# How Academic Standards Shape the Returns to For-Profit and Public Colleges

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**Abstract**

A disproportionate share of the returns to college accrues to graduates, but only 30% of two-year public college students earn degrees. I document that for-profit colleges award degrees at twice the rate of comparable public programs, despite serving academically weaker students. I then develop two strategies for identifying sector effects on completion rates: (1) a DiD estimator comparing students who enroll in each sector during different enrollment spells, and (2) an IV estimator using excluded cost-shifters for enrollment to identify sector effects on the for-profit/public margin. Each design finds a for-profit completion premium of 40 percentage points, with larger gains for low-ability students. Next, I trace how these effects shape earnings. Although ex-post earnings gains from both graduation and dropout are lower at for-profits, their higher completion rates imply comparable ex-ante returns. Finally, I turn to transcript evidence to understand why low-ability students gain relatively more from for-profit enrollment. I show that for-profits offer a significantly narrower and less demanding curriculum, consistent with academic match effects. These results suggest that, by introducing similar tracks, public colleges could significantly improve degree attainment among low-skill vocational students while preserving the returns to college.

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# 1 Introduction

A disproportionate share of the returns to college accrues to those who graduate (Jepsen, Troske and Coomes 2014). While graduation rates are relatively high at four-year and selective colleges, the 40% of all U.S. college students who seek degrees from *two*-year colleges mostly fail to ever accomplish that goal: only 30% of community-college (CC) students graduate within 1.5 times the expected program duration, rising to at most 40% when including transfer students.[1] Ever since the widespread publication of graduation rate statistics more than 25 years ago, much research and policymaking has sought to improve persistence and degree completion at two-year public colleges. The few efforts which have clearly succeeded — most notably, the Accelerated Study in Associate Programs (ASAP) interventions — are intensive and costly programs which have yet to be scaled significantly beyond their trial settings (Weiss et al. 2019). As a result, CC graduation rates have only risen modestly since the 2000s.

Nearly 90% of two-year students enroll in public colleges. Yet those enrolling in for-profit colleges graduate at twice the rate of their public peers. This is perhaps surprising given that for-profit colleges are known to underperform on most other metrics, charging high prices that saddle students with significant debt, while leading to generally worse labor market outcomes. But higher graduation rates do not necessarily indicate better performance, as graduation rates and college returns are jointly determined by a college's degree production technology. To the extent that for-profits achieve higher graduation rates by relaxing their academic standards, the value of their degrees may suffer. On the other hand, less academically prepared students may find degree attainment particularly challenging at public colleges and turn to the for-profit sector for a better-matched degree pathway.

This paper estimates the relative productivity of for-profit and public programs for students of differing academic skills. By characterizing differences in the underlying degree production technology, my results can inform public colleges' efforts to design new degree pathways that foster success among academically under-prepared students. Hundreds of community colleges have begun designing alternative "guided pathways" models with simpler requirements and greater structure (Jenkins et al. 2025). Yet their effects remain poorly understood since these kinds of whole-program reforms are highly varied, often address only one of multiple potentially compounding barriers to degree attainment, and do not lend themselves to randomized evaluations — unlike student-level interventions like ASAP. Comparison to for-profit degree pathways therefore allows a unique window into the operation of

[1] Author's calculations using IPEDS degree-completion data and NSC estimates of graduation rates among transfer students.

a wholly different model with potential benefits for non-traditional college students.

Toward understanding the welfare and policy implications of this for-profit completion premium, I ask three principal questions: First, why do two-year for-profit students graduate at significantly higher rates than community-college students? Here, I disentangle the roles of sorting and school effects. Second, I consider how these differences shape the relative returns to for-profit and public college, and whether they lead to academic match effects. Finally, I ask whether relaxed for-profit academic standards can explain these patterns by characterizing how for-profit and public degree production technologies differ.

Combining evidence from national panel surveys with administrative education and earnings data from Texas, I first show that for-profits' elevated graduation rates are not attributable to differences in degree composition or student sorting, but rather owe primarily to school effects. Although private colleges specialize in programs with naturally higher graduation rates — relatively short degrees in a subset of vocational majors —, I find that sectoral gaps in degree attainment remain large within each degree type. Next, I show that despite achieving higher graduation rates, for-profit students enter college with significantly weaker academic backgrounds than community-college students. As a result, controlling for a rich set of pre-college academic and socioeconomic characteristics only inflates the for-profit completion premium. I also find significantly larger CC completion-rate penalties among the least academically prepared students, who disproportionately sort into for-profits. These patterns point to the possibility of academic match effects and suggest that for-profits raise graduation rates by relaxing their academic standards.

I then address sorting on unobserved heterogeneity under two different identification strategies using the administrative records. First, I estimate relative completion rates among students enrolling in both sectors at different times. Conditioning on "switchers" purges bias due to sorting on permanent unobserved heterogeneity, and observing switchers in both directions allows identification of the average sector effect under a symmetry assumption. Estimates indicate a for-profit completion premium of 40 percentage points. Next, I extend Mountjoy (2022)'s identification of margin-specific treatment effects using distance-to-college instruments as excluded cost-shifters. I show that student characteristics are balanced across values of the instruments once conditioning on a rich set of location characteristics. Estimates again show a 40 percentage-point for-profit sector effect among marginal students.

For-profits' alternative degree pathways are only useful as a model for public colleges to the extent that they preserve the returns to college. Do for-profits function as "diploma mills" churning out degrees with little value, or do they provide a better academic match to students who are less prepared for the demands of a public education? To understand whether the for-profit completion premium dilutes the value of for-profit degrees, I next

estimate the ex-post returns to different schooling outcomes using individual FE models of earnings. I find substantial returns to both for-profit and community college degrees, while the returns to those who enroll and dropout are small.

Though CCs yield somewhat larger ex-post returns, the for-profit graduation premium makes the ex-ante returns to enrollment comparable. Low-ability students in particular rarely earn the large returns to CC degrees, diminishing their ex-ante return to CC enrollment. I then show how these patterns impact ex-ante relative returns across the distribution of academic ability. While academically prepared students earn much larger expected returns at CCs, low-ability students earn similar, if not larger, returns at for-profit colleges. I also estimate ex-ante relative returns among marginal students using the distance-IV design, again finding parity in gross returns among low-ability students and substantial match effects. I next show that for-profit colleges spend less per enrollee than community colleges, implying that the for-profit degree production technology is relatively efficient for low-ability students.

To characterize the underlying sources of these school effects, I finally provide evidence on differences in for-profit and public degree pathways. For-profit students with observably similar academic backgrounds earn significantly higher grades than their community-college peers. They are also much less likely to be placed into remedial education, and they take substantially narrower courses of study, avoiding the out-of-major academic courses commonly required at CCs. Conditional on student characteristics, for-profit GPAs are nearly 0.50 GPA points higher — one third of which owes to their narrower vocational focus, with the remaining two thirds explained by within-subject grade inflation. These curricular differences help rationalize both the for-profit completion premium and the match effects in degree production and earnings.

I conclude that for-profit colleges efficiently supply an alternative curricular level better suited to the weaker academic backgrounds of many of their non-traditional students. To better serve for-profit students, community colleges might therefore invest in new vocational degree programs with narrower scope and more attainable academic requirements.

**Related Literature** My results primarily contribute to the literature on for-profit colleges, the drivers of low community-college graduation rates, and college returns. While prior work has noted two-year for-profits' higher graduation rates in passing, little attention has been devoted to explaining them. Exceptions include Person, Rosenbaum and Deil-Amen (2006), who use narrative evidence from a sample of 14 two-year colleges to argue that CC students face significant information problems as they navigate their degree pathways, pointing to the potential for the alternative degree structures encountered at for-profits to improve attainment. Several decades earlier, Wilms (1974) showed in a sample of 50 career

colleges that students with lesser academic preparation were disproportionately more likely to graduate from for-profit colleges — indicating that the variation in academic standards I find may represent a longstanding structural feature of US higher education. More recently, Haygood (2025) shows that community colleges significantly slow the degree progression of for-profit students, as for-profit students downshift to part-time enrollment when they enroll in CCs. Since initial enrollment intensity is highly predictive of persistence (Attewell, Heil and Reisel 2012), for-profits' accelerated programs may therefore contribute to completion-rate gaps.

Much more attention has been paid to the issue of low graduation rates at community colleges, which has concerned researchers and policymakers for decades. While community colleges promise gateways to human capital formation for students of lesser means, some have pointed to a tension between their open-access mission and their performance (Bailey, Jaggars and Jenkins 2015). Bound and Turner (2007) and Bound, Lovenheim and Turner (2010) find that supply factors exert important influences on degree production, showing that declines in per-student spending have significantly reduced graduation rates at non-selective colleges — though they find a weaker relationship within the two-year sector. Other research provides quasi-experimental evidence that low CC completion rates indeed reflect large school effects — but for students on the margin of four-year and selective college attendance (Zimmerman 2014; Cohodes and Goodman 2014; Goodman, Hurwitz and Smith 2017; Bleemer 2021). I contribute by showing that CC graduation rates reflect significant completion penalties, even relative to other non-selective schools. Yet the reasons for CC penalties among students on the for-profit margin may differ significantly from those on the selective-college margin. For-profit students are substantially more disadvantaged in their resources, academic preparation, and socioeconomic background, and the constraints on degree attainment relevant for these students, who primarily seek short vocational degrees, likely differ too.

Convincing evidence on the specific drivers of low CC graduation rates remains relatively scarce. Researchers have articulated many potential barriers, including implicit capacity constraints and cohort crowding (Bound and Turner 2007), limited course offerings and flexibility (Robles, Gross and Fairlie 2021; Grosz, Kurlaender and Stevens 2022), the structure of remedial requirements (Bailey, Jeong and Cho 2010; Meiselman and Schudde 2022), insufficient advising resources to navigate complex degree requirements (Person, Rosenbaum and Deil-Amen 2006; Bahr 2008), lack of structure and "guided pathways" to degrees (Scott-Clayton 2011; Bailey, Jaggars and Jenkins 2015), and peer effects (Smith and Stange 2016), among others. Progress on empirically identifying the significance of these hypothesized barriers to degree progression has been somewhat limited due to challenging identification

issues and potential interactions between different barriers. I look to the example of another sector producing similar degrees to highlight two additional challenges faced by academically weaker students: broad curricular requirements with relatively tough grading standards.

A number of interventions have also been designed to relax some of these constraints. Most notable are the ASAP programs in New York and Ohio, which have shown easily the greatest effects on CC graduation rates of any known intervention (Weiss et al. 2019; Miller et al. 2020). These student-level randomized programs offered a bundle of services including increased advising and tutoring resources, tuition waivers and other in-kind financial support, and full-time enrollment requirements. It is difficult to separately identify the influence of any one element of these treatment bundles, yet together they nearly double students' graduation rates. While these interventions show that allocating significantly greater resources to students in existing degree pathways can improve degree progression, my results indicate that alternative reforms which adapt the structure of the degree pathway itself could produce even larger effects on degree attainment.

Two-year for-profits' elevated graduation rates have not been carefully studied, and the bulk of research on for-profit colleges centers on alternative outcomes on which for-profits typically underperform. For-profits are significantly more expensive than public colleges, and most studies show their earnings effects fall near or below those of community colleges (Darolia et al. 2015; Cellini and Turner 2019; Lovenheim and Smith 2023; Armona and Cao 2024). Jepsen et al. (2025) is a notable recent exception in the literature, showing that for-profits in Missouri somewhat out-perform community colleges in gross returns to many degree programs. Even taking into account the cost of tuition, they find relatively large net returns to for-profit enrollment, though CCs still offer significantly higher returns once accounting for tuition. Other research highlights the significant student loan debt that many for-profit students acquire and struggle to pay off (Cellini and Darolia 2016; Armona, Chakrabarti and Lovenheim 2022).

Still, existing estimates of the relative returns to for-profit versus public colleges are not robust to sorting on unobserved heterogeneity in treatment gains. I provide the first estimates of the relative return to for-profit and public college robust to these issues, showing that standard return comparisons can be meaningfully impacted by match effects and sorting on relative returns. Here, I build on the extensive literature on identification and estimation of college returns under heterogeneity and non-random sorting. Particularly relevant is Mountjoy (2022), who shows identification of margin-specific treatment effects in settings with multiple, unordered treatments and unrestricted treatment-effect heterogeneity, along with earlier work on identification under essential heterogeneity (Willis and Rosen 1979; Heckman, Urzua and Vytlacil 2006; Carneiro, Heckman and Vytlacil 2011). Also relevant

are Altonji (1993) and Stange (2012*b*), who theoretically and empirically characterize differences between the ex-ante and ex-post returns to schooling. I also follow the literature in panel identification of college returns using individual fixed effects earnings specifications (Jacobson, LaLonde and Sullivan 2005; Dynarski, Jacob and Kreisman 2018).

Finally, I provide some of the first evidence for match effects within non-selective colleges. Most of the match and affirmative-action literature focuses on college quality, defined in terms of selectivity. Arcidiacono, Aucejo and Hotz (2016) and Dillon and Smith (2020), for instance, find significant complementarities between ability and college quality in graduation rates and earnings at four-year colleges. A smaller literature studying two-year colleges finds little evidence of match effects, as differentiation within the public two-year sector appears less salient (Stange 2012*a*). I show that complementarities exist when broadening the choice set to include two-year private colleges.

I begin in Section 2 by describing the landscape of two-year colleges in the US and potential sources of the for-profit completion premium. Section 3 then describes patterns of degree attainment across sectors, followed by identification and estimation of sector effects on completion rates in Section 4. I then estimate the ex-ante and ex-post returns to for-profit and community colleges in Section 5, showing how they depend on graduation rates and ability. Section 6 documents how the for-profit completion premium and academic match effects are driven by relaxed for-profit academic standards. I conclude with a discussion in Section 7.

# 2 Institutional Background

## 2.1 Data and Sample Description

I employ a combination of survey and administrative panel data. I take nationally representative survey data from the National Center for Education Statistics' Beginning Postsecondary Students (BPS) survey, which followed a cohort of first-time undergraduate students beginning their college studies in the 2011-12 academic year through multiple waves culminating in 2017. The survey collected detailed data on students' pre-college socioeconomic and academic characteristics, their beliefs and preferences at entry and over time, as well as their enrollment and degree completion outcomes during each enrollment spell. A subset of the sample also participated in the Postsecondary Education Transcript Study (PETS), which includes data on courses and credits attempted and earned by subject, as well as grades over time and by subject. The NCES requested transcripts from 93% of the 4,360 institutions included in the BPS and received a transcript from at least one attended institution for 73%

of the 35,540 BPS student participants.

I focus on the subset of 9,400 students surveyed who enroll in 2-year or less-than-2-year colleges. For the majority of the analysis, I restrict attention to the 7,200 students initially declaring a major in a career and technical education (CTE) field, since two-year for-profits offer almost exclusively CTE degrees. And since patterns of degree attainment differ significantly between certificate and Associate's programs, I further split the analysis by the student's intended degree level. This makes for primary analysis samples of 2,800 certificate and 4,400 Associate's students. For one analysis, I also employ an earlier edition of the BPS for a cohort beginning college in the 2003-04 academic year.

To ascertain more granular statistics on degree progression and connect degree completion patterns to labor market outcomes, I also use individual-level linked administrative data on the education and earnings of the universe of Texas public HS students from the Education Research Center (ERC) at UT Austin. The data include student demographic variables, HS test scores and graduation records, the near-universe of Texas college enrollments and degree awards, and quarterly earnings data from the Texas Workforce Commission (TWC), which collects data on the near-universe of wage-earners in Texas based on UI wage reports.

My primary analysis sample includes all Texas HS graduates enrolling in a two-year college in Texas between 2005-2014 who intend a Certificate or Associate's degree in a CTE field.[2] This includes 1.6 million community-college students and 160,000 private students attending all 64 Texas community colleges and 91 private colleges. The for-profit college sample contains more than 95% of all two-year for-profit college enrollment reported in the Department of Education's Integrated Postsecondary Education Data System (IPEDS), which covers all colleges participating in federal financial aid programs. Coverage of purely certificate-granting less-than-2-year for-profits is relatively weak, both because some which report to IPEDS do not report to the ERC, and because many small non-degree-granting for-profits do not belong to the IPEDS data universe, as they do not participate in federal financial aid disbursement. This is not a significant limitation for my purposes, since coverage is nearly complete for the part of the for-profit sector where overlap with CC degree programs is largest — namely, Associate's degree programs in CTE fields.

Finally, I take institution-level data from IPEDS for national summary statistics and for supplemental information on the analysis sample of Texas colleges.

[2]I define CTE fields according to the two-digit Classification of Instructional Programs (CIP) taxonomy. In particular, I include codes 11, 12, 15, 22, 43, 46, 47, 48, 50, 51, and 52, referring to computer and information sciences, personal and culinary services, engineering technologies/technicians, legal professions and studies, security and protective services, construction trades, mechanic and repair technologies/technicians, precision production, visual and performing arts, health professions, and business.

## 2.2 For-Profit and Community Colleges in Perspective

I focus on the two-year college sector, where the vast majority of students intend to graduate with a certificate or Associate's degree. Students in these sub-baccalaureate degree programs make up more than 40% of all US undergraduates. Though two-year for-profit colleges offer substantially higher graduation rates than publics, the opposite is true among four-year colleges. In general, the for-profit sector appears to function best in the market for short credentials with a clear connection to in-demand occupations (Deming, Goldin and Katz 2013). Consistent with this view, Gilpin, Saunders and Stoddard (2015) show that two-year for-profits' entry and program-offering patterns are highly responsive to changes in local labor demand. Still, for-profits are a diverse set of colleges, and the two-year market has also been home to some of the sector's worst offenders in terms of false advertising and fraud (U.S. Government Accountability Office 2010).

While for-profits specialize in shorter certificates, the vast majority of public degrees are awarded at the Associate's level. In the Texas sample, 74.0% of for-profit students enroll in typically one-year certificate programs, compared to just 8.2% of CC students. The rest of the CC students enroll in traditionally two-year Associate's programs, whether terminal or designed to prepare students for four-year transfer. Transfer is much rarer among for-profit students, as for-profits primarily offer terminal degrees and for-profit credits are often not accepted at other institutions. Unlike many of the largest four-year for-profit colleges, two-year for-profits primarily offer in-person degree programs with limited fully online offerings. In addition, for-profits almost exclusively offer certificate/degree programs in CTE fields, while community colleges offer the whole gamut of academic and vocational majors. Thus, in both the majors and future schooling options available to students, community colleges offer a more expansive choice set. This may lead students who are particularly unsure of their desired degree or major to opt for community colleges to preserve these option values.

While public colleges have about 86% market share nationally among primarily sub-baccalaureate colleges, the 12% who enroll in for-profit colleges are particularly socioeconomically disadvantaged.[3] Private non-profit colleges do not operate widely in the two-year sector. Compared to community-college students, for-profit students come from lower-income backgrounds, are less likely to have graduated high school, and often enter college at an older

[3]Based on author's calculations from 2021 IPEDS Fall enrollment of first-time degree-/certificate-seeking undergraduates in primarily sub-baccalaureate colleges. Primarily sub-baccalaureate colleges are those where a minority of degrees are awarded at the Bachelor's level. This distinction matters because a portion of community colleges have officially switched from two-year to four-year status, even though they continue to primarily offer sub-baccalaureate programs. These statistics likely understate the for-profit market share, since for-profits enroll larger shares of their students outside the Fall enrollment reporting window, and because some small for-profits exist outside the IPEDS universe.

age. Based on their academic backgrounds, for-profit students are unlikely to apply or gain admission to selective colleges, so that they mostly face a choice among their local community college, a regional public four-year, or a for-profit.[4]

If anything, it is remarkable that for-profits maintain the small fringe they do given how much higher are their tuition rates. While many community-college students attend school for free after grants, for-profit tuition typically ranges between \$10-\$20k per year. While Armona and Cao (2024) emphasize the role of information frictions, advertising, and generous student loans in dampening students' price sensitivities, other research shows that for-profit students appear to know a fair amount about their college options and choose for-profits for their unique characteristics. For instance, Haygood (2025) shows that for-profit students have strong preferences for particular programs of study offered at for-profits. For-profit students are also significantly more likely to report considering graduation rates when deciding where to enroll, and the vast majority enroll as full-time degree- or certificate-seeking students. This suggests that degree attainment is an important goal among for-profit students in its own right. Beyond whether for-profit degree programs yield labor-market value, demand for viable paths to college degrees provides an independent reason to improve graduation outcomes where possible.

## 2.3 Potential Drivers of the Completion-Rate Gap

For-profit and community college programs differ in multiple dimensions which may contribute to elevated for-profit completion rates. Community college programs must accommodate a wide range of students' educational goals, as they offer both technical training programs and a wide array of academic programs — in addition to providing a gateway to further study at four-year institutions. For-profits, on the other hand, are much smaller and commonly offer only a handful of programs in career-oriented fields. Their students generally come to college with the goal of completing a short program relevant to a particular vocation. For-profits' narrower goals and degree offerings lend themselves to more streamlined curricula. They typically do not require the remedial sequences which CCs require under-prepared students to enroll in before accessing college-level courses, and for-profits also may require fewer general-education courses outside of a student's major. Since community colleges offer open admissions at very low tuition rates, they provide access to college for many students but often lack the advising resources necessary to adequately serve all of their students. By contrast, for-profit colleges allocate larger shares of their spending on advising and support services, and relatively less on instruction. These and other differences may all play a role

[4] Deming, Goldin and Katz (2012) and Haygood (2025) offer additional background on variation among for-profits and the kinds of students the for-profit sector caters to.

in limiting degree attainment at community colleges.

Efforts to improve community-college degree attainment have taken two broad approaches: helping students navigate existing degree pathways, and altering the structure of degree programs themselves. In other words, colleges can either supply greater inputs to their existing degree production technologies or improve the productivity of existing inputs by changing the degree production function. Interventions like Accelerated Study in Associate Programs (ASAP) primarily operate through input augmentation: participants were offered increased advising and tutoring resources, tuition waivers and other in-kind financial support, and were required to enroll full-time.[5] Other common interventions like co-requisite remediation and those falling under the umbrella of "guided pathways" reforms seek to change degree requirements, course-taking options, the timing of specialization, and other features of the degree pathway. These more fundamental reorganizations of community colleges gained traction following criticisms of CC degree pathways as excessively complex and unstructured (Bailey, Jaggars and Jenkins 2015).

Input-augmenting reforms lend themselves to evaluation through student-level randomization, while structural changes to degree pathways are typically only implementable at the college-level, where randomization would be significantly more challenging. Randomized evaluations of ASAP programs in both New York and Ohio demonstrate the largest known graduation-rate effects of existing community-college reforms, nearly doubling the three-year graduation rate, which reached 40% among treated students. And while hundreds of community colleges have adapted their degree pathways over the last decade, identifying the causal effects of these highly varied reforms remains challenging. Many such reforms have targeted only one or two elements of degree requirements, like grouping remedial and college-level courses into shorter co-requisite tracks. Even where causal identification is possible, evaluating these piecemeal reforms in isolation may miss out on important complementarities between reforms. For instance, improving remedial passing rates alone may have no effect on degree attainment if the upper-level general-education courses required to graduate remain out of reach — even if relaxing both constraints together would have large effects. The for-profit model therefore provides a unique window into the operation of a completely different degree production technology. While separately identifying the influence of any single difference between public and private degree pathways may be challenging, evaluating the composite effects of a wholly different degree pathway becomes possible.

[5]In practice, the lines between input- and productivity-augmenting interventions can be blurred. While ASAP did not fundamentally change course offerings or degree requirements, the full-time requirement resembles more of a change in production technology.

# 3 The For-Profit Completion Premium

Within the two-year college sector,[6] 60% of for-profit college students graduate from their original college within 150% of expected time, compared to just 30% of public college students. Figure 1 shows that CC graduation rates have been even lower historically, and the very small number of two-year private non-profit colleges are similar to for-profits in their graduation rates. Incorporating transfer students only modestly shrinks this gap. Though transfer is rare at for-profits, about 18% of CC students transfer to another college. The IPEDS collection does not track the degree attainment of these students, but the NSC estimates that 48% of CC transfer students earn degrees nationally. Imputing this graduation rate to the IPEDS transfer data, Figure 1 also plots the resulting estimates of total graduation rates incorporating transfers. For-profit students remain 20 percentage points more likely to earn a degree.

To begin to understand what drives these completion-rate gaps, I now turn to national survey evidence from the Beginning Postsecondary Students (BPS) survey. This survey tracks students across multiple waves following their entry into college. I again restrict the sample to students beginning at two-year and less-than-two-year colleges. Given that for-profits offer exclusively vocational programs, I also restrict the sample to students intending a major in career and technical education. Since public colleges specialize in longer Associate's degrees, comparing degree outcomes without conditioning on degree intent may conflate the influence of degree program and sector. I therefore split the sample by initial degree intention throughout.

Similar to the analysis in Deming, Goldin and Katz (2012), I present both raw mean differences and comparisons which control for observable pre-college student characteristics. Though selection-on-observables is a strong assumption in this setting, it serves as a starting point to describe key differences between sectors and understand how observable sorting impacts the completion-rate gap. I deal with unobserved heterogeneity in Section 4.1. For now, consider identification of the average for-profit treatment effect $\mathbb{E}[Y_i^{FP} - Y_i^{CC}]$, where $(Y_i^{FP}, Y_i^{CC})$ are for-profit and community-college potential outcomes. Given a vector of controls $X_i$, I estimate regressions of the following form:

$$Y_i = \beta FP_i + X_i'\beta_x + \varepsilon_i \,.$$

Conditional independence, i.e. $(Y_i^{FP}, Y_i^{CC}) \perp FP_i \mid X_i$, along with the linear constant-

[6] I define two-year colleges as those offering primarily sub-baccalaureate degrees. This includes colleges which, as of 2015, were classified as two-year or less-than-two-year, as well as those public colleges classified as 4-year but whose baccalaureate share of degree awards is below 10%.

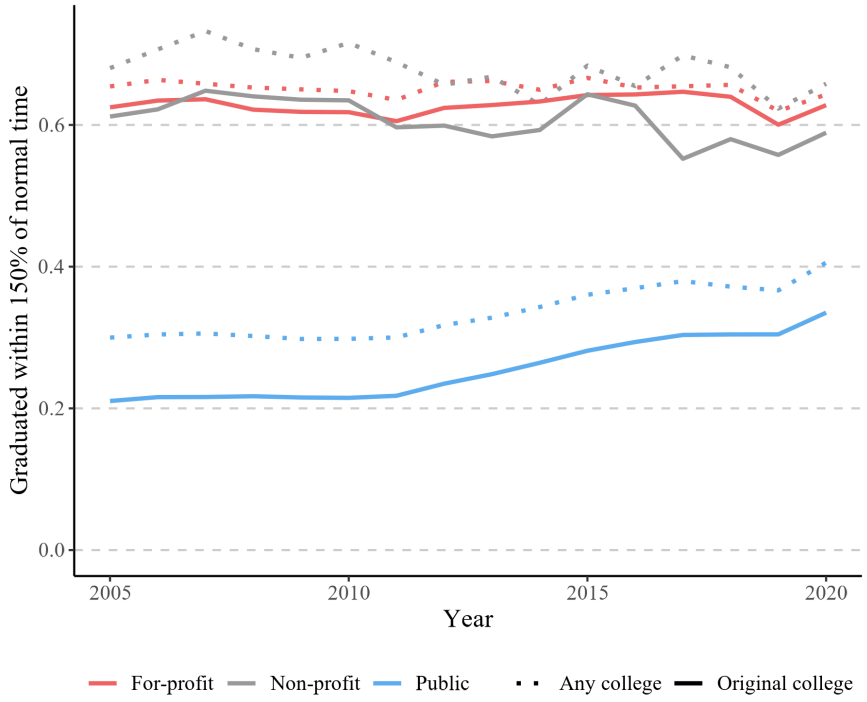



**Figure 1:** Degree Completion Rates by Sector

*Notes:* Graduation rates weighted by full-time equivalent undergraduate enrollment. Primarily sub-baccalaureate colleges only. Estimates of the share graduating from any college add in 48% of those transferring within 150% of the expected degree date, consistent with NSC estimates.

effects functional form then deliver $\beta = \mathbb{E}[Y_i^{FP} - Y_i^{CC}]$. In the results to follow, I will sometimes report estimates of $\beta$, and at other times I will plot selection-corrected means: $\mathbb{E}[Y_i \mid FP_i = 0]$, the observed CC mean, relative to the mean for-profit potential outcome among CC students,

$$\mathbb{E}_{X|FP=0}[\mathbb{E}[Y_i \mid FP_i = 1, X]] = \mathbb{E}[Y_i \mid FP_i = 0] + \beta\,.$$

The difference of these means is simply $\beta$, and the levels correspond to the distribution of $X$ among CC students.

I start by replicating the key facts from the aggregate graduation statistics. Table 1 presents mean public graduation rates and the for-profit graduation premium — shown both as the raw mean difference, and as the residual completion-rate gap after controlling for baseline student characteristics. These include pre-college measures of academic ability and preparedness, socioeconomic status and family background, and student demographics including age at enrollment and single parenthood. I do not control for full-time status, since Haygood (2025) finds that enrollment intensity is strongly influenced by college sector and

may represent an important channel underlying sector effects on degree attainment, as is also suggested by the ASAP studies (Weiss et al. 2019; Miller et al. 2020). Panel A presents results for Certificate students, while Panel B presents those for Associate's students.

Rates of graduation — with any degree from any college, within 3 and 6 years of first enrollment — are significantly higher at for-profit colleges. Since for-profit students have weaker academic preparedness and come from more disadvantaged backgrounds, controlling for student characteristics inflates the completion-rate gap. The for-profit premium is largest for Associate programs, where for-profit students are nearly three times as likely to graduate within 3 years. While public graduation rates catch up over time, still only 40.4% of public Associate's students graduate within 6 years, compared to a (selection-corrected) 61.6% of for-profit students. Graduation rates for public Certificate students are much higher, at 43.6% within 3 years, but Certificate programs make up a negligible share of public enrollment. And even there, for-profit students are 18.8 (12.5) percentage points more likely to graduate within 3 (6) years. So despite for-profits' specialization in shorter vocational degrees, these differences do not explain a large share of the graduation-rate gap.[7]

Students beginning in Certificate programs rarely graduate with a higher degree level, where the for-profit premium operates exclusively through Certificate awards. Switching degree level is more common among Associate's students, however, as half of public Associate's students who graduate end up with a degree other than an Associate's. Of those beginning in a public Associate's program and graduating within 6 years, 18.3% drop down to a Certificate program, while 30% go on to achieve a Bachelor's degree. In part because for-profit credits do not transfer across schools as easily, for-profit students are 5.4 percentage points less likely to attain a Bachelor's degree, yet they are also 3.3 percentage points less likely to switch down to a Certificate (conditional on observables).

Among Associate's students who complete their Associate's degree, for-profit graduates also finish much more quickly, spending nearly half as much time in school. I plot these degree-attainment dynamics in more detail in Figure 2, which shows unadjusted public completion probabilities alongside selection-corrected estimates of for-profit completion rates. These are the estimates of $\mathbb{E}[Y_i \mid FP_i = 0]$ and $\mathbb{E}[Y_i \mid FP_i = 0] + \beta$. Most Certificate students who graduate in either sector will earn their first credential within the first 2 years. Among Associate's students, however, while the vast majority of for-profit graduates complete their first degree within 3 years, it takes a majority of public graduates more than 3

[7] We might worry that for-profit and community colleges offer different distributions of majors even within vocational programs and that specific vocational majors may differ in difficulty. To address this possibility, in Appendix Figure A3 I estimate completion-rate gaps in the Texas administrative data within finer major classifications and find large completion-rate gaps in every field (with the exception of the smallest field, legal studies).

**Table 1:** Degree Attainment by Sector

| | Public mean | For-profit premium | |
|---|---|---|---|
| | | Unadjusted | With controls |
| *Panel A:* Certificate students | | | |
| Any degree within 3 years | 0.436 | 0.152 | 0.188 |
| | | (0.049) | (0.054) |
| Any degree within 6 years | 0.510 | 0.105 | 0.125 |
| | | (0.047) | (0.054) |
| Highest degree: Certificate | 0.464 | 0.123 | 0.133 |
| | | (0.048) | (0.053) |
| Highest degree: Associate's | 0.035 | -0.013 | -0.010 |
| | | (0.014) | (0.015) |
| Highest degree: Bachelor's | 0.010 | -0.005 | — |
| | | (0.008) | — |
| Months elapsed (Certificate graduates) | 16.0 | -2.7 | -2.4 |
| | | (1.4) | (1.5) |
| Months enrolled (Certificate graduates) | 12.6 | -1.4 | -0.9 |
| | | (1.1) | (1.2) |
| *Panel B:* Associate's students | | | |
| Any degree within 3 years | 0.174 | 0.301 | 0.332 |
| | | (0.042) | (0.046) |
| Any degree within 6 years | 0.404 | 0.152 | 0.212 |
| | | (0.044) | (0.053) |
| Highest degree: Certificate | 0.074 | -0.016 | -0.033 |
| | | (0.016) | (0.020) |
| Highest degree: Associate's | 0.209 | 0.277 | 0.299 |
| | | (0.047) | (0.055) |
| Highest degree: Bachelor's | 0.121 | -0.109 | -0.054 |
| | | (0.013) | (0.017) |
| Months elapsed (Associate's graduates) | 36.6 | -17.4 | -18.8 |
| | | (1.2) | (1.9) |
| Months enrolled (Associate's graduates) | 30.8 | -13.9 | -14.0 |
| | | (1.0) | (1.4) |

*Notes:* Estimates from BPS 12/17. Sample includes all students enrolling in a two-year or less-than-two-year college and initially intending a CTE major. The unadjusted for-profit premium is a simple difference of means. The for-profit premium with controls represents the coefficients on for-profit indicators from regressions with the following independent variables: income percentile rank, total income by dependency status, highest level of HS math, years completed of HS math, number of HS honors subjects, number of HS science courses, whether took AP courses, HS GPA, HS degree status, family size, father's and mother's highest education level, whether first in family to attend college, parents' marital status, degree of urbanization, age at enrollment, gender, ethnicity, index of dropout risk, single parenthood, and pre-college work experience. Standard errors in parentheses.

years to earn their first degree. Finally, I show in Appendix Figures A4 and A5 that these national patterns replicate remarkably well in the Texas administrative data, not only in terms of cumulative completion rates, but also in the timing of degree completion and the extent of switching between degree levels.

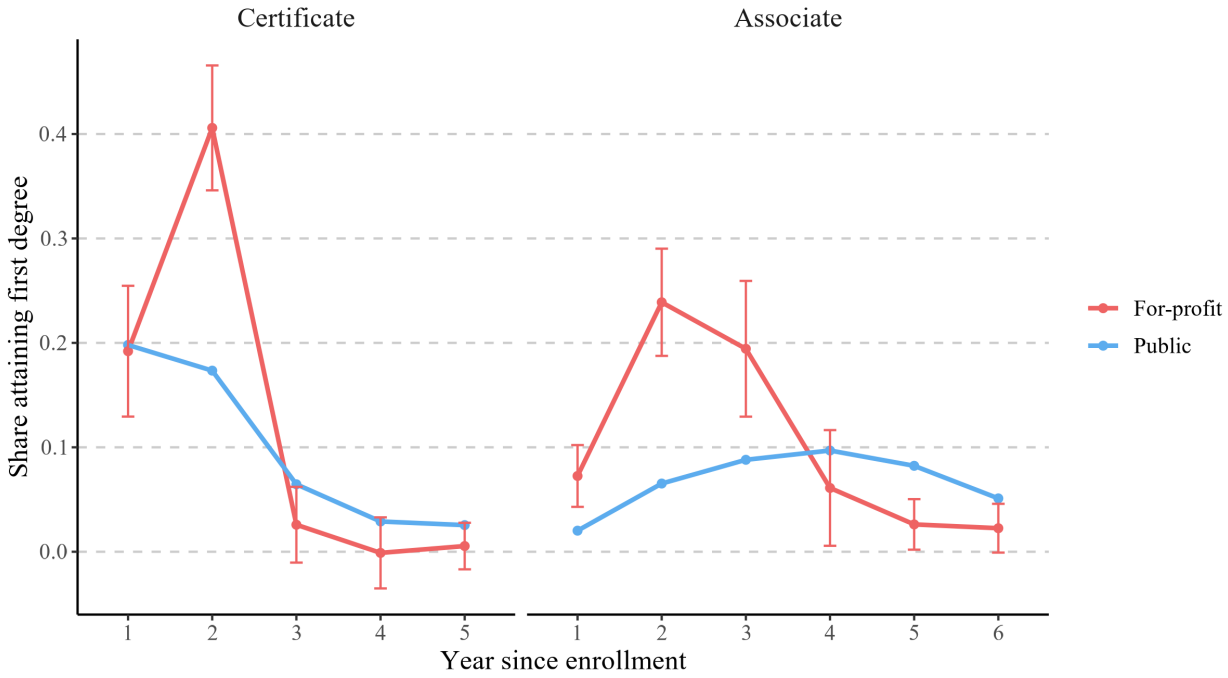



**Figure 2:** Flow Graduation Rates by Degree Program and Sector

*Notes:* Estimates from BPS 12/17. Sample includes all students enrolling in a two-year or less-than-two-year college and initially intending a CTE major. Blue dots represent the proportion of public students completing their degree each year after first enrollment. Red dots are selection-corrected proportions for for-profit students — that is, they add the for-profit coefficient from a regression with controls (where public is the omitted group) to the public mean. Controls include income percentile rank, total income by dependency status, highest level of HS math, years completed of HS math, number of HS honors subjects, number of HS science courses, whether took AP courses, HS GPA, HS degree status, family size, father's and mother's highest education level, whether first in family to attend college, parents' marital status, degree of urbanization, age at enrollment, gender, ethnicity, index of dropout risk, single parenthood, and pre-college work experience. Error bars represent 90% confidence intervals.

Overall, then, although the IPEDS data underlying the aggregate graduation statistics have limitations, they paint a relatively accurate picture of sector differences in degree attainment. Incorporating transfers only modestly shrinks the for-profit completion premium, and conditioning on observable student characteristics in fact expands the gap. Although degree completion patterns do differ substantially by program — with for-profits specializing in shorter, vocational degrees —, the completion-rate gap holds up even within degree levels and within vocational majors.

**Heterogeneity by Academic Ability** Barriers to graduation may differ across students.

If public graduation rates are lower due to stricter academic standards, academically weaker or less prepared students should face particularly low graduation prospects at public colleges. Here I present descriptive evidence consistent with this hypothesis, using the larger administrative sample from Texas. While this analysis remains descriptive in nature, the remainder of the paper will establish that these patterns indeed reflect sector effects that vary by ability, and Section 6 provides direct evidence that public colleges impose stricter academic standards using transcript records.

If academic standards drive the for-profit completion premium, for-profit completion probabilities should be higher across the board, yet less sensitive to their students' academic skills. Denoting $G_i^j$ the potential sector-$j$ graduation outcome of student $i$ with ability $A_i$, we would predict $\mathbb{E}[G_i^{FP} \mid A_i = a] > \mathbb{E}[G_i^{CC} \mid A_i = a]$ for all $a$, while

$$0 \leq \frac{\partial \mathbb{E}[G_i^{FP} \mid A_i = a]}{\partial a} < \frac{\partial \mathbb{E}[G_i^{CC} \mid A_i = a]}{\partial a}.$$

To map this prediction to data, I return to the Texas administrative education records, which I link to measures of students' pre-college ability from 9th- and 10th-grade test scores. Figure 3 shows that public completion rates are in fact highly sensitive to pre-college ability, while the relationship between ability and graduation is significantly weaker in the for-profit sector. The more challenging Associate's programs naturally feature lower completion rates and steeper ability gradients, yet the ability-elasticity of graduation rates remains substantially higher at CCs.

These gradients may reflect differences in other student characteristics associated with HS test scores. Yet conditioning on ethnicity, gender, HS fixed effects, and free-/reduced-price lunch (FRPL) eligibility does not significantly change the estimated slopes. Consistent with sorting on gains, Figure 3 also shows that lower-ability students are over-represented in the for-profit sector, even within degree levels. In Section 5, I show how this sorting on relative graduation rates generates match effects in ex-ante returns. Finally, while the national BPS survey does not include the granular ability measures available in the Texas administrative sample, I find very similar patterns in the national survey data when using binned HS GPA as a measure of academic preparedness (Appendix C).

# 4 Estimating Causal Sector Effects on Completion Rates

While the for-profit completion premium remains large even conditional on a rich set of student characteristics, sorting on unobserved student heterogeneity may still compromise the interpretation of these residual completion-rate gaps as sector effects. Although for-

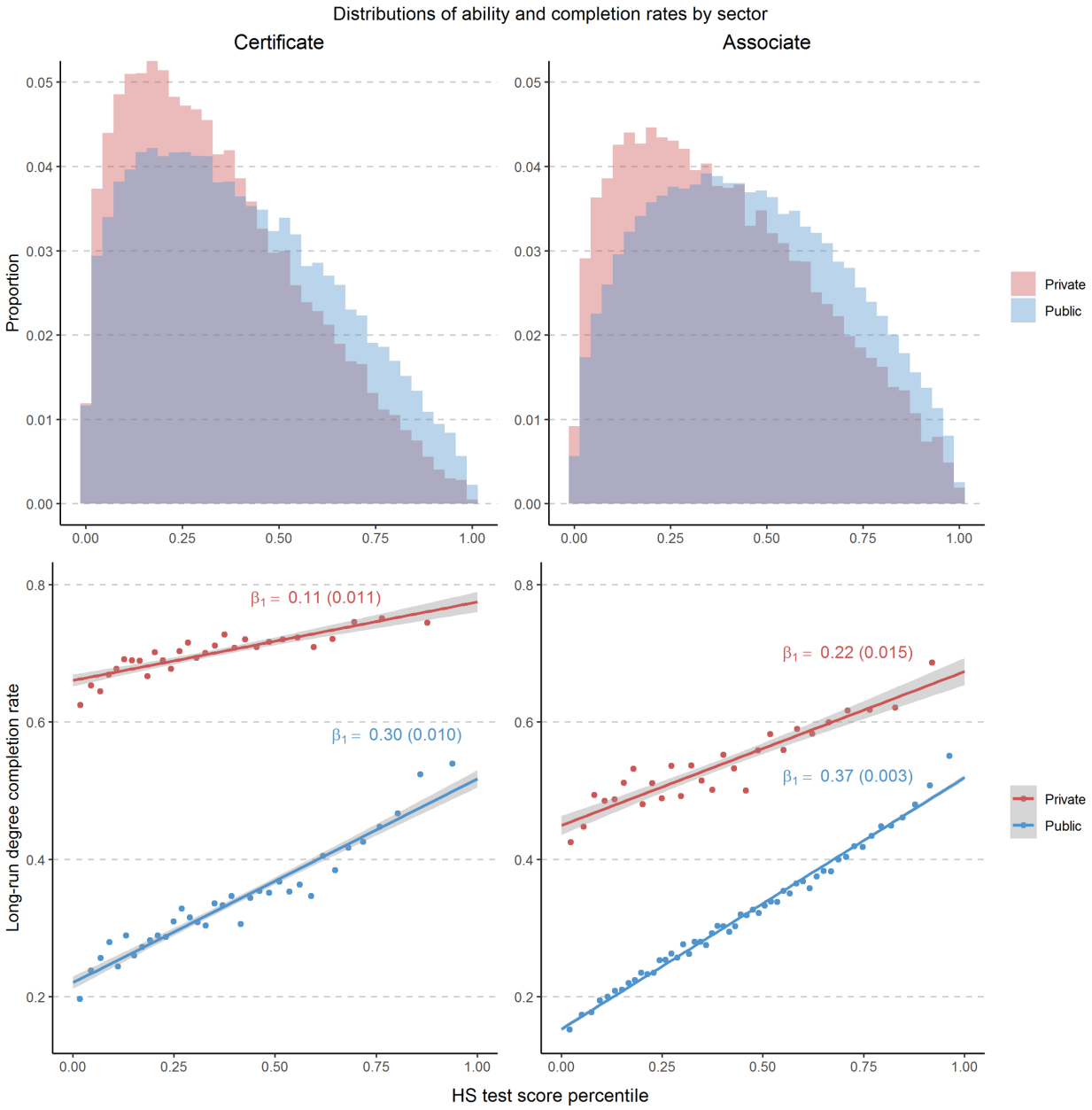



**Figure 3:** Graduation Rates by Pre-College Academic Ability

*Notes:* Sample includes all Texas public HS students who enroll in a two-year for-profit or community college intending a Certificate or Associate's degree from 2005-2012. The HS test score percentile is taken from statewide 9th- and 10th-grade tests in math and reading, which are converted to within-cohort percentile ranks. The long-run degree completion rate is the share of students completing any degree from any college within 7 years of first enrollment.

profit students are observably less prepared to succeed in college, other determinants of graduation like motivation are challenging to measure and may bias the estimated gap in the opposite direction. For instance, a much larger share of CC students begin part-time, suggesting that they may be less committed to earning a degree than their for-profit peers. In addition, for-profit students may know their desired program of study earlier than CC students — since for-profit colleges typically only offer a handful of majors, students must be relatively certain of their major preferences when they first enroll. These and potentially other unobserved differences make selection-on-observables an unsatisfying assumption. To allay these concerns, I now turn to administrative data to estimate causal sector effects on completion rates using two different research designs.

## 4.1 Identifying Sector Effects from Switchers

I begin by identifying sector effects using a "switchers" design. I leverage the administrative data from Texas to identify the sector-specific graduation rates of students who enroll in both sectors at different times. This approach purges any confounding due to permanent unobserved heterogeneity in traits like ability, schooling preferences, effort, and motivation. Time-varying confounders remain an issue, yet observing sector-switchers moving in both directions allows us to separate out a common time-varying switching effect and identify the sector effect under a symmetry assumption. Without imposing symmetric switching effects, I will also show that FP $\rightarrow$ CC switchers yield a lower bound on the for-profit completion premium under reasonable models of the joint decision of graduation and transfer.

**Identification** To formalize the identification argument, let $G_{it}^{j} \in \{0,1\}$, $j \in \{CC, FP\}$, denote potential graduation outcomes for student $i$ in enrollment spell $t$. Graduation is determined by sector-specific graduation thresholds $g_j$, as well as permanent and transitory student characteristics $(X_i, \chi_{it})$ and random spell-specific shocks $\varepsilon_{it}$:

$$G_{it}^{j} = \mathbb{1}\{g_j(X_i, \chi_{it}) > \varepsilon_{it}\}$$

Most students have either $\sum_t G_{it}^{FP}$ or $\sum_t G_{it}^{CC}$ censored, as they only ever enroll in one sector. Yet a subset of students transfer between sectors, allowing us to observe $(G_{i1}^{FP}, G_{i2}^{CC})$ or $(G_{i1}^{CC}, G_{i2}^{FP})$ (where $t \in \{1,2\}$ denotes the first and second enrollment spells). Note that $\chi_{i2}$ may include $G_{i1}^{j}$, the realized graduation outcome at the sector $j$ of the initial enrollment spell.

We would like to identify $\mathbb{E}[G_{i1}^{FP} - G_{i1}^{CC} \mid i \in I]$, the average sector effect on graduation rates for different populations $I$. Yet these are not identified from the observed graduation rates of transfer students without further assumptions. Denoting $\beta_i = G_{i1}^{FP} - G_{i1}^{CC}$ the for-

profit sector effect for student $i$ and $\Delta G_i = G_{i2} - G_{i1}$ their observed difference in graduation outcomes, for CC $\rightarrow$ FP students we have

$$\begin{aligned}\Delta G_i &= G_{i2}^{FP} - G_{i1}^{CC} \\ &= (G_{i2}^{FP} - G_{i1}^{FP}) + (G_{i1}^{FP} - G_{i1}^{CC}) \\ &= (G_{i2}^{FP} - G_{i1}^{FP}) + \beta_i\end{aligned}$$

and analogously among FP $\rightarrow$ CC students, $\Delta G_i = (G_{i2}^{CC} - G_{i1}^{CC}) - \beta_i$. Taking conditional means,

$$\begin{aligned}\mathbb{E}[\Delta G_i \mid CC \rightarrow FP] - \mathbb{E}[\Delta G_i \mid FP \rightarrow CC] &= \mathbb{E}[\beta_i \mid CC \rightarrow FP] + \mathbb{E}[\beta_i \mid FP \rightarrow CC] \\ &= 2\mathbb{E}[\beta_i \mid FP \leftrightarrow CC],\end{aligned}$$

provided that switching effects are symmetric, i.e.,

$$\mathbb{E}[G_{i2}^{FP} - G_{i1}^{FP} \mid CC \rightarrow FP] = \mathbb{E}[G_{i2}^{CC} - G_{i1}^{CC} \mid FP \rightarrow CC]. \tag{A1}$$

The second equality requires either equal shares of switchers in each direction or that sector effects don't depend on the direction of transfer (where FP $\leftrightarrow$ CC denotes all switchers). Then the mean for-profit completion premium among switchers is identified:

$$\mathbb{E}[\beta_i \mid FP \leftrightarrow CC] = \frac{1}{2}\Big(\mathbb{E}[\Delta G_i \mid CC \rightarrow FP] - \mathbb{E}[\Delta G_i \mid FP \rightarrow CC]\Big) \equiv \beta.$$

This parameter is identified under the same assumptions from a regression of graduation outcomes on individual fixed effects, an indicator for the second enrollment spell, and a for-profit sector indicator.

A1 is a reasonable assumption if the graduation-relevant factors that change between enrollment spells — like accumulated skills, schooling preferences, and motivation — are shared by all the kinds of students who ultimately re-enroll in another sector and don't depend on the particular sequence of schooling choices. There are several reasons we might expect the direction of transfer to matter, however. For instance, for-profit schools may be more likely to accept CC transfer credits, which could disproportionately raise the second-spell graduation rates of CC $\rightarrow$ FP switchers. Alternatively, FP $\rightarrow$ CC students may benefit from beginning in the sector with weaker standards before transitioning to a more advanced public program.

To avoid making any symmetry assumptions, we can also bound the for-profit sector effect by restricting the sign of the switching effect. Note that $G_{i1}^{j}$ and $G_{i2}^{j}$ differ for two

reasons. First, transitory student characteristics $\chi_{it}$ may evolve between enrollment spells due to accumulated schooling and possibly graduation during the prior spell, as well as changes in student skills, preferences, and information. The distributions of shocks $\varepsilon_{i1}$ and $\varepsilon_{i2}$ may also differ, as transfer students are a self-selected sample. Selection on the prior graduation outcome may therefore alter the observed distribution of $\varepsilon_{i1}$.

Both of these influences are likely to overstate the graduation rates of transfer students in their second enrollment spell. Even if it ended in dropout, an initial enrollment spell arguably would not reduce a student's accumulated skills and information about their ability, preferences, and the details of college enrollment and course selection. Thus, changes in $\chi_{it}$ seem likely to favor graduation in the second spell. In addition, earning a degree in the first spell is likely to reduce rates of re-enrollment, particularly when restricting to students switching between degree programs of the same level. Therefore, we would expect switchers to be adversely selected on $\varepsilon_{i1}$, as students with negative initial graduation shocks will be over-represented. Together, these predictions would indicate

$$\mathbb{E}[G_{i2}^{CC} - G_{i1}^{CC} \mid FP \to CC] \geq 0. \tag{A2}$$

Under this sign restriction, we have

$$\begin{aligned}\mathbb{E}[\beta_i \mid FP \to CC] &= \mathbb{E}[(G_{i2}^{CC} - G_{i1}^{CC}) - \Delta G_i \mid FP \to CC] \\ &\geq \mathbb{E}[G_{i1} - G_{i2} \mid FP \to CC] \equiv \beta_{LB},\end{aligned}$$

providing a lower bound for the for-profit completion premium among FP $\to$ CC switchers.

Although A2 is not a testable restriction, notice that the average switching effect across both transfer directions is identified from

$$\begin{aligned}\gamma \equiv \frac{1}{2}\Big(\mathbb{E}[\Delta G_i \mid FP \to CC] + \mathbb{E}[\Delta G_i \mid CC \to FP]\Big) = \frac{1}{2}\Big(&\mathbb{E}[G_{i2}^{CC} - G_{i1}^{CC} \mid FP \to CC] \\ &+ \mathbb{E}[G_{i2}^{FP} - G_{i1}^{FP} \mid CC \to FP]\Big),\end{aligned}$$

provided that sector effects don't depend on the direction of transfer. The average switching effect $\gamma$ can therefore shed light on the sign of the switching effect among FP $\to$ CC switchers, even if switching effects are not exactly symmetric.

**Estimation** In practice, I restrict attention to delayed transfers, omitting students who transferred between sectors without ceasing enrollment, as arguably the ultimate origin-sector graduation outcome is censored for those students who remain continuously enrolled. I will also show estimates when restricting attention to students who seek degrees of the same

level and major in each sector, to avoid comparing graduation outcomes in degree programs of differing difficulty.

First, Table 2 shows sector-specific graduation rates $\bar{G}^j$, splitting switchers by the direction of transfer. In the full sample, for-profit graduation rates are 45–62 percentage points larger depending on the transfer direction. To ensure effects are not driven by switching across degree levels of varying difficulty, Panels B and C condition on students who enroll in the same degree programs in each sector. Here the for-profit premia among CC $\rightarrow$ FP remain significant, as these students are highly unlikely to have graduated from their original CC. The for-profit premia among FP $\rightarrow$ CC switchers falls to 20 percentage points, as those who switch to the same degree program are much less likely to have graduated from their original college. These statistics make sense given the prediction that transfer students would face adverse first-spell graduation shocks and do relatively better at their second school. Yet despite the likely positive sign of the switching effect, FP $\rightarrow$ CC students remain substantially more likely to complete the same degree at for-profits.

Table 3 shows resulting estimates for the parameters of interest, which identify or bound the for-profit sector effect on completion rates among transfer students. Assuming symmetric switching effects (A1), $\hat{\beta}$ is a consistent estimator of the for-profit sector effect across all switchers. I find large for-profit premia of more than 40 percentage points even among students switching within the same degree programs. Under non-negative switching effects (A2), $\hat{\beta}_{LB}$ is consistent for a conservative lower bound on the for-profit sector effect among FP $\rightarrow$ CC switchers. I find lower bounds of 20 percentage points or more across all samples. Finally, to judge the sign of switching effects across all switchers, $\hat{\gamma}$ consistently estimates this parameter provided that sector effects are equal across transfer directions. I find switching effects of between 9–22 percentage points depending on the sample. These are significant and positive, consistent with the earlier predictions and the identifying assumptions required for the lower bound $\beta_{LB}$. Finally, in heterogeneity analysis I find that the ability gradients from this within-student analysis match the descriptive ability gradients in Figure 3, indicating that sector effects are indeed larger among low-ability students (Appendix Figure A6).

## 4.2 Identifying Sector Effects from Excluded Cost-Shifters

Admittedly, students who pursue very similar degrees at both for-profit and public colleges are a unique subset of two-year students, and the assumptions needed for identification are difficult to empirically validate. To cement the evidence for sector effects, I next develop an alternative identification strategy which yields sector effects for the broader population of students on the for-profit/public margin under more traditional exclusion and monotonicity

**Table 2:** Completion Rates of Switchers

| | $\bar{G}^{FP}$ | $\bar{G}^{CC}$ | $\bar{G}^{FP} - \bar{G}^{CC}$ | # students |
|---|---|---|---|---|
| *Panel A:* Full sample | | | | |
| CC → FP | 0.66 | 0.04 | 0.62 | 8,219 |
| | (0.01) | (0.002) | (0.006) | |
| FP → CC | 0.59 | 0.14 | 0.45 | 6,039 |
| | (0.01) | (0.004) | (0.008) | |
| *Panel B:* Same degree level | | | | |
| CC → FP | 0.65 | 0.03 | 0.62 | 2,119 |
| | (0.01) | (0.004) | (0.01) | |
| FP → CC | 0.37 | 0.17 | 0.20 | 1,745 |
| | (0.01) | (0.01) | (0.01) | |
| *Panel C:* Same degree level × major | | | | |
| CC → FP | 0.67 | 0.02 | 0.65 | 417 |
| | (0.02) | (0.007) | (0.02) | |
| FP → CC | 0.39 | 0.17 | 0.21 | 321 |
| | (0.03) | (0.02) | (0.03) | |

*Notes:* Sector-specific graduation rates of students enrolling in both sectors at different times, who remained out of college for more than one year between spells. Standard errors in parentheses.

**Table 3:** Implied Sector and Switching Effects

| | $\hat{\beta}$ | $\hat{\beta}_{LB}$ | $\hat{\gamma}$ |
|---|---|---|---|
| Full sample | 0.54 | 0.45 | 0.09 |
| | (0.005) | (0.008) | (0.005) |
| Same degree level | 0.41 | 0.20 | 0.21 |
| | (0.009) | (0.01) | (0.009) |
| Same degree level × major | 0.43 | 0.21 | 0.22 |
| | (0.02) | (0.03) | (0.02) |

*Notes:* $\beta$ gives the for-profit sector effect under A1 (symmetric switching effects). $\beta_{LB}$ bounds the for-profit sector effect under A2 (non-negative switching effects among FP → CC). $\gamma$ gives the average switching effect across both transfer directions under symmetric sector effects. Standard errors in parentheses.

assumptions. Here, I identify margin-specific sector effects using multiple sector-specific cost-shifters for college enrollment, as in Mountjoy (2022).

**Identification** Let $Y_j$ be potential outcomes under a set of mutually exclusive and exhaustive treatments $j \in \{0, 1, ..., N\}$. Also define potential treatments $D_j(\boldsymbol{Z}) \in \{0, 1\}$ with $\sum_j D_j(\boldsymbol{Z}) = 1$, over an instrument vector $\boldsymbol{Z} = (Z_1, ..., Z_N)$.

Under standard independence, exclusion, rank, and monotonicity conditions, variation in only a single element of $\boldsymbol{Z}$ yields a weighted average of treatment effects on different complier margins:

$$LATE_j = \sum_{k \neq j} \omega_k \mathbb{E}[Y_j - Y_k \mid j \leftarrow k \text{ complier}]$$

where the $\omega_k$ complier shares are further identified by single-IV regressions of $D_k$ on $D_j$. Yet the margin-specific local average treatment effects of interest, $\mathbb{E}[Y_j - Y_k \mid j \leftarrow k \text{ complier}]$, are not separately identified. In my setting, reducing the cost of two-year for-profits brings in students not only from CCs, but also from the non-enrollment and four-year margins, which contaminates identification of the for-profit sector effect relative to CCs.

With valid instruments for every treatment level — the full $\boldsymbol{Z}$ —, multivariate TSLS has more promise. Yet even then the margin-specific sector effects are only identified under implausible restrictions on college preferences and/or treatment effect heterogeneity (Kirkeboen, Leuven and Mogstad 2016). Given that low-ability students sort into for-profits and have especially low completion rates at public colleges, essential heterogeneity appears to be a salient feature of my setting, rendering these standard IV estimands uninformative.

However, an alternative estimand which chains together multiple single-IV estimands does identify margin-specific treatment effects under close relatives of the standard IV assumptions. This identification is also robust to arbitrary forms of sorting and treatment effect heterogeneity. Mountjoy (2022) introduces this technique and proves identification in the case of three unordered treatments. Here, I show that identification easily generalizes to finitely many treatment levels.[8]

First, I assume that the $N$ instruments are valid, independent of all potential outcomes and treatments and excluded from the outcome equation:

**Assumption (A-IE)** Independence and Exclusion:

$$\mathbf{Z} \perp\!\!\!\perp \left(Y_0, ..., Y_N, \{\mathbf{D}(\mathbf{z})\}_{\forall \mathbf{z}}\right)$$

Next, I assume a natural extension of monotonicity from the binary case, requiring that the

[8] I present an abbreviated exposition here and refer the reader to Mountjoy (2022) for further discussion.

cost-shifter for $j$ only induces complier flows from $j$ to $k$, $k \neq j$.

**Assumption (A-UPM)** Unordered Partial Monotonicity: $\forall\, z'_j < z_j$, $\mathbf{z}'_{-j} = \mathbf{z}_{-j}$

$$D_j(\mathbf{z}') \geq D_j(\mathbf{z}),\ D_k(\mathbf{z}') \leq D_k(\mathbf{z})\ \ \forall k \neq j,$$

*for all individuals, and strictly for some.*

Note that a rank assumption is embedded here. As usual, this assumption requires that all students agree on the sign of the cost-shifter's utility, ruling out defiers, so that flows go in one direction. However, we impose no restriction on the composition of next-best alternatives from which students are drawn.

Under these conditions, the mean potential outcomes of each complier margin are identified at each point in the support of the instrumental variation, through local IV projections of interacted outcomes $YD_k$ on $D_k$ — instrumenting for $D_k$ with $Z_j$.

**Theorem.** *Under (A-IE) and (A-UPM), for $j \neq k$, $j \geq 1$, $k \geq 1$,*

$$\underbrace{\frac{\partial \mathbb{E}[YD_k \mid \mathbf{Z}]}{\partial Z_j} \Big/ \frac{\partial \mathbb{E}[D_k \mid \mathbf{Z}]}{\partial Z_j}\Big|_{\mathbf{Z}=\mathbf{z}}}_{LIV_{kj}(\mathbf{z})} = \mathbb{E}[Y_k \mid j-k \text{ complier at } \mathbf{z} \text{ wrt } Z_j]$$

*Proof.* See Appendix A. □

Intuitively, these IV regressions isolate how sector-$k$ outcomes change in response to changes only in the cost of sector $j$. While changes in $Z_j$ induce inflows to $j$ on multiple margins $l \neq j$, any change in $Y$ among $k$ enrollees must be due to outflows on the single complier margin $j \leftarrow k$, (under the stated monotonicity and exclusion restrictions). Scaling the total change in the outcome of that sector by the size of the outflow then yields the mean potential outcome among those marginal students.

One additional assumption is required to contrast these identified mean potential outcomes and form the treatment effects of interest. Within students on the $j-k$ margin, we need those induced into $j$ by $Z_k$ to be "comparable" to those induced into $k$ by $Z_j$, in terms of potential outcomes. Formally, we require the following assumption.

**Assumption (A-CC)** Comparable Compliers: *for each* $\mathbf{z}$ and $\mathbf{z}'$ s.t. $z'_l = z_l$ for $l \neq j, k$,

$$\lim_{z'_j \uparrow z_j} \mathbb{E}[Y_k \mid D_j(\mathbf{z}') = 1, D_k(\mathbf{z}) = 1] = \lim_{z'_k \downarrow z_k} \mathbb{E}[Y_k \mid D_j(\mathbf{z}') = 1, D_k(\mathbf{z}) = 1]$$

This is a relatively weak condition, as we only require that students on the same indifference margin treat increases in $Z_j$ similarly to decreases in $Z_k$. Mountjoy (2022) shows that

virtually all standard index models of college choice immediately imply A-CC, though it does rule out certain school preferences, e.g., in which some students with systematically different levels of the outcome are insensitive to just one of the cost-shifters. Under all these assumptions, the margin-specific treatment effects are identified:

$$LIV_{jk}(\mathbf{z}) - LIV_{kj}(\mathbf{z}) = \mathbb{E}[\, Y_j - Y_k \mid j - k \text{ complier at } \mathbf{z}]$$

**Estimation** In practice, I partition the treatments into four levels: non-enrollment, two-year for-profit enrollment, two-year public enrollment, and four-year enrollment.[9] As in Mountjoy (2022), I use the distance to the nearest college in each sector as excluded cost-shifters. Distance instruments are highly correlated with characteristics of the locations where students grow up, so that unconditional IV independence assumptions are implausible. I therefore condition on a rich set of location characteristics and show below that this eliminates the correlation between the distance IVs and pre-determined student characteristics.

I estimate IV systems of the following form:

$$\begin{aligned} YD_j &= \beta D_j + \sum_{l \neq k} \beta_{z,l} Z_l + \beta_x' \boldsymbol{X} + u \\ D_j &= \alpha Z_k + \sum_{l \neq k} \alpha_{z,l} Z_l + \alpha_x' \boldsymbol{X} + \nu \end{aligned}$$

The location characteristics $\boldsymbol{X}$ include fixed effects for Commuting Zone (CZ) and a 12-factor urbanicity variable, HS-level variables including the school's share of free-/reduced-price lunch students and historical industry employment shares for six different industries, as well as a large set of Census tract-level variables from the American Community Survey (ACS) relating to the area's ethnic, education, and income composition. Figure 4 shows that first stages on the FP/CC margin are strong. The right two panels show the relevant first stages, where enrollment in $j$ is regressed on distance to $k$. When including controls for $\boldsymbol{Z}_{-k}$ and $\boldsymbol{X}$, the F-statistics for the exclusion of $Z_{FP}$ and $Z_{CC}$ in the first stages for $D_{CC}$ and $D_{FP}$, respectively, remain strong at 936.9 and 73.2.

Table 4 next evaluates the conditional independence assumptions by estimating the relationship between the instruments and pre-determined student characteristics including gender, ethnicity, FRPL as a proxy for socioeconomic status, and the HS test score percentile as a proxy for academic ability.[10] These characteristics are highly predictive of graduation

[9] Enrollment status is determined by the first recorded sector of enrollment within four years of HS graduation.

[10] This exercise is again similar to that in Mountjoy (2022).

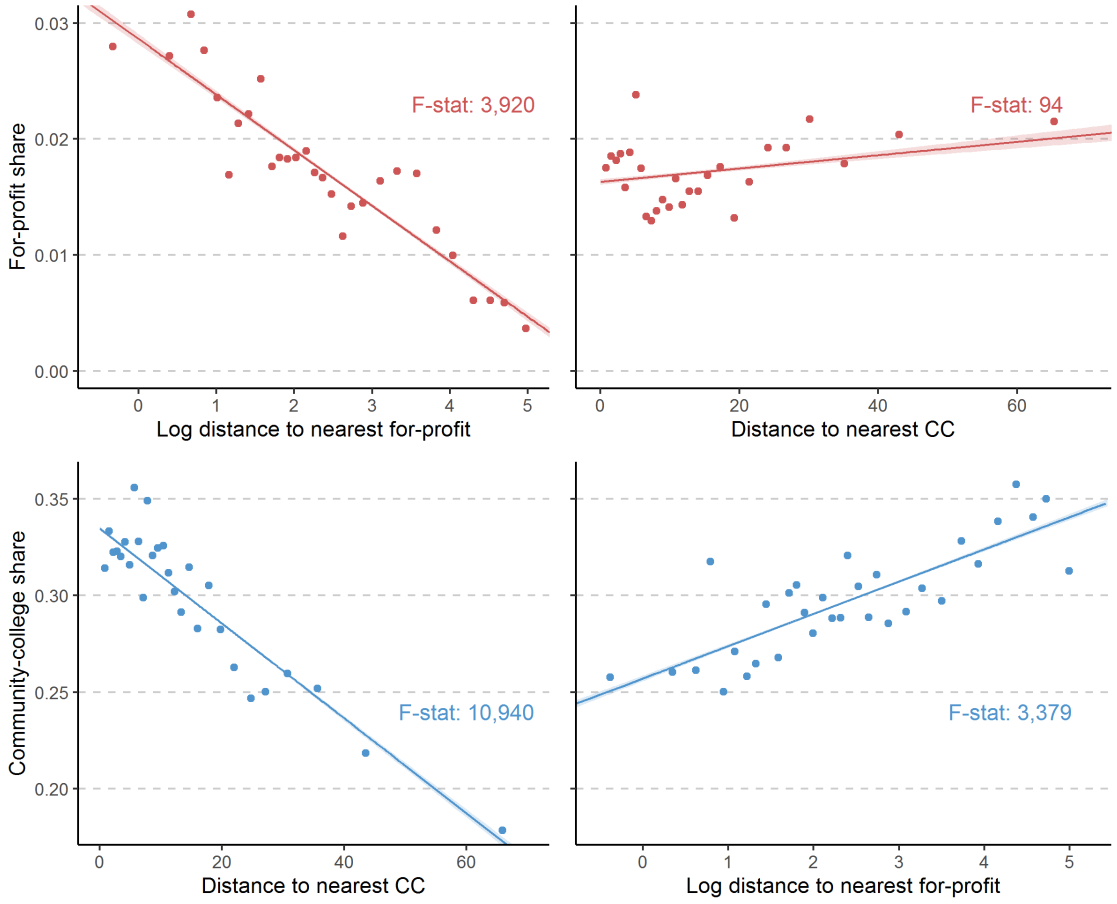



**Figure 4:** First-Stage Relationships

*Notes:* First-stage regressions of $D_j$ on $Z_j$ (left) and $Z_k$ (right), overlaid with binned means. Distance is in miles.

outcomes and, if not balanced across values of the instruments, would indicate potential for unobserved confounding. Without any location controls, these instruments are highly correlated with baseline student characteristics. These relationships attenuate considerably when adding controls for CZ, urbanicity, and HS FRPL share in Columns (2) and (5), and they shrink even further when adding tract-level neighborhood demographics from ACS and local industry employment shares in Columns (3) and (6). The HS test score percentile — the single variable most predictive of college graduation — becomes statistically insignificant as a predictor of CC distance, and moving from the bottom to the top of the HS test score distribution only correlates with a 0.6% difference in for-profit distance. The magnitudes of the correlations in all other cases are negligible once controlling for location characteristics. That the residual distance variation is not meaningfully correlated with observed student characteristics predictive of graduation rates suggests that the location controls effectively capture other forms of unobserved confounding — though a direct test of the conditional independence assumptions is of course not feasible.

**Table 4:** Balance of Student Characteristics Across Distance

| | Log for-profit distance | | | Community-college distance | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Male | −0.001 | −0.002 | 0.001 | 0.136 | 0.020 | 0.003 |
| | (0.001) | (0.001) | (0.001) | (0.018) | (0.012) | (0.012) |
| Black | −0.292 | 0.001 | −0.017 | −2.228 | −0.547 | −0.109 |
| | (0.003) | (0.002) | (0.002) | (0.026) | (0.018) | (0.019) |
| Hispanic | −0.633 | −0.084 | −0.034 | 1.938 | −0.496 | −0.349 |
| | (0.002) | (0.001) | (0.001) | (0.025) | (0.017) | (0.017) |
| FRPL | −0.030 | −0.000 | −0.014 | 1.335 | −0.151 | −0.093 |
| | (0.002) | (0.001) | (0.001) | (0.022) | (0.016) | (0.015) |
| HS test score pctl (0 – 1) | −0.221 | −0.041 | 0.006 | 0.467 | 0.393 | 0.014 |
| | (0.003) | (0.002) | (0.002) | (0.035) | (0.024) | (0.023) |
| $\boldsymbol{Z}_{-j}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CZ, urbanicity FE | | ✓ | ✓ | | ✓ | ✓ |
| HS FRPL share | | ✓ | ✓ | | ✓ | ✓ |
| Neighborhood demographics | | | ✓ | | | ✓ |
| Industry employment shares | | | ✓ | | | ✓ |
| Observations | 1,912,513 | 1,704,059 | 1,697,043 | 1,912,513 | 1,704,059 | 1,697,043 |
| $R^2$ | 0.409 | 0.799 | 0.825 | 0.293 | 0.725 | 0.744 |

*Notes:* Student-level regressions of $Z_j$ on student characteristics, distance to other sectors $\boldsymbol{Z}_{-j}$, and different sets of location-varying control variables. Distance is in miles. Standard errors in parentheses.

Finally, I present estimated sector effects on completion rates for students on the FP/CC

margin. Table 5 shows both the mean potential outcomes and the sector effect for distance-sensitive students on this complier margin, using the full set of location controls as in Column (6) of Table 4, along with student-level controls. I estimate a nearly 40 percentage-point for-profit sector effect for marginal students. This estimate happens to match the point estimate from the "switchers" design in Section 4.1.

**Table 5:** Effects on FP/CC margin

| | Degree completion |
|---|---|
| $Y_{FP}$ | 0.73 |
| | (0.06) |
| $Y_{CC}$ | 0.34 |
| | (0.03) |
| $Y_{FP} - Y_{CC}$ | 0.39 |
| | (0.06) |
| Observations | 1,697,043 |

*Notes:* Mean potential outcomes for students on the FP/CC margin, identified from distance IVs. Sample includes all Texas public HS graduates between 2005-2012. Degree completion includes graduation with any degree within 7 years of first enrollment. Standard errors in parentheses.

# 5 Implications for College Returns

Next, I relate the for-profit completion premium to college returns across the ability distribution. Higher graduation rates entail a tradeoff: although more students earn credentials which may be valued in the labor market, the quality of those credentials may fall to the extent that for-profits achieve higher graduation rates by diluting the instructional value of their programs. Different instructional levels or academic standards may therefore entail a quantity/quality tradeoff, and the implications for expected returns are therefore ambiguous. I will also estimate how this tradeoff depends on initial academic ability, as the for-profit completion premium is much larger among low-ability students. This suggests that curricular differences may have both vertical (instructional quality) and horizontal (academic match) components.

As in Altonji (1993), I distinguish between the ex-post realized returns to different final education levels and the ex-ante returns to college enrollment, which include the option values of further education. These concepts differ due to the significant heterogeneity in

outcomes conditional on enrollment, and the uncertainty students initially face about their prospects of graduation, their transfer probabilities, and potentially also their desired majors. I first estimate ex-post returns using standard panel estimators to evaluate whether for-profit degrees yield any labor-market value, given their seemingly relaxed academic standards. I then aggregate the ex-post returns to estimate the ex-ante relative returns to for-profit vs. community college conditional on pre-college ability. As these ex-ante return estimates rely on strong assumptions about heterogeneity in returns, I finally estimate ex-ante returns using the more robust distance IV estimator from Section 4.2. Both sources of variation indicate strong complementarities between student ability and college quality.

## 5.1 Ex-Post Returns to Graduation and Dropout

To identify ex-post returns, I employ a panel identification strategy taking advantage of the fact that a significant share of two-year college students enter college with prior work experience. For those older students with pre-college earnings histories, ability bias and other forms of permanent unobserved heterogeneity driving wage rates can be captured with individual fixed effects. I begin by plotting the evolution of mean quarterly earnings among graduates and dropouts of private and public colleges, in time relative to their initial college enrollment, with levels fixed to zero the year before enrollment.[11]

Figure 5 shows that each group's earnings followed very similar trajectories prior to enrollment and experienced Ashenfelter's dips in the three quarters before college entry. Following enrollment, eventual graduates spend more time in school and therefore experience temporarily reduced earnings which then rebound well above the long-run earnings profiles of non-graduates. These patterns hold for both for-profit and community-college students. For-profit graduates earn degrees substantially faster and therefore experience elevated earnings in the short-run, yet their earnings fall below those of CC graduates about seven years after enrollment. For-profit non-graduates also earn less than CC non-graduates. Appendix Figure A7 shows that the pooled earnings profiles of for-profit and community college students are nearly identical due to higher for-profit graduation rates.

Given the potentially large returns to four-year degrees, and since public students are much more likely to earn them, I will further split graduates into those who earn at most a 2-year degree and those who earn a Bachelor's degree. For each group $c(i) = (j(i), g(i))$ — combinations of enrollment sector $j(i) \in \{\text{FP}, \text{CC}\}$ and attainment level $g(i) \in \{0, 2, 4\}$ (no degree, two-year degree, and four-year degree, respectively) — I estimate the following

[11] Here, students are considered to have graduated if they earned any degree from a Texas university within seven years of initial enrollment.

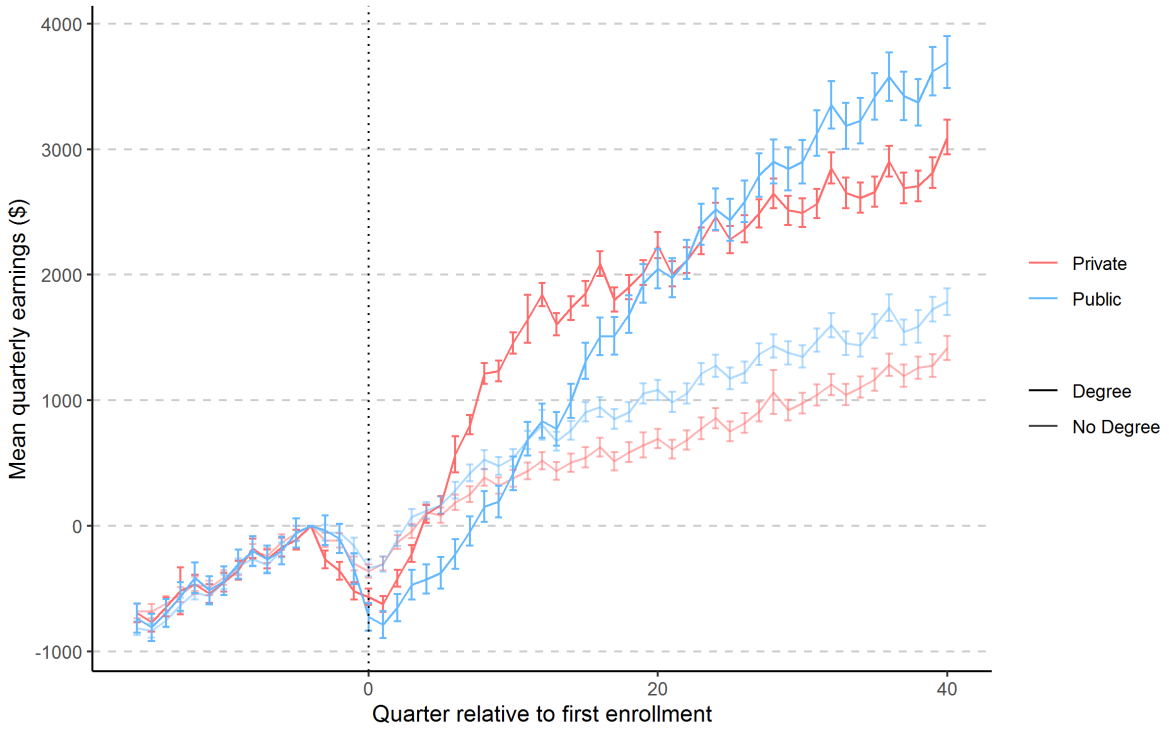



**Figure 5:** Raw Earnings Profiles of Associate's Degree-Seekers

*Notes:* Earnings are deflated to 2010 dollars. Sample includes all Texas public HS students who enroll in a two-year for-profit or community college between 2005-2012 at age 22 or older, who have some recorded prior earnings, intend an Associate's degree, and did not go on to earn a higher degree. Error bars represent 95% confidence intervals. Quarterly earnings profiles for each group are pegged to zero one year before enrollment.

earnings equations for those students entering college at age 22 or older with prior earnings:

$$w_{it} = \eta_i + \gamma_{t,c(i)} + \theta_i t + f_{X_i,c(i)}(Age_{it}) + \sum_{s=-4}^{12} \tau_{s,c(i)} \mathbb{1}\{t = T_i + s\} + \varepsilon_{it}$$

where I fix $\tau_{-2,c} = 0$, and $T_i$ indicates the year of first enrollment. This specification compares treated with not-yet-treated students within the same sector/attainment level $c(i)$, while allowing for quadratic age profiles specific to gender/ethnicity combinations $X_i$, common macroeconomic shocks $\gamma_{t,c}$, and individual-specific earnings trends $\theta_i t$.[12] Even within students enrolling in the same sector and achieving the same degree outcome, variation in enrollment timing across cohorts identifies dynamic treatment effects $\tau_{s,c}$. Across-cohort variation and heterogeneity in age-at-entry further helps to identify time and age profiles.

[12] Dynarski, Jacob and Kreisman (2018) recommend including individual trends to capture both heterogeneity in levels and predictable differences in growth rates. In practice, estimated returns are larger but qualitatively similar when excluding the individual-specific linear trends.

Under a standard conditional parallel-trends assumption,[13] $\tau_{s,c}$ identifies the dynamic earnings effects of each education outcome on the subsample of those who attain that level of schooling:

$$\tau_{s,c} = \mathbb{E}[w_{is}^{jg} - w_{is}^{0} \mid D_i = j, G_i = g],$$

where $w_{is}^{jg}$ are potential earnings outcomes $s$ years after enrollment, and $w_{is}^{0}$ is the no-college potential outcome. The parameters $\tau_{s,c}$ characterize the value students derive from their chosen sector and their realized final attainment level — e.g., how valuable are for-profit degrees among for-profit graduates? We may also wish to identify relative returns to different schooling outcomes — e.g., how much would for-profit students gain/lose had they enrolled in a CC? — yet relative returns are not identified from naive contrasts of these ATT parameters across groups $c$. This is because schooling choices may be correlated with unmodeled heterogeneity in college returns.

Given that women and underrepresented minorities are more likely to enroll in for-profits, as well as evidence that these groups earn lower college returns (Imberman et al. 2026), ATT contrasts may overestimate the returns to public enrollment among for-profit students. To correct for this, I apply inverse probability weighting (IPW) on gender/ethnicity combinations $X_i$, as well as age-at-entry and enrollment year, reweighting the public-student sample to match the for-profit distribution of $X_i$. If any residual heterogeneity in returns is mean-independent of schooling outcomes, i.e.,

$$\mathbb{E}[w_{is}^{jg} - w_{is}^{0} \mid X_i = x, D_i = j, G_i = g] = \mathbb{E}[w_{is}^{jg} - w_{is}^{0} \mid X_i = x],$$

then the IPW-corrected estimands $\tilde{\tau}_{s,jg|\text{FP}}$ identify the returns to schooling level $j, g$ among for-profit students:

$$\tilde{\tau}_{s,jg|\text{FP}} = \mathbb{E}[w_{is}^{jg} - w_{is}^{0} \mid D_i = \text{FP}].$$

Relative returns to different schooling outcomes among for-profit students are then identified by contrasting $\tilde{\tau}_{s,jg|\text{FP}}$ across $j, g$ cells. In Section 5.2, I will fully relax this conditional

[13] Even within groups achieving the same schooling outcome, the parallel-trends assumption may be suspect if students experience correlated shocks to labor supply and schooling preferences. For instance, a parent whose child enters formal schooling may find that they have additional time for work or school, in which case earnings could rise even had they not pursued additional schooling. Still, longer-run estimates may remain reliable provided those contemporaneous labor supply shocks are transient. And to the extent that these shocks impact graduates and non-graduates similarly, the relative earnings gains of graduates can still indicate the value of for-profit degree pathways. Though concerns like these are challenging to account for, I will evaluate the presence of earnings pre-trends and the potential for fade-out.

independence assumption and identify relative returns exactly using distance instruments.

Figure 6 presents IPW-corrected dynamic effects $\tilde{\tau}_{s,jg|\text{FP}}$ for each schooling level, among students enrolling in Associate's programs in CTE fields. I find precisely estimated and relatively flat pre-trends, preceding an Ashenfelter's dip in earnings the year prior to enrollment.[14] The returns to two-year degrees are large and similar across sectors, though for-profit returns materialize sooner as students spend less time in school. In particular, for-profit degree pathways yield significant and durable labor-market value despite higher graduation rates and potentially weaker academic standards. Degree returns show no signs of fade-out even twelve years after enrollment. If anything, graduate returns remain on an upward trajectory even through the twelfth year, particularly for public graduates, suggesting that these estimates may understate the long-run returns. On the whole, these estimates are broadly consistent with ex-post return estimates for two-year degree programs in other states (Belfield and Bailey 2017).

Mean returns to both for-profit and public dropouts are small. If anything, for-profit students face negative returns to enrolling and dropping out, consistent with evidence from resume audit studies showing that for-profit students face reduced callback rates (Darolia et al. 2015), and failing to graduate from for-profit college may constitute a particularly negative signal. Four-year graduates who begin at community colleges earn even larger long-run returns than two-year graduates, yet results are less precise for this sample. Very few two-year for-profit students go on to earn Bachelor's degrees, so I cannot estimate the returns to four-year graduation among this group. Table 6 summarizes the long-run return estimates for each sector and graduation outcome.

Finally, I show the pooled return to enrollment estimated as the weighted average of the ex-post returns, using as weights the unconditional sector graduation rates.[15] Though public colleges yield somewhat larger ex-post returns, mean ex-ante returns to for-profit and public colleges are nearly identical, at roughly $1,000 per quarter in the long-run. Especially given the evidence on ability sorting and sector differences in the sensitivity of graduation to ability, however, these pooled returns can only be contrasted to deliver average relative returns under strong assumptions.

**Ex-Ante Returns and Match Effects** Next I estimate ex-ante returns, accounting for how academic ability shapes the expected return to enrollment through graduation probabilities. Here I incorporate the completion-rate gradients from Section 3 into the estimation. Since much of the return to enrollment lies with graduates, and since HS test scores are

[14] I normalize the coefficient on the second year prior to enrollment for this reason.

[15] I attach the public four-year return to the 4% of cases where for-profit students earn a Bachelor's degree. Expected returns are not particularly sensitive to this choice since Bachelor's attainment is so rare among for-profit students.

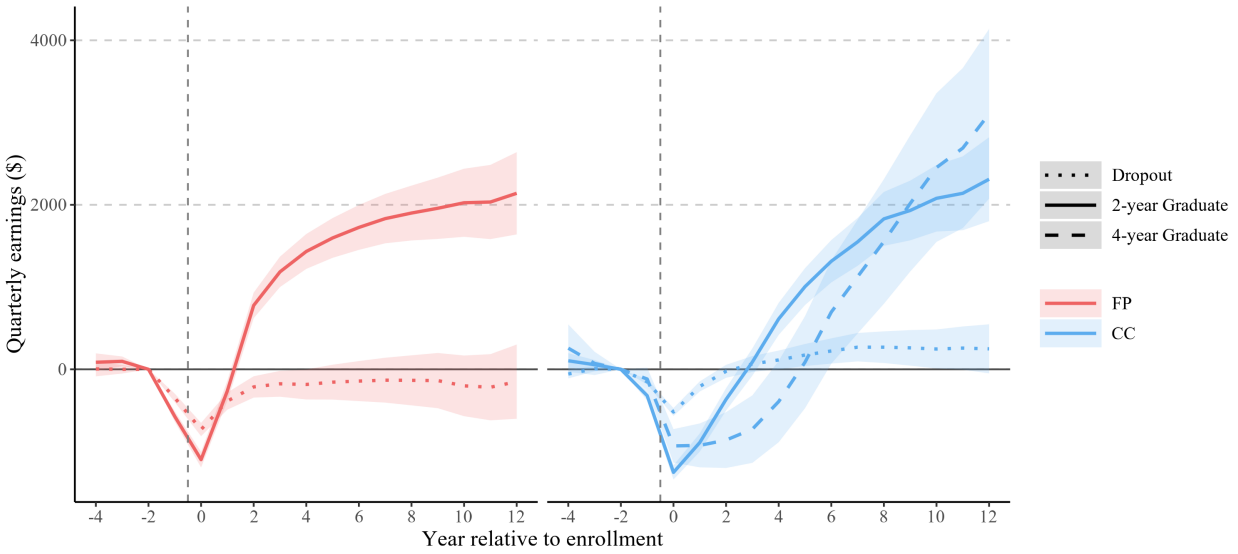



**Figure 6:** Gross Ex-Post Returns

*Notes:* Earnings are deflated to 2010 dollars. Sample includes all Texas public HS students who enroll in a two-year for-profit or community college between 2003-2014 at age 22 or older, who have some recorded prior earnings, intend an Associate's degree, and earned at most a two-year degree within 7 years of first enrollment. Shaded region represents 95% confidence intervals, based on standard errors clustered at the individual level.

highly predictive of degree attainment — particularly so at CCs —, allowing for match effects through this channel significantly enriches the analysis. Incorporating ability heterogeneity also takes another step toward identification of ex-ante relative returns by accounting for sorting gains, which may be generated by sector differences in academic standards.

I estimate ability-specific ex-ante returns by expressing them as a combination of long-run ex-post returns $Y_i^{jg} \equiv w_{i,12}^{jg} - w_{i,12}^{0}$. The ex-ante return to enrolling in $j$ for a student of ability $A_i$ and other covariates $X_i$ is

$$\begin{aligned}\rho^j(A_i, X_i) &= \mathbb{E}[Y_i^{j,G_i^j} \mid A_i, X_i] \\ &= \mathbb{E}\big[\mathbb{E}[Y_i^{jg} \mid A_i, X_i, G_i^j = g] \mid A_i, X_i\big] \\ &= \sum_{g \in \{0,2,4\}} \mathbb{P}\big(G_i^j = g \mid A_i, X_i\big)\mathbb{E}[Y_i^{jg} \mid A_i, X_i, G_i^j = g]\end{aligned}$$

where $G_i^j \in \{0, 2, 4\}$ indicates $i$'s potential degree attainment outcome in sector $j$. To isolate the role of completion rates, I abstract from how ability might influence the $Y_i^{jg}$ themselves,[16] assuming $\mathbb{E}[Y_i^{jg} \mid A_i, X_i, G_i^j = g] = \mathbb{E}[Y_i^{jg} \mid X_i, G_i^j = g]$, and assuming that sorting gains

[16] An additional source of sorting gains may come from higher-ability students deriving higher ex-post returns as well. Estimates which allow ex-post returns to vary linearly with ability yield similar qualitative conclusions but are less precise due to limited availability of HS test score data for the older event-study sample.

**Table 6:** Long-Run Quarterly Earnings Effects

| | Public | For-profit |
|---|---|---|
| 4-year graduates | 3386 | — |
| | (413) | — |
| 2-year graduates | 2099 | 2015 |
| | (198) | (199) |
| Non-graduates | 227 | -126 |
| | (63) | (103) |
| Pooled | 995 | 978 |
| | (77) | (105) |
| 2-year completion rate | 0.21 | 0.45 |
| 4-year completion rate | 0.12 | 0.04 |
| Baseline mean earnings | 3,892 | 3,712 |
| # student/quarters | 1,369,095 | 1,675,947 |
| # students | 15,045 | 18,417 |
| $R^2$ | 0.542 | 0.572 |

*Notes:* Estimates of ex-post and pooled ex-ante returns to different attainment levels 12 years after initial enrollment. Returns to for-profit enrollees who complete 4-year degrees are omitted due to sample size limitations. Earnings are deflated to 2010 dollars. Sample includes all Texas public HS students who enroll in a two-year for-profit or community college between 2003-2014 at age 22 or older, who have some recorded prior earnings, and intend an Associate's degree at entry. Students' highest earned degree level is recorded 7 years after first enrollment. Standard errors clustered at the individual level in parentheses.

only flow through completion rates, so that $\mathbb{E}[Y_i \mid X_i, D_i = j, G_i = g] = \mathbb{E}[Y_i^{jg} \mid X_i, G_i^j = g]$. Consistent with the evidence for school effects on graduation rates, I assume that conditional on ability, we have $\mathbb{P}(G_i^j = g \mid D_i = j, A_i, X_i) = \mathbb{P}(G_i^j = g \mid A_i, X_i)$. In practice, I estimate $\mathbb{P}(G_i^j = 2 \mid A_i, X_i)$ with a linear function and $\mathbb{P}(G_i^j = 4 \mid A_i, X_i)$ with a cubic polynomial in $A_i$, and $X_i$ is expanded to include gender, ethnicity, free-/reduced-price lunch indicators, HS campus FE, and HS graduation year FE.[17] I combine these probabilities with the long-run ex-post return estimates $\tilde{\tau}_{12,jg|\text{FP}}$ to form estimates of the conditional ex-ante returns among for-profit students $\bar{\rho}^j(A) \equiv \mathbb{E}_{X|D_i=\text{FP},A}\left[\rho^j(A, X)\right]$.

Figure 7 plots $\bar{\rho}^{\text{FP}}(A) - \bar{\rho}^{\text{CC}}(A)$, the estimated distribution of ex-ante relative returns across ability levels, along with the ex-ante returns to each sector relative to no college in

[17] Appendix Figure A8 shows how Bachelor's completion rates vary by sector and HS test score; the cubic polynomial accounts for some non-linearity at the top.




**Figure 7:** Ex-Ante Relative Returns by Academic Ability

*Notes:* Earnings are deflated to 2010 dollars. Estimates based on a sample of Texas public HS students enrolling in Associate's programs at two-year for-profit and community colleges between 2003-2014. Shaded region represents 95% pointwise confidence intervals.

the left panel. Results indicate significant interactions between skills and college quality, even simply through the channel of completion rate differences. Sectoral differences in the relationship between graduation rates and pre-college ability introduce match effects in ex-ante returns. The lowest-ability students earn $200 per quarter more by attending for-profits ($p = 0.144$), while the highest-ability students incur long-run quarterly earnings penalties of $500 by attending for-profits ($p = 0.026$). And the long-run gross returns to college are large even for the lowest-ability students. To the extent that students sort on gains arising from channels other than these completion gradients, these figures may continue to understate the relative for-profit return among for-profit students. I allow for unrestricted essential heterogeneity in Section 5.2.

**Net Returns and Efficiency** These estimates represent gross earnings effects, which do not account for the costs of schooling. For one, for-profit students earn degrees and re-enter the labor market more quickly, reducing their opportunity costs of enrollment. On the other hand, for-profits charge much higher tuition, depressing the net private return to for-profit enrollment. For evaluating the efficiency of for-profit and CC degree production technologies, however, what matters are the economic costs of their programs. This is also the relevant question for understanding whether for-profit degree pathways might serve as a model for public colleges seeking to improve attainment among low-ability students.

To estimate the expected net private and social returns to two-year college enrollment, I now quantify schooling costs. I combine IPEDS revenue and expenditure data with administrative enrollment records to infer lifetime expected tuition and costs per enrollee. Since CC students spend more time enrolled in college, comparing annual spending per student would be misleading. Instead, I multiply the annual average costs per student by estimates of the expected number of enrolled years from the administrative data. Since ex-ante return estimates include transfer students, I break down expected costs by sector, including enrollment spells in both the two-year for-profit and public sector and the four-year private and public sectors. Since after-grant tuition varies considerably by a student's enrollment intensity, I estimate average after-grant tuition and fees in the same way, dividing total tuition revenues net of grants by annual enrollment.

The ideal cost measure would capture all costs incurred as a consequence of the student's enrollment, including both instructional and non-instructional inputs. This spending concept is not directly observable, as IPEDS divides spending into relatively coarse categories. I consider both an expansive definition using total spending and a definition restricting to spending on instruction, academic support, student services, and institutional support. This latter concept excludes spending on activities like research, public service, and affiliated hospital services. Net return estimates are not particularly sensitive to this choice, and below I report estimates using the more expansive total-cost definition. Hoxby (2018) discusses these and other issues with estimating higher education productivity in greater detail.

Another wrinkle in my measurement of average costs is that CC expenditures are dispersed over a wider set of students than the vocational student sample used in the gross returns estimation. If CCs' academic programs are more or less costly on average, college-level cost estimates will be biased. This issue could be ameliorated using finer-grained data on course- or program-specific costs, as in Altonji and Zimmerman (2019). Lacking program-level cost data, I identify a small set of technical public colleges which offer exclusively vocational programs, typically of less than two years, which closely resemble the short, terminal vocational programs offered by two-year for-profits. Despite not offering academic programs and transfer pathways, I find that these technical public colleges spend nearly the same amount per student as traditional public colleges. This suggests that sectoral differences in program composition are not driving relative expenditure estimates.

Table 7 presents the expected private and social costs of for-profit and CC enrollment per year and over a student's lifetime. Public colleges spend about $1,500 less per year but about $3,000 more over the lifetime of a student. While expenditures per student are similar, tuition costs are significantly lower among CC students, who often pay near-zero

tuition while enrolled in CCs.[18] By contrast, the average for-profit student pays $8,000 per year in tuition (after grants). Though relatively large, for-profits' tuition charges equal their average costs, while CCs offer steep discounts relative to their average expenditures. This wedge reflects significant state subsidization of the public sector.

**Table 7:** Expected Costs by Initial Two-Year Sector

| | Public | For-Profit |
|---|---|---|
| *Panel A:* Per enrolled year | | |
| Social | 6,874 | 8,326 |
| Private | 2,393 | 8,063 |
| *Panel B:* Per student lifetime | | |
| Social | 27,172 | 23,919 |
| Private | 9,461 | 23,164 |
| Years enrolled | 3.95 | 2.87 |

*Notes:* Social and private costs represent average college spending and after-grant tuition, respectively. Costs include enrollment in all colleges, regardless of sector, after first enrollment. Cost and enrollment data restricted to Texas colleges for comparability to return estimates.

I next calculate the expected net present-discounted value of enrollment for students (using tuition) and for society (using college expenditures).[19] I use the dynamic gross return estimates from before, assuming the returns plateau at their final estimated value twelve years after first enrollment. Note that the dynamic return estimates already incorporate expected opportunity costs of enrollment through reduced in-school labor supply. For each initial sector $j$, I assume that tuition costs $T_{it}^j$ are deferred through federal student loans, while expenditures (social costs) $C_{it}^j$ are borne during enrollment. I assume the full tuition balance is amortized over the ten years after exiting college.[20] Under these assumptions I

[18] Note that average CC tuition is only $718, compared to $7,567 at for-profits. Table 7 shows annual expected tuition costs of students initially enrolling in CCs total $2,393, which is larger because some students transfer to more expensive four-year colleges.

[19] The full social returns to education would incorporate educational spillovers and education effects on non-pecuniary outcomes. My lack of data on such outcomes and the difficulty of estimating such effects prevents this more comprehensive accounting of net benefits.

[20] Results are not sensitive to how loans and repayment are specified. The typical federal loan interest rate is approximately 3% in real terms, often with no payments or interest accrual until six months after exiting school. A student with a discount factor of 0.98 may therefore prefer to pay up front for schooling; I assume in this case that credit constraints prevent early payment.

calculate the expected net present-discounted value of enrollment in sector $j$ as

$$\mathbb{E}[\text{PDV}_j^{social}] = \sum_{t=0}^{T} \delta^t \Big( \mathbb{E}\big[w_{it}^{jg} - w_{it}^0\big] - \mathbb{E}\big[C_{it}^j\big] \Big)$$
$$\mathbb{E}[\text{PDV}_j^{private}] = \sum_{t=0}^{T} \delta^t \Big( \mathbb{E}\big[w_{it}^{jg} - w_{it}^0\big] - \mathbb{E}\big[T_{it}^j\big] \Big)$$

Setting $T = 35$ and $\delta = 0.98$, I present social and private PDVs in Table 8. These results continue to use return estimates reweighted to match the for-profit demographic distribution. I find large social and private returns to both public and for-profit enrollment, ranging from \$55,000 to \$73,000 in present value. The social return to for-profit enrollment is about \$12,000 larger than that of CC enrollment. Yet due to public tuition subsidization, private returns to CC enrollment are slightly larger.

**Table 8:** Expected PDV by Initial Sector

| | Public | For-Profit |
|---|---|---|
| *Panel A:* Social returns | | |
| Gross returns | 81,302 | 91,300 |
| Costs | 26,048 | 23,432 |
| Net PDV | 55,254 | 67,868 |
| *Panel B:* Private returns | | |
| Gross returns | 81,302 | 91,300 |
| Costs | 8,311 | 20,348 |
| Net PDV | 72,991 | 70,952 |

*Notes:* Gross returns use IPW-corrected estimates of dynamic ex-ante returns. Social costs use total expected college expenditures per student; private costs use expected tuition payments under a 10-year repayment plan. All values discounted by discount factor $\delta = 0.98$.

Despite community colleges' low graduation rates, and despite for-profits' high tuition, two-year college enrollment remains lucrative across the board. The social return even to students with the lowest pre-college academic performance is also positive: these students generate \$37,830 enrolling in CCs and \$54,113 at for-profits. Thus, for-profits' degree production technology is relatively efficient among academically weak students.

## 5.2 Ex-Ante Returns for Marginal Students

These panel estimators are particularly useful for identifying the absolute returns to college (relative to non-enrollment). Both sectors confer significant long-term labor-market value. Yet for identifying the ex-ante relative return to for-profit vs. community college among for-profit students, any residual sorting gains will lead to bias in the conditional ATT contrasts depicted in Figure 7. Unobserved sorting gains are also plausible if only because HS test scores are an imperfect proxy for true ability. Apart from these issues, the prior analysis yields returns averaged over the whole population of marginal and inframarginal students — whereas the relative return among those on the for-profit/public margin may be a more policy-relevant estimand.

To address these limitations, I return to the distance-IV estimator from Section 4.2, which identifies exactly the ex-ante relative return among distance-sensitive students on the FP/CC margin. I use the same specification as in Table 5 to identify mean potential outcomes and treatment effects. Table 9 shows that CCs confer an additional $880 per quarter in long-run earnings, on average among marginal students. Yet this estimate is somewhat imprecise, and we cannot statistically distinguish the relative return from zero ($p = 0.17$).

**Table 9:** Average Sector Effects on FP/CC Margin

| | Degree completion | Quarterly earnings ($) |
|---|---|---|
| $Y_{FP}$ | 0.73 | 4,379 |
| | (0.06) | (527) |
| $Y_{CC}$ | 0.34 | 5,259 |
| | (0.03) | (430) |
| $Y_{FP} - Y_{CC}$ | 0.39 | -880 |
| | (0.06) | (639) |
| Observations | 1,697,043 | 1,697,043 |

*Notes:* Mean potential outcomes for students on the FP/CC margin, identified from distance IVs. Sample includes all Texas public HS graduates between 2005-2012. Degree completion includes graduation with any degree within 7 years of first enrollment. Earnings measured at age 27-28. Standard errors in parentheses.

Next I split the sample by initial academic ability, defining high-ability students as those scoring above the median for-profit student's HS test score (the 33rd percentile in the population).[21] Conditional on controls, F-statistics in these split samples remain larger than

[21] I choose the median among for-profit students to preserve power, as for-profit enrollment shares are much lower.

32 in all cases. First, Table 10 shows that for-profit colleges graduate low- and high-ability students at similarly high rates (64% and 80%, respectively), while public colleges graduate low-ability students at especially low rates of 22%. Thus, the descriptive pattern of more ability-elastic CC graduation rates (Figure 3) indeed reflects significant CC penalties for low-ability students. In other words, for-profit colleges disproportionately raise the graduation rates of low-ability students, who are three times as likely to graduate at for-profits; this compares to a doubling for high-ability students.

Given the large returns to graduation, these patterns also show up in college returns. While ability does not significantly predict the earnings of for-profit students, high-ability CC students earn nearly 60% more than low-ability students by age 27-28. While high-ability students face significant penalties from for-profit enrollment — earning $1,547 less per quarter than they would have earned from CCs —, low-ability students face modest (and statistically insignificant) earnings gains from for-profit enrollment. This near parity in returns for low-ability students matches the evidence from Section 5.1 that low-ability students derive similar absolute returns from for-profit and public enrollment, due to their disproportionately lower CC graduation rates. In addition, the especially high ex-ante returns to CC enrollment among the high-ability students reflect the option value of four-year transfer — an option which is made much more difficult by for-profit enrollment due to reduced credit transferability.

**Table 10:** Sector Effects by Academic Ability

| | Degree completion | | Quarterly earnings ($) | |
|---|---|---|---|---|
| | Low-ability | High-ability | Low-ability | High-ability |
| $Y_{FP}$ | 0.64 | 0.80 | 4,236 | 4,551 |
| | (0.08) | (0.08) | (750) | (762) |
| $Y_{CC}$ | 0.22 | 0.40 | 3,852 | 6,098 |
| | (0.04) | (0.04) | (710) | (537) |
| $Y_{FP} - Y_{CC}$ | 0.42 | 0.40 | 383 | −1,547 |
| | (0.10) | (0.08) | (962) | (858) |
| Observations | 465,962 | 1,231,081 | 465,962 | 1,231,081 |

*Notes:* See notes to Table 9. High-ability students have HS test score percentiles above the median among for-profit students (0.33).

Altogether, these results show that for-profits' high graduation rates do not water down the expected returns to college for low-skill students. They also suggest that public colleges might improve the graduation prospects of low-ability students without compromising the value of college by incorporating elements of the for-profit degree production technology. Yet

it remains unclear *how* for-profits achieve higher graduation rates. The relationship between students' baseline academic ability and their relative returns is, among other explanations, consistent with for-profit colleges offering a curriculum better-matched to the capabilities of many for-profit students. Yet these curricular differences may encompass a wide variety of concrete policies, including grading standards, passing thresholds, and the breadth and depth of course requirements. In the next section, I turn to transcript data to evaluate whether relaxed academic standards can explain for-profit colleges' elevated graduation rates and, if so, how this bears out in the design of their degree pathways and grading standards.

# 6 The Role of Academic Standards

School effects on graduation rates can themselves owe to many different forces. Characterizing the drivers of the for-profit completion premium is a key step toward understanding its welfare implications, as well as whether public colleges can learn anything useful from the example of for-profit degree pathways. Prior work has emphasized potential non-academic barriers to degree completion at CCs, including implicit capacity constraints (e.g., course shutouts and inflexibility) and limited advising resources (Bound and Turner 2007; Robles, Gross and Fairlie 2021). While these resource constraints may be important drivers of CC completion penalties in their own right, here I offer evidence that differences in academic standards and the structure of degree programs themselves contributes to the CC completion-rate penalty among lower-ability students. In particular, I consider the roles of curriculum breadth and grade inflation, as shifts in grading standards have been shown to exert first-order effects on degree-completion rates across US college sectors (Denning et al. 2022).

A limitation of the administrative data in Texas is that transcript data is unavailable for for-profit colleges, which limits my ability to understand what distinguishes the for-profit degree production technology. Still, observing CC transcripts does allow for distance-IV identification of CC potential outcomes for students on the FP/CC margin. While I cannot form treatment effects without the corresponding for-profit potential outcomes, these statistics are useful for characterizing the unique barriers to degree completion that for-profit students face when they do enroll in public colleges. Appendix B presents this analysis, showing that students on the FP/CC margin attempt many CC credits but fail a large portion of them, earning average GPAs of just 1.81, nearly 0.5 GPA points lower than the mean among all CC students.

In order to characterize the for-profit degree production technology, I now return to national BPS data which includes transcripts for both public and for-profit colleges. Although

here we lose the careful identification techniques possible in the administrative data, the survey data include rich measures of pre-college academic and socioeconomic characteristics. In addition, I can condition on programs of study so as to compare for-profit and public pathways for students enrolling in vocational programs in the same degree level. Under the selection-on-observables assumptions from Section 3, I am then able to illustrate fundamental differences between the public and for-profit pathways to a similar set of short, vocational degrees.

**Differences in Curricula** For-profit students take substantially less remedial coursework than comparable public-college students. Figure 8 shows remedial course-taking probabilities by sector in the same style as in Figure 2. While for-profit students rarely take remedial courses, nearly 40% of public Associate's students enroll in some form of remediation, with math being the most common. Remediation is far less common in Certificate programs. Rather than a student choice, remediation at community colleges is generally the result of tracking policies which sort students into remedial courses who fail to meet academic requirements for enrolling in college-level courses. Remediation is therefore a type of academic standard which can directly lengthen the time-to-degree. Of course, remediation may also improve future course-passing rates for academically under-prepared students, though several evaluations of its effects on marginal students indicate minimal and sometimes negative effects on future performance (Martorell and McFarlin 2011; Scott-Clayton and Rodriguez 2015). Regardless of its effects, higher rates of remediation for academically similar students suggest that public degree requirements are more demanding in this dimension — either due to the remediation itself, or because of the more advanced coursework it leads to.[22]

Beyond these differences in academic level and depth, course-taking patterns also differ in breadth. Among students intending an Associate's degree in a vocational field, public-college students are more likely to take courses outside their major. Figure 9 plots the share of students taking each of several subjects, restricting in each case to students who are not majoring in the given subject. For-profit students are less likely than comparable public-college students to take out-of-major courses in humanities, social science, statistics, and foreign languages, and in no subject are they statistically significantly more likely to enroll in an out-of-major course. These differences likely reflect both differences in degree requirements and course supply. Non-major courses in humanities and social science, for

[22]We might worry that the remedial label is a distinction without a difference — for-profits may require the same courses but choose to brand them differently. However, community colleges often do not award college credits for remedial courses, meaning that remediation increases the number of courses required for the degree, and there exists complementary case-study evidence that for-profit colleges do not require the same kinds of multi-step general-education coursework typical of community colleges (Bailey, Badway and Gumport 2001).

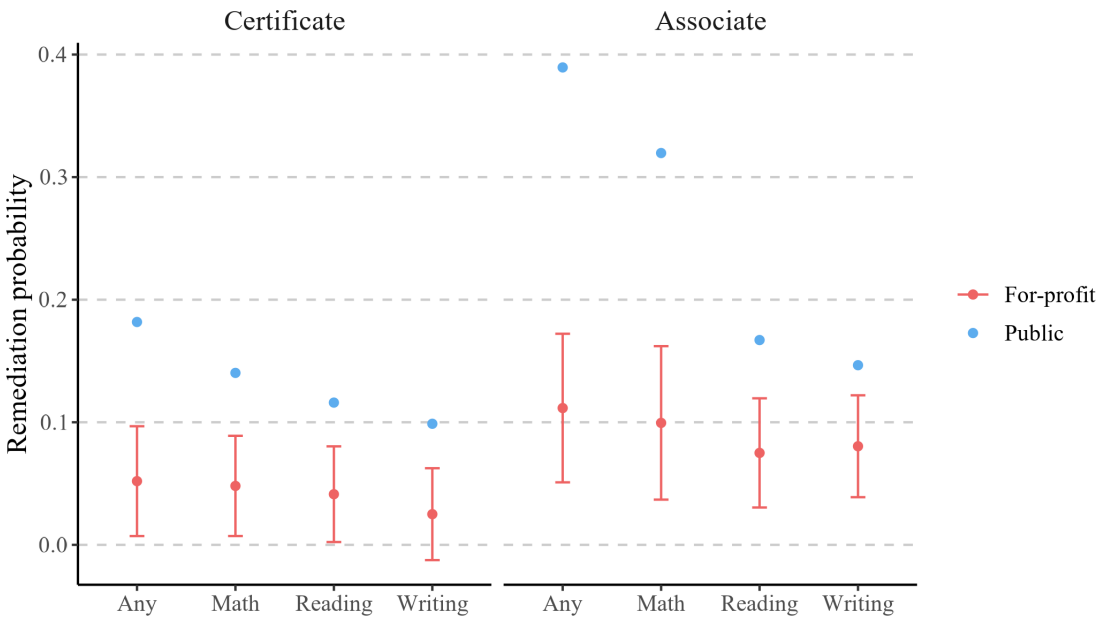



**Figure 8:** Remedial Course-Taking

*Notes:* Estimates from BPS 12/17. Plotted are shares of students taking remedial courses in the first academic year. Also see notes for Figure 2.

instance, often form part of community colleges' general-education curriculum. And some for-profit colleges may not offer academic coursework in these subjects, given that they almost exclusively offer a handful of vocational majors.[23]

Narrower for-profit courses of study are also evident in students' course credits. Among Associate's students intending a CTE major, public students take only 43.5% of their total credits in CTE courses, compared to 74.5% for for-profit students.[24] For-profit course-taking patterns are therefore more focused, both due to reduced out-of-major course-taking as well as substantially greater enrollment intensity in vocation-oriented courses. This comes at the expense of the academic coursework more likely to be required at community colleges, including remedial and general-education courses.

**Grade Inflation** Also relevant for students' ability to graduate is their academic perfor-

[23]Differences in course-taking patterns could also be driven by student demand, yet controlling for student characteristics and conditioning on degree program should absorb some such differences. Still, public students are more likely to switch major and may be less certain of their field preferences in ways not easily captured by observables. On the other hand, students initially intending a vocational degree in, say, automobile repair or cosmetology are unlikely to switch to an academic major like English.

[24]The transcript data only provide the total CTE credits attempted anywhere through 2017, not solely at the first institution. Since transfer students may be more likely to pursue academic coursework, I use total credits at the first institution for the denominator of the CTE credit shares. Instead using the total credits attempted anywhere through 2017, the CTE shares become 30.2% and 64.8% for public and for-profit students, respectively. These differences in CTE shares are nearly identical when controlling for student characteristics.

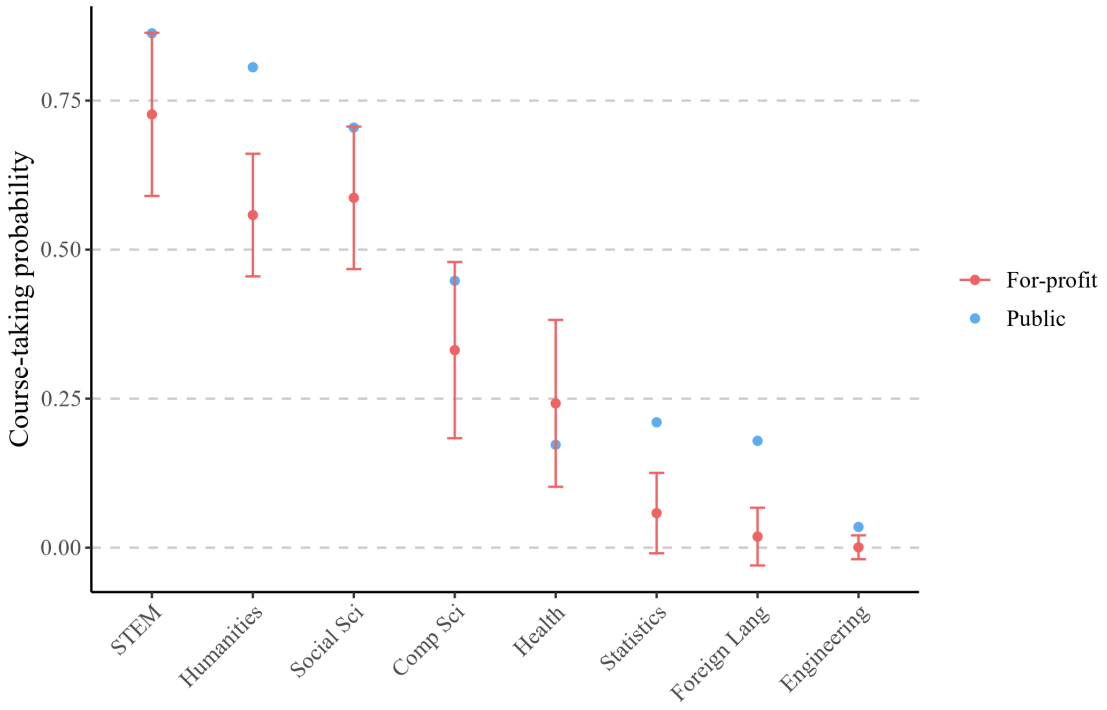



**Figure 9:** Out-of-Major Course-Taking

*Notes:* Estimates from BPS 12/17. Sample includes all students in the transcript sample who enroll in a two-year or less-than-two-year college and initially intend a CTE major. Plotted are shares of students taking each subject at any point through 2017, among those whose intended major does not fall within that subject. Also see notes for Figure 2.

mance in their chosen courses. Colleges set their academic standards in part through their choice of course grade distributions and passing standards. To measure differences in grading standards, we would ideally compare how different colleges evaluate students achieving the same level of academic performance. Though the survey data do not contain objective measures of academic performance, we can compare students who enter college with observably similar levels of academic ability and preparedness. These characteristics proxy for students' baseline academic potential, which colleges then grow according to their value added. Conditional on pre-college ability, then, awarded grades may reflect both real growth in academic achievement (value added) and the college's subjective grading standards.

Table 11 shows that academically similar students at for-profit colleges indeed earn significantly higher grades. Adjusting for student characteristics at entry, for-profit Associate's students earn first-year GPAs 0.43 points higher on average, while the for-profit premium among Certificate students is more muted. The for-profit grade bump shows up just as strongly when comparing grades over the entire enrollment period at the first school, and when comparing career GPAs through 6 years after first enrollment. Going beyond mean comparisons, Figure 10 shows how the entire distribution of grades compares across sectors:

for both Certificate and Associate programs, for-profit grades first-order stochastically dominate public-sector GPAs. Given that for-profit colleges spend significantly less than public colleges on instruction, these grading differences are unlikely to reflect higher for-profit value added. Rather, they are more easily explained by grade inflation and lower academic standards at for-profits.

**Table 11:** Grading Standards by Sector

| | Public mean | For-profit premium | |
|---|---|---|---|
| | | Unadjusted | With controls |
| *Panel A:* Certificate students | | | |
| First-year GPA | 2.693 | 0.219 | 0.126 |
| | | (0.131) | (0.113) |
| First-school GPA | 2.678 | 0.190 | 0.150 |
| | | (0.134) | (0.109) |
| Career GPA | 2.717 | 0.178 | 0.125 |
| | | (0.110) | (0.097) |
| Career GPA in CTE courses | 2.891 | 0.118 | 0.063 |
| | | (0.119) | (0.121) |
| *Panel B:* Associate's students | | | |
| First-year GPA | 2.546 | 0.342 | 0.428 |
| | | (0.098) | (0.096) |
| First-school GPA | 2.490 | 0.374 | 0.484 |
| | | (0.092) | (0.101) |
| Career GPA | 2.501 | 0.347 | 0.468 |
| | | (0.085) | (0.098) |
| Career GPA in CTE courses | 2.829 | 0.041 | 0.157 |
| | | (0.078) | (0.096) |

*Notes:* Estimates from BPS 12/17. Sample includes all students in the transcript sample who enroll in a two-year or less-than-two-year college and initially intend a CTE major. Also see notes for Table 1.

**Decomposing GPA Differences: Curriculum vs. Grade Inflation** Interestingly, while Associate's students' GPAs are 0.47 points higher at for-profits overall, Table 11 also shows that this gap falls to 0.16 within CTE courses (among students majoring in a CTE field). Given that for-profit students take much less academic coursework, part of the for-profit GPA premium simply comes from the narrower vocational focus of their degree programs. To quantify this channel, I decompose the overall for-profit GPA premium into a part owing to different academic intensities and a residual part owing to different within-subject grading standards.

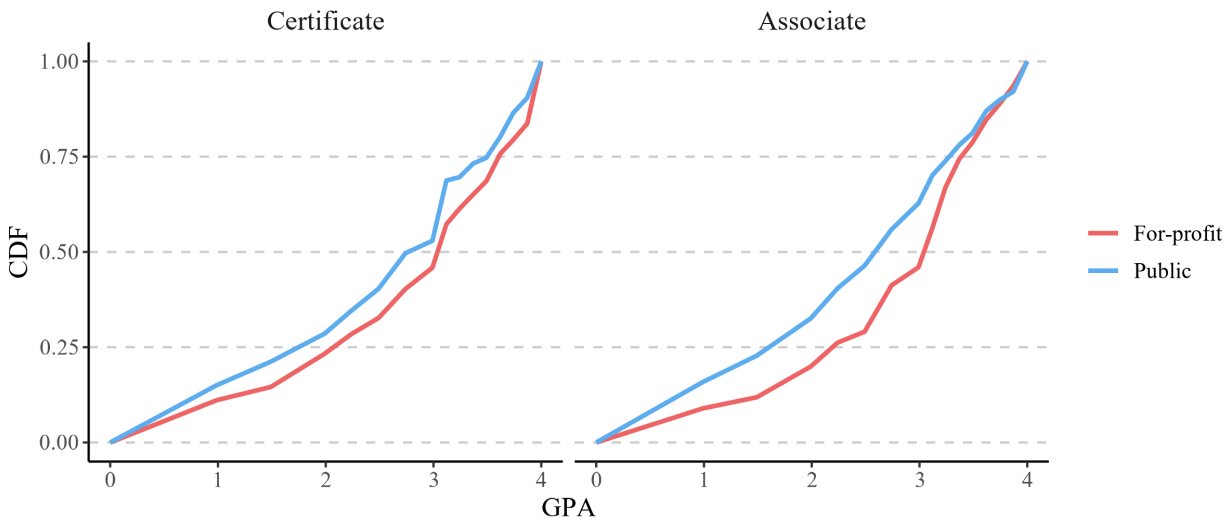



**Figure 10:** First-Year GPA Distributions

*Notes:* Estimates from BPS 12/17. Sample includes all students in the transcript sample who enroll in a two-year or less-than-two-year college and initially intend a CTE major.

Let the grades for student $i$ in course $c$ at college $j \in \{CC, FP\}$ be determined according to

$$GPA_{icj} = \beta_{0j} + \beta_{1j} A_{ic} + \varepsilon_{icj}$$

where $A_{ic}$ is an indicator for academic (non-CTE) courses. The overall GPA premium $\Delta\overline{GPA} \equiv \overline{GPA}_{FP} - \overline{GPA}_{CC}$ can be re-written according to the Oaxaca-Blinder decomposition, taking the public academic standards as the reference case:

$$\begin{aligned}\Delta\overline{GPA} &= \underbrace{(\bar{A}_{CC} - \bar{A}_{FP})(-\beta_{1,CC})}_{\text{different course mix}} + \underbrace{(\beta_{0,FP} - \beta_{0,CC}) + \bar{A}_{FP}(\beta_{1,FP} - \beta_{1,CC})}_{\text{different grading standards}} \\ &= \underbrace{(\bar{A}_{CC} - \bar{A}_{FP})(-\beta_{1,CC})}_{\text{different course mix}} + \underbrace{\bar{A}_{FP}\Delta\overline{GPA}_{A}}_{\text{academic inflation}} + \underbrace{(1 - \bar{A}_{FP})\Delta\overline{GPA}_{CTE}}_{\text{CTE inflation}}\end{aligned}$$

where $\Delta\overline{GPA}_A = (\beta_{0,FP} + \beta_{1,FP}) - (\beta_{0,CC} + \beta_{1,CC})$ and $\Delta\overline{GPA}_{CTE} = \beta_{0,FP} - \beta_{0,CC}$ represent the within-subject grade inflation. The first term expresses how much a reduction in the academic intensity of the CC curriculum down to the for-profit level would increase grades, holding fixed the public grading standards. The next two terms capture for-profits' grade inflation within each type of course — after accounting for how the course mix changes, for-profits elevate grades even further due to the residual within-subject GPA gaps.

I next estimate these components of the for-profit GPA premium, controlling for student

characteristics. Again, the aggregate grade inflation is 0.47 GPA points. The for-profit GPA premium within CTE courses is $\Delta\overline{GPA}_{CTE} = 0.16$, and the academic premium is $\Delta\overline{GPA}_{A} = 0.67$. The selection-corrected academic share of for-profit credits is $\bar{A}_{FP} = 0.30$, compared to $\bar{A}_{CC} = 0.57$ among public students. Thus, the course-composition effect totals 0.16 GPA points — reduced academic intensity alone explains 34% of the overall premium. Different grading standards account for the remainder of the gap, with grade inflation in academic courses totaling 0.20 GPA points and inflation in CTE courses totaling 0.11 GPA points, for 42.5% and 23.5% of the GPA premium, respectively.

Overall, for-profit colleges appear to set lighter academic standards for their students. For one, for-profit students take a narrower mix of courses with fewer falling outside their vocational major. They also take far fewer non-major academic credits, due to both reduced remedial requirements and less general-education course-taking. These reduced academic requirements translate into better academic performance, as vocational students perform worse in academic courses generally. Beyond the role of narrower vocational degree paths, for-profits also award significantly higher within-subject GPAs to students of similar initial academic preparedness. This is driven primarily by grade inflation in academic courses. Relaxed for-profit academic standards are also reflected in students' self-reported academic confidence at entry, as I document in Appendix C.

Though the academic-GPA gap may simply reflect a rosier for-profit evaluation of the same underlying academic performance, an alternative explanation is that vocational students at public colleges perform just as well as for-profit students, yet are evaluated by comparison to the other public students in those classes who take them as part of their academic majors. In this way, for-profit students may also benefit from being relatively bigger fish in a smaller pond — public vocational students required to take many of the same academic requirements as stronger academic majors may suffer by comparison.

In any case, awarded grades are among the strongest predictors of graduation, both through graduation requirements and by reducing the option value of further schooling. And academically weaker students on the for-profit margin are particularly impacted by grading standards since their CC grades place them relatively close to meaningful thresholds that determine course passing and academic advancement (Appendix B). Moreover, recent evidence from Denning et al. (2022) indicates that grade inflation has been the primary contributor to the observed increase in graduation rates across multiple US college sectors since the 1990s.

These striking differences between for-profit and public degree pathways suggest concrete ways for public colleges to better serve the interests and academic level of low-skill students who might otherwise turn to expensive for-profit colleges. Distinct vocational pathways

with narrower curricula and more generous passing thresholds could significantly improve retention and graduation of low-skill students who enter college with a clear idea of their desired vocation. The results from Section 5 show that such programs could, if anything, be offered at lower cost per student, and need not compromise the expected return to college among low-skill students. Of course, caution should attend any such reforms to ensure that program placement is well-targeted and does not dilute the value of traditional programs.

# 7 Discussion

When choosing where to enroll, students face a significant trade-off between the ease of for-profit degree pathways and the greater option value of community-college enrollment. Steep ability gradients in public-college completion rates and for-profit grade inflation indicate that public completion-rate penalties arise from stricter academic standards. High public standards appear to create market opportunities for private colleges to offer easier degrees. Although one might expect the returns to such degrees to be correspondingly small, I find they still confer large long-run earnings premia. I also characterize the distribution of relative returns to two-year private and public colleges, showing that the differences in their degree production technologies generate significant match effects. My results therefore contribute some of the first evidence of meaningful interactions between skills and college quality within non-selective colleges.

For community colleges seeking to improve degree attainment among the kinds of low-ability and non-traditional students who often turn to the for-profit sector, my results suggest that the for-profit model offers a way of doing so without compromising the value of degree programs. Redesigned pathways to vocational degrees — perhaps alternative tracks in existing programs — might do well to feature narrower curricula with fewer academic requirements, and grading standards which are suited to the purposes of terminal vocational training. Still, these possibilities are somewhat more speculative — while I find patterns across multiple sources of evidence consistent with a strong role for academic standards, separately identifying the influence of the many differences between private and public degree pathways on the for-profit completion premium remains an important direction for future research.

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# Appendix

## A Additional Proofs

**Extension of Mountjoy (2022) Identification**

**Theorem.** *Under A-IE and A-UPM, for $j \neq k$, $j \geq 1$, $k \geq 1$,*

$$\underbrace{\frac{\partial \mathbb{E}[YD_k \mid \mathbf{Z}]}{\partial Z_j} \Big/ \frac{\partial \mathbb{E}[D_k \mid \mathbf{Z}]}{\partial Z_j}\Big|_{\mathbf{Z}=\mathbf{z}}}_{LIV_{kj}(\mathbf{z})} = \mathbb{E}[Y_k \mid j-k \text{ complier at } \mathbf{z} \text{ wrt } Z_j]$$

*Proof.* For $z_j' < z_j$, $\mathbf{z}'_{-j} = \mathbf{z}_{-j}$,

$$\begin{aligned}
\mathbb{E}[YD_k \mid \mathbf{z}'] - \mathbb{E}[YD_k \mid \mathbf{z}] &= \mathbb{E}[Y_k D_k(\mathbf{z}')] - \mathbb{E}[Y_k D_k(\mathbf{z})] \\
&= \mathbb{E}[Y_k D_k(\mathbf{z}') D_k(\mathbf{z})] - \mathbb{E}[Y_k D_k(\mathbf{z})(D_k(\mathbf{z}') + (1 - D_k(\mathbf{z}')))] \\
&= -\mathbb{E}[Y_k D_k(\mathbf{z}) D_j(\mathbf{z}')] \\
&= -\mathbb{E}[Y_k \mid D_k(\mathbf{z}) = 1, D_j(\mathbf{z}') = 1] \cdot \mathbb{P}[D_k(\mathbf{z}) = 1, D_j(\mathbf{z}') = 1]
\end{aligned}$$

$$\begin{aligned}
\mathbb{E}[D_k \mid \mathbf{z}'] - \mathbb{E}[D_k \mid \mathbf{z}] &= \mathbb{E}[D_k(\mathbf{z}')] - \mathbb{E}[D_k(\mathbf{z})] \\
&= \mathbb{E}[D_k(\mathbf{z}') D_k(\mathbf{z})] - \mathbb{E}[D_k(\mathbf{z})(D_k(\mathbf{z}') + (1 - D_k(\mathbf{z}')))] \\
&= -\mathbb{E}[D_k(\mathbf{z}) D_j(\mathbf{z}')] \\
&= -\mathbb{P}[D_k(\mathbf{z}) = 1, D_j(\mathbf{z}') = 1]
\end{aligned}$$

Combining these expressions,

$$\frac{\mathbb{E}[YD_k \mid \mathbf{z}'] - \mathbb{E}[YD_k \mid \mathbf{z}]}{\mathbb{E}[D_k \mid \mathbf{z}'] - \mathbb{E}[D_k \mid \mathbf{z}]} = \mathbb{E}[Y_k \mid j-k \text{ complier wrt } \mathbf{z}' \leftarrow \mathbf{z}]$$

Taking the limit as $z_j' \to z_j$,

$$\begin{aligned}
\lim_{z_j' \to z_j} \frac{(\mathbb{E}[YD_k \mid \mathbf{z}'] - \mathbb{E}[YD_k \mid \mathbf{z}])/(z_j - z_j')}{(\mathbb{E}[D_k \mid \mathbf{z}'] - \mathbb{E}[D_k \mid \mathbf{z}])/(z_j - z_j')} &= \lim_{z_j' \to z_j} \mathbb{E}[Y_k \mid j-k \text{ complier wrt } \mathbf{z}' \leftarrow \mathbf{z}] \\
\frac{\partial \mathbb{E}[YD_k \mid \mathbf{Z}]}{\partial Z_j} \Big/ \frac{\partial \mathbb{E}[D_k \mid \mathbf{Z}]}{\partial Z_j}\Big|_{\mathbf{Z}=\mathbf{z}} &= \mathbb{E}[Y_k \mid j-k \text{ complier at } \mathbf{z} \text{ wrt } Z_j]
\end{aligned}$$

□

Finally, comparing mean potential outcomes from different IVs requires A-CC:

$$\lim_{z_j' \uparrow z_j} \mathbb{E}[Y_k \mid D_j(\mathbf{z}') = 1, D_k(\mathbf{z}) = 1] = \lim_{z_k' \downarrow z_k} \mathbb{E}[Y_k \mid D_j(\mathbf{z}') = 1, D_k(\mathbf{z}) = 1]$$

Contrasting the identified mean potential outcomes then identifies mean sector effects on the $j - k$ margin:

$$LIV_{jk}(\mathbf{z}) - LIV_{kj}(\mathbf{z}) = \mathbb{E}[\, Y_j - Y_k \mid j - k \text{ complier at } \mathbf{z}]$$

# B CC Degree Pathways for FP/CC Marginal Students

Here I evaluate how for-profit students fare when they enroll in CCs, using the administrative transcript records from Texas for public colleges. Specifically, I estimate the mean potential outcomes at CCs for students on the FP/CC margin using the distance IVs. For a range of intermediate outcomes, I estimate $\mathbb{E}[Y_{CC} \mid \text{FP} - \text{CC complier wrt } Z_{FP}]$ and compare it to the average among CC students $\mathbb{E}[Y_{CC} \mid D_{CC} = 1]$ as a benchmark. This allows for a description of the unique barriers to degree completion that for-profit students face when they do enroll in public colleges.

Table A1 presents the mean CC potential outcome among marginal students, the mean among all CC students, and the difference between the two. CC students on the for-profit margin are significantly more likely to intend shorter Certificate degrees and pursue vocational majors. This is sensible given that for-profit colleges overwhelmingly specialize in vocational Certificates. At the same time, the fact that 30% of marginal students enter with a non-vocational major illustrates the option value with respect to field of study afforded by community colleges, as these students would have had to enroll in a vocational major had they attended a for-profit.

The remedial course-taking rates at CCs significantly understate the probability that for-profit students would have to take remediation. Fully 62% of marginal students would have to take remedial math, compared to just 45% of all CC students. Despite facing larger remedial requirements, marginal students are high-effort, taking an average of 13.5 semester credit hours (SCH) in their first term. This compares to an average of just 7.9 SCH among CC students, who are much more likely to enroll part-time. This fact also makes sense given that 90% of for-profit students enroll full-time, meaning they take at least 12 SCH per term. Strikingly, for-profit students earn first-term GPAs of just 1.81, compared to a 2.27 college average. This lies well below the 2.0 threshold for academic probation at many CCs and shows that for-profit students do face significant academic challenges with the public curriculum.

Marginal students attempt an average of 63 credits total, more than the 60 credits required for most Associate's degrees. Yet they only pass 37 of those credits on average. By virtue of their full-time intensity, marginal students complete degrees at somewhat above-average rates of 41%.[25] And consistent with the idea that for-profit students are more sure of their intended programs of study, more than half of graduates earn their degree in their originally declared major — compared to less than a quarter of all CC students.

[25] Note that this differs from the 34% reported in Table 9 because transcript data is only available beginning in 2011, and the sample therefore differs.

**Table A1:** Degree Progression Outcomes

| | $Y_{CC}$, FP/CC margin | CC | Difference |
|---|---|---|---|
| *Panel A:* At entry | | | |
| Intent: Certificate | 0.16 | 0.06 | 0.10 |
| | (0.02) | (0.00) | (0.02) |
| Intent: Vocational major | 0.70 | 0.37 | 0.33 |
| | (0.03) | (0.00) | (0.03) |
| Remedial math | 0.62 | 0.45 | 0.16 |
| | (0.07) | (0.00) | (0.07) |
| Remedial reading | 0.41 | 0.27 | 0.14 |
| | (0.06) | (0.00) | (0.06) |
| Remedial writing | 0.40 | 0.30 | 0.10 |
| | (0.06) | (0.00) | (0.06) |
| First-term SCH | 13.5 | 7.94 | 5.56 |
| | (0.62) | (0.01) | (0.62) |
| First-term GPA | 1.81 | 2.27 | -0.46 |
| | (0.22) | (0.00) | (0.22) |
| *Panel B:* Cumulative performance | | | |
| Total semesters | 7.00 | 6.53 | 0.47 |
| | (0.55) | (0.01) | (0.55) |
| Total SCH | 63.2 | 36.4 | 26.80 |
| | (4.47) | (0.04) | (4.47) |
| Total SCH passed | 37.1 | 21.4 | 15.70 |
| | (3.52) | (0.04) | (3.52) |
| Completion rate | 0.41 | 0.32 | 0.09 |
| | (0.06) | (0.00) | (0.06) |
| Completion in original major | 0.21 | 0.07 | 0.14 |
| | (0.04) | (0.00) | (0.04) |

*Notes:* $Y_{CC}$ for students on the FP/CC margin identified from distance IVs. "CC" is the mean among all CC students. Sample includes all Texas public HS graduates between 2011-2012. Degree completion includes graduation with any degree within 7 years of first enrollment. Standard errors in parentheses.

# C Additional Survey Evidence

**Academic Confidence at Entry** Beyond transcript outcomes, for-profit students also report higher academic confidence at entry, despite generally entering college with lesser academic preparation. Figure A1 shows that, conditional on observables, for-profit students in both degree levels are significantly more likely to anticipate academic success than CC students. Together with the transcript evidence, these facts show that for-profit students both expect and achieve higher academic performance than their CC peers, likely due to grade inflation. Awareness of relaxed academic standards at entry may also influence student sorting, particularly among academically under-prepared students.

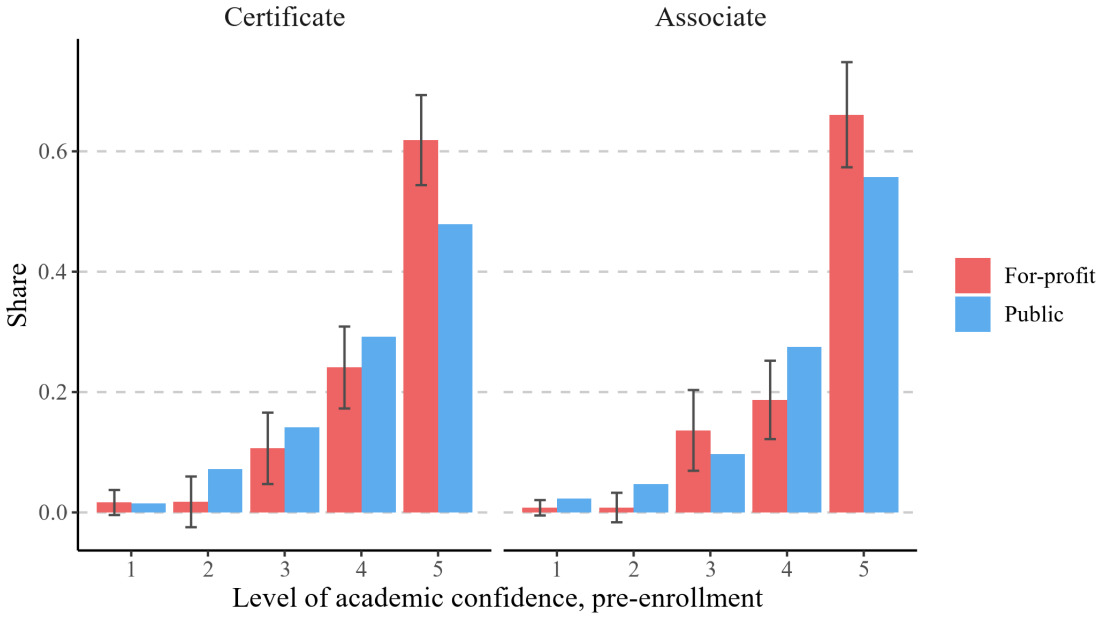



**Figure A1:** Academic Confidence at Entry

*Notes:* Estimates from BPS 12/17. Students indicated their agreement on a 1-5 scale with the statement, "Before I attended my first institution, I was confident I had the ability to succeed there as a student." Also see notes for Figure 2.

**Ability Gradients in the National Data** Figure A2 shows that, controlling for rich pre-college characteristics, for-profit graduation rates do not significantly vary with HS GPA, while CC students with HS GPAs of 3 or more are 30% more likely to graduate than those with GPAs below 3 ($p < 0.001$). Beyond degree attainment, the BPS also includes students' self-reported satisfaction with their college choices and perceived return on investment. While prior work has documented that for-profit students report significantly lower satisfaction with their schooling choices, Figure A2 shows that this pattern is concentrated among academically better-prepared students. Under-achieving students — those with HS

GPAs below 2 — report similar rates of satisfaction with for-profit and community college quality and are equally likely to view for-profit and community college as worth the cost.

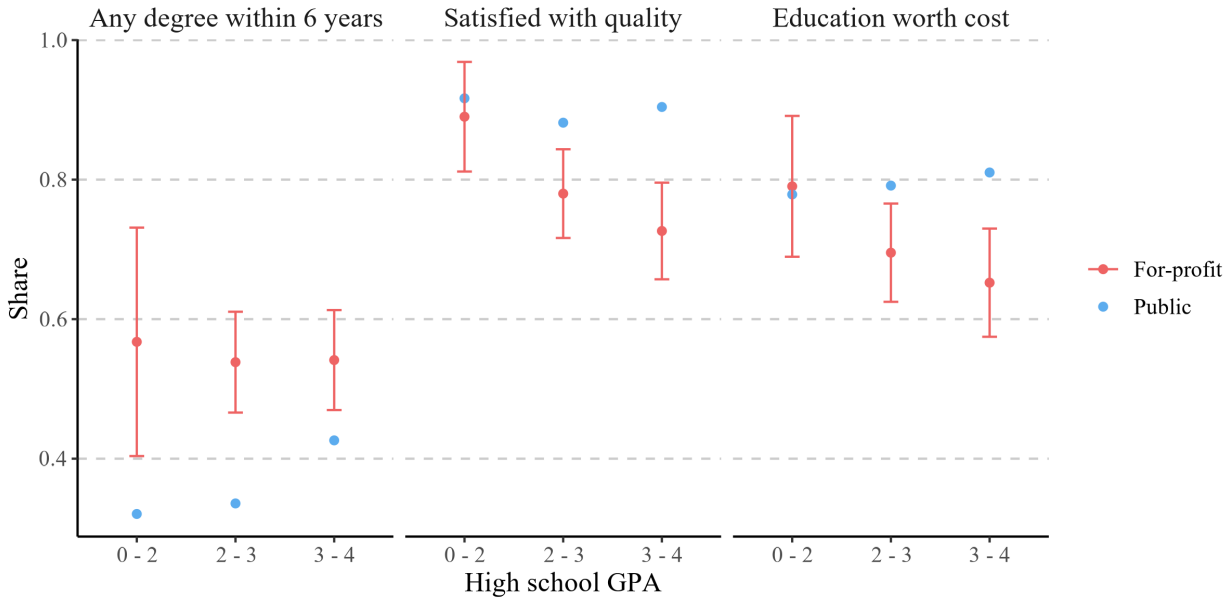



**Figure A2:** Relative Success by Academic Preparedness

*Notes:* Estimates from BPS 04/09. Sample pools students beginning college in Certificate and Associate programs at two-year and less-than-two-year colleges. High-school GPA is self-reported and binned. Satisfaction with college quality and the student's belief that their education was worth the cost were measured in a survey 6 years after initial enrollment. Blue dots represent sample proportions among public students. Red dots are selection-corrected means for for-profit students — that is, they add the for-profit coefficient from a regression with controls (where public is the omitted group) to the public mean. Controls include income percentile rank, total income by dependency status, whether parents own more than $10,000 in investments or businesses, dependency status, highest level of HS math, years of HS math, years of HS science, HS GPA, family size, father's and mother's highest education level, parents' marital status, gender, ethnicity, index of dropout risk, and single parenthood. Error bars represent 90% confidence intervals.

# D Additional Charts

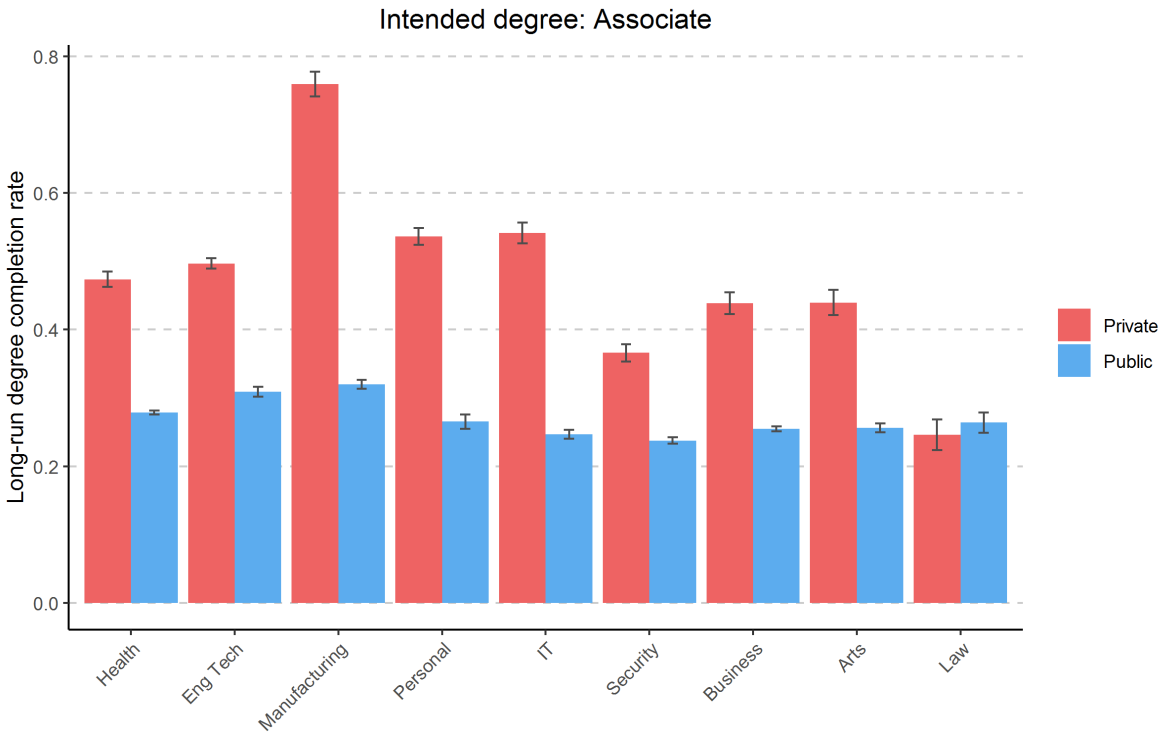



**Figure A3:** Completion Rates by Intended Major

*Notes:* Sample includes all Texas public HS students who enroll in a two-year for-profit or community college intending an Associate's degree in one of the listed majors from 2005-2012. Majors correspond to two-digit CIP codes; the Manufacturing category groups codes 46-48. Outcome is completing any degree within 7 years of first enrollment. Error bars denote 95% CIs.

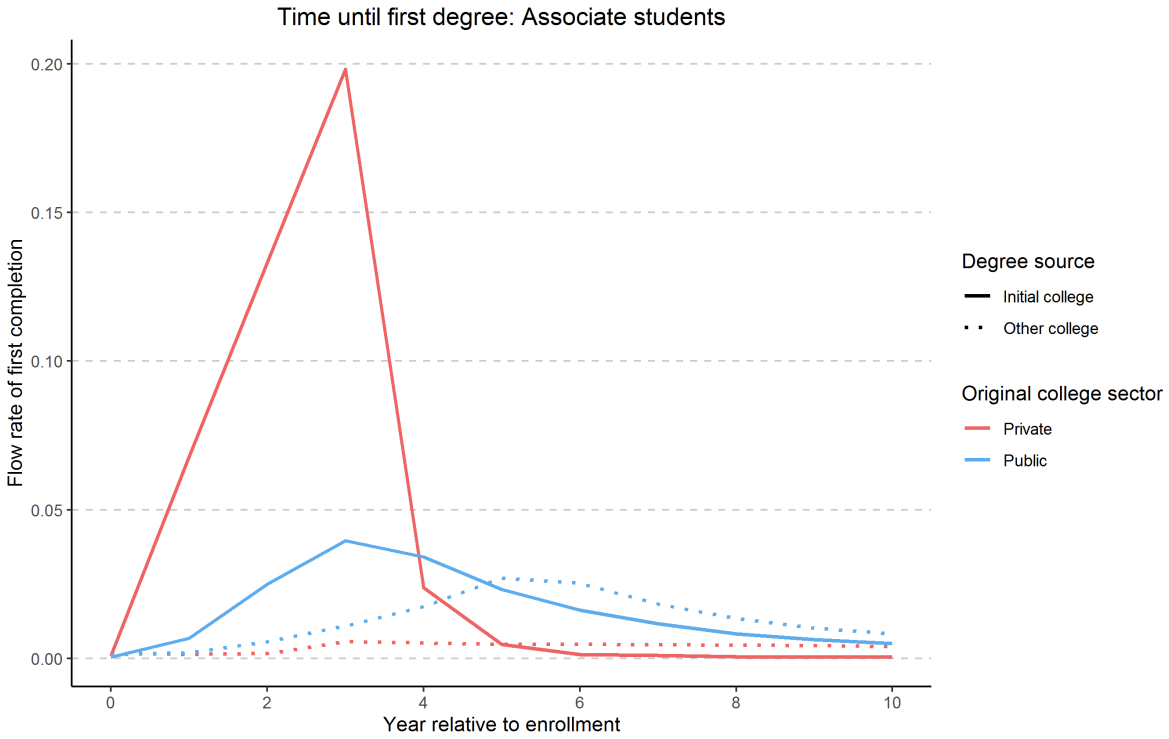



**Figure A4:** Flow Completion Rates by Initial vs. Transfer School

*Notes:* Sample includes all Texas public HS students who enroll in a two-year for-profit or community college intending an Associate's degree in a vocational field from 2005-2011.

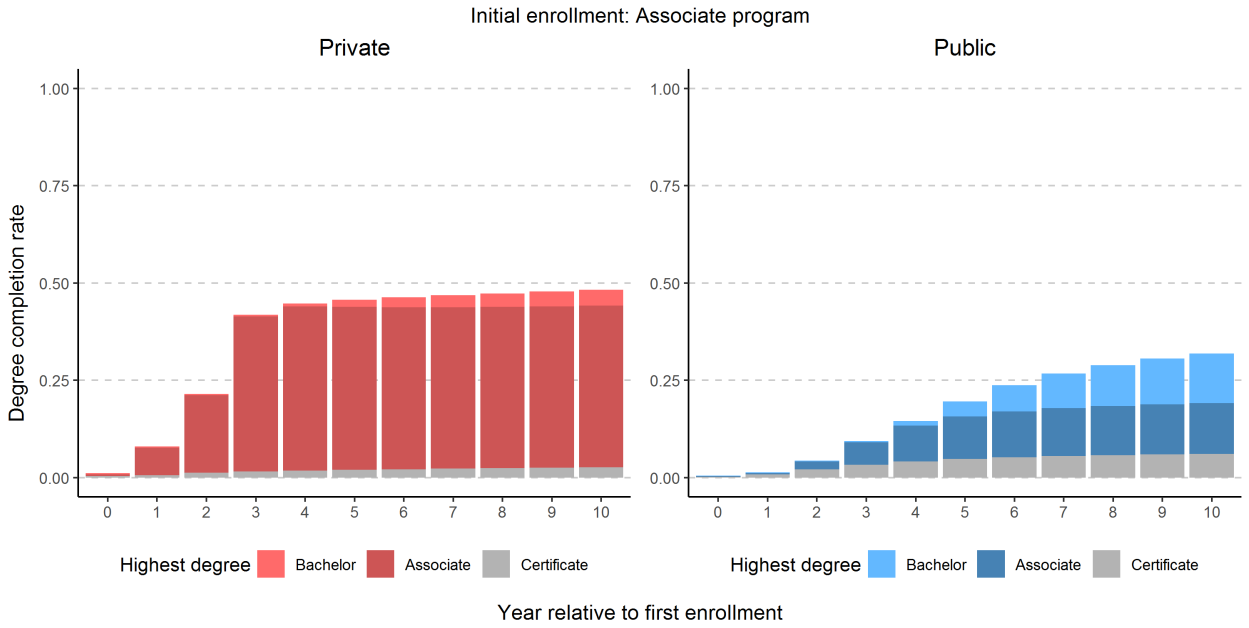



**Figure A5:** Composition of Degrees Earned among Initially Associate's Students

*Notes:* Sample includes all Texas public HS students who enroll in a two-year for-profit or community college intending an Associate's degree in a vocational field from 2005-2011.

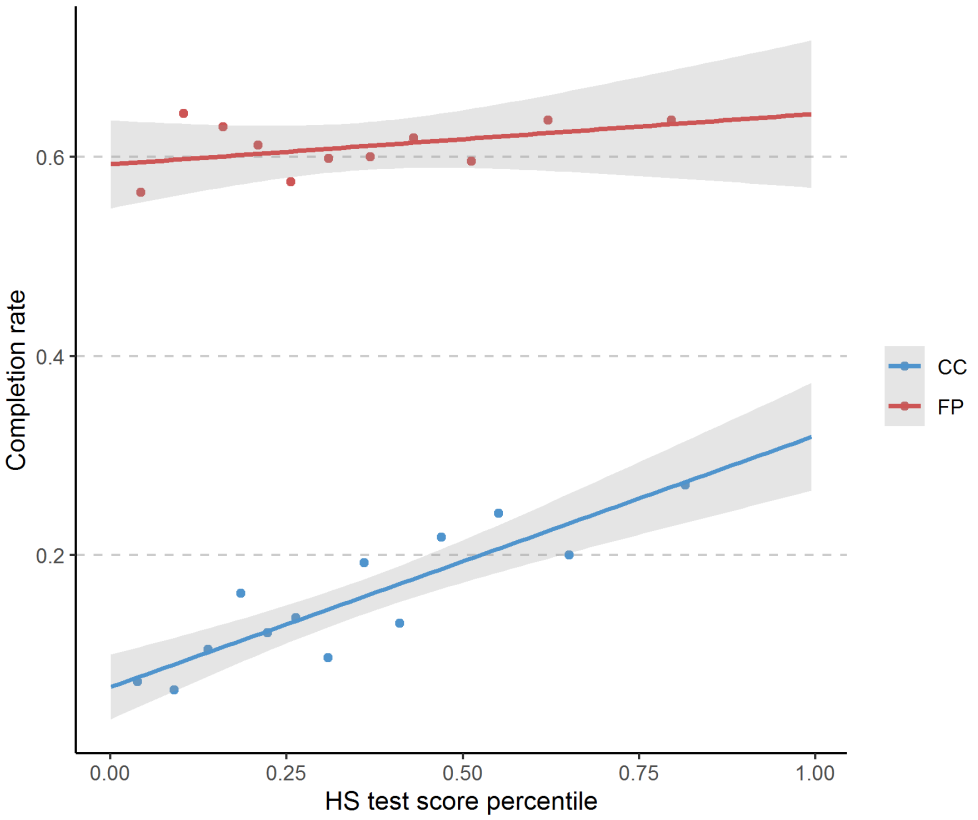



**Figure A6:** Completion Rates of FP → CC Switchers

*Notes:* Sector-specific graduation rates of students first enrolling in a for-profit and later enrolling in community college, with more than one year between enrollment spells. Shaded regions represent 95% pointwise confidence bands.

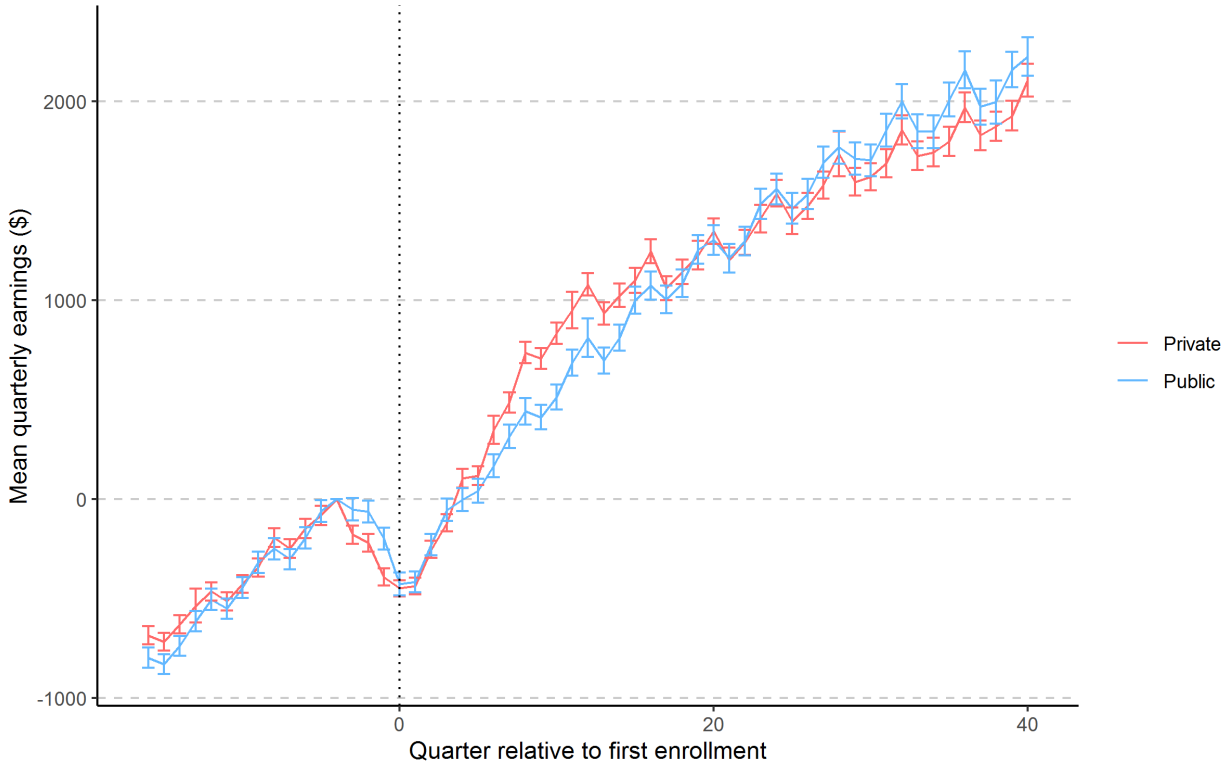



**Figure A7:** Raw Earnings Profiles of Associate's Degree-Seekers

*Notes:* See notes for Figure 5. Earnings profiles of eventual graduates and dropouts are pooled within initial enrollment sectors.

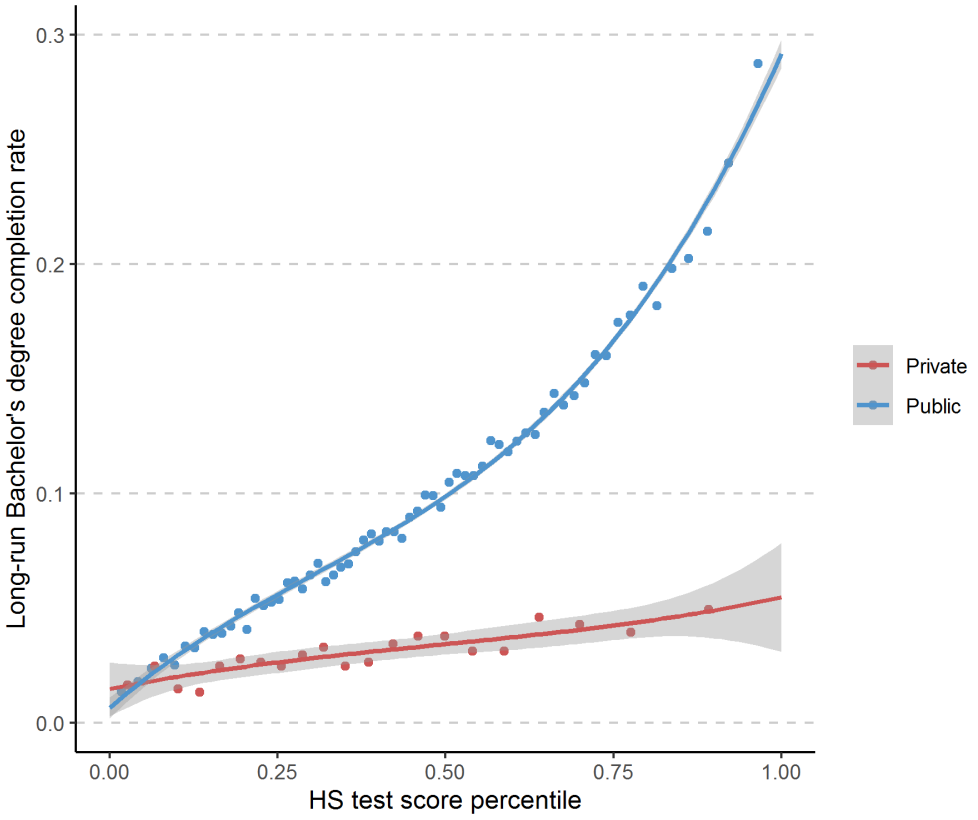



**Figure A8:** Bachelor's Completion Rates by Pre-College Academic Ability

*Notes:* Sample includes all Texas public HS students who enroll in a two-year for-profit or community college intending an Associate's degree from 2005-2012. The HS test score percentile is taken from statewide 9th- and 10th-grade tests in math and reading, which are converted to within-cohort percentile ranks. The long-run degree completion rate is the share of students completing a Bachelor's degree from any college within 7 years of first enrollment.