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College competition: The effects of the expansion of for-profit colleges on student enrollments and outcomes at public community colleges

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A Thesis Presented to the Faculty
of the Graduate School of Education of Harvard University in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

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This thesis is dedicated to Susan, Peter and Sarah Soliz, who have always left me free to dance to my own tune. I love you all so much.

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Table of Contents

Abstract

Community colleges enrolled 37 percent of students attending Title IV-eligible, degree-granting institutions in 2000, but by 2012, this had dropped to 33 percent (National Center for Education Statistics (NCES), 2013). At least some of this decline is hypothesized to be due to the rise of for-profit institutions, which enrolled approximately 9 percent of students in 2012, as compared to only 3 percent in 2000 (NCES, 2013). The decline in the share of undergraduate enrollment at public community colleges combined with the increasing share enrolled in for-profit colleges suggests that for-profit and public community colleges may compete for some of the same students, and several studies support this conjecture (Rosenbaum, Deil-Amen and Person, 2006; Cellini, 2009; Iloh and Tierney, 2014).

This study is the first large-scale examination of the impact of for-profit colleges on the enrollment and outcomes of students at other postsecondary institutions. I make use of data from the Integrated Postsecondary Education Data System merged with data from the Census, American Community Survey, Bureau of Labor Market Statistics and Grapevine Survey. In the first part of this study, using an event study model in which I interact year with the distance to the nearest newly-opened degree-granting, for-profit college, I estimate the effect of a new for-profit institution opening on community college enrollments and degree completions. In the second part of this study, I estimate the effect of having a new for-profit college open on county education levels. My results suggest that community college enrollments and degree completions do not decline when a new degree-granting for-profit college opens nearby, and these zeros are precisely estimated. Furthermore, I find evidence that the county-level production of short- and long-term

certificates increases after a new for-profit college opens, though the number of associate's degrees does not increase. This evidence should serve to broaden conversations about the role of for-profit colleges in the larger landscape of the American higher education system.

Introduction

In an address to Congress on February 24, 2009, President Obama called for every American to complete at least one year of higher education. Most of the population will rely on public two-year institutions (i.e. community colleges) to reach this goal. However, while community colleges enrolled 37 percent of students attending Title IV eligible, degree-granting institutions in 2000, by 2012, this had dropped to 33 percent (National Center for Education Statistics (NCES), 2013). At least some of this decline is hypothesized to be due to the rise of for-profit institutions, which enrolled approximately 9 percent of students in 2012, as compared to 3 percent in 2000 (NCES, 2013). These trends suggest that for-profit colleges and public community colleges may compete for some of the same students (Rosenbaum, Deil-Amen and Person, 2006; Cellini, 2009; Iloh and Tierney, 2014). If these two types of institutions compete for students, then shifting enrollment patterns towards for-profit colleges may increase overall student debt levels since these students could have attended a public community college more cheaply. Alternatively, for-profit colleges may increase access to higher education for students who would not otherwise enroll by providing a feasible college option. This study explores this policy puzzle: do for-profit colleges increase access to higher education or simply enroll students who would otherwise attend a public community college?

Though a handful of studies have provided some evidence that students may view public community colleges and two and four-year for-profit colleges as interchangeable (Ordovensky, 1995; Turner, 2003; Cellini, 2009; Chung, 2012; Iloh and Tierney, 2014), this study will be the first to explore this with a large, national sample of institutions. In addition, previous quantitative studies exploring competition between for-profit and

community colleges have not used the most recent data. This is the only study exploring this question during the expansion of the for-profit colleges between 2000 and 2012. Finally, though previous studies have examined enrollment trends at two-year public and for-profit colleges, to my knowledge, no study has analyzed the broader question of whether the growth of the for-profit colleges has affected enrollment at other types of postsecondary institutions or the production of certificates and degrees in the counties where they have opened.

This study has three goals. The first is to understand whether public two-year and for-profit colleges compete for the same students, by examining how enrollments and program awards at public two-year institutions are affected by the opening of a new for-profit college nearby. If public two-year institutions and for-profit institutions compete for some of the same students, then enrollments and program awards should decline at public community colleges after a new for-profit institution opens nearby. I also investigate the impact of for-profit colleges on not-for-profit, private two-year colleges. The second goal is to understand whether any enrollment shifts are localized within particular subgroups of students, or within particular program strands, such as those more focused on careers in health, business and computers. A larger proportion of the students enrolled in for-profit colleges are ethnic minorities or of non-traditional age, compared to public community colleges. Moreover, for-profit colleges tend to offer credentials in rapidly expanding industries such as information technology and business (Deming, Goldin and Katz, 2012). The final goal of this study is to determine whether the expansion of the for-profit colleges between 2000 and 2012 increased the overall education levels of the populations in communities where they opened. For-profit

colleges may provide access to higher education for students who wouldn't otherwise attend. If this is the case then the number of people earning postsecondary credentials in a county could increase after a new for-profit college opens.

In this paper I make use of an event study model in order to explore how new for-profit colleges opening between 2001 and 2012 affected enrollments and program awards at public community colleges. I find that having a new degree-granting for-profit college open nearby does not affect enrollments at public community colleges, on average. Looking at specific subgroups, I find that having a new degree-granting for-profit college open does not affect the enrollment of students of color or older students. These results differ from Cellini (2009) who finds some evidence that enrollment at community colleges increases when for-profit colleges leave the market. However, Cellini (2009) makes use of data from a single state (California) between 1995 and 2003. Though I find that community colleges across the United States do not lose enrollment to new for-profit colleges, on average, these results could mask heterogeneity by region. Finally, in Cellini (2009), enrollment shifts are the result of changes in funding for community colleges, not only changes in the availability of for-profit college education as in my study.

I also examine certificate and associate's degree production in health, business, computers, education and service-related fields. Having a new for-profit college open nearby does not affect the production of associate's degrees, but I find that there are small declines in the number of certificates awarded in health-related fields at public community colleges two years after a new for-profit institution opens nearby.

I also explore how having a new for-profit college open nearby affects enrollments at private, non-profit two-year institutions. I hypothesize that the for-profit

colleges are more of a competitive threat to private, non-profit two-year institutions than they are to public community colleges. For-profit institutions and private, non-profit two-year institutions have more similar tuition levels than for-profit colleges and public community colleges, as well as offering more of the same types of programs. I find that the enrollment of males and students over the age of 25 declines at private, non-profit two-year colleges when a new for-profit college opens nearby, but other groups appear to be unaffected.

My results suggest that for-profit colleges do not only enroll students who would have otherwise attended a public community college. If this is the case, then, after a new for-profit college opens, the overall number of degrees produced in a county could increase, depending on the quality of the for-profit institution. In the final part of this paper, I examine how the number of certificates and associate's degrees produced in a county is affected by a new for-profit college opening. I find that the number of certificates produced in a county increases after a new for-profit college opens, though there is no impact on associate's degrees. This suggests that marginal increases in completion at for-profit colleges are concentrated in credentials that take fewer than two years to complete.

The rest of this paper proceeds as follows. Section II reviews the literature. Section III describes the data, sample and empirical strategy. I describe my results for community college enrollments in section IV. Section V describes the results for degree completion outcomes. In Section VI, I describe the sample, empirical strategy and results for estimating the effect of for-profit colleges on county education levels. Section VII discusses my findings and concludes.

II. Literature Review

Comparing for-profit and community colleges

Some students may view for-profit and community colleges as interchangeable because they offer some similar programs, however they are very different institutions. Public community colleges are typically open-access, two-year institutions with multiple missions. On the one hand, they award terminal degrees such as certificates and associate's degrees, but some students also enroll in public community colleges with the goal of completing general requirements before transferring to a four-year institution. The curriculum at community colleges typically includes both job-training and academic components. In 2010 public community colleges enrolled 40 percent of undergraduates in the United States (NCES, 2011). Though large for-profit college chains, which offer some online degree programs, such as the University of Phoenix, are among the largest institutions of higher education in the U.S., on average, individual for-profit institutions are much smaller than public two-year institutions. In 2012, the average enrollment at brick and mortar for-profit colleges was approximately 333 students (median = 163.5), while the average enrollment at public community colleges was approximately 6671 students (median = 4191) (tabulation using IPEDS). For-profit institutions also enroll a larger proportion of females, minority students and students over the age of 25 than public community colleges (Rosenbaum, Deil-Amen, and Person, 2006; Chung, 2009; Deming, Goldin and Katz, 2012). In 2011, 44 percent of undergraduate students at for-profit colleges were African-American or Hispanic, compared to 34 percent at community colleges, and, while 13 percent of community college undergraduates were

between the ages of 25 and 29, 21 percent of students at for-profit colleges were (NCES, 2012).

For-profit institutions tend to hire professionals as adjuncts to teach their classes and open in office buildings or shopping centers in order to avoid the costs and bureaucracy associated with faculty and facilities faced by other types of institutions, including public community colleges (Breneman, 2006). For-profit colleges develop curricular materials centrally so that courses and programs can be easily replicated in new locations (Bailey, Badway, and Gumport, 2001; Breneman, 2006; Hentschke, 2010). In contrast, in public community colleges, faculty develop their own course materials and new programs often have to go through a lengthy approval process with the state's higher education governance structure (Rosenbaum, Deil-Amen and Person, 2006).

The flexible business model of for-profit institutions leaves them freer than community colleges to respond to local labor market conditions and student demand. For-profit colleges may attract students by offering programs that are more directly tied to local employment demands than those at community colleges (Breneman, 2006; Gilpin, Saunders and Stoddard, 2015). Moreover, students may choose to enroll in for-profit institutions because capacity constraints at community colleges could prevent them from accessing the courses in which they need or want to enroll (Iloh and Tierney, 2014). Almost 20 percent of respondents to a survey of the National Council of State Directors of Community Colleges (NCSDCC) reported incapacity to serve current and projected student enrollments in 2013 (Education Policy Center, 2013).

It has also been documented that some for-profit colleges offer flexibility and services not provided by many community colleges (Bailey, Badway, and Gumport,

2001; Kirp, 2003; Breneman, 2006; Hentschke, 2010). Kirp (2003) describes the aggressive job placement services that DeVry offers in order to attract students. Breneman (2006), in a case study of the University of Phoenix, writes that branches of this school offer extensive academic support services, including tutorial services provided online and during the weekend. Hentschke (2010) explains that the for-profit colleges make use of a unique advising model that combines support navigating the financial aid process, planning one's course of study and overcoming academic issues.

Finally, because they do not have access to the same state subsidies for higher education, which allow public community colleges to charge students only a small percent of the total cost of their education, for-profit institutions charge higher tuitions than public community colleges. Charges for tuition, fees, room and board for undergraduates at two-year public institutions in 2009-2010 amounted to $8,088, whereas at for-profit institutions in the same year these charges amounted to $25,016 (NCES, 2012). In order to pay these higher costs, students make use of federal financial aid and for-profit colleges receive a disproportionate amount of federal aid dollars. In 2008-2009, 76 percent of all associate's degrees were awarded by public colleges, while 18 percent were awarded by for-profit colleges (College Board, 2011). However, though for-profit institutions produce a much smaller share of the total number of associate's degrees awarded than public community colleges, they receive a similar portion of total Pell grants and a much larger share of subsidized Stafford loans. In 2007-2008 public two-year institutions received 31 percent of Pell grants compared to 21 percent at for-profit colleges (College Board, 2011). Moreover, for-profit institutions received 21 percent of subsidized Stafford loans compared to 8 percent at public two-year colleges (College

Board, 2011). This distribution of federal financial aid dollars has drawn negative attention to for-profit colleges partly because students attending these schools are more likely to default on student loans than those attending public community colleges (Deming, Goldin and Katz, 2012).

Are for-profit and public community colleges substitutes?

Some early studies theorized about whether public community colleges and for-profit colleges could be substitutes, which draw their enrollees from the same pool of potential students (Bailey, Badway, and Gumport, 2001; Turner, 2006). On the one hand, these two types of institutions may not be substitutes because community colleges have multiple missions, including providing a gateway to four-year institutions by offering general education requirements at lower tuition levels than four-year, public institutions. Moreover, for-profit colleges cost much more than public community colleges. It is not clear that these institutions could draw in students who could otherwise go to public community colleges at a lower cost. Using Integrated Postsecondary Education Data System (IPEDS) data from 1992-1993 and 1997-1998, Bailey, Badway, and Gumport (2001) argue that the for-profit colleges do not pose a strong competitive threat to public community colleges because they enroll a much smaller share of students and charge much higher tuition levels. In their case study of a large, multi-branch for-profit institution and community colleges located near the for-profit's branches, Bailey, Badway, and Gumport (2001) find community college administrators report that nearby public four-year institutions pose the greatest competitive threat.

However, though public two-year and for-profit colleges might not be perfect substitutes, they may compete along some dimensions. Turner (2006) observes that for-

profit colleges are most likely to compete with the public sector for enrollment in programs that offer skills that are easy to observe and certify, such as business and allied health. Moreover, though for-profit colleges and community colleges may have very different sticker prices, for students comparing tuitions net of financial aid, the costs of these two types of institutions may seem more similar.

Despite the importance of understanding whether for-profit and public community colleges compete for the same students, there is little empirical evidence exploring this policy puzzle. Ordovensky (1995) uses data from the High School and Beyond Survey of 1980 to explore the effects of distance and cost on college choice. She finds that some students trade away from community colleges towards for-profit colleges when the cost of public institutions increases or when the for-profit institution is closer to the student's home. Using data on the distribution of Pell grant receipt, Turner (2003) shows that for-profit college enrollment increases when the cost of community college increases. Moreover, she finds that decreases in state appropriations to higher education are positively correlated with enrollment at for-profit colleges. Finally, Chung (2012), using data from the National Educational Longitudinal Survey of 1988 and the associated Post-secondary Education Transcript Study, also finds that characteristics of the higher education marketplace, including the density of surrounding for-profit institutions and the cost of community college are important predictors of for-profit college choice. These findings suggest that students may view these two types of institutions as interchangeable and decide which to attend based on contextual factors such as which is nearer and which seems to be the best deal financially. On the other hand, a student's socioeconomic background, and the degree to which their parents are involved in the college-going

process also affect the likelihood that a student will choose a for-profit college (Chung, 2012). This suggests that for-profit colleges may provide access to higher education for students who wouldn't otherwise enroll. However, given the recent expansion of the for-profit colleges, and the increase in online enrollment, the findings of these studies using older data may no longer be valid.

A recent qualitative study also offers mixed evidence as to whether for-profit colleges and community colleges are substitutes. Iloh and Tierney (2014) make use of surveys, focus groups and interviews to better understand how 137 students chose between enrolling in health-related programs at a for-profit or community college in California. Some students appear to view these institutions as substitutes, and they chose between them based on which offered the best service or price. Students who enrolled in the for-profit college report doing so because enrolling was easy and immediate (i.e. the for-profit college has good customer service), while community college students enrolled because of the low-cost. However, these authors also found that, for other students, the transfer mission of the community college makes it distinct from a for-profit institution.

Cellini (2009) offers the first causal evidence that for-profit colleges and community colleges compete for the same students. Using an administrative dataset including all postsecondary institutions in California from 1995 to 2003, she estimates off the discontinuity caused by votes on bond referenda, and finds that an increase in funding for community colleges reduces the number of for-profit colleges in the market. She also finds some evidence that this increase in funding increases enrollment at the public community college, though these estimates are not robust to different specifications.

Does it matter where students go?

It is only important to understand whether students view for-profit colleges and community colleges as substitutes if where students enroll affects their academic and labor-market success. On the one hand, there is some evidence that students who start at for-profit colleges are more likely to complete their degrees than students who start at public community colleges. In 2005, 58 percent of students at for-profit institutions completed degrees within 150 percent of normal time, compared to 21 percent at public community colleges (College Board, 2011).

Deming, Goldin and Katz (2012) use data from the 2004/2009 Beginning Postsecondary Survey and propensity-score matching methods to compare completion rates and employment outcomes for students enrolled in for-profit colleges to observationally similar peers enrolled in public community colleges. The authors find that students enrolled in certificate and associate's degree programs at for-profit colleges are more likely to complete their credentials than students at public community colleges. On the other hand, students at for-profit colleges are more likely to be unemployed six years after entering their programs (Deming, Goldin and Katz, 2012).

A recent study explores whether students who are employed after completing their credentials at for-profit colleges experience a financial return to their degrees. Cellini and Chaudhary (2014) make use of data from the National Longitudinal Survey of Youth (NLSY97) to estimate the returns to education for students enrolled in associate's degree programs at for-profit colleges, compared to high school students who never enrolled in any post-secondary education. The authors make use of a differences-in-differences model, controlling for individual fixed effects, to estimate returns for a sample of 388 for-profit college students, compared to 2303 individuals who only have

high school diplomas. They find that students enrolled in associate's degree programs at for-profit colleges experience a 10 percent return to their education. Because these students take, on average, 2.6 years to complete their degrees, the yearly return is estimated to be 4 percent, per year (Cellini and Chaudhary, 2014).

Jacobson, Lalonde and Sullivan (2005) estimate the returns to a public two-year education for displaced workers in Washington State using an individual fixed effects approach. This paper is estimating returns for a very specific population – displaced workers who return to community college for retraining. However, this population most likely overlaps with the population of students enrolling in for-profit colleges who are older than traditional college students and have probably been in the labor market before enrolling. In their preferred specification, the authors find that an additional year of community college for displaced workers yields a 9 percent increase in long-term earnings for men and a 13 percent increase for women.

Although there are returns to associate's degrees earned at for-profit colleges, relative to high school only, these returns are not as high as estimated returns to public two-year credentials (Jacobson, Lalonde and Sullivan, 2005; Cellini and Chaudhary, 2014). Moreover, in the context of a cost-benefit analysis, Cellini (2012) estimates that the return to for-profit education would have to be at least 8.5 percent, per year, in order to outweigh the costs to both students and society. The estimated yearly return to students enrolled in for-profit colleges is less than half of that (Cellini and Chaudhary, 2014).

Two additional studies take a different approach to assessing the labor-market value of credentials from for-profit colleges. A resume audit study by Deming,

Yuchtman, Abulafi, Goldin and Katz (2014) compares the number of call-backs received by applicants submitting fabricated resumes with credentials obtained from for-profit colleges to those obtained from resumes with credentials from public institutions. They also compare the value of credentials obtained from brick and mortar for-profit colleges to those obtained from online for-profit institutions. The authors find that, for health-related jobs that do not require a degree, resumes with certificates obtained from for-profit colleges are approximately 57 percent less likely to receive a call-back than resumes with certificates from public institutions. On the other hand, when the job requires an occupational license, the authors find no difference in call-back rates for credentials from for-profit versus public institutions (Deming, Yuchtman, Abulafi, Goldin and Katz, 2014).

A second resume audit study by Darolia, Koedel, Martorell, Wilson and Perez-Arce (2015) makes use of a sample of 9,000 resumes sent out in 7 large cities and finds some evidence that employers are more likely to call back applicants listing a credential from a public community college than applicants listing a credential from a for-profit college, though these estimates are not statistically significant. These authors also find that employers are not more likely to call back an applicant with a resume listing a credential from a for-profit college compared to one listing no credential at all (Darolia, Koedel, Martorell, Wilson and Perez-Arce, 2015).

Though more research is needed on the academic and labor-market outcomes of students attending for-profit and public two-year institutions, these studies suggest that choosing to obtain credentials from for-profit colleges, rather than public community colleges has a detrimental effect on students' labor-market outcomes.

The importance of distance

According to the classical model of the college enrollment decision, students choose to enroll in college if the long-run benefits outweigh the present costs. However, after deciding to enroll, a student has to decide where to enroll. The outcome of this decision is probably based on the relative importance of a number of factors including the types of programs offered at different institutions, the relative cost of different schools, and distance from the student's house to different possible schools. Several studies have demonstrated that distance from home to the nearest college or university affects the educational attainment and enrollment decisions of students (Anderson, Bowman, and Tinto 1972; Card, 1993; Rouse, 1995; Ordovensky, 1995; Long, 2004; Long and Kurlaender, 2009; Backes and Dunlop Velez, 2015). While the few students attending selective institutions travel to enroll in college, the majority of college students enroll in an institution that is close to home (Niu, 2014). In fact, the median distance from a student's home to the college where they enroll is 11 miles (NCES, 2013). Not only does the distance to the nearest college or university affect the likelihood that a student will enroll (Card, 1993; Rouse, 1995), the nearest school affects the type of institution that a student attends, with people who live near a two-year college more likely to attend a two-year college, and people who live near a four-year college more likely to attend a four-year college (Ordovensky, 1995; Backes and Dunlop Velez, 2015).

I make use of the distance between public community colleges and the nearest newly-opened, for-profit college as a measure of the "competitive threat" posed by a new for-profit institution. Because distance matters to students when they decide where to enroll, the distance between institutions may be a good indicator of how much they

compete with each other. If a new college opens near an already-established one, not only is it now visible and salient to students enrolled at the older school, perhaps leading some students to consider switching, it is also now in close proximity to students who were in close proximity to the already established institution.

III. Empirical Framework

Data and Sample

The data for this study comes from the Integrated Postsecondary Education Data System[1] (IPEDS) merged with data from the Census, the American Community Survey, the Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) and the Grapevine Survey[2] as well as data from Esri Business Analyst.[3] I make use of IPEDS data on institutional characteristics, enrollments and program completions. I use county-level population data from the Census, county-level population living in poverty and county-level African-American population from the American Community Survey, county-level unemployment rates from the LAUS and state-level per capita appropriations for higher education from the Grapevine Survey. Esri Business Analyst is

[1] IPEDS is a national survey of all Title IV-eligible colleges and universities. Schools are required to complete this survey in order to maintain Title IV eligibility.

[2] Since 1960, the Grapevine Survey, run out of the Center for the Study of Education Policy at Illinois State University, has asked states for data on tax appropriations to higher education. Since 2010, Grapevine has been a joint project of the Center for the Study of Education Policy and the State Higher Education Executive Officers (SHEEO) and survey has been consolidated with the State Higher Education Finance (SHEF) project run by SHEEO (http://education.illinoisstate.edu/grapevine/). Per capita state appropriations data were converted to constant 2012 dollars using conversion factors downloaded from (http://oregonstate.edu/cla/polisci/sahr/sahr).

[3] Esri is a technology company, which developed ArcGIS, software used for geographic analysis. The Business Analyst dataset combines business and geographic data, including a large library of geocodes for individual postal addresses.

used to obtain school geocodes not available in IPEDS.[4] Geocodes are used, in turn, to calculate distances between public community colleges and newly-opened, for-profit colleges. All distances are calculated using ArcGIS software.[5]

I make use of IPEDS data from 2001 to 2012, because this is the period during which the for-profit colleges experienced the most explosive growth. The years after 2000 also have the greatest data coverage in IPEDS. Because my analysis makes use of geographic markets, I limit my sample to community colleges within the continental United States. My rationale is that the geographies of both Hawaii and Alaska make them very different geographic markets than other states. 1237 Title-IV eligible, public community colleges appear in IPEDS in the sample years. Of these schools, 24 colleges have missing enrollment data that is not explained by the institution closing or combining with another institution. These schools were excluded from the sample. Appendix 1 lists these institutions as well as the unit ID and year of closure of community colleges that closed or combined with another institution between 2001 and 2012. My main sample consists of 1213 public community colleges. Observations are community college by year. Because some community colleges that were open in 2001 closed before 2012, there are not 12 years of data for every institution.

The distance between each public community college and the nearest new for-profit college to open within the sample years is key to my analysis. I primarily make use

[4] Geocodes only became available from IPEDS in 2009. For institutions that closed before 2009 or for institutions with missing geocodes, I looked up the address of the institution on the internet and used Esri to obtain the geocodes.

[5]Geocodes from IPEDS were imported into ArcGIS using the 1984 revision of the World Geodetic Coordinate System (WGS 84) and projected using the North America Lambert conformal conic projection.

of the distance between public community colleges and the nearest degree-granting[6] for-profit college, rather than the nearest for-profit college of any kind. I hypothesize that it is nearby degree-granting schools, rather than schools that are far away or that are exclusively offering more specific certification programs, such as beauty and truck-driving schools, which are potentially competing with public two-year colleges. However, when I explore the effect of having a new for-profit college open up nearby on certificates awarded at public community colleges, I make use of the distance between public two-year institutions and the nearest new for-profit institution of any kind. This is because the non-degree-granting for-profit colleges award certificates. Both two-year and four-year for-profit institutions are used when calculating distances because 35 percent of the degrees awarded by for-profit colleges offering degrees of four years or more in 2011-12 were associate's degrees (College Board, 2013). Finally, because my analysis focuses on geographic markets, I have to account for the fact that some for-profit colleges offer primarily online programs. Following Deming, Goldin and Katz (2012), an institution is coded as "online" if less than 80 percent of its enrollment comes from in-state or from a state bordering the institution's home state, or if "online" appears in the name of the school. These online schools were not used when calculating the distance between public community colleges and newly opened for-profit colleges.

Figures 1 and 2 display the location of the community colleges in the sample as well as the new for-profit colleges that were used to calculate the distances. These maps show that, while public community colleges are often scattered across states, in both rural and urban areas, new for-profit institutions open in urban areas. On the one hand, this

[6] "Degree-granting" for-profit colleges are defined as those whose highest degree offer is at least and associate degree.

suggests that there is variation in the distance measure. On the other hand, community colleges on both ends of the distance continuum are probably very different types of schools. The community colleges that are near new for-profit colleges are much more likely to be large, urban schools. A histogram of the distances (in miles) between the public community colleges in the sample and the nearest newly-opened, degree-granting for-profit college is displayed in Appendix 2.

The difference in the geographic distributions of community colleges and for-profit colleges can be explained by their differing motivations for opening. While for-profit institutions open where they will be able to enroll the most students and maximize their profits, public community colleges expanded in order to increase access to higher education (Brint and Karabel, 1989). Public community colleges began to expand rapidly after World War II in order to meet the labor force needs of an expanding economy as well as to respond to a growing belief that all Americans were owed access to higher education in the same way they had a right to secondary education (Brint and Karabel, 1989). In 1948 the Truman Commission recommended that access to grades 1 through 14 be made available to the whole population and explicitly recommended the expansion of public community colleges in local communities (Brint and Karabel, 1989). The development of new community colleges still appears to be driven by the needs of local communities. For example, a plan or proposal for a new community college in Ohio must include "a demonstration of needs and prospective enrollment" (Ohio Revised Code Title 33, Chapter 3354.07).

There are two main sets of outcomes in this analysis: enrollments and degree completions. The enrollment outcomes include total fall enrollment, full-time equivalent

enrollment,[7] enrollment of Black and Hispanic students, enrollment by gender, as well as students over the age of 25 and enrollment of degree-seeking students. Degree completion outcomes include short certificates (certificates of less than one year) and long certificates (certificates of at least one year but less than two years) as well as associate's degrees awarded in business, education, service, computers and health-related fields. IPEDS only requires that institutions report enrollments by age group in odd years. For institutions that had missing age-group enrollments in odd years, the previous year's data was carried forward. For institutions that closed or combined with another institution, enrollment data was missing for the year of and the year before the institution's change in status. These missing values were replaced with zeros.

Some public community colleges did not award any certificates and/or associate's degrees in one or more of the program types included in my analysis in the sample years. In this case, these institutions were assumed not to have those program types and they were excluded from the models with those outcomes. If an institution did not report awarding any degrees of a particular type, in a particular program, in a given year, but had degree awards of this type in other years, the program awards in missing years were assumed to be zero. Appendices 3 to 6 display the distributions of each of these outcome variables before and after they are log-transformed.

Empirical Strategy

In order to estimate the effect of competition with for-profit institutions on community college enrollments and program completions, I make use of variation in the competitive threat faced by public, two-year institutions arising from new for-profit

[7] Full-time equivalent enrollments are calculated using the formula suggested by IPEDS: FTE enrollment = full-time enrollment + (part-time enrollment*.335737)

colleges opening in the sample years. Table 1 displays the number of new for-profit colleges opening in each of the sample years. Over 100 new colleges opened in each year, and the largest growth occurred from 2009 to 2011. Because my main model makes use of a time trend variable that is zero the year a new for-profit college opens, and more new for-profit colleges opened in 2010 and 2011 than in earlier years, more data is being used to estimate trends before the new for-profit colleges opened than afterwards. A total of 1752 new for-profit colleges opened within the sample years, though not all of them end up being one of the nearest schools to the public community colleges in my sample.

As described in the literature review, it has been established that distance is an important predictor of community college student enrollment and persistence (Anderson, Bowman, and Tinto 1972; Rouse 1995; Ordovensky, 1995; Long, 2004; Long and Kurlaender, 2009). It is plausible that when a new for-profit college opens near a public community college, putting it at a similar distance as the public institution for many students, it may offer a tempting alternative for those who see the two types of institutions as substitutes. In order to estimate the effect of the competitive threat arising from newly-opened, for-profit colleges on community college enrollments, I make use of the distance between public two-year institutions and the nearest new degree-granting for-profit institution to open within my sample years. I estimate the following model,

(1) $\log(y)_{ijt} = \beta_0 + \sum_{t=-4}^{4} \beta_t (year_t * \log(distance))_{ijt} + \beta_9 log(distance)_{ijt} + \beta_{10}(Z)_{jt} + \lambda_i + \gamma_j + \delta_t + \epsilon_{ijt}$

in which y are outcomes for public community college i, in state j in year t. My outcomes include total fall enrollment, full-time equivalent (FTE) enrollment, as well as

the enrollment of African-American students, Hispanic students, Females, Males, degree-seeking students and students over the age of 25. "Year" variables are binary variables specific to each community college: $year_{-4}$ is the year four years before a new degree-granting for-profit college opened nearby, $year_{-3}$ is the year three years before a new degree-granting for-profit college opened nearby, etc., up to $year_4$ which is the year four years after the new for-profit college opened. Given that I have an unbalanced panel in which the number of years before and after a new for-profit institution opens varies across community colleges, my empirical strategy involves a trade-off between using the maximum number of colleges to contribute to my estimation strategy, which implies using fewer years, versus using more years, and having fewer schools contributing to estimation.

I include interactions with dummies for four years before and after the new for-profit college opens because it is these years that have the greatest data coverage. Appendix 7 displays the number of observations in each year, for the year variable which is zero in the year the nearest new for-profit college first appears in the data. Appendix 8 displays the number of community college observations in each calendar year as well as the distribution of calendar years for observations before and after the new for-profit college opened nearby. Year 0 is the year a new degree-granting, for-profit opened nearby. "Distance" is the number of miles between a public community college and the nearest new degree-granting for-profit college to open within the sample years. I use log transformations of both my outcome variables and the distance measure because these variables are not normally distributed and data exploration suggested that their relationship is not linear.

I calculate 1.10^{β} using the coefficients on the distance*year interactions. I interpret the result as the effect of a 10 percent change in distance, in a given year, on the outcome variable. In order to interpret the coefficient on the interaction as the effect of having a new for-profit college open nearer to the community college, the sign on the coefficient has to be reversed. γ are state fixed effects and δ are year fixed effects. State fixed effects control for non time-varying differences across states and year fixed effects control for any policy changes or other shocks in the four years before and after a new for-profit college opened, which may have affected community college enrollments or program awards. Standard errors are clustered by state in order to account for the fact that the errors on individual institutions within the same state may be correlated. Sample sizes vary across subgroups because some colleges have zero enrollment of, for example, Hispanic students, and when I log-transform the outcome variables, these zeros drop out.

As stated above, Turner (2006) hypothesizes that, while community and for-profit colleges may not be complete substitutes, they are likely to compete for enrollment in programs such as allied health, which teach easily certifiable skills. In order to explore this hypothesis, I also run my model on a second set of outcomes: associate's degrees, short certificates and long certificates awarded in health, business, education, service and computer-related fields.

I am estimating off of variation in the timing and location of new for-profit colleges opening. However, it is possible that the location of a new for-profit college is determined by factors that may also affect community college enrollments, in other words, that where and when a new for-profit college chooses to open is not exogenous. For example, the cost of a particular community college or the local unemployment rate

may affect both where a new degree-granting for-profit college chooses to open and community college enrollments. In an effort to overcome this problem, I control for a vector of county and institution-level covariates ("Z") including population, population living in poverty, population age 20 to 29, unemployment rate, state appropriations to higher education, and community college tuition. In addition, my preferred specification includes fixed effects for college, λ. By including college fixed effects, I no longer rely on the assumption that the location of newly opened for-profit colleges is exogenous, only that when they open is at least partly exogenous. This may also be problematic if, as is suggested by Table 1, the timing of new for-profit colleges opening is as strategic as where they open. Many more colleges opened in 2009, 2010 and 2011 than in previous years, perhaps in order to take advantage of effects of the Great Recession, such as rising college enrollment rates due to higher unemployment (Barr and Turner, 2013). If the timing of new for-profit colleges opening was affected by the Great Recession, this would make me less likely to observe a decrease in enrollment at public community colleges due to new for-profit colleges opening, because enrollment rose across sectors during this period. In my preferred specification, which includes college fixed effects, I am estimating off of variation in the timing of new for-profit colleges opening.

My results will be biased if the covariates and fixed effects do not fully control for factors affecting both where a new for-profit college opens and enrollments and program completions at nearby community colleges. For example, if a new for-profit college that opens near a public community college strategically offers program types not offered by the nearby community college, then my estimates will be biased upwards. In other words, I would not find a decline in community college enrollments and program

awards, even though, if these two types of colleges offered the same program types, some students may see them as substitutes.

Table 2 compares community colleges for which the distance to the nearest new degree-granting for-profit college is above or below the sample average. These descriptive statistics quantify what can be observed in the maps in Figures 1 and 2: new for-profit colleges open in urban areas. Community colleges nearer new for-profit colleges have larger enrollments, on average, and larger numbers of African-American, Hispanic and non-traditional students. For example, average enrollment at public two-year colleges with a new for-profit institution opening at a distance below the sample average is 6741 students, compared to 3057 students at community colleges farther than average from a new for-profit college. These colleges are also located in counties with larger populations and slightly lower unemployment rates. The average county-level population of community colleges near a new degree-granting for-profit institution is 1,000,000, compared to approximately 120,000 in counties with community colleges farther away from new for-profit colleges. On the other hand, public two-year colleges with nearer new for-profit colleges are located in states with slightly lower per capita state appropriations to higher education. Community college tuition levels in both groups of schools are very similar.

In order to further explore the potential effects of these differences on my estimates, I run my model using county-level population, population age 20 to 29, unemployment rate, population living in poverty, community college tuition, African-American population and state appropriations as outcomes. Table 3 displays these estimates. Models 1, 3 and 5 suggest that community colleges with new for-profit

colleges opening nearer experience statistically significant increases in population, population age 20 to 29 and population living in poverty in the years after the new college opens. If these trends are driving my results, then I would expect to see community college enrollments increasing after a new for-profit college opens.

If any effects on community college enrollments and degree-completion outcomes in the years after the new for-profit college opens are due to competition from the for-profit institution, rather than secular trends, then I would expect there to be no effects in the years before the new school opens. Equation 1 allows me to test this assumption. If trends in community college enrollments and program completions are equivalent for schools that have a new degree-granting for-profit college open up nearby and for those that have a new degree-granting for-profit institution open up far away, then there should be no statistically significant effect on my outcomes of the interaction of log(distance) and years -4, -3, -2 and -1. Table 4 displays the estimated effects of having a new degree-granting for-profit college open nearby on community college enrollments four years before, as well as four years after, the new for-profit institution appears in IPEDS. The coefficients on the interactions of log(distance) and years -4, -3, -2 and -1 are close to zero and not statistically significant for any of the enrollment outcomes. This supports my hypothesis that there is no difference in enrollment trends before a new for-profit college opens for public community colleges with new schools opening nearby versus far away. These coefficients suggest that my models meet the assumption that outcome trends for community colleges with a new for-profit college opening near versus far away are equivalent before the new for-profit institution opens.

IV. The Impact of a New For-Profit College on Nearby Community College Enrollments

It is unclear whether year zero- the year the new for-profit college first appears in IPEDS- should be considered a year in which the new school is potentially competing with the nearby public community college. On average, the non degree-granting for-profit colleges opening in my sample years already have 232 students enrolled the first year they appear in IPEDS. New degree-granting for-profit colleges already have 399 students enrolled, on average, in the first year they appear in IPEDS. This suggests that year zero should be considered a year in which the new for-profit institution could already potentially be competing with the nearby community college.

I examine the effect of having a new degree-granting for-profit college open on both total enrollment at public community colleges as well as the enrollment of students in several subgroups. Some groups of students may be more likely than others to enroll in a for-profit rather than a community college. In 2010, while only approximately 10 percent of total fall enrollment was in for-profit institutions, approximately 19 percent of African-American students were enrolled in for-profit colleges as well as approximately 11 percent of Hispanic students (NCES, 2011).

In order to observe the overall trends in community college enrollments, I regressed the enrollment outcomes on the year fixed effects included in equation 1 as well as county-level covariates and state fixed effects. Figure 3 displays the coefficients on the year fixed effects from these models. Total fall enrollment, full-time equivalent enrollment, the enrollment of men and women, degree-seeking student enrollment and the enrollment of students over the age of 25 are clearly increasing over this period. On

the other hand, the enrollment of African-American and Hispanic students remains fairly stagnant.

In all of the main tables, the first model does not include college fixed effects but the second model does. Table 4 displays the estimated effect of having a new degree-granting, for-profit college open up nearby on total enrollment at public community colleges as well as the enrollment of students from ethnic subgroups. Models 1 and 2 display the effects of a new degree-granting for-profit college opening up nearby on total fall enrollment, while Models 3 and 4 display the effects on Full-Time Equivalent (FTE) enrollment. Models 5 and 6 display the effects on the enrollment of African-American students and, finally, models 7 and 8 display the effects on the enrollment of Hispanic students. All models include main effects for log(distance) as well as year fixed effects, and all models control for county and state-level covariates. Because I have regressed log enrollments on the interaction of log distance and year dummy variables, I can interpret the coefficients as elasticities.[8] For example, in model 1, the coefficient on the interaction of distance with year 0 is 0.00699. This suggest that a ten percent increase in the distance between a community college and the nearest, newly-opened for-profit college in year 0 results in a 0.07 percent increase in total enrollment at the public community college.[9] The coefficients on the interactions in the models with and without college fixed effects are very similar. As stated above, my preferred specification includes college fixed effects (models 2, 4, 6 and 8) because this specification does not rely on the assumption that where a new for-profit college opens is random. In all cases, the coefficients on the interactions of distance with the years after the new for-profit

[8] I calculate elasticities using $1.01\hat{}\beta$, where β is the coefficient on one of the (log(distance) X Year) terms.

[9] $1.10^{0.00699} = 1.00066$

college has opened are zero, and these estimates are precise. Model 2 displays the estimates of the effect of having a new for-profit college open nearby on total enrollments at public community colleges. The standard errors on the coefficients on the interactions for the years after the new for-profit college has opened range from 0.0068 to 0.0117. In order for a 10 percent decline in the distance between a public community college and the nearest, newly-opened for-profit college to cause a 1 percent decline in community college enrollments, the coefficient on the interaction would have to be close to 0.1000. Given the standard errors on the coefficients in model 2, this estimate would be statistically significant.

Table 5 displays the effects of having a new degree-granting for-profit college open up nearby on the enrollment of additional subgroups including students over the age of 25, degree-seeking students and gender subgroups. In general these estimates tell the same story as that told for total enrollment. Having a new degree-granting for-profit college open nearby has no effect on the enrollment of these subgroups at public community colleges, and these zeros are precisely estimated. There is one exception to this story. Model 4 shows the effect of having a new degree-granting for-profit college open nearby on the enrollment of degree-seeking students at community colleges. A reduction in the distance between the public community college and the nearest newly-opened for-profit college is associated with a small increase in the number of degree-seeking students enrolling at the public community college in years 2 through 4. For example, in year 2, a 10 percent reduction in the distance between to the nearest newly opened for-profit college is associated with a 0.12 percent increase in the number of degree-seeking students enrolled. This is not surprising given that, on average,

community colleges enroll a larger portion of students pursuing associate degrees ("degree-seeking" students) than for-profit colleges. In 2011, 76 percent of students seeking associate's degrees were enrolled in community colleges, while only 10 percent of associate degree seekers were enrolled in for-profit colleges (NCES, 2012).

Enrollment Shifts Due to For-Profit College Chains

The explosive growth in for-profit college enrollment between 2000 and 2010 was largely due to enrollment in large chain for-profit colleges (Deming, Goldin and Katz, 2012). It is possible that any competitive threat to community colleges comes largely from these institutions. They spend large amounts of their budget on advertising and recruitment (Deming, Goldin and Katz, 2012), and, as a result, are probably the most salient to students making decisions about where to attend. In addition, the effect of these institutions on students' decision-making process probably has the greatest policy relevance. It is these institutions whose predatory practices have made headlines and mobilized the policy community against them.

In order to explore the question of whether newly-opened branches of for-profit college chains affect community college enrollments differently than all newly-opened, degree-granting for-profit institutions, I reran my model using community college for which the nearest newly-opened for-profit college was part of a chain.[10] Tables 6 and 7 display the effects of having a new branch of a chain for-profit college open up nearby on community college enrollments. Consistent with the results using all newly-opened for-profit colleges, having a new branch of a chain open has no effect on total or subgroup enrollments at nearby public community colleges.

[10] Following Deming, Goldin and Katz (2012), I coded a new for-profit as a chain if it operated in more than one state or had more than five branches in a single state.

Specification Check

The effect on enrollments of a new for-profit opening near a public community college may depend on the number of for-profit colleges already operating in the region. A new for-profit college that opens in a region where few for-profit institutions are already operating may have more of an effect on the enrollment at a nearby public community college than a new school opening in an area where there are already several for-profit colleges. In order to explore whether the surrounding density of already existing for profit colleges is an important factor determining the effect of having a new for-profit open up nearby on community college enrollment, I ran the enrollment models controlling for enrollment in already-existing for-profit colleges, counted at the city, county and state level. Table 8 displays these estimates. Models 1 and 2 control for for-profit college enrollment calculated at the state level, without and with college fixed effects. Models 3 and 4 control for enrollment in already-existing for-profit colleges calculated at the county level, and models 5 and 6 control for for-profit college enrollment calculated at the city level. Comparing the coefficients of interest in these models to the coefficients displayed in Table 4 suggests that controlling for the density of surrounding for-profit colleges does not change the effect of having a new degree-granting for-profit institution open on public community college enrollments.

Falsification Test

The results above suggest that, on average, public community colleges do not lose enrollment to for-profit colleges when a new degree-granting for-profit institution moves in nearby. Students may not see community and for-profit colleges as interchangeable because, though there is some program overlap, most community colleges offer a much

more diverse set of programs than for-profit institutions. In addition, for-profit colleges charge much higher tuition levels than community colleges. In my sample, the mean, reported for-profit college tuition is $13,492 (median = $12,967) compared to mean tuition costs at public community colleges of $2,390 (median = $2,390).

Though it is not clear whether community and for-profit colleges compete for the same students, it seems likely that private, non-profit, two-year colleges would compete with for-profit colleges for the same students. The average tuition charged by the private, non-profit, two-year colleges in my sample is $8,743 (median = $8,088). This is much closer to the tuition charged by for-profit institutions than community college tuition levels are. Moreover, many of the private, non-profit, two-year colleges in my sample are professional schools, similar to the for-profit institutions. There are 301 private, non-profit, two-year colleges in my sample, 125 of which I exclude because they have missing geocodes. Of the remaining 176 colleges, 81 have the words "nursing" or "radiologic technology" in the institution's name. An additional 7 schools are described as technical colleges or institutes of technology.

If private, non-profit, two-year colleges are more likely than public two-year institutions to compete with nearby, newly-opened for-profit institutions, then running equation 1 with outcomes at private, non-profit, two-year colleges provides a test of my empirical strategy. Table 9 displays the estimates of the effect of having a new degree-granting for-profit college open up nearby on enrollments at private, non-profit two-year colleges. All of the models in Table 9 make use of my preferred specification, which includes college fixed effects. The sample size varies by subgroup because the dependent variables are log-transformed and the zeros drop out. Model 1 shows the effect of having

a new degree-granting for-profit college open on total enrollment. In years zero to three, the coefficients suggest that a one percent increase in the distance from the private, non-profit two-year college to the nearest newly-opened degree-granting for-profit institution has no effect on total enrollment at the non-profit college. The coefficient on the interaction of year and distance in year 3 suggests that a 10 percent reduction in the distance between the private non-profit, two-year college and the nearest newly-opened, degree-granting for-profit institution is associated with an approximately 0.68 percent decline in total enrollment, on average, across non-profit private two-year colleges. This very small reduction in enrollment is statistically significant.

Model 5 shows the estimated effect of having a new degree-granting for-profit college open on the enrollment of students over the age of 25 at private, non-profit two-year colleges and model 7 shows the estimates for the enrollment of men. The estimates for both of these two subgroups suggest a small, negative but statistically significant effect on enrollment of having a new degree-granting for-profit college open nearby and this effect is fairly consistent in the years after the new school has opened. The coefficients on the interaction of time and distance suggest that a change in the distance between a private, non-profit two-year college has no effect on the enrollment of students over the age of 25 until the year after the new for-profit college has opened. In the year after the new for-profit college has opened, a 10 percent reduction in the distance between the non-profit two-year college and the new for-profit institution is associated with a 0.65 percent decline in the enrollment of students over the age of 25, and this change is statistically significant. In the second year after the new for-profit college has opened, a 10 percent reduction in distance is associated with a 0.39 percent reduction in

enrollment. In year 3, there is a 0.83 percent reduction in enrollment, and this number is 0.62 percent in the fourth year after the new for-profit college has opened. As explained above, I would expect for-profit colleges to be more of a competitive threat to private, non-profit two-year colleges than to public community colleges because private, non-profit two-year institutions charge more similar tuition levels and offer more similar programs. Though the effects on enrollment are small, the coefficients in the models using enrollment at private, non-profit two-year colleges as the outcome suggest these two types of institutions compete for the same students.

While I hypothesize that enrollment at private, non-profit two-year colleges may be more affected by having a new for-profit institution open up nearby, I would expect a nearby for-profit college to have no effect on enrollments at a private, non-profit four-year institutions. The majority of private, non-profit four-year colleges are not open admission. Moreover, they do not tend to focus their curricula around work-force education the way for-profit colleges do. Table 10 displays estimates of the effect of having a new degree-granting for-profit college open nearby on enrollments at private, non-profit four-year colleges. Having a new degree-granting for-profit institution open nearby has no effect on total enrollment or the enrollment of subgroups except for African-American and Hispanic students. Moreover, these zeros are precise. In the case of African-American and Hispanic students, there are small, statistically significant declines in enrollment after a new degree-granting for-profit college opens, however there are also statistically significant declines in the enrollment of these subgroups the year before the new for-profit school opens. This suggests that these declines are a secular trend and not associated with having a new for-profit institution open up nearby.

V. The Impact of Opening a For-Profit College Nearby on Community College Degree Completions

In order to better understand any underlying mechanism driving competition between for-profit and public community colleges, what I would like to know is how competition with for-profit institutions affects community college enrollment in particular program strands. This would allow me to test Turner's (2006) hypothesis that for-profit and community colleges compete mainly within particular program strands, such as allied health, that offer easily certifiable skills. Unfortunately, IPEDS does not collect data on enrollments by program, only completions by program. Therefore the closest I can come to estimating the effect of having a new for-profit college open up nearby on enrollment in particular community college programs is to estimate the effect of the new for-profit institution opening on program completions. However, because many students, particularly at community colleges, enroll in a program without completing it, the program completions variables are a far from perfect proxy for program enrollments. Among the 2005 cohort of first-time, full-time degree-seeking students at public community colleges, only 21 percent completed their associate's degrees or certificates within 150 percent of normal time (College Board, 2011).

Table 11 shows that there is program overlap between the community and for-profit colleges in the sample. Column 1 displays the number of community colleges that awarded short certificates, long certificates, and associate's degrees in computers, service, health, business and education, respectively. The second column displays these counts for all for-profit institutions in the data in the sample years and the third column

displays counts for the newly-opened, for-profit colleges. The counts are higher for the community colleges than for the for-profit colleges because, while a community college tends to offer more than one of these degree types, some for-profit institutions specialize, for example, by only offering health-related degrees. However, there is overlap in degree-types offered by community and for-profit colleges, suggesting that these schools could be competing for students interested in these programs.

Table 12 displays the results of the analysis of the effect of having a new degree-granting for-profit college open nearby on the number of associate's degrees awarded in computer, service, education, health and business-related fields.[11] For each model, the sample is limited to community colleges that awarded at least one degree in this subject area during the sample years. Models 1 and 2 display the estimated effect of having a new degree-granting for-profit college open on the number of associate's degrees awarded in computer-related fields at community colleges without and with college fixed effects. Models 3 and 4 show the estimates for service-related fields, and in models 5 and 6 the outcomes are associate's degrees awarded in education-related fields. Models 7 and 8 show the estimates for health-related fields and models 9 and 10 show the estimates for associate's degrees awarded in business-related fields. My preferred specification includes fixed effects for college. In computer, education and health-related fields, the coefficients on the interactions of the log of distance and year, in the years after a new degree-granting for-profit college has opened, suggest that having a new for-profit institution open up nearby has no effect on the number of associate's degrees produced at a community college. The models in which the outcomes are either associate's degrees

[11] Subject fields are determined by the first two digits of the degree award Classification of Instructional Program (CIP) code.

in service or business-related fields have small, but statistically significant increases both before and after a new for-profit college opens. This suggests that community colleges with new for-profit institutions opening nearer are producing more of these degree types, on average, than community colleges with new for-profit schools opening farther away. However, these differences are unrelated to the for-profit colleges themselves.

Table 13 displays the results of the analysis of the effect of having a new degree-granting for-profit college open nearby on long certificates in computers (models 1 and 2), service (models 3 and 4), education (models 5 and 6), health (models 7 and 8) and business-related fields (models 9 and 10). All models include covariates and state fixed effects. In all cases, the second model for a given subject area also includes college fixed effects. For most subjects, the coefficients on the interactions of year and the log of distance tell a similar story about the effect of having a new for-profit institution open on the completion of long certificates as was told about associate's degrees above. In general, having a new for-profit college open up nearby has no effect on the completion of long certificates at public community colleges.

There is one possible exception to this finding. Model 8 in Table 13 displays the estimated effect of having a new for-profit college open on the number of long certificates awarded in health-related fields in public community colleges. Two years after a new for-profit institution opens, a 10 percent reduction in the distance between a community college and the newly open for-profit college is associated with a 0.27 percent reduction in the number of long certificates awarded in health-related fields at a public community college, and this decline is statistically significant. It is plausible that having a new for-profit college open up nearby would have an effect on long certificates

awarded in health but not in other subject areas. Table 10 shows the overlap in program type by degree level at the community colleges and new for-profit colleges in my sample. Some of the greatest overlap in program offerings is in health-related fields.

Finally, Table 14 displays estimates of the effect of having a new for-profit college open up nearby on the number of short certificates awarded, by subject area, at community colleges. Again, these estimates tell a similar story to that told about other degree types. There appear to be small increases in the number of short certificates produced in service-related fields at community colleges with new for-profit institutions opening nearer, but these increases are not associated with the new for-profit college opening. There is a small, statistically significant decline in the number of short certificates in health-related fields awarded three years after the new for-profit college opens, but this seems too late to be associated with the new institution opening, given that there weren't also declines earlier.

VI. Community Education Levels

The results above suggest that have a new for-profit college open nearby does not affect community college enrollment or program completions. Given these results, I would expect having a new for-profit college open in a county to increase the number of degrees produced in that county. In this final section, I explore whether for-profit colleges provide some students with a path to degree completion that they would not have at public community colleges, by examining how new for-profit institutions affect the total number of degrees produced at the county level.

Sample

In order to explore how the growth of for-profit colleges between 2001 and 2012 affected county education levels, I again make use of data from IPEDS merged with data from the Census, the American Community Survey, the Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) and the Grapevine Survey. The main sample for this analysis includes all counties that are home to a public community college and a new for-profit college. The sample changes slightly over the years as community colleges close, combine or change control.

Three hundred and fifty one counties with public community colleges had a new for-profit institution open between 2001 and 2012, and 215 of these counties had a new degree-granting for-profit college open during these years. Table 15 displays descriptive statistics for these samples, and compares counties with new for-profit colleges to counties with community colleges but where no new for-profit institutions opened. Counties where new for-profit colleges opened have, on average, larger populations, and larger community college enrollments than counties with only community colleges. The average population and the population age 20 to 29 is an order of magnitude larger in counties where new for-profit institutions opened compared to counties with only public community colleges. This confirms what is apparent from the maps in Figures 1 and 2: for-profit colleges open in urban areas where there are large potential pools of students, whereas community colleges are located in both rural and urban areas. On the other hand, county-level unemployment rates (averaged across counties and years) are very similar for counties with and without new for-profit colleges (near 7 percent). The average community college tuition is slightly higher in counties where at least one new

for-profit institution opened, again probably reflecting that these are counties with large urban areas.

Empirical Strategy

In order to estimate the effect of having a new for-profit college open on county-level degree production, I estimate the following model,

(2) $\log(y)_{jt} = \beta_0 + \beta_1(After)_{jt} + \beta_2(Time)_{jt} + Z_{jt} + \lambda_j + \epsilon_{jt}$

in which y are county totals of short and long certificates as well as associate's degrees. "After" is a binary variable coded 0 in the years before the first new for-profit college opens, and 1 in the years after. "Time" is a linear time trend ranging from -9 (9 years before the first new for-profit college opened in county j) to +9 (9 years after the new for-profit college opened in county j). "Z" is the same vector of county-level covariates described above and λ are county fixed effects.

These outcome variables are log-transformed in an effort to make the distribution of the outcome variables more normal. Appendix 9 displays these outcome variables before and after the transformation. The errors are clustered by state. $\beta_1$is the coefficient of interest and it estimates the effect on county education levels (measured by degree completions) of having a new degree-granting for-profit college open.

Results

Figure 4 plots the coefficients on year fixed effects from regressions of county-level degree totals on year fixed-effects and county covariates including population, unemployment rate, the population age 20 to 29, average community college tuition, percent of the population living in poverty, African-American population and state appropriations to higher education. The model was estimated without an intercept so the

coefficient on the year fixed effect represents average county-level degree totals for that year, conditional on covariates. Year is zero for the year in which the first new for-profit college (for certificates) opened or the first new degree-granting for-profit college (for associate's degrees) opened in each county.

The trends plotted in Figure 4 suggest that the average number of degrees produced in a county is increasing over time for all degree types. In the case of associate's degrees, the increase after year zero appears to be the continuation of a secular trend. In the plots for both types of certificates, the average number granted in a county appears to be decreasing in the one or two years before the first new for-profit college opens, and to increase after the new school opens.

Table 16 displays the coefficients on the models estimating the effects of having a new for-profit college open on county-level degree production. In models 1 and 2 in the top panel of Table 16, the outcomes are county-level totals of short and long certificates, respectively. In these models "after new for-profit college" is a dummy variable coded 1 in all years after a new for-profit college opens and zero otherwise. In model 3 the outcome is total associate's degrees produced at the county level and "after new for-profit college" is a dummy variable coded 1 in all the years after the first new degree-granting for-profit college opens in a county and zero otherwise. In all models, the outcomes are log-transformed. The sample size is different for each model because the log transformation causes counties-year combinations, in which there are zero of these degrees produced, to drop out.

In model 1, the coefficient of interest suggests that after a new for-profit college opens in a county, the number of short certificates produced increases by approximately

23 percent, on average, and this increase is statistically significant.[12] The estimate from model 2 indicates that, after a new for-profit college opens in a county, the number of long certificates produced increases by approximately 13 percent, on average. While for-profit colleges appear to increase the number of certificates produced in a county, they do not increase the number of associate's degrees produced. The coefficient of interest in model 3 suggests that having a new degree-granting for-profit college open in a county does not change the number of associate's degrees produced in that county, on average.

Falsification Test

As a simple test of my assumption that it is the new for-profit college opening in a county that is increasing the number of certificates produced and not just the continuation of a secular trend, I rerun my models with a dummy variable coded 1 beginning two years before the first new for-profit college opens in the county. The estimates from these models are displayed in the bottom panel of Table 16. The coefficients on the variables indicating two years before the first new for-profit college opens support my argument that it is the new schools that are causing the increases in the number of certificates produced, and that this is not just the continuation of a secular trend. In both models 4 and 5, in which the outcomes are log-transformed county totals of short and long certificates, respectively the coefficients indicate very small declines in the percent of certificates produced, and these estimates are not statistically significant.

[12] Percent change is calculated as $1 - e^{\beta} = \%\Delta$

VII. Summary and Conclusion

I make use of an event study model and explore whether having a new for-profit college open up nearby affects community college enrollments and program awards in computers, service, education, health and business-related fields. I find that having a new for-profit institution open nearby has no effect on total community college enrollment or the enrollment of African-American or Hispanic students, students over the age of 25, degree-seeking students or male or female students. Likewise, I find almost no evidence that having a new for-profit college open up nearby changes the number of associate's degrees, or short or long certificates awarded at public community colleges in computers, service, education, health or business-related fields. The only exception to this finding is some evidence that there is a slight reduction in the number of long certificates awarded in health-related fields in the years after a new for-profit college opens up nearby. This is plausible given that a large number of the new for-profit colleges to open during my sample years offer degrees in health-related fields. Moreover, a larger proportion of students seeking vocational certificates enroll in for-profit colleges than in public community colleges (NCES, 2012).

My overall findings are different from those of Cellini (2009) who finds evidence that for-profit colleges and community colleges are substitutes. However, in Cellini (2009) enrollment shifts from the for-profit to the public sector are the result of increases in funding for public community colleges. It is possible that students choose community colleges in this instance because of a perceived improvement in community college quality as a result of the increase in funding. However, in my estimation strategy, there is no change in the real or perceived quality of for-profit versus community colleges that

could be driving my findings. I am only examining whether a change in the availability of a for-profit education leads to students to shift from public community colleges to for-profit colleges. Moreover, because a large proportion of for-profit college enrollment is online, it is possible that a new brick and mortar for-profit college does not even change the relative availability of for-profit education. In 2012, 42.6 percent of students enrolled in for-profit institutions were enrolled exclusively in distance education, compared to 9.8 percent of students at public community colleges (NCES, 2014). In addition, though Cellini (2009) finds strong evidence that an increase in funding for public community colleges causes for-profit institutions to leave the geographic market, her results for community college enrollment are not consistent. Finally, it is possible that there are regional differences in the effect of having a new for-profit college open nearby on community college enrollments and program awards that are not detectable in my national sample.

The third part of this study explores how new for-profit colleges affect the number of associate's degrees, as well as long and short certificates, produced at the county level. I find that having a new for-profit college open increases the number of long and short certificates awarded at the county level, though there is no effect on the number of associate's degrees produced. This supports my findings related to community college enrollments. If there is no decline in enrollment at public community colleges when a new for-profit college opens nearby, then the for-profit institutions must be enrolling some students who would not otherwise attend. If this is the case, then I would expect to find that a new for-profit college increases the overall number of degrees

produced in a community. This is indeed what I find, and it appears that the increase in credentials produced occurs primarily at the certificate level.

The results from the third part of my analysis are not surprising, given the distribution of students across the different sectors of higher education, seeking particular credentials. In 2011, 46 percent of students seeking certificates were enrolled in for-profit colleges, compared to 38 percent enrolled in public community colleges (NCES, 2012). This comparison is starker if you consider only students enrolled in occupational education. Forty-nine percent of students seeking certificates in occupational education were enrolled in for-profit colleges in 2011, compared to 36 percent at community colleges (NCES, 2012). On the other hand, 76 percent of students seeking an associate's degree were enrolled in community colleges at this time, while only 10 percent of associate's degree seekers were enrolled in for-profit colleges (NCES, 2012).

Though enrollment in for-profit colleges expanded rapidly between 2000 and 2010, enrollment in these institutions is now on the decline. At the end of the decade, for-profit institutions faced tightening regulations intended to help students judge the quality of a for-profit college education. The Federal Register issued on October 29, 2010 specified that the following information must be clearly displayed on a program's website: occupations the program prepares students to enter, on-time graduation rates for students completing the program, tuition and fees charged to students completing the program in normal time, placement rates for students completing the program, and median loan debt incurred by students who complete the program (75 Federal Register 209). Also in 2010 the Government Accountability Office released a report describing the aggressive recruiting practices of for-profit colleges. In May of 2015 the for-profit

college chain Corinthian Colleges filed for chapter 11 bankruptcy, leaving thousands of students adrift (Douglas-Gabriel, 2015, May 4; Fain, 2014, June 20). My results suggest that for-profit colleges are enrolling some students who would not otherwise attend a public community college. If this is the case, there may be unmet demand for higher education as for-profit colleges cease to be an option.

Research suggests that students with credentials from for-profit colleges have worse labor market outcomes than students who earn their degrees from public two-year institutions (Deming, Goldin and Katz, 2012; Deming, Yuchtman, Abulafi, Goldin and Katz, 2014; Cellini and Chaudhary, 2014; Darolia, Koedel, Martorell, Wilson and Perez-Arce, 2015). However, despite much higher tuition levels, students still choose to enroll in these colleges. On the one hand, this could be the result of aggressive recruitment practices and the large portion of their budgets that these institutions spend on advertising (Government Accountability Office, 2010). On the other hand, students may enroll in these institutions because they offer programs that are more tightly coupled with local labor market demand than programs at community colleges (Gilpin, Saunders and Stoddard, 2015) or because the for-profit institutions are easy to enroll in and offer clear paths to graduation (Rosenbaum, Deil-Amen and Person, 2006; Iloh and Tierney, 2014).

If some students are choosing to enroll in a for-profit college who wouldn't otherwise enroll in a public two-year institution, then community colleges may not be meeting the needs of some students. The development of programs such as the National Science Foundation's Advanced Technological Education (ATE) program suggest that community colleges are attuned to the fact that students want to enroll in certificate programs that are tightly coupled with local labor market needs, and that these programs

are being developed. Calls for clearer pathways to degrees at public community colleges also suggest that there is a growing recognition that, for some students, community colleges are not effective. As for-profit colleges continue to close, it is the responsibility of state and federal policy makers to ensure that community colleges have the capacity and resources to serve student demand.

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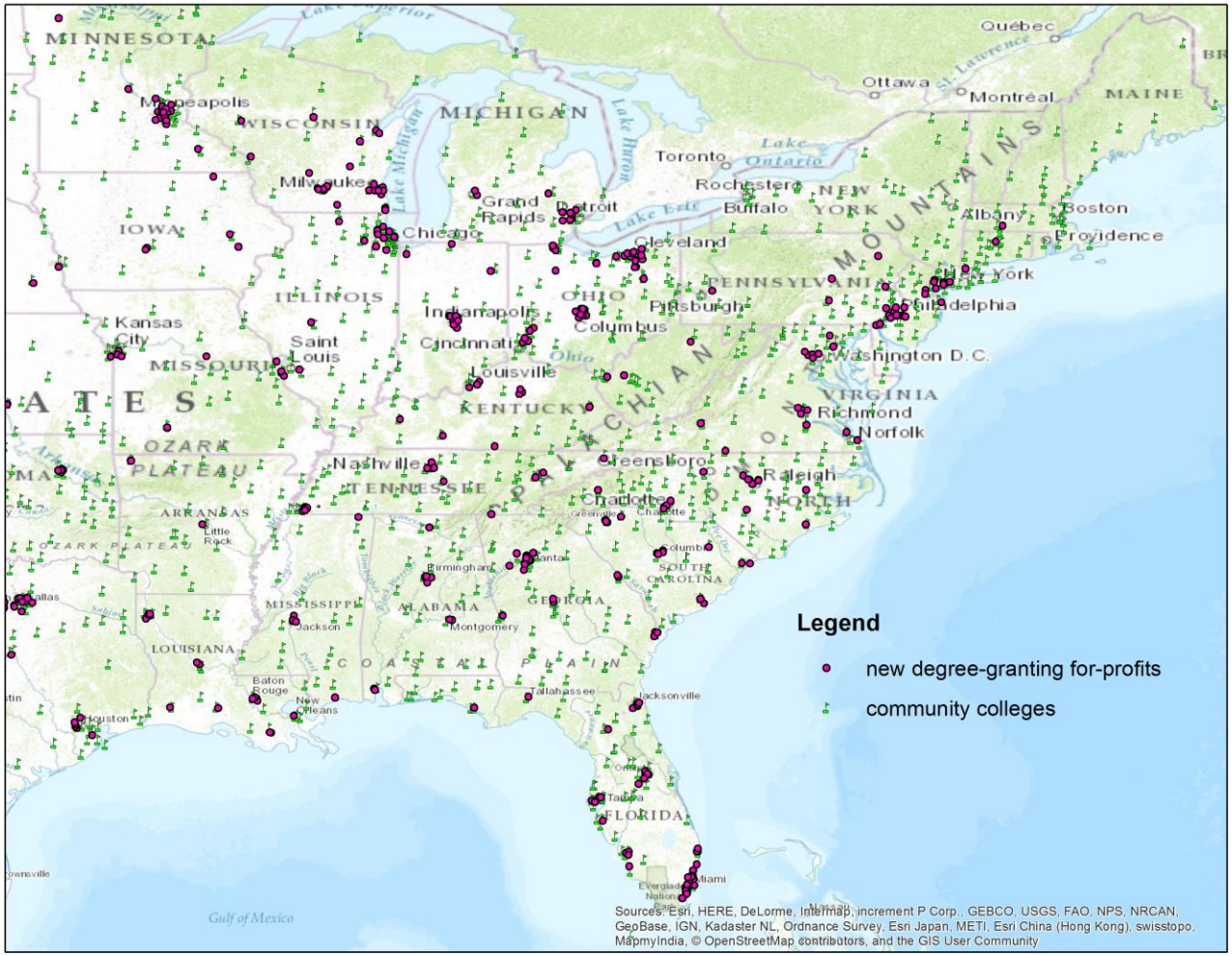
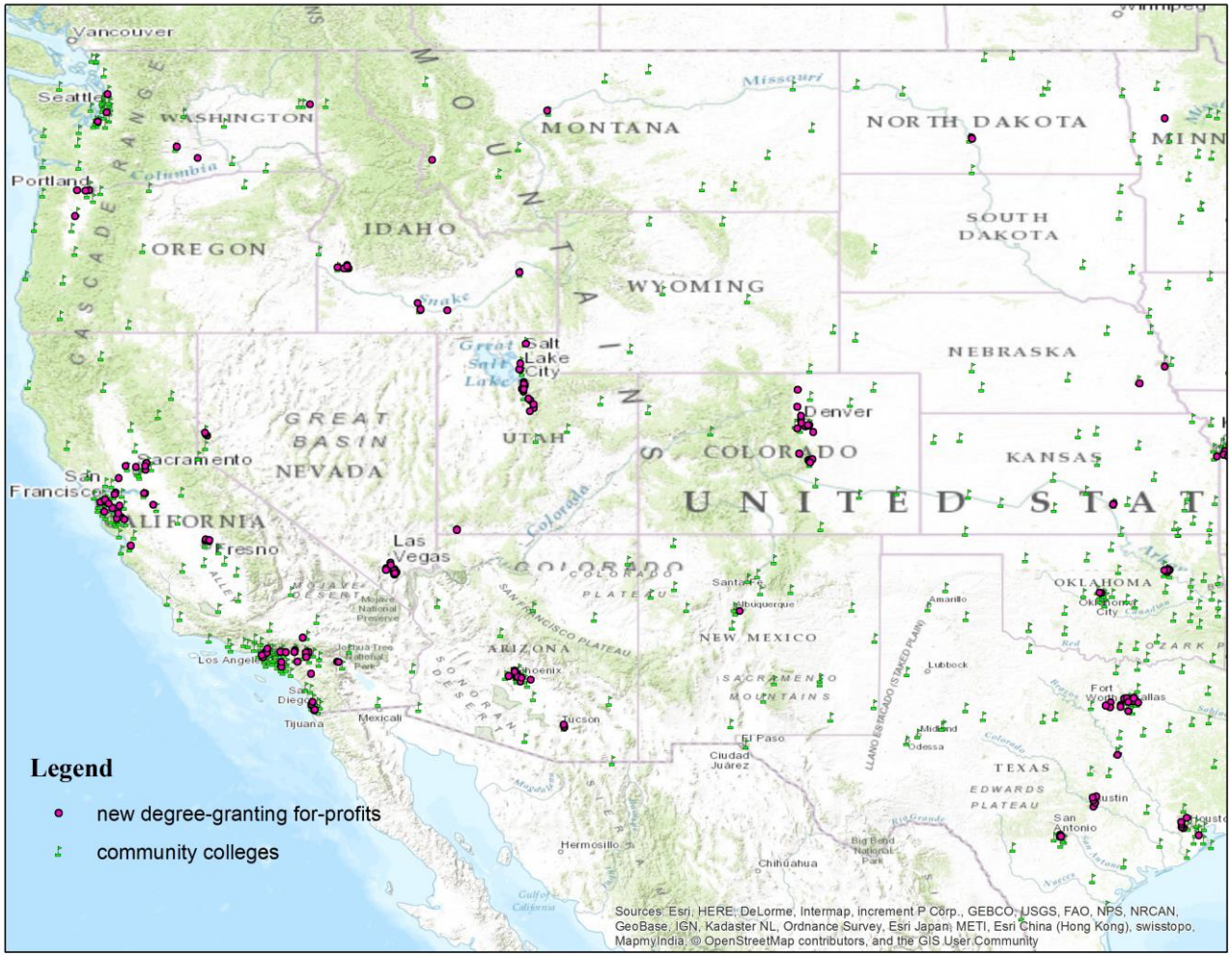
Figures and Tables

Figure 1: Community colleges and newly opened degree-granting for-profits 2001 to 2012



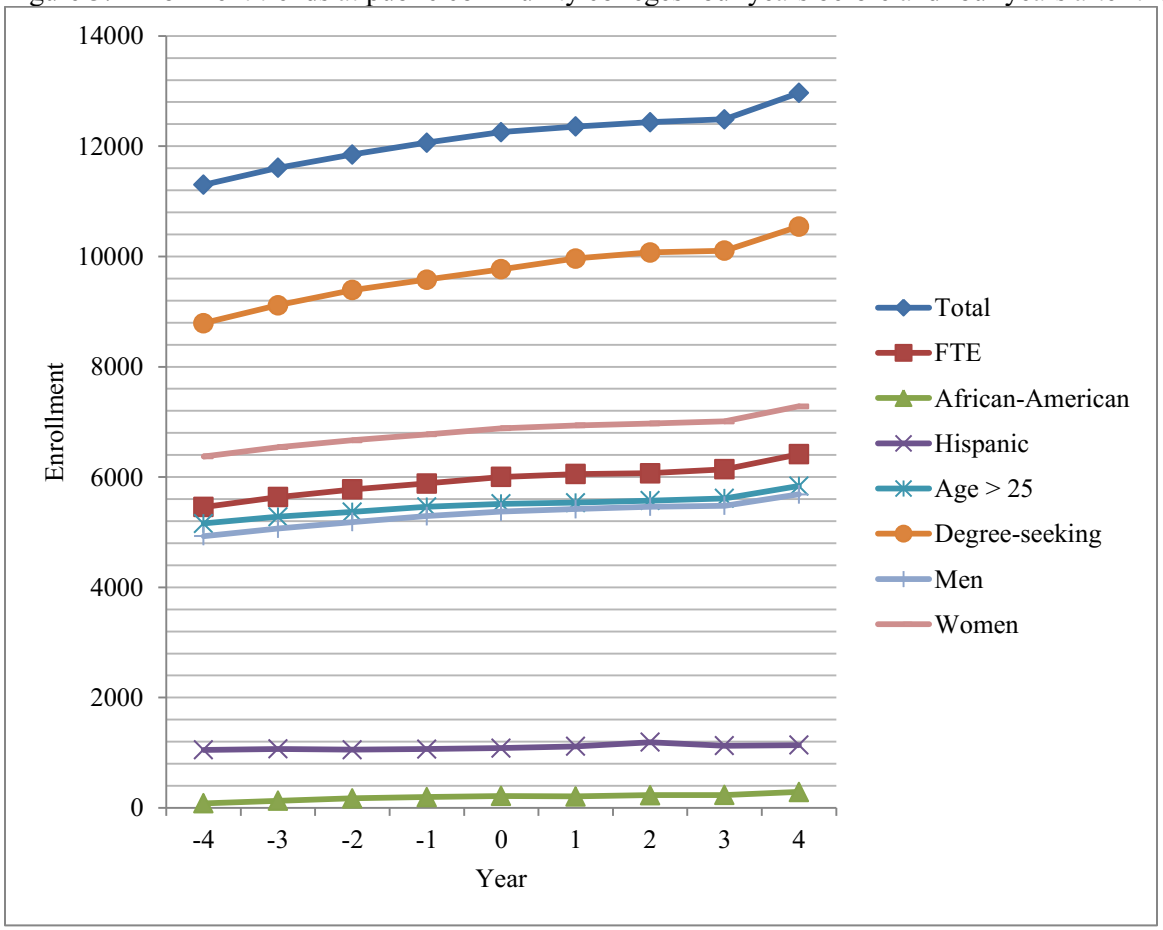
Data sources: IPEDS, Esri Business Analyst

Figure 2: Community colleges and newly opened degree-granting for-profits 2001 to 2012



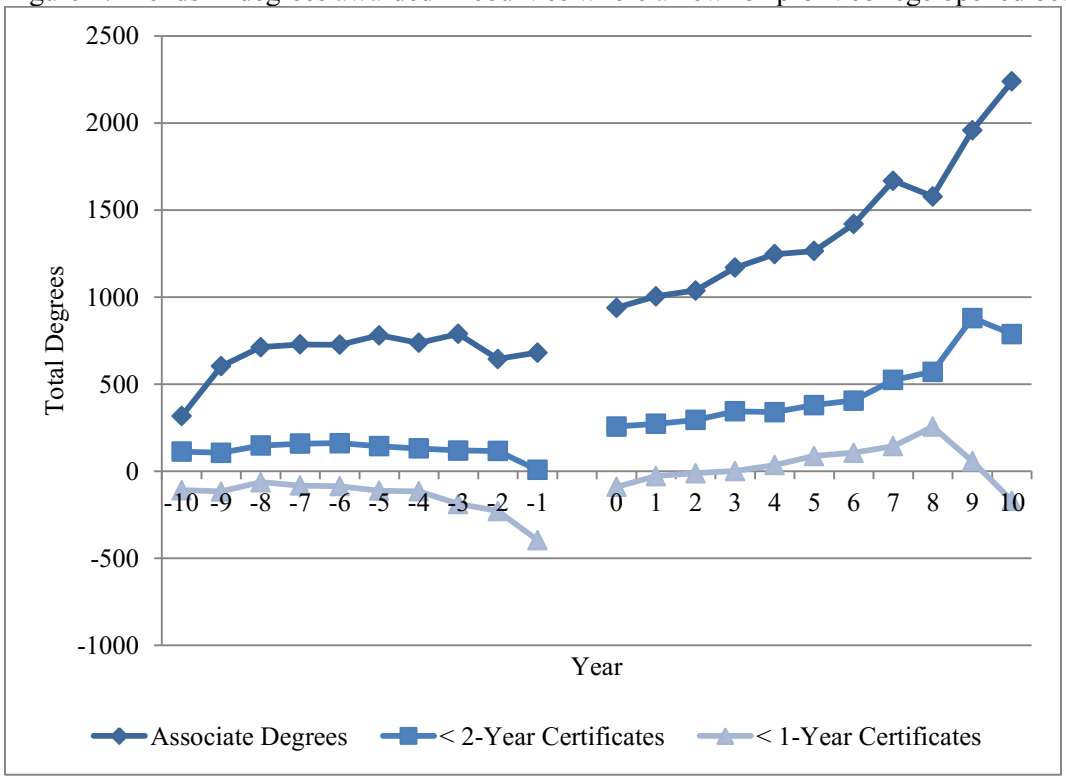
Data sources: IPEDS, Esri Business Analyst

Figure 3: Enrollment trends at public community colleges four years before and four years after the nearest new for-profit college opens



Data sources: IPEDS, Census, Bureau of Labor Statistics, American Community Survey, Grapevine Survey
Notes: This figure plots the coefficients on year fixed effects from a regression of enrollment variables for all the community colleges in the sample on year fixed effects, county-level covariates (including population, unemployment rate, population age 20 to 29, African-American population, percent of the population living in poverty, and average community college tuition), state appropriations for higher education and state fixed effects.

Figure 4: Trends in degrees awarded in counties where a new for-profit college opened between 2001 and 2012



Data sources: IPEDS, Census, Bureau of Labor Statistics, American Community Survey, Grapevine Survey
Notes: This figure displays coefficients on year fixed effects from regressions of county-level degree completions on year fixed effects, county covariates (including population, unemployment rate, population age 20 to 29, African-American population, average community college tuition and percent of the population living in poverty), and state appropriations.

Table 1: New For-Profit Colleges appearing in IPEDS between 2002 and 2012

	New For-Profit Colleges	New Degree-Granting For-Profit Colleges	New Chain For-Profit Colleges	New Degree-Granting Chain For-Profit Colleges
2002	108	36	44	24
2003	102	46	43	26
2004	124	45	54	25
2005	155	65	67	41
2006	130	50	59	32
2007	112	52	60	38
2008	146	50	72	30
2009	190	74	78	35
2010	278	118	160	85
2011	243	105	132	77
2012	164	71	82	47
Total	*1752*	*712*	*851*	*460*

Data source: IPEDS

Notes: Degree-granting for-profit colleges are defined as colleges that offer degrees at least as high as associate degrees. An institution is designated as a chain if it operates in more than one state or has more than five campus branches in a single state.

Table 2: Descriptive statistics for community colleges in the sample

	All Community Colleges	Distance < Sample Average	Distance >= Sample Average
Total Enrollments	5417	6741	3057
FTE Enrollments	3122	3806	1902
African-American Student Enrollments	649	867	260
Hispanic Student Enrollments	746	977	332
Enrollment of Students Age > 25	2400	3056	1230
Population (thousands)	684	1000	120
Unemployment Rate (percentage)	5.09	4.95	5.35
Population Age 20 to 29 (thousands)	101	148	17
African-American Population (thousands)	233	340	42
State Appropriations	218	217	222
Community College Tuition	1688	1723	1627
N	1213	751	462

Data sources: IPEDS, Census, Bureau of Labor Statistics, American Community Survey, Grapevine Survey
Notes: Distance is the distance (in miles) between each public community college in the sample and the nearest, newly-opened for-profit college. Population variables and unemployment rate are county-level variables. Population numbers are in thousands. State appropriations are per capita 2011 dollars.

Table 3: Main event study model run with covariates as outcomes

	(1) Population	(2) Unemployment Rate	(3) Population Age 20 to 29	(4) State Appropriations	(5) Population in Poverty	(6) Community College Tuition	(7) African-American Population
Year -4 X Log(Distance)	3,592**	0.122**	500.8	-1.607	3,675*	4.583	-11,498
	(1,456)	(0.0554)	(306.7)	(1.217)	(2,019)	(20.06)	(7,699)
Year -3 X Log(Distance)	1,839	0.123	266.4	-1.161	3,139	8.404	-11,272
	(2,242)	(0.0869)	(433.3)	(1.347)	(2,630)	(16.14)	(7,156)
Year -2 X Log(Distance)	299.2	0.0609	-26.31	-0.385	2,121	15.60	-11,623
	(2,083)	(0.0993)	(383.3)	(1.265)	(1,969)	(21.15)	(7,391)
Year -1 X Log(Distance)	-2,151	0.00563	-387.7	0.890	-217.1	2.358	-12,379
	(2,341)	(0.0851)	(391.4)	(1.290)	(1,777)	(24.17)	(7,649)
Year 0 X Log(Distance)	-4,621*	0.0530	-742.9**	0.757	-2,524**	16.30	-5,506
	(2,626)	(0.0766)	(349.5)	(1.044)	(1,114)	(24.94)	(7,022)
Year 1 X Log(Distance)	-6,790**	0.0558	-1,205***	1.327	-4,426***	14.34	26,665
	(2,994)	(0.0704)	(301.6)	(0.923)	(1,117)	(30.81)	(19,265)
Year 2 X Log(Distance)	-9,653**	0.0677	-1,610***	0.545	-5,775***	23.45	23,252
	(3,738)	(0.0801)	(408.5)	(1.093)	(1,418)	(28.96)	(16,854)
Year 3 X Log(Distance)	-10,671**	0.0345	-1,613***	-0.258	-4,491**	44.19	5,445
	(4,739)	(0.0810)	(418.0)	(1.352)	(2,187)	(37.69)	(3,420)
Year 4 X Log(Distance)	-13,102**	-0.0665	-2,160***	0.830	-5,776**	33.73	11,696
	(5,246)	(0.0978)	(528.9)	(1.366)	(2,341)	(36.38)	(8,867)
Log(Distance)	-153,648***	0.0655	-26,574***	-0.483	-21,106***	-147.6***	3,494
	(1,066)	(0.0483)	(219.2)	(0.780)	(431.1)	(14.61)	(9,054)
Constant	613,126***	7.084***	94,829***	189.3***	77,189***	1,847***	-6,003
	(2,513)	(0.0861)	(417.9)	(1.094)	(2,538)	(19.34)	(18,597)
Observations	12,020	12,020	12,020	12,020	12,020	12,020	12,020
R-squared	0.999	0.518	0.999	0.823	0.990	0.872	0.893

Data sources: IPEDS, Census, Bureau of Labor Statistics, American Community Survey, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit college appeared in the data, and Year 4 is 4 years after the new for-profit college appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same

state between 2001 and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year, college and state. Standard errors are clustered by state.

Table 4: The effect of having a new degree-granting for-profit open on community college enrollments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrollment Outcomes	Total		FTE		Black		Hispanic	
Year -4 X Log(Distance)	0.000585	-0.00558	-0.000190	-0.00472	-0.0119	-0.00749	-0.00230	-0.00364
	(0.0204)	(0.00685)	(0.0194)	(0.00592)	(0.0233)	(0.0123)	(0.0223)	(0.0124)
Year -3 X Log(Distance)	0.00181	-0.00328	0.000723	-0.00262	-0.0206	-0.00875	-0.00457	0.000743
	(0.0149)	(0.00488)	(0.0140)	(0.00440)	(0.0214)	(0.0113)	(0.0213)	(0.0128)
Year -2 X Log(Distance)	0.00416	-0.00423	0.00161	-0.00517	-0.0144	-0.00307	0.00261	0.00877
	(0.0140)	(0.00556)	(0.0133)	(0.00521)	(0.0186)	(0.0122)	(0.0209)	(0.0122)
Year -1 X Log(Distance)	-0.000219	0.000115	-0.00250	-0.00122	-0.00838	0.00507	0.00144	0.0173
	(0.0132)	(0.00665)	(0.0130)	(0.00633)	(0.0175)	(0.0134)	(0.0219)	(0.0169)
Year 0 X Log(Distance)	0.00699	0.00185	0.00613	0.00113	-0.000654	0.0128	0.00957	0.0262
	(0.0126)	(0.00683)	(0.0120)	(0.00609)	(0.0196)	(0.0157)	(0.0247)	(0.0181)
Year 1 X Log(Distance)	0.00739	0.00316	0.00516	0.00261	0.00177	0.0118	0.0117	0.0254
	(0.0199)	(0.00800)	(0.0188)	(0.00671)	(0.0301)	(0.0162)	(0.0320)	(0.0251)
Year 2 X Log(Distance)	0.00443	-0.00135	0.00158	-0.00490	-0.0285	0.00615	-0.00776	0.0169
	(0.0180)	(0.00731)	(0.0170)	(0.00649)	(0.0297)	(0.0148)	(0.0309)	(0.0185)
Year 3 X Log(Distance)	0.000430	-0.0120	-0.00497	-0.0166*	-0.0176	0.0180	-0.0188	-0.00313
	(0.0169)	(0.00955)	(0.0167)	(0.00861)	(0.0292)	(0.0179)	(0.0356)	(0.0222)
Year 4 X Log(Distance)	0.00745	-0.0139	0.00462	-0.0160	-0.0441	0.00286	0.00740	0.0105
	(0.0240)	(0.0117)	(0.0238)	(0.0110)	(0.0383)	(0.0170)	(0.0468)	(0.0217)
Log(Distance)	-0.300***	-0.0750	-0.285***	-0.146***	-0.559***	-0.458***	-0.461***	-0.419***
	(0.0379)	(0.0508)	(0.0353)	(0.0532)	(0.0527)	(0.115)	(0.0518)	(0.153)
		Yes		Yes		Yes		Yes
Constant	10.02***	8.942***	9.115***	8.364***	7.094***	5.767***	6.979***	6.389***
	(0.247)	(0.0951)	(0.228)	(0.105)	(0.299)	(0.524)	(0.227)	(0.269)
Observations	12,365	12,365	12,365	12,365	12,190	12,190	12,120	12,120
R-squared	0.458	0.980	0.435	0.981	0.543	0.970	0.671	0.968

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001 and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 5: The effect of having a new degree-granting for-profit open on community college enrollments for additional subgroups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrollment Outcomes	Age > 25		Degree-Seeking		Men		Women	
Year -4 X Log(Distance)	0.000173	-0.000786	0.00634	-0.00250	0.00135	-0.00161	-0.000484	-0.00927
	(0.0162)	(0.00742)	(0.0206)	(0.0115)	(0.0228)	(0.00733)	(0.0186)	(0.00693)
Year -3 X Log(Distance)	0.00556	0.00202	0.00378	-0.00277	1.15e-06	-0.00128	0.00523	-0.00360
	(0.0155)	(0.00773)	(0.0138)	(0.00818)	(0.0171)	(0.00538)	(0.0139)	(0.00515)
Year -2 X Log(Distance)	0.00672	-0.00468	0.00398	-0.00540	0.00484	0.000314	0.00377	-0.00824
	(0.0146)	(0.00724)	(0.0136)	(0.00686)	(0.0151)	(0.00643)	(0.0142)	(0.00605)
Year -1 X Log(Distance)	-0.00215	-0.00307	-0.00370	-0.00244	0.00405	0.00721	-0.00344	-0.00552
	(0.0126)	(0.00734)	(0.0134)	(0.00750)	(0.0148)	(0.00728)	(0.0133)	(0.00707)
Year 0 X Log(Distance)	0.00441	-0.000559	-0.00305	-0.00349	0.00721	0.00503	0.00937	0.000623
	(0.0109)	(0.00704)	(0.0135)	(0.00781)	(0.0139)	(0.00783)	(0.0126)	(0.00696)
Year 1 X Log(Distance)	0.00583	-0.000978	-0.0114	-0.00690	0.00896	0.00540	0.00812	0.00183
	(0.0198)	(0.00892)	(0.0198)	(0.00783)	(0.0214)	(0.00854)	(0.0193)	(0.00847)
Year 2 X Log(Distance)	0.00121	-0.00758	-0.0189	-0.0127*	0.00517	0.00250	0.00559	-0.00496
	(0.0179)	(0.00861)	(0.0158)	(0.00689)	(0.0200)	(0.00822)	(0.0168)	(0.00748)
Year 3 X Log(Distance)	0.000647	-0.0133	-0.0200	-0.0177*	0.00259	-0.00885	0.000190	-0.0146
	(0.0176)	(0.00987)	(0.0177)	(0.0103)	(0.0185)	(0.0102)	(0.0173)	(0.00976)
Year 4 X Log(Distance)	0.00310	-0.0252*	-0.0137	-0.0245*	0.0117	-0.00769	0.00835	-0.0178
	(0.0231)	(0.0145)	(0.0274)	(0.0125)	(0.0253)	(0.0119)	(0.0252)	(0.0119)
Log(Distance)	-0.334***	-0.131	-0.311***	0.191	-0.308***	-0.0119	-0.294***	-0.137**
	(0.0393)	(0.106)	(0.0378)	(0.256)	(0.0390)	(0.0535)	(0.0385)	(0.0571)
		Yes		Yes		Yes		Yes
Constant	8.883***	8.418***	9.838***	8.009***	8.827***	7.962***	9.675***	8.489***
	(0.117)	(0.207)	(0.256)	(0.528)	(0.253)	(0.0967)	(0.258)	(0.112)
Observations	12,343	12,343	12,365	12,365	12,365	12,365	12,365	12,365
R-squared	0.477	0.972	0.429	0.965	0.447	0.977	0.443	0.979

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001

and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 6: The effect of having a new degree-granting for-profit college open on community college enrollments when the new for-profit college is a chain

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrollment Outcomes	Total		FTE		African-American		Hispanic	
Year -4 X Log(Distance)	-0.00756	-0.00962	-0.00954	-0.00948	-0.00917	-0.00486	-0.0186	-0.0122
	(0.0207)	(0.00743)	(0.0202)	(0.00650)	(0.0265)	(0.0151)	(0.0226)	(0.0152)
Year -3 X Log(Distance)	-0.0103	-0.00485	-0.0117	-0.00415	-0.0209	-0.00845	-0.0155	0.00218
	(0.0178)	(0.00557)	(0.0168)	(0.00473)	(0.0261)	(0.0136)	(0.0238)	(0.0140)
Year -2 X Log(Distance)	-0.00707	-0.00585	-0.00960	-0.00647	-0.0176	-0.00588	0.00238	0.0127
	(0.0164)	(0.00658)	(0.0157)	(0.00607)	(0.0212)	(0.0128)	(0.0220)	(0.0136)
Year -1 X Log(Distance)	-0.0132	-0.00630	-0.0149	-0.00664	-0.00791	-0.000368	-0.00828	0.0111
	(0.0185)	(0.00930)	(0.0176)	(0.00844)	(0.0221)	(0.0159)	(0.0269)	(0.0175)
Year 0 X Log(Distance)	-0.00650	-0.00338	-0.00784	-0.00382	-0.00162	0.00615	0.0129	0.0210
	(0.0163)	(0.00908)	(0.0158)	(0.00811)	(0.0212)	(0.0181)	(0.0259)	(0.0212)
Year 1 X Log(Distance)	0.00255	-0.00151	3.65e-05	-0.00123	0.00721	0.00442	0.0389	0.0311
	(0.0243)	(0.0106)	(0.0239)	(0.00911)	(0.0309)	(0.0176)	(0.0434)	(0.0282)
Year 2 X Log(Distance)	-0.00465	-0.00210	-0.00898	-0.00553	-0.0249	-0.000589	0.00226	0.0171
	(0.0204)	(0.00960)	(0.0198)	(0.00872)	(0.0321)	(0.0166)	(0.0389)	(0.0209)
Year 3 X Log(Distance)	-0.00119	-0.0181	-0.00505	-0.0211	-0.0182	-0.00883	0.0116	0.00889
	(0.0260)	(0.0147)	(0.0263)	(0.0134)	(0.0397)	(0.0227)	(0.0539)	(0.0257)
Year 4 X Log(Distance)	0.0199	-0.0160	0.0162	-0.0195	-0.00965	0.00137	0.0515	0.0221
	(0.0315)	(0.0174)	(0.0317)	(0.0166)	(0.0488)	(0.0213)	(0.0652)	(0.0280)
Log(Distance)	-0.321***	-0.117*	-0.304***	-0.158**	-0.575***	-0.589***	-0.450***	-0.507**
	(0.0360)	(0.0589)	(0.0351)	(0.0655)	(0.0542)	(0.0232)	(0.0517)	(0.190)
		Yes		Yes		Yes		Yes
Constant	10.65***	9.608***	10.01***	9.205***	8.705***	5.744***	7.081***	6.585***
	(0.180)	(0.202)	(0.179)	(0.231)	(0.263)	(0.137)	(0.264)	(0.331)
Observations	8,368	8,368	8,368	8,368	8,266	8,266	8,214	8,214
R-squared	0.472	0.980	0.451	0.981	0.545	0.972	0.673	0.967

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. An institution is designated as a chain if it operates in more than one state or has more than five campus branches in a single state. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the

distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001 and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 7: The effect of having a new degree-granting for-profit college open on community college subgroup enrollments when the new for-profit college is a chain

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrollment Outcomes	Age > 25		Degree-Seeking		Men		Women	
Year -4 X Log(Distance)	-0.0102	-0.00732	-0.00400	-0.00886	-0.00697	-0.00499	-0.0106	-0.0143*
	(0.0182)	(0.00847)	(0.0202)	(0.0122)	(0.0231)	(0.00773)	(0.0199)	(0.00801)
Year -3 X Log(Distance)	-0.00282	0.00104	-0.00411	-0.00105	-0.0111	-0.000118	-0.00924	-0.00762
	(0.0173)	(0.00823)	(0.0171)	(0.0100)	(0.0198)	(0.00595)	(0.0169)	(0.00632)
Year -2 X Log(Distance)	-0.000414	-0.00376	-0.000343	-0.00120	-0.00492	0.000982	-0.00888	-0.0110
	(0.0171)	(0.00840)	(0.0171)	(0.0101)	(0.0174)	(0.00744)	(0.0174)	(0.00770)
Year -1 X Log(Distance)	-0.00988	-0.00680	-0.00702	-0.00132	-0.00853	0.00268	-0.0177	-0.0136
	(0.0165)	(0.00886)	(0.0191)	(0.0117)	(0.0197)	(0.00959)	(0.0190)	(0.0105)
Year 0 X Log(Distance)	-0.00489	-0.00535	-0.00862	-0.00298	-0.00575	0.00233	-0.00478	-0.00652
	(0.0139)	(0.00806)	(0.0188)	(0.0129)	(0.0166)	(0.00976)	(0.0177)	(0.00983)
Year 1 X Log(Distance)	-0.00180	-0.00835	-0.0131	-0.00916	0.00609	0.00373	0.00149	-0.00416
	(0.0225)	(0.0104)	(0.0269)	(0.0117)	(0.0255)	(0.0107)	(0.0248)	(0.0116)
Year 2 X Log(Distance)	-0.0150	-0.0161	-0.0323	-0.0181**	-0.000640	0.00773	-0.00615	-0.00903
	(0.0220)	(0.0105)	(0.0200)	(0.00892)	(0.0217)	(0.00976)	(0.0210)	(0.0106)
Year 3 X Log(Distance)	-0.00166	-0.0183	-0.0192	-0.0250*	0.00265	-0.0113	-0.00358	-0.0206
	(0.0284)	(0.0116)	(0.0282)	(0.0146)	(0.0282)	(0.0152)	(0.0266)	(0.0151)
Year 4 X Log(Distance)	0.0117	-0.0286	-0.00205	-0.0300	0.0288	-0.00915	0.0156	-0.0180
	(0.0319)	(0.0185)	(0.0365)	(0.0201)	(0.0336)	(0.0172)	(0.0320)	(0.0179)
Log(Distance)	-0.360***	-0.206**	-0.333***	0.247	-0.334***	-0.115*	-0.311***	-0.121*
	(0.0386)	(0.0883)	(0.0373)	(0.282)	(0.0388)	(0.0614)	(0.0348)	(0.0637)
		Yes		Yes		Yes		Yes
Constant	10.10***	9.245***	10.61***	8.069***	9.736***	8.594***	10.13***	9.162***
	(0.196)	(0.332)	(0.225)	(1.050)	(0.190)	(0.203)	(0.181)	(0.226)
Observations	8,356	8,356	8,368	8,368	8,368	8,368	8,368	8,368
R-squared	0.492	0.973	0.442	0.966	0.472	0.977	0.453	0.978

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. An institution is designated as a chain if it operates in more than one state or has more than five campus branches in a single state. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the

distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001 and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 8: The effect of having a new degree-granting for-profit college open on community college enrollments, controlling for density

	(1)	(2)	(3)	(4)	(5)	(6)
Total Enrollment	Density Calculated at State Level		Density Calculated at County Level		Density Calculated at City Level	
Year -4 X Log(Distance)	0.000432	-0.00570	-0.00307	-0.00554	-0.00307	-0.00558
	(0.0204)	(0.00685)	(0.0212)	(0.00685)	(0.0212)	(0.00686)
Year -3 X Log(Distance)	0.00187	-0.00347	-0.00188	-0.00318	-0.00188	-0.00327
	(0.0149)	(0.00493)	(0.0152)	(0.00485)	(0.0152)	(0.00487)
Year -2 X Log(Distance)	0.00421	-0.00437	-4.76e-05	-0.00409	-4.76e-05	-0.00423
	(0.0140)	(0.00559)	(0.0142)	(0.00555)	(0.0142)	(0.00555)
Year -1 X Log(Distance)	-0.000188	0.000128	-0.00167	0.000142	-0.00167	0.000115
	(0.0132)	(0.00666)	(0.0135)	(0.00664)	(0.0135)	(0.00665)
Year 0 X Log(Distance)	0.00705	0.00194	0.00802	0.00190	0.00802	0.00185
	(0.0126)	(0.00682)	(0.0124)	(0.00683)	(0.0124)	(0.00683)
Year 1 X Log(Distance)	0.00773	0.00305	0.0110	0.00331	0.0110	0.00318
	(0.0199)	(0.00795)	(0.0180)	(0.00800)	(0.0180)	(0.00802)
Year 2 X Log(Distance)	0.00533	-0.00181	0.00868	-0.00103	0.00868	-0.00133
	(0.0180)	(0.00731)	(0.0176)	(0.00727)	(0.0176)	(0.00728)
Year 3 X Log(Distance)	0.00148	-0.0125	0.00117	-0.0118	0.00117	-0.0120
	(0.0169)	(0.00943)	(0.0171)	(0.00957)	(0.0171)	(0.00958)
Year 4 X Log(Distance)	0.00829	-0.0143	0.00834	-0.0137	0.00834	-0.0139
	(0.0240)	(0.0116)	(0.0230)	(0.0118)	(0.0230)	(0.0117)
Log(Distance)	-0.300***	-0.0561	-0.313***	-0.0834	-0.313***	-0.0752
	(0.0378)	(0.0417)	(0.0356)	(0.0598)	(0.0356)	(0.0533)
College Fixed Effects?		Yes		Yes		Yes
Constant	9.511***	8.900***	9.775***	8.960***	9.775***	8.527***
	(0.111)	(0.0738)	(0.0563)	(0.112)	(0.0563)	(0.239)
Observations	12,365	12,365	12,365	12,365	12,365	12,365
R-squared	0.458	0.980	0.454	0.980	0.454	0.980

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. An institution is designated as a chain if it operates in more than one state or has more than five campus branches in a single state. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the

distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001 and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 9: The effect of having a new degree-granting for-profit college open on enrollments at private two-year institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrollment Outcomes	Total	FTE	African-American	Hispanic	Age > 25	Degree-Seeking	Men	Women
Year -4 X Log(Distance)	-0.000934	-0.00747	-0.0497**	-0.0177	0.0404	-0.00548	0.0153	2.22e-05
	(0.0117)	(0.0183)	(0.0245)	(0.0446)	(0.0335)	(0.0188)	(0.0202)	(0.0120)
Year -3 X Log(Distance)	0.0208	0.00925	-0.00325	0.0237	0.0437	0.0327	0.0195	0.0231
	(0.0218)	(0.0301)	(0.0447)	(0.0588)	(0.0363)	(0.0236)	(0.0368)	(0.0229)
Year -2 X Log(Distance)	0.0270	0.0174	8.94e-05	-0.0169	0.0365	0.0159	0.0332	0.0323
	(0.0263)	(0.0354)	(0.0400)	(0.0481)	(0.0445)	(0.0282)	(0.0289)	(0.0301)
Year -1 X Log(Distance)	0.00314	-0.00402	-0.0253	0.0186	0.0274	-0.00412	0.00854	0.0127
	(0.0222)	(0.0317)	(0.0433)	(0.0370)	(0.0368)	(0.0241)	(0.0315)	(0.0232)
Year 0 X Log(Distance)	0.0285	0.0127	0.0144	0.0438	0.0394	0.0268	0.0412	0.0378
	(0.0216)	(0.0348)	(0.0502)	(0.0386)	(0.0297)	(0.0209)	(0.0308)	(0.0265)
Year 1 X Log(Distance)	0.0332	0.00718	0.0485	0.0340	0.0680**	0.0348	0.0789**	0.0268
	(0.0239)	(0.0251)	(0.0432)	(0.0394)	(0.0332)	(0.0220)	(0.0327)	(0.0247)
Year 2 X Log(Distance)	0.0272	0.0306	0.0557	0.0402	0.0404	0.0302	0.0639*	0.0170
	(0.0264)	(0.0329)	(0.0634)	(0.0575)	(0.0394)	(0.0250)	(0.0370)	(0.0277)
Year 3 X Log(Distance)	0.0665***	0.0715*	0.0350	0.0408	0.0869***	0.0726***	0.0986***	0.0435
	(0.0243)	(0.0364)	(0.0457)	(0.0490)	(0.0239)	(0.0246)	(0.0330)	(0.0295)
Year 4 X Log(Distance)	0.0505	0.0394	-0.0237	0.000117	0.0646**	0.0454	0.0647*	0.0269
	(0.0308)	(0.0414)	(0.0448)	(0.0748)	(0.0274)	(0.0273)	(0.0367)	(0.0325)
Log(Distance)	0.422***	-0.169	0.205***	0.327***	0.253***	0.411***	-1.121*	0.563***
	(0.0480)	(0.162)	(0.0492)	(0.103)	(0.0766)	(0.0462)	(0.587)	(0.0484)
Constant	6.672***	5.372***	-1.231***	-0.434	5.518***	2.820***	2.063	0.555***
	(0.428)	(0.603)	(0.288)	(0.424)	(0.735)	(0.210)	(1.379)	(0.140)
Observations	1,760	1,047	1,456	1,234	1,715	1,759	1,725	1,747
R-squared	0.947	0.920	0.909	0.872	0.924	0.907	0.929	0.939

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001 and

2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year, college and state. Standard errors are clustered by state.

Table 10: The effect of having a new degree-granting for-profit college open on enrollments at private four-year institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Enrollment Outcomes	Total	FTE	African-American	Hispanic	Age > 25	Degree-Seeking	Men	Women
Year -4 X Log(Distance)	-0.00653	-0.00714	0.000901	0.00206	-0.00757	-0.00874	-0.00225	-0.0106
	(0.00504)	(0.00516)	(0.0112)	(0.0103)	(0.00838)	(0.00632)	(0.00596)	(0.00633)
Year -3 X Log(Distance)	-0.00470	-0.00472	0.0114	0.00835	-0.0120	-0.00163	-0.00768	-0.00700
	(0.00589)	(0.00620)	(0.0156)	(0.0148)	(0.00996)	(0.00774)	(0.00671)	(0.00726)
Year -2 X Log(Distance)	-0.00584	-0.00515	0.0239	0.0254	-0.0174	-0.00242	-0.00400	-0.00968
	(0.00605)	(0.00676)	(0.0153)	(0.0155)	(0.0111)	(0.00752)	(0.00854)	(0.00678)
Year -1 X Log(Distance)	-0.00475	-0.00439	0.0396**	0.0301**	-0.00566	-0.00288	0.00550	-0.0111
	(0.00586)	(0.00596)	(0.0160)	(0.0141)	(0.0120)	(0.00716)	(0.00643)	(0.00736)
Year 0 X Log(Distance)	-0.00417	-0.00311	0.0427**	0.0322*	-0.00893	-0.00467	0.00193	-0.00691
	(0.00590)	(0.00569)	(0.0160)	(0.0174)	(0.0135)	(0.00704)	(0.00675)	(0.00717)
Year 1 X Log(Distance)	-0.00427	-0.00252	0.0384**	0.0369**	-0.0184	-0.00468	0.00397	-0.00699
	(0.00611)	(0.00590)	(0.0171)	(0.0161)	(0.0151)	(0.00682)	(0.00689)	(0.00763)
Year 2 X Log(Distance)	-0.00120	6.85e-05	0.0464***	0.0434**	-0.0171	0.00230	0.00994	-0.00379
	(0.00688)	(0.00683)	(0.0166)	(0.0166)	(0.0157)	(0.00734)	(0.00833)	(0.00856)
Year 3 X Log(Distance)	-0.00270	-0.00271	0.0300*	0.0293	-0.0164	-0.00278	0.00776	-0.00512
	(0.00722)	(0.00714)	(0.0175)	(0.0207)	(0.0158)	(0.00747)	(0.00897)	(0.00962)
Year 4 X Log(Distance)	-0.00114	-0.000690	0.0250*	0.0442*	-0.00876	-0.00372	0.00895	-0.00464
	(0.00846)	(0.00926)	(0.0143)	(0.0250)	(0.0152)	(0.00883)	(0.00961)	(0.00894)
Log(Distance)	0.336***	0.354***	0.198***	0.614***	0.266***	0.494***	0.486***	0.499***
	(0.00596)	(0.00652)	(0.0157)	(0.0207)	(0.00980)	(0.00700)	(0.00769)	(0.00784)
Constant	4.229***	3.914***	1.578***	0.926***	4.288***	4.378***	2.484***	3.721***
	(0.0358)	(0.0408)	(0.0885)	(0.117)	(0.0813)	(0.0521)	(0.0621)	(0.0446)
Observations	12,434	12,434	12,434	12,434	12,434	12,431	12,289	12,399
R-squared	0.976	0.977	0.949	0.936	0.946	0.967	0.968	0.973

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001 and

2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year, college and state. Standard errors are clustered by state.

Table 11: Overlap in degree production by institution type

	Community Colleges	For-Profit Colleges	Newly Opened For-Profit Colleges
Awards < 1 Year Certificates in Computers	746	334	135
Awards < 1 Year Certificates in Service	495	934	444
Awards < 1 Year Certificates in Education	347	172	22
Awards < 1 Year Certificates in Health	931	703	481
Awards < 1 Year Certificates in Business	886	436	146
Awards < 2 Year Certificates in Computers	781	353	104
Awards < 2 Year Certificates in Service	635	1066	638
Awards < 2 Year Certificates in Education	379	69	9
Awards < 2 Year Certificates in Health	1111	771	527
Awards < 2 Year Certificates in Business	1092	452	115
Awards Associate Degrees in Computers	973	516	208
Awards Associate Degrees in Service	442	94	39
Awards Associate Degrees in Education	746	31	13
Awards Associate Degrees in Health	999	553	262
Awards Associate Degrees in Business	1068	509	200
N	1277	4248	1752

Data Source: IPEDS

Table 12: The effect of having a new degree-granting for-profit college open on community college associate's degree completions, by subject

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Associate Degrees	Computers		Service		Education		Health		Business	
Year -4 X Log(Distance)	-0.0376	-0.0142	0.00541	0.0394	0.129***	0.0832*	-0.0199	0.0150	-0.0113	-0.00597
	(0.0243)	(0.0216)	(0.0384)	(0.0355)	(0.0466)	(0.0457)	(0.0314)	(0.0211)	(0.0239)	(0.0143)
Year -3 X Log(Distance)	-0.0118	0.00877	-0.000360	0.0219	0.0754*	0.0459	-0.00108	0.0169	-0.0136	-0.00520
	(0.0263)	(0.0232)	(0.0388)	(0.0341)	(0.0413)	(0.0410)	(0.0264)	(0.0195)	(0.0188)	(0.0126)
Year -2 X Log(Distance)	0.0131	0.0195	0.00135	0.00238	0.0804*	0.0721	0.00242	0.0129	-0.0145	-0.0224
	(0.0241)	(0.0227)	(0.0345)	(0.0320)	(0.0406)	(0.0442)	(0.0264)	(0.0174)	(0.0170)	(0.0138)
Year -1 X Log(Distance)	0.0294	0.0338	0.0674*	0.0781**	0.0574	0.0475	-0.0161	0.00201	-0.0212	-0.0180
	(0.0231)	(0.0259)	(0.0378)	(0.0367)	(0.0437)	(0.0408)	(0.0286)	(0.0179)	(0.0147)	(0.0124)
Year 0 X Log(Distance)	0.00150	0.00489	-0.0325	-0.00309	0.0143	0.00499	-0.0211	-0.00254	-0.0282	-0.0186
	(0.0242)	(0.0265)	(0.0397)	(0.0404)	(0.0393)	(0.0407)	(0.0242)	(0.0156)	(0.0182)	(0.0125)
Year 1 X Log(Distance)	0.0107	0.0256	-0.0632	-0.0401	0.0425	0.0395	-0.0298	-0.00741	-0.0249	-0.0314**
	(0.0245)	(0.0252)	(0.0401)	(0.0422)	(0.0389)	(0.0495)	(0.0284)	(0.0157)	(0.0241)	(0.0151)
Year 2 X Log(Distance)	0.0136	0.0208	-0.0451	-0.00768	0.0763*	0.0477	-0.0312	0.000666	-0.0374	-0.0289*
	(0.0325)	(0.0249)	(0.0435)	(0.0395)	(0.0389)	(0.0467)	(0.0317)	(0.0174)	(0.0237)	(0.0158)
Year 3 X Log(Distance)	0.0262	0.0532*	-0.148***	-0.0641	0.00577	-0.00951	-0.0179	0.0119	-0.0481*	-0.0526**
	(0.0277)	(0.0292)	(0.0533)	(0.0485)	(0.0434)	(0.0517)	(0.0294)	(0.0234)	(0.0264)	(0.0203)
Year 4 X Log(Distance)	0.00729	0.00941	-0.185***	-0.105***	-0.0132	-0.0292	-0.0159	-0.0103	-0.0510*	-0.0625***
	(0.0383)	(0.0420)	(0.0540)	(0.0334)	(0.0411)	(0.0482)	(0.0433)	(0.0279)	(0.0289)	(0.0227)
Log(Distance)	-0.272***	-0.651	-0.230***	-0.214***	-0.201***	0.0702	-0.187***	0.227	-0.260***	-0.0217
	(0.0314)	(0.549)	(0.0461)	(0.0174)	(0.0525)	(0.129)	(0.0375)	(0.330)	(0.0346)	(0.0185)
College fixed effects?		Yes		Yes		Yes		Yes		Yes
Constant	4.176***	4.663***	2.454***	0.0292	2.123***	0.761	2.711***	1.527**	6.142***	4.950***
	(0.148)	(0.992)	(0.214)	(0.362)	(0.393)	(0.710)	(0.127)	(0.652)	(0.228)	(0.195)
Observations	8,733	8,733	3,280	3,280	5,374	5,374	10,136	10,136	10,919	10,919
R-squared	0.297	0.736	0.254	0.758	0.367	0.732	0.221	0.857	0.379	0.858

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001

and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 13: The effect of having a new degree-granting, for-profit college open on the production of long certificates, by subject

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Long Certificates	Computers		Service		Education		Health		Business	
Year -4 X Log(Distance)	0.0840*	0.0899	-0.0202	-0.0364	0.0230	0.0127	-0.0250	-0.0159	-0.00803	-0.0172
	(0.0461)	(0.0579)	(0.0246)	(0.0295)	(0.0627)	(0.0605)	(0.0245)	(0.0189)	(0.0255)	(0.0291)
Year -3 X Log(Distance)	0.00788	0.0295	0.00381	-0.0105	0.0599	0.0436	-0.0176	0.00550	0.0283	0.00853
	(0.0402)	(0.0585)	(0.0225)	(0.0262)	(0.0571)	(0.0554)	(0.0220)	(0.0168)	(0.0257)	(0.0229)
Year -2 X Log(Distance)	0.0250	0.0357	-0.0414*	-0.0366*	-0.0430	0.0885	-0.00142	0.0128	-0.00246	-0.0134
	(0.0494)	(0.0679)	(0.0214)	(0.0206)	(0.0787)	(0.0834)	(0.0183)	(0.0169)	(0.0235)	(0.0272)
Year -1 X Log(Distance)	0.0275	0.00587	0.0360	0.0270	0.00222	0.0538	0.00633	0.0171	-0.00769	-0.0134
	(0.0392)	(0.0550)	(0.0338)	(0.0241)	(0.0809)	(0.0934)	(0.0226)	(0.0175)	(0.0262)	(0.0301)
Year 0 X Log(Distance)	0.0217	0.0116	-0.0154	0.000619	-0.0402	0.0186	-0.00115	0.00790	-0.0213	-0.00341
	(0.0305)	(0.0451)	(0.0316)	(0.0261)	(0.0751)	(0.0904)	(0.0277)	(0.0191)	(0.0228)	(0.0278)
Year 1 X Log(Distance)	0.0312	0.0228	0.0208	0.0119	-0.0114	0.0486	-0.0184	0.0131	-0.0402	-0.0297
	(0.0358)	(0.0469)	(0.0369)	(0.0282)	(0.0813)	(0.0711)	(0.0319)	(0.0243)	(0.0335)	(0.0327)
Year 2 X Log(Distance)	-0.0115	-0.00652	-0.0171	-0.0463	0.0128	0.0202	0.00966	0.0279*	-0.00944	-0.00285
	(0.0413)	(0.0509)	(0.0442)	(0.0387)	(0.0903)	(0.0730)	(0.0296)	(0.0164)	(0.0324)	(0.0319)
Year 3 X Log(Distance)	-0.0284	-0.0365	0.0609	-0.00123	-0.0317	-0.0109	-0.00521	-0.00657	-0.0789***	-0.0615**
	(0.0386)	(0.0456)	(0.0496)	(0.0411)	(0.104)	(0.0952)	(0.0223)	(0.0209)	(0.0290)	(0.0290)
Year 4 X Log(Distance)	0.00287	-0.00315	0.0331	-0.0244	-0.00971	0.0208	0.0468	0.0482**	-0.0531	-0.0377
	(0.0439)	(0.0620)	(0.0526)	(0.0414)	(0.107)	(0.0736)	(0.0312)	(0.0191)	(0.0403)	(0.0350)
Log(Distance)	-0.177***	-0.256***	-0.0879**	0.164	-0.151***	0.758	-0.148***	-0.0573	-0.171***	0.105
	(0.0251)	(0.0423)	(0.0392)	(0.608)	(0.0466)	(1.254)	(0.0270)	(0.0424)	(0.0304)	(0.744)
College fixed effects?		Yes		Yes		Yes		Yes		Yes
Constant	2.399***	2.846***	3.054***	3.248***	3.987***	0.186	3.008***	2.237***	1.537***	1.713
	(0.165)	(0.195)	(0.113)	(0.442)	(0.348)	(4.953)	(0.163)	(0.208)	(0.334)	(2.461)
Observations	4,474	4,474	4,531	4,531	1,919	1,919	9,489	9,489	8,568	8,568
R-squared	0.168	0.580	0.249	0.751	0.309	0.690	0.210	0.761	0.245	0.687

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001

and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 14: The effect of having a new degree-granting for profit open on short certificate awards, by subject

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Short Certificates	Computers		Service		Education		Health		Business	
Year -4 X Log(Distance)	0.0599	0.0729**	-0.0469	-0.0490	0.0183	0.00180	-0.0679	-0.0771**	0.0247	0.0376
	(0.0369)	(0.0319)	(0.0521)	(0.0462)	(0.0687)	(0.0568)	(0.0448)	(0.0361)	(0.0404)	(0.0404)
Year -3 X Log(Distance)	-0.0144	-0.00200	-0.116***	-0.0701*	0.0334	-0.00632	0.00958	-0.0241	-0.0365	-0.00726
	(0.0367)	(0.0323)	(0.0372)	(0.0366)	(0.0884)	(0.0818)	(0.0306)	(0.0272)	(0.0340)	(0.0340)
Year -2 X Log(Distance)	-0.0191	0.00417	-0.0710	-0.0565	0.0947	0.0983	0.00956	-0.00249	-0.0113	-0.00671
	(0.0281)	(0.0290)	(0.0513)	(0.0480)	(0.0706)	(0.0779)	(0.0330)	(0.0272)	(0.0382)	(0.0422)
Year -1 X Log(Distance)	0.0624	0.0937**	-0.0852	-0.0626	-0.0142	-0.0205	0.0454	0.0404	-0.0207	-0.0434
	(0.0417)	(0.0375)	(0.0529)	(0.0569)	(0.0651)	(0.0645)	(0.0316)	(0.0330)	(0.0376)	(0.0453)
Year 0 X Log(Distance)	-0.0125	0.0439	-0.0484	-0.0153	0.0322	-0.0162	0.0400	0.0431	-0.0360	-0.0317
	(0.0383)	(0.0420)	(0.0547)	(0.0526)	(0.0791)	(0.0724)	(0.0288)	(0.0312)	(0.0338)	(0.0390)
Year 1 X Log(Distance)	-0.0434	0.0155	-0.183**	-0.127*	-0.0488	-0.0845	0.0262	0.0344	-0.0497*	-0.0222
	(0.0415)	(0.0380)	(0.0757)	(0.0687)	(0.0661)	(0.0842)	(0.0301)	(0.0299)	(0.0280)	(0.0289)
Year 2 X Log(Distance)	-0.00631	0.0589	-0.135**	-0.121**	0.0687	-0.0283	0.0287	0.00472	-0.0170	-0.0264
	(0.0433)	(0.0490)	(0.0526)	(0.0479)	(0.0748)	(0.0508)	(0.0393)	(0.0309)	(0.0333)	(0.0276)
Year 3 X Log(Distance)	-0.0162	0.0149	-0.0967	-0.117	0.0775	-0.0277	0.0983***	0.0776**	0.00306	-0.0206
	(0.0289)	(0.0452)	(0.0788)	(0.0710)	(0.0968)	(0.0699)	(0.0284)	(0.0373)	(0.0460)	(0.0306)
Year 4 X Log(Distance)	0.0275	0.0315	-0.0924	-0.0729	0.217	0.0467	0.00786	-0.00425	-0.0172	-0.00894
	(0.0541)	(0.0522)	(0.0744)	(0.0492)	(0.131)	(0.0916)	(0.0441)	(0.0419)	(0.0492)	(0.0356)
Log(Distance)	-0.160***	-0.0230	-0.0352	0.0685	-0.109**	-0.377	-0.203***	-0.451***	-0.187***	0.379***
	(0.0258)	(0.0462)	(0.0333)	(0.0718)	(0.0460)	(0.350)	(0.0403)	(0.0198)	(0.0275)	(0.0282)
College fixed effects?		Yes		Yes		Yes		Yes		Yes
Constant	2.427***	2.004***	0.755***	-0.154	1.699***	2.275***	1.965***	1.286***	2.664***	1.470***
	(0.364)	(0.288)	(0.257)	(0.472)	(0.228)	(0.803)	(0.232)	(0.354)	(0.204)	(0.155)
Observations	4,559	4,559	2,814	2,814	1,591	1,591	6,684	6,684	6,417	6,417
R-squared	0.227	0.708	0.143	0.671	0.214	0.685	0.324	0.743	0.211	0.690

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. "Distance" is the distance, in miles, between the community college and then nearest degree-granting for-profit to open in the same state between 2001

and 2012. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and state. Standard errors are clustered by state.

Table 15: Descriptive statistics for counties with community colleges

	No new for-profits	At least one new for-profit	At least one new degree-granting for-profit
Community college enrollment	2313	2541	2498
Population (in thousands)	135	1488	1732
Population age 20 to 29 (in thousands)	17	225	264
Population living in poverty (in thousands)	16	222	260
Unemployment rate	6.6	6.6	6.6
Per capita state appropriations	224	214	215
Community college tuition	2325	2371	2311
Number of counties	616	351	215
Number of community colleges	588	576	423

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey
Notes: Averages are across counties and years.

Table 16: The effect of having a new for-profit college open on county-level degree production

	(1)	(2)	(3)
	Short Certificates	Long Certificates	Associate Degrees
After New For-Profit	0.210***	0.122***	-0.00605
	(0.0604)	(0.0412)	(0.0336)
Year	0.0566***	0.0595***	0.0611***
	(0.0104)	(0.00681)	(0.00598)
Constant	14.32**	6.443***	7.876***
	(5.902)	(0.419)	(0.514)
Observations	3,664	3,741	2,306
R-squared	0.854	0.887	0.939
	(4)	(5)	(6)
	Short Certificates	Long Certificates	Associate Degrees
2 Years Before New For-Profit	-0.0193	-0.0524	-0.0696**
	(0.0700)	(0.0429)	(0.0331)
Year	0.0774***	0.0746***	0.0660***
	(0.0103)	(0.00679)	(0.00790)
Constant	17.19***	6.824***	7.992***
	(5.770)	(0.437)	(0.513)
Observations	3,664	3,741	2,306
R-squared	0.853	0.886	0.939

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey
Notes: Observations are community college by year. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, African-American population, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for year and county. Standard errors are clustered by state.

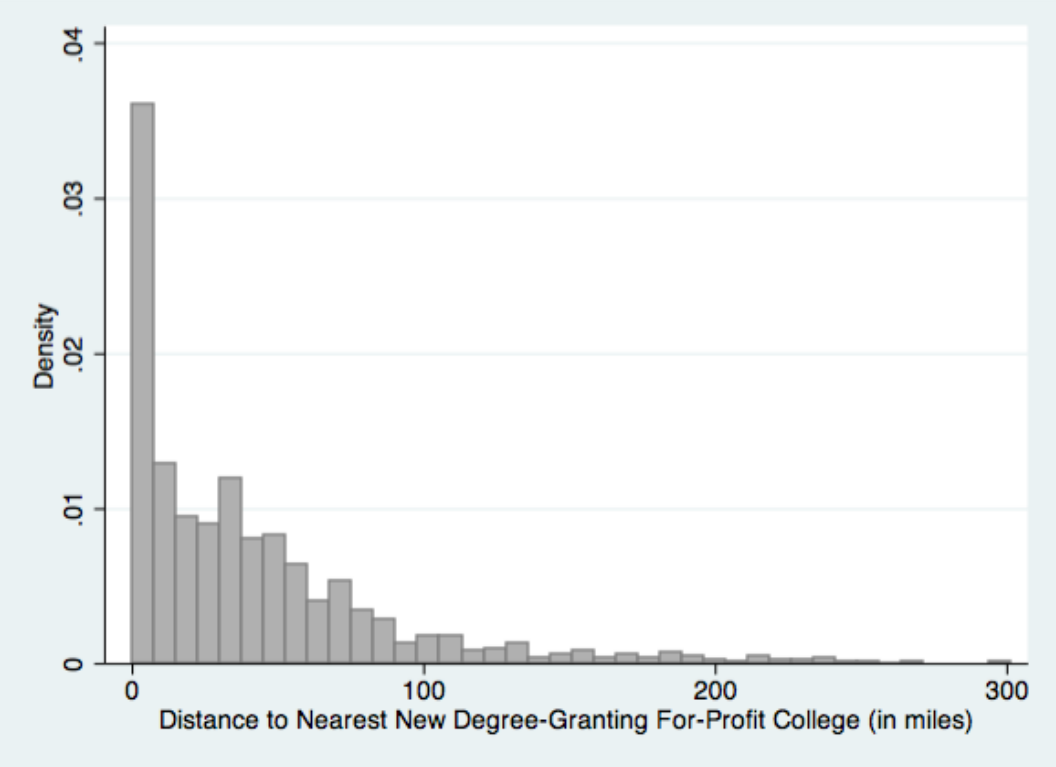
Appendix 1: Missing data

Unitid	Reason	Year Closed/ Years Missing	Unitid	Reason	Year Closed/ Years Missing
100919	combined	2009	160560	combined	2010
100973	combined	2005	160579	unclear	just 2005 is missing
101107	combined	2004	160667	unclear	just 2005 is missing
101347	combined	2004	160676	combined	2010
101523	combined	2004	160685	combined	2011
113953	not clear	lots of years missing	160694	combined	2010
139126	combined	2010	160719	combined	2010
140076	combined	2011	160816	combined	2010
140809	combined	2009	160843	combined	2010
141121	combined	2009	160870	combined	2010
141228	combined	2009	173425	unclear	only has 3 years and 2 are missing
141273	combined	2009	173513	unclear	only has 3 years and 2 are missing
153296	restore	only 2002 missing	173531	unclear	only has 3 years and 2 are missing
155609	combined	2009	173540	unclear	only has 3 years and 2 are missing
156240	combined	2006	173753	unclear	only has 3 years and 2 are missing
156806	combined	2002	174349	unclear	only has 3 years and 2 are missing
156930	combined	2006	175050	unclear	only has 3 years and 2 are missing
157173	combined	2006	175193	unclear	only has 3 years and 2 are missing
157313	combined	2002	175263	unclear	2002 is missing, 2001 is zero
157322	combined	2006	227997	unclear	2003 is missing, and that's its last year
157605	combined	2006	228006	unclear	2003 is missing, and that's its last year
157942	combined	2006	229072	combined	2010
158219	combined	2011	248794	combined	2010
158237	combined	2010	366456	combined	2009
158307	combined	2010	371690		2006 and 2007 inactive becomes active in 2010
158583	combined	2010	381389	combined	2003
158893	combined	2010	381413	unclear	only has 3 years and 2 are missing
158936	combined	2010	383419		2005, 2007 inactive
158945	combined	2010	384360	combined	2012
159018	combined	2010	384379	combined	2012
159045	combined	2010	384388	combined	2012
159090	combined	2010	406398	combined	2005
159249	combined	2010	408127	unclear	only has 3 years and 2 are missing
159258	combined	2011	408932	combined	2002
159267	combined	2011	417150	unclear	has six years and missing in all of them
159692	combined	2010	417211	unclear	missing all years except 2010
159823	combined	2010	417220	unclear	has seven years and missing all of

					them
159984	combined	2010	417248	unclear	missing all except 2010, 2011, 2012
160001	combined	2010	417822	deleted	2010
160047	combined	2010	418418	deleted	2009
160214	combined	2010	418454	unclear	has four years, missing four years
160311	combined	2010	429021	deleted	2005
160366	combined	2010	440615	combined	2008
160384	combined	2010	440943	unclear	only has 3 years, missing last one
160427	combined	2010	441894	unclear	has 9 years, missing 5
			447032	unclear	only has two years, missing both

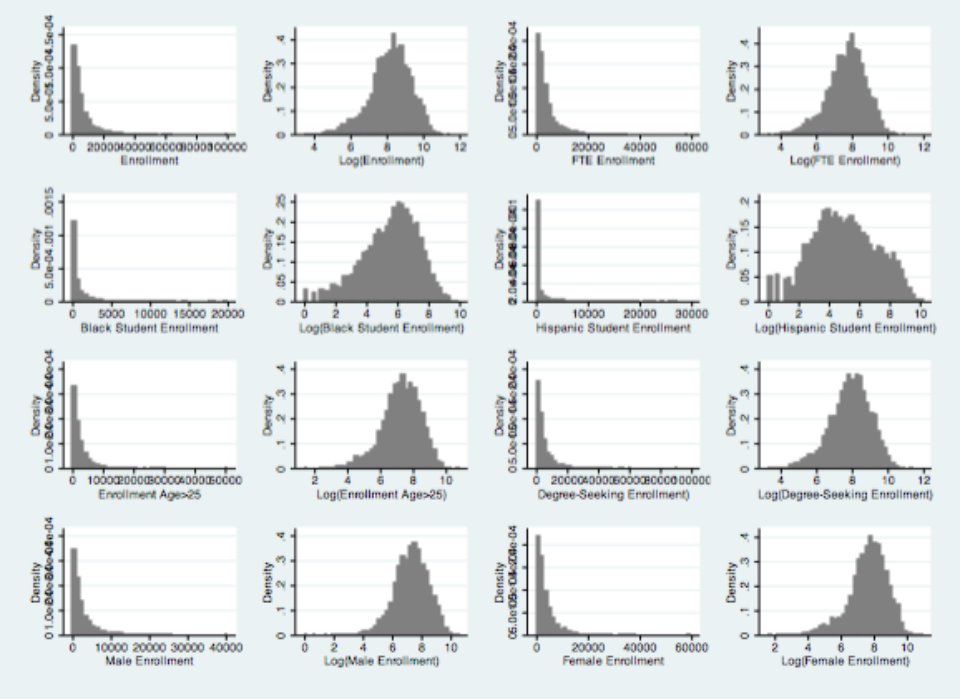
Data source: IPEDS

Appendix 2: Distribution of the distance between public community colleges in the sample and the nearest, newly-opened degree-granting for-profit college



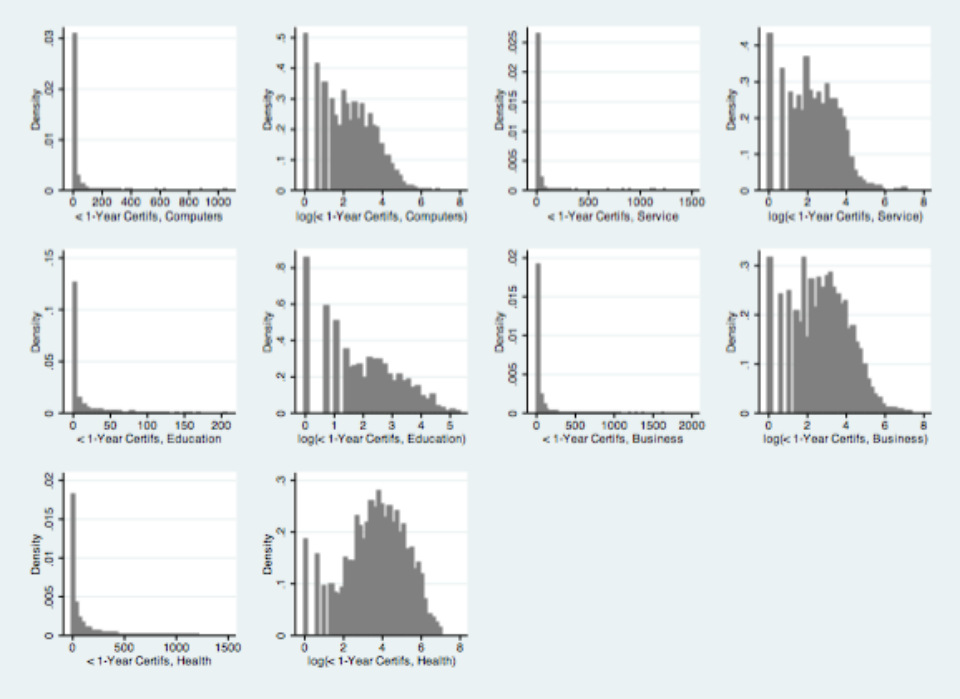
Data source: IPEDS

Appendix 3: Distributions of enrollment outcomes before and after log transformation



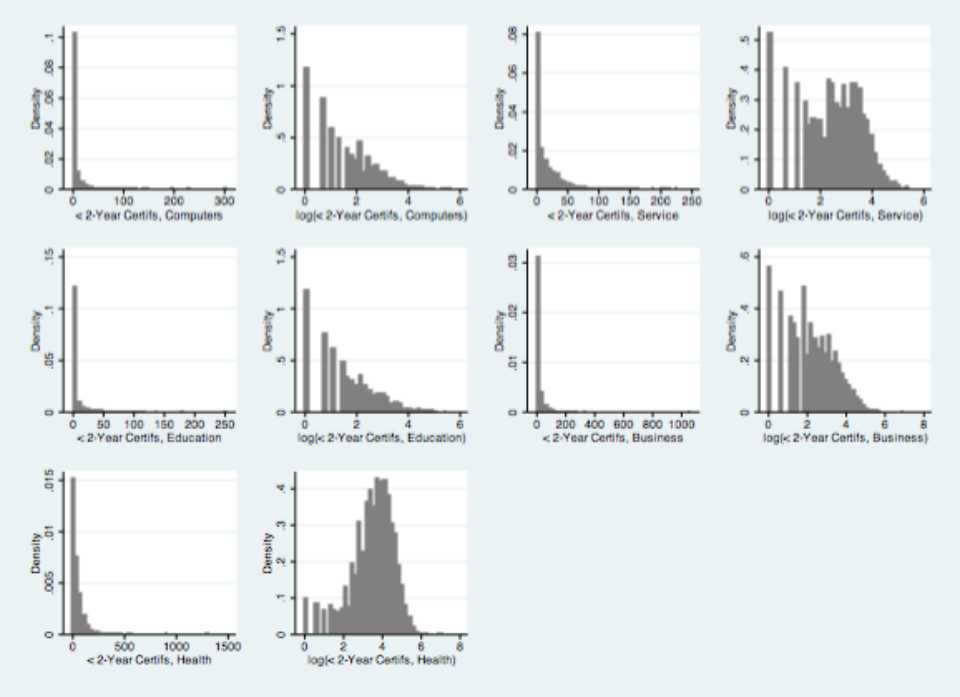
Data source: IPEDS

Appendix 4: Distributions of < 1-year certificate outcomes before and after log transformation



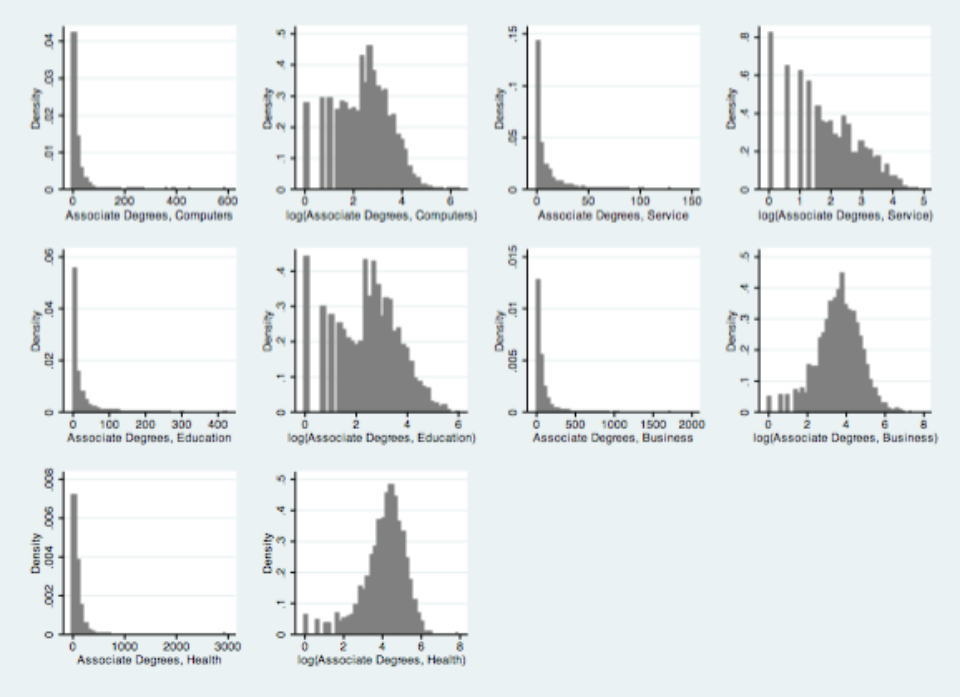
Data source: IPEDS

Appendix 5: Distributions of < 2-year certificate outcomes before and after log transformation



Data source: IPEDS

Appendix 6: Distributions of associate degree outcomes before and after log transformation



Data source: IPEDS

Appendix 7: Community college observations in each year

Year	Observations
-11	108
-10	245
-9	434
-8	559
-7	629
-6	719
-5	794
-4	920
-3	969
-2	1,026
-1	1,058
0	1,039
1	923
2	766
3	591
4	459
5	376
6	306
7	233
8	114
9	78
10	33

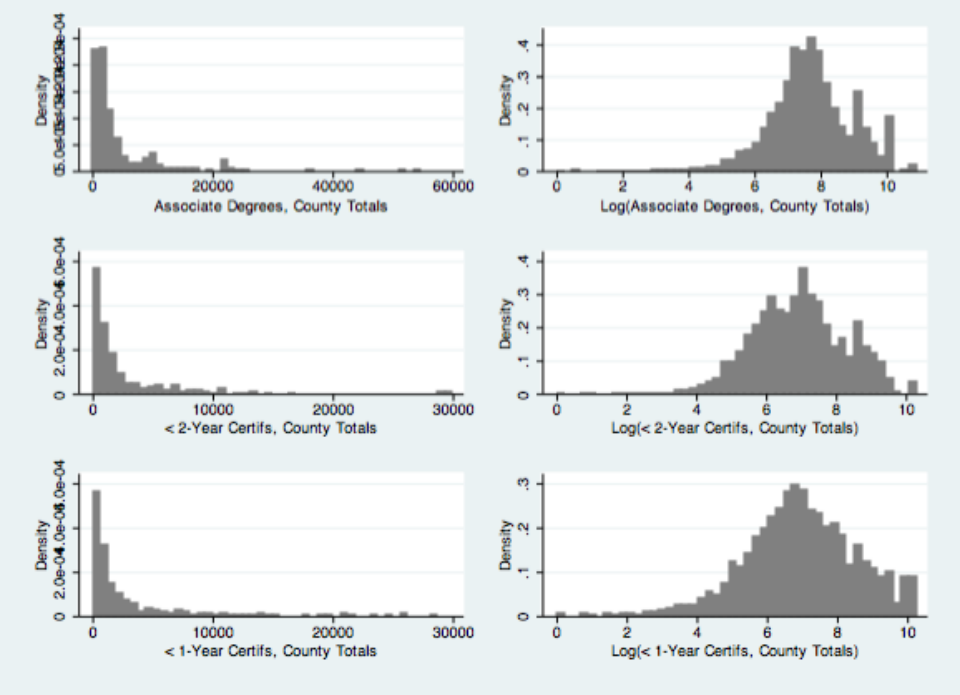
Data source: IPEDS
Notes: Observations are community college by year. Year zero is the year that the nearest new degree-granting for-profit college appeared in IPEDS.

Appendix 8: Distribution of years in sample

	Community colleges in sample	Community colleges for which this is a year before the nearest new for-profit college opened	Community colleges for which this is a year after the nearest new for-profit college opened
2001	1,057	1,057	0
2002	1,026	992	34
2003	1,037	946	91
2004	1,036	917	119
2005	1,049	795	254
2006	1,057	732	325
2007	1,056	650	406
2008	1,052	573	479
2009	1,029	435	594
2010	1,009	255	754
2011	1,003	109	894
2012	968	0	968

Data source: IPEDS

Appendix 9: Distribution of county-level total program awards before and after log transformation



Data source: IPEDS

Appendix 10: Time trends in enrollment outcomes

	(1) Total	(2) FTE	(3) Black	(4) Hispanic	(5) Age > 25	(6) Degree-Seeking	(7) Men	(8) Women
Year -4	-280.9***	-160.2***	-49.66**	20.55	-124.3***	-199.7***	-129.3***	-151.6***
	(85.08)	(50.02)	(22.30)	(30.82)	(41.33)	(69.99)	(35.59)	(50.67)
Year -3	-56.81	-24.16	-16.13	29.64	-34.83	39.46	-29.07	-27.74
	(96.90)	(61.55)	(24.41)	(33.27)	(41.52)	(97.92)	(43.03)	(55.19)
Year -2	120.3	80.55	16.74	7.167	28.94	248.2	59.42	60.90
	(94.73)	(61.27)	(23.96)	(16.98)	(38.32)	(158.2)	(44.40)	(52.50)
Year -1	270.0**	152.3**	30.42	13.30	95.92*	368.1*	138.3**	131.7*
	(122.4)	(70.99)	(28.74)	(17.77)	(49.72)	(185.2)	(59.85)	(66.28)
Year 0	419.4***	245.9***	42.54	25.67	134.3***	509.6***	200.5***	218.9***
	(123.1)	(74.59)	(32.88)	(16.76)	(48.43)	(173.4)	(55.41)	(70.55)
Year 1	496.4***	284.9***	30.17	56.99*	142.7*	678.8***	237.1***	259.3***
	(164.3)	(92.29)	(49.80)	(31.17)	(76.48)	(224.4)	(72.38)	(94.37)
Year 2	553.3**	288.8**	51.48	128.9**	172.9	768.4**	272.0**	281.4*
	(263.9)	(134.9)	(66.66)	(60.38)	(110.2)	(289.1)	(113.8)	(152.5)
Year 3	583.8**	347.7**	52.23	62.23	205.7*	775.2***	277.3**	306.6**
	(237.3)	(132.2)	(68.37)	(70.62)	(110.8)	(273.3)	(109.1)	(130.4)
Year 4	1,022***	600.0***	98.96	71.82	414.8**	1,173***	465.2***	557.1***
	(336.7)	(192.8)	(88.14)	(73.98)	(168.8)	(354.0)	(145.1)	(194.9)
Constant	9,810***	4,644***	-126.8	852.6***	4,593***	7,106***	4,262***	5,547***
	(560.5)	(374.4)	(155.2)	(313.7)	(272.1)	(757.9)	(258.2)	(317.7)
Observations	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020
R-squared	0.319	0.283	0.200	0.466	0.303	0.251	0.337	0.298

Data sources: IPEDS, Census, Bureau of Labor Statistics, Grapevine Survey

Notes: Observations are community college by year. Year -4 is four years before the new degree-granting for-profit appeared in the data, and Year 4 is 4 years after the new for-profit appeared in the data. All models include covariates including county population, county unemployment rate, and county population of adults age 20 to 29, population living in poverty, state appropriations to higher education and community college tuition. All models include fixed effects for state. Standard errors are clustered by state.