



Unfinished Business? Academic and Labor Market Profile of Adults with Substantial College Credits But No Degree

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Unfinished Business?

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Abstract

Recent state policy efforts have focused on increasing attainment among adults with some college but no degree (SCND). Yet little is actually known about the SCND population. Using data from the Virginia Community College System (VCCS), we provide the first detailed profile on the academic, employment, and earnings trajectories of the SCND population, and how these compare to VCCS graduates. We show that the share of SCND students who are academically ready to re-enroll and would benefit from doing so may be substantially lower than policy makers anticipate. Specifically, we estimate that few SCND students (approximately three percent) could fairly easily re-enroll in fields of study from which they could reasonably expect a sizable earnings premium from completing their degree.

Keywords

Community college; college completion; re-enrollment interventions; adults in higher education; earnings gaps

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Introduction

Increasing adult college enrollment and success is a top higher education policy priority in many states. A steadily growing share of jobs (two-thirds by some estimates) now require some form of postsecondary education (Carnevale, Smith, & Strohl, 2013). Since 2011, the U.S. economy has added 11.5 million net new jobs for workers with postsecondary education but only 80,000 for those with a high school diploma or less (Lumina Foundation, 2017). And while adult students aged 25-49 already comprise a sizeable share of all postsecondary enrollments (one quarter of all undergraduates), they have worse postsecondary outcomes than their traditional age peers: the first-year persistence rate for students aged 24 and over was 25.5 percentage points lower than the first-year retention rate for students aged 20 and below (Digest of Education Statistics, Table 303.50; National Student Clearinghouse, 2017). Policy makers' focus on the some college credits but no degree (henceforth "SCND") population is supported by data showing that 36 million adults nationwide have some college credit, but no degree, including close to one million in Virginia (Shapiro et al, 2019). This includes a subset of students who made substantial progress towards their credential or degree (as many as 75 percent of the credits typically needed for a diploma) but who withdrew prior to finishing (Mabel & Britton, 2018).

Over the last several years, there have been a variety of initiatives to increase re-enrollment and degree attainment among SCND adults. For instance, through Project Win-Win, a partnership between the Institute for Higher Education Policy and the State Higher Education Executive Officers, sixty postsecondary institutions attempted to re-engage former college-goers requiring ten credits or fewer to earn an associate degree (IHEP, 2013). Evidence indicates that efforts to increase enrollment among adults, particularly those who are un- or under-employed, can result in higher rates of matriculation. During the Great Recession, for instance, the federal government

sent letters to Unemployment Insurance recipients that informed them of their Pell Grant eligibility and that encouraged them to consider pursuing postsecondary education. Barr and Turner (2018) find that these letters led to higher rates of postsecondary enrollment. At the state level, several states, including Virginia, have conducted limited outreach campaigns to re-engage students. Ortagus, Tanner, and McFarlin (2020) evaluate a re-enrollment campaign conducted by Florida community colleges in which students received text message re-enrollment reminders or the same reminders as well as the offer of a one-course tuition waiver. The reminders and waiver led to a modest (1.5 percentage point) increase in re-enrollment.

While numerous states cite overall estimates of the number of residents with some college credits but no degree, there is a dearth of more detailed descriptive evidence on the demographic composition, academic experiences, or labor market trajectories of the SCND population. States would benefit from more precise estimates of the size SCND population. While prior research suggests that there are tens of millions of SCND adults, there is much less data on what share of these students made meaningful progress towards their degree prior to withdrawal. Similarly, there is little data on what share of SCND students who experience a longer separation eventually re-enroll (either at their original institution or at a different institution) and complete a credential. More detailed information on the factors associated with student withdrawal prior to degree completion could support institutions to proactively intervene and support current students to stay enrolled through completion. Finally, detailed descriptive analysis of students' educational and labor market trajectories after extended separation from college could increase the efficiency of outreach efforts. For instance, states might want to allocate outreach resources differentially based on the employment stability and wage trajectory of SCND students since leaving college. Drawing on individual-level, linked higher education-workforce data for five recent cohorts of Virginia

Community College System (VCCS) students, we provide the first detailed descriptive analysis we are aware of for this population. While research on the returns to community college credentials has considered the SCND population (Carruthers and Sanford, 2018; Grosz, 2020; Liu, Belfield, and Trimble, 2015; Turner, 2016; Jepsen, Troske, and Coomes, 2014; Stevens, Kurlaender, and Grosz, 2018; Xu and Trimble 2016), our analysis offers a more in-depth investigation of the demographic composition, academic profile, and labor market trajectories of the SCND population. We focus primarily on students who earned at least 30 credits prior to withdrawal, since states typically prioritize re-enrollment efforts on students who have made substantial progress towards their credential, but also quantify and briefly describe SCND students who stopped out with fewer credits. We moreover focus on students who left VCCS for at least three consecutive years, since, as we show in Figure 1 below, students who have been separated from college for this time period are much less likely to have temporarily stopped out from college. We include students who were pursuing any college-level credential from a credit-bearing program at VCCS, which includes Associates degrees as well as long-term and short-term certificates.

Several primary insights emerge from our analyses. First, we show that the share of SCND students who appear academically prepared to complete their degree is likely much smaller than prior estimates of this population suggest. During our focal years of analysis (2009-2014) there were nearly 200,000 who met a basic definition of having earned at least some college credits and who left VCCS without earning a degree. But fewer than one in seven had earned at least 30 college-level credits and maintained a cumulative GPA of 2.0 or higher prior to their departure.

Second, we show that among our focal sample of SCND students who had met the credit and GPA thresholds we describe above, students tended to be performing fairly well academically up until the term immediately preceding their separation from VCCS. For instance, students' mean

GPA was 2.93 in all prior terms but 2.34 in the term immediately preceding their break. This decline in academic performance was accompanied by substantial increases in the share of college-level math or difficult courses that students took, but interestingly we do not observe changes in employment in prior terms relative to the term immediately preceding their break.

Following SCND students' separation from VCCS, we observe steadily increasing wages on average in the years following their break. Mean quarterly wages were approximately \$5,200 in the year preceding students' separation, and \$9,400 five years following their break. SCND students were less likely to be employed and conditional on employment earned less than students who graduated during the same time period, but these differences are relatively modest--typically less than five percent of the Graduate employment or wage mean, after controlling for other observable differences. Out of 19 fields of study for which we observe a sufficient number of students to precisely estimate employment and earnings differentials between SCND students and graduates, we do not observe significant differentials in the majority of these fields of study.

Finally, we show that the share of SCND who might be receptive to and would benefit from re-enrollment efforts may also be substantially lower than policy makers anticipate. Of SCND students who meet the credit and GPA thresholds we describe above and who separated for at least three years from VCCS, approximately 50 percent were employed in every quarter their third year following their break. Among these students--and similarly among students with no employment or periods of unemployment--the substantial majority (~80 percent) left fields of study without a significant earnings differential between graduates and SCND students. Even among SCND students who left fields of study with a significant positive premia to a degree, most (75 to 85 percent) left health fields that are typically oversubscribed and have competitive admissions, so it would be difficult for students to re-enroll even if they wanted to. Collectively,

these patterns suggest there are relatively few SCND students (approximately three percent) who could fairly easily re-enroll in fields of study from which they could reasonably expect a sizable earnings premium from completing their degree.

Empirical Strategy

Site and data sources

The Virginia Community College System (VCCS) is currently made up of 23 colleges across the Commonwealth. In the 2019-20 academic year, VCCS enrolled 218,985 students. The system also supports a large number of dual-enrolled students as well as those seeking to earn a GED or non-credit workforce training.

Data for this study come from systemwide administrative records students enrolled in credit-bearing coursework during the period from Fall 2000 to Fall 2019. These records include detailed information about each term in which a student enrolled, including program of study, courses taken, grades earned, credits accumulated, and financial aid received. The records also include basic demographic information, including gender, race, and home zip code. Finally, we observe all credentials awarded by VCCS colleges beginning in 2006. In addition to the VCCS administrative records, we also have access to National Student Clearinghouse (NSC) matches and state unemployment insurance (UI) records provided by the Virginia Employment Commission (VEC) for all students. The NSC data allows us to observe all enrollment periods and postsecondary credentials earned at non-VCCS institutions, beginning in 2004. The VEC data includes quarterly information on employer and earnings, for up to five years prior to a student's first enrollment at VCCS and indefinitely during and after VCCS enrollment. The coverage of the VEC data begins in 2005. In the VEC data, we observe all non-federal employment within the Commonwealth of Virginia who pay into the UI system.[1]

Sample Construction

Beginning with the roughly two million students who were enrolled at VCCS between Fall 2000 and Fall 2019, the first two restrictions we make are to identify first-time degree-seeking students primarily enrolled at VCCS. Specifically, we exclude students who were exclusively enrolled at VCCS via dual enrollment (i.e. students who only took VCCS courses through their high school), and students who had completed a degree prior to their initial enrollment at VCCS. We define a student's initial enrollment term as the first non dual-enrollment term in which they attended VCCS. These two restrictions exclude approximately 15 percent of all students.

We then focus our analysis on students who were enrolled at a VCCS institution between the 2009-10 and 2013-14 academic years (inclusive) so that we can observe academic and employment information about these students for a sufficient number of years both before and after their VCCS enrollment break. We further restrict our sample to students who had not earned a degree from a non-VCCS institution. We only include students who were between the ages of 18 and 50, on the assumption that students in this age range are more likely to contemplate re-enrollment if they separate from a VCCS institution without a degree. These restrictions result in a sample of 376,366 students. In our primary analysis, we focus on students who had accumulated at least 30 college credits and who had a cumulative GPA of at least 2.0 as of the term immediately before leaving (or graduating from) VCCS. These students have shown that they can be successful in college and, for those who left before earning a degree, made substantial progress toward doing so. In other words, these are the students who are best positioned to benefit from re-enrollment. All of these restrictions result in an overall population of 95,380 students.

The final important sample selection decision we face is how to define the minimum period of separation from a VCCS institution for our focal population of adults. One approach would be

to include all adults who have stopped out for as little as one semester. To inform this decision, we visualize in Figure 1 the re-enrollment and completion trajectories of students based on the length of their separation from a VCCS institution. On the left-most side of Figure 1 we show the sample of 95,380 students we describe in the prior paragraph. To the right, we divide the overall population into three groups based on their status when they first leave VCCS (not including Summer terms): (1) Students who left VCCS without earning a degree or directly transferring to non-VCCS; (2) Students who transferred directly to non-VCCS institution without taking a term off; and (3) Students who earned VCCS degree without taking a term off.

As we show in the second column, over two thirds of students who meet our basic sample criteria either complete their degree without taking a break (50.3 percent) or transfer directly to a four-year institution (18.9 percent), leaving 30.8 percent of students who belong to the first category. In the next column we show, for this 30.8 percent of the focal sample, re-enrollment rates over different time intervals (from one year through five years following their break). Over a third of students (38.9 percent) do not re-enroll anywhere within five years following their break from VCCS. Approximately one-third (34.3 percent) of students re-enroll within a year of their break; most do so at a VCCS institution. Among these soon-to-re-enroll students, completion rates are quite high, as shown in the final column: 50.5 percent among VCCS and 53.5 percent among non-VCCS re-enrollees. A substantially smaller share re-enrolls in the second year after initially leaving VCCS: 12.3 percent of students re-enroll at a VCCS institution and 3.5 percent do so at a non-VCCS institution.

Starting three years following break, re-enrollment rates decline much more rapidly. For instance, only 4.0 percent of the sample re-enrolls at a VCCS institution three years after their break, and only an additional 1.3 percent does so five years after their break. Completion rates

decline substantially the longer the time interval between separation and re-enrollment. Given these trends, we focus on a minimum of three years break from VCCS as a meaningful demarcation between students who are temporarily stopping out from college and students who are separating for a more sustained duration.[2][3] Note that we define cohorts of students based on the academic year in which they were last enrolled at VCCS before leaving for a minimum of three years.

Therefore, our SCND sample of interest on which we focus remaining analysis are students who left VCCS between Summer 2009 and Spring 2014 with at least 30 credits and a minimum 2.0 GPA, and did not enroll anywhere for a minimum of three years after leaving, for a sample size of $n = 26,031$. That without making the minimum credit and GPA sample requirements, there are $n = 194,313$ such students; in other words, fewer than one out of seven of the “some community college, no degree” population in Virginia made substantial progress toward their degree.[4]

For some of our analyses, we use a comparison sample of VCCS graduates. We construct the “Graduates” sample using similar restrictions. Instead of selecting students who experienced a break of at least three years, we select students who earned their last VCCS degree between the 2009-10 and 2013-14 academic years (inclusive) and had no subsequent enrollment -- either at a VCCS college or a non-VCCS institution -- within three years of their graduation ($n = 28,795$).[5]

Due to likely differences in both academic and employment outcomes for SCND students of different ages, we repeat all key analyses by separating the sample into younger (24 years or younger) versus older (25 and older) students, based on their age at the time they left VCCS. We also address the question as to how the timing of our sample around the Great Recession (officially, December 2007 to June 2009) affects the interpretation of our results by repeating all analyses for two subsets of our sample: earlier cohorts (those who left VCCS during 2009-10 or 2010-11); and more recent cohorts (those who left VCCS during 2012-13 or 2013-14). We view the earlier

cohorts as “Great Recession affected,” in that these students are those more likely to have been induced to enroll due to the economic downturn (Barr & Turner, 2015; Belfield, 2015; Long, 2014), and also faced a still recovering labor market at the time they left VCCS.

Measures

We construct most of our analytic measures to describe academic and employment experiences either before or after a SCND student’s break with VCCS (or in the case of the Graduates comparison groups, after they earn their most recent VCCS degree). Figure 2 provides an illustration of the timing of pre-break and post-break measures. For example, suppose a student’s “break term” was Spring 2014 -- that is, they were enrolled at a VCCS college in Spring 2014, but then did not enroll at any VCCS college or non-VCCS institution through and including at least Spring 2017. We incorporate academic and employment information for the four years prior to break and financial aid information for the two years prior to break, which reflects data availability for the earliest cohort of students who left VCCS in Summer 2009. For all cohorts, we observe five years of post-break employment, although we do observe up to nine years of post-break employment outcomes for the earliest cohorts.

All information regarding student demographics, credits accumulation, GPA, financial aid receipt, program of study, and VCCS degree awards come directly from the VCCS administrative records. Student demographic characteristics (age, race, gender) are measured at the time of a student’s VCCS enrollment break. For SCND students, we define their program of study (e.g. Nursing AAS degree program, or Welding certificate program) as the one they were pursuing at the time of their break.[6] We also use the first two digits of the Classification of Instruction Program (CIP) codes of a student’s program to measure their broader field of study (e.g. Health

Professions for Nursing, or Precision Production for Welding). We observe enrollment and degree attainment from non-VCCS institutions from the National Student Clearinghouse.[7]

We focus on three annual employment measures in our analysis. The first measure is whether the student was employed at all. The second measure is average quarterly wages, conditional on employment. This linear measure is equal to total wages earned across all quarters in a given year, divided by the number of quarters employed in that year. If a student was not employed during that year, then this measure is set to missing. Finally, the third measure is whether the student's earnings were above 200 percent of the federal poverty level. This indicator equals one if the student's total wages in the year are at or above 200 percent of the federal poverty threshold in the relevant year.[8] We use the poverty threshold for a two-person household with no children. If a student was not employed during that year, then this indicator is set to missing. Our primary employment outcome of interest is conditional (i.e. non-zero) quarterly wages in the fifth year following the student's break from VCCS as this is the year furthest post-break we observe for all cohorts. We choose to focus on non-zero wages due to the nature of the VEC data, where we cannot distinguish between individuals who are truly have zero earnings versus those with earnings we cannot observe due to being employed by the federal government, or an out-of-state employer; self-employed or an independent contract worker; or informal sector employees. In the context of similar UI data from Ohio, Ost, Pan & Webber (2018) estimate that only 32 percent of individuals in their sample (which include students with at least some college experience) for whom they do not observe employment actually had zero earnings. Still, Scott-Clayton & Wen (2018) find that, unlike bachelor's degree attainment, there is no significant correlation with interstate mobility among associate degree enrollees and graduates; this finding

suggests that our estimates of the gaps between SCND and Graduates are not biased by conditioning on observed employment.[9]

Methods

We use regression analysis to estimate the employment and earnings gaps between SCND and Graduates, both overall and separately by field of study. Specifically, we estimate the following OLS regression model:

$$EmploymentOutcome_i = \beta_0 + \beta_1 StudentChar_i + \beta_2 SCND_i + \chi_c + \nu_y + \phi_p + \epsilon_i \quad (1)$$

Where χ_c , ν_y , and ϕ_p are college, cohort (academic year at time of break), and program of study fixed effects. We estimate models separately for the post-break employment outcomes of: (1) any observed employment in the fifth year after break; and (2) average quarterly wages in the fifth year after break, conditional on being employed. The coefficient β_2 is an estimate of the employment outcome gap between SCND and Graduates. If $\beta_2 < 0$, then SCND perform worse on the employment outcome, measured in the third year after break/graduation. We only estimate these gaps for programs of study with at least 100 combined SCND and Graduates, and with at least ten observations in each SCND or Graduates separately. We include the following student-level characteristics[10]: basic demographics (age, race, gender); academic experiences in the four years prior to break, including average credits earned per term enrolled at VCCS, average percent of credits attempted that the student completed at VCCS, whether the student had previously stopped out for at least three terms at VCCS total length (i.e. number of academic terms) of previous stopouts at VCCS, enrollment at any non-VCCS institution, enrollment at non-VCCS institution by type: eight categories at the intersection of public versus private, four-year versus

two-year, and Virginia versus out-of-state institutions, and number of terms enrolled at non-VCCS institution; labor market experiences in the four years prior to break, including any observed employment and average quarterly wages[11]; and academic performance measures at the time of break from VCCS, including cumulative credits earned, cumulative GPA, and difference in cumulative GPA and GPA in term prior to break.

Results

Summary statistics - SCND students

In Table 1 we provide summary statistics on the overall SCND population. Column (1) shows the summary statistics for the SCND population inclusive of all restrictions we describe in the “Sample” section above and which had not re-enrolled for at least three years following their break from VCCS. Column (2) shows summary statistics for the corresponding group of VCCS graduates. Across demographic, financial, and academic characteristics, SCND students and Graduates are relatively similar. The SCND sample was comprised of a smaller share of female students (53.6 vs. 57.8 percent) and smaller shares of White students (64.9 vs. 69.1 percent). The mean age of SCND students at the time of their break was 27.0, compared with 29.1 for Graduates. Approximately 40 percent of the SCND sample received a Pell Grant and 15.6 percent received a Stafford Loan in the year prior to their break, compared with 36.8 percent and 13.1 percent for Graduates, respectively. Debt accumulation was generally modest (~\$3,500) at the time of students’ break for both samples. As would be expected, Graduates accumulated more credits than SCND students (62.5 vs. 47.7 credits on average). Graduates also had higher GPAs (3.21 mean GPA vs. 2.86 for SCND students).[12]

Academic performance - SCND students

In Figure 3 we illustrate the academic performance of SCND students in their final term at VCCS (i.e. their break term) compared with their prior cumulative academic performance. As a reminder, we condition the sample on students who earned at least 30 credits, given that many states have prioritized their re-enrollment efforts among students with substantial prior credits.

We illustrate the difference in academic performance during the break term relative to their cumulative performance in prior terms using “box and whisker” plots. In particular we draw attention to the means of each academic performance measure, labeled with a black “x”, and to the interquartile range, represented by the vertical edges of the boxes. The top panel presents differences in term-level GPA during and preceding the break term, while the bottom panel presents differences in term-level attempted and completed credits during and preceding the break term.

In the years preceding their break term, SCND students had a mean GPA of 2.93, with an interquartile range of 2.5 - 3.33. In the term preceding students’ separation from VCCS their mean GPA declined substantially, to 2.34. The interquartile range during the break term was considerably wider, which we would expect given fewer observations and therefore lower precision, but also quite a bit lower in the GPA distribution. The 25th percentile of GPA in students’ break term was 1.33. We observe a similar pattern with both attempted credits and completed credits. Focusing on completed credits, students completed an average of 7 credits per term in the terms preceding their break term, compared with a mean of 4.9 completed credits during students’ break term. The interquartile range was similarly lower in the distribution during students’ break term: the 25th percentile is one completed credit during the break term. These substantial declines in GPA, attempted credits, and cumulative credits during students’ break term suggest that students experienced some form of disruption in their lives that contributed to

declining academic performance and which may have contributed to their decision to stop out of their VCCS institution. As we show in Appendix Table A1, these declines in performance between prior terms and break terms are similar between older and younger SCND students, and between earlier and more recent cohorts of SCND students. The patterns we observe between prior and break terms are also very similar if we define the SCND student sample as having at least one or at least five years of separation from a VCCS institution.

In Table 2 we investigate the extent to which aspects of students' experience at VCCS changed during their break term and preceding terms, by the magnitude of academic disruption they experienced during the break. In the top panel, we consider the characteristics of the courses students took. Specifically, we compute the share of a student's credits that were taken online (versus in-person or hybrid), the share of a student's credits that were in college-level math, and the share of a student's credits that were in "difficult" courses, which we define as courses with a historically low GPA or withdraw rate.[13] In the bottom panel we present differences between the break and preceding terms in students' financial aid receipt, employment, and wages. For each of these measures of students' experience, we compare their break term to the pre-break mean for three levels of academic disruption: students who did not experience a significant academic disruption (columns 1 and 2); students who experienced a GPA decline of one point or higher during their break term (columns 3 and 4); and students who withdrew from or failed of their courses during their break term (columns 6 and 7). We also test whether break term and pre-break differences reported in columns 2, 4, and 7 are significantly different across levels of academic disruption, and report the corresponding p-values in columns 5, 8 and 9.

In the top panel of Table 2, students' pre-break means for each course characteristics were quite similar across level of academic disruption. For instance, 28 to 30 percent of students' credits

in the pre-break term were in difficult courses, across levels of academic disruption. Among students who experienced a more significant academic disruption (columns 3-9), however, we observe meaningful increases in the share of credits that were taken online, in college-level math and in difficult courses. For instance, among students who experienced no academic disruption in their break term, there was no difference in the share of credits students took in college-level math courses, but a 2.5 percentage point increase (40 percent relative to the pre-break mean) in the share of credits students took in college-level math courses among students who experienced a GPA decline of one point or higher. Among students who experienced no academic disruption in their break term, there was a 1.3 percentage point decline in the share of credits students took in difficult courses compared to a 7 percentage point increase in the share of credits students took in difficult courses among students who experienced a GPA decline of one point or higher--both relative to a pre-break mean of approximately 29 percent.[14]

In the bottom panel we compare students' financial aid, employment, and wages in students' break and preceding terms. Across levels of academic disruption we observe sizeable reductions in the share of students that received a Pell Grant or that borrowed federal loans in their break term compared with all prior terms. For instance, among all SCND students regardless of academic disruption, 23 percent who had recently received a Pell grant and 38 percent who had recently borrowed a federal loan did not receive these forms of aid during their break term (as seen in Appendix Table A2). One possible explanation is that students failed to meet Satisfactory Academic Progress (SAP), an eligibility requirement for maintaining federal financial aid. While SAP requirements differ by college and we cannot observe SAP status directly, a common element is maintaining a minimum GPA of 2.0. Yet only one percent of students who did not receive a Pell Grant during their break term (but had done so previously) had a cumulative GPA less than

2.0 prior to their break, suggesting that failure to meet SAP did not drive the reduction in the share of students receiving federal aid during the break term. Alternatively, it could be the case that students experienced a substantial increase in income during their break term which led them to no longer be eligible for Pell Grants (though they would maintain eligibility for federal loans). As we show in Table 2, however, mean quarterly wages are very similar during the break term as they are in preceding terms. A third factor that determines financial aid award is enrollment intensity: students enrolled less-than half-time are less likely to be eligible for Pell grants, and not eligible to borrow federal student loans. Among students who had received a Pell Grant or federal loans in preceding terms but who did not do during their break term, over one-third (36 and 34 percent, respectively) dropped below half-time status for their break term. Taken collectively, these results suggest that other factors in students' lives may have contributed to the reduction in students' enrollment intensity and may also have been correlated with their decision to stop out of college.

By contrast, we observe fewer differences across levels of academic disruption. For instance, Panel B of Table 2 shows that the share of students receiving Pell Grants declined by 8 to 11 percentage points in the break term relative to preceding terms across levels of academic disruptions, though the pre-break term mean for Pell Grant receipt was significantly higher for students who experienced substantial academic disruptions in their break term than for students (~45 percent versus 36 percent for students who did not experience an academic disruption during the break term). Interestingly we do not observe differences between break terms and preceding terms in the share of students who were employed, within or across levels of academic disruptions, nor differences in the pre-break mean employment levels.[15][16]

The similarity in break and preceding term employment across levels of academic disruption, combined with the differences in course characteristics we describe in the top panel,

suggest that differences in students' academic choices during their break term, rather than differences in outside employment opportunities, may have contributed to their academic decline prior to leaving VCCS. That being said, it is also possible students experienced a non-employment disruption in their lives (e.g. loss of childcare) that contributed both to different academic choices (e.g. taking more classes online) and reduced academic performance.

Labor market outcomes - SCND students

In Figure 4 we turn to analyzing several dimensions of SCND students' labor market experience in the years leading up to and following their break from a VCCS institution. Across plots we present employment/earnings trends for all cohorts combined (including the 2009-10 cohort) and separately just for the 2009-2010 cohort, for whom we can observe the longest post-break labor market outcomes (nine years).

Plot A shows first that a modestly growing share of the SCND sample was employed in the years leading up to their break. For instance, considering all cohorts pooled, we observe employment records for 61 percent of SCND students four years prior to their break, whereas 73 percent have observed employment in the year prior to their break. The share of SCND students we observe as employed declines steadily in the years following their break. Among all SCND students, 72 percent have observed employment in the year after their break but only 62 percent have observed employment five years after their break. Among the 2009-2010 cohort, we observe very similar trends. By nine years after students' break, only 58 percent of students had observable employment. We hypothesize that this downward trend in observed employment is driven by workers finding employment outside what we can observe in our data.

Plot B shows steadily increasing quarterly wages for SCND students. Among observably employed students, the mean quarterly wage was \$4,572 four years prior to their break and \$5,176

in the year prior to their break. Following the break, wages continue to grow. By five years after break SCND students' mean wages were \$9,397. Among the 2009-2010 cohort we observe very similar trends. By nine years after their break, SCND students' quarterly wages were \$11,714.

Plot C shows that, at least in observed wages in UI records, most observably employed SCND students did not earn at least 200 percent of the federal poverty level in the years preceding and following their departure from VCCS, though the share that did so steadily increases after students' break from VCCS. In the year prior to their break roughly 15 percent of SCND students earned above 200 percent of the federal poverty level, though this likely reflects the sizeable share of students working part-time while in college. In the year after their break 26 percent of employed SCND students across all cohorts were above that threshold, and by five years after the break 49 percent earned at least 200 percent of the federal poverty level. Among the 2009-10 cohort, 61 percent of students earned at least 200 percent of the poverty level by nine years after their break.

In Appendix Figure B1 (online), we present the same three plots separately by whether we define the SCND student sample as having at least one or at least five years of separation from a VCCS institution; by whether SCND students are older or younger; and by whether we focus on earlier or more recent SCND cohorts. We observe very similar levels and trends by how we define the SCND sample. The employment and wage trends are relatively similar for older and younger students, though the wage levels are substantially higher for older students. We also observe similar trends whether we focus on earlier or more recent cohorts.

Taken collectively, these wage profiles show that, at least on average, the economic circumstances of SCND students steadily improved after they left VCCS. This trend suggests that efforts to re-enroll students may be more compelling to SCND students who are not experiencing

the steady increase in quarterly wages or who are not reaching important benchmarks in employment quality.

Labor market outcome differentials - SCND students and VCCS graduates

In Figure 5 we present employment and earnings differentials between SCND students and Graduates. Specifically, we use regression analysis (see equation 1 above) to estimate the difference in outcomes for SCND students after they separate from a VCCS institution, compared to Graduates after they complete their degree, while controlling for an array of demographic, academic, and pre-break employment characteristics.[17][18] Figure 5 displays the estimated differentials expressed in percentage terms of the Graduate mean of the relevant employment outcome variable (i.e. the coefficient on the SCND term from equation 1 divided by the Graduate mean). We focus here on two employment outcomes: any employment, and conditional (non-zero) wages.

Starting with Plot A, we observe negative employment differentials between SCND students and Graduates, in the range of 2 to 3 percent of the Graduate mean; these gaps remain fairly stable in the five years following students' break. For the earliest cohort -- those students who left VCCS in 2009-10 -- the estimated gap is mostly consistent from one year to the next across the nine years we can observe in the data, although does decrease slightly in magnitude and precision over time. In Plot B, we observe that SCND students with observed employment earned seven percent less than graduates in the year following their break but that this gap declines somewhat, to five percent, by five years following their break. For the 2009-2010 cohort we observe largely similar trends in wages for nine years following separation.

In Appendix Figure A1 we again present the same two plots separately by whether we define the SCND student sample as having at least one or at least five years of separation from a

VCCS institution; by whether SCND students are older or younger; and by whether we focus on earlier or more recent SCND cohorts. When we define the SCND sample as students separating from VCCS for at least one year we observe a slightly smaller negative employment differential compared to the three year and five year break samples, both of which are very similar to each other. Among SCND students age 25 and older the employment differential is substantially larger in magnitude than for younger students (~5 percent of the Graduate mean compared to zero). The wage differential between SCND students and Graduates is also larger for older students (~7 percent for older students compared to ~4 percent for younger students). These differences in wage differentials by age are likely driven by differences in the types of programs that younger versus older students enroll in, with the former being more likely to enroll in Liberal Arts or General Studies degree programs, and the latter being more likely to enroll in applied or vocational programs. We observe similar differentials when comparing earlier and more recent cohorts.

In Figure 6 we present employment and wage differentials between SCND students and Graduates by students' field of study.[19] We present field of study-specific differentials for those fields with a sufficient number of students to estimate the differentials (100 students total and at least 10 each of SCND and Graduates). There are 19 fields of study that meet these definitions for the outcome of observed employment and 17 fields of study for non-zero wages. We sort programs by the significance of the estimate (specifically, by the coefficient estimate divided by the standard error) and magnitude of the SCND-Graduates differential, so that the top programs have the most significant and negative gaps between SCND students and Graduates.

Plot A presents SCND-Graduate differentials in the share of students employed. In 6 of the 19 fields of study that meet our inclusion criteria there are significant, negative employment differentials between SCND and Graduates (using p-values < 0.10). These fields of study include

Health Professions, Protective Services, and Culinary/Professional Services. Only 1 of the 19 fields of study (Multidisciplinary) has a significant positive employment differential for SCND students.

Plot B presents SCND-Graduate wage differentials. Health Professions, Engineering Technology, and Legal Professions fields of study all have significant negative wage differentials between SCND students and Graduates. The remaining 14 field of study wage differentials are too imprecisely estimated to rule out no differences in the wages of SCND students and Graduates, though some programs, like Culinary/Professional Services have directionally negative differentials while others like Engineering and Visual/Performing Arts have directionally positive differentials between SCND students and Graduates.[20]

Informing how states prioritize re-enrollment interventions for SCND students

As we describe in the introduction, numerous states have prioritized re-enrollment among SCND students in order to reach degree attainment goals. This prioritization is partly informed by existing estimates that there are tens of millions of adults across the country with some credits but no degree (Shapiro et al., 2019), which implies to state leaders that there are many adults who might benefit from returning to college and who would be receptive to doing so if they received outreach and support. And yet, there is little existing evidence of strategies that lead to substantial increases in SCND re-enrollment and completion. One contributing factor to this lack of success to date may be that states are not targeting their outreach to SCND students who may be most receptive to and likely to benefit from re-enrollment and completion.

To inform states' future re-enrollment initiatives, in the final section of our paper we attempt to quantify different segments of the SCND population based on employment and earnings trends after their departure from college, and the premia to having a degree in their field of study.

Our goal with this analysis is to illustrate for state leaders what share of the SCND student population has experienced relatively positive labor market outcomes, what share has experienced worse labor market outcomes, and for the latter group, what share of SCND students left a field of study where they might reasonably expect to receive employment and wage premia by completing their degree.

In Figure 7 we segment the SCND population based on their employment outcomes in the third year after their break (column 2), whether they left a field of study with positive employment and wage premia for a degree (column 3), and whether they left a health science field of study or not (column 4).[21] We include the latter segmentation because these programs tend to have competitive admissions (even at community colleges) and be oversubscribed, so it may be difficult for SCND students to re-enroll in these programs even if they are inclined to do so.

Of the 26,031 SCND students we focus on in most of our analysis, 25.6 percent were employed all four quarters and earning at least 200 percent above the federal poverty line in the third year after their break. Only twenty percent of these students left a field of study with a significant negative wage differential between SCND students and Graduates. Of these, 25.3 percent left a non-health sciences field of study (n = 340). 26.9 percent of SCND students were employed all four quarters but did not earn above 200 percent of the poverty line. Of these students, relatively few left a field of study with a significant negative wage differential between SCND students and Graduates (22.1 percent) and even fewer left a non-health sciences field of study (14.0 percent, or n = 217). 12.8 percent of SCND students were employed between 1-3 quarters in the third year after their break. Approximately one in five of these students left a field of study with a significant negative wage differential between SCND students and Graduates, and one in five of these remaining students left a non-health sciences field of study (n = 132). Even among SCND

students with no employment in the third year after their break (34.6 percent), again the majority left a field of study with no significant differences in wages between SCNDs and Graduates or left a health science field, leaving $n = 530$ who left a non-health science field of study with a significant wage differential. As we show in Appendix Table B7 (online), these patterns look generally similar whether students experienced an academic disruption or not during their break term; whether we focus on older vs. younger students; whether we focus on earlier or more recent cohorts; whether we define the SCND sample as having at least a one, three, or five year break from VCCS; or how we estimate the SCND-Graduates wage differentials.[22]

This analysis demonstrates that there are relatively few SCND students who state leaders would likely view as compelling candidates for re-enrollment intervention, i.e. they have experienced relatively poor labor market outcomes (i.e. are not earning at least 200 percent above the poverty line for the full year) but left a field of study where they could reasonably expect to experience better labor market performance if they had a degree and where there would likely be capacity for them to re-enroll if they chose to do so. From the analysis we present in Figure 6, only 878 SCND students out of the 26,031 (3.4 percent) we focus on in our analysis would meet these criteria.

Conclusion

Increasing degree attainment among adults is broadly viewed as integral to states achieving their policy goals and to fulfilling labor market demand for workers with postsecondary training and credentials. Numerous states have focused in particular on adults with some college credits but no degree as a high priority for re-enrollment and completion efforts. Despite many states identifying adults with some credits but no degree as a priority population, however, there has been

little research to date describing their demographic composition, academic experiences, or labor market trajectories.

We show that the share of SCND students who appear academically prepared to complete their degree is likely much smaller than prior estimates of this population suggest. Among approximately 200,000 adults with some credits but no degree that we identified from the VCCS, fewer than one in seven had earned at least 30 college-level credits and maintained a cumulative GPA of 2.0 or higher prior to their departure.

SCND students with stronger academic records tended to experience substantial academic declines in the term immediately preceding their break, with this decline accompanied by differences in students' academic choices (e.g. taking more difficult courses). This pattern suggests that the first opportunity for intervention to improve adult postsecondary attainment is not after students have left, but when students who appeared on track for graduation exhibit signs of struggling in college or alter their course-taking behavior. This suggestion is consistent with Mabel & Britton's (2018) analysis of the "late departure" phenomenon: students who earn most of the credits they need to graduate but who withdraw prior to earning their degree. The authors note a variety of strategies that could increase attainment among this population, from "reverse transfer" of degrees to guided pathways for students' to finish their program of study. Institutions could also incorporate the patterns we identify into risk modeling to proactively identify students who may be on the verge of departure and intervene to support them to complete the degree for which they have already made substantial progress. At the same time, the fact that (1) SCND students tend to experience steadily increasing wages in the years after their break and (2) most SCND students leave fields of study with non-significant earnings premia associated with a degree suggests that SCND students may also be making informed decisions that the opportunity cost of

staying in college may be high relative to the labor market opportunities available to them. It is also worth noting that one large-scale intervention motivated by the Mabel & Britton (2018) analysis, in which advanced students received interactive nudges encouraging them to make use of campus-based resources and to connect with advisors, did not increase attainment among students with substantial credits at risk of withdrawal.[23]

Finally, we show that there are relatively few SCND students (roughly three percent) who could fairly easily re-enroll in fields of study from which they could reasonably expect a sizeable earnings premia from completing their degree. This finding suggests that increasing attainment among SCND students likely needs to be complemented by other efforts, such as strengthening success supports for current students and supporting training and credentialing among adults with little to no postsecondary participation. These efforts could build on existing evidence-based approaches to improve attainment among higher-risk student populations, including intensive coaching and advising (Bettinger & Baker, 2014); structured learning and financial supports, like CUNY ASAP (Scrivener et al., 2015); and increased grant assistance to improve college affordability (Castleman & Long, 2016; Bettinger et al., 2019; Dynarski, 2008; Scott-Clayton, 2011).

Endnotes

[1] Earnings and employment measures derived from state-level UI data come with some limitations. Because VEC records only cover non-federal positions in which workers pay into the UI system, those who are self-employed, independent contractors, or who are paid “off the books” are not included.

[2] We repeat key analyses for the population of students who experience a break of at least one year or at least five years and in the results section briefly compare findings for these alternate stop-out demarcations to our primary three-year demarcation.

[3] In Appendix Table B1 (online), we provide additional detail on the types of non-VCCS institutions that students attend after leaving VCCS, as well as the graduation and employment outcomes.

[4] In Appendix Table B2 (online), we show a version of Figure 1 for the students who left VCCS with fewer than 30 credits or less than a 2.0 GPA. Of these students, 76 percent leave VCCS without completing a degree or transferring. Of this subset, 67 percent do not re-enroll within five years (twice the amount compared to students who do meet the credit and GPA benchmarks); 25 percent re-enrolls within two years. Conditional on re-enrollment, 33 percent of students complete a degree. Note that the vast majority of students with a GPA less than 2.0 also had fewer than 30 credits.

[5] If a student earned multiple degrees but in separate terms (which is true of roughly 16 percent of VCCS graduates), we always consider the most recent degree the student earned when making program-specific comparisons between SCND and Graduates.

[6] We define program of study as the combination of curriculum x intended degree level.

[7] In the National Student Clearinghouse data, enrollment and graduation records are not assigned a particular term. Instead, these records include enrollment beginning, enrollment ending, and graduation dates. In order to make direct comparisons between VCCS and non-VCCS enrollment timing, we assign terms to NSC enrollment records in the following manner: Spring terms are those that began between January 1st and April 30th, and ended between May 1st and July 31st; Summer terms are those that began between May 1st and July 31st, and ended between June 1st

and August 31st; and Fall terms are those that began between August 1st and December 31st and ended between September 1st and December 31st. Similarly, we assign terms to NSC graduation records such that Spring graduation terms include graduation dates between January 1st and June 30th; Summer between July 1st and August 31st, and Fall between September 1st and December 31st. This means that if a student was enrolled in an irregularly timed term that began November 1st and ended February 1st, then that student is counted as having been enrolled in both the Fall and Spring terms. This method assigns at least one enrollment term to each observation in the NSC data.

[8]Source:[www.census.gov/data/tables/time-series/demo/income-poverty-thresholds.html](http://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html)

[9] We repeated all analyses using unconditional wages, in which we code unobserved employment as \$0 earned in a quarter. As expected, the pattern of results are a confluence of the Any Employment and Conditional Wages outcomes.

[10] For each of these student-level characteristics that contains missing values, we set those missing values equal to zero and include a missing value indicator in the regression model.

[11] Because the coverage of the employment data begins in 2005, we can only observe up to four years of data prior to break for all students in our sample.

[12] In Appendix Table B3 (online), we show the same information for the subsamples of the SCND based on age and cohort timing, as well as the SCND population based on the one year versus five year break definitions. We also show the same information for the sample of graduates that is not conditioned on no enrollment for at least three years after earning their VCCS degree.

[13] Specifically, we classify a course as difficult if in the three years prior, the average grade points earned was less than 2.5 or the withdraw rate was less than 67 percent.

[14] In Appendix Table B4 (online), we show the same information for other course characteristics, including Daytime (versus evening); 200-level (versus 100-level); and the broad categories of Lab-science, Arts, Business, English, Voc-Tech, Social Sciences/Humanities, and Health Sciences. Particularly for the broad categories, we find no differential patterns across level of academic disruption. We find no meaningful differences in distance from the student's home zip code to the zip code of the college, using data from the ZIP Code Distance Database (<https://www.nber.org/research/data/zip-code-distance-database>).

[15] We have insufficient precision to detect differences between break terms and preceding terms in students' mean wages conditional on employment, among students who experienced academic disruptions during their break term.

[16] In Appendix Table B5 (online), we also show differences in whether students' break term occurred in the Fall, Spring, or Summer terms by level of academic disruption and whether students changed their field or program of study in the term immediately preceding their break term by level of academic disruption. Across levels of academic disruption students' separation from VCCS most commonly occurred after the Spring semester. We do not observe meaningful differences in whether students changed their field or program of study in the term preceding their break term, across levels of academic disruption.

[17] As a reminder, the Graduates sample includes students who earned their most recent VCCS degree during the same time period that the SCND sample left VCCS, and did not enroll at any higher education institution in the three years following. As we show in the final set of plots in Appendix Figure A2, when we include all Graduates as a comparison, the employment differentials are larger in magnitude, which is driven in part by Graduates who subsequently enroll being more likely to be observably employed compared with Graduates who do not. When

considering wages, SCND students earn more than Graduates in the first few years following their last term at VCCS, due to many Graduates being enrolled and less likely to be working full-time, but as time goes on the wage gaps increase in magnitude.

[18] Appendix Table B6 (online) shows the estimates of the SCND-Graduate differential, beginning with no other regression controls in column (1) and adding in categories of controls and fixed effects in a sequential manner culminating in the full set of controls in column (7). The point estimates of the SCND-Graduate differentials are reasonably stable across model specifications. We observe the largest change in magnitude of the point estimates with the inclusion of VCCS academic characteristics, as these are the measures where SCND and Graduates differ most (see Table 1), and likely capture differences in ability, motivation, or social capital. When considering wages in Panel B, we also observe a significant change with the inclusion of prior employment characteristics, which capture differences in prior work experience and are generally included in such models due to their correlation with future wages (as seen by the increase in R-squared from columns 4 to 5).

[19] We classify students' field of study according to the two-digit CIP code within which their program of study is nested.

[20] We also estimate the SCND-Graduate differentials for specific programs of study (Online Appendix Figure B2, Plot B); however, only a relatively small share of programs meet our sample requirements (at least ten SCND observations, at least ten Graduate observations, and at least 100 total observations).

[21] We use wages from the third year after break, as opposed to the fifth year after break used in our analysis above, to guide our analysis of which SCND students may be most receptive to and benefit from re-enrollment. Specifically, if a college wants to identify former students who left

three years ago and would be receptive to re-enrollment interventions, then the college would want to use the most recent year of employment data for these students, i.e. the third year after leaving VCCS.

[22] The one noticeable difference appears when considering the one-year break sample, for which there are significantly larger share of the SCND population represented in the right-most column. This difference is due to the wage differential estimate for the “Liberal Arts & Sciences/General Studies” field of study, in which the most students enroll, having a small marginally significant wage differential estimate.

[23] An evaluation of this intervention will be publicly available as a working paper, to be disseminated in November 2021.

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Table 1: Demographic, financial aid, and academic characteristics of SCND and Graduates comparison sample

	SCND	Grads
	(1)	(2)
Female	53.6%	57.8%
White	64.9%	69.1%
Black	17.8%	16.0%
Hispanic	6.5%	5.2%
Asian	5.8%	5.9%
Other	4.9%	3.7%
Age	27.0	29.1
Received Pell	39.7%	36.8%
Received Stafford	15.6%	13.1%
Accumulated Stafford loans	\$3,436	\$3,472
Cumulative credits when left VCCS	47.7	62.5
Cumulative GPA when left VCCS	2.86	3.21
N	26,031	28,795

Notes: See text for descriptions of the SCND and Grads samples. Race/ethnicity category "Other" includes categories the categories American Indian/Alaskan; Hawaiian/Pacific Islander; Two or More Races; and Not Specified. Gender, race, and age are constructed using student information current as of the time they left VCCS. Received Pell and Received Stafford based on financial aid records for the two years prior to leaving VCCS. Stafford loans include both subsidized and unsubsidized.

Table 2: Exploring student experiences, by level of academic disruption in their break term

Panel A: Types of courses taken (% of attempted credits)

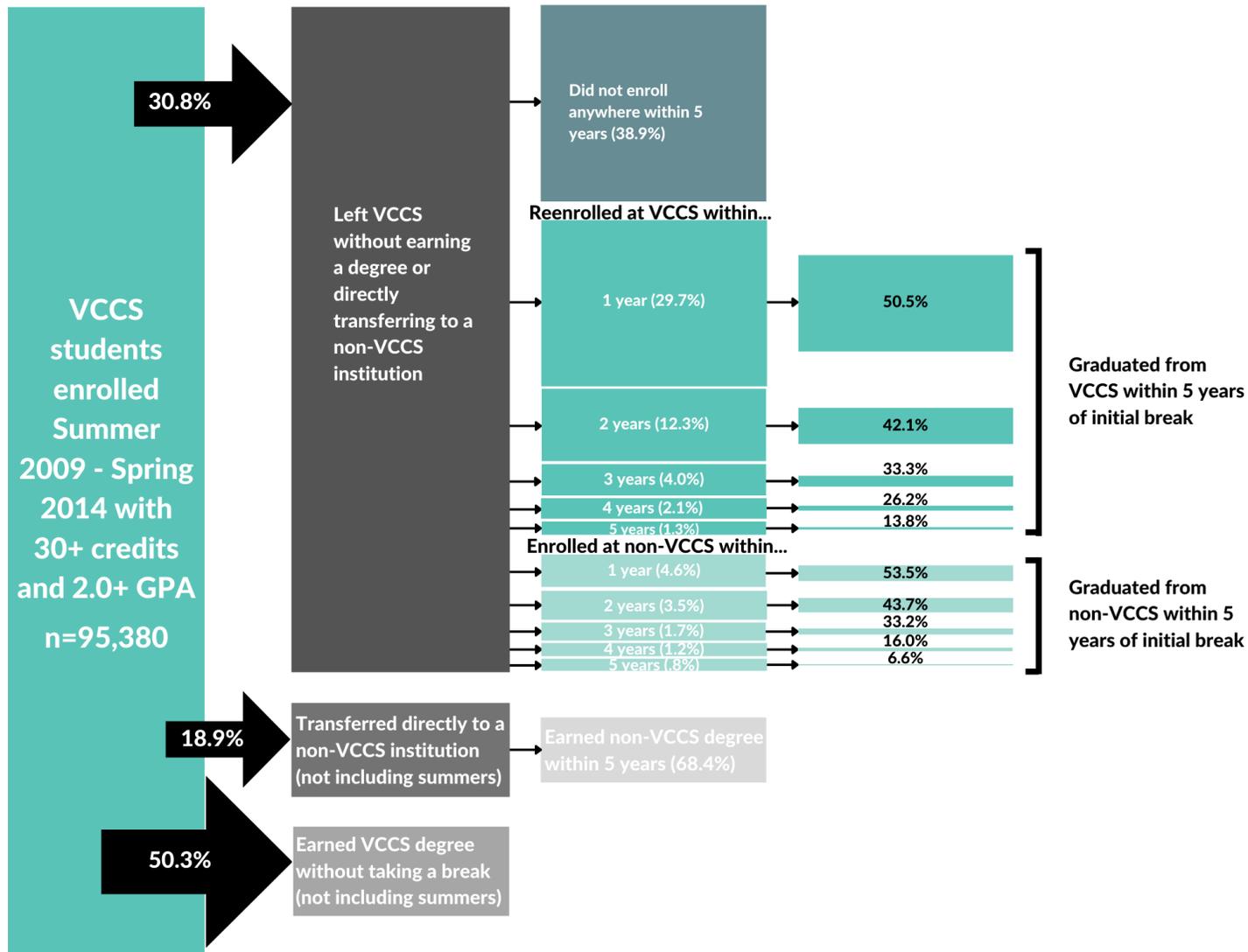
	No Disruption		GPA drop > 1 point			All W/F			
	Pre-break mean (1)	Difference At Break (2)	Pre-break mean (3)	Difference At Break (4)	P-value of (4) = (2) (5)	Pre-break mean (6)	Difference At Break (7)	P-value of (7) = (2) (8)	P-value of (7) = (4) (9)
Online	0.162	0.086***	0.168	0.123***	0	0.194	0.159***	0	0
College-level Math	0.06	0.000	0.063	0.025***	0	0.063	0.030***	0	0.291
Difficult	0.282	-0.013***	0.296	0.070***	0	0.289	0.107***	0	0

Panel B: Financial aid, employment, and earnings

	No Disruption		GPA drop > 1 point			All W/F			
	Pre-break mean (1)	Difference At Break (2)	Pre-break mean (3)	Difference At Break (4)	P-value of (4) = (2) (5)	Pre-break mean (6)	Difference At Break (7)	P-value of (7) = (2) (8)	P-value of (7) = (4) (9)
Received Pell Grant	0.355	-0.085***	0.459	-0.082***	0.760	0.449	-0.112***	0.008	0.020
Borrowed loans	0.133	-0.050***	0.180	-0.052***	0.764	0.188	-0.085***	0	0
Any employment	0.625	0.007	0.632	0.006	0.925	0.668	0.016*	0.370	0.439
Q. wages (\$1000s)	6.406	-0.169**	5.247	-0.093	0.642	5.814	-0.005	0.245	0.633
N	14,845		4,615			6,571			

Notes: sample limited to SCND students (n = 26,031). The three student categories "No Disruption", "GPA drop > 1 point" and "All W/F" refer to the student's academic outcomes in their break term, with "No Disruption" referring to students who are in neither the other two categories. Columns (1), (3), and (6) show the mean values of the student experience variables for the students in the four years prior to but excluding their break term. Columns (2), (4), and (7) show the result of t-tests comparing the student experience variable during the break term and pre-break, within the three student categories. For example, the first row of this table displays the difference between the average percent of in-person courses taken during the break terms compared to the average percent of day courses taken by the student in the four years prior, within student category. *p<0.10; **p<0.05; ***p<0.01.

Figure 1: Re-enrollment and completion trajectories of VCCS students



Notes: includes VCCS students who were enrolled in the 2009-10 through 2013-14 academic years and had earned at least 30 college-level credits and had at least a 2.0 GPA when they left VCCS. We further restrict the sample to students ages 18-50 at the time they left VCCS. We exclude students who were only ever dually enrolled; we also exclude students who had earned a degree prior to their initial VCCS enrollment. Students within the "Left VCCS without earning a degree or directly transferring..." category are those who left VCCS for at least one non-Summer term. We classify a student as having enrolled within 1 year if they enrolled in one of the three terms following the term they were last enrolled at VCCS. For example, if a student left VCCS Summer 2009 and re-enrolled in Spring 2010 or Summer 2010, then we classify them as having re-enrolled within one year. All VCCS enrollment and graduation information is observed in VCCS administrative data; all non-VCCS enrollment and graduation information is observed in National Student Clearinghouse matches.

Figure 2: Timing of pre-break and post-break academic and employment measures

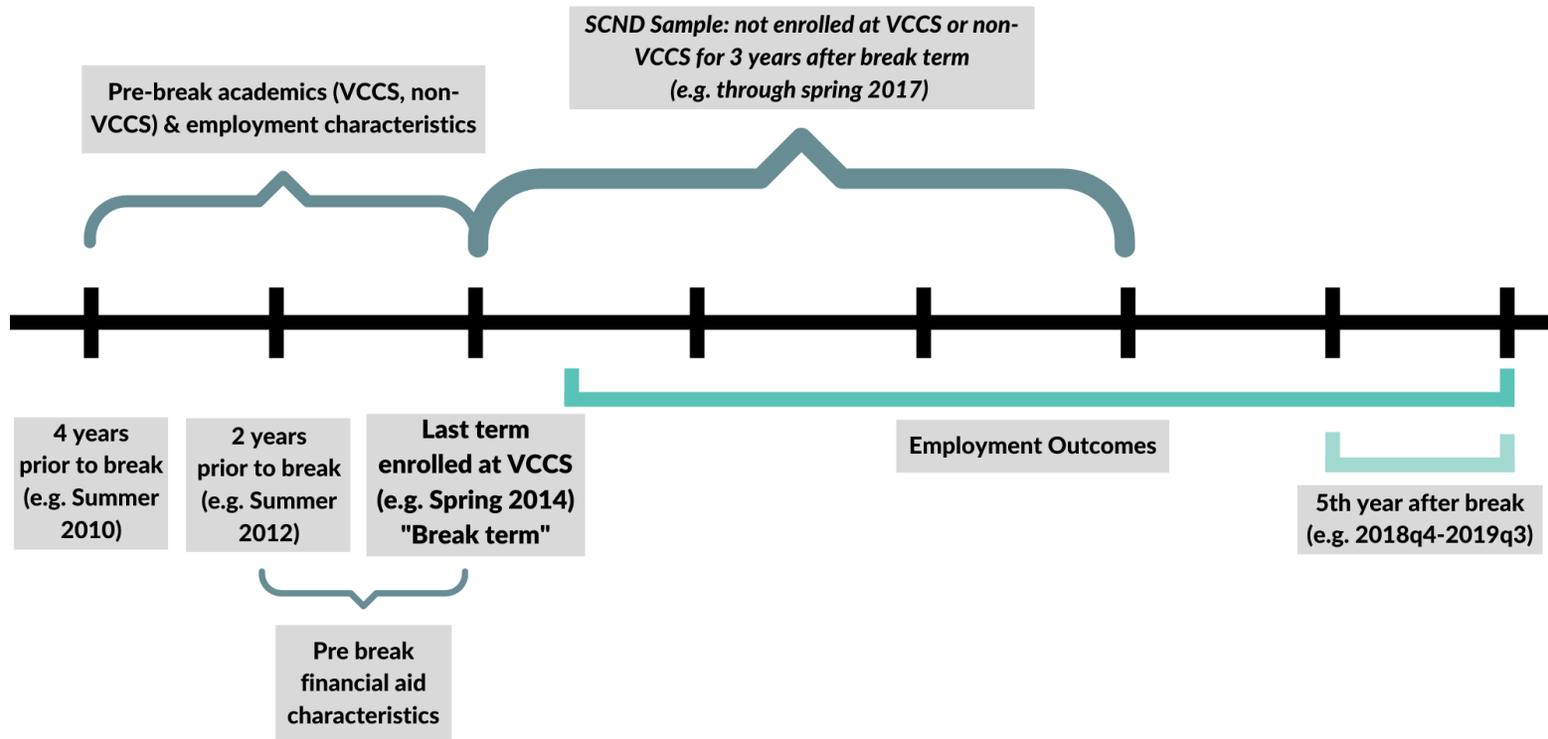
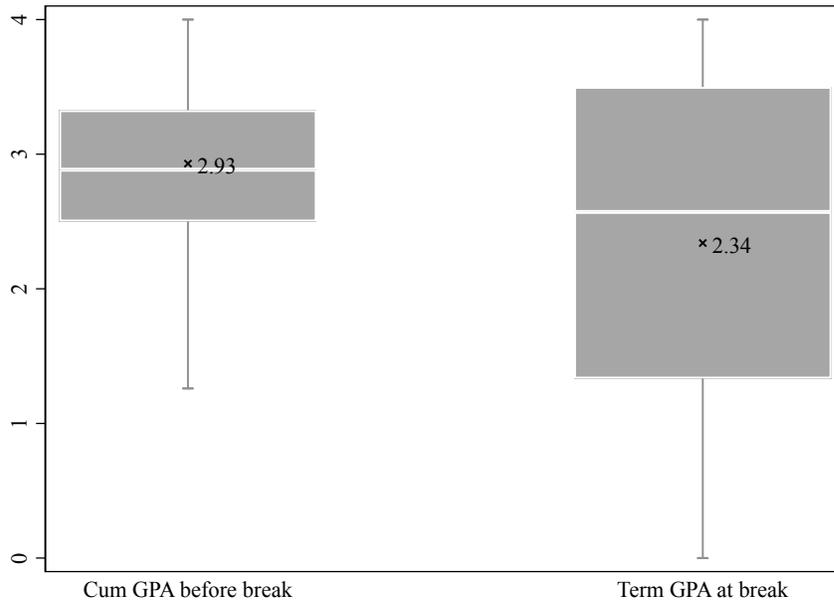
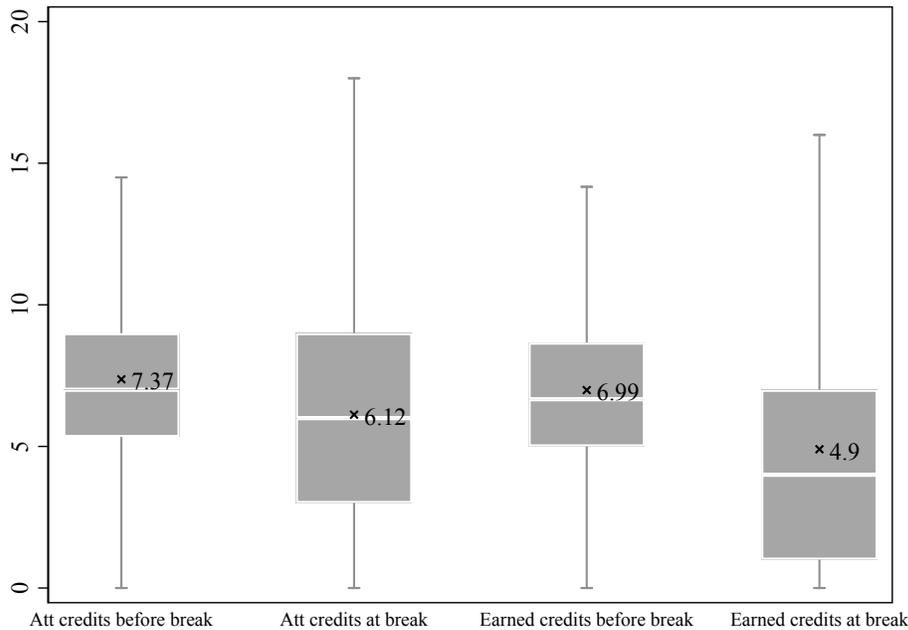


Figure 3: Comparing prior and during break term academic performance among SCND students

Panel A: GPA

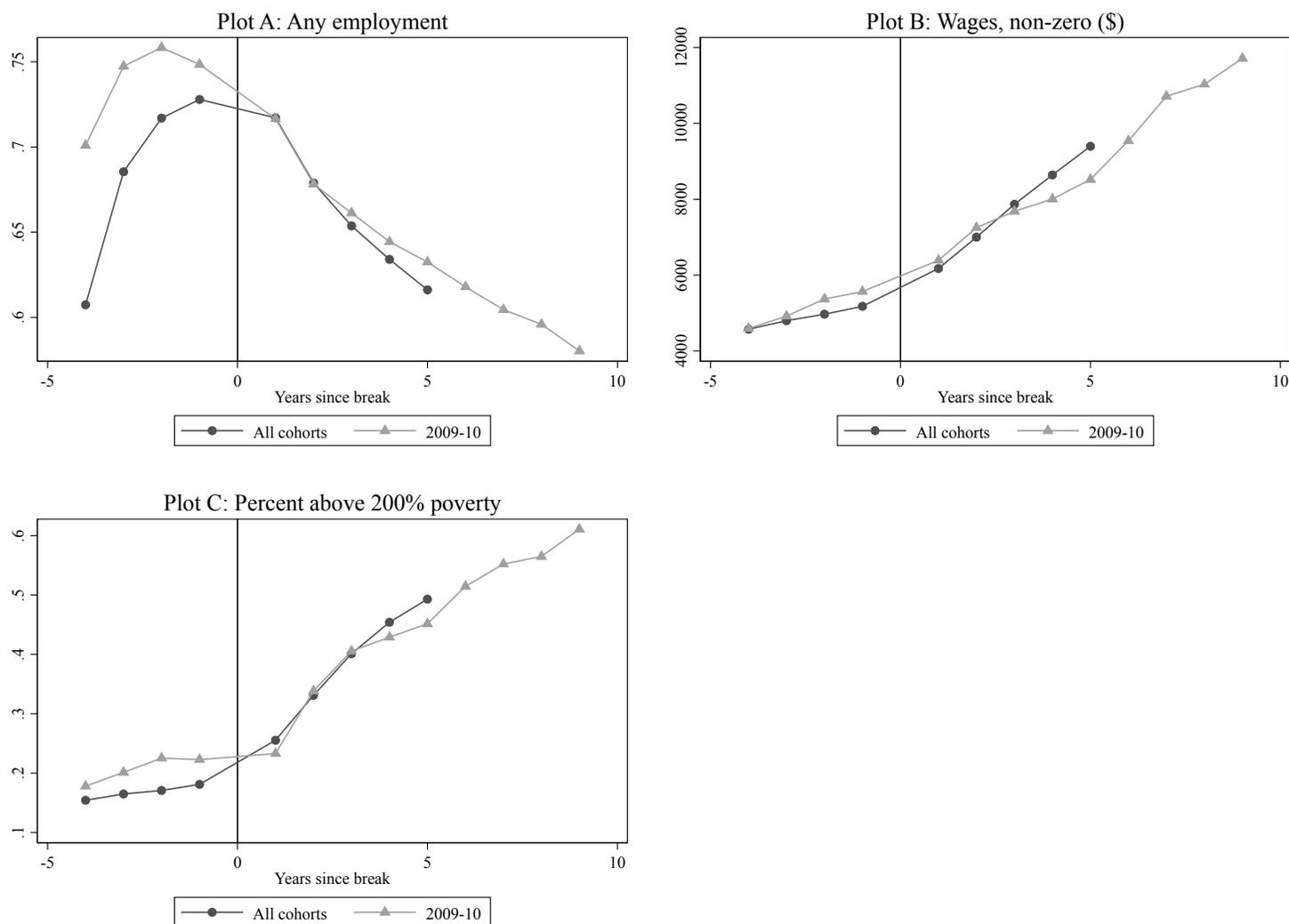


Panel B: Credits attempted and earned



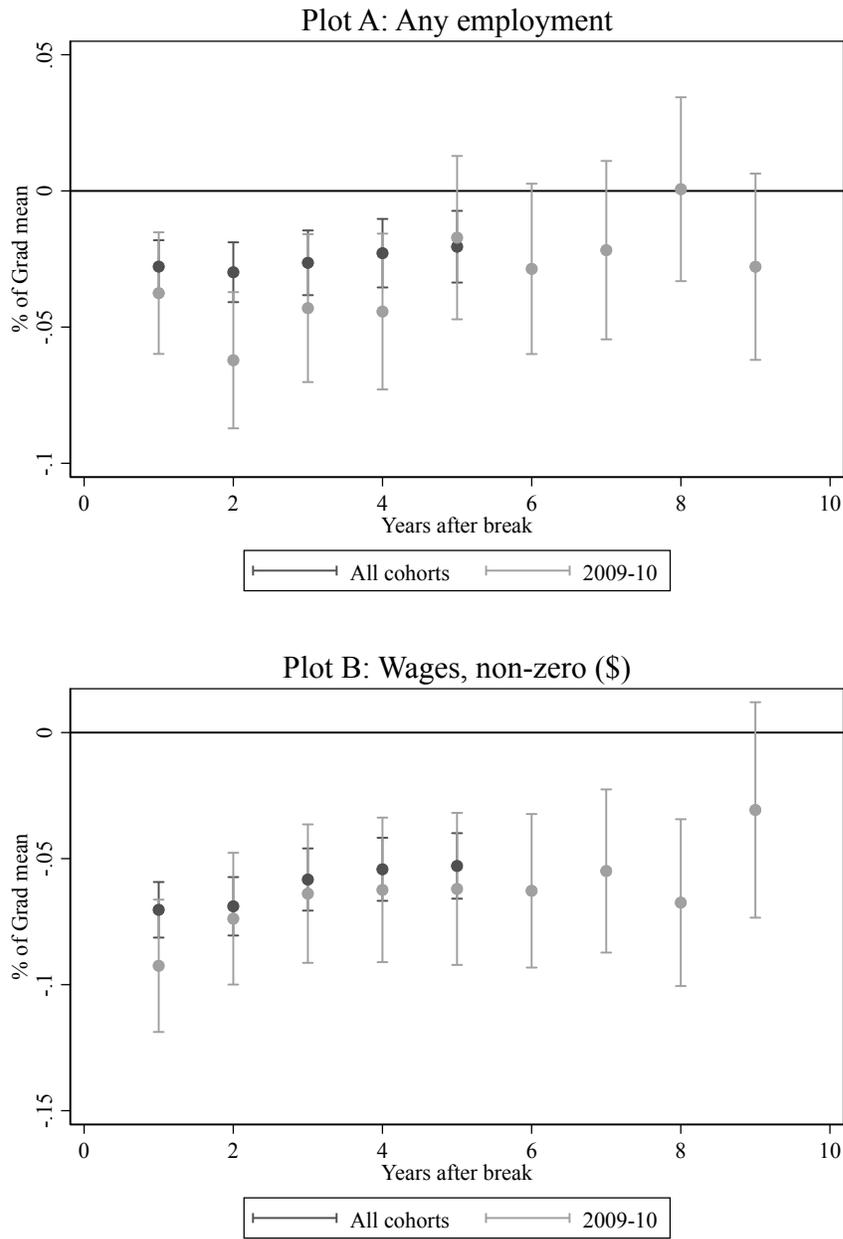
Notes: N = 26,031. The black labels represent the means of each variable; the white lines represent the medians; the edges of the boxes represent the 25th and 75th percentiles; and the end of the whiskers represent the 1.5 IQR or the minimum or maximum value. The "before break" measures are constructed using the four years of academic data prior to and excluding the student's break term (i.e. the last term the student was enrolled at VCCS before leaving for at least three years). 13% of the sample does not have a valid GPA for their break term due to either fully withdrawing from courses, or only earning grades that do not contribute grade points (e.g. "P"). Therefore, these students do not contribute toward Panel A.

Figure 4: Labor market experiences of SCND, pre- and post-break



Notes: The line at $x = 0$ represents the "break term", i.e. the last term the student was enrolled at VCCS. Plot A shows the share of SCND students with any observed employment (i.e. in at least one of the four quarters) for each pre- and post-break year. Plot B shows the average quarterly earnings, using quarters with observed employment only. Plot C shows the share of SCND who were observably employed in a given year who earned above the 200% federal poverty line.

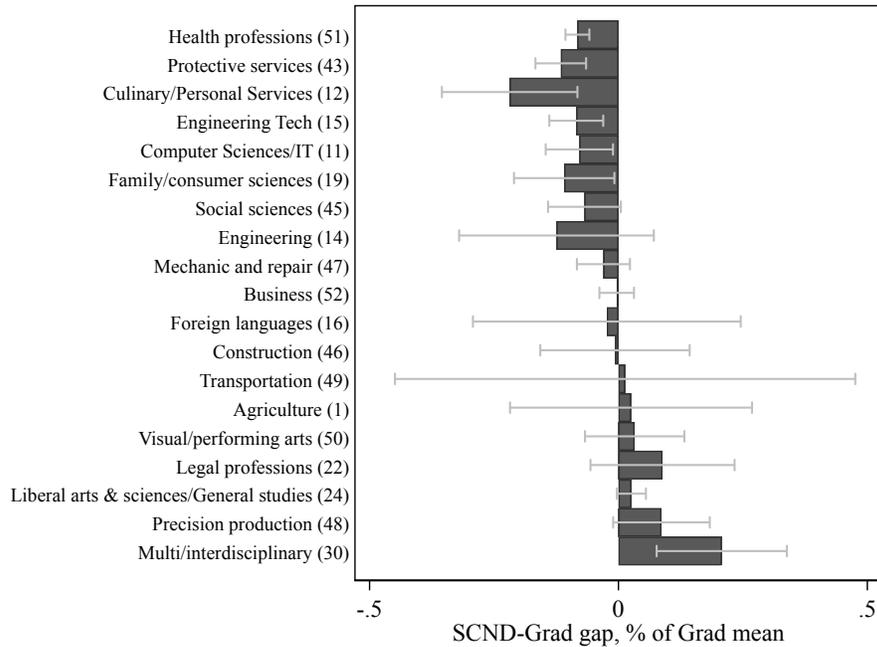
Figure 5: Estimated SCND-Graduate employment and earnings differentials



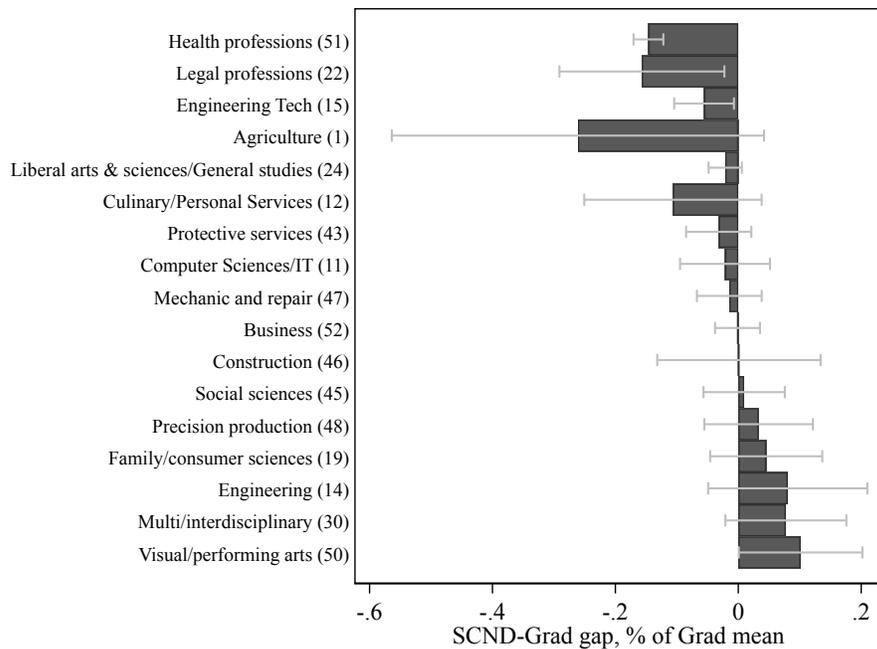
Notes: this figure shows the estimated SCND-Graduate differentials in observed employment and conditional average quarterly wages, expressed as percent of the graduate mean, and the 90% confidence intervals of these estimates. See equation 1 for the regression model that produces these estimates.

Figure 6: Estimated SCND-Graduate employment and wage differentials, by field of study

Plot A: Any employment



Plot B: Wages, non-zero (\$)



Notes: this figure shows the estimated gaps in observed employment (Plot A) or conditional average quarterly wages (Plot B) measured in the 5th year after break/graduation, expressed as percent of the graduate mean, and the 90% confidence intervals of these estimates. We estimated equation 1 separately for each 2-digit CIP code (title and code shown on the right). We do not display CIP codes with fewer than 10 SCND students, fewer than 10 graduates, or fewer than 100 combined.

Figure 7: SCND population by employment outcomes (third year after break) and characteristics of field of study



Notes: the four employment categories represented in the second column are measured in the third year after break. The SCND/graduate gaps referenced in the third column are estimated using equation 1 with the outcome of conditional average quarterly wages in the fifth year after break, with $p < 0.10$ considered significant. Health science fields are identified by the CIP code of the program of study the student was most recently pursuing before their break from VCCS. Note that within employment category, the “Negative & significant” and “Non-negative or insignificant” percentages do not sum to 100 percent as a small share (generally 1-2 percent) of students left a program of study that had too few SCND or Graduate observations to estimate the gaps.

Appendix Table A1: Comparing prior and during break term academic performance among SCND students, different samples of interest

	Older (≥ 25) (1)	Younger (≤ 24) (2)	Earlier (2009-10, 2010-11) (3)	Recent (2012-13, 2013-14) (4)	1+ year break (5)	5+ year break (6)
Cum GPA before break	3.08	2.80	2.95	2.90	2.95	2.93
Term GPA at break	2.49	2.21	2.40	2.25	2.39	2.36
Att credits before break	6.61	8.02	7.28	7.40	7.77	7.27
Att credits at break	5.53	6.63	5.98	6.26	6.52	6.00
Earned credits before break	6.33	7.57	6.93	7.00	7.44	6.89
Earned credits at break	4.48	5.27	4.88	4.90	5.38	4.79
N	12,147	13,884	9,615	10,091	28,140	25,355

The "before break" measures are constructed using the four years of academic data prior to and excluding the student's break term (i.e. the last term the student was enrolled at VCCS before leaving for at least three years, or 1 year or 5 years in the case of columns 5 and 6).

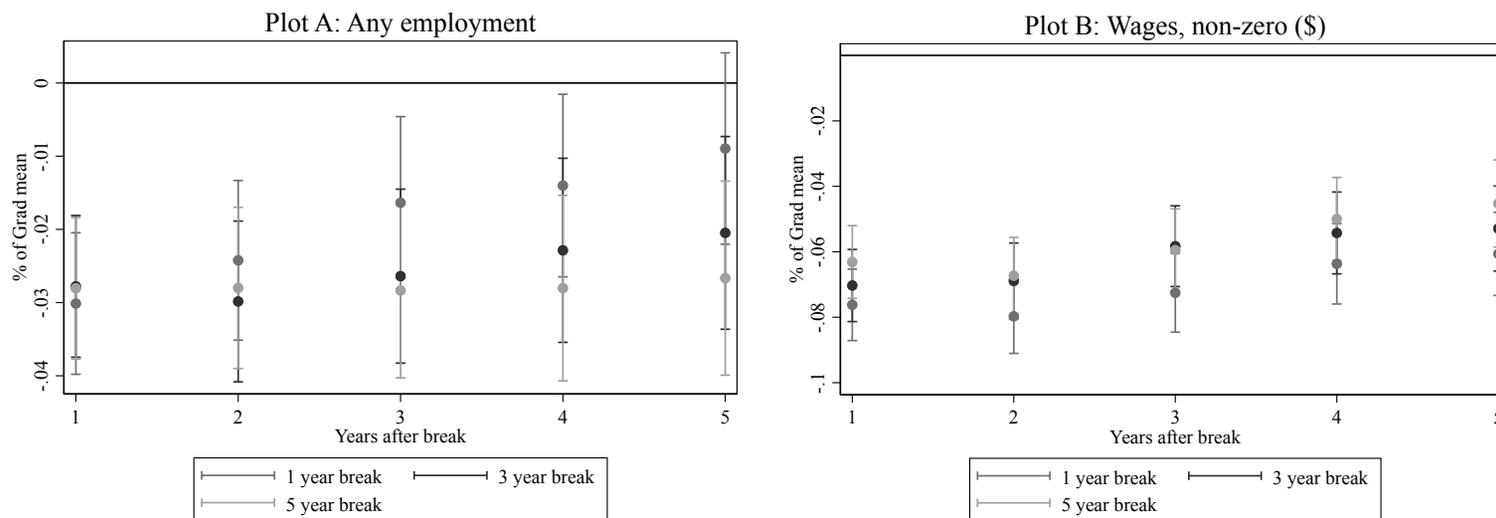
Appendix Table A2: SCND students who had previously received financial aid, but did not during their break term

	Pell Grant (1)	Federal Loan (2)
Share of SCND students receiving aid in prior terms	23.0%	37.9%
GPA fell below 2.0	1.2%	0.9%
Dropped below half-time status	35.7%	34.1%

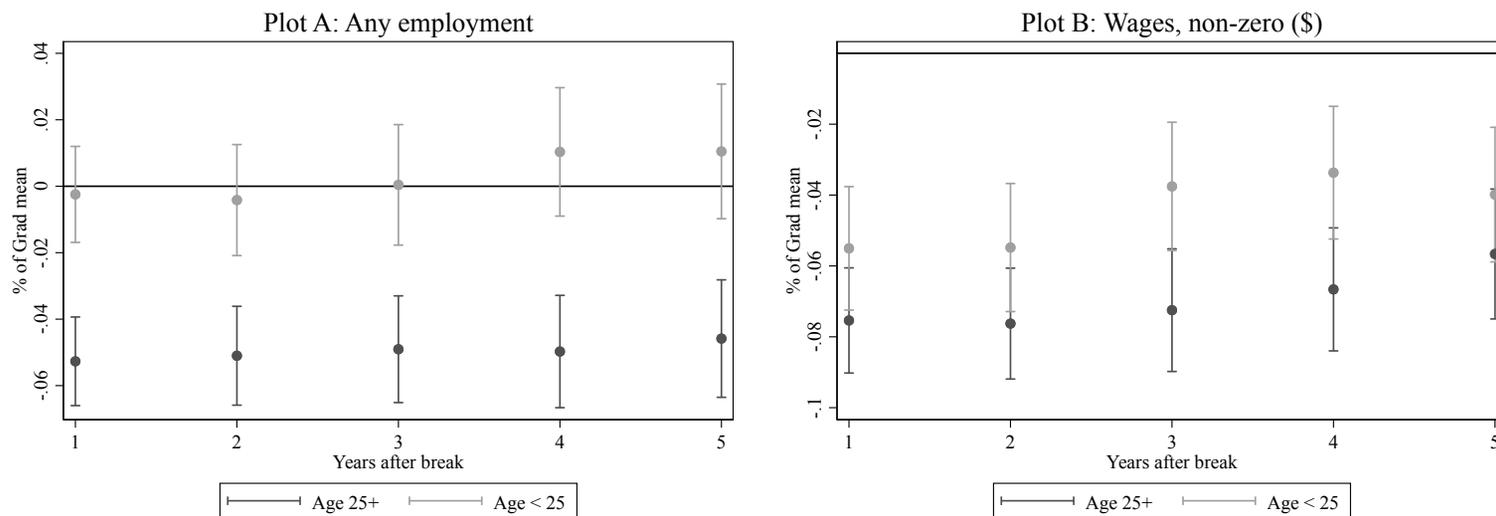
Notes: sample limited to SCND students (n = 26,031). The first row displays the share of students who had received the form of aid in the prior two years (n = 10,345 for Pell; n = 4,050 for Stafford loans) but who did not receive that form of aid during break term. The second and third rows show the subset of the 23.0% and 37.9% whose GPA fell below 2.0 in the term immediately prior to break or whose enrollment status dropped below half-time during the break term, respectively.

Appendix Figure A1: Estimated SCND-Graduate employment and earnings differentials

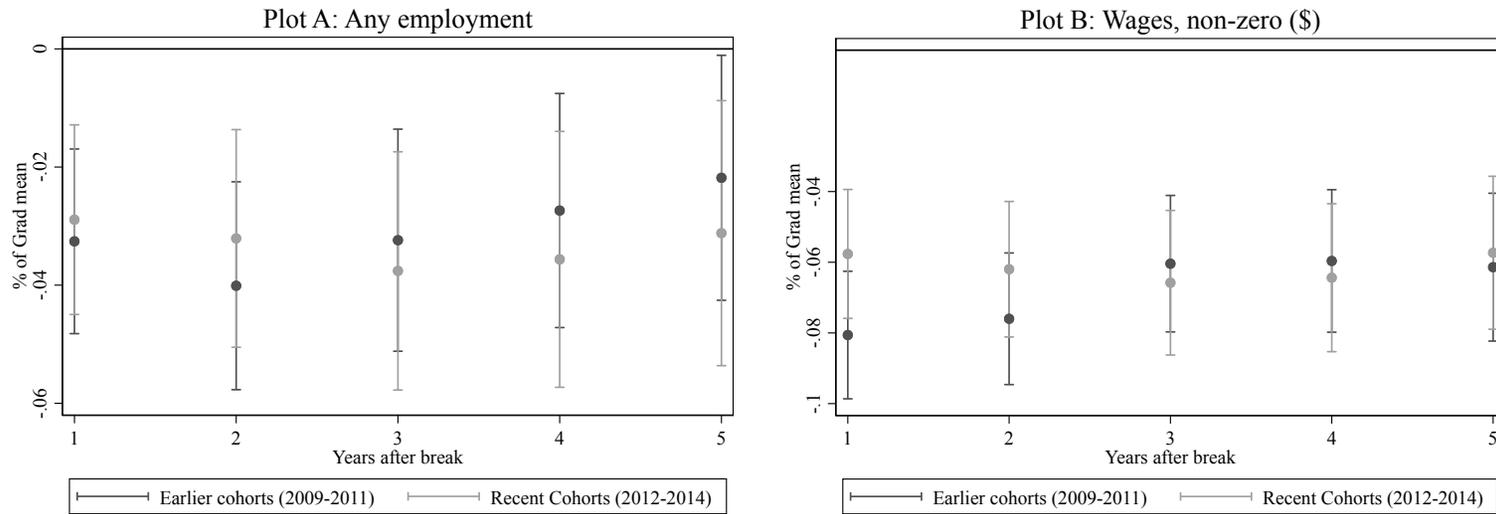
Panel A: SCND populations with different break-length definitions



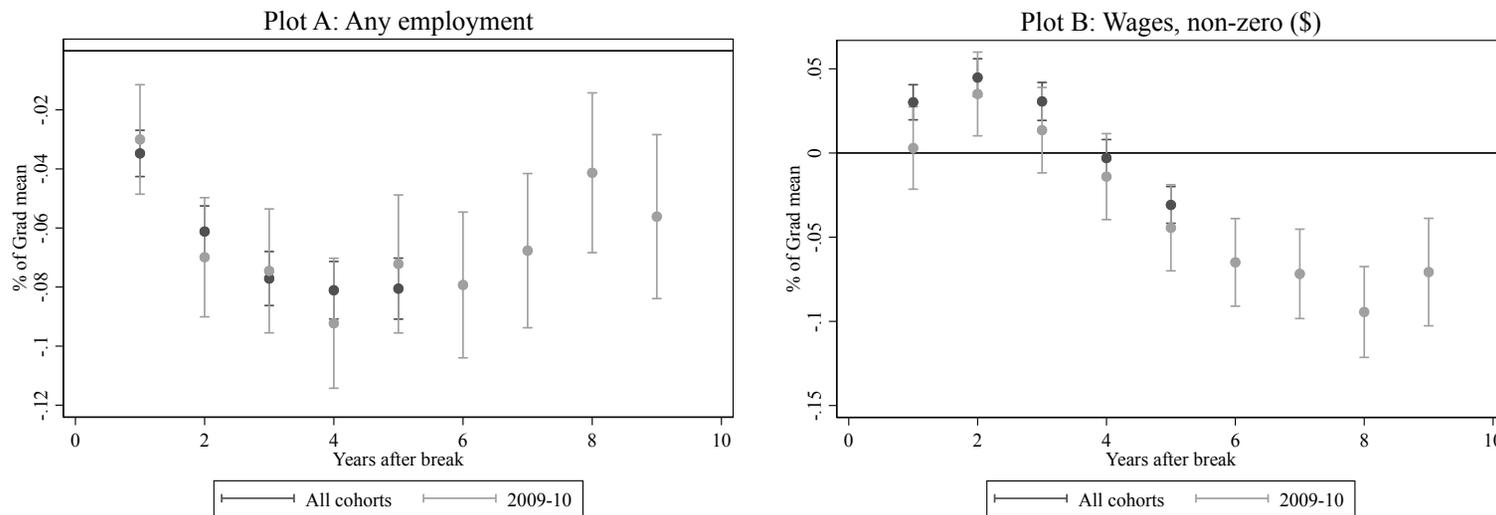
Panel B: Older versus younger SCND students



Panel C: Earlier versus more recent SCND cohorts



Panel D: Using all Graduates as comparison when estimating differentials



Appendix Table B1: Post-break enrollment, degree completion, and employment by institution type, among students who enroll at a non-VCCS institution within three years of leaving VCCS

	Enrolled within 3 years	Graduation rate among enrollees	Observed employment among enrollees	Wages (non- zero) among enrollees
	(1)	(2)	(3)	(4)
Public 4-year, in-state	51.5%	68.8%	65.7%	\$9,453
Public 2-year, in-state	0.1%	19.4%	89.7%	\$9,562
Non-profit 4-year, in-state	14.0%	47.6%	26.3%	\$9,102
Non-profit 2-year, in-state	8.5%	26.1%	16.9%	\$7,585
For-profit 4-year, in-state	14.2%	58.5%	69.3%	\$10,038
For-profit 2-year, in-state	0.2%	80.4%	78.0%	\$12,178
Public 4-year, out-of-state	9.3%	49.3%	36.4%	\$9,996
Public 2-year, out-of-state	0.0%	50.0%	54.5%	\$7,610
Non-profit 4-year, out-of-state	4.2%	60.1%	79.1%	\$9,854
Non-profit 2-year, out-of-state	0.5%	65.6%	81.7%	\$10,107
For-profit 4-year, out-of-state	8.3%	35.8%	59.5%	\$10,151
For-profit 2-year, out-of-state	0.2%	53.7%	31.6%	\$5,483

Notes: N = 22,112. The percentages within column (1) to over 100% because the categories are not mutually exclusive, because we consider all colleges a student may have attended within the three years after their VCCS break. We consider all levels of degrees and credentials present in the NSC graduation records. Observed employment and wages are measured in the fifth year after leaving VCCS.

Appendix Table B3: Demographic, financial aid, and academic characteristics of SCND and Graduates comparison samples

	SCND, older	SCND, younger	SCND, earlier cohorts	SCND, recent cohorts	SCND, 1+ year break	SCND, 5+ year break	All Grads
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	57.1%	50.5%	54.5%	52.2%	55.0%	53.3%	58.3%
White	58.8%	70.2%	67.1%	63.1%	62.9%	65.9%	64.0%
Black	23.3%	13.0%	16.6%	18.2%	18.4%	17.4%	16.6%
Hispanic	6.4%	6.6%	5.4%	7.7%	7.2%	6.2%	6.9%
Asian	6.5%	5.3%	6.3%	5.6%	6.2%	5.8%	7.6%
Other	4.9%	4.8%	4.6%	5.1%	5.1%	4.7%	4.7%
Age	33.6	21.3	27.1	26.9	25.8	27.7	26.5
Received Pell	43.9%	36.1%	32.4%	46.0%	42.8%	39.5%	39.6%
Received Stafford	19.1%	12.5%	12.5%	18.7%	17.6%	15.1%	17.3%
Accumulated Stafford loans	\$3,960	\$2,731	\$3,069	\$3,663	\$3,357	\$3,474	\$3,419
Cumulative credits	48.6	47.0	47.7	48.0	47.0	47.9	64.4
Cumulative GPA	3.01	2.72	2.88	2.83	2.88	2.86	3.20
N	12,147	13,884	9,615	10,091	28,140	25,355	79,571

Notes: Race/ethnicity category "Other" includes categories the categories American Indian/Alaskan; Hawaiian/Pacific Islander; Two or More Races; and Not Specified. Gender, race, and age are constructed using student information current as of the time they left VCCS. Received Pell and Received Stafford based on financial aid records for the two years prior to leaving VCCS. Stafford loans include both subsidized and unsubsidized. Cumulative credits and GPA are measured at the time of break (SCND) or graduation (Graduates)

Appendix Table B4: Exploring student experiences, by level of academic disruption in their break term

	No Disruption		GPA drop > 1 point			All W/F			
	Pre-break mean (1)	Difference At Break (2)	Pre-break mean (3)	Difference At Break (4)	P-value of (4) = (2) (5)	Pre-break mean (6)	Difference At Break (7)	P-value of (7) = (2) (8)	P-value of (7) = (4) (9)
<i>% of credits attempted that were...</i>									
Daytime	0.676	-0.138***	0.684	-0.131***	0.424	0.66	-0.174***	0	0
200-level	0.283	0.094***	0.271	0.098***	0.617	0.293	0.046***	0	0
Lab Science	0.001	-0.000***	0.001	-0.000	0.237	0.001	-0.000	0.378	0.717
Arts	0.068	0.014***	0.062	0.002	0.002	0.067	-0.010***	0	0.016
Business	0.068	0.013***	0.063	0.020***	0.141	0.069	0.012***	0.877	0.158
English	0.11	-0.041***	0.118	-0.051***	0.009	0.109	-0.028***	0	0
Voc-Tech	0.199	0.003	0.199	-0.007	0.071	0.213	-0.032***	0	0.0002
Social Sciences/Humanities	0.065	0.005**	0.061	-0.008*	0.006	0.048	-0.004	0.022	0.520
Health Sciences	0.073	0.028***	0.073	0.042***	0.0104	0.07	0.014***	0.002	0
Distance from college (zip code)	19.659	-0.418	17.77	0.268	0.578	19.123	0.931	0.212	0.637
N	14,845		4,615			6,571			

Notes: sample limited to SCND students (n = 26,031). The three student categories "No Disruption", "GPA drop > 1 point" and "All W/F" refer to the student's academic outcomes in their break term, with "No Disruption" referring to students who are in neither the other two categories. Columns (1), (3), and (5) show the mean values of the student experience variables for the students in the four years prior to but excluding their break term. Columns (2), (4), and (6) show the result of t-tests comparing the student experience variable during the break term and pre-break, within the three student categories. For example, the first row of this table displays the difference between the average percent of in-person courses taken during the break terms compared to the average percent of day courses taken by the student in the four years prior, within student category. The negative values in the first row show that students were less likely to take daytime in their break term, compared to the pre-break window. The asterisks denote the statistical significance of the t-tests, with *p<0.10; **p<0.05; ***p<0.01.

Appendix Table B5: Exploring student experiences, by level of academic disruption in their break term

	No Disruption	GPA drop > 1 point		All W/F in break term		
	Mean	Mean	P-value of (2) = (1)	Mean	P-value of (4) = (1)	P-value of (4) = (2)
	(1)	(2)	(3)	(4)	(5)	(5)
<i>Break term was in the...</i>						
Fall	0.331	0.365	0	0.4	0	0
Spring	0.148	0.113	0	0.137	0.024	0
Summer	0.521	0.522	0.893	0.463	0	0
<i>Immediately prior to break term...</i>						
Changed field of study (2-digit CIP)	0.123	0.153	0	0.12	0.519	0
Changed program of study	0.083	0.104	0	0.078	0.317	0
N	14,845		4,615		6,571	

Notes: sample limited to SCND students (n = 26,031). The three student categories "No Disruption", "GPA drop > 1 point" and "All W/F" refer to the student's academic outcomes in their break term, with "No Disruption" referring to students who are in neither the other two categories.

Appendix Table B6: Estimating SCND employment and wage gaps, gradually adding regression controls and fixed effects

Panel A: Any Employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SCND	-0.0164*** (0.0041)	-0.0111*** (0.0041)	-0.0243*** (0.0049)	-0.0251*** (0.0049)	-0.0365*** (0.0046)	-0.0278*** (0.0046)	-0.013** (0.0051)
N	54,826	54,826	54,826	54,826	54,826	54,826	54,826
R-squared	0.0003	0.0279	0.0441	0.0495	0.1679	0.1861	0.2024
Graduate mean	0.633	0.633	0.633	0.633	0.633	0.633	0.633
<i>Type of Controls</i>							
Demographic		X	X	X	X	X	X
Prior VCCS academic			X	X	X	X	X
Prior non-VCCS academic				X	X	X	X
Prior employment					X	X	X
Cohort and cohort FE						X	X
Program of study FE							X

Panel B: Non-zero wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SCND	-1,037.3*** (73.96)	-831.8*** (72.68)	-105.1 (86.38)	-103.4 (86.38)	-406.5*** (76.96)	-495.6*** (76.29)	-552*** (82.45)
N	34,254	34,254	34,254	34,254	34,254	34,254	34,254
R-squared	0.0057	0.0683	0.1085	0.1090	0.2947	0.3167	0.3678
Graduate mean	10434	10434	10434	10434	10434	10434	10434
<i>Type of Controls</i>							
Demographic		X	X	X	X	X	X
Prior VCCS academic			X	X	X	X	X
Prior non-VCCS academic				X	X	X	X
Prior employment					X	X	X
Cohort and cohort FE						X	X
Program of study FE							X

Notes: within each panel, each column represents a separate regression. Column (7) represents the full regression model shown in equation 1, with columns (1) through (6) including fewer regression controls as displayed in the table. The outcomes Any employment and non-zero wages (quarterly average) are measured in the 5th year after the student's break (for SCND) or earning their degree (for graduates).

Appendix Table B7: SCND population by employment outcomes (third year after break) and characteristics of field of study

		<i>Neg & sig gap</i>	<i>Left non health science field</i>
<i>Panel A: GPA drop > 1 point (n = 4,615)</i>			
Employed in 4 qts, wages > 200% pov line	21.3%	19.0%	28.9%
Employed in 4 qts, wages < 200% pov line	30.2%	25.1%	10.6%
Employed between 1-3 quarters	13.3%	20.0%	22.8%
Not employed in any quarter	35.2%	20.4%	32.9%
<i>Panel B: All W/F in break term (n = 6,571)</i>			
Employed in 4 qts, wages > 200% pov line	24.3%	16.6%	29.2%
Employed in 4 qts, wages < 200% pov line	28.7%	20.1%	15.8%
Employed between 1-3 quarters	14.6%	17.0%	23.2%
Not employed in any quarter	32.4%	17.1%	28.0%
<i>Panel C: No negative academic shock (n = 14,845)</i>			
Employed in 4 qts, wages > 200% pov line	27.6%	21.8%	23.4%
Employed in 4 qts, wages < 200% pov line	25.2%	22.0%	14.6%
Employed between 1-3 quarters	11.8%	20.8%	18.0%
Not employed in any quarter	35.4%	17.8%	34.1%
<i>Panel D: Age 25 and older (n = 12,147)</i>			
Employed in 4 qts, wages > 200% pov line	31.0%	22.9%	24.2%
Employed in 4 qts, wages < 200% pov line	20.7%	27.2%	12.7%
Employed between 1-3 quarters	11.6%	24.4%	19.7%
Not employed in any quarter	36.6%	22.1%	29.3%
<i>Panel E: Age 24 and younger (n = 13,884)</i>			
Employed in 4 qts, wages > 200% pov line	20.9%	16.6%	27.1%
Employed in 4 qts, wages < 200% pov line	32.4%	19.2%	15.0%
Employed between 1-3 quarters	13.8%	16.1%	20.8%
Not employed in any quarter	32.9%	14.2%	37.3%
<i>Panel F: Earlier cohorts, 2009-10 and 2010-11 (n = 9,615)</i>			
Employed in 4 qts, wages > 200% pov line	25.4%	20.7%	27.5%
Employed in 4 qts, wages < 200% pov line	28.3%	21.8%	15.0%
Employed between 1-3 quarters	12.9%	19.0%	20.9%
Not employed in any quarter	33.5%	18.9%	32.6%
<i>Panel G: Recent cohorts, 2012-13 and 2013-14 (n = 10,091)</i>			
Employed in 4 qts, wages > 200% pov line	26.7%	18.5%	26.5%

Employed in 4 qts, wages < 200% pov line	24.5%	21.1%	15.5%
Employed between 1-3 quarters	13.1%	19.3%	20.5%
Not employed in any quarter	35.8%	17.1%	31.8%

Panel H: Break definition = 1 year (n = 28,140)

Employed in 4 qts, wages > 200% pov line	21.7%	48.9%	67.5%
Employed in 4 qts, wages < 200% pov line	29.8%	57.9%	67.3%
Employed between 1-3 quarters	14.1%	2.9%	71.6%
Not employed in any quarter	34.4%	47.9%	74.7%

Panel I: Break definition = 5 years (n = 25,355)

Employed in 4 qts, wages > 200% pov line	26.7%	18.8%	23.3%
Employed in 4 qts, wages < 200% pov line	26.0%	22.1%	12.0%
Employed between 1-3 quarters	12.8%	19.2%	18.4%
Not employed in any quarter	34.5%	17.9%	31.5%

Panel J: Creating employment categories based on 5th year after break (n = 26,031)

Employed in 4 qts, wages > 200% pov line	29.8%	19.9%	23.6%
Employed in 4 qts, wages < 200% pov line	20.9%	23.1%	13.0%
Employed between 1-3 quarters	10.9%	18.8%	22.9%
Not employed in any quarter	38.4%	18.5%	30.8%

Panel K: Using full grads comparison sample (n = 26,031)

Employed in 4 qts, wages > 200% pov line	25.6%	19.5%	22.6%
Employed in 4 qts, wages < 200% pov line	26.9%	21.7%	12.2%
Employed between 1-3 quarters	12.8%	19.3%	19.0%
Not employed in any quarter	34.6%	17.5%	30.3%

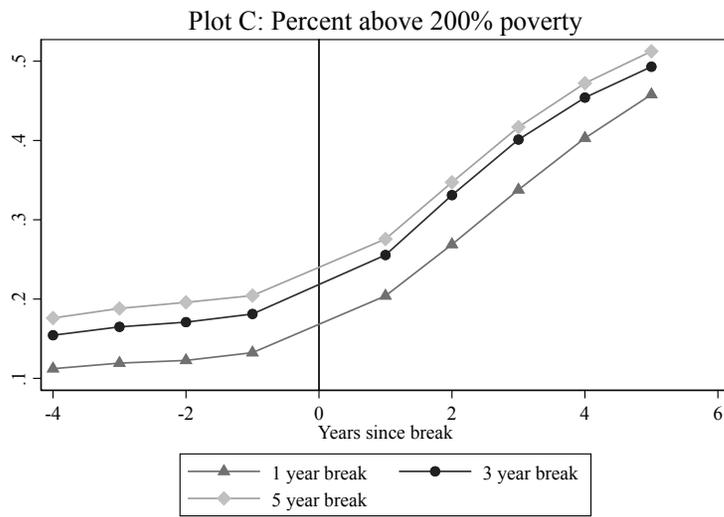
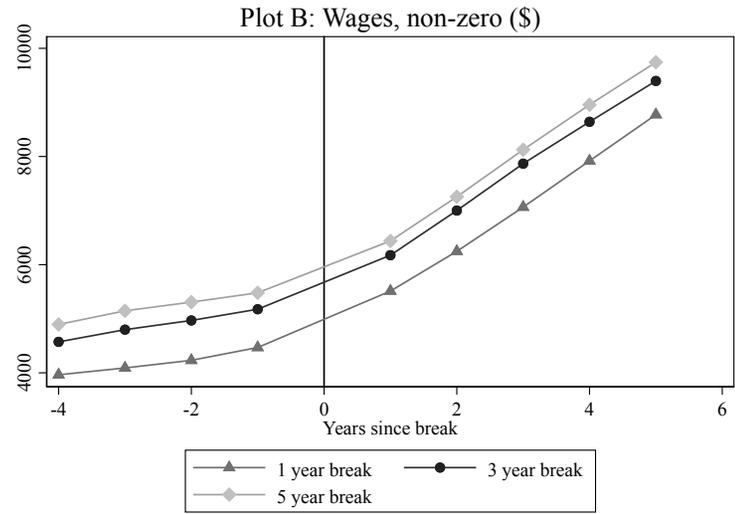
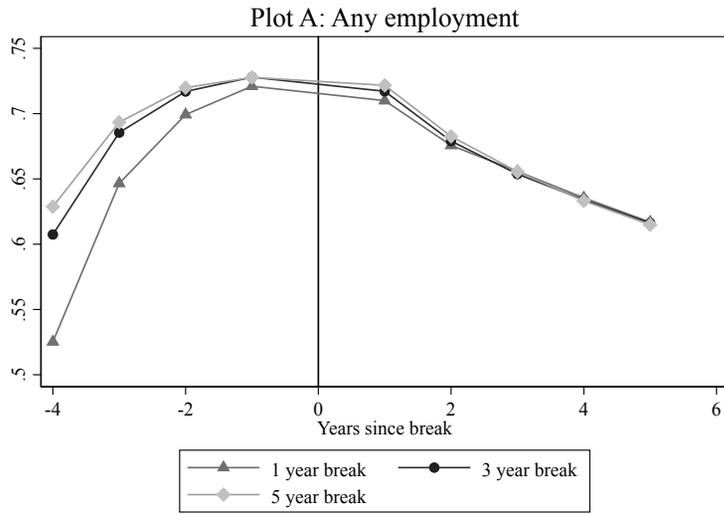
Panel L: Using wage gaps based on observed employment in 3rd year after break (n = 26,031)

Employed in 4 qts, wages > 200% pov line	25.6%	15.5%	3.1%
Employed in 4 qts, wages < 200% pov line	26.9%	20.0%	4.8%
Employed between 1-3 quarters	12.8%	16.4%	4.8%
Not employed in any quarter	34.6%	12.9%	5.4%

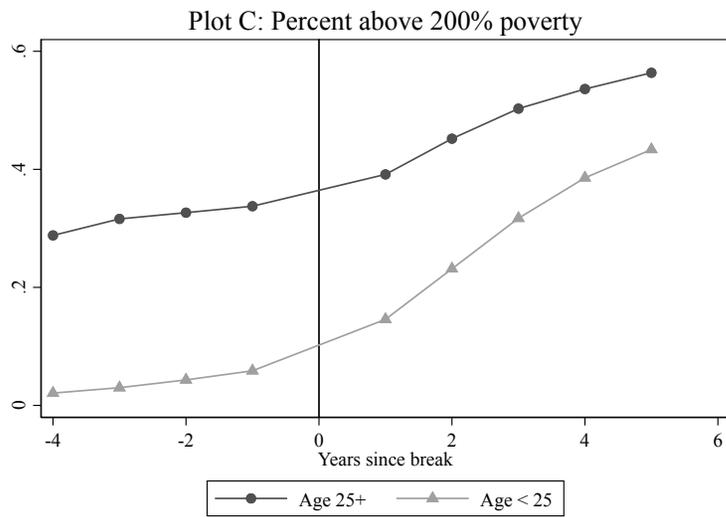
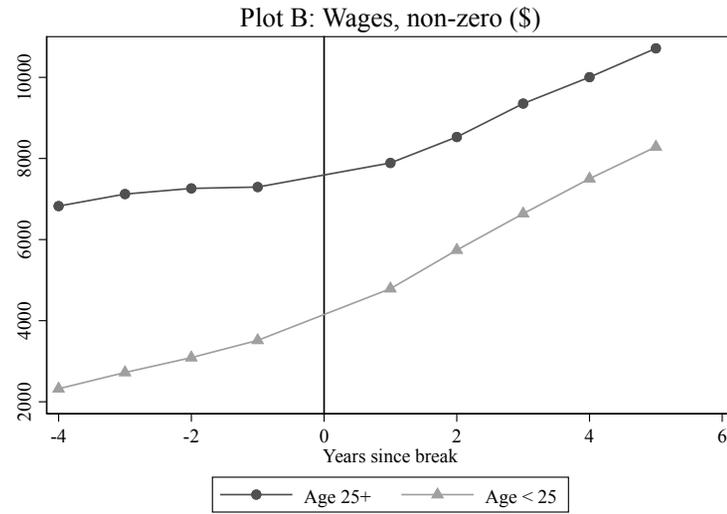
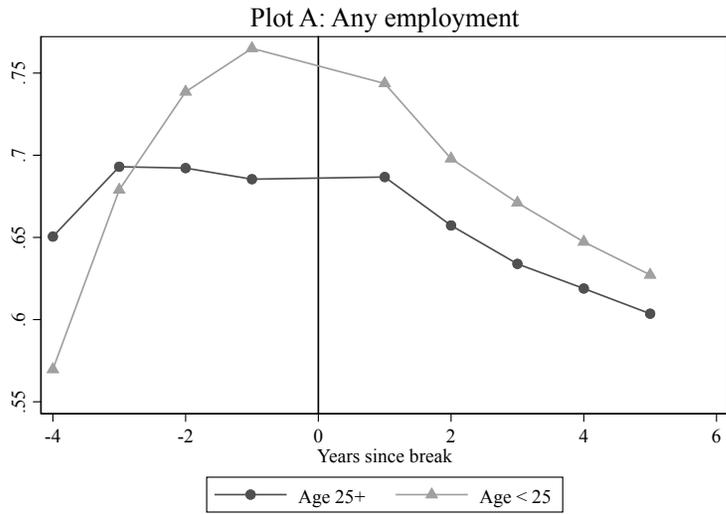
Notes: the four employment categories represented in the second column are measured in the third year after break (with the exception of Panel J). The SCND/graduate gaps referenced in the third column are estimated using equation 1 with the outcome of conditional average quarterly wages in the fifth year after break (with the exception of Panel L), with $p < 0.10$ considered significant. Health science fields are identified by the CIP code of the program of study the student was most recently pursuing before their break from VCCS.

Appendix Figure B1: Labor market experiences of SCND, pre- and post-break

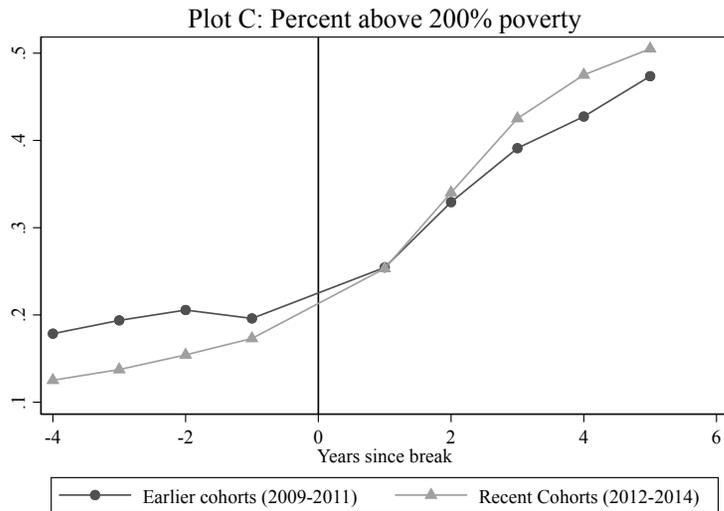
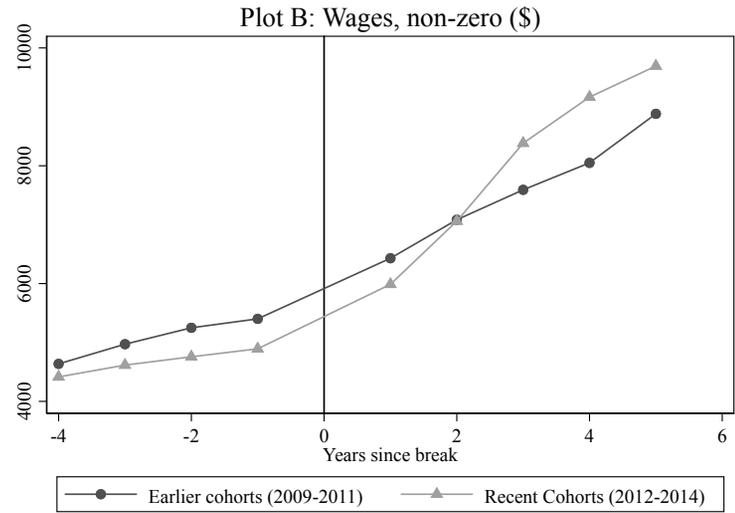
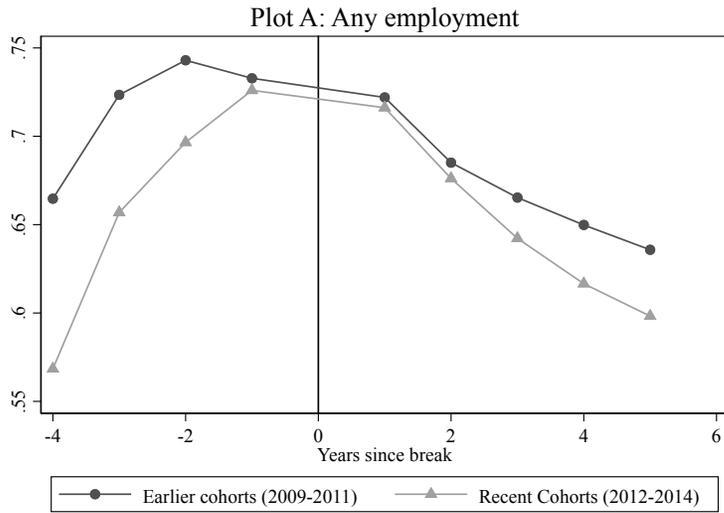
Panel A: SCND populations with different break-length definitions



Panel B: Older versus younger SCND students

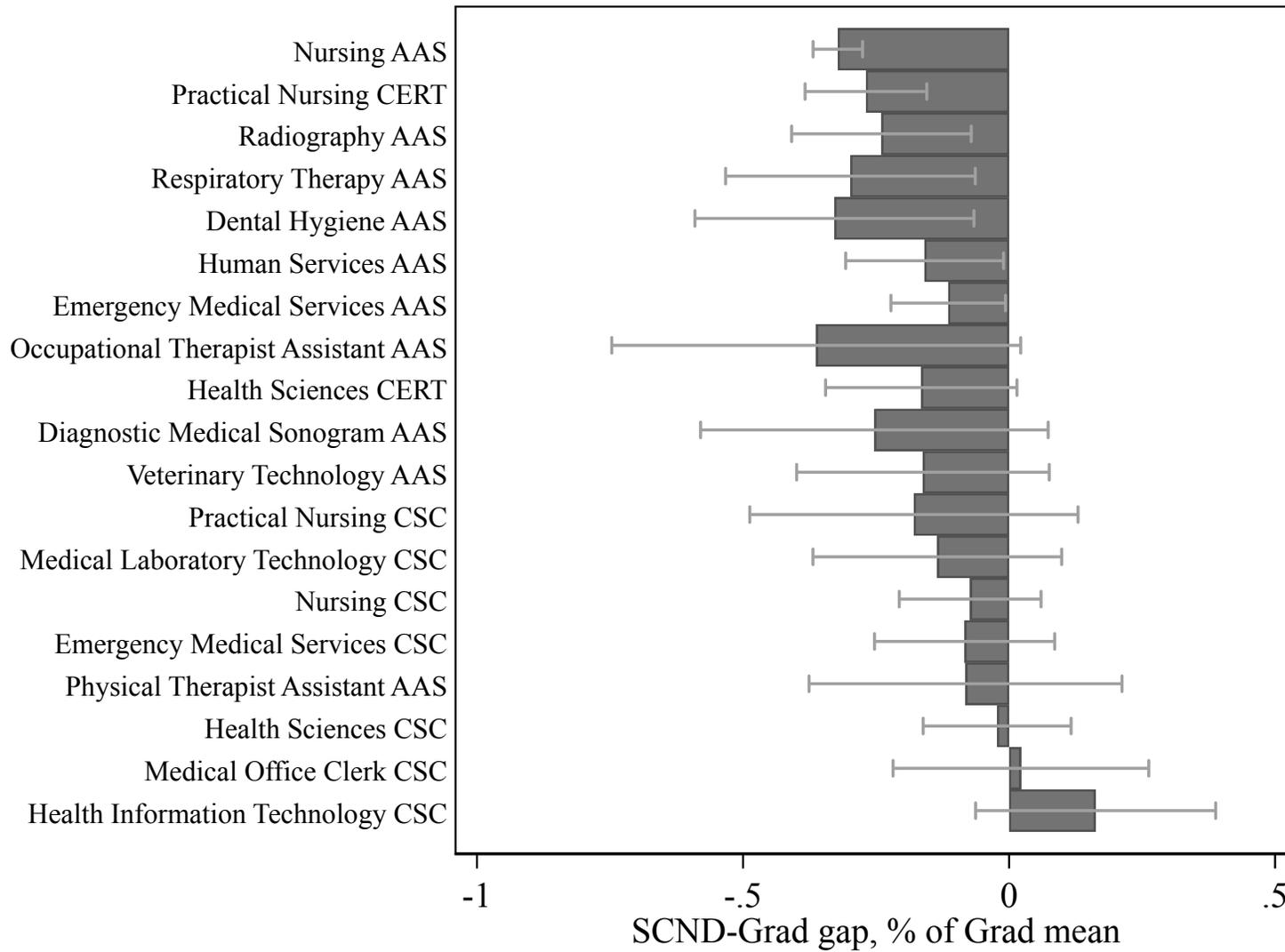


Panel C: Earlier versus more recent SCND cohorts

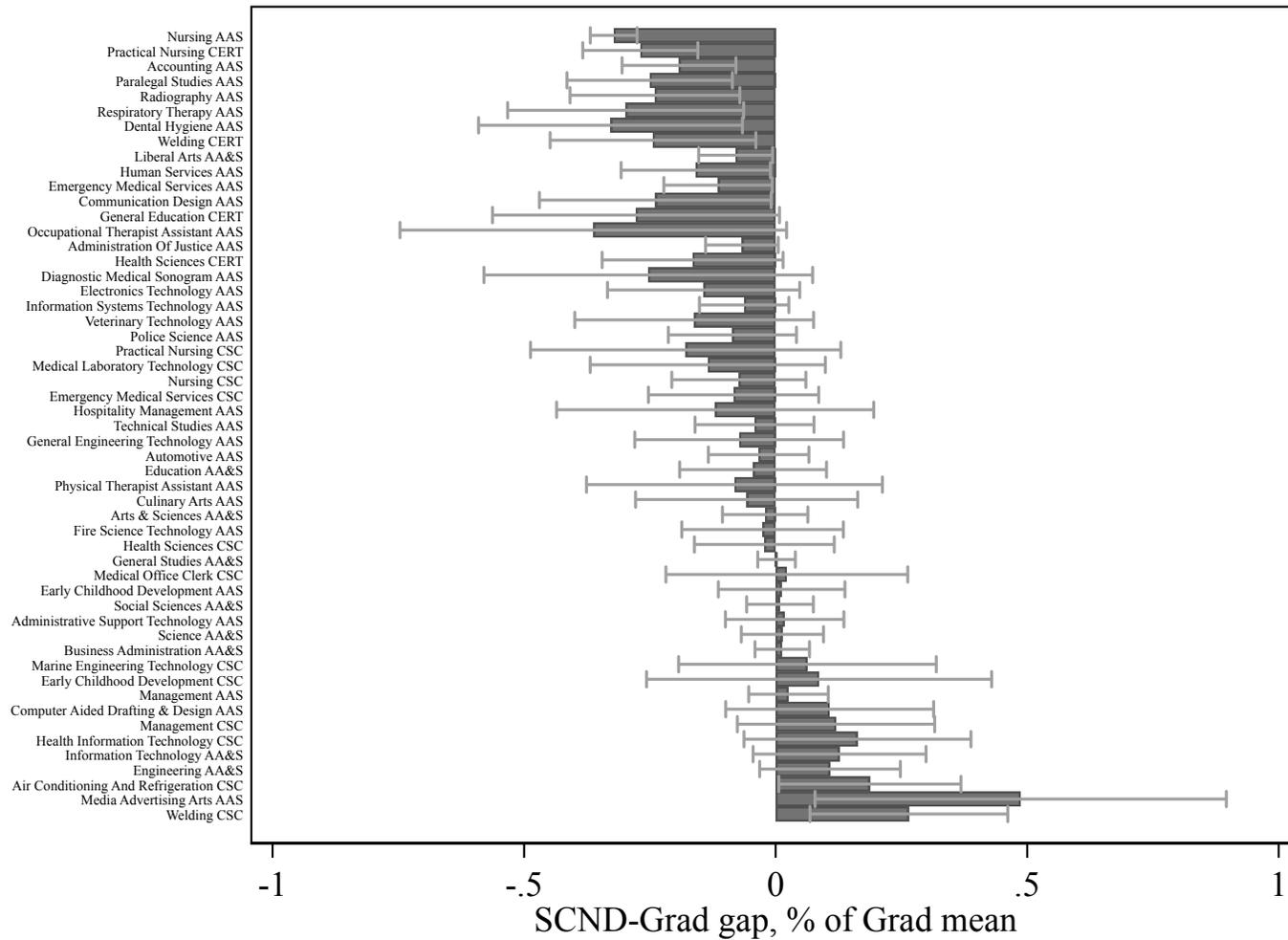


Appendix Figure B2: Estimated SCND-Graduate earnings differentials, by program of study

Plot A: Health science programs of study



Plot B: All programs of study with sufficient sample size



Notes: this figure shows the estimated gaps in average quarterly wages measured in the 5th year after break/graduation, expressed as percent of the graduate mean, and the 90% confidence intervals of these estimates. We estimated equation 1 separately for each program of study with fewer than 10 SCND students, fewer than 10 graduates, or fewer than 100 combined.