Estimates of Earnings Returns by Field of Study for For-Profit Schools and Community Colleges

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December 2024

ABSTRACT

We estimate labor-market returns for students pursuing certificates or associate's degrees in eight broad fields of study at for-profit institutions and community colleges. The data contain 400,000 students beginning their studies between 2005 and 2012 in one state. We estimate two-step models to address recent econometric concerns with two-way fixed effects models. Our analyses show important differences in return by field, with similar patterns for for-profit schools and community colleges. Apart from those studying in health fields, returns are generally greater for those attending for-profit schools than those attending community colleges. Higher estimated overall returns for for-profit schools are not primarily due to differences in areas of study.

JEL classification: J24, I26

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

* Corresponding author. We thank the European Commission (Marie Curie Career Integration Grants) and the Spencer Foundation (Small Grants) for financial assistance. We thank seminar participants at the UCD Geary Institute, IRVAPP (Trento), Free University of Bolzano, and the University of Zurich for useful comments and suggestions. Several individuals in the state Department of Higher Education provided invaluable assistance in procuring and interpreting the school data. All opinions and errors are the authors' sole responsibility.

1. Introduction

For-profit colleges are a polarizing postsecondary education option in the United States. Proponents characterize them as flexible, innovative institutions providing education where it is needed most. Jepsen et al. (2024) show that the labor-market benefits of attending a for-profit school generally outweigh the costs. On the other hand, detractors point to media reports of grossly overstated benefits of attendance, financial mismanagement, and a sector in decline (Beaver, 2017; Jackson, 2021). In fact, Cellini (2022) reviews twenty years of research on for-profits and concludes that for-profits do not improve labor-market outcomes. Over the past two decades, the controversy has played out in the political sphere. The Obama administration developed "Gainful Employment" (GE) regulations, which were designed to deny federal loans to students in for-profit schools where graduates failed to meet specified earnings and debt benchmarks. The Trump administration held up implementation of GE regulations and then rescinded them 2019, whereas the Biden administration reinstituted GE (with some modifications), which took effect on July 1, 2024.

A key element largely missing from this debate on for-profit schools is the importance of field of study. A large literature in economics documents differences in labor-market returns by field of study. Jepsen and Soliz (2024) review the literature for community colleges, whereas Altonji, Arcidiacono, and Maurel (2016) focus on four-year schools. Patnaik, Wiswall, and Zafar (2022) and Lovenheim and Smith (2023) review the returns by field of study in community colleges and graduate schools as well as for four-year schools.[1] Yet, none of these articles – nor the work on for-profit schools reviewed in Cellini (2022) or the more recent work by Jepsen et al. (2024) – presents labor-market returns for for-profit schools by field of study.

[1] Jepsen and Soliz (2024) and Lovenheim and Smith (2023) include reviews on field of study as part of broader reviews of community colleges and labor-market returns to postsecondary education, respectively.

There are substantial differences in the chosen field of study between for-profit schools and community colleges. In the sample used here, which is based on residents in one state, among men seeking associate's degrees, 70 percent are in the academic/other field in community colleges, whereas in for-profit schools fewer than 5 percent are in this field. Similarly, among women seeking certificates, in for-profit schools 76 percent are in the health fields, compared with 44 percent in community colleges. Thus, one potential source of differences in the estimated return to attendance in the two types of schools could be differences in the returns by field across the two school types.

Our main contribution is to present new evidence on field-of-study-specific returns to for-profit schools and community colleges, providing separate analyses of students seeking certificates and associate's degrees. We use administrative data from a single state that collects information on all for-profit and public-school students, in addition to labor market information. Given recent concerns about potential biases in two-way fixed-effects models, we use the estimation strategy introduced by Borusyak, Jaravel, and Speiss (2024), which produces unbiased estimates.

Our results show that, although choice of field does vary substantially across for-profit schools and community colleges, these differences are not a result of observed differences in characteristics of students in the two school types. Instead, choice of field seems related to unobserved differences, possibly differences in preferences. We also find that returns to attendance differ by field and by school type, but the patterns are consistent—in six of the seven fields where offerings overlap, the returns to attending a for-profit school are as high or higher than the returns to attending a community college. The one exception is the health field where the returns are higher in community colleges than in for-profit schools. These results show that

the often-higher returns to attending a for-profit school relative to attending a community college are not a function of differences in field.

2. Literature

In her review of 12 papers on labor-market outcomes for for-profit schools, Cellini (2022) reports a consistent pattern where students in for-profit colleges nearly always have lower average earnings than students in public schools. In contrast, more recent work by Jepsen et al. (2024) finds that students in for-profit schools have similar, and, often, greater earnings returns than students in public schools in Missouri, for attendance in both certificate and associate's degree programs.[2]

Little previous work looks at field of study in for-profit schools. The most important exception is the study of Cellini and Turner (2019), which controls for field of study in a comparison of for-profit schools and community colleges. Given the apparent similarity between their work and ours, their methods and findings warrant an extended commentary. We discuss their study below, showing how their analysis relates to ours.

Previous work on for-profit schools using survey data has too few observations of for-profit students to obtain meaningful estimates of return by field of study. There are, however, a large number of studies that identify differences in return by field in public postsecondary schools. Recent studies have been careful to use methods that take account of student selection into field by measured and unmeasured factors.

The bulk of the work on returns by field of study focuses on four-year schools. This work is summarized in Altonji, Arcidiacono and Maurel (2016); Patnaik, Wiswall, and Zafar (2022);

[2] Jepsen et al. (2024) also show that the primary reason for the difference in results reported by these studies is due differences in model specification. Jepsen et al. (2024) reproduce the Cellini and Turner (2019) result when they estimate a model pooling the data for for-profit and community college students, but they find higher returns for for-profit schools when they estimate separate models for for-profit and community college students.

and Lovenheim and Smith (2023). Despite differences in econometric methods, time periods, and locations, studies generally find that engineering is the field with the highest returns, whereas education and arts/humanities usually have the lowest returns. For example, the results are broadly consistent between analyses based on simple mean differences in Altonji, Arcidiacono, and Maurel (2016) and the careful analyses of Kirkeboen, Leuven, and Mogstad (2016), who use a regression discontinuity model that compares the chosen major with the next-most-preferred option, based on data from a centralized admission process. Differences by field for graduate study are also substantial (Altonji and Zhong, 2021); as expected, medicine is an outlier, and graduate business study joins engineering and other quantitative fields providing larger-than-average returns.

Although studies of college and graduate students are suggestive, given that the vast majority of for-profit students are seeking certificates or two-year degrees, among public providers it is community colleges that most closely parallel services of the for-profit sector. Several papers estimate labor-market returns for community colleges by field of study. For associate's degrees, Jepsen, Troske, and Coomes (2014) and Stevens, Kurlaender, and Grosz (2019) document the highest returns for health-related fields, with Jaggars and Xu (2016) also reporting high returns in health fields. Looking at a more detailed breakdown of fields, Liu, Belfield, and Trimble (2015) and Dadgar and Trimble (2015) show that nursing has the highest returns, with substantial returns for allied health fields. Vocational and academic associate's degrees also have substantial earnings gains in multiple studies (Jepsen, Troske, and Coomes, 2014; Jaggars and Xu, 2016; Liu, Belfield, and Trimble 2015; Dadgar and Trimble, 2015). In a study of Further Education colleges in Britain, the closest equivalent to US community colleges, Aucejo, Hupkau, and Ruiz-Valenzuela (2022) find substantial differences in return across field.

Although technical fields have among the highest returns, there is much variation that is not easily summarized. Men and women often have different returns by field.

The literature also provides evidence on return by field for students in public community colleges seeking more limited credentials. In their pioneering study of displaced workers in Washington state, Jacobson, LaLonde, and Sullivan (2005a, 2005b) find that the returns to credits are much higher for technically-oriented subjects compared to other subjects. Similarly, among diplomas and long-certificates, Jepsen, Troske, and Coomes (2014) and Stevens, Kurlaender, and Grosz (2019) find the highest earnings gains for health-related fields, and Liu, Belfield, and Trimble (2015), Dadgar and Trimble (2015), and Xu and Trimble (2016) find the highest gains for nursing. Among short-term certificates, labor-market gains are much more modest, and no clear pattern emerges across studies in return by field. For example, Jepsen, Troske, and Coomes (2014) find modest earnings gains for men receiving vocational certificates and women receiving health certificates. Dadgar and Trimble (2015) find women have modest gains in construction, and business and marketing; men have large gains in protective services.

As noted above, Cellini and Turner (2019) compare returns for students seeking certificates in for-profit schools with those in community colleges, identifying differences in returns separately for the ten largest fields in for-profit schools. They conclude that returns for public community colleges yield higher returns than for-profit schools in seven of the fields, with no significant differences in two fields, and larger returns in for-profit schools in one field.[3] Their analysis is limited in several important respects. First, they only have data for students who receive federal aid and are enrolled in certificate programs covered by the federal "Gainful Employment" regulations; this limitation omits a substantial number of for-profit and community

[3] They also provide analyses that report differences in return for 98 fields of study defined by four-digit CIP codes. They find that for 74 of the 98 fields of study the return is greater for community colleges than for-profit schools.

college students. The sample includes a short time window, including only students who completed a program or dropped out in the period October 2006 through September 2008. The study does not present estimates of overall returns by field but instead reports only differences in returns for for-profit schools and community colleges. Community college students are included in the analysis only insofar as they are matched by field and personal characteristics with for-profit students.

We contribute to this literature in multiple ways. Whereas Cellini and Turner (2019) estimate only the difference in earnings between students seeking certificates in for-profit schools and community colleges, we report gains in earnings by field separately for each school type for students seeking certificates. Our analyses of returns by field for students seeking associate's degrees in for-profit schools have no antecedent in the literature. Our estimates of returns in community colleges, which offer the largest number of associate's degrees, provide a direct comparison with for-profit schools using the same methods.

Another contribution is our estimation of the effect of the treatment on the treated using a highly flexible model, in contrast to the matching estimates in Cellini and Turner (2019), which exclude over half the data. We provide the best quantitative picture of the experience of the average student enrolling in a given field in a given type of school. This approach recognizes that student choice implies that students in various fields differ in ability and preferences, so returns would not necessarily be the same if students were shifted from one field or school type to another. Yet, for many policy questions, our estimates are appropriate, as they tell us the degree to which the choices students make end up benefiting them.

3. Data

We use administrative data on enrollment and earnings for students who entered for-profit post-secondary schools or public community colleges located in Missouri from January 2005 to December 2015. Missouri's Proprietary School Certification Program requires for-profit schools with a physical presence in the state to provide student-level data. These for-profit institutions include campuses of national institutions such as Strayer University as well as local institutions providing one or two subjects such as truck driving academies.[4] In total, our analysis includes 151 for-profit schools in the state. The Enhanced Missouri Student Achievement Study (EMSAS) contains student-level data for the state's 14 public community colleges.

Our unit of analysis is a spell of enrollment, where a spell is a period of participation either in a for-profit school or in a community college. Given that students often take short breaks from enrollment, usually over the summer, our definition of a spell allows for periods of non-enrollment of less than a year within a spell.[5] The sample is limited to spells for students who specify that they are seeking certificates or associate's degrees. Nearly a third of spells in community colleges are omitted because the degree sought is "other," often identifying students who plan to transfer to four-year schools; among for-profit schools, 13 percent of spells are omitted for students who were seeking other degrees, typically bachelor's or master's degrees. Consistent with recent studies of community colleges, we exclude spells where students attend a

[4] Although the program criteria would appear to include nonprofit private schools, almost all are exempted in practice. For a discussion of the program's requirements, see http://dhe.mo.gov/psc/.

[5] For-profit school data specify an entry and an exit date for each enrollment period in a given school. When more than one enrollment period is observed in for-profit schools, if there are fewer than 365 days between exit from one and entry into the next, they are combined into a single spell of enrollment. For any period of enrollment with a missing exit date, the exit date is set equal to 365 days after entry date. The community college data provide a record for each semester of attendance (winter/spring, summer, or fall), so a spell is defined as a series of semesters of community college enrollment with no gaps of more than two semesters. The spells are important for identifying the period of enrollment, but the length of a spell has little impact on the estimated return, as returns are estimated relative to entry date.

public four-year educational institution in the state anytime between the beginning of a spell and two years following the end of the last period of enrollment. Finally, we omit approximately 16 percent of for-profit student spells and 2.2 percent of public college spells because they do not indicate at the time of enrollment that they are permanent residents of Missouri or Kansas, the states for which we have administrative earnings data. We exclude students who attend both a for-profit school and a community college during the period of our study, which reduces the number of for-profit spells by about 8 percent and the number of community college spells by under 4 percent.[6]

Both the community college and for-profit data use the Classification of Instructional Programs (CIP) code to identify the field of study at the beginning of the spell. The data also contain the specific school attended and the degree sought. Among award recipients, we have the type of degree or certificate received, and the field.

Using Social Security number, we matched the educational data with administrative data on quarterly earnings from the Missouri and Kansas Unemployment Insurance (UI) programs.[7] We have adjusted all earnings for inflation, with 2010 as the base year. Despite excluding some types of earnings such as those from self-employment and federal jobs, Kornfeld and Bloom (1999) and Wallace and Haveman (2007) document similar program effects of worker training programs and welfare programs, respectively, for analyses based on wage record data and survey data.

[6] The effects of our selection criteria on sample size are reported in Appendix Table A1. Although the order in which observations are omitted affects the sample size reductions, in the case at hand the percent change is not very sensitive to the order.

[7] Although the St. Louis metropolitan area is on the border with Illinois, the proportion of Missouri residents who work in Illinois is small. Within the metropolitan area, only 16 percent of private sector jobs were in Illinois in 2012 (www.bls.gov/news.release/cewqtr.toc.htm), and we expect that Illinois residents held most of these jobs.

The earnings data cover the first quarter of 1999 through the third quarter of 2014. Because our earnings analysis focuses on spells that began in 2005 through 2012, we have data for over five years prior to school attendance and at least seven quarters after initial enrollment in a for-profit school or community college. The analysis data set is a panel of student spells and earnings for up to 24 quarters prior to entry and 25 quarters after entry. 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 all observations from individuals with missing age or Social Security number. We also exclude any quarter of earnings more than 24 quarters prior to program entry or more than 25 quarters after program entry.

Although we study individuals attending schools only in Missouri, our comparisons based on available data suggest that students attending Missouri's for-profit schools and community colleges make similar field choices to those in the remainder of the U.S.[8] Missouri's labor market is similar to that of the U.S. as a whole. The industrial structure in Missouri is typical of U.S. states, and Missouri earnings and wages are about 10 percent below the U.S. average. The proportion Hispanic is in line with most states even though it is below the U.S. average. Given the similarity between Missouri and many states across multiple dimensions, our results are plausible estimates for many parts of the country.

[8] We do not know of a dataset comparable to ours providing information on fields of study in for-profit schools outside Missouri. The Integrated Postsecondary Education Data System (IPEDS), maintained by the U.S. Department of Education, only requires reporting for for-profit schools that are eligible for federal aid, omitting approximately a third of the for-profit schools in Missouri. As a second-best, we have compared fields of study for the IPEDS schools in Missouri with those in the remainder of the country. Although the distribution differs, the rank order of fields in Missouri and that for the remainder of the U.S. are very similar. Correlations for the percentages across fields for the U.S. and Missouri by type of degree are over 0.9 for both for-profit schools and community colleges. In contrast, consistent with our results, in the IPEDS, differences between distributions of fields in for-profit schools and community colleges are much greater. See Appendix Table A2.

4. Descriptive Comparisons

Our analyses focus on students seeking certificates and associate's degrees.[9] There are substantial differences in demographic characteristics by type of degree sought and type of school. Perhaps the biggest difference is in race, where for-profit schools are disproportionately attended by Black students. Those seeking certificates are generally older, as are those attending for-profit schools. Community college students are generally more likely to be from nonmetropolitan areas. See Appendix Table A3.

Length of time in school differs as well. Certificates can require as little as a month of full-time study, and seldom take more than a year to complete, whereas an associate's degree generally requires two years of full-time study (omitting summers). In our data, the average spell for a student seeking a certificate is 3.2 semesters, whereas the average for students seeking associate's degrees is 4.1 semesters.[10]

Field of study and gender also differ dramatically across this credential dimension. Table 1 provides the distribution of individual spells by field of study, type of credential, gender, and for-profit school/community college. Before we turn to an examination of fields, it is worth noting that three-quarters of those seeking certificates are attending for-profit schools. In contrast, 87 percent of students seeking associate's degrees are attending community colleges. The numbers of associate's degrees for the two types of schools are strongly skewed by the large proportion of community college students seeking degrees in academic or other fields. Looking at all credentials in both types of schools, 97 percent of the students who list their chosen field as

[9] Here and below, statistics are based on the sample of spells. Up to 8.4% of students in for-profit schools have more than one spell, and up to 13.8% of students in community colleges have more than one spell. We present statistics based on spells since these are used in our analysis. Results are essentially unchanged if we limit the sample to one spell per person.

[10] The counts are based on number of semesters spanned in a spell. Recall, spells include any nonenrolment periods of less than a year.

academic/other are community college students seeking associate's degrees. Further disaggregation of this field is not possible because over 95 percent of students pursuing academic associate's degrees are in the single category "liberal arts," with no subcategories.

Table 2 provides the distribution across fields in percentages. The academic/other field is presented as a percentage of the total number, whereas other field percentages omit academic/other. After the academic/other field, health is clearly the most important field overall, with nearly 38 percent of remaining cases specifying that field (rightmost column). Health is popular among women seeking certificates (in both for-profit schools and community colleges) and among women seeking associate's degrees in for-profit schools. Our second observation is that health is appreciably more important for women attending for-profit schools than for women attending community colleges. Women in community colleges are more likely to be in the "vocational" field than those in for-profit schools. These differences are apparent for both those seeking certificates and those seeking associate's degrees.

For men, the differences in the distribution of fields of study do not generalize across credential type. Among men seeking certificates, transport and trades are more popular in for-profit schools, whereas engineering and vocational areas are more popular in community colleges. Among men seeking associate's degrees, computers, engineering, and health are larger in for-profit schools, whereas trades and vocational fields are more important in community colleges.

Differences in the distribution of detailed subfields within broad fields are generally modest. The most popular subfields within each broader field are generally the same for the two types of schools within gender and credential type. One important difference is in the vocational classification. Among community college students, most students in vocational fields specify

education as their field, whereas very few make this choice in for-profit schools.[11] Similarly, we find that males seeking certificates in community colleges are much more likely to specify the security subfield than those in for-profit schools. Conversely, those in for-profit schools within the vocational classification are more likely to indicate services as their field of study than those in community colleges. This heterogeneity in subfield suggests that comparisons between school type for students within the vocational classification are less meaningful than for the other broad field classifications. The distribution by two-digit CIP codes for each of our broad categories is provided in Appendix Table A4.

How important are differences in the kinds of individuals who select fields? Table 3 provides information on student characteristics by field. Racial differences are among the most pronounced across field, especially among those seeking certificates. The largest proportions Black are in health and trades, at about 34 percent. In contrast, fewer than 15 percent of the students in the academic/other category or in engineering are Black, and only about 18 percent in transport are Black. The average age varies from 28 years of age among those in the academic/other category, up to 37 in transport. The most dramatic outlier by field among certificate seekers is the proportion from major metropolitan areas in trades, for which only 18 percent are from major metropolitan areas, compared to proportions that range from 52 percent to 72 percent in the other fields.

For students seeking associate's degrees, we observe smaller differences in characteristics by field, although the differences at least partly correspond with those for students seeking certificates. For example, as is the case for certificates, we note that Blacks are less

[11] We suspect that some students who are hoping to ultimately obtain a state "teaching certificate" (only available to students with four-year degrees) may specify that they are seeking a certificate. We do not know how common this error is.

likely to study in trades, with a share of only 8 percent, whereas the proportion in other fields ranges from 13 percent to 18 percent. We also looked to see if the patterns were similar by field within gender. Although levels were often very different, basic patterns for men and women were similar across fields.

There are substantial differences in the characteristics of students in for-profit schools and community colleges.[12] For each gender-credential group, Blacks are substantially overrepresented in for-profit schools. For example, nearly 30 percent of men seeking certificates in for-profit schools are Black, compared to only 9 percent in community colleges; for women, the differential is 37 percent compared to 10 percent. As a result, the vast majority of Blacks seeking certificates are in for-profit schools. For men seeking certificates, we see that for-profit students are, on average, more than four years older than community college students. The difference is somewhat smaller for men seeking associate's degrees. In contrast, community colleges have an overrepresentation of students from small metropolitan areas for all genders and school types.

Given the large difference in the distribution of fields between for-profit schools and community colleges, it is natural to ask to what degree the differences in characteristics are due to the field distribution. We undertook an analysis that examined the extent to which differences in characteristics can be traced to differences in the distribution of fields and how much can be traced to the differences within field.[13] We find that, for almost all characteristics where differences are substantial, the field distribution does *not* explain much of the observed differences, i.e., the overall differences are similar to differences within field. For example,

[12] The overall means for the characteristics are presented in Appendix Table A3.
[13] Appendix Table A5 reports the overall differences for characteristics between for-profit schools and community colleges, as well as within-field differences, allowing calculation of the Oaxaca-Blinder decomposition. See notes to Appendix Table A5.

looking at the 4.2-year difference in age between for-profit and community college men seeking certificates, we see that the average difference within field is 3.6 years, implying that only about one-eighth of the age difference is due to differences in the distribution of field of study.[14]

In conclusion, we observe that the choice of field of study varies by gender, credential, and school type. Differences in field by gender are as expected, with women overrepresented in health and men in computers, engineering, trades, and transport. The most important difference in choice of field between students in for-profit schools and community colleges is that many more students in community colleges (especially among those seeking associate's degrees) choose the academic/other field of study—with almost all selecting liberal arts—whereas very few students in for-profit schools choose this field. Although choice of field differs between students in for-profit schools and community colleges, these differences do not explain observed differences in characteristics (most importantly, differences in race and age) between these types of schools.

5. Methods

In estimating labor-market returns, we use a student fixed-effects model to compare the post-schooling earnings of an individual with the pre-schooling earnings of the same individual. The average age at school entry is between 24.8 and 32.7 for the gender-credential-school type groups (Appendix Table A3). Thus, the pre-schooling earnings of students are a plausible counterfactual for earnings in the absence of enrolling in education. Person fixed-effects models are common in papers using administrative data to study labor-market returns to certificates and

[14] The one exception is the gap in age between for-profits and community colleges for men seeking associate's degrees. We see that only about one year of the nearly three-year difference in age is within field, implying that about two-thirds is explained by the field distribution. In this case, the lower average age for community college students is largely explained by the greater proportion of such students in the academic/other field. More than two-thirds of community college students are in this category, as compared with only 5 percent of for-profit students, and the average age in that field is at least two years younger than the average for the other categories combined. See Appendix Table A5.

associate's degrees (Cellini and Turner, 2019; Cellini and Chaudhary, 2014; Jepsen, Troske and Coomes, 2014; Belfield and Bailey, 2017).

Several recent papers document potential bias in estimating program effects in single equation models that control for two-way fixed effects (de Chaisemartin and D'Haultfoeuille, 2020; Borusyak, Jaravel, and Spiess, 2024; and elsewhere). In particular, where effects are heterogeneous, models may produce estimates of an observed intervention that are highly misleading, possibly even outside the range of true effects.[15] In response, we estimate the two-step model proposed in Borusyak, Jaravel, and Spiess (2024).[16] We fit the model separately by gender, type of school (for-profit versus community college), program (certificate versus associate's degree), and field, yielding 60 sets of estimates (associate's degrees in transport are not offered). Although the fixed-effects model adjusts for time-invariant individual differences, we also include controls for calendar quarter and age to predict the earnings that an individual would have obtained in the period following enrollment if he or she had not enrolled.[17]

The model is estimated in multiple steps.[18] First, we estimate parameters using log earnings for all time periods from 5 to 24 quarters prior to enrollment. We include all individuals who began participation over the period 2005 through 2015. The fixed-effects model fits the following multivariate regression:

[15] Our experiments with these models indicate that such biases are particularly important if the effect of school participation is captured in a single measure that does not account for time since school entry. Bias in the model used here is less severe.
[16] The only difference between our model and the one they specify is that our first-stage estimates are based on a slightly different sample than our final-stage estimates, whereas Borusyak, Jaravel, and Spiess (2024) assume the two samples are the same.
[17] All time-invariant personal characteristics as well as field of study are captured in person fixed effects.
[18] We also estimate a standard single-equation two-way fixed effects model containing all of the variables from equation (1) below, along with all of the variables from equation (3) interacted with dummy variables for our eight areas of study, fitted separately for the eight gender-credential-school type groups. Estimates from this model of returns by field are of similar magnitude and ordering as the results from our two-stage model. Results are available from the authors upon request.

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

The unit of analysis is earnings in quarter-year *t* for individual *i*. *LNEARN* is the natural logarithm 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 third-order polynomial. The model also contains person fixed effects (η) and calendar quarter-year fixed effects (τ). The last element (ε) is the error term.

Using the estimates from equation (1), we construct counterfactual earnings for quarters beginning four quarters prior to the enrollment. For an individual *i*, we specify:[19]

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

In the final step, we fit the following equation for the cohorts entering between 2005 and 2012:

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

ENROLL is a variable equal to one-half for the first quarter and last quarter of school enrollment and a value of one for each quarter in between.[20] We assign a value of one-half for the entry and exit quarter because the school entry and exit dates likely do not align perfectly with the calendar quarter.

The input of interest is the vector *ENTRY*, a set of dichotomous variables for each quarter of entry from four quarters prior to the date of entry through quarter 25 after entry. The variables for the four quarters before enrollment are included to capture any anticipation effects or pre-entry dips in enrollment (as noted in Ashenfelter, 1978). The quarters more than one year before enrollment serve as the reference period. Thus, the coefficient for each quarter represents the

[19] 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.

[20] For approximately 18 percent of for-profit students, the exit date is missing. For these students, we assign an exit date that is 365 days after the entry date. We fitted alternative models that omitted those with missing exit dates and fitted models with alternative parameterizations for enrollment but found that none of our substantive conclusions was altered.

difference in earnings for the specified quarter relative to quarters more than one year before school entry, controlling for age, calendar quarter effects, and person fixed effects.[21]

One advantage of using a series of quarterly variables is that this approach does not specify any parametric relationship between earnings and the time since enrollment. We do not pool the data by gender, school type, or program type because we find that the restrictions imposed by pooling the data produce substantially different results, implying that our more flexible specification is appropriate. We initially estimated (1) separately for each of the 60 subgroups, but we found that, for the smaller subfields, estimates were often implausibly large or less than zero. We discovered that if we fit (1) for each of the eight subgroups defined by gender, credential, school type, pooling together different fields of study, but continued to fit (2) and (3) for the 60 subgroups, we observed that smaller fields displayed far fewer estimates outside plausible ranges, whereas estimates for larger groups were essentially unchanged. We therefore present results based on this latter approach.

Because the sample includes only individuals who attended for-profit schools or community colleges, identification of the post-attendance parameters relies on a parallel trends assumption, namely that the patterns of schooling returns are similar for individuals initially enrolling at different ages and in different periods. Under these "parallel trends" assumptions, Borusyak, Jaravel, and Spiess (2024) show that this multi-step estimator is efficient, even when all observations are eventually treated. We undertake a test for the parallel trends as specified in in Borusyak, Jaravel, and Spiess (2024), finding that it fails in about half the samples. However, the results from a random effects model that accounts for violation of the parallel trends

[21] Estimates identify earnings impacts relative to the quarter of entry. A specification that omits the enrollment dummy produces results that are very similar to those reported here and are essentially identical for earnings more than 10 quarters after initial enrollment. Spell length allows us to identify the effects of enrollment, which are not relevant after the point when almost all students have exited.

assumption are nearly identical, and the coefficient for a differential time trend for the period prior to enrollment is trivial in magnitude.

Given that 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. We look at spells of attendance rather than degree completion to avoid endogeneity concerns associated with non-random completion (Cellini and Chaudhary, 2014; Cellini and Turner, 2019).

We have estimated standard errors using a bootstrap approach, sampling (with replacement) from the population of individuals and performing the full estimation procedure for each replication. Our standard error for a coefficient is the standard deviation of the coefficient estimate across 1000 replications. Given the large number of parameters we estimate, we have suppressed standard errors and confidence intervals in our presentation. The appendix tables present underlying estimates and standard errors.

6. Return by Field of Study

We have calculated returns by gender, degree type, and type of school, generating eight returns for each of up to eight areas of study, a total of 60 estimates for each return by time since entry. Rather than presenting all 60 estimates separately, Figure 1 provides a return profile for each field of study, combining estimates for the eight groups into an average formed by weighting each group estimate by the number of student spells in each.[22] For all fields, earnings decrease prior to the quarter of enrollment, reaching a minimum in the first or second quarter following enrollment. The decline is smallest for those in the academic/other field, where the

[22] Figure 1 combines the coefficients estimating effects of enrollment with the quarter earnings increment coefficients, with enrollment set equal to the mean for each field. Mean coefficient estimates underlying Figure 1 are presented in Appendix Table A6, along with bootstrap standard errors.

decline is only about 8 percent in the second quarter after entry. In contrast, those in transport experience a decline in earnings of over 44 percent in the quarter after entering training. Students in trades and health have somewhat longer and deeper declines in earnings than other fields through the third and fourth quarters after entry, with declines approaching 0.3 log points for several quarters for the health field.

For all fields, earnings increments increase after the dip, but earnings remain below their expected levels in the absence of schooling for up to five quarters after entry. Although fields generally show increases in relative earnings through quarter 25 (the last quarter in our data), increases tend to slow in later years. Return estimates in the fifth and sixth years after entry (quarters 17-24) imply that earnings increments associated with the eight field categories vary from about 0.14 log points to 0.27 log points. Although there is substantial overlap, returns for health and computers are generally higher than the others; business and trades are lower.

Next, we calculate separate return profiles for for-profit schools and community colleges. Figure 2 presents the mean return and 95 percent confidence interval across subgroups for quarters 17-20 (the fifth year) after initial enrollment by field, weighted by the number of spells of participation.[23] We have ordered the fields by the approximate size of the return. Looking at the for-profit schools, the lowest return is in trades, which produces an increase in earnings of 0.16 log points, although the return for the vocational fields is similar (0.18 log points). The highest return for for-profit schools is in the academic/other category (an increment of 0.26 log points), but – as shown in Table 1 – only about 2,300 students are in that category, very small compared to the over 200,000 students pursuing these fields in community colleges. Computers

[23] Appendix Tables A7-A11 provide the estimates underlying Figures 2-6, in addition to bootstrap standard errors.

and engineering have similar returns in for-profit schools, with log increments of 0.25 and 0.23, respectively.

The variation in returns across fields in community colleges is somewhat greater, with business displaying the lowest return (0.09 log points) and health the highest (0.28 log points). Figure 2 clearly illustrates the importance of field for community college students, in that low-return fields have substantial numbers of students in them (see Table 1). In fact, if we omit transport (with a trivial number of community college students), no field except for computers and health provides a return of over 0.16 log points.[24] For-profit returns vary substantially, but all have returns over 0.16 log points.

In comparisons between for-profit schools and community colleges, we observe that returns are higher in the for-profit sector in six of the eight categories. In health, the return for community college students is 0.28 log points versus 0.22 log points for for-profit students, a difference that is borderline significant at conventional levels (see Appendix Table A7). For the other areas, omitting academic/other, which has a very small number of for-profit students, and transport, which has a trivial number of community college students, the increment in favor of for-profit students varies from 0.03 log points for trades, to 0.08 log points for engineering. All but one of these differences is statistically significant.[25]

A natural question is the extent to which observed differences in the graph above reflect differences between men and women or differences between those seeking certificates versus associate's degrees. Figures 3 through 6 contain the average return in quarters 17 to 20 after enrolling, distinguishing by gender and degree sought. Fields with fewer than 300 students are

[24] There are only 612 students in community college in transport while there are 10,355 students in for-profit students in the transport field.
[25] Statistical significance for differences is reported in Appendix Table A7.

omitted from the figure, such as the 57 women pursuing transport certificates in community colleges (see Table 1).

In the community college literature, the returns are highest in health, especially for associate's degree recipients (see Jepsen, Troske, and Coomes, 2014; Stevens, Kurlaender, and Grosz, 2019; and others). This finding is confirmed in our data for each subgroup, as we find that the highest returns for both men and women seeking associate's degrees in community colleges are in health (see Figures 5 and 6). Health also provides the highest returns for men seeking associate's degrees in for-profit schools. For women seeking associate's degrees in for-profit schools, the two fields with returns higher than those in health—trades and engineering—have fewer than 400 students combined, compared with over 13,000 in health.

When looking at certificates, our results mimic the findings noted elsewhere in the literature of substantial variation in return by field of study. Among men in community colleges, those in business, vocational subjects, and health have the largest returns (Figure 3). Returns by field for men in for-profit schools tend to vary somewhat less. For women, ignoring fields of study with fewer than 300 students, the for-profit return is greater by 0.03 to 0.17, except for health, where the community college return is greater by 0.06 (see Figure 4).

Looking across all the figures, of 25 comparisons where the number of cases is sufficient, in 17 comparisons for-profit returns are higher, in four community college returns are higher, and in four they are virtually the same. The bottom line is that the higher returns of for-profit schools observed in Figure 2 are not a result of differing mixes of students by gender or type of credential in for-profit schools or community colleges, although those differences are substantial.

Despite substantial differences in the patterns of returns as displayed in Figures 3-6, those fields with higher returns in for-profit schools tend to have higher returns in community colleges.

For each of the four credential-gender groups, we observe a positive relationship between for-profit and community college returns. Appendix Figure A1 provides a scatterplot of relative returns in for-profit schools and community colleges for groups based on field of study, credential, and gender.

7. Discussion and Conclusion

These analyses highlight the importance of field of study in understanding the decisions facing students seeking post-secondary training below a bachelor's degree. For those seeking certificates, about three-quarters attend for-profit schools, and there are differences in the distribution of fields by type of school. Looking at men, we see that transport (truck driving) and trades are much more common in for-profit schools, and engineering and vocational fields are more common in community colleges. Notably, health is the dominant field for women in both for-profit schools and community colleges, but the focus on health certificates is greater in for-profit schools, with more than three-quarters of women who seek certificates in for-profit schools choosing health.

Looking at students seeking associate's degrees, we see that over 85 percent of students attend community colleges. The most important difference in field choice between for-profit schools and community colleges is that over two-thirds of students (both men and women) in community colleges choose the academic field—almost all of them studying liberal arts—in contrast to only five percent of students in for-profit schools. Even omitting this field, about two-thirds of students seeking associate's degrees enroll in community colleges.

We see that for-profit schools differ in terms of the kinds of students they attract, differing in terms of racial composition, age, and metropolitan classification. Observed

differences in field, however, do not play an important role in explaining these differences; for the most part, these differences exist within field.

For both for-profit schools and community colleges, there are substantial differences in returns by field, but differences are somewhat larger for community colleges. Hence, choice of field is more important for community colleges students. Perhaps surprisingly, students in community colleges who pursue the academic option do not appear to suffer in the labor market relative to students in most other fields.

Although differences in the distribution of fields are clearly important, they explain little of the observed differences in return between for-profit schools and community colleges. Our estimates suggest that in five of the six general fields with substantial numbers of students in both school types, returns are as high or higher for students attending for-profit schools. The exception is that returns in health fields for community college students are both higher than those in other fields and higher than the returns of students in for-profit health programs. This finding squares with the observation that health programs in public schools are commonly oversubscribed, and admission is often rationed (Grosz, 2020). As a result, the high returns we find for health fields in community colleges are likely not available to all students. In contrast, although returns are lower in for-profit schools, health credentials appear to be widely available, especially at the certificate level. These data provide support for the claim that for-profit schools offer students opportunities that they may not be able to access at public schools.

Given that our estimates attempt to identify returns of those who participate in a particular field within a particular school type, the returns provide a direct answer to the question of whether students are benefiting from their training choices. For essentially all subgroups we are studying, our answer is "yes." Although returns are clearly higher in some fields than others,

it is not obvious that students would always be able to switch to the field of study with the greatest returns. In addition to rationing, idiosyncratic preferences and abilities are important determinants of choice. On the other hand, our results suggest that, for those students who are on the margin in the choice between alternative fields, differences in pecuniary returns are likely to be significant and may well be decisive.

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Table 1: Distribution of Enrollment for Field by Gender, Credential, and For-Profit School/Community College

	Certificates				Associate's Degrees				
	Males		Females		Males		Females		
Field	For-Profit	Community College	For-Profit	Community College	For-Profit	Community College	For-Profit	Community College	Total
Academic/Other	266	1,059	357	3,044	631	77,937	1,080	120,089	204,463
Business	1,266	632	2,754	1,232	1,285	4,326	2,506	8,796	22,797
Computers	1,402	615	587	307	3,675	5,654	985	1,959	15,184
Engineering	1,872	1,578	274	160	3,128	7,397	359	956	15,724
Health	4,950	1,555	30,404	6,289	2,340	2,715	13,413	10,670	72,336
Trades	9,968	1,480	482	76	430	6,459	33	410	19,338
Transport	9,432	612	923	57	0	6	0	0	11,030
Vocational	2,961	2,258	4,049	3,206	1,490	8,765	2,739	10,653	36,121
Total	32,117	9,789	39,830	14,371	12,979	113,259	21,115	153,533	396,993

Notes: Counts are based on spells of school attendance. Field and credential are coded by the school at the beginning of the spell.
Source: Authors' tabulations of administrative data (see text).

Table 2: Distribution of Enrollment for Field by Gender, Credential, and For-Profit School/Community College, Percent

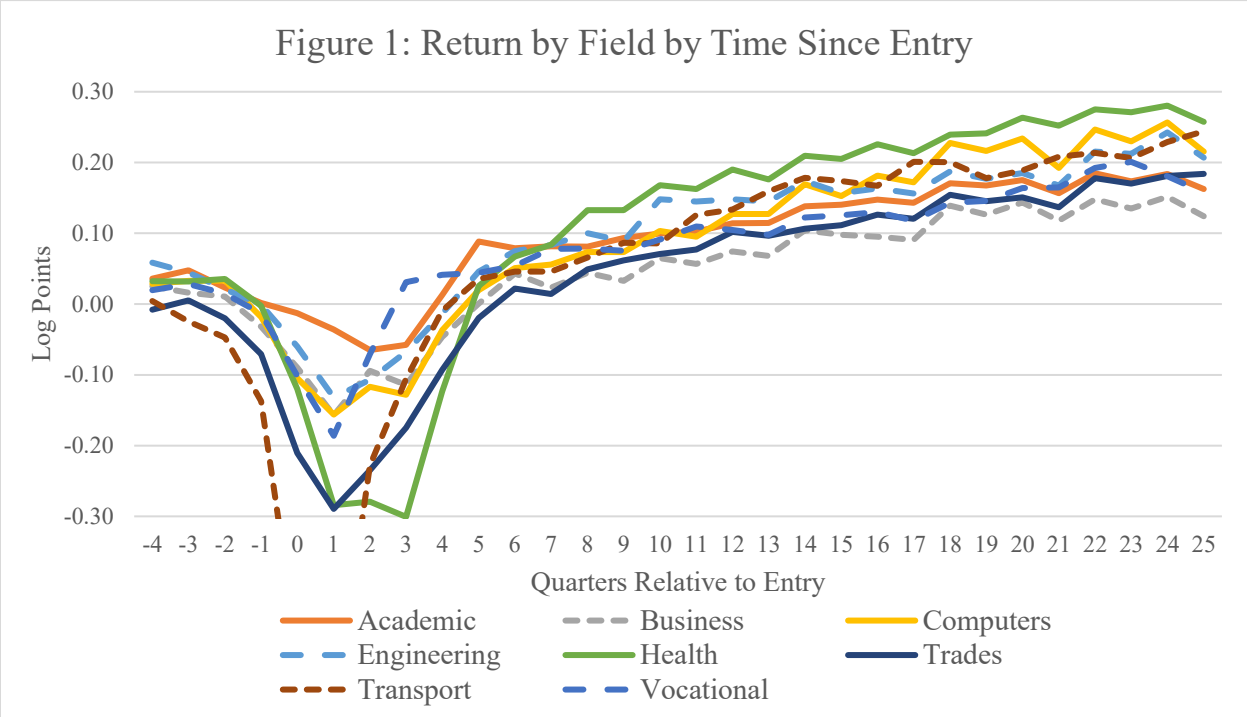
	Certificates				Associate's Degrees				
	Males		Females		Males		Females		
Field	For-Profit	Community College	For-Profit	Community College	For-Profit	Community College	For-Profit	Community College	Overall
Academic/Other	*0.8*	*10.8*	*0.9*	*21.2*	*4.9*	*68.8*	*5.1*	*78.2*	*51.5*
Omitting Academic/Other									
Business	4.0	7.2	7.0	10.9	10.4	12.2	12.5	26.3	11.8
Computers	4.4	7.0	1.5	2.7	29.8	16.0	4.9	5.9	7.9
Engineering	5.9	18.1	0.7	1.4	25.3	20.9	1.8	2.9	8.2
Health	15.5	17.8	77.0	55.5	19.0	7.7	66.9	31.9	37.6
Trades	31.3	17.0	1.2	0.7	3.5	18.3	0.2	1.2	10.0
Transport	29.6	7.0	2.3	0.5	0.0	0.0	0.0	0.0	5.7
Vocational	9.3	25.9	10.3	28.3	12.1	24.8	13.7	31.9	18.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: Counts are based on spells of school attendance. Field and credential are coded by the school at the beginning of the spell.
Source: Authors' tabulations of administrative data (see text).

Table 3: Characteristics of Students by Field and Credential

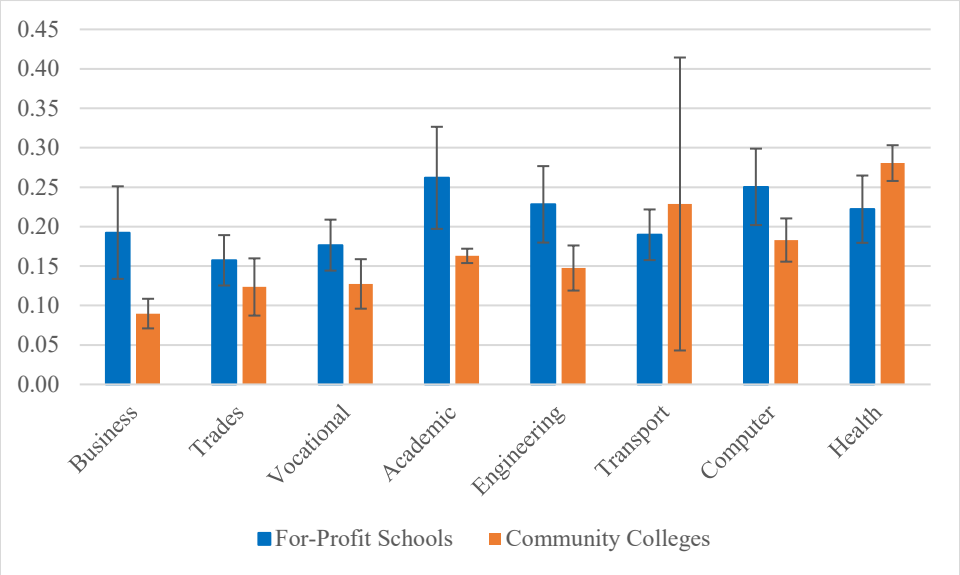
	Students Seeking Certificates							
	Academic/Other	Business	Computers	Engineering	Health	Trades	Transport	Vocational
White	0.700	0.613	0.662	0.753	0.571	0.599	0.729	0.734
Black	0.146	0.288	0.244	0.106	0.335	0.338	0.178	0.177
Other/missing race	0.154	0.100	0.095	0.142	0.094	0.063	0.093	0.089
Age at time of entry	27.992	33.038	33.543	33.892	28.774	29.536	37.065	28.347
Less than high school	0.021	0.060	0.013	0.011	0.056	0.013	0.140	0.009
High school	0.792	0.758	0.751	0.740	0.773	0.704	0.622	0.821
GED	0.056	0.109	0.144	0.118	0.132	0.245	0.173	0.105
Missing education	0.132	0.074	0.091	0.131	0.039	0.037	0.066	0.065
Major urban	0.580	0.719	0.527	0.608	0.638	0.181	0.523	0.567
Small metro	0.170	0.127	0.096	0.232	0.225	0.071	0.360	0.074
Nonmetro	0.250	0.154	0.377	0.160	0.137	0.748	0.098	0.359
Missing metro	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000
Number of entries	4,726	5,884	2,911	3,884	43,198	12,006	11,024	12,474
	Students Seeking Associate's Degrees							
	Academic/ Other	Business	Computers	Engineering	Health	Trades	Transport	Vocational
White	0.653	0.704	0.725	0.716	0.733	0.820	1.000	0.682
Black	0.184	0.178	0.133	0.144	0.165	0.081	0.000	0.182
Other/missing race	0.163	0.118	0.142	0.141	0.102	0.099	0.000	0.136
Age at time of entry	25.452	29.006	27.729	26.741	28.282	25.009	22.341	26.967
Less than high school	0.003	0.010	0.009	0.002	0.010	0.002	0.000	0.007
High school	0.804	0.778	0.797	0.805	0.829	0.806	0.833	0.812
GED	0.052	0.106	0.111	0.095	0.109	0.085	0.167	0.083
Missing education	0.141	0.107	0.083	0.098	0.052	0.108	0.000	0.098
Major urban	0.692	0.462	0.579	0.729	0.590	0.332	0.000	0.644
Small metro	0.117	0.262	0.273	0.184	0.263	0.434	1.000	0.199
Nonmetro	0.191	0.276	0.148	0.087	0.147	0.233	0.000	0.157
Missing metro	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of entries	199,737	16,913	12,273	11,840	29,138	7,332	6	23,647

Notes: Counts are based on spells of school attendance. Field and credential are coded by the school at the beginning of the spell. Source: Authors' tabulations of administrative data (see text).



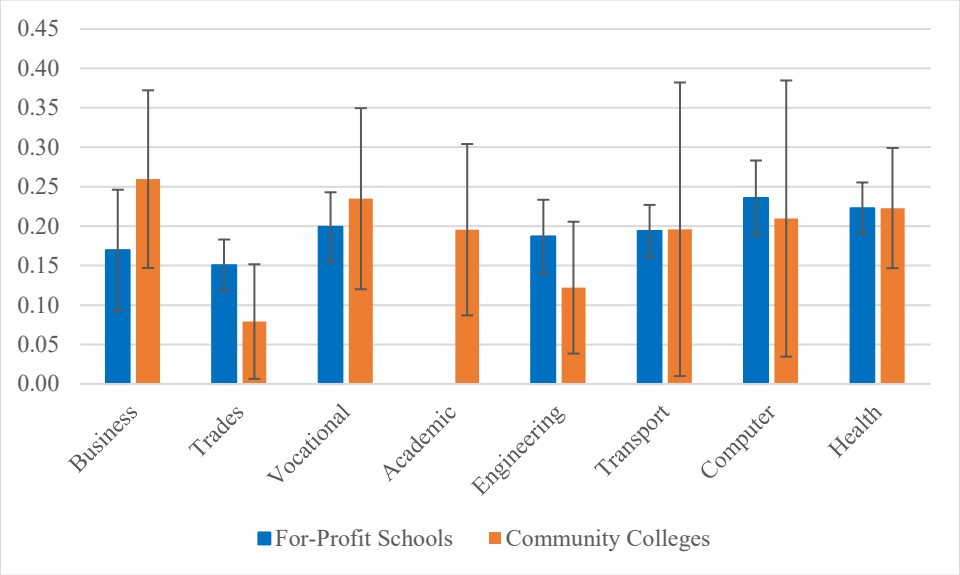
Note: The estimated effect for transport at time 0 is -0.486; at time 1, it is -0.583. Reported increment estimates are weighted averages across eight groups of students defined by gender, degree type, and type of school, with the weight being the number of spells in each group. Mean coefficient values and bootstrap standard errors are provided in Appendix Table A6.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Figure 2: Return for Quarters 17-20 for For-Profit Schools and Community Colleges



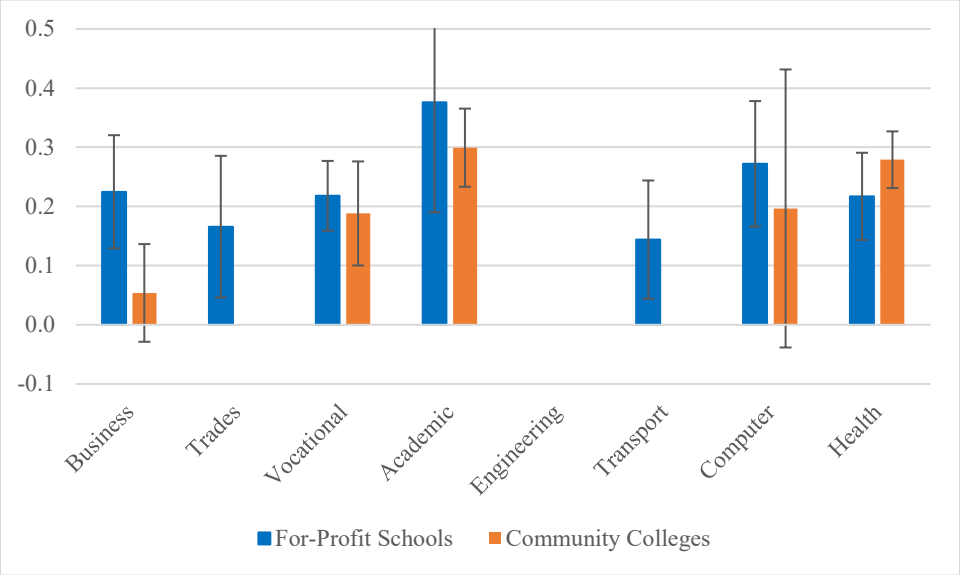
Note: Reported returns are simple averages of the returns for quarters 17-20 as presented in Figure 1 and Appendix Table A6. Whisker plots represent 95% confidence intervals. Numerical values and bootstrap standard errors are presented in Appendix Table A7.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Figure 3: Return by Field, Quarters 17-20, Men Seeking Certificates



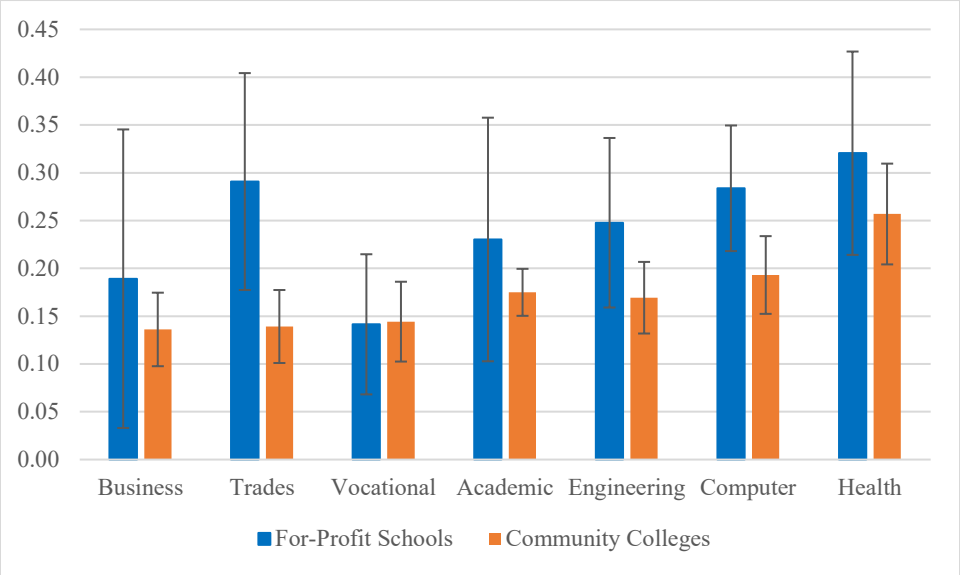
Notes: Reported returns are simple averages of coefficients for quarters 17-20 for men seeking certificates. Fields of study with fewer than 300 students are omitted from the figure. Whisker plots represent 95% confidence intervals. Numerical values and bootstrap standard errors are presented in Appendix Table A8.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Figure 4: Return by Field, Quarters 17-20, Women Seeking Certificates



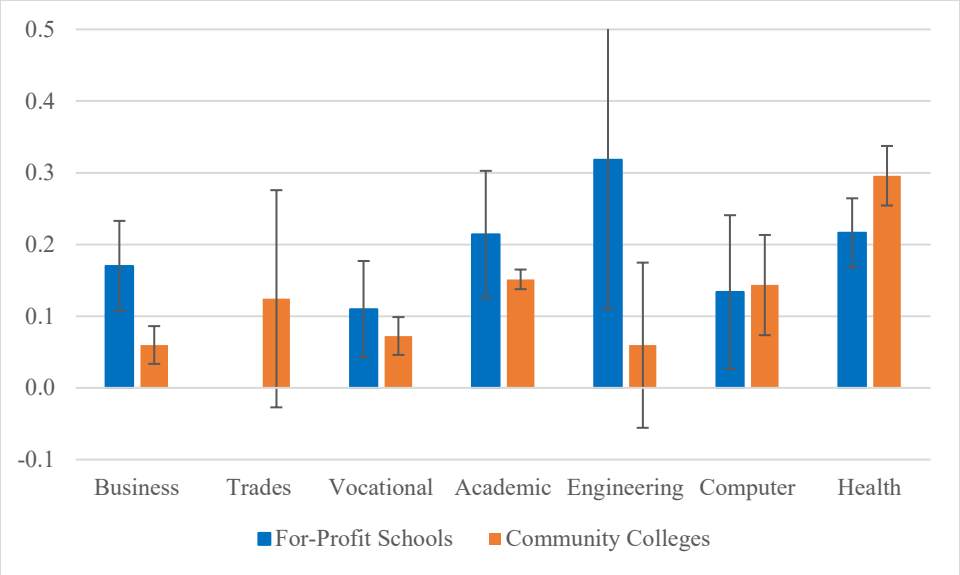
Note: Reported returns are simple averages of coefficients for quarters 17-20 for women seeking certificates. Fields of study with fewer than 300 students are omitted from the figure. Whisker plots represent 95% confidence intervals. Numerical values and bootstrap standard errors are presented in Appendix Table A9.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Figure 5: Return by Field, Quarters 17-20, Men Seeking Associate's Degrees



Note: Reported returns are simple averages of coefficients for quarters 17-20 for men seeking associate's degrees. Whisker plots represent 95% confidence intervals. Numerical values and bootstrap standard errors are presented in Appendix Table A10.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Figure 6: Return by Field, Quarters 17-20, Women Seeking Associate's Degrees



Note: Reported returns are simple averages of coefficients for quarters 17-20 for women seeking associate's degrees. Fields of study with fewer than 300 students are omitted from the figure. Whisker plots represent 95% confidence intervals. Numerical values and bootstrap standard errors are presented in Appendix Table A11.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Appendix

Table A1: Omission Criteria for Regression Sample

	For-Profit			Community College		
	Sample Size	Number Change	Percent Change	Sample Size	Number Change	Percent Change
Number of individuals in sample	170,190			496,716		
Number of spells	184,481	14,291	8.40%	565,119	68,403	13.8%
Omit spells for students without SSN or valid SSN	176,680	-7,801	-4.23%	507,957	-57,162	-10.1%
Omit spells for students who enroll in 4-year public university	174,685	-1,995	-1.13%	465,674	-42,283	-8.3%
Omit spells for students over 60 or under 18 at enrollment	161,701	-12,984	-7.43%	454,516	-11,158	-2.4%
Omit spells for students with missing or invalid gender code	157,529	-4,172	-2.58%	454,424	-92	0.0%
Omit spells for students not seeking certificate or degree	137,668	-19,861	-12.61%	308,648	-145,776	-32.1%
Omit spells for students not resident in Missouri or Kansas[a]	115,187	-22,481	-16.33%	301,850	-6,798	-2.2%
Omit spells for students attending both for-profit and community college	106,041	-9,146	-7.94%	290,952	-10,898	-3.6%

Notes: For-profit school data are from Missouri's Proprietary School Certification Program. Community College data are from the Enhanced Missouri Student Achievement Study. Spells are formed from periods of enrollment, but include any periods of less than a year of non-enrollment. [a] Students with no residence reported are retained.

Table A2: Distribution by Field for Credentials Awarded in the U.S. and Missouri by For-Profit Schools and Community Colleges, 2006-2012: IPEDS, Percent

	Certificate						Associate's Degree					
	For-Profit			Community College			For Profit			Community College		
	IPEDS		*Missouri Admin.*	IPEDS		*Missouri Admin.*	IPEDS		*Missouri Admin.*	IPEDS		*Missouri Admin.*
	U.S.	Missouri		U.S.	Missouri		U.S.	Missouri		U.S.	Missouri	
Academic or Other	0.7	0.0	*0.9*	10.4	12.2	*17.0*	3.9	0.6	*5.0*	49.6	60.0	*74.2*
Business	1.8	2.1	*5.6*	11.3	7.0	*7.7*	13.6	8.8	*11.1*	12.1	5.7	*4.9*
Computers	1.6	3.7	*2.8*	4.1	2.8	*3.8*	7.6	5.3	*13.7*	3.2	3.2	*2.9*
Engineering	2.4	2.7	*3.0*	3.8	8.5	*7.2*	5.8	3.2	*10.2*	3.7	3.2	*3.1*
Health	69.5	74.7	*49.1*	34.2	39.6	*32.5*	39.0	66.5	*46.2*	17.8	14.8	*5.0*
Trades	14.9	10.1	*14.5*	17.5	8.7	*6.4*	9.8	3.0	*1.4*	3.0	3.8	*2.6*
Transport	0.5	0.2	*14.4*	4.2	4.3	*2.8*	0.0	0.0	*0.0*	0.3	0.0	*0.0*
Vocational	8.7	6.4	*9.7*	14.4	16.9	*22.6*	20.3	12.7	*12.4*	10.3	9.4	*7.3*
Total all years	100.0	100.0	*100.0*	100.0	100.0	*100.0*	100.0	100.0	*100.0*	100.0	100.0	*100.0*

Notes: The Integrated Postsecondary Education Data System (IPEDS), maintained by the U.S. Department of Education, provides national counts of certificates or degrees awarded by field. The figures under the U.S. heading include all states outside of Missouri, Hawaii, and Alaska. The Missouri Administrative count, provided for comparison (in italics), presents tabulations of spells as constructed for the analysis in the current paper. In these data, the field reported is the one chosen at the beginning of a spell of enrollment; it is not based on an awarded degree. The sample of schools is also different from the IPEDS. See text.
Source: Authors' tabulations.

Table A3: 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								
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								
Semesters spanned	2.67	4.19	3.15	4.07	3.14	3.87	4.36	4.35
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
No certificate or degree	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

Notes: Means are for spells of school attendance. The standard deviation for age is in parentheses.
Source: Authors' calculations from administrative data (see text).

Table A4: Distribution of Enrollment by Two-Digit CIP Code, by Gender, Type of Degree Sought, and For-Profit School/Community College

			Certificates				Associate's Degrees			
			Men		Women		Men		Women	
			For-Profits	Community College	For-Profits	Community College	For-Profits	Community College	For-Profits	Community College
Field	CIP		Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Academic or Other	26	Biological Sciences	0.0	0.1	0.0	0.2	0.0	0.3	0.0	0.3
	19	Family Sciences	0.0	0.2	0.1	3.7	0.0	0.2	0.0	3.6
	16	Foreign Languages	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.1
	24	Liberal Arts	0.0	7.3	0.1	13.4	1.1	66.3	3.8	72.4
	50	Performing Arts	0.3	1.8	0.4	1.6	3.8	1.1	1.3	0.9
		Other academic fields	0.4	1.3	0.3	1.6	0.0	1.0	0.0	1.0
		Missing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Business	52	Business	3.4	6.4	6.7	8.6	9.9	3.7	11.9	5.7
	09	Journalism	0.5	0.0	0.2	0.0	0.0	0.1	0.0	0.1
Computers	10	Communications	0.1	0.7	0.1	0.4	1.0	0.7	0.1	0.4
	11	Computer Sciences	4.3	5.5	1.4	1.7	27.3	4.3	4.6	0.9
Engineering	14	Engineering	0.0	0.4	0.0	0.0	0.3	2.1	0.0	0.2
	15	Engineering Tech	5.8	15.7	0.7	1.1	23.8	4.4	1.7	0.4
Health	34	Health-Related Skills	0.2	0.0	0.1	0.0	0.2	0.0	0.1	0.0
	51	Health Professions	15.2	15.9	76.2	43.8	17.8	2.4	63.5	6.9
Trades	46	Construction Trades	5.0	2.3	0.2	0.2	0.8	0.7	0.0	0.0
	47	Mechanic	20.4	8.1	0.9	0.2	2.3	4.0	0.1	0.2
	48	Precision Production	5.6	4.7	0.1	0.1	0.3	1.0	0.0	0.1
Transport	49	Transportation	29.4	6.3	2.3	0.4	0.0	0.0	0.0	0.0

Continued

Table A4 Continued

			Certificates				Associate's Degrees			
			Men		Women		Men		Women	
Fields	CIP		For-Profits	Community College	For-Profits	Community College	For-Profits	Community College	For-Profits	Community College
			Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Vocational	01	Agriculture	0.8	1.1	0.5	0.8	0.0	0.8	0.0	0.3
	04	Architecture	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
	13	Education	0.8	9.0	1.1	15.9	0.0	1.2	0.0	2.8
	22	Legal Studies	0.1	0.5	0.4	2.0	1.4	0.1	4.7	0.7
	36	Leisure Studies	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	03	Natural Resources	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
	31	Parks and Recreation	0.4	0.0	0.1	0.0	1.4	0.0	0.3	0.0
	12	Services	6.8	1.1	7.9	1.5	2.5	1.1	2.2	0.8
	44	Public Administration	0.0	0.3	0.0	0.4	0.0	0.2	0.0	0.8
	41	Science Tech	0.0	0.2	0.0	0.2	0.0	0.1	0.0	0.1
	43	Security	0.0	10.9	0.0	1.5	6.2	4.0	5.8	1.4

Note: Counts are based on spells of school attendance. Field and credential are coded by the school at the beginning of the spell. The 'other academic fields' category includes CIP codes: 5 (Ethnic and Gender Studies), 23 (English), 27 (Mathematics), 30 (Interdisciplinary Studies), 32 (Basic Skills), 37 (Personal Awareness), 38 (Philosophy), 39 (Theology), 40 (Physical Sciences), 42 (Psychology), 45 (Social Studies), 53 (High School Diplomas and Certificates), and 54 (History).
Source: Authors' tabulations of administrative data.

Table A5: Differences in Characteristics of Students in For-Profit Schools and Community Colleges with Decomposition by Field of Study

	Students Seeking Certificates				Students Seeking Associate's Degrees			
	Men		Women		Men		Women	
Variable	Mean Difference	Mean Difference within Field	Mean Difference	Mean Difference within Field	Mean Difference	Mean Difference within Field	Mean Difference	Mean Difference within Field
White	-0.122	-0.142	-0.224	-0.207	-0.096	-0.139	-0.047	-0.100
Black	0.189	0.190	0.274	0.254	0.122	0.147	0.102	0.133
Other/missing race	-0.067	-0.048	-0.050	-0.048	-0.027	-0.008	-0.055	-0.033
Age at time of entry	4.200	3.642	0.600	0.345	2.800	1.064	1.300	0.344
Less than high school	0.061	0.053	0.064	0.065	0.010	0.007	0.017	0.011
High school	-0.009	0.040	-0.036	-0.017	-0.024	-0.009	-0.006	0.002
GED	0.156	0.142	0.103	0.091	0.155	0.135	0.108	0.091
Missing education	-0.209	-0.235	-0.131	-0.139	-0.140	-0.133	-0.118	-0.104
Major urban	-0.026	0.112	0.261	0.304	0.176	0.243	0.084	0.226
Small metro	-0.141	-0.268	-0.146	-0.234	-0.060	-0.156	0.014	-0.137
Nonmetro	0.161	0.153	-0.115	-0.070	-0.116	-0.087	-0.098	-0.089
Missing metro	0.006	0.003	0.001	0.000	0.000	0.000	0.000	0.000

Notes: Odd columns report differences in means between student characteristics for entries into for-profit schools and community colleges; even columns report the weighted mean differences within field weighted by the size of the field. In terms of the Oaxaca-Blinder decomposition, the overall difference can be expressed as the sum of the within-field difference and the between-field difference, i.e., $M_F - M_C = \sum_i \left(\frac{1}{2}\right)(P_{Fi} + P_{Ci})(M_{Fi} - M_{Ci}) + \sum_i \left(\frac{1}{2}\right)(M_{Fi} + M_{Ci})(P_{Fi} - P_{Ci})$, where $M_S, M_{Si},$ and P_{Si} are the overall mean for each school type, the means within school type and field, and the proportion in a field for a given school type, respectively, with $S = F, C$ indicating school type (for-profit or community college) and i indicating field. Mean values for variables are presented in Appendix Table A3.
Source: Authors' tabulations of administrative data.

Table A6: Mean Coefficient Estimates and Standard Errors by Field, Weighted by Subsample Size

	Business		Trades		Vocational		Academic		Engineering		Transport		Computer		Health	
Quarter	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
-4	0.025	0.005	-0.008	0.015	0.019	0.009	0.036	0.003	0.059	0.008	0.004	0.008	0.029	0.007	0.032	0.004
-3	0.016	0.006	0.005	0.007	0.028	0.005	0.047	0.002	0.045	0.011	-0.025	0.011	0.033	0.014	0.032	0.003
-2	0.010	0.006	-0.020	0.009	0.015	0.007	0.023	0.003	0.021	0.012	-0.047	0.012	0.033	0.010	0.036	0.004
-1	-0.032	0.008	-0.071	0.011	-0.014	0.007	0.002	0.003	-0.001	0.010	-0.137	0.010	-0.018	0.013	-0.003	0.005
0	-0.031	0.013	-0.138	0.026	-0.014	0.013	0.057	0.003	0.004	0.017	-0.333	0.027	-0.031	0.016	0.048	0.006
1	-0.039	0.015	-0.144	0.030	-0.010	0.009	0.103	0.005	-0.004	0.022	-0.583	0.038	-0.009	0.027	0.052	0.007
2	0.024	0.013	-0.089	0.036	0.017	0.011	0.074	0.004	0.021	0.015	-0.228	0.017	0.031	0.025	0.057	0.006
3	0.004	0.011	-0.029	0.026	0.031	0.008	0.082	0.003	0.060	0.018	-0.106	0.013	0.019	0.029	0.036	0.007
4	0.013	0.012	-0.020	0.019	0.041	0.007	0.082	0.003	0.051	0.014	-0.009	0.015	0.037	0.017	0.045	0.009
5	0.001	0.010	-0.020	0.018	0.044	0.008	0.089	0.003	0.046	0.015	0.035	0.015	0.020	0.017	0.025	0.006
6	0.043	0.012	0.022	0.013	0.054	0.009	0.079	0.003	0.075	0.014	0.046	0.015	0.051	0.018	0.067	0.013
7	0.023	0.013	0.014	0.018	0.078	0.008	0.082	0.004	0.083	0.014	0.046	0.014	0.056	0.013	0.084	0.010
8	0.044	0.012	0.049	0.019	0.079	0.010	0.081	0.004	0.100	0.015	0.066	0.013	0.073	0.015	0.133	0.012
9	0.033	0.009	0.062	0.014	0.075	0.006	0.093	0.005	0.089	0.012	0.087	0.015	0.073	0.011	0.133	0.009
10	0.065	0.009	0.071	0.017	0.091	0.008	0.100	0.004	0.148	0.015	0.086	0.013	0.103	0.014	0.168	0.010
11	0.057	0.015	0.077	0.015	0.109	0.009	0.103	0.005	0.145	0.014	0.126	0.017	0.095	0.012	0.163	0.008
12	0.075	0.010	0.102	0.017	0.105	0.008	0.114	0.006	0.148	0.019	0.134	0.017	0.127	0.012	0.190	0.013
13	0.068	0.009	0.097	0.011	0.098	0.008	0.115	0.007	0.145	0.015	0.160	0.014	0.127	0.009	0.176	0.013
14	0.104	0.015	0.107	0.015	0.122	0.008	0.138	0.006	0.174	0.017	0.179	0.017	0.169	0.011	0.209	0.013
15	0.098	0.015	0.112	0.017	0.126	0.012	0.140	0.004	0.157	0.013	0.174	0.016	0.153	0.015	0.205	0.011

Continued

Table A6 Continued

	Business		Trades		Vocational		Academic		Engineering		Transport		Computer		Health	
Quarter	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
16	0.095	0.015	0.126	0.022	0.130	0.011	0.148	0.006	0.163	0.019	0.167	0.014	0.182	0.016	0.226	0.009
17	0.090	0.015	0.120	0.013	0.118	0.012	0.143	0.005	0.156	0.015	0.201	0.015	0.172	0.017	0.213	0.015
18	0.139	0.018	0.154	0.014	0.143	0.016	0.171	0.004	0.187	0.022	0.201	0.022	0.227	0.014	0.239	0.015
19	0.126	0.013	0.145	0.012	0.146	0.019	0.167	0.006	0.177	0.016	0.178	0.019	0.216	0.021	0.241	0.016
20	0.144	0.014	0.151	0.015	0.164	0.015	0.175	0.005	0.185	0.017	0.189	0.024	0.234	0.019	0.263	0.013
21	0.118	0.013	0.137	0.017	0.165	0.018	0.156	0.005	0.167	0.016	0.208	0.024	0.193	0.019	0.252	0.016
22	0.148	0.025	0.178	0.015	0.192	0.016	0.185	0.006	0.215	0.020	0.213	0.023	0.247	0.015	0.275	0.013
23	0.135	0.024	0.170	0.013	0.201	0.015	0.173	0.006	0.212	0.019	0.207	0.027	0.230	0.016	0.271	0.015
24	0.151	0.021	0.181	0.015	0.180	0.011	0.184	0.006	0.242	0.024	0.229	0.018	0.257	0.015	0.280	0.016
25	0.124	0.024	0.184	0.020	0.157	0.011	0.162	0.006	0.207	0.018	0.244	0.027	0.215	0.026	0.258	0.018
Enrollment	-0.118	0.015	-0.146	0.028	-0.176	0.010	-0.139	0.005	-0.128	0.018	-0.307	0.062	-0.148	0.027	-0.336	0.007

Note: As reported in Figure 1, mean of coefficients across gender-credential-school type, weighted by sample size. Standard errors are for means based on bootstrap with 1000 replications.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Table A7: Mean Coefficient Estimates for Quarters 17-20 and Standard Errors, by Field and School Type, Weighted by Subsample Size

	For-Profit Schools		Community Colleges			
	Coef.	SE	Coef.	SE	Difference	SE
Business	0.192	0.030	0.090	0.010	0.103	0.029
Trades	0.157	0.016	0.123	0.018	0.034	0.026
Vocational	0.177	0.016	0.127	0.016	0.049	0.015
Academic	0.262	0.033	0.163	0.005	0.099	0.032
Engineering	0.228	0.025	0.148	0.015	0.081	0.023
Transport	0.190	0.016	0.229	0.095	-0.039	0.096
Computer	0.250	0.025	0.183	0.014	0.067	0.024
Health	0.222	0.022	0.281	0.012	-0.058	0.030

Note: Estimates correspond to those in Figure 2, averages of the returns for quarters 17-20 as reported in Figure 1 and Appendix Table A6. Standard errors are for means based on bootstrap with 1000 replications.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Table A8: Mean Coefficient Estimates for Quarters 17-20 and Standard Errors, by Field and School Type, Men Seeking Certificates

	For-Profit Schools		Community Colleges			
	Coef.	SE	Coef.	SE	Difference	SE
Business	0.169	0.039	0.260	0.057	-0.090	0.075
Trades	0.151	0.017	0.079	0.037	0.072	0.040
Vocational	0.199	0.022	0.235	0.059	-0.036	0.066
Academic	0.378	0.081	0.196	0.055	0.182	0.100
Engineering	0.187	0.024	0.122	0.043	0.065	0.049
Transport	0.194	0.017	0.196	0.095	-0.002	0.095
Computer	0.236	0.024	0.210	0.089	0.026	0.092
Health	0.223	0.017	0.223	0.039	0.000	0.040

Note: As reported in Figure 3, coefficients are means for estimated returns for quarters 17-20 by field and school type, for men seeking certificates. Standard errors are for means based on bootstrap with 1000 replications.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Table A9: Mean Coefficient Estimates for Quarters 17-20 and Standard Errors, by Field and School Type, Women Seeking Certificates

	For-Profit Schools		Community Colleges			
	Coef.	SE	Coef.	SE	Difference	SE
Business	0.225	0.049	0.054	0.042	0.171	0.048
Trades	0.166	0.061	-0.351	0.186	0.517	0.193
Vocational	0.218	0.030	0.188	0.045	0.030	0.045
Academic	0.376	0.095	0.299	0.034	0.077	0.092
Engineering	0.170	0.070	-0.082	0.084	0.253	0.091
Transport	0.144	0.051	0.579	0.209	-0.435	0.230
Computer	0.272	0.054	0.197	0.120	0.075	0.113
Health	0.217	0.038	0.279	0.024	-0.062	0.044

Note: As reported in Figure 4, coefficients are means for estimated returns for quarters 17-20 by field and school type, for women seeking certificates.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Table A10: Mean Coefficient Estimates for Quarters 17-20 and Standard Errors, by Field and School Type, Men Seeking Associate's Degrees

	For-Profit Schools		Community Colleges			
	Coef.	SE	Coef.	SE	Difference	SE
Business	0.189	0.080	0.136	0.020	0.053	0.087
Trades	0.291	0.058	0.139	0.019	0.152	0.066
Vocational	0.141	0.037	0.144	0.021	-0.003	0.042
Academic	0.230	0.065	0.175	0.013	0.055	0.065
Engineering	0.248	0.045	0.169	0.019	0.078	0.041
Computer	0.284	0.034	0.193	0.021	0.091	0.035
Health	0.320	0.054	0.257	0.027	0.064	0.069

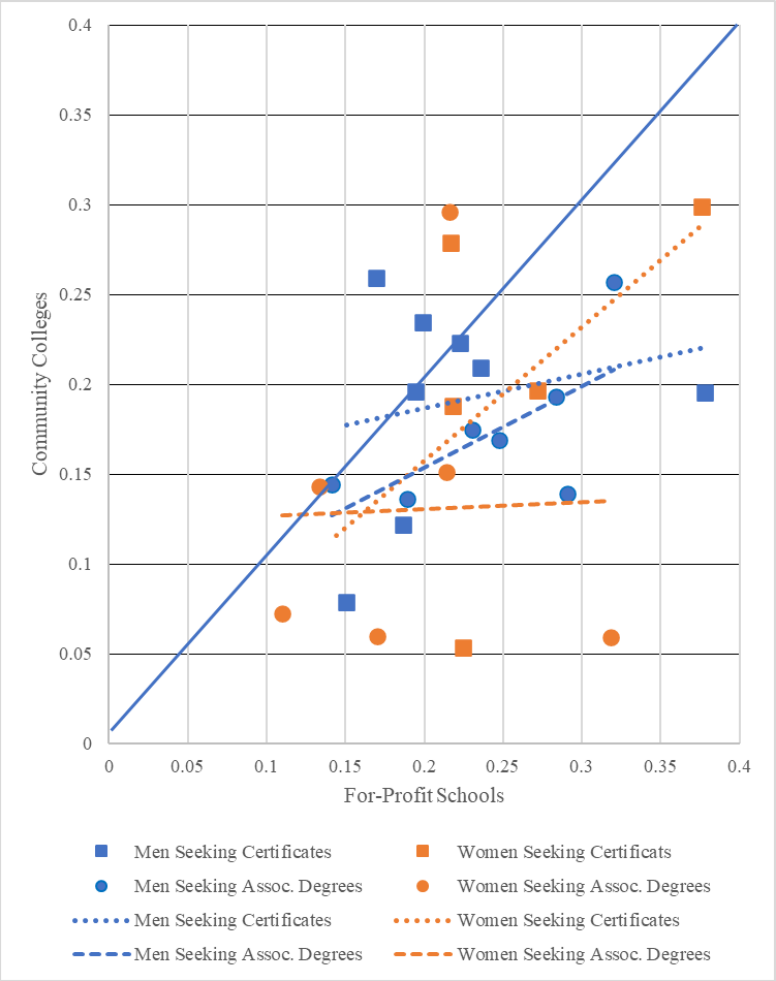
Note: As reported in Figure 5, coefficients are means for estimated returns for quarters 17-20 by field and school type, for men seeking associate's degrees.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Table A11: Mean Coefficient Estimates for Quarters 17-20 and Standard Errors, by Field and School Type, Women Seeking Associate's Degrees

	For-Profit Schools		Community Colleges			
	Coef.	SE	Coef.	SE	Difference	SE
Business	0.170	0.032	0.060	0.013	0.110	0.038
Trades	0.281	0.338	0.124	0.077	0.156	0.310
Vocational	0.110	0.034	0.072	0.013	0.038	0.039
Academic	0.214	0.045	0.151	0.007	0.063	0.048
Engineering	0.318	0.106	0.059	0.059	0.259	0.105
Computer	0.134	0.055	0.143	0.036	-0.010	0.066
Health	0.216	0.025	0.296	0.021	-0.080	0.026

Note: As reported in Figure 6, coefficients are means for estimated returns for quarters 17-20 by field and school type, for women seeking associate's degrees.
Source: Authors' estimates of increment in earnings using administrative data based on equation (3).

Figure A1: Scatterplot of Returns in For-Profit Schools and Community Colleges by Field, Gender and Credential Sought



Notes: Data points identify mean returns for for-profit schools and community colleges for quarters 17-20 as reported in Figures 3-6, and Appendix Tables A8-A11, for up to eight fields of study. Lines are least squares trend lines indicating relationships across fields of study within the four specified groups. Positive slopes indicate that fields with high returns in for-profit schools also have high returns in community colleges.
Source: Authors' calculations.