The Benefits of Alternatives to Conventional College:
Labor-Market Returns to Proprietary Schooling

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Abstract:
This paper provides novel evidence on the labor-market returns to proprietary (also called for-profit) postsecondary school attendance. Specifically, we link administrative records on proprietary school attendance with quarterly earnings data for nearly 100,000 students. Because average age at school entry is 30 years of age, and because we have earnings data for five or more years prior to attendance, we estimate a person fixed-effects model to control for time-invariant differences across individuals. By six years after entry, quarterly earnings returns are around $700 to $900 for men and $600 to $800 for women, or 14-21 percent of earnings. Returns are higher for associate's degree programs than for certificate programs and vary substantially by demographic characteristics and field of study.

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. States have drastically reduced funding for education, and public community colleges and universities are particularly hard hit (Katsinas and Friedel, 2010). Proprietary schools (also known as for-profit schools) have been growing dramatically over the last decade, filling a gap in demand for postsecondary education, particularly for low-income and nonwhite individuals. Between 2000 and 2012, postsecondary enrollment increased by 302 percent in proprietary schools and 27 percent in public schools, so that nearly nine percent of all postsecondary students were attending proprietary schools (U.S. Department of Education, 2013). In response to concerns about false promises to students of future earnings and employment opportunities, states and the federal government have increased oversight of the industry. However, lawmakers have little hard evidence on whether and to what extent these schools improve labor-market outcomes.

We provide the first evidence of which we are aware of the returns to proprietary school using administrative data. Specifically, we match schooling data with quarterly earnings data for nearly 100,000 students who enrolled in proprietary schools in one state between 2005 and 2009. Our preferred model includes person fixed effects to control for time-invariant differences across individuals. This method is appropriate because the vast majority of students are over 20 years of age when they first attend, and we have earnings data for at least five years before enrollment.

We find sizable earnings returns to proprietary school attendance relative to the period 5 to 20 quarters before enrollment. By 20 quarters after entry, quarterly returns are $700 to $900 for men and $600 to $800 for women, or 14 to 21 percent of earnings. Consistent with previous

studies, returns are higher associate's degree programs compared to certificate programs. The returns vary greatly among demographic groups according to race, age at entry, high school or GED status, and location. For field of study, the highest returns are in computers, the "other" category, and – for men only – trades. Transport has the lowest returns, with no statistically significant returns for men or women.

II. Relation to Previous Literature

Few studies have attempted to estimate the labor-market returns to proprietary schools due to limited data availability. Deming, Goldin, and Katz (2012) provide an overview of many aspects of the proprietary school market, including student outcomes such as employment and earnings six years after initial enrollment. Using the Beginning Postsecondary Survey (BPS), a national longitudinal survey of students, they find that individuals who had attended for-profit schools have lower annual earnings of approximately $2,000 (contingent on being employed) and higher unemployment rates of 5 percent compared with students at not-for-profit institutions.

In contrast, other extant studies find little difference between proprietary schools and public postsecondary schools in labor-market returns. Lang and Weinstein (2013) also study BPS data, including transcript data. They find no difference in returns to associate's degrees between not-for-profit and for-profit colleges, and slightly smaller returns for certificates from for-profit colleges compared to not-for-profit colleges. They conclude that the variation in returns among fields of study is greater than the variation in returns between types of institutions, although their ability to disaggregate by field of study is limited by sample sizes of 400 and 700 in for-profit associate's degree and certificate programs, respectively.

Cellini and Chaudhary (2014) use survey data from the National Longitudinal Survey of Youth 1979 (NLS79) to study the labor-market returns of for-profit colleges. They find that

enrollment in an associate's degree program at a for-profit college corresponds with an earnings increase of roughly 10 percent, lower than the returns typically found for receipt of an associate's degree from community colleges such as in Jepsen, Troske, and Coomes (2014), Liu, Belfield, and Trimble (2014), and elsewhere.

Chung (2008) uses survey and transcript data from the National Education Longitudinal Study (NELS) to look at the returns to training programs provided by for-profit colleges. She finds little difference in employment between individuals attending for-profit colleges and individuals not attending colleges. She finds mixed evidence on the effects of for-profit college certificates and associate's degrees on earnings, but the inferences that can be drawn are limited by small sample sizes of for-profit students.

Grubb (1992) studies the difference in returns between public and private colleges and between vocational and academic credits using data from the National Longitudinal Survey of 1972. No distinction is made between for-profit and not-for-profit colleges, likely because for-profit colleges were basically non-existent in the 1970s. He finds uneven returns to certificates and associate's degrees, in large part a reflection of small sample sizes.

All of these results are based on surveys, which rely on self-reported earnings.[1] These survey datasets have relatively small numbers of respondents attending proprietary schools. Deming et al. (2012) provide the largest sample of propriety school students, but their analysis is limited to Title IV eligible institutions, omitting the large number of schools that offer only certificates. Both Deming et al. (2012) and Lang and Weinstein (2013) have data only for first-time students, and they acknowledge that many students in proprietary schools have previously attended college. Lang and Weinstein (2013) look separately at certificates and associate's

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[1] Liu and Belfield (2013) use administrative data to study the returns for the select sample of students who transfer to a for-profit school after starting at a community college. They find that students have a significant wage penalty to transferring to a for-profit college.

degrees, including an analysis by type of degree, but they have small sample sizes and no information on earnings prior to college entry.

We contribute to this literature by providing the first study using administrative data on proprietary schools. Not only is our dataset much larger than any used for prior analysis – we have information on nearly 100,000 students attending proprietary schools in one state – it also allows us to control for individual fixed effects. In addition, the dataset includes schools offering only certificates as well as those offering degrees, and it provides information on field of study.

Because the state we study is representative of the nation in many respects, the results will provide estimates that are plausible for many parts of the country. Such information is vital for lawmakers and policymakers as they aim to balance accountability of these schools with the need to allow flexibility in order to best meet the changing demands for postsecondary education.

III. Data

Our analysis focuses on all students who entered proprietary schools in one state between January 2005 and September 2009. The sample of entries is limited to those in which the student had not participated in a proprietary school program in the state in the 12 months prior to the observed program entry.[2] The sample contains students who enroll in certificate or associate's degree programs because the vast majority of students in proprietary school enroll in these two program types. We exclude students who are coded as seeking bachelor's degree or graduate

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[2] Our data include all those entering programs beginning in January 2004. For those entering in the early years of our analysis window, our sample of entries will include some individuals who were attending proprietary schools in the year prior to entry but who entered before January 2004. 4.5 percent of 2005 entries were omitted because of enrollment in the prior year, whereas the number was 11.3 percent for 2006 entries and about 14 percent for later entries. Hence, it appears likely that up to 10 percent of those included as 2005 entries would have been omitted if we had full information on prior enrollment, and under 3 percent for those entering in 2006. Note that if an individual enters a program within our window, then exits, and enters a program after a gap of more than 365 days, both entries are included in our analyses. The number of entries exceeds the number of individuals by 2.4 percent.

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degree programs, along with a very small set of students who declare other degree or no degree programs. We also exclude students who are not permanent residents of the state or the neighboring state for which we have administrative earnings data.

For each student attending proprietary school during this time period, the data contain the specific school attended, the Classification of Instructional Programs (CIP) code with the field of study, the entry and exit date for each enrollment spell, and—for award recipients—the type of certificate or associate's degree received.

These data are matched with administrative data on earnings from the state's and one neighboring state's Unemployment Insurance program, providing quarterly earnings information from the first quarter of 2000 through the second quarter of 2014. Thus, we have data for at least five years prior to proprietary school attendance and a minimum of nearly five years (19 quarters) after initial enrollment in proprietary school attendance. The resulting data set is a panel of student entries and time periods. We exclude observations where the individual is under the age of 18 or over the age of 60 during the quarter, or where age or Social Security Number are missing.

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. Cellini and Chaudhary (2014), cited

above, use a student fixed effects model for measuring the labor-market returns to proprietary

schools. Jacobson, LaLonde, and Sullivan (2005) Jepsen, Troske, and Coomes (2014), and

others use student fixed effects models to estimate labor-market returns to community colleges.

Such a model is appropriate for studying proprietary schools; over 80 percent of students in our

data are age 20 or above when they initially enroll in proprietary school.

The basic structure of the fixed effects model is illustrated by the following multivariate

regression:

$$(1) \qquad EARN_{it} = \beta \cdot PROPRIETARY_{it} + \delta \cdot AGE_{it} + \eta_i + \tau_t + \varepsilon_{it}.$$

In this equation, i denotes a person and t denotes a quarter. *EARN* is the total reported UI

earnings across all jobs for the quarter. Individuals with no reported UI earnings in a quarter are

assumed to have zero earnings for that quarter. *AGE* is the individual's age, measured as a cubic.

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. As

mentioned previously, we have earnings data from the first quarter of 2000 through the second

quarter of 2014, so we have up to 58 quarters of earnings observations per person. In our

preferred models, we estimate separate regressions by sex.

The input of interest is proprietary school attendance. In the simplest specification, the

vector *PROPRIETARY* contains a set of dichotomous variables measuring time relative to

enrollment at proprietary school. Specifically, we include variables for each quarter starting

from the fourth quarter before enrollment. In other words, we include a variable for the fourth

quarter before enrolling, a variable for the third quarter before enrolling, and so on. 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. In other words, the coefficients report the difference in earnings for that quarter relative to quarters more than one year before entering proprietary school, taking account of age and calendar quarter effects. The quarterly variables for the quarters after initial enrollment provide a flexible way to capture the returns to attendance. We do not constrain the earnings to have any specific parametric relationship with the time since enrollment.

The basic model in equation (1) does not differentiate returns between individuals pursuing a certificate and individuals pursuing an associate's degree. In equation (2), we allow for different returns between the two programs by including a set of interaction terms between the dichotomous variables in $PROPRIETARY$ and an individual-level dichotomous variable for associate's degree programs, $ASSOCIATE$:

(2) $EARN_{it} = \beta \cdot PROPRIETARY_{it} + \gamma \cdot PROPRIETARY_{it} \cdot ASSOCIATE_i + \delta \cdot AGE_{it} +$
$\eta_i + \tau_t + \varepsilon_{it}.$

Thus, the coefficients for the interaction terms show the increase (or decrease) in earnings of individuals pursuing associate's degrees relative to individuals pursuing certificates.

The data also permit us to classify proprietary schools by their area of study—for example computers or traditional trades—to examine differences in impacts on labor-market outcomes. Therefore, we also investigate differences in returns to fields of study by estimating separate models of attendance by field of study. In addition, we also consider differences by race, age, prior education and geographic area within the state.

V. Results

Descriptive Statistics

Table 1 contains the descriptive statistics for the analysis sample of 43,302 male and

47,229 female entries for students into the state's proprietary schools between January 2005 and

September 2009.[3] Nearly 65 percent of males and 60 percent of females are white. The average

age at entry is around 30 years of age. Approximately 75 percent have at least a high school

degree, under 20 percent have a GED, around 5 percent have less than a high school degree, and

at most 2 percent have missing high school / GED status. For men, over 75 percent pursue a

certificate rather than an associate's degree, compared to under 70 percent for women. Over two-

thirds of women pursue a degree in health. For men, transport is the most popular field of study

at 34 percent.

Figures 1a and 1b (for men and women, respectively) and Table 1 present the trends in

average earnings by quarter relative to quarter of entry, where 0 denotes the quarter of initial

enrollment. Individuals with no reported UI earnings are coded as having zero earning for the

quarter, so the reported means are not conditional on employment. As Figure 1a shows, men in

certificate programs have noticeably higher earnings than men in associate's degree programs,

although the gap narrows toward the end of the sample period.[4] Both groups experience an

"Ashenfelter dip" in earnings around the time of school entry, 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

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[3] 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 proprietary school in the state in the prior 12 months.

[4] The higher earnings for men seeking certificates can be traced largely to measured characteristics. Certificate degree seekers are nearly six years older, are more likely to enter the program in more recent years, and are more likely to be high school graduates than those seeking associate's degrees. Such differences are fully controlled in our estimates of the effects attendance, which include individual fixed effects.

earnings exceed their pre-schooling levels a few quarters after school entry. The highest average

earnings are approximately $6,000 per quarter for the certificate program and $5,400 for the

associate's degree program.

For women, average earnings are much more similar for the two programs. Average

earnings for the certificate program are higher in the pre-schooling period. After a substantial

earnings reduction around entry, participants in both programs experience drastic increases in

average earnings during the first few post-entry quarters, but then the rate of growth is more

modest in later periods. From 9 quarters after entry until 34 quarters after entry, average

earnings are slightly higher for associate's degree programs than for certificate programs. At the

end of the sample period, average quarterly earnings are around $4,100 for both programs.

For both men and women, these trends in average earnings strongly suggest positive

impacts of participation, but we now turn to regression results, which control for calendar

quarter, age, and student fixed effects, for the estimates of returns to proprietary school

attendance.

Regression Results

Figures 2a and 2b and Appendix Table A1 contain the regression results for the model

depicted in equation (2), again estimated separately for men (Figure 2a) and women (Figure 2b).

The dependent variable is quarterly earnings, where earnings are coded as zero for any quarter in

which no earnings are reported for the individual. The figures show the returns to attendance for

individuals pursuing certificates (dashed line) and associate's degrees (solid line) for each

quarter relative to entry, from four quarters before to 37 quarters after. The coefficients denote

the change in earnings in that quarter relative to the period from 20 quarters to five quarters

before entry (the reference period). The time fixed effects included in equation (2) control for

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quarter-specific trends such as statewide changes in wages due to inflation or variation in the health of the economy.

In equation (2), the coefficient for one of the $PROPRIETARY$ variables is the return for attendance in certificate programs, whereas the return for attendance in associate's degree programs in a given quarter is the sum of that coefficient and the interaction term for the associate's degree program (the coefficient for one of the $ASSOCIATE \cdot PROPRIETARY$ variables in equation (2)). For example, in quarter 10, the return for certificate programs is $66 for men, and the interaction term between quarter 10 and associate's degree program is $202. Thus, the return is $268 (= $66 + $202) for associate's degree programs.

The figures show a broadly similar pattern for men and women: slightly lower earnings in the last four quarters before entry, a large decline around entry (except for men in associate's degree programs), followed by consistent gains in earnings for both program types. Earnings gains are higher and have a steeper earnings profile for men compared to women. By the end of the sample period, the earnings gain (relative to 5+ quarters before school entry) is nearly $1,500 for certificate programs and over $1,600 for associate's programs. As percentages of the average earnings, the returns are as much as 24 percent for certificate programs and 31 percent for associate's degree programs.[5] For all but four of the first 22 post-entry quarters, earnings for associate's programs are significantly higher than for certificate programs, with a difference of as much as $200 per quarter.[6] However, starting 6 years after entry (i.e., 25 quarters), differences in returns are not statistically significant.

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[5] The percentage return is a comparison of the return in a given quarter relative to average earnings in that same quarter.

[6] Unless stated otherwise, all statistically significant coefficients are at the five-percent for a two-sided test. Coefficients that are statistically significant at the ten-percent level but not at the five-percent level are considered marginally significant. Consequently, when we indicate coefficients are not statistically significant, we refer to the ten-percent level, also for a two-sided test.

For women, certificate programs initially have a higher return for most of the first 8 quarters after entry. In quarters 11 through 29, associate's degree programs have higher returns, again with a difference of as much as $200 per quarter. In quarters 30 and beyond, the interaction term capturing the added return for associate's degree programs is generally smaller (or reverses sign) and is often not statistically significant. The highest quarterly returns, relative to earnings more than one year before entry, are slightly less than $1100 for certificate programs and slightly more than $1100 for associate degree programs. The highest percentage returns are 25% for certificate programs and 27% for associate's degree programs.

Returns by Demographics

In this section, we study the extent to which the returns to proprietary schooling vary by race, age, prior education, location of high school, and current location within the state. For simplicity, the figures only contain the returns for certificate programs even though we estimate separate returns by program type. Unless we explicitly comment on the returns for those seeking associates degree, the patterns correspond with those we report for those seeking certifications. The results for associate's degree programs are available from the authors upon request. As always, we estimate returns for men and women separately.

Figures 3a and 3b illustrate the difference in returns by race. For both men and women, the returns for whites are similar to the overall returns reported in Figures 2a and 2b. The returns for blacks, who comprise approximately one-fourth of males and one-third of females in certificate programs, are much lower. For men, the effects on earnings are significant in early quarters and are positive but not statistically significant from zero in later quarters. The returns to associate's degree programs (not shown) are substantially higher than the returns to certificate programs in each of the first 23 quarters after school entry. Even so, the overall returns to

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associate's degree programs in later quarters are at most $500 per quarter. For women, the returns to certificates among blacks are positive and significant from quarter 9 to quarter 36, but the returns are at most $350 per quarter, compared with returns often in excess of $1,000 per quarter for white women.

Next we estimate returns by age at school entry, dividing the sample into three age groups as illustrated in Figure 4a for men and 4b for women. For both men and women, the oldest cohort (age 40 to 60 at entry) have by far the largest dip in earnings at entry. However, they also have the largest post-entry gain in earnings, so that they usually have the largest dollar effects on earnings in later periods (i.e. starting 6 years after enrollment). The younger two cohorts have a similar pattern of returns; the only notable difference is that the dip at entry is larger for middle age cohort (age 25 to 40 at entry), so that the returns in the first 5 years after entry are lower. By the end of the sample, returns for men are around $1,500 per quarter for all three cohorts. For women, the maximum returns are $1,900 per quarter for the oldest cohort, $900 for the youngest cohort, and $800 for the middle cohort.

Education prior to proprietary school entry is divided into four categories: (1) graduation from a high school in the state, (2) graduation from high school outside the state, (3) receipt of a GED (in any location), and (4) not a graduate of high school nor a GED recipient. Figures 5a and 5b present the returns to certificate programs for each of these four groups.

For men, the returns are highest for in-state, high-school graduates. GED recipients have similar returns to in-state, high-school graduates until 12 quarters after entry, at which point the returns for GED recipients grow at a slower rate. By six to seven years after entry, returns are above $2,000 per quarter for in-state, high-school graduates compared to returns around $1,000 for GED recipients. The returns are not statistically different from zero for out-of-state high-

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school graduates and for individuals without high school graduation or GED receipt. However, the returns for out-of-state high-school graduates should be interpreted with caution given the assumption that quarters without earnings data (from the state and one neighboring state) are treated as zero earnings. Individuals who went to high school in another state may be more likely to return to that state (or move to yet another state). In a later section, we address this concern for the overall returns by estimating models that exclude zeros (including models where log earnings is the dependent variable).

For women who are in-state high-school graduates, the earnings effects exceed $500 per quarter by three years (12 quarters) after entry, and they exceed $1,000 per quarter around seven years after entry. For women with a GED, an out-of-state high-school degree, and those without high-school graduation or GED receipt, effect estimates are around $500 per quarter in most of the post-entry period.

Our final analysis by demographic group considers differences in returns to certificate programs by student-reported permanent home residence at the time of enrollment. [7] Specifically, the state is divided into three groups, large metropolitan areas (of which there are few), other metropolitan areas, and non-metropolitan areas. Figure 6a shows that men in other metropolitan areas have returns that are not statistically different from zero, in contrast to larger returns for the other two categories. Men outside urban areas have the fastest growth in returns soon after entry, so that returns are positive by 9 quarters after entry. For men in major metropolitan areas, the returns are positive starting 13 quarters after entry. By five years (20

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[7] Recall, students who report a permanent home residence outside the state and the neighboring state are omitted from all analyses. The analyses here omit individuals in the adjoining state.

quarters) after entry, the returns for these two locations are quite similar,[8] with a maximum

return of over $1,500 per quarter.

For women, the pattern of returns is slightly different.[9] Non-metropolitan areas have the

highest returns starting around 10 quarters after entry, with the gap relative to other locations

growing over time. In years 7 and 8 after entry, the returns exceed $1,000 per quarter. For

major urban areas, the returns in later years are between $500 and $1,000 per quarter, compared

with quarterly returns of $400 to $500 in other urban areas.

Thus, the overall returns to proprietary schools in Figures 2a and 2b mask substantial

heterogeneity by demographic characteristics. Furthermore, the pattern of results for a given

demographic characteristic such as location varies between men and women.

Returns by Area of Study

Because our data set provides information on area of study for nearly 100,000 students,

we are able to obtain precise estimates of returns by estimating separate regressions for different

fields of study. Figures 7a (for men) and 7b (for women) contain the earnings estimates based on

the model presented in equation (2). The black line in each panel identifies the return to the

specified area of study (e.g., under "business", the black line denotes the returns for business),

whereas the grey lines show effects for each of the other subject areas, to allow comparison.

Again, the returns to certificate programs are presented in the figures; returns for associate's

programs are available from the authors upon request.

For men, the highest returns are for computers, trades such as construction, and for the

"other" category, which includes areas such as services and technology. In these three areas of

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[8] For associate's degree programs, the returns for men in major metropolitan areas exceeds the returns outside metropolitan areas in most quarters after quarter 16 following entry.

[9] For women, the returns to certificate programs also differ from those for associate's degree programs. For the latter, the returns in non-metropolitan areas are much larger than the returns from the two types of metropolitan areas, whereas the gap in returns between the two types of metropolitan areas are much smaller.

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study, the returns grow substantially, although not always steadily, reaching returns in excess of $2,000 per quarter by the end of the period. For the other areas of study, we find no evidence of significantly positive returns, although the standard errors for business are large, in excess of $600 per quarter, due to the small sample of such students (fewer than 900).

For women, the highest returns are for computers and for the "other" category, with the latter having particularly large returns exceeding $3000 after 30 quarters. Business and health also have positive returns throughout most of the post-entry period. The quarterly returns for business are around $600 to $1000, compared to quarterly returns for health around $400 to $900.

In sum, the returns by field of study vary tremendously. Computers and the "other" category, which includes technology, have the highest returns for both men and women. Trades such as construction have sizable returns for men, but the returns are smaller and imprecisely estimated for small share of women (under 400) pursuing trade certificates. Business and health have positive effects, often more than $500 per quarter, for women, but the returns are not statistically significant for men in these fields of study. There is no evidence that pursuit of a certificate in transport is associated with higher earnings, as most point estimates are close to zero even many quarters after participation.

Returns for Alternate Outcomes

In addition to the preferred outcome of quarterly earnings (with missing quarters treated as quarters with zero earnings), we estimate models with three additional dependent variables: (1) employment, measured as a dummy variable equal to one for quarters when individuals report positive earnings, (2) earnings where missing quarters are treated as missing rather than

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zero, and (3) log earnings, where by construction quarters with zero or missing earnings are treated as missing.

Figures 8a and 8b illustrate the employment returns to proprietary schools. Unlike earnings, proprietary schooling is associated with lower levels of employment. In other words, individuals are less likely to be employed in the quarters after school. In fact, after entry, the employment coefficients steadily decline across quarters. For men, the coefficient for certificate programs is -4 percentage points 8 quarters after entry, but it declines to -10 percentage points 24 quarters after entry. This pattern also holds for associate's degree programs for men and in both program types for women. For men, employment outcomes are lower for certificate programs than for associate's degree programs. For women, the two program types have statistically indistinguishable coefficients starting 10 quarters after entry. For both program types, the employment effects are lower for men than for women.

In Appendix Figures 1a and 1b, the dependent variable is earnings conditional on employment. In other words, the effect of attendance on earnings is isolated from the effect on employment by treating all observations with no reported earnings as missing (rather than treating them as zero earnings as is done in Figures 2a and 2b through 7a and 7b). For men, certificate programs have moderately greater effects than associate's degree programs, with the increment in some quarters as high as $500. In conjunction with the results for employment (Figures 8a and 8b) and unconditional earnings (Figures 2a and 2b), the overall pattern is that certificate programs lead to higher earnings for the employed, but levels of employment are lower than for associate's degree seekers, which on net means overall earnings effects are smaller.

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For women, the returns for certificate programs are slightly below the returns for associate's degree programs. Due primarily to smaller forgone earnings, average quarterly earnings for certificate programs are initially higher for certificates, but, starting seven quarters after attendance, the returns for associate's degree programs are greater. This difference of roughly $100 to $200 per quarter is statistically significant at the five-percent level starting 12 quarters after entry. Thus, for women, associate's degree programs lead to higher earnings regardless of whether we condition on employment or not.

Our final outcome measure is log earnings, which allows for a nonlinear effect of attendance on earnings conditional on employment. For both men and women, in most quarters – especially after the first two years – the earnings effects of attendance for the two program types are similar; we cannot reject the hypothesis that the difference in returns between program types is zero (Appendix Figures 2a and 2b). This implies that the difference in effects on earnings for certificate and associate's degree programs correspond with differences in average earnings.

VII. Conclusion

This paper investigates the relationship between proprietary school attendance and quarterly earnings. We use an individual fixed effects method to control for time-invariant differences between students. We find positive effects of attendance on earnings for students enrolled in certificate and associate's degree programs.

How do our results compare to others in this literature?[10] Cellini and Chaudhary (2014) find an earnings increment conditional on employment of around 10 percent for young students in the NLSY attending associate's degree programs. Our earnings returns conditional on

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[10] Because Deming et al. (2012) and Lang and Weinstein (2013) use data from the Beginning Postsecondary Survey, their preferred estimates compare proprietary schooling to public schooling rather than reporting overall returns as we do.

employment are noticeably larger. In the log specification closest to theirs, we find that the earnings increments become positive after about 2-3 years, with an earnings increment over 20 percent by around four years. For men, the impact of earnings reaches a peak of nearly 60 percent (0.5 log points) at eight years, whereas the maximum for women is at about 35 percent (0.3 log points). However, when we take into account employment, in analyses that look at total earnings, rather than earnings contingent on employment (Figures 2a and 2b), the percentage effects are somewhat smaller, with maximums at 24 percent for men and 27 percent for women.

Jepsen, Troske, and Coomes (2014) find that students who complete associate's degree programs in Kentucky community colleges have higher quarterly earnings of as much as 56 percent, compared to earnings increases of at most seven percent for completing a certificate. Our returns to attendance – which include a substantial proportion who did not complete degrees – are smaller than their returns to associate's degree completion, but they are larger than their returns to certificate completion.

With respect to fields of study, computers, the "other" category, and – for men – trades have higher returns than business and health. Transport is the only field of study with no significantly positive returns for men or women. Although Lang and Weinstein (2013) find small returns to certificates in vocational (i.e., trades and transport) and health areas, it is difficult to directly compare their results with ours because their returns by field of study include public as well as for-profit colleges. The pattern of results in Lang and Weinstein (2013) is similar to the pattern of results by field of study found in the Jepsen, Troske, and Coomes (2014) analysis of community colleges.

Our results suggest that the benefits of proprietary school attendance are somewhat greater than found in previous studies, perhaps because we have data on earning for a longer

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post-entry period. Although we find that earning in the two years following program entry are appreciably below what they would have been, the earnings increment is positive and large in subsequent years, so that, at almost any discount rate, and even allowing for substantial tuition expenses, the returns clearly justify the costs. On the other hand, we do find important differences by demographic group and across fields of study. Most notable is that returns for blacks, who make up between a quarter and a third of our proprietary school entrants, are appreciably lower than returns for others. Perhaps even more dramatic are differences by field of study. Transport is the only field with little return, but differences between fields with modest returns like health and those with larger returns, like computers, are very large. When expressed as percentages of earnings, the observed differences are smaller but they do not disappear.

Overall, it would appear that students attending proprietary schools are obtaining valuable labor market skills. But, perhaps not surprisingly, the benefits are not equally distributed, nor do all subclasses of individuals we consider experience benefits.

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Figure 1a – Quarterly Earnings by Program Type and Quarters since School Entry, Men
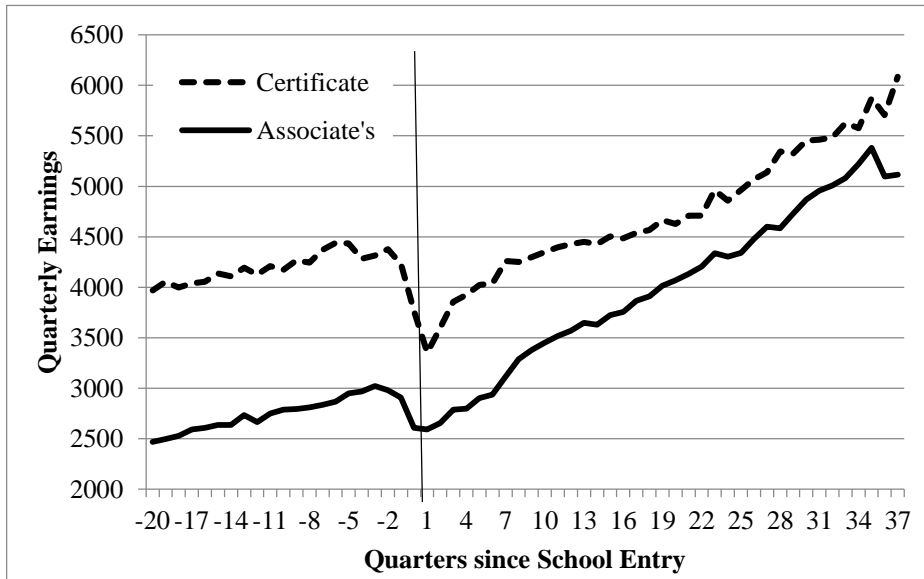

Figure 1b – Quarterly Earnings by Program Type and Quarters since School Entry, Women
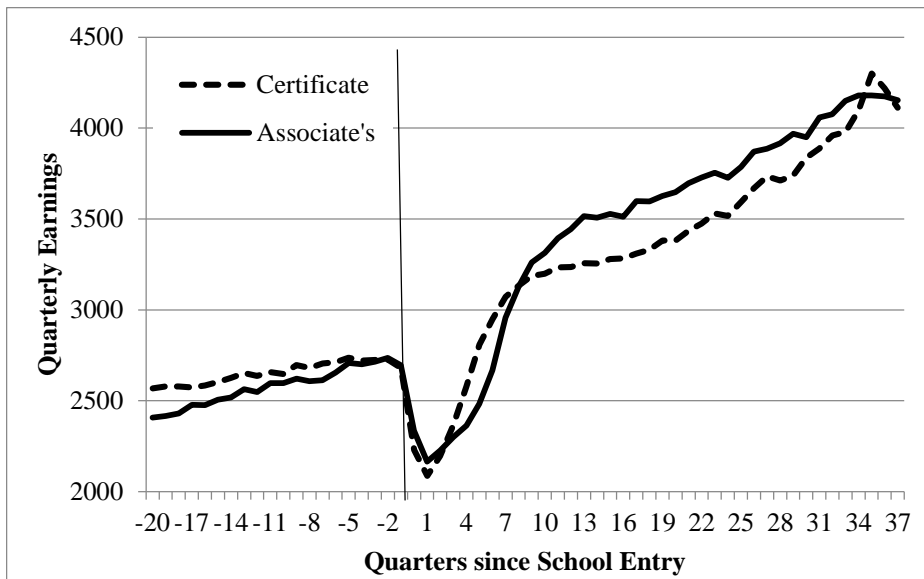
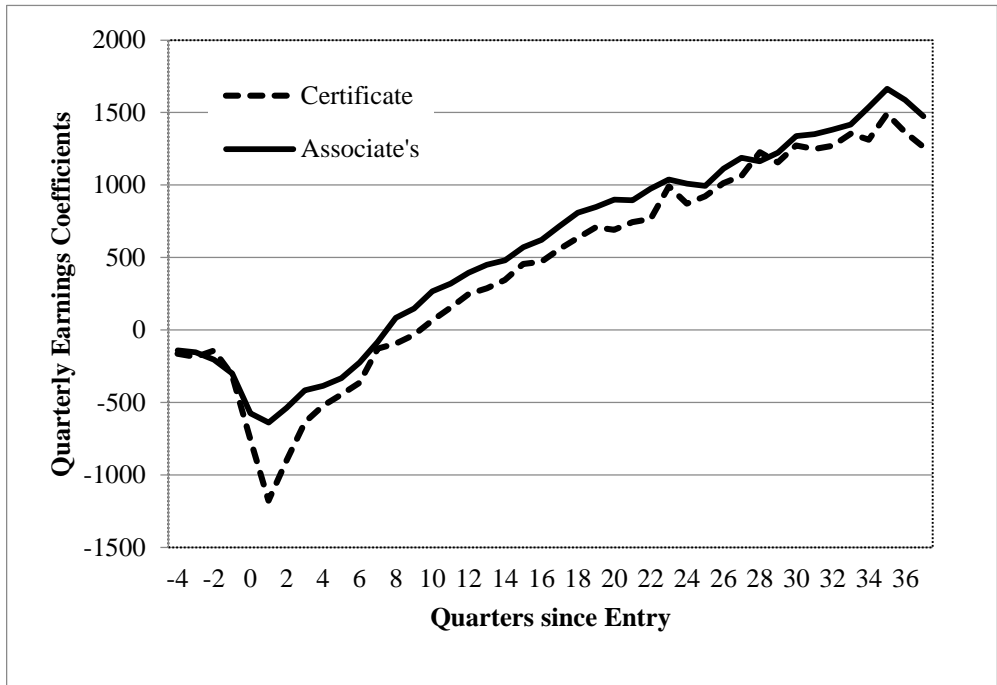Figure 2a – Effect of Attendance on Earnings by Quarter and Program Type, Men

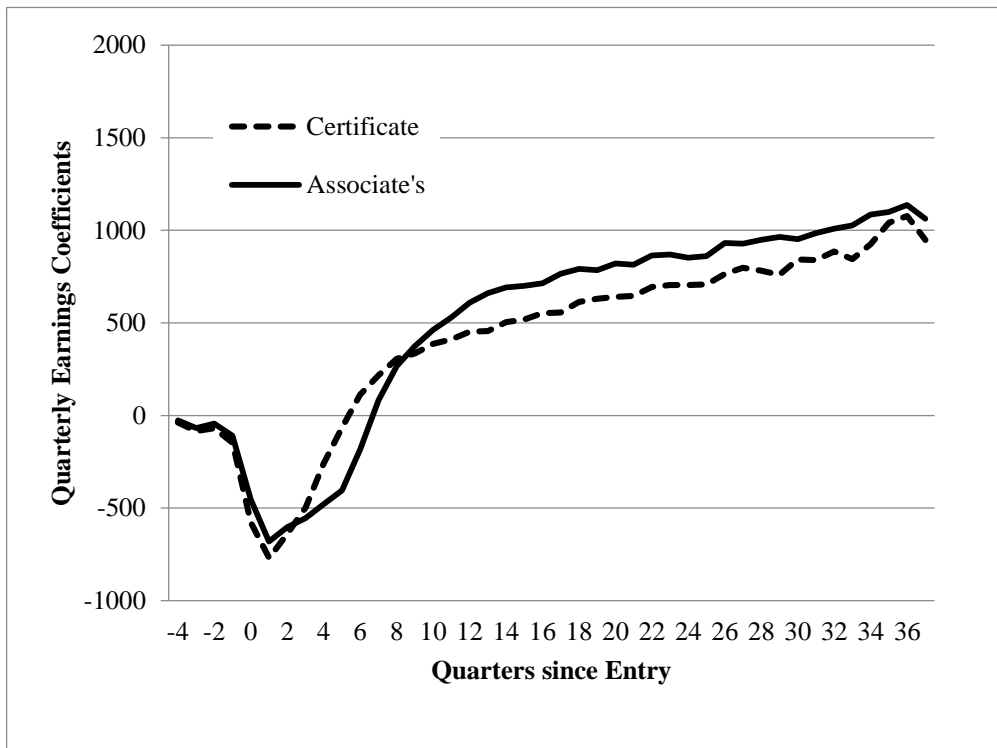Figure 2b – Effect of Attendance on Earnings by Quarter and Program Type, Women

Figure 3a – Effect of Attendance on Earnings by Quarter and Race,
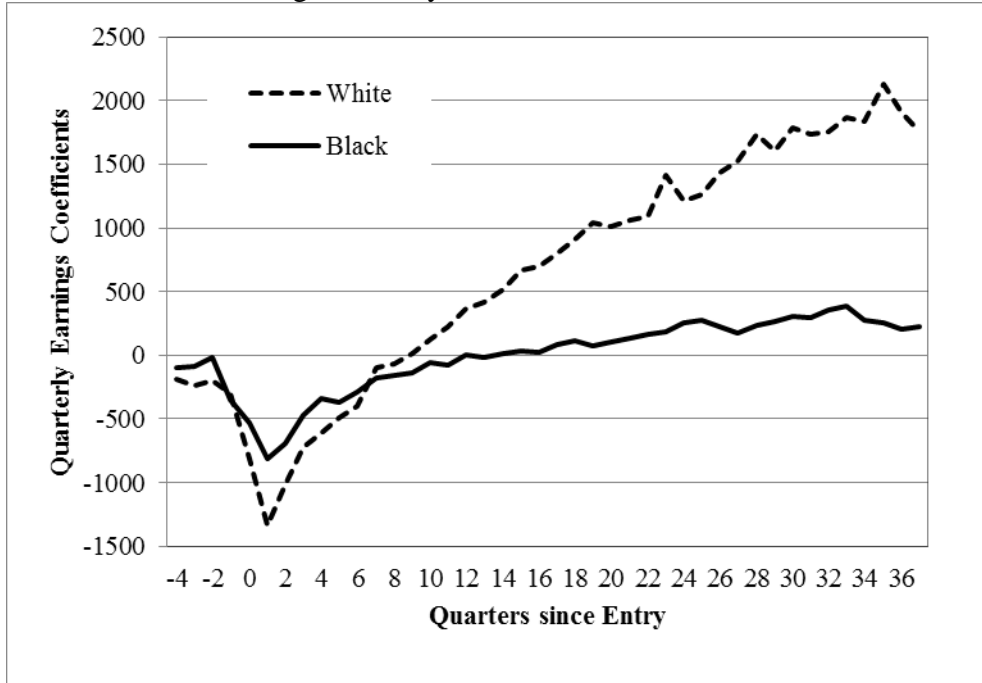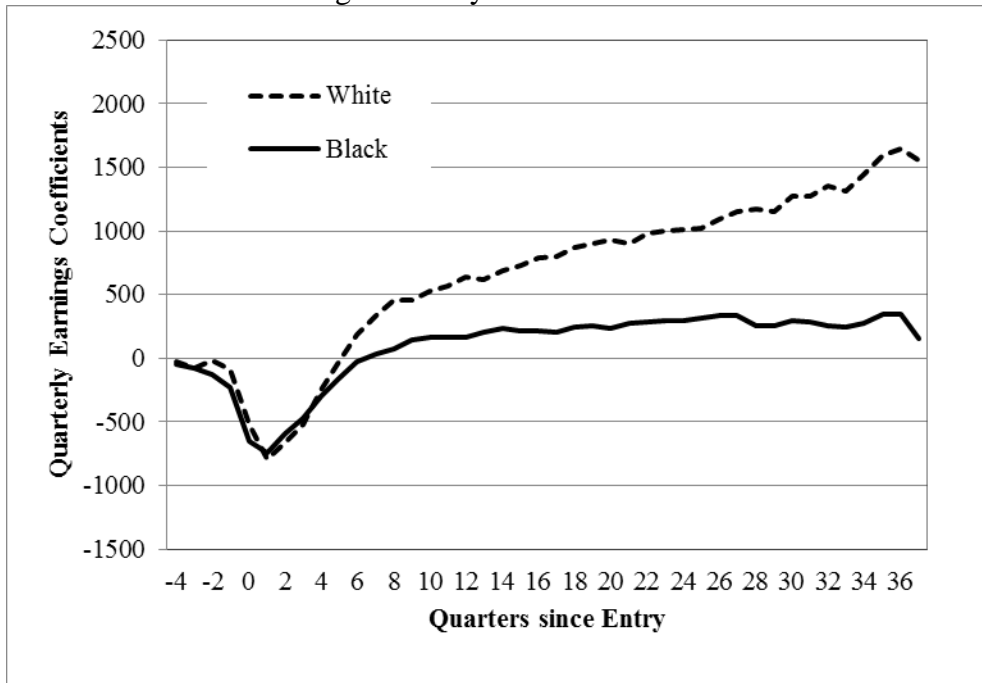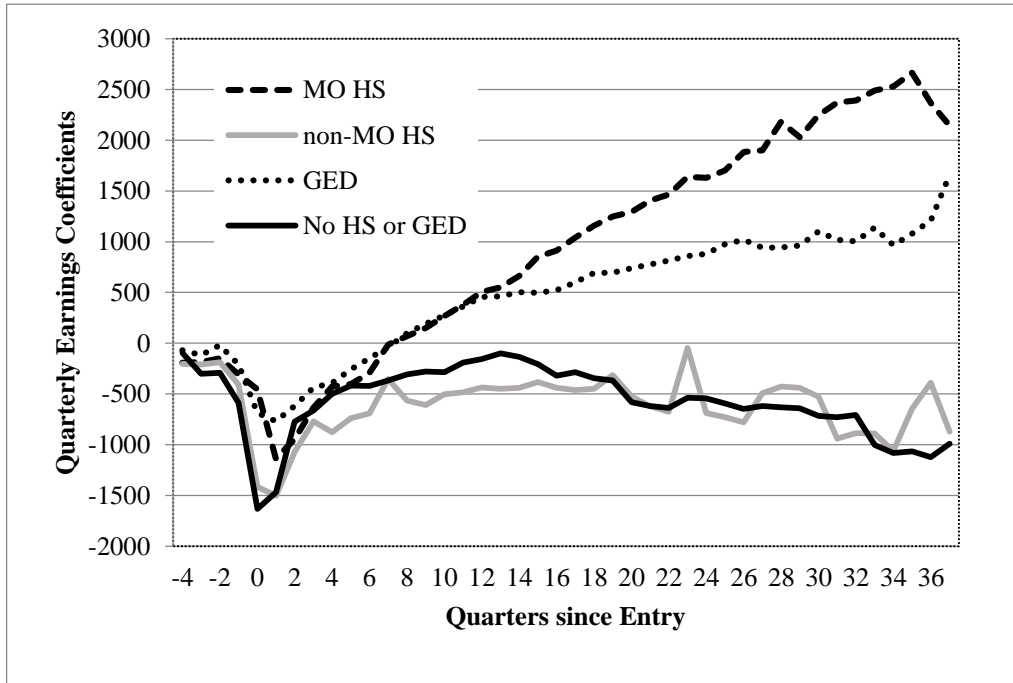Men in Certificate Programs Only

Figure 3b – Effect of Attendance on Earnings by Quarter and Race,
Women in Certificate Programs Only

Figure 4a – Effect of Attendance on Earnings by Quarter and Age at Entry,
Men in Certificate Programs Only
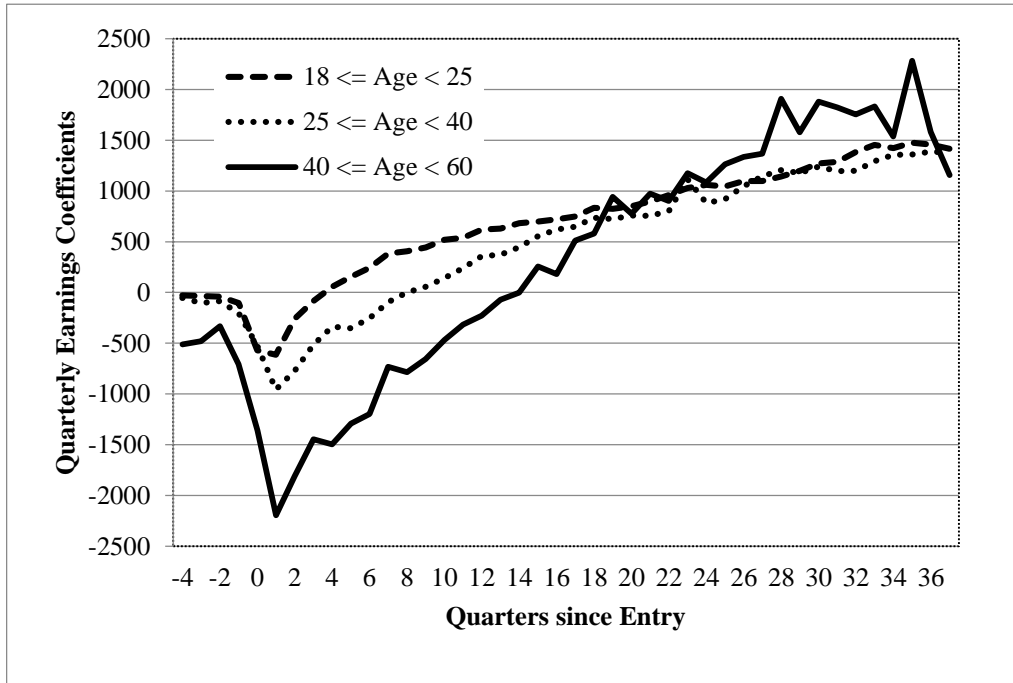
Figure 4b – Effect of Attendance on Earnings by Quarter and Age at Entry,
Women in Certificate Programs Only
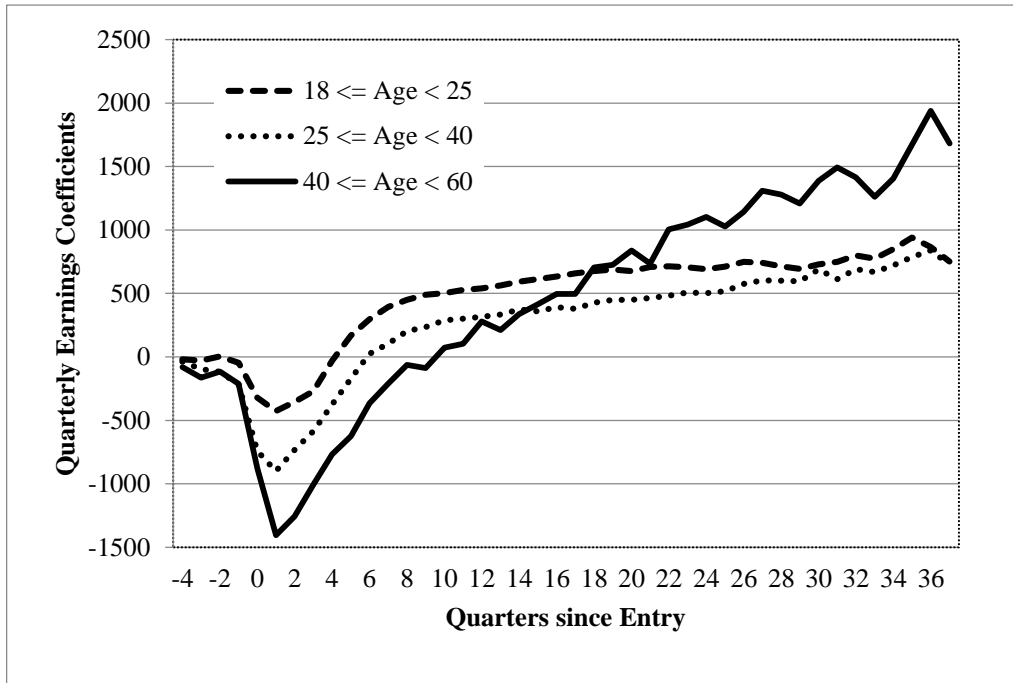
Figure 5a – Effect of Attendance on Earnings by Quarter and High School Type, Men in Certificate Programs Only

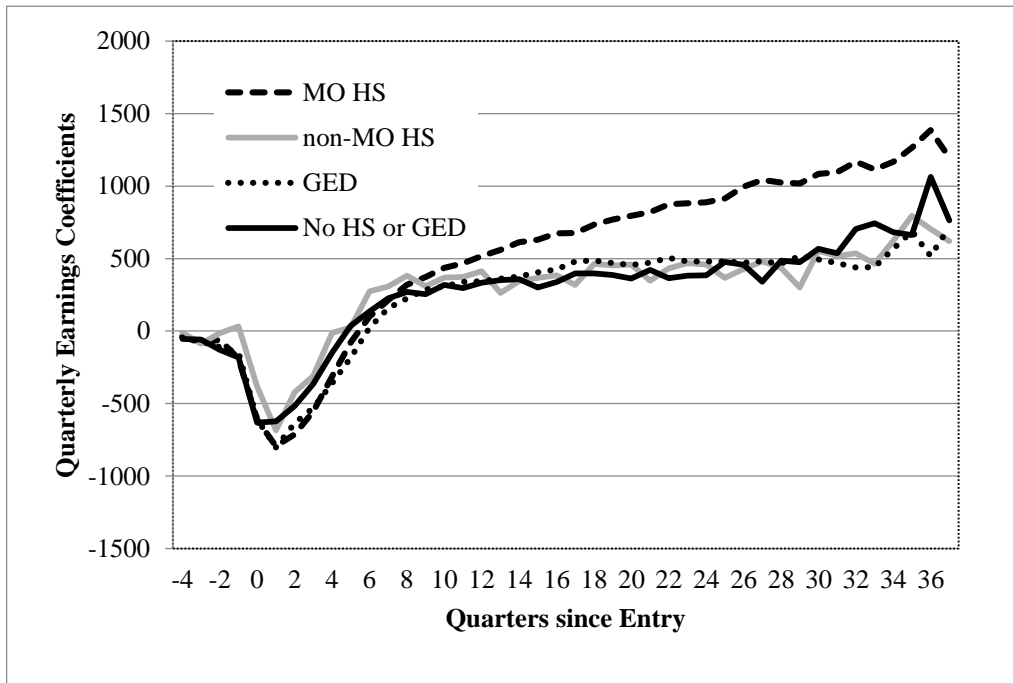Figure 5b – Effect of Attendance on Earnings by Quarter and High School Type, Women in Certificate Programs Only

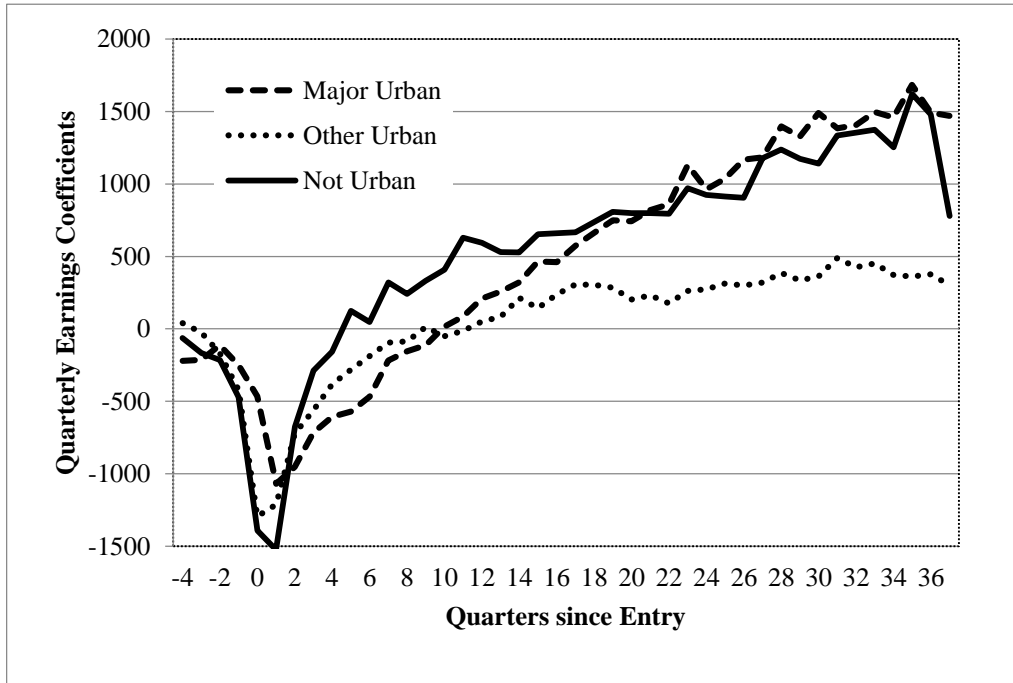Figure 6a – Effect of Attendance on Earnings by Quarter and Metro Area Type, Men in Certificate Programs Only

Figure 6b – Effect of Attendance on Earnings by Quarter and Metro Area Type, Women in Certificate Programs Only
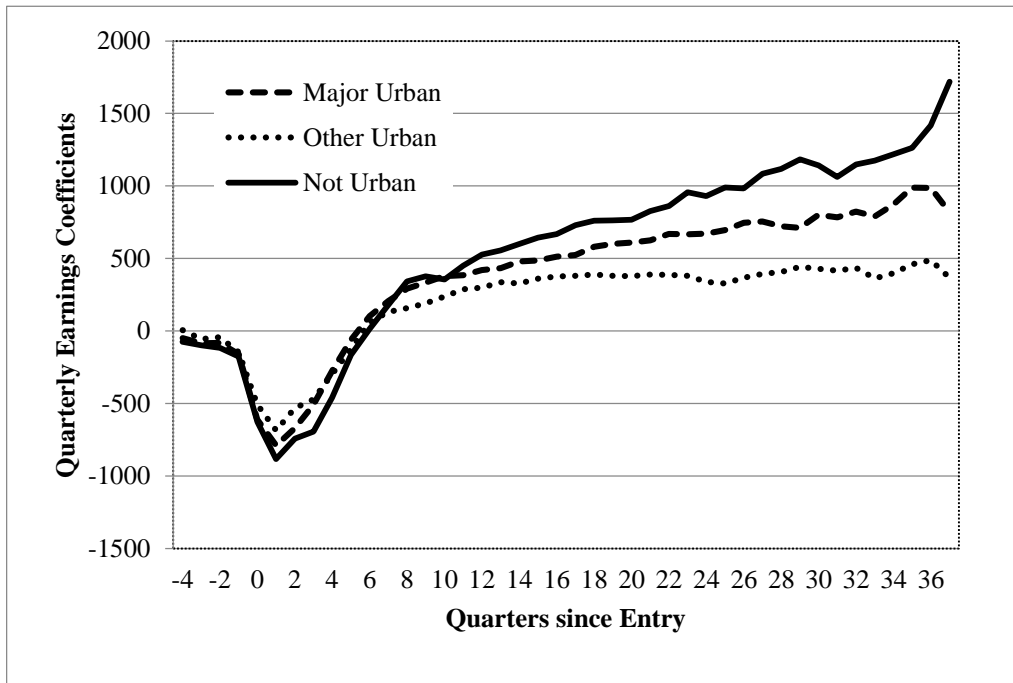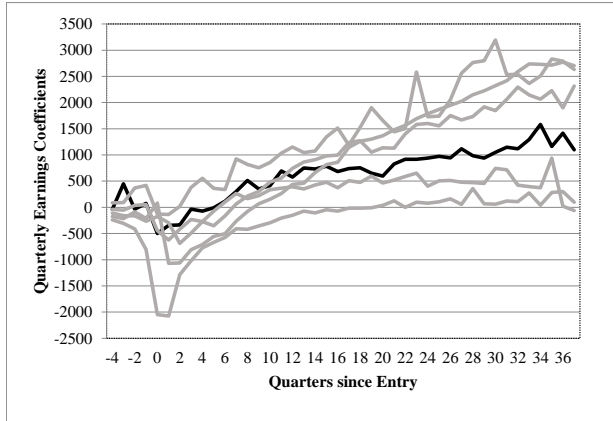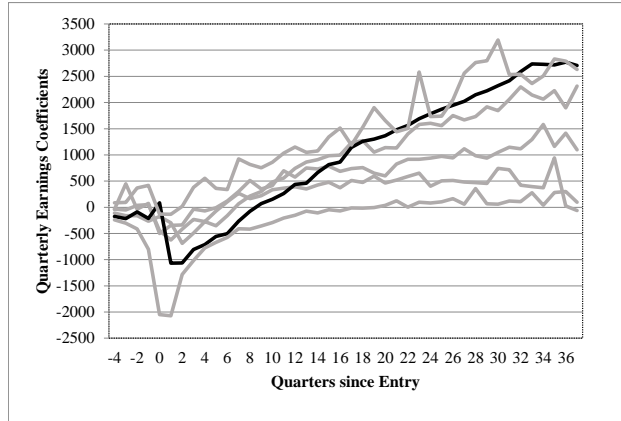
Figure 7a – Effect of Attendance on Earnings by Quarter and Field of Study, Men
Certificate Programs Only

Business
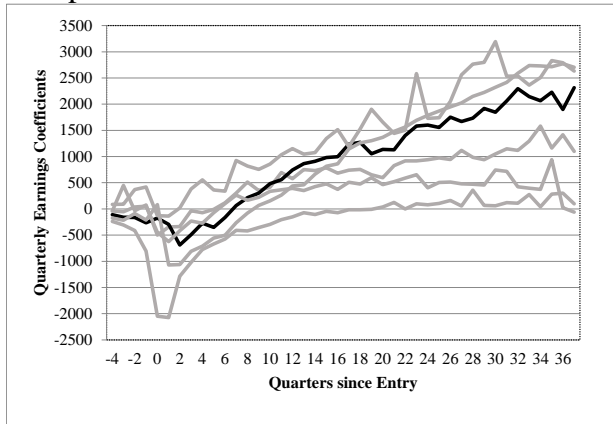
Trades

Computers
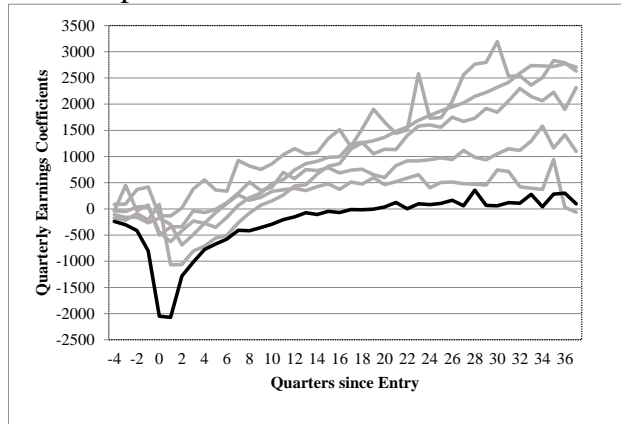
Transport

Health

Other

Figure 7b – Effect of Attendance on Earnings by Quarter and Field of Study, Women
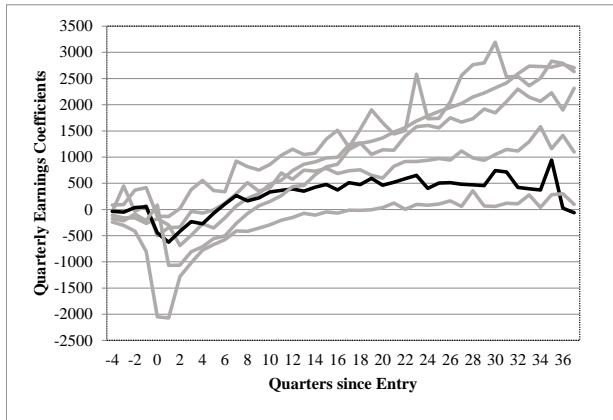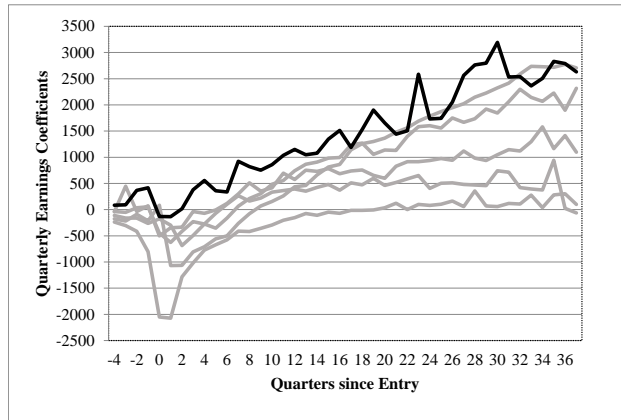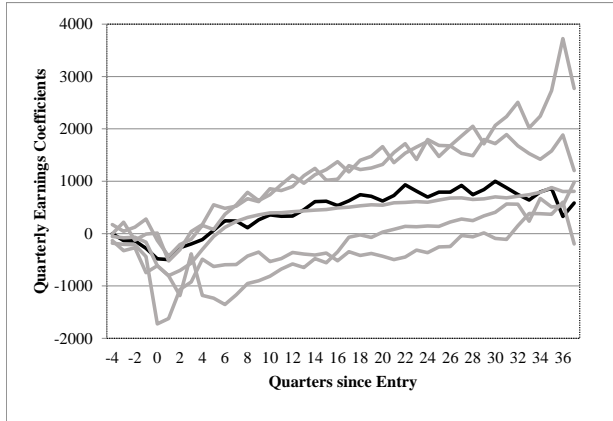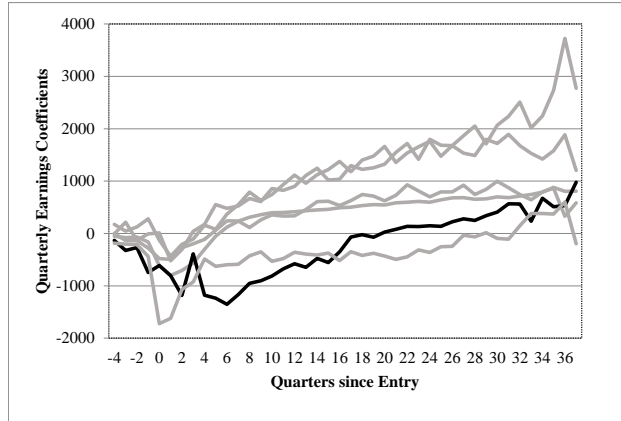Certificate Programs Only

Business

Trades

Computers
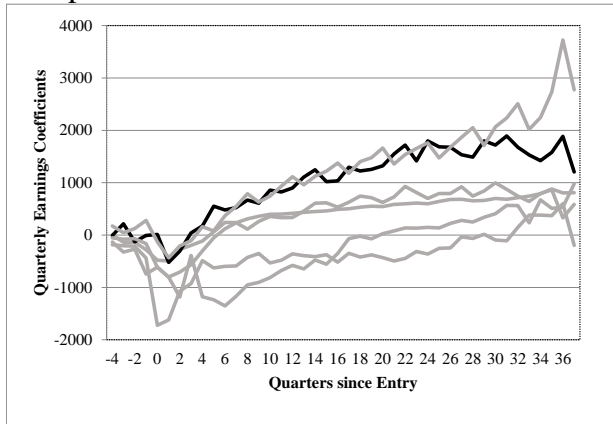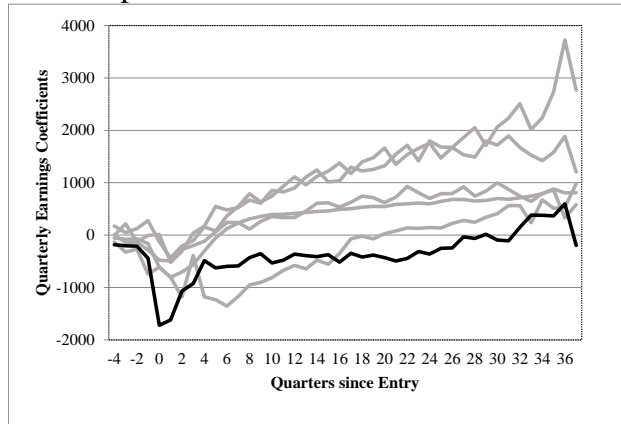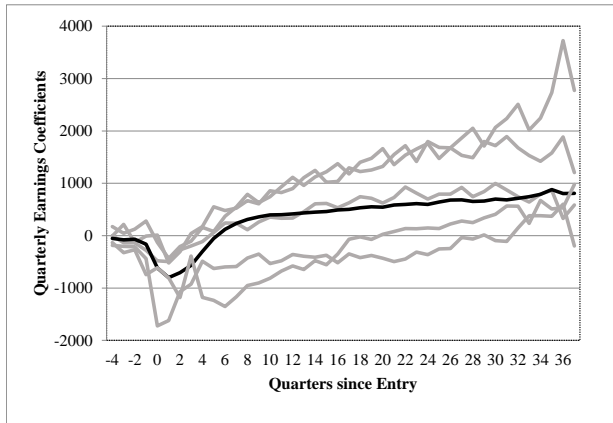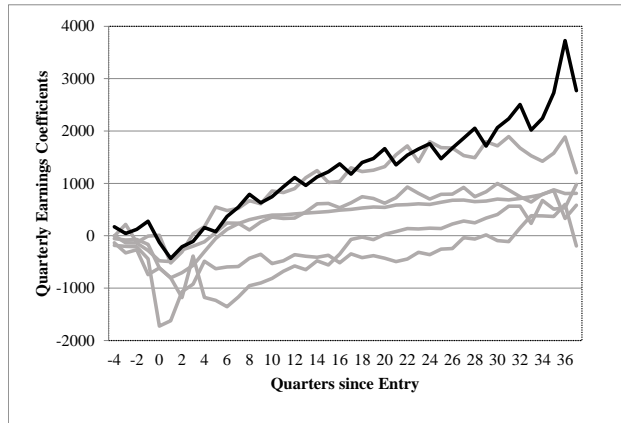

Transport

Health

Other

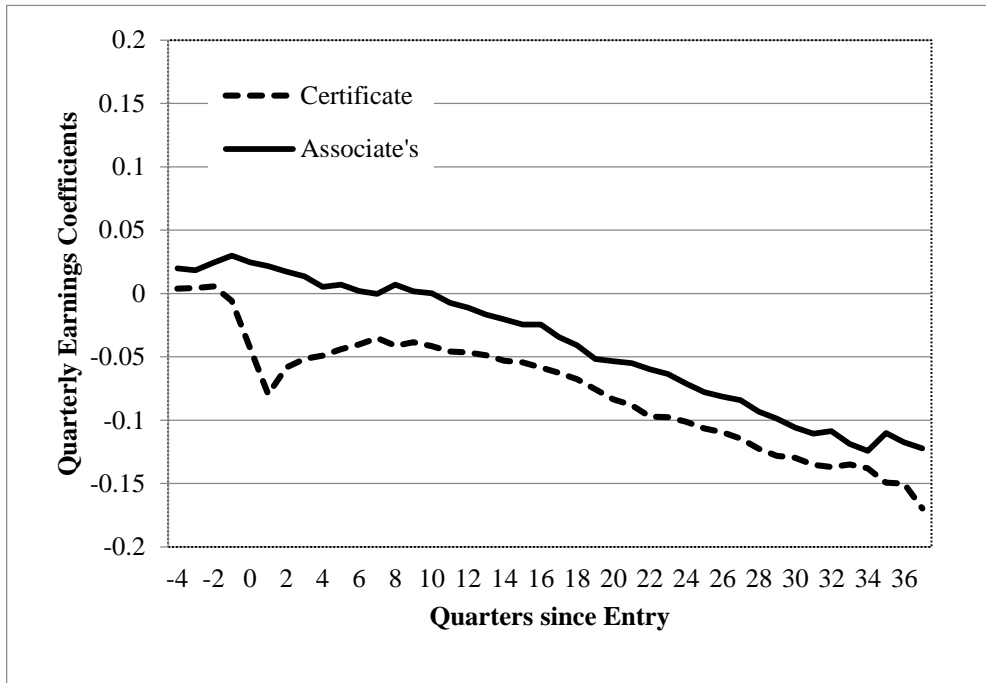Figure 8a – Effect of Attendance on Employment by Quarter and Program Type, Men

Figure 8b – Effect of Attendance on Employment by Quarter and Program Type, Women
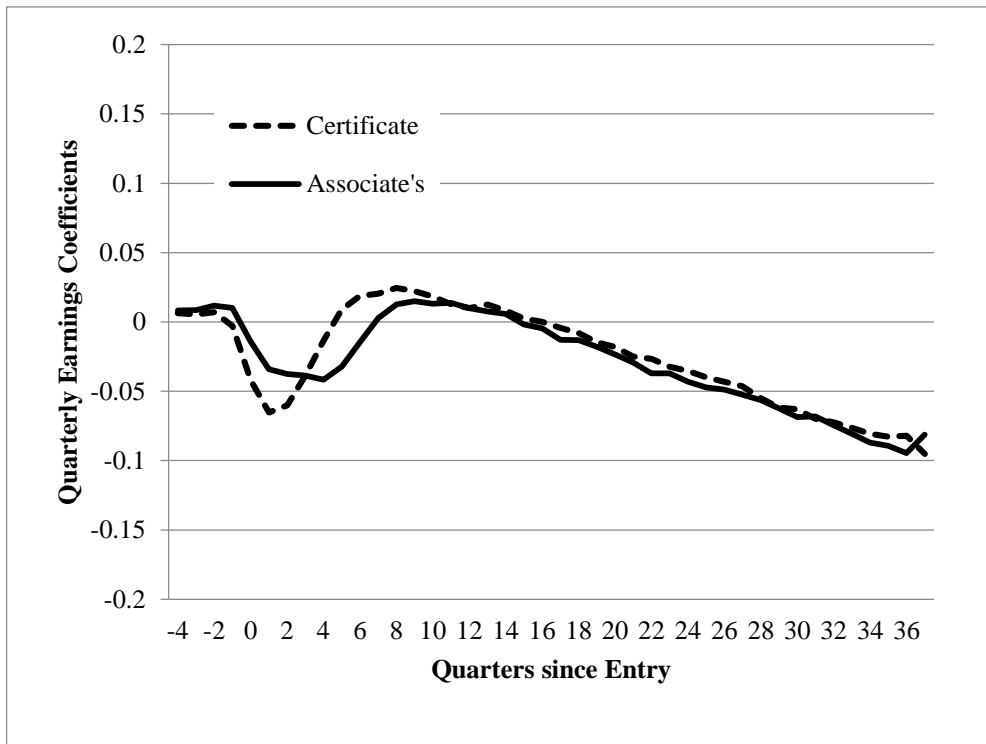
Table 1 – Descriptive Statistics by Gender and Program Type

| | Men | | | | Women | | | |
| | Certificate | | Associate's | | Certificate | | Associate's | |
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Demographics and Schooling Information								
Male	1	0	1	0	0	0	0	0
White	0.666	0.472	0.599	0.490	0.570	0.495	0.636	0.481
Black	0.269	0.443	0.261	0.439	0.364	0.481	0.286	0.452
Other / Missing Race	0.065	0.247	0.140	0.347	0.066	0.247	0.078	0.269
Age at time of entry	32.6	10.7	26.9	8.0	29.3	9.9	27.4	8.4
Less than high school	0.065	0.247	0.017	0.130	0.067	0.250	0.027	0.162
High school or more	0.723	0.447	0.774	0.418	0.771	0.420	0.795	0.404
GED	0.191	0.393	0.203	0.402	0.154	0.361	0.169	0.374
Missing education	0.021	0.142	0.006	0.077	0.008	0.090	0.010	0.097
Entry year 2005	0.221	0.415	0.198	0.398	0.226	0.418	0.222	0.415
Entry year 2006	0.222	0.416	0.179	0.384	0.207	0.405	0.210	0.407
Entry year 2007	0.200	0.400	0.174	0.379	0.199	0.399	0.186	0.389
Entry year 2008	0.188	0.391	0.239	0.426	0.207	0.405	0.219	0.414
Entry year 2009	0.169	0.374	0.210	0.407	0.161	0.367	0.163	0.370
Schooling Information								
Pursue certificate	1	0	0	0	1	0	0	0
Pursue associate's	0	0	1	0	0	0	1	0
Studying business	0.037	0.189	0.096	0.295	0.068	0.251	0.138	0.345
Studying computers	0.045	0.208	0.310	0.462	0.017	0.130	0.051	0.220
Studying health	0.142	0.349	0.153	0.360	0.756	0.430	0.598	0.490
Studying trades	0.323	0.468	0.047	0.211	0.015	0.121	0.002	0.047
Studying transport	0.319	0.466	0	0	0.026	0.159	0	0
Studying other	0.134	0.341	0.394	0.489	0.118	0.323	0.211	0.408
Completed certificate	0.662	0.473	0.012	0.107	0.547	0.498	0.023	0.151
Completed associate's	0.007	0.086	0.315	0.465	0.014	0.116	0.410	0.492
Missing completion info	0.331	0.471	0.671	0.470	0.440	0.496	0.556	0.497

Table 1 (Continued) – Descriptive Statistics Gender and by Program Type

| | Men | | | | Women | | | |
| | Certificate | | Associate's | | Certificate | | Associate's | |
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mean Earnings								
3-20 quarters before entry	3925	5636	2477	2822	2411	3000	2333	2452
2 quarters before entry	4377	9001	2981	4121	2726	6504	2736	4278
1 quarter before entry	4227	10841	2908	4503	2680	5461	2696	4258
Quarter of entry	3759	13105	2610	4572	2229	4787	2335	4152
1 quarter after entry	3353	8825	2592	3811	2086	4160	2165	3144
2 quarters after entry	3597	7719	2657	3747	2196	4163	2226	3188
3 quarters after entry	3857	8052	2788	4015	2365	4466	2301	2999
4 quarters after entry	3925	8106	2798	4034	2577	3989	2364	3375
5-8 quarters after entry	4144	6539	3060	3437	2993	3531	2809	2896
9-20 quarters after entry	4483	6527	3708	3830	3281	3640	3494	3331
21-37 quarters after entry	4914	7707	4415	4840	3558	4253	3851	3964
Mean Employment								
3-20 quarters before entry	0.891	0.312	0.872	0.335	0.892	0.310	0.905	0.293
2 quarters before entry	0.684	0.465	0.676	0.468	0.675	0.468	0.709	0.454
1 quarter before entry	0.672	0.469	0.683	0.465	0.667	0.471	0.708	0.455
Quarter of entry	0.632	0.482	0.676	0.468	0.625	0.484	0.682	0.466
1 quarter after entry	0.595	0.491	0.673	0.469	0.603	0.489	0.663	0.473
2 quarters after entry	0.612	0.487	0.662	0.473	0.603	0.489	0.655	0.475
3 quarters after entry	0.618	0.486	0.658	0.474	0.623	0.485	0.652	0.476
4 quarters after entry	0.617	0.486	0.648	0.477	0.644	0.479	0.646	0.478
5-8 quarters after entry	0.750	0.433	0.781	0.413	0.805	0.397	0.815	0.388
9-20 quarters after entry	0.804	0.397	0.828	0.378	0.848	0.359	0.867	0.339
21-37 quarters after entry	0.701	0.458	0.731	0.443	0.748	0.434	0.769	0.422
Number of students	23,023		8,273		28,436		13,276	

Appendix Figure 1a – Effect of Attendance on Earnings by Quarter and Program Type, Men
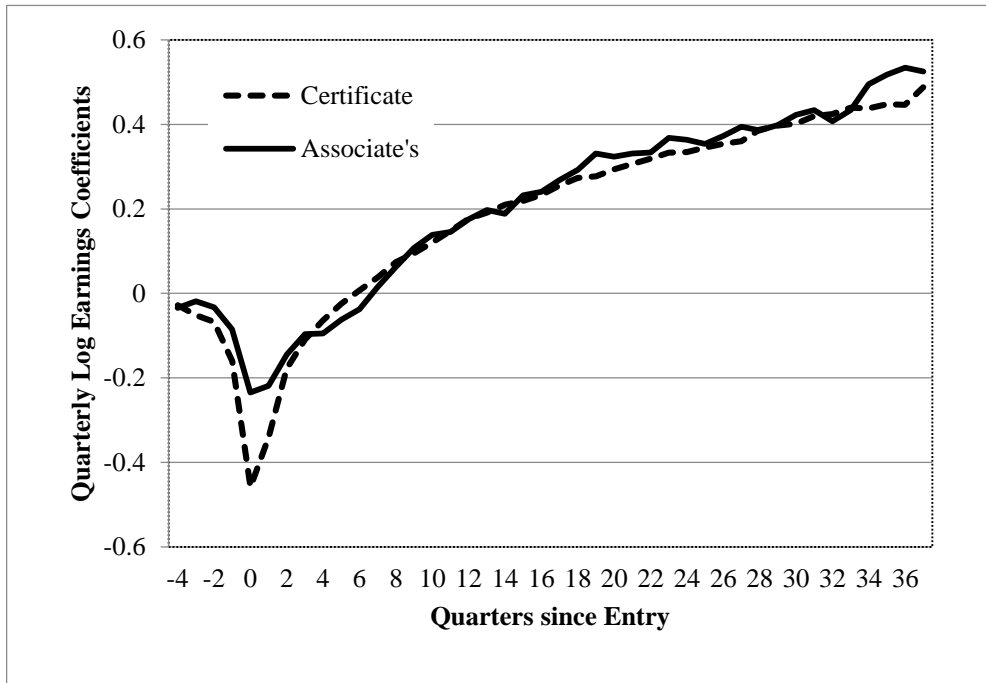Omitting All Quarters with Zero Reported Earnings
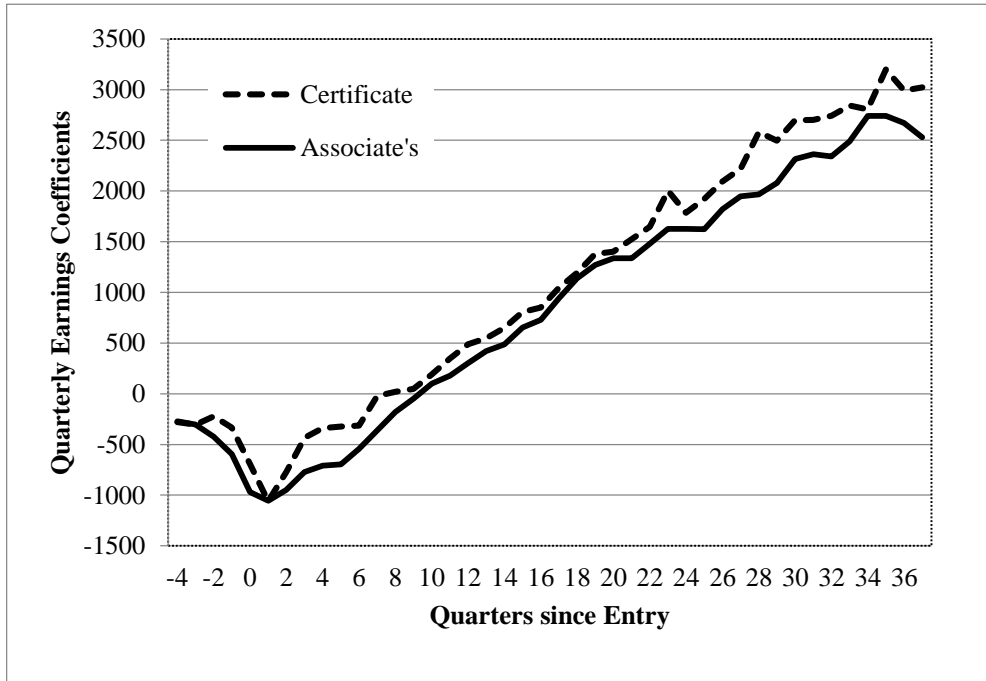
Appendix Figure 1b – Effect of Attendance on Earnings by Quarter and Program Type, Women
Omitting All Quarters with Zero Reported Earnings
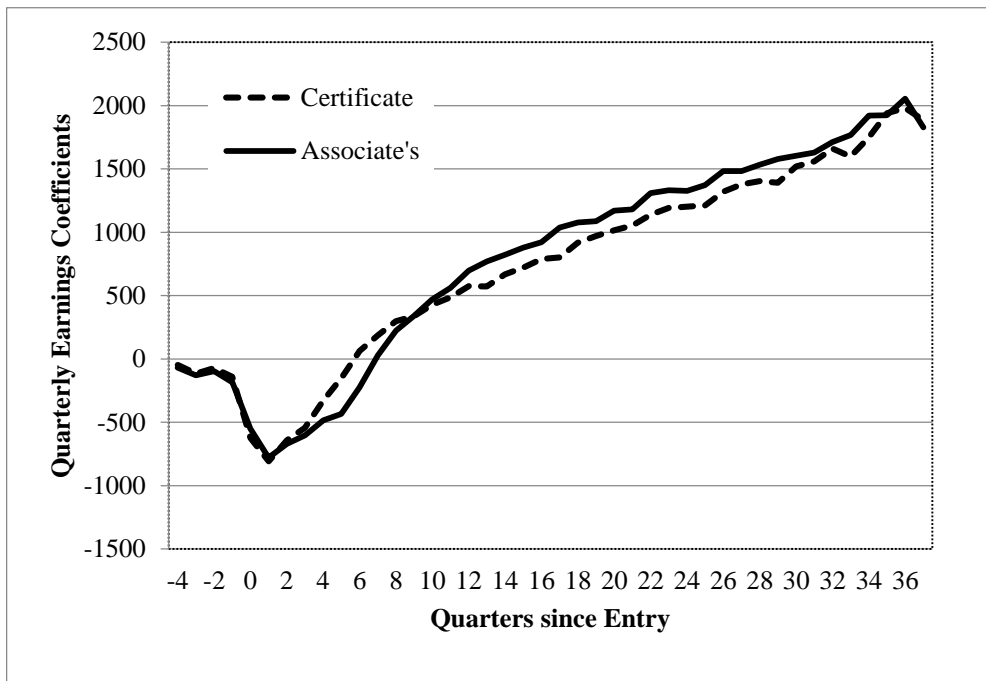
Appendix Figure 2a – Effect of Attendance on Log Earnings by Quarter and Program Type, Men

Appendix Figure 2b – Effect of Attendance on Log Earnings by Quarter and Program Type, Women
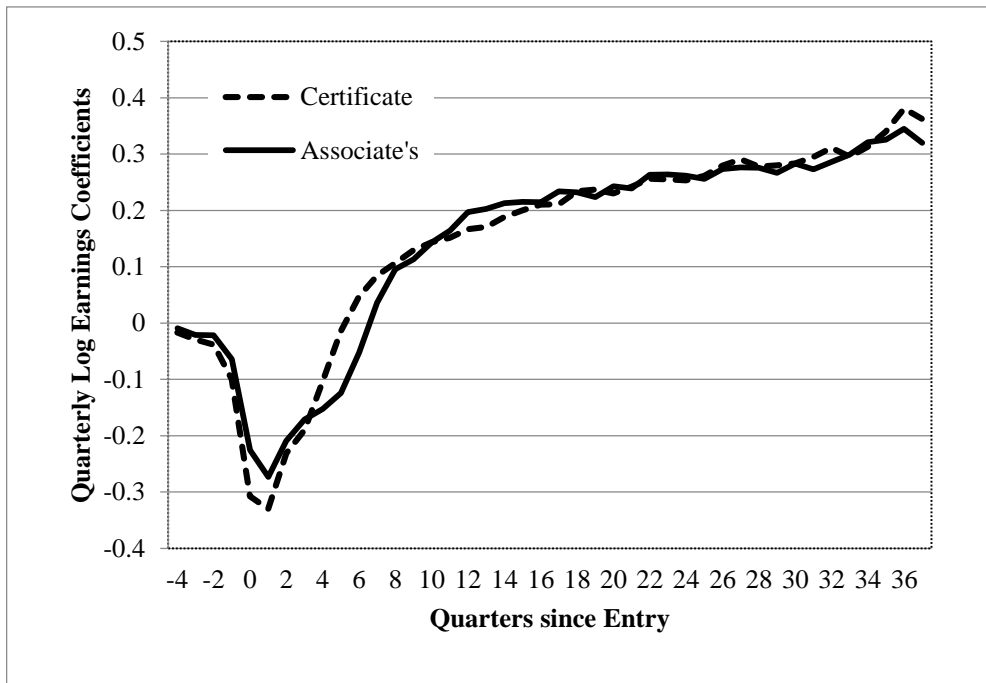
Appendix Table A1 – Effect of Proprietary School Attendance on Quarterly Earnings

	Men		Women	
	Coefficient	Std. Error	Coefficient	Std. Error
4 quarters prior to entry	-164.8	(38.5)	-37.8	(15.3)
3 quarters prior to entry	-186.6	(43.7)	-84.1	(18.0)
2 quarters prior to entry	-141.2	(58.7)	-69.1	(33.7)
1 quarter prior to entry	-310.1	(72.2)	-147.7	(28.7)
Quarter of entry	-752.9	(89.2)	-577.9	(26.9)
1 quarter after entry	-1177.6	(70.5)	-769.7	(26.0)
2 quarters after entry	-898.0	(67.6)	-639.5	(27.2)
3 quarters after entry	-635.8	(69.5)	-497.0	(29.6)
4 quarters after entry	-523.7	(76.7)	-260.9	(29.0)
5 quarters after entry	-446.8	(73.6)	-67.9	(29.8)
6 quarters after entry	-363.3	(75.4)	113.0	(31.4)
7 quarters after entry	-127.4	(81.0)	216.8	(32.7)
8 quarters after entry	-93.7	(82.3)	306.2	(34.7)
9 quarters after entry	-33.1	(82.2)	334.4	(35.9)
10 quarters after entry	66.0	(88.5)	387.1	(37.8)
11 quarters after entry	153.0	(94.0)	410.7	(39.8)
12 quarters after entry	247.9	(97.3)	451.9	(41.7)
13 quarters after entry	287.3	(99.6)	455.6	(43.8)
14 quarters after entry	344.9	(102.8)	503.8	(46.3)
15 quarters after entry	454.9	(106.3)	518.1	(48.3)
16 quarters after entry	471.8	(116.2)	553.4	(50.6)
17 quarters after entry	559.5	(114.0)	555.4	(52.8)
18 quarters after entry	636.8	(118.3)	612.7	(55.2)
19 quarters after entry	709.4	(120.4)	629.8	(57.8)
20 quarters after entry	690.4	(125.8)	641.3	(60.1)
21 quarters after entry	744.9	(133.8)	645.1	(63.1)
22 quarters after entry	767.1	(137.6)	694.8	(65.8)
23 quarters after entry	990.7	(176.8)	705.0	(68.3)
24 quarters after entry	873.0	(146.7)	704.6	(70.2)
25 quarters after entry	922.7	(151.0)	707.7	(72.7)
26 quarters after entry	1012.7	(161.1)	765.6	(76.0)
27 quarters after entry	1063.2	(171.1)	797.6	(78.8)
28 quarters after entry	1226.8	(205.4)	782.0	(81.8)
29 quarters after entry	1155.3	(187.0)	760.5	(84.5)
30 quarters after entry	1273.2	(197.0)	842.1	(90.0)

Appendix Table A1 (Cont'd) – Effect of Proprietary School Attendance on Quarterly Earnings

	Men		Women	
	Coefficient	Std. Error	Coefficient	Std. Error
31 quarters after entry	1248.5	(183.3)	839.5	(92.6)
32 quarters after entry	1270.4	(190.5)	886.0	(95.9)
33 quarters after entry	1354.3	(198.4)	844.2	(99.8)
34 quarters after entry	1312.7	(210.2)	925.0	(107.1)
35 quarters after entry	1491.6	(222.0)	1040.8	(115.8)
36 quarters after entry	1362.2	(234.1)	1077.8	(122.1)
37 quarters after entry	1262.3	(258.2)	947.6	(137.4)
Associate's*4 quarters prior	24.3	(44.4)	10.9	(27.7)
Associate's*3 quarters prior	33.2	(47.1)	16.5	(29.7)
Associate's*2 quarters prior	-63.9	(64.1)	24.4	(48.7)
Associate's*1 quarter prior	10.6	(77.4)	37.7	(43.8)
Associate's*quarter of entry	178.4	(93.1)	124.6	(42.7)
Associate's*1 quarter after	538.0	(67.4)	89.4	(36.4)
Associate's*2 quarters after	361.4	(62.2)	37.0	(36.8)
Associate's*3 quarters after	220.0	(65.0)	-58.8	(37.1)
Associate's*4 quarters after	138.9	(66.8)	-218.6	(37.7)
Associate's*5 quarters after	114.0	(58.7)	-336.3	(37.9)
Associate's*6 quarters after	138.5	(58.7)	-294.7	(35.7)
Associate's*7 quarters after	43.5	(67.2)	-135.0	(36.6)
Associate's*8 quarters after	176.8	(63.2)	-38.6	(37.5)
Associate's*9 quarters after	180.4	(59.3)	39.9	(37.9)
Associate's*10 quarters after	202.1	(62.7)	75.6	(39.0)
Associate's*11 quarters after	167.3	(63.5)	118.8	(39.5)
Associate's*12 quarters after	146.8	(63.8)	157.2	(40.2)
Associate's*13 quarters after	162.2	(64.1)	205.1	(41.6)
Associate's*14 quarters after	136.2	(65.1)	187.3	(41.0)
Associate's*15 quarters after	116.7	(66.6)	181.5	(41.5)
Associate's*16 quarters after	150.2	(72.9)	161.0	(41.8)
Associate's*17 quarters after	157.1	(66.1)	209.6	(42.6)
Associate's*18 quarters after	172.3	(68.2)	178.2	(43.1)
Associate's*19 quarters after	138.9	(77.3)	154.5	(43.5)
Associate's*20 quarters after	209.4	(69.8)	180.0	(44.4)
Associate's*21 quarters after	149.9	(72.6)	169.6	(45.8)
Associate's*22 quarters after	206.9	(77.7)	169.2	(47.0)
Associate's*23 quarters after	48.6	(121.3)	165.2	(47.7)

Appendix Table A1 (Cont'd) – Effect of Proprietary School Attendance on Quarterly Earnings

	Men		Women	
	Coefficient	Std. Error	Coefficient	Std. Error
Associate's*24 quarters after	137.6	(80.1)	148.3	(48.9)
Associate's*25 quarters after	70.5	(82.0)	153.9	(50.8)
Associate's*26 quarters after	101.3	(96.4)	166.4	(54.0)
Associate's*27 quarters after	125.7	(101.3)	130.1	(54.5)
Associate's*28 quarters after	-62.0	(136.8)	166.5	(58.2)
Associate's*29 quarters after	67.8	(118.1)	204.4	(59.6)
Associate's*30 quarters after	63.9	(128.9)	110.1	(63.8)
Associate's*31 quarters after	103.6	(115.3)	146.3	(66.1)
Associate's*32 quarters after	111.8	(124.2)	123.2	(72.8)
Associate's*33 quarters after	63.0	(135.4)	182.4	(76.7)
Associate's*34 quarters after	226.1	(161.5)	160.3	(87.3)
Associate's*35 quarters after	172.5	(171.4)	58.6	(97.2)
Associate's*36 quarters after	225.4	(206.3)	59.0	(118.4)
Associate's*37 quarters after	211.4	(262.5)	115.8	(154.5)
Age	736.9	(71.3)	495.2	(40.2)
Age squared	-15.0	(2.0)	-9.8	(1.1)
Age cubed	0.06	(0.02)	0.05	(0.01)
N	1,421,601		1,862,150	
Adj R-squared	0.019		0.046	

Notes: Standard errors are clustered at the individual level. In addition to the variables shown, all models also contain controls for person and calendar quarter fixed effects.