Long-term Outcomes of High School CTE Completers in Virginia: Employment Status and Wages

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INSIGHT POWERED BY VLDS

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Executive Summary

In Virginia, more than 45 percent of high school graduates—more than 40,000 graduates per year—complete a career and technical education (CTE) program of study. Virginia's CTE instructional programs are designed to prepare young people for productive futures while meeting the commonwealth's need for well-trained and industry-certified technical workers. They aim to integrate instruction to ensure that students graduate meeting academic standards, and, have workplace readiness and industry-specific technical skills. CTE programs prepare students for postsecondary education, training, and for beginning careers. Programs vary in content, but include a sequence of at least two courses in a career cluster as part of graduation requirements.

Leaders in the Virginia Department of Education's (VDOE's) Office of Career and Technical Education (CTE) regularly works with Virginia's local educators to strengthen program quality, with the goal of ensuring that all CTE graduates are prepared for success in college and careers. As part of federal reporting requirements, VDOE's CTE office prepares annual reports on the 9-month college enrollment and employment status of students who complete a CTE program of study (i.e., CTE completers). CTE leaders need more information about completers' long-term college and employment outcomes. Based on data available from the Virginia Longitudinal Data System (VLDS), this report is one of two prepared as part of a research project that followed CTE completers from high school graduates in the 2008 and 2009 cohorts for up to four years. This report focuses on two workforce outcomes:

1) High school graduates' employment status during college, and
2) Graduates' quarterly wages after they leave college.

For both outcomes, we describe outcomes for CTE completers and non-completers. In addition to reporting weighted means, we estimated statistical models to control for student demographics, high school experience, and college experience to compare concurrent employment status of CTE completers to non-completers. For employment status, the sample included 48,207 students in 2008 and 51,454 students in 2009 who enrolled directly into a Virginia college or university within one year of graduating from high school. For wage outcomes, we focused on reporting wages within the first quarter after students left college. For these analyses, the sample was reduced to 11,887 students from the 2008 and 11,936 students from the 2009 high school graduation cohorts.

Key Findings

Results of this report are limited to high school graduates, including CTE completers and non-completers *enrolled in a public or private non-profit college in Virginia within one year of high school graduation*. This limitation is a result of current availability of data in Virginia that can

link students between high school and employment records. Importantly, results do not generalize to high school graduates who enrolled in college out of state or enrolled in college more than one year after high school graduation; enlisted in the military; and went directly into the workforce.

> *Results of this study generalize only to high school graduates who enrolled in a Virginia public or private college within one year of high school graduation, and were employed in Virginia by a non-federal government employer during the study period.*

The results for this sample show that CTE completers are generally more likely to work while in college. CTE completers also had, on average, higher wages than non-completers after they left college, with or without a degree. Below are the key findings from this research.

CTE completers were more likely to be employed while college-enrolled

We calculated a series of descriptive statistics and regression analysis to control for student demographics, high school experience, and college experience. Results showed that CTE completers were more likely to be employed while college-enrolled than non-CTE completers. This pattern was robust and consistent for students who:

- Enrolled in 2-year or 4-year institutions; and
- Earned a Standard or Advanced Studies diploma.

CTE completers had higher average quarterly wages after leaving college

We used descriptive statistics to determine average quarterly wages of students each fiscal quarter since leaving a postsecondary institution. We found that CTE completers had higher wages than non-CTE completers. This pattern was consistent for students who:

- Attended more years in a postsecondary institution; and
- Earned a Standard or Advanced Studies diploma.

CTE completers who earned Advanced Studies diplomas had the highest average wages three-months after graduating with a Bachelor's degree.

Among students who earned a Bachelor's degree, we found an almost $2000 difference in average wages 3-months (or on average $8000 per year) after graduating with a Bachelor's degree among CTE completers with an Advanced Studies diploma, compared to CTE completers with a Standard diploma, and non-CTE completers with a Standard diploma or an Advanced Studies diploma.

Introduction

Career and Technical Education (CTE) offers multiple academic pathways and opportunities for students (Barnett & Bragg, 2006). While historically, the goal of CTE has been for all students to finish high school prepared either to enter the workplace or to be prepared for postsecondary education (Castellano, Stringfield, & Stone, 2003), current employer expectations and future employment projects demand that by 2018, 65 percent of jobs will require some form of postsecondary education or training (Carnevale, Smith, & Strohl, 2010). Furthermore, the wage gap between individuals whose highest level of education is a high school diploma and those with a college degree is growing (Federal Interagency Forum on Child and Family Statistics, 2014). In response to changing workforce demands, CTE programs of study have become increasingly rigorous, delivering rigorous academic content in combination with occupation-specific instruction. The occupation-specific instruction with rigorous academic curriculum has been shown to increase student attachment to and motivation to school among 9th graders who are 14 years of age or younger (Plank, DeLuca, & Estacion, 2008). Not surprisingly, CTE has been associated with higher rates of high school attendance and graduation (Bishop & Mane, 2004; Carnevale, Rose, & Hanson, 2012; Dare, 2006), including for students with disabilities (Shandra & Hogan, 2008).

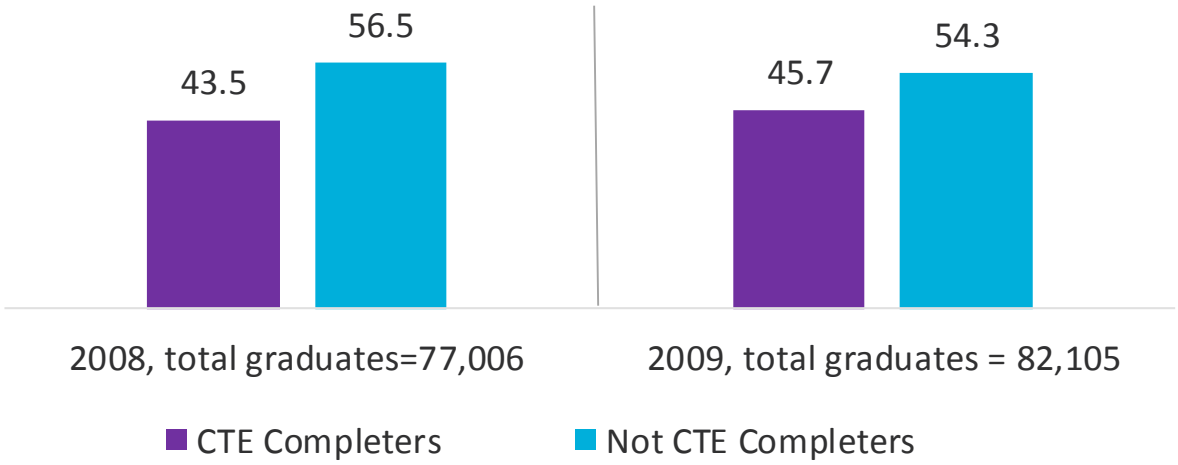
Evidence shows that participating in CTE programs of studies pays off. On average, high school graduates who complete a CTE program of study (herein, CTE completers) are more likely to enroll in and graduate from college than similar graduates who were not CTE completers (Bishop and Mane 2004; Dare 2006; Carnevale, Rose and Hanson 2012). Furthermore, CTE has a positive impact on earnings (Bishop & Mane, 2004), as well as students who receive certificates (Carnevale et al., 2012) and 2-year community college degrees (Marcotte, 2006). In one analysis using the National Education Longitudinal Study (NELS:88), Bishop and Mane (2004) found that of students who took vocational occupation-specific courses (CTE), students earned at least 12 percent more one year after graduating, and 8 percent more seven years later, than similar peers.

Overall, while research on CTE has shown positive effects on students' high school, college, and employment outcomes, recent trends show students are taking fewer CTE courses in high school (NCES, 2014). From 1990 to 2009, the average number of CTE credits that US high school graduates earned went from 4.2 to 3.6, while the average number of credits earned in other subject areas has increased (NCES, 2014). During this time, employment rates of 18-24 year olds across the country have steadily declined (75% employed in 1985 compared to 65% in 2012) (Federal Interagency Forum on Child and Family Statistics, 2014). Among those 20-24 year old young adults working (not simultaneously enrolled in school), the median annual earnings have also been steadily declining over the past ten years across all levels of education (Federal Interagency Forum on Child and Family Statistics, 2014). In 2012, the median annual

earnings for young adults were $17,460 overall and ranged from $13,910 for young adults with less than a high school education to $24,990 with a bachelor's or higher degree (Federal Interagency Forum on Child and Family Statistics, 2014). CTE's goal of ensuring that all students finish high school prepared for the workforce and postsecondary education is especially salient in today's economy and national trends.

In Virginia, CTE enrollment continues to rise. Virginia has embraced CTE as one means of strengthening high school graduates' preparation for college and careers. Virginia's high schools offer students diverse opportunities to participate in programs of study that prepare graduates for high-demand, high-wage, and high-skill careers. In 2009-2010, 39,617 students completed two or more CTE courses, and 29,057 students earned an industry credential. By 2011-2012, 41,677 students completed CTE courses with a significant increase in industry credentials with 51,192 students. Virginia offers multiple pathways for students to participate in CTE programs, including regional CTE programs, dual enrollment options, and Science, Technology, Engineering, and Mathematic (STEM) and Health Science Academies. In fact, CTE completers represent just under half of the high school graduates in the 2008 and 2009 high school graduating cohorts, shown in Figure 1.

Figure 1: Percent of Virginia Graduates who Completed CTE Programs of Study (2008 and 2009 High School Cohorts)[1]



Leaders in the Virginia Department of Education's Office of Career and Technical Education are interested in learning more about postsecondary and workforce outcomes for career and technical education (CTE) completers. These students have graduated from a Virginia public high school with a diploma and have completed a CTE program of study.

[1] From Jonas, Garland, Yamaguchi, & Hall (2014).

As part of federal Perkins reporting requirements, Virginia follows CTE completers for 9 months after high school graduation, and assesses postsecondary and workforce outcomes. Virginia's CTE leaders are interested in learning about postsecondary enrollment and workforce outcomes beyond this period. This report, one in a series of two, focuses on the following outcomes:

- High school graduates' employment status during college, and
- Graduates' quarterly wages after they leave college.

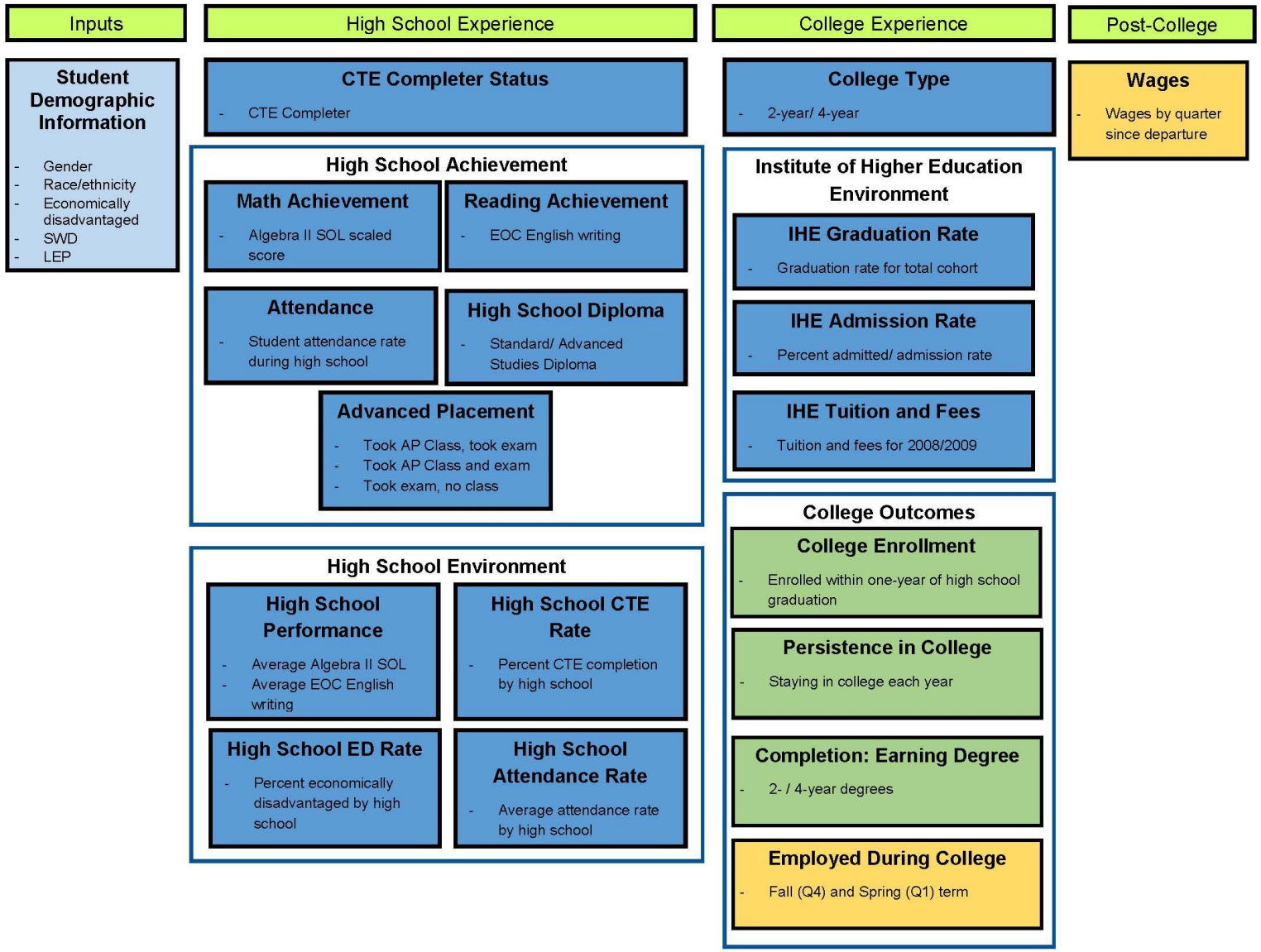
Employment status while attending postsecondary institutions is an important long-term outcome to investigate. While this is an economic reality for many students, research shows positive effects on GPAs to working part-time on campus (Stiglitz et al, 2010; Gleason, 1993), though at the same time, working full-time is negatively associated with student enrollment and academic performance in college (Stiglitz et al, 2010; Gleason, 1993). Wages are a critical long-term outcome, associated with national, local, and personal measures of success. Research shows wages are higher for students who completed CTE programs in high school (Bishop & Mane, 2004), certificates (Carnevale, Rose, & Hanson, 2012), and 2-year community college degrees (Marcotte, 2006).

Using VLDS, we were able to follow two cohorts of public high school graduates into college and upon leaving, into the workforce through fall, 2012. We followed 2008 cohort graduates for four years and 2009 graduates for 3 years. We assessed employment status and average quarterly wages for CTE completers and non-completers.

Data sources and methods

Figure 2 shows the conceptual model for this study. The two yellow boxes in Figure 2 represent the two main outcomes of this study: 1) High school graduates' employment status during college, 2) Graduates' quarterly wages after they leave college.

Figure 2: Conceptual Model of Long-term Outcomes of CTE



These analyses are designed as a starting point to support the CTE office's long-term interest in understanding CTE completers' outcomes beyond the nine months that Perkins requires. The analysis focused on answering the following questions:

1. To what extent were high school graduates employed while enrolled in a postsecondary institution?
    a. Were there differences in concurrent employment between CTE completers and non-completers?
    b. What other factors, besides CTE completion status, were associated with concurrent employment in college?
2. What were the average wages of CTE and non-CTE completers after they left college (with or without a credential) and entered the workforce?

Data sources

With authorization from VDOE, the State Council of Higher Education for Virginia (SCHEV) and the Virginia Employment Commission (VEC), we used VLDS to request and receive de-identified data available from Virginia public high school graduates of 2008 and 2009. The system enabled us to received de-identified data from high school graduates' experiences in high school, college, and employment. Based on VLDS secure methods, we were able to link records from individuals in the data using a randomly generated identifier unique within the data we requested. All personal information (e.g., names, social security and other identification numbers, date of birth) were stripped from the data before they were securely transferred to the research team (see www.vlds.virginia.gov for more information on the VLDS privacy policy and process for de-identifying records).

High school records included students' high school achievement data (e.g., state test scores, diploma type), demographic characteristics (e.g., race/ethnicity, economically disadvantaged status), program participation (e.g., services for students with disabilities, English learners, and gifted students), and the students' high school. College records included de-identified course enrollment and completion data from Virginia's colleges and universities, and records from students' on-campus employment. De-identified wage records included total wages earned by quarter and year. We obtained college and wage records beginning in 2006, to ensure that we could capture students who earned college credits while dual enrolled in high school and college. Data from the colleges were available through spring 2012, and wage records were available through fall 2012.

Our measure of whether students were concurrently enrolled in college and employed is derived from two sources: 1) wage records from VEC, and 2) participating in work-study programs from the SCHEV data. We determined that this measure would be more complete than using the wage records only, because colleges and universities (i.e., employers) are not

required to submit records to VEC for unemployment insurance for most work-study programs (SCHEV, personal communication). Our measure of wages is based on quarterly wages earned, as reported to VEC. No information was available about the number of hours worked, benefits, employment sector, or job location.

Methods

Throughout the paper, we present data in terms of descriptive statistics (N, weighted percent, weighted averages). The descriptive statistics were weighted by sample size. For the analysis of employment while concurrently enrolled in college, we also used multivariate regression models to understand differences in concurrent employment by CTE completers and non-completers after controlling for student demographics, high school experience, and college experience. This enabled us to compare employment status of CTE completers to non-completers while statistically accounting for observable differences in the student populations (Greene, 2008; Szumilas, 2010). The control variables, depicted in Figure 2, allowed us to estimate CTE program completion's unique influence on employment status, after statistically controlling for prior achievement and other important influences. These statistical controls are critical for understanding outcomes, because high school CTE completers in this sample, on average, had lower high school achievement, and were more likely to be economically disadvantaged, male, and African American, compared to non-CTE completers, as shown in Table 1. Education research shows that student demographic variables, as well as prior achievement, accounts for much of the variance in student achievement outcomes (Schochet, 2005; Deke, Dragoset, & Moore, 2010).

For the analysis of wage outcomes, we presented weighted average wages for those who remained in the study sample after leaving college. The averages are weighed by sample size. We chose to report weighted averages, rather than medians, because the wage records were not widely dispersed or skewed. We also did not calculate multivariate regressions for wages due to the smaller sample size. The small sample size is first due to the specific sample, the 2008 Virginia public high school graduates who enrolled in a Virginia college, left that college, and found in the workforce data by the fall of 2012. This sample, while sizable, is missing a large number of students whose status was unknown. For example, of the 20,958 students who left college with no degree, we identified just more than half (57 percent) in the wage records in the quarter after they left college. While this is a sizable group (n=11,887) representing high school graduates who left college, we have no information about the remaining 9,071 individuals who left college and were not found in the wage records. These individuals could be working in a job that was not included in the wage records (e.g., for the federal government or in another state); enrolled in college beyond the time period of the study; transferred to a college or university outside of Virginia; be in the military; or be unemployed. Because of the potential lack of generalizability, possible sample bias, and overall unknowns regarding the

broader sample of students who left college but were not found in the wage records, we describe the weighted average wages of students who left college, without calculating additional comparative statistics.

More detailed information on the methodology is shown in Appendix A.

Table 1: Descriptive Indicators of the 2008 and 2009 Cohort of Students

Descriptive indicator	2008 cohort		2009 cohort	
	Not CTE Completers N = 43,542	CTE Completers N = 33,464	Not CTE Completers N = 44,561	CTE completers N = 37,544
Student achievement variables				
Earned Standard diplomas (%)	37	50	37	50
Earned Advanced Studies diplomas (%)	60	46	58	46
Algebra II scaled score (mean)	509	505	511	507
Algebra II participation (%)	84	81	88	85
Writing scaled score (mean)	523	509	529	515
Attendance rate	94	94	94	94
Advanced Placement course participation (%)	40	23	40	23
Demographic variables				
Asian (%)	6	5	7	5
African American (%)	21	27	22	28
Hispanic (%)	6	5	6	6
White (%)	65	62	63	60
Economically disadvantaged (%)	16	22	18	25
Male (%)	46	52	46	53

Note: Only Standard and Advanced Studies diploma-earners are shown due to the small number of students who earned other types of diplomas and who subsequently enrolled in a postsecondary institution. As a result, these percentages do not sum to 100.

Study Limitations

The results of this report are based on a sample of Virginia public high school graduates whose data were available using VLDS. VLDS uses probabilistic matching to connect students between VDOE and SCHEV, and a unique identifier that is in both SCHEV and VEC records to link

individuals between college and the workforce. The current process does not permit direct matching from high school to wage/employment outcomes (see Jonas, 2014 for more information). As well, the employment data are limited to individuals who are employed in Virginia, and excludes federal government employees. We provide a more complete explanation of the data linking process and implications in Appendix B.

For analysis of concurrent employment, we further restricted the sample to employment in quarters 1 (Jan-Mar) and 4 (Oct-Dec) to minimize the influence of summer employment on employment status.

Results, while applicable to the specific samples, and replicated in two cohorts, are limited in the following ways:

1. Employment results are limited to Virginia public high school graduates who:
    a. Enrolled in college within one year of graduating from high school;
    b. Enrolled in a Virginia college or university sometime between 2006 and 2012; and
    c. While in college, worked in Virginia in quarters 1 and 4 in a job that is subject to Unemployment Insurance tax or as part of a reportable work-study program.
2. Wage results are limited to Virginia public high school graduates who:
    a. Enrolled in college within one year of graduating from high school;
    b. Enrolled in a Virginia college or university between 2006 and 2012;
    c. Left college, with or without a degree; and
    d. Were employed in Virginia in a job that is subject to Unemployment Insurance tax.

Study results are limited to employment outcomes for high school graduates who enrolled in a Virginia college or university and worked in Virginia during the study period. Employment data were not available for students who graduated from high school and entered the workforce directly, or who attended college out of state.

Study Findings

We answered the research questions with a series of descriptive statistics. For each calculation, we display a graph showing the outcome (percent employed or average wages) for CTE

completers and non-completers.[2] The graphs show the results for the 2008 cohort on the left side and the 2009 cohort on the right side. The purple line or bar represents the CTE completers, while the blue dashed line or blue bar represents non-completers. These results describe outcomes for students who took different pathways in high school, and do not indicate causal relationships.

To understand concurrent college enrollment and employment, we also estimated the influence of CTE completion status on individual's probability of being employed, while statistically controlling for other factors that may be associated with employment status. Results of these multivariate regression analyses follow the descriptive statistics and are reported in odds ratios. The odds ratios allowed us to compare the degree to which each factor (e.g., CTE completion, different achievement levels, and students' socio-economic status) influenced students' likelihood of being employed while in college.

Interpreting Odds Ratios. *Odds ratios are used to compare the relative odds of an outcome, in this case employment status during college, given a variable of interest, such as CTE completion. The guide below is to help interpret the odds ratios:*

- *Odds ratios of 1.0 (OR = 1) means that CTE completion does not affect the odds of employment during college.*

- *Odds ratios greater than 1.0 (OR > 1) means CTE completion is associated with higher odds of employment during college.*

- *Odds ratios less than 1.0 (OR < 1) means CTE completion is associated with lower odds of employment during college.*

When interpreting odds ratios, the magnitude is important. OR ranging from .90 – 1.10 are not considered meaningfully different from 1.0.

Concurrent college enrollment and employment

Our study focused on answering the question, "*To what extent were high school graduates employed while enrolled in a postsecondary institution?*" Within this context, we were also interested in understanding whether CTE completers were more likely to work while in college

[2] Throughout this report, we refer to high school graduates who completed a CTE program of study as *CTE completers* and high school graduates who did not complete a CTE program of study as *non-completers*. All are high school graduates and earned Virginia Standard or Advanced Studies diploma.

than non-completers, and, how other factors influenced students' likelihood of concurrent employment.

The study sample included 48,207 students in the 2008 cohort and 51,454 students for the 2009 cohort who were enrolled in Virginia institutions of higher education (IHE) within one-year of graduating from college. We reported results for two different groups of students:

1) Students who were enrolled in a four-year college or university (4-year)
2) Students who were enrolled in a two-year college (2-year)

Results for each student group are reported for each semester in which students could be identified as being enrolled in college during the study. Students were included in the group at the time of reporting, and moved groups (e.g., from 2-year to 4-year IHE) based on their status at the time.

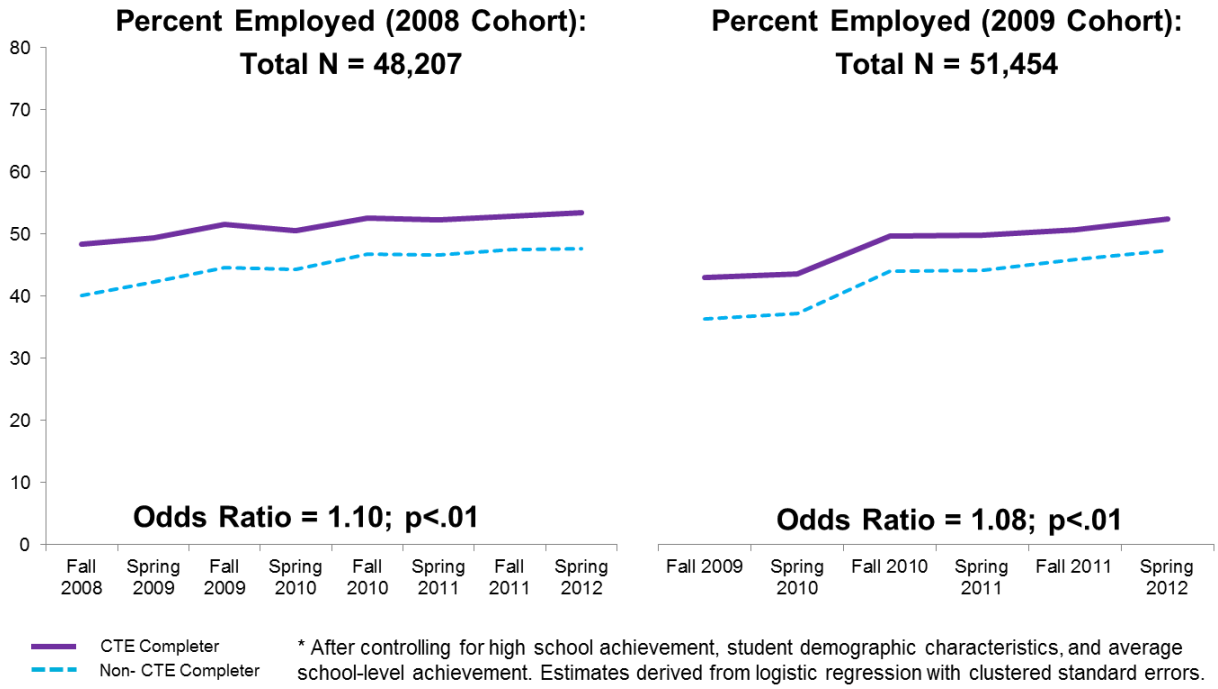
Results showed that the number and percentage of students working while in college generally increased each semester. Descriptive statistics including sample sizes used in the analyses are shown in Appendix C.

Finding 1. CTE completers were slightly more likely to be employed while college-enrolled

CTE completers had slightly higher employment rates than non-completers while concurrently enrolled in a postsecondary institution. We show this difference based on simple descriptive statistics in Figure 3, where CTE completers are represented by the solid purple line. The multivariate regression results suggest that while the differences are significant, the magnitude suggests these differences may not be practically meaningful. The analysis showed that CTE completers were less than 10 percent more likely to be concurrently employed relative to non-completers (Odds Ratio = 1.099; $p<.01$ and Odds Ratio = 1.083; $p<.01$ for the 2008 and 2009 cohorts respectively).

The descriptive and regression results both suggest that employment rates steadily increase over time spent in college each semester (Odds Ratio = 1.113; $p<.01$). We observed the same pattern in the 2009 cohort (Odds Ratio = 1.083; $p<0.01$), although the odds ratios suggested smaller differences over time that on average, may not be meaningful.

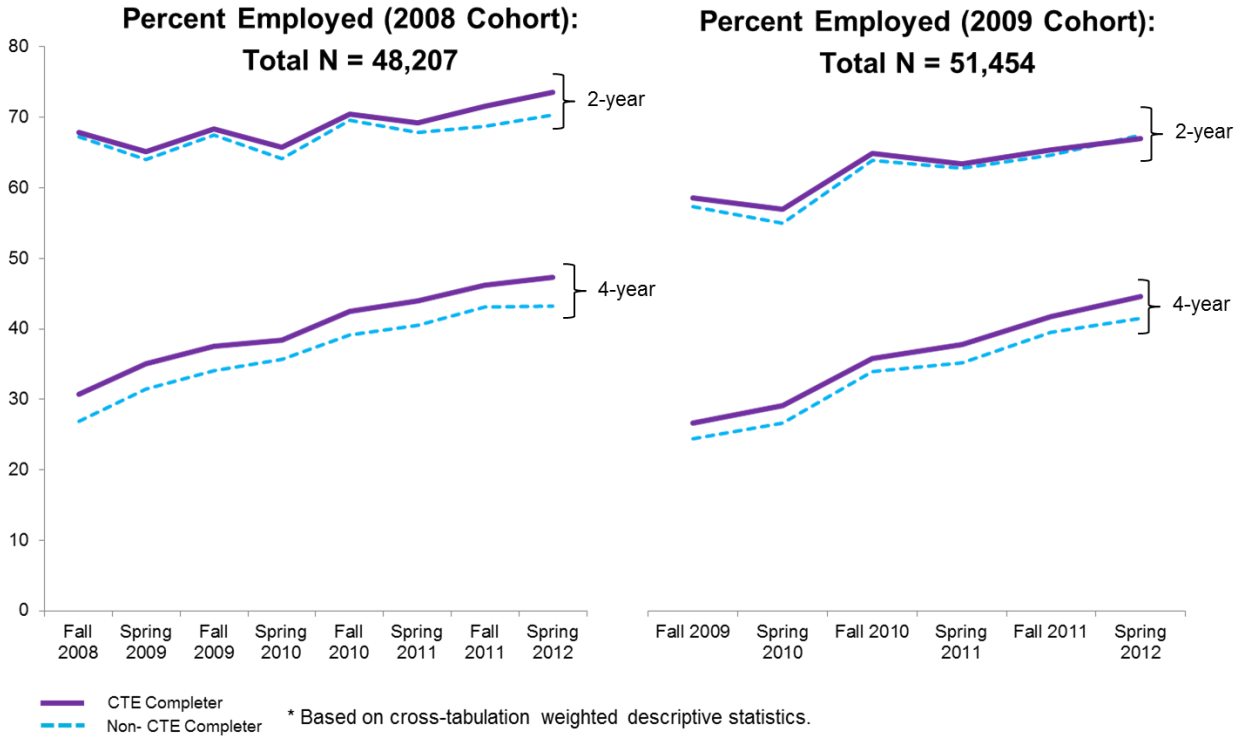
Figure 3: Percent of CTE Completers and Non-Completers who were employed while college-enrolled



Finding 2. High school graduates enrolled in 2-year colleges were 40 to 60 percent more likely to be employed than other students

While time in college and CTE completion status were both associated with slightly higher, statistically significant (but perhaps less practically significant) increases in employment rates, other factors had stronger influences on college students' probability of working. We found that college type had a larger influence on students' likelihood of working while in school. Results showed that students who attended 2-year colleges were 48 to 63 percent more likely to be employed than students in 4-year colleges, even after controlling for student demographics, high school experience, and college experience (Odds Ratio = 1.482; p<.01 and Odds Ratio = 1.631; p<.01 for the 2008 and 2009 cohorts respectively). We show this difference based on simple descriptive statistics in Figure 4.

Figure 4: Percent employed during college, CTE completers and non-completers



Finding 3. Students who were more likely to work while in college were Caucasian, women, economically disadvantaged, did not have identified disabilities in high school, and earned an Advanced Studies diploma.

We used the results of the multivariate regression analysis to learn more about students who were more likely to work while in college. We controlled for student demographic information, high school achievement and experience, and college experience, as described in Figure 2.

Specifically, we found that:

- Economically disadvantaged students were approximately 20 percent more likely to work during college than non-economically disadvantaged students (Odds Ratio = 1.238; p<.01 and Odds Ratio = 1.165; p<.01 for the 2008 and 2009 cohorts respectively).
- Young men were approximately 60 percent less likely to work than young women during college (Odds Ratio = .613; p<.01 and Odds Ratio = .617; p<.01 for the 2008 and 2009 cohorts respectively).
- Students with at least one primary disability code were 26 to 40 percent less likely to work than students without disabilities. Differences occurred between the 2008 and 2009 high school cohorts (Odds Ratio = .736; p<.01 and Odds Ratio = .601; p<.01 for the 2008 and 2009 cohorts respectively).

- Asian and African American students were about 25 percent less likely to work while in college than Caucasian students (Asian Odds Ratio = .775; p<.01 and Odds Ratio = .723; p<.01 for the 2008 and 2009 cohorts respectively; African American Odds Ratio = .720; p<.01 and Odds Ratio = .733; p<.01 for the 2008 and 2009 cohorts respectively).
- Students who earned Advanced Studies diplomas from the 2008 cohort were slightly more likely (9 percent) to work than students who earned Standard diplomas. For the 2009 cohort, Advanced Studies diploma-earners were 23 percent more likely to work while in college than students who earned Standard diplomas (Odds Ratio = 1.089; p<.05 and Odds Ratio = 1.232; p<.01 for the 2008 and 2009 cohorts respectively).

Finding 4. CTE completers with Advanced Studies diplomas were slightly more likely to be employed while college-enrolled

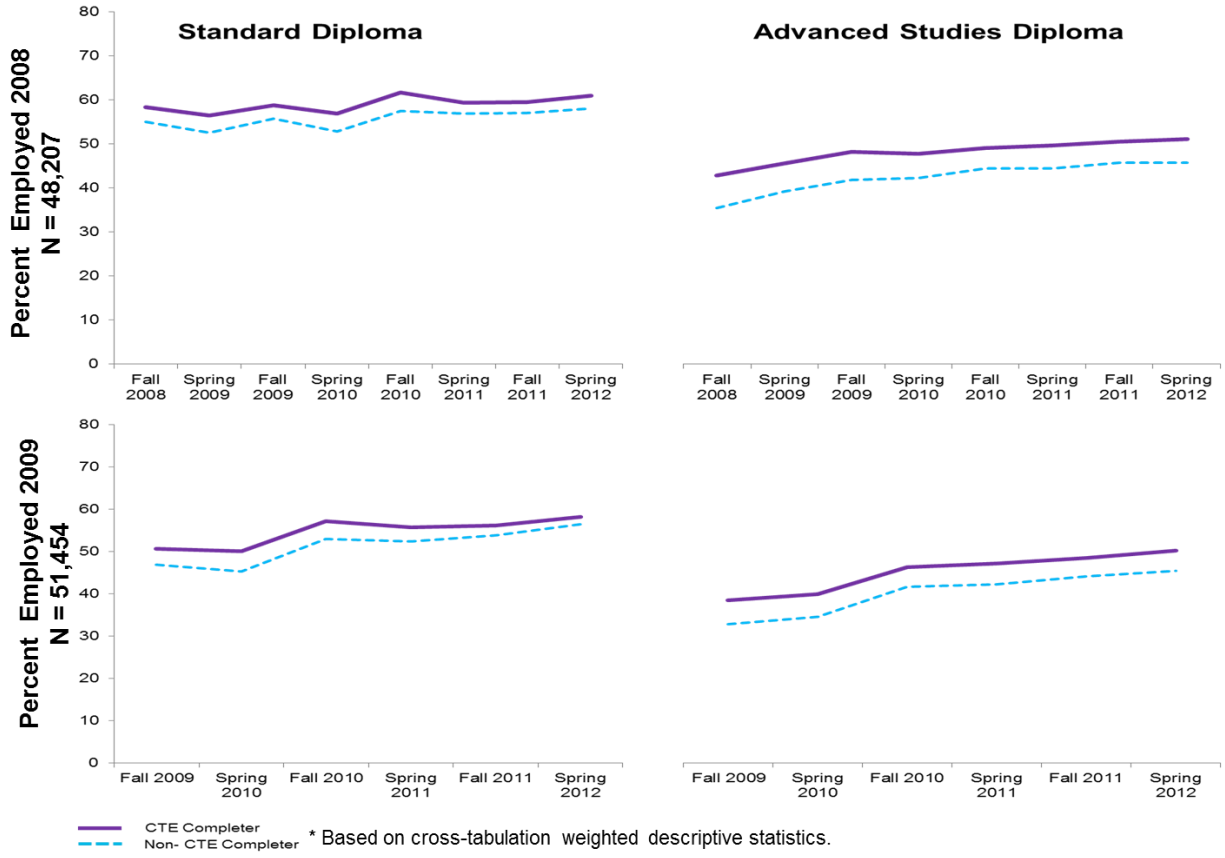
Figure 5 shows the percent of students employed for the 2008 and 2009 cohort. The graph on the left shows the percent employed by CTE completers (purple line) versus non-completers (blue dashed line) who earned a Standard high school diploma.[3] The graph on the right shows the percent employed by CTE completers versus non- completers who earned an Advanced Studies diploma in high school.[4] As mentioned in Finding 3, on average, high school graduates who earned Advanced Studies diplomas were 9 percent (2008 cohort) and 23 percent (2009 cohort) more likely to work while in college than students who earned Standard diplomas (Odds Ratio = 1.089; p<.05 and Odds Ratio = 1.232; p<.01 for the 2008 and 2009 cohorts respectively).

In addition, the descriptive statistics showed that regardless of diploma type, a larger percentage of CTE completers were employed during college than non-completers.

[3] To graduate with a Standard Diploma, a student must earn at least 22 standard units of credit by passing required courses and electives, and earn at least six verified credits by passing end-of-course SOL tests or other assessments approved by the Board of Education. For more information, see: http://www.doe.virginia.gov/instruction/graduation/standard.shtml

[4] To graduate with an Advanced Studies Diploma, a student must earn at least 24 or 26 standard units of credit, depending on when he or she entered ninth grade, and at least nine verified units of credit by passing end-of-course SOL tests or other assessments approved by the Board of Education. For more information, see: http://www.doe.virginia.gov/instruction/graduation/advanced_studies.shtml.

Figure 5: Percent employed during college, CTE completers and non-completers, by diploma type



In summary, we found that CTE completers were more likely to be employed in college, and that this was consistent across students with different demographic characteristics, economic circumstances, and high school achievement. This is important information, and is particularly interesting in light of recent findings that showed that once they are college-enrolled, CTE completers have similar chances of earning degrees as non-completers (Jonas, Garland, & Yamaguchi, 2014). Nonetheless, it is important to be cautious in drawing conclusions that could influence practice. One reason we can say little about the implications of this finding is that we have no information about the amount of hours students spent working in college. Previous research shows that working part-time on campus is associated with positive outcomes, but working full time can have negative effects on enrollment and academic performance (Stiglitz et al, 2010; Gleason, 1993). While these results provide an overall description of employment status, more detailed information, such as hours worked or part-time/full-time status, would be helpful to better inform the CTE office.

Post-college wage outcomes for CTE completers and non-completers

Our second research question was, "*What were the average wages of CTE and non-CTE completers after they left college (with or without a credential) and entered the workforce?*" We answered this question by describing weighted average wages for CTE-completers and non-completers after they left college by fiscal quarter.

The study sample included 11,887students in the 2008 cohort and 11,936 students for the 2009 cohort. As described previously, results are limited to Virginia public high school graduates from the 2008 and 2009 cohorts who enrolled in a Virginia college or university and were found in the Virginia Unemployment Insurance wage records. Due to the limited sample, it is important to be cautious in drawing conclusions from these results. A description of general data limitations that stem from the sample is provided in Appendix A. More information about the sample is presented in Appendix B. Descriptive statistics including sample sizes used in the analyses are shown in Appendix C.

Results show the weighted average quarterly wage since students departed from a Virginia postsecondary institution. The results showed that the quarterly wages since departing from college increased each quarter. In fact, the longer a student stayed in college, the higher their average quarterly salary upon departure, regardless of whether students earned a degree.

Finding 5. CTE completers had higher average quarterly wages than non-completers

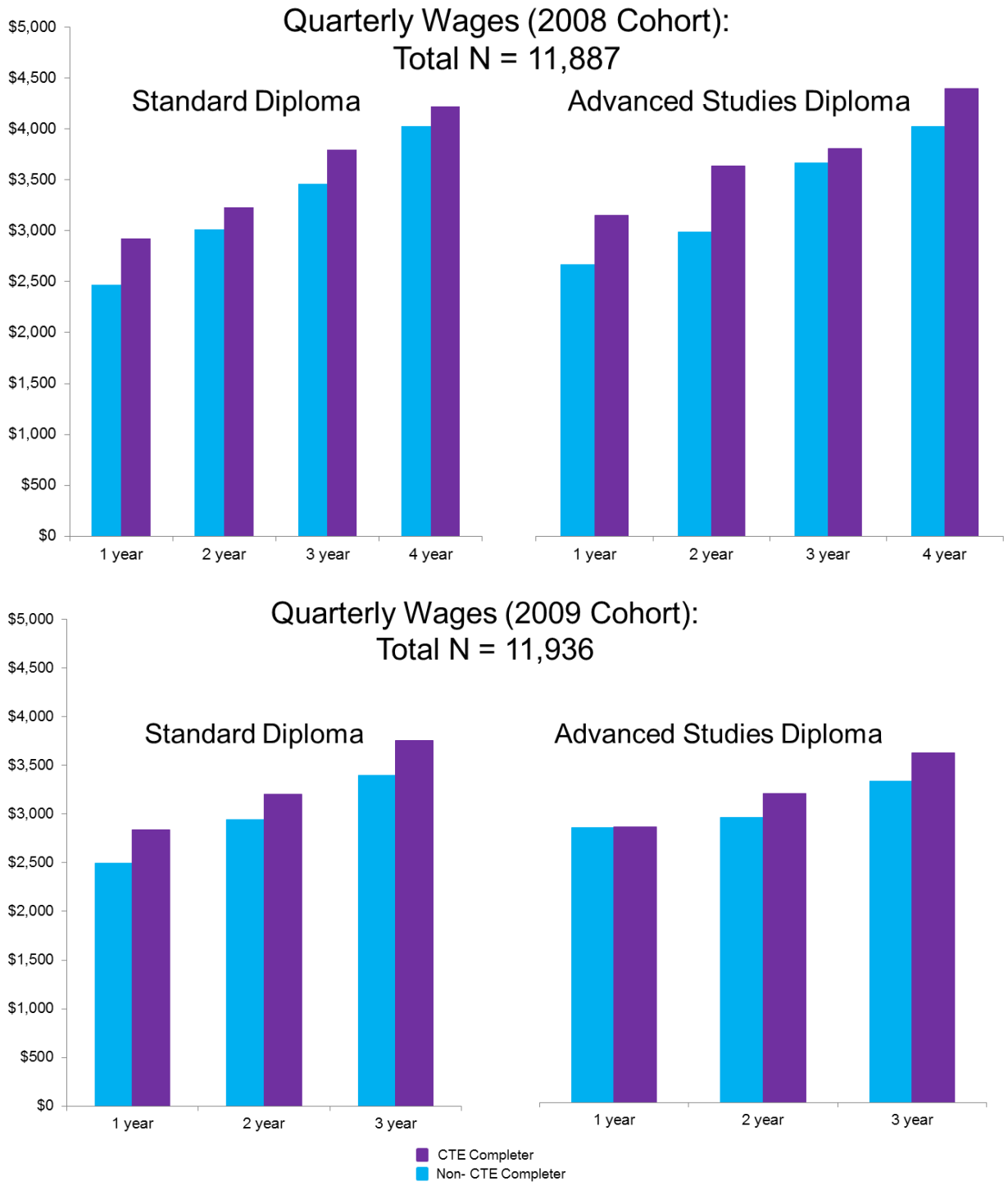
Figure 6 shows the average quarterly wages at three-months since students departed from a Virginia college. The graph on the left shows the 2008 cohort, and the graph on the right shows the 2009 cohort. The purple line represents the CTE completers and the blue dashed line represents the non-completers. The y-axis shows the average quarterly wage, while the x-axis shows the number of years a student attended a postsecondary institution prior to departure. The graph shows that overall, while CTE completers had higher quarterly wages overall, the longer a student stayed in college, the higher their quarterly wages upon departure. For example, for both the 2008 and 2009 cohort, if students had only 1 year of postsecondary college experience, their average quarterly wage was from $2,500 to $3000. With three years of postsecondary college experience, their average quarterly wage was $1,000 higher, ranging from $3,000 to $4,000.

Figure 6: Average quarterly wages three-months after departing college by CTE and Non-CTE students

Finding 6. CTE completers with Advanced Studies diplomas had higher average quarterly wages

Students who earned Advanced Studies diplomas had higher quarterly wages three-months after departing from a Virginia college than students who earned Standard diplomas. In fact, the students who earned the highest average quarterly wages were CTE completers with Advanced Studies diplomas. The graph, Figure 7, shows that the longer a student stayed in college, the higher their quarterly wages upon departure from college. For example, for both the 2008 and 2009 cohort, if students had only 1 year of postsecondary college experience, their average quarterly wage was from $2,500 to slightly over $3000, with CTE completers with Advanced Studies diplomas earning the highest. With three years of postsecondary college experience, their average quarterly wage was about $1,000 higher, ranging from $3,500 to $4,000.

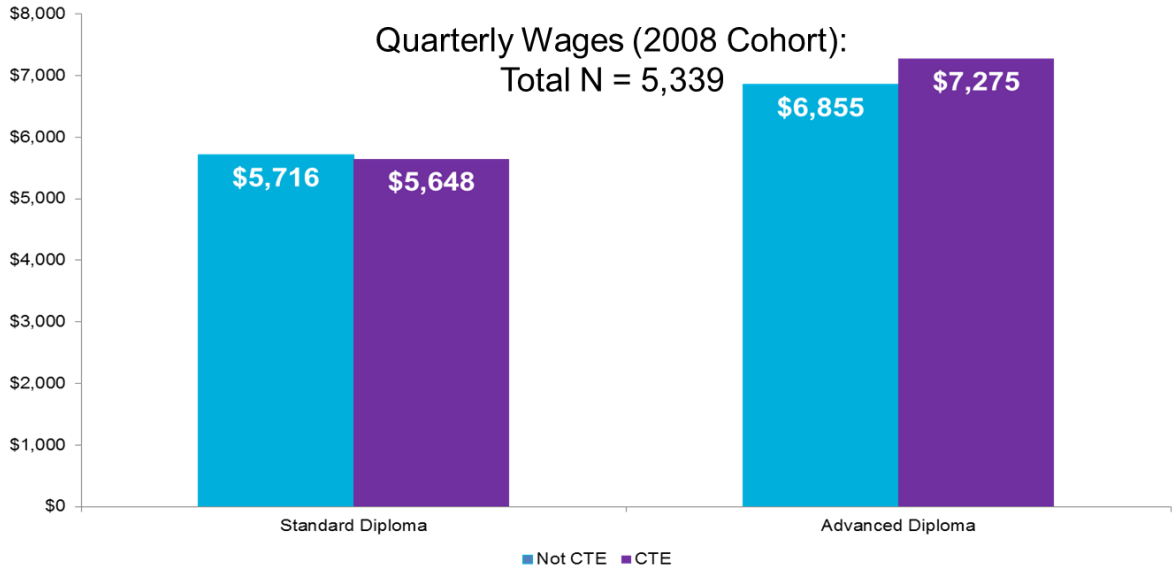
Figure 7: Average quarterly wages three-months after departing college by CTE and Non-CTE students and diploma type



Finding 7. For Bachelor's degree earners, having earned an Advanced Studies diploma and being a CTE completer resulted in higher average wages than other Bachelor-degree earners

This analysis looked only at students who graduated from college with a Bachelor's degree (and in some cases, Bachelor's and Associate's degrees). This means that data were only available for the 2008 cohort (4 years of post-high school data, with an earned Bachelor's degree). Interestingly, wages were highest among students who completed CTE and earned an Advanced Studies diploma, as shown in Figure 8. In fact, we observed a $1,627 difference in average quarterly wages (the equivalent of more than $6,500 per year) between CTE completers who earned Advanced Studies diplomas and those who earned Standard diplomas, despite both groups earning Bachelor's degrees. However, due to the significant drop in sample size and the descriptive nature of this finding,[5] the results should be considered cautiously.

Figure 8: Average quarterly wages three-months after graduating from college with a Bachelor's degree by CTE and Non-CTE completer status and diploma type



Note: N-count is small. More time/students are needed to assess impact of degree status on wages for CTE completers/non-completers.

* Based on cross-tabulation weighted descriptive statistics

In summary, we found that CTE completers had higher quarterly average wages than non-completers. This benefit for CTE completers was consistent across students who earned Standard or Advanced Studies diplomas in high school and across students who spent different amounts of time in college. For the 2008 cohort, we saw this same benefit for those CTE

[5] Because the result is from descriptive statistics, we did not control for important confounding variables, such as student demographic information, high school and college achievement (other than time and degree earned), and high school and college experiences within 2- and 4-year institutions. This would be an important follow-up topic and analyses.

completers who earned a Bachelor's degree. These consistent results are important, yet due to the reduced sample size, we caution using the results to draw firm conclusions. Besides the reduced sample size, another reason to caution the use of the results is that we have no information about the career field, area of study, or field of degree students earned. Previous research has shown that while overall, wages are higher for students who completed CTE programs in high school (Bishop & Mane, 2004), certificates (Carnevale, Rose, & Hanson, 2012), and 2-year community college degrees (Marcotte, 2006), we also see that students with STEM backgrounds earn more than other fields (Carnevale, Smith, & Melton, 2011). The wage difference by STEM was evident across degrees (e.g. Associates and Bachelor's degrees). Therefore, while these results provide a "first glance" of long-term outcomes, a larger sample size coupled with more information, such as field of study or field of employment, would be helpful to better inform the CTE office.

Conclusion

This report looked at the long-term outcomes of CTE completion on workforce outcomes, specifically, employment status during postsecondary education, and wages after postsecondary education. We utilized high school, postsecondary, and employment data for two cohorts of high school graduates: the high school graduating cohort of 2008 for four years of college, and the graduating cohort of 2009 for three years of college.

The results represent students who graduated high school in 2008 and 2009 who:

- Graduated from a public high school in Virginia;
- Were employed in Virginia by an employer that reports Unemployment Tax to the Virginia Employment Commission (VEC), which excludes federal employees including those in the Department of Defense.

This resulted in tracking 48,207 and 51,454 students for the 2008 and 2009 cohort respectively to determine employment status during postsecondary education, and 11,887 and 11,936 students for the 2008 and 2009 cohort respectively to determine wages after postsecondary education. Calculating both descriptive statistics and regression models, we found that CTE completion had a positive association with employment status while concurrently enrolled in college. Specifically, a larger percent of CTE completers were employed while in a postsecondary institution than non-completers. This pattern was consistent across 2-year and 4-year colleges and high school diploma type. For wages, we found that CTE completers had higher average quarterly wages three-months after departing from a postsecondary institution than non-completers. We also found that high school diploma type matters even for high school graduates who enrolled in college. Students who earned an Advanced Studies diploma in

high school earned higher quarterly wages than students who earned a Standard diploma. This difference was consistent even for students earned a Bachelor's degree.

The results of this study provide information about the potential value of work-based/applied learning approaches that are at the core of CTE programs of study. The report is designed to provide the CTE office with valuable information to inform their long-term interest in understanding CTE completers' outcomes. What is unique about this study is that it follows two cohorts of students beyond the nine months that Perkins requires, integrating information about students' high school, postsecondary, and employment data. Given the data limitations and small sample size for wage records, generalizations should be made with caution (see Appendix A for more information on sample limitations). Nonetheless,, the results of this study provides a "first glance" at the overall employment patterns and wages of CTE completers up to four years after high school.

Specific Implications for Policy and Future Research

Given the sample reduction with each dataset, generalizations cannot be made. These analyses are designed as a starting point to support the CTE office's long-term interest in understanding CTE completers' outcomes beyond the nine months that Perkins requires. In conducting the analyses, we learned not only that CTE completion has promise in promoting employment during and after college, we learned valuable lessons on the data sources and variables used in the analyses. Below, we outline implications for future research and policy.

Implications for Future Research

This study was successful in merging three sources of data (VDOE, SCHEV, and VEC) to look at workforce outcomes of the 2008 and 2009 Virginia high school graduates. We found that CTE completers were employed at higher rates during college and had higher quarterly average wages, as compared to non-completers. It is important for future research to tease out or explaining these differences.

Important factors to consider in future research include the type of employment, such as work-study, full-time, or part-time status. In our analysis, we did not control for students who worked during high school, or were enrolled in a dual-enrollment programs. These experiences in high school could be related to a smooth transition to college, as well as working while in college. Further, for students employed during college, this can provide valuable "human capital", such as networks, mentors, and exposure to employers, which could influence employment and wages after college.

To more fully understand CTE completers' long-term wages, it is critical that future research follow students for several more years and include information about students' field of study or employment. Even using the 2008 and 2009 high school graduating cohorts, we were limited to

four years and 3 years of data, respectively. It is important to understand whether CTE completion influences longer-term employment outcomes, as well as postsecondary outcomes. Looking at wage differences by career pathways, or field of employment, would also help delve deeper into the wage differences by CTE completers and non-completers.

To summarize, for future research, we recommend the following:

1) Additional time points. Especially for wage records, future research would benefit from more students and more time points of data post-college graduation to track employment status and wages. Many jobs require a Bachelor's degree for employment. Therefore, tracking wages and employment status after students earn a Bachelor's degree would help to determine if CTE has a sustained effect.
2) Dual enrollment. The conceptual model used in this study could be updated to include dual enrollment. The variable could then be included as a covariate in regression estimates or could be considered a key analytic variable, depending on interest.
3) Hours worked. For employment status, it is important to understand if there are differences based on full-time versus part-time status. The CTE Office collects information from a CTE completer follow-up survey, where one question asks whether a student is employed part-time or full-time. Adding results of the survey to data available within VLDS would enable researchers to include the data in future studies.
4) Career pathway/field of study/field of employment. Wages can differ greatly by the field of employment. Using data already available via VLDS, future analysis could include either career pathways or field of study (major in college). It would also be helpful to include field of employment in VLDS to strengthen these analyses. Including this information would help to distinguish wages for students in STEM fields, social services, and other fields.

Implications for Policy

Implications for policy include recommendations to the CTE office, as well as for VLDS. This study merged data from VDOE, SCHEV, and VEC to answer important questions for the CTE office. In so doing, we found challenges in obtaining variables of interest, as well as in matching a substantial proportion of high school graduates to wage records. For variables of interest, the CTE office collects survey data from their students' post-high school graduation with a high response rate. This survey can serve as a valuable data source for additional analyses. The survey already collects data on part-time versus full-time employment. Additional variables that could be added to the survey include information about career pathways or field of study, type or career field of their credential, reasons for working if they are in college full-time, reasons of

their CTE satisfaction, and information about college loans. These additional variables can help explain why we consistently see that CTE students are employed at higher rates during college, and explain the wage differential. Having this type of information can help program leaders ensure that students have access to the critical experiences that research shows are associated with better long-term postsecondary and wage outcomes.

When linking data between agency data sets, we saw a reduction in our analytic sample size, particularly with wage records. To be able to have access to more complete wage records, it may be possible to extend VLDS to leverage information available from other agencies to serve as a resource for probabilistic matching. For example, it may be possible to leverage data from Virginia's Department of Motor Vehicles to conduct probabilistic matches with high school records and deterministic matches with employment records to connect more data between high school and employment records; this approach has been successful in other states (see SLDS Topical Webinar Summary for more information). Establishing a method whereby Virginia can securely link de-identified records for nearly all high school graduates to employment outcomes would strengthen the Commonwealth's ability to focus on cost-effective education and workforce development programs, while providing parents, students, and families with objective information to inform decisions.

There may also be approaches to incorporating federal employment records into research projects. For example, depending on the project, aggregated federal employment records for recent high school graduates might improve employment estimates for recent high school graduates.

To summarize, for policy implications, we recommend the following:

1) Access to more complete wage records. VLDS could use probabilistic match through other agencies, such as DMV, to enhance employment estimates, particularly for high school graduates who do not go to college. This information would increase the availability of wage records data that can be used to understand high school graduates' employment pathways.
2) CTE Post-High School Survey. The data gathered from the CTE survey can be used to refine the current analyses. For example, the CTE survey already collects information about full-time/part-time status, whether the student earned a credential, whether a student is employed (and reasons for unemployment), and their overall satisfaction with their CTE program of study in high school. Adding the survey data to VLDS would be necessary to include the results in the types of analyses described in this report.
3) Additional questions to the CTE Post-High School Survey. The current survey has a high response rate, part in due to the short, easy-to-complete survey design.

Without adding too much burden to students, additional questions can include the field of study or field of their credential, and whether students have loans to attend college. Survey results would need to be included in VLDS to be used in this type of research project.

Work Cited

Barnett, E. A., & Bragg, D. D. (2006). Academic pathways and increased opportunities for underserved students: Crosscutting themes and lessons learned. *New Directions for Community Colleges, 135*, 101-107.

Bishop, J. H., & Mane, F. (2004). The impacts of career-technical education on high school labor market success. *Economics of Education Review, 23*, 381-402.

Carnevale, A. P., Rose, S. J., & Hanson, A. R. (2012). Certificates: Gateway to Gainful Employment and College Degrees. Washington DC: Georgetown University Center on Education and the Workforce.

Carnevale, A. P., Smith, N., & Melton, M. (2011). Science Technology Engineering Mathematics (STEM). Washington DC: Georgetown University Center on Education and the Workforce.

Castellano, M., Stringfield, S., & Stone, J. R. (2003). Secondary career and technical education and comprehensive school reform: Implications for research and practice. *Review of Educational Research, 73*(2), 231-272.

Dare, D. E. (2006). The role of career and technical education in facilitating student transitions to postsecondary education. *New Directions for Community Colleges, 135*, 73-80.

Deke, J., Dragoset, L., & Moore, R. (2010). Precision Gains from Publically Available School Proficiency Measures Compared to Study-Collected Test Scores in Education Cluster-Randomized Trials (NCEE 2010-4003). Washington DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, US Department of Education.

Dynarski, S. M., Hemelt, S. W., & Hyman, J. M. (2013). The Missing Manual: Using National Student Clearinghouse Data to Track Postsecondary Outcomes (NBER Working Paper 19552). Cambridge, MA: National Bureau of Economic Research.

Federal Interagency Forum on Child and Family Statistics. (2014). America's Young Adults: Special Issue, 2014. Washington DC: US Government Printing Office.

Greene, W. H. (2008). *Econometric Analysis* (6th ed.). New Jersey: Prentice Hall.

Holian, L., & Mokher, C. (2011). Estimating College Enrollment Rates for Virginia Public High School Graduates (REL 2011-No. 104). Washington DC: Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.

Jonas, D., Garland, M., Yamaguchi, R., & Hall, L. (2014). *Following high school CTE completers into college and the workforce*. Presentation at the VLDS Insights Conference, June 24, 2014. Glen Allen, Virginia.

Lister, K., & Harnish, T. (2011). The State of Telework in the U.S.: How Individuals, Businesses, and Government Benefit. San Diego, CA: Telework Research Network.

Marcotte, D. E. (2006). The Earnings Effect of Education at Community Colleges. Bonn, Germany: The Institute for the Study of Labor.

NCES. (2014). NCES Data Point: Trends in CTE Coursetaking (NCES 2014-901). Washington DC: US Department of Education National Center for Education Statistics.

Plank, S. B., DeLuca, S., & Estacion, A. (2008). High school dropout and the role of career and technical education: A survival analysis of surviving high school. *Sociology of Education, 81*(October), 345-370.

Schochet, P. Z. (2005). Statistical Power for Random Assignment Evaluations of Education Programs. Princeton, NJ: Mathematica Policy Research Inc.

Shandra, C. L., & Hogan, D. P. (2008). School-to-work program participation and the post-high school employment of young adults with disabilities. *Journal of Vocational Rehabilitation, 29*, 117-130.

Szumilas, M. (2010). Explaining odds ratios. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 19*(3), 227-229.

Appendix A: Data Sources, Variables, and Analytic Technique

The analysis of CTE completer's workforce outcomes relied on two cohorts of students: the 2008 high school graduates and the 2009 high school graduates from the state of Virginia. The analysis focused on the following questions:

1. To what extent were high school graduates employed while enrolled in a postsecondary institution?
    a. Were there differences in concurrent employment between CTE completers and non-completers?
    b. What other factors, besides CTE completion status, were associated with concurrent employment in college?
2. What were the average wages of CTE and non-CTE completers after they left college (with or without a credential) and entered the workforce?

Data Sources and Variables

The data from the 2008 and 2009 cohorts were obtained using VLDS, and included high school records from VDOE, postsecondary enrollment and completion records from SCHEV, and quarterly wage records from VECF. In our analysis of employment participation and earnings, we used the following outcome measures:

- Employment status (yes or no), based on employment data from VEC wage records and work-study information available from SCHEV records.
- Quarterly earnings, based on VEC wage records.

Given that we had secondary, postsecondary, and employment records, we were able to control for student demographics, high school experience, and postsecondary experience as we look at employment status and wages. We estimated outcomes using a series of statistical models that increase the statistical controls (i.e., covariates) included in each subsequent model. Table A.1 shows the list of variables used in the analysis.

Table A.1: Variables Used in the Analysis

Variable Name	Description of Variable	Value	Label
	Workforce Outcomes		
Employment Status by semester	Employed post-high school from VEC or SCHEV	0, 1	No, Yes
Wages by quarter	Wages post-IHE by fiscal quarter from VEC	Dollar	Wages by quarter
	Student Demographic Characteristics		
Disadvantage status	Economically disadvantaged status from VDOE	0, 1	No, Yes

Limited English Proficient	Limited English Proficient status from VDOE	0, 1	No, Yes
Student Gender	Student gender from VDOE	0, 1	Female, Male
Student Race/Ethnicity	Student's race category from VDOE	0, 1, 2, 3, 4, 5	Unspecified, Native American, Asian, African American, Hispanic, White
Students with Disability	Student had at least one primary disability code from VDOE	0, 1	No, Yes
	High School Experience and Achievement		
CTE Type	CTE Completer in high school status from VDOE	0, 1	No, Yes
Semester Enrollment	Postsecondary IHE semester enrollment from SCHEV	1, 2, 3	Fall, Spring, Summer semester
Time	Semester-year linear trend from SCHEV	1 - 9	2008 cohort: 1 = Fall 2008 ~ 9 = Spring 2012 2009 cohort: 1 = Fall 2009 ~ 7 = Spring 2012
AP Participation	AP participation type in high school from VDOE	0, 1, 2, 3	No AP; AP class but no exam; AP class and exam; AP exam no class
Algebra II	Algebra II SOL scaled score from VDOE	Score	Scale score of Algebra II
Attendance rate	Percent of total days student present at school from VDOE	0-100%	Attendance rate of student
English SOL	English/Writing SOL scaled score from VDOE	Score	Scale score of English/Writing SOL
Graduation Type	High School Diploma type from VDOE	1, 2, 3, 4	Standard, Advanced/IB, Special, Modified
	High School Characteristics		
HS Algebra II	High school mean Algebra II SOL scaled score from VDOE	Score	High school average Algebra II SOL
HS Attendance Rate	High school mean attendance rate from VDOE	0-100%	High school attendance rate
HS Disadvantage Status Rate	High school percentage who were economically disadvantaged from VDOE	0-100%	High school Economically Disadvantage rate

HS English SOL	High school mean English/Writing SOL scaled score from VDOE	Score	High school average English SOL
HS CTE Rate	High school percentage who were CTE finishers from VDOE	0-100%	High school CTE rate
HS SAT/ACT English	High school mean combined SAT/ACT English score from VDOE	Score	Average SAT/ACT English for school
HS SAT/ACT Math	High school mean combined SAT/ACT mathematics score from VDOE	Score	Average SAT/ACT math for school
Postsecondary Characteristics			
IHE Type	Last-IHE type in a semester-year from SCHEV	0, 1, 2	No enrollment record, 2 year, 4- year
Admission_08	IHE Admissions rate: Percent admitted in 2008 SY – total from SCHEV	0-100%	Percent admission rate for IHE
Graduation_08	IHE Graduation rate: Percent graduated in 2008 SY – total from SCHEV	0-100%	Percent graduation rate for IHE
Tuition_08	Tuition and fees of IHE in 2008 SY from SCHEV	Dollar	Total dollar cost of IHE

Analytic Technique

Given the cross-sectional nature of the data, we calculated a series of descriptive statistics separately for the 2008 and 2009 cohort by semester and by fiscal quarter. Further, the descriptive statistics included cross-tabulations of CTE and non-CTE students by diploma type, by IHE type, and by economically disadvantaged students. The descriptive statistics included the sample size (N-count) and weighted outcomes (percentages and averages). The outcomes were weighted by N-count.

We also estimated a logistic regression for employment status (0 = No; 1 = Yes). The logistic regression was done in a nested method, where we built the model by adding a set of covariates. These models estimated the likelihood that students were simultaneously employed and enrolled in an IHE. Models assessed how CTE completion in high school affected these estimates. Further, we controlled for individual demographic characteristics, high school program participation, and high school achievement and course-taking rigor. We also assessed whether institutional factors influenced the estimates, including high school and IHE location, IHE type (two-year/four-year), and IHE graduation rates. The outcome measure for these models was binary employment status, based on identification in VEC wage or SCHEV work-

study records. Each successive model added variables to assess the degree to which each group of variables influenced the probability of being employed while in college. The following models include:

- **Model 1: CTE completer status.** This was the base model that descriptively compares college students' employment status in accordance with high school graduates' CTE completer status.
- **Model 2**: **Add IHE type** (two-year/four-year)
- **Model 3: Add IHE institutional factors**
- **Model 4**: **Add high school experience (achievement and course-taking rigor)**
- **Model 5: Add high school institutional factors**
- **Model 6: Add student demographics and program participation in high school**

Through these models, we determined if employment status was robust or if it was sensitive to student demographic characteristics, high school achievement and experience, and postsecondary experience. Below was the logistic equation used for the final model (Model 6).

$$
\begin{aligned}
Y_i = \mathrm{L} = \ \ln(o) &= \ln\left(\frac{p}{1-p}\right) \\
&= \beta_{0i} + \ \beta_1(CTE\ Type)_i + \ \beta_2(Semester\ Enroll)_i + \beta_3(Time)_i \\
&+ \beta_4(IHE\ Type)_i + \beta_5(Admin\_08)_i + \beta_6(Grad\_08)_i + \beta_7(Tuition\_08)_i \\
&+ \beta_8(AP)_i + \beta_9(AlgII)_i + \beta_{10}(Attendance)_i + \beta_{12}(English)_i \\
&+ \beta_{13}(Grad\ Type)_i + \beta_{14}(HS\ AlgII\ Rate)_i + \beta_{15}(HS\ Attendance)_i \\
&+ \beta_{16}(HS\ EcDis)_i + \beta_{17}(HS\ English)_i + \beta_{18}(HS\ CTE)_i \\
&+ \beta_{19}(HS\ SAT\ ACT\ English)_i + \beta_{20}(HS\ SAT\ ACT\ Math)_i + \beta_{21}(EcDis)_i \\
&+ \beta_{22}(LEP)_i + \beta_{23}(Gender)_i + \beta_{24}(Race\ Ethnicity)_i + \beta_{25}(SWD)_i + \varepsilon_i
\end{aligned}
$$

Where

- Y_i is the binary outcome, employment status, for the i-th student. L represents the ln(odds of the event). $\beta_1(CTE\ Type)_i$ represents the main variable of interest, CTE status.
- Model 1 represents the regression with $\beta_1, \beta_2, \beta_3$ as covariates.
- Model 2 represents the inclusion of IHE type with β_4 as the covariate.
- Model 3 adds the IHE institutional factors with $\beta_5, \beta_6, \beta_7$ as covariates.
- Model 4 includes high school experiences including achievement and course-taking with $\beta_8, \beta_9, \beta_{10}, \beta_{11}, \beta_{12}, \beta_{13}$ as covariates.
- Model 5 adds the high school institutional factors with $\beta_{14}, \beta_{15}, \beta_{16}, \beta_{17}, \beta_{18}, \beta_{19}, \beta_{20}$ as covariates.
- Model 6 adds the student demographics with $\beta_{21}, \beta_{22}, \beta_{23}, \beta_{24}, \beta_{25}$.

$\beta_3(Time)_i$ represents cross-sectional data for eight time points for the 2008 cohort, and seven time points for the 2009 cohort.

To account for repeated observations within each student, we used the robust cluster variance estimator in Stata. Taken together, we controlled for student demographics, high school achievement and experience, and postsecondary experience. Table A.2 shows a cross-walk of the research questions, data sources, and analytic technique used.

Table A.2: Cross-walk of Research Questions, Data Source, and Analysis

Research Question	Data Source	Analytic Technique
How many high school graduates were employed while enrolled in a postsecondary institution? Are there differences between CTE completers and non-completers?	VDOE SCHEV VEC	• Descriptive statistics of employment status • Cross-tabulation of employment status by ○ CTE status • Logistic multivariate regression
What are the characteristics of students who concurrently work while in college and those who do not?	VDOE SCHEV VEC	• Logistic multivariate regression

Are there systematic differences in graduates' observed characteristics and achievement in high school (e.g., CTE completer status; student demographic characteristics; achievement variables) for those who are concurrently employed and enrolled in an IHE, and those who are not?	VDOE
	SCHEV
	VEC
		• Cross-tabulation of employment status by
		  ○ CTE status X Diploma type
		  ○ CTE status X Economically disadvantaged status

Is CTE completion status associated with wages earned for high school graduates who left college (with or without a credential) and entered the workforce?	VDOE
	SCHEV
	VEC
		• Cross-tabulation of quarterly wages by
		  ○ CTE status X Diploma type
		  ○ CTE status X Bachelor's degree

Study Limitations: General Limitations of the Data

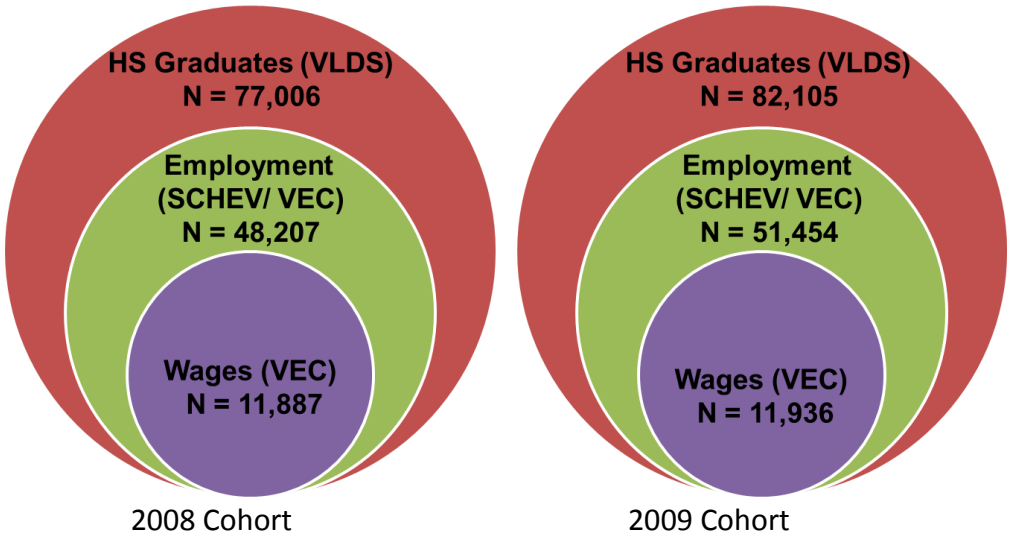
This report represented information about the 2008 and 2009 high school graduating cohort. With authorization, the research team accessed data through VLDS to merge records from

VDOE, SCHEV, and VEC to look at long-term employment outcomes. As seen in Figure A.1, our data was limited to students who:

- Graduated from a public high school in Virginia;
- Enrolled directly in a non-profit public or private university and
- Were employed in Virginia by an employer that reports Unemployment Tax to the Virginia Employment Commission (VEC).

This excluded students who attended private high schools, private for-profit colleges in Virginia or attended an out-of-state college or university. This also excluded students employed by the Department of Defense, the federal government, or out-of-state employers. This can disproportionately affect certain regions in Virginia. For example, in Norfolk, many residents are employed by the Department of Defense. In Northern Virginia, many residents are employed by the federal government. In border regions, residents can be employed out-of-state. Further, with the increase in teleworking nationwide (Lister & Harnish, 2011), many more residents are teleworkers, where they work for an out-of-state employer.

Figure A.1: General Limitations of the Data—Sample Reduction



For the 2008 graduating cohort, we started with 77,006 of students in the VLDS data, shown in Figure 1 and Table 1. For employment status while concurrently attending a Virginia postsecondary institution in the fall of 2008, we merged SCHEV and VEC data and resulted in 48,207 students in the sample who enrolled DTC into a postsecondary institution in Virginia that reports enrollment records to SCHEV. Further, when linked VEC wage records for students who departed from a Virginia postsecondary institution. The result was a further reduction for a sample size of 11,887. More information between the students not represented (or

unmatched) compared to students in the sample (or matched) is in Appendix B. The demographic characteristics among students in the wage sample versus students not in the wage sample were similar, with about 14% economically disadvantaged, 6% students with disabilities, 2% Limited English Proficient, 67% White, 20% African American, and 4% Hispanic.

For the 2009 graduating cohort, we started with 82,105 students in the VLDS data. For employment in college in the fall of 2009, we had 51,454 students in the sample. Further, when linked to the VEC wage records after departing from college, our sample reduces even more to 11,936. More information between the students not represented (or unmatched) compared to students in the sample (or matched) is in Appendix B. The demographic characteristics of students in the wage sample versus students not in the wage sample were similar, with about 17% economically disadvantaged, 7% students with disabilities, 2% Limited English Proficient, 65% White, 22% African American, and 5% Hispanic.

The reduction in the sample size from high school to postsecondary education is due to students who did not attend a Virginia college or university. Further, the sample is greatly reduced with wage records after departing from a postsecondary institution, representing only 15% of the original high school students. In Northern Virginia, many residents are employed by the federal government. In areas such as Norfolk, many residents are employed by the Department of Defense. These areas will not be represented in the wage records. In addition, the sample must be employed in Virginia by an employer that reports Unemployment Tax to the Virginia Employment Commission (VEC); this can exclude people who are employed in Washington, D.C., Maryland, North Carolina, or other regions outside of Virginia.

Appendix B: Sample Description

Concurrent college enrollment and employment

The following tables show the sample of students from VLDS matched using SCHEV and VEC. The report shows results for the sample of those kids who were eligible to be matched; meaning, students must have enrolled directly to college in a SHEV institution.

The sample description below shows the match results for students who enrolled directly to college in a SCHEV institution.

Table B.1: Descriptive Statistics of Unmatched and Matched Samples for the 2008 Cohort Employment Status Records (VLDS, SCHEV, and VEC datasets)

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics	Total Sample Descriptive Statistics
CTE Completer	Mean =	0.37	0.43	0.42
	N =	7,153	41,054	48,207
Standard diploma	Mean =	0.22	0.32	0.30
	N =	7,153	41,054	48,207
Advanced Studies diploma	Mean =	0.78	0.68	0.70
	N =	7,153	41,054	48,207
Algebra II	Mean =	483.41	464.94	467.66
	N =	5,792	33,558	39,350
English SOL	Mean =	502.98	489.16	491.21
	N =	7,042	40,459	47,501
Attendance	Mean =	95.55	95.18	95.24
	N =	7,097	40,544	47,641
Any AP	Mean =	0.53	0.40	0.42
	N =	7,153	41,054	48,207
ACT English	Mean =	24.68	22.34	22.71
	N =	5,955	31,163	37,118
Asian	Mean =	0.11	0.06	0.07
	N =	7,153	41,054	48,207
African American	Mean =	0.17	0.20	0.20
	N =	7,153	41,054	48,207
Hispanic	Mean =	0.03	0.04	0.04
	N =	7,153	41,054	48,207
White	Mean =	0.67	0.67	0.67
	N =	7,153	41,054	48,207

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics	Total Sample Descriptive Statistics
Disadvantaged status	Mean =	0.11	0.14	0.13
	N =	7,153	41,054	48,207
Student gender (Male)	Mean =	0.54	0.44	0.46
	N =	7,153	41,054	48,207
Limited English Proficient	Mean =	0.02	0.02	0.02
	N =	7,153	41,054	48,207
Students with Disabilities	Mean =	0.07	0.06	0.06
	N =	7,153	41,054	48,207

Table B.2: Descriptive Statistics of Unmatched and Matched Samples for the 2009 Cohort Employment Status Records (VLDS, SCHEV, and VEC datasets)

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics	Total Sample Descriptive Statistics
CTE Completer	Mean =	0.39	0.45	0.44
	N =	10,231	41,223	51,454
Standard diploma	Mean =	0.25	0.33	0.32
	N =	10,231	41,223	51,454
Advanced Studies diploma	Mean =	0.75	0.67	0.68
	N =	10,231	41,223	51,454
Algebra II	Mean =	484.85	466.09	469.90
	N =	9,109	35,676	44,785
English SOL	Mean =	507.50	494.60	497.17
	N =	10,080	40,564	50,644
Attendance	Mean =	95.61	95.12	95.22
	N =	10,104	40,670	50,774
Any AP	Mean =	0.52	0.40	0.42
	N =	10,231	41,223	51,454
ACT English	Mean =	24.61	22.20	22.71
	N =	7,712	28,820	36,532
Asian	Mean =	0.11	0.06	0.07
	N =	10,231	41,223	51,454
African American	Mean =	0.15	0.22	0.20
	N =	10,231	41,223	51,454
Hispanic	Mean =	0.06	0.05	0.05
	N =	10,231	41,223	51,454
White	Mean =	0.66	0.65	0.65

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics	Total Sample Descriptive Statistics
	N =	10,231	41,223	51,454
Disadvantaged status	Mean =	0.11	0.17	0.16
	N =	10,231	41,223	51,454
Student gender (Male)	Mean =	0.54	0.44	0.46
	N =	10,231	41,223	51,454
Limited English Proficient	Mean =	0.04	0.02	0.03
	N =	10,231	41,223	51,454
Students with Disabilities	Mean =	0.09	0.07	0.07
	N =	10,231	41,223	51,454

Post-college wage outcomes for CTE completers and non-completers

The following tables show the sample of students from VLDS matched using SCHEV and VEC for wage records. The tables below show the matched versus unmatched students immediately after they departed from a postsecondary institution (time point zero).

Table B.3: Descriptive Statistics of Unmatched and Matched Samples for the 2008 Cohort Wage Records (VLDS, SCHEV, and VEC datasets)

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics
CTE Completer	Mean =	0.46	0.49
	N =	9,071	11,887
Standard diploma	Mean =	0.46	0.51
	N =	9,071	11,887
Advanced Studies diploma	Mean =	0.54	0.49
	N =	9,071	11,887
Algebra II	Mean =	453.31	445.25
	N =	6,951	8,985
English SOL	Mean =	477.99	471.50
	N =	8,909	11,697
Attendance	Mean =	94.38	94.34
	N =	8,879	11,639
Any AP	Mean =	0.29	0.22
	N =	9,071	11,887
SAT ACT English	Mean =	21.25	20.02
	N =	6,250	7,281
Asian	Mean =	0.06	0.04

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics
	N =	9,071	11,887
African American	Mean =	0.28	0.25
	N =	9,071	11,887
Hispanic	Mean =	0.05	0.06
	N =	9,071	11,887
White	Mean =	0.60	0.64
	N =	9,071	11,887
Disadvantaged status	Mean =	0.18	0.18
	N =	9,071	11,887
Student Gender (Male)	Mean =	0.54	0.48
	N =	9,071	11,887
Limited English Proficient	Mean =	0.02	0.02
	N =	9,071	11,887
Students with Disabilities	Mean =	0.10	0.09
	N =	9,071	11,887

Table B.4: Descriptive Statistics of Unmatched and Matched Samples for the 2009 Cohort Wage Records (VLDS, SCHEV, and VEC datasets)

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics
CTE Completer	Mean =	0.47	0.51
	N =	10,713	11,936
Standard diploma	Mean =	0.50	0.54
	N =	10,713	11,936
Advanced Studies diploma	Mean =	0.50	0.46
	N =	10,713	11,936
Algebra II	Mean =	455.11	445.38
	N =	8,361	9,184
English SOL	Mean =	482.49	474.27
	N =	10,494	11,717
Attendance	Mean =	94.21	94.25
	N =	10,455	11,675
Any AP	Mean =	0.28	0.21
	N =	10,713	11,936
SAT ACT English	Mean =	21.22	19.75
	N =	6,327	6,379
Asian	Mean =	0.06	0.04
	N =	10,713	11,936

		Unmatched Sample Descriptive Statistics	Matched Sample Descriptive Statistics
African American	Mean =	0.27	0.26
	N =	10,713	11,936
Hispanic	Mean =	0.06	0.07
	N =	10,713	11,936
White	Mean =	0.59	0.61
	N =	10,713	11,936
Disadvantaged status	Mean =	0.21	0.23
	N =	10,713	11,936
Student Gender (Male)	Mean =	0.52	0.47
	N =	10,713	11,936
Limited English Proficient	Mean =	0.03	0.03
	N =	10,713	11,936
Students with Disabilities	Mean =	0.11	0.09
	N =	10,713	11,936

Appendix C: Table of Results

The analysis used two cohorts of students (2008 high school graduates and the 2009 high school graduates) to answer the following questions:

1. To what extent were high school graduates employed while enrolled in a postsecondary institution?
    a. Were there differences in concurrent employment between CTE completers and non-completers?
    b. What other factors, besides CTE completion status, were associated with concurrent employment in college?
2. What were the average wages of CTE and non-CTE completers after they left college (with or without a credential) and entered the workforce?

The two main outcomes included:

- Employment status (yes or no), based on employment data from VEC wage records and work-study information available from SCHEV records.
- Quarterly earnings, based on VEC wage records.

For the outcome, employment status, we employed both descriptive statistics, cross-tabulated weighted means and sample sizes, and multivariate regressions. These results are shown in Tables C.1 and C.2.

For the outcome, quarterly wage records, we employed descriptive statistics and cross-tabulated weighted means and sample sizes. These results are shown in Tables C.3 through C.12.

Table C.1: Percent of students employed by semester by CTE status, institution type, and diploma type: 2008 cohort

	Not CTE				CTE			
	2 year		*4 year*		*2 year*		*4 year*	
	Standard	*Advanced*	*Standard*	*Advanced*	*Standard*	*Advanced*	*Standard*	*Advanced*
Fall 2008	65%	69%	30%	27%	67%	69%	29%	31%
N =	4,038	3,807	1,607	14,540	4,732	3,429	1,383	7,603
Spring 2009	61%	67%	31%	32%	64%	67%	32%	36%
N =	3,824	3,968	1,517	14,198	4,509	3,487	1,334	7,408
Fall 2009	64%	70%	36%	34%	66%	71%	37%	38%
N =	3,089	3,874	1,340	13,776	3,551	3,332	1,159	7,133
Spring 2010	60%	67%	37%	36%	64%	68%	38%	39%
N =	2,809	3,722	1,259	13,470	3,200	3,195	1,097	6,942
Fall 2010	67%	72%	43%	39%	69%	72%	46%	42%
N =	2,185	2,857	1,359	13,719	2,454	2,316	1,180	7,279

Spring 2011	66%	69%	45%	40%	67%	72%	46%	44%
N =	1,890	2,458	1,392	13,639	2,110	2,044	1,219	7,263
Fall 2011	67%	70%	48%	42%	69%	74%	48%	46%
N =	1,422	1,844	1,521	13,771	1,606	1,442	1,318	7,316
Spring 2012	68%	72%	50%	43%	72%	76%	50%	47%
N =	1,252	1,624	1,519	13,366	1,360	1,239	1,306	7,152

Note: The table shows the 2008 graduating cohort who enrolled directly into a SCHEV college.

Table C.2: Percent of students employed by semester by CTE status: 2009 cohort

	Not CTE				**CTE**			
	2 year		***4 year***		***2 year***		***4 year***	
	Standard	*Advanced*	*Standard*	*Advanced*	*Standard*	*Advanced*	*Standard*	*Advanced*
Fall 2009	54%	61%	24%	24%	57%	61%	26%	27%
N =	4,693	4,328	1,470	14,398	5,760	4,304	1,341	8,195
Spring 2010	51%	59%	26%	27%	55%	60%	29%	29%
N =	4,703	4,529	1,373	14,048	5,674	4,399	1,261	7,974
Fall 2010	60%	67%	34%	34%	64%	66%	34%	36%
N =	3,479	4,105	1,239	13,615	4,178	3,938	1,118	7,656
Spring 2011	59%	66%	35%	35%	62%	65%	34%	38%
N =	3,050	3,978	1,171	13,293	3,777	3,762	1,067	7,413
Fall 2011	61%	68%	42%	39%	63%	67%	40%	42%
N =	2,353	2,860	1,337	13,735	2,791	2,692	1,214	7,853
Spring 2012	64%	70%	45%	41%	65%	69%	44%	45%
N =	1,999	2,446	1,353	13,596	2,499	2,337	1,246	7,805

Note: The table shows the 2009 graduating cohort who enrolled directly into a SCHEV college.

Table C.3: Multivariate Regression Results for Employment Status: 2008 Cohort

	2008 Model 1	2008 Model 2	2008 Model 3	2008 Model 4	2008 Model 5	2008 Model 6
CTE Type	1.299***	1.132***	1.047*	1.038	1.041	1.099***
Semester Enroll	1.039***	1.087***	1.113***	1.111***	1.112***	1.113***
Time	0.976***	0.951***	0.981**	0.981**	0.981**	0.982**
IHE Type		3.588***	1.521***	1.745***	1.574***	1.482***
Graduation_08				(-0.0712)	(-0.0689)	(-0.0619)
Tuition_08				(-0.00895)	(-0.00876)	(-0.00917)
Admission_08			0.998*	0.998**	0.998*	0.996***
Attendance rate				1.002	0.996	1.004
Graduation Type				1.227***	1.202***	1.089*
Algebra II				0.999***	0.999***	0.999***
English SOL				1.00	1.00	0.999**
AP Participation: AP class no exam					-0.0283	-0.0174
AP Participation: AP class exam				0.938**	0.968	0.955
AP Participation: No AP class, only exam					-0.0591	-0.049
HS Algebra II					1.003***	1.003**
HS English SOL					0.996**	0.998*
HS Attendance Rate					1.020**	1.015*
HS SAT/ACT Math					0.902***	0.927***
HS SAT/ACT English					1.018	0.99
HS Disadvantage Status Rate					0.499***	0.493***
HS CTE Rate					0.881	0.802**
Student Race/Ethnicity: Unspecified						0.812*
Student Race/Ethnicity: Native American						0.973
Student Race/Ethnicity: Asian						0.775***
Student Race/Ethnicity: African American						0.720***
Student Race/Ethnicity: Hispanic						1.092

	2008 Model 1	2008 Model 2	2008 Model 3	2008 Model 4	2008 Model 5	2008 Model 6
Disadvantage status						1.238***
Student Gender						0.613***
Limited English Proficient						1.06
Students with Disability						0.736***
Number of Observations (N)	278754	278754	190490	163834	163813	163813

Note: Depicted are odds ratio for employment status; * p<.05; ** p<.01; *** p<.001.

Table C.4: Multivariate Regression Results for Employment Status: 2009 Cohort

	2009 Model 1	2009 Model 2	2009 Model 3	2009 Model 4	2009 Model 5	2009 Model 6
CTE Type	1.264***	1.088***	1.016	1.009	1.019	1.083***
Semester Enroll	1.100***	1.156***	1.196***	1.196***	1.197***	1.199***
Time	0.939***	0.908***	0.921***	0.923***	0.923***	0.923***
IHE Type		3.188***	1.598***	1.711***	1.592***	1.631***
Graduation_08			(-0.0798)	(-0.0748)	(-0.0677)	(-0.0752)
Tuition_08			(-0.0104)	(-0.0115)	(-0.0114)	(-0.0134)
Admission_08			0.997**	0.997***	0.997***	0.995***
Attendance rate				1.002	0.997	1.005
Graduation Type				1.347***	1.353***	1.232***
Algebra II				0.999***	0.999***	0.999***
English SOL				1.00	1.00	0.999**
AP Participation: AP class no exam				-0.0328	-0.0211	-0.0175
AP Participation: AP class exam				0.930**	0.944*	0.940*
AP Participation: No AP class, only exam				(-0.0108)	(-0.0211)	(-0.0170)
HS Algebra II					1.004***	1.003**
HS English SOL					0.998	0.999
HS Attendance Rate					1.006	1.004
HS SAT/ACT Math					0.875***	0.901***
HS SAT/ACT English					1.044*	1.016
HS Disadvantage Status Rate					0.472***	0.485***
HS CTE Rate					0.780**	0.695***
Student Race/Ethnicity: Unspecified						0.849*

	2009 Model 1	2009 Model 2	2009 Model 3	2009 Model 4	2009 Model 5	2009 Model 6
Student Race/Ethnicity: Native American						0.812
Student Race/Ethnicity: Asian						0.723***
Student Race/Ethnicity: African American						0.733***
Student Race/Ethnicity: Hispanic						1.101
Disadvantage status						1.165***
Student Gender						0.617***
Limited English Proficient						1.016
Students with Disability						0.601***
Number of Observations (N)	233405	233405	145010	138015	138012	138012

Note: Depicted are odds ratio for employment status; * p<.05; ** p<.01; *** p<.001.

Table C.5: Quarterly Wages for 2008 Cohort: One Year of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$1880.70	$1780.20	$2122.17	$2343.27
	N = 699	N = 368	N = 861	N = 325
1	$2466.49	$2668.31	$2927.20	$3151.64
	N = 708	N = 392	N = 881	N = 352
2	$2736.69	$3030.76	$3230.18	$3425.38
	N = 670	N = 361	N = 829	N = 333
3	$3329.59	$3613.10	$3775.79	$4105.13
	N = 658	N = 364	N = 831	N = 319
4	$3450.86	$3708.97	$4039.83	$4241.12
	N = 670	N = 361	N = 840	N = 316
5	$3834.21	$4095.14	$4413.39	$4874.16
	N = 656	N = 347	N = 825	N = 304
6	$4241.25	$4643.33	$4729.73	$5231.08
	N = 651	N = 359	N = 825	N = 312
7	$4424.93	$4965.52	$4979.29	$5481.20
	N = 671	N = 351	N = 825	N = 326

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
8	$4671.63	$5725.41	$5865.06	$5635.98
	N = 276	N = 109	N = 304	N = 108

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2008 cohort.

Table C.6: Quarterly Wages for 2008 Cohort: Two Years of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$2,372.64	$2,297.49	$2,407.31	$2,564.55
	N = 528	N = 441	N = 611	N = 376
1	$3,017.58	$2,985.06	$3,233.48	$3,641.38
	N = 572	N = 470	N = 660	N = 394
2	$3,335.80	$3,367.52	$3,500.74	$3,915.95
	N = 551	N = 455	N = 675	N = 399
3	$3,749.78	$3,826.23	$4,022.57	$4,420.15
	N = 545	N = 428	N = 644	N = 375
4	$4,058.55	$4,368.88	$4,534.22	$4,822.26
	N = 548	N = 441	N = 629	N = 363
5	$4,528.20	$4,858.22	$4,885.20	$5,415.59
	N = 538	N = 428	N = 628	N = 352
6	$4,971.77	$4,994.40	$5,230.80	$5,357.86
	N = 216	N = 179	N = 263	N = 121

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2008 cohort.

Table C.7: Quarterly Wages for 2008 Cohort: Three Years of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$2,734.32	$2,892.21	$3,188.00	$3,101.24
	N = 452	N = 525	N = 585	N = 383
1	$3,464.32	$3,668.71	$3,796.34	$3,806.63
	N = 478	N = 528	N = 610	N = 431
2	$3,942.04	$4,393.93	$4,529.00	$4,457.17
	N = 471	N = 518	N = 604	N = 412
3	$4,387.36	$4,634.98	$4,933.08	$5,196.02
	N = 472	N = 534	N = 602	N = 410
4	$4,635.31	$5,444.85	$5,357.12	$5,499.92
	N = 196	N = 217	N = 271	N = 168

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2008 cohort.

Table C.8: Quarterly Wages for 2008 Cohort: Four Years of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$3,140.19	$3,082.64	$3,473.82	$3,284.40
	N = 629	N = 903	N = 648	N = 636
1	$4,028.74	$4,025.65	$4,221.66	$4,399.96
	N = 634	N = 1026	N = 695	N = 701
2	$4,320.97	$5,451.63	$4,871.87	$5,969.30
	N = 235	N = 399	N = 285	N = 274

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2008 cohort.

Table C.9: Quarterly Wages for 2009 Cohort: One Year of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$1768.31	$1800.79	$1922.94	$1961.91
	N = 739	N = 364	N = 955	N = 406
1	$2494.11	$2828.61	$2839.62	$2832.94
	N = 821	N = 405	N = 1073	N = 474
2	$2823.67	$3006.73	$3145.70	$3116.68
	N = 812	N = 393	N = 1057	N = 456
3	$3348.76	$3633.56	$3696.89	$3805.55
	N = 788	N = 380	N = 1020	N = 442
4	$3589.31	$3871.08	$4019.79	$4292.86

	N = 797	N = 378	N = 1040	N = 431
5	$3909.26	$4391.13	$4382.12	$4821.80
	N = 814	N = 372	N = 1042	N = 447
6	$4355.89	$4662.08	$4764.24	$4761.28
	N = 305	N = 111	N = 377	N = 148

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2009 cohort.

Table C.10: Quarterly Wages for 2009 Cohort: Two Years of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$2,252.40	$2,321.19	$2,489.12	$2,491.19
	N = 663	N = 604	N = 821	N = 551
1	$2,946.58	$2,930.87	$3,203.36	$3,175.82
	N = 683	N = 613	N = 839	N = 590
2	$3,463.78	$3,392.86	$3,702.10	$3,772.59
	N = 661	N = 606	N = 831	N = 588
3	$3,785.36	$4,008.51	$4,171.59	$4,250.97
	N = 674	N = 578	N = 831	N = 573
4	$4,391.32	$4,615.43	$4,561.88	$4,771.31
	N = 283	N = 229	N = 337	N = 201

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2009 cohort.

Table C.11: Quarterly Wages for 2009 Cohort: Three Years of Postsecondary Institution Experience

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$2,798.80	$2,509.96	$3,104.04	$2,942.08
	N = 774	N = 985	N = 920	N = 806
1	$3,399.51	$3,303.50	$3,759.63	$3,597.23
	N = 840	N = 1023	N = 981	N = 845
2	$3,973.38	$4,429.29	$4,290.12	$4,583.75
	N = 290	N = 308	N = 348	N = 295
6	$4355.89	$4662.08	$4764.24	$4761.28
	N = 305	N = 111	N = 377	N = 148

Note: Represents only high school graduates who enrolled directly to college in SCHEV Institution, includes students with no college attendance from 2009 cohort.

Table C.12: Quarterly Wages for Students who graduated with a Bachelor's Degree: 2008 cohort

Quarter/ Time since departure	Standard: Not CTE	Advanced: Not CTE	Standard: CTE	Advanced: CTE
0	$1795.37	$1506.47	$2070.36	$1837.29
	N = 124	N = 2166	N = 92	N = 1082
1	$5716.18	$6855.11	$5647.514	$7274.70
	N = 163	N = 3332	N = 144	N = 1700

Note: Represents the 2008 cohort who enrolled directly to college in a SCHEV Institution, who earned a Bachelors (or Bachelors and Associates degree).