The Benefits of Alternatives to Conventional College:
Comparing the Labor-Market Returns to For-Profit Schools and Community Colleges

Christopher Jepsen[1], Peter Mueser, Kenneth Troske & Kyung-Seong Jeon

Abstract:

This paper provides novel evidence on the labor-market returns to for-profit postsecondary school and community college attendance. Specifically, we link administrative records on for-profit school and community college attendance with quarterly earnings data for over 400,000 students who enrolled in for-profit schools and community colleges in one state between 2005 and 2012. Five years after enrollment, for students attending for-profit schools certificate programs, quarterly earnings conditional on employment exceed earnings in the absence of schooling by about 21 percent for men and 24 percent for women. For women seeking associate's degrees, the return is 20 percent, but it is about 29 percent for men seeking associate's degrees. For students attending community colleges, the increment in quarterly earnings conditional on employment is 18 to 24 percent for those seeking certificates and 15 to 17 percent for those seeking associate degrees.

JEL classification: J24, I26

Keywords: postsecondary education, labor-market returns, for-profit schools

I. Introduction

The income distribution in the United States has widened over the last few decades. The relative earnings for high school graduates have declined substantially, and job opportunities for less-skilled workers are becoming more limited. U.S. states have drastically reduced funding for education, and public community colleges and universities are particularly hard hit (Phelan, 2014). One response by potential students to this cut in funding appears to have been an increase in enrollment in for-profit colleges (also known as proprietary schools). Between 2000 and 2010 enrollment in for-profit colleges increased by 350 percent while enrollment in all public higher education institutions rose by 29 percent and enrollment in two-year public schools rose by 27 percent; in 2010 9.6 percent of all post-secondary students were attending for-profit schools (Snyder, de Brey and Dillow, 2019).

During the Obama administration, the U.S. government, along with several states, increased oversight of the for-profit school industry in response to "abusive practices" such as false promises to students of future earnings and employment opportunities (U.S. Department of Education, 2015). Under the U.S. Department of Education "gainful employment" rules, for-profit institutions and community colleges had to satisfy requirements concerning their graduates' employment in order to be eligible for federal aid. Controversial when implemented, the rules were labeled "overly burdensome" by the Trump administration and their full implementation suspended (U.S. Department of Education, 2017), however, candidate Biden indicated that he would reinstate many of the rules put in place during the Obama adminstration. Notwithstanding the federal position, the continued criticism of for-profit schools by elected officials and other policy makers, as well as recent research finding reporting low or even negative returns to attending a for-profit school (Cellini and Koedel, 2017; Cellini and Turner,

2019), appears to have impacted more recent enrollments in for-profit schools, while continued budget cuts appears to have impacted enrollment in public schools and particularly enrollment in community colleges. Since 2010, total enrollment in for-profit schools has fallen by 42 percent and students in for-profit schools now make up less than 6 percent of total enrollment in all post-secondary schools (Snyder, de Brey and Dillow, 2019). At the same time enrollment in public post-secondary schools has fallen by 4 percent while enrollment in two-year schools has declined by 20 percent (Snyder, de Brey and Dillow, 2019). In the midst of this on-going controversy on the effectiveness of for-profit schools as well as the decline in funding for public schools, evidence on whether these schools improve labor-market outcomes and what type of school is more efficient at improving outcomes is critical for deciding whether for-profit or community colleges should receive public support or be allowed to grow.

We estimate the returns to for-profit schools and public community colleges using administrative data for over 100,000 students who enrolled in for-profit schools and over 290,000 students who enrolled in public community colleges in one state between 2005 and 2012. These data allow us to directly compare the returns between these two types of schools. We complement previous studies using national data by including a broader set of for-profit schools and students, specifically schools that do not receive U.S. federal aid, as well as students who do not receive federal financial aid. Our preferred model is a two-step model using person fixed effects and calendar quarter in the first stage to predict earnings in the pre-enrollment period, estimated separately by gender, school type, and degree type. Our model allows the earnings increment resulting from program participation to vary with time since enrollment.

We find sizable earnings returns to for-profit school attendance as predicted from a base period 5 to 24 quarters before enrollment. By the fifth year after entry (17-20 quarters after

enrollment) for students attending for-profit schools certificate programs, quarterly earnings conditional on employment exceed earnings in the absence of schooling by about 21 percent for men and 24 percent for women. For women seeking associate's degrees, the return is 20 percent, but it is about 29 percent for men seeking associate's degrees. For students attending community colleges, the increment in quarterly earnings conditional on employment is 18 to 24 percent for those seeking certificates and 15 to 17 percent for those seeking associate degrees. Estimated effects on employment are much more modest, ranging between 0 and 4 percentage points in the fifth year after entry. Finally, students in for-profit schools have much higher costs than community college students, and differences in field of study only explain a fraction of the cost differences between the two sectors.

These comparisons, however, ignore the important differences in both the kinds of individuals who attend for-profit schools and community colleges and the areas of study they pursue. Whether considering men or women, the differences are such that for-profit schools and community colleges are serving distinct markets. Once an individual has chosen a field of study, choices between the two types of schools become very limited.

II. Relation to Previous Literature

Research on the labor-market returns to for-profit schools fall in to three categories: (1) studies using nationally representative data sets such as the Beginning Postsecondary Survey (BPS) (Deming, Goldin, and Katz, 2012; Lang and Weinstein, 2013; Cellini and Chaudhary, 2014; and Liu and Belfield, 2014);[2] (2) studies using administrative data (Liu and Belfield, 2013;

---

[2] Due to the small sample of students attending for-profit schools, Chung's (2008) analysis of the labor-market returns of attending for-profit schools using data from the National Education Longitudinal Study is inconclusive.

Cellini and Turner, 2019) and (3) audit studies (Darolia et al., 2015; and Deming et al., 2016).[3] Cellini and Koedel (2017) review this literature and conclude that for-profit colleges generally have lower returns than public colleges, whereas Gilpin and Stoddard (2017) interpret the findings as inconclusive.

Perhaps the most widely cited recent paper in this area, published after the above reviews, is by Cellini and Turner (2019). They use administrative data from the U.S. Department of Education to study labor-market returns to certificates in for-profit colleges among the subset of students who receive federal aid under Title IV of the Higher Education Act of 1965. Their approach matches students in for-profit certificate programs with students in public community colleges and finds that earnings are lower for the former group. However, they are not able to control for race, which could induce bias if returns differ by race. Blacks are overrepresented in for-profit schools and generally obtain lower earnings.

Our main contribution to the existing literature using national data is that we exploit data with a much broader set of for-profit schools and students in one state. Survey datasets have the advantage of covering the entire country, but they have relatively small numbers of respondents attending for-profit schools.[4] The national data used by Cellini and Turner (2019) include only schools eligible for Title IV federal assistance, and they have data only on students who actually receive federal aid. Many for-profit schools offer only certificates and do not participate in federal government programs. Any comprehensive look at for-profit institutions should include schools and students that do not receive federal assistance as well as those that do.

---

[3] Armona, Chakrabarti, and Lovenheim (2018) focus on financial aid and student loan debt, although they provide some estimates of the returns for students attending for-profit schools using both survey and administrative data. Results generally suggest returns are smaller for-profit schools, but most estimates are quite imprecise.

[4] BPS data, for example, include only first-time students and are limited to students attending Title IV eligible institutions. Deming, Goldin, and Katz (2012) and Lang and Weinstein (2013) acknowledge that many students in for-profit colleges have previously attended postsecondary education.

Second, we estimate a more flexible model specification that allows the returns to for-profit schools to vary over time. Although several recent papers estimate models that allow the return to community college to vary by time since enrollment, existing studies of for-profit schools usually fit models that assume the return is constant in each time period. These studies also pool students from for-profit and community colleges when estimating fixed-effects models. We are concerned that this less flexible model may mask heterogenous impacts in returns and population differences between students attending for-profit and community colleges.

Finally, we present evidence showing that students in for-profit schools and community colleges pursue different degrees and focus on different areas of study. We undertake comparisons in returns for the small number of students who are comparable—in terms of personal characteristics and area of study—and find that results are largely unchanged. However, we suggest that the two types of schools serve distinct markets, so that the comparison does not represent choices faced by many individuals.

III. Data

Our analyses examine the enrollment and earnings returns for students who entered for-profit post-secondary schools or public community colleges located in Missouri from January 2005 to December 2012. In order to estimate counterfactual earnings, we also use data on pre-entry earnings for individuals who entered school as late as December 2015.

For-profit schools with a physical presence in the state must provide student-level data as part of Missouri's Proprietary School Certification Program.[5] Although we do not have data on

---

[5] See http://dhe.mo.gov/psc/. Although the program formally requires certification of both nonprofit and for-profit postsecondary education programs, a variety of provisions exempt most non-profit postsecondary institutions. We were able to identify the for-profit or not-for-profit status of all schools that accepted students in 2010. This set of schools accounted for 81 percent of individuals analyzed in our sample. In this subgroup, 99 percent attended private for-profit institutions; private nonprofit institutions accounted for the remainder. We refer to these schools as for-profit schools to be consistent with the literature.

schools that are on-line only, discussions with state education officials suggest that very few on-line only schools exist during this time period.[6] As in most states, the set of schools includes campuses of national institutions such as the University of Phoenix as well as local institutions focusing on one or two subjects such as truck driving academies. The data are not limited to schools that receive Title IV funding from the U.S. government or to students who receive federal financial aid. Although we know of no comprehensive listing that would allow us to identify whether all for-profit schools within the state are included, the analyses here are based on a more comprehensive listing of for-profit schools – for one state – than that used in any previous analyses. The state's Enhanced Missouri Student Achievement Study (EMSAS) records provide information about individuals who enroll in any of the state's 14 community colleges.

Our analysis will focus on spells of enrollment, where a spell is a period of participation in either a for-profit school or a community college, allowing for periods of non-enrollment of no more than a year within a spell. The for-profit data provide an entry date and an exit date for each person in a given institution. For an individual who exits a for-profit school and then re-enters that school or another for-profit school within one year, we combine these periods of enrollment into a single spell. If a second period of enrollment begins more than one year after the date of a prior exit, the second enrollment begins a separate spell. The community college data provide information on enrollment by semester for the fall semester, the winter/spring semester, and the summer semester, but do not provide specific dates of enrollment. We define a spell of enrollment as a period with successive semesters for which an individual is recorded as enrolled, with no more than two intervening semesters of non-enrollment. If an individual enrolls in a community college after three or more intervening semesters of non-enrollment, this

---

[6] We found no evidence of any on-line only for-profit colleges in the Integrated Postsecondary Education Data System (IPEDS). Because non-Title IV schools are not required to fill out the IPEDS, few do so.

enrollment begins a new spell. For both for-profit and community college students, spells are identified by the number of semesters of enrollment.[7]

The sample is limited to students who specify that they are seeking certificates or associate's degrees; the majority of students in for-profit schools and community colleges specify these program types.[8] Those who attend a public four-year educational institution in the state anytime between the beginning of a spell and two years following the end of the last spell of enrollment are omitted from the analysis, as are the small number of individuals who attend both for-profit schools and community colleges during the period of our study. We also exclude students who indicate at the time of enrollment that they are not permanent residents of Missouri or Kansas, the states for which we have administrative earnings data.[9]

For each student, the data contain the specific school attended, the Classification of Instructional Programs (CIP) code with the field of study, and—for award recipients—the type of degree or certificate received.

These data are matched with administrative data on earnings from the Missouri and Kansas Unemployment Insurance (UI) programs, which provide information on quarterly earnings for the overwhelming majority of workers who live in these states.[10] We have adjusted

---

[7] Entry into a for-profit school from January 1 to May 31 is coded as the winter/spring semester, entry from June 1 to July 31 is coded as the summer semester, and entry from August 1 to December 31 is coded as the fall semester. Exits are coded similarly. Although only spells beginning in 2005 or later are considered in the analysis, construction of spells is based on data that begin in 2004, so participation prior to 2005 may influence spells for a given person.

[8] We omit the third of community college students who specify "other" as the degree they are seeking, many of whom intend to transfer to a four-year college. Among for-profit students, we omit the 15 percent of students who indicate that they are seeking a bachelor's or graduate degree.

[9] We keep students who do not specify a state of permanent residence (primarily community college students) because we find that the proportion of these students who have earnings reported in our UI wage record data is similar to that of students who report living in Missouri or Kansas.

[10] One of the two largest population centers in Missouri, the Kansas City metropolitan area, is on the border of Kansas. Although the other center, the St. Louis metropolitan area, is on the border with Illinois, the proportion of Missouri residents who work in Illinois is small. Within the St. Louis metropolitan area, only 16 percent of private sector jobs were in Illinois in 2012 (www.bls.gov/news.release/cewqtr.toc.htm), and most of these jobs would have been held by Illinois residents.

all earnings for inflation, with 2010 as the base year. The data do not include earnings from employment in other states, jobs not covered by UI reporting requirements, such as informal or federal employment, or earnings from self-employment. Notwithstanding these omissions, it has been suggested that program effects on employment and earnings based on wage records are generally comparable to those obtained in surveys, at least in the context of worker training programs (Kornfeld and Bloom, 1999) and welfare programs (Wallace and Haveman, 2007).

Our outcome analyses use quarterly earnings information from the first quarter of 1999 through the third quarter of 2014. Thus, we have data for at least five years prior to school attendance and over four years (19 quarters) after initial enrollment in a for-profit school or community college. The resulting data set is a panel of student entries and time periods. We exclude quarters where the individual is under the age of 18 or over the age of 60 at any time during the quarter, as well as any quarter of earnings more than 24 quarters prior to program entry or more than 25 quarters after program entry. We also exclude all observations for individuals where age or Social Security number are missing. The number of individuals omitted for these latter reasons is very small. In the for-profit data, we also omit the approximately 22 percent of cases where the date of exit is missing. In the community college data, since spells are constructed from data on semesters of enrollment, exit date is never missing.

Although our data pertain only to those attending for-profit schools and community colleges in Missouri, the state is typical of the U.S. The industrial structure is similar to that of the U.S. as a whole, and earnings and wages are no more than 10 percent below the U.S. average. The proportion of the population that is African-American is slightly below the national average. The proportion Hispanic is substantially below the U.S. average but similar to that of most states.

Because the state is representative of the nation in many respects, the results provide estimates that are plausible for many parts of the country.

IV. Methods

To estimate labor-market returns, we compare the post-schooling earnings of an individual with the pre-schooling earnings of the same individual. In effect, the comparison group and the treatment group (to use experimental terminology) consist of the same individuals, so most of the measured and unmeasured factors that influence earnings are the same.

This fixed-effects model is a valid tool for estimating returns to schooling for individuals with pre-schooling earnings information. Economists regularly use fixed-effects models to estimate labor-market returns for nontraditional students.[11] Cellini and Turner (2019) and Cellini and Chaudhary (2014) use a student fixed-effects model for measuring the labor-market returns to for-profit schools. Several papers also use student fixed-effects models to estimate labor-market returns to community colleges (Jepsen, Troske and Coomes, 2014, Belfield and Bailey, 2017). Using pre-schooling time periods as controls is appropriate in our data because over 80 percent of students are age 20 or older when they initially enroll, and average age is around 30.

Following Cellini and Chaudhary (2014), we focus on quarters with positive earnings. We fit the model separately by gender, type of school (for-profit versus community college), and program (certificate versus associate's degree) yielding eight sets of estimates. Although the fixed effects model adjusts for individual differences, it is necessary to obtain estimates of the effects of calendar quarter and age in order to predict the earnings that an individual would have obtained following enrollment if he or she had not enrolled. To estimate such counterfactual

---

[11] The main limitation of student fixed effect models pointed out by Dynarski, Jacob, and Kreisman (2016) is the underlying assumption that the pre-enrollment earnings trends between completers and dropouts are similar. This concern does not apply here because we do not compare completers and dropouts.

earnings, we obtain estimates of these parameters using earnings for all individuals prior to enrollment. In particular, we undertake such estimation using earnings 24 to five quarters prior to enrollment for all individuals who began participation over the period 2005 through 2015. The fixed-effects model fits the following multivariate regression:

(1) $\quad LNEARN_{it} = \delta \cdot AGE_{it} + \eta_i + \tau_t + \varepsilon_{it}.$

In this equation, i denotes a person and t denotes a quarter. *LNEARN* is the log of total reported UI earnings across all jobs for the quarter. Quarters with no reported UI earnings are excluded. *AGE* is the individual's age in years, represented by a cubic. The parameter η is a set of person fixed effects, capturing all person-specific components that are constant over time, such as race/ethnicity or innate ability. The model also contains a set of dichotomous variables to control for each calendar quarter (τ). The last component (ε) is the error term.

Based on (1), we construct counterfactual earnings for each individual for quarters beginning four quarters prior to the enrollment. In particular, for an individual i, we specify:

(2) $\quad \widehat{LNEARN}_{it} = \hat{\delta} \cdot AGE_{it} + \hat{\eta}_i + \hat{\tau}_t.$

Because we estimate the model in (1) on earnings five or more quarters prior to program entry, and the latest entry date available is at the end of 2015, the most recent earnings available are for quarter 3 in 2014. The reason for estimating this model is to provide estimates of the calendar quarter and age coefficients that cannot, by construction, be influenced by earnings subsequent to enrollment.[12]

---

[12] In preliminary estimation, we found indeed that estimates of equation (1) were unstable, producing implausible estimates of the calendar quarter effects. The most likely explanation for this result is – as mentioned in the text above – that these dummy variables are capturing some of the impact of education on earnings. A similar concern exists with the model that uses a single post-enrollment dummy variable to estimate the effect of enrollment on earnings, as discussed in Jepsen, Mueser, and Jeon (2019). The approach we use here has the important advantage that it avoids the potential bias that can occur in fixed effects models as described in de Chaisemartin and D'Haultfoeuille (2020).

We then fit the following equation for all entries occurring from 2005 through 2012:

(3) $LNEARN_{it} - \widehat{LNEARN}_{it} = \alpha \cdot ENROLL_{it} + \beta \cdot ENTRY_{it} + \varepsilon_{it}.$

ENROLL is a variable equal to one for each quarter in which the individual is enrolled in school for the entire quarter and a value of one-half for the first quarter and last quarter of school enrollment. Because the school entry and exit dates are unlikely to coincide perfectly with the calendar quarter, we assume that individuals spend only half of those quarters enrolled in school.

The input of interest is for-profit school or community college attendance. The vector *ENTRY* contains a set of dichotomous variables measuring time relative to entry into schooling, beginning four quarters prior to the date of entry through quarter 25. Hence, we include a variable for the fourth quarter before enrolling, a variable for the third quarter before enrolling, extending through the twenty-fifth quarter after enrolling. The variables for the four quarters before enrollment are included to capture the possibility of an "Ashenfelter dip" in earnings in the quarters immediately before enrollment, as Jepsen, Troske, and Coomes (2014) document large dips in earnings immediately prior to community college attendance. The reference period or omitted category is the set of quarters more than four quarters before enrollment. The coefficients report the difference in earnings for the specified quarter relative to quarters more than one year before school entry, taking account of age and calendar quarter effects.

As mentioned previously, we have earnings data from the first quarter of 1999 through the third quarter of 2015. Because we exclude observations more than 24 quarters before program entry and more than 25 quarters after program entry, we have up to 50 quarters of earnings observations per person.

The quarterly variables for the period after initial enrollment provide a flexible way to capture the returns to attendance, similar to recent work on the returns to community colleges

(Jaggars and Xu, 2016; Bahr, 2016; Minaya and Scott-Clayton, 2017).[13] Unlike the estimator in much previous work on for-profits, we do not constrain the earnings to have any specific parametric relationship with the time since enrollment. Estimates of the impact of attendance are identified relative to the implicit counterfactual defined by the dummies for calendar quarter and the cubic function for age. Furthermore, we do not pool the data, either by gender, school type, or program type, to avoid constraining the estimates.

Because the sample includes only individuals who attend for-profit schools or community colleges, identification of the effects in post-participation quarters derives from a comparison with earnings for quarters at least a year prior to participation and by the assumption that, given controls for age and calendar quarter, the patterns of schooling returns are similar for those beginning their attendance at different ages and in different periods. Having data on non-students is not necessarily essential for identification, as Stevens, Kurlaender, and Grosz (2018) and Jepsen, Troske, and Coomes (2012) find similar returns for community college awards in models that exclude dropouts to their preferred model that includes them.

We look at spells of attendance rather than completion of a degree in order to avoid endogeneity concerns associated with non-random completion, as noted in Cellini and Chaudhary (2014). Another, more practical, reason for the focus on attendance rather than completion is that, in those cases where the degree completed is not specified, we cannot always determine whether the individual left the program without a degree or if the information is missing for some other reason.

---

[13] The seminal papers on returns to community college, Jacobson, LaLonde, and Sullivan (2005a, 2005b), also allowed the overall effect of community college attendance to vary with the number of quarters since enrollment through the inclusion of what they call short-run deviations.

By design, our structure is only relevant for individuals with observed earnings. In other words, our earnings estimates understate the contribution of enrollment to overall earnings if attendance increases the likelihood of employment. As a complement to these analyses, we also fit a model that predicts expected employment:

(4) $\quad EMP_{it} - \widehat{EMP}_{it} = \alpha \cdot ENROLL_{it} + \beta \cdot ENTRY_{it} + \varepsilon_{it}.$

Employment (*EMP*) is a dichotomous variable equal to one for individuals with observed earnings. Here $\widehat{EMP}_{it}$ is estimated in equations paralleling (1) and (2) above. We estimate the model as a linear probability model.

There are several reasons that individuals may not have observed earnings in a quarter. Given that our earnings measures capture employment only in the state where enrollment occurred and one adjacent state, those who leave these states after completing schooling may have earnings elsewhere that we do not capture. Insofar as school attendance is associated with departure from our states, our estimates that predict employment will misrepresent returns from enrollment. Alternatively, individuals may have no observed earnings because they are unemployed or have left the labor market. Insofar as these latter employment differences reflect the impact of school attendance, we wish to take them into account.

As a way to incorporate the possibility that individuals may have left these states, we have fitted the above employment model on a sample that omits quarters if we observe no employment for an extended period through the end of our earnings data. In particular, if we observe no earnings in quarter 30 (or the last quarter for which earnings data are available), and the continuous string of quarters with no earnings subsequent to initial enrollment is at least 10 quarters in length, we omit this string of quarters from the analysis. This approach will fail to account for employment of those who left the state after completing enrollment and were

employed elsewhere before resuming employment in the state, because the intervening years would be coded as including no employment. Conversely, this approach omits some individuals who are unemployed for more than 10 quarters or withdraw from the labor market because of poor opportunities. In each case, bias would result if these activities were associated with school attendance. Given this limitation in the employment analysis, we focus on earnings conditional on employment.

V. Results

Descriptive Statistics

Table 1 contains the descriptive statistics for the analysis sample of over 100,000 entries for students into the state's for-profit schools and nearly 300,000 entries for students into the state's community colleges between January 2005 and December 2012.[14] We provide statistics separately by gender, type of school and by degree program.

Students in for-profit schools are less likely to be white than students in community colleges, with the share Black between 10 and 27 percentage points higher. Some of this difference may be explained by location of the school since, except for men seeking certificates, students attending for-profit schools are more likely to be attending schools in major urban areas. Students in for-profit schools also appear to be less educated than students in community college. Approximately 6.5 percent of certificate-seeking students and 1-2 percent of associate's-seeking students in for-profit schools report having neither a high school degree or GED certification, in contrast to fewer than 0.4 percent of community college students.[15] The share of students who

---

[14] Recall, the analysis sample is limited to entries into certificate or associate's degree programs, where the individual indicated permanent residency in the state or the neighboring state for which we have administrative earnings data, and where the individual had not been enrolled in a for-profit school or community college in the state in the prior 12 months.

[15] Education is missing for around 20 percent of community college students but is missing for fewer than 2 percent of for-profit students, so it is possible that nonrandom reporting of prior education on the part of community college students could account for this difference.

have GED certification is also much higher in for-profits compared to community colleges.

There are also substantial differences in the desired degree program and field of study between students in for-profit schools and students in community colleges. Seventy-one percent of men and two-thirds of women entering for-profit schools are pursuing a certificate compared with around eight percent of men and women entering community colleges. Looking within genders and degree sought, we see very important differences as well. In general, men in for-profit schools are more likely to be in trades, transport, and computer, and those in community colleges are much more likely to be in academic or other fields. Women in for-profit schools are very likely to be in health, and those in community colleges are much more likely to be in the academic/other category.

Finally, we find stark differences in completion rates between students in for-profit schools and community colleges. For individuals who indicate they are seeking a certificate, 63.0 percent of men and 52.5 percent of women in for-profit schools complete the certificate; among students in community colleges, only 19.6 percent of men and 9.7 percent of women complete the certificate program. For students who indicate they are pursuing an associate's degree, 41.6 percent of men and 47.0 percent of women in for-profit school complete the degree; the comparable numbers for community colleges are 9.9 and 12.3 percent, respectively.

To summarize, the numbers in Table 1 show that students in for-profit schools differ from students in community colleges on a number of dimensions such as race, age, and education. Given the significant differences in demographic characteristics, field of study and completion rates between for-profit and community college students, these schools appear to operate in different parts of the higher education market. We explore these differences more thoroughly later in the paper.

Tables 2a and 2b provide mean earnings and levels of employment for selected quarters prior to and subsequent to enrollment by gender, school and program type. Figures 1a and 1b (for men and women, respectively) present the trends in average earnings by quarter relative to quarter of entry, where quarter zero denotes the quarter of initial enrollment. Individuals with no reported earnings in the states' employment records are coded as having zero earnings for the quarter, so the reported means are not conditional on employment.[16]

As Figure 1a shows, men in certificate programs have noticeably higher earnings than men in associate's degree programs for both for-profit schools and community colleges, although the difference narrows for for-profit students after around four years. The difference can be traced to measured characteristics, most notably age. All groups experience an "Ashenfelter dip" in earnings immediately prior to the time of school entry, although the declines are larger for men enrolling in certificate programs (particularly at for-profit schools), as well as reduced earnings following the entry quarter, often called a "lock-in" effect, reflecting participation in school. Because earnings growth is higher in the post-entry period than the pre-schooling period, average earnings exceed their pre-schooling levels a few quarters after school entry for all groups except for-profit students pursuing certificates. The highest average earnings, observed 25 quarters after enrollment, are approximately $6,000 per quarter for the community college certificate program, $5,000 for the community college associate's degree program, $4,700 per quarter for the for-profit certificate program, and $4,300 for the for-profit associate's degree program.

For women, average earnings are much more similar for the different schools and programs. Average earnings for those in community college programs are somewhat higher than

---

[16] As noted above, these means exclude strings of quarters of length 10 or more after initial enrollment where no earnings are observed in quarter 30, or to the end of our observation window if prior to that point.

for for-profit programs, both prior to enrollment and in later periods. After a moderate earnings reduction for all groups around entry, participants in both school types and degree programs experience large increases in average earnings during the first few post-entry quarters; the rate of growth is more modest in later periods. From six quarters after entry until 25 quarters after entry, average earnings are highest for the community college certificate programs, followed by community college associate's programs; earnings for the for-profit programs are lower. At the end of the sample period, average quarterly earnings are between $4,200 and $4,600 for the two community college degree programs, compared with average quarterly earnings around $3,500 for for-profit students.

For both men and women in both type of schools, these trends in average earnings strongly suggest positive impacts of participation. We now turn to regression results, which control for calendar quarter, age, and student fixed effects, for the estimates of the return to for-profit school attendance.

Effects on Earnings

Figures 2a and 2b contain the earnings regression results for the model depicted in equation (3) for men and women, respectively, with separate regressions for each of the four lines in each figure. The figures show the earnings gains (relative to predicted earnings) to attendance for individuals pursuing certificates (dashed lines) and associate's degrees (solid lines) for each quarter beginning four quarters before entry to 25 quarters after entry.[17] The lines indicate the estimated increment in log earnings in that quarter relative to the period from 24 to five quarters before entry (the reference period), controlling for age and year/quarter.[18] Finally,

---

[17] Coefficient estimates and standard errors are shown in Appendix Table A1. For simplicity, figures exclude confidence intervals. We discuss important differences in significance levels in the text.

[18] Note that the graph shows the combined effect of the coefficients for the dummy variables in *ENTRY* and the coefficient for *ENROLL*. We set the *ENROLL* dummy variable equal to one for the average number of quarters in

note that the calendar quarter dummies included in equation (1) control for calendar quarter effects such as those due to statewide changes in wages due to inflation or variation in the health of the economy.

Figure 2a shows a broadly similar pattern for men across school type and degree program: slightly declining earnings in the last four quarters before entry, a large decline around entry (particularly for men in for-profit certificate programs), followed by consistent gains in earnings. Earnings continue to rise for men enrolled in for-profit associate's degree programs, but earnings gains level off around four years after entry for the other three groups. By the fifth year after entry,[19] the average earnings increment relative to predicted earnings in the absence of schooling (based on earnings five to 24 quarters prior to entry) for men seeking certificates in both for-profit schools and community colleges is about 20 percent.[20] In contrast, the average return for for-profit associate's degree students is 29 percent, compared to only 19 percent for community college students seeking associate's degrees.[21] By the end of our period, men in associate's degree programs in for-profit colleges have the largest gain in earnings, well over 30 percent, followed by men in certificate programs in for-profit colleges, with gains of slightly over 25 percent. Men in community colleges continue to experience smaller growth in earnings than men in for-profit colleges, despite having the highest earning growth in the first 10 quarters after enrollment.

Figure 2b shows a different pattern for women. Women in associate's degree programs in

---

which enrollment was observed (rounded to the nearest discrete value). For example, the average number of quarters of enrollment for men in certificate programs is about three, so the dummy variable for enrollment is set to one in the graph for quarters 0 to 2 in the graph, i.e., the first three quarters in which individuals are enrolled.

[19] We choose five years or quarters 17-20 after entry because that time period corresponds roughly with the average post-schooling time period in Cellini and Chaudhary (2014), thus facilitating comparisons of our results with theirs.

[20] Coefficients for earnings reported in the figures and tables refer to effects on the natural logarithm of earnings. We have converted these to percentages for ease of interpretation.

[21] Estimates of return have standard errors between 1 and 2.5 percentage points, so differences of less than 3 percentage points are often not statistically significant at conventional levels. See Appendix Tables A1a and A1b.

community college experience the lowest growth, with for-profit associate's degree programs slightly higher. Growth rates for women in the certificate programs are somewhat higher and for-profit and community college returns are indistinguishable after two years. Five years after entry, the increases in earnings (again, relative to five to 24 quarters prior to entry) average 16 percent for women pursuing associate's degrees in community colleges, compared to 20 percent for for-profit schools. Returns average from 24 to27 percent for women in certificate programs. In quarters 21 to 25, earnings growth tapers for associate's degree programs.

Overall, Figures 2a and 2b illustrate that individuals who attend for-profit schools fare as well as, if not better than, individuals who attend community colleges. The highest gains are for men pursuing associate's degrees in for-profit schools, and the lowest gains are for women pursuing associate's degrees in community colleges.

Effects on Employment

Figures 3a and 3b provide estimates of the effects of enrollment on employment for males and females. Recall that this analysis omits quarters with zero earnings that are of length 10 or greater up through quarter 30 (or the end of the earnings record if prior to that) following school entry, so individuals who permanently left the state do not contribute to this analysis after their departure.

Looking first at Figure 3a, men seeking certificates have an immediate decline in employment of between 6 and 9 percentage points in both for-profit schools and community colleges. In contrast, employment does not decline below the base period for men enrolled in associate's degree programs. Three to eight quarters after enrollment, men attending community colleges have substantially better employment gains (compared to employment of at least one year prior to enrollment) relative to men attending for-profit institutions. For men in community

colleges pursuing certificates, the employment gain is around 6 percentage points in some quarters, with gains slightly lower for men pursuing associate's degrees. In contrast, men in certificate programs at for-profit colleges have the lowest employment gains throughout the period. For these students, the gain is less than 1 percentage point, and by six years after enrollment, employment probabilities are actually lower than the reference period of five to 24 quarters prior to enrollment. For men seeking an associate's degree at a for-profit college, employment prospects improve steadily before peaking 13 quarters after entry at around 5 percentage points. Although the employment gains decline after this point, the employment gains are generally higher than for the other three programs in the last ten quarters of our analysis.[22]

Turning to Figure 3b we see that all four groups of women experience a decline in employment rates (relative to predicted employment) during the period of enrollment, with the decline ranging from 2 to 12 percentage points. Women attending certificate programs in community colleges have no more than a 2 percentage point improvement in employment, and in later quarters have worse employment relative to the pre-enrollment period. The highest gains in employment are for women attending certificate programs in for-profit colleges, where women experience gains of 3 to 5 percentage points for years two to five after enrollment. Women pursuing associate's degrees, either in for-profit schools or in community colleges, have more modest employment gains of 2 to 3 percentage points for much of the post-enrollment period.

Comparing Figures 3a and 3b we see stark differences in employment between men and women. Certificates in for-profit schools provide the best employment outcomes for women and the worst outcomes for men, whereas certificates in community colleges provide the smallest

---

[22] For people who entered schooling in 2005-2006, five to six years later is 2010-2012, a period of unusually high unemployment. If those with new credentials faced particular problems obtaining employment during this period, this would cause a decline in employment near the latter part of our data window.

improvement for women and provide the highest short-run improvement for men. Associate's degree programs provide similar gains for both men and women three to five years after enrollment.

Sensitivity Analysis

The first sensitivity analysis conducted here is whether to pool data across different groups such as degree or school type. Cellini and Turner (2019) pool data between for-profit and community college students seeking certificates. Table 3 explores the sensitivity of the results to pooling the data in this way. Columns 1 and 3 present the results from the model in Appendix Table A1, with separate regressions for for-profit students and community college students. In columns 2 and 4, we estimate pooled models on the combined sample of for-profit and community college students. We include interaction terms between for-profit attendance and each control variable in the second-stage equation estimated in equation 2.[23] The first two columns are for men, and the second two columns are for women.

The table clearly shows that pooling the data affects the results. In the pooled data (Columns 2 and 4), the earning gains for for-profit students are much lower than the coefficients for community college students, a pattern found in Cellini and Turner (2019). In contrast, the gap in earnings gains between school types is much smaller in the separate models (Columns 1 and 3), with men in for-profit colleges having higher earnings gains in the longer term. Our conclusion is that pooling the data in this way is not appropriate. The formal assumption implied by pooling the data is that the income attainment processes for the two groups of students, prior to entry into schooling, are the same, although, in practice, we often pool data to improve precision as long as the processes are not "too different." In the case at hand, however, the very

---

[23] Such interaction terms are not included in the first stage because they are absorbed by the person fixed effects.

different results show that the prior processes differ substantially, and we believe results of the pooled model are likely to be misleading. Given the stark differences in student characteristics between the two school types documented above, we believe that separate models should be estimated by school type, degree sought, and gender to provide the most flexible model.

In Appendix Table A3, we make the same comparison between pooled and separate models for individuals seeking an associate's degree. Again, the pooled model produces lower earnings gains for for-profit students compared to community college students. However, the reported earnings penalty for for-profit students, and thus the gap between for-profit students and community college students, is smaller for associate's degree seekers.

Next, we exclude observations with earnings $1 or less per quarter, as well as trimming the sample of the top 1% and the bottom 1% of the remaining observations. The results from this trimmed sample, used as a robustness test in Cellini and Chaudhary (2014), are nearly identical to the results for the untrimmed sample.

Finally, we exclude students who study the academic/other field, as very few students in for-profit schools – usually less than five percent – are in such fields. The results from these restricted samples are quite similar to the results in the preferred sample, suggesting that the difference in earnings and employment gains between school types are not driven by students pursuing academic fields of study.

So far, the results are for attendance regardless of completion. In Figures 4a and 4b, we limit the sample to completers. These results are informative for comparing with previous work such as Jepsen, Troske, and Coomes (2014) that compares community college completers to dropouts. However, because completion is not random, the results should not be interpreted as causal. Not surprisingly, earnings gains are higher for completers (Figure 4) than for the full

sample of attendees (Figure 2). For men, the earnings gains are again the highest for associate's degrees in for-profits (33% five years after enrollment), but in most quarters the gains are indistinguishable for the other three groups (24-26%). For women, the highest earnings gains are for community college completers of certificates (58% five years after enrollment) followed by associate's degrees in community colleges (35%) and completers in for-profit schools (26-27%). With the exception of men pursuing associate's degrees, completers in community college do as well as, and often better than, completers in for-profits. But community college students are between a fifth and a third as likely to complete certificates or degrees as are for-profit students.

As mentioned previously, the results for employment omit any strings of zero earnings of length 10 or more quarters at the end of the period. In Appendix Figures A1a-A1d, we present results where the number of zero quarters is either 5 or 15 quarters. The figures shows that the coefficients are sensitive to this choice, with higher coefficients for the model that excludes any strings of five or more zeros and lower coefficients for the model excluding strings of 15 or more zeros. However, the ranking of coefficients is stable across these changes. For men, the highest employment gains in the short run are for students seeking a certificate in a community college, whereas the highest gains in the long run are for those seeking an associate's degree in a for-profit. Among women, the highest gains are for certificate seekers in for-profits, and the lowest gains are for certificate seekers in community colleges.

Cellini and Turner (2019) look only at students who receive Title IV funding in schools that are eligible for Title IV funding. Although all the community college students attend schools eligible for Title IV funding, a substantial number of students attend for-profit schools that are not eligible to receive Title IV funding. As a further robustness test, we estimate returns for for-profit students who attend Title-IV eligible schools; we do not have information about student-

24

level aid receipt. The results, available from the authors upon request, are similar to the results for all students reported in Figure 2, with slightly higher returns for men attending Title IV eligible for-profit schools in pursuit of a certificate.

Further Analysis of Differences between For-Profit Schools and Community Colleges

As mentioned previously, for-profit and community college students differ on many dimensions. A particularly important difference is field of study. Table 4 provides tabulations of the index of dissimilarity between for-profit schools and community college by gender and degree sought for characteristics of students and field of study. We see that for men seeking certificates, the index of dissimilarity for field of study is calculated to be 0.39, implying that 39 percent of the students (in either the for-profit or the community college sample) would have to be shifted from one field to another for the field of study distribution to be the same across students in for-profit schools and community colleges. Returning to Table 1, the reason for this large value is clear. The two most popular fields of study for men in certificate programs at for-profit schools are trades and transport, with around 60 percent of men seeking a certificate in one of these two fields, in contrast to certificates in community college, where the two most popular programs, vocational and health, account for 54 percent of students.

The index value for field of study indicating the dissimilarity between for-profit and community college students for men seeking an associate's degree is 0.673. This reflects the fact that, among men in for-profit schools, 36 percent of men seeking associate's degrees are in the vocational field and 28 percent are in the computer field, whereas for men in community colleges, 70 percent are in the other field, largely those in "academic."

For women, the index of dissimilarity between for-profit and community colleges students is of the same order of magnitude as for men, but the explanation differs. Among

women in for-profit schools, the health field is by far the most popular field of study regardless of degree program, with 77 percent of women seeking a certificate program in this field and 64 percent of women seeking as associate's degree in this field. For women in community colleges, health also is the most popular for certificates, but it is much smaller (44 percent), whereas the other/academic field is by far the most popular for associate's degrees (79 percent).

The distribution of students seeking certificates across the 13 regions of the states (based on school location) is quite discrepant for both men and women, and nearly half the students in a school type would need to be reassigned to provide equal shares. The index of dissimilarity implies differences by race and age in the distribution between the two types of schools, although these are somewhat more modest. The final line of Table 4 provides the index of dissimilarity when we use a logit to estimate of the probability that a student (in a given gender-degree class) is in a for-profit school rather than a community college using all the measures listed in Table 1, in addition to prior earnings and employment, and year of entry into school. The index of dissimilarity is based on deciles of the propensity score in the full sample. The index of dissimilarity is over 0.7 in every case, with a maximum value of 0.86 for women seeking associates degrees.

These measures make clear that for-profit schools and community colleges are serving different student populations and providing instruction in different fields of study. Nonetheless, we can attempt to identify the returns for comparable individuals in comparable fields. We use propensity score matching to form a comparison group of students in each school by gender and degree sought. We consider two alternative estimates. In the first estimate, we examine individuals in a given gender-degree category who attend for-profit schools and ask the question of what the returns are of comparable students in similar fields in community colleges; in this

26

case, the for-profit school is considered the treatment. The second estimate starts with community college students and asks what the return is for comparable for-profit students in the same fields of study; here, community college is the treatment. As above, we perform these analyses separately for men seeking a certificate, men seeking an associate's degree, women seeking a certificate, and women seeking an associate's degree.

We start by estimating the probability that an individual enrolls in a for-profit school, using a logit controlling for age,[24] dummy variables indicating prior education (less than high school, GED, high school graduate), dummy variables indicating race (white, black, missing/other), a series of dummy variables indicating the location of the school, dummy variables indicating the field of study (academic/other, business, computers, health, trades, transportation, vocational) as well as dummy variables controlling for the year/quarter of entry into school. We also interact all the variables with race and education except the year/quarter of entry variables. We do not include prior earnings in the matching measures given the potential bias that matching on prior values of the dependent variable may produce in difference-in-difference models (Daw and Hatfield, 2018).

We impose three sample restrictions in order to make the two groups of students as similar as possible. First, as a first step, we omit any case whose characteristics or field are unique to either for-profit schools or community college, as such characteristics / fields perfectly predict school type for these cases. Once we estimate the logit we impose a common support condition by dropping for-profit students whose estimated probability of enrollment in a for-profit school lies above the maximum estimated probability among community-college students,

---

[24] We control for age by including both age and age squared, along with a series of dummy variables for: people less than 20 years old; people 20 years old and older but less than 25; people 25 years old and older but less than 30; people 30 years old and older but less than 40; and people 40 years old.

and dropping community college students whose estimated probability lies below the smallest estimated probability among for-profit students. Finally, we drop cases with probability ranges where one of the school types has very low density.

Our preferred matching technique is inverse probability weighting as follows. We use estimated propensity scores to calculate probability weights for the community college sample that reproduces the observed characteristics and field of study for for-profit students. Estimates of the return for entry into school are then estimated using our fixed effects model for both for-profit and community college students, taking the for-profit school as the treatment. The comparison is our best estimate of what the return would be for community college students if they had the same characteristics and fields of study as for-profit students. We also use the propensity scores to construct weights for the for-profit student sample, so it reproduces the characteristics and field of the community college sample, producing estimates that take the community college as the treatment. Sample sizes for the matched samples are presented in Appendix Table A5; estimates of return by quarter from school entry are graphed in Appendix Figures A2a to A2d.

Estimates of returns for men seeking certificates appear in Appendix Figure A2a. Table 5A shows that we find matches for only about half of the for-profit students when for-profit is taken as the treatment. However, the estimated returns for this more limited sample "FP Return (FP Treatment)" are quite similar to those reported in Table 2a. We observe that estimated returns for the small proportion of community college students matched with this "CC Returns (FP Treatment)" are appreciably higher, implying that the small proportion of students who find comparable training in community colleges do very well. For the matched sample, returns for for-profit students average 21 percent for the fifth year, but are 34 percent for the matched

28

community college sample. However, the returns are not uniformly higher for community college students. When community college is taken as the treatment, the for-profit returns are also are greater than those for community college returns. Returns for community college students in this sample are only 18 percent, but the for-profit returns for the sample that is matched to it are 27 percent.

When we consider men seeking associate degrees (Appendix Table A2b), we find somewhat different results. When for-profit schools are taken as the treatment, community college returns for cases matched to the for-profit students are appreciably lower (community college returns average 18 percent compared to 25 percent for for-profit students in year five). When community college is taken as the treatment, the community college returns are also lower than the for-profit returns (fifth year averages of 16 percent versus 34 percent).

The difference in returns across conditions are smaller for women. However, in the case where for-profit schools are the treatment, the patterns are similar to those of men, implying that the community college students with characteristics and fields similar to for-profit students have higher returns than the for-profit students (fifth year average 30 percent versus 21 percent). There is essentially no difference in the return when community college is taken as the treatment. Finally, when we consider women seeking associate's degrees, we find that the returns for for-profit schools and community college are quite similar when for-profit is taken as the treatment, but when community college is taken as the treatment, returns for community college are much higher.

Overall, these analyses do not suggest that either for-profit or community colleges dominate in terms of expected return. The case of certificates is notable in that the ranking of returns depends on the choice of the treatment group. Specifically, the select set of community

college students who are similar to for-profit students and have similar fields of study may have greater returns than for-profit students, the returns for the selected set of for-profit students who match community college students are higher than the returns for community college students.

VII. Estimated Costs

Our analyses above focus on the labor market return to school attendance, but we have not considered any direct costs. We do not have a measure of direct cost incurred for any of the individuals in our sample. However, the for-profit schools reported, for each certificate or degree that they offered, the total cost of obtaining the degree, including tuition and fees, as well as incidentals, such as books and supplies. We matched these cost figures by year for each school by certificate or degree, corresponding to the detailed field of study (CIP code) in which the individual was seeking a certificate or degree. We found acceptable matches for 95 percent of our individuals.[25] We omitted cases where zero tuition was reported, and where we suspect that tuition was erroneously reported.

The community colleges did not report total costs for a particular certificate or degree, but each community college provided information on tuition and fees, as well as the cost of books and supplies, which can be converted to a per-credit-hour cost. Tuition per credit hour was not differentiated by field of study for students in a given community college, but tuition did differ by residence. Those in the local taxing district—generally a small area including towns near the college—paid the lowest tuition, those in the state but outside the taxing district paid a higher rate, and those outside the state paid a still higher rate. We used the second cost measure, for those within the state but not inside the taxing district. There were at least modest differences

---

[25] Tuition and other costs are listed by institution, year, degree title and CIP code. For 80 percent of cases, tuition was available matching on all these measures. For an additional 15 percent of cases, we used tuition for the same institution and degree title, but we used tuition for another year or another program with a similar but not identical CIP code.

in other costs by course and field of study, but we were not able to separate these out. Instead, we have used averages for a given community college. In order to make our measures of cost for community colleges comparable to those available for the for-profit schools, we calculated the average number of credit hours of those who actually completed a certificate or degree in the field of study (two-digit CIP code) corresponding to the certificate or degree sought, and multiplied this by the cost per credit hour for the particular community college.[26] Hence our measures of costs for community colleges differ across individuals because of differences in credit hours required by field of study and by differences in costs across colleges and years.

Table 5 provides average cost estimates for students in our dataset. Line (i) indicates the estimate for those seeking a degree or certificate and line (ii) for those who obtain a certificate or degree. Focusing on the first group, for both men and women, the average cost of a certificate is between $13,000 and $14,000 for students in for-profit schools. In contrast, the average cost of a certificate for those attending community colleges is $6,319 for men and $7,715 for women. In addition to the substantial differences in the averages, there are large difference in the variances. For community colleges, about 80 percent of our cost estimates are between $5,000 and $10,000. For those attending the for-profit schools, 10 to 20 percent have total cost estimates below $5,000, and between 40 and 50 percent of the individuals have reported costs over $15,000. Very few have estimated costs that exceed $30,000.

As noted earlier, important differences exist in the areas of studies between for-profit and community college students. The lower part of the table provides average costs for each of the seven areas we have used in our analysis. With the exception of the "academic" field of study

---

[26] Some of those who indicate they are seeking a certificate identify a field of study where no certificates are offered (the largest number are those who indicate education as the field of the certificate they are seeking). In these cases, we use the average number of credit hours of those who indicate that area, regardless of whether they completed a certificate.

and transport (for men), for-profit costs are higher within each category. Is it possible that part of the difference in costs is due to for-profit students choosing more expensive fields? In fact, for men, the difference in the choice of fields has little effect on average costs. In contrast, if women seeking certificates in for-profit schools had the same distribution of fields of study as those in community colleges, their costs would be $1,746 lower, explaining about 29 percent of the of the $6,098 difference between costs for for-profit schools and community colleges.

In the case of those seeking associate's degrees, the difference in costs between for-profit schools and community colleges is even greater than for certificates. For men, the cost to obtain an associate's degree in a for-profit school averages $35,719, more than three times the figure for a community college. For women, the average cost of obtaining an associate's degree in a for-profit school is $27,176, a little less than three times the figure for a community college. Essentially none of the difference is explained by the difference in the fields of study chosen by students in for-profit schools and community colleges.

Table 5 also provides average costs for the sample of those who actually obtain certificates or degrees. For both men and women in for-profit schools, those who complete certificates are in less expensive programs than those indicating they were seeking certificates, but the reverse is true for those in community colleges. In the case of for-profit schools, the differences are at least partly explained by differences in the distribution of field of study (using our seven categories), meaning that those in the least expensive fields are more likely to obtain a certificate or degree. In contrast, the observed differences for community colleges are not due to differences in choice of field.

VIII. Conclusion

This paper investigates the relationship between attendance in a for-profit school or a community college and quarterly earnings. We use an individual fixed-effects method, estimated in two steps, to control for time-invariant differences between students. We find positive effects of attendance on earnings for students enrolled in both types of schools and degree programs. For any given program, men have higher returns than women. The lowest returns are for women pursuing associate's degrees in community colleges.

How do our results compare to others in this literature? Cellini and Chaudhary (2014) find a weekly earnings increment conditional on employment of around 10 percent in the four years after leaving school for young students in the NLSY attending associate's degree programs at for-profit institutions. If we look at a similar post-schooling time period, the average returns in quarters 5 to 20 (the first four years after 5 quarters) are between 12 and 18 percent. However, for longer post-schooling periods, our analysis suggests that the returns to attendance grow, so that the effective benefits of attendance appear somewhat larger.

Jepsen, Troske, and Coomes (2014) find that students who complete associate's degree programs in Kentucky community colleges have higher quarterly earnings of 56 percent for women and 24 percent for men. Their time period of study is 4.5 to 6 years after entry, so we use our results for quarters 22-25 for comparison (the last four quarters for which we have estimates). Over this time period, our estimates for the average gains for those attending community colleges are 21-36 percent for men and 17-31 percent for women.[27] For comparison, Stevens, Kurlaender, and Grosz (2018) find average returns in excess of 40 percent for attending vocational associate's degree programs. With respect to employment outcomes, we find an

---

[27] This pattern of results also holds if we compare our results to unreported results from Kentucky that condition on employment by estimating a log earnings model.

increase of no more than 2 percentage points, much smaller than the effect for completing an associate's degree of 12-19 percentage points in Jepsen, Troske, and Coomes (2014).

Deming et al. (2012) and Lang and Weinstein (2013) have preferred estimates that compare for-profit schooling to public schooling rather than reporting overall returns. Deming et al. (2012) report lower earnings for degree seeking students in for-profit schools, whereas Lang and Weinstein (2013) find no statistically significant differences, although power in the latter study is very limited.

For individuals pursuing certificates, Cellini and Turner (2019) find that for-profit students have lower returns than matched community college students. In contrast, Lang and Weinstein (2013) find no difference. Our results suggest that men receive higher returns in for-profit schools, whereas women receive slightly higher returns in for-profit schools. Studies of public or nonprofit schools offering certificates provide a wide variety of estimates. In a study of Kentucky community colleges, Jepsen, Troske, and Coomes (2014) find modest unconditional earnings gains of 5-7 percent. For California, Stevens, Kurlaender, and Grosz (2018) find larger effects when they condition on employment, of 12 to 23 percent. If we use the time period of 5 to 20 quarters after enrolling (comparable to the period considered in those studies), we find an average conditional earnings increase of 13-17 percent.

With the exception of Cellini and Turner (2019), our results suggest that the benefits of for-profit school attendance are broadly similar to previous studies such as Cellini and Chaudhary (2014) for for-profit colleges and Stevens, Kurlaender, and Grosz (2018) for community colleges.

Overall, the universe of students attending for-profit schools in this state seem to gain valuable labor market skills. But, perhaps not surprisingly, the benefits are not equally

distributed, and the tuition costs are substantial relative to the returns. Future work should

compare the costs of attendance with the benefits.

References

Armona, Luis, Rajashri Chakrabarti, and Michael F. Lovenheim. 2018. How Does For-profit College Attendance Affect Student Loans, Defaults, and Earnings? Paper Presented at Staff Report No. 811, Federal Reserve Bank of New York.

Bahr, Peter R. 2016. The Earnings of Community College Graduates in California. Center for Analysis of Postsecondary Education and Employment Working Paper.

Belfield, Clive, and Thomas Bailey. 2017. The Labor-Market Returns to Sub-Baccalaureate College: A Review. Center for Analysis of Postsecondary Education and Employment Working Paper.

Cellini, Stephanie, and Latika Chaudhary. 2014. The Labor-Market Returns to a For-Profit College Education. *Economics of Education Review* 43: 125-140.

Cellini, Stephanie Riegg, and Cory Koedel. 2017. The Case for Limiting Federal Student Aid to For-Profit Colleges. *Journal of Policy Analysis and Management* 36(4): 934-942.

Cellini, Stephanie, and Nicholas Turner. 2019. Gainfully Employed? Assessing the Employment and Earnings of For-Profit College Students Using Administrative Data. *Journal of Human Resources* 54(2): 342-370.

Chung, Anna S. 2008. Effects of For-Profit Training on Earnings. Working paper.

Darolia, Rajeev, Cory Koedel, Paco Martorell, Katie Wilson, and Francisco Perez-Arce. 2015. Do Employers Prefer Workers Who Attend For-Profit Colleges? Evidence from a Field Experiment. *Journal of Policy Analysis and Management* 34(4): 881-903.

Daw, Jamie, and Laura A. Hatfield. 2018. Matching in Difference-in-Differences: Between a Rock and a Hard Place. *Health Services Research* 53(6) (Pt 1):4111-4117.

de Chaisemartin, Clément, and Xavier D'Haultfoeuille. 2020. Two-way Fixed Effects Estimators with Heterogeneous Treatment Effects. American Economic Review 110(9): 2964-96.

Deming, David J., Claudia Goldin, and Lawrence F. Katz. 2012. The For-Profit Postsecondary School Sector: Nimble Critters or Agile Predators? *Journal of Economic Perspectives* 26(1): 139-164.

Deming, David J., Noam Yuchtman, Amira Abulafi, Claudia Goldin, and Lawrence F. Katz. 2016. The Value of Postsecondary Credentials in the Labor Market: An Experimental Survey. *American Economic Review* 106(3): 778-806.

Dynarski, Susan, Brian Jacob, and Daniel Kreisman. 2016. The Fixed-Effects Model in Returns to Schooling and Its Application to Community Colleges: A Methodological Note. Center for Analysis of Postsecondary Education and Employment.

Giplin, Gregory, and Christina Stoddard. 2017. Does Regulating For-profit Colleges Improve
Educational Outcomes? What We Know, What We Don't Know, and What We Need to
Find Out. *Journal of Policy Analysis and Management* 36(4): 942-950.

Jaggars, Shanna Smith, and Di Xu. 2016. Examining the Earnings Trajectories of Community
College Students Using a Piecewise Growth Curve Modelling Approach. *Journal of
Research on Educational Effectiveness* 9(3): 445-471.

Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan. 2005a. Estimating the Returns to
Community College Schooling for Displaced Workers. *Journal of Econometrics* 125(1–
2): 271–304.

Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan. 2005b. The Impact of
Community College Retraining on Older Displaced Workers: Should We Teach Old
Dogs New Tricks? *Industrial and Labor Relations Review* 58(3): 398–415.

Jepsen, Christopher, Peter Mueser, and Kyung-Seong Jeon. 2019. The Benefits of Alternatives to
Conventional College: Labor-Market Returns to For-Profit Schooling. Paper presented at
Association for Education Finance and Policy Annual Meetings, Kansas City.

Jepsen, Christopher, Kenneth Troske, and Paul Coomes. 2012. The Labor-Market Returns to
Community College Degrees, Diplomas, and Certificates. IZA Discussion Paper 6902.

Jepsen, Christopher, Kenneth Troske, and Paul Coomes. 2014. The Labor-Market Returns to
Community College Degrees, Diplomas, and Certificates. *Journal of Labor Economics*
32(1): 95-121.

Kornfeld, Robert and Howard Bloom. 1999. Measuring Program Impacts on Earnings and
Employment: Do Unemployment Insurance Wage Reports from Employers agree with
Surveys of Individuals? *Journal of Labor Economics* 17(1): 168-197.

Lang, Kevin, and Russell Weinstein. 2013. The Wage Effects of Not-for-profit and For-profit
Certifications: Better Data, Somewhat Different Results. *Labour Economics* 24: 230-
243.

Liu, Vivian Y. T., and Clive R. Belfield. 2013. The Labor Market Returns to For-Profit Higher
Education: Evidence for Transfer Students. Paper presented at 2013 Education Finance
and Policy Annual Conference.

Liu, Vivian Y. T., and Clive R. Belfield. 2014. Evaluating For-Profit Higher Education:
Evidence from the Education Longitudinal Survey. Center for Analysis of Postsecondary
Education and Employment Working Paper.

Minaya, Veronica, and Judith Scott-Clayton. 2017. Labor Market Trajectories for Community
College Graduates: New Evidence Spanning the Great Recession. Center for Analysis of
Postsecondary Education and Employment Working Paper.

Phelan, Daniel J. 2014. The Clear and Present Funding Crisis in Community Colleges. *New Directions for Community Colleges*, 2014(168): 5-16.

Snyder, T.D., de Brey, C., and Dillow, S.A. 2019. *Digest of Education Statistics 2017* (NCES 2018-070), Table 300.25. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Stevens, Ann Huff, Michal Kurlaender, and Michel Grosz. 2018. Career Technical Education and Labor Market Outcomes: Evidence from California Community Colleges. *Journal of Human Resources*, forthcoming.

U.S. Department of Education. 2015. Fact Sheet: Obama Administration Increases Accountability for Low-Performing For-Profit Institutions. Washington, D.C.: U.S. Department of Education. Accessed January 3, 2017.

U.S. Department of Education. 2017. "DeVos Presses Pause on Burdensome Gainful Employment Regulations." Bulletin, June 30.

Wallace, Geoffrey L., and Robert Haveman. 2007. The Implications of Differences between Employers and Worker Employment/Earnings Reports for Policy Evaluation. *Journal of Policy Analysis and Management*, 26(4): 737-753.

Figure 1a – Quarterly Earnings by School, Program Type and Quarters since School Entry, Men
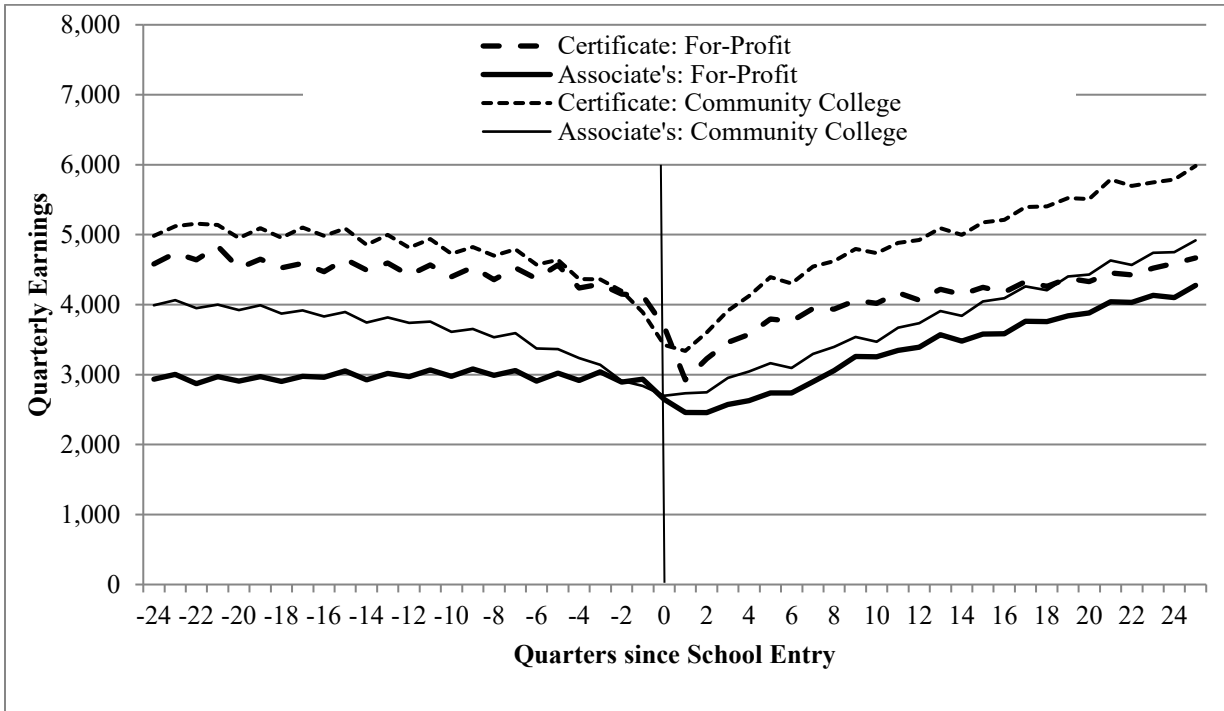
Figure 1b – Quarterly Earnings by School, Program Type and Quarters since School Entry, Women
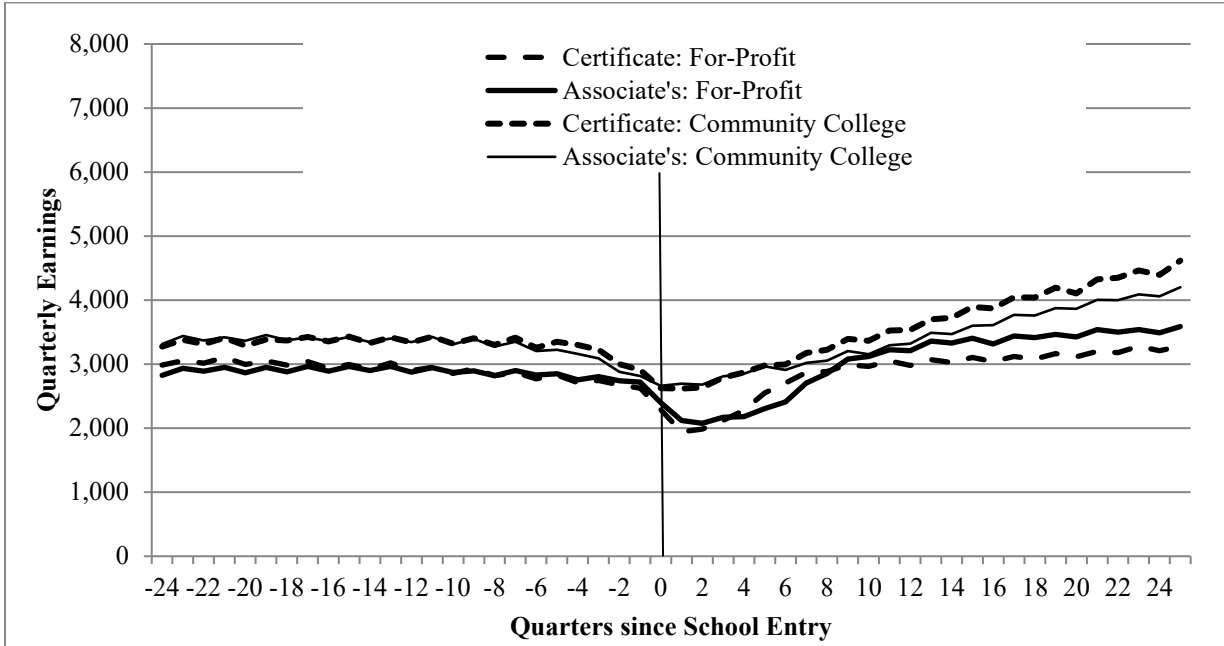
Notes: The figure shows the average quarterly earnings separately for men / women pursuing associate's degrees and men / women pursuing certificates. Earnings are not conditional on employment, except for the exclusion of strings of quarters of zero earnings of length 10 or more through quarter 30 following initial enrollment. Earnings are measured in first quarter 2010 dollars.

Figure 2a – Effect of Attendance on Earnings by Quarter and School and Program Type, Men
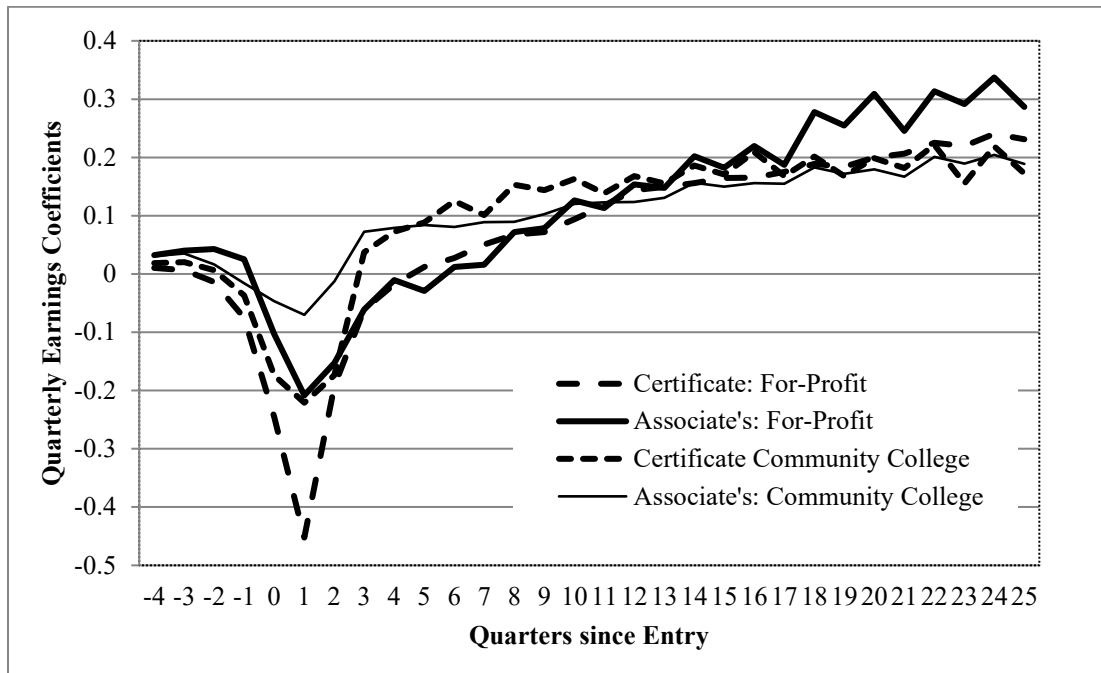
Notes: Each data point is the effect estimate for quarterly earnings from the earnings regression shown in Appendix Table A1a. The return is adjusted for enrollment during the quarters after entry, based on the coefficient for the enrollment variable, with the period of enrollment taken as the mean for each group (see text).

Figure 2b – Effect of Attendance on Earnings by Quarter and School and Program Type, Women
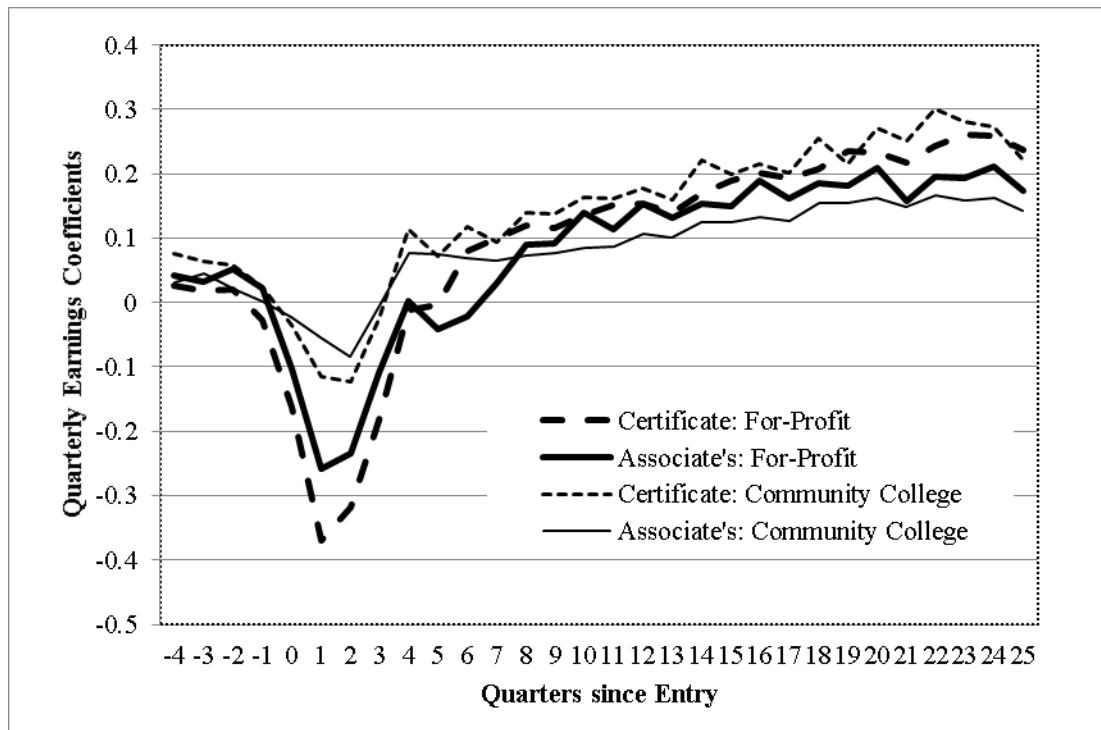
Notes: Each data point is the effect estimate for quarterly earnings from the earnings regression shown in Appendix Table A1b. The return is adjusted for enrollment during the quarters after entry, based on the coefficient for the enrollment variable, with the period of enrollment taken as the mean for each group (see text).

Figure 3a – Effect of Attendance on Employment by Quarter and Program Type, Men
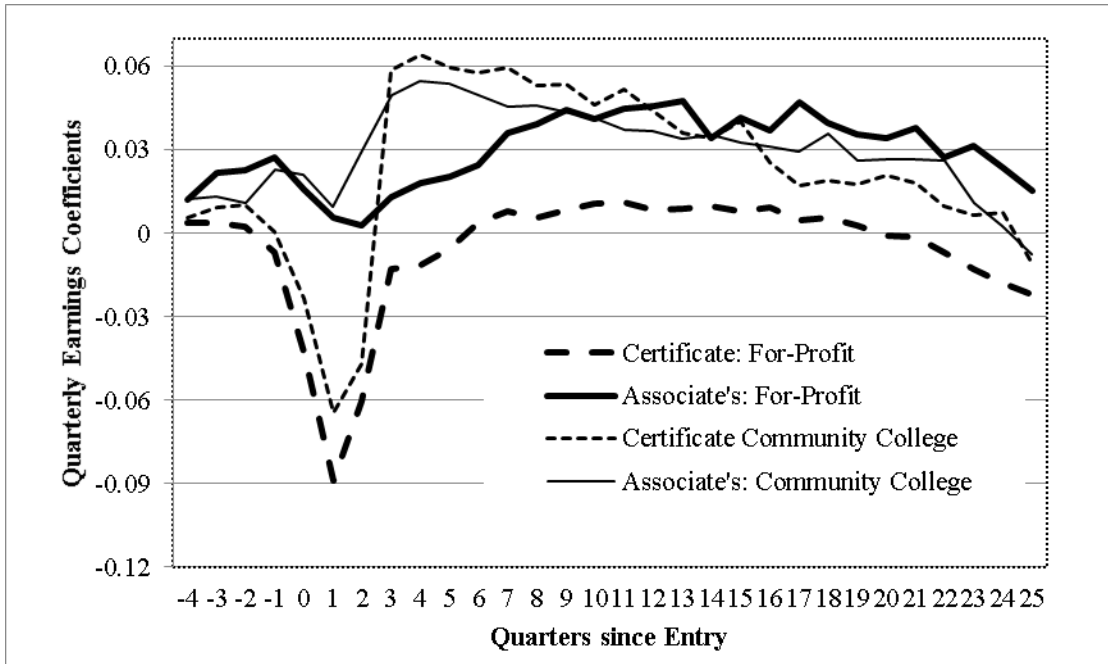
Note: Each data point is the effect estimate for quarterly employment based on equation (2). The return is adjusted for enrollment during the quarters after entry, based on the coefficient for the enrollment variable, with the period of enrollment taken as the mean for each group (see text).

Figure 3b – Effect of Attendance on Employment by Quarter and School and Program Type, Women
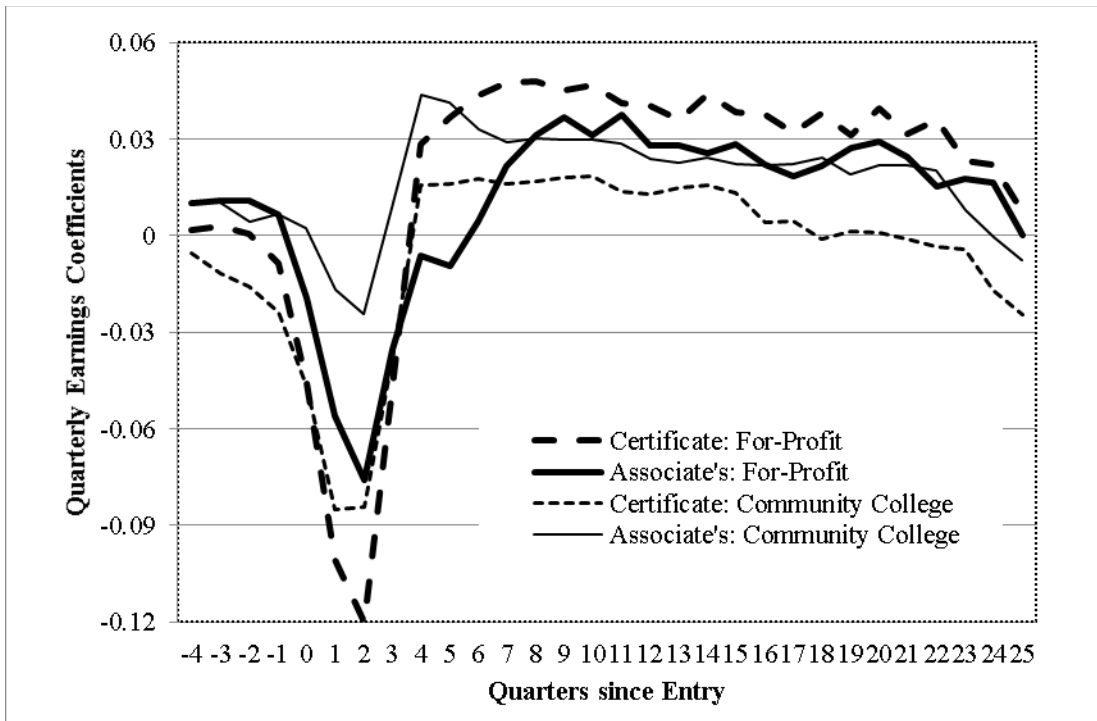
Note: Each data point is the effect estimate for quarterly employment based on equation (2). The return is adjusted for enrollment during the quarters after entry, based on the coefficient for the enrollment variable, with the period of enrollment taken as the mean for each group (see text).

Figure 4a – Effect of Completion on Earnings by Quarter, School and Program Type, Men
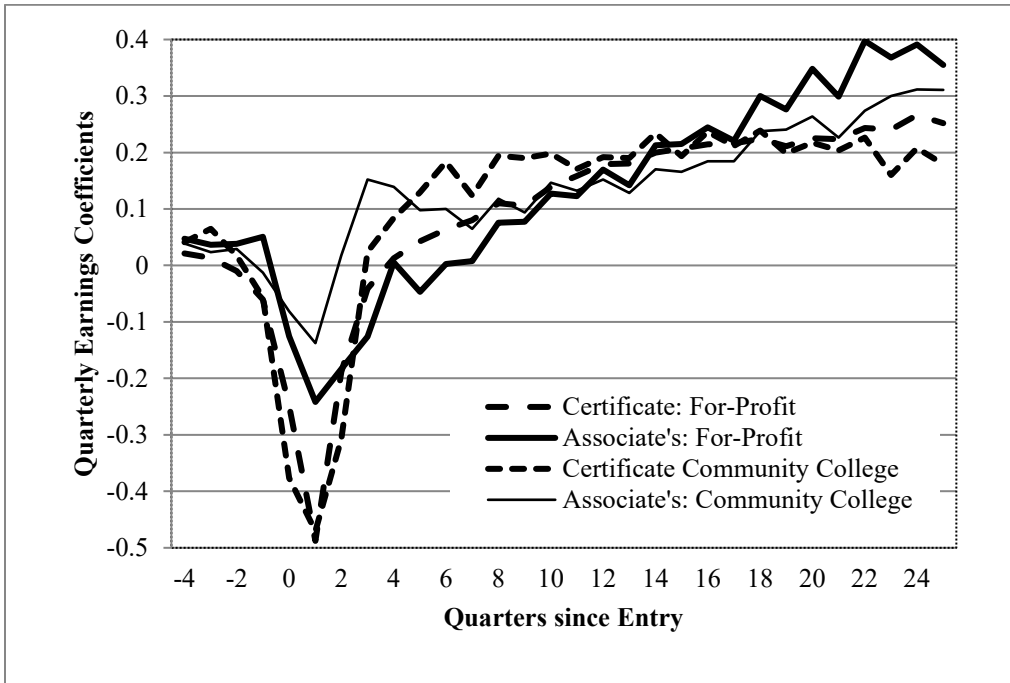
Note: Each data point is the effect estimate for log quarterly earnings based on equation (2), estimated for the sample of people who complete the degree they pursued.

Figure 4b – Effect of Completion on Earnings by Quarter, School and Program Type, Women
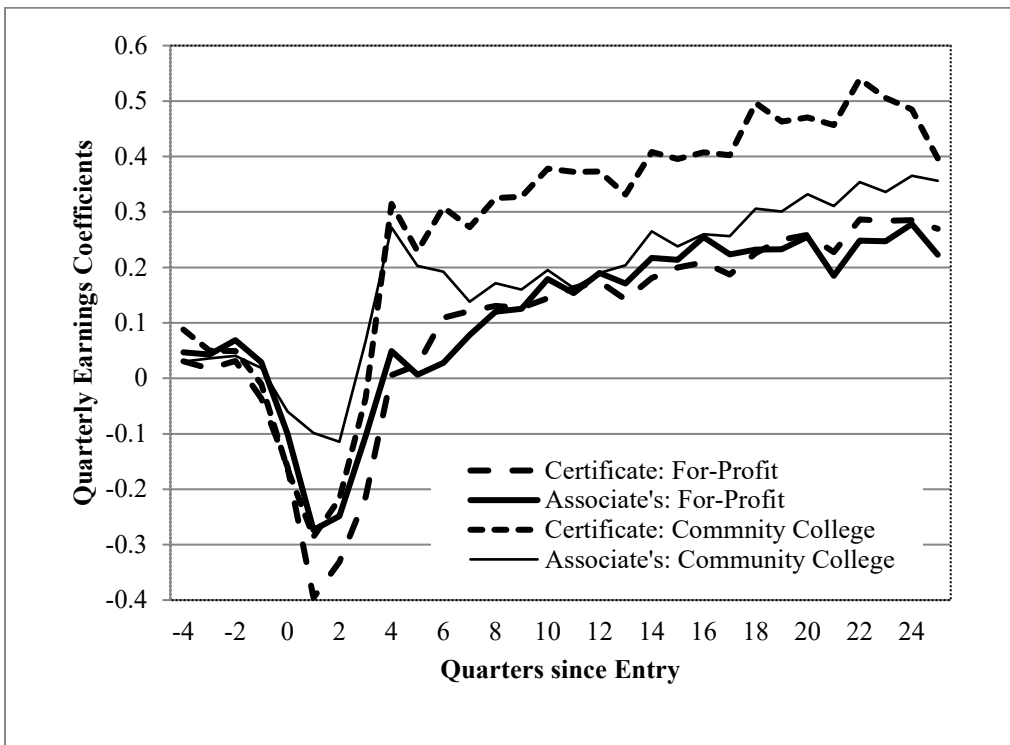
Note: Each data point is the effect estimate for log quarterly earnings based on equation (2), estimated for the sample of people who complete the degree they pursued.

Table 1 - Descriptive Statistics by Gender and Program Type

	For-Profit				Community College			
	Men		Women		Men		Women	
	Certificate	Associate's	Certificate	Associate's	Certificate	Associate's	Certificate	Associate's
Variable	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Demographics and Schooling Information								
White	0.642	0.601	0.544	0.626	0.764	0.697	0.768	0.673
Black	0.279	0.263	0.374	0.281	0.090	0.141	0.100	0.179
Other / Missing Race	0.079	0.136	0.082	0.093	0.146	0.163	0.132	0.148
Age at time of entry	32.7	27.6	29.5	28.1	28.5	24.8	28.9	26.8
	(10.7)	(8.3)	(10.0)	(8.8)	(10.5)	(8.4)	(10.5)	(9.6)
Less than high school	0.063	0.013	0.067	0.021	0.002	0.003	0.003	0.004
High school	0.718	0.775	0.766	0.806	0.727	0.799	0.802	0.812
GED	0.199	0.205	0.154	0.164	0.043	0.050	0.051	0.056
Missing education	0.020	0.008	0.014	0.010	0.229	0.148	0.145	0.128
Major Urban	0.496	0.802	0.667	0.735	0.522	0.626	0.406	0.651
Small Metro	0.141	0.127	0.163	0.161	0.282	0.187	0.309	0.147
Nonmetro	0.357	0.071	0.170	0.104	0.196	0.187	0.285	0.202
Missing metro	0.006	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Schooling Information								
Studying business	0.039	0.099	0.069	0.119	0.065	0.038	0.086	0.057
Studying computers	0.044	0.283	0.015	0.047	0.063	0.050	0.021	0.013
Studying health	0.154	0.180	0.763	0.635	0.159	0.024	0.438	0.070
Studying trades	0.310	0.033	0.012	0.002	0.151	0.057	0.005	0.003
Studying transport	0.294	0.000	0.023	0.000	0.063	0.000	0.004	0.000
Studying Vocational	0.143	0.356	0.103	0.147	0.380	0.134	0.226	0.072
Studying Academic/Other	0.016	0.049	0.014	0.051	0.120	0.697	0.220	0.786
Completed certificate	0.630	0.012	0.525	0.024	0.196	0.011	0.097	0.010
Completed associate's	0.007	0.416	0.013	0.470	0.041	0.099	0.089	0.123
Missing completion info	0.363	0.572	0.462	0.506	0.764	0.891	0.814	0.867
Number of Entries	32,117	12,979	39,830	21,115	9,789	113,259	14,371	153,533

Note: The standard deviation for age is in parentheses.

Table 2a - Descriptive Statistics for Earnings by Gender, School and Program Type

	For-Profit								Community College							
	Men				Women				Men				Women			
Men, Certificate	Certificate		Associate's		Certificate		Associate's		Certificate		Associate's		Certificate		Associate's	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mean Earnings																
5-24 qtrs before entry	4546	8986	2982	4256	2942	4245	2896	3690	4905	6837	3746	5673	3359	4291	3355	4807
4 quarters before entry	4240	8875	2916	3880	2711	4244	2755	3598	4365	5792	3237	5779	3301	4672	3158	17113
3 quarters before entry	4293	7098	3038	4200	2745	4068	2803	3471	4361	6196	3142	7338	3227	4212	3091	3974
2 quarters before entry	4151	8655	2893	4366	2674	6341	2738	4101	4196	8176	2912	5842	3000	4380	2881	4354
1 quarter before entry	4131	9982	2937	5555	2625	5045	2721	4609	3892	6757	2837	5364	2908	3876	2813	6017
Quarter of entry	3687	10692	2646	5320	2293	5342	2401	4575	3424	6186	2698	4681	2623	3428	2661	3845
1 quarter after entry	2925	7721	2461	3661	1943	3704	2120	3172	3338	5339	2731	5519	2618	3407	2694	3458
2 quarters after entry	3226	7935	2457	3720	1986	4253	2076	2953	3603	5658	2748	4562	2636	3698	2678	3579
3 quarters after entry	3459	7164	2572	3506	2119	3879	2173	3182	3913	5144	2953	4398	2789	3533	2812	3771
4 quarters after entry	3577	7407	2627	3969	2281	3954	2180	3194	4123	4951	3046	4277	2869	5088	2849	3554
5-8 quarters after entry	3860	7226	2858	3779	2752	3711	2569	3246	4466	5501	3238	4706	3092	3620	2987	3617
9-15 qtrs after entry	4131	6707	3410	4103	3026	3784	3246	3635	4939	5624	3738	4972	3584	3982	3357	4184
16-25 qtrs after entry	4402	8168	3920	4644	3160	4035	3464	3900	5571	6218	4462	5526	4202	4476	3898	4354

Notes: Earnings are measured first quarter 2010 dollars. Observations with zero earnings are included in the means except for the exclusion of quarters when individuals have 10 or more consecutive quarters after enrollment of missing earnings at the end of the observed time period.

Table 2b - Descriptive Statistics for Employment by Gender, School and Program Type

	For-Profit				Community College			
	Men		Women		Men		Women	
	Certificate	Associate's	Certificate	Associate's	Certificate	Associate's	Certificate	Associate's
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Mean Employment								
5-24 quarters before entry	0.622	0.578	0.624	0.648	0.663	0.607	0.655	0.659
4 quarters before entry	0.634	0.606	0.627	0.660	0.670	0.618	0.688	0.672
3 quarters before entry	0.641	0.617	0.639	0.668	0.664	0.613	0.681	0.673
2 quarters before entry	0.633	0.611	0.630	0.660	0.655	0.598	0.671	0.657
1 quarter before entry	0.630	0.621	0.629	0.662	0.661	0.632	0.680	0.673
Quarter of entry	0.593	0.616	0.591	0.637	0.654	0.651	0.676	0.689
1 quarter after entry	0.568	0.617	0.565	0.621	0.637	0.650	0.665	0.690
2 quarters after entry	0.588	0.621	0.565	0.613	0.679	0.670	0.682	0.696
3 quarters after entry	0.621	0.631	0.593	0.623	0.716	0.701	0.696	0.712
4 quarters after entry	0.637	0.641	0.622	0.623	0.743	0.726	0.712	0.725
5-8 quarters after entry	0.686	0.675	0.703	0.688	0.757	0.735	0.735	0.732
9-15 quarters after entry	0.730	0.728	0.747	0.757	0.791	0.766	0.779	0.763
16-25 quarters after entry	0.757	0.772	0.770	0.786	0.821	0.809	0.816	0.804

Table 3 – Difference between For-Profit and Community College Coefficients for Students Seeking a Certificate, by Gender

	Men		Women	
	Separate Regressions	Pooled Regressions	Separate Regressions	Pooled Regressions
4 quarters prior to entry	-0.008	-0.045	-0.049	-0.048
3 quarters prior to entry	-0.014	-0.046	-0.045	-0.050
2 quarters prior to entry	-0.020	-0.066	-0.038	-0.040
1 quarter prior to entry	-0.038	-0.076	-0.051	-0.062
Quarter of entry	-0.096	-0.124	-0.104	-0.130
1 quarter after entry	-0.280	-0.349	-0.211	-0.270
2 quarters after entry	-0.134	-0.217	-0.150	-0.196
3 quarters after entry	-0.098	-0.168	-0.134	-0.185
4 quarters after entry	-0.090	-0.162	-0.126	-0.160
5 quarters after entry	-0.076	-0.139	-0.075	-0.109
6 quarters after entry	-0.097	-0.166	-0.038	-0.077
7 quarters after entry	-0.050	-0.118	0.008	-0.053
8 quarters after entry	-0.086	-0.159	-0.020	-0.064
9 quarters after entry	-0.072	-0.146	-0.023	-0.075
10 quarters after entry	-0.069	-0.146	-0.029	-0.071
11 quarters after entry	-0.021	-0.097	-0.009	-0.078
12 quarters after entry	-0.024	-0.101	-0.024	-0.078
13 quarters after entry	-0.006	-0.085	-0.019	-0.085
14 quarters after entry	-0.030	-0.106	-0.053	-0.112
15 quarters after entry	-0.006	-0.088	-0.010	-0.106
16 quarters after entry	-0.044	-0.123	-0.014	-0.094
17 quarters after entry	0.007	-0.080	-0.009	-0.106
18 quarters after entry	-0.013	-0.094	-0.048	-0.122
19 quarters after entry	0.016	-0.073	0.021	-0.100
20 quarters after entry	0.001	-0.086	-0.038	-0.140
21 quarters after entry	0.025	-0.070	-0.034	-0.147
22 quarters after entry	0.004	-0.083	-0.058	-0.145
23 quarters after entry	0.064	-0.034	-0.021	-0.157
24 quarters after entry	0.021	-0.068	-0.014	-0.131
25 quarters after entry	0.058	-0.038	0.016	-0.110
Enrolled	0.049	-0.230	-0.044	-0.282

Table 4 - Index of Dissimilarity between For-Profit and Community College Students

	Men		Women	
	Certificates	Associate's Degrees	Certificates	Associate's Degrees
Field of study (7 areas)	0.390	0.673	0.352	0.736
Race	0.190	0.122	0.274	0.102
Region within the state	0.467	0.233	0.453	0.202
Age (4 categories)	0.197	0.197	0.038	0.099
Propensity score (deciles)	0.762	0.797	0.703	0.863

Note: We also calculated the Gini coefficient as an alternative measure of dissimilarity. While numerical values where always higher (by as much as 0.15), the rankings were essentially the same.

Table 5 – Mean Estimated Cost of Certificate or Degree

	For-Profit		Community Colleges		For-Profit		Community Colleges	
	Certificates	Associate's	Certificates	Associate's	Certificates	Associate's	Certificates	Associate's
	Mean ($)	Mean ($)	Mean ($)	Mean ($)	Mean ($)	Mean ($)	Mean ($)	Mean ($)
	Men				**Women**			
(i) All students seeking certificates or degrees	13,065	35,719	6,319	10,423	13,813	27,176	7,715	10,170
(ii) Students obtaining certificates or degrees	10,436	34,873	8,482	10,841	12,828	26,242	9,584	10,232
Average cost by field								
(i) All students seeking certificates or degrees								
Academic/other	6,983	36,835	6,343	10,029	6,039	27,207	6,479	9,906
Business	6,238	25,116	4,932	9,848	7,945	23,660	5,991	9,771
Computers	17,765	39,017	8,130	11,270	13,003	35,721	5,854	10,852
Health	11,324	25,563	7,195	13,774	14,483	25,830	9,641	13,320
Trades	20,563	31,116	5,739	11,703	21,664	29,232	6,089	10,547
Transport	5,522	.	5,467		5,456	.	2,036	.
Vocational	15,173	41,245	6,251	11,175	14,612	33,115	6,158	10,193
(ii) Students obtaining certificates or degrees								
Academic/other	7,335	38,059	10,707	10,056	13,556	28,623	10,157	9,748
Business	4,999	24,885	8,226	9,689	7,068	23,242	8,212	9,549
Computers	17,997	38,643	10,921	11,533	10,587	32,012	8,715	10,898
Health	9,513	24,568	9,667	13,097	13,915	24,877	10,420	12,724
Trades	18,327	31,448	8,967	13,068	19,841	33,750	9,031	10,967
Transport	5,409	.	5,711	20,822	5,385	.	2,055	.
Vocational	13,031	40,961	7,949	10,975	12,431	32,709	7,911	9,639

Notes: The sample of students seeking certificates or degrees corresponds with the regression sample for Figures 2a and 2b. The sample of students obtaining certificates or degrees corresponds with the regression sample for Figures 4a and 4b.

Appendix Table A1a – Effect of School Attendance on Log Quarterly Earnings: Men

	For-profit				Community College			
	Certificate		Associates		Certificates		Associates	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
4 quarters prior to entry	0.011	(0.007)	0.032	(0.012)	0.019	(0.012)	0.031	(0.004)
3 quarters prior to entry	0.006	(0.007)	0.040	(0.012)	0.020	(0.012)	0.035	(0.004)
2 quarters prior to entry	-0.014	(0.007)	0.043	(0.012)	0.007	(0.013)	0.016	(0.004)
1 quarter prior to entry	-0.075	(0.008)	0.025	(0.013)	-0.037	(0.014)	-0.016	(0.004)
Quarter of entry	-0.178	(0.012)	-0.051	(0.017)	-0.082	(0.021)	0.026	(0.006)
1 quarter after entry	-0.318	(0.015)	-0.104	(0.024)	-0.038	(0.025)	0.076	(0.007)
2 quarters after entry	-0.125	(0.012)	-0.048	(0.022)	0.010	(0.019)	0.060	(0.006)
3 quarters after entry	-0.061	(0.011)	-0.009	(0.021)	0.037	(0.017)	0.073	(0.006)
4 quarters after entry	-0.018	(0.010)	-0.010	(0.018)	0.072	(0.016)	0.079	(0.005)
5 quarters after entry	0.012	(0.009)	-0.029	(0.016)	0.088	(0.016)	0.084	(0.005)
6 quarters after entry	0.028	(0.009)	0.012	(0.016)	0.125	(0.015)	0.081	(0.005)
7 quarters after entry	0.051	(0.009)	0.016	(0.015)	0.101	(0.015)	0.089	(0.005)
8 quarters after entry	0.067	(0.009)	0.072	(0.015)	0.153	(0.015)	0.090	(0.005)
9 quarters after entry	0.072	(0.009)	0.078	(0.015)	0.144	(0.015)	0.103	(0.005)
10 quarters after entry	0.094	(0.009)	0.126	(0.015)	0.163	(0.015)	0.120	(0.005)
11 quarters after entry	0.117	(0.009)	0.113	(0.015)	0.138	(0.015)	0.123	(0.005)
12 quarters after entry	0.144	(0.009)	0.154	(0.015)	0.168	(0.016)	0.123	(0.006)
13 quarters after entry	0.149	(0.009)	0.148	(0.015)	0.156	(0.016)	0.131	(0.006)
14 quarters after entry	0.156	(0.009)	0.202	(0.015)	0.186	(0.016)	0.156	(0.006)
15 quarters after entry	0.165	(0.009)	0.182	(0.015)	0.171	(0.017)	0.150	(0.006)
16 quarters after entry	0.165	(0.010)	0.220	(0.016)	0.209	(0.017)	0.156	(0.006)
17 quarters after entry	0.175	(0.010)	0.187	(0.017)	0.168	(0.018)	0.155	(0.006)
18 quarters after entry	0.189	(0.010)	0.278	(0.017)	0.201	(0.020)	0.183	(0.007)
19 quarters after entry	0.184	(0.010)	0.255	(0.017)	0.168	(0.020)	0.172	(0.006)
20 quarters after entry	0.200	(0.011)	0.309	(0.018)	0.199	(0.023)	0.179	(0.007)
21 quarters after entry	0.206	(0.011)	0.245	(0.019)	0.182	(0.022)	0.167	(0.007)
22 quarters after entry	0.225	(0.011)	0.313	(0.020)	0.222	(0.023)	0.201	(0.008)
23 quarters after entry	0.220	(0.012)	0.292	(0.020)	0.156	(0.024)	0.190	(0.008)
24 quarters after entry	0.240	(0.012)	0.337	(0.022)	0.219	(0.025)	0.204	(0.008)
25 quarters after entry	0.231	(0.012)	0.287	(0.023)	0.173	(0.026)	0.189	(0.008)
Enrolled	-0.135	(0.015)	-0.105	(0.020)	-0.183	(0.026)	-0.146	(0.007)
Constant	0.001	(0.000)	0.002	(0.000)	0.000	(0.000)	0.002	(0.000)
Observations	761,300		263,191		194,341		1,746,373	

Notes: Coefficient estimates are from equation (3). Standard errors are clustered at the individual level.

Appendix Table A1b – Effect of School Attendance on Log Quarterly Earnings: Women

	For-profit				Community College			
	Certificates		Associates		Certificates		Associates	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
4 quarters prior to entry	0.026	(0.006)	0.042	(0.008)	0.075	(0.010)	0.031	(0.003)
3 quarters prior to entry	0.019	(0.007)	0.031	(0.009)	0.064	(0.010)	0.046	(0.003)
2 quarters prior to entry	0.020	(0.007)	0.052	(0.009)	0.058	(0.011)	0.021	(0.003)
1 quarter prior to entry	-0.027	(0.007)	0.022	(0.009)	0.024	(0.011)	0.001	(0.003)
Quarter of entry	-0.014	(0.011)	0.028	(0.013)	0.090	(0.015)	0.059	(0.004)
1 quarter after entry	-0.073	(0.015)	0.004	(0.019)	0.138	(0.019)	0.110	(0.006)
2 quarters after entry	-0.021	(0.013)	0.027	(0.017)	0.129	(0.017)	0.081	(0.005)
3 quarters after entry	-0.034	(0.012)	0.021	(0.016)	0.100	(0.016)	0.077	(0.005)
4 quarters after entry	-0.012	(0.010)	0.003	(0.014)	0.113	(0.015)	0.077	(0.004)
5 quarters after entry	-0.003	(0.009)	-0.041	(0.013)	0.073	(0.015)	0.075	(0.004)
6 quarters after entry	0.080	(0.008)	-0.022	(0.013)	0.118	(0.014)	0.068	(0.004)
7 quarters after entry	0.101	(0.008)	0.031	(0.011)	0.093	(0.014)	0.065	(0.004)
8 quarters after entry	0.119	(0.008)	0.090	(0.011)	0.139	(0.014)	0.072	(0.004)
9 quarters after entry	0.115	(0.008)	0.092	(0.011)	0.138	(0.013)	0.077	(0.004)
10 quarters after entry	0.135	(0.008)	0.139	(0.011)	0.164	(0.014)	0.086	(0.004)
11 quarters after entry	0.152	(0.008)	0.114	(0.011)	0.161	(0.014)	0.087	(0.004)
12 quarters after entry	0.154	(0.008)	0.154	(0.011)	0.178	(0.015)	0.106	(0.004)
13 quarters after entry	0.140	(0.008)	0.132	(0.011)	0.159	(0.015)	0.101	(0.004)
14 quarters after entry	0.169	(0.009)	0.155	(0.012)	0.222	(0.015)	0.125	(0.005)
15 quarters after entry	0.190	(0.009)	0.149	(0.012)	0.200	(0.015)	0.125	(0.005)
16 quarters after entry	0.202	(0.009)	0.190	(0.013)	0.215	(0.017)	0.132	(0.005)
17 quarters after entry	0.193	(0.009)	0.161	(0.013)	0.202	(0.017)	0.127	(0.005)
18 quarters after entry	0.207	(0.009)	0.185	(0.014)	0.255	(0.018)	0.154	(0.005)
19 quarters after entry	0.235	(0.009)	0.182	(0.015)	0.215	(0.018)	0.155	(0.005)
20 quarters after entry	0.233	(0.010)	0.210	(0.015)	0.271	(0.019)	0.162	(0.006)
21 quarters after entry	0.218	(0.010)	0.157	(0.016)	0.252	(0.020)	0.148	(0.006)
22 quarters after entry	0.242	(0.011)	0.195	(0.017)	0.300	(0.021)	0.167	(0.006)
23 quarters after entry	0.261	(0.011)	0.193	(0.016)	0.281	(0.021)	0.159	(0.006)
24 quarters after entry	0.259	(0.011)	0.211	(0.018)	0.273	(0.023)	0.163	(0.007)
25 quarters after entry	0.237	(0.012)	0.173	(0.018)	0.222	(0.024)	0.143	(0.007)
Enrolled	-0.296	(0.014)	-0.262	(0.016)	-0.252	(0.018)	-0.164	(0.006)
Constant	0.001	(0.000)	0.002	(0.000)	-0.022	(0.001)	0.002	(0.000)
Observations	887,934		473,377		284,890		2,893,457	

Notes: Coefficient estimates are from equation (3). Standard errors are clustered at the individual level.

Appendix Table A2a – Effect of School Attendance on Quarterly Employment: Men

	For-profit				Community College			
	Certificate		Associates		Certificate		Associates	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
4 quarters prior to entry	0.004	(0.002)	0.012	(0.004)	0.006	(0.004)	0.012	(0.001)
3 quarters prior to entry	0.004	(0.002)	0.022	(0.004)	0.009	(0.005)	0.013	(0.002)
2 quarters prior to entry	0.002	(0.003)	0.023	(0.004)	0.010	(0.005)	0.011	(0.002)
1 quarter prior to entry	-0.007	(0.003)	0.027	(0.004)	0.000	(0.005)	0.023	(0.002)
Quarter of entry	-0.009	(0.004)	0.024	(0.006)	0.023	(0.007)	0.039	(0.002)
1 quarter after entry	-0.022	(0.006)	0.023	(0.009)	0.027	(0.010)	0.045	(0.003)
2 quarters after entry	-0.026	(0.005)	0.021	(0.009)	0.045	(0.008)	0.048	(0.003)
3 quarters after entry	-0.013	(0.004)	0.022	(0.008)	0.059	(0.007)	0.050	(0.002)
4 quarters after entry	-0.011	(0.004)	0.018	(0.007)	0.064	(0.007)	0.054	(0.002)
5 quarters after entry	-0.006	(0.003)	0.020	(0.006)	0.060	(0.006)	0.054	(0.002)
6 quarters after entry	0.004	(0.003)	0.024	(0.006)	0.057	(0.006)	0.049	(0.002)
7 quarters after entry	0.008	(0.003)	0.036	(0.006)	0.060	(0.006)	0.045	(0.002)
8 quarters after entry	0.006	(0.003)	0.039	(0.006)	0.053	(0.006)	0.046	(0.002)
9 quarters after entry	0.008	(0.003)	0.044	(0.006)	0.053	(0.006)	0.043	(0.002)
10 quarters after entry	0.011	(0.003)	0.041	(0.006)	0.046	(0.006)	0.041	(0.002)
11 quarters after entry	0.011	(0.003)	0.045	(0.005)	0.051	(0.006)	0.037	(0.002)
12 quarters after entry	0.008	(0.003)	0.046	(0.006)	0.044	(0.007)	0.037	(0.002)
13 quarters after entry	0.009	(0.003)	0.047	(0.006)	0.036	(0.007)	0.034	(0.002)
14 quarters after entry	0.010	(0.004)	0.034	(0.006)	0.034	(0.007)	0.035	(0.002)
15 quarters after entry	0.008	(0.004)	0.042	(0.006)	0.040	(0.007)	0.032	(0.002)
16 quarters after entry	0.009	(0.004)	0.037	(0.006)	0.025	(0.007)	0.031	(0.002)
17 quarters after entry	0.005	(0.004)	0.047	(0.006)	0.017	(0.008)	0.029	(0.002)
18 quarters after entry	0.006	(0.004)	0.040	(0.007)	0.019	(0.008)	0.036	(0.003)
19 quarters after entry	0.003	(0.004)	0.036	(0.007)	0.018	(0.008)	0.026	(0.003)
20 quarters after entry	-0.001	(0.004)	0.034	(0.007)	0.021	(0.009)	0.027	(0.003)
21 quarters after entry	-0.001	(0.004)	0.038	(0.007)	0.018	(0.009)	0.026	(0.003)
22 quarters after entry	-0.007	(0.004)	0.027	(0.008)	0.010	(0.010)	0.026	(0.003)
23 quarters after entry	-0.013	(0.004)	0.031	(0.008)	0.006	(0.010)	0.011	(0.003)
24 quarters after entry	-0.018	(0.005)	0.023	(0.009)	0.007	(0.010)	0.003	(0.003)
25 quarters after entry	-0.022	(0.005)	0.015	(0.009)	-0.011	(0.010)	-0.008	(0.003)
Enrolled	-0.067	(0.006)	-0.018	(0.009)	-0.092	(0.011)	-0.036	(0.003)
Constant	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Observations	1,200,008		431,969		282,902		2,721,522	

Notes: Coefficient estimates are from equation (3). Standard errors are clustered at the individual level.

Appendix Table A2b – Effect of School Attendance on Quarterly Employment: Women

	For-profit				Community College			
	Certificates		Associate's		Certificates		Associate's	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
4 quarters prior to entry	0.002	(0.002)	0.010	(0.003)	-0.005	(0.004)	0.011	(0.001)
3 quarters prior to entry	0.003	(0.002)	0.011	(0.003)	-0.012	(0.004)	0.011	(0.001)
2 quarters prior to entry	0.001	(0.002)	0.011	(0.003)	-0.016	(0.004)	0.005	(0.001)
1 quarter prior to entry	-0.008	(0.002)	0.007	(0.003)	-0.024	(0.004)	0.007	(0.001)
Quarter of entry	0.030	(0.004)	0.029	(0.005)	0.007	(0.006)	0.038	(0.002)
1 quarter after entry	0.051	(0.005)	0.040	(0.007)	0.023	(0.008)	0.054	(0.002)
2 quarters after entry	0.031	(0.005)	0.021	(0.006)	0.024	(0.007)	0.046	(0.002)
3 quarters after entry	0.029	(0.004)	0.013	(0.006)	0.016	(0.006)	0.044	(0.002)
4 quarters after entry	0.028	(0.003)	-0.006	(0.005)	0.016	(0.006)	0.044	(0.002)
5 quarters after entry	0.037	(0.003)	-0.009	(0.005)	0.016	(0.006)	0.041	(0.002)
6 quarters after entry	0.044	(0.003)	0.004	(0.004)	0.018	(0.005)	0.033	(0.002)
7 quarters after entry	0.048	(0.003)	0.022	(0.004)	0.016	(0.005)	0.029	(0.002)
8 quarters after entry	0.048	(0.003)	0.031	(0.004)	0.017	(0.005)	0.030	(0.002)
9 quarters after entry	0.045	(0.003)	0.037	(0.004)	0.018	(0.005)	0.030	(0.002)
10 quarters after entry	0.047	(0.003)	0.031	(0.004)	0.018	(0.005)	0.030	(0.002)
11 quarters after entry	0.041	(0.003)	0.038	(0.004)	0.014	(0.005)	0.029	(0.002)
12 quarters after entry	0.040	(0.003)	0.028	(0.004)	0.013	(0.006)	0.024	(0.002)
13 quarters after entry	0.036	(0.003)	0.028	(0.004)	0.015	(0.006)	0.023	(0.002)
14 quarters after entry	0.044	(0.003)	0.026	(0.004)	0.016	(0.006)	0.024	(0.002)
15 quarters after entry	0.038	(0.003)	0.029	(0.004)	0.013	(0.006)	0.022	(0.002)
16 quarters after entry	0.038	(0.003)	0.022	(0.005)	0.004	(0.006)	0.022	(0.002)
17 quarters after entry	0.032	(0.003)	0.018	(0.005)	0.005	(0.006)	0.022	(0.002)
18 quarters after entry	0.038	(0.003)	0.022	(0.005)	-0.001	(0.007)	0.024	(0.002)
19 quarters after entry	0.031	(0.003)	0.027	(0.005)	0.001	(0.007)	0.019	(0.002)
20 quarters after entry	0.040	(0.004)	0.029	(0.005)	0.001	(0.007)	0.022	(0.002)
21 quarters after entry	0.032	(0.004)	0.024	(0.005)	-0.001	(0.007)	0.022	(0.002)
22 quarters after entry	0.036	(0.004)	0.015	(0.006)	-0.003	(0.008)	0.020	(0.002)
23 quarters after entry	0.023	(0.004)	0.018	(0.006)	-0.004	(0.008)	0.008	(0.002)
24 quarters after entry	0.022	(0.004)	0.016	(0.006)	-0.017	(0.009)	0.000	(0.002)
25 quarters after entry	0.007	(0.004)	0.000	(0.006)	-0.024	(0.009)	-0.008	(0.003)
Enrolled	-0.152	(0.005)	-0.096	(0.007)	-0.108	(0.008)	-0.070	(0.002)
Constant	0.001	(0.000)	0.000	(0.000)	0.021	(0.001)	0.001	(0.000)
Observations	1,391,966		717,489		419,884		4,227,248	

Notes: Coefficient estimates are from equation (3). Standard errors are clustered at the individual level.

Appendix Table A3 – Difference between For-Profit and Community College Coefficients for Students Seeking an Associate's Degree, by Gender

	Men		Women	
	Separate Regressions	Pooled Regressions	Separate Regressions	Pooled Regressions
4 quarters prior to entry	0.002	-0.032	0.001	-0.024
3 quarters prior to entry	0.005	-0.023	0.000	-0.046
2 quarters prior to entry	0.026	-0.012	0.000	-0.008
1 quarter prior to entry	0.041	0.001	0.000	-0.019
Quarter of entry	-0.077	-0.108	0.001	-0.126
1 quarter after entry	-0.180	-0.223	0.003	-0.183
2 quarters after entry	-0.108	-0.161	0.002	-0.130
3 quarters after entry	-0.081	-0.134	0.001	-0.132
4 quarters after entry	-0.089	-0.155	-0.001	-0.150
5 quarters after entry	-0.113	-0.171	-0.002	-0.174
6 quarters after entry	-0.069	-0.140	-0.003	-0.155
7 quarters after entry	-0.073	-0.137	-0.003	-0.094
8 quarters after entry	-0.018	-0.101	-0.003	-0.051
9 quarters after entry	-0.024	-0.099	-0.006	-0.042
10 quarters after entry	0.006	-0.081	-0.008	-0.004
11 quarters after entry	-0.010	-0.094	-0.009	-0.028
12 quarters after entry	0.030	-0.075	-0.010	-0.017
13 quarters after entry	0.017	-0.071	-0.011	-0.012
14 quarters after entry	0.046	-0.064	-0.014	-0.027
15 quarters after entry	0.032	-0.059	-0.011	-0.033
16 quarters after entry	0.064	-0.063	-0.002	-0.033
17 quarters after entry	0.033	-0.063	-0.008	-0.031
18 quarters after entry	0.095	-0.031	-0.016	-0.037
19 quarters after entry	0.083	-0.021	-0.009	-0.048
20 quarters after entry	0.130	-0.011	-0.012	-0.045
21 quarters after entry	0.078	-0.034	-0.015	-0.055
22 quarters after entry	0.112	-0.030	-0.031	-0.036
23 quarters after entry	0.102	-0.018	-0.028	-0.024
24 quarters after entry	0.133	-0.023	-0.019	-0.042
25 quarters after entry	0.098	-0.029	-0.022	-0.030
Enrolled	0.041	-0.146	-0.004	-0.166

**Appendix Table A4a – Difference in Returns for Matching Estimators
Certificate Seeking Students, Men**

	For-Profit Treatment		Comm. College Treatment	
	Coefficient	Std. Error	Coefficient	Std. Error
4 quarters prior to entry	-0.005	(0.091)	-0.053	(0.047)
3 quarters prior to entry	-0.107	(0.049) **	-0.011	(0.043)
2 quarters prior to entry	-0.087	(0.089)	-0.075	(0.090)
1 quarter prior to entry	-0.121	(0.076)	-0.054	(0.062)
Quarter of entry	-0.099	(0.129)	0.032	(0.075)
1 quarter after entry	-0.437	(0.105) ***	0.000	(0.097)
2 quarters after entry	-0.227	(0.102) **	-0.029	(0.072)
3 quarters after entry	-0.240	(0.091) ***	-0.080	(0.062)
4 quarters after entry	-0.230	(0.084) ***	-0.063	(0.079)
5 quarters after entry	-0.158	(0.167)	-0.170	(0.072) **
6 quarters after entry	-0.277	(0.084) ***	-0.263	(0.116) **
7 quarters after entry	-0.095	(0.130)	-0.089	(0.089)
8 quarters after entry	-0.235	(0.064) ***	-0.134	(0.091)
9 quarters after entry	-0.309	(0.072) ***	-0.139	(0.098)
10 quarters after entry	-0.077	(0.126)	-0.191	(0.112) *
11 quarters after entry	-0.160	(0.074) **	-0.092	(0.127)
12 quarters after entry	-0.099	(0.083)	-0.041	(0.077)
13 quarters after entry	-0.103	(0.078)	0.027	(0.058)
14 quarters after entry	-0.100	(0.067)	-0.002	(0.066)
15 quarters after entry	-0.179	(0.058) ***	0.030	(0.050)
16 quarters after entry	0.083	(0.211)	0.014	(0.047)
17 quarters after entry	-0.153	(0.064) **	0.009	(0.048)
18 quarters after entry	-0.180	(0.077) **	0.037	(0.050)
19 quarters after entry	0.027	(0.180)	0.092	(0.052) *
20 quarters after entry	-0.114	(0.080)	0.033	(0.059)
21 quarters after entry	-0.182	(0.057) ***	0.004	(0.064)
22 quarters after entry	-0.184	(0.063) ***	-0.011	(0.061)
23 quarters after entry	-0.066	(0.073)	0.026	(0.074)
24 quarters after entry	-0.161	(0.067) **	-0.123	(0.129)
25 quarters after entry	-0.167	(0.070) **	0.040	(0.075)

Notes: The reported results are the difference in coefficients from estimating equation (3) for the matched sample.

Appendix Table A4b – Difference in Returns for Matching Estimators Certificate Seeking Students, Women

	For-Profit Treatment		Comm. College Treatment	
	Coefficient	Std. Error	Coefficient	Std. Error
4 quarters prior to entry	-0.122	(0.044) ***	-0.076	(0.061)
3 quarters prior to entry	-0.093	(0.050) *	-0.106	(0.072)
2 quarters prior to entry	-0.083	(0.052)	-0.030	(0.038)
1 quarter prior to entry	-0.083	(0.054)	-0.088	(0.048) *
Quarter of entry	-0.020	(0.067)	-0.182	(0.065) ***
1 quarter after entry	-0.125	(0.072) *	-0.281	(0.092) ***
2 quarters after entry	-0.133	(0.063) **	-0.464	(0.263) *
3 quarters after entry	-0.124	(0.065) *	-0.188	(0.066) ***
4 quarters after entry	-0.224	(0.050) ***	-0.172	(0.058) ***
5 quarters after entry	-0.103	(0.053) *	-0.139	(0.053) ***
6 quarters after entry	-0.159	(0.048) ***	-0.038	(0.049)
7 quarters after entry	-0.130	(0.053) **	-0.018	(0.048)
8 quarters after entry	-0.159	(0.050) ***	-0.093	(0.055) *
9 quarters after entry	-0.128	(0.044) ***	-0.140	(0.059) **
10 quarters after entry	-0.144	(0.050) ***	-0.100	(0.054) *
11 quarters after entry	-0.186	(0.059) ***	-0.098	(0.052) *
12 quarters after entry	-0.208	(0.057) ***	-0.075	(0.046)
13 quarters after entry	-0.179	(0.079) **	-0.143	(0.063) **
14 quarters after entry	-0.286	(0.061) ***	-0.116	(0.054) **
15 quarters after entry	-0.294	(0.054) ***	-0.068	(0.054)
16 quarters after entry	-0.230	(0.055) ***	-0.111	(0.063) *
17 quarters after entry	-0.225	(0.063) ***	-0.094	(0.053) *
18 quarters after entry	-0.230	(0.065) ***	-0.097	(0.069)
19 quarters after entry	-0.230	(0.052) ***	-0.036	(0.059)
20 quarters after entry	-0.183	(0.073) **	-0.180	(0.077) **
21 quarters after entry	-0.241	(0.063) ***	-0.166	(0.075) **
22 quarters after entry	-0.158	(0.067) **	-0.171	(0.115)
23 quarters after entry	-0.096	(0.070)	-0.037	(0.081)
24 quarters after entry	-0.154	(0.064) **	-0.042	(0.084)
25 quarters after entry	-0.081	(0.064)	-0.021	(0.081)

Notes: The reported results are the difference in coefficients from estimating equation (3) for the matched sample.

Appendix Table A5 - Match Rate for Treated Cases by Gender, Degree, and School Type

Men			Women	
Seeking Certificates	Seeking Associate's Degrees		Seeking Certificates	Seeking Associate's Degrees
Treatment: For-profit Schools				
49%	88%		72%	85%
Treatment: Community Colleges				
80%	54%		35%	54%

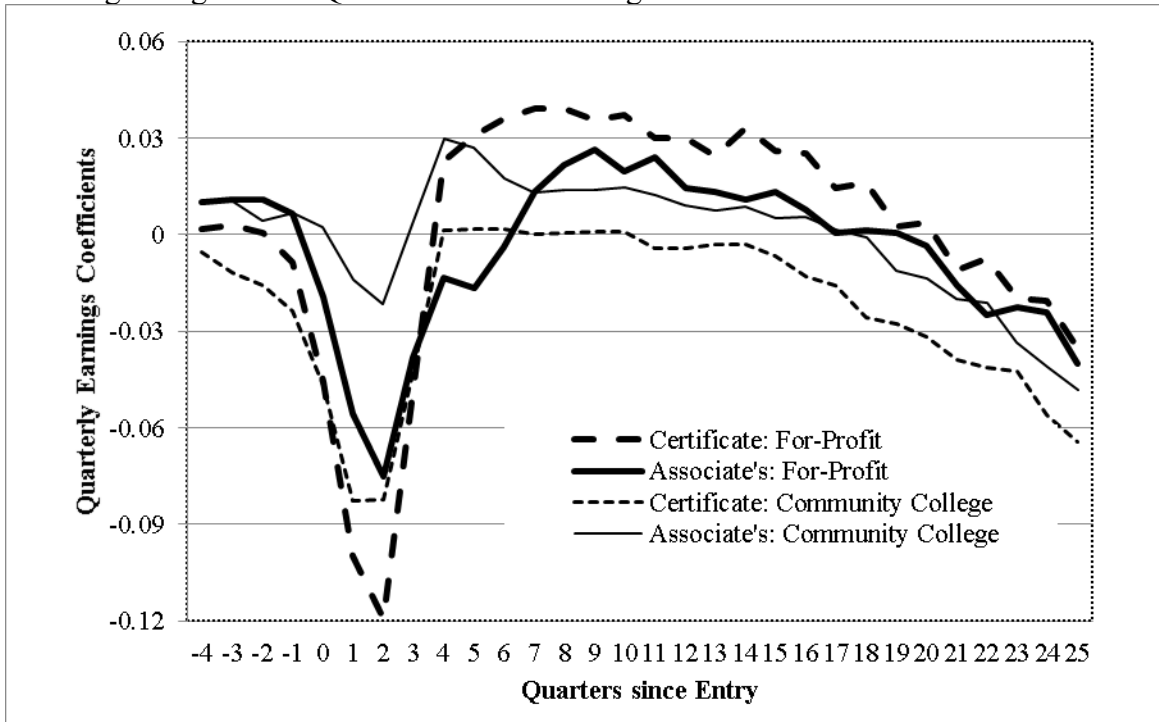Appendix Figure A1a - Effect of Attendance on Employment by Quarter and Program Type, Men Omitting Strings of 5+ Quarters of Zero Earnings
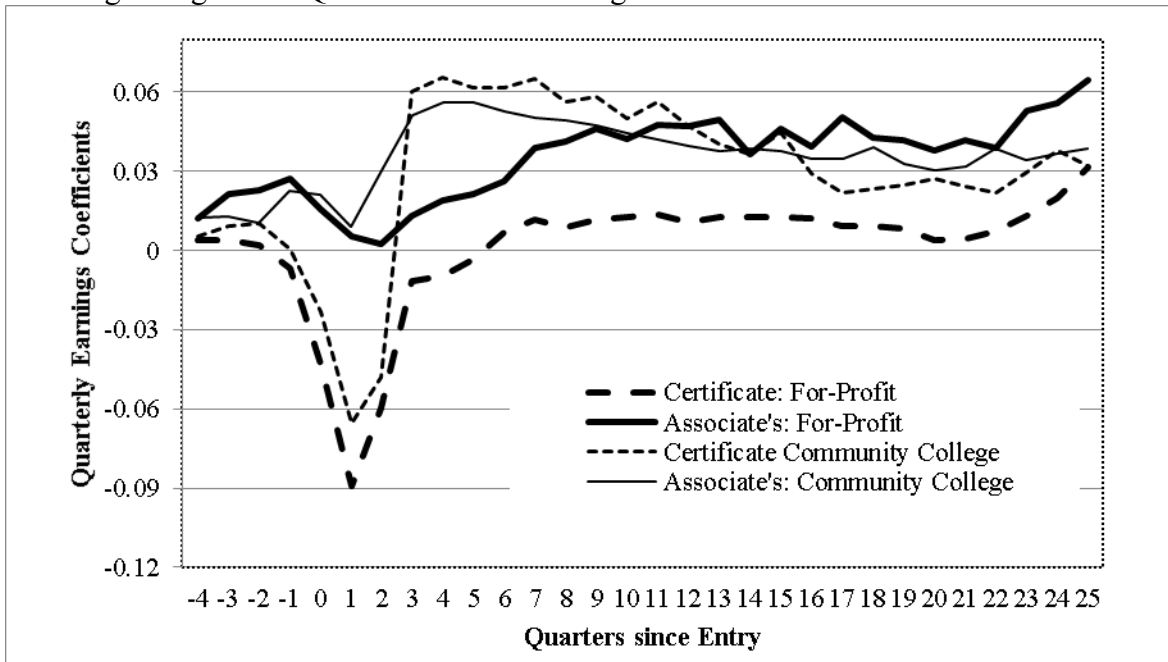
Appendix Figure A1b - Effect of Attendance on Employment by Quarter and Program Type, Men Omitting Strings of 15+ Quarters of Zero Earnings
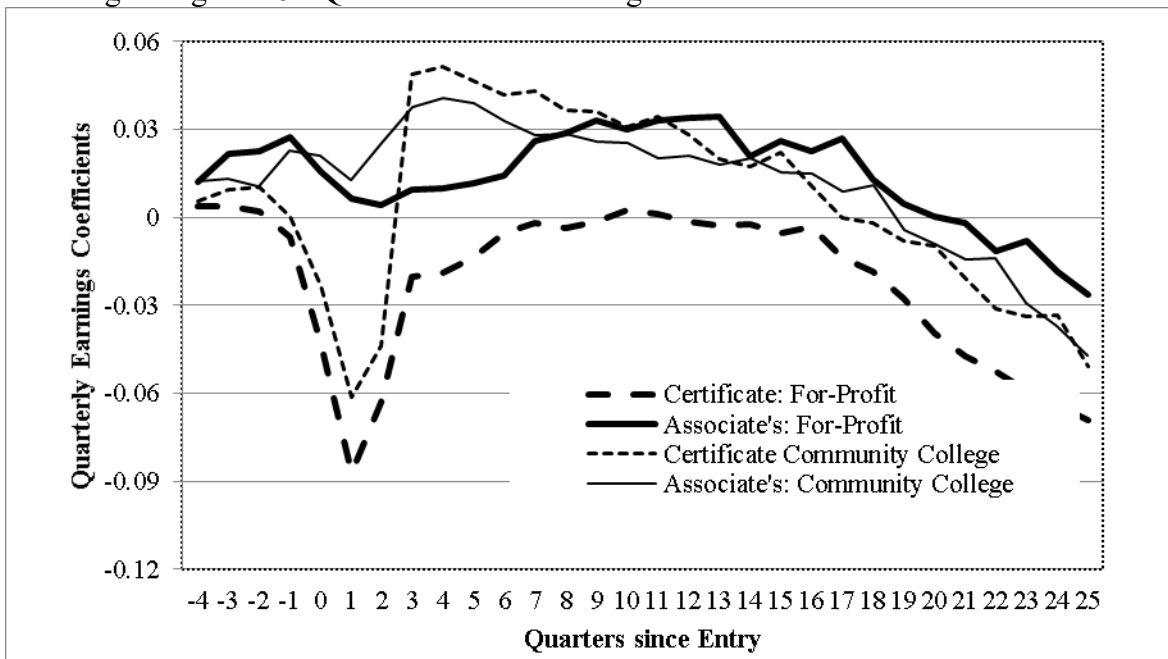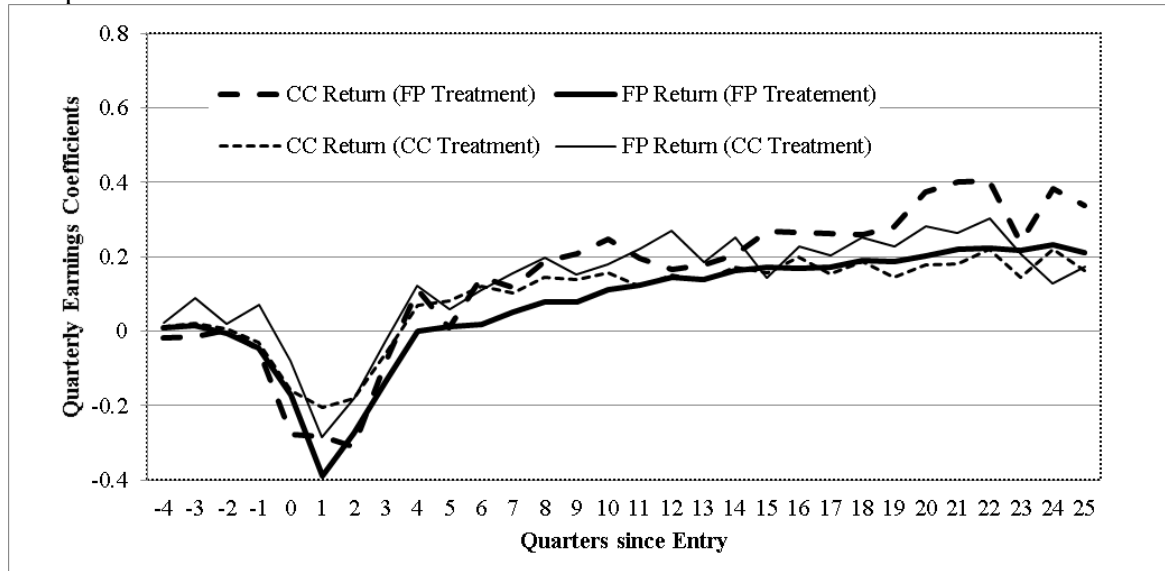
Appendix Figure A1c - Effect of Attendance on Employment by Quarter and Program Type, Women Omitting Strings of 5+ Quarters of Zero Earnings
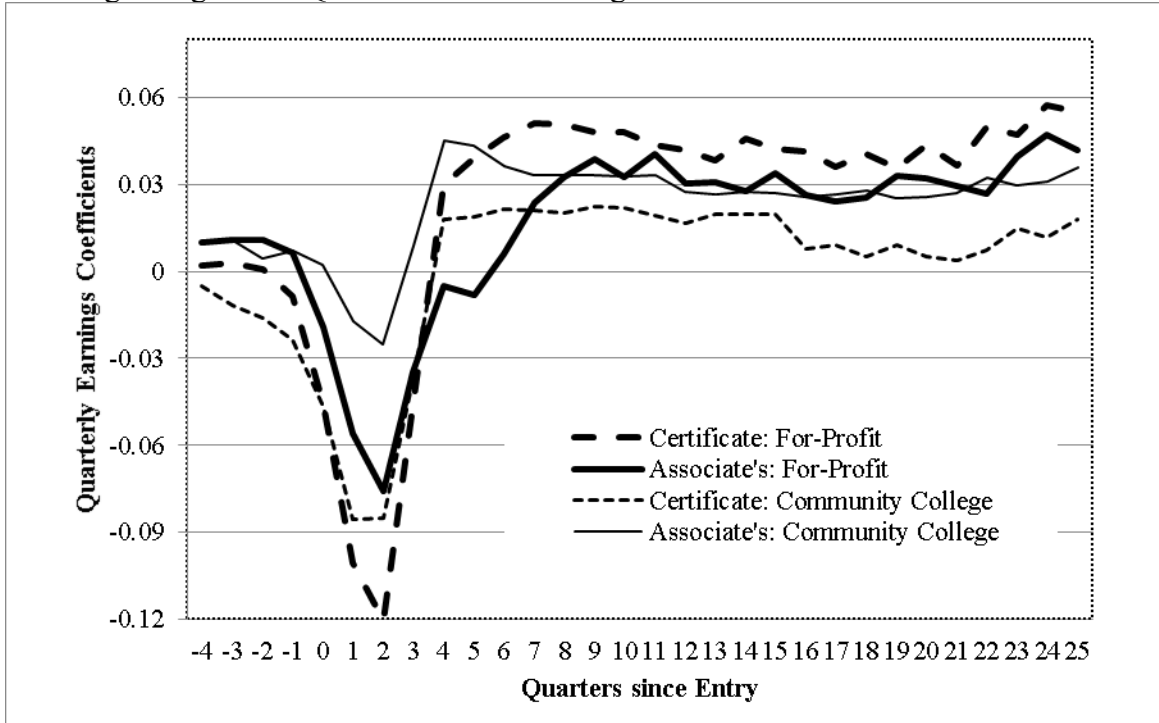
Appendix Figure A1d - Effect of Attendance on Employment by Quarter and Program Type, Women Omitting Strings of 15+ Quarters of Zero Earnings
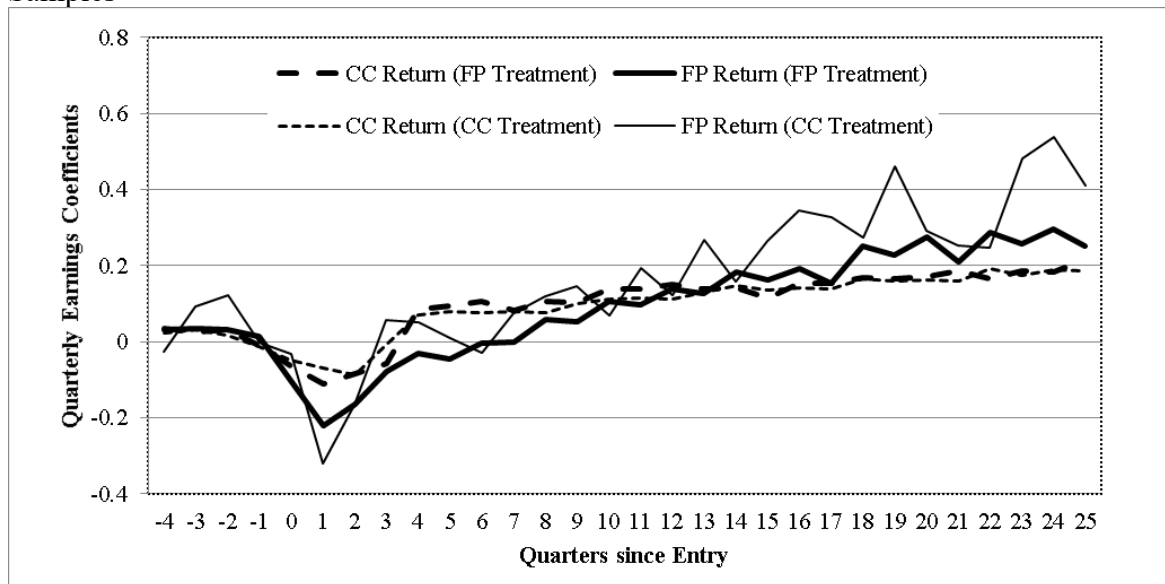

58

Appendix Figure A2a –Effect of Attendance on Quarterly Earnings, Men Pursuing Certificates, Matched Samples


Note: Each data point is the estimate log quarterly earnings gain based on equation (3), estimated for the matched sample.

Appendix Figure A2b –Effect of Attendance on Quarterly Earnings, Men Pursuing Associate's, Matched Samples

Note: Each data point is the estimated log quarterly earnings gain based on equation (3), estimated for the matched sample.

Appendix Figure A2c –Effect of Attendance on Quarterly Earnings, Women Pursuing Certificates, Matched Samples
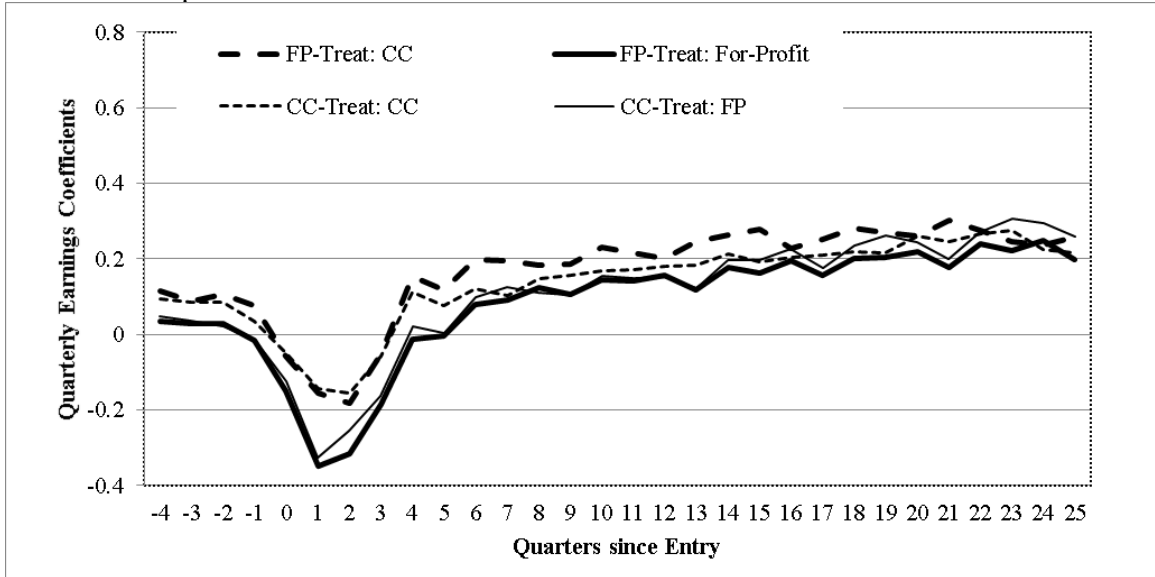
Appendix Figure A2d –Effect of Attendance on Quarterly Earnings, Women Pursuing Associate's, Matched Samples