Effects of Work Ready Kentucky Scholarship:
Program Enrollment and Credential Completion

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INTRODUCTION

Kentucky, like many other states, has established a statewide goal for postsecondary educational achievement, aiming to increase the percentage of residents holding a postsecondary degree or certificate to 60% by the year 2030. To achieve this objective and address the escalating needs of rapidly expanding and high-demand workforce industries, the state of Kentucky introduced the Work Ready Kentucky Scholarship (WRKS) in the 2017-2018 academic year. WRKS provides financial aid for eligible Kentuckians who have not yet earned a postsecondary degree to pursue an industry-recognized certificate, diploma, or associate degree. High-demand workforce sectors that are eligible for WRKS include: (1) advanced manufacturing, (2) business and information technology, (3) construction, (4) healthcare, and (5) transportation and logistics.[1] The WRKS aid amount is structured to cover the difference in cost between an eligible student's tuition and fees and the financial assistance they receive from federal and state student aid programs. In the 2021-2022 academic year, WRKS disbursed a total amount of approximately $10.5 million, benefiting a total of 3,720 recipients.[2]

In our first policy brief on WRKS, we examined who participates in the aid program and explored the most popular high-demand fields that WRKS recipients enrolled in and their educational pathways.[3] In this policy brief, we expand our examination to focus on whether and how enrollment and credential awards change after programs become WRKS eligible.

KEY FINDINGS

1. Since Kentucky started the Work Ready Kentucky Scholarship (WRKS) in the 2017-2018 academic year, the state has provided a new source of financial aid for Kentucky residents to pursue an industry-recognized certificate, diploma, or associate degree in high-demand workforce sectors.

2. Annually, WRKS programs have smaller enrollments and confer fewer associate degrees than non-WRKS programs. However, WRKS programs award about eleven times more certificates than their non-WRKS counterparts on average each year.

3. After a program became eligible for WRKS funds, student enrollment and credentials were higher than before the aid money became available. This finding remains true after partially accounting for concurrent trends in non-WRKS programs; however, more work is needed to understand how WRKS aid affects student and program outcomes.

To conduct the analysis, we use administrative postsecondary education system records for the state of Kentucky from the 2013-2014 through 2020-2021 academic years, including information for all students who attended one of 16 community colleges with more than 70 locations across the state. The data provide information on enrollment records, credential attainment, financial aid, institution-related information, and student-level demographics. We define an academic program as each unique combination of community colleges and six-digit Classification of Instructional Programs (or "CIP") codes.[4] For the analysis in this brief, we use the aggregated program-level data on student enrollment, the number of associate degrees awarded, and the number of certificates awarded for each specific program across years.[5]

The focus of this brief is academic programs that became eligible for WRKS since the state introduced the aid in the 2017-2018 academic year (or referred to

as WRKS programs). We also include academic programs that never attained WRKS eligibility (or referred to as non-WRKS programs) in our analyses to see how WRKS program outcomes compared to programs where students were not eligible for WRKS aid.

In Table 1, we present summary statistics of program enrollment and credentials awarded from the 2013-2014 through 2020-2021 academic years for our analytical sample of WRKS and non-WRKS programs. There are 425 academic programs that became eligible for WRKS since the 2017-2018 academic year, and 351 non-WRKS programs.[6] On average, non-WRKS programs have a larger enrollment size annually; they also have a relatively larger share of students who are female. Additionally, non-WRKS programs confer more associate degrees annually on average, whereas WRKS programs award about eleven times more certificates than their non-WRKS counterparts.[7]

Table 1: Summary Statistics

	WRKS Programs	Non-WRKS Programs
	(1)	(2)
Annual Average of Total Student Enrollment	31,675	43,951
Share of Female Students	0.53	0.66
Share of Black Students	0.10	0.12
Share of White Students	0.84	0.82
Share of Non-Hispanic Students	0.94	0.93
Average Age of Enrolled Students	29	28
Annual Average of Total Associate Degrees Awarded	3,436	6,322
Annual Average of Total Certificates Awarded	22,936	1,904
Number of Programs	425	351

DESCRIPTIVE TRAJECTORIES

In this section, we present descriptive trends of average number of enrolled students and credentials awarded at the individual program level for WRKS and non-WRKS programs from the 2013-2014 through 2020-2021 academic years based on the analytical sample we described above.

In Panel A of Figure 1, we show the trends of program-level average counts of unique enrolled students for both WRKS and non-WRKS programs (left figure), and for specific WRKS fields (right figure). On average, there is a larger enrollment size for non-WRKS programs compared to WRKS programs, as we also see in Table 1. Over time, we observe a general decline in the average program size for both types, with non-WRKS programs undergoing a more pronounced decrease of about 31% compared to WRKS programs (a decrease of about 25%). Examining the trends within WRKS programs across five high-demand fields, we see that the field of business/IT stands out with the highest program size. Program enrollment in business/IT and healthcare decreases over time, remains relatively stable for construction and transportation/logistics, but increases for advanced manufacturing.

We present the trends of program-level average counts of associate degrees awarded in Panel B of Figure 1. On average, non-WRKS programs confer more associate degrees than WRKS programs over time. However, the trend for WRKS programs is on an upward trajectory, whereas it remains relatively constant for non-WRKS programs. Across WRKS fields, business/IT programs lead in awarding associate degrees. Moreover, there is a continuous increase in the number of associate degrees awarded over time for business/IT, advanced manufacturing, and construction, while we observe relatively flat trends for healthcare and transportation/logistics. There are fewer than ten associate degrees awarded per WRKS program. Research generally indicates that labor

market benefits of associate degrees exceed those of shorter-term certificates, and associate degrees are more commonly part of pathways that can be extended into bachelor's degrees.[8] Therefore, the workforce focus of WRKS programs may provide benefits to students who are trying to add skills in their chosen career paths; however, in ongoing research, we are examining whether WRKS programs affect educational pathways of students.

We show the trends of program-level average counts of certificates awarded in Panel C of Figure 1. We find that contrary to associate degrees, WRKS programs produce more certificates than non-WRKS programs. The number of certificates awarded by WRKS programs has been increasing at a faster pace than non-WRKS programs since the 2015-2016 academic year. This upward trajectory is evident across all five fields, except for healthcare. Business/IT programs stand out by awarding the highest number of certificates compared to other fields.

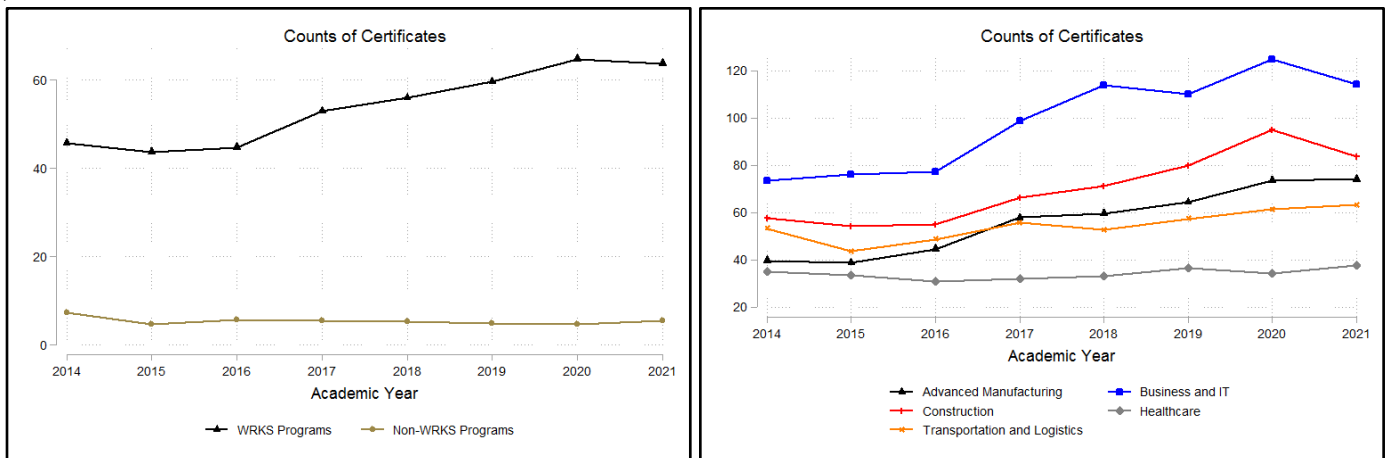# Figure 1: Trajectories of Student Enrollment and Credentials Awarded

(A) Counts of Student Enrollment
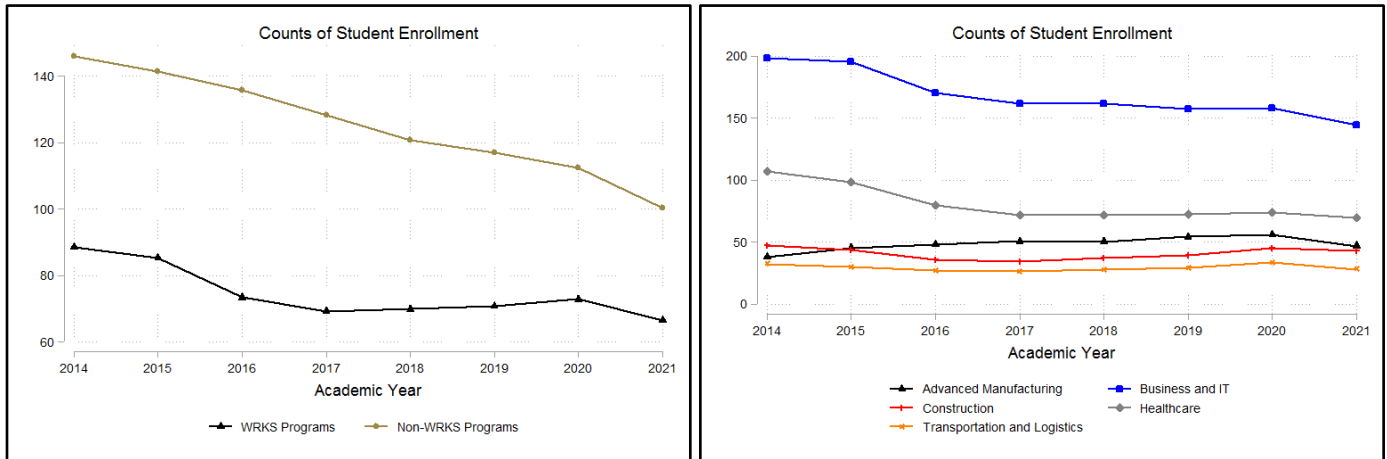
(B) Counts of Associate Degree Awarded
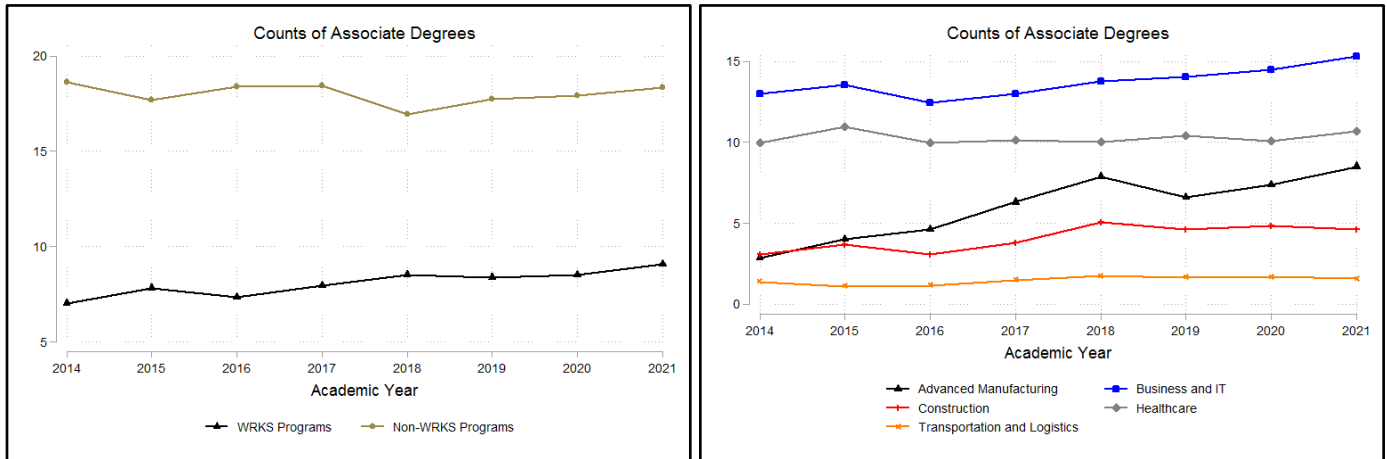
(C) Counts of Certificates Awarded

RESEARCH APPROACH

We employ an analytical approach known as a difference-in-differences (DID) design in our analysis. Under certain assumptions, a DID design estimates the effect of becoming eligible for WRKS by comparing outcomes of the program after WRKS eligibility, as compared to before eligibility. In this case, we focus on the enrollment and credentials awarded for programs that become WRKS eligible. To account for trends that are common to all programs across the state, we subtract the contemporaneous trends of non-WRKS programs. To ensure that the WRKS and non-WRKS programs that we examine are comparable, we create a "matched" comparison group of non-WRKS programs that exhibit similar pre-treatment outcome trends as WRKS programs.[9] We describe the research design and the matching procedure in detail in Appendix B.

RESULTS

We present the main results in Figure 2. In the figure, we show the difference in trends in outcomes between WRKS programs and non-WRKS programs both before and after the eligibility of WRKS. In the figure, we plot the estimated coefficients using circle markers, with the coefficient for the first year prior to becoming eligible for WRKS set to zero. We also show the 95% confidence intervals for each point estimate as the vertical lines associated with each circle marker. The horizontal axis spans the four years leading up to programs becoming WRKS eligible (negative -4 to -1), up through four years after WRKS eligibility (positive 1 to 4). Whereas in Figure 1 we show descriptive trends over time, Figure 2 shows the relative effect of WRKS program to a group of matched non-WRKS programs with similar pre-treatment trends.

After becoming WRKS eligible, student enrollment and credentials awarded were higher in WRKS programs as compared to non-WRKS programs, and in some outcomes, that gap grew over time. For example, post-WRKS eligibility enrollment was about 11 students per year higher on average than non-WRKS programs (or about 15% of the average pre-WRKS eligibility program-level enrollment size). WRKS programs also awarded about two more associate degrees (or about 25% of the pre-WRKS eligibility program-level average) and awarded about seven certificates more (or about 13% of the pre-WRKS eligibility program-level average).

In this analysis, we cannot rule out the possibility that our results are affected by differences in pre-treatment trends between treatment and control groups. Work is therefore ongoing to determine whether WRKS programs are effective in influencing students' enrollment choices in high-demand major fields and promoting certificate and associate degree attainment in these specific areas.

Figure 2: Estimated Effects of WRKS on Student Enrollment and Credentials Awarded
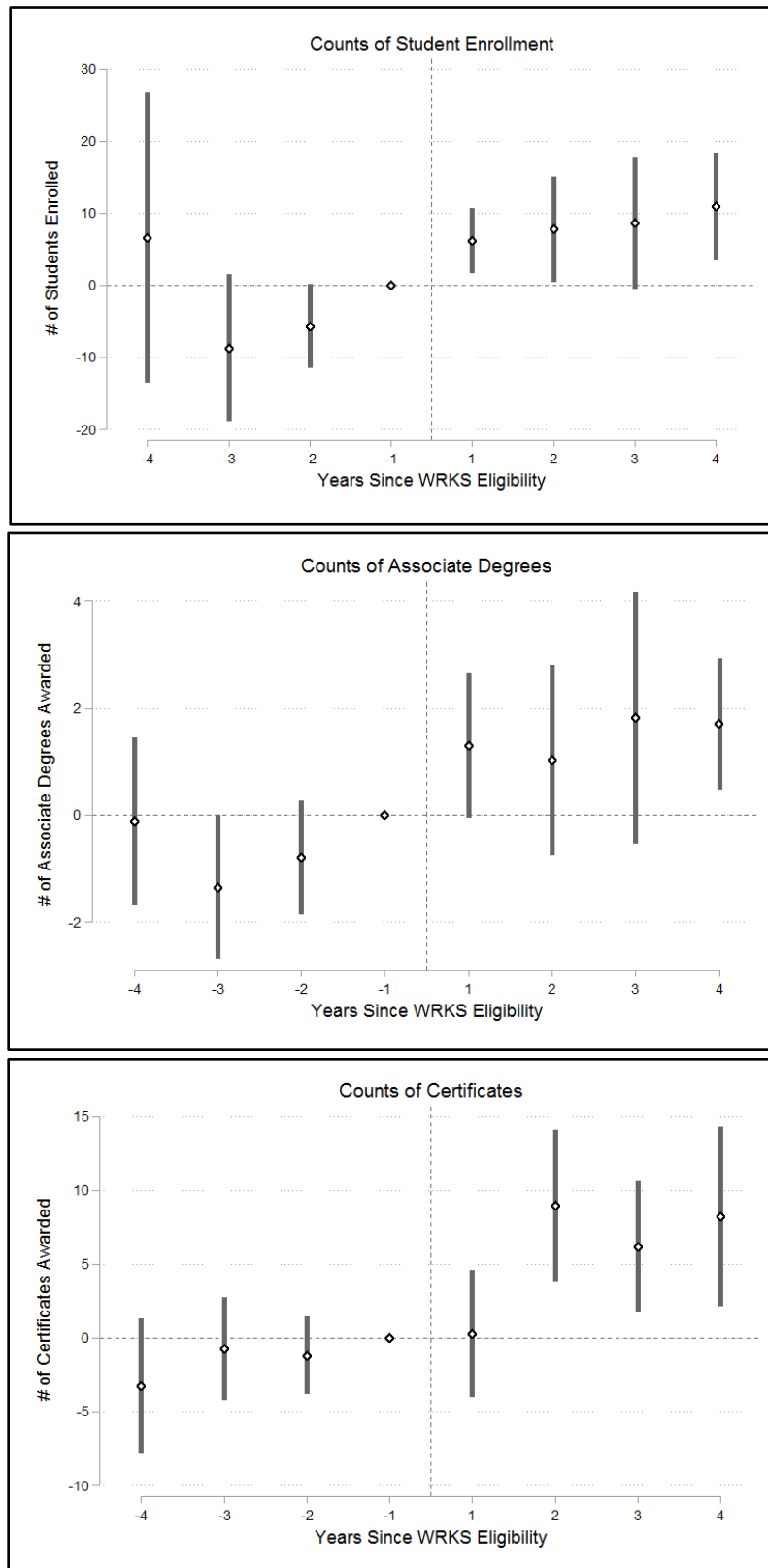
Notes: The horizontal axis represents years prior to (if negative) or after (if positive) becoming eligible for WRKS. The circle markers report the estimated effects of WRKS on student enrollment and credentials awarded for each year. Vertical lines show the 95% confidence interval. If the confidence interval of an estimated effect does not intersect with zero (represented by the horizontal dashed line), this indicates that the effect is statistically significant at the significance level of 5%.

SUMMARY AND NEXT STEPS

In this brief, we examine whether the program enrollment and credential awards of WRKS programs have changed since the state introduced WRKS aid in the 2017-2018 academic year. Policymakers hoped that WRKS financial aid would induce Kentuckians to pursue an industry-recognized certificate, diploma, or associate degree in high-demand fields. WRKS programs have a smaller enrollment size annually and confer fewer associate degrees than non-WRKS programs. However, by the 2020-2021 academic year, WRKS programs have awarded about eleven times more certificates than their non-WRKS counterparts annually on average.

While pure enrollment differences are insightful, examining trends tells a more complete story. The state of Kentucky started WRKS at a time in which community college enrollment was declining. In Figure 1, while enrollment in both WRKS and non-WRKS programs continued to drop after the WRKS aid was introduced, the rate of enrollment decline slowed in WRKS programs. In addition, awards for associate degrees and certificates have increased since the 2017-2018 academic year among WRKS programs. The lessons learned from examining enrollment and certificate patterns in Figure 1 are confirmed by a more in-depth analysis in which we control for enrollment and certificate trends prior to the implementation of WRKS financial aid.

In future work, we will push further to better understand whether the WRKS financial aid has the intended effect of increasing enrollment and credential completion in the state. We will also examine whether these programs appear to lead students to have improved labor market outcomes, such as higher earnings and employment rates.

[1] According to Kentucky Senate Bill 98 (available at: https://apps.legislature.ky.gov/record/19RS/sb98.html), the Kentucky Workforce Innovation Board and the Education and Workforce Development Cabinet determined the five high-demand workforce sectors. These five sectors have remained unchanged since the state introduced WRKS in the 2017-2018 academic year.

[2] *Work Ready Kentucky Scholarship Annual Report 2021-2022.* https://www.kheaa.com/web/resources/pdf/reports/wrks/WRKSAnnual2022.pdf

[3] See more in our first WRKS policy brief here: *Work Ready Kentucky Scholarships: Who Participates?* https://pwaef.uky.edu/sites/default/files/2023-06/2023_06_08_WRKS_PDF_of_Brief_v4-2.pdf

[4] The Classification of Instructional Programs (CIP) codes were developed by the U.S. Department of Education as the national taxonomic standard of academic program titles. Each program of study is assigned with a six-digit CIP code that describes the program curriculum.

[5] See Appendix A for a detailed description of dataset construction and sample restriction.

[6] As we discuss in Appendix A, our analytical sample of WRKS and non-WRKS programs in this brief only include those academic programs that have enrolled at least one student *and* awarded at least one credential during the analytical time frame. We also exclude WRKS programs that later became ineligible for WRKS from the analyses. Out of the total 425 WRKS programs, there are 303 academic programs that became eligible for the aid in the 2017-2018 academic year, 88 programs in the 2018-2019 academic year, 24 programs in the 2019-2020 academic year, and 10 programs in the 2020-2021 academic year.

[7] WRKS programs are designed to address workforce demands by focusing on vocational and skill-specific training. Certificates, being shorter-term credentials than associate degrees, align well with this goal as they often provide a quicker pathway for students to acquire specialized skills directly applicable to the workforce. Non-WRKS programs encompass a range of offerings, spanning from general education programs to specific vocational tracks. Examples of general education programs include those with 2-digit CIP codes such as 13 (Education), 19 (Family and Consumer Sciences/Human Sciences), 24 (Liberal Arts and Sciences, General Studies and Humanities), and 44 (Public Administration and Social Service Professions). Additionally, certain vocational programs, falling under categories like Engineering Technologies/Technicians (with the 2-digit CIP code of 15), Mechanic and Repair Technologies/Technicians (47), and Health Professions and Related Clinical Sciences (51), are also classified as non-WRKS programs.

[8] For instance, Minaya and Scott-Clayton (2022) analyze the administrative data from the State of Ohio, and find that associate degrees tend to yield substantial labor market returns, with earnings increasing significantly over time. In contrast, there are only small returns among certificates and earnings growth remains flat. Jepsen, Troske, and Coomes (2014) show that earnings returns are larger among associate degrees compared to certificates for both men and women in Kentucky. Xu and Trimble (2016) also document that students with associate degrees have higher quarterly earnings and rates of employment than those with certificates in North Carolina and Virginia.

Jepsen, C., Troske, K., & Coomes, P. (2014). The Labor-Market Returns to Community College Degrees, Diplomas, and Certificates. *Journal of Labor Economics*, *32*(1), 95-121.

Minaya, V., & Scott-Clayton, J. (2022). Labor Market Trajectories for Community College Graduates: How Returns to Certificates and Associate's Degrees Evolve Over Time. *Education Finance and Policy*, *17*(1), 53-80.

Xu, D., & Trimble, M. (2016). What About Certificates? Evidence on the Labor Market Returns to Nondegree Community College Awards in Two States. *Educational Evaluation and Policy Analysis*, *38*(2), 272-292.

[9] We successfully match about 55% of the WRKS programs in the analytical sample. We observe that the matched WRKS and non-WRKS programs exhibit similar program enrollment and credentials awarded during pre-treatment periods.

[10] High school students in Kentucky are eligible for another workforce-aligned aid program called Work Ready Dual Credit (WRDC) Scholarship. We only focus on WRKS in this brief, and will examine WRDC in future analyses.

We first construct a student-level data file that consists of all individuals who enrolled in the Kentucky Community and Technical College System between the 2013-2014 and 2020-2021 academic years. We exclude records of high school students from the analytical sample.[10] We then aggregate this dataset at the program-by-academic year level to obtain the counts of unique enrolled students, the number of associate degrees awarded, and the number of certificates awarded for each program across years. In our context,

we define an academic program as each unique combination of community colleges and six-digit Classification of Instructional Programs (or "CIP") codes. We only include academic programs that have enrolled at least one student and awarded at least one credential during the analytical time frame. We assign a value of 0 to observations in cases where we don't observe any enrollment or credentials awarded. We exclude WRKS programs that later became ineligible for WRKS from the sample.

1. Research Design

Our main empirical strategy is to estimate a matched comparison group staggered difference-in-differences design to compare the within-program post- vs. pre-treatment outcomes (i.e., student enrollment and credentials awarded) of WRKS programs with non-WRKS programs. We employ coarsened exact matching (CEM) to enhance the similarity of WRKS and non-WRKS programs. Specifically, for each WRKS program, we match exactly on average program-level student enrollment and credentials awarded prior to the year of becoming eligible for WRKS. Our sample in this analysis therefore includes WRKS programs and a group of matched non-WRKS programs that have similar pre-treatment outcomes.

We estimate the following event study equation:

$$Y_{pt\tau} = \alpha + \sum_{j=-4}^{-2} \beta_1^{\tau}\left(WRKS_p * \mathbf{1}[\tau = j]\right)$$

$$+ \sum_{j=1}^{4} \beta_2^{\tau}\left(WRKS_p * \mathbf{1}[\tau = j]\right)$$

$$+ \theta_{\tau} + \eta_p + \lambda_t + \varepsilon_{pt\tau}, \qquad (1)$$

where p and t index programs and academic years, respectively. Regarding the outcome variable Y_{pt}, we separately estimate the number of unique enrolled students, associate degrees awarded, and certificates awarded for program p in year t. $WRKS_p$ is equal to one if the program is a WRKS program and zero for non-WRKS programs. $\mathbf{1}[\tau = j]$ indicates the period j years before or after becoming eligible for WRKS. We examine the outcomes in four years before and four years since becoming eligible for WRKS. We set the omitted base quarter to be $\tau = -1$ (i.e., one year before the eligibility of WRKS). We include fixed effects for years before and after becoming eligible for WRKS (θ_{τ}), programs (η_p), and years (λ_t). $\varepsilon_{pt\tau}$ is the error term. We cluster standard errors at the individual program level. Our sample in this analysis includes WRKS programs and a group of matched non-WRKS programs that have similar pre-treatment outcomes as described below.

The coefficients of interest are β_2^{τ}, which measure the effects of WRKS on within-program outcomes in post period τ relative to pre-treatment outcomes, as compared to the comparable post vs. pre within-program outcome differences of the matched

comparison group. An identifying assumption of this research design is that in the absence of WRKS, program enrollment and credential completion trajectories would be similar between the WRKS and non-WRKS groups. An attractive feature of Equation (1) is that we can examine elements of the β_1^τ-vector as a formal test of parallel pre-trends from four years prior to the eligibility of WRKS. If components of the β_1^τ-vector are precisely estimated zeros, then this provides supportive evidence that the parallel trends assumption is satisfied in our context.

2. Coarsened Exact Matching Procedure

In this paper, we perform exact matches by matching each WRKS program to non-WRKS programs that are in the same stratum based on the number of associate degrees and certificates awarded during pre-WRKS periods. Specifically, we average the following variables in year blocks (4 years prior to attaining the eligibility of WRKS, and 1-3 years prior), and create mutually exclusive categories for each block.

(1) Average number of associate degrees awarded (Asso): Asso = 0, 0 < Asso ≤ 1st quartile, 1st quartile < Asso ≤ median, median < Asso ≤ 3rd quartile, Asso > 3rd quartile.

(2) Average number of certificates awarded (Cert): Cert = 0, 0 < Cert ≤ 1st quartile, 1st quartile < Cert ≤ median, median < Cert ≤ 3rd quartile, Cert > 3rd quartile.