



Who Should Re-enroll in College? The Academic and Labor Market Profile of Adults with Substantial College Credits But No Degree

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Tens of millions of Americans have lost their jobs in the wake of the COVID-19 health and economic crisis, and a sizable share of these job losses may be permanent. Unemployment rates are particularly high among adults without a college degree. Recent state policy efforts have focused on increasing re-enrollment and credentialing among adults with some college but no degree (SCND); these efforts are likely to accelerate given the COVID-19 disruptions to the U.S. economy. Yet little is actually known about the background characteristics, academic experiences, or labor market trajectories of this 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 on key measures to VCCS graduates. We also develop a framework for prioritizing which segments of the SCND population states might target for re-enrollment and completion interventions. This framework may be particularly useful to states that need to fill critical workforce shortages in healthcare and other sectors or re-train their workforce in the wake of mass unemployment and economic disruption stemming from the COVID-19 crisis.

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Abstract

Tens of millions of Americans have lost their jobs in the wake of the COVID-19 health and economic crisis, and a sizeable share of these job losses may be permanent. Unemployment rates are particularly high among adults without a college degree. Recent state policy efforts have focused on increasing re-enrollment and credentialing among adults with some college but no degree (SCND); these efforts are likely to accelerate given the COVID-19 disruptions to the U.S. economy. Yet little is actually known about the background characteristics, academic experiences, or labor market trajectories of this 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 on key measures to VCCS graduates. We also develop a framework for prioritizing which segments of the SCND population states might target for re-enrollment and completion interventions. This framework may be particularly useful to states that need to fill critical workforce shortages in healthcare and other sectors or re-train their workforce in the wake of mass unemployment and economic disruption stemming from the COVID-19 crisis.

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Introduction

As of June 2020, more than forty million Americans had lost their jobs as a result of the economic fallout from the COVID-19 crisis. Estimates suggest that a large share of these job losses may be permanent--perhaps as high as 40 percent (Barrero, Bloom, and Davis, 2020). While the path to economic recovery and re-employment remains highly uncertain, numerous policy makers and researchers anticipate substantial near-term and perhaps longer-lasting transformations to the American economy and labor market (Baker et al, 2020; Congressional Budget Office, 2020; Sablik and Schwartzman, 2020). Some sectors, like health care and technology, may be less affected, while others, like travel and hospitality, expect substantial losses to continue through the end of the year (Muro et al 2020; Oxford Economics, 2020). These transformations will in turn likely require additional education and training for a large segment of the American adult workforce, particularly since unemployment stemming from COVID-19 is concentrated among workers with less education: 8.4 percent of individuals with a bachelor's degree or higher were unemployed, compared with 15 percent of individuals with some college and 17.3 percent of individuals with a high school diploma (Bureau of Labor Statistics, 2020).

Even before COVID-19, increasing adult college enrollment and success was a 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 had 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 undergraduate enrollments), 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; NSC Research Center, 2017). Evidence indicates that efforts to increase enrollment among adults 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.

The policy focus on increasing adult educational attainment is likely to accelerate during the COVID crisis, as some states view re-enrollment efforts as essential to filling critical workforce needs in healthcare, logistics, and other sectors, and to better position workers for the labor market transformations that may ensue in the months and years to come (Breulin, 2020; Jenkins & Fink, 2020). Policy makers have shown particular interest in the sub-population of adults with some college credits but no degree (henceforth SCND). This focus on the SCND is supported by descriptive evidence that upwards of 30 percent of students who complete most of the credits typically needed for a college degree withdraw prior to finishing (Mabel and Britton, 2015). Moreover, 36 million adults nationwide have some college credit, but no degree, including close to one million in Virginia (Shapiro et al, 2019). SCND adults have already demonstrated their potential for academic success in postsecondary education, and by virtue of the progress they have already made, may accrue fewer private and social costs to obtaining their degree.

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). 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 or academic experiences of this “some college, no degree” (henceforth

SCND) population. Nor do policy makers have evidence on the employment and earnings profiles of SCND students. More detailed evidence on the SCND population could assist efforts to increase re-enrollment and completion among these students in several ways. For instance, identifying the subset of SCND students who do not already re-enroll in postsecondary education in the years after their separation from college could support targeted outreach to former students who are not already taking action to finish their degree. In addition, evidence on program-specific earnings differentials between SCND students and graduates could inform targeting of students for whom the financial benefit of re-enrollment may be most compelling. As we allude to above, data on the share of SCND students in important sectors like healthcare could also support state policy efforts to fill critical workforce needs. What's more, further information on the factors associated with students withdrawing prior to a degree could support institutions to proactively intervene and support current students to stay enrolled through completion.

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. We focus in particular 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 degree. In addition, we define our SCND population as students who, after earning at least 30 credits, left VCCS for at least three consecutive years, since students who have been separated from college for this time period are less likely to be temporarily stopping out from college. In addition to characterizing the demographic and academic profile and the employment and earnings trajectories of the SCND population, and how these compare on key measures to VCCS graduates, we investigate SCND re-enrollment patterns both at VCCS and non-VCCS institutions. We also examine SCND-graduate employment and earnings differentials within programs. Finally, we develop a framework for prioritizing which segments of the SCND population states might target for re-enrollment and completion interventions.

Our study makes several contributions. First, by estimating the financial implications of students' dropout decision -- and how this varies by students' program of study -- our results

help quantify the potential public and private returns to greater re-enrollment among SCND workers. We show that while some SCND students may benefit financially by re-enrolling and completing a credential, given positive within-program premia associated with degree attainment, this is not true of all programs of study.

Second, while research on the returns to community college credentials has considered the SCND population (Carruthers and Sanford, 2018; Liu, Belfield, and Trimble, 2015; Turner 2015; Jepsen, Troske, and Coomes, 2014; Xu and Trimble 2016; Liu et al. 2015; Stevens et al. 2018), our analysis offers a more in-depth investigation of the demographic composition and academic profile of the SCND population, and investigates heterogeneous employment outcomes within this group based on their progression towards a credential. Third, we also consider additional employment outcomes in our description of the SCND labor market outcome which give a broader picture of the financial well-being (pre-COVID-19) of SCND students versus graduation and the quality of their employment experiences -- specifically, whether the student earnings reached the 200% poverty line and whether they earn above a living wage. While our focus with these employment quality metrics in this paper is on the SCND population, this broader assessment of employment quality is applicable to a wide range of policy-related research topics.

Fourth, we provide a concrete framework for institutions and states to identify SCND students who might most benefit from re-enrollment and completion efforts, based on either a student's prior academic record, employment and earnings trends after their departure from college, and the premia to having a degree in their field of study. This framework could assist state and institutional leaders to prioritize which segment of the broader SCND population to target for re-enrollment and completion support.

Several primary insights emerge from our analyses. First, among the approximately 300,000 adults with some credits but no degree that we identified from the Virginia Community College System, approximately one in six had earned at least 30 college-level credits and maintained a cumulative GPA of 2.0 or higher prior to their departure. Most SCND students would have to complete substantial credits and improve their academic performance in order to earn a degree, were they to re-enroll. Among students with at least 30 credits and a GPA of 2.0

or higher though, most SCND students earned the majority of credits they need to complete a certificate or associate degree prior to their break from a VCCS institution. The mean student earned 48 credits prior to their break and had a mean GPA of 2.86.¹ In fact, most SCND students with at least 30 credits and a GPA of 2.0 or higher were doing fine academically for most of their time at VCCS. But in the term immediately preceding their break from the institution, we observe sizeable academic and non-academic shocks: students earned fewer credits, had lower GPAs, shifted the delivery method of their courses (e.g. in-person to online), and worked significantly more, on average.

In terms of SCND students' experiences after they departed from VCCS, nearly half (46 percent) enrolled at a non-VCCS institution within three years of leaving VCCS. This illustrates that a sizeable share of SCND students are already choosing to re-enroll after leaving VCCS. However, only eight percent of SCND students returned to VCCS after a three year absence. In the years following their break, SCND students' wages steadily increased, as did the share of the population earning above 200 percent of the poverty line and the share of students earning at least a living wage. These trends may explain why prior re-enrollment efforts have had limited effect: a meaningful share of SCND students have steadily improving economic circumstances, and may not see the value in completing their degree. That being said, we find sizeable differentials between SCND and VCCS graduates on multiple labor market outcomes. For instance, comparing SCND students to graduates who did not pursue additional postsecondary education after their degree, SCND students earn 5-8 percent less than graduates starting in the year following their break; this gap persists for the several years we can observe in our data. These labor market differentials are particularly large and significant in certain programs, most commonly in health science fields.

Finally, we demonstrate in our intervention framework that the size of the SCND population that many states cite in their policy documents may be substantially larger than the subset of SCND students who may be responsive to and who would potentially benefit from re-enrollment and completion campaigns. That being said, there are concrete subsets of the SCND population, e.g. those who were enrolled in programs with a significant earnings premia

¹ As a reminder, this credit accumulation statistic is inflated due to our sample restriction of students with at least 30 credits

associated with having a degree, or SCND student profiles who experienced stagnant or declining wages and employment, who would potentially be responsive to and would benefit from re-enrollment and completion efforts.

Empirical Strategy

Site and data sources

The Virginia Community College System (VCCS) is currently made up of 23 colleges across the Commonwealth. In the 2018-19 academic year, VCCS enrolled 228,135 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 for the period from Fall 2000 to Spring 2019.² These records include detailed information about each term in which a student enrolled, including program of study, courses taken, grades earned, credit accumulated, and financial aid received. The records also include basic demographic information, including gender, race, parental education, 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) 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.³

² Note that this data contains information for students enrolled in credit-bearing coursework only; VCCS colleges also offer non-credit training programs, but we are not able to observe students in these programs or their employment outcomes.

³ Earnings and employment measures derived from state-level UI data come with some limitations. Because VEC records only cover 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. In addition, federal workers are not included, which means we may not observe employment records for a sizeable share of individuals who work in the DC metropolitan

Sample Construction

Our goal is to construct a sample of SCND students that would position us to (1) describe the relevant academic and employment experiences of SCND students who made substantial progress toward earning a degree before leaving VCCS; and (2) to narrow in on a subset of SCND students who we think would most benefit from re-enrollment interventions. Table 1 describes our sample selection process, showing the number of unique students remaining in the analytic sample after each restriction. 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.⁴

We then create a SCND sample that includes students who experienced an enrollment break at VCCS of least three years⁵ (up to indefinite in length).⁶ We focus our analysis on students who experienced their first break 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.⁷ There are $n = 336,987$ such students. We further restrict our sample to students who did not earn a degree

area or in areas with large military populations (such as Norfolk). Despite these limitations, which are common to other studies that use UI information (e.g., Minaya & Scott-Clayton, 2017; Carruthers & Sanford, 2018), VEC data represent the best data available to track employment and earnings records for a large number of students across time.

⁴ There is a small share of dual enrollment students (~1%) who oscillate between dual enrollment and college-level curriculum at VCCS; most of these cases appear to be students who take dual enrollment during the school year (Fall and Spring terms) and take additional classes at VCCS in the Summer term outside the scope of dual enrollment. Due to these cases, we define initial non-dual enrollment so that it must occur after the student has completed all their dual enrollment terms.

⁵ Specifically, we calculate three years as nine consecutive terms, including Fall, Spring, and Summer terms.

⁶ We have repeated all analyses using an alternative definition of SCND, which is students who experienced an enrollment break of at least one year. The results are very similar between the two definitions. The similarity of the result is driven by the fact that most students who leave VCCS for at least three terms do not return.

⁷ The majority of VCCS colleges (19 out of 23) have "leading Summer" academic years, e.g. Summer 2009 is the first term in the 2009-10 academic year. We use leading Summer academic years in all of our analysis, although there are 4 colleges that use "lagged Summer" academic years.

from a non-VCCS institution prior to their break from VCCS, although many of these students were already excluded in the first-time degree seeking restriction above. We only include students who were between the ages of 18 and 50 at the time of their break, on the assumption that students in this age range are more likely to contemplate re-enrollment. All above restrictions result in a sample size of $n = 303,726$.

The next two sample restrictions are to exclude students who had accumulated fewer than 30 college credits prior to their break, and to exclude students who had a cumulative GPA lower than 2.0 as of the term immediately before their break. The purpose of these restrictions is to focus our analysis on students who have shown that they can be successful in college and have already made substantial progress toward earning a degree. In other words, these are the students who are best positioned to benefit from re-enrollment. Fifteen percent of the sample ($n = 48,953$) remain after the credit accumulation and GPA restrictions.

For much of our analyses, we restrict the sample to students who did not enroll elsewhere after they left VCCS. We impose this restriction because students who have already chosen to enroll at other institutions may be less responsive to re-enrollment interventions. We describe these non-VCCS enrollment patterns in more detail below. This restriction removes 46% of students from the sample, resulting in a final sample size of $n = 26,512$ SCND students.

For some of our analyses, we use a comparison sample of VCCS graduates. We construct the “Grads” 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).⁸ We use two separate comparison samples in our analysis. Our “All Grads” sample includes all $n = 79,559$ VCCS graduates. However, the majority of VCCS graduates do go on to enroll at a non-VCCS institution, and therefore are less likely to be seeking full-time employment. Therefore, we also use a “Non-enrolled Grads” comparison sample ($n = 28,599$) that excludes any graduate who was

⁸If 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 Grads. Our results are very similar if we instead focus on the first (earliest) degree the student earned. If a student earned multiple degrees during the same term, then we consider the highest-level degree that the student earned in that term, e.g. if a student earned a General Studies AAS/AS and a General Education Certificate in the same term, then we only consider the General Studies AAS/AS degree.

enrolled anywhere -- either at a VCCS college or a non-VCCS institution -- within three years of their graduation.

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 Grads comparison groups, after they earn their most recent VCCS degree). For example, suppose a student's "break term" was Spring 2012 -- that is, they were enrolled at a VCCS college in Spring 2012, but then did not enroll at any VCCS college through and including at least Spring 2015. In this case, any academic measure for "the year prior to break" includes information from the Summer 2011, Fall 2011, and Spring 2012 terms. Because employment information is measured by quarter, any employment measure for the year prior to break would include information from 2011q2 through 2012q1. On the other side, any academic measure for "the year after break" includes information from Summer 2012 through Spring 2013 terms; any employment measure for "the year after break" includes information from 2012q3 through 2013q2.

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, first generation status) are measured at the time of a student's VCCS enrollment break.⁹ First generation status, which we derive from mother's and father's education levels, is missing for a significant portion of our sample. Missingness of this variable is highest among students in the earlier cohorts. For SCND students, we define their program of study as the one they were pursuing at the time of their break.¹⁰

⁹ For most students, race, gender, and first generation status are consistent within student, over time. However, there are a few instances when these variables change for a given student, either due to recording error or meaningful changes in the student's circumstances.

¹⁰ We define program of study as the combination of curriculum x intended degree level. There are a small number of program of study cells for which there are multiple credentials available, e.g. "Career Studies Certificate in Emergency Medical Services - Intermediate" and "Career Studies Certificate in Emergency Medical Services - Advanced"

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 records in the following manner:

- Spring term:
 - Began enrollment January 1st - April 30th
 - Ended enrollment May 1st - July 31st
 - Graduation date January 1st - June 30th
- Summer term:
 - Began enrollment May 1st - July 31st
 - Ended enrollment June 1st - August 31st
 - Graduation date July 1st - August 31st
- Fall terms:
 - Began enrollment August 1st - December 31st
 - Ended enrollment September 1st - December 31st
 - Graduation date September 1st - 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.

We focus on five employment measures (for the Xth year before or after break/graduation) our analysis:

- *Whether the student was employed at all.* This indicator equals one if we observe at least one employment record for any of the four quarters in the Xth year.
- *Average quarterly wages.* This linear measure is equal to total wages earned across all quarters in that year, divided by four. If we do not observe any employment for a student in a given quarter, then wages are set to zero. We use real wages set to 2018Q1 dollars, using the Federal Reserve's publicly-available CPI index.
- *Average quarterly wages, conditional on employment.* This linear measure is equal to total wages earned across all quarters in that year, divided by the number of quarters

employed in that year. If a student was not employed during that year, then this measure is not populated.

- *Earnings 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.¹¹ 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.
- *Earnings above full-time living wage.* This indicator equals one if the student's total wages in the year are at or above what someone would have earned had they worked 35 hours per week at \$15 per hour (in 2018Q1 dollars).

Methods

We begin our analysis by describing the background characteristics (age, race, gender, first-generation status), academic experiences (credit accumulation, GPA, financial aid receipt, enrollment at non-VCCS institutions), and employment metrics for our SCND sample (observed employment, average quarterly wages, earnings above 200 threshold poverty level).

Next, we use regression analysis to estimate the relationship between pre-break VCCS academic measures and post-break employment outcomes, within our SCND sample. The purpose of this analysis is to examine whether better performance at VCCS (either by accumulating more credits or earning higher GPAs) translates into better employment outcomes for the SCND sample. Specifically, we estimate the following OLS regression model:

$$EmploymentOutcome_i = \beta_0 + \beta_1 StudentCharacteristics_i + \chi_c + \nu_y + \phi_p + \varepsilon_i \quad (1)$$

Where χ_c , ν_y , and ϕ_p are college, academic year cohort, and program of study fixed effects. We estimate models separately for the post-break employment outcomes of: (1) any observed employment in the third year after break; (2) average quarterly wages in the third year after

¹¹ Source: <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html>

break; and (3) whether the student earned at or above 200 percent of the poverty level in the third year after break. We include the following student-level characteristics¹²:

- Basic demographics (age, race, gender, first-generation status)
- In the four years prior to break:
 - 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
 - Number of terms enrolled at non-VCCS institution
- Any observed employment in the first and fourth year prior to break¹³
- Average quarterly wages in the first and fourth year prior to break
- Cumulative credits earned at time of break from VCCS
- Cumulative GPA at time of break from VCCS
- Difference in cumulative GPA and GPA in term prior to break

Finally, we estimate the employment gaps between SCND and Grads, both overall and for each individual program of study. To estimate these gaps, we estimate the same regression model as equation (1) but with two differences: inclusion of Grads in the sample, and inclusion of a SCND indicator:

$$EmploymentOutcome_i = \beta_0 + \beta_1 StudentCharacteristics_i + \beta_2 SCND_i + \chi_c + v_y + \phi_p + \varepsilon_i \quad (2)$$

¹² 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.

¹³ 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. Because many students do not have employment observations four years prior to break -- particularly traditionally-aged college student who were under 16 years old four years prior -- we also include employment information for the year directly prior to break.

In Equation (2), the coefficient β_2 is an estimate of the employment outcome gap between SCND and Grads. 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 200 combined SCND and Grads, and with at least ten observations in each SCND or Grads separately.

Results

Summary statistics - SCND students

In Table 2 we provide summary statistics on the overall SCND population. Column (1) shows the summary statistics for the SCND population inclusive of all restrictions through row 8 in Table 1; Column (2) repeats this for the subset of the SCND population who additionally did not re-enroll at any non-VCCS institution in the three years following their break (row 9 in Table 1). For simplicity we focus on describing the characteristics of the sample in column (2), though we call attention to where a characteristic of the restricted sample differs meaningfully from the overall sample. SCND students were a slight majority female (53.9 percent) and substantial majority White (64.9 percent). The mean age of students at the time of their separation was 27.2, compared with 25.2 for the overall sample, and only a small share of the sample is over 30--the 75th percentile for the age distribution is 31 (29 for the overall sample). Approximately 38 percent of the SCND sample received a Pell Grant and 14 percent received a Stafford Loan in the year prior to their break. Debt accumulation was generally modest at the time of students' break: the mean amount of accumulated Stafford Loans was \$3,026, with the 75th percentile of the distribution at \$4,270.

As we show in columns 3 and 4, VCCS graduates were more likely to be female and White, and were a couple years older than SCND students. The share of graduates receiving Pell Grants or borrowing Stafford loans was broadly similar to SCND students. Interestingly, the distribution of debt accumulation among borrowers is quite similar between the SCND and Grads populations.

Academic performance - SCND students

In Table 3 we describe the academic performance of SCND students leading up to their break from a VCCS institution. The sample for Table 3 only includes the “No post-break enrollment” SCND students ($n = 26,512$). 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. With this sample condition in mind, the average SCND student completed 48.19 credits prior to their break, with the 75th percentile of the distribution at 57 credits (column 1). While associate’s degrees typically require 60 college-level credits, it is difficult to assess the extent to which SCND students were “close” to finishing their degree, since a substantial share of students take credits that do not count towards their program of study. SCND students had a mean cumulative GPA of 2.86 prior to their break (column 2), with a meaningful share of the distribution doing quite well academically (the 75th percentile of the GPA distribution was a 3.27). But in the term immediately preceding their break, SCND students’ term GPAs were substantially lower: 2.35 on average (column 3). Note that columns (3) and (4) in Table 3 do not take into account the small but meaningful share of SCND students (13.5 percent) who withdrew from all courses during their break term, and therefore do not have a valid GPA for their break term. Following a similar pattern as with GPA, we observe a decline in the number of credits students attempted (comparing columns 5 and 6) and the completion rate of attempted credits (comparing columns 7 and 8) in the term preceding students’ break. Whereas students attempted nine credits per term on average in the four years preceding their break, they attempted an average of 7.76 credits in their break term. And while students completed 74.9 percent of their credits per term in the four years preceding their break, they completed only 63 percent of their credits in their break term.¹⁴ These patterns suggest that students may have experienced some kind of shock to their academic, work, or family life that negatively affected their academic performance and may have contributed to their decision to separate from VCCS.

In Table 4 we further compare students’ experiences in their break term to the year preceding their break term at VCCS;¹⁵ specifically, we focus on the delivery method of students’

¹⁴ Both differences between credits attempted (share of credits completed) in break term and average credits attempted (share of credits completed) in the past 4 years is statistically significant at the $p < 0.01$ level.

¹⁵ For instance, if a student’s break term was Spring 2012, then we compare their experiences in Spring 2012 compared to the average across Spring 2011, Summer 2011, and Fall 2011.

courses (in- person vs online), their financial aid receipt, and their employment. Again, we focus only on the “No post-break enrollment” sample in Table 4. We make these comparisons within three separate groups of students that describe whether the student experienced an “academic shock”: (1) students who completed their break term and did not experience a large drop in GPA during their break term (“No Shock”, columns 1 and 2); (2) students who completed their break term but whose GPA during their break term was one point or more lower compared to their cumulative GPA (columns 3 and 4); and (3) students who either failed or withdrew from all courses (columns 5 and 6). The odd-numbered columns show the “at break” mean of the delivery method, financial aid receipt, and employment variables. The even-numbered columns show the results from the t-test of comparing means of the delivery method, financial aid receipt, and employment variables between the break term and the year break to the break term.

Regardless of whether students experienced an academic shock or not, we observe decreases in the share of students’ courses that were in-person and increases in the share of online courses in the break term relative to the mean share for all preceding terms, though this change is most pronounced for students experiencing larger academic shocks. For instance, among students whose GPA during their break term was more than one point lower than their cumulative GPA, their share of online courses increases by 8 percentage points relative to all prior terms, in which the mean share of online courses was 29.7 percent. This increase was fully offset by a decline in in-person courses. Across categories of academic shock (or lack thereof) we also observe a meaningful decline in the share of students who received Pell Grants or borrowing Stafford Loans. The decreases in the share of students receiving Pell Grants and Stafford loans is largest for students who fully withdrew from or failed all courses. For instance, students who withdrew from or failed all of their courses in their break term were 7.3 percentage points less likely to borrow Stafford Loans than in all preceding terms, in which the mean share borrowing was 10.2 percent. This latter pattern is consistent with recent experimental evidence that decreases in borrowing at the community college level are associated with worse academic performance (Barr, Bird, and Castleman, 2019). Across academic shock categories we observe higher rates of employment and higher wages in the break term relative to all preceding terms, with these increases most pronounced among students experiencing the largest negative shocks.

For instance, students who withdrew from or failed all of their courses in their break term earned \$351 more in quarterly wages than in the preceding year, in which the mean quarterly wage was \$5,784.¹⁶ These patterns suggest that negative academic shocks may be related to other non-academic factors that are concurrently changing in students, which may also contribute toward their decision to leave VCCS. For example, a student may have been given the opportunity to work more hours at their job, or perhaps they took a second job in order to cover a new financial need. As a result of working more, the student may have been unable to attend in-person classes, and had less time to devote to their studies, resulting in decreased performance. Of course, our results in Table 4 only provide suggestive evidence for this and similar scenarios, it is not possible for us to disentangle causality. Still, these results suggest that it is important for institutions to consider additional predictors for identifying “at risk” students beyond just their current academic performance, and to intervene when the potential risk factors are observed. For example, if a college advisor sees a student shifting from all in-person courses to all online courses, the advisor could reach out to discuss the student’s needs for more flexible course offerings along with any other needs (e.g. financial) that the student is currently experiencing.

Postsecondary educational participation after break from VCCS - SCND students

In Table 5 we describe post-break enrollment patterns among SCND students. As with Table 2, we provide summary statistics on the overall SCND population, applying all restrictions through row 8 in Table 1 (column 1) and on the subset of the SCND population who additionally did not re-enroll at any non-VCCS institution in the three years following their break (column 2). One of the more interesting findings from our analysis is that a sizeable share of SCND students eventually re-enrolled in college, either at a VCCS institution or at a different college or

¹⁶ We also compare the propensity for students to take difficult courses during their break term; specifically, we look at whether students take their first college-level math, laboratory science, or 200-level course during their break term. If we found large differences across the groups represented in Table 4, then the results would suggest that these courses were significant barriers to students' progress. However, we find that very few students (typically, less than 5 percent) are taking these types of courses during their break term, due to the students in our sample having already amassed 30 or more college level credits. We also compare the distance between the student and the college (measured by distance in zip code) across the groups represented in Table 4, but we find no meaningful differences since so few students move outside of their zip code during the year before break.

university. A large share of SCND students enrolled at a non-VCCS college or university. Approximately 39 percent of SCND students from the overall sample enrolled at a non-VCCS institution within one year of their break, and nearly half (45.8 percent) have done so within three years of their break. Among students who re-enrolled at a non-VCCS institution within three years of their break, 49.8 percent attended an in-state public four-year institution and 15.6 percent attended a private, non-profit four-year institution in Virginia. Approximately 15 percent of students attended a for-profit four-year institution (either in and out of state).

Degree attainment is also quite high among students who re-enrolled. For instance, among SCND students who enrolled at an in-state public four-year institution, 67.6 percent earned a degree within five years of their separation as did 52.2 percent of students who enrolled at a private, non-profit four-year institution in Virginia. Degree attainment is also high among students who enrolled at in-state for-profit four-year institutions after VCCS (56.2 percent) though lower (32.2 percent) among students who attended out-of-state for-profit four-year institutions. As we show in Table 5, we also observe meaningful though lower (10-15 percent) rates of re-enrollment and relatively high rates of degree attainment at out-of-state public and non-profit four-year institutions.

In the final two rows of Table 5, we present summary statistics on re-enrollment at VCCS institutions. Conditional on students taking at least a three-year break from VCCS, a very small share of the sample (eight percent) re-enrolled within five years of their break. Of students who do, less than a third of students re-enrolled in the same program of study they were pursuing prior to their break.

Labor market outcomes - SCND students

In Figure 1 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. As a reminder, our employment and earnings analyses are based on Unemployment Insurance data, and as we describe in the prior section, we are not able to observe all employment using UI data. Plot A presents the share of SCND students employed. Plot B presents mean quarterly wages without conditioning on observing students as employed in the UI data (i.e. we assign \$0 as the

quarterly wage for individuals we don't observe employment for in a given quarter) and Plot C presents quarterly wages conditional on observing employment in a given quarter. In Plots D and E we present two measures of employment "quality": the share of SCND students earning at least 200% of the federal poverty level, since this is a common threshold beyond which people would not be eligible for means-tested public benefits; and the share of SCND students earning a "living wage", or the equivalent of at least 35 hours per week at \$15 per hour or more. Across plots we present employment/earnings trends for all cohorts combined and separately for the 2009-2010 cohort, for whom we can observe the longest post-break labor market outcomes (eight years). It is also worth noting, however, that the employment outcomes for the 2009-2010 cohort may not be representative for later cohorts given that this coincides with the Great Recession.

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, across all cohorts 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 65 percent have observed employment three years after their break. Among the 2009-2010 cohort, we observe very similar trends. By eight years after students' break, only 61 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. For example, we would expect workers in Northern Virginia to become more likely to find different employment in Washington DC or Maryland as time goes by. Similarly, workers may be more likely to become self-employed in the years after leaving college.

Plot B shows steadily increasing quarterly wages for SCND students. Among all students, the mean quarterly wage was \$2,449 four years prior to their break and \$3,534 in the year prior to their break. Following the break, wages continue to grow. By three years after break SCND students' mean wages were \$4,686. Among the 2009-2010 cohort we observe very similar levels trends. By eight years after their break, SCND students' quarterly wages were \$5,898. The trends

in Plot C are quite similar, though the levels are higher as a function of removing observations for whom we don't observe employment in a given quarter. For instance, by three years after break SCND students' mean wages were \$7,485.

Plot D 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 19 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 three years after the break 38 percent earned at least 200% of the federal poverty level. Among the 2009-10 cohort, 55 percent of students earned at least 200% of the poverty level by eight years after their break. Finally, Plot E shows that more students earned the equivalent of a full-time living wage compared to above 200 percent of the federal poverty level, with over 60 percent of observably employed SCND from the 2009-10 cohort reaching this mark six years after leaving VCCS. Otherwise, the trend in Plot E is quite similar to Plot D.

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. Below, we show the share of the SCND who experienced stagnant or declining wages (see description of Table 7).

In Table 6 we present regression analyses of the relationship between academic performance prior to SCND students' break and their observed employment and earnings three years after their break from VCCS -- see equation (1) above for the regression model and the full list of predictors included in the model.¹⁷ The first set of rows shows the relationship between cumulative credits attempted and completed prior to the break, holding constant other

¹⁷ In the interest of concision, we only display the coefficients for a subset of the model regressors. We omit all demographic characteristics. We find no relationship between whether the student had previous stopouts or the length of those stopouts. Because only a small share of the sample attend a non-VCCS institution prior to their break, the coefficients on the 12 non-VCCS types of institutions are noisy with no consistent pattern emerging.

demographic, financial, and academic characteristics of the student and whether students were employed (column 1), their average quarterly earnings, conditional on employment (column 2), and whether students earned above 200 percent of the federal poverty line (column 3). We find no relationship between cumulative credits and overall employment, but we do find significant relationships between the number of credits students attempted and the share of credits they completed and earnings. If a student attempted one more credit per term on average, they earned an additional \$63 per quarter; similarly, for each 10 percentage point increase in the share of credits students completed, they earned an additional \$69 per quarter. The share of credits completed is also positively associated with an increase in the share of SCND students earning above 200 percent of the poverty line.

We find a strong relationship between cumulative GPA and employment outcomes. For each one point gain in students' GPA they are 3.8 percentage points less likely to be employed, but earn \$469 more in quarterly wages conditional on being employed. The decrease in observed employment from higher GPAs may reflect students having greater opportunities for employment out of state or in the federal government, which we do not observe in UI data. Each one point gain in GPA is also associated with a 4 percentage point increase in the share of students that earned above the federal poverty line.

In the next set of rows we present the relationship between enrollment at non-VCCS institutions in the years preceding students' break and their employment outcomes. We find no relationship between whether students had non-VCCS enrollment and any of the employment outcomes we consider, and only a moderate relationship between the number of terms of non-VCCS enrollment preceding break and wages. For each additional term of non-VCCS enrollment, students earned an additional \$194 in quarterly wages.

The final set of rows examines the relationship between employment preceding students' break and labor market outcomes subsequent to the break. Students with observed employment while at VCCS are substantially more likely to be employed after their break--approximately eight percentage points for students employed at any point in the four years prior to their break and over thirty percentage points for students employed in the year prior to their break. But in both cases, SCND students' who worked prior to their break earned less in quarterly wages:

Students employed at any point in the four years prior to their break earned \$350 less per quarter than students who were not employed, and students employed at any point in the year prior to their break earned \$1,100 less per quarter than students who were not employed. These increases in observed employment rates and decrease in wages relative for SCND students who worked while at VCCS relative to those who did not may reflect that students who did not have to work while enrolled at VCCS were better off socioeconomically. Specifically, if a student is from a higher SES background, then that student may have more “social capital” (Coleman, 1988) -- and therefore may find it easier to make connections with potential employers and be better equipped for the job search and interview process; these students may also be more mobile. Therefore, higher-SES students who do not work while enrolled at VCCS may be more likely to work outside Virginia (for example, in D.C. or Maryland), potentially explaining the positive coefficients on “Any employment, X years prior to break” in column (1). What’s more, among the higher-SES students who did stay in Virginia, their higher social capital may translate into better paying jobs, explaining the negative coefficient in columns (2). Due to the lack of causality in these results, these explanations are conjecture on our part; however, in other work we do see similar patterns where lower-SES students have worse employment outcomes, after controlling for program of study and academic performance (Kim, Bird, & Castleman, 2020). We observe a more consistent positive relationship between wages earned while working at VCCS and wages after VCCS. For instance, for each additional \$1,000 students earned in the year prior to their break (conditional on observing their employment), they earned an additional \$616 in quarterly wages after break.

Labor market outcome differentials - SCND students and VCCS graduates

In Figure 2 we present employment and earnings differentials between SCND students and Grads. Specifically, we use regression analysis (see equation 2 above) to estimate the difference in outcomes for SCND, compared to graduates, while controlling for an array of demographic, academic, and pre-break employment characteristics. Figure 2 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 2 divided by

the graduate mean). We focus here on two employment outcomes: any employment, and conditional (non-zero) wages; we show the same plots for the other three employment outcomes in the Appendix. As a reminder, the Grads samples includes students who earned their most recent VCCS degree during the same time period that the SCND sample left VCCS. We consider two sub-samples of Grads: “All Grads”, which includes any Graduates who had additional postsecondary enrollment subsequent to completing their VCCS degree; and “Non-enrolled Grads”, which only includes graduates who did not enroll anywhere in the three years following their degree. This latter group may more accurately capture employment and earnings premia associated with having a VCCS degree in a given field. Starting with the left-hand side of Plot A, we show that, starting in the first year after their break, SCND students were four percent less likely to be employed than graduates within their first year of graduation than All Grads; this gap grows over the next several years, so that by four years after their break, SCND students were nine percent less likely to be employed. The 2009-2010 cohort plot suggests that over time, SCND students gained relative to All Grads on their observed employment rate, so that by eight years after their break, employment rates were once again fairly similar. On the right-hand side of Plot A, we observe smaller negative employment differentials between SCND students and Non-enrolled Grads, typically in the range of three percent; these gaps remain fairly stable in the years following students’ break. The larger observed employment gaps for All Grads may reflect that more All Grads who were still in school were also working in Virginia in positions that we can observe in the UI data. The fact that the employment gaps between SCND students and All Grads narrow over time--and are more similar to the gaps we observe from the break onwards for SCND students and Non-enrolled Grads--may reflect that a greater share of All Grads have since completed their subsequent program of study and have additional opportunities for out-of-state or federal employment.

In Plot B, we observe that SCND student wages, conditional on observing their employment, earned 3 to 5 percent more each year than All Grads in the years immediately following their separation (when a meaningful share of All Grads were still enrolled in college, and presumably more likely to be working at part-time or lower wage jobs), but by the fourth year after their break SCND students and All Grads’ earnings are indistinguishable. The wage

trends for the 2009-2010 cohort suggest that by eight years after their break, SCND students earned substantially less (eight percent) than All Grads. When comparing SCND students to Non-enrolled Grads, we observe that SCND students earned seven percent less in the year following their break but that this gap declines somewhat, to five percent, by four years following their break. The 2009-2010 cohort trends indicate that this gap approaches zero by eight years following their break. The divergence in SCND-Grad wage differentials over time between the All Grads and Non-enrolled Grads samples may indicate the wage premia that All Grads received from pursuing additional education beyond their VCCS degree, whereas the wage premia associated with a VCCS degree may decline over time relative to additional labor market experience.

In Figure 3 we present program-level labor market outcome differentials between SCND students and graduates, focusing on employment and earnings in the three years after break/graduation. Specifically, we present the program-specific differentials for the non-transfer-intending programs with a sufficient number of students to estimate the differentials (200 students total with the relevant outcome observable, and at least 10 each of SCND and Grads). We exclude the transfer-oriented Associate degree programs from Figure 3 because most students who graduate from those programs go on to enroll at a four-year institution, with the goal of earning a bachelor's degree. In other words, in the program-specific analysis we want to focus on programs for which students typically enter the workforce after completion.¹⁸ In the Figure 3 plots, we sort programs by the significance of the estimate (specifically, by the coefficient estimate divided by the standard error) and magnitude of the SCND-Grad differential, so that the top programs have the most significant and negative gaps between SCND students and graduates. Programs with one plus signs “+” indicate health science programs; programs with three plus signs “+++” indicate health science programs with competitive admission; these programs typically have more student demand than capacity. Plots A and B present program-level differentials in the share of SCND students vs. graduates employed, for the All

¹⁸ Another reason we exclude transfer-oriented Associate degree programs is that these are often “placeholder” programs for students who either do not know what they want to major in, or for students waiting to be admitted into the competitive and popular programs, such as Nursing. When we estimate the gaps for transfer-oriented degree programs -- which are some of the most popular programs at VCCS in terms of number of students enrolled -- we do not find statistically significant differences between SCND and Grads for most of those programs.

Grads and Non-enrolled Grads samples. Perhaps the most notable comparison is that, for many of the programs displayed, there are no statistically significant differences (with $p < 0.10$) in the share of SCNDs or Grads that were employed in three years following their break. In Plot A, there are twenty programs for which SCND students are significantly less likely to be employed than students in the All Grads sample, and the differentials in employment probability for these programs are typically in the range of 10 to 20. Of these, six are in health sciences and three are competitive programs. When we focus on the Non-enrolled Grads sample, we generally see the same number (although slightly lower) and composition of programs with negative, significant SCND-Grad differentials. There are a small number of programs for which we see a significant *positive* SCND-Grad differential in the share of students employed.

Plots C and D rank programs by the SCND-Grad differential in wages, conditional on observing students' employment. We observe slightly fewer programs with significant negative SCND-Grad differentials-- fourteen for the All Grads sample, thirteen for the Non-enrolled Grads sample--though again many of these are for health sciences programs and several are for competitive admissions programs. For several of these programs the earnings differential is quite large, likely reflecting degree and licensure requirements to work in a profession. For instance, students in nursing programs with some college but no degree earn 37 (38) percent less than All Grads (Non-enrolled Grads) from those programs. We also observe several programs for which there are *positive* SCND-Grad wage differentials, in both the All Grad and Non-enrolled Grad samples. For instance, among the Non-enrolled Grad sample, students who earned some credits but no degree in Early Childhood Development AAS, Health Sciences CSC, Media Advertising Arts AAS, and Welding CSC programs all earned substantially more than graduates. This may reflect that the skills learned in the program were more valuable than the credential, and that SCND students benefited from earlier entry into the labor market.

Framework to prioritize SCND students for re-enrollments

In the final section of the paper we propose a framework for prioritizing SCND students for re-enrollment efforts, and estimate what share of the total SCND population in our analysis would reach the criteria for prioritization given this framework. We present the empirical data

supporting our framework in Table 7. The first row represents the $n = 48,953$ SCND students from VCCS after we impose the sample restrictions described in Table 1, up to and including restricting the sample to students who had a cumulative GPA of at least 2.0 at the time of their break from VCCS. Of this sample, we show in Table 6 that nearly half ($n = 22,441$) re-enrolled at a non-VCCS institution within three years of leaving VCCS. We do not believe these students are a high priority for re-enrollment efforts since they have already taken the initiative to enroll elsewhere on their own. Perhaps a more effective strategy would be to invest in student success supports once VCCS institutions observe SCND students re-enrolling after a substantial break -- although in the case of VCCS, this is a fairly small population, within only 8 percent of SCND students re-enrolling after a break of three years (Table 5).

Policy makers or institution leaders might be inclined to target students who enrolled at a for-profit institution after their departure from VCCS, given the generally worse academic, labor market, and financial outcomes for students who attend for-profit institutions (e.g. Cellini and Turner, 2018; Scott-Clayton, 2018;). But as we showed in Table 5, conditional on students enrolling at a for-profit institution, graduation rates are relatively high. In Table 8 we further compare labor market outcomes for students who leave VCCS and attend a for-profit institution within a year of their departure, to those who leave and attend a public or private non-profit institution within a year. Across different categories of enrollment and graduation, we observe that students who attended for-profit institutions were more likely to be employed and earned more in quarterly wages than students who enrolled at public and private, non-profit institutions. There is clearly selection in which SCND students chose to attend different types of institutions, so we do not interpret these patterns as the causal effect of attending a for-profit institution. What's more, students who enroll at non-profit institutions may be more likely to still be enrolled in the fourth year after the break, explaining the lower wages in part. Rather, these results indicate that students who select to attend for-profit institutions after leaving VCCS appear to be making reasonably-informed decisions.

Therefore, we focus the remaining analysis in Table 7 on the $n = 26,512$ students who did not enroll anywhere within three years of leaving VCCS. We first consider in Panel A the academic experiences of students in the term preceding their break. Forty-three percent of these

students experienced a negative academic shock in the term before their separation from VCCS. Forty-one percent of students experiencing a negative shock had a term GPA during their break term that was at least one point lower than their cumulative GPA, and the balance withdrew from or failed all courses during their break term. These patterns indicate that the first opportunity for intervention is not at the re-enrollment margin, but rather in identifying students who are experiencing negative academic shocks after generally solid academic performance, and providing supports that can hopefully keep students on track to degree completion. The patterns we observe in Table 4 also suggest that there are potentially leading indicators--e.g. larger shifts to online courses or decreased borrowing relative to prior terms--of early departure that could inform proactive outreach and support to students.

In Panels B and C we shift to considering the labor market outcomes of the SCND students who did not enroll anywhere in the three years following their break. Out of the 26,512 SCND students who did not enroll anywhere in the three years after their break, half left a non-transfer-oriented program. We anticipate these students to be higher priority for re-enrollment efforts since they presumably have a shorter path to complete their workforce-relevant degree. Of students who left non-transfer-intending programs, two-thirds were in a sufficiently large program (at least 200 combined SCND students and graduates) that we can estimate labor market differentials with reasonable precision. In Panel C we indicate the share of SCND students leaving larger, non-transfer-oriented programs for whom we estimate negative or positive earnings differentials three years after their break -- note that these counts reflect estimates using the "Non-enrolled Grads" comparison samples. Forty percent of students left programs for which we estimate a significant, negative wage differential; we believe students from these programs would be the highest priority for re-enrollment efforts since, conditional on employer demand, they presumably have the most to benefit from completing their credential. Another 35 percent of students were in programs for which the direction of the differential is negative but not significant. By contrast only eight percent of SCND students were in programs with a significant positive gap. It is also important to note that, of SCND students who left programs with a significant negative earnings differential, 40 percent were in competitive admissions health sciences programs. These students would likely not be high priorities for

re-enrollment in their previously enrolled programs since students might not be able to gain readmission in the programs; although, these students could be targeted for enrollment in other health sciences programs with capacity for more students in areas with expanding labor market needs.

In Panel D we examine SCND students who had stagnant or declining labor market outcomes after their break from VCCS, since these students might be responsive to and more likely to benefit from re-enrollment efforts. We consider both the overall sample of SCND students who did not re-enroll within three years of their break ($n = 26,512$) and two subsets of this population (1) students who left a large, non-transfer-oriented degree program and (2) students who left a large, non-transfer-oriented degree program in which there was a negative and significant earnings differential between SCND students and Grads. Of the overall SCND sample who did not re-enroll within three years, 13 percent experienced negative wage changes in the three years following their break, and nine percent experienced a wage decline of at least 10 percent over this time period. Of SCND students in large, non-transfer-oriented programs, 14 percent experienced negative wage changes in the three years following their break, and ten percent experienced a wage decline of at least 10 percent over this time period. These rates are the same among SCND students in large, non-transfer-oriented programs with negative SCND-Grad earnings differentials.

This is just one possible approach to a framework for identifying SCND students to prioritize for re-enrollment outreach. Yet the broader point this analysis illustrates is that the size of the SCND population that many states cite in their policy documents may be substantially larger than the subset of SCND students who may be responsive to and who would potentially benefit from re-enrollment and completion campaigns. This analysis also illustrates the potential value in empirically-driven strategies to target and prioritize subsets of the SCND student population for outreach.

It is worth noting the limitations of relying on our SCND/Grads labor market gaps in its current form. For instance, some programs are too small for us to have sufficient statistical power to estimate program gaps; more than half of all VCCS programs did not meet our sample

size requirements. Finally, our current focus on shorter-term employment outcomes (within three years of break/graduation) may mask longer-term gaps that exist in other programs.

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. This will likely remain true in the wake of the COVID crisis, both to fill critical needs in sectors like healthcare that typically require postsecondary training, and to support workers to compete for positions in an economy that may be very different from the pre-COVID-19 labor market. Numerous states have focused in particular on adults with substantial college credits but no degree as a high priority for re-enrollment and completion efforts, on the rationale that this segment of the adult population has already demonstrated potential for success in higher education and has comparatively fewer credits to complete in order to obtain a credential. 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 demonstrate that, conditional on students meeting at least 30 credits, SCND students have in fact earned a large share of the credits typically needed for a degree. The mean SCND student in our sample earned 48 credits prior to their break from VCCS. In the current paper we are not able to assess the extent to which SCND students are in fact “close” to completing their degree; prior evidence shows that students at broad access institutions frequently take “excess” credits that do not count towards their degree requirements (Complete College America, 2017). We also show that nearly half of students who are “some college, no degree” from the VCCS perspective enrolled at a non-VCCS institution within three years of leaving VCCS. This illustrates that a sizeable share of SCND students may already choose to continue their education, even if they do not return to the institution at which they had last enrolled.

Our analysis also demonstrates the sizeable and observable shocks that students experienced in the semester immediately preceding their separation from VCCS. Students’ credit

completion and GPA declined substantially in the break term, and we also observe meaningful changes in course delivery, financial aid receipt, and employment.

We document that SCND students experienced steadily increasing wages over time and increasing shares of SCND students earned above 200 percent of the poverty line and above a living wage as additional years pass following their separation from VCCS. That being said, we also see evidence of overall and within specific programs of study sizeable negative differentials between SCND students and VCCS graduates, most commonly in health sciences fields.

Finally, our intervention framework provides policy makers and higher education institution leaders with concrete and actionable guidelines for how to prioritize SCND students for re-enrollment efforts. The first opportunity for intervention is not after students have left, but when they exhibit signs of struggling in college. Academic, financial aid, and employment behaviors and outcomes all change substantially in students' break term; institutions can incorporate these patterns 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. Mabel et al. (in progress) demonstrate that proactive outreach to near completers at the highest predicted risk of withdrawal can lead to significant increases in the share of students who complete their degree. Our framework also suggests that institutions should focus on students who are not already choosing to re-enroll elsewhere following their departure from VCCS; conditional on re-enrolling, degree attainment rates are relatively high for this population. Among SCND students who have not re-enrolled at VCCS or non-VCCS institutions, our framework suggests that institutions may want to prioritize students who were in programs of study with significant negative labor market differentials relative to VCCS graduates. There are over 3,000 such students in our sample that VCCS or other state agencies might focus their re-enrollment and completion efforts on. Yet this represents a small share of all SCND students in the Commonwealth. This suggests that increasing attainment among SCND students likely needs to be complemented by other efforts, such as strengthening success among current students and supporting training and credentialing among adults with little to no postsecondary participation.

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Table 1: Number of unique student observations in analysis samples, after sequential application of sample restrictions

Row	Sample restrictions	Sample Size	
		SCND	Grads
1	All unique students enrolled between Fall 2000 and 2019	1,965,969	
2	Dropping exclusively Dual Enrollment students	1,734,185	
3	No degree prior to initial VCCS enrollment	1,665,299	
4	Experienced break of at least 3 years (SCND) or earned first VCCS degree (Grads) between Summer 2009 and Spring 2014	336,987	84,984
5	No non-VCCS degree prior to break / graduation	328,563	83,768
6	Between ages of 18 and 50 at the time of their break / graduation	303,726	79,559
7	Earned at least 30 credits from VCCS before break (SCND only restriction)	55,702	79,559
8	Had a cumulative GPA of at least 2.0 at time of break (SCND only restriction)	48,953	79,559
9	Did not enroll at non-VCCS within 3 years of break (SCND) or earning first degree (Grads)	26,512	28,599

Notes: see text and corresponding footnotes for in-depth explanation of sample selection process.

Table 2: Demographic and financial aid characteristics of SCND samples

	SCND		Grads	
	Full sample	No post-break enrollment	Full sample	No post-break enrollment
	(1)	(2)	(3)	(4)
Female	54.7%	53.9%	58.2%	57.7%
White	63.1%	64.9%	63.9%	69.1%
Black	18.2%	18.0%	16.6%	16.0%
Hispanic	6.5%	6.3%	7.0%	5.2%
Asian	6.7%	5.8%	7.7%	5.9%
Other	5.2%	4.9%	4.7%	3.7%
Age				
Mean	25.7	27.2	26.4	29.0
10th percentile	19	20	19	20
25th percentile	20	21	20	21
50th percentile	23	24	23	25
75th percentile	29	31	30	36
90th percentile	38	41	40	44
Received Pell in year prior to break	33.7%	37.8%	37.9%	35.3%
Received Stafford loans in year prior to break	15.4%	14.1%	16.0%	12.2%
Accumulated Stafford loans (borrowers only)				
Mean	\$2,975	\$3,026	\$3,069	\$3,115
10th percentile	\$1,306	\$1,263	\$1,294	\$1,294
25th percentile	\$1,866	\$1,796	\$1,970	\$1,979
50th percentile	\$2,722	\$2,723	\$2,772	\$2,805
75th percentile	\$4,045	\$4,270	\$4,206	\$4,389
90th percentile	\$5,155	\$5,195	\$5,198	\$5,198
N	48,953	26,512	79,559	28,599

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 of their break with VCCS. Stafford loans include both subsidized and unsubsidized.

Table 3: Academic experiences of SCND, cumulative and immediately prior to break

	Cumulative credits earned (1)	Cumulative GPA (2)	GPA in break term (3)	Difference between cumulative and GPA in break term (4)	Average credits attempted per term, 4 years prior to break (5)	Credits attempted in break term (6)	Average completion rate of attempted credits, 4 years prior to break (7)	Completion rate of attempted credits in break term (8)
Mean	48.19	2.86	2.35	-0.60	9.0	7.76	74.9%	63.0%
10th %tile	32	2.18	0.00	-2.54	5.1	3	51.1%	0.0%
25th %tile	36	2.41	1.33	-1.47	6.8	4	62.5%	10.0%
50th %tile	44	2.80	2.58	-0.35	9.0	7	75.6%	82.4%
75th %tile	57	3.27	3.50	0.32	11.0	12	89.6%	100.0%
90th %tile	69	3.66	4.00	0.89	12.5	13	100.0%	100.0%

Notes: sample limited to SCND students who did not enroll at a non-VCCS institution within 3 years of their break (n = 26,512). Note that 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 to a GPA (e.g. "P" or "S"). Therefore, these students do not contribute toward the calculation of columns (3) and (4)

Table 4: Exploring student experiences, by level of negative academic shock in their break term

	No Shock		Greater than 1 point drop in GPA during break term		Withdrew from or failed all courses in break term	
	At break mean	Difference	At break mean	Difference	At break mean	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Percent in-person courses	69.0%	-0.042***	64.8%	-0.080***	58.4%	-0.090***
Percent online courses	6.1%	0.038***	5.6%	0.080***	6.3%	0.090***
Percent hybrid courses	24.9%	0.004**	29.7%	-0.000	35.1%	0.001
Received Pell Grant	26.6%	-0.067***	38.8%	-0.056***	33.7%	-0.088***
Borrowed Stafford loans	8.2%	-0.037***	13.0%	-0.038***	10.2%	-0.073***
Any employment	63.2%	0.013***	64.2%	0.019***	68.5%	0.030***
Quarterly wages	\$6,218	133.025***	\$5,157	261.532***	\$5,784	351.026***
N	15193		4610		6709	

Notes: sample limited to SCND students who did not enroll at a non-VCCS institution within 3 years of their break (n = 26,512). Columns (1), (3), and (5) show the mean values of the student experience variables during students' break term for the three categories of students: "No Shock", "Greater than 1 point drop in GPA during break term", and "Withdrew from or failed all courses in break term". Columns (2), (4), and (6) show the result of t-tests comparing the student experience variable during the break term and the year prior to break term (within the three relevant 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 during the year prior, within student category. The negative values in the first row show that students were less likely to take in-person courses in their break term, compared to the year prior. The asterisks denote the statistical significance of the t-tests, with *p<0.10; **p<0.05; ***p<0.01.

Table 5: Post-break enrollment and degree completion, non-VCCS and VCCS institutions

Enroll at non-VCCS within ...	Full sample	No post-break enrollment
	(1)	(2)
1 year	39.2%	0.0%
3 years	45.8%	0.0%
5 years	49.0%	5.9%
<i>Institution type attended (if enrolled within 5 years)</i>		
Public 4-year, in-state	49.8%	13.9%
Public 2-year, in-state	0.1%	0.0%
Non-profit 4-year, in-state	15.6%	12.2%
Non-profit 2-year, in-state	0.2%	0.3%
For-profit 4-year, in-state	4.5%	6.8%
For-profit 2-year, in-state	0.6%	0.5%
Public 4-year, out-of-state	16.1%	16.9%
Public 2-year, out-of-state	9.9%	18.4%
Non-profit 4-year, out-of-state	11.5%	13.7%
Non-profit 2-year, out-of-state	0.1%	0.1%
For-profit 4-year, out-of-state	10.7%	21.1%
For-profit 2-year, out-of-state	0.2%	0.4%
<i>Earned degree within 5 years (if attended institution type)</i>		
Public 4-year, in-state	67.6%	8.4%
Public 2-year, in-state	18.8%	N/A
Non-profit 4-year, in-state	56.2%	8.5%
Non-profit 2-year, in-state	76.8%	50.0%
For-profit 4-year, in-state	56.2%	21.9%
For-profit 2-year, in-state	60.4%	0.0%
Public 4-year, out-of-state	44.7%	5.3%
Public 2-year, out-of-state	24.1%	10.2%
Non-profit 4-year, out-of-state	45.9%	7.5%
Non-profit 2-year, out-of-state	46.2%	0.0%
For-profit 4-year, out-of-state	32.2%	6.4%
For-profit 2-year, out-of-state	48.9%	16.7%
Re-enrollment at VCCS		
Re-enrolled within 5 years of break	8.0%	9.2%
Re-enrolled in same curriculum	30.8%	35.6%
N	48,953	26,512

Notes: The percentages within the Institution type attended categories sum 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.

Table 6: Relationship between student VCCS experiences and employment outcomes from 3 years post break

	Any employment (1)	Average quarterly wages (2)	Earn above 200% of poverty line (3)
Average credits attempted per term, 4 years prior to break	-0.0008 (0.0010)	63.2696*** (14.5461)	-0.0026* (0.0014)
Percent of credits attempted that were completed, 4 years prior to break	0.0171 (0.0188)	689.1079*** (241.3275)	0.1141*** (0.0233)
Cumulative credits earned, at time of break	-0.0000 (0.0002)	0.3103 (2.2021)	0.0007*** (0.0002)
Cumulative GPA, at time of break	-0.0383*** (0.0059)	468.6223*** (77.1557)	0.0396*** (0.0074)
Difference in break term GPA and cumulative GPA from prior term	0.0017 (0.0023)	72.9212** (29.7168)	0.0104*** (0.0029)
Enrolled at non-VCCS institution, 4 years prior to break	-0.0293 (0.0343)	-229.5959 (489.9976)	0.0074 (0.0472)
Number of terms enrolled at a non-VCCS institution, 4 years prior to break	0.0056 (0.0048)	194.4706*** (61.4162)	0.0224*** (0.0059)
Any employment, 4 years prior to break	0.0885*** (0.0069)	-349.8300*** (89.5708)	0.0413*** (0.0086)
Any employment, 1 year prior to break	0.3137*** (0.0073)	-1,100.1189*** (108.1131)	0.0087 (0.0104)
Quarterly wages (\$1000s), 4 years prior to break	0.0005 (0.0010)	178.4083*** (11.9103)	0.0066*** (0.0011)
Quarterly wages (\$1000s), 1 year prior to break	0.0119*** (0.0009)	616.1488*** (10.3522)	0.0309*** (0.0010)
Observations	26,512	17,355	17,355
R-squared	0.2198	0.4595	0.2724
Sample Mean	0.655	7485	0.385

Notes: sample limited to SCND students who did not enroll at a non-VCCS institution within 3 years of their break (n = 26,512). Each column corresponds to a separate regression of the employment outcome on student baseline characteristics, including race, gender, age, and cohort, program of study, and college fixed effects. Any variable containing missing values is set to zero, and a variable-specific missing value indicator is included in the regression model. *p<0.10; **p<0.05; ***p<0.01

Table 7: Counts of students by potential intervention targeting

All SCND students	48,953
Did not enroll anywhere within 3 years of break	26,512

Panel A: Counts by prior academic experiences (denominator = 26,512)

No negative academic shock	15,193
Drop in GPA of 1.0+ points	4,610
Withdrew or Failed all courses in break term	6,709
Experienced stopout in prior 3 years	5,537
Experience stopout in prior 6 years	8,285

Panel B: Counts by size and type of program

Left a large program (at least 200 combined SCND and graduates in sample)	21,884
Left a non-transfer-oriented degree program	13,156
Left a large, non-transfer-oriented degree program	8,695

Panel C: Counts by estimated program-specific SCND-Grad Gaps

Left a large, non-transfer-oriented degree program with a...	
...Negative significant gap ($p < 0.10$)	3,499
...Negative insignificant gap ($p > 0.10$)	3,022
...Positive insignificant gap ($p > 0.10$)	1,492
...Positive significant gap ($p < 0.10$)	682
Left a large, non-transfer-oriented degree program with a negative significant gap...	
...in the health sciences	2,246
...in the health sciences with competitive admission	1,408

Panel D: Counts by employment experience after break

SCND who did enroll elsewhere (n = 26,512)	
Negative wage growth in 3 years after break	3,475
Wage decline > 10% in 3 years after break	2,302
... and left large, non-transfer-oriented degree program (n = 8,695)	
Negative wage growth in 3 years after break	1,260
Wage decline > 10% in 3 years after break	840
... and with a negative significant gap (n = 3,547)	
Negative wage growth in 3 years after break	514
Wage decline > 10% in 3 years after break	373

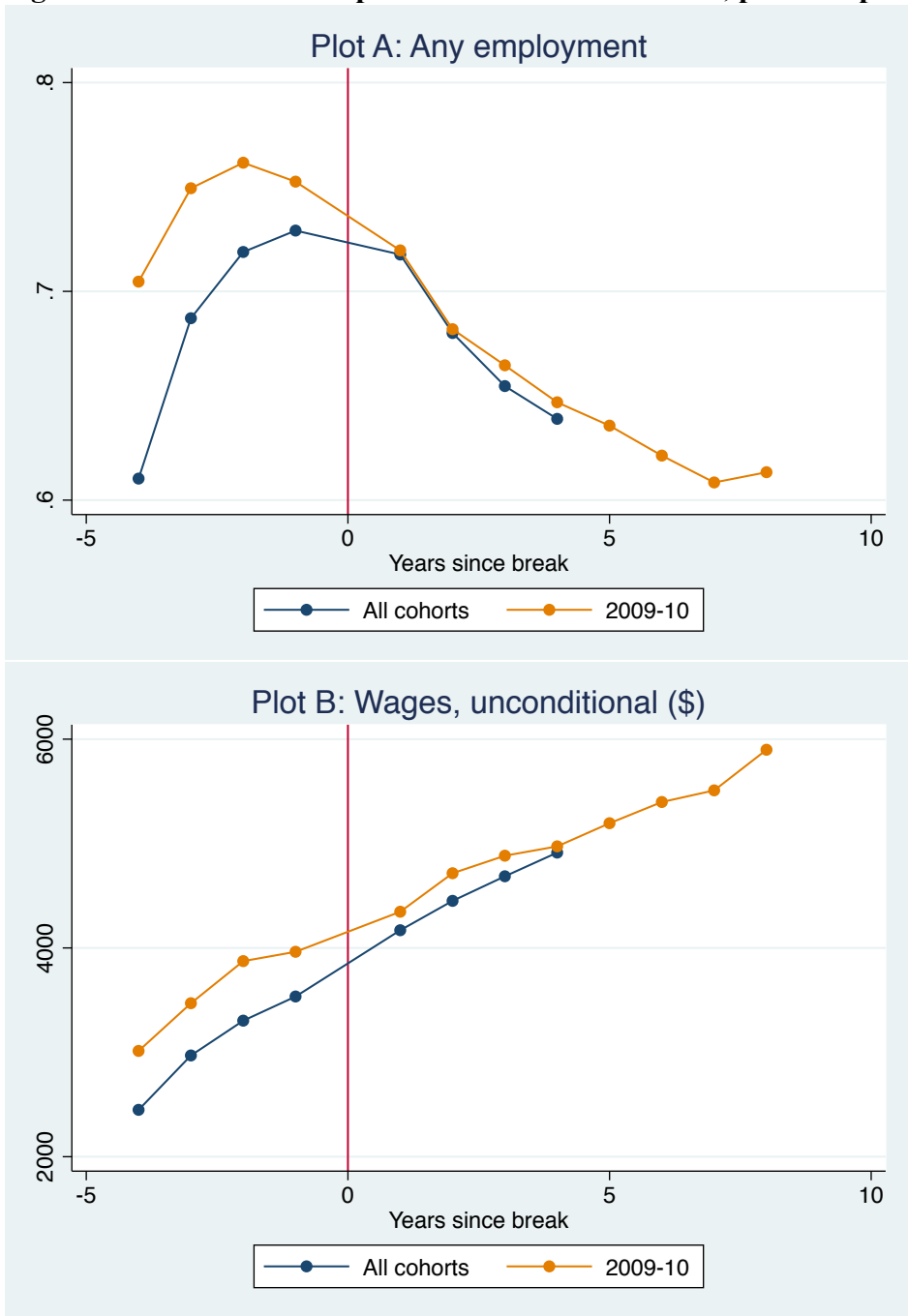
Notes: estimated program-specific gaps based on average quarterly wages (conditional on employment) in the third year after break/graduation from VCCS, using a comparison sample of non-enrolled Grads. Results are very similar when using a comparison sample of all Grads, or when using the other employment outcomes.

Table 8: Outcomes for SCND students who enroll within 1 year of leaving VCCS, by institution type

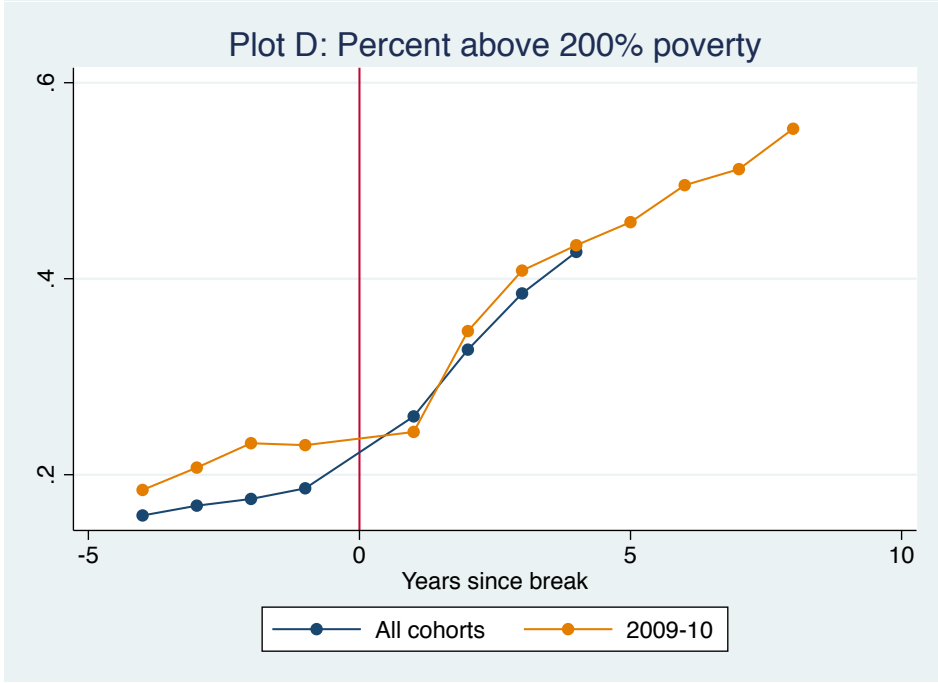
		Enroll within 1 year of Break	
		N	% of SCND
	For-profit	1,777	3.6%
	Public or non-profit	17,568	35.9%
Employment outcomes in 4th year after break			
		% employed	Average quarterly wage
	Enrolled at for-profit	69.6%	\$8,120
	Enrolled at for-profit only, graduated	73.7%	\$8,588
	Enrolled at for-profit only, did not graduate	65.1%	\$7,460
	Enrolled at public/non-profit	60.4%	\$7,252
	Enrolled at public/non-profit, graduated	62.6%	\$7,884
	Enrolled at public/non-profit, did not graduate	56.2%	\$5,911

Notes: based on the overall SCND sample of n = 48,953. The two categories of students who enrolled at a for-profit or public/non-profit institution within 1 year of leaving VCCS are not necessarily mutually exclusive, as a student theoretically could have enrolled at both. We consider all credential levels and degree types when identifying graduates in the NSC data.

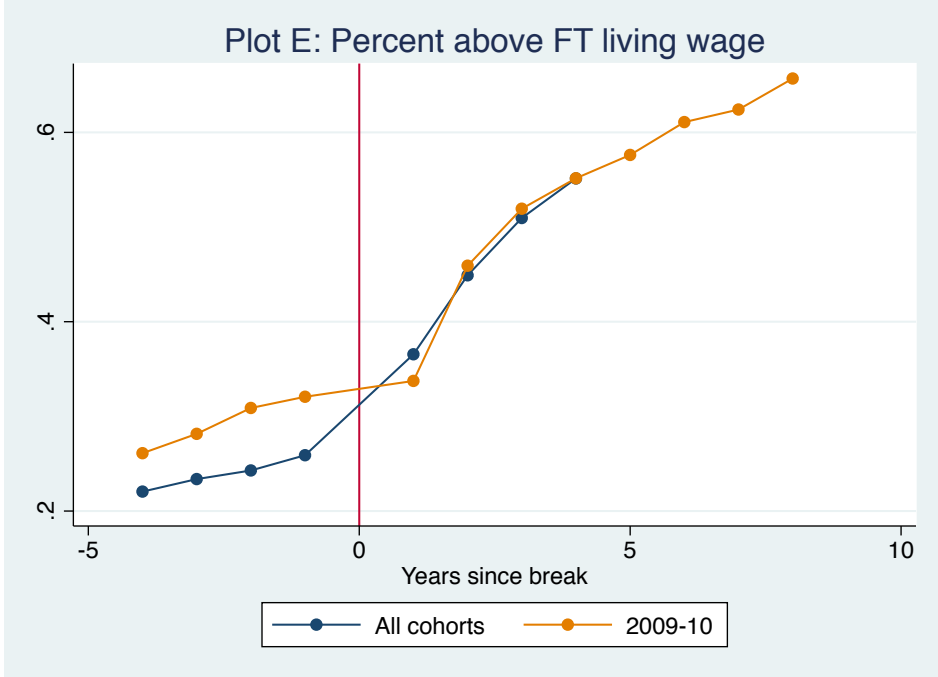
Figure 1: Labor market experiences of SCND students, pre- and post-break



(Figure 1, continued)

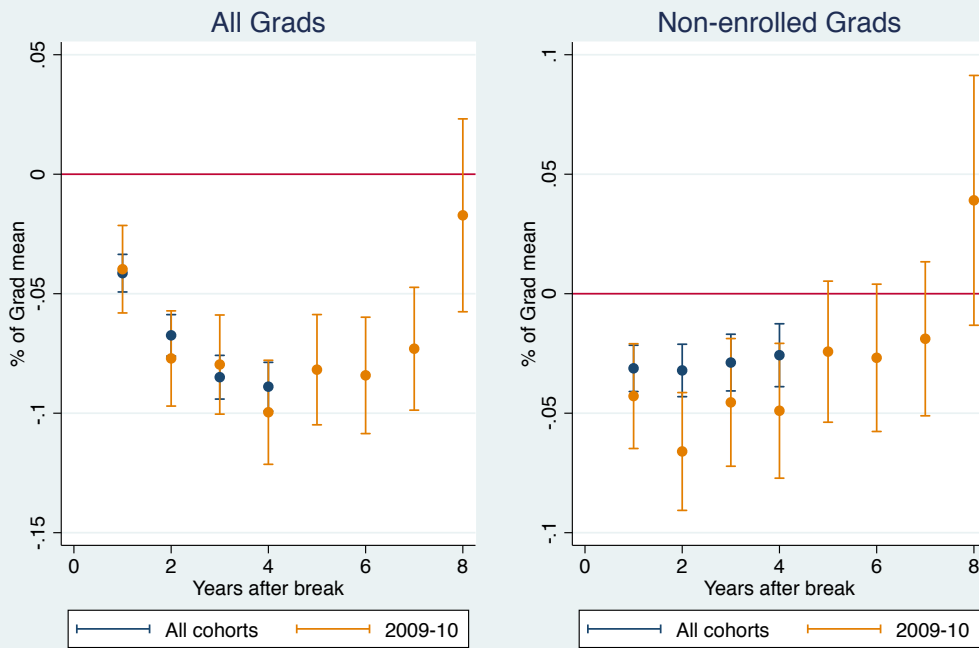


(Figure 1, continued)



Figures 2: Estimated SCND-Graduate employment and earnings gaps

Plot A. Percent employed



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

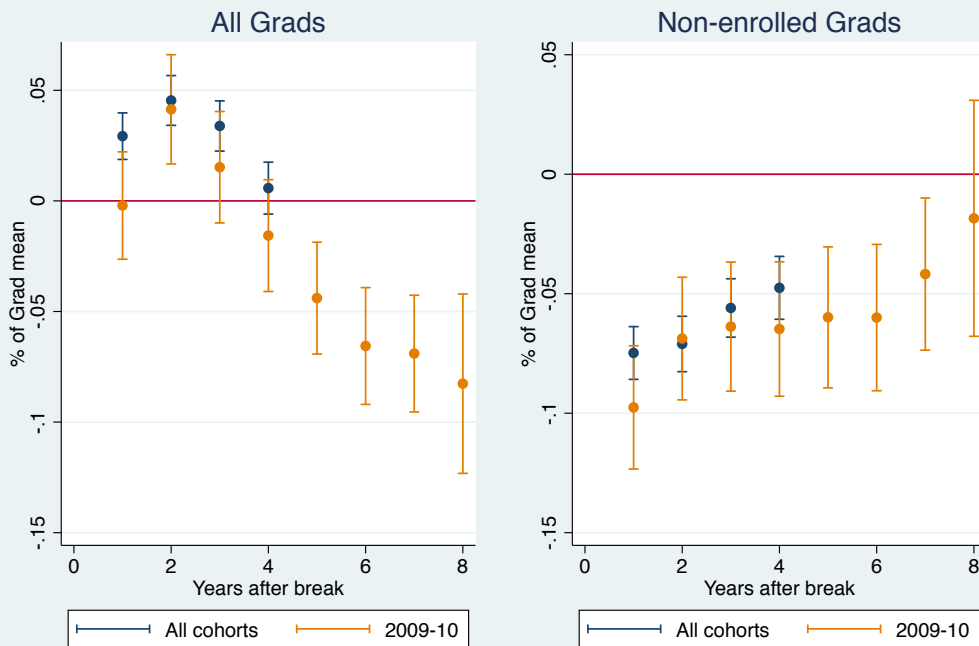
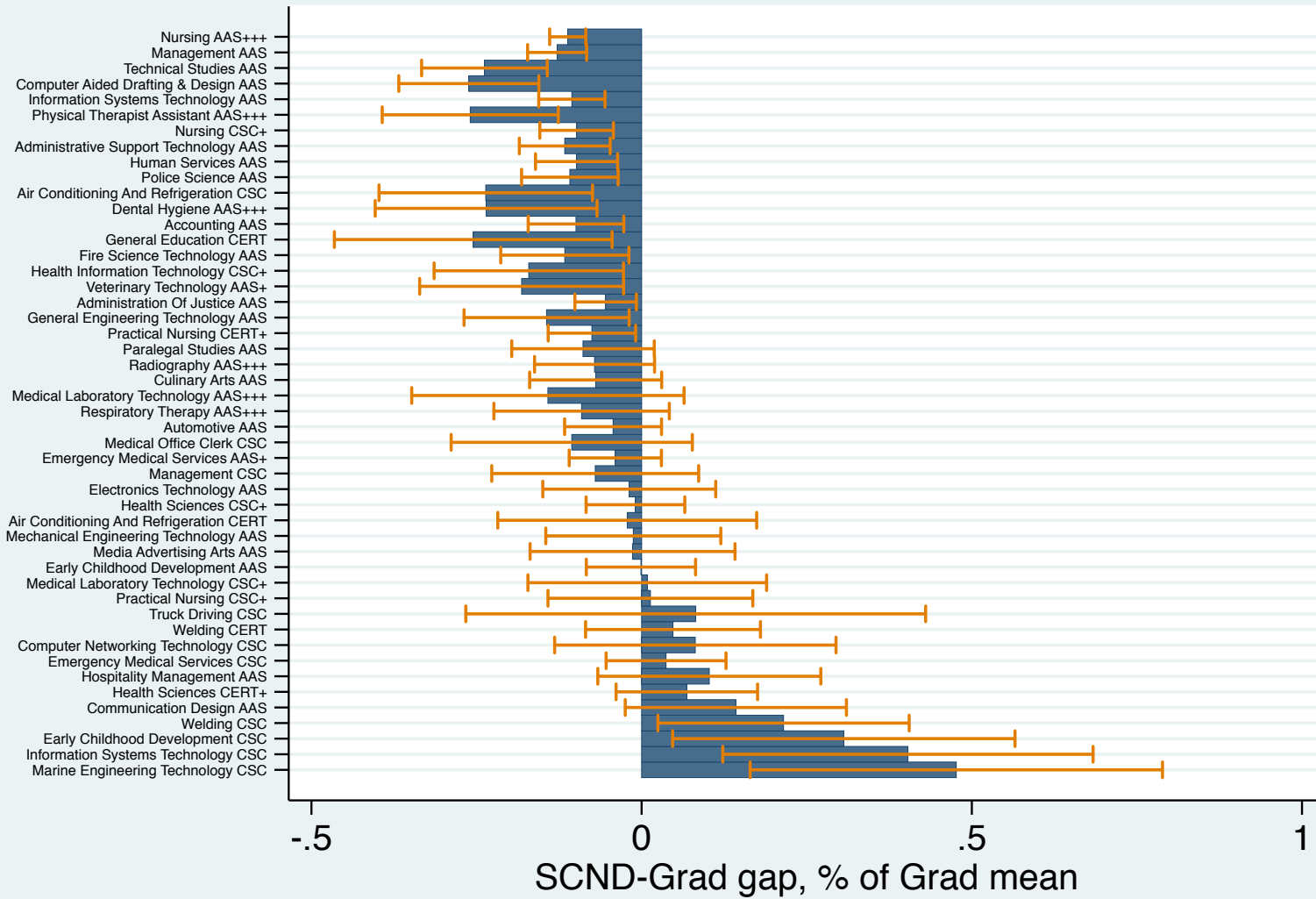


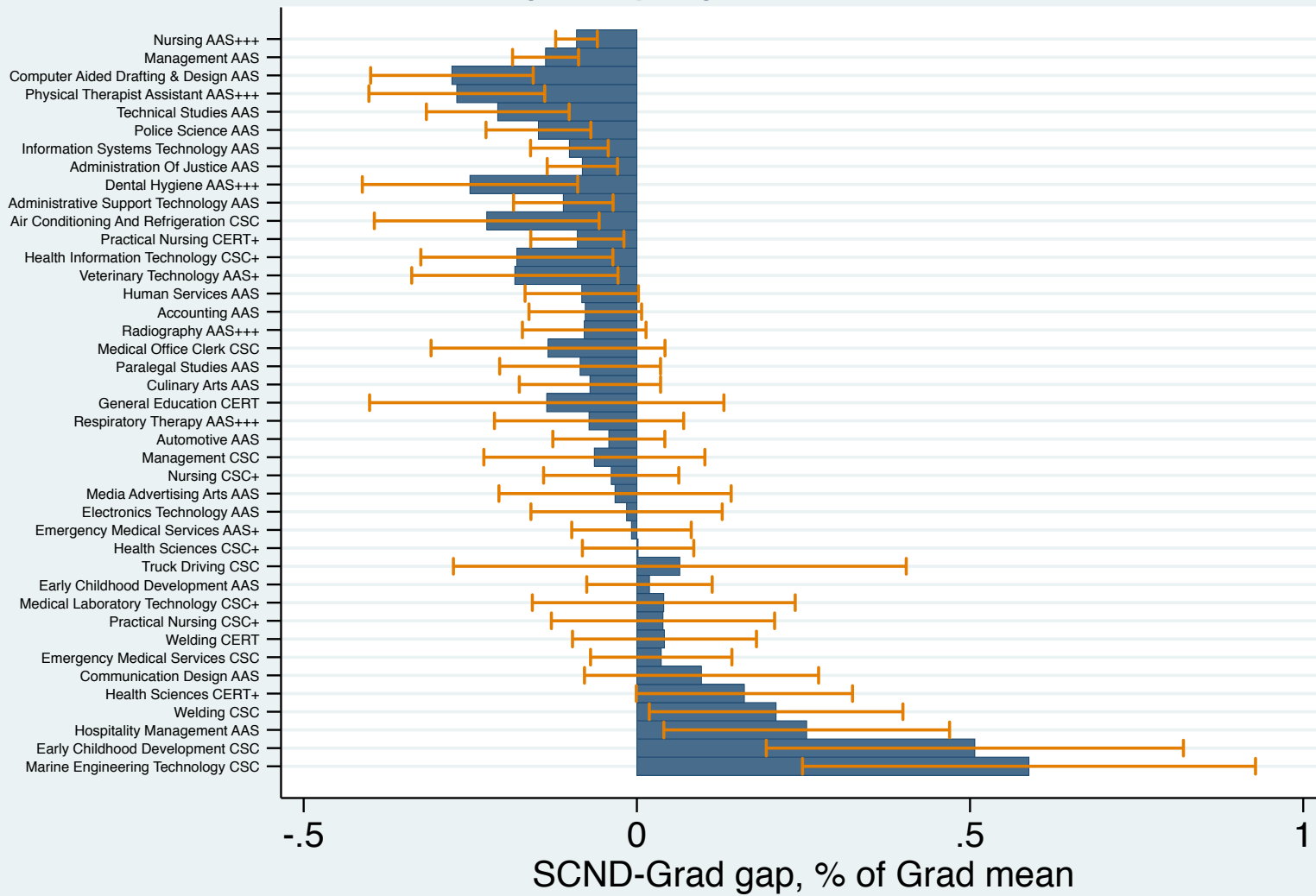
Figure 3: Estimated SCND-Graduate employment and earnings gaps, by program of study

Plot A: Any employment, All Grads



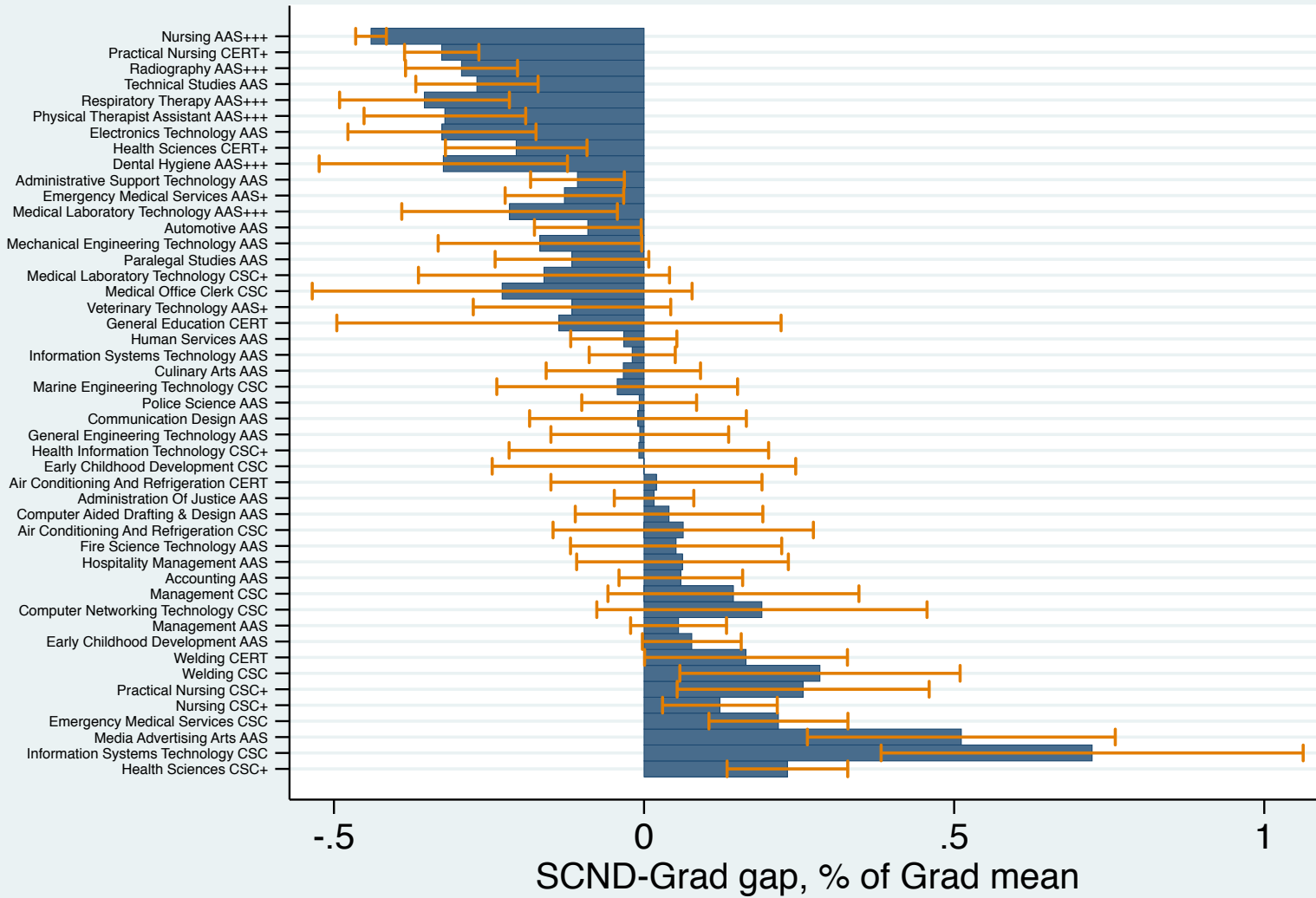
(Figure 3, continued)

Plot B: Any employment, Non-enrolled Grads



(Figure 3, continued)

Plot C: Non-zero wages (\$), All Grads

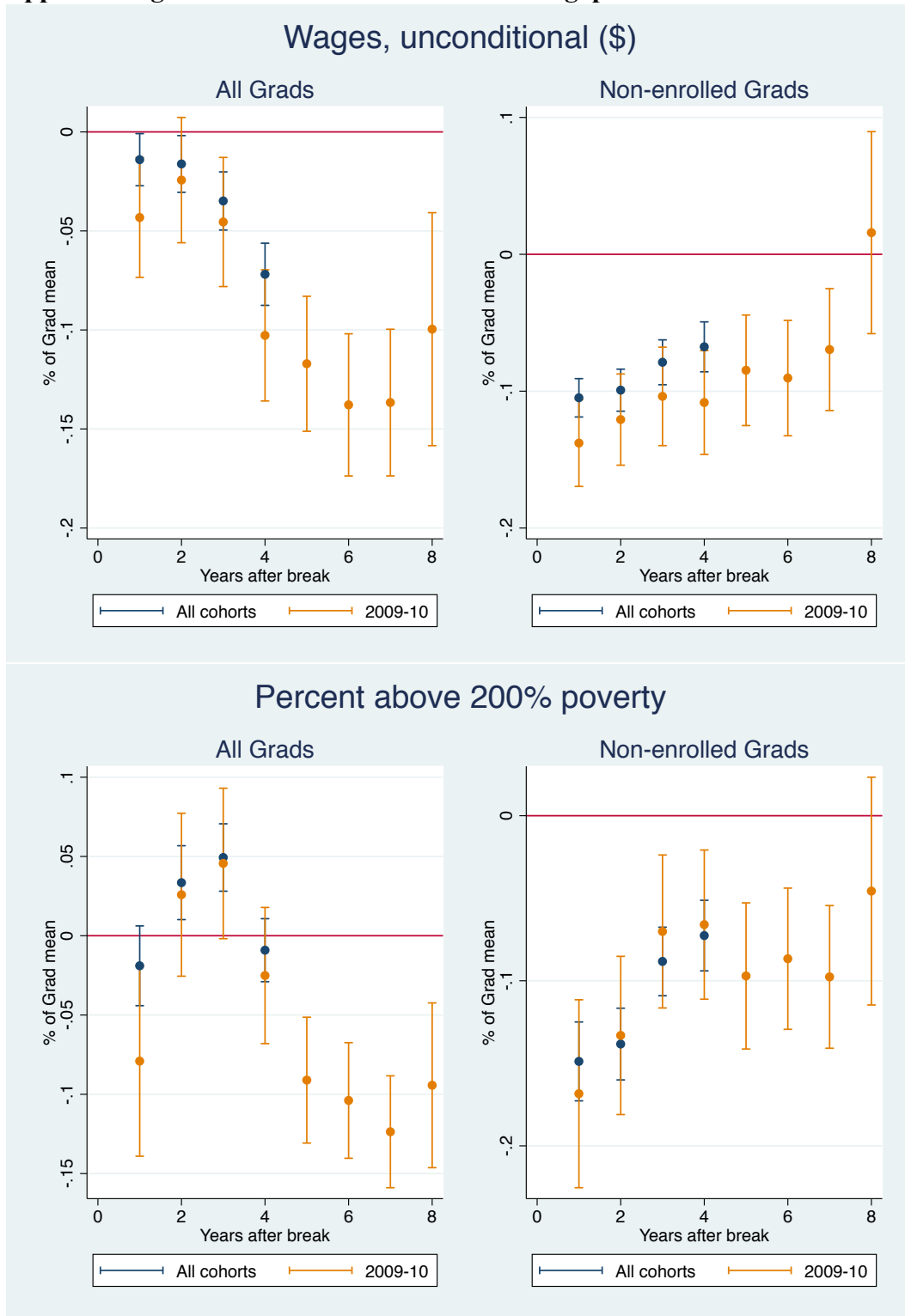


(Figure 3, continued)

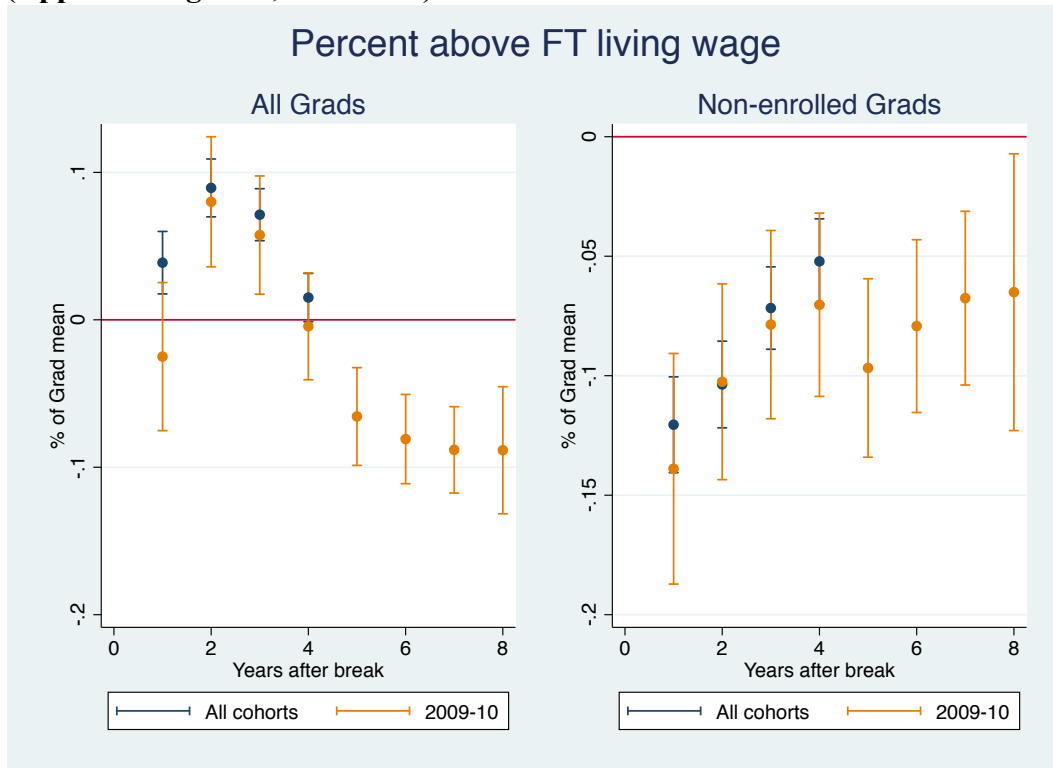
Plot D: Non-zero wages (\$), Non-enrolled Grads



Appendix Figure 1: estimated SCND-Graduate gaps for additional labor market outcomes

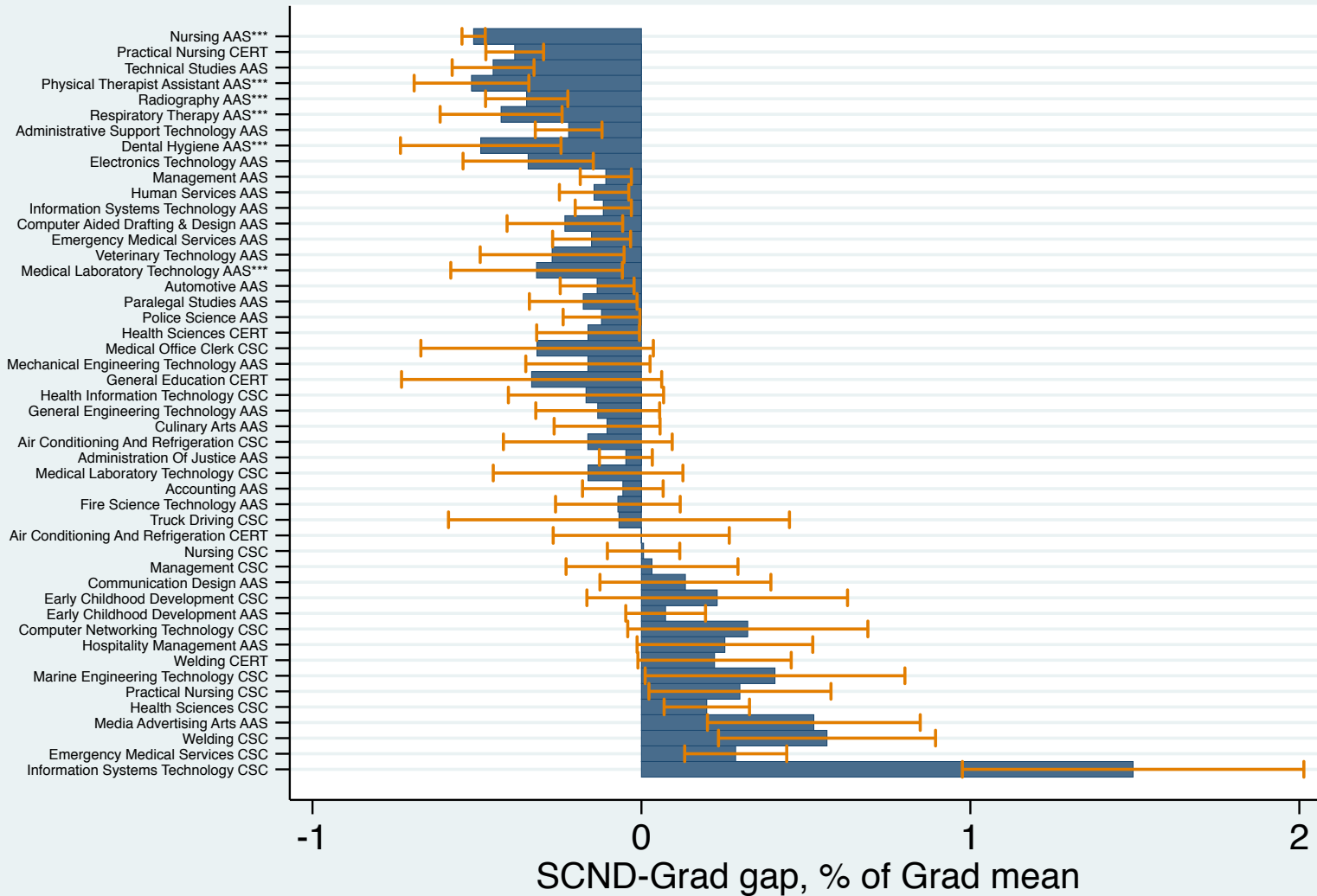


(Appendix Figure 1, continued)



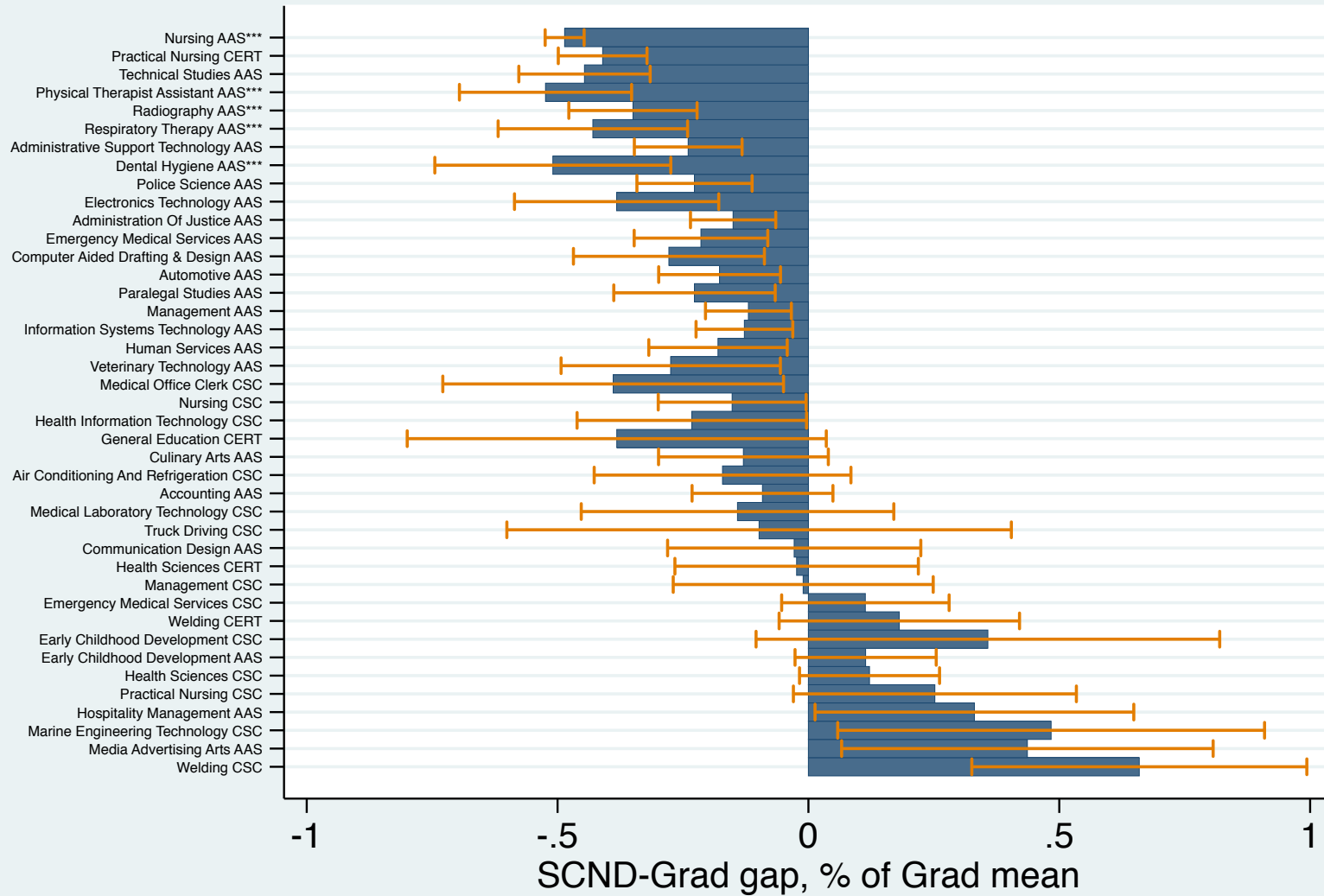
Appendix Figure 2: estimated SCND-Graduate gaps by program of study, additional earnings outcomes

Unconditional wages (\$), All Grads



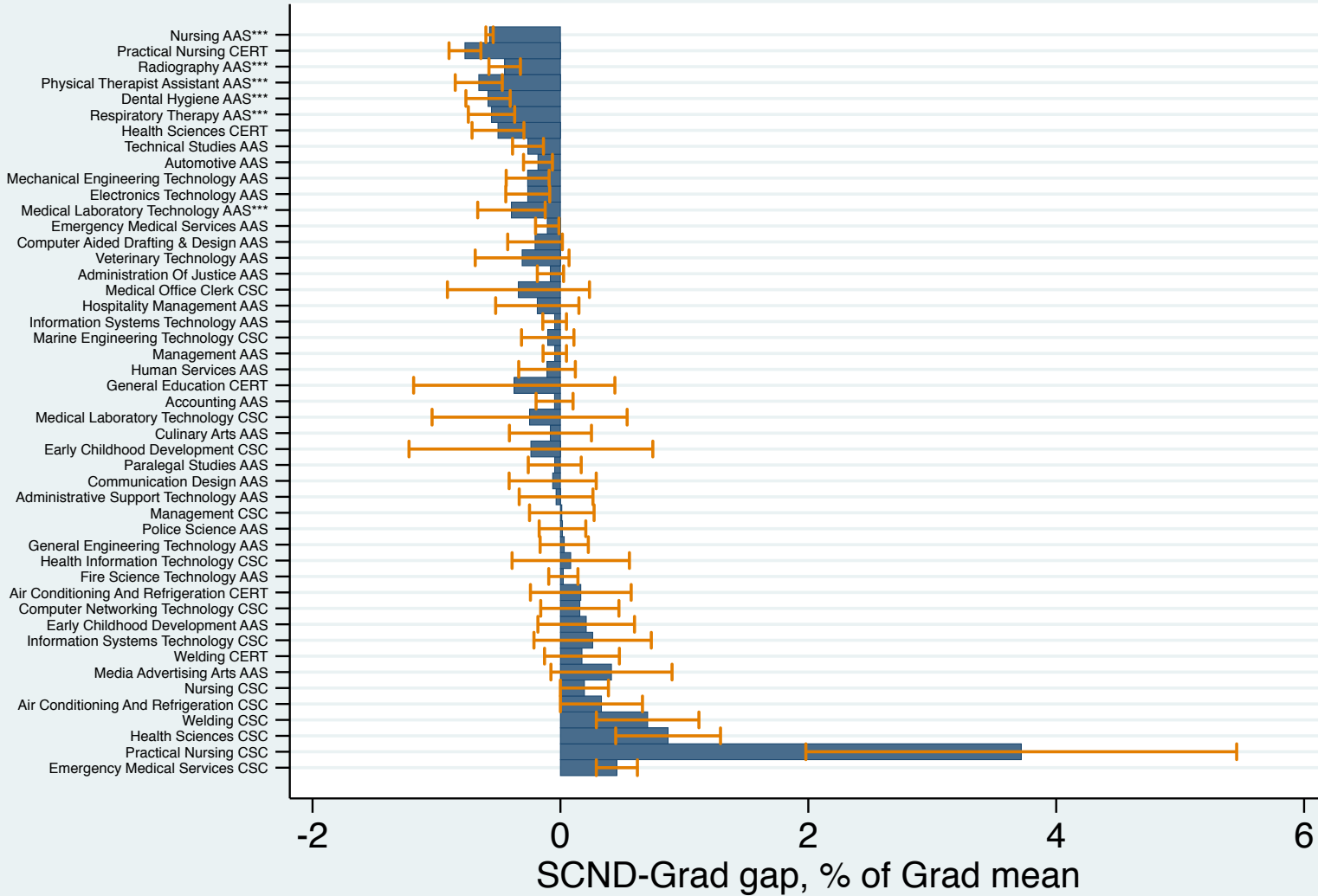
(Appendix Figure 2, continued)

Unconditional wages (\$), Non-enrolled Grads



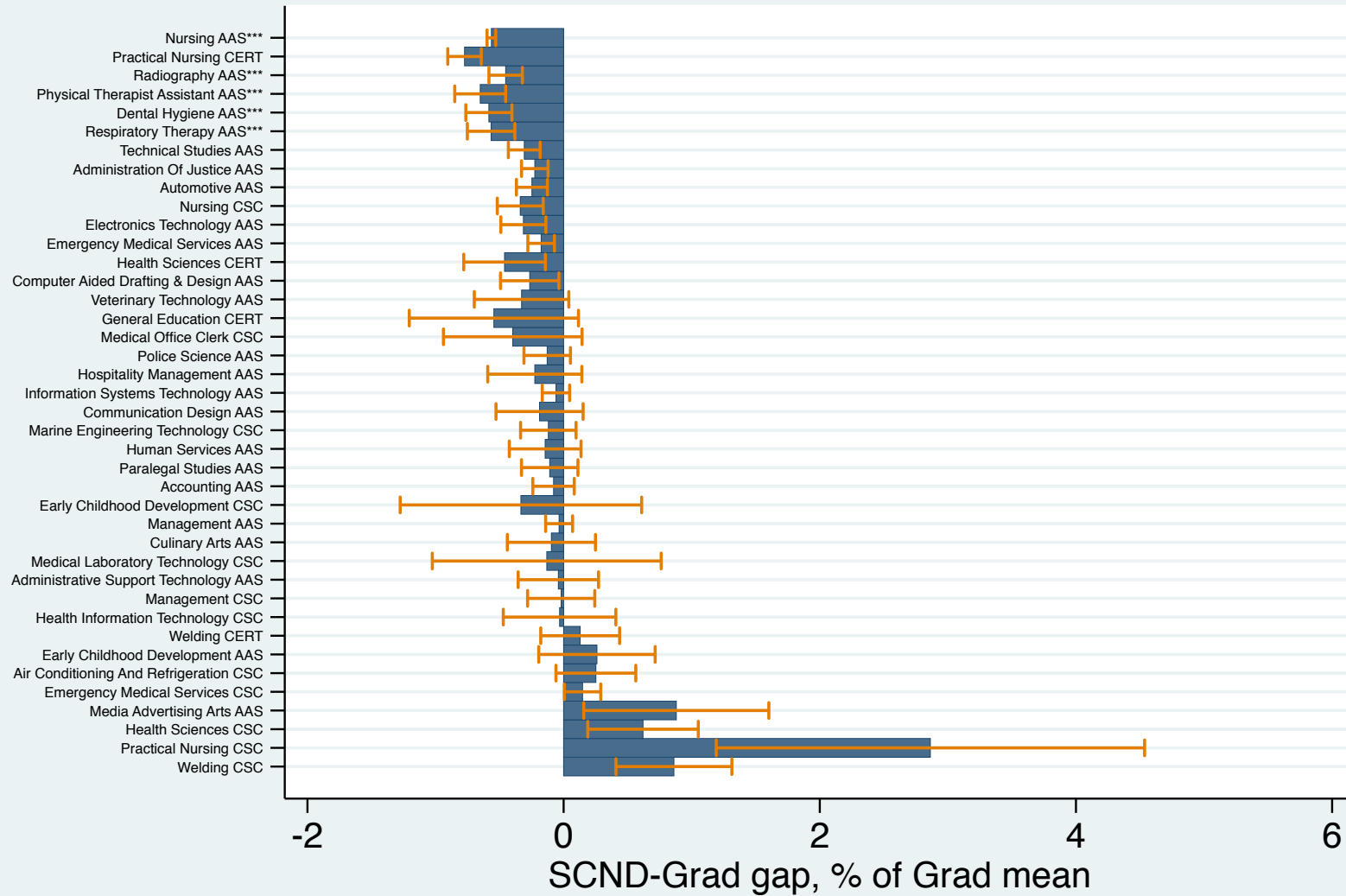
(Appendix Figure 2, continued)

Percent above 200% poverty, All Grads



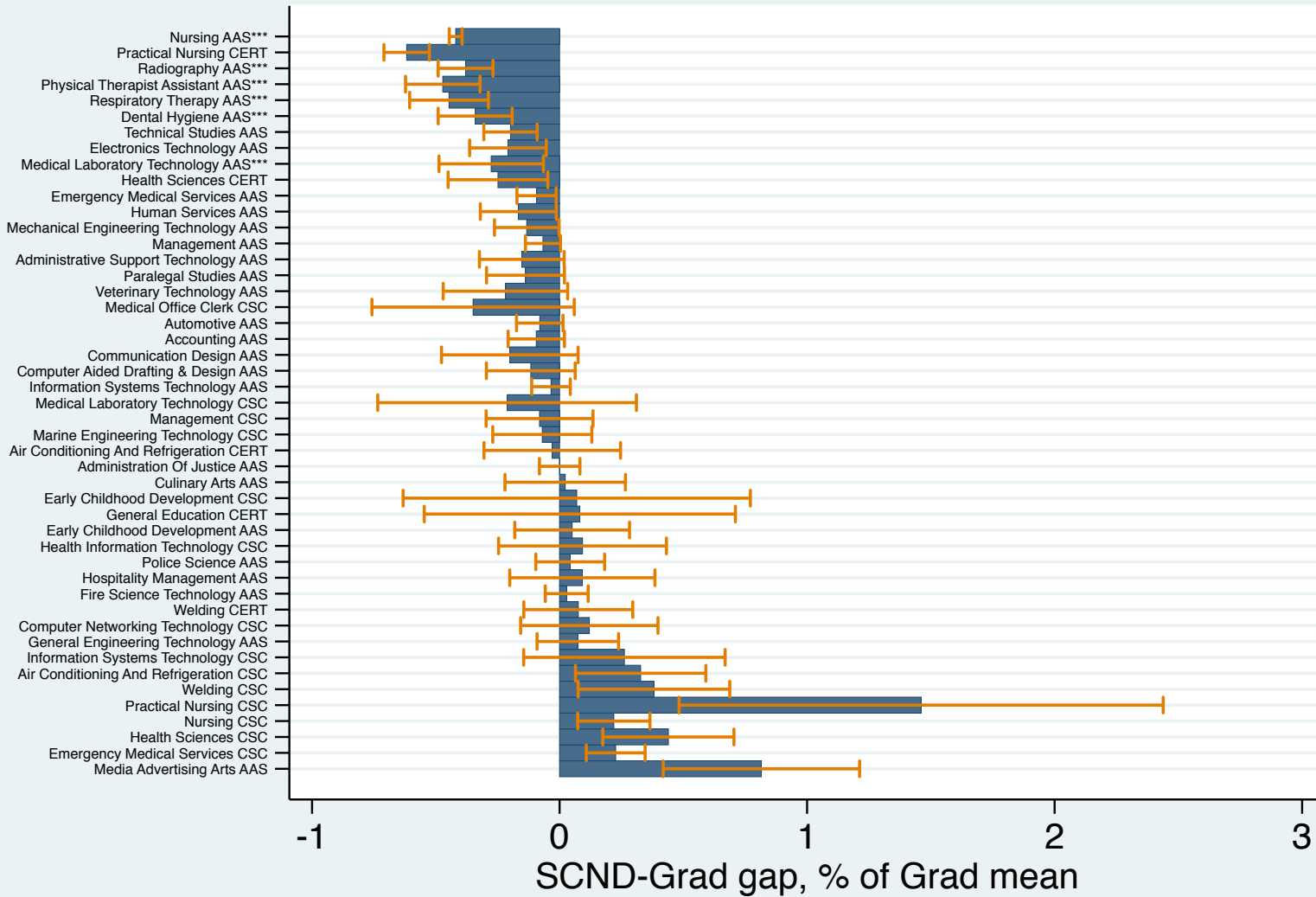
(Appendix Figure 2, continued)

Percent above 200% poverty, Non-enrolled Grads



(Appendix Figure 2, continued)

Percent above FT living wage, All Grads



(Appendix Figure 2, continued)

Percent above FT living wage, Non-enrolled Grads

