	[0.006]	[183]	[0.011]
Mean	0.76	10,441	8.96
Observations	6,276,129	6,276,129	5,020,672
Individuals	548,168	548,168	543,560

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). Full sample incldues all public and for-profit certificate students. Matched sample includes public and for-profit students matched on propensity scores within sex-age-3-digit zipcode-4-digit CIP code bins. All years enrolled in a Gainful Employment program are dropped. Annual Earnings in column (2) include individuals who are not employed and have zero earnings, while Ln(Annual Earnings) in column (3) drop individuals with zero earnings. Mean is the pre-enrollment mean of public sector students.

Table 4. Employment and Earnings Outcomes of For-Profit Certificate Students Relative to Matched Public Students, by Sex

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Females	Males	Females	Males	Females	Males
	(1)	(2)	(3)	(4)	(5)	(6)
Post-Education	0.004	-0.022	1,395**	74	0.209*	0.006
	[0.022]	[0.017]	[515]	[740]	[0.084]	[0.056]
Post-Education*For-Profit	-0.021**	0.006	-2,234**	-1,807**	-0.119**	-0.089**
	[0.006]	[0.011]	[161]	[348]	[0.013]	[0.017]
Mean	0.77	0.73	10,230	11,252	8.9	9
Observations	4,865,348	1,410,781	4,865,348	1,410,781	3,899,276	1,121,396
Individuals	237,082	77,848	237,082	77,848	234,727	77,112

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). Matched sample includes public and for-profit students matched on propensity scores within sex-age-3-digit zipcode-4-digit CIP code bins. All years enrolled in a Gainful Employment program are dropped. Annual Earnings in columns (3) and (4) include individuals who are not employed and have zero earnings, while Ln(Annual Earnings) in columns (5) and (6) drop individuals with zero earnings. Mean is the pre-enrollment mean of public sector students. Mean is the pre-enrollment mean of public sector students.

Table 5. Employment and Earnings Outcomes of Certificate Students Relative to Matched Public Students, by Institutional Characteristics

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Online	Campus	Online	Campus	Online	Campus
A. Online	(1)	(2)	(3)	(4)	(5)	(6)
Post-Education	0.036	0.000	1,229	1,422**	0.117	0.179*
	[0.020]	[0.018]	[1,408]	[500]	[0.072]	[0.084]
Post-Education*For-Profit	-0.071**	-0.014*	-5,083**	-2,138**	-0.230**	-0.105**
	[0.011]	[0.006]	[418]	[188]	[0.033]	[0.013]
Mean	0.81	0.77	11,818	10,179	9	8.9
Observations	94,767	4,328,651	94,767	4,328,651	78,181	3,476,734
Individuals	5,635	221,699	5,635	221,699	5,597	219,839

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Chain	Non-Chain	Chain	Non-Chain	Chain	Non-Chain
B. Chains	(1)	(2)	(3)	(4)	(5)	(6)
Post-Education	0.005	0.074*	898	1,258**	0.172*	0.116**
	[0.022]	[0.032]	[509]	[318]	[0.077]	[0.041]
Post-Education*For-Profit	-0.025**	0.020*	-2,398**	-1,200**	-0.121**	-0.072**
	[0.006]	[0.010]	[205]	[213]	[0.012]	[0.014]
Mean	0.77	0.74	10,278	9,656	8.9	8.9
Observations	4,983,487	1,049,337	4,983,487	1,049,337	4,035,161	791,399
Individuals	253,492	59,032	253,492	59,032	251,371	58,092

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). "Online" and "chain" designations are based on 2012 IPEDS data. "Online" = 1 for for-profit colleges in which 50 percent of more students take courses exclusively online. "Chain"= 1 for institutions that report being part of a "multi-institution system, governing board, or corporate structure." To avoid splitting matched pairs, we keep all for-profit students in each subsample (online/campus and chain/non-chain) then re-run the match to match with the closest public student. All years enrolled in a Gainful Employment program are dropped. Annual Earnings in columns (3) and (4) include individuals who are not employed and have zero earnings, while Ln(Annual Earnings) in columns (5) and (6) drop individuals with zero earnings. Mean is the pre-enrollment mean of public sector students.

Table 6. Employment and Earnings Effects of For-Profit Certificate Students Relative to Matched "No College" Group

	Employment	Annual Earnings ($)	Ln Annual Earnings
	(1)	(2)	(3)
Post-Education	-0.084**	511	0.085**
	[0.014]	[303]	[0.027]
Post-Education*For-Profit	0.028**	356	-0.045*
	[0.008]	[257]	[0.019]
Mean	0.67	6,595	8.58
Observations	1,597,832	1,597,832	1,143,559

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). Sample includes for-profit students and "no-college" individuals matched on propensity scores within sex-age-3-digit zipcode bins, as described in text. All years enrolled in a Gainful Employment program are dropped. Mean is the pre-enrollment mean of the "no college" group.

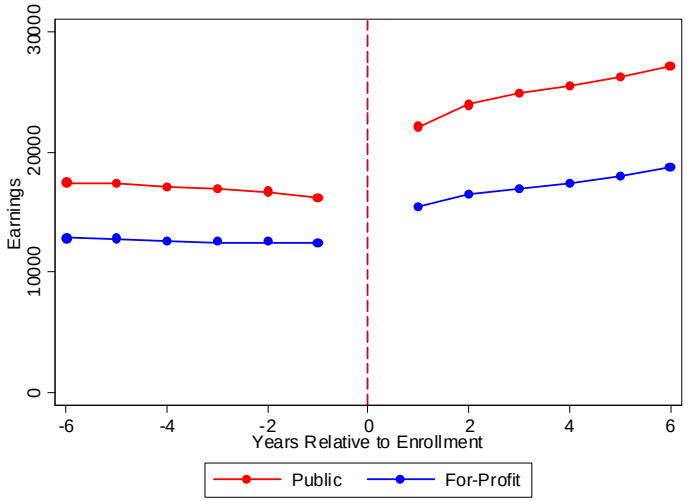
Table 7. Employment and Earnings Outcomes of For-Profit Certificate Students Relative to "No College" Group, by Sex

	Employment		Annual Earnings ($)		Ln Annual Earnings	
	Females	Males	Females	Males	Females	Males
	(1)	(2)	(3)	(4)	(5)	(6)
Post-Education	-0.071**	-0.113**	480	505	0.081**	0.094
	[0.016]	[0.015]	[349]	[615]	[0.031]	[0.049]
Post-Education*For-Profit	0.019*	0.049**	-25	1,356**	-0.047*	-0.040*
	[0.009]	[0.012]	[260]	[506]	[0.021]	[0.020]
Mean	0.67	0.66	6,121	7,679	8.5	8.7
Observations	1,113,733	484,099	1,113,733	484,099	794,577	348,982

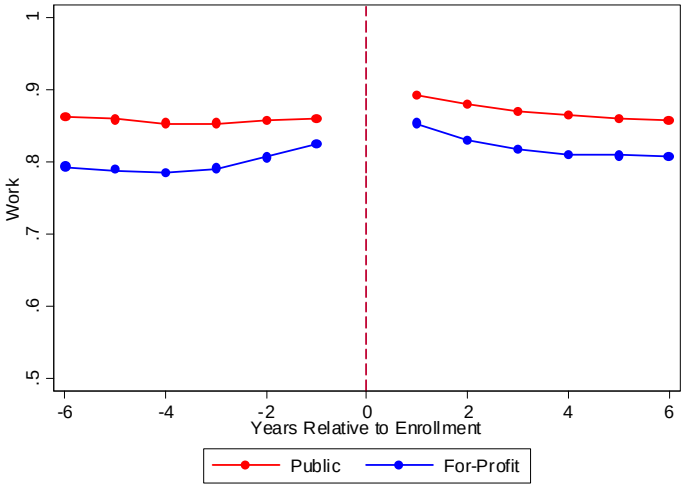
Notes: Standard errors clustered at the state-year level in brackets. ** p<0.01, * p<0.05. All regressions include age, year, and individual fixed effects, as described in equation (1). Sample includes for-profit students and "no-college" individuals matched on propensity scores within sex-age-3-digit zipcode bins, as described in text. All years enrolled in a Gainful Employment program are dropped. Mean is the pre-enrollment mean of the "no college" group.

Figure 1. Mean Earnings and Employment Over Time, For-Profit and Public Certificate Students

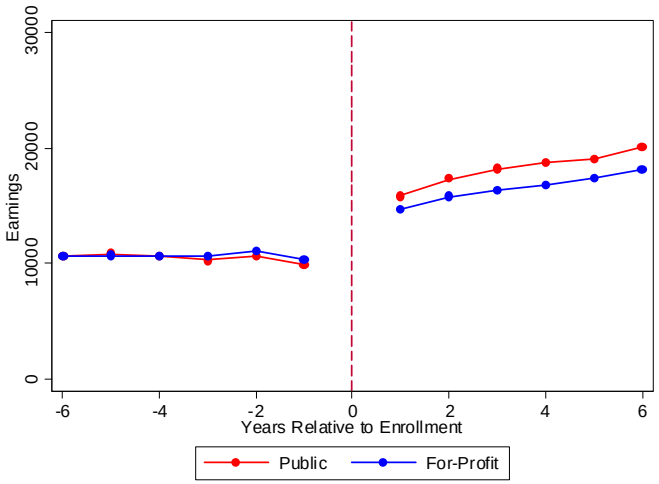
A. Annual Earnings ($), Full Sample



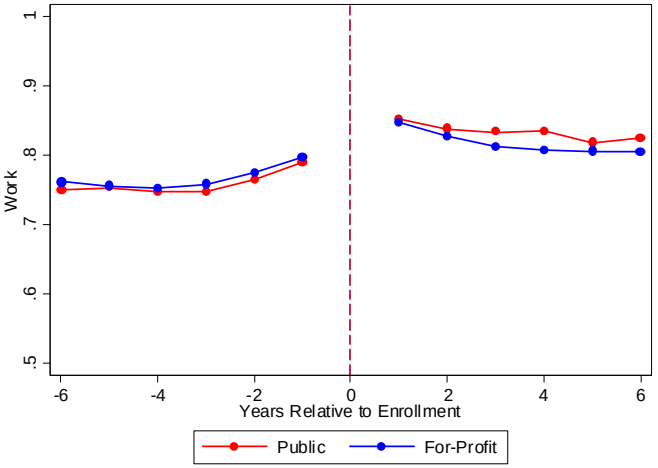
B. Probability of Employment, Full Sample



C. Annual Earnings ($), Matched Public Sample



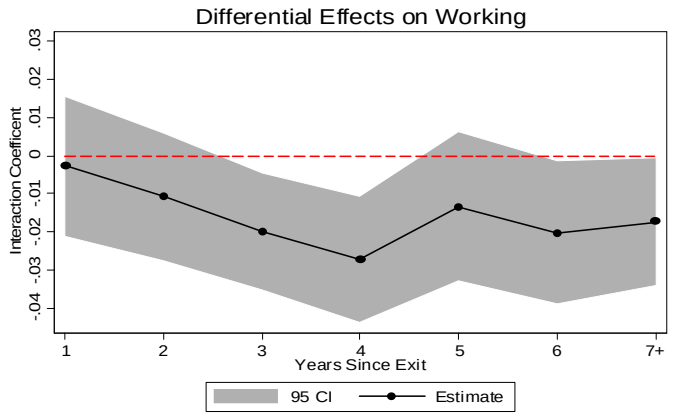
D. Probability of Employment, Matched Public Sample



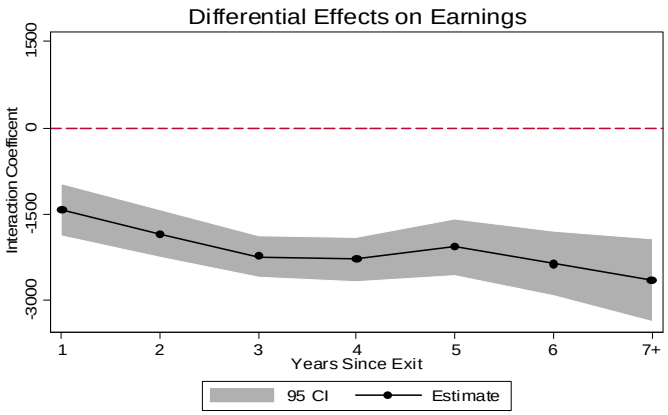
Notes: All years enrolled in a Gainful Employment program are dropped.

Figure 2. Time Pattern of Relative Employment and Earnings of For-Profit Certificate Students, Matched Public Sample

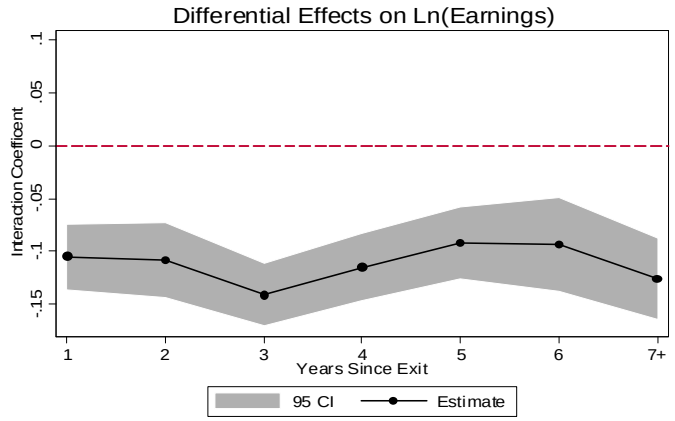
A. Employment



B. Annual Earnings ($)

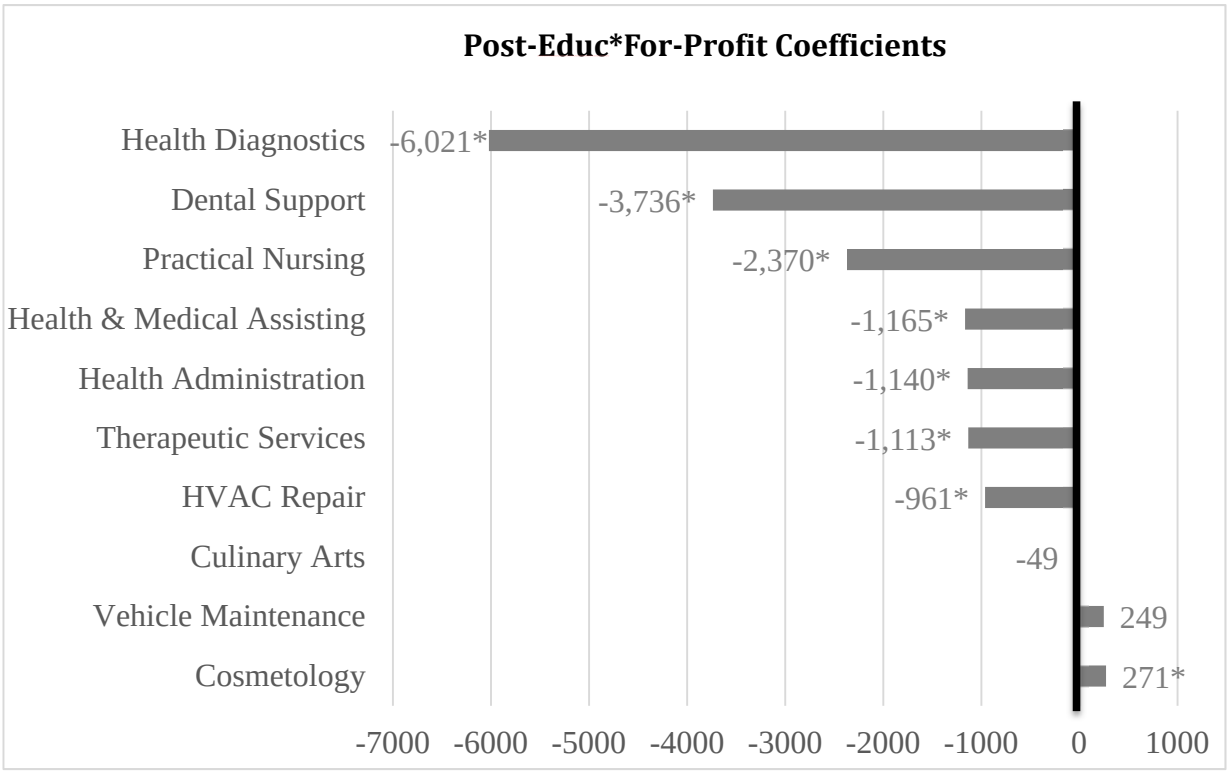


C. Ln(Annual Earnings)



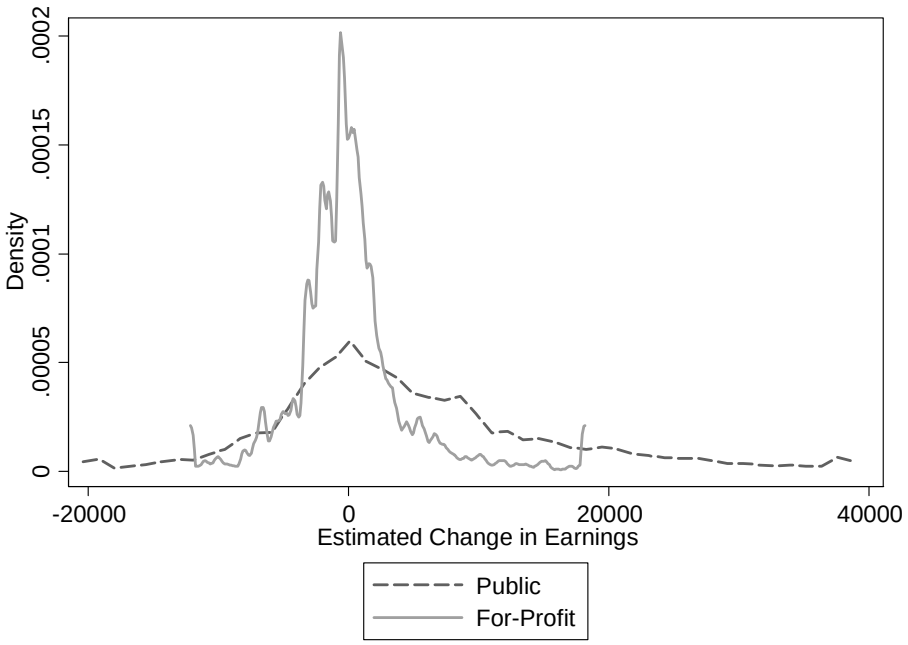
Notes: Figures plot coefficients of interactions of *Post*For-Profit* with indicators for the number of years post-exit for the matched sample. Shaded areas represent 95 percent confidence intervals.

Figure 3. Annual Earnings ($) of For-Profit Certificate Students Relative to Public Students in Top 10 Fields



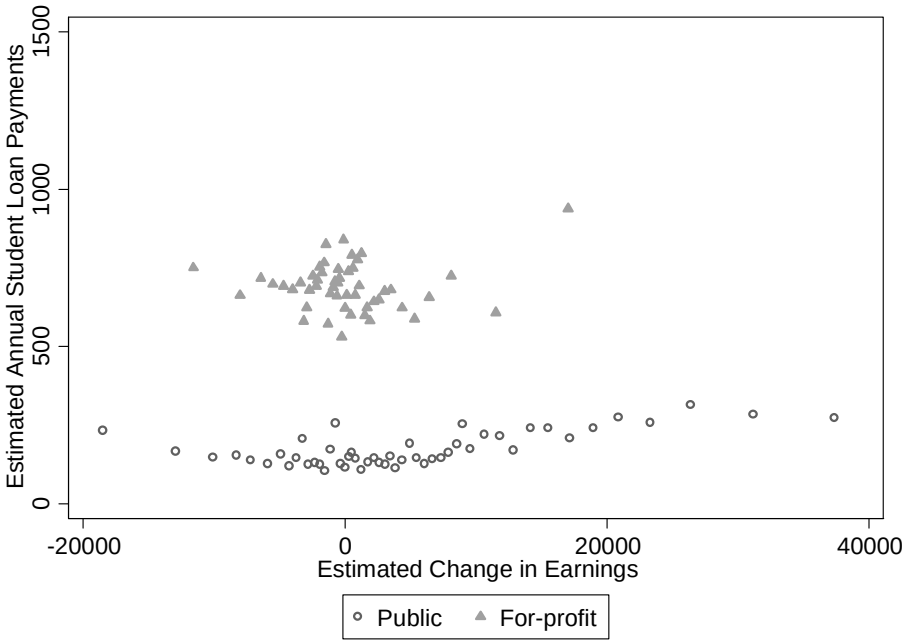
Notes: * Denotes significance at the 5% level or higher. Estimates are from separate regressions for subsamples of public and for-profit students in each field. All regressions include age, year, and individual fixed effects, as described in equation (1). For a listing of the number of for-profit and public students in each field, see Table 2.

Figure 4. Institution-Level Distribution of Earnings for Certificate Students, by Sector



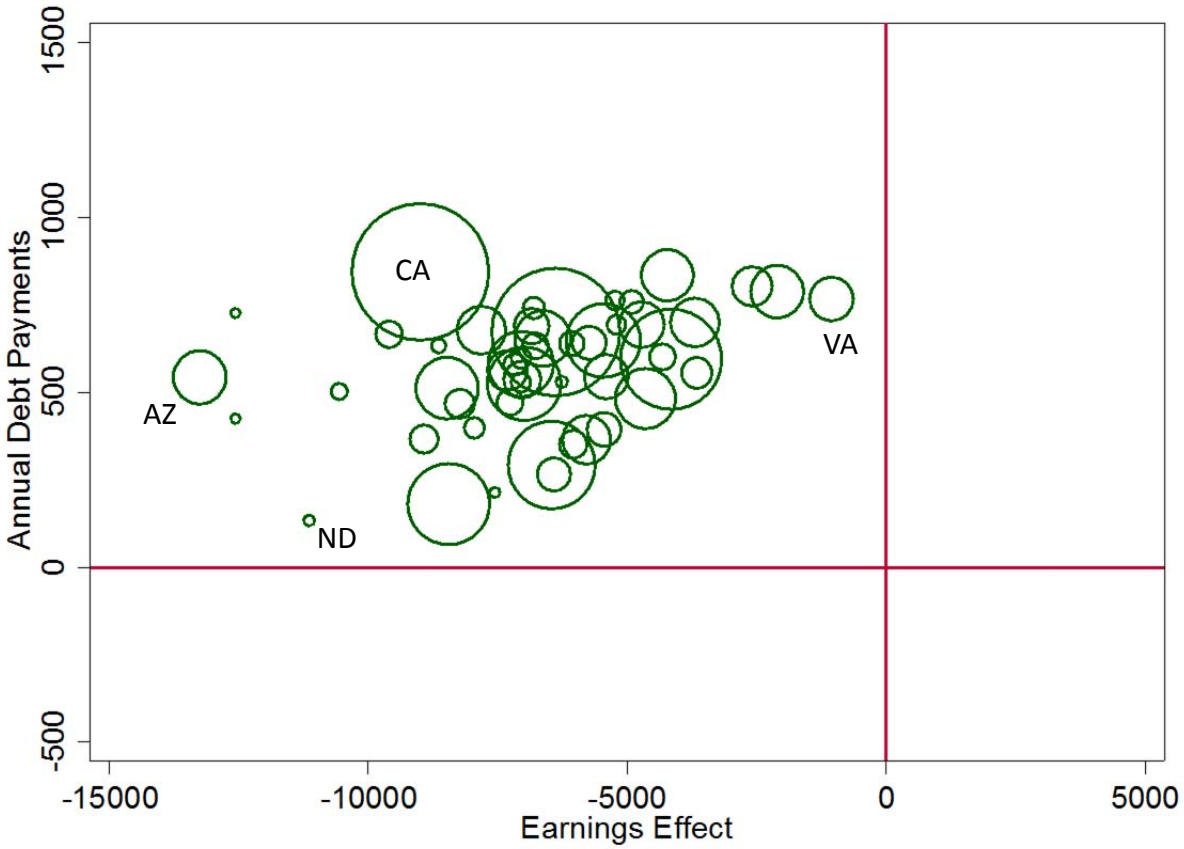
Notes: This figure plots student weighted PDFs of earnings effects (single difference) estimated from separate regressions for each institution that has at least 20 students. These estimates are winsorized at the top and bottom 1% by control. The sample includes just over 9 million observations from roughly 780,000 individuals.

Figure 5. Institution-Level Debt vs. Earnings for Certificate Students, by Sector



Notes: This scatter plot shows average student weighted earnings effects (single difference) estimated from separate regressions for each institution that has at least 20 students and average annual student loan paymments in 50 equally sized groups defined by control. Earnings estimates are winsorized at the top and bottom 1% by control prior to averaging. The sample includes just over 9 million observations from roughly 780,000 individuals.

Figure 6. Relative Debt and Earnings for Certificate Students, by State



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