

School-to-Work: Do Tennessee's Higher Education Graduates Work in Tennessee?

Part 1. State-level Labor Market and Earnings Trends

April 3, 2007

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Acknowledgments: This project was prepared under an agreement with the Tennessee Higher Education Commission with the gracious cooperation of the Tennessee Department of Labor and Workforce Development.

Introduction

Tennessee's public higher education institutions—9 public universities, 13 public community colleges, and 27 technology centers—currently enroll 284,464 students.¹ As the state continues to make investments to educate students, conduct research, improve the economy and quality of life of state residents, and prepare students for the work force, the question arises: how much does Tennessee's economy benefit by Tennessee's higher education graduates working in the state?

All states experience a loss of some graduates, but it seems likely that some states are experiencing a larger brain drain, exporting both top-level graduates and other educated people, than are others. This brain-drain can come after states' considerable investments in recruiting and training students. Until now, little information on the propensity of people to work in Tennessee after their education has been available. The lack of information makes it very difficult to assess the returns to education investments in the state. While we do not have data on the ability of other states to retain their graduates as workers, this project provides key information that helps our understanding of the returns to *Tennessee* of investments in higher education, by examining the propensity of people who attend Tennessee public institutions of higher education to work in Tennessee after graduation.

The first installment of this multi-part project combines and matches the records of the degrees awarded in Tennessee to the workers in Tennessee during snapshots of time after the degree was awarded. Part 1 examines the propensity of Tennessee's higher education graduates (both in-state students and out-of-state students, regardless of institution) to work in the state after graduation, and if they do, provides information about full-time or part-time employment

¹ Tennessee Higher Education Commission. (2006). *Tennessee Higher Education Fact Book, 2006-2007*. Nashville, TN. Retrieved February 9, 2007 from <http://www.tennessee.gov/thec/2004web/division_pages/ppr_pages/pdfs/Research/2006-2007%20Fact%20Book.pdf>.

status and earnings. Future reports will address trends and earnings based on the higher education system and institution, key majors, student's race and sex, and lottery scholarship status.

An overall picture of Tennessee's working graduates

- Within two years after graduation, approximately two-thirds of Tennessee's higher education graduates are working for employers who are part of the unemployment insurance system and about four-fifths are working in total.
- An additional 5 to 6 percent of graduates remain in Tennessee attending a higher-ed institution after earning a degree.
- As time passes, fewer of Tennessee's graduates work in the state but this trend is tempered by new graduates working in the state.
- The vast majority of working graduates are employed full-time and most of them were enrolled as in-state students.
- Students who were in-state students at the time of graduation are more likely to work in Tennessee than their out-of-state counterparts.

An overall picture of Tennessee graduates' wages

- In 2005, the nearly 120,000 Tennessee higher-ed graduates working in Tennessee earned over \$4.4 billion.
- Seven years after graduation, Tennessee's higher-ed graduates who are working full-time in Tennessee earn an average annual wage of \$50,418.
- Students with out-of-state residency at graduation earn more on average than in-state students.
- Seven years after graduation, bachelor's degree holders are earning almost \$7,000 more annually than associate's degree holders. Bachelor's degree holders' wages grow at a 7.3 percent compound annual growth rate compared with a 2.5 percent inflation rate. Associate's degree holders' wages grow faster than inflation as well at 4.3 percent.

Overview of Discussion

To paint this picture of Tennessee's higher education graduates, we analyze data from two sources: the Tennessee Department of Labor and Workforce Development (TDLWD) and the Tennessee Higher Education Commission (THEC). Tennessee higher-ed institutions awarded just over 232,000 degrees to 207,600 different people between 1997 and 2005.² Almost 12 percent of the degrees awarded were to out-of-state students (just over 25,000).³

When linking the education data to the graduation data, we evaluate the employment data beginning the first full quarter after the graduation term: winter graduates could potentially enter the labor market in Q2, spring graduates, in Q3, summer, in Q4, and fall, in Q1 of the next year. In this and subsequent reports, we look at Tennessee workers in terms of the potential time in which a graduate could work once he or she earned a degree, and the time is measured in calendar quarters of the year from 1997Q1 to 2005Q2. For instance, a student who earned a bachelor's degree in Spring 2002 could have worked in Tennessee at some point during the following 13 different quarters. This graduate counts, then, as 13 potential manpower-quarters. If every Tennessee graduate worked every quarter after their degree was awarded, collectively they would represent over 3.8 million manpower-quarters of potential workforce participation.

We examine the percentage of Tennessee graduates who *are working* in each quarter as a percentage of those who *could be* working in the particular quarter. The analysis allows us to examine graduates for up to 29 quarters (or seven years) after graduation.⁴ These same trends can be studied based on various characteristics, such as whether their residency during school was in-state or out-of-state, whether they worked full-time or part-time in that quarter, whether they also

² The actual number of graduates who could be matched to TDLWD records was 206,431, because records for 1,169 graduates did not contain valid social security numbers.

³ Out-of-state students are those who have out-of-state residency at the time of their graduation.

⁴ The analysis was cut off after 29 quarters because so few graduates could be studied for longer time periods.

enrolled in additional education in a Tennessee institution during that quarter, and—in later reports—their race and gender and degree-awarding institution. This analysis does not track particular people over time but rather average quarterly labor market participation.

The Basic Question: Working or Not

Again we start with a very basic question: do Tennessee's higher education graduates work in Tennessee after earning their degree?⁵ In their first quarter out of school, 67.2 percent of graduates are working in Tennessee for employers who are part of the state's unemployment insurance system. An additional 6.2 percent are not earning wages but are enrolled in a Tennessee higher-ed institution. Of the approximately 206,000 graduates, then, almost three-quarters remain in Tennessee—either in the labor market or enrolled in a higher-ed institution. This leaves 26.6 percent of Tennessee's graduates who are neither working in Tennessee as part of the unemployment insurance system nor continuing their education at a Tennessee higher-ed institution, but as described below many of these may still be working in the state.

The percentage of working graduates declines to 64.6 percent after one year; two years later, to 62.8 percent, and so on until seven years later, it has fallen to 55.5 percent. Similarly, the percentage of graduates who are *not* working but are continuing their education in Tennessee declines to 5.5 percent one year later, 4.1 percent two years later, and so on until seven years

⁵ Employment and wage data can only be obtained for individual workers from the TDLWD ES202 series that are reported quarterly by all employers who are part of the Tennessee unemployment insurance system. Most employers in the state are liable under the Tennessee Employment Security Law. Liability is based on criteria set by federal law and include: all governmental employers; certain nonprofit, domestic, and agricultural employers; and all other employers who have a total payroll of \$1,500 or more in any quarter in the current or previous calendar year, or who have at least one employee for any day during 20 different weeks during the current or previous calendar year. (TDLWD, <<http://www.state.tn.us/labor-wfd/ui/ui.htm>>). Not included in these data are, for example, the self-employed, employees or officers in a non-profit organization with three or fewer employees, and other domestic, agricultural, and for-profit businesses who do not meet the requirements outlined above.

later, only 1.0 percent of graduates are continuing their education in Tennessee while not working.⁶

The analysis reported here mostly relies on TDLWD data, which represent approximately 80.1 percent of the total number of people working in Tennessee (TDLWD; BLS). If the 19.9 percent of people not captured in the data behave similarly to those people who are, we can approximate their propensity to work or continue education in Tennessee. Specifically, in quarter five, or one full year after earning a degree, recall that 64.6 percent of graduates in our data are working and 5.5 percent are not working but are continuing their education in Tennessee. When we account for the nearly 20 percent of people not contained in our data, we find that 84.4 percent of Tennessee graduates are working or continuing their education in Tennessee after one year; after four years, 76.3 percent are working or are in school in the state; and after seven years, 69.8 percent. The remainder of this report reflects only the graduates for whom we have data, but it is useful to keep in mind the likelihood to work and be in school of the other one-fifth of workers the data do not account for.

Figure 1a shows the overall labor market participation of graduates for various time periods; Figure 1b adds the percentage of graduates who are not working but are engaged in continuing education in Tennessee.

⁶ On the flip side, of the 153,500 graduates (67.2 percent) who are working in Tennessee during their first quarter after graduation, over 24,000 (15.8 percent) are also enrolled in school. Over half of them are working full-time and continuing their education.

Figure 1a: Percent of higher education graduates working in Tennessee

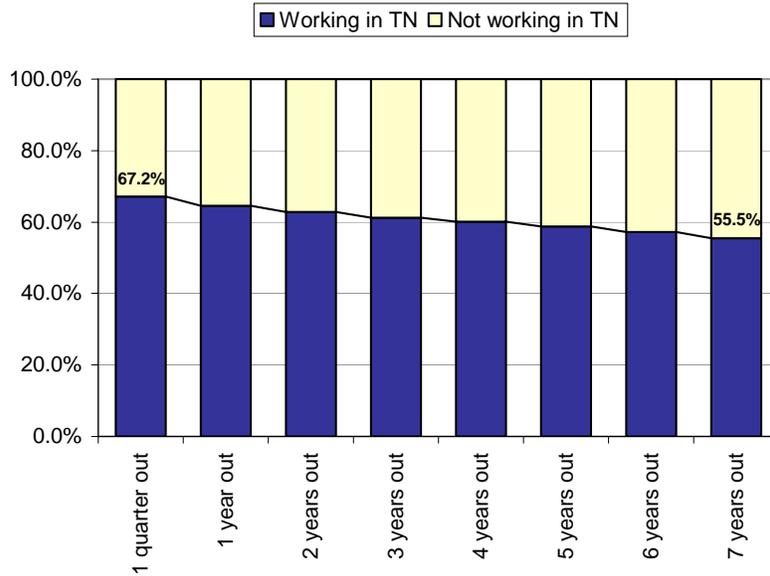
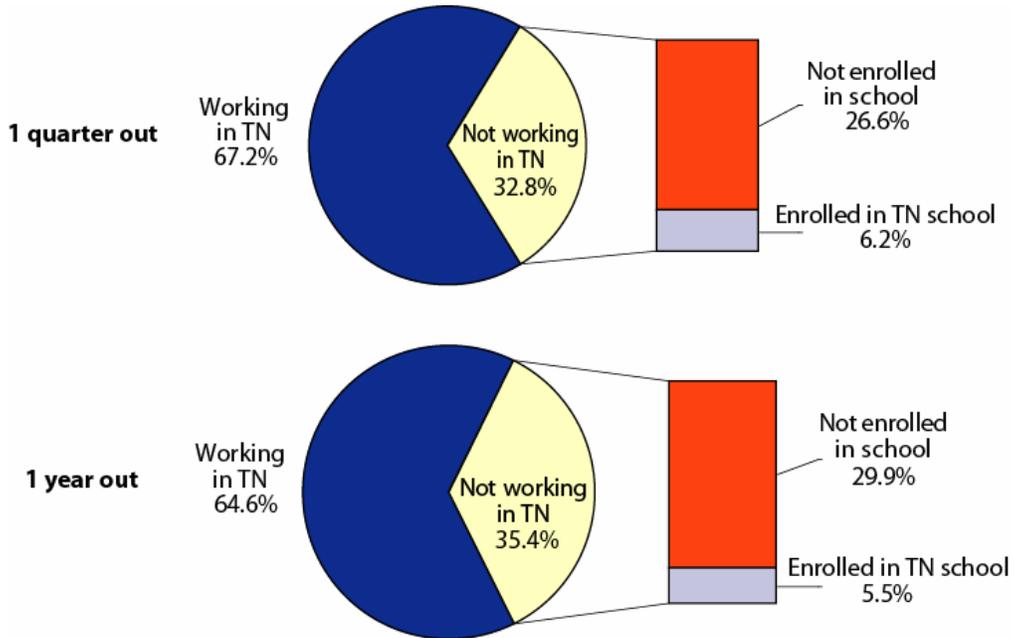


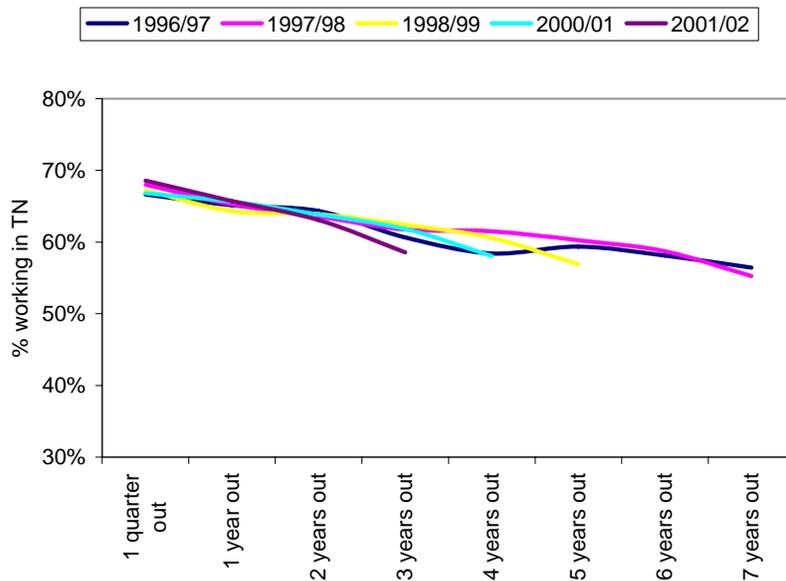
Figure 1b: Percent of higher education graduates working in Tennessee or continuing their education



While the decline illustrated in Figure 1a might seem disturbing (as if Tennessee will one day run out of college graduates), it should be noted that the state’s higher-ed institutions continue to graduate new students every year and that the propensity to work will likely be

repeated again and again by these new graduates. To illustrate this point, Figure 2 shows the trend for graduates from each of the 1996/97 to 2001/02 academic years. That the lines are difficult to distinguish is precisely the point: regardless of the year of graduation, Tennessee higher education graduates exhibit similar tendencies to work in Tennessee.

Figure 2: Trends in work participation by year of graduation



Full-time or part-time employment

Full-time and part-time employment must be determined based on earnings since the TDLWD quarterly wage records only indicate employment and do not distinguish between full- and part-time work status. Specifically, for this report, an individual’s employment is considered part-time when his or her wage record for that quarter equals less than the earnings of a fully-employed minimum wage earner. This approach does not result in a precise measurement of full- and part-time employment. For example, the part-time employees identified here include employees who work less than 40-hours a week (perhaps the best definition of part-time) and employees who are employed full-time but earn less than the minimum wage for the quarter, such as some people who work only part of the quarter. Similarly, full-time employees include

both people who are fully employed for the quarter and some people who are less than fully employed but earn more per hour than the minimum wage.

Figure 3 shows that a relatively large share (17.6 percent) of Tennessee’s graduates is employed part-time during their first quarter out of school. After just one year, the number of graduates employed part-time reduces by half; and as more time passes, part-time employment continues to decline. In fact, by seven years out, only 3.0 percent of Tennessee’s graduates are working in Tennessee on a part-time basis. Figure 4 shows the sharp increase in full-time employment within the first four- to five-quarters after graduation alongside the corresponding decline in part-time employment. As can be seen, the decline in work participation is almost entirely a fall off in the work participation of part-timers, as the percentage of full-time workers is relatively stable after the initial increase, falling only from 54.9 percent to 52.5 percent, as part-time workers fell from 9.7 to 3.0 percent.

Figure 3: Full-time and part-time work participation

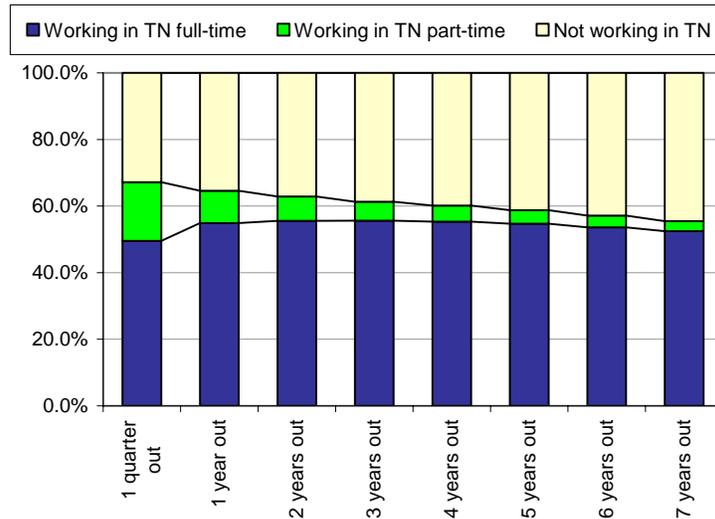
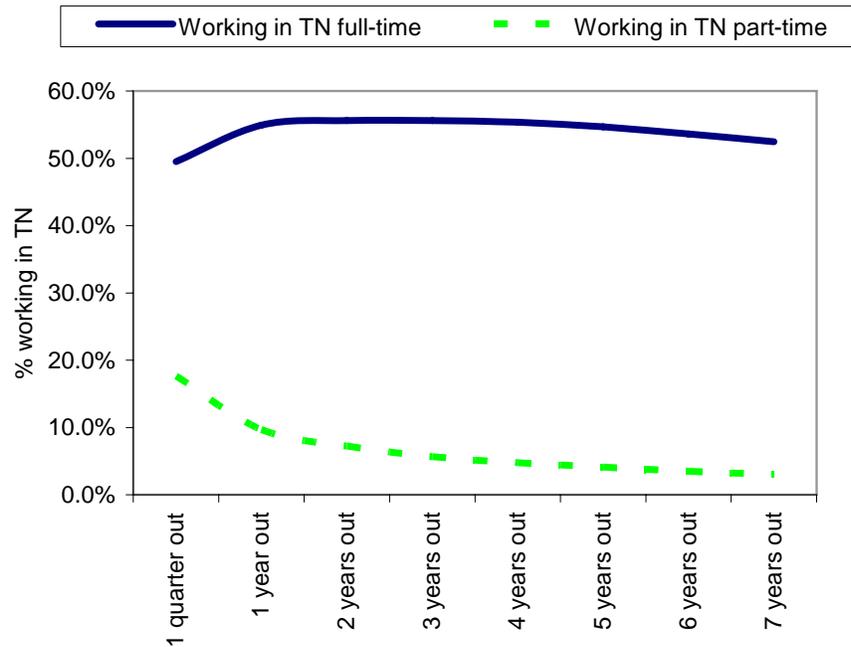


Figure 4: Full-time and part-time work participation, another look



In-state or out-of-state student residency

A key issue is whether the propensity to work in Tennessee differs between people who began school as Tennesseans and those who came from outside to receive their education in the state. These distinctions are examined based on students’ residency status at the time they graduated from a Tennessee institution. From the approximately 206,000 students who graduated during this time period, just over 25,000 were out-of-state students (12.2 percent). It is evident that a much smaller share of out-of-state students stay and work in Tennessee (see Figure 5). Of course, we do not know where they go—they might have returned to their home state, another location, or perhaps they continue to live in Tennessee but do not work as part of the unemployment insurance system—but we do know that a small share of out-of-state students continue to work in Tennessee after graduation. One year after graduation, 69.7 percent of in-state students are working in Tennessee compared with only 25.6 percent of out-of-state students. Thus, of the 67.2 percent of graduates who are working in Tennessee one year out, 95.4

percent of them were in-state students. Not only is the share of out-of-state students working in Tennessee small, but it falls faster than for in-state students, meaning the share of these students is declining (see Figure 6). The out-of-state student share of the workers declines over time to just 3.1 percent at seven years after graduation.

Figure 5: Comparison of in-state and out-of-state student participation in Tennessee labor market

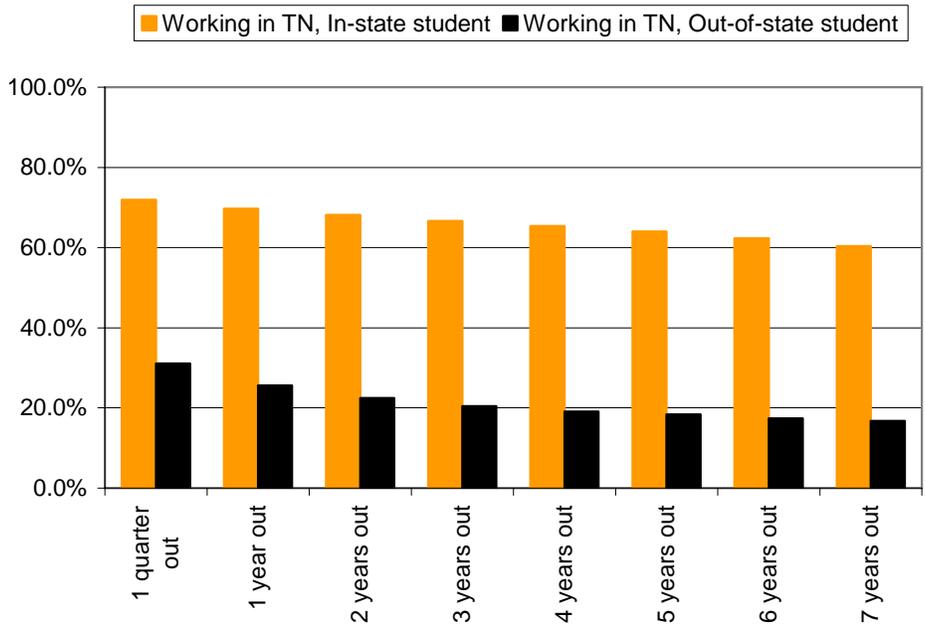
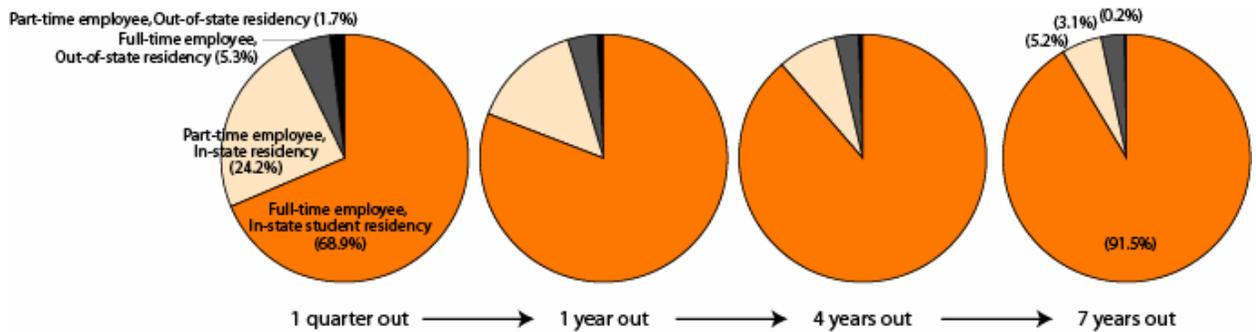


Figure 6: An overall picture of Tennessee graduates who are working, with full-time, part-time work status & in-state and out-of-state student residency



More Detail: Participation by Degree Type

Just over one-half of the graduates from 1996/97 to 2004/05 earned bachelor's degrees from Tennessee's higher-ed institutions. Almost three-quarters (73.7 percent) of graduates earned bachelor's degrees or higher including master's, doctoral, professional, or educational specialist degrees; the remaining quarter earned either a certificate⁷ or an associate's degree. The distribution of degrees over the 1996/97 through 2004/05 graduates has remained relatively stable and mirrors the distribution awarded in the 2005/06 academic year (THEC, 2006).

Figure 7: Distribution of degrees awarded

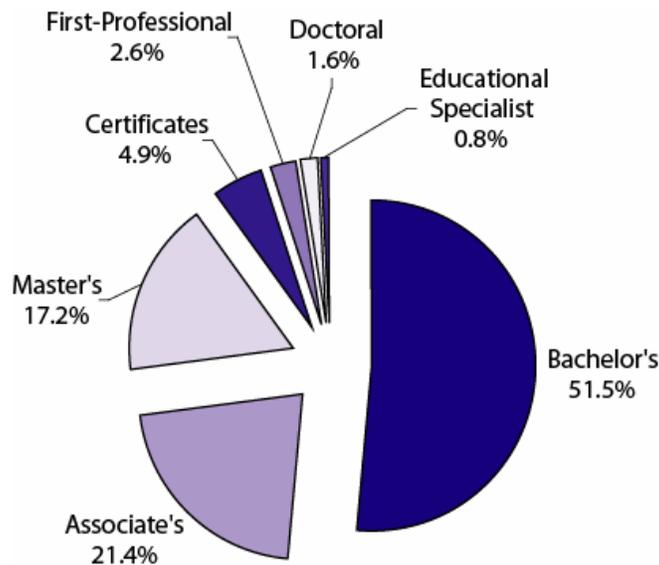
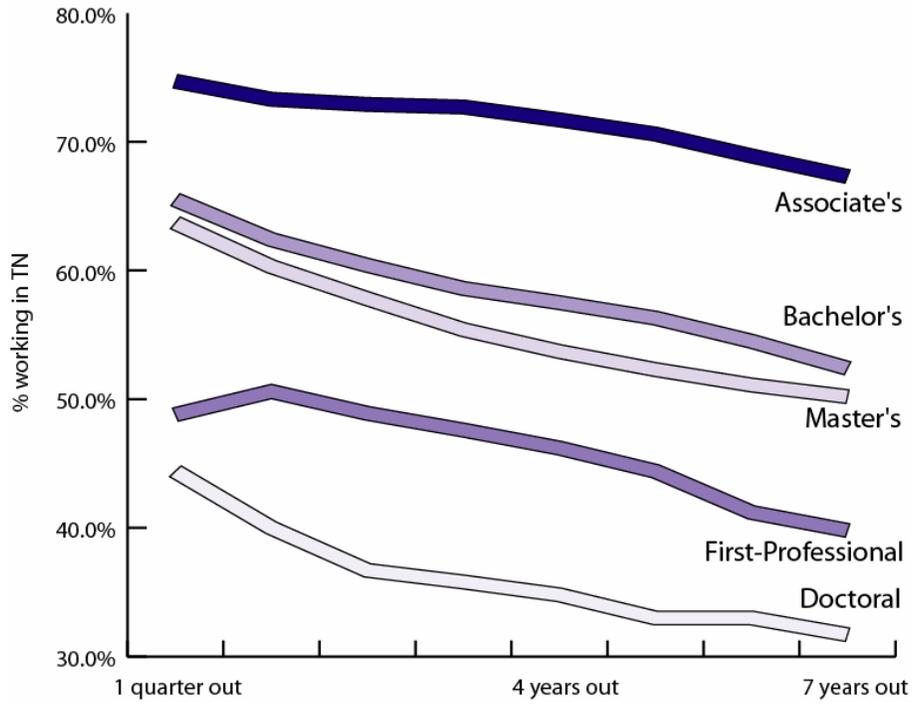


Figure 8 shows the propensity to work in Tennessee based on the degree that was earned. Those earning associate's degrees are much more likely to work in Tennessee than other degree-earners. In fact, after one year, 73.3 percent of associate's-degree earners are working in Tennessee while only 62.4 percent of bachelor's-degree earners and 40.0 percent of doctoral-degree earners remain. As is evident in Figure 8, the relative decline over a seven-year period is

⁷ A small number of certificates (less than 1 percent) were awarded post-baccalaureate.

also slower for associate's degree earners than for others; as would be expected, the relative decline over time is fastest for doctoral- and professional-degree earners.

Figure 8: Select degree earners who are working in Tennessee



Average Wages of Tennessee Graduates in the Tennessee Labor Market

In 2005, the nearly 120,000 who graduated between 1997 and 2005 and were working in Tennessee for employers that were part of the unemployment insurance system earned over \$4.4 billion.⁸ These graduates earned 5.0 percent of total Tennessee wages and made up 4.2 percent of the state's total workers. The average of the working graduates earned \$38,927 in 2005, regardless of the degree earned or length of time working in Tennessee; the average salary of everyone else working in Tennessee was \$32,565, or 16.3 percent less.⁹

This section of the report analyzes the earnings of graduates who are working in Tennessee—making comparisons by residency status, current enrollment in school, and degree level. The remainder of this section focuses on wages for full-time workers to provide evidence of the earnings that are available if people choose full time employment.

It is important to note that the wages reported here have been annualized and adjusted so that comparisons can be made based on the *length of time* graduates are out of school after obtaining a degree,¹⁰ rather than based on the year in which they graduated. The data for earlier years are adjusted for both inflation and real productivity changes over time, which should eliminate the effects of any fluctuations in the economy tied to specific historical time periods.¹¹ In other words, the wages reported for the 17th quarter out of school (for instance) represent the same relative wages for graduates from the academic years of 1996/97 through 2000/01, even though the occasion of “17 quarters out” occurs in completely different calendar years.

⁸ Including workers that were outside the unemployment insurance system, more than \$5.0 billion was earned.

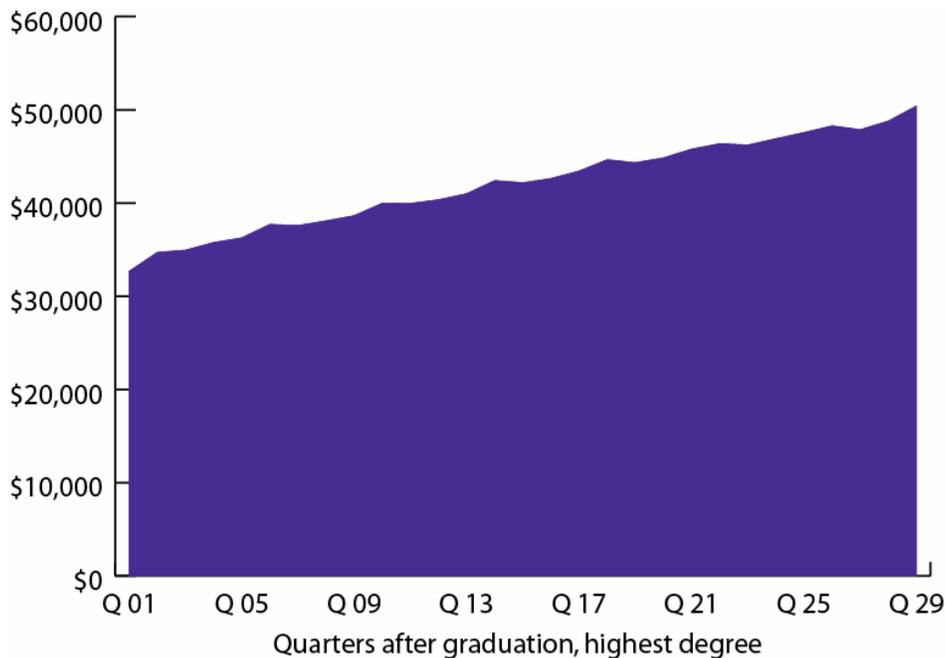
⁹ “Everyone else working in Tennessee” in 2005 would include graduates from Tennessee’s higher education institutions before 1996/97 as well as workers who earned degrees in other states or countries and workers *without* higher education degrees.

¹⁰ Approximately 12,000 students earned multiple degrees in Tennessee’s higher-ed institutions during the 1996/97-2004/05 time period. In this discussion of wages, we look at either the wages after the highest degree the student earned or the wages after the most recent degree the student earned.

¹¹ Wage data are deflated by both the consumer price index (CPI) and changes in output per worker over time.

As we might expect, in the first quarter after graduation, workers do not earn as much as they do in subsequent quarters—at least in part because graduates may not start working until the middle of the quarter and do not earn wages for a full quarter. As shown in Figure 9, the average annual earnings for full-time workers during their first quarter was \$32,696 but then rises over \$2,000 in just one quarter to \$34,720. Thereafter, the average annual earnings for full-time workers grow at a 5.7 percent compound annual growth rate (CAGR) to \$50,418 just seven years later. Inflation, as measured by the consumer price index, rose only 2.5 percent annually during this time period.

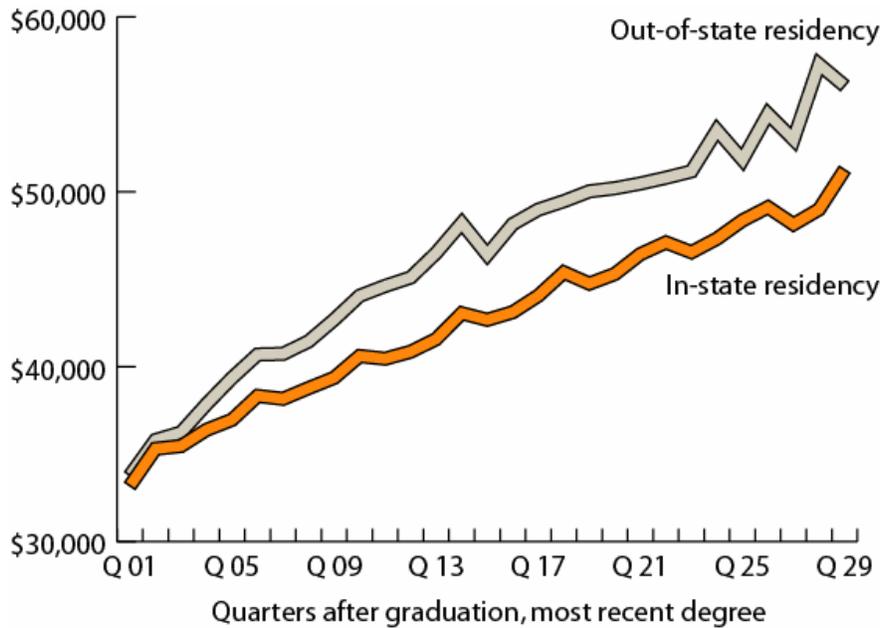
Figure 9: Average annual wages, all full-time workers



Students with out-of-state residency at graduation earn more on average than in-state students. Figure 10 shows the annual average wages for both in-state and out-of-state students based on their most recent degree. Although the wages start out roughly the same for the first three quarters after graduation, seven years later, people who came into the state for school and worked in Tennessee on a full-time basis after graduation earn on average \$5,000 more than in-

state students. More information regarding the nationality of these out-of-state students, the institution in which they enrolled, the majors they chose in their degree programs, traits associated with people who attend out-of-state institutions, and the quality of their kindergarten through 12 education might shed more light on these wage differences. Many of these issues are explored in future reports.

Figure 10: Average annual wages, full-time workers, by residency status



Similar trends in wage growth over time occur for graduates who are continuing their education in the same quarter in which they are working full-time, but average annual wages are a bit lower when workers are in school. One year after graduation, people who are working full-time and not continuing their education are earning approximately \$6,000 more than those who are continuing their education, and this difference grows as time passes after graduates earn their most recent degree (see Figure 11). It is important to remember that the definition of full-time employment includes people who may be working less than 40-hours per week but are earning more than the minimum wage; therefore, the growing differences based on the time after earning

a degree may be a reflection of changes in the number of hours worked rather than an indication that additional education costs more the longer a worker waits after earning a degree.

Figure 11: Average annual wages, full-time workers, continuing education

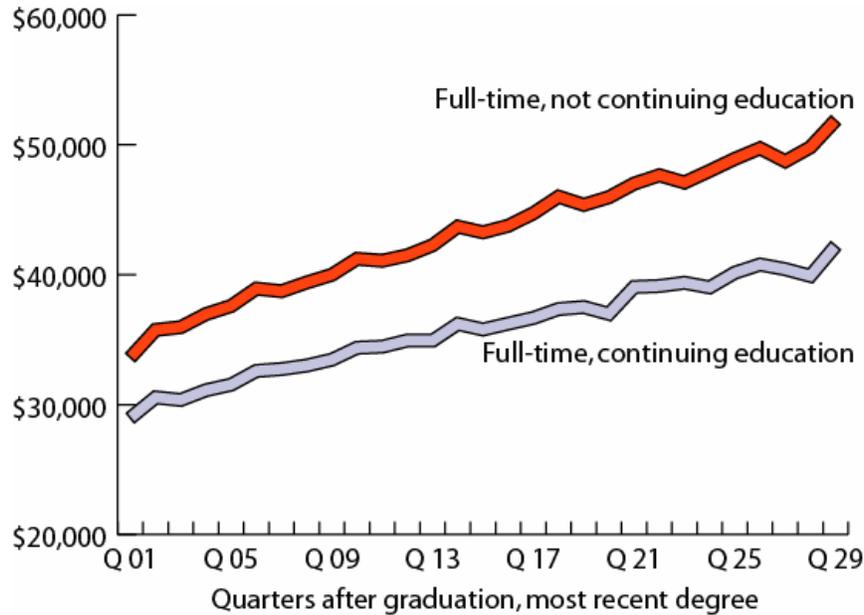


Figure 12 breaks average wages down by the level of degree earned in Tennessee. As expected, the higher the degree earned, the higher the average wages. As shown in Table 1, one year after graduation, doctoral graduates earn an average of \$57,097 annually, after four years, they earn \$65,361, and by seven years, \$68,760. At the other end of the spectrum, associate's degree graduates earn \$33,326 on average one year after graduation; \$38,952 four years later; and \$42,921 after seven years. Figure 12 shows that in the first few quarters after graduation, associate's and bachelor's degree graduates earn approximately the same average wages; however, over time, bachelor's degree graduates earn more. Just seven years after graduation, bachelor's degree holders are earning almost \$7,000 more annually than associate's degree holders.

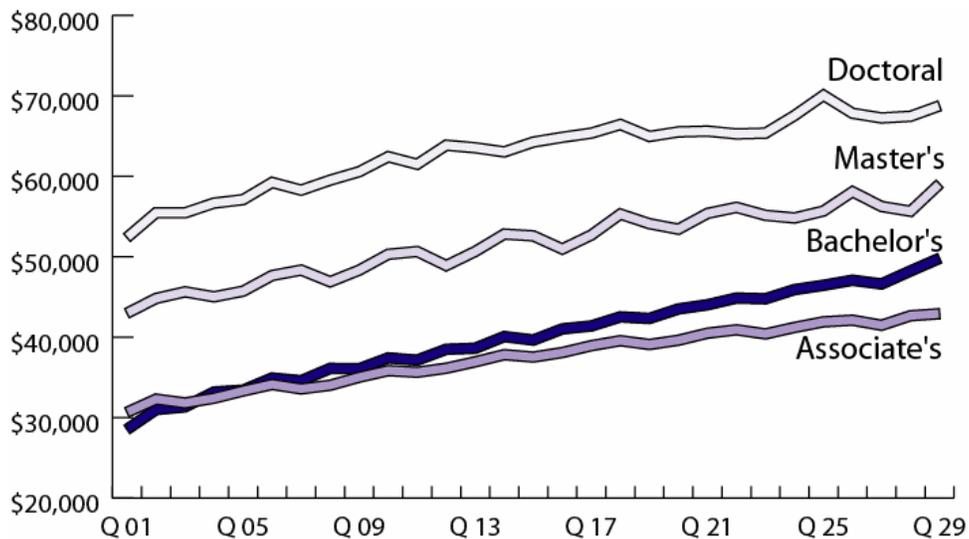
Returning to Table 1, the final row shows the compound annual growth rate for each degree level; these growth rates are calculated from the full-time workers' second quarter in the

Tennessee labor market to the 29th quarter in the labor market, or seven years. Bachelor’s degree holders who are working full-time experience an average annual wage growth of 7.3 percent. Master’s degree holders experience the slowest growth rate among these degree levels¹² at 3.2 percent, but this still exceeds inflation.

Table 1: Average annual wages by select degrees

	Associate's	Bachelor's	Master's	Doctoral
1 quarter out	\$30,678	\$28,549	\$42,979	\$52,390
1 year out	\$33,326	\$33,421	\$45,723	\$57,097
4 years out	\$38,952	\$41,403	\$52,701	\$65,361
7 years out	\$42,921	\$49,811	\$59,056	\$68,760
CAGR from Q2 to Q29	4.3%	7.3%	3.2%	4.2%

Figure 12: Average annual wages by select degrees



¹² The CAGR for Educational Specialist holders appears to be the lowest, at just 1.7 percent.

Conclusion

Part 1 of this series of reports provided a broad look at whether Tennessee's higher-ed graduates work in Tennessee after graduation, who they are, and the percentage of them who are still working in Tennessee up to seven years after graduation. It also provides preliminary data on the wages Tennessee's graduates earn. Future reports will explore these topics in more detail, evaluating trends in both participation and earnings for a variety of degrees earned, for certain majors chosen by graduates, and for other demographic characteristics of Tennessee's graduates, like sex and race.