Post-COVID Labor Market Shortages and College Enrollment*

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Abstract

There were 1.1 million fewer students enrolled in U.S. higher education in Fall 2022 than Fall 2019. During the same period of time, the labor market grew increasingly favorable to young workers without college. I examine the relationship between these patterns using state administrative data connecting K-12, higher education, and workforce outcomes for Tennessee 12th grade classes of 2009 - 2022. I construct labor market indicators that would have been salient to 12th grade students and representative of their local employment opportunities: Job mobility and earnings for the most recent cohort from the same school, and in some models, from the same career and technical education focal area. I find that labor tightness may have explained 11% of the fall in college going between 2019 and 2022 and 26% of the fall in 2-year college going. Estimated effects are concentrated among Black students, students with low or missing ACT scores, and CTE students in Advanced Manufacturing and Hospitality, two areas that experienced labor shortages after the 2020 recession.

Keywords: College enrollment, labor tightness, career and technical education
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1 Introduction

There were 500,000 fewer students enrolled in college in Fall 2020 than in Fall 2019 (National Student Clearinghouse, 2022). Much of the fall was concentrated in community colleges, where hands-on coursework may have been constrained by the movement to online learning, social distancing, and other steps that colleges took to mitigate the risks of spreading the virus (Schanzenbach & Turner, 2022). Students more generally expressed a strong preference against online classes, and colleges that maintained in-person instruction sustained larger enrollments through 2020-2021 (Harris et al., 2024). In addition, the onset of COVID-19 in spring 2020 led to a short but deep recession with historically high 14.8% unemployment as well as food, housing, and general economic insecurity that may have ruled out first-time or returning enrollment (Rodriguez-Planas, 2022).

This pattern of declining post-secondary enrollment during the 2020 recession was at odds with prior downturns, when more students chose college over an unfavorable labor market (Barr & Turner, 2013; Long, 2014; Hillman & Orians, 2013). Post-secondary enrollment continued to drop after Fall 2020, however, for both first-time and returning students (Bulman & Fairlie, 2022; Dagorn & Moulin, 2023). The gap with pre-COVID enrollment widened to 1.1 million by Fall 2022 (National Student Clearinghouse, 2022). This is more consistent with countercyclical student demand for college because the steep recession in spring 2020 was followed by a rapid return to more than full employment by mid-2021 (Bureau of Labor Statistics, 2024). The labor force participation rate remained below pre-COVID levels, however, and throughout 2022 there were nearly two job openings per unemployed job seeker (Federal Reserve Bank of St. Louis, 2024). Combined with inflationary pressures, this pushed earnings up as employers competed for a limited pool of available workers.

Autor et al. (2023) document aspects of post-COVID labor market tightness that would have been relevant for college going decisions. First, the post-COVID economy exhibited wage compression: High-earning, older, college-educated workers experienced wage gains that tended to fall short of inflation, whereas pay for younger workers without college exceeded high rates of inflation. Second, young non-college workers were more mobile between jobs in the immediate post-COVID years, tending to move into higher paying work. These patterns are in agreement with an imperfectly competitive, monopsonistic labor market and reduced job stickiness post-COVID. For a 12th grade student considering their next steps, the on-the-ground reality of that model would have been more job openings with higher pay and without the requirement to have a college education.

In the wake of COVID-19, did more high school graduates go to work instead of college? I investigate this question using linked K-12, higher education, and workforce data describing Tennessee 12th grade students from the classes of 2009 - 2022. These data allow me to personalize the labor market conditions that may have informed a student's decision about going to college versus going to work. Specifically, I complement county unemployment rates with measures of short-term job mobility and earnings experienced by recent graduates from the same school as each 12th grader, and in some specifications, from same-school prior cohorts who took a similar sequence of career and technical education (CTE) courses.

Countercyclical post-secondary enrollment is consistent with the idea that stronger economic conditions raise the opportunity cost of college. Prior research on post-COVID college enrollment, however, found no significant effect of county unemployment (Schanzenbach & Turner, 2022) or labor force participation (Harris et al., 2024). In other settings, effects of labor market conditions on post-secondary enrollment tend to be more apparent from larger shocks such as the 2000s housing boom

(Charles et al., 2018), or with measures of youth unemployment (Clark, 2011; Betts & McFarland, 1995) rather than measures describing an area's entire labor force (Card & Lemieux, 2001). Same-school, prior-cohort measures of labor tightness may have been more salient to 12th graders than unemployment among the broad labor force, and they may have been better proxies of local labor demand for young workers without a college education.

Tennessee is an important setting for this study. After the introduction of tuition-free community college through Tennessee Promise, college enrollment increased from 59% to 64% among high school graduates, and the college-going gap closed between CTE and non-CTE students (Carruthers & Attridge, 2019). But for the class of 2021, Tennessee's college-going rate was just 53% and has yet to fully recover to pre-COVID levels (THEC, 2024). Complementing a tight labor market, Tennessee's K-12, labor, and higher education agencies have recently accelerated efforts around nontraditional postsecondary pathways including dual enrollment, industry certifications, and apprenticeship training (THEC, 2024; Veach, 2024; Tennessee Board of Regents, 2024).

Preliminary results indicate that labor market tightness reduced college going in Tennessee, both before and after COVID. Estimates indicate that labor market developments over 2019 - 2022 (i.e., lower unemployment along with higher earnings and job mobility among recent graduates) could have accounted for 11% of the drop in Tennessee college going over that same time frame, and up to 26% of declines in 2-year college going. This leaves a lot of room for reverberating effects of supply constraints, distaste for online learning, higher cost of living, and economic insecurity to explain enrollment declines in the post-COVID period, although enrollment did not fully rebound even as some of those factors resolved or returned to pre-COVID levels. Other factors that are more difficult to quantify include eroding sentiments

about the value of college (Fry et al., 2024).

I estimate more potent effects of labor market tightness on 2-year college enrollment than 4-year college enrollment, as well as larger effects on college going for Black students and students with low or missing ACT scores. Estimated effects by students' CTE fields are noisier, but two clusters–Hospitality and Tourism Management and Advanced Manufacturing–are notable for having low overall college going rates and particularly large declines in college going following an increase in labor market tightness.

These patterns were not wholly unique to the post-COVID period, and results suggest that overall college going was not significantly more or less responsive to the labor market after COVID than before. Estimates do indicate, however, that the probability of enrolling in a 2-year community or technical college was significantly more sensitive to labor market tightness after COVID. Likewise, Autor et al. (2023) find steeper quit elasticities for young, non-college workers post-COVID than pre-COVID, and to a lesser extent during other expansions going back to the early 1980s. The implication is that the appeal of one's current job, or current plans for enrolling in a 2-year college, may weaken during strong economies to a greater degree than they strengthen during weak economies.

2 Methods and Data

2.1 Methods

My focal question is whether the labor market affects college enrollment, and in particular, whether the labor market can explain some portion of the drop in college going shortly after the onset of the COVID-19 pandemic. A related, secondary ques-

tion is whether CTE plays a role in how students navigate the labor market after high school.

My baseline regression model is specified as follows:

$$Y_{isct} = LM_{isct}\delta_1 + X_i\gamma + \theta_s + \theta_t + \epsilon_{isct}, \tag{1}$$

where Y_{ist} is one of three college enrollment outcomes for student i attending 12th grade in school s, county c, year t: Any enrollment in college in year $t+1$, enrollment in a 2-year community or technical college, or enrollment in a 4-year college or university.

Equation 2 examines whether college going decisions were more or less sensitive to the labor market after COVID-19:

$$Y_{isct} = LM_{isct}\delta_1 + LM_{isct} * PostCOVID_t\delta_2 + X_i\gamma + \theta_s + \theta_t + \epsilon_{isct}, \tag{2}$$

where $PostCOVID_t$ is a binary variable equal to one for the classes of 2020 and later. In both specifications, the variable of interest is LM_{isct}, which represents labor market conditions relevant to student i, school s, and time t. In results to follow, LM_{isct} is the average of three normalized labor market indicators:

- -1 $\times$ average monthly county c unemployment during student i's 12th grade year.
- School s, cohort $t-1$'s employment-to-employment (EE) separation rate during i's 12th grade year (t). A job separation is defined as the end of a matched employer-employee spell. An EE separation is a separation where the em-

ployee works for another employer with no interruption. The EE separation rate is the percent of total jobs in a quarter (i.e., employer-employee matches) that are comprised of EE separated workers. This construction is similar to BLS and Census definitions for EE separations (Hyatt et al., 2014) and is featured by Autor et al. (2023) as a procyclical measure of labor tightness. In this context, the population of workers is limited to individuals in the year after high school.

- School s, cohort $t-1$'s average number of full-time-equivalent jobs (FTEJ) during i's 12th grade year (t). For each worker and each quarter, this indicator is equal to earnings divided by the product of the federal minimum wage ($7.25 throughout almost all of this time period) and 500 hours, and then divided by the worker's number of employers. FTEJ rises with earnings, and for a given level of earnings the measure is smaller for workers with multiple jobs. The multi-job penalty is meant to account for non-wage benefits such as health insurance coverage, retirement, sick leave, and public service loan forgiveness that are conditioned on full-time work.

I summarize EE and FTEJ indicators for each school, cohort, and quarter over the four quarters following the traditional spring season for high school graduation, i.e., quarters 3-4 and then quarters 1-2 of the following year. As an example, consider a hypothetical cohort of 12th graders from Central High School, class of 2019 - 2020. I link each student in the Central High 2020 cohort to their in-state, UI covered employment and earnings in the year after high school, between July 2020 and June 2021. I compute the cohort's EE rate each quarter of 2020 - 2021 as the number of EE separated workers in the cohort divided by total cohort employment in that quarter. I compute FTEJ for each student, each quarter, as equal to total earnings divided by the product of $7.25, 500 hours, and the number of i's unique employers

in the quarter. Cohort-by-quarter EE and average FTEJ are then assigned to the Central High School 12th grade class of 2020 - 2021 as two parts of their LM_{isct}. The third part of LM_{isct} for the Central High class of 2021 is the average monthly unemployment rate in their county over July - June of their 12th grade year, July 2020 - June 2021 (year t).

I normalize each of the three indicators–EE, FTEJ, and local unemployment–to have mean zero and standard deviation equal to one samplewide, multiply the unemployment rate by -1, and define LM_{isct} as the average of the three normalized measures. A tighter labor market corresponds with lower unemployment, higher EE as a portion of total employment, higher earnings in a typical job, and thus higher values of LM_{isct}.

The three-part construction of LM_{isct} offers two advantages over a summary measure of the labor market such as the unemployment or labor force participation rate. First, LM_{isct} indicators are derived from the work mobility and earnings experienced by slightly older peers. The t cohort is likely to know students in the $t-1$ cohort from their school, and likely to know how they are faring in college and work. This information may be more influential to their views on college and work than broad labor market measures that describe all workers of all ages.

Second, but related, LM_{isct} indicators at the school-by-cohort level may be better representations of labor opportunities available to young people in the vicinity of school s. In the years before COVID-19, and even more so in the years during and after, wage compression and job ladders differentially benefited young workers without a college education. If students are responsive to the labor market when determining their post-secondary work and schooling, we may be more apt to observe responses to measures that describe youth employment and earnings.

In some specifications of Equation 1, I further atomize EE and FTEJ measures to the school-cohort-cluster level. That is, I compute EE for students from school s and cohort $t-1$, and who additionally had the same CTE profile k as student i. A third advantage from this more personalized LM_{iksct} is that it represents labor market opportunities for someone with student i's skill profile.

Control variables in X_i include student i's gender, race, Hispanic ethnicity, ACT score, an indicator for missing ACT, and indicators for potential CTE concentration in one of the 16 career clusters in the national CTE framework.[1] Standard errors in Equations 1 - 2 allow for clustering within schools for LM_{isct} specifications of labor tightness, and within school-cohorts for LM_{iksct}.

Equations 1 - 2 identify the relationship between labor tightness and college enrollment choices from fluctuations in unemployment, job mobility, and earnings per job across cohorts attending the same school. We can interpret these relationships as the causal effect of labor tightness on college enrollment if unobserved components of the error (ϵ_{isct}) are not related to both LM_{isct} and college enrollment outcomes.

Preliminary results discussed below are from specifications that exclude measures of local COVID-19 health risks, instructional modality of colleges and universities near student i's school, the local cost of goods and housing, and less observable student sentiments about the value of higher education that might co-move with local labor markets. Each of these are in ϵ_{isct} and plausibly correlate with labor market tightness as well as student demand for college. As shown below, inferences are robust to several modifications of the baseline model, including specifications

[1]The 16 career clusters in the national framework are as follows: Agriculture, Food, & Natural Resources; Architecture & Construction; Arts, A/V Technology, & Communications; Business Management & Administration; Education & Training; Finance; Government & Public Administration; Health Science; Hospitality & Tourism; Human Services; Information Technology; Law, Public Safety, Corrections, & Security; Manufacturing; Marketing; Science, Technology, Engineering, & Mathematics (STEM); and Transportation, Distribution, & Logistics. Descriptions and additional details are at https://careertech.org/what-we-do/career-clusters/

that control for school-cohort fixed effects (θ_{st} rather than θ_s and θ_t) along with the school-cohort-cluster specification of LM_{iksct}. This richer specification controls for unobserved health, instructional, inflationary, and sentiment factors that are shared among members of a cohort within a school, and identification is driven from within-school, within-cohort variation in labor indicators across career clusters, conditional on cluster fixed effects.

2.2 Data

I estimate Equations 1 and 2 using linked administrative data from Tennessee's Department of Education (TDOE), Higher Education Commission (THEC), Independent Colleges and Universities Association (TICUA), and Department of Labor and Workforce Development (TDLWD).

The sample starts with all 12th graders enrolled in the state's public schools, from school years 2007-2008 through 2021-2022. TDOE records on these students include course-taking, school, gender, race, Hispanic ethnicity, and ACT composite and subject tests.

I use course-taking records to identify the CTE cluster or clusters where a student took three or more courses, and where they may have been designated as a concentrator. Tennessee followed the 16-cluster national framework over this time period, which includes focal areas spanning nearly every occupation and industry in the economy. Students usually attain concentrator status if they take three courses in a program within a cluster. I do not observe CTE programs, however, which varied from one cohort to another and consolidated over this timeframe, and I also do not observe students' formal concentrator status. So, these three-course indicators are best thought of as potential concentrations that are consistent across cohorts and schools.

I use THEC data to identify college enrollment in Tennessee's public technical and community colleges and public 4-year colleges and universities. Available enrollment data also cover private TICUA member institutions who share enrollment records with THEC or the National Student Clearinghouse. These data do not include enrollment in out-of-state and private non-TICUA institutions. Across cohorts, my estimates of college enrollment are consistently 7-11 percentage points lower than state reports (THEC, 2024), and much of that difference is likely accounted for by unobserved out-of-state and private enrollment. The gap narrowed somewhat for the post-COVID cohorts (from 11 to 9 percentage points between the classes of 2019 and 2022), which is consistent with steeper declines in private post-secondary colleges in that time period (National Student Clearinghouse, 2022). I also define cohorts somewhat more broadly, covering all enrolled 12th graders regardless of graduation outcomes, whereas THEC limits their college-going analysis to graduates with regular diplomas. Graduation rates are very high for students who reach 12th grade (94% in these data), so my cohort groups are likely very similar to THEC's.

TDLWD data allow me to link each 12th grade student to quarterly measures of earnings, de-identified employer identifiers, and employer industry through the second quarter of 2023. These linkages permit EE and FTEJ construction for the $t-1$ classes of 2008 through 2021, which I combine with county unemployment rates from the BLS LAUS. I estimate Equations 1 and 2 for the classes of 2009 through 2022. All earnings measures are converted to 2023 dollars using the Consumer Price Index.

3 Results

3.1 College going and youth labor markets: Trends from 2009 - 2022

Figure 1 plots trends in the percent of 12th grade cohorts observed in one of Tennessee's public or TICUA institutions in the next year (solid line) along with the percent who have any UI-covered Tennessee earnings in the next year.

Rates of enrollment in observed institutions increased from 50 to 54% between the 12th grade classes of 2014 and 2015, the same year that Tennessee Promise made tuition-free community college available to all high school graduates. This increase is smaller than official state reports of 5.8 percentage point gains in college enrollment (THEC, 2024), which differ from my estimates by limiting the set of 12th graders to those who graduated with a regular diploma and including private and out-of-state institutions that I do not observe. In the research data, college enrollment declined from the class of 2015 peak to 50.9% for the class of 2019, before dropping to the lowest level on record for the class of 2021 (44.9%). The class of 2022 was somewhat more likely to enroll in college, at 45.3%, which was still below pre-COVID and pre-Promise rates.

Similar to the rest of the U.S., enrollment declines were driven by fewer students attending 2-year schools. The 5.6-point fall in observed enrollment between the classes of 2019 and 2022 came from a 4.3-point drop in 2-year enrollment and a 1.5-point reduction in 4-year enrollment (from 27.5 and 25.4%, respectively, to 23.2 and 23.9%).

Rates of employment in UI-covered work increased from 64% for the class of 2009 to 74% for the class of 2015, and fluctuated within 3 percentage points from 2015 - 2022. Not shown in Figure 1, I find that while 12th graders were not substantially

more likely to work during the labor shortages that followed COVID, they were less likely to work and attend college at the same time (40% for the class of 2019 falling to 36.5% for the class of 2022, the lowest level since 2013), and less likely to only attend college (10.8% for the class of 2019 falling to to 8.8% for the class of 2022).

Figure 2 plots the average 4th-quarter EE separation rate for students who have recently left high school. EE separation roughly tracks the broader economy: falling during the Great Recession, rising during the 2010s expansion, falling in 2020, and then rising post-COVID.

The more remarkable insight from Figure 2, though, is the enormous amount of mobility that students exhibit in the year after high school. This is not due to 4th-quarter seasonality, since EE separations tend to grow in the middle of a calendar year. For comparison, Autor et al. (2023) document EE separation rates of 3-5% for the broad workforce in recent years, versus 30-35% in Figure 2 for Tennessee students who have just left high school. That is, about 1 in 3 of the jobs for this young population are held by workers who have just left another employer. This is in agreement with a large number of separations relative to total employment for teenagers[2] and a high likelihood of holding more than one job at a time.[3] Job spells in this population last 4 quarters at the uncensored median during the three years following high school. Some specifications to follow substitute overall EE separations with EE separations to higher-paying employment. This more upwardly mobile measure of job changes follows a similar trend as the overall EE separation rate and likewise accounts for a high rate of total employment among workers who have just finished high school. Upward EE separation rates measured 10-19% prior to COVID and 18-21% over 2020-2022.

[2]Among 14-21 year-old Tennesseans, the ratio of total separations to employment is about 49%, versus 14 - 18% for 35 - 54 year-olds (author's calculations using the Census QWI).

[3]Tennessee students have 1.2 employers per quarter in the year after high school, on average.

Figure 3 illustrates average pay in the year after high school, by cohort (panel A) and the equivalent number of full-time jobs at minimum wage (panel B). Both series shift sharply upward starting with the class of 2020. The first COVID cohort earned $8,001 over the four quarters starting in summer 2020 (in real 2023 dollars), up 16% from 6,889 for the class of 2019. This corresponded with about 0.9 full-time equivalent jobs, a 12.5% increase over 0.8 FTEJ for the prior class. Both total earnings and FTEJ rose to their highest level for the class of 2021 ($8,794 and 1.0, respectively) before tapering to their second-highest level for the class of 2022.

3.2 Estimated effects of labor market tightness on college going

Table 1 regression results indicate that greater post-COVID job mobility and earnings shown in Figures 2 - 3 can explain some degree of lower college going seen in Figure 1. Each standard deviation increase in the three-part indicator of labor tightness during a student's 12th grade year corresponds with a 2.8 percentage point decline in the likelihood of enrolling in college (column 1). This is driven by a 2.5-point lower likelihood of enrolling in a 2-year school (column 3), with no significant change in 4-year enrollment (column 5).

The story is somewhat more nuanced for post-COVID cohorts. Overall, college enrollment was just as sensitive to the labor market before COVID as after (column 2). Between the classes of 2019 and 2022, the labor market index increased by 22% of a standard deviation, which could explain 11% of the 5.6-point decline in observed college going based on column 1-2 results for any college enrollment. Descriptively, enrollment into 4-year colleges and universities changed very little after COVID and actually increased between classes of 2021 and 2022. Since the labor market index remained elevated at this time, column 4 estimates indicate that an increase in labor tightness is associated with a conditionally higher post-COVID likelihood of

enrollment into 4-year colleges and universities.

By contrast, 2-year enrollment was more sensitive to the labor market after COVID (column 4). A 1-standard deviation increase in labor tightness would have decreased 2-year college going by 5.1 percentage points in the post-COVID cohorts (combining δ_1 and δ_2 estimates in column 4), an extent that could account for 26% of the 4.3-point decline in 2-year college going. Nevertheless, this leaves a lot to be explained by other post-COVID factors, including student avoidance of health risks, student avoidance of health risk mitigators, economic insecurity, higher cost of living, and worsening qualitative views toward higher education.

3.3 Heterogeneous effects by student subgroup and CTE cluster

Figure 4 plots δ_1 coefficient estimates from Equation 1 for the full sample as well as several subgroups. Results point to a statistically significant substitution between college and labor opportunities for men, women, Black students, students with low or missing ACT scores, and both CTE and non-CTE students. Point estimates are most negative for Black students and those with low/missing ACT scores. Estimates of δ_1 are imprecise for Hispanic students and negative but imprecise for White and high-ACT students.

Figure 5 illustrates δ_1 coefficient estimates by CTE cluster (vertical axis), where each cluster's point estimate and confidence interval is plotted against overall college enrollment rates among potential concentrators (horizontal axis). There is not a clear pattern between estimated effects by cluster and expected college going, i.e., it is not the case that clusters with less college going tend to be more sensitive to labor market fluctuations. The only two clusters fitting that pattern are Hospitality & Tourism Management and Advanced Manufacturing, both of which have college going under 50% and large, statistically significant enrollment responses to labor tightness. Both

fields may have been particularly sensitive to growing employment opportunities in the post-COVID economy, e.g., in production of supply-limited goods or in low-wage service industries where labor shortages were particularly acute (Dvorkin & Bharadwaj, 2022; U.S. Chamber of Commerce, 2023). But in general, cluster-specific estimates in Figure 5 are too imprecise to draw strong conclusions about the relative contribution of different CTE fields to the overall fall in college enrollment.

Next, Figure 6 plots estimates of $\delta_1 + \delta_2$ from Equation 2, which represents the effect of post-COVID labor tightness on college going. Standard errors and confidence intervals of this coefficient combination are derived by the delta method. The same subgroups exhibiting more overall sensitivity to labor tightness–Black students and students with low or missing ACT scores–were also significantly more sensitive to unemployment rates and prior cohort job mobility and earnings after COVID.

3.4 Estimated effects of cluster-level labor tightness on college going

Table 2 reports results from a modification of Equation 1 and 2, where LM_{iksct} is computed at the cohort t, school s, and CTE cluster k level. In these specifications, the EE and FTEJ indicators in LM_{iksct} represent job mobility and full-time equivalent jobs experienced by the prior $t-1$ cohort from student i's school s, and with the same CTE concentration profile k as student i. Students with no potential CTE concentrations are matched with indicators from prior-cohort, same-school, non-CTE students, and students with multiple potential CTE concentrations are matched with average labor market indicators across their fields.

This more granular measure of labor market opportunities may be even more salient to 12th graders, since they may have shared more classes with prior-cohort students

in their CTE cluster. In addition, LM_{iksct} at the school-cohort-cluster level may better represent labor demand for i's skillset and their career preparation through CTE. Perhaps because of greater salience and relevance, Table 2 coefficient estimates indicate that overall college enrollment is more responsive to atomized labor market indicators. A 1-standard-deviation increase in LM_{iksct} is expected to reduce college going by 4.6 - 4.7 percentage points (columns 1-2), versus 2.8 percentage points from an equivalent increase in labor tightness at the broader schoolwide level (columns 1-2, Table 1). In contrast to the Table 1 model, however, students are more responsive to personalized labor market indicators on the 4-year college enrollment margin than on the 2-year college enrollment margin (columns 3-6). One implication is that college or career decisions may be more dependent on the economic outlook across sectors for aspiring 2-year college students, whose transitions between high school and higher education tend to be more countercyclical than transitions into 4-year college (National Center for Education Statistics, 2024).

3.5 Alternate specifications

Table 3 reports results from several modifications of LM_{isct} in Equations 1 and 2. These are listed roughly in order of estimated effects of LM_{isct} on college going. All except the last specification of LM_{isct} are measured at the school and cohort level.

I find that overall college going is not significantly responsive to LM_{isct} derived from EE and FTEJ as experienced by the $t-1$ and $t-2$ cohorts together. This supports the salience of LM_{isct} as one mechanism explaining my main findings. LM_{isct} in this specification is derived from job mobility and earnings as experienced by $t-1$ and $t-2$ cohorts during school year t, but a student in cohort t is less likely to know students from $t-2$, and less likely to have shared a class with them.

The primary concern with inferring causal effects from δ_1 estimates is that unob-

served aspects may have co-moved with student demand for college as well as the labor market. Many such aspects might relate to the early phase of the pandemic, when the job market was improving but health risks and adaptations to the college experience may have kept students away. I show in Table 3 that removing the 2019-2020 cohort does not change takeaways from Equations 1 - 2.

Main results are derived from labor market indicators that are averaged over four quarters starting just after the traditional high school graduation season and concluding one year later. The depth of the short, mid-year 2020 recession pulled academic-year indicators down to an extent that understated labor market tightness in the fourth and first quarters of the 2020-2021 cohort's 12th grade year, when they would have been taking important steps toward enrolling in college. In addition, the April - August period is an especially volatile one for recent high school graduates, in terms of their job mobility and earnings growth. With this in mind, the third alternate specification in Table 3 reports estimated effects of LM_{isct} from prior-cohort, same-school EE and FTEJ measured over September - March of each student's 12th grade year. Enrollment responses are somewhat more sensitive to this measure, but conclusions are not qualitatively different from those reported in Table 1.

Fourth, I estimate responsiveness to LM_{isct} that includes upwardly mobile EE separation rates rather than overall EE. This is in recognition of a high degree of job mobility among recent high school graduates that is not necessarily into higher paying work. The upward EE separation rate in a given quarter is equal to the percent of prior-cohort jobs held by workers who ended an employment spell in the prior quarter and had greater total earnings in the current quarter. Roughly 1-2 out of every 3 EE separations in these data are upward EE separations. I prefer the full EE indicator since earnings growth is factored into FTEJ, and the year immediately

following high school is a short window to observe movements up the job ladder. Nonetheless, this adapted LM_{isct} results in qualitatively similar changes in college going, albeit with less precision on the 2-year margin and more precision on the 4-year margin.

Finally, the fifth set of results in Table 3 estimate the effect of LM_{iksct} at the school-cohort-cluster level, as in Table 2, but with school-by-cohort fixed effects rather than separate school and cohort fixed effects. Identification in this model comes from differences in near-peer labor tightness across CTE concentrations in the same school and cohort, conditional on concentration fixed effects that are included in all results. If the labor market shifted over time in such a way that, for example, a school's Hospitality alumni improved relative to Marketing alumni, we might expect college going to fall more for current Hospitality concentrators than for current Marketing concentrators. This addresses potential omitted variables that affect students attending 12th grade in the same place and time, such as local COVID health risks and the instructional modality of nearby schools. School-by-cohort fixed effects also stand in for variables that might measure local sentiments toward higher education at a point in time, such as political preferences (Fry et al., 2024). Reassuringly, results are of a similar sign and significance as in Table 2, indicating that within schools, these aspects are not correlated with labor tightness. Coefficients are 4-5 times larger than those reported in Table 2, largely because there is less within-school, within-cohort variation in labor tightness than there is within-school, across-cohort variation that identifies effects of LM_{iksct} reported in Table 2. And as in the Table 2 specification, 2-year enrollment is notably less sensitive than 4-year enrollment to cluster-specific labor tightness.

4 Discussion and Ongoing Work

Findings suggest that better workforce opportunities for young workers without college can affect college enrollment, and that the decision to enroll in a 2-year college is particularly sensitive to the labor market. This was the case for Tennessee 12th graders during an extraordinarily tight post-COVID labor market, and also for several cohorts who graduated prior to COVID. The estimated college/work tradeoff can explain 11% of the drop in seamless transitions from 12th grade to college between 2019 and 2022, and perhaps 26% of the drop in 2-year college going. Estimated effects are more potent for groups of Tennessee students with lower baseline levels of college enrollment: Black students, students with low or missing ACT scores, and CTE students in Advanced Manufacturing and Hospitality.

These findings are derived from measures of job mobility and earnings that are specific to each student's cohort, school, and in some specifications, their CTE cluster. Same-school, prior-cohort labor market indicators describe jobs and earnings for near-peers and thus may be particularly influential on student decisions and serve as better proxies of labor demand for young workers without college in an area. There may be a limit, however, to the idea that enrollment decisions are more influenced by more personalized labor market indicators. I find that 2-year college enrollment is more sensitive to labor indicators from prior cohorts in the same school than from prior cohorts in the same school and CTE cluster.

At this stage, my findings are blind to health, safety, and institutional factors that Schanzenbach & Turner (2022) and Harris et al. (2024) have shown to be important in college enrollment patterns after COVID, as well as rising cost of living and declining sentiments toward college that may have both co-moved with near-peer labor supply. Post-secondary institutional responses to economic conditions are likewise omitted,

and it is possible that college going decisions were influenced by schools' ability to absorb stimulus funds (Dinerstein et al., 2014), cut or recruit faculty (Turner, 2014), or alter ACT/SAT requirements for admission applications. Specifications with school-by-cohort fixed effects help to control for the portion of those factors that are unique to a particular time and place. Ongoing work refines the analysis to quantify some of these determinants of college going more directly, as well as externally driven shocks to local labor markets for young workers without college.

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Figures and Tables

Figure 1: College and work outcomes after high school, by cohort

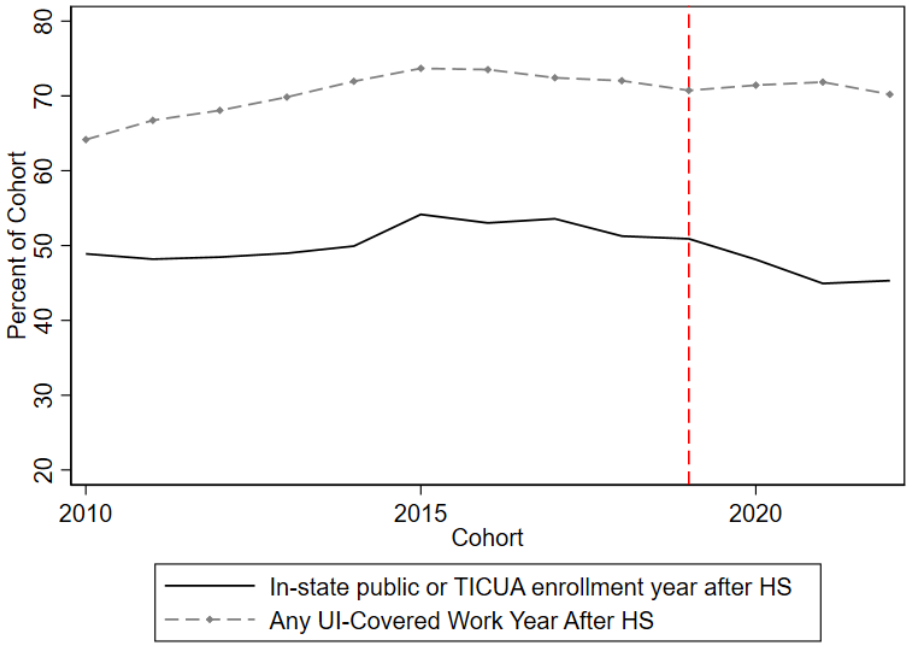


Figure 2: Fourth quarter employment-to-employment separation rate in the year after 12th grade

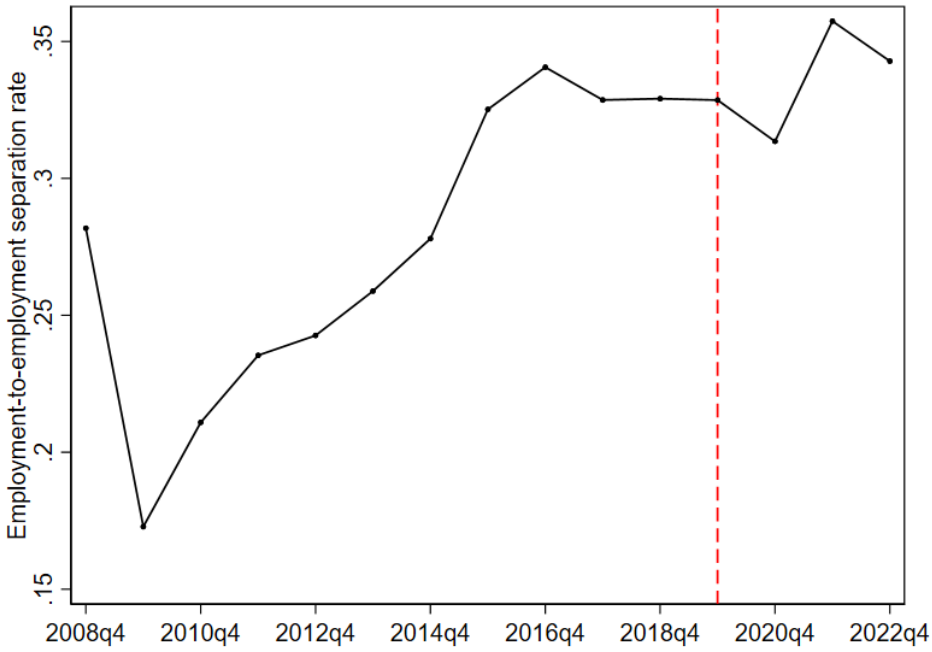
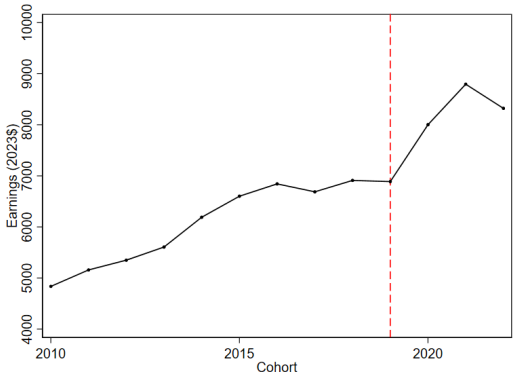


Figure 3: Total UI-covered Tennessee earnings and fourth quarter full-time equivalent jobs in the year after 12th grade

A. Total earnings



B. Full-time equivalent jobs

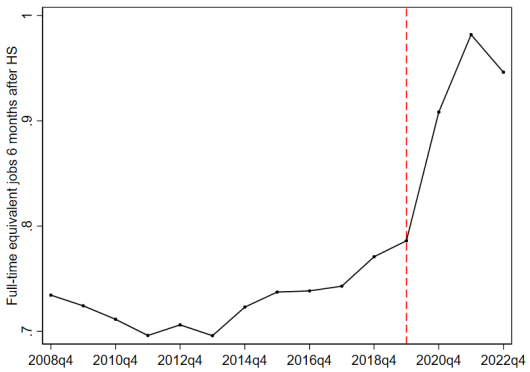


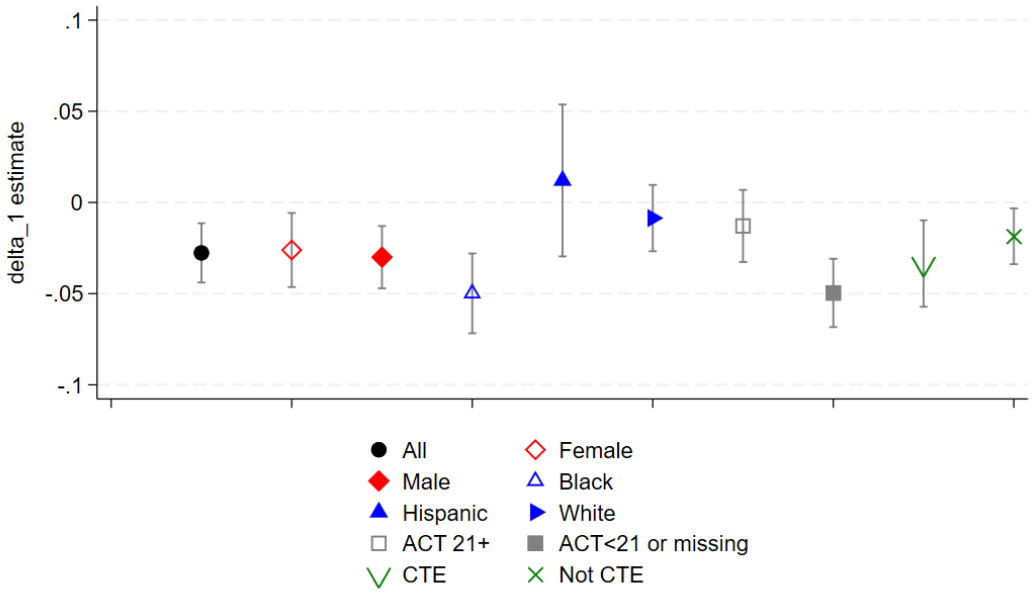
Table 1: Equation 1 and 2 results: Estimated effect of labor tightness on college going

	College enrollment		2-year enrollment		4-year enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
LM_{isct}	-0.028***	-0.028***	-0.025**	-0.017*	-0.002	-0.014
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.007)
$LM_{isct} * PostCOVID_t$		0.002		-0.034***		0.049***
		(0.012)		(0.008)		(0.014)
N	889,132	889,132	889,132	889,132	889,132	889,132

Standard errors in parentheses allow for clustering within schools.

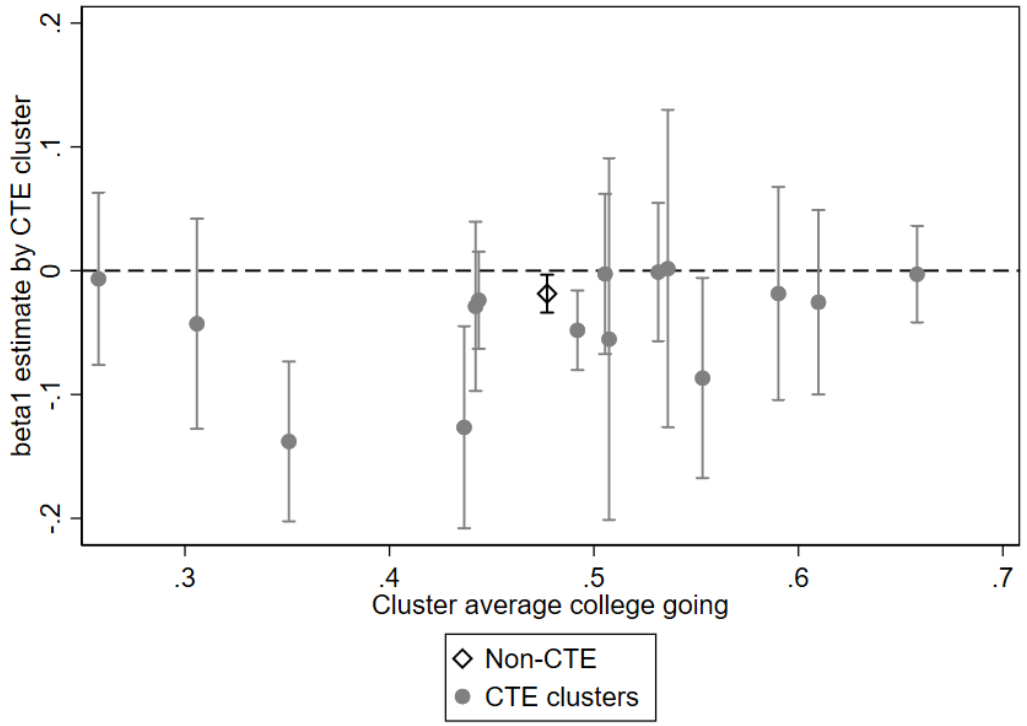
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 4: Estimated effect of labor tightness on college going, by subgroup



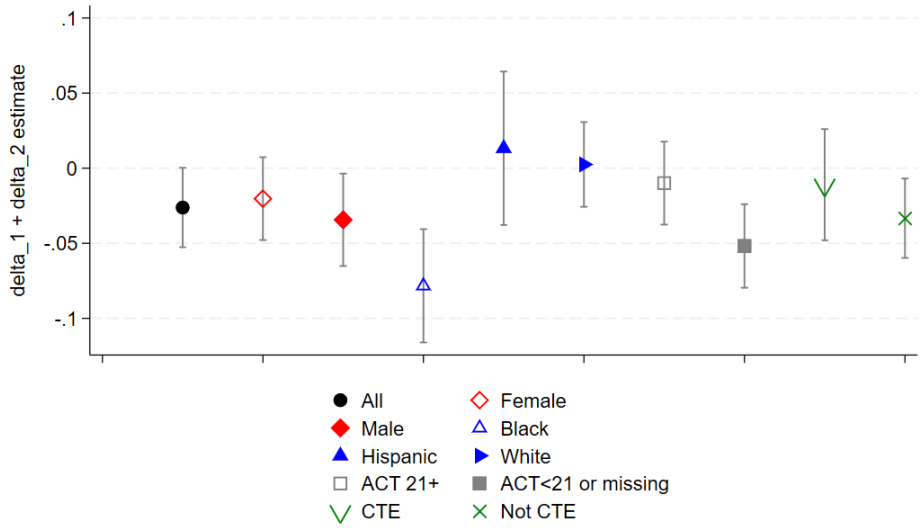
The figure plots Equation 1 estimates of δ_1, overall and by subgroup. 95% confidence intervals are derived from standard errors that allow for clustering within schools.

Figure 5: Estimated effect of labor tightness on college going, by CTE cluster



The figure plots Equation 1 estimates of δ_1 by CTE cluster and for non-CTE students. 95% confidence intervals are derived from standard errors that allow for clustering within schools.

Figure 6: Estimated effect of post-COVID labor tightness on college going, by subgroup



The figure plots Equation 2 estimates of $\delta_1 + \delta_2$, overall and by subgroup. 95% confidence intervals are derived from delta-method standard errors that allow for clustering within schools.

Table 2: Equation 1 and 2 results: Estimated effect of cluster level labor tightness on college going

	College enrollment		2-year enrollment		4-year enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
LM_{iksct}	-0.047***	-0.046***	-0.010**	-0.010**	-0.042***	-0.041***
	(0.005)	(0.005)	(0.003)	(0.004)	(0.004)	(0.005)
$LM_{iksct} * PostCOVID_t$		-0.008		-0.002		-0.005
		(0.006)		(0.005)		(0.007)
N	884,325	884,325	884,325	884,325	884,325	884,325

Standard errors in parentheses allow for clustering within school-cohorts.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Equation 1 and 2 results: Alternate specifications

	College enrollment		2-year enrollment		4-year enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
$t-1$ and $t-2$ cohort indicators						
LM_{isct}	-0.016	-0.017*	-0.022**	-0.015*	0.007	-0.005
	(0.008)	(0.008)	(0.007)	(0.007)	(0.009)	(0.007)
$LM_{isct} * PostCOVID_t$		0.007		-0.031***		0.049***
		(0.010)		(0.007)		(0.011)
Without Class of 2020						
LM_{isct}	-0.025**	-0.027**	-0.027***	-0.019*	0.002	-0.011
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.007)
$LM_{isct} * PostCOVID_t$		0.008		-0.037***		0.061***
		(0.014)		(0.010)		(0.015)
With 4th quarter indicators						
LM_{isct}	-0.031***	-0.029**	-0.012	-0.006	-0.019*	-0.025**
	(0.009)	(0.009)	(0.007)	(0.007)	(0.008)	(0.008)
$LM_{isct} * PostCOVID_t$		-0.009		-0.028**		0.031*
		(0.013)		(0.010)		(0.014)
With upwardly mobile EE						
LM_{isct}	-0.039***	-0.039***	-0.016*	-0.011	-0.024***	-0.032***
	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)
$LM_{isct} * PostCOVID_t$		-0.002		-0.023**		0.031**
		(0.011)		(0.008)		(0.012)
With school-cohort-cluster LM_{isct} and school-cohort fixed effects						
LM_{iksct}	-0.195***	-0.204***	-0.040*	-0.041***	-0.175***	-0.184***
	(0.009)	(0.011)	(0.004)	(0.005)	(0.007)	(0.009)
$LM_{iksct} * PostCOVID_t$		-0.031		-0.058		0.029*
		(0.017)		(0.010)		(0.013)

Standard errors in parentheses allow for clustering within schools (LM_{isct}) or within school-cohort (LM_{iksct}).
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$