

A Profile of Non-Completers in Tennessee Higher Education

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EXECUTIVE SUMMARY

In a 2009 address to a Joint Session of Congress, President Obama challenged “every American to commit to at least one year or more of higher education or career training.”¹ These comments spurred an ongoing, national debate about whether higher education *should* be a priority for every young person. Nationwide, enrollment in higher education institutions increased 31.7% between 2000 and 2009, far outpacing 9.7% growth in the over-18 U.S. population.² The fact remains, however, that many of these students will leave college without a degree. For these non-completers, is their time in college well spent, or do the returns to education go primarily to degree recipients?

The impact of higher education has national and local importance. The Tennessee economy’s ability to compete with the rest of the U.S. and the world, for instance, depends crucially on the state’s ability to develop and retain a highly skilled labor force. The state’s two-year and four-year institutions of higher education are key components of the state’s strategy to create and sustain an amply-skilled labor force. This report provides a thorough analysis of college completion and labor market outcomes for two recent cohorts of Tennessee public postsecondary students. The study profiles college completers and non-completers throughout the state and also characterizes the economic (i.e. earnings) gains from college persistence and completion.

We undertake a careful analysis of all students who began as first-time freshmen at any one of the state’s *public* institutions of higher education in 2002 for the 2002/2003 school year and in 2003 for school year 2003/04. We explore a series of important outcomes for these students, including their:

- persistence through college
- time of exit or degree completion
- earnings if they are working in the Tennessee economy.

Each student’s experience is tracked within and across campuses and into the labor force. We analyze student education and work experience outcomes through the end of calendar year 2010. We focus in particular on students who *did not* complete college within the window of time we observe, which covers up to 400% of the normal time to complete a degree for community college students and up to 200% of normal time for four-year college students. Selected findings include the following:

- (1) 72 percent of two-year college entrants and 45 percent of four-year college entrants failed to earn a degree by the spring of 2010.
- (2) Non-completers had lower ACT scores than degree recipients, and lower ACT scores were associated with lower earnings after college.
- (3) Non-completers came from neighborhoods that were less affluent and more diverse than those of degree recipients

¹ See a transcript here: http://www.whitehouse.gov/the_press_office/Remarks-of-President-Barack-Obama-Address-to-Joint-Session-of-Congress.

² Enrollment statistics derived from the Integrated Postsecondary Education Data System. Population statistics are from the U.S. Census.

- (4) Four-year college non-completers were close to minimum degree requirements, in terms of credits and semesters, but tended to stay in college just 2/3 as long as Bachelor's degree recipients.
- (5) Students were at the highest risk of leaving college in their first and second terms.
- (6) Students who transferred from community colleges to four-year schools were at the highest risk of dropping out after their first term as a four-year college student.
- (7) Non-completers earned nearly \$10,000 less than degree recipients seven years after entering college.
- (8) Students who completed a Bachelor's degree within four years earned more than non-completers and all other degree recipients 7-8 years after starting college.
- (9) Non-completers benefitted from college persistence. Post-college earnings rose with each additional semester that a student accumulated, even if that student left without a degree.

The report begins with a discussion of data used in this study as well as descriptive statistics for 2002 and 2003 first-time freshmen in Tennessee. This is followed by a section on college progression and graduation which demonstrates the variance in degree receipt across campuses and the typical time spent in college for non-completers and completers. Finally, we summarize a series of statistical analyses that explain which characteristics are most closely linked to college completion as well as workforce earnings shortly after college. We conclude by discussing policy implications and opportunities for additional research.

DATA

Tennessee's higher education institutions serve many different types of students: traditional college students who enroll shortly after completing high school, non-traditional students who start or return to college after a number of years in the workforce, and part-time students who work while enrolled, among others. These broad groups of students have very different goals regarding degree completion and employment. Since we are interested in producing comparable profiles of non-completers and degree recipients, we focus on first-time college freshmen, a group of students who likely had similar goals, accumulated work experience prior to college, college admission standards, curriculum and labor market conditions.

Data on education experiences in Tennessee public institutions of higher education are obtained from THEC administrative files. Data on graduation from Tennessee private colleges and universities or any school outside the state are obtained from the National Student Clearinghouse.³ Data on workforce experience are obtained from the Tennessee Department of Labor and Workforce Development's unemployment insurance records.⁴

³ We find that 469 students graduated from schools other than Tennessee public colleges from the 2002 cohort. A smaller number, 215 students, graduated from schools other than Tennessee public institutions from the 2003 cohort.

⁴ We are only able to examine workers who are in the Tennessee unemployment insurance system, which primarily applies to people who work for an employer and excludes people who work for themselves. Farm workers are also generally excluded. Approximately 88.9 percent of the state's workers are covered by the unemployment system, so we underestimate the share of graduates working in the state.

We define the 2002 cohort of students as those who entered college as first-time freshmen in the summer or fall of 2002.⁵ The 2002 cohort had a total of 24,630 first time students, including 14,625 in four-year schools and 10,005 in two-year schools. We define the 2003 cohort as all first-time freshmen who entered college in the summer or fall of 2003. The 2003 cohort had 24,485 students, with 14,041 from four-year schools and 10,444 from two-year schools. **Table 1** provides a listing of freshmen enrollment by campus for 2002 and 2003 and **Table 2** shows the overall outcomes for these students. Each student's experience is tracked across campuses (if they chose to attend another school) and into the labor force. Thus, we follow students who begin at each campus to determine whether they obtained a degree at their initial campus or at any other public or private school in Tennessee or elsewhere in the nation. We analyze student education and work experience outcomes through the end of calendar year 2010 for both cohorts of students.

We focus much of our evaluation on the workforce participation and earnings of people who *did not* graduate. Specifically, we compare the employment and earnings of these non-completers to the employment and earnings of completers to approximate the effect of degree receipt on post-college earnings. We must emphasize that results only reflect the initial effects of education and graduation on earnings and workforce participation because many four-year graduates can only be observed for two or fewer working years after graduation. These findings are not necessarily indicative of career earnings profiles.⁶ Based on this initial analysis, the data can be extended and updated in the future to allow more complete evaluation of labor force outcomes. Also notice that our analysis is only of students who pursued higher education.

⁵ Students who were dual enrolled while in high school are considered first-time enrollees when they begin higher education after graduation from high school.

⁶ Age-earnings profiles vary systematically for different degrees and levels of educational attainment.

TABLE 1: First-Term Freshman Classes

	Cohort		Total
	2002	2003	
Two-Year Institutions			
Chattanooga State Community College	931	1,006	1,937
Cleveland State Community College	457	514	971
Columbia State Community College	677	667	1,344
Dyersburg State Community College	474	595	1,069
Jackson State Community College	698	679	1,377
Motlow State Community College	767	708	1,475
Nashville State Community College	457	481	938
Northeast State Community College	669	749	1,418
Pellissippi State Community College	961	884	1,845
Roane State Community College	881	867	1,748
Southwest State Community College	1,239	1,409	2,648
Volunteer State Community College	911	970	1,881
Walters State Community College	883	915	1,798
Total	10,005	10,444	20,449
Four-Year Institutions			
Austin Peay State University	947	913	1,860
East Tennessee State University	1,407	1,423	2,830
Middle Tennessee State University	2,944	2,711	5,655
Tennessee State University	1,113	952	2,065
Tennessee Technological University	1,144	1,090	2,234
UT Chattanooga	1,117	1,288	2,405
UT Knoxville	3,237	2,928	6,165
UT Martin	1,020	881	1,901
University of Memphis	1,696	1,855	3,551
Total	14,625	14,041	28,666

TABLE 2: Completer/Non-Completer Totals

	Two-Year						Four-Year						All College-Going					
	2002		2003		Total		2002		2003		Total		2002		2003		Total	
Non-completers	70.6%	7,064	73.3%	7,660	72.0%	14,724	44.4%	6,491	45.8%	6,428	45.1%	12,919	55.0%	13,555	57.5%	14,088	56.3%	27,643
Single-Term	10.6%	1,061	13.4%	1,404	12.1%	2,465	10.5%	1,540	12.6%	1,767	11.5%	3,307	10.6%	2,601	13.0%	3,171	11.8%	5,772
Multi-Term	60.0%	6,003	59.9%	6,256	59.9%	12,259	33.9%	4,951	33.2%	4,661	33.5%	9,612	44.5%	10,954	44.6%	10,917	44.5%	21,871
Completers	29.4%	2,941	26.7%	2,784	28.0%	5,725	55.6%	8,134	54.2%	7,613	54.9%	15,747	45.0%	11,075	42.5%	10,397	43.7%	21,472
Associates	16.0%	1,598	14.4%	1,502	15.2%	3,100	2.3%	335	2.1%	289	2.2%	624	7.8%	1,933	7.3%	1,791	7.6%	3,724
Bachelor	13.4%	1,343	12.3%	1,282	12.8%	2,625	53.3%	7,799	52.2%	7,324	52.8%	15,123	37.1%	9,142	35.1%	8,606	36.1%	17,748
Total	100.0%	10,005	100.0%	10,444	100.0%	20,449	100.0%	14,625	100.0%	14,041	100.0%	28,666	100.0%	24,630	100.0%	24,485	100.0%	49,115

CHARACTERISTICS OF THE 2002 AND 2003 COHORTS

This section describes the characteristics of students entering two-year and four-year schools, and also compares them with 2000 statewide population statistics. We begin by discussing students who entered two-year schools and follow with a subsection on those who started at four-year schools (see **Table 1** for student counts by institution). We divide students into four groups: those earning a Bachelor's degree, those earning an Associate's degree, those who stay in school for a brief period of time (referred to as "single-term non-completers" who persisted one semester in two-year schools and up to two semesters in four-year schools), and those staying in school longer but failing to earn a degree (henceforth, "multi-term" or "extended" non-completers). The discussion is focused on attributes of these four groups within the overall cohorts, but significant differences often exist across campuses as well. The Appendix provides more detailed campus-level student characteristics and outcomes.

Table 2 summarizes the distribution of completers and non-completers for first-time freshmen entering Tennessee's higher education institutions in 2002 or 2003. We find that 72 percent of Tennessee's two-year college entrants and 45 percent of four-year college entrants failed to complete a degree by the spring of 2010, the last term for which we have data. Just less than 12 percent of all college-going students left after completing no more than 25% of the normal time to degree receipt. Among all two-year entrants in the 2002 and 2003 cohorts, 15 percent ultimately received an Associate's degree, and 13 percent received a Bachelor's degree. Among four-year entrants, Associate's degree receipt was very rare, and 53 percent received a Bachelor's degree. The following pages describe these cohorts in more detail; we focus first on students who entered as two-year community college students and then we turn to students who entered as four-year college or university students.

Students Entering Two-Year Schools

Table 3 summarizes student characteristics by completion category, and **Table 4** shows Census Bureau statistics from the area where the students lived immediately prior to college.

Turning first to **Table 3**, we show that nearly 60 percent of students entering Tennessee's two-year colleges in 2002 or 2003 were female. Just over three-fourths of students entering two-year schools from each cohort were white, more than one-sixth were African-American and a small share represented other ethnic groups. White students were somewhat better represented among degree recipients than they were among all two-year entrants, meaning that white students were slightly more likely to go on to earn a Bachelor's degree or an Associate's degree than non-white students.

Overall, two-year college students averaged almost 21 years old when they began, and 14 percent were 25 years or older when they started. Students who ultimately earned a Bachelor's degree typically entered college slightly younger than students who earned an Associate's degree. The average age of one-term students was high, and out of all single-term non-completers who started in two-year schools, 21 percent were older than 25 when they initially enrolled.⁷

⁷ This finding may be partly the result of older students being more likely to take a specific certificate program or other type of training with no intention of earning a degree.

The typical two-year college entrant scored just over 18.5 on the ACT.⁸ Those who went on to earn a Bachelor’s degree had the highest average ACT, followed by those obtaining an Associate’s degree. Non-completers had lower ACT scores than degree recipients, on average.

We mapped each student’s pre-college address to 2000 U.S. Census records,⁹ and **Table 4** describes characteristics of the neighborhoods these students originated from. Non-completers tended to come from more racially and ethnically diverse neighborhoods with lower shares of married households and lower median incomes. Bachelor’s degree recipients came from higher-income neighborhoods than Associate’s degree recipients, although the difference was small on average. About one-half of all two-year college entrants were from neighborhoods where the median household income was less than \$36,000.

TABLE 3: First-Time Freshmen Entering Two-Year Colleges in 2002 and 2003

THEC Administrative Data	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
Male (%)	45.0	41.3	34.8	43.0	41.0
White (%)	74.8	74.4	85.5	87.8	77.9
Black (%)	21.5	21.7	10.2	7.4	18.1
Other race/ethnicity (%)	2.5	2.6	2.9	3.6	2.7
Hispanic (%)	1.2	1.3	1.4	1.2	1.3
Age as entering freshman	22.0	20.8	21.0	19.2	20.8
Older than 25 as entering freshman (%)	21.0	13.8	15.2	5.1	13.7
Composite ACT	17.4	17.8	19.3	20.1	18.5
Distance in miles between home and college*	26.6	31.8	29.6	34.2	31.2

* Where home addresses were missing, high school zip codes were used to calculate the distance between home and college.

⁸ Note that many two-year students did not have ACT records. Summary statistics are average ACT scores for students who took the test.

⁹ We thank Grant Thrall, retired Professor of Geography at the University of Florida, for matching student addresses with 2000 U.S. Census data.

TABLE 4: First-Time Freshmen Entering Two-Year Colleges in 2002 and 2003

	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
2000 Census Data Mapped to Home Addresses					
White %	77.5	79.7	86.7	88.1	81.6
Black %	19.2	17.0	10.3	8.8	15.2
Hispanic %	2.2	2.1	1.9	1.9	2.1
Foreign born (%)	2.5	2.6	2.3	2.4	2.5
Median age	36.0	36.1	36.7	36.8	36.3
Married households (%)	51.5	53.0	56.4	57.8	54.0
Rural households (%)	35.0	34.6	42.2	42.2	36.8
Owner-occupied housing unit with mortgage (%)	63.4	64.5	63.8	64.2	64.2
Moved to this housing unit since 1995 (%)	45.7	46.0	44.9	45.0	45.7
Housing unit built in 1990 or later (%)	22.6	24.2	25.7	27.4	24.7
Employed (% 16 and over)	58.0	59.2	59.7	60.3	59.2
Women in labor force (% of total population)	29.8	30.1	29.6	29.8	29.9
Median income (1000s)	35.8	37.9	38.3	40.0	38.0
Income below poverty line (%)	15.3	14.0	12.6	11.9	13.7
Low income (median income <=36,000 at home Census block group)	58.5	49.5	47.9	45.4	49.8
2000-2010 compounded per capita income growth rate	2.1	2.1	2.1	2.0	2.1
2000-2010 compounded population growth rate	0.9	1.1	1.2	1.3	1.1

* Compound growth rates were calculated using the 2000 Census and 2010 Census estimates as of July 2011.

Students Entering Four-Year Schools

Table 5 reports characteristics of students entering four-year schools and **Table 6** lists characteristics of these students' home neighborhoods. Students entering four-year schools in 2002 or 2003 were 55 percent female, slightly less than three-fourths white, about one-fifth black, and a little over one percent Hispanic. Overall, four-year students were much more likely to be male than their two-year counterparts and somewhat more likely to be nonwhite. Much like two-year college entrants, white students were somewhat better-represented among Bachelor's degree recipients.

The typical four-year college student was 19 years of age when he or she entered as a first-time freshman, with less than three percent of students being over 25 when they first entered four-year schools (compared with 13-14 percent for two-year schools). Among Bachelor's degree recipients, fewer than one percent were over the age of 25 at entry. Students averaged 22 points on the ACT exam, although there was considerable variation in students' incoming ACT scores across campuses (see the Appendix for a detailed table of average ACT scores by campus). The simple means show that Bachelor's degree recipients tended to have higher ACT scores than Associate's degree recipients, who in turn had higher ACT scores than students who failed to complete a degree. The average student entered a campus that was less than 100 miles from their home, although like ACT scores, the typical distance

from home varied widely across campuses. Those starting closer to home were more likely to attend school for only one year or less.

Census Bureau statistics listed in **Table 6** echo those of **Table 4** for two-year college entrants. Four-year entrants who ultimately completed a degree tended to come from neighborhoods with higher shares of white, married, and/or higher-income households.

Table 5: First-Time Freshmen Entering Four-Year Colleges in 2002 and 2003

	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
THEC Administrative Data					
Male (%)	48.7	48.5	39.4	42.4	45.1
White (%)	69.7	68.8	87.7	78.0	74.2
Black (%)	23.9	25.5	9.5	16.9	20.4
Other race/ethnicity (%)	4.5	4.2	2.1	3.8	4.0
Hispanic (%)	1.9	1.6	0.8	1.3	1.4
Age as entering freshman	19.5	19.0	18.6	18.5	18.8
Older than 25 as entering freshman (%)	6.0	3.5	1.6	0.8	2.3
Composite ACT	20.5	21.1	21.5	22.9	22.2
Distance in miles between home and college	56.9	76.4	71.0	95.6	84.1

* Where home addresses were missing, high school zip codes were used to calculate the distance between home and college.

TABLE 6: First-Time Freshmen Entering Four-Year Colleges in 2002 and 2003

	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
2000 Census Data Mapped to Home Addresses					
White %	78.0	78.2	85.2	82.7	80.7
Black %	18.1	17.6	11.4	13.3	15.2
Hispanic %	2.6	2.5	2.1	2.2	2.4
Foreign born (%)	3.0	3.4	2.5	3.4	3.3
Median age	35.6	35.3	36.5	35.9	35.7
Married households (%)	52.5	53.2	57.3	56.1	54.7
Rural households (%)	33.2	25.8	35.5	26.2	27.1
Owner-occupied housing unit with mortgage (%)	66.0	68.7	66.8	69.7	68.8
Moved to this housing unit since 1995 (%)	47.5	49.6	46.9	49.6	49.3
Housing unit built in 1990 or later (%)	24.7	26.6	28.3	29.1	27.7
Employed (% 16 and over)	59.1	61.2	60.7	62.5	61.6
Women in labor force (% of total population)	30.3	31.1	30.1	31.1	31.0
Median income (1000s)	38.2	42.4	42.0	46.0	43.8
Income below poverty line (%)	13.9	12.1	11.1	10.6	11.5
Low income (median income <=36,000 at home Census block group)	48.9	38.1	38.8	33.5	36.9
2000-2010 compounded per capita income growth rate	2.2	2.2	2.2	2.2	2.2
2000-2010 compounded population growth rate	1.2	1.4	1.5	1.6	1.5

* Compound growth rates were calculated using the 2000 Census and 2010 Census estimates as of July 2011.

COLLEGE PERSISTENCE, GRADUATION, AND TIME TO DEGREE

This section reports graduation and progression outcomes for students in terms of degree type, time to degree, and the duration of college for non-completers. The discussion begins with summary statistics for students entering two-year and four-year schools before turning to two questions: (1) How close were non-completers to graduation? and (2) When were students at greatest risk of dropping out?

A Summary of Two-Year Students Who Left College: Completers Versus Non-Completers

We allow for four possible completion outcomes for each two-year entrant: graduate with an Associate's degree, transfer to a four-year school and earn a Bachelor's degree, fail to graduate or transfer to a four-year school, or finally, transfer to a four-year school but fail to graduate.¹⁰ **Figure 1** illustrates the likelihood of each completion outcome by two-year campus. Note that the percentage shares sum to 100 for each campus and that degree outcomes are measured as each student's highest degree. All students are evaluated relative to the school where they began and not the school from which they ultimately graduated or withdrew. Completion outcomes are summarized in the left bar for

¹⁰ A total of 793 (3.2%) from the 2002 cohort and 689 (2.8%) from the 2003 cohort received both an Associate's and a Bachelor's degree. Also, some students earned an Associate's degree and transferred to a four-year school but did not obtain a Bachelor's degree. These students are treated as Associate's degree graduates and not as transfers to four-year schools.

each campus, and non-completion outcomes are summarized in the right bar. Looking across campus, we find that Columbia State had the highest share of first-time freshmen go on to earn an Associate's or Bachelor's degree, followed by Motlow State, Roane State, and Pellissippi State. Schools with higher rates of non-completers tended to be found in Chattanooga, Nashville, and Memphis metropolitan areas.

Figure 1 demonstrates that 15 percent of the students entering two-year schools ultimately earned an Associate's degree as their *highest* credential. **Table 7** disaggregates this statistic by cohort and time to degree completion. We find that a little over 4 percent of two-year students obtained an Associate's degree within 100 percent of expectations (two years) and 15 percent received an Associate's within four years. It is worth noting that although a low share of two-year students finished "on time," a meaningful share of two-year students became college completers after 200% of the normal time to degree completion had passed. Overall, 16 percent of the 2002 cohort received an Associate's degree by the spring semester of 2010 (400% of normal time) and we expect the share of degree recipients within these cohorts to continue growing. Furthermore, about 3 percent of each cohort earned an Associate's *and* Bachelor's degree, although **Table 7** just summarizes the time it took to earn their highest degree.

A number of students began at two-year schools and subsequently transferred to four-year schools (including dual degree recipients).¹¹ As illustrated in the rightmost bars of **Figure 1**, 22 percent of two-year entrants transferred at some point to a four-year school (9.1percent+12.8 percent), and of these, more than half ultimately graduated with a Bachelor's degree. The **Table 7** summary of time to degree receipt indicates that just 2 percent of transfer students completed a Bachelor's within 100% of normal time, increasing to 10-13 percent within 150-200% of normal time.

A Summary of Four-Year Students Who Left College: Completers Versus Non-Completers

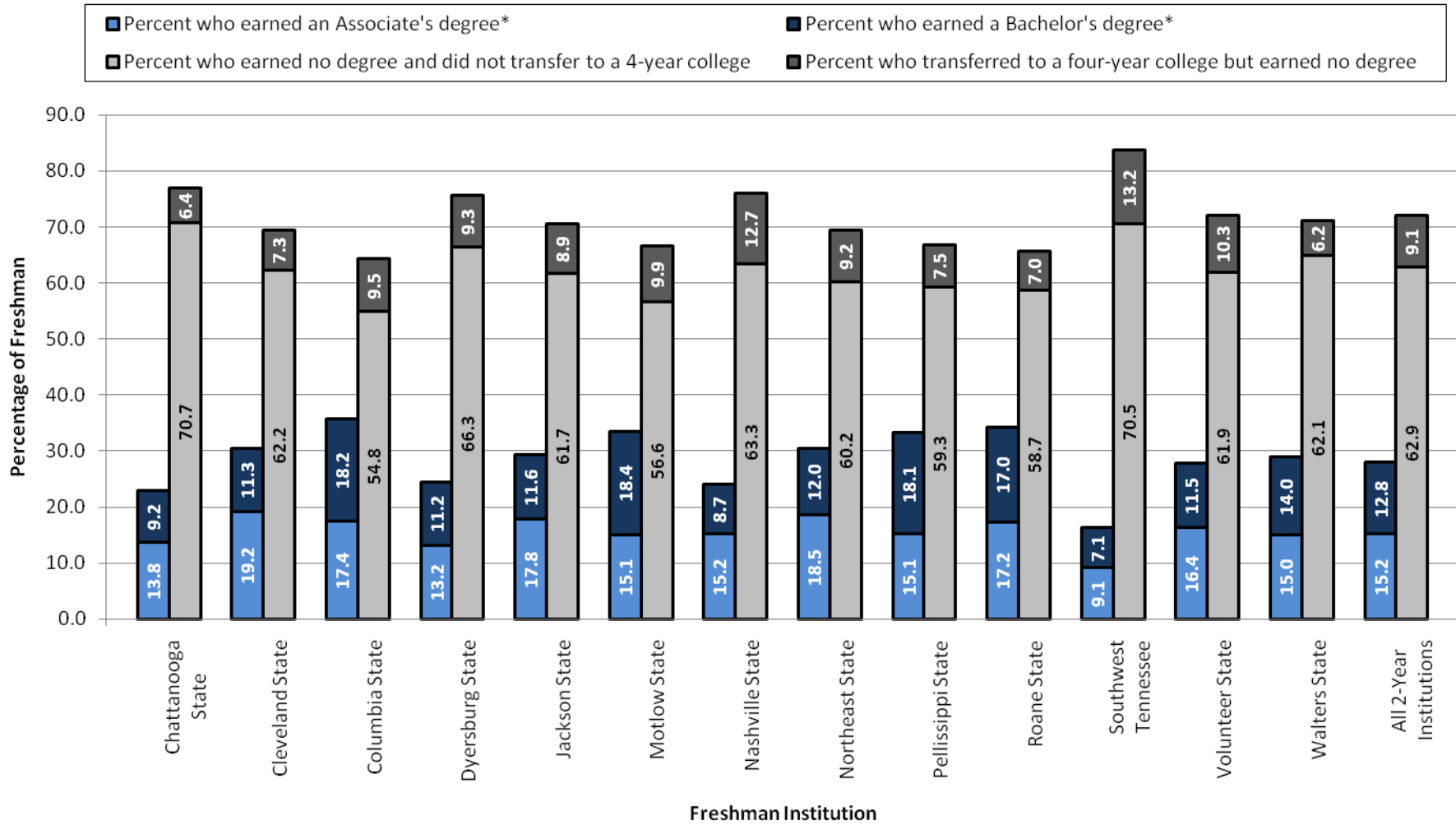
This subsection summarizes the completion and non-completion outcomes of students who entered four-year schools in 2002 or 2003. We consider three possible outcomes: graduate with a Bachelor's degree, graduate with an Associate's degree (a relatively rare event), or fail to obtain either degree by the Spring of 2010, 175-200% of the expected time needed for a Bachelor's degree. **Figure 2** illustrates the share each outcome represents, by campus and for the state total. All students are evaluated relative to the school where they began and not the school from which they ultimately graduated, so the graduation rates are the total for the incoming freshman classes of 2002-2003. We often focus the comparisons on students who graduate, either from their initial school of enrollment or from any other school, compared with those who fail to complete any degree, whether they transferred or not. Again, the left hand bars for an institution illustrate graduation percentages and the right hand bars for an institution show those who did not graduate. UT Knoxville had the highest share of students go on to earn a degree (68 percent), followed by several institutions with 50-60 percent graduation rates. Overall, 53 percent of students entering a four-year school went on to earn a Bachelor's degree and 2 percent earned an Associate's degree.

¹¹ Note again that these students are not included in the data on graduates from four-year schools, because all statistics are based on students' first campus of enrollment.

The share of degree completers grew with the number of years since beginning school. Four-year degree completers were largely finished with college around six years after initial enrollment, or 150% of the normal time to degree receipt. We find that 48 percent of the 2002 cohort of four-year students obtained a Bachelor's degree by this time, while 53 percent were finished by the spring semester of 2010, 200% of the normal time to degree.¹² On average about 47 percent of all entering students graduated from the campus where they began and about 5.5 percent transferred and graduated from another public four-year school.

¹² Note that comparisons across the cohorts are difficult to make because 2002 students have one more year to graduate since beginning higher education.

FIGURE 1: Degree and Transfer Outcomes for Two-Year College Entrants in 2002 and 2003, by Institution (Through Spring 2010)



*Highest degree earned

FIGURE 2: Degree Outcomes for Four-Year College Entrants in 2002 and 2003, by Institution

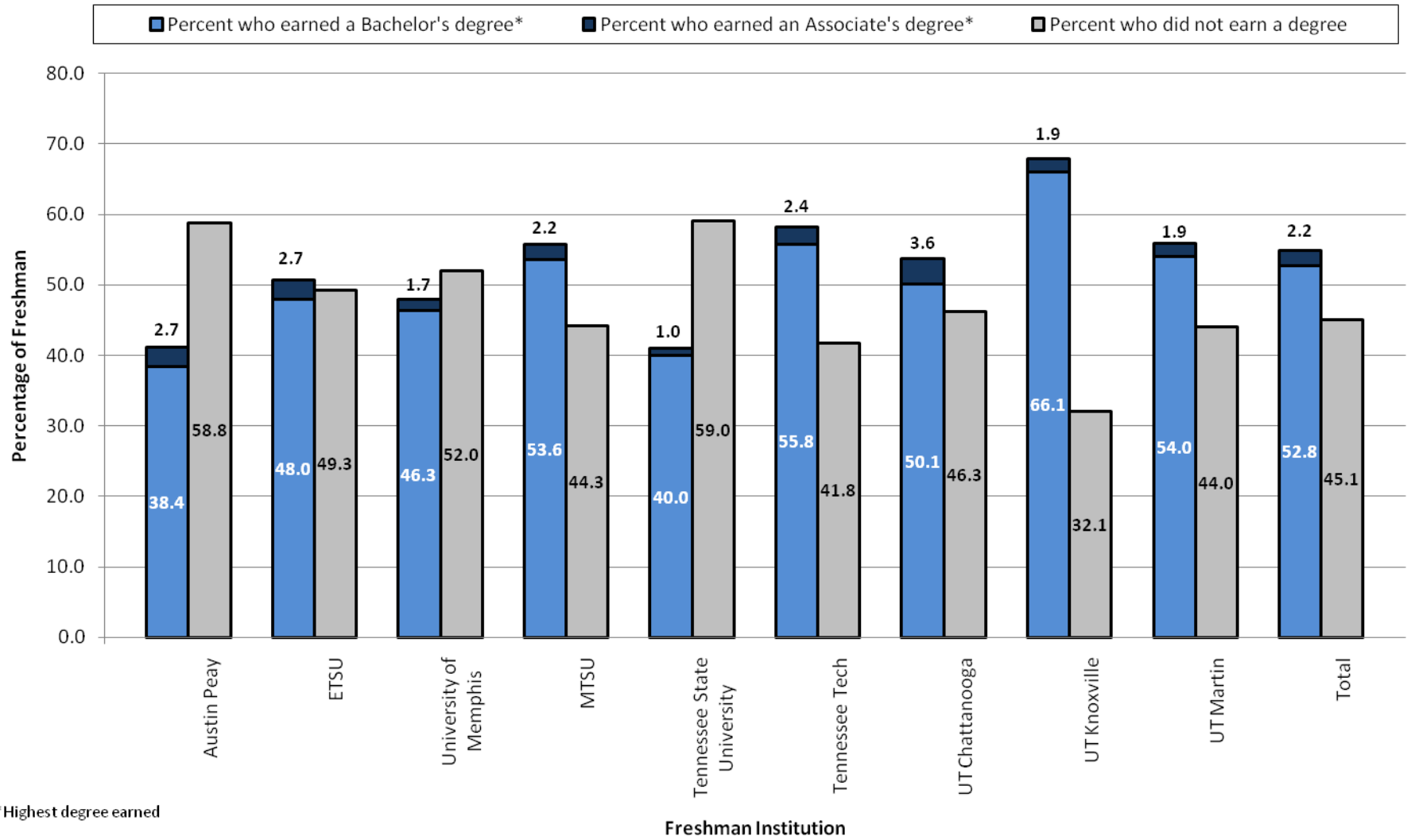


TABLE 7: Time to Highest Degree Completion for First-Time Freshmen

	Two-Year Schools		Four-Year Schools		All Entering Freshman	
	2002	2003	2002	2003	2002	2003
Associate's obtained in ...						
100% time (%)	4.3	4.1	0.1	0.0	1.8	1.8
150% time (%)	11.5	11.2	0.7	0.4	5.1	5.1
200% time (%)	15.9	15.2	1.2	1.1	7.2	7.1
by Spring 2010 (%)	16.0	14.3	2.3	2.1	7.8	7.3
Bachelor's obtained in ...						
100% time (%)	2.1	2.2	19.2	20.1	12.2	12.4
150% time (%)	10.2	10.7	48.1	49.3	32.7	32.8
175% time (%)	13.4	12.3	53.3	52.2	37.1	35.1

For bachelor's degrees, Spring 2010 is 200% time for the 2002 cohort and 175% time for the 2003 cohort.
 For associate's degree, Spring 2010 is 400% time for the 2002 cohort and 350% time for the 2003 cohort.
 Students who obtained both degrees are included in the statistics for both associate's and bachelor's degrees.
 Percentages are cumulatives within degree.

HOW CLOSE WERE NON-COMPLETERS TO GRADUATION?

Given the high share of students who left college without a degree, the question of how close they came to graduation arises. Although we do not assess student progress through detailed degree requirements, we can readily observe how non-completers compared to degree recipients in terms of credits earned and semesters enrolled. This section focuses on four-year college entrants, but qualitative persistence patterns (summarized in **Table 8A**) are similar for two-year college entrants.

Figure 3 illustrates the number of cumulative college credits earned by single-term non-completers (who persisted no more than one academic year, 25% of the normal time to a Bachelor's), multi-term non-completers (who persisted at least 25% of normal time), and Bachelor's degree recipients. Obviously, students who left college after no more than one academic year were quite far from graduation, earning a small share of the credits earned by degree recipients. On average, we find that extended non-completers earned 40 – 43 percent fewer credits than degree recipients, which indicates that non-completers were relatively far behind graduates in terms of college persistence. But with 89 – 92 cumulative credits, extended non-completers were not far from the 120-credit benchmark that colleges typically require for Bachelor's degree receipt. **Table 8B** expresses these same statistics in tabular form.

Figure 4 illustrates the total number of fall and spring semesters students attended, by degree status. Extended non-completers enrolled for seven semesters, on average, which is just one semester shy of 100% of the normal time to degree. By that measure, non-completers exhibited lengthy college persistence. But Bachelor's degree recipients tended to enroll for 10 – 11 semesters (about 150% of normal time). So if graduates are a reliable indication of how long it *usually* takes to earn a degree, extended non-completers typically persisted for about two-thirds as long as they needed to.

FIGURE 3: Extended Noncompleters Earned 40 - 43 Percent Fewer Credits Than Bachelor's Degree Recipients

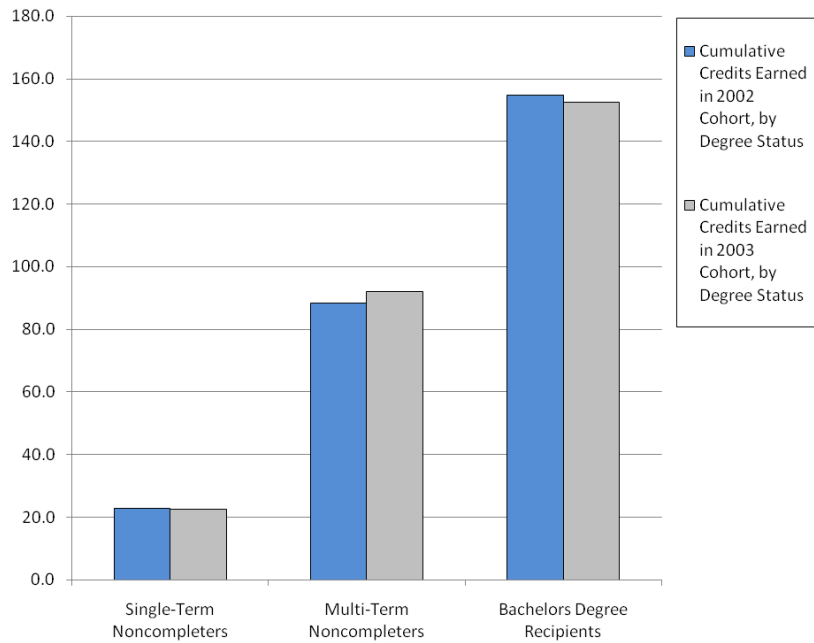


FIGURE 4: Extended Noncompleters Enrolled for 32 - 33 Percent Fewer Semesters Than Bachelor's Degree Recipients

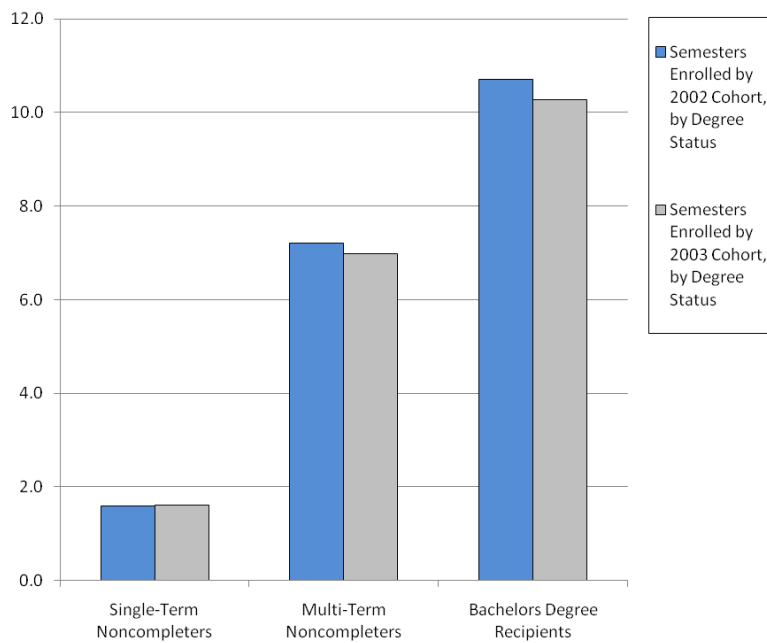


TABLE 8A: First-Time Freshmen Entering Public Two-Year Colleges in 2002 and 2003

Outcomes	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
Cumulative credits	13.8	58.0	103.1	149.7	71.3
Semesters enrolled	1.0	5.0	8.4	10.9	5.8
Transferred to four-year institution	--	16.4	26.2	97.1	26.3

TABLE 8B: First-Time Freshmen Entering Public Four-Year Colleges in 2002 and 2003

Outcomes	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
Cumulative credits	22.7	90.3	120.2	153.8	116.6
Semesters enrolled	1.6	7.1	10.0	10.5	8.3

WHEN WERE STUDENTS AT GREATEST RISK OF DROPPING OUT?

So far, we have considered two types of non-completers separately: those who leave college at or before 25 percent of normal time (“single-term non-completers”) and those who persist longer (“multi-term non-completers”). We have profiled non-completers in terms of their ACT aptitude, demographics, and home neighborhoods, and for multi-term non-completers in four-year schools, we have shown that they persist about two-thirds as long as degree recipients, on average. Now, we combine single-term and multi-term non-completers and ask a more general question of them all: when are students most likely to leave college?

We find that college students are much more likely to leave following their first or second term enrolled. **Figure 5** illustrates this pattern for four-year college students. Among all non-completers who started in four-year schools, one-fifth left college after just one term and did not return in the window of time we consider. **Figure 5** also illustrates an interesting cycle: four-year non-completers are rarely *last* observed in a summer term. They are more likely to leave college following a spring or fall term. After the initial term in college, the likelihood of dropping out trends gradually downward as students persist longer and longer in college.

Figure 6 repeats this exercise for two-year enrollees who left college without a degree and without transferring to a four-year institution. We see three patterns that parallel the dropout behavior of four-year college students. First, we find that about 20 percent of two-year non-completers leave college following their first term. And again, we see a distinct cyclicity in dropout behavior, as the propensity to leave college is very low following summer terms but significantly higher following fall or spring terms. Lastly, we show that the risk of leaving college trends gradually downward as students persist longer.

Finally, **Figure 7** examines the dropout behavior of students who started in a two-year community college and later transferred to a four-year school. Since these students transfer at many different points in their college career, we focus on the number of terms they persist *after* transferring and enrolling in a four-year college. Clearly, the most dangerous time for these students is their first term in a four-year institution. We find that 22.5 percent of transfer students who ultimately left college without a degree dropped out following their first term as a four-year student. Subsequently, the likelihood of dropping out declined steeply for these transfer students.

FIGURE 5: Four-Year Students are at Highest Risk of Leaving College in Their First Term

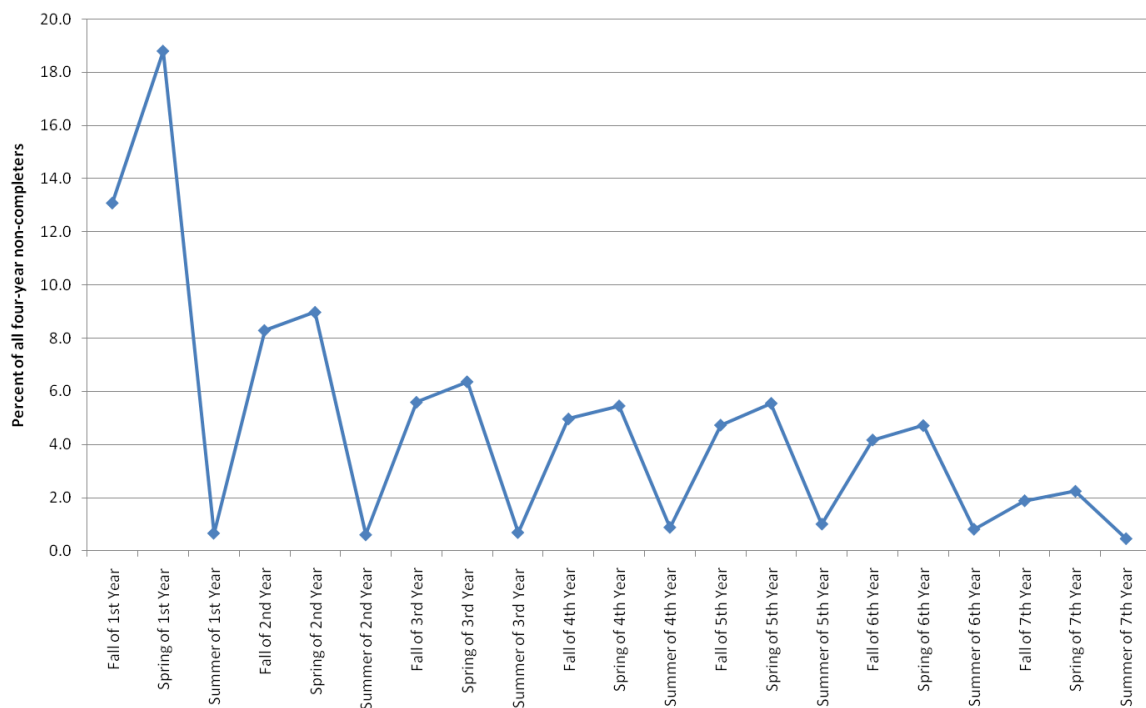


FIGURE 6: Two-Year Students are at Highest Risk of Leaving College in Their First and Second Terms

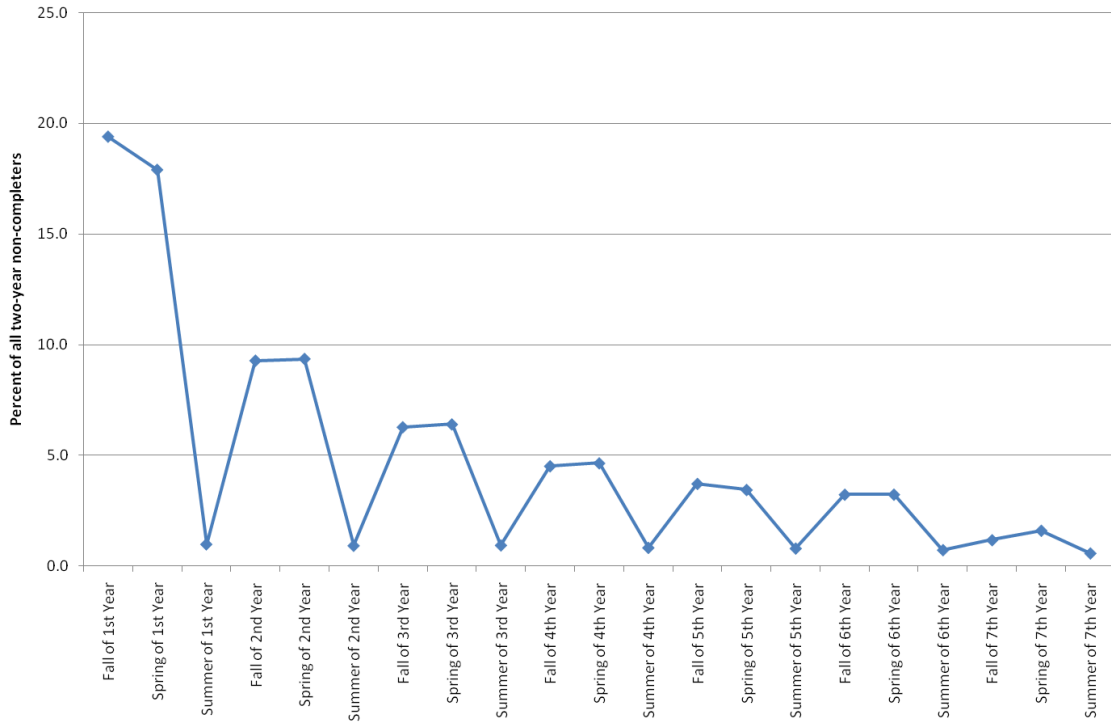
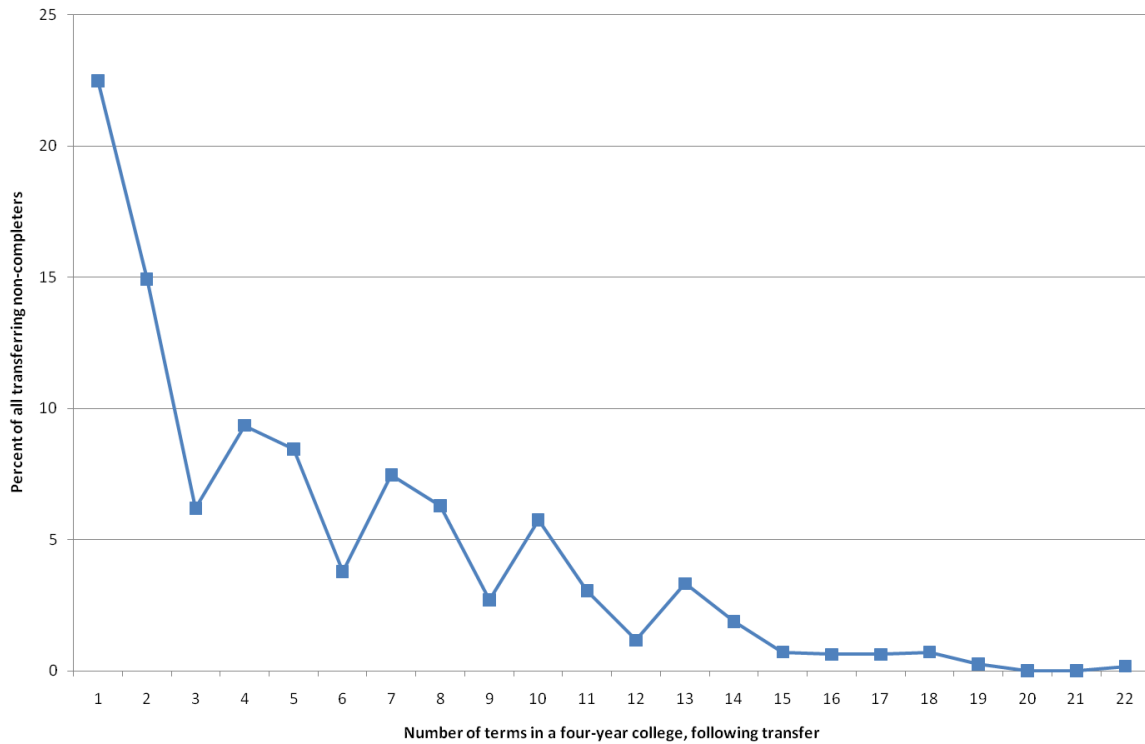


FIGURE 7: Community College Transfers are Most Likely to Leave College after Their First Term in a Four-Year School



EMPLOYMENT IN TENNESSEE

We use quarterly earnings data from the Tennessee Department of Labor and Workforce Development to characterize the employment and earnings of 2002 and 2003 first-time-freshmen, seven to eight years *after* entering college and one or more years *after* leaving college, with or without a degree. Earnings data are available for all workers covered by the Tennessee Unemployment Insurance system, who account for about 89 percent of workers in the state.¹³ In this section, we limit our focus to students who were evidently out of college by January 1, 2009 for the 2002 cohort or January 1, 2010 for the 2003 cohort so that we may assess their post-college employment outcomes for the years 2009-2010. We analyze 2009-2010 earnings for students who entered college in 2002, and we analyze 2010 earnings for students who entered college in 2003. Employment outcomes are discussed separately for those who began in two-year schools and those who began in four-year schools. We pay particular attention to the difference in employment and earnings between students who left college with versus without a degree.

Post-College Employment of those Who Entered Two-Year Schools

Employment is examined seven to eight years after beginning school to allow sufficient time for many students who will receive a two-year degree to do so and still permit a brief window to see work experience. **Table 9** reports the percentage employed in Tennessee by completion and non-completion category, and **Figures 8** and **9** summarize these statistics visually. Two salient conclusions emerge. First, two-year students who completed a degree were more likely to have Tennessee earnings seven years after entering college. And second, the effects of the 2007-2009 recession and its aftermath are evident in significantly lower labor force participation for the 2003 cohort. Compared to students who entered college just one year earlier, members of the 2003 cohort were much less likely to have Tennessee wages seven years after starting college. Overall, 71 percent of the 2002 cohort had Tennessee earnings seven years after starting college, versus 61 percent of the 2003 cohort.

Table 9 and **Figure 9** summarize inflation-adjusted earnings seven years after starting college, by cohort and degree status. Again, we see lower wages for the later cohort and we also find that degree completers had much stronger employment outcomes, earning close to \$10,000 more than noncompleters. We expect the annual returns to education to increase for these students as time goes on (consistent with traditional age-earnings profiles) and more data become available. Interestingly, students who began at two-year schools and earned an Associate's degree had inflation-adjusted higher earnings several years after starting college than those who earned a Bachelor's degree. It is highly likely that some of those receiving Associate's degrees were already employed when they went to school and thus had already moved up along the lifetime age-earnings profile prior to receipt of the degree.

Even though students were out of college at the time these wages were earned, they may have been working part-time, or they may have spent part of the year looking for work. These realities will overstate the effective employment rate and understate average earnings. Accordingly, we hone our focus to consider students who likely had full-time fourth-quarter earnings seven years after starting

¹³ Exceptions include self-employed persons and personnel in some federal or agricultural occupations.

college. We define the fulltime earnings threshold to be what a person would earn at the minimum wage if he or she worked fulltime throughout the fourth quarter.¹⁴ Of course, what we refer to as the fulltime analysis will include some people working part-time at a wage above the minimum, but the data do not permit us to make any finer adjustment for whether people working less than fulltime. Notice that the fulltime employment data are one component of the overall employment data, so these two measures are not fully independent. **Table 9** shows that 48 percent of the 2002 and 2003 cohorts met this condition (closer to 60 percent for degree recipients). As with employment overall, we find that degree completers with full-time earnings earned more than non-completers, although the gap in annualized fourth-quarter earnings was somewhat smaller than the gap in overall earnings (about \$6,000 versus \$10,000).

TABLE 9: First-Time Freshmen Entering Public Two-Year Colleges in 2002 and 2003

	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
Outcomes					
Employed in TN in 2009 (% of 2002 cohort)	56.3	69.6	80.5	81.4	70.7
Wages in TN in 2009 (in thousands, 2002 cohort)	18.8	21.3	30.1	29.2	23.5
Employed in TN in 2010 (% of 2003 cohort)	60.6	59.8	62.4	66.0	61.0
Wages in TN in 2010 (in thousands, 2003 cohort)	18.1	19.7	28.2	26.5	21.7
Full-time employed in TN in 2009 quarter (% of 2002 cohort)	33.7	44.8	61.5	58.5	48.1
Full-time wages in TN in 2009 quarter 4 (in annualized thousands, 2002 cohort)	31.0	31.4	36.9	36.9	33.4
Full-time employed in TN in 2010 quarter 4 (% of 2003 cohort)	34.2	41.3	57.1	58.7	44.7
Full-time wages in TN in 2010 quarter 4 (in annualized thousands, 2003 cohort)	31.0	30.9	37.5	36.5	33.0

All wage data are reported in 2010 dollars.

2009 wage data are limited to members of the 2002 cohort who left college (either with or without a degree) prior to January 1, 2009.

2010 wage data are limited to 2003 entrants who left college prior to January 1, 2010.

Full-time wage data are the annualized quarterly earnings for people who have a least a 40-hour per week minimum wage earnings based on the number of working days during that quarter and the federal minimum wage.

¹⁴ We base fulltime employment on the fourth quarter alone. Workers had to earn \$3712 in the fourth quarter of 2009 to be considered full time that year and had to earn \$3828 in the fourth quarter of 2010 to be full time that year.

FIGURE 8: Degree Completers are More Likely to be Working in Tennessee Seven Years after Entering a Community College

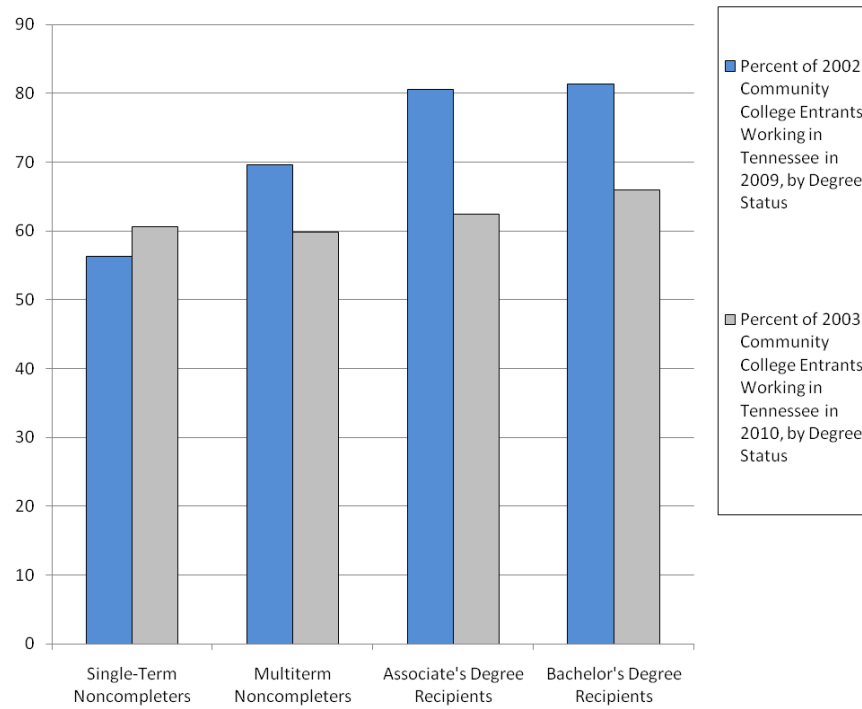
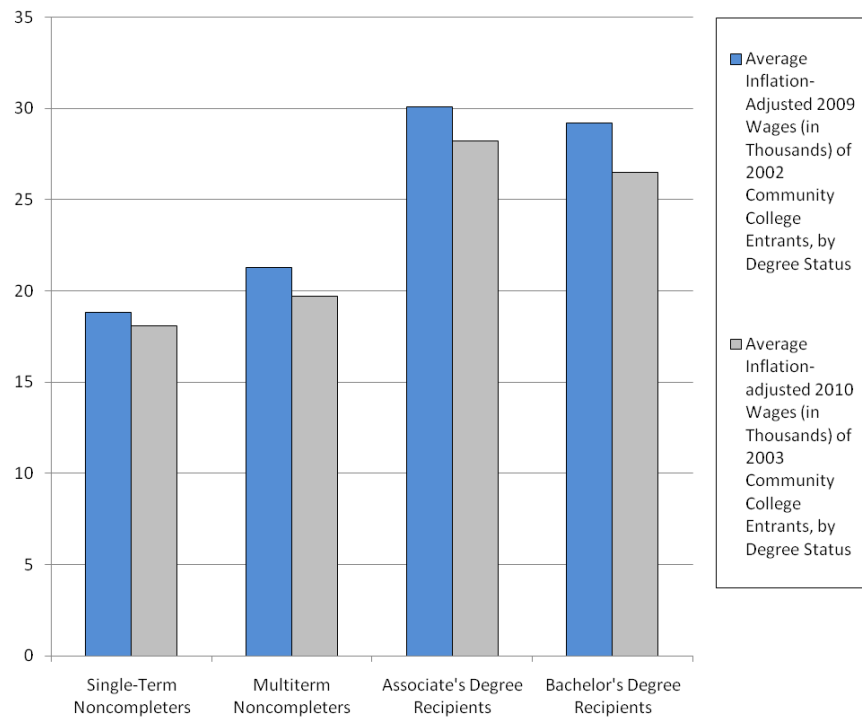


FIGURE 9: Degree Completers Earn Higher Wages Seven Years after Entering a Community College



College Persistence and Post-College Employment of those Who Entered Four-Year Schools

Table 10 and **Figure 10** describe the employment participation rates of four-year college students seven years after they initially enrolled. Echoing our findings for two-year enrollees, degree recipients were much more likely to be working than non-completers, and the later cohort had lower labor force participation rates regardless of degree completion. We show that overall, 63 percent of the 2002 cohort was working seven years after starting college, but this average masks a large gap between degree recipients (71-79 percent were working) and non-completers (37-63 percent). Even though single-term non-completers presumably had many more years to accumulate working experience, they were least likely to be found working in Tennessee, and if they were working, they earned about as much as extended non-completers who left college later. **Figure 11** plots average inflation-adjusted earnings for 2002 and 2003 four-year college entrants, by degree status and cohort. Once again, we find that degree recipients earned about \$10,000 more than non-completers. As with two-year college students, we find that Associate’s degree recipients earned slightly more than Bachelor’s degree recipients seven years after starting college. For instance, four-year enrollees in the 2003 cohort whose highest degree was ultimately an Associate’s degree drew about \$32,000 in wages in 2010, versus \$28,000 for their peers who earned Bachelor’s degrees. But this gap may have been driven by four-year graduates who spent part of 2010 looking for work. When we limit our focus to annualized, full-time, fourth-quarter earnings, we find that Bachelor’s degree recipients earned \$39,400 on average, versus \$38,500 for Associate’s degree recipients. Statistical analyses in the following section attribute an even larger difference in fulltime earnings, again favoring Bachelor’s degree recipients.

TABLE 10: First-Time Freshmen Entering Public Four-Year Colleges in 2002 and 2003

	Non-Completers		Completers		Total
	Single-Term	Multi-Term	Associates	Bachelors	
Outcomes					
Employed in TN in 2009 (% of 2002 cohort)	37.2	63.2	79.1	70.5	63.4
Wages in TN in 2009 (in thousands, 2002 cohort)	21.4	21.9	30.7	31.1	27.3
Employed in TN in 2010 (% of 2003 cohort)	38.4	50.7	55.7	56.7	52.4
Wages in TN in 2010 (in thousands, 2003 cohort)	20.1	20.1	32.1	28.4	25.1
Full-time employed in TN in 2009 quarter (% of 2002 cohort)	23.4	41.5	52.5	52.2	45.6
Full-time wages in TN in 2009 quarter 4 (in annualized thousands, 2002 cohort)	32.0	32.4	37.2	39.7	37.0
Full-time employed in TN in 2010 quarter 4 (% of 2003 cohort)	22.8	38.9	62.3	49.9	43.1
Full-time wages in TN in 2010 quarter 4 (in annualized thousands, 2003 cohort)	32.0	31.5	38.5	39.4	36.5

All wage data are reported in 2010 dollars.

2009 wage data are limited to members of the 2002 cohort who left college (either with or without a degree) prior to January 1, 2009.

2010 wage data are limited to 2003 entrants who left college prior to January 1, 2010.

Full-time wage data are the annualized quarterly earnings for people who have a least a 40-hour per week minimum wage earnings based on the number of working days during that quarter and the federal minimum wage.

FIGURE 10: Degree Completers are More Likely to be Working in Tennessee Seven Years after Entering a Four-Year College or University

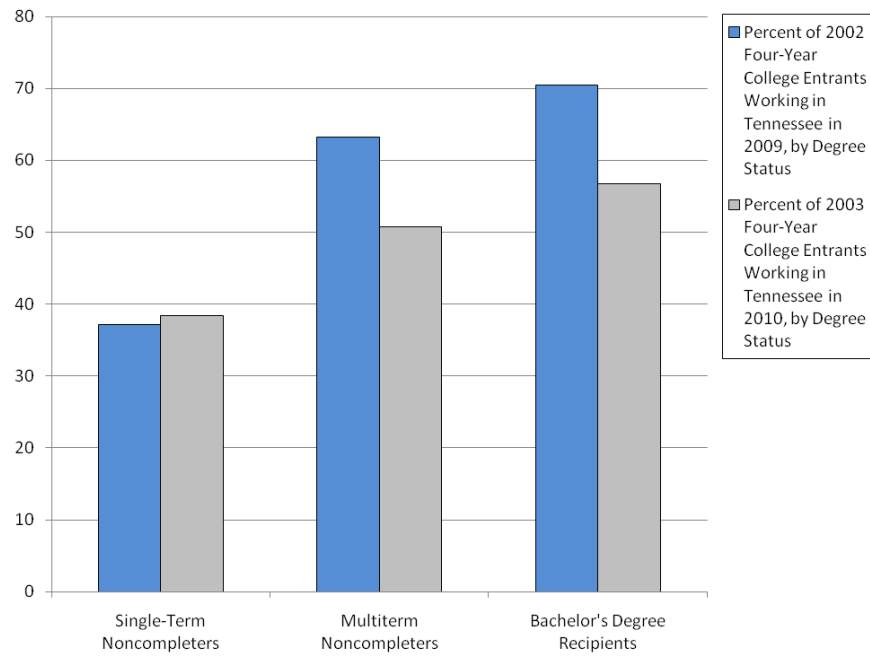
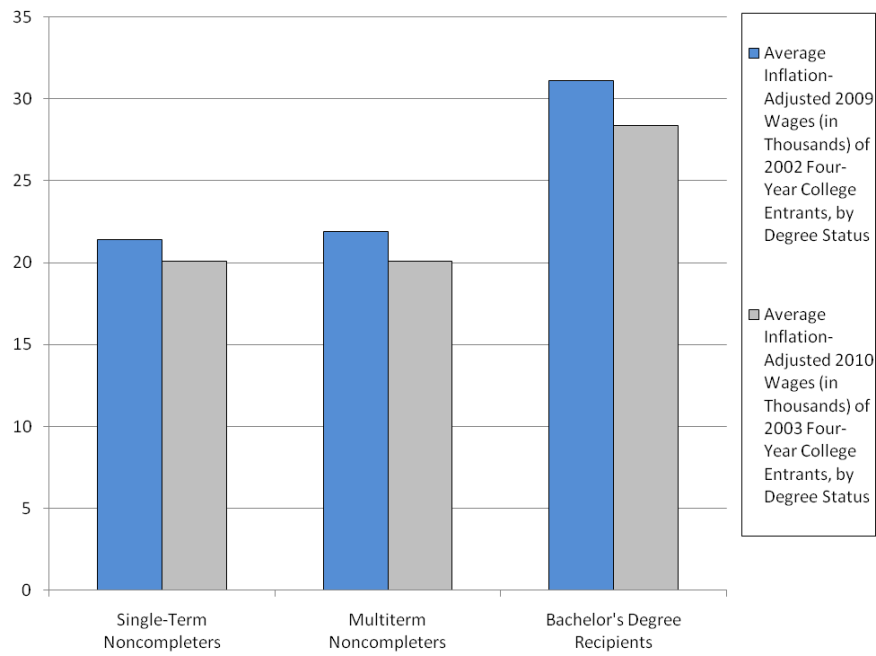


FIGURE 11: Degree Completers Earn Higher Wages Seven Years after Entering a Four-Year College or University



POST-COLLEGE EMPLOYMENT AND THE RETURNS TO COLLEGE COMPLETION AND PERSISTENCE

Figures 9 and 11 indicate that multi-term non-completers earn more – but not remarkably more – than single-term non-completers seven years after starting college. Does this mean that without a degree, students would be nearly as well off out of college and in the workforce? For some students, this is undoubtedly true, but before applying this conclusion to *all* students who fail to earn a degree, two caveats must be emphasized. First, the earnings we examine offer a very short-sighted view of labor market success, because with an eight-year panel of data, we can only observe these former students working for a few years after they leave college. As time moves on, the earnings gap between single-term non-completers and multi-term non-completers may grow. And second, our descriptive analysis thus far only permits one student characteristic at a time, such as gender, ACT scores, or persistence through college to be related to outcome measures like employment and wages. But many factors influence outcomes and these factors are often correlated and interdependent, so multivariate analysis must be used to decompose the contribution of different student characteristics to education outcomes like degree completion as well as the contribution of degree completion itself to employment outcomes. We employ regression analysis in this section to hold constant each factor and determine the independent effect of each variable on education and employment outcomes.

First, we report the estimated effect of higher education on earnings when all students are analyzed together (**Table 11**), which allows us to estimate the wage gap between two-year and four-year students and between completers and non-completers. Results indicate that degree recipients earned significantly more than non-completers, but also that single-term non-completers earned less than non-completers who stayed longer in college. Next, we examine whether earning a degree faster yields higher earnings (**Table 12**). Having established the earnings gap between completers and non-completers, a second analysis focuses on non-completers and estimates the relationship between college *persistence* (that is, the duration of enrollment) and Tennessee earnings, separately for two-year entrants, two-year transfer students, and four-year entrants (**Tables 13-15**). Results show that non-completers earned more after college for each additional semester they spent in college. Finally, we examine the relationship between observable student characteristics and the propensity to complete a degree or transfer from a two-year to a four-year college (**Table 16**). Results show that students with higher ACT scores were more likely to graduate, and if they started at a two-year school, were more likely to transfer to a four-year school.

Do degree recipients earn more after college? Do extended non-completers earn more than single-term non-completers?

We run a series of regressions where we seek to explain the different earnings outcomes using the range of student characteristics. Specifically, we examine the relationship between Tennessee earnings 7-8 years after entering college and ACT scores, ethnic characteristics, gender, age, distance from home to the school attended, and whether students came from a low-income community. So that we may have ample time to observe employment outcomes, we limit the analysis to members of the 2002 cohort who left college (with a degree or as a non-completer) by January 1, 2009. Note that all

student characteristics are based on their values at the time of college entry (fall 2002) and all time periods are measured from the starting year of the cohort. In the discussion below we generally only discuss the relationship between student characteristics and outcomes when the regression coefficients are statistically significant.

Using the 2002 cohort data we examine the relationship between various student characteristics and earnings seven years after starting school (the 2009 calendar year) and eight years after starting school (the 2010 calendar year). The latest possible years are chosen for evaluation because the intent is to study post-education employment experiences. Though some students may still be in school, and therefore not part of this analysis, 2009 and 2010 wage data allow us to examine students at nearly 200 percent of expected time to degree for four-year entrants and 400 percent of expected time for two-year entrants. We separately examine earnings overall versus earnings from individuals who were likely working fulltime in the fourth quarter of each year. We reiterate that the analysis cannot account for students who left Tennessee to work elsewhere and only includes those who work for employers covered by the state unemployment insurance system. Wage equations focus on former students who were working in Tennessee, and no attempt is made to account for selection into the labor market.¹⁵

It is important to remember that the likelihood of being employed and the wages earned are functions of both sides of the labor market. Characteristics of students and their achievements may affect their choices of majors and whether and where (in or out of Tennessee) they wish to work. These same characteristics may influence employers' willingness to hire people and the wages they will be paid based on expectations of worker productivity.

Table 11 provides the estimated relationships between student characteristics and 2009-2010 earnings. A number of demographic and education traits influence the market wages. Males and white individuals tended to earn higher wages 7-8 years after starting college, which is consistent with economy-wide patterns. This may reflect the mix of areas of study in addition to other factors. Wages tended to be greater for those with higher ACT scores, suggesting that the market places higher value (at least initially) on workers who were good students before college. Overall wages did not appear to be influenced by age of the students, although older students earned more if he or she worked fulltime. Wages were somewhat higher for those who went farther away for school, but the effects were modest. This is consistent with human capital models of investments in education where some individuals are willing to move further distances in pursuit of better earnings opportunities.

Following the results for students' pre-college characteristics, **Table 11** illustrates the estimated relationship between college persistence (here, represented by the number of full semesters during which students attempted credit hours) and subsequent earnings. We find that each additional

¹⁵ Extended analyses indicate that the propensity to have *any* Tennessee earnings was greater for females, white individuals, students with lower ACT scores, students who went to college closer to home, two-year college students, students who completed at least 25% of the normal time to a degree, and students who ultimately earned a degree. Part of these tendencies can be explained by the benefits of education (i.e., the fact that degree recipients were more likely to be working after college), but part can be explained by selection out of Tennessee, out of UI-covered employment, and/or out of the labor market altogether.

semester was associated with lower 2009 earnings, but this may have been driven by students who completed or left college later and earned lower wages while they searched for work. There is no significant relationship between semesters enrolled and fulltime 2009 earnings or either type of 2010 earnings, controlling for student characteristics and degree receipt. Students who enrolled part-time, on average, earned substantially more than fulltime students 7-8 years after college, but this was likely due to their stronger connections to the workforce while enrolled. It is highly possible that some of these part-time students were working and moving along the age-earnings profile, ahead of their counterparts who were not employed during or before college. It remains to be seen in future research if former part-time students continued to earn more than their fulltime student peers many years after college. Early evidence suggests this was not the case: the earnings premium for being a part-time student declined 32-39% between 2009 and 2010.

The last three variables listed in **Table 11** are mutually exclusive indicators for how each student left college: as a single-term non-completer, an Associate's degree recipient, or a Bachelor's degree recipient. Since the indicator for multi-term non-completers is excluded, coefficients are estimated earnings *relative to* multi-term non-completers, controlling for other variables listed in **Table 11**. Students who obtained very limited education (single-term non-completers) earned significantly lower wages than multi-term non-completers, even though single-term students had more time after college to accumulate human capital. This may simply reflect a lower attachment to the labor force for students who dabbled with the college experience. Associate's degree recipients earned more than multi-term non-completers and single-term non-completers. Bachelor's and Associate's degree recipients had similar overall earnings, but when we focus on fulltime workers, annualized fourth-quarter earnings are higher for Bachelor's degree holders.

Descriptive statistics illustrated by **Figures 9** and **11** show that degree recipients earned about \$10,000 more in 2009 than non-completers. After accounting for the relationship between earnings and student demographics, pre-college aptitude, college persistence, and part-time student status, regression analysis reduces that premium to about \$9,400. 2010 earnings (which were more affected by the recession) reflected about a \$8,600 – 8,800 premium for degree holders, controlling for student characteristics and college persistence. The fulltime earnings gap between workers with and without a degree was somewhat smaller: \$6,800 – 8,100, depending on the year earnings were measured and the type of degree earned. In general, Bachelor's degree holders earned more than Associate's degree holders, although this was more true of fulltime workers than workers overall.

TABLE 11: Regression Analysis for 2002 Entrants

	Dependent Variables			
	Wages 2009 (thousands)	Wages Fulltime 2009 (thousands)	Wages 2010 (thousands)	Wages Fulltime 2010 (thousands)
Male	2.5561*** (8.20)	4.5232*** (9.95)	4.4172*** (13.26)	5.4653*** (10.59)
White	2.2004*** (6.07)	1.9729*** (4.73)	2.5110*** (6.56)	2.4986*** (5.26)
Age as entering freshman	-0.0159 (0.21)	0.0549 (0.65)	-0.052 (0.68)	0.0696 (0.70)
Older than 25 as entering freshman	1.8516 (1.64)	2.2847* (1.71)	1.5806 (1.38)	2.3869* (1.70)
Composite ACT	0.2117*** (3.95)	0.3344*** (5.61)	0.1735*** (3.12)	0.2719*** (4.11)
Low income (median income <=36,000 at home Census block group)	-1.1611*** (3.64)	-0.6478 (1.16)	-0.9494*** (2.82)	-1.0181* (1.72)
Distance in miles between home and college	0.0031 (1.57)	0.0080*** (3.24)	0.0051** (2.41)	0.0115*** (3.61)
Semesters enrolled	-0.2024*** (2.79)	-0.1292 (1.28)	0.0956 (1.25)	-0.008 (0.07)
Part-time student (enrolled <=9 hours per term)	2.8284*** (4.30)	4.0068*** (4.90)	1.9440*** (2.93)	2.7581*** (3.49)
First time freshman in community college	-0.5631 (1.31)	-0.4901 (1.00)	-0.5823 (1.32)	-1.8126*** (3.27)
Transferred from community college to four-year school	-0.2308 (0.40)	-0.2196 (0.34)	-0.2868 (0.48)	-0.0674 (0.10)
Single-term non-completer	-2.5185*** (4.18)	-1.5904** (2.52)	-2.0861*** (3.69)	-1.3060* (1.81)
Completed Associate's degree	9.4268*** (16.24)	6.8372*** (10.23)	8.8170*** (14.21)	6.6936*** (9.72)
Completed Bachelor's degree	9.4323*** (19.25)	7.9724*** (10.90)	8.5705*** (16.09)	8.1074*** (9.75)
N	18,208	12,103	18,208	8,786

* p<.05; **p<.01; ***p<.001

The sample for these regressions are all 2002 entrants who left school (with degree or not) by Jan 1, 2009.

Transfer to a four-year school is defined as entering a two-year school as a first time freshman and last enrolled or received degree at a four-year school.

Wages are calendar year wages from quarterly data from the Tennessee Department of Labor and Workforce Development unemployment insurance records.

Full-time employment is defined as receiving at least full-time minimum wages for the fourth quarter of the calendar year. The full-time quarterly wages are annualized.

The median ACT for the student's institution was used in place of missing ACT scores.

The zip code for the high school was used if the home address was missing.

t-statistics from robust standard errors are in parenthesis.

The Returns to Timely Degree Receipt for Completers

The regression analysis reported in **Table 11** returned the average earnings differential between multi-term non-completers and Associate's degree recipients, and between multi-term non-completers and Bachelor's degree recipients. We extend this analysis by testing whether there are returns to the speed at which these degrees are earned. Specifically, we replace the variables "Completed Associate's degree" and "Completed Bachelor's degree" with a mutually exclusive set of variables describing how fast students received an Associate's or Bachelor's degree (again, focusing on the highest degree earned). **Table 12** presents selected results. As before, all coefficients are estimated earnings gaps between the type of completer or non-completer listed in the leftmost column and multi-term non-completers, controlling for student demographics, part-time status, community college status, and other observable student characteristics.

As in **Table 11**, we show that single-term non-completers earned significantly less than multi-term non-completers overall, although their fulltime earnings were comparable. All degree recipients earned significantly more than non-completers, whether single-term or multi-term. But we see an interesting pattern for Associate's degree recipients, whereby students who took longer to earn an Associate's degree tended to earn more than students who earned the degree faster. Even though we control for the average earnings gap enjoyed by part-time enrollees in two-year schools, this pattern may still be driven by two-year students who worked while they were enrolled, leading to a promotion or other advantage in the labor market shortly after college.

With regards to Bachelor's degree receipt, the clear advantage went to students who earned the degree within four years. The gap between students who obtained a Bachelor's degree within 100% of normal time and multi-term non-completers was \$11,500 – 13,000, a premium which dominates every other category of degree receipt listed in **Table 12**. Students who earned a Bachelor's degree within six years also earned more than multi-term non-completers, but the premium was just \$5,300 – 7,200. Focusing on earnings 7-8 years after college, students who took more than six years to earn a Bachelor's degree earned about as much as students who left college without a degree, even if they were working fulltime. It bears repeated emphasis that these results reflect the wage-based labor market performance of degree recipients as of their initial entry into the Tennessee workforce, and not their longer-term earnings, earnings from self-employment or occupations not covered by Unemployment Insurance, earnings in other states, or any of the various non-pecuniary and non-wage benefits of education.

Three explanations for the premium to timely Bachelor's degree receipt are worthy of further exploration. First, students who left college one or two years later than the normal time to a degree may have found themselves with entry-level wages while faster degree recipients were already enjoying higher earnings from annual raises or promotions. That is to say, the returns to timely degree receipt may just reflect a head start in the age-earnings profile. An analysis of longer-term earnings – which is beyond the scope of this study but a topic for future research – will test if students with extended stays in college catch up to their peers who graduated earlier. Even so, **Table 12** results indicate that there is a large short-term opportunity cost to delaying graduation. Students who choose to stay in college and graduate later forgo substantial earnings in the labor market. A second explanation for the premium to

timely degree receipt is the idea that employers view extended enrollment in college as a negative signal of a student's aptitude, commitment, or efficiency at completing tasks. Recent economic research on the long-term effects of college persistence and degree completion suggests this may be true.¹⁶ By contrast, this theory suggests that college persistence can be a positive signal in the absence of a degree, which we find evidence for in the following subsection. Finally, a more subtle explanation for the premium to timely Bachelor's degree receipt is the notion that students who finish college faster are fundamentally different than students who take longer, in ways that influence later earnings and prove difficult to control for statistically. It remains to be seen if inducing a student to graduate earlier will improve his or her labor market prospects.

TABLE 12: Regression Analysis for 2002 Entrants

Completion/Non-Completion Outcome	Dependent Variables			
	Wages 2009 (thousands)	Wages Fulltime 2009 (thousands)	Wages 2010 (thousands)	Wages Fulltime 2010 (thousands)
Single-term non-completer	-1.4992** (2.47)	-0.7138 (1.16)	-1.1886** (2.08)	-0.379 (0.54)
Associate's within two years	8.0721*** (5.65)	5.1096*** (3.41)	9.0758*** (6.29)	4.8217*** (3.15)
Associate's within three years	8.2031*** (8.95)	5.8648*** (5.32)	7.6822*** (8.31)	5.3002*** (5.06)
Associate's within four years	10.8904*** (10.66)	7.3532*** (6.80)	8.8264*** (8.47)	6.4070*** (5.62)
Associate's by spring 2010	7.6432*** (7.51)	6.2434*** (5.52)	7.9475*** (6.40)	7.4203*** (6.24)
Bachelor's within four years	12.9801*** (19.85)	11.4870*** (9.60)	12.2471*** (17.07)	12.4039*** (9.08)
Bachelor's within six years	7.1821*** (13.64)	5.4719*** (8.50)	6.1475*** (10.64)	5.3376*** (6.85)
Bachelor's by spring 2010	-1.3035 (1.17)	2.3025 (1.57)	2.0374 (1.57)	2.204 (1.35)

* p<.05; **p<.01; ***p<.001

The sample for these regressions are all 2002 entrants who left school (with degree or not) by Jan 1, 2009.

Wages are calendar year wages from quarterly data from the Tennessee Department of Labor and Workforce Development unemployment insurance records.

Full-time employment is defined as receiving at least full-time minimum wages for the fourth quarter of the calendar year. The full-time quarterly wages are annualized.

t-statistics from robust standard errors are in parenthesis.

¹⁶ Flores-Lagunes, A. and A. Light, 2010. "Interpreting Degree Effects in the Returns to Education." *Journal of Human Resources* 45: 439-467.

The Returns to College Persistence for Non-completers

One finding presented in **Table 11** suggests that additional semesters in college yielded no significant increase in earnings, or even a *decrease* in earnings, conditional on the type of degree received and other student characteristics. Does this mean that non-completers would be better off leaving college and joining the workforce as soon as they conclude they will not finish college? Not necessarily. Recent research supports the idea that college persistence sends a mixed signal to employers. For degree recipients, extra time in college may be reflective of inefficient academic progress, whereas for non-completers, additional semesters can send a positive signal in the absence of a degree. In this subsection we focus on non-completers and re-estimate the earnings regressions for three types of students: non-completers who started in two-year colleges and did not transfer to four-year colleges (**Table 13**), non-completers who transferred at some point from a two-year school to a four-year school (**Table 14**), and finally, non-completers who started in a four-year college or university (**Table 15**).

We analyze wages, based on fulltime employment and total employment, seven and eight years after starting higher education. As discussed in the section above on overall employment outcomes of all students, completers have higher earnings than those who fail to complete, whether with a two-year or a four-year degree. This section focuses on the economic outcomes within each group of non-completers and does not provide further insight into the workforce outcomes of completers versus non-completers. It is important to keep in mind that since the regressions compare people from the same group in terms of graduation outcomes, the analyses are not comparisons between people with and without any college experience or between two-year and four-year graduates. Also, people who lose their job or choose not to take a job in Tennessee are omitted from the earnings analysis, at least in part because we do not know whether not having a job was a voluntary choice.

The emphasis here is on the effects of additional education (i.e., semesters enrolled) on the earnings and workforce experience of people *within* the different groups of non-completers. Effects of other student characteristics, such as ethnicity and age, can be seen in the tables, but are not discussed in this part of the text. The results generally indicate that for non-completers, employers value additional semesters enrolled in college. Additional education (that is, more semesters) undertaken by students *not* completing the two-year degree and *not* transferring to a four-year college (**Table 13**) increased their earnings by \$399 – 795 per semester. Additional semesters also increased the overall earnings of non-completers who began at two-year schools and transferred to a four-year school (**Table 14**), by \$985 per semester in 2009 and \$1,263 in 2010, but we do not detect an impact on fulltime earnings in either year. Finally, added semesters in school tended to raise the earnings for four-year non-completers by a moderately significant \$366 – 503 per semester in 2010 (**Table 15**).

TABLE13: Regression Analysis for 2002 Entrants into Two-Year Schools, Non-Completers

	Dependent Variable			
	Wages 2009 (thousands)	Wages Fulltime 2009 (thousands)	Wages 2010 (thousands)	Wages Fulltime 2010 (thousands)
Male	4.1724*** (8.64)	5.4597*** (10.2)	5.4855*** (10.92)	5.8673*** (10.09)
White	2.1381*** (3.86)	1.4990* (2.3)	2.4165*** (4.22)	2.0556** (3)
Age as entering freshman	-0.0335 (-0.34)	0.1756 (1.69)	-0.0961 (-1.02)	0.1053 (0.77)
Older than 25 as entering freshman	1.5745 (1.18)	0.4414 (0.27)	2.2174 (1.64)	0.7589 (0.45)
Composite ACT	-0.1847 (-1.61)	-0.002 (-0.01)	-0.2755* (-2.42)	-0.2704* (-2.01)
Low income (median income <=36,000 at home Census block group)	-1.3095** (-2.66)	-0.6778 (-1.2)	-1.3522** (-2.63)	-0.9343 (-1.52)
Distance in miles between home and college	0.0075 (1.26)	0.0107 (1.63)	-0.0001 (-0.02)	0.006 (0.72)
Semesters enrolled	0.6677*** (5.66)	0.3990** (3.03)	0.7945*** (6.63)	0.5130*** (3.56)
Enrolled <=9 average semester hours	1.7318* (2.28)	3.3197*** (3.71)	0.7892 (1.02)	1.5556 (1.69)
Constant	17.4446*** (6.27)	21.3927*** (6.83)	19.2099*** (6.99)	27.2229*** (7.8)
N	3,846	2,514	3,725	2,389

* p<.05; **p<.01; ***p<.001

The sample for this regression is all 2002 entrants who left school (with degree or not) by Jan 1, 2009.

Wages are calendar year wages from quarterly data from the Tennessee Department of Labor and Workforce Development unemployment insurance records.

Full-time employment is defined as receiving at least full-time minimum wages for the fourth quarter of the calendar year. The full-time quarterly wages are annualized.

The median ACT for the student's institution was used in place of missing ACT scores.

The zip code for the high school was used if the home address was missing.

t-scores are in parenthesis.

TABLE 14: Regression Analysis for 2002 Entrants into Two-Year Schools That Transferred to Four-Year School, Non-Completers

	Dependent Variable			
	Wages 2009 (thousands)	Wages Fulltime 2009 (thousands)	Wages 2010 (thousands)	Wages Fulltime 2010 (thousands)
Male	5.0842** (3.06)	4.7911* (2.38)	4.9799** (2.83)	4.8504* (2.41)
White	3.6870* (1.99)	3.3848 (1.28)	6.0085*** (3.38)	5.0385* (2.06)
Age as entering freshman	0.0208 (0.04)	0.9126 (1.3)	-0.4581 (-0.78)	0.9373 (1.06)
Older than 25 as entering freshman	6.428 (1.02)	-4.9275 (-0.66)	10.6339 (1.64)	-2.3356 (-0.25)
Composite ACT	-0.3529 (-0.98)	0.3006 (0.7)	-0.5194 (-1.54)	-0.2758 (-0.67)
Low income (median income <=36,000 at home Census block group)	-2.8728 (-1.67)	0.4163 (0.18)	-2.896 (-1.65)	2.2112 (0.99)
Distance in miles between home and college	0.0079 (0.43)	0.0217 (0.76)	-0.0057 (-0.29)	-0.007 (-0.36)
Semesters	0.9850** (2.97)	0.5645 (1.44)	1.2633*** (3.77)	0.603 (1.48)
Enrolled <=9 average semester hours	2.8827 (1.66)	4.4976* (2.06)	0.5934 (0.34)	1.4897 (0.72)
Constant	15.4621 (1.3)	-1.871 (-0.13)	24.8592 (1.91)	9.814 (0.54)
N	415	283	404	263

* p<.05; **p<.01; ***p<.001

The sample for this regression is all 2002 entrants who left school (with degree or not) by Jan 1, 2009.

Transfer to a four-year school is defined as entering a two-year school as a first time freshman and last enrolled or received degree at a four-year school.

Wages are calendar year wages from quarterly data from the Tennessee Department of Labor and Workforce Development unemployment insurance records.

Full-time employment is defined as receiving at least full-time minimum wages for the fourth quarter of the calendar year. The full-time quarterly wages are annualized.

The median ACT for the student's institution was used in place of missing ACT scores.

The zip code for the high school was used if the home address was missing.

t-scores are in parenthesis.

TABLE 15: Regression Analysis for 2002 Entrants into Four-Year Schools, Non-Completers

	Dependent Variable			
	Wages 2009 (thousands)	Wages Fulltime 2009 (thousands)	Wages 2010 (thousands)	Wages Fulltime 2010 (thousands)
Male	2.9366*** (4.61)	4.3218*** (6.36)	4.2696*** (6.78)	5.3710*** (6.88)
White	2.5280*** (3.68)	1.8811* (2.46)	3.3452*** (4.77)	2.7113** (3.2)
Age as entering freshman	-0.0103 (-0.05)	0.1566 (0.77)	-0.1124 (-0.59)	0.3451 (1.31)
Older than 25 as entering freshman	-3.9413 (-1.44)	-3.0565 (-1.02)	-3.6156 (-1.31)	-5.2998 (-1.44)
Composite ACT	0.0002 (0)	0.0048 (0.04)	-0.0192 (-0.17)	-0.0268 (-0.16)
Low income (median income <=36,000 at home Census block group)	-2.4340*** (-3.67)	-1.6083* (-2.24)	-0.6253 (-0.96)	-1.7285* (-2.25)
Distance in miles between home and college	-0.0045 (-1.43)	0.0001 (0.02)	-0.0003 (-0.08)	0.0106 (1.82)
Semesters enrolled	0.0878 (0.57)	0.3466 (1.8)	0.3660* (2.35)	0.5028* (2.47)
Enrolled <=9 average semester hours	2.8159* (2.18)	4.3367** (2.83)	3.8538** (2.83)	4.6578** (2.76)
Constant	19.1126*** (4.27)	23.9364*** (5.12)	18.2437*** (4.17)	19.7427** (3.28)
N	2,720	1,804	2,623	1,713

* p<.05; **p<.01; ***p<.001

The sample for this regression is all 2002 entrants who left school (with degree or not) by Jan 1, 2009.

Wages are calendar year wages from quarterly data from the Tennessee Department of Labor and Workforce Development unemployment insurance records.

Full-time employment is defined as receiving at least full-time minimum wages for the fourth quarter of the calendar year. The full-time quarterly wages are annualized.

The median ACT for the student's institution was used in place of missing ACT scores.

The zip code for the high school was used if the home address was missing.

t-scores are in parenthesis.

Determinants of Graduation and Transfer

Descriptive statistics on completers and non-completers indicates that degree recipients tended to have higher ACT scores, socioeconomic advantages, and longer distances between home and college. These factors are related and interdependent, and we wish to isolate the contribution of each student characteristic to the overall likelihood of finishing college and/or transferring between a two-year and four-year school.

Table 16 reports the results of four regressions. The first three focus on two-year college entrants and estimate the factors contributing to one of three possible outcomes: finish with an Associate's degree, transfer to a four-year college, or complete a Bachelor's degree. The fourth analysis estimates the likelihood that four-year college students complete a Bachelor's degree within the time we observe them. Higher ACT scores are significantly predictive of all categories of degree receipt, as well as the likelihood of transferring to a four-year school. For instance, each additional point on the ACT increased the likelihood that four-year students earn a Bachelor's degree by 2.5 percentage points. Males were generally less likely to graduate (but more likely to transfer), and white students were more likely to graduate than non-white students if they started in a two-year school. Older students were moderately more likely to complete an Associate's degree but less likely to transfer out of community colleges or complete a Bachelor's degree. Students originating from low-income neighborhoods were less likely to transfer between two-year and four-year schools, or if they started in a four-year school, they were 4.1 percentage points less likely to earn a Bachelor's degree. Students who travelled farther to attend a two-year college were *less* likely to complete an Associate's degree there but more likely to transfer to a four-year college. Those who travelled farther to attend a four-year college were *more* likely to finish with a Bachelor's degree. Finally, the 2002 cohort was more likely to receive a degree within the window of time we observe, chiefly because they had an extra year to do so.

Together, results summarized by **Table 16** lend insight to some of the pre-existing risk factors associated with college dropout. Males are at higher risk of dropping out, as are nonwhite students in two-year colleges, older students seeking Bachelor's degrees, students from low-income neighborhoods, and students with lower pre-college aptitude as measured by ACT scores.

TABLE 16: Regression Analysis for Degree Completion and Transfer

	Two-year students			Four-year students
	Transfer for 4-year			Bachelor's degree
	Associate's degree	school	Bachelor's degree	Bachelor's degree
Male	-0.0510*** (7.02)	0.0343*** (3.99)	0.0037 (0.51)	-0.0820*** (13.18)
White	0.0493*** (5.43)	-0.017 (1.51)	0.0251*** (2.93)	0.0129 (1.64)
Age as entering freshman	0.0069** (2.09)	-0.0061* (1.69)	-0.0087*** (2.92)	-0.0069* (1.66)
ACT Composite	0.0098*** (9.00)	0.0267*** (21.10)	0.0225*** (20.47)	0.0253*** (32.21)
Low income (median income <=36,000 at home Census block)	0.0002 (0.02)	-0.0261*** (3.03)	-0.0118 (1.64)	-0.0406*** (6.25)
Distance in miles between home and college	-0.0002*** (3.91)	0.0002*** (3.08)	1.90E-05 (0.38)	0.0003*** (9.50)
Cohort 2002	0.0661*** (8.61)	0.1186*** (13.38)	0.0604*** (8.08)	0.1044*** (16.85)
N	11,807	11,807	11,807	23,054

* p<.05; **p<.01; ***p<.001

t-statistics from robust standard errors are in parenthesis.

CONCLUSION, ACTIONABLE POLICY IMPLICATIONS, AND FUTURE RESEARCH

To date, this study is the most comprehensive of its kind regarding the determinants of program completion and subsequent employment and earnings by students in Tennessee public postsecondary education. In addition to presenting a wealth of descriptive information on progression, dropout, and graduation patterns, our research validates the State of Tennessee's recent emphasis on college completion and student retention. As evidenced by **Figures 9** and **11**, degree recipients earn nearly \$10,000 more than non-completers seven years after completing college. But this does not mean that students should avoid college if they do not expect to finish. Our extended analyses of the returns to college persistence indicate that non-completers can benefit from spending additional time in college, even if they ultimately fail to complete a degree. Unfortunately, achieving timely degree receipt appears to be a challenge for students.

This research also validates the public higher education funding formula committee's emphasis on two student subpopulations of compelling interest to Tennessee – adults and low-income students. Summary statistics suggest that graduation rates were relatively low for adults, and that they were more likely to have very short spells in college. Further, the analysis indicates that a sustained policy emphasis on low income students is warranted. Coming from a low-income neighborhood is associated with a lower likelihood of degree receipt, and subsequently, lower earnings after college.

The findings summarized here present several opportunities for additional research. First, our analyses accounted only for student characteristics in predicting college completion and post-college labor force participation and earnings. Our related research indicates that some institutions are more effective than others in advancing these outcomes.¹⁷ Additional work is necessary to identify specific institutional characteristics and practices that benefit students. Second, we were limited to examining very near-term labor market outcomes of college graduates who chose to work for Tennessee employers covered by unemployment insurance (representing approximately 89 percent of Tennessee workers). Future work will trace the wage returns to higher education over a longer period of time, and perhaps for a more comprehensive set of workers. Finally, our ongoing and future research examines the effect of particular policies (for example, Tennessee Education Lottery scholarships) on college completion and labor market outcomes.

¹⁷ See Carruthers, Celeste K., William F. Fox, Matthew N. Murray, Grant Thrall, and David Wright, "College Participation, Persistence, Graduation, and Labor Market Outcomes: An Input-Adjusted Framework for Assessing the Effectiveness of Tennessee's Higher Education Institutions," (forthcoming), prepared for the Context for Success Project, an initiative of HCM Strategists and the Gates Foundation.

APPENDIX

APPENDIX TABLE 1: Average Age of First-Time Entering Freshmen By Institution

	Non-Completers				Completers				Total	
	Single-Term		Multi-Term		Associate's		Bachelor's			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Two-Year Institutions										
Chattanooga State Community College	21.6	22.3	21.2	20.7	20.4	20.7	18.9	19.3	20.9	20.8
Cleveland State Community College	22.1	21.7	21.3	20.7	20.1	21.2	19.3	19.2	21.0	20.7
Columbia State Community College	20.7	21.0	20.4	20.2	19.5	20.7	19.2	19.1	20.0	20.1
Dyersburg State Community College	20.3	22.2	20.8	21.8	20.3	21.4	20.0	19.1	20.6	21.6
Jackson State Community College	22.0	22.2	20.4	20.8	21.2	20.7	19.4	19.2	20.7	20.8
Motlow State Community College	21.5	21.9	20.2	20.7	19.6	20.0	19.1	19.0	20.0	20.4
Nashville State Community College	22.8	23.0	21.6	22.1	22.1	22.4	20.7	20.5	21.7	22.1
Northeast State Community College	24.4	22.3	21.3	21.0	23.2	21.9	19.4	19.6	21.8	21.2
Pellissippi State Community College	21.5	21.5	20.2	20.1	20.4	19.8	18.6	18.8	20.1	20.0
Roane State Community College	22.4	22.5	20.9	20.4	20.6	20.2	19.0	18.9	20.7	20.4
Southwest State Community College	21.9	22.9	21.2	21.1	22.6	22.3	20.3	20.5	21.3	21.4
Volunteer State Community College	20.5	22.0	20.4	20.5	21.0	21.2	19.2	19.2	20.4	20.7
Walters State Community College	22.3	21.7	20.6	21.0	20.7	21.5	19.1	18.9	20.6	20.9
Total	21.8	22.2	20.8	20.8	20.9	21.0	19.3	19.2	20.7	20.8
Four-Year Institutions										
Austin Peay State University	20.6	21.6	20.1	20.0	20.3	19.5	18.9	18.9	19.7	19.9
East Tennessee State University	20.2	20.4	19.4	19.4	18.7	19.0	18.5	18.6	19.1	19.1
Middle Tennessee State University	19.3	19.1	18.9	18.8	18.3	18.3	18.6	18.5	18.7	18.7
Tennessee State University	18.4	19.2	18.8	19.4	18.5	20.7	18.5	18.6	18.6	19.0
Tennessee Technological University	19.3	19.4	18.8	18.8	18.6	19.0	18.5	18.5	18.7	18.7
UT Chattanooga	19.1	18.7	18.5	18.4	18.4	18.4	18.4	18.3	18.5	18.4
UT Knoxville	18.6	18.5	18.5	18.4	18.2	18.5	18.4	18.4	18.4	18.4
UT Martin	19.7	20.4	19.0	19.5	18.3	18.2	18.6	18.6	18.9	19.1
University of Memphis	19.7	19.6	19.1	19.1	18.8	18.6	18.5	18.5	18.9	18.9
Total	19.4	19.6	19.0	19.0	18.6	18.6	18.5	18.5	18.8	18.8

APPENDIX TABLE 2: Average ACT Score of First-Time Entering Freshmen By Institution¹⁸

	Non-Completers				Completers				Total	
	Single-Term		Multi-Term		Associate's		Bachelor's		Total	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Two-Year Institutions										
Chattanooga State Community College	20.5	17.0	17.7	17.7	19.4	18.9	20.1	19.5	18.5	18.1
Cleveland State Community College		16.9	18.3	18.3	19.0	19.5	20.1	20.2	18.9	18.8
Columbia State Community College		17.3	18.3	18.2	19.9	19.7	20.0	21.0	19.1	19.0
Dyersburg State Community College		16.5	17.7	17.7	18.8	19.5	20.9	19.8	18.8	18.1
Jackson State Community College	27.0	17.8	18.1	17.8	19.8	20.1	19.8	20.5	19.0	18.6
Motlow State Community College		17.3	18.2	18.0	18.7	19.3	19.7	19.8	18.9	18.6
Nashville State Community College		16.6	16.5	16.7	19.1	18.5	17.6	18.1	17.3	17.2
Northeast State Community College		17.4	17.9	18.5	18.8	18.6	19.5	19.8	18.5	18.6
Pellissippi State Community College		18.7	19.0	19.3	19.1	20.4	21.1	20.9	19.6	19.8
Roane State Community College	20.0	17.3	18.4	18.6	19.3	19.8	20.8	20.7	19.4	19.2
Southwest State Community College		16.0	15.8	16.2	16.8	17.4	18.2	18.2	16.3	16.5
Volunteer State Community College	14.0	18.3	17.9	18.0	19.4	19.6	19.9	20.5	18.7	18.7
Walters State Community College		19.6	18.5	18.4	19.6	19.9	19.9	20.6	19.1	19.1
Total	20.4	17.4	17.8	17.9	19.1	19.4	20.0	20.2	18.6	18.5
Four-Year Institutions										
Austin Peay State University		20.3	20.4	20.4	20.9	20.9	22.1	22.0	21.5	21.1
East Tennessee State University	24.0	20.4	20.6	20.7	21.0	20.4	22.5	22.6	21.9	21.7
Middle Tennessee State University	20.3	20.9	21.7	21.4	20.9	21.3	22.6	22.7	22.3	22.1
Tennessee State University	12.0	17.2	18.0	18.0	19.1	19.0	19.1	18.9	18.7	18.4
Tennessee Technological University	20.0	20.8	21.4	21.6	22.0	21.9	23.1	24.0	22.6	23.0
UT Chattanooga		19.1	20.4	20.3	20.5	21.1	22.0	22.4	21.4	21.5
UT Knoxville	21.0	22.2	23.4	23.6	23.8	22.4	24.5	24.5	24.3	24.2
UT Martin		20.0	20.1	20.7	21.4	21.4	21.7	22.0	21.3	21.4
University of Memphis		20.9	21.5	20.7	21.0	21.7	22.9	22.4	22.4	21.5
Total	20.2	20.5	21.2	21.1	21.6	21.4	22.9	23.0	22.4	22.1

¹⁸ ACT scores were more likely to be missing for two-year college entrants and single-term non-completers, especially in 2002. Appendix Table 2 reports average non-missing ACT scores. Regression analysis controls for missing ACT scores.

APPENDIX TABLE 3: Distance in Miles between Home and College for First-Time Entering Freshman By Institution

	Non-Completers				Completers				Total	
	Single-Term		Multi-Term		Associate's		Bachelor's		2002	2003
	2002	2003	2002	2003	2002	2003	2002	2003		
Two-Year Institutions										
Chattanooga State Community College	15.7	21.6	17.1	25.4	24.0	26.7	21.0	23.1	18.1	24.8
Cleveland State Community College	15.9	22.5	22.3	29.8	32.6	23.8	26.2	35.2	24.3	28.6
Columbia State Community College	34.2	30.7	34.9	40.3	32.1	28.4	35.0	29.0	34.4	35.2
Dyersburg State Community College	27.2	33.0	45.4	34.2	25.7	42.4	48.1	48.8	40.8	36.3
Jackson State Community College	38.0	29.4	41.4	40.7	31.1	29.1	50.1	44.7	39.7	38.1
Motlow State Community College	29.4	43.9	38.6	39.9	34.2	32.1	35.5	36.2	36.3	38.5
Nashville State Community College	21.3	23.5	27.4	35.9	40.7	44.8	23.3	33.8	28.3	35.4
Northeast State Community College	13.9	20.7	27.0	26.3	23.0	16.7	35.3	18.5	25.9	22.9
Pellissippi State Community College	18.5	34.5	29.9	28.1	16.8	22.3	28.4	21.6	26.5	26.7
Roane State Community College	35.7	42.0	44.3	43.9	33.8	43.6	35.2	38.7	39.9	42.8
Southwest State Community College	17.9	12.1	22.4	23.2	23.1	32.2	37.1	27.1	23.4	22.3
Volunteer State Community College	30.4	35.1	32.0	36.8	39.3	25.2	41.5	30.5	34.1	34.0
Walters State Community College	25.4	33.7	33.4	36.7	31.9	28.5	52.7	37.2	35.1	35.3
Total										
Four-Year Institutions										
Austin Peay State University	30.0	34.4	58.3	44.6	59.6	58.2	48.8	49.5	50.2	44.7
East Tennessee State University	34.0	32.8	55.7	59.3	61.8	56.2	76.1	67.9	63.0	59.5
Middle Tennessee State University	46.2	44.2	61.3	67.1	88.7	65.4	71.6	71.2	66.1	66.7
Tennessee State University	30.3	42.1	92.6	116.0	50.6	21.6	117.8	121.9	91.8	103.2
Tennessee Technological University	67.6	71.1	72.0	73.0	107.1	71.5	79.6	77.7	76.6	75.5
UT Chattanooga	78.2	80.6	104.7	100.1	68.5	56.4	111.4	108.9	104.4	100.9
UT Knoxville	111.8	117.4	129.0	126.9	104.3	97.5	148.6	151.1	140.2	141.2
UT Martin	70.8	59.0	87.3	78.4	46.9	50.1	94.8	78.2	88.9	75.0
University of Memphis	20.7	32.9	30.6	41.7	48.4	33.8	38.6	43.2	33.9	41.2
Total	55.5	58.1	76.1	76.6	77.3	63.6	96.3	94.8	84.7	83.5

*Where home addresses were missing, high school zip codes were used to calculate the distance between home and college.

APPENDIX TABLE 4: Percentage of First-Time Entering Freshmen from Low Income Neighborhoods By Institution

	Non-Completers				Completers				Total	
	Single-Term		Multi-Term		Associate's		Bachelor's		2002	2003
	2002	2003	2002	2003	2002	2003	2002	2003		
Two-Year Institutions										
Chattanooga State Community College	33.6	68.1	39.2	43.4	34.5	31.8	35.6	31.9	37.6	44.0
Cleveland State Community College	44.9	70.1	40.8	45.8	47.1	53.6	34.8	40.6	42.0	49.6
Columbia State Community College	30.9	66.2	36.7	49.9	47.8	45.4	46.0	35.3	39.9	48.1
Dyersburg State Community College	61.4	68.5	54.4	60.8	47.1	63.0	50.0	51.9	53.6	61.7
Jackson State Community College	62.8	81.8	60.8	67.7	54.4	62.5	58.8	72.5	59.5	69.4
Motlow State Community College	39.1	61.3	42.0	47.1	43.6	55.4	43.1	43.7	42.1	49.4
Nashville State Community College	34.4	63.6	32.6	49.5	29.6	47.2	40.0	38.1	33.0	50.1
Northeast State Community College	46.9	70.4	62.1	67.6	55.5	60.3	61.5	62.0	59.2	66.1
Pellissippi State Community College	32.6	63.0	31.2	38.8	29.2	28.9	30.0	23.2	30.8	37.1
Roane State Community College	57.7	84.2	62.7	72.2	73.5	68.7	68.8	70.3	65.0	72.7
Southwest State Community College	46.4	64.0	44.0	43.9	31.7	39.8	24.8	13.8	41.2	45.1
Volunteer State Community College	22.4	58.8	31.8	32.2	26.7	26.6	32.7	32.1	30.2	34.5
Walters State Community College	53.2	88.0	71.4	77.6	75.2	70.0	66.1	65.4	69.6	76.4
Total	43.5	69.8	46.5	52.5	46.9	48.9	46.1	44.7	46.2	53.3
Four-Year Institutions										
Austin Peay State University	16.7	54.1	30.0	36.1	35.7	30.4	28.6	31.2	27.6	37.8
East Tennessee State University	39.2	85.2	57.7	64.4	72.3	71.4	57.4	57.3	55.7	64.2
Middle Tennessee State University	18.3	59.4	25.9	30.8	31.8	21.1	27.6	27.5	26.2	32.0
Tennessee State University	10.6	83.4	39.0	52.6	28.6	14.3	35.6	44.3	33.0	54.9
Tennessee Technological University	39.3	76.2	51.7	47.9	44.1	60.0	48.2	47.3	48.3	51.0
UT Chattanooga	26.7	71.9	33.4	36.9	33.3	23.5	30.1	32.2	31.2	37.4
UT Knoxville	9.2	83.5	27.5	33.9	21.7	36.4	27.3	25.0	25.7	33.1
UT Martin	37.3	83.5	52.4	58.8	66.7	84.2	50.8	54.3	50.0	60.4
University of Memphis	19.4	61.7	25.3	34.6	34.4	34.5	16.9	23.4	20.8	32.9
Total	21.9	72.4	35.2	41.1	39.4	38.1	32.9	34.0	32.7	41.3

*Low income neighborhood is defined as median income <=\$36,000 at home Census block group

APPENDIX Table 5: Percentage of First-Time Entering Freshmen in Two-Year Schools Attaining Degrees by Normal Time Benchmarks, Institution, and Cohort

Institution	Associate's				Bachelor's			
	100%	150%	200%	Spring	100%	150%	175%	Spring
				2010				2010
				400%				200%
Chattanooga State	2.7	8.4	11.5	16.5	1.2	6.6	8.9	9.3
Cleveland State	5.3	12.9	17.3	26.3	1.5	8.3	9.6	10.1
Columbia State	6.9	13.3	19.9	26.4	3.8	15.4	17.4	18.6
Dyersburg State	3.0	10.1	14.8	19.8	2.1	9.7	12.9	13.9
Jackson State	4.9	12.6	18.6	27.2	1.3	9.2	10.7	11.5
Motlow State	8.6	18.0	21.6	25.4	3.3	15.8	18.1	19.9
Nashville State	1.8	9.4	15.1	18.8	0.7	5.0	6.8	8.8
Northeast State	4.9	15.4	19.6	27.8	0.4	9.0	10.5	11.7
Pellissippi State	1.8	10.2	15.7	23.4	3.1	13.5	16.2	17.7
Roane State	6.0	14.1	20.0	26.8	4.4	15.1	17.3	18.2
Southwest Tennessee	1.3	5.2	8.6	13.7	0.6	5.0	7.2	8.8
Volunteer State	3.4	9.9	14.5	21.6	1.8	8.7	10.1	11.4
Walters State	6.7	14.7	18.8	24.9	2.6	11.2	13.1	14.0
Total	4.3	11.5	16.2	22.5	2.1	10.2	12.3	13.4

Degree Progression by Two-Year Institutions, 2003 Cohort

Institution	Associate's				Bachelor's		
	100%	150%	200%	Spring	100%	150%	Spring
				2010			175%
				350%			
Chattanooga State	1.0	6.7	12.8	18.4	1.0	7.8	9.0
Cleveland State	5.1	13.8	15.4	21.0	2.9	11.3	12.5
Columbia State	7.5	18.3	23.1	27.9	3.7	16.0	17.8
Dyersburg State	2.5	7.4	10.3	15.0	0.8	7.1	9.1
Jackson State	5.9	13.3	16.9	20.3	2.7	10.3	11.8
Motlow State	8.5	17.2	21.2	26.1	4.0	14.5	16.8
Nashville State	4.0	10.2	14.6	18.3	0.8	7.3	8.7
Northeast State	5.7	15.0	19.8	25.0	2.0	10.0	12.3
Pellissippi State	3.1	11.0	17.4	24.2	2.7	16.4	18.6
Roane State	5.4	13.7	18.5	24.8	4.0	13.6	15.9
Southwest Tennessee	0.8	3.4	6.2	9.2	0.5	4.9	5.7
Volunteer State	3.8	11.5	16.2	20.6	1.8	10.4	11.5
Walters State	4.7	12.2	15.5	19.2	2.7	12.3	13.9
Total	4.1	11.2	15.4	20.1	2.2	10.7	12.3

APPENDIX TABLE 6: Percentage of First-Time Entering Freshmen in Four-Year Schools Attaining Degrees by Normal Time Benchmarks, Institution, and Cohort

Institution	Associate's				Bachelor's			
	100%	150%	200%	Spring 2010 400%	100%	150%	175%	Spring 2010 200%
Austin Peay	0.5	1.2	1.9	4.3	15.1	34.6	37.0	39.9
ETSU	0.1	1.2	1.6	4.2	17.3	44.1	47.4	48.8
University of Memphis	0.0	0.1	0.4	2.3	13.1	41.1	46.4	49.1
MTSU	0.1	0.6	1.2	3.5	17.7	48.5	52.5	54.1
Tennessee State University	0.0	0.4	0.6	2.1	11.9	33.5	36.8	38.6
Tennessee Tech	0.2	1.0	1.8	4.0	16.8	46.9	51.7	53.3
UT Chattanooga	0.1	0.9	2.0	4.6	16.2	44.1	47.4	49.1
UT Knoxville	0.1	0.7	1.3	2.7	29.9	61.7	65.2	66.5
UT Martin	0.1	0.3	0.7	2.5	19.7	51.0	53.8	55.4
Total	0.1	0.7	1.2	3.2	19.2	47.8	51.5	53.3

Degree Progression by Four-Year Institutions, 2003 Cohort

Institution	Associate's				Bachelor's		
	100%	150%	200%	Spring 2010 350%	100%	150%	Spring 2010 175%
Austin Peay	0.0	0.4	1.0	2.7	14.2	34.3	36.9
ETSU	0.1	0.5	1.3	2.8	18.7	44.0	47.2
University of Memphis	0.1	0.3	0.8	1.9	13.2	39.9	43.7
MTSU	0.0	0.4	1.1	2.6	19.0	49.5	53.0
Tennessee State University	0.0	0.3	0.5	1.4	13.9	38.3	41.5
Tennessee Tech	0.2	0.7	1.5	2.9	19.8	55.1	58.4
UT Chattanooga	0.0	0.5	1.6	4.9	17.7	48.6	50.9
UT Knoxville	0.1	0.3	0.9	2.5	30.1	63.4	65.5
UT Martin	0.1	0.8	2.0	3.2	23.3	49.5	52.4
Total	0.0	0.4	1.1	2.7	20.1	49.2	52.2