

TENNESSEE'S POST-PANDEMIC WORKFORCE: IMPLICATIONS FOR THE VALUE OF GOING TO COLLEGE

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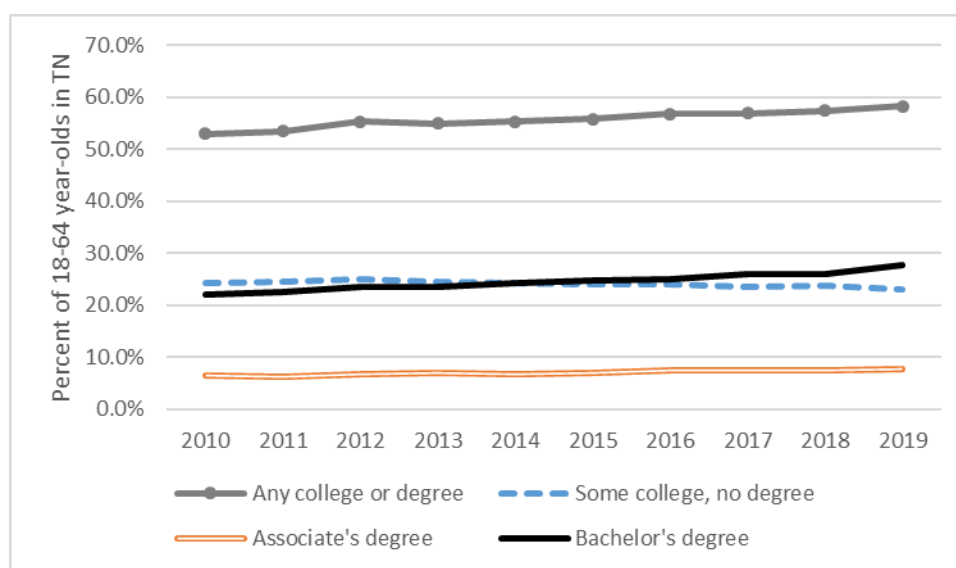
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Summary

In the wake of the Great Recession, Georgetown University researchers projected that 58 percent of Tennessee jobs would require education beyond high school by 2020 (Carnevale et al., 2013). This inspired the “Drive to 55” in Tennessee—the goal to have at least 55 percent of the working-age population hold a postsecondary certificate or degree by 2025. The state invested considerable resources in providing new pathways and encouraging completion of a variety of credentials and degree programs, largely focused on two-year college credentials.

Much has changed in the decade since the Drive to 55 was initiated. According to the American Community Survey, 58% of Tennesseans 25 and older had at least some college-level education in 2019, up from 53% in 2010 (Figure 1). The Lumina Foundation estimates that 47% of working-age Tennesseans now have a workforce-relevant postsecondary credential or industry-recognized certificate.¹ Technology has also marched ahead over the last ten years, and automation threatens many jobs that do not require a college education (Haar & Scott, 2016; Hershbein & Kahn, 2018).

Figure 1. College attainment of 18-64 year-old Tennesseans. In 2019, 58% had some college or a degree, up from 53% in 2010.



Source: Authors' calculations using the 2010-2019 American Community Survey (Ruggles et al., 2022).

However, as the impacts of COVID-19 reverberate throughout our economy, the current environment is more favorable for workers without college than it has been for a generation or more. In every sector and in firms of every size, workers and employers have reevaluated virtually every element of the employment relationship. While higher education continues to offer a pathway to long and successful careers in many fields, employers are facing considerable difficulty finding enough applicants to fill the available job openings. Nominal wages and job opportunities are rising for workers at every level of education, and high school graduates are reevaluating the costs and benefits of college. Nationwide, college enrollment dropped 5% between fall 2019 and 2021, driven by a 13% decline in two-year

¹ <https://www.luminafoundation.org/stronger-nation/report/#/progress/state/TN>

Summary

community college enrollment (NSCRC, 2021). Initial estimates for fall 2022 point to another 1% decline in undergraduate enrollment, along with a softer 0.4% slide in community college enrollment (NSRC, 2022). In Tennessee, falling college-going in 2020 and 2021 quickly erased gains following the introduction of Tennessee Promise and Tennessee Reconnect in 2015 (THEC/TSAC, 2022). Tennessee's industrial composition has changed as well, with strong employment growth in manufacturing and the leisure and hospitality sectors (Kessler et al., 2023), where many in-demand jobs do not require a college education.

A tight labor market, high college costs alongside high rates of student loan default, and growth in job opportunities for workers without college have led many to question if college is still worth the cost. The answer will depend on many factors, including changes to the college wage premium and the cost of college, as well as advancement opportunities for workers with and without college. Many of these factors are unforeseen beyond a short window. We are, however, beginning to get a clearer picture of the post-pandemic workforce—the evolving composition of occupations, and wages for occupations with different education levels—and how the workforce equilibrium has changed over the last five years.

This picture, along with the employment and economic outlook for Tennessee, suggests that the average long-term payoff from enrolling in college remains large and positive, but not guaranteed. Our major findings are as follows.

- A college education is a large, upfront investment of time and money, but the payoff from higher lifetime earnings usually makes it worthwhile. We estimate a 14.5% return to the time and money spent earning a bachelor's degree and a 9.5% return to earning an associate's degree. Returns to college are not always positive, however, and will depend on a student's program and whether or not they graduate. We estimate a 6-7% return to enrolling in college without earning a degree.
- The post-pandemic labor market is very tight and continues to favor college-educated workers in terms of wages and unemployment rates.
- Pre-pandemic and post-pandemic, employment growth in Tennessee has been faster for higher-paying, college-level jobs.
- The national economic outlook is souring, and recessions tend to hit workers without college harder.
- In terms of job availability, the outlook for Tennessee workers without college degrees is favorable relative to the rest of the U.S.
- Recent wage gains for high school-level jobs have outpaced rapid inflation. But these wage gains are not likely to cut deeply into the expected return to college, much of which comes at midcareer. This could change if employers modify education requirements for traditionally college-level jobs. We are not yet seeing high school-educated workers move into these jobs in large numbers.

The sections to follow review the evidence behind these points, beginning with an updated analysis of the post-pandemic return to different levels of higher education (Sections 1-3). In Section 4 we provide an overview of the national and Tennessee labor markets, with implications for earnings and employment by education. Section 5 describes our analysis of occupations in Tennessee, focusing on growth in jobs requiring high school versus jobs requiring college. Section 6 summarizes the outlook for Tennessee's economy and labor market, and Section 7 concludes.

1. The Average Payoff from College is Large but not Guaranteed

In this section, we compare annual earnings for U.S. workers with a college education to earnings for workers without college in order to estimate the individual financial return to investing time and money in higher education. A big caveat is that our estimated returns to college are descriptive, not causal estimates of the additional earnings that a student would accrue if they enrolled in college. Higher earnings and lower unemployment for college-educated workers can be explained in part by factors other than college: advantageous family backgrounds, for example, or an aptitude for skills that lead to success in school and in work. Researchers have deployed a variety of quasi-experimental methods to better understand the causal role of a postsecondary education in later earnings. Oreopoulos and Petronijevic (2013) review this literature, finding that each year in college raised earnings by 8% or more, on average. They also review research on the non-pay benefits of college, including evidence of better health, higher rates of family formation, and higher rates of civic participation. Our estimates exclude these and other non-financial returns to higher education.

Table 1 reports the average annual income by education level for 2019 and 2022. These data come from the March Current Population Survey (CPS; Flood et al., 2022), limited to full-time U.S. workers aged 18-64 who were not enrolled in high school or college when surveyed. Before the onset of the pandemic, and in 2022 as the economy recovered, workers with a college education earned substantially more than those with a high school diploma. In both 2019 and 2022, a worker with a high school diploma earned 80-82% as much as someone with an associate's degree and just over half as much as someone with a bachelor's degree.

Table 1. Annual U.S. Wage and Salary Income by Education (2022\$)

	March 2019	March 2022
Less than High School	\$34,822	\$35,619
High School Graduate	\$48,170	\$45,919
Some College, No Degree	\$55,826	\$53,198
Associate's Degree	\$60,218	\$56,291
Bachelor's Degree	\$86,258	\$86,554
Graduate or Professional Degree	\$119,492	\$116,796

Source: Authors' calculations using March CPS for 18-64 year-olds working full-time and not enrolled in school or college when surveyed. Wage and salary income is inflation-adjusted to March 2022 dollars.

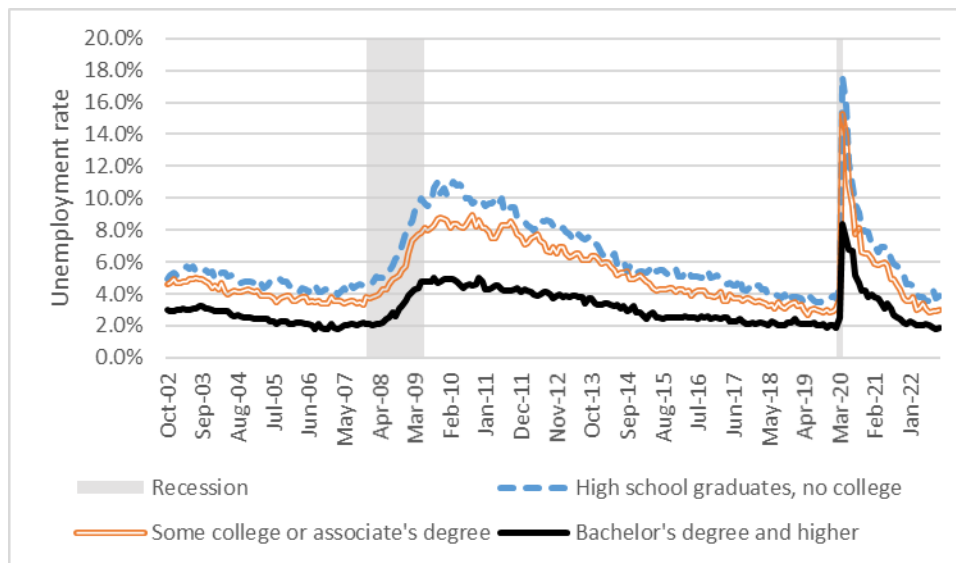
Another interesting insight from Table 1 is the change in average earnings from 2019 to 2022, both expressed in inflation-adjusted 2022 dollars. The inflation rate was 13.1% from March 2019 to March 2022—a historically high rate of price increase. Wages and salaries rose in nominal terms, but inflation-adjusted income has been falling since the beginning of the pandemic.² The exceptions are for bachelor's degree recipients, whose real incomes held steady, and workers who did not complete high school, whose incomes rose 2.3% in real terms.

² Weekly real earnings are plotted against the annual inflation rate here: <https://fred.stlouisfed.org/graph/?g=WILc>.

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A college education is also strongly associated with whether or not someone is out of work, as seen in Figure 2, sourced from the Bureau of Labor Statistics (BLS). The most recent unemployment data from October 2022 indicate that just 3.9% of workers with a high school diploma were out of work. This is a very low rate of joblessness (although, somewhat higher than 3.6% in summer 2022), matching the rate of unemployment in January 2020 following more than 10 years of economic expansion. And yet, unemployment is even lower for college-educated workers: 3.0% among those with up to an associate's degree and 1.9% among those with a bachelor's degree.

Figure 2. U.S. unemployment rate by educational attainment.
College-educated workers are less likely to be out of work, especially during recessions.

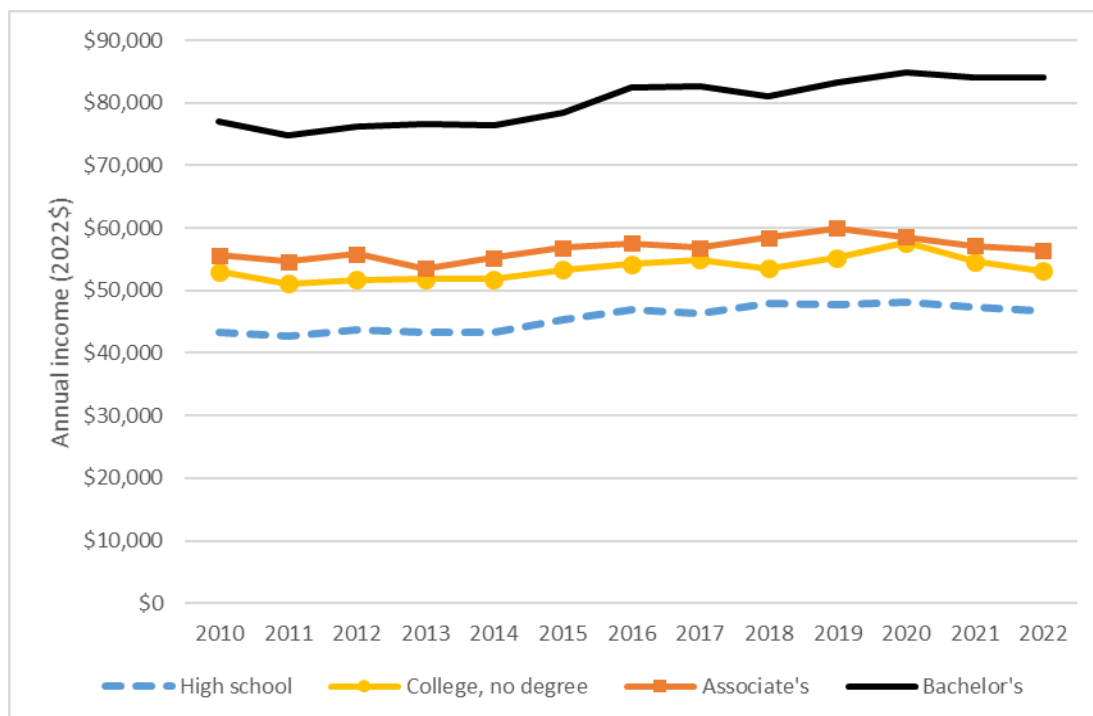


Source: BLS Employment Situation. Limited to persons in the labor force age 25 and older.

Figure 3 illustrates 2010-2022 trends in annual income by educational attainment, limiting the Table 1 CPS sample to high school graduates, ages 18-64, working full time, not enrolled in college, and without graduate, professional, or doctoral degrees. In addition, we control for changes in the composition of workers over the last 13 years, so Figure 3 depicts what we would expect the 2022 workforce to earn at different points in time and at different education levels.³ Real income trended upward throughout the 2010s, and all four education groups earned more in 2019 than they did in 2010. As in the unadjusted summary statistics in Table 1, we see real incomes decline post-pandemic for workers with less than a bachelor's degree. Also notably, workers with a high school education earn less than workers with some college or an associate's degree, but the gap has narrowed over the last several years.

³ From 2010 to 2022, the full-time workforce became somewhat younger, on average, more racially and ethnically diverse, more likely to be single, and less likely to live in the northeast or north-central United States. To control for these and other changes in worker composition, we estimate separate wage regressions for each CPS year and four education levels: high school, some college, associate's, and bachelor's. Controls include age, age squared, race, Hispanic ethnicity, gender, U.S. nativity, marital status, and U.S. Census division. We then use coefficients from these regressions to predict average wages in each year, and at each education level, holding control variables at their March 2022 average.

Figure 3. Average U.S. income by year and education (2022\$). The income gap between high school and college-educated workers remains large but has narrowed since 2010.



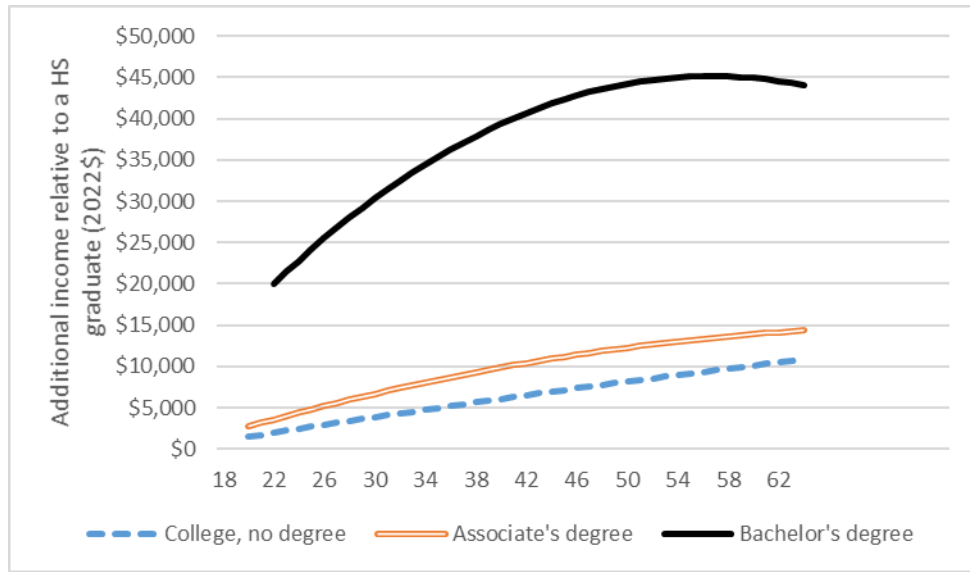
Source: Authors' calculations using March CPS, 2010-2022, limited to age 18-64 high school graduates working full time, not enrolled in college, and without graduate degrees. Nominal incomes are inflation-adjusted to March 2022 dollars and account for demographic and regional changes in workforce composition.

The income premium for college-educated workers tends to widen at midcareer, when advancement opportunities often require college. Figure 4 illustrates this for full-time workers in the 2022 March CPS. The vertical axis measures the additional income that a college-educated worker typically earns relative to a high school-educated worker at each age from 18 to 64. Workers with an associate's degree, for example, earn 11.5% more than a high school graduate at age 25 but 20.7% more at age 50. The gap grows even wider for bachelor's degree recipients, who earn 55.5% more than high school-educated workers at age 25 but 69.8% more at age 50.

We use Figure 4 age-income profiles to compute total lifetime earnings by education, reporting results in Table 2. We expect a bachelor's degree recipient to earn \$1.5 million more than a high school graduate over their career. The premium is \$375,000 with an associate's degree and \$224,000 for a college non-completer.⁴

⁴ These lifetime earnings premiums are similar to what Abel and Deitz (2014) report using the CPS and the same methodology: in 2022 dollars, \$401,416 for an associate's degree and "well over" \$1.2 million for a bachelor's degree. Our findings are also similar to analogous results reported by Carnevale et al. (2021). In 2022 dollars, their estimates are \$1.36 million for a bachelor's degree, \$452,000 for an associate's degree, and \$339,000 for some college without a degree. Carnevale et al. (2021) use the larger American Community Survey and estimate median lifetime earnings, whereas we focus on the CPS and average lifetime earnings.

Figure 4. Additional earnings with a college education in the U.S., relative to high school-educated workers, by age (2022\$). The income gap between workers with and without college widens over the course of a career.



Source: Authors' calculations using the March 2022 CPS, limited to age 18-64 high school graduates working full time, not enrolled in college, and without graduate degrees.

Table 2. Lifetime Earnings by Education (thousands of 2022\$)

	Lifetime earnings	Premium over High School
High School Graduate	\$2,160	
Some College, No Degree	\$2,384	\$224
Associate's Degree	\$2,535	\$375
Bachelor's Degree	\$3,665	\$1,505

Source: Authors' calculations using the March 2022 CPS for age 18-64 working full-time and not enrolled in school or college when surveyed.

Do higher earnings make up for the cost of college and time spent out of the workforce while enrolled? Abel and Deitz (2014, 2019) take on this question with estimates of the internal rate of return to attaining an associate's or bachelor's degree. The internal rate of return is the return on privately-invested funds that would make a student financially indifferent between incurring the direct and indirect costs of enrolling in college, or going to work and investing those costs instead. They estimate a 13-14% internal rate of return to an associate's degree as of 2013, and a 14-15% return to a bachelor's degree. Their 2019 update finds that the return to a bachelor's degree edged down from 16% to 14% over the 2010s in part because of the rising costs of college, but nonetheless, they conclude that a 14% rate of return "easily surpass[es] the threshold for a good investment."

We replicate Abel and Deitz's (2014, 2019) methodology using 2010-2022 CPS data to get a sense of how the internal rate of return to a college degree may have changed post-pandemic. Specifically, we estimate earnings and/or the cost of college at each age from 18 to 64 for four hypothetical students:

- A high school graduate who goes to work at age 18
- A student who enrolls in college for two years (age 18-19) and does not complete a degree
- A student who enrolls in a public community college for two years (age 18-19) and completes an associate's degree
- A student who enrolls in a four-year university (age 18-21) and completes a bachelor's degree

Our assumption that these hypothetical students complete associate's degrees in two years and bachelor's degrees in four years (that is, "on time") contradicts what we know about typical time to degree. Shapiro et al. (2016) find that students typically take 3.3 years to complete an associate's degree and 5.1 years to complete a bachelor's degree. Accounting for an additional year in college and out of the workforce would increase the cost of college and reduce estimated returns to postsecondary education. Offsetting this, however, is another simplifying assumption we make, namely that students earn no income while they are enrolled. The National Center for Education Statistics (2018) estimates that 43% of full-time students and 81% of part-time students work while enrolled, and Ecton et al. (2023) find that working students take longer to complete degrees. We do not observe time to degree or income during college for workers in the CPS, so we maintain these assumptions but note that inefficient time to degree and non-zero cash flow as a student will affect an individual's return on their investment in higher education.

We assume that all four hypothetical students work until age 64, earning a typical wage or salary for their age and education level, tying demographic and regional aspects of the workforce to their average 2022 values. The income difference between college-educated workers and high school-educated workers, summed over the work life, represents the financial benefit of enrolling in college.

To represent the cost of college, we start with the net price (tuition and fees minus grants, scholarships, and discounts) of attending two-year public colleges, four-year public colleges, and four-year private nonprofit colleges from 2010-2022, as reported by Ma and Pender (2022). For the hypothetical bachelor's degree recipient, we assume that they incurred four years of a weighted average of public and private university net tuition.⁵ We assume that the associate's degree recipient incurred the net price of public two-year college enrollment for two years. We do not know if a CPS respondent who reported having some college without a degree attended a 2-year or 4-year school, and we do not know how long they were enrolled. We assume that "Some college, no degree" respondents attended college for two years and incurred a 50/50 weighted average of 2-year and 4-year college costs.⁶ To represent the indirect cost of college, i.e., time spent on coursework rather than in the labor force, we use a high school graduate's expected earnings from age 18-19 for associate's degrees and some college without degrees, or from 18-21 for bachelor's degrees. All estimated benefits and costs are inflation-adjusted to 2022 dollars.

Figure 5 illustrates the internal rate of return estimates for attaining a bachelor's degree, an associate's degree, or enrolling in college without completing a degree. All are relative to the earnings of a high school graduate. Pre-pandemic bachelor's and associate's degree estimates are within 1 percentage

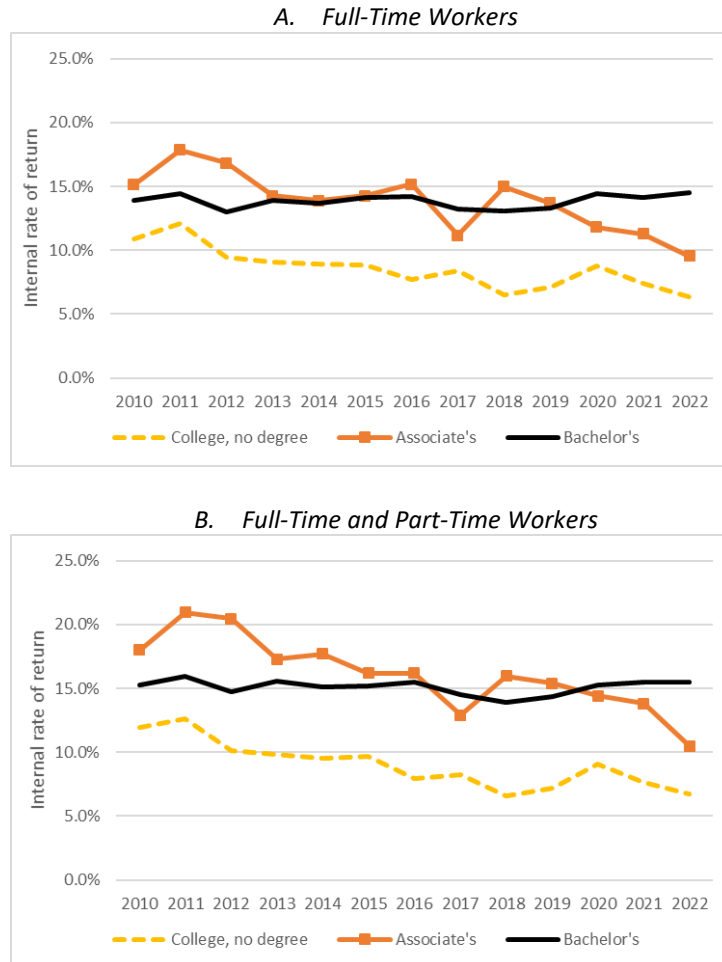
⁵ Weighted-average university costs are computed as 30% of the typical private nonprofit university net price and 70% of the typical public university net price. This is consistent with the distribution of total public and private undergraduate students from 2010-2022 (Ma and Pender, 2022, Figure CP-17).

⁶ This may overstate the cost of college for non-completers, since 2-year schools tend to have lower graduation rates than 4-year schools.

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point of Abel and Deitz’s (2014, 2019) reported estimates. For full-time workers (5A), estimated returns for associate’s degrees fluctuated around a downward trend, from 15.1% in 2010 to 13.7% in 2019. Returns to bachelor’s degrees were more stable over that time period, ranging from 13-14%. Post-pandemic, associate’s degree returns fell to 9.5%, while bachelor’s degree returns increased to 14.5%. We do not attribute the downward trend in associate’s degree returns to the cost of college, because tuition and fees have stabilized since 2010 and even declined in real terms since the start of the pandemic (see Section 3). Instead, it appears that a smaller return to associate’s degrees is driven by the relative rise in earnings for high school graduates that we also saw in Table 1 and Figure 3.

Figure 5. Estimated return on investment in college in the U.S., 2010-2022. The return to a college degree remains high at 9.5-15.5%, although higher earnings for high school-educated workers have cut into the return to an associate’s degree, and to enrolling without completing a degree.



Source: Authors’ calculations using the 2010 - 2022 March CPS for age 18-64 high school graduates not enrolled in school or college when surveyed. Wage and salary income is inflation-adjusted to March 2022 dollars and account for demographic and regional changes in workforce composition. Internal rate of return estimates are calculated as the discount rate that balances the present value of higher lifetime earnings with the present value of direct and indirect costs of college.

Nevertheless, Figure 5 results indicate that a college degree remains a good investment, on average.⁷ Even at 9.5%, the estimated return to an associate's degree in 2022 exceeds the 7% real annual return to stocks since 1950, and the 3% return to bonds. In addition, we find that estimated returns increase when we include part-time workers in the CPS sample (5B), and even more when we include unemployed workers and assume that they had no income in the previous year (not shown). This is because workers without a college education are more likely to work part time, and, calling back to Figure 2, more likely to have spells of unemployment.

Figure 5 shows that enrolling in college without completing a degree yields the lowest estimated return, trending downward from 11% to 6% among full-time workers and from 12% to 7% among full-time and part-time workers. An investment in college is less likely to pay off for students who do not attain a degree.

"Investment" is an apt word for the upfront time and expense devoted to college enrollment. A college student is banking on the idea that future earnings and non-pay benefits will more than recover those costs. As with other large financial investments, a positive payoff is not guaranteed. Our Figure 5 results represent average returns to college, but these averages conceal a considerable range of returns that depend on college completion, major or program, location, and more.

Focusing on bachelor's degree recipients, Webber (2018) estimates that college pays off for 93% of graduates who incur typical public university tuition. Even with \$50,000 in annual college expenses, 87% of 4-year college graduates would earn more than a median high school graduate. This is consistent with our findings in Figure 5, which depict a fairly high return to graduating with a bachelor's degree. But after accounting for a 60% likelihood of graduating, Webber finds that a \$50,000 annual investment in college would pay off for just over half of college students. Even with no direct costs of college, 22% of 4-year college students would not ultimately earn more than a median high school graduate. In the same vein, Cooper (2021) finds that the median return on investment in a 4-year education shrinks by more than 50% after accounting for dropout risk, and that returns vary widely by school and field of study. The Beacon Center (2022) similarly finds wide variation in debt-to-earnings ratios for programs across Tennessee colleges and universities.

Carnevale et al. (2021) emphasizes the wide range of income for workers with the same level of education, illustrating that the highest-earning high school graduates earn more than the median college graduate. They also highlight the role of occupation and location in lifetime earnings; every level of education, architecture, engineering, computational, and health occupations pay more.

We close this section with two additional caveats. First, our estimated lifetime returns to college rely on retrospective CPS data from the last 13 years, along with respondents' previous education choices. Labor market and higher education circumstances will evolve in ways that we cannot foresee, which will affect realized education premiums. Nonetheless, our findings are in line with cited research using similar methods and data several years before the pandemic. Second, we do not estimate returns to

⁷ In results not shown, we find that rate of return estimates are similar for women, non-white workers, and the whole population shown in Figure 5, even though women earn 30% less than men on average and non-white workers earn 10% less than white workers. For women and non-white workers, the opportunity cost of college, i.e., what they would have made in the workforce as 18-21 year-olds, is also lower than it is for males and white workers, and this offsets lower post-college pay in rate of return calculations.

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enrolling in a for-profit college or university, although some portion of CPS respondents were likely educated in the for-profit sector. For-profit institutions typically charge higher tuition than public colleges and universities (Ma and Pender, 2022), and their students graduate at lower rates⁸ and earn less after school (Cellini & Turner, 2019; Itzkowitz, 2021). Therefore, we likely understate the return to enrolling in public or nonprofit schools.

⁸ See graduation rates by education sector here: <https://nces.ed.gov/programs/coe/indicator/ctr/undergrad-retention-graduation>.

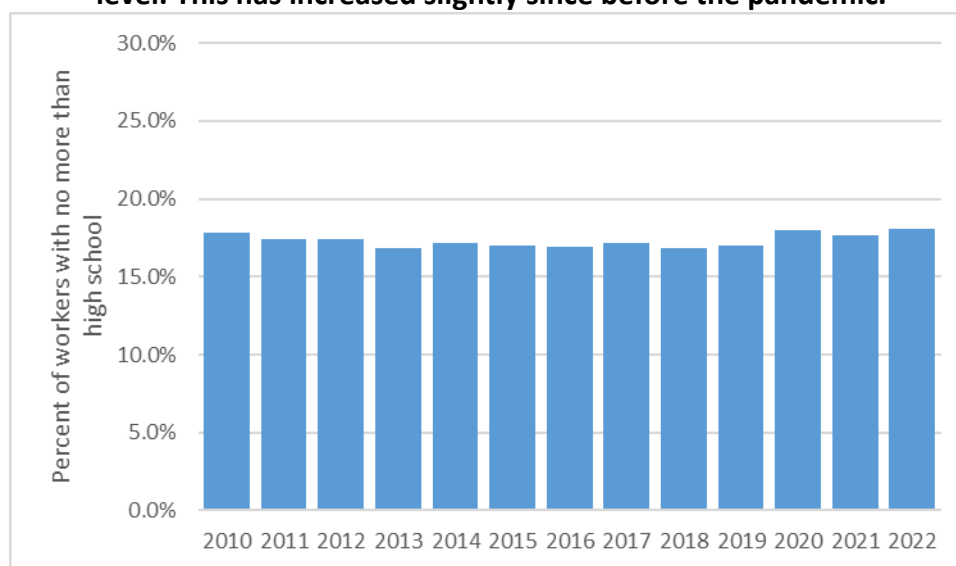
2. High School-Educated Workers are Getting More College-Level Jobs, but Slowly

Estimated returns to college in the previous section could overstate realized pay premiums in the future if employers relax education requirements for higher-paying jobs, as Maryland recently did for thousands of state jobs (Schweitzer, 2022). Blair et al. (2020) estimate that there are 11 million non-college educated workers with high-wage skills, but who are working in low or middle wage jobs. In addition, there is growing interest in alternatives to college, such as short-term non-degree credentials provided online or through employers (Fain, 2020; Hufford, 2022).

We examine monthly U.S. data from the 2010-2022 CPS Earner Study to assess if the recent labor shortage (discussed in more detail in Section 4) may have led more workers with a high school education to move into traditionally college-level jobs. We limit monthly samples to wage and salary workers age 18-54, who graduated from high school, and who were not enrolled in college when surveyed. We match almost all of the 451 occupation codes in the CPS Earner Study to typical entry-level education as recorded by the BLS.⁹

Among workers a high school education in 2022, we find that 18.1% held jobs with college-level entry requirements (Figure 6). This has increased since 2019, but only by 1 percentage point. Looking closer, we find that this modest growth was driven by older workers. High school graduates age 45-54 were 20% likely to have a college-level job in 2022, up 1.3 percentage points from 2019.

Figure 6. Percent of U.S. high school-educated workers in college-level jobs, 2010-2022. Workers without college are 18% likely to hold jobs that usually require college at entry level. This has increased slightly since before the pandemic.



Source: Authors' calculations using the 2010-2022 CPS Earner Study, limited to age 18-54 high school graduates working full-time and not enrolled in college when surveyed. CPS respondents' occupation code was matched to BLS-determined typical entry-level education requirements.

⁹ We use the 2019 entry-level education assignments found here: <https://www.bls.gov/oes/additional.htm> and the 2010 Standard Occupational Classification system, grouping jobs into three education categories: (1) no formal education requirement or high school diploma; (2) college up to an associate's degree; (2) bachelor's or advanced degree. We use the BLS Occupational Outlook Handbook to resolve cases where a Census occupation code has ambiguous education levels. Ultimately, we match all but 2.5% of workers in the CPS Earner Study to typical entry-level education levels in their occupations.

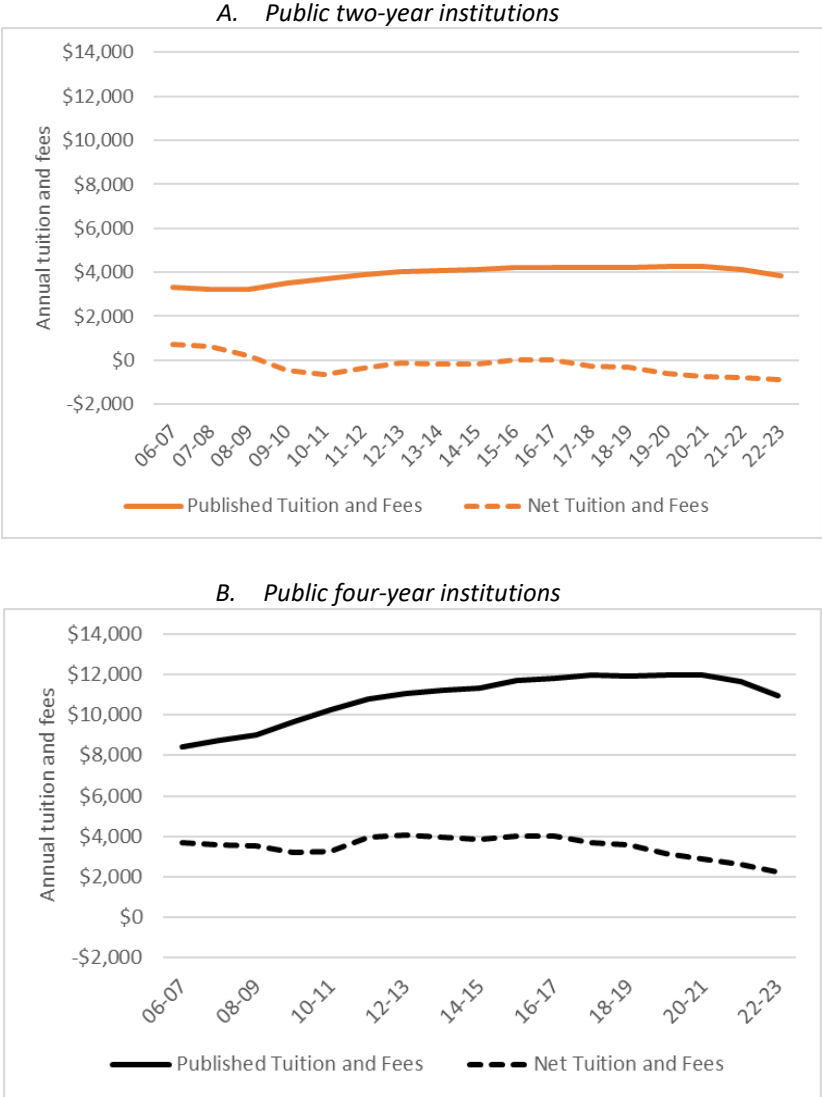
3. The Cost of College is Holding Steady or Falling

The direct and indirect costs of college are a big part of the equation for the individual payoff to enrolling in higher education. Published tuition and fees are much higher in 2022 than they were 15 years ago. Even with inflation adjustments, tuition and fees to attend public four-year universities are 30% higher in 2022 than in 2006, and 17% higher for community colleges (Ma & Pender, 2022).

Rapid growth in tuition and fees was concentrated in the earliest years of the 2010s. Public college enrollment in the U.S. peaked in 2011, shortly after the Great Recession, when state and local appropriations to higher education were not keeping up with enrollment growth (SHEEO, 2022). Inflation-adjusted tuition and fees have levelled or fallen since 2015 (Figure 7). After subtracting grants and scholarships, net tuition and fees have been steady or falling for several years as well. Public college and university tuition rose only 1.6-1.8% between 2021 and 2022 (Ma and Pender, 2022). This represents a significant decline in real terms since inflation measured 8.2% over the same time period.

There is reason to expect that tuition and fees will remain stable in the short term, in inflation-adjusted if not nominal terms. Post-pandemic tuition growth has been very slow despite rising prices elsewhere in the economy, but inflation may ultimately push nominal tuition up to help cover higher operating costs. A 2023 recession may increase enrollment and contract other sources of higher education revenue, but likely not to the degree experienced during and following the 2007-2009 Great Recession. Current forecasts summarized in Section 6 point to a milder downturn. In addition, the U.S. population is aging, and the number of 18-22 year olds is declining. This will work against tuition and fee growth as institutions compete for a smaller number of traditionally-aged students.

Figure 7. U.S. public college and university tuition, by year and institution level (2022\$). The tuition price of college has stabilized or declined since 2015.



Source: Ma and Pender (2022), Figures CP-8 and CP-9. Tuition and fee figures are inflation adjusted to 2022 dollars.

4. Job Seekers had the Advantage in the Post-Pandemic Labor Market, with or without College

Several factors placed upward pressure on earnings in recent years, namely a very tight labor market and 40-year high inflation rates. Good workers are currently in short supply relative to openings, and employers are increasing pay and perhaps other fringe benefits in order to attract increasingly rare workers to their firms. In this section, we review the latest data on worker turnover and business sentiment around the job market in Tennessee relative to national trends.

Turnover

Job openings have been exceptionally high in recent months, according to the BLS Job Openings and Labor Turnover Survey (JOLTS).¹⁰ October 2022 data show a job opening rate of 7.0 percent in Tennessee (Figure 8A: openings divided by the sum of employment and openings), continuing a long-running increase from a low of 1.5 percent in April 2009.

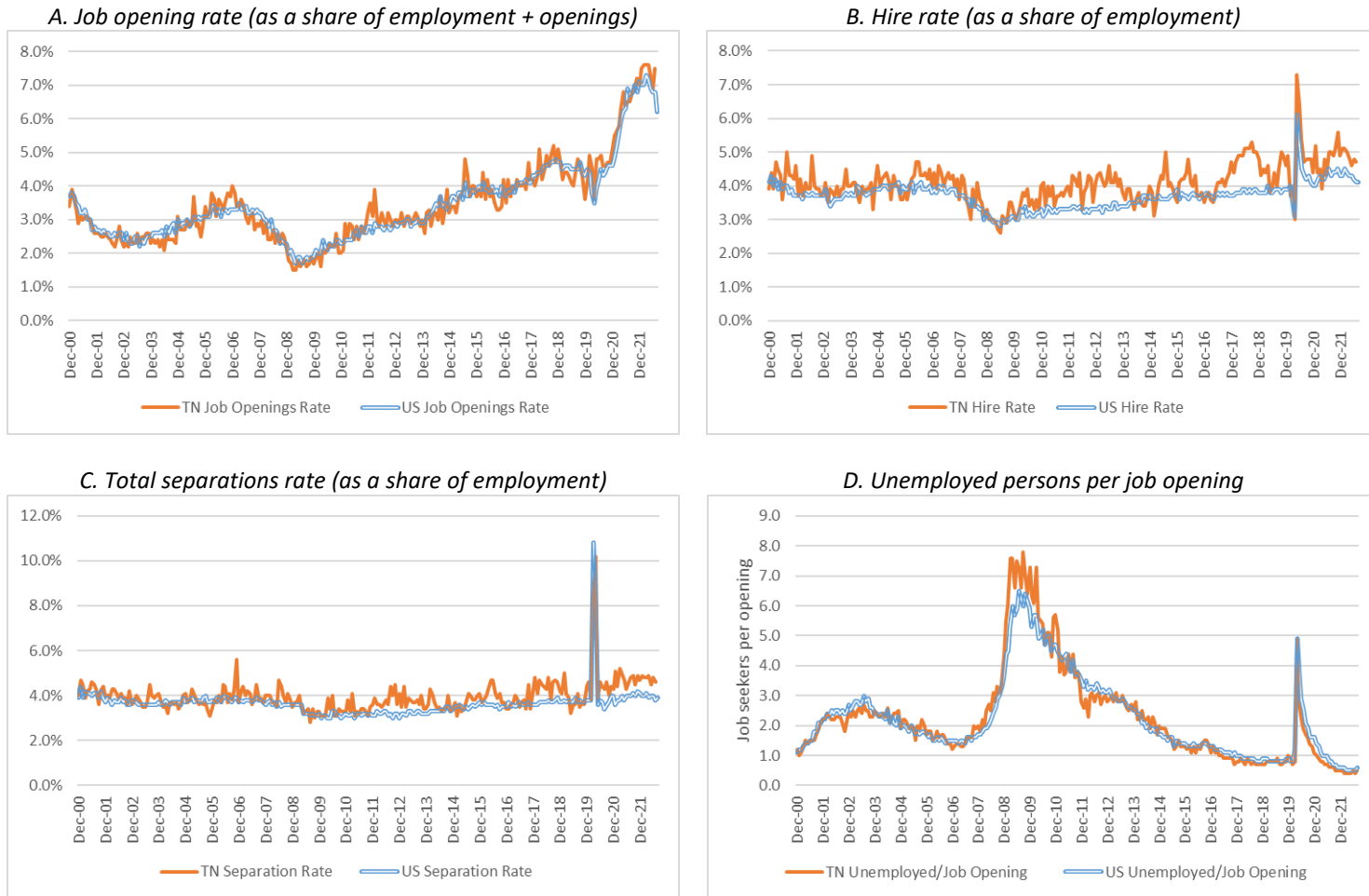
Hire rates (as a share of employment) have also increased overall for both Tennessee and the nation, although the state's hire rate is up relative to the national data in the most recent months and has exceeded the U.S. in most of the last decade (Figure 8B). Indeed, labor market volatility appears to be greater in general in Tennessee relative to the U.S. Despite similar longer-term trends, the total separation rate (layoffs, discharges, quits, and other separations as a percentage of total employment) has been about one percentage point higher in Tennessee in the post-pandemic period (Figure 8C).

Another clear sign of labor market tightness at the state and national levels from the JOLTS data can be seen in the number of unemployed persons per job opening (Figure 8D). This ratio has declined considerably since the Great Recession highs in 2009 and 2010, despite the short-lived pandemic spike in April 2022. It fell back below 1.0 in early 2021, and reached a historic low below 0.5 (i.e., one unemployed person for every two openings) in the most recent data. Notably, Tennessee's ratio of unemployed persons per job opening has been below the national rate for most of the last seven years.

To better gauge the tightness of the labor market, Figure 9 illustrates two perspectives of labor supply versus labor demand in Tennessee. Labor supply measures the number of people working or willing to work, i.e., the sum of employed workers and unemployed persons looking for work. Labor demand is represented by the total number of workers needed in the state, i.e., the sum of employed workers and job openings. Figures 9A-B show that the state has had a shortage of workers for nearly two years. As of October 2022, the gap between labor supply and labor demand sits at 128,000 workers. That is, even if every unemployed job-seeker in Tennessee found a job today, there would still be about 128,000 job openings in the state.

¹⁰ The JOLTS data can be accessed at <https://www.bls.gov/jlt/home.htm>.

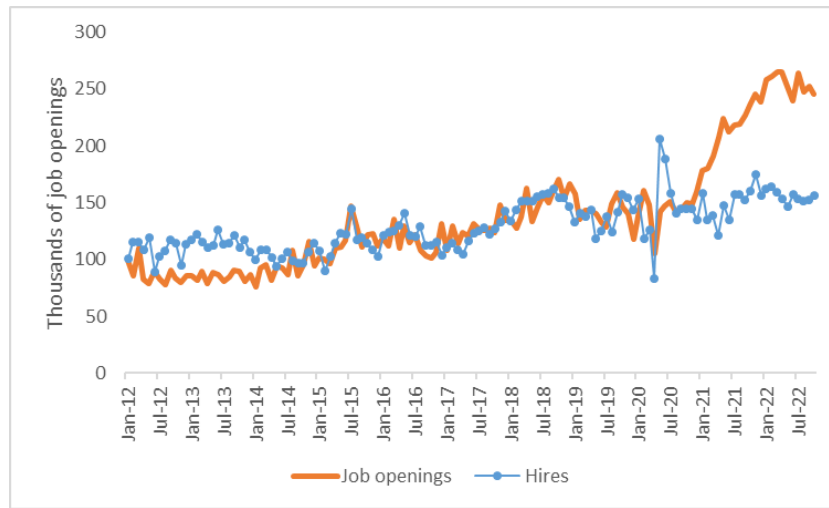
Figure 8. The U.S. and Tennessee labor markets: Job openings, hires, separations, and job seekers per opening. The post-pandemic labor market has been favorable for job seekers, even more so in Tennessee than in the rest of the U.S.



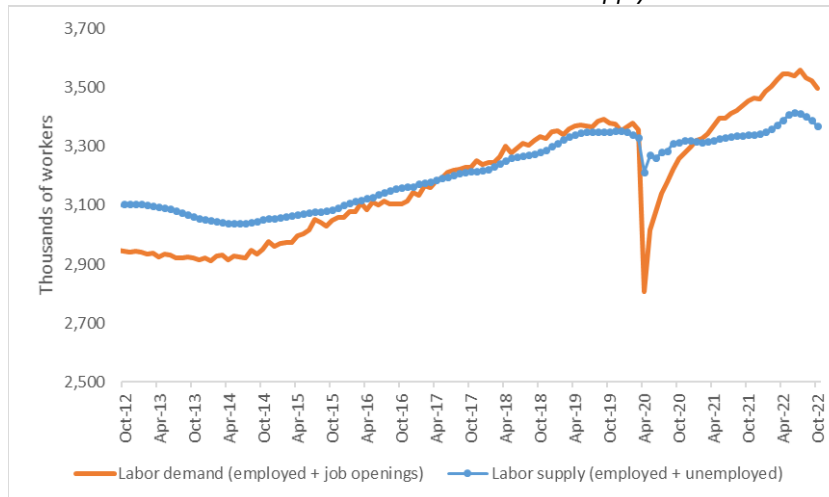
Source: BLS Job Opening and Labor Turnover Survey.

Figure 9. Tennessee has experienced a labor shortage since January 2021.

A. Tennessee job openings versus hires



B. Tennessee labor demand versus supply



Source: BLS Job Opening and Labor Turnover Survey

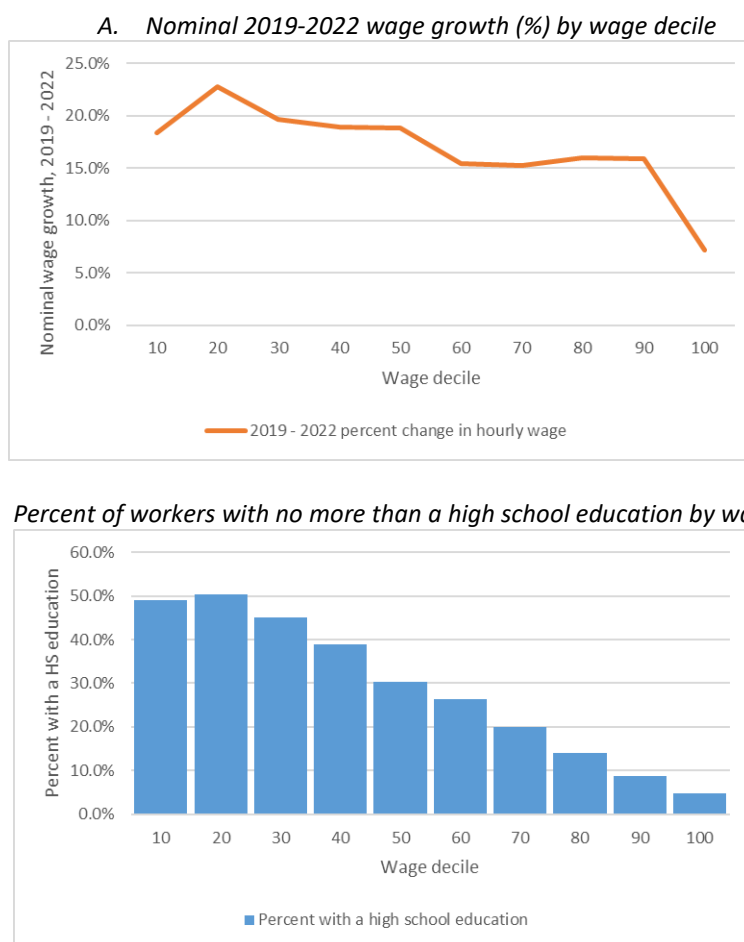
Wages

Inflation and labor market tightness have driven wages up as employers try to fill job openings with a limited number of job seekers. For U.S. prime-age workers with at least a high school education, nominal wages rose 10.5% from 2016-2019, prior to the pandemic.¹¹ From 2019-2022, by comparison, nominal wages rose 16.8%. As shown in Figure 10A, wage growth was even higher at the bottom of the pay scale. Workers with hourly wages in the bottom 20% realized wage gains of 18-22%, exceeding 13.1% inflation over the 2019-2022 period. The highest wages only grew by 7%. Figure 10B shows that high rates of pay gains were more likely to go to workers with no more than a high school education.

¹¹ Authors' computations using the CPS Earner Study, 2019Q2 compared to 2016Q2, limited to age 18-54 high school graduates with wage and salary income, who were not enrolled in college when surveyed.

About half of workers with wages in the bottom 20% have no more than a high school diploma, versus 5% of workers with wages in the top 10%.

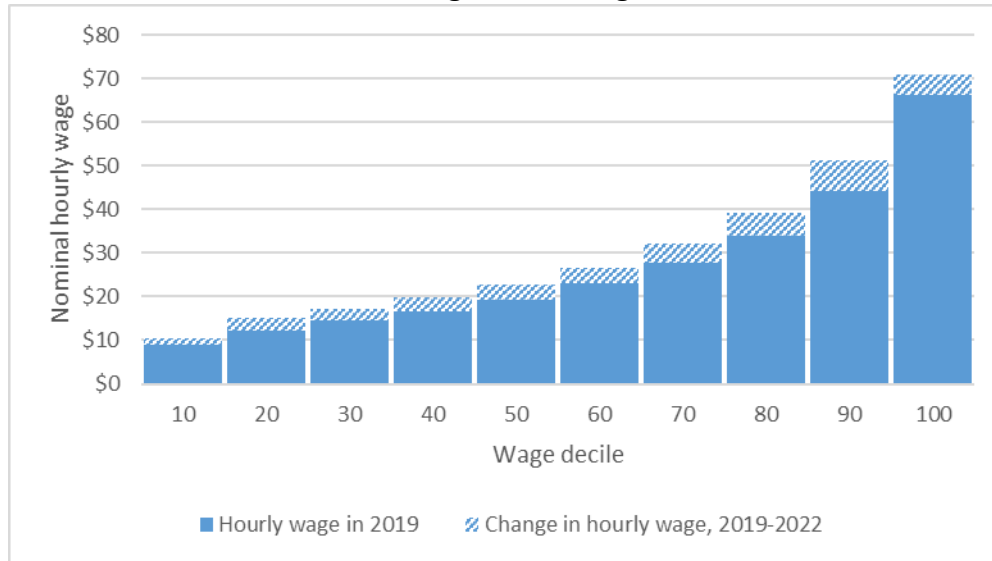
Figure 10. U.S. hourly wage growth (A) and percent of workers with at least a high school education (B), from low to high wages. The lowest-paid workers are more likely to have no more than a high school diploma, and they have experienced the largest wage gains from June 2019-June 2022.



Source: 2019Q2 and 2022Q2 CPS Earner Study, limited to age 18-54 high school graduates with wage or salary income who were not enrolled in college when surveyed. We divide this sample into 10 evenly-sized deciles. Figure 9A illustrates the percentage increase in nominal wages per hour from 2019Q2-2022Q2 for each decile, and Figure 9B illustrates the percent of workers in each decile with no more than a high school education.

Wage and job growth for workers without a college education may be in part responsible for falling college enrollment in 2020, 2021, and to a lesser extent in 2022. It is important to note, however, that high percentage gains for low wages do not necessarily mean that these workers are significantly catching up in terms of take-home pay. Figure 11 plots average hourly pay in 2019 dollars by wage decile (solid bars). The bottom 20% of the pay scale corresponded with hourly wages of \$9-12, versus \$66 for the top 10%. The patterned portion of each bar quantifies the nominal increase in hourly wages from 2019-2022. An 18-22% gain in wages for the bottom 20% meant an additional \$1.64-\$2.79 per hour. Nominal gains were larger for higher-paid workers—as much as \$7.05 for 90th percentile workers who were making \$44/hour in 2019.

Figure 11. Nominal hourly 2019 wages and 2019-2022 wage gains, by wage decile. The lowest-earning 20% of workers earned \$1.64-\$2.79 more in 2022 than in 2019, versus \$4.71-\$7.05 for the highest-earning 20% of workers.



Source: 2019Q2 and 2022Q2 CPS Earner Study, limited to age 18-54 high school graduates with wage or salary income who were not enrolled in college when surveyed. We divide this sample into 10 evenly-sized deciles. The figure illustrates average 2019Q2 wages for each decile (solid bars) along with the nominal 2019Q2-2022Q2 increase in wages (patterned bars).

Business Sentiment

As a final look at labor market trends, we consider the biannual *Tennessee Business Leaders Survey*, conducted by researchers at the University of Tennessee Boyd Center for Business and Economic Research.¹² In the August 2022 survey, the most frequently-cited area of improvement for the state’s business climate was enhanced workforce development. Nearly 70 percent of respondents indicated that there was an insufficient supply of appropriately trained workers, and they suggested that more and better training and education were key to expanding the quality of labor supply. These mirrored findings from the August 2021 and January 2022 surveys, and the labor force challenges were significantly greater in these more recent surveys relative to the Summer 2020 and Winter 2021 surveys.

¹² Results from these surveys can be accessed at <https://haslam.utk.edu/boyd-center/tennessee-business-leaders-survey/>.

5. Tennessee is Growing High School-Level Jobs, but Growing College-Level Jobs Faster

Our estimates of the return to college in Section 1 and hourly wage trends in Section 4 rely on national data in the CPS, which is available in close to real time. To zoom in to the state level, we turn to the BLS Occupational Employment and Wage Statistics (OEWS) for 2010-2021. The OEWS surveys over 1 million firms in state Unemployment Insurance systems and estimates employment and pay at the area-by-year-by-occupation level.¹³ “Area” is either a metropolitan statistical area or a more rural, multi-county non-metro area. We link each occupation code in 2010-2021 OEWS data to its typical entry-level education as determined by the BLS: high school or less, college up to an associate’s degree, or a bachelor’s or higher degree (the same entry-level education categories used in Section 2).

Table 3 reports OEWS employment estimates for Tennessee and the rest of the U.S. by year and typical entry-level education. First, note that the share of jobs requiring college at the entry level (36% in Tennessee in 2021) is well below the share of the population with some amount of college education (58% in Figure 1). Carnevale et al. (2013) note the same discrepancy in BLS-determined education requirements. This is not to say that college-educated workers in those jobs are overqualified. Even detailed occupation titles mask pay and promotion steps that may require college.¹⁴

Table 3. Tennessee and U.S. jobs by typical entry-level education and year (in thousands)

Typical Entry-Level Education	Tennessee			Rest of the United States		
	High School	Up to Associate's	Bachelor's-Plus	High School	Up to Associate's	Bachelor's-Plus
2010/11	1,698	312	567	79,475	14,046	31,558
2015/16	1,884	338	617	86,338	14,969	34,919
2018/19	1,928	356	680	89,356	15,696	37,360
2021	1,889	357	727	83,415	15,143	39,096
2015/16 - 2018/19 Growth	2.3%	5.4%	10.1%	3.5%	4.9%	7.0%
2018/19 - 2021 Growth	-2.0%	0.3%	7.0%	-6.6%	-3.5%	4.6%
2015/16 - 2021 Growth	0.2%	5.7%	17.7%	-3.4%	1.2%	12.0%

Source: Aggregations of BLS OEWS, matched to 2019 typical entry-level education by detailed occupation code. OEWS data omit self-employed workers, farm workers, owners, and household workers.

Over the pre-pandemic 2016-2019 period, Tennessee and the rest of the U.S. grew jobs at each level of education but grew college-level jobs somewhat faster than high school-level jobs (5-10% versus 2-4%). During the pandemic, Tennessee lost 2% of high school jobs but added jobs requiring some college or an associate’s degree by 0.3% and added jobs requiring a bachelor’s or advanced degree by 7%. The nation did not fare as well over the same time period, losing high school jobs at a higher rate and gaining 5% more bachelor’s-plus jobs. Putting these two time periods together, Tennessee’s 5-year employment growth from 2016-2021 was positive at each level of education but more concentrated in college-level

¹³ https://www.bls.gov/oes/oes_emp.htm

¹⁴ In the CPS, we find that income rises with education among workers with the same occupation title. Abel and Deitz (2014) similarly find a 7-12% return to bachelor’s degrees in occupations that do not typically require a bachelor’s degree at the entry level.

Section 5

jobs.¹⁵ The percent of Tennessee jobs typically requiring college up to an associate’s degree stayed at 12% from 2016-2021, while the percent requiring a bachelor’s degree or higher rose slightly from 23-24%.

Turning to average pay, Table 4 shows that Tennessee’s high school-level jobs gained 8% in average nominal pay from 2019-2021, or \$2,598. Jobs requiring up to an associate’s degree gained 7% in average pay (\$2,785), and jobs requiring at least a bachelor’s degree gained 8% (\$6,317). Pay tends to be higher in the rest of the U.S., on average, and 2019-2021 pay gains were larger outside of Tennessee for high school jobs (10%, or \$3,642) and associate’s-level jobs (8%, or \$3,782), but not for bachelor’s-level jobs (6%, or \$5,508).

Table 4. Tennessee and U.S. average pay by typical entry-level education and year (nominal dollars)

Typical Entry-Level Education	Tennessee			Rest of the United States		
	High School	Up to Associate's	Bachelor's-Plus	High School	Up to Associate's	Bachelor's-Plus
2010/11	\$29,260	\$35,061	\$68,215	\$32,243	\$38,567	\$78,737
2015/16	\$31,417	\$38,844	\$74,881	\$34,786	\$42,055	\$86,459
2018/19	\$33,890	\$41,646	\$78,361	\$37,655	\$45,006	\$91,221
2021	\$36,488	\$44,431	\$84,678	\$41,297	\$48,788	\$96,729
2015/16 - 2018/19 Growth	7.9%	7.2%	4.6%	8.2%	7.0%	5.5%
2018/19 - 2021 Growth	7.7%	6.7%	8.1%	9.7%	8.4%	6.0%
2015/16 - 2021 Growth	16.1%	14.4%	13.1%	18.7%	16.0%	11.9%

Source: Aggregations of BLS OEWS, matched to 2019 typical entry-level education by detailed occupation code. OEWS data omit self-employed workers, farm workers, owners, and household workers. Average pay is in nominal dollars.

Pulling these pieces from the OEWS together, we conclude that Tennessee is outpacing the nation in jobs for workers with a high school education, but growing college-level jobs even faster.

These patterns generally hold for metro areas as well as Tennessee’s more rural, non-metro areas. Tables 5-6 summarize OEWS job totals and average nominal pay by minimum entry-level education level and metro status.¹⁶ The state’s metro and non-metro areas grew bachelor’s-level jobs faster than high school-level jobs in the years surrounding the onset of the pandemic, and metro areas also grew associate-level jobs faster than high school-level jobs.

¹⁵ According to BLS Business Employment Dynamics data, recent employment growth in Tennessee has been driven by new firms and new jobs more so than job growth within existing firms. In addition, data from the Tennessee Secretary of State’s office show that the number of new business filings has risen to record highs since the beginning of the pandemic.

¹⁶ The BLS defines 10 metropolitan areas and 4 non-metro areas in Tennessee. Two of the metro areas—Kingsport-Bristol and Memphis—span state borders but are included in total in Tables 5-6. Table 5 employment totals are sums of BLS estimates for the 14 metro and non-metro areas. Because of rounding, multi-state metros, and estimation error, these do not sum to Table 3 employment totals for the state.

Table 5. Jobs by typical entry-level education and year, Tennessee metro versus non-metro areas (in thousands)

Typical entry-level education	Tennessee metro areas			Tennessee non-metro areas		
	High school	Up to Associate's	Bachelor's-plus	High school	Up to Associate's	Bachelor's-plus
2010/11	1,389	258	466	321	60	79
2015/16	1,591	287	535	305	52	69
2018/19	1,633	306	578	308	52	73
2021	1,621	308	635	316	54	77
2015/16 - 2018/19 growth	2.7%	6.7%	7.9%	0.8%	<0.1%	5.8%
2018/19 - 2021 growth	-0.8%	0.6%	10.0%	2.8%	2.6%	4.4%
2015/16 - 2021 growth	1.9%	7.3%	18.7%	3.6%	2.6%	10.5%

Source: Aggregations of BLS OEWS, matched to 2019 typical entry-level education by detailed occupation code. OEWS data omit self-employed workers, farm workers, owners, and household workers. Average pay is in nominal dollars.

Table 6. Average pay by typical entry-level education and year, Tennessee metro versus non-metro areas (nominal dollars)

Typical entry-level education	Tennessee metro areas			Tennessee non-metro areas		
	High school	Up to Associate's	Bachelor's-plus	High school	Up to Associate's	Bachelor's-plus
2010/11	\$29,506	\$35,553	\$70,023	\$26,689	\$30,342	\$57,796
2015/16	\$31,678	\$39,019	\$76,607	\$28,542	\$33,358	\$60,898
2018/19	\$33,998	\$41,855	\$78,787	\$31,170	\$36,211	\$62,793
2021	\$36,853	\$44,645	\$84,850	\$33,267	\$38,757	\$69,955
2015/16 - 2018/19 growth	7.3%	7.3%	2.8%	9.2%	8.6%	3.1%
2018/19 - 2021 growth	8.4%	6.7%	7.7%	6.7%	7.0%	11.4%
2015/16 - 2021 growth	16.3%	14.4%	10.8%	16.6%	16.2%	14.9%

Source: Aggregations of BLS OEWS, matched to 2019 typical entry-level education by detailed occupation code. OEWS data omit self-employed workers, farm workers, owners, and household workers. Average pay is in nominal dollars.

6. Looking Ahead: Tennessee's Employment, Population, and Recession Outlook

Employment Growth

Over the next twelve years, nonfarm employment in Tennessee is projected to expand by a compound annual growth rate (CAGR) of 1.4 percent per year, representing an increase of 510 thousand workers between 2021 and 2032. This would represent a slowdown in job growth as compared to the 2.0 percent (CAGR) rate of growth from the previous decade,¹⁷ due to an aging population and persistent drop in birth rates. A similar pattern will take place in the national labor market, which expanded by an average annual rate of 1.7 percent from 2011 to 2019, but is projected to grow by only 0.6 percent per year over the next decade.

There are a number of reasons for the state's more positive employment outlook, including favorable migration patterns, a strong manufacturing sector, and planned state spending on infrastructure and construction projects. Regarding manufacturing, employment in the nation's manufacturing sector is expected to contract over the next ten years. In contrast, the manufacturing industry has a strong presence in Tennessee, and will grow by a projected 0.9 percent per year and add roughly 34,000 new manufacturing workers to state payrolls over the next 12 years.

Employment Growth by Sector

Table 7 presents employment projections by broad sector in Tennessee, as well as average hourly wages from August 2022 for both the state and nation. Over the next 12 years, employment growth in Tennessee will be strongest among the service sectors. Most notably, employment in leisure and hospitality is projected to expand by 3.0 percent per year and add 121,000 workers to Tennessee payrolls. Leisure and hospitality jobs are least likely to require a college education. Unfortunately, this is also the lowest-paying sector in the state economy, on average. In August 2022, average wages were only \$18.38/ hour.

Employment in the professional and business services sector will also see strong growth over the next 12 years, and is expected to expand by 1.9 percent per year and add 100,000 workers to payrolls between 2021 and 2032, as the proliferation of remote work enables more workers from this sector to move to Tennessee. Encouragingly, with an average wage of \$33.05/hour, this is also one of the highest-paying sectors in the state. However, Tennessee professional and business service workers make 14.4 percent less than their national counterparts, who are paid an average wage of \$38.51/hour. In fact, the wage data show that Tennessee wages are lower than the national average across all sectors of the economy. As a result, per capita income in Tennessee has consistently trailed that of the nation, and this trend is expected to continue over the next decade.

¹⁷ Historic job growth is measured for the 2011-2019 period as to exclude the extraordinary volatility from the pandemic and ensuing economic recovery.

Table 7. Tennessee nonfarm employment by broad sector (thousands of jobs)

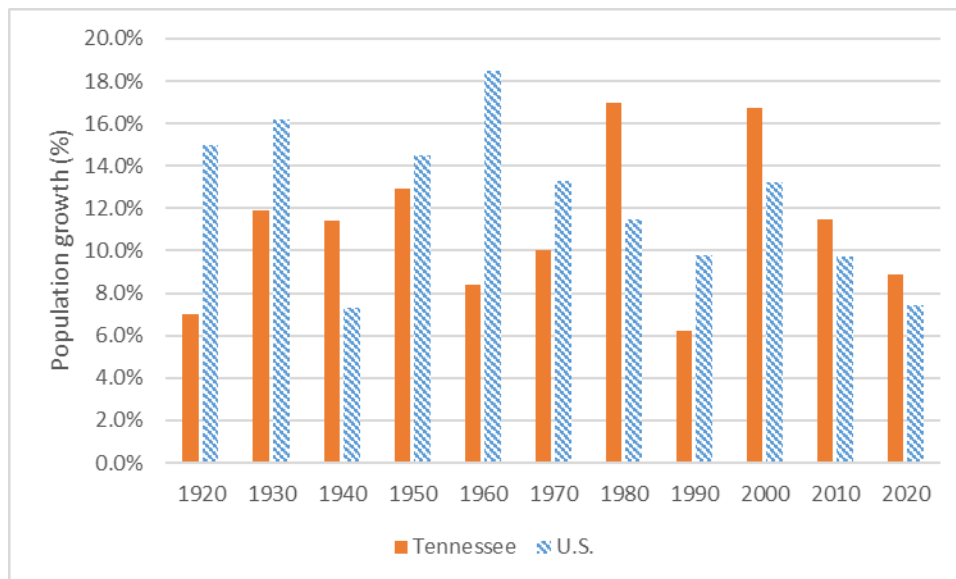
	Employment				Growth Rate**			Avg. Hourly Wage - August 2022	
	2011	2019	2021	2032*	2011 to 2019	2011 to 2021	2021 to 2032*	TN	U.S.
Total Nonfarm	2664.4	3122.4	3107.0	3617.1	2.00%	1.55%	1.39%		
Natural Resources, Mining & Construction	108.7	134.4	140.9	173.7	2.69%	2.63%	1.92%		
Manufacturing	302.4	355.4	349.4	383.3	2.04%	1.45%	0.85%	\$28.24	\$30.82
Trade, Transportation, Utilities	561.6	637.1	653.7	713.2	1.59%	1.53%	0.79%	\$25.57	\$27.68
Information	44.0	45.5	46.8	50.8	0.43%	0.61%	0.76%	\$34.16	\$46.45
Financial Activities	139.2	171.6	172.0	202.1	2.65%	2.14%	1.47%	\$39.39	\$41.59
Professional & Business Services	324.2	426.4	436.0	536.3	3.48%	3.01%	1.90%	\$33.05	\$38.61
Education & Health Services	389.1	445.4	438.8	513.8	1.70%	1.21%	1.44%	\$26.74	\$31.96
Leisure & Hospitality	267.6	347.2	316.3	437.5	3.31%	1.68%	2.99%	\$18.38	\$20.02
Other Services	102.0	121.7	122.5	150.3	2.24%	1.85%	1.87%	\$27.37	\$28.33
Government	425.6	437.7	430.5	456.1	0.35%	0.11%	0.53%		
U.S. Nonfarm (in Millions)	131.9	150.9	146.1	156.5	1.69%	1.03%	0.63%		
U.S. Manufacturing (in Millions)	11.7	12.8	12.3	11.7	1.12%	0.52%	-0.51%		

Sources: Authors' calculations using BLS and IHS Markit data (Kessler et al., 2023). * Projections. **Compound Annual Growth Rate (CAGR).

Migration

Tennessee's stronger long-term employment outlook is also driven by favorable migration patterns, which are helping to counteract the demographic-driven slowdown in population growth. Figure 12 presents population growth by decade in both Tennessee and the nation, and shows that population gains have slowed dramatically over the last three decades. Expectations are for this trend to continue, as Tennessee's population is projected to grow by only 7.7 percent between 2020 and 2030, though this is much faster than the 4.6 percent rate of growth projected for the nation as a whole. Counteracting the effects of low birth rates on population growth has been a strong rate of in-migration for Tennessee, as the net migration rate (in-migration minus outmigration) has averaged 7.1 people per 1,000 population between 2016 and 2020, versus only 2.3 people per 1,000 for the U.S. as a whole. Tennessee migration accelerated to 9.1 people per 1,000 between 2020 and 2021 as more people moved to the state during the pandemic.

Figure 12. 10-year percentage change in population, 1920-2020. Population growth is decelerating, but to a lesser degree in Tennessee than in the rest of the U.S.



Source: U.S. Decennial Census, 1920 - 2020

Recession Outlook

Following incredibly strong economic growth in 2021, the U.S. economy slipped in the first half of 2022 as inflation-adjusted gross domestic product (real GDP) contracted in both the first and second quarter. Real GDP has largely fallen because of extremely high inflation. In nominal terms, U.S. GDP rose by a very strong 6.6 and 8.5 percent in the first and second quarters of 2022, respectively. However, this growth was driven by people spending more money to purchase goods and services, and not because they were actually purchasing more goods and services. As of November, the consumer price index (CPI) is up by 7.1 percent (compared to the same time last year) after peaking at 9.1 percent in June.

Inflation has not been this high in four decades. In response to elevated inflation, the Federal Reserve (the Fed) has aggressively increased interest rates in hopes of reducing aggregate demand and putting

downward pressure on prices. The Fed is purposefully trying to slow the economy in an effort to get inflation under control. Higher interest rates have put downward pressure on both the real estate and stock markets. This could lead to a reduction in consumption and investment spending, and potentially spur an economic recession. National projections call for a mild recession, with U.S. real GDP falling through the first half of 2023.

In Tennessee, economic growth will slow appreciably in 2023, but will likely remain positive due to less adverse economic conditions in the state relative to the nation. As a key example, Tennessee real GDP grew by a robust 3.7 percent in the first quarter of 2022 and then slowed to 0.3 percent growth in the second quarter, compared to negative growth rates in the first and second quarters for the nation. In addition, state employment growth will likely outpace national job growth in the near term due to favorable migration patterns, strong service and manufacturing sectors, and large construction projects like the development of the Ford electric vehicle complex in West Tennessee.

7. Conclusions

The labor market and broader economy remain in flux as the U.S. unevenly rebounds from COVID-19 disruptions to health, education, work, prices, and every other aspect of life. One silver lining of these disruptions, for job seekers, has been an exceptionally tight labor market with rising wages and job opportunities. The bottom of the pay scale has risen the most in percentage terms, benefitting jobs that are less likely to require a college education. This may be part of the reason why college enrollment fell by 5% in the two years following the onset of the pandemic. Additionally, worker and skill shortages have led many employers to develop in-house training and credential pathways, leading some to question the value of college in the post-pandemic economy (Nietzel, 2022; Wingard, 2022; Hufford, 2022).

Pre-pandemic, an individual's investment in college typically paid off in the form of higher earnings, although as with most investments, this was not universally true. For today's potential college students, higher wages for workers with a high school education would reduce the average return to college, all else equal. The expected return on an individual's investment in education would be negative for more potential students.

Nonetheless, early indicators from the post-pandemic U.S. labor market suggest that, nationally, the average individual return to college remains large and positive. We replicate and extend pre-pandemic research on the return to time and money spent in college, finding that the estimated return to a bachelor's degree remains high at 14.5%. This is driven by consistently high earnings for bachelor's degree recipients and a stable or (in real terms) declining cost of college. The estimated return to an associate's degree has fallen from 13-14% just before the pandemic to 9.5% in 2022, driven by a narrower post-pandemic gap between earnings with a high school diploma versus an associate's degree. This remains higher than the historic returns to other investments (e.g., 7% for stocks), and increases beyond 10% when we account for higher likelihoods of part-time work or unemployment among workers without college. More concerning is the estimated return to enrolling in college without completing a degree, which is just 6-7%. This is consistent with pre-pandemic research finding that the payoff to college is more certain with a degree in hand.

A tight labor market has increased job opportunities and pay for workers without college, perhaps even more so in Tennessee than in the rest of the nation. Tennessee's employment outlook looks relatively favorable for high school-level jobs in manufacturing, leisure, and hospitality. But we find that pay gains have been larger for workers with college—in terms of dollars if not percentages—and that college-level jobs are growing faster in Tennessee than jobs for workers with a high school education. The professional and business service sector is one specific example of a high-paying area of Tennessee's workforce, with a positive long-term outlook and a variety of college-level occupations.

Our bottom-line assessments are that the current and future value of a high school education has improved since the onset of the 2020 pandemic, that this improvement has cut into but not closed the return to earning an associate's degree or enrolling without completing college, and that Tennessee job growth and pay continue to favor college graduates.

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