

THE VALUE OF A COLLEGE EDUCATION IN TENNESSEE

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Prepared by

Celeste K. Carruthers

William F. Fox Distinguished Professor of Labor Economics, Boyd CBER

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BOYD CENTER FOR BUSINESS &
ECONOMIC RESEARCH

Boyd Center for Business & Economic Research

Haslam College of Business

The University of Tennessee

716 Stokely Management Center

Knoxville, Tennessee 37996

Phone: (865) 974-5441

Fax: (865) 974-3100

<http://haslam.utk.edu/boyd-center>

Summary

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 aspect of life. One silver lining of these disruptions, for job seekers, has been an exceptionally tight labor market with rising wages and expanding 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 there are over 1 million fewer students enrolled in U.S. higher education than before the pandemic (National Student Clearinghouse, 2023). In Tennessee, the percent of high school graduates going straight to college fell from 61.7 to 52.8 percent between 2019 and 2021 (THEC and TSAC, 2022), the lowest level in at least ten years, before climbing to 54.3 percent in 2022 (THEC and TSAC, 2023). 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 (Fain, 2020; Hufford, 2022; Nietzel, 2022; Wingard, 2022).

Is college still “worth it” in this environment? Workers with postsecondary credentials tend to earn significantly more than workers without college. On average, the gap is large enough to make up for the time and expense that a student invests in college. Carnevale et al. (2021) analyze nationwide earnings by education and estimate that a U.S. worker with a bachelor’s degree earns \$1.4 million more over their career than someone with a high school diploma, and that an associate’s degree corresponds with \$452,000 more in lifetime earnings than a high school diploma.¹ Abel and Deitz (2014, 2019) estimate that the internal rate of return to college is 13-14% for an associate’s degree and 14-16% for a bachelor’s degree, both of which compare very favorably to the historic 7% inflation-adjusted return on stocks. Carruthers et al. (2023) replicated these analyses for the post-pandemic U.S. They find a consistent 14-15% return on time and tuition costs of attaining a bachelor’s degree before, during, and after the pandemic. They also estimate that returns to associate’s degrees fell from 15.0% to 9.5% between 2016 and 2022, driven in part by rising relative pay for workers without college, and that returns on attaining some college credit but no degree have fluctuated around 7%. This is consistent with research using pre-pandemic data, which generally finds that college is less likely to pay off for students who do not finish (Webber, 2018; Cooper, 2021).

In this note, I add to an extensive body of research on the individual return to college with a more focused analysis of the value of going to college for Tennesseans. Findings append to what Carruthers et al. (2023) showed for the post-pandemic U.S. by drilling down to the state level with further analysis for subgroups of Tennesseans with different demographic profiles, who live in different parts of the state, or who have degrees in different fields.

Results are broadly in agreement with Carruthers et al. (2023) and pre-pandemic research on the nationwide returns to college. Tennesseans with bachelor’s degrees earn \$1.4 million more over their careers than Tennesseans with high school diplomas, or a 14% return relative to the direct and indirect costs of enrolling in college for four years. Associate’s degrees are worth \$417,000 more in lifetime earnings, amounting to an 11% return relative to the costs of enrolling for two years. Workers with some college but no degree earn \$258,000 more over their career than high school graduates who did

¹ Carnevale et al. (2021) reported lifetime income premia in 2019 dollars; here, I adjust them to 2022 dollars.

not attend college, which represents a 7% return. Estimates are limited to the individual financial benefits of college and exclude any non-financial or societal benefits of higher education.

I also find evidence of inequality by gender and race in the college income gap and return to college. A college degree does not increase lifetime incomes as much for women or Black, Hispanic, American Indian, and Multiracial workers in Tennessee as it does for White, non-Hispanic men. Nevertheless, estimated returns to college are large for all gender and race/ethnicity subgroups in Tennessee: 12-19% for associate's degrees, and 12-16% for bachelor's degrees.

For Tennesseans with bachelor's degrees, majoring in business, science, or engineering is associated with higher lifetime incomes than education, arts, humanities, communication, or other fields. Women are over-represented in lower-earning fields, particularly education. About 4 out of 5 Tennesseans with bachelor's degrees in education are women, and the estimated lifetime return on education degrees is only 7%, the same as the return on enrolling in college without completing a degree.

Data

The Census Bureau's American Community Survey (ACS) is an annual survey of over 3.5 million U.S. households. The size of the ACS makes it suitable to estimate characteristics of the state population. People who take the ACS respond to questions about where they live as well as their age, demographics, educational attainment, labor force participation, employment, and income from wages and salaries. I collect ACS microdata on these and other individual characteristics from IPUMS (Ruggles et al., 2022). I limit ACS samples from 2011-2021 survey years² to individuals who were 18-64, in the labor force (either working or looking for work), not enrolled in school when surveyed, and who had lived in Tennessee for at least one year. Figures to follow are inflation-adjusted to 2021 dollars.

Table 1 summarizes Tennessee's 18-64 year-old workforce by educational attainment, as of 2021. Women are somewhat under-represented in the workforce, at 46.7%, but over-represented among workers with associate's degrees (57.3%), bachelor's degrees (50.8%), or graduate/professional degrees (56.8%). Turning to race and ethnicity, non-White workers are less likely to have college degrees. For example, Black workers represent 15.9% of the state workforce but 11-14% of workers with college degrees. Hispanic workers and Multiracial workers collectively represent about 12% of the state workforce but 40% of workers who have not finished high school.

In Tennessee and across the U.S., wage and salary income rises with each level of education, and the likelihood of being unemployed falls (**Figure 1**). In 2021, workers with a high school diploma had a 3% unemployment rate in Tennessee. This is a very low rate of joblessness and part of a welcoming environment for job seekers. But those with an associate's degree were in an even better position, at 2% unemployment, and just 1% of Tennesseans with a bachelor's, graduate, or professional degree were looking for work in 2021. Figure 1 also shows that workers with college earn significantly more than those with no more than a high school diploma. Average wage and salary income in Tennessee is about \$51,000 with an associate's degree and \$71,000 with a bachelor's degree, compared to \$38,000 with a high school diploma. Even with some college credit but no degree, workers might expect to earn around \$46,000, 21% more than average pay without college.

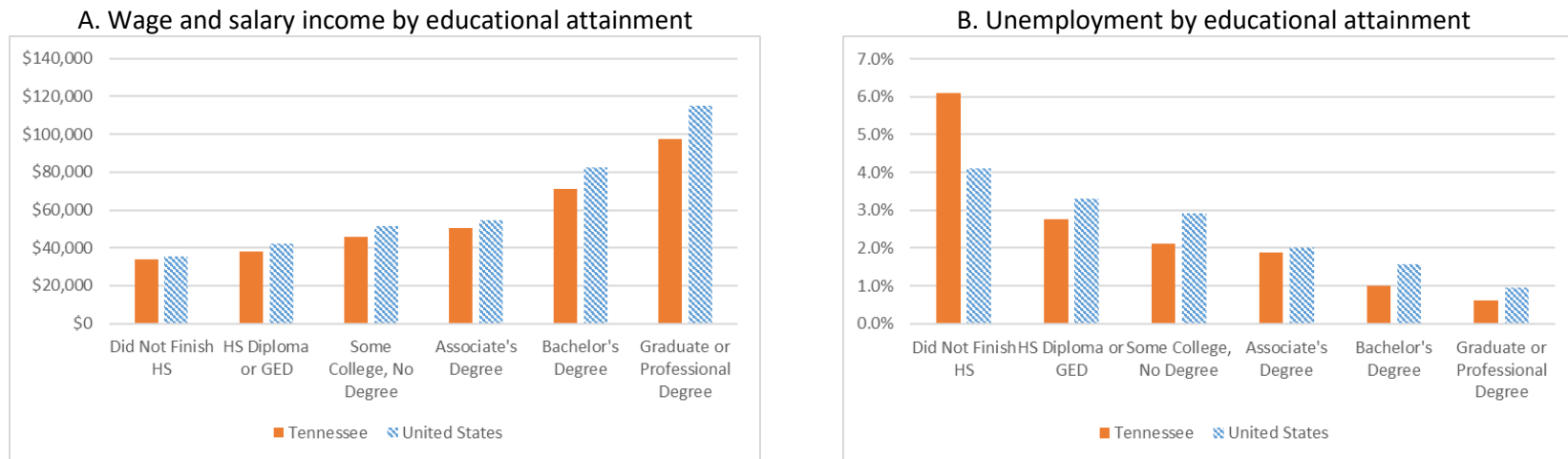
² Results are similar if I exclude the 2020 ACS, which used experimental weights to counteract pandemic-era sampling problems.

Table 1. 2021 Tennessee Working-Age Population Characteristics, by Educational Attainment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All TN 18-64 year-olds in the labor force and out of school	Did not finish HS (6.7%)	HS diploma or GED (30.9%)	Some college, no degree (20.8%)	Associate's degree (8.2%)	Bachelor's degree (21.8%)	Graduate or professional degree (11.7%)
Female (%)	46.7	33.7	40.4	46.3	57.3	50.8	56.8
Black (%)	15.9	15.5	18.8	20.4	14.2	11.0	10.7
American Indian (%)	0.2	0.7	0.2	0.2	0.2	0.1	0.1
Multiracial (%)	5.8	14.0	5.5	5.6	5.4	4.7	5.0
Hispanic (%)	5.7	26.2	6.0	3.8	3.0	3.0	3.4
Full-time (%)	84.3	77.6	81.9	82.7	86.4	87.9	89.4
Unemployment rate (%)	4.9	11.4	7.0	5.0	3.6	2.4	1.3

Notes: Author's calculations using the 2021 American Community Survey, limited to 18-64 year-olds living in Tennessee for at least one year. Headings in columns 2-7 include the percentage of the 18-64 state labor force with each level of educational attainment.

Figure 1. In Tennessee and throughout the U.S., income rises and unemployment falls with education.



Notes: Author's calculations using 2021 ACS, limited to 18-64 year-olds in the labor force and not attending school. Tennessee statistics omit individuals who have lived in the state less than one year.

Estimates: The Value of College in Tennessee

Methods

The fact that college-educated workers have higher average income does not necessarily mean that college is worth the time and expense that students must invest in order to obtain degrees. In addition to the direct costs of enrolling—tuition, fees, books, and supplies—the cost of going to college implicitly includes the amount of income that a student could have earned if they were not enrolled. This opportunity cost is particularly salient when unemployment rates are very low and would-be college students have more options in the labor force.

Following Carruthers et al. (2023) and Abel and Deitz (2014, 2019), I assess the time and expense of college for Tennesseans as if it were a financial investment. Specifically, I compute the internal rate of return for three levels of postsecondary attainment: some college without a degree, associate’s degree, and bachelor’s degree. See Carruthers et al. (2023) for complete methodological details; I will give a brief overview here.³

The internal rate of return is the hypothetical return on 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. Although this is an unrealistic investment scenario for most prospective college students, the rate of return is an informative summary measure of how the costs of college compare with the earnings premium for college-educated workers. Our nationwide estimates of the post-pandemic return to college suggest that college remains a good investment, on average, despite moderately rising earnings for workers without college (Carruthers et al., 2023). Here, I ask if the same holds true for Tennesseans as well as several subgroups of the state population.

In order to compute the return to college, I first need to quantify the value of time and tuition investments that students make when they enroll. I represent the direct cost of college as equal to typical tuition and fees for full-time enrollment in U.S. two-year or four-year colleges, minus average grants and scholarships (Ma and Pender, 2022). I represent the indirect cost of spending time in college rather than work as equal to the average income of 18-21 year-old high school graduates in Tennessee who did not go to college. The sum of these direct and indirect costs is about \$45,000 for an associate’s degree, or \$22,000 – 23,000 annually for students who follow a two-year timeline. The investment in a bachelor’s degree is much more: \$124,000 spread over four years.

Next, I compute the potential benefits of college. I represent these benefits as purely financial, equal to the present value of a stream of estimated income in excess of what a high school graduate earns, up to

³ Carruthers et al. (2023) used the Current Population Survey (CPS), a smaller and more frequently updated Census survey than the ACS. This allowed them to estimate returns to college as recently as 2022, albeit for the U.S. rather than Tennessee. The larger ACS allows me to replicate the CPS analysis for Tennessee and subpopulations of the state, albeit only through 2021. Income, education, and demographic fields are very similar in the ACS and CPS. But aside from timing and sample size, there are other differences between the CPS and ACS that make results from the two surveys less than perfectly comparable. The ACS is a year-round survey, for example, rather than tied to a specific month like the CPS. I do not observe exactly when an ACS respondent was surveyed, and therefore, I do not know the exact reference period for their assessment of income and employment status.

age 64. I use 2011-2021 ACS samples for the U.S., Tennessee, and several Tennessee subpopulations to estimate average earnings at each age, 18-64, for four hypothetical students:⁴

- 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 degree⁵
- 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

Before moving on to results, I will highlight several caveats and limitations of this exercise. Most importantly, the returns to college reviewed here should be treated as estimates of average returns for new high school graduates who finish college by age 21. Deviations from that timeline, or from other assumptions that go into these calculations, will result in higher or lower returns in reality. Not all students pay the U.S. average tuition, for example, or end up earning the average income for their education level. Many students take more than the “normal” two or four years to complete a degree (Shapiro et al., 2016), which could decrease their individual return to college by increasing the opportunity cost of time outside the workforce. My estimated returns assume that students do not earn income while they are in college, although a majority of Tennessee college students do in fact work while enrolled (Ecton et al., 2023). This could offset the costs of college and increase their individual return if work does not impede their time to degree or success in college. Additionally, estimated returns are not entirely attributed to the causal effects of college alone on earnings, since I cannot control for all of the reasons why ACS respondents chose to attend college or had the ability to attend college. Some of those reasons—aptitude for high-skilled work, family resources, etc.—may have led to higher earnings with or without a college education. Finally, estimated earnings over ages 18-64 necessarily rely on people in the ACS who are in that age range now, and it might not be the case that today's high school graduates follow the same age-earnings profile. Nevertheless, my findings and inferences about the financial return to college are consistent with prior research that improves on one or more of these limitations, for example, using data that follows workers over time and that allows for a more causal research design (Zimmerman, 2014; Webber, 2018; Mountjoy, 2022).

Two limitations of my analysis likely decrease estimated returns to college. First, I omit workers who are unemployed when computing earnings premiums by age. A college-educated worker is much less likely to be unemployed (Figure 1), so this omission overstates average incomes for high school-educated workers. And second, I do not try to quantify various non-financial benefits of college that have support in the research literature, such as increased civic participation, higher likelihood of marriage, and better health (Oreopoulos & Petronijevik, 2013).

⁴ Findings from combined 2011-2021 ACS samples are similar to findings from smaller, post-pandemic ACS samples. I prefer the larger sample for this application to support analysis of small demographic and regional subpopulations.

⁵ I do not observe if college non-completers enrolled in a two-year or four-year school. I represent their direct college expenses as a weighted average of two-year and four-year net price.

Estimated Returns to College in Tennessee

Figure 2 depicts the college income premium over ages 18-64, i.e., the estimated income difference between the hypothetical high school graduate who did not attend college and each of the three hypothetical college-educated workers. In Tennessee and throughout the U.S., this difference grows through midcareer. Taking bachelor's degrees as an example, a 22 year-old with a bachelor's degree in Tennessee might expect to earn \$9,000 more in 2021 dollars than a 22 year-old who went to work at age 18 rather than college (Figure 2, Panel A). A college income premium of that size might not be enough to justify the \$124,000 investment of time, tuition, and fees. But the income gap between workers with and without college widens considerably over time. By age 44, a Tennessean with a bachelor's degree can expect to make \$41,000 more than a 44 year-old with a high school diploma. One reason for this widening gap may be that college-educated workers have access to jobs with more opportunities for raises and promotions (Deming, 2023).

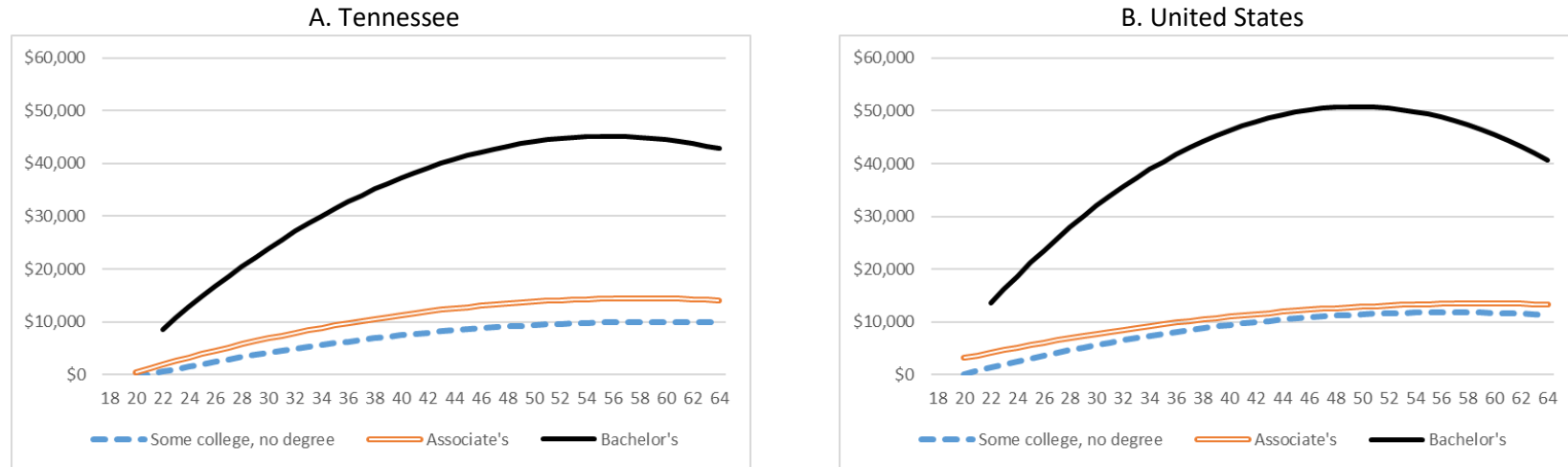
Adding up the college income premium over ages 18-64, I estimate that Tennesseans with bachelor's degrees earn \$1.4 million more over their careers than Tennesseans without college (**Table 2**). The earnings premium is \$417,000 with an associate's degree and \$258,000 with some college but no degree. The income premium with a bachelor's degree, or with some college but no degree, is notably larger outside of Tennessee (Table 2, Column 2). This is consistent with Tennesseans generally having lower average income relative to the rest of the U.S. (Kessler et al., 2023).⁶

Next, I estimate the internal rate of return to three different levels of postsecondary attainment—some college, associate's degree, and bachelor's degree—corresponding with the three hypothetical students who enrolled in college immediately after high school. In Tennessee, like the U.S. more broadly, I find large estimated returns to college degrees: 11-13% for associate's degrees and 14-16% for bachelor's degrees (Table 2, Columns 3-4). These compare favorably to the 7% historic, inflation-adjusted return to stocks.

Not everyone who enrolls in college completes a degree, however. In recent years, 36% of students who enrolled in four-year colleges and universities did not complete a bachelor's degree within 6 years, and two out of every three students who enrolled in two-year colleges did not graduate within 3 years (National Center for Education Statistics, 2022). Estimated returns to college are lower for those non-completers: 7% in Tennessee and 11% in the U.S.

⁶ Estimated income differences between Tennessee and the U.S. more broadly do not adjust for differences in the cost of living.

Figure 2. The income gap between workers with and without college widens with age.



Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the labor force, not attending school, and excluding workers with graduate degrees. Tennessee statistics additionally exclude individuals who have lived in the state less than one year.

Table 2. Estimated Lifetime Income Premium and Internal Return to College

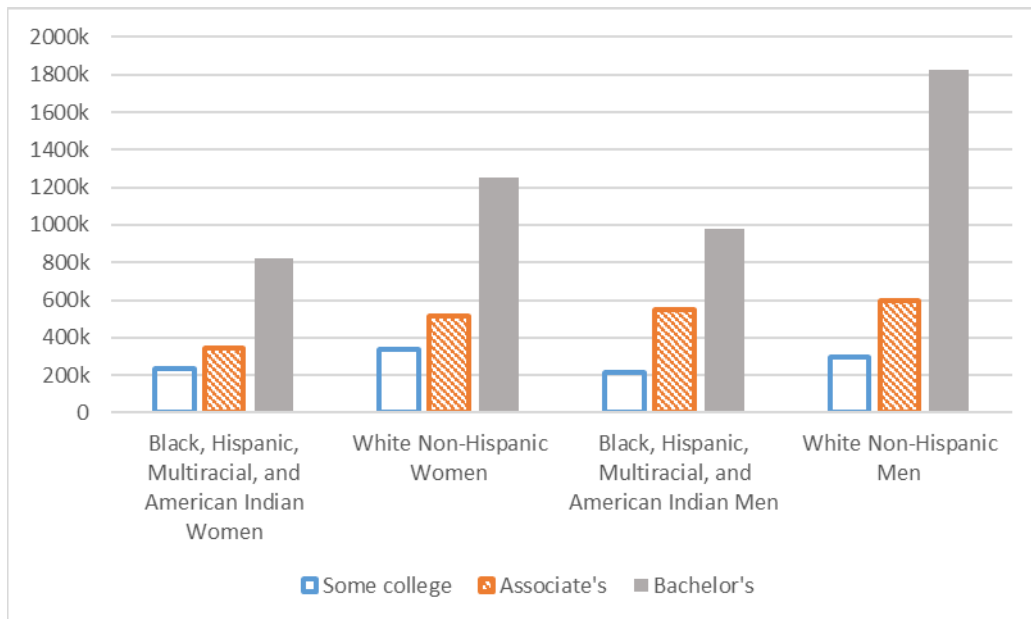
	Additional lifetime income		Internal rate of return to college	
	(1) Tennessee	(2) United States	(3) Tennessee	(4) United States
Some college, no degree	\$258,000	\$332,000	7%	9%
Associate's degree	\$417,000	\$417,000	11%	13%
Bachelor's degree	\$1.41 million	\$1.66 million	14%	16%

Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the labor force, not attending school, and excluding workers with graduate degrees. Tennessee statistics additionally exclude individuals who have lived in the state less than one year.

Estimated Returns to College, by Gender and Race/Ethnicity

Figure 3 depicts the difference in lifetime earnings (in present value terms) between workers with no more than a high school diploma and three levels of postsecondary education, by gender and race/ethnicity. I combine Black, Hispanic, Multiracial, and American Indian workers because the ACS is not large enough to examine every race/ethnicity subgroup in detail.⁷ This construct is similar to how the Tennessee Department of Education reports some K-12 outcomes by race and ethnicity.

Figure 3. Tennessee's college income premium is largest for White, non-Hispanic men.



Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year.

Figure 3 illustrates evidence of gender and race/ethnicity inequality in additional earnings from college. For example, whereas a bachelor's degree in Tennessee is typically associated with \$1.4 million in additional lifetime earnings (Table 2), a Black, Hispanic, Multiracial, or American Indian worker with a bachelor's degree only earns about \$826,000 more over their lifetime than a Black, Hispanic, Multiracial, or American Indian worker with a high school diploma. Likewise, women with bachelor's degrees do not add to their lifetime income as much as White, non-Hispanic men. There are many possible reasons for this—differences in occupation, workday flexibility, work experience, parental wealth, labor market demand for particular skills, the quality of K-12 education, discrimination in salary and wage offers, or

⁷ I report supplemental results for Black men and women in the appendix. One notable difference from Figure 3 and Table 3 results is particularly low college income premiums for Black men in Tennessee, and correspondingly low estimated returns to college for Black men.

differences in risk aversion and negotiation habits. Research has found support for each of these factors in gender or racial pay gaps.⁸

Unique to the exercise here, it is also possible that the high school wage is relatively higher for some demographic groups, which would shrink the college income premium. However, this does not appear to drive the differences seen in Figure 3. Instead, I find that young women have particularly low pay without college: \$18,000 at age 18 rising to \$26,000 at age 29, versus \$26,000 for men at age 18 rising to \$37,000 at age 29. A college education significantly increases women’s estimated lifetime income but not to the same extent as for college-educated men. Similarly, I find that the income gap between White and non-White workers in Tennessee widens at higher levels of education.

Smaller income premiums for college-educated women and non-White workers in Tennessee do not necessarily mean that these same groups realize smaller rates of return to college. A large part of the cost of college is the opportunity cost of attending classes rather than working, which I quantify as equal to the average income of a young high school graduate. This opportunity cost is smaller for women and non-White workers, since they tend to have lower incomes with and without college.

Table 3 lists estimated returns to college for three levels of college attainment and four demographic subgroups. The most important takeaway is that the estimated return to college is sizable for Tennesseans in each of the four gender and race/ethnicity groupings. For women, direct and indirect costs of college are associated with at least a 9% return, and as much as 19% for White, non-Hispanic women with associate’s degrees. I also find a large 18% return to associate’s degrees for Black, Hispanic, Multiracial, and American Indian men. By contrast, estimated returns tend to be smaller for White, non-Hispanic men than for women or non-White men. This is in part because pay is relatively high for younger White, non-Hispanic men without college. These early years of moderately high income without college receive more weight in present value calculations, although college-educated men catch up quickly.

Table 3. Estimated Internal Rate of Return to a College Education in Tennessee, by Gender and Race/Ethnicity

	(1) Black, Hispanic, Multiracial, and American Indian Women	(2) White, non-Hispanic Women	(3) Black, Hispanic, Multiracial, and American Indian Men	(4) White, non-Hispanic Men
Some college, no degree	9%	11%	8%	7%
Associate's degree	12%	19%	18%	12%
Bachelor's degree	12%	16%	12%	13%

Notes: Author’s calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year.

⁸ See Bayer and Charles (2018), Chetty et al. (2020), Quillian et al. (2017), and Neumark (2018) for more on pay gaps by race or Hispanic ethnicity. See Goldin (2014) for a review of the gender pay gap, with special emphasis on gender differences in work schedules and workday flexibility. See Goldin et al. (2017) for a decomposition of the gender gap by age.

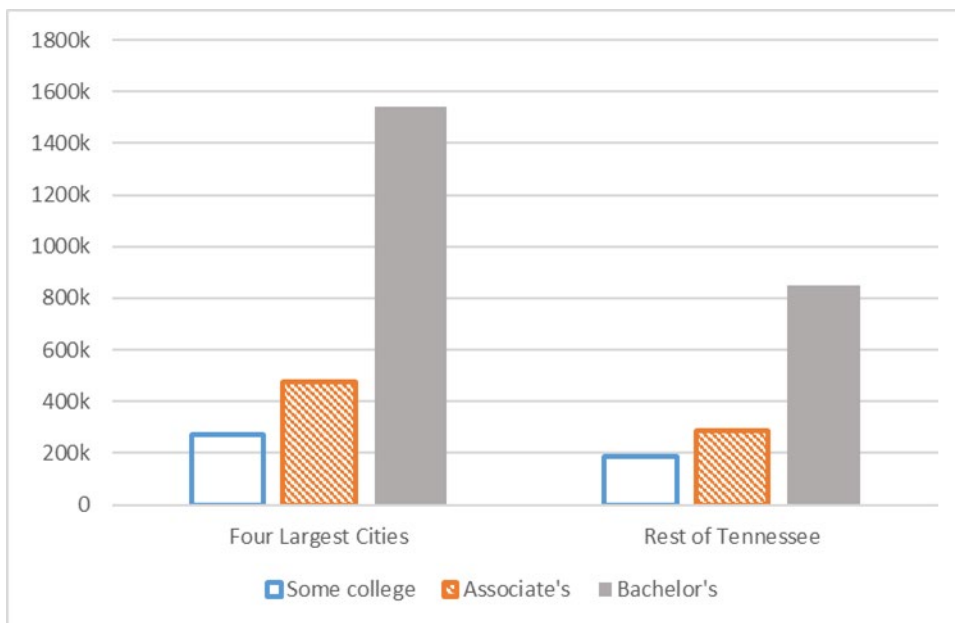
The second most important takeaway from Table 3 is that, for each demographic subgroup, graduating from college yields a larger payoff than enrolling in college without completing a degree. The estimated return to associate’s and bachelor’s degrees is 12-19% versus 7-11% for some college without a degree.

Estimated Returns to College, by Location

Figure 4 illustrates lifetime college income premiums for metro and non-metro parts of the state. The 2011-2021 ACS samples allow me to identify if respondents lived in one of Tennessee’s four large metropolitan areas: Chattanooga, Knoxville, Memphis, or Nashville. These metro areas include their respective city limits as well as nearby suburban areas and communities with economic and cultural ties to the urban core.

As seen in Figure 4, a college education adds more to lifetime income for metro-area workers. Workers with a bachelor’s degree living near one of the state’s four largest cities earn \$1.5 million more over their careers than workers in those cities who have no more than a high school education. This is 82% more than the \$847,000 premium for workers with bachelor’s degrees outside of the four cities. The income premiums for associate’s degrees and some college are also significantly larger in the four metro areas than in other parts of the state.

Figure 4. Tennessee's college income premium is larger in the state's four largest cities.



Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year. The "Four Largest Cities" series of results is from ACS subsamples of respondents who lived in Chattanooga, Knoxville, Memphis, or Nashville metro areas. The "Rest of Tennessee" series refers to respondents in smaller or non-metro areas.

Table 4. Estimated Internal Rate of Return to a College Education in Tennessee, by Metro/Non-Metro Status

	(1) Four largest cities	(2) Rest of Tennessee
Some college, no degree	8%	6%
Associate's degree	13%	9%
Bachelor's degree	15%	10%

Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year. Column 1 lists results for ACS respondents in Chattanooga, Knoxville, Memphis, or Nashville metro areas. Column 2 lists results for respondents in smaller or non-metro areas.

The estimated return on investing time and tuition payments toward a college education is also larger for workers in the state's four largest cities than in smaller cities and towns or rural parts of the state (Table 4). Compared to an 11-14% return on associate's and bachelor's degrees statewide (Table 2), metro area workers realize 13-15% returns, versus 9-10% outside of the four cities.

Estimated Returns to Bachelor's Degrees, by Degree Field

So far, I have reviewed evidence that, for Tennesseans, a college degree is associated with higher lifetime earnings that not only recoup the costs of enrolling but represent a large return on investment. This is consistent with a long line of research on the individual returns to college. Research has also shown that *what* people study in college matters for lifetime earnings (Andrews et al., 2022). The ACS allows me to explore returns to college by degree field, but only for workers with bachelor's degrees.

Table 5 lists summary statistics describing Tennesseans with four-year college degrees, by broad degree group. Business, science, and engineering majors account for two-thirds of the state workforce with bachelor's degrees, and they tend to earn more than people who major in education, arts, humanities, or other fields: \$73,000 – 83,000 versus \$48,000 – 62,000.

Women are under-represented in the higher-paying degree fields, where they account for 41-44% of workers. By contrast, 79% of Tennesseans with bachelor's degrees in education are women, and this is the lowest-paying degree field of the four in Table 5. Non-White and Hispanic workers of both genders are somewhat more evenly represented across these broad degree groupings. Hispanic workers, for example, account for 3% of the state workforce with bachelor's degrees (Table 2) and they also represent 3% of workers with degrees in business, science, or engineering. Black workers account for 11% of bachelor's degree holders in the state as well 10-11% of business, science, and engineering majors. Workers of color are under-represented in Tennessee's college-educated population, but conditional on having bachelor's degrees they are as or more likely to have majored in higher-paying fields.

Table 6 reports estimated income premiums and returns to college by bachelor's degree field. Both sets of estimates are relative to the Tennessee workforce without college. Business majors have the highest estimated return on the typical time and expense invested in college (17%) as well as the largest lifetime income premium over high school (\$1.9 million). The 13-14% estimated return for science, engineering, arts, and other fields is close to the statewide average return on bachelor's degrees. Note, however,

that tuition costs here and throughout the analysis are represented by average full-time tuition rates inclusive of any differential tuition charged by some fields. Higher tuition for business or engineering majors, for example, would cut into estimated returns to college for those fields.

Table 5. 2021 Characteristics of Tennessee Bachelor's Degree-Holders, by Broad Degree Field

	(1)	(2)	(3)	(4)	(5)
	All Bachelor Degree-Holders in the Workforce	Workers with Business Degrees (28.2%)	Workers with Education Degrees (7.4%)	Workers with Science and Engineering Degrees (39.4%)	Workers with Arts, Humanities, Communication, and Other Degrees (25.1%)
Salary and Wage Income	71,113	83,401	47,714	72,709	61,636
Female (%)	48.1	41.4	79.3	44.7	51.9
Black (%)	11.3	11.0	10.5	9.9	14.2
American Indian (%)	0.1	0.1	0.2	0.1	0.1
Multiracial (%)	4.6	4.4	4.7	5.1	4.1
Hispanic (%)	2.9	3.3	1.3	3.3	2.4

Notes: Author's calculations using 2011-2021 ACS samples, limited to 22-64 year-olds with bachelor's degrees in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year. Column 2-5 headings include the share of the bachelor's-holding workforce with degrees in each broad area.

Table 6. Estimated Lifetime Income Premium and Internal Return to College for Tennessee Bachelor's Degree Holders, by Degree Field

	(1)	(2)
	Additional lifetime income	Internal rate of return to college
Business	\$1.85 million	17%
Science and engineering	\$1.49 million	14%
Arts and other fields	\$1.04 million	13%
Education	\$368,000	7%

Notes: Author's calculations using 2011-2021 ACS samples, limited to 22-64 year-olds with bachelor's degrees in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year.

A final, concerning takeaway from Table 6 is that a degree in education adds just \$368,000 to lifetime earnings and yields a 7% return on the cost of college. This is a low payoff to the time and expense that goes into a four-year degree, and equivalent to Table 2 results for the return on enrolling in college without completing a degree.⁹ In results not shown, I estimate a 7% return on education degrees nationwide, so low returns to this degree field are not unique to Tennessee.

⁹ Estimates do not account for the possibility that some workers with education degrees work less than year-round, or any non-salary or societal benefits of working in education. Workers with education degrees are not necessarily teachers, and rate of return analyses do not control for occupation. In addition, all ACS samples are limited to people who report that they are in the labor force and working full-time.

Conclusion

I find that a college education is a good investment toward higher lifetime earnings for Tennesseans, consistent with a long line of prior research for the U.S. or other settings. Also echoing earlier research, I find that the income premium is largest for (1) degree completers, (2) White, non-Hispanic men, (3) workers in one of the state's four largest metro areas, and (4) bachelor's degree holders who majored in business, science, or engineering. Nonetheless, I find large estimated returns on associate's and bachelor's degrees for all demographic and regional subgroups, and all bachelor's degree fields other than education. See the appendix, however, for a more focused analysis of returns to college for Black men and women, and evidence of lower returns to bachelor's degrees for Black men.

I close by reiterating limitations of the analysis, each of which presents opportunities for future research. First, findings here are averages, and financial payoffs from college could be higher, lower, or negative. Webber (2018) estimates that enrollment does not pay off for at least 22% of students seeking bachelor's degrees, when accounting for the risk of dropping out. Second, my estimated returns to college are non-experimental and could be overstated if today's college-educated workers would have earned more regardless of whether they had attended college. Working against that bias, findings may understate the returns to college by excluding non-financial benefits of higher education and not accounting for the effect of a college education on the risk of unemployment. And finally, estimates necessarily speculate about the age-earnings profile of young people today, and it is possible that economic and labor market conditions will shift in ways that change the value of college credits and credentials in the future. For example, many states and private sector employers are eliminating requirements that workers have a college education for certain jobs (Schweitzer, 2022). Deming (2023) finds that much of the income premium for college-educated workers can be attributed to their choice of, and access to, occupations with more opportunities for pay increases over time. It remains to be seen if relaxed education requirements will open up more of these jobs to workers without a college education.

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Appendix: Additional Findings for Black Men and Women

Results by gender and race/ethnicity grouped Tennessee's Black, Hispanic, American Indian, and Multiracial workers together (Figure 3 and Table 3) due to small-sample concerns for breakouts by each race/ethnicity. But this is somewhat less of an issue for Black workers, who constitute 15.9% of the Tennessee workforce (Table 1). This appendix focuses on Black Tennesseans and presents estimates for additional lifetime income with college and returns to college. Although nearly 1 in 6 Tennessee workers are Black, I caution that results may nonetheless be affected by small-sample statistical noise, especially in breakout estimates that focus on Black men or women with a particular education level.

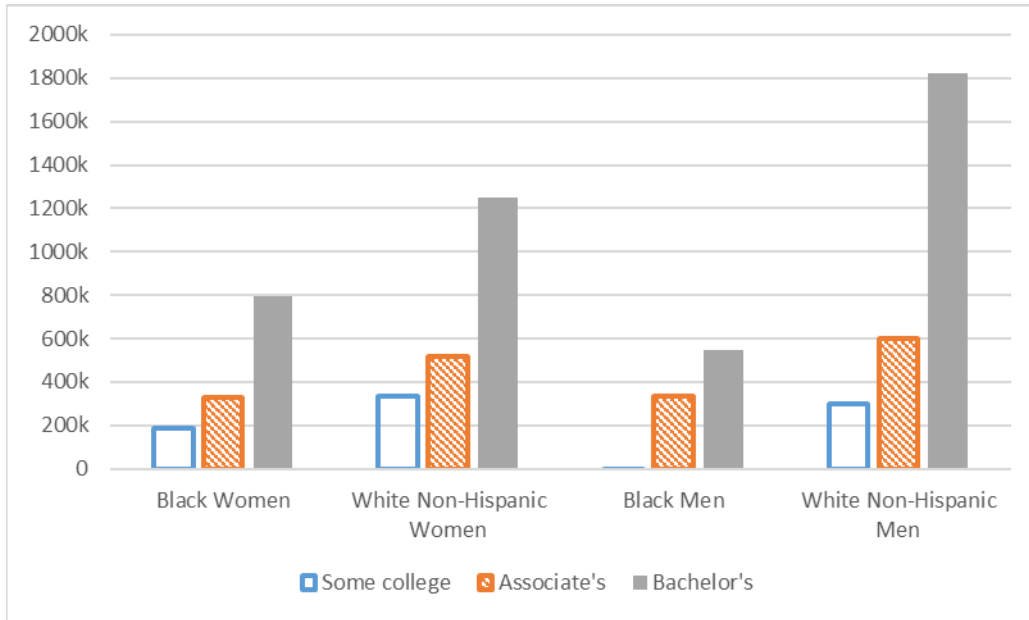
Figure A1 illustrates the gap between lifetime income with a college education and lifetime income with no more than a high school diploma, by the intersection of race and gender. For Black men and women, and for White non-Hispanic men and women, college degrees are associated with more lifetime income. But as in Figure 3, I find evidence of gender and race gaps in the college income premium. White, non-Hispanic men have the largest college income premium, followed by White, non-Hispanic women, Black women, and finally Black men. I estimate that Black men with bachelor's degrees earn \$548,000 more over their career than Black men without college. This is less than the amount by which White, non-Hispanic men extend their lifetime income with an associate's degree: \$598,000. Additionally, I estimate that Black men with some college but no degree earn about as much as Black men who did not enroll in college at all.

Table A1 lists estimated returns to college by gender, race, and postsecondary attainment. I estimate that White, non-Hispanic women have the largest estimated returns to college: 11% for some college, 19% for an associate's degree, and 16% for a bachelor's degree. Black women and White, non-Hispanic men have very similar rates of return to each level of higher education: 7% for some college, 12% for an associate's degree, and 12-13% for a bachelor's degree.

Black men have the lowest estimated returns to college among the four race-by-gender groups listed in Table A1. For Black men, enrolling in college without completing a degree is associated with a small negative return on the direct and indirect costs of college, due to a very small amount of additional income relative to Black men with no more than a high school diploma (Figure A1). I estimate a strong 11% return to associate's degrees for Black men, but a more modest 7% return to bachelor's degrees.

Bearing small-sample cautions in mind, Figure A1 and Table A1 suggest that Tennessee's college-educated Black workers generally recover a strong return on the cost of completing college, but to a lesser degree than the state's White, non-Hispanic workers. Black men, in particular, experience weaker returns to bachelor's degrees and do not appear to benefit financially from enrolling in college without completing a degree.

Figure A1. The college income premium is smaller for Tennessee's Black men than for Black women or White, non-Hispanic workers.



Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year.

Table A1. Estimated Internal Rate of Return to a College Education in Tennessee, by Demographic Subgroup

	Black Women	White, non-Hispanic Women	Black Men	White, non-Hispanic Men
Some College, No Degree	7%	11%	-2%	7%
Associate's Degree	12%	19%	11%	12%
Bachelor's Degree	12%	16%	7%	13%

Notes: Author's calculations using 2011-2021 ACS samples, limited to 18-64 year-old high school graduates in the Tennessee labor force, not attending school, and excluding workers with graduate degrees or who have lived in the state less than one year.