Quasi-Experimental Impact Study of NFWS/SIF Workforce Partnership Programs

Evidence on the Effectiveness of Three Workforce Partnership Programs in Ohio

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DISCLAIMER

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EXECUTIVE SUMMARY

Since its establishment in 2007, the National Fund for Workforce Solutions (NFWS) has invested in Regional Funding Collaboratives which match NFWS funds with funds from other sources to support the development of local workforce partnerships. These partnerships identify local employer workforce needs and design and administer programs to help low-income workers to obtain the skills needed to meet those needs. As of 2010, NFWS was supporting 30 local workforce partnerships with active training programs in six states. In 2010, NFWS was awarded a 2-year, $7.7 million grant by the Social Innovation Fund (SIF) to scale up the operations of these programs and to support the creation of new programs.

In 2011, NFWS asked IMPAQ International, LLC (IMPAQ) to evaluate the effectiveness of the 30 NFWS/SIF-funded workforce partnership programs. The evaluation consisted of two components: an outcomes assessment study to examine program participation, services provided, and participant outcomes in the period of the SIF funding (January 2010 – December 2011), and a quasi-experimental impact study to assess the impacts of selected NFWS/SIF programs on the labor market outcomes of individuals who entered those programs during the study period.

This report presents the findings of the impact study for three Ohio-based NFWS/SIF programs: the Healthcare Careers Collaborative, the Advanced Manufacturing Partnership, and the Construction Sector Partnership. Each of these partnership programs focused on providing training and other services to individuals interested in obtaining jobs and advancing their careers in the programs' respective focus industries (healthcare, manufacturing, and construction). The impact study relies on a quasi-experimental approach to estimate the impacts of these three programs on the labor market outcomes of participants who were unemployed at program entry by: (1) using the *propensity score matching* method to identify matched comparison groups consisting of unemployed of unemployed non-participants who were observationally equivalent to NFWS/SIF program participants, and (2) estimating program

impacts by comparing the labor market outcomes of NFWS/SIF unemployed program participants with the outcomes of unemployed individuals in the matched comparison groups.

Program Descriptions

The three NFWS/SIF partnership programs examined in this study were supported by the Partners for a Competitive Workforce collaborative, a regional partnership in the Greater Cincinnati area in southwest Ohio. This collaborative used NFWS funds combined with funds from numerous private and public organizations to help the three partnerships design and implement sustainable workforce strategies to promote the employment of low-income individuals in their respective focus industry. Below is summary of the three programs.

Health Careers Collaborative of Greater Cincinnati. The Health Careers Collaborative of Greater Cincinnati program focused on assisting unemployed workers to obtain the skills needed to access healthcare jobs, and on helping incumbent entry-level healthcare workers to promote their careers. The program provided a wide range of services, including job readiness training, assistance in obtaining employability and training credentials, industry-focused training, and job search assistance. During the study period, the program served 992 unemployed participants, the majority of whom were women, had more than a high school education, were less than 35 years of age, and had prior work experience.

Advanced Manufacturing Partnership. The Advanced Manufacturing Partnership program focused on promoting the employment and career advancement of low-skill workers in advanced manufacturing jobs. The program used an incremental approach in promoting participant employment and educational advancement, which included job readiness training, assistance in obtaining employability credentials, enrollment in college coursework and specialized apprenticeships, and receipt of job search assistance. During the study period, the program recruited 684 unemployed participants, the majority of whom were men, were nonwhite, had no more than a high school education, were less than 35 years of age, and had limited work experience.

Construction Sector Partnership. The Construction Sector Partnership program focused on creating construction career pathways for low-skill workers. The program's pathways model was based on enrolling participants in pre-apprenticeship programs to help them obtain construction skills and providing job search services to help them find suitable jobs. During the study period, the program recruited 379 unemployed participants, the majority of whom were men, were nonwhite, had no more than a high school education, were less than 35 years of age, and had limited work experience.

Impact Results

The objective of the impact study was to examine the impacts of the three Ohio NFW/SIF programs on the labor market outcomes of unemployed participants, including: employment, employment in the program's focus industry, job retention, and earnings. To conduct this study, IMPAQ developed a quasi-experimental approach based on the *propensity score matching* method, which involves the following steps:

- *Step 1: Merge data* – Merge NFWS/SIF data on unemployed program participants (treatment group) with Ohio state Employer Service data, which include information on unemployed workers who sought state services during the same period as NFWS/SIF program participants (comparison group).
- *Step 2: Produce propensity score* – Apply a logit model on the merged data to estimate the probability of NFWS/SIF program participation based on individual characteristics and employment history, and use the results to produce the propensity score (predicted probability of NFWS/SIF participation) for treatment and comparison cases.
- *Step 3: Use propensity score to construct sample weight* – Weight each comparison case by the odds ratio of the predicted propensity score, so that the weighted comparison sample has the same characteristics distribution as the treatment sample.
- *Step 4: Compare treatment and weighted matched comparison sample* – Conduct statistical tests to verify that the treatment and matched comparison groups are truly matched in terms of their characteristics.

IMPAQ successfully implemented the above approach, producing a matched comparison group for each NFWS/SIF program which consisted of non-participants who sought state employment services during the same period, had similar characteristics, and resided in the same area as unemployed NFWS/SIF participants. We then used Ohio Unemployment Insurance Wage Records data to produce common labor market outcomes for treatment and matched comparison cases in the four-quarter period following program entry, including: *employment, employment in the program's focus industry, job retention,* and *earnings.* Program impacts on these outcomes were estimated by comparing the mean outcomes between the treatment and the matched comparison group. The impact results for each NFWS/SIF program are summarized below.

Health Careers Collaborative of Greater Cincinnati Impact Results

- The program led to positive impacts on the employment of unemployed participants in each of the four quarters following program entry. On average, unemployed program participants were 14.1 to 17.6 percentage points (32 to 40 percent) more likely than unemployed individuals in the matched comparison group to be employed in the four quarters after program entry.
- The program was effective in assisting unemployed participants to obtain jobs in healthcare, the program's focus industry. In particular, program participants were 24.0 to 25.3 percentage points (233 to 304 percent) more likely to be employed in healthcare than those in the matched comparison group.
- The program was effective in helping participants to find and retain employment following program entry. On average, unemployed participants were 15.3 to 17.3 percentage points (43 to 65 percent) more likely than those in the matched comparison group to find employment in quarter 1 and remain employed in subsequent quarters.
- The program led to significant positive impacts on participant earnings. On average, in the four quarters after program entry, program participants had $3,789 (59 percent) higher earnings than those in the matched comparison group.

Advanced Manufacturing Partnership Impact Results

- The program led to significant positive impacts on overall employment, but had modest impacts on employment in the program's focus industry. On average, unemployed participants were 8.2 to 14.6 percentage points (24 to 40 percent) more likely than unemployed individuals in the matched comparison group to be employed in the four quarters after program entry. The program also led to positive but modest impacts on manufacturing employment (2.0 to 2.5 percentage points).
- The program was effective in helping unemployed participants to find employment and retain their jobs following program entry. Program participants were 5.7 to 7.6 percentage points (about 30 percent) more likely than those in the matched comparison group to find employment in quarter 1 and remain employed in subsequent quarters.
- The program led to positive impacts on participant earnings. On average, program participants had $1,628 (32 percent) higher earnings in the four quarters after program entry compared with those in the matched comparison group.
- The program's impacts on job retention and earnings were substantial, but lower than the impacts of the Health Careers program.

Construction Sector Partnership Impact Results

- The program had positive but small impacts on employment. Unemployed participants were 3.2 to 6.1 percentage points (9 to 16 percent) more likely than unemployed individuals in the matched comparison group to be employed in the four quarters after program entry, and about 3.3 percentage points more likely to be employed in construction. These impacts were smaller than those of the other two programs.
- There were no impacts on job retention and, with the exception of the period immediately after program entry, there is no evidence that the program helped unemployed participants to improve their earnings.

Conclusion

The results of the quasi-experimental impact study show that all three programs were effective in assisting unemployed participants to obtain employment in the entire 12-month follow-up period. The Health Careers program was also very effective in promoting participant employment in its focus industry, while the other two programs had modest impacts on this outcome. The Health Careers program also led to significant impacts on job retention and earnings, which were higher than the impacts of the Advanced Manufacturing program. In contrast, there is no evidence that the Construction Partnership program led to higher job retention and earnings.

Although all three programs led to positive impacts overall, the Health Careers program had higher impacts than the other two programs, and the Advanced Manufacturing program had positive impacts on a wider range of outcomes than the Construction Partnership program. Disparities in program impacts may be attributed to a number of factors, including the fact that Health Careers focused on an industry that had lower unemployment and higher potential growth during the study period than the focus industries of the other two programs.

Overall, the results of this study show that the three Ohio NFWS/SIF program were effective in assisting unemployed participants to improve their labor market outcomes during the study period. Since these programs represent a wide range of NFWS/SIF programs in terms of their focus industry, services provided, and participant characteristics, these results provide evidence that the NFWS model of supporting local workforce partnership programs is effective for promoting the reemployment of unemployed workers.

1. Introduction

The National Fund for Workforce Solutions (NFWS), a collaboration of national foundations, was established in 2007 to promote the employment and career advancement of low-income individuals and ensure that employers are able to obtain the skilled workforce needed to compete in the modern economy. To achieve these goals, NFWS invests in Regional Funding Collaboratives, which match NFWS contributions with public and private funding to support local workforce partnerships composed of employers, community-based organizations, and service providers. These partnerships identify employer workforce needs in their local areas and use the funding to design and administer programs that provide training and other services to low-income workers to prepare them to meet those needs.

In 2010, NFWS was awarded a 2-year, $7.7 million grant by the Social Innovation Fund (SIF) to expand the NFWS model. This grant was used by NFWS to support existing collaboratives that were committed to scaling up the operations of their programs and to support the development of new collaboratives. In 2011, NFWS selected IMPAQ International, LLC (IMPAQ) to conduct an evaluation of the 30 NFWS/SIF-funded workforce partnerships supported by eight scale-up collaboratives. The evaluation consisted of two components:

1) An *outcomes assessment study* of all 30 scale-up programs to examine program participation, services provided, and participant outcomes in the period covered by the SIF funding (January 2010 through December 2011).[1]

2) A *quasi-experimental impact study* to assess the impacts of selected NFWS/SIF workforce partnership programs on the labor market outcomes of individuals who entered these programs from January 2010 through December 2011.

This report presents the findings of the quasi-experimental impact study for three Ohio-based NFWS/SIF workforce partnership programs: the Healthcare Careers Collaborative, the Advanced

[1] This study was completed in February 2013: Michaelides M., Poe-Yamagata E., and Mbwana K. *Outcomes Assessment Study of NFWS/SIF Programs.* Report Submitted to the National Fund for Workforce Solutions, February 2013.

Manufacturing Partnership, and the Construction Sector Partnership. These three workforce partnerships, supported by the Partners for a Competitive Workforce collaborative (formerly called Greater Cincinnati Workforce Network), were among the first to receive NFWS funds to develop workforce training programs. These partnerships were successful in leveraging NFWS funds with funds from other sources to implement industry-focused training programs that attracted a total of 3,210 participants in the period January 2010 through December 2011, of whom 2,055 were unemployed and 1,155 were employed at program entry.

This study examines the impact of the three Ohio-based NFWS/SIF programs on the labor market outcomes of participants who were unemployed at program entry. To estimate program impacts, a quasi-experimental approach was implemented that relied on NFWS/SIF program data and state administrative data to: (1) apply the *propensity score matching* method to identify matched comparison groups consisting of unemployed non-participants who were observationally equivalent to NFWS/SIF program participants, and (2) estimate program impacts by comparing the labor market outcomes of unemployed NFWS/SIF program participants (employment, employment in program's focus industry, job retention, and earnings) with the outcomes of the matched comparison cases. Due to lack of appropriate data for constructing matched comparison groups for NFWS/SIF participants who were employed at program entry, the study excludes employed participants.

The remainder of the report is organized as follows. Section 2 provides an overview of NFWS and a discussion of the design of the quasi-experimental impact study. Section 3 describes each of the three partnership programs, including partnership objectives, program services provided to their target populations, and the characteristics of all unemployed individuals who participated in each program during the study period. Section 4 presents the results of the quasi-experimental impact study for each program. Section 5 provides our conclusions based on the study findings.

2. Background

2.1 The National Fund for Workforce Solutions

NFWS has created a model of developing sustainable workforce strategies based on the principle that local entities are well suited to identify local workforce needs and to leverage the funding needed to develop workforce programs to address those needs. Based on this model, NFWS invests in regional collaboratives which are responsible for: 1) matching NFWS contributions with public and private funding, and 2) using the leveraged funding to support and build capacity of local workforce partnerships that are developing or implementing promising workforce strategies.

Local workforce partnerships are typically composed of employers, community-based organizations, and training/service providers. These partnerships identify employer workforce needs in their local areas, often in specific industries, and use their available funding to provide training and other resources to low-income workers to prepare them to meet those needs. As of January 2010, NFWS was funding eight regional collaboratives which supported a total of 30 partnerships with active workforce programs:[2]

- Pennsylvania Fund for Workforce Solutions (Pennsylvania, 5 partnerships)
- Philadelphia Job Opportunity Investment Network (Pennsylvania, 4 partnerships)
- Milwaukee Area Workforce Funding Alliance (Wisconsin, 3 partnerships)
- Workforce Central Funders Collaborative (Wisconsin, 3 partnerships)
- Partners for a Competitive Workforce (Ohio, 3 partnerships)
- Baltimore Workforce Funders Collaborative (Maryland, 3 partnerships)
- SkillWorks (Massachusetts, 4 partnerships)
- SkillUp Washington (Washington, 5 partnerships)

[2] NFWS was funding 14 additional collaboratives that supported partnerships which, at that time, had not started implementing their programs.

Of the 30 partnership programs, 26 focused on helping workers to obtain skills needed to access careers in a specific industry, while the remaining four provided services to help participants obtain employment in various industries. The majority of the 26 industry-specific programs emphasized three sectors: healthcare (eight programs), manufacturing (five programs), and construction (four programs). Other focus industries included hospitality, utilities, landscaping, transportation, information technology, financial services, and biotechnology.[3]

In 2010, the Social Innovation Fund (SIF), an initiative of the Corporation for National and Community Service (CNCS), awarded NFWS a 2-year, $7.7 million grant to expand its model. These funds were partly used to extend grants to the eight collaboratives listed above, which committed to use the funding to scale up the operations of their 30 workforce partnership programs through services enhancement and increasing participant recruitment. The remaining funds were used to support the efforts of collaboratives that had not started implementing their programs yet and to support the creation of new collaboratives. These collaboratives were expected to use the funding to adopt successful and sustainable workforce strategies to address employer needs in their region.

Due in part to the SIF grant, NFWS has made significant progress since 2010. It has grown from 8 collaboratives that supported 30 active workforce partnership programs in 2010 to 29 collaboratives that supported 96 active programs in 2012.[4] The majority of these 96 programs focused on three sectors: healthcare (38 programs), manufacturing (17 programs), and construction (16 programs). According to NFWS, through 2012, NFWS partnerships had received a total of $41 million in Federal funds and had leveraged approximately $192 million from 476 different private sources.[5] NFWS also reported that these funds were used to engage

[3] For more details, see: Michaelides M., Poe-Yamagata E., and Mbwana K. *Outcomes Assessment Study of NFWS/SIF Programs.* Report Submitted to the National Fund for Workforce Solutions, February 2013.
[4] Source: *Building on Success: Five Years of Impact 2007-2012.* National Fund for Workforce Solutions, 2013. (http://www.nfwsolutions.org/tools/building-success).
[5] Source: *Building on Success: Five Years of Impact 2007-2012.* National Fund for Workforce Solutions, 2013. (http://www.nfwsolutions.org/tools/building-success).

a total of 4,064 employers and provide training and other services to 42,299 individuals.

2.2 Quasi-Experimental Impact Study Design

One of the key components of the evaluation undertaken by IMPAQ was to examine the impacts of NFWS/SIF programs[6] on the labor market outcomes of individuals who entered those programs in the period January 2010 through December 2011, which was the period covered by the SIF grant. To conduct this study, IMPAQ developed a quasi-experimental evaluation approach, in which NFWS/SIF program impacts were estimated by comparing the outcomes of program participants (treatment group) with the outcomes of non-participants who were observationally equivalent to program participants (matched comparison group). This approach included the following components:

- Apply matching methods to construct matched comparison groups for NFWS/SIF participants using NFWS/SIF program data merged to administrative data from the state in which the program operates.
- Use state administrative data to construct common labor market outcomes for treatment and matched comparison group cases in the 12-month follow-up period.
- Estimate program impacts by comparing the labor market outcomes between the treatment and the matched comparison group.

The majority of participants in NFWS/SIF programs were unemployed workers, but many programs also served employed workers. However, due to lack of appropriate data for constructing matched comparison groups for participants who were employed at program entry (incumbent workers), the study focused on estimating impacts only for unemployed workers. Below, we discuss the evaluation approach, including: 1) key research questions, 2) approach for selecting NFWS/SIF programs for inclusion in the study, 3) data sources used to conduct the study, and 4) methodology for implementing the quasi-experimental impact study.

[6] Hereafter, the term "NFWS/SIF programs" refers to the 30 workforce partnership programs that were active at the beginning of 2010 and received SIF funding to scale up their operations.

2.2.1 Key Research Questions

The objective of the NFWS/SIF quasi-experimental impact study was to address a number of key research questions about the efficacy of NFWS/SIF programs in improving the labor market outcomes of unemployed participants:

- Were these programs effective in helping unemployed participants to obtain employment after program entry?
- Did these programs help unemployed participants to obtain jobs in the industries related to the training received?
- Were these programs successful in helping unemployed participants to obtain employment *and* remain employed for longer periods than they would have in the absence of the program?
- Were these programs effective in helping unemployed participants to achieve higher earnings than they would have in the absence of the program?

Addressing these questions provides substantial insight into the effectiveness of NFWS/SIF programs in promoting the employment and career advancement of low-income unemployed individuals. Further, this study provides information on whether certain types of programs – based on focus industry, services provided, and participant characteristics – are likely to be more effective than others in improving participant labor market outcomes.

2.2.2 Program Selection

During the study period, NFWS funded eight collaboratives which supported a total of 30 partnerships with active workforce programs. Of these, 17 programs provided training and other services to low-income workers to access jobs in healthcare, manufacturing, and construction, while the remaining programs focused on various other industries. An important aspect of implementing the impact study was to identify which programs were suitable for inclusion in the study. A number of selection criteria were used:

- ***Exemplary Implementation of the NFWS Model*** – Select sites that were successful in

implementing the NFWS model, based on: 1) their effectiveness in matching NFWS funds, 2) the strength of their partnership with employers and service providers, and 3) the types and quality of training/services they provided. This criterion ensured that impact findings would represent program effectiveness, resulting from successfully implementing the NFWS model.

- ***Number of Participants*** – Select programs that served at least 100 participants, to ensure that there are sufficiently large samples of participants so that the study could detect substantively meaningful impacts.
- ***Data Availability*** – As outlined in Section 2.2.3 below, the study relied on two types of data: (1) NFWS/SIF program data with information on participant characteristics and personal identifiers to link participants to state administrative data, and (2) state administrative data with information on the characteristics of non-participants and on the labor market outcomes of both participants and non-participants. It was, therefore, critical that programs included in the study were collecting high-quality participant data (including personal identifiers) and were operating in states willing to provide their administrative labor market data to support the study.

Nearly all 30 NFWS/SIF partnership programs were successful in implementing the NFWS model and collected participant data providing the information listed above.[7] However, 13 of the 30 programs served fewer than 100 participants during the study period, that is, they were too small to meet the minimum sample size requirements for inclusion in the impact study. These 13 programs were therefore excluded from the study because the numbers of participants they recruited were insufficient to allow the identification of matched comparison groups and to produce meaningful impact estimates. In addition, although the five SkillUp Washington programs served a total of 1,285 participants, a sample size that was sufficient to implement the impact study, they were excluded because they could not provide participant identifiers, which are critical for identifying program participants in state administrative data.

[7] For a detailed discussion of each program and their data availability, see: Michaelides M., Poe-Yamagata E., and Mbwana K. *Outcomes Assessment Study of NFWS/SIF Programs.* Report Submitted to the NFWS, February 2013.

Using the criteria described above, IMPAQ in consultation with NFWS determined that only the remaining 12 programs were eligible for inclusion in the study. Exhibit 1 presents a summary of these 12 programs, including their focus industry and the total number of participants served during the study period.

Exhibit 1: NFWS/SIF Programs Eligible for the Quasi-Experimental Impact Study

Collaborative / Partnership Name	Focus Industry	Number of Participants	
		Total	Unemployed
Partners for a Competitive Workforce			
Health Careers Collaborative	Healthcare	1,970	992
Advanced Manufacturing Partnership	Manufacturing	766	684
Construction Sector Partnership	Construction	464	379
Philadelphia Job Opportunity Investment Network			
Southeast Regional Advanced Manufacturing Partnership	Manufacturing	498	0
Pennsylvania Partnership for Direct Care Workers	Healthcare	708	172
Pennsylvania Fund for Workforce Solutions			
Lancaster-SACA Partnership	Various Industries	601	315
Labor Management Clearinghouse	Building Services, Hospitality	250	111
Keystone Utilities Partnership	Utilities	230	136
Reading Regional Construction Partnership	Construction	191	191
Northwest Healthcare Partnership	Healthcare	178	61
Milwaukee Area Workforce Funding Alliance			
WRTP Construction Pathways	Construction	1,114	656
Milwaukee Area Healthcare Alliance	Healthcare	344	261

As shown in Exhibit 1, the 12 programs that were deemed eligible for this study were supported by four collaboratives, operating in three states – Ohio (three programs), Pennsylvania (seven programs), and Wisconsin (two programs). Exhibit 1 also shows that 9 of these 12 programs focused on three industries: healthcare (four programs), manufacturing (two programs), and

construction (three programs). In addition, during the study period, the 12 programs eligible for the impact study served a total of 7,314 participants, of whom 3,958 (54 percent) were unemployed at program entry.

A critical aspect of implementing the quasi-experimental study for each program was the availability of state administrative data that could be used to identify appropriate matched comparison groups and produce labor market outcome measures for both treatment and matched comparison group cases (see Section 2.2.3). To date, IMPAQ and NFWS have been able to secure state administrative data only from Ohio. We have reached an agreement with the state of Wisconsin in November 2013 and we expect to obtain access to Wisconsin administrative data. As of November 2013, we are still in negotiations to secure data from Pennsylvania. In the remainder of this report, we present the impact results for the three Ohio NFWS/SIF programs. The report will be updated with results for the two Wisconsin NFWS/SIF programs once we access Wisconsin administrative data, and the seven Pennsylvania NFWS/SIF programs if Pennsylvania administrative data become available. This update is conditional on these data becoming available by January 31, 2014 to allow sufficient time for producing and incorporating these additional results in the report before the end of the project period of performance in March 31, 2014.

We believe that the results of the impact study for the three Ohio NFWS/SIF programs can be used to draw inferences about the efficacy of the remaining programs for several reasons. First, these three programs combined to serve 2,055 of the 3,958 (52 percent) of all unemployed participants served by the 12 eligible programs during the study period. Second, the three programs focused on healthcare, manufacturing, and construction, which were the focus industries of 9 of the 12 eligible programs. Finally, the three Ohio programs offered a wide range of training and employment services to participants, which are comparable to the training and services provided by nearly all of the 12 programs eligible for this study.[8]

[8] For a discussion of the focus industry, services provided, and participant characteristics for each NFWS/SIF program, see Michaelides, Poe-Yamagata, and Mbwana (2013).

2.2.3 Data Sources

The quasi-experimental impact study of the three Ohio-based programs relies on participant data gathered by each program and on Ohio state administrative data. Below, we provide an overview of these data sources.

NFWS/SIF Program Data. The NFWS/SIF program data provide information on all individuals who entered NFWS/SIF programs in the period January 2010 through December 2011. The data include the following:

- Participant socioeconomic characteristics at program entry, including gender, race, age, and education, date of program entry, Local Workforce Investment Area (LWIA) area in which the participant was residing.
- Personal identifiers to match to state administrative data.
- Types of program services received.

Employment Service (ES) Data. ES data provide information on all unemployed workers who sought employment and training services with the Ohio employment exchange agency in the period January 2010 through December 2011 and were residing in the same LWIAs as NFWS/SIF program participants.[9] In particular, the data provide information similar to that reported in the NFWS/SIF data, including socioeconomic characteristics (gender, race, age, education, date of program entry, and LWIA of residence) and personal identifiers. IMPAQ obtained a de-identified dataset that provided information on all ES participants in the period January 2010-December 2011; these data were provided by the Ohio State University's Center for Human Resource Research (CHHR).

Unemployment Insurance (UI) Wage Records. UI Wage Records provide quarterly earnings information on all NFWS/SIF participants who entered the program during the study period and

[9] ES data typically include information on unemployed workers who applied for Unemployment Insurance benefits and/or registered with the state's labor exchange agency to find a job.

on all Ohio ES non-participants who sought state services during that period.[10] The data include year/quarter of employment, total earnings, employer industry, and identifiers used for matching with NFWS/SIF and ES data. IMPAQ has obtained from CHHR matched, de-identified Ohio UI Wage Records for the period quarter 1, 2009 through quarter 2, 2012, which were used to construct employment outcomes for at least four quarters following program entry for all NFWS/SIF participants and for all ES participants who entered their respective programs from January 2010 through December 2011. These data also provide information on prior employment outcomes beginning in quarter 1, 2009, which were used to construct measures of prior employment experience.

2.2.4 Quasi-Experimental Approach

This study uses a quasi-experimental approach to estimate the impact of the three Ohio NFWS/SIF programs. This approach involves the following steps: 1) use matching methods to construct matched comparison groups for unemployed participants in each of the three Ohio NFWS/SIF program; 2) use Ohio UI Wage Records to construct common labor market outcomes for treatment and matched comparison cases in the 12-month follow-up period, and 3) estimate the impacts of each program by comparing the mean labor market outcomes between the treatment and the matched comparison group. A detailed description of this approach follows. The results of the matching and the impact analyses are presented in Section 4.

Construct Matched Comparison Groups Using Matching Methods. A key component of this study was the use of matching methods to construct matched comparison groups for unemployed participants in each of the three Ohio NFWS/SIF programs. Matching methods have emerged as a reliable approach for producing rigorous impact studies of workforce programs when an experimental impact design is not feasible.[11] These methods rely on the *conditional independence assumption*, which stipulates that participant outcomes had the individual not participated in the program are independent of program participation controlling

[10] Ohio UI Wage Records include earnings from employers located within the state, but do not report earnings that individuals may have earned from employers located outside the state.
[11] Rubin D. *Matched Sampling for Causal Effects.* Cambridge, England: Cambridge University Press, 2006.

for observed characteristics. The implication is that non-participants who are observationally similar to participants can be used as an appropriate matched comparison group for estimating program impacts. Matching methods provide credible impact estimates when the data include large samples of non-participants and matching is based on rich information on participant and non-participant characteristics and prior work history.[12]

The treatment group in this study included unemployed individuals who participated in the three Ohio NFWS/SIF programs during the study period. To construct matched comparison groups, we relied on ES data which provide rich information on the characteristics of unemployed individuals who sought state employment services, combined with UI Wage Records which provide detailed information on individual employment history. ES data are particularly appropriate to use for this purpose. First, they include large samples of unemployed non-participants who: (1) were residing in the same LWIAs as unemployed NFWS/SIF participants and (2) sought state employment and training services at the same time the NFWS/SIF unemployed participants entered their programs. Second, the ES data report similar information (gender, age, education, etc.) to that reported in the NFWS/SIF program data, which facilitates the matching process. These properties ensure that, if matching is done correctly, we will be able to identify a matched comparison sample that was in the same labor market and was nearly identical to the treatment sample in terms of personal characteristics and prior employment history.

To construct matched comparison groups in this study, we used the *propensity score matching* (PSM) method. Since the three Ohio NFWS/SIF programs differed in terms of their target populations, focus industries, and services provided, this method was implemented separately

[12] Detailed discussion of these methods applied to job training evaluations are found in Mueser P., Troske K., and Gorislavsky A. *Using State Administrative Data to Measure Program Performance.* Review of Economics and Statistics, Vol. 89, No. 4, November 2007, pp. 761-783; and Heinrich C., Mueser P., Troske K., Jeon K., and Kahvecioglu D. *Do Public Employment Training Programs Work?* IZA Journal of Labor Economics, Vol. 2, No. 6, 2013.

for each program.[13] The PSM method was implemented as follows:

- *Step 1: Merge data* – We merged the NFWS/SIF data for each program with ES and UI Wage Record data using participant personal identifiers (Social Security number, name, and address). The merged data included all available characteristics, service location, and prior employment outcome measures of participants and non-participants.
- *Step 2: Produce propensity score* – We used a logit model to estimate the likelihood of NFWS/SIF program participation based on: 1) individual characteristics; 2) employment history measures; and 3) interactions between these. Using the results from the model, we produced the propensity score for each participant and non-participant in the data; this score is equal to the predicted probability of program participation based on individual characteristics.
- *Step 3: Use propensity score to construct sample weight* – We weighted each comparison case by the odds ratio of the predicted propensity score. If the specification used for the logit is correct, theory assures us that the weighted comparison sample will have the same distribution on all control variables (i.e., the logit model variables) as the treatment sample.[14]
- *Step 4: Compare treatment and weighted matched comparison sample* – Once matching is done, it is necessary to test whether the implementation of the matching has been successful, that is, to ensure that the treatment and the matched comparison group are truly matched in terms of their characteristics. When differences were detected, the specification of the logit was modified to include additional interactions between variables and steps 1–4 were repeated until a successful matching was achieved.

This matching approach ensured that we would be able to construct a matched comparison group for each of the three NFWS/SIF programs consisting of non-participants who enrolled in

[13] Differences in participant characteristics are particularly important since they show that participation in each program is strongly correlated with certain characteristics that do not necessarily influence participation in the other two programs. For this reason, the matching should be done separately for each program.
[14] Angris J. and Pischke J. *Mostly Harmless Econometrics.* Princeton, NJ: Princeton University Press, 2009, pp. 80-83.

ES during the same period, had similar socioeconomic characteristics, had similar prior employment outcomes, and resided in the same LWIA as unemployed NFWS/SIF program participants. Under our maintained assumptions, the outcomes observed in the matched comparison group provide us with the counterfactual of the outcomes the treated group would have achieved if treatment had not occurred. The difference between the outcomes for the treated sample and the matched comparison sample is the impact estimate, or the *average effect of the treatment on the treated*.

Construct Labor Market Outcome Measures. Once matching was achieved, we used the UI Wage Records to construct common labor market outcome measures for treatment and matched comparison group members for up to four quarters following program entry.[15] Specifically, UI Wage Records were used to construct the following outcomes:

- *Employed* – Participant had positive earnings in the quarter, for each of the four quarters after program entry.
- *Employed in focus industry* – Participant had positive earnings in the quarter from an employer in the program's focus industry, for each of the four quarters after program entry.
- *Job retention* – Participant had positive earnings in the first quarter after program entry *and* in subsequent quarters.
- *Earnings* – Participant's earnings amounts in each of the quarters after program entry.

Estimate Program Impacts. When matching is successful, there should be no statistically significant differences in socioeconomic characteristics and prior employment measures between the treatment group and the matched comparison group for each NFWS/SIF program.

[15] To date, we have obtained UI Wage Records for the period through quarter 2, 2012. The evaluation sample includes treatment cases that entered NFWS/SIF programs and matched comparison cases that entered ES in January 2010 through December 2011 (quarter 1, 2010 through quarter 4, 2011). Thus, using available UI Wage Records, we can construct quarterly employment outcomes for four quarters after program entry for individuals who entered their program in quarter 1, 2010 through quarter 2, 2011; for three quarters after program entry for individuals who entered in quarter 3, 2010; and for two quarters after program entry for individuals who entered in quarter 4, 2011.

Given the conditional independence assumption, the only difference between the treatment and the matched comparison group is that individuals in the treatment group participated in the NFWS/SIF program. Therefore, any differences in outcomes between the treatment group and the matched comparison group are attributed to the program.

To estimate the impact of each of the three Ohio NFWS/SIF programs, we compared differences in outcome means between the treatment group and the matched comparison group. This provides an estimate of the effect of the training program for the average program participant. There is, of course, variation across participants in program impact, and the estimate is subject to uncertainty because of random factors that may affect individual program success. For that reason, it is important to calculate the statistical significance of the estimates using standard errors that capture statistical factors that influence program success. For the type of matching process used in this study, bootstrapping methods is the best method to calculate standard errors that capture such statistical factors.[16] Bootstrap standard errors are used to calculate t-tests to assess whether the estimated program impacts are statistically significant.

3. Program Descriptions

3.1 Overview of the Partners for a Competitive Workforce Collaborative

The Partners for a Competitive Workforce collaborative (originally named Greater Cincinnati Workforce Network) was established in 2008 as a regional partnership in the greater Cincinnati area in Southwest Ohio, and consists of area Workforce Investment Boards (WIBs), employers, community colleges, service providers, and other community-based organizations. The collaborative had three main objectives:

1) Connect regional employers with qualified workers by coordinating the efforts of area

[16] Bootstrapping involves re-estimating the impact multiple times while applying random sampling with replacement to the treatment and matched comparison samples. The bootstrap standard errors reported here are based on 20 replications. For a discussion of bootstrapping in PSM models, see Caliendo M. and Kopeing S. *Some Practical Guidance for the Implementation of Propensity Score Matching.* Journal of Economic Surveys, Vol. 22, No. 1, 2008, pp. 21-72.

WIBs to create a common system where workers can access information on available jobs and employers can access information on jobseekers who match their needs.

2) Improve the work readiness of low-income individuals by providing them with counseling services and training to improve their core work competencies and basic skills.

3) Align training/education with current employer needs by creating industry-driven training programs that create career pathways for low-skill workers.

To achieve its objectives, the collaborative leveraged funding from foundations and numerous private and public organizations, including NFWS. In fact, the $450,000 start-up grant provided by NFWS in 2008 was instrumental in the collaborative's inception.[17] The leveraged funds were invested in three workforce partnership programs that aimed to provide training and other services to low-income individuals to help them access jobs in their respective focus industries: 1) Health Careers Collaborative of Greater Cincinnati; 2) Advanced Manufacturing Partnership; and 3) Construction Sector Partnership.

The collaborative has obtained $22.5 million from public and private sources including the $450,000 NFWS start-up grant in 2008 and an additional $600,000 from the NFWS/SIF grant in 2010.[18] These funds were partly used to expand the operations of the three partnership programs and enhance participant recruitment. Detailed descriptions of the three programs are provided below, followed by an overview of the characteristics of participants in each program during the study period and the types of services that participants received. A summary of each program is provided in Box 1.

[17] Spence C., Elvery J., and Stacy L. Greater Cincinnati Workforce Network, Annual Evaluation Report, 2009.

[18] The collaborative secured funds from multiple sources, including $4.5 million from philanthropic funds, $8 million from state and Federal grants, and $10 million in aligned training funds from the region's public workforce system: http://www.nfwsolutions.org/regional-collaboratives/partners-for-competitive-workforce.

BOX 1: SUMMARY OF OHIO-BASED NFWS/SIF PROGRAMS

Health Careers Collaborative of Greater Cincinnati

Objective. A workforce partnership focused on addressing shortages of skilled healthcare workers by assisting: (1) low-skill unemployed workers to obtain the skills needed to access healthcare jobs and (2) incumbent entry-level healthcare workers to promote their careers.

Services. The program offered participants a wide range of services, including job readiness training, assistance in obtaining employability and training credentials, industry-focused training, and job search assistance services.

Participants. The program recruited 992 unemployed participants during the study period. The majority of unemployed participants were women (90 percent), had more than a high school education (54 percent), and were less than 35 years of age (65 percent). Large proportions were white (50 percent), had prior work experience (67 percent), and prior work experience in healthcare (28 percent).

Advanced Manufacturing Partnership

Objective. A workforce partnership focusing on promoting the employment and career advancement of low-skill workers – particularly unemployed workers – in advanced manufacturing jobs.

Services. The program used an incremental approach in promoting participant employment and educational advancement. Upon program entry, participants were offered job readiness training followed by assistance in obtaining national employability credentials. Participants who completed these steps were offered the opportunity to enroll in college coursework or engage in specialized apprenticeships. Participants were also offered job search assistance services.

Participants. The program recruited 684 unemployed participants during the study period. The majority of unemployed participants were men (66 percent) and nonwhite (79 percent), had no more than a high school education (69 percent), and were under 35 years of age (51 percent). A large proportion had no prior work experience (47 percent) and most had no experience in manufacturing (95 percent).

Construction Sector Partnership

Objective. A workforce partnership focused on creating construction career pathways for low-skill workers to meet regional construction workforce needs.

Services. The program's career pathways model was based on providing participants with: 1) the opportunity to enroll in construction pre-apprenticeship programs and receive on-the-job training to help them obtain the skills needed to access construction jobs, and 2) job search assistance services to help them find jobs that suited their skills.

Participants. The program recruited 379 unemployed participants during the study period. The majority of unemployed participants were men (52 percent) and nonwhite (81 percent), had no more than a high school education (72 percent), and were less than 35 years of age (60 percent). A large proportion had no work experience (56 percent) and most had no experience in construction (98 percent).

3.2 Health Careers Collaborative of Greater Cincinnati

The Health Careers Collaborative of Greater Cincinnati (Health Careers) was established in 2003 as a partnership between the Cincinnati State Technical and Community College, Great Oaks Institute of Technology, and the Cincinnati Children's Hospital Medical Center in Greater Cincinnati to address a serious shortage of skilled healthcare workers. The key objective of the partnership was to create a training program that would provide low-skill workers with the skills needed to access in-demand healthcare jobs. A secondary objective was to increase the diversity of healthcare workers by recruiting and training minorities. Over time, the partnership grew to involve a large number of healthcare employers, education and training providers, and community-based organizations.

The partnership leveraged the funds from the NFWS grant to the Partners for a Competitive Workforce with funding from numerous additional sources, including the US Department of Labor and the Bill and Melinda Gates Foundation. These funds were used to help implement their healthcare-focused training program and to scale up its operations by expanding to other area hospitals, recruiting additional educational institutions, and expanding the breadth of training provided.

The partnership used the funding to develop a career pathways program for careers in nursing, allied health, rehabilitation, health IT, and biotechnology. The program targeted low-skill workers who were interested in obtaining the skills needed to access jobs in the healthcare industry, particularly in the sectors listed above. Recruitment was supported by community-based organizations and partnership service providers through referrals of jobseekers who expressed interest in the program. In addition, partner employers played a key role in recruitment by referring entry-level healthcare workers to the program who were interested in accessing mid-level careers. As a result, the program primarily attracted two types of participants: low-skill unemployed workers interested in healthcare jobs, and incumbent workers in entry-level healthcare jobs interested in promoting their careers.

Upon program entry, participants were paired with a qualified career pathways advisor from partner OhioMeansJobs Centers or other training/services providers. The advisor was assigned to help the participant identify the types of program services that were best suited to the participant's individual needs. The key services offered by the program included:

- *Job readiness training*. The purpose of this training was to provide participants with the basic skills needed to pursue, obtain, and retain a rewarding career in healthcare. The training included the following components: 1) workplace professionalism guidance (including dress for success); 2) computer literacy training to learn the basic use of computers and the internet; 3) financial and life skills training; and 4) introduction to avenues for accessing public benefits and other available public services.
- *Obtain National Career Readiness Certificate (NCRC).* The program offered participants assistance in obtaining the National Career Readiness Certificate (NCRC), which demonstrates to potential employers that the individual possesses basic employability skills in applied mathematics, locating information, and reading for information.[19] In addition, participants had access to the School at Work program, a healthcare-focused career development and academic readiness course designed to help incumbent workers advance their careers and education. Participants also had access to GED programs to assist them in earning a GED diploma and preparing for entry into post-secondary education.
- *Industry-focused training.* Service providers worked closely with employers to develop curricula with customized training courses that would help participants acquire the skills and knowledge needed to address specific employer needs. Participants who opted to enroll in this training received a training credential upon completion that they could use to obtain immediate employment with the partner employers that supported the training. To enhance recruitment and retention in these programs, partner employers offered tuition reimbursement to participants and, in some cases, even prepaid tuition.

[19] For more information on NCRC, see http://www.act.org/products/workforce-act-national-career-readiness-certificate.

- *Job search assistance*. Participants were offered the opportunity to receive personalized job search assistance services to help them to access jobs that were compatible with their skills. In particular, participants had face-to-face consultations with advisors and other qualified workforce staff from OhioMeansJobs Centers or other service providers, in which they received (1) a skills assessment to help them identify their skills and work experience, (2) résumé development assistance to develop a résumé that would highlight their skills and work experience, (3) job application assistance, including mock interviews, and (4) referrals to job openings at partner employers.

The advisor was responsible for helping participants identify which of the services best suited their needs, and working with participants as they progressed through the program to identify additional services that might advance their educational/employment goals. It should be noted that the design of this program has enjoyed critical success, including a 2011 study that found that the program was successful in serving its target population and providing the training services needed to help them access healthcare jobs.[20]

3.3 Advanced Manufacturing Partnership

The Advanced Manufacturing Partnership (Advanced Manufacturing) was created in 2009 with the objective of promoting the employment and career advancement of low-skill workers in advanced manufacturing jobs. The partnership is composed of nearly 40 employers, 8 educational institutions, and 8 community-based organizations. Advanced Manufacturing used funds from NFWS and other sources to develop a program that creates educational and career pathways for in-demand advanced manufacturing jobs, including team assembler, electro-mechanical maintenance, welder, computer numerical control (CNC) operator, and bioscience/ pharmaceutical technician. The program primarily targeted unemployed workers who were interested in advanced manufacturing jobs, including new labor force entrants. A secondary target population was entry-level incumbent workers interested in accessing high-skill jobs and advancing their careers.

[20] Elvery J. and Spence C. *Health Careers Collaborative of Greater Cincinnati Return on Investment Report, 2011*. Report prepared by The New Growth Group.

The Advanced Manufacturing program used a service delivery model that was different from that of the Health Careers partnership. In particular, the training was primarily short-term, with a career pathways framework that promoted incremental employment and educational advancement. The following services were offered:

- *Job readiness training*. First, to increase their employability, participants were offered training to improve their basic personal and professional skills. Once individuals completed the training, the program attempted to place them in entry-level internships/part-time jobs in manufacturing to gain workplace experience.
- *Obtain NCRC and Manufacturing Standard Skills Council* (MSSC) *certifications.* Participants who completed the job readiness training and retained entry-level jobs for some time were offered assistance in obtaining the NCRC. Participants were also encouraged to enroll in the MSSC Certified Production Technician program to earn a certification that shows they have the skills for high-skill manufacturing jobs.[21] These certifications were expected to promote evidence-based hiring of program participants in mid-level and, potentially, high-skill manufacturing jobs.
- *Academic and career advancement services.* Participants who were successful in earning certificates and obtaining mid-level and high-skill jobs were given the opportunity (1) to enroll in college-level coursework and to obtain an associate degree with one of the partner colleges, and (2) to engage in specialized apprenticeships with partner employers to help them advance their careers.
- *Job search assistance*. Throughout the program, participants were offered job search assistance services to help them connect to employers with workforce needs that fitted their individual skills and experience. These services were expected to be most valuable for participants who went through the program and were able to earn both NCRC and MSSC certifications, which opened pathways to in-demand high-skill jobs with partner employers. Nevertheless, these services were available to all participants, even those who did not earn any credentials.

[21] For more details, see http://www.msscusa.org/production-certification-cpt.

The program was structured so that, over time, motivated participants would be able to obtain all the credentials and work experience needed to access high-skill manufacturing jobs. To ensure program success, participants were advised by case managers, who were responsible for supporting them through the entire program, from enrollment to finding a job.

3.4 Construction Sector Partnership

The mission of the Construction Sector Partnership (Construction Partnership), which was formed in 2009, is to improve existing construction career pathways and design new ones to meet regional workforce needs. The partnership is composed of employers, community colleges and vocational schools, the Associated Builders and Contractors, the Independent Electrical Contractors, and the Greater Cincinnati Apprenticeship Council. The partnership's program emphasizes the development of educational pathways for the region's in-demand construction occupations, as identified by partner employers, including carpentry, electrical, plumbing/pipefitting, HVAC/R, and laborers.

The program primarily focuses on recruiting low-skill jobseekers, including new labor market entrants and inexperienced workers. Special emphasis is placed on recruiting women and minorities, as a way to increase diversity in the construction workforce. The Construction Partnership program differs from the two programs described earlier in that its career pathways model is based on pre-apprenticeship programs and on-the-job training. The program enrolls participants in pre-apprenticeship programs sponsored by its partners, which gives them the opportunity to receive on-the-job training and learn the skills needed to access entry-level construction jobs. The program is similar to the other two programs in offering participants job readiness training and job search assistance to ensure high job placement and retention rates.

3.5 Participant Characteristics

All three programs collected rich information on all participants who entered their programs during the study period, from January 2010 through December 2011. Exhibit 2 provides

descriptive analyses of the characteristics of unemployed participants in each of the three programs. As shown, during this period, the Health Careers program served a total of 992 unemployed participants making it the largest of the three programs. The Advanced Manufacturing and Construction Partnership programs served a total of 684 and 379 participants, respectively.[22]

The figures in Exhibit 2 also show that the three programs attracted different unemployed participant populations. About 90 percent of unemployed Healthcare Careers participants were women, compared to 34 percent and 48 percent for the Advanced Manufacturing and Construction Partnership programs, respectively. This is not surprising given the fact that, historically, healthcare is an industry in which women are typically overrepresented relative to men, while the opposite is true for manufacturing and construction.[23] However, we should note that Advanced Manufacturing and particularly the Construction Partnership program were successful in recruiting a high number of women considering their focus industries, which was a key program recruitment objective.

Although half the unemployed participants in the Health Careers program were white, the program was successful in recruiting a large proportion of black participants (40 percent). The Advanced Manufacturing and Construction Partnership programs recruited primarily black and other race participants. This shows that the latter two programs were very effective in recruiting racial minorities, which was one of their objectives. The education distribution shows that the Health Careers program attracted individuals with higher educational attainment than those attracted by the other two programs. About 46 percent of Health Careers unemployed participants had an associate degree or some college education, and 8 percent had a college degree. On the other hand, only 31 and 28 percent of participants in the Advanced

[22] Note that, during the study period, the three programs also served employed participants. In particular, Health Careers served 978 employed participants, Advanced Manufacturing served 82 employed participants, and Construction Pathways served 85 employed participants. Since employed participants are not included in the quasi-experimental study, we only present analyses of the characteristics of unemployed participants.

[23] For a discussion of the industry workforce composition by gender, race, and ethnicity, see: Michaelides M. and Mueser P. *The Role of Industry and Occupation in Recent US Unemployment Differentials by Gender, Race, and Ethnicity.* Eastern Economic Journal, Vol. 39, No. 3, 2013, pp. 358-386.

Manufacturing and Construction Partnership programs, respectively, had more than a high school education.

Exhibit 2: Characteristics of Unemployed Program Participants

	Health Careers	Advanced Manufacturing	Construction Partnership
Unemployed Participants	**992 (100%)**	**684 (100%)**	**379 (100%)**
Gender			
Men	97 (10%)	449 (66%)	197 (52%)
Women	895 (90%)	235 (34%)	182 (48%)
Race			
White	499 (50%)	142 (21%)	70 (18%)
Black	397 (40%)	517 (76%)	296 (78%)
Other Race	95 (10%)	25 (3%)	12 (3%)
Missing	1 (0%)	--	1 (0%)
Education			
No High School Diploma	80 (8%)	199 (29%)	63 (17%)
High School Diploma	391 (38%)	273 (40%)	210 (55%)
Associate Degree, Some College	454 (46%)	187 (27%)	93 (25%)
College Degree	77 (8%)	25 (4%)	13 (3%)
Age			
Less than 25 Years	311 (31%)	145 (21%)	118 (31%)
25-34 Years	333 (34%)	206 (30%)	111 (29%)
35-44 Years	147 (15%)	146 (21%)	90 (24%)
45-54 Years	124 (13%)	127 (19%)	48 (13%)
55-64 Years	54 (5%)	53 (8%)	8 (2%)
65+ Years	5 (1%)	5 (1%)	1 (0%)
Missing	18 (2%)	2 (0%)	3 (1%)
Local Workforce Investment Area			
Area 12 (Butler County)	184 (19%)	81 (12%)	53 (14%)
Area 13 (Hamilton County)	788 (79%)	598 (87%)	326 (86%)
Other Areas	20 (2%)	5 (1%)	--
Program Entry			
Quarter 1, 2010	234 (24%)	12 (2%)	59 (16%)
Quarter 2, 2010	76 (8%)	29 (4%)	77 (20%)
Quarter 3, 2010	96 (10%)	52 (8%)	73 (19%)
Quarter 4, 2010	93 (9%)	80 (12%)	75 (20%)
Quarter 1, 2011	87 (9%)	147 (21%)	26 (7%)
Quarter 2, 2011	127 (13%)	123 (18%)	25 (7%)
Quarter 3, 2011	150 (15%)	87 (13%)	20 (5%)
Quarter 4, 2011	129 (13%)	154 (23%)	24 (6%)

Note: Reported is the number of participants with sample proportion in parentheses.

The age distribution of participants did not vary much across programs. All three programs attracted high proportions of unemployed participants who were less than 35 years old (65 percent for Health Careers, 51 percent for Advanced Manufacturing, and 60 percent for Construction Partnership), while no more than 9 percent of participants were 55 years old or older in each program. Finally, the vast majority of unemployed participants in all three programs resided in Ohio's LWIAs 12 (Butler County) and 13 (Hamilton County).

Using the merged Ohio UI Wage Records and the NFWS/SIF program data, we examined the employment history of unemployed program participants in the eight-quarter period prior to program entry. UI Wage Records were used to construct the following prior employment measures:

- *Employment in prior eight quarters* – Participant had positive earnings in the quarter, for each prior quarter.
- *Prior employment in both quarters 1–2* – Participant had positive earnings in each of the two quarters prior to program entry.
- *Prior employment in all quarters 1–4* – Participant had positive earnings in each of the four quarters prior to program entry.
- *No prior employment in quarters 1–2* – Participant had zero earnings in each of the two quarters prior to program entry.
- *No prior employment in quarters 1–4* – Participant had zero earnings in each of the four quarters prior to program entry.
- *Prior employment in focus industry, quarter 1* – Participant had positive earnings from an employer in the program's focus industry in quarter 1 prior to program entry.
- *Prior employment in focus industry, quarter 1–4* – Participant had positive earnings from an employer in the program's focus industry in any of the four quarters prior to program entry.

- *Earnings amount in prior eight quarters* – Earnings amount in each quarter prior to program entry.

Exhibit 3 presents these measures for the three programs. As shown, unemployed participants in the Health Careers program were more likely than those in the other two programs to be employed prior to program entry. In particular, 45 percent of unemployed Health Careers participants were employed in quarter 1 prior to program entry compared to 29 percent of Advanced Manufacturing participants and 30 percent of Construction Partnership participants. These proportions were similar in the entire eight-quarter period prior to program entry.

Comparing the remaining measures of prior employment history across programs, we find that 390 (39 percent) Health Careers participants were employed in both quarters 1 and 2 prior to program entry, and 309 (31 percent) were employed in all four quarters prior to program entry. These proportions much exceeded those of the other two programs, which shows that unemployed participants in Health Careers were not only more likely to be employed prior to program entry than participants in the other two programs, but were also much more likely to have continuous employment. Moreover, only 33 percent of Health Careers unemployed participants had no earnings in the entire four-quarter prior to program entry, compared with 50 percent and 44 percent for Advanced Manufacturing and Construction Partnership unemployed participants, respectively.

Another interesting difference across the three programs is that a relatively high proportion of Health Careers participants had prior work experience in the healthcare industry. As shown in Exhibit 2, 20 percent of unemployed participants in this program had positive earnings from a healthcare employer in the first quarter prior to program, and 28 percent had positive earnings from a healthcare employer in any of the four quarters prior to program entry. By comparison, fewer than 3 percent of Advanced Manufacturing and Construction Partnership unemployed participants had experience working in their program's focus industry in the four quarters prior to program entry.

Exhibit 3: Employment History of Unemployed Program Participants

	Health Careers	Advanced Manufacturing	Construction Partnership
Unemployed Participants	**992 (100%)**	**684 (100%)**	**379 (100%)**
Employment			
In Prior Quarter 1	451 (45%)	196 (29%)	113 (30%)
In Prior Quarter 2	487 (49%)	199 (29%)	131 (35%)
In Prior Quarter 3	511 (52%)	227 (33%)	122 (32%)
In Prior Quarter 4	531 (54%)	221 (32%)	130 (34%)
In Prior Quarter 5	522 (53%)	234 (34%)	151 (40%)
In Prior Quarter 6	518 (52%)	257 (38%)	166 (44%)
In Prior Quarter 7	549 (55%)	260 (38%)	171 (45%)
In Prior Quarter 8	551 (56%)	292 (42%)	170 (45%)
Prior Employment			
In Both Quarters 1-2	390 (39%)	131 (19%)	80 (21%)
In All Quarters 1-4	309 (31%)	95 (14%)	49 (13%)
No Prior Employment			
In Quarters 1-2	444 (45%)	420 (61%)	215 (57%)
In Quarters 1-4	323 (33%)	340 (50%)	168 (44%)
Prior Employment in Focus Industry			
In Quarter 1	200 (20%)	19 (3%)	<10 (<3%)
In Quarter 1-4	280 (28%)	34 (5%)	<10 (<3%)
Earnings Amount ($)			
In Prior Quarter 1	1,902 (5,241)	785 (2,469)	1,028 (5,549)
In Prior Quarter 2	1,905 (3,560)	1,073 (3,322)	824 (2,046)
In Prior Quarter 3	2,328 (5,560)	1,352 (3,358)	935 (2,369)
In Prior Quarter 4	2,216 (4,456)	1,464 (3,452)	1,095 (2,677)
In Prior Quarter 5	2,380 (5,285)	1,617 (3,744)	1,172 (2,448)
In Prior Quarter 6	2,348 (4,547)	1,679 (3,519)	1,627 (5,800)
In Prior Quarter 7	2,354 (3,718)	1,983 (5,218)	1,460 (2,770)
In Prior Quarter 8	2,364 (4,506)	2,001 (3,680)	1,451 (2,855)

Note: Reported is the number of participants with sample proportion in parentheses; for prior earnings, reported is the sample mean with standard deviation in parentheses

Overall, the figures presented in Exhibits 2 and 3 are compatible with the recruitment strategies and objectives of the three programs. The Health Careers program targeted unemployed workers interested in accessing healthcare jobs, so it primarily attracted women, individuals with more than a high school diploma, those in the younger age categories, and those with prior work experience, particularly in the healthcare industry. The Advanced Manufacturing and Construction Partnership programs primarily focused on low-skill jobseekers, including new

labor market entrants and inexperienced unemployed workers. The majority of unemployed participants in these two programs were men, nonwhites, individuals with no more than a high school education, young workers, and unemployed workers with limited work experience. It is noteworthy that both these programs were successful in recruiting relatively high proportions of women and racial minorities. Based on these results, it appears that all three programs were successful in reaching their target populations.

3.6 Services Received by Program Participants

Program data also provide information on the types of services received by participants. This information cannot be used to identify all the individual services that participants received in a particular program, but it can be used to identify if participants received: (1) job readiness training, (2) occupational training (includes industry-focused training, NCRC and other certificate preparation assistance, and participation in pre-apprenticeship programs), and (3) employment services. The data also report whether a participant earned a credential (occupational skills credential or NCRC) as a result of program participation. Using this information, we examined the types of services received by unemployed participants in each program.

Health Careers Program. Exhibit 4 presents the services received by unemployed participants. As can be seen, only 27 percent of unemployed participants received job readiness training. On the other hand, the majority of unemployed participants received occupational training (including industry-focused training and NCRC preparation assistance) to improve their employability in healthcare. A little over a third of unemployed participants (35 percent) received employment services.

Exhibit 4 also shows the combinations of services received by unemployed participants. Of the 266 participants who received job readiness training, 26 received job readiness and occupational training but no employment services and 76 received job readiness and employment services but no occupational training. Of the 676 participants who received

occupational training, 110 also received employment services but no job readiness training. Moreover, we find that 14 percent of all unemployed participants received all three types of services and only 20 percent did not receive any program services. Finally, 64 percent of unemployed participants earned the NCRC or another training/occupational credential as a result of program participation.

Exhibit 4: Services Received by Unemployed Participants, Health Careers

	Health Careers
Unemployed Participants	**992 (100%)**
Job Readiness Training	266 (27%)
Occupational Training	676 (68%)
Employment Services	352 (35%)
Job Readiness & Occupational Training Only	26 (3%)
Job Readiness & Employment Services Only	76 (8%)
Occupational Training & Employment Services Only	110 (11%)
All Services	142 (14%)
No Services	194 (20%)
Earned Credential	626 (64%)

Note: Reported is the number of participants with sample proportion in parentheses.

These analyses show that the majority of unemployed participants received at least one type of service, which suggests that they took advantage of the services offered by the program. It is also notable that less than a third of unemployed participants received job readiness training, while more than two thirds received occupational training. Finally, the fact that nearly two thirds of unemployed participants earned a credential shows that the program was successful in helping them to obtain training/occupational credentials needed to access healthcare careers.

Advanced Manufacturing. Exhibit 5 presents the services received by Advanced Manufacturing unemployed participants. A total of 73 percent of unemployed participants received job readiness training, which was the primary service offered to participants upon entering the program. Similarly, a large proportion of unemployed participants received employment services (82 percent). Interestingly, only 23 percent received occupational training, which included NCRC and MSSC preparation assistance, enrollment in undergraduate coursework, and

participation in specialized pre-apprenticeship programs.

Exhibit 5: Services Received by Unemployed Participants, Advanced Manufacturing

	Advanced Manufacturing
Unemployed Participants	**684 (100%)**
Job Readiness Training	501 (73%)
Occupational Training	157 (23%)
Employment Services	559 (82%)
Job Readiness & Occupational Training Only	--
Job Readiness & Employment Services Only	373 (55%)
Occupational Training & Employment Services Only	2 (2%)
All Services	124 (18%)
No Services	99 (14%)
Earned Credential	57 (8%)

Note: Reported is the number of participants with sample proportion in parentheses.

Exhibit 5 also shows that of the 501 participants who received job readiness training, 373 participants also received employment services but no occupational training. We also find that less than a fifth of all unemployed participants received all three types of services but only 14 percent received no services at all.

These figures reveal an interesting pattern. The majority of unemployed participants received job readiness training and employment services, but no occupational training. This suggests that a relatively high proportion of unemployed participants were perhaps more interested in improving their employability skills and looking for a job, and less interested in receiving manufacturing-focused training. As a result, only 8 percent of unemployed participants earned a credential, much lower than in the Health Careers program (see Exhibit 4). This disparity may be due to a number of factors, including the fact that Advanced Manufacturing attracted larger proportions of inexperienced workers who were perhaps in need of basic training before they would be ready to work toward earning a credential.

Construction Partnership. Exhibit 6 presents the services received by Construction Partnership unemployed participants. A total of 62 percent of unemployed participants received job

readiness training, 56 percent received occupational training (which included on-the-job training obtained through participation in pre-apprenticeship programs) and 62 percent received employment services.

Exhibit 6: Services Received by Unemployed Participants, Construction Partnership

	Construction Partnership
Unemployed Participants	**379 (100%)**
Job Readiness Training	235 (62%)
Occupational Training	211 (56%)
Employment Services	236 (62%)
Job Readiness & Occupational Training Only	26 (7%)
Job Readiness & Employment Services Only	79 (21%)
Occupational Training & Employment Services Only	15 (4%)
All Services	127 (34%)
No Services	71 (19%)
Earned Credential	212 (56%)

Note: Reported is the number of participants with sample proportion in parentheses.

Exhibit 6 also shows that 7 percent of unemployed participants received job readiness and occupational training but no employment services. At the same time, 21 percent of unemployed participants received job readiness training and employment services but no occupational training. Furthermore, more than one third of unemployed participants received all three types of services offered by the program while nearly one fifth did not receive any services. Finally, 56 percent of unemployed participants earned a credential (including training credential and apprenticeship certificate), a proportion that is lower than those in the Health Careers program.

4. Quasi-Experimental Impact Study Results

IMPAQ implemented the quasi-experimental approach described in Section 2.2.4 to estimate the impacts of each of the three Ohio NFWS/SIF programs on the labor market outcomes of unemployed participants. Due to differences across programs in their focus industry, participant characteristics, and services provided, the matching process and the impact results were produced separately for each of the three NFWS/SIF programs. This section presents the results of the impact study. We begin by presenting the results of the matching process,

followed by a presentation of the impact results for each program (see Box 2 for a summary of the results). Finally, we summarize the findings and their interpretation.

BOX 2: SUMMARY OF IMPACT RESULTS

Health Careers Collaborative of Greater Cincinnati

- The program led to positive impacts on employment – unemployed participants were 14.1 to 17.6 percentage points (32 to 50 percent) more likely than unemployed individuals in the matched comparison group to be employed in the four quarters after program entry.
- The program was effective in assisting unemployed participants to obtain jobs in healthcare – unemployed participants were 24.0 to 25.3 percentage points (233 to 304 percent) more likely to be employed in healthcare than those in the matched comparison group.
- The program was effective in helping participants to find and retain employment – unemployed participants were 15.3 to 17.3 percentage points (43 to 65 percent) more likely than those in the matched comparison group to find a job in quarter 1 and remain employed in subsequent quarters.
- The program led to significant positive impacts on participant earnings – program participants had $3,789 (59 percent) higher earnings in the four quarters after program entry than those in the matched comparison group.

Advanced Manufacturing Partnership

- The program led to significant positive impacts on employment – on average, unemployed participants were 8.2 to 14.6 percentage points (24 to 40 percent) more likely than those in the matched comparison group to be employed in the four quarters after program entry.
- The program had modest impacts on employment in the program's focus industry.
- The program was effective in improving job retention – unemployed participants were 5.7 to 7.6 percentage points (about 30 percent) more likely than those in the matched comparison group to find a job in quarter 1 and remain employed in subsequent quarters. These impacts were lower than those of the Health Careers program, but substantial nonetheless.
- The program helped participants earn $1,628 (32 percent) higher earnings than those in the matched comparison group. These impacts were lower than those of the Health Careers program.

Construction Sector Partnership

- The program had positive impacts on employment – unemployed participants were 3.2 to 6.1 percentage points (9 to 16 percent) more likely than those in the matched comparison group to be employed in the four quarters after program entry.
- The program had modest impacts on construction employment, no impacts on job retention and, with the exception of the initial period after program entry, no impacts on earnings.

4.1 Matching Results

To construct appropriate matched comparison groups for unemployed participants in each of the three Ohio NFWS/SIF programs, we used the Ohio ES population which includes unemployed workers who sought state employment and training services during the study period. Exhibit 7 summarizes the characteristics of unemployed participants in each NFWS/SIF program and of unemployed ES participants in Ohio.

As shown in Exhibit 7, there were notable differences between the unemployed participants in each program and the unemployed ES population. For example, the Health Careers program attracted unemployed participants who were much more likely to be female, nonwhite, educated beyond high school, and less than 45 years old, as compared to unemployed workers in the ES population. Similarly, the Advanced Manufacturing program attracted unemployed participants who were more likely to be male and nonwhite than ES participants, while the Construction Partnership program attracted a relatively higher proportion of nonwhites, individuals with no more than a high school diploma, and younger workers. These disparities show that the unemployed ES population differs in important ways from the unemployed participants in the three programs, and, therefore, we could not use the ES data in their original form as a comparison group for the impact study.

It is also important to note the disparities in the characteristics of unemployed participants across the three NFWS/SIF programs. Relative to the other two programs, Health Careers attracted larger proportions of unemployed participants who were female, white, and had more than a high school education. Moreover, the Advanced Manufacturing program attracted larger proportions of unemployed participants who were male, had no high school diploma, and were at least 45 years old relative to the other two programs.

Exhibit 7: Characteristics of Unemployed NFWS/SIF and ES Participants

	Health Careers	Advanced Manufacturing	Construction Partnership	ES
Total Number of Participants	**992 (100%)**	**684 (100%)**	**379 (100%)**	**55,754 (100%)**
Gender				
Men	97 (10%)	449 (66%)	197 (52%)	30,645 (55%)
Women	895 (90%)	235 (34%)	182 (48%)	25,109 (45%)
Race				
White	499 (50%)	142 (21%)	70 (18%)	37,302 (67%)
Black	397 (40%)	517 (76%)	296 (78%)	9,072 (16%)
Other Race	95 (10%)	25 (3%)	12 (3%)	2,445 (4%)
Missing	1 (0%)	--	1 (0%)	6,935 (12%)
Education				
No High School Diploma	80 (8%)	199 (29%)	63 (17%)	8,219 (15%)
High School Diploma	391 (38%)	273 (40%)	210 (55%)	24,230 (43%)
Associate Degree, Some College	454 (46%)	187 (27%)	93 (25%)	13,164 (24%)
College Degree	77 (8%)	25 (4%)	13 (3%)	10,141 (18%)
Age				
Less than 25 Years	311 (31%)	145 (21%)	118 (31%)	9,584 (17%)
25-34 Years	333 (34%)	206 (30%)	111 (29%)	13,533 (24%)
35-44 Years	147 (15%)	146 (21%)	90 (24%)	11,197 (20%)
45-54 Years	124 (13%)	127 (19%)	48 (13%)	11,752 (21%)
55-64 Years	54 (5%)	53 (8%)	8 (2%)	7,603 (14%)
65+ Years	5 (1%)	5 (1%)	1 (0%)	1,885 (3%)
Missing	18 (2%)	2 (0%)	3 (1%)	200 (0%)
Local Workforce Investment Area				
Area 12 (Butler County)	184 (19%)	81 (12%)	53 (14%)	23,882 (43%)
Area 13 (Hamilton County)	788 (79%)	598 (87%)	326 (86%)	27,609 (50%)
Other Areas	20 (2%)	5 (1%)	--	4,263 (7%)
Program Entry				
Quarter 1, 2010	234 (24%)	12 (2%)	59 (16%)	8,604 (15%)
Quarter 2, 2010	76 (8%)	29 (4%)	77 (20%)	7,581 (14%)
Quarter 3, 2010	96 (10%)	52 (8%)	73 (19%)	8,311 (15%)
Quarter 4, 2010	93 (9%)	80 (12%)	75 (20%)	6,761 (12%)
Quarter 1, 2011	87 (9%)	147 (21%)	26 (7%)	7,128 (13%)
Quarter 2, 2011	127 (13%)	123 (18%)	25 (7%)	6,605 (12%)
Quarter 3, 2011	150 (15%)	87 (13%)	20 (5%)	5,621 (10%)
Quarter 4, 2011	129 (13%)	154 (23%)	24 (6%)	5,143 (9%)

Note: Reported is the number of participants with sample proportion in parentheses.

Exhibit 8 summarizes the employment history of unemployed participants in each NFWS/SIF program and of ES unemployed participants and confirms that there were important disparities between the four populations on these measures. All three NFWS/SIF programs attracted unemployed participants with weak employment history relative to the ES population. As shown in Exhibit 8, NFWS/SIF participants in the three programs were less likely than unemployed ES participants to be employed in each of the eight quarters prior to program entry and to have continuous employment in the four quarters prior to program entry. Notably, Health Career participants were more likely than participants in the other two programs to be employed and to have continuous employment prior to program entry. Interestingly, Health Career participants were much more likely than ES participants to have prior employment in the program's focus industry, while the opposite is true for participants in the other two NFWS/SIF programs. Finally, participants in each of the three NFWS/SIF programs had much lower prior earnings in the eight quarters prior to program entry compared with ES participants.

The disparities in characteristics and prior employment measures show that the three NFWS/SIF programs attracted different types of unemployed participants, which suggests that participation in a given program is strongly correlated with certain characteristics that do not necessarily influence participation in the other two programs. Furthermore, the three programs focused on different industries and provided different services. For these reasons, the three programs were considered separately in the impact study.

Exhibit 8: Employment History of Unemployed NFWS/SIF and ES Participants

	Health Careers	Advanced Manufacturing	Construction Partnership	ES
Total Number of Participants	**992 (100%)**	**684 (100%)**	**379 (100%)**	**55,754 (100%)**
Employment				
In Prior Quarter 1	451 (45%)	196 (29%)	113 (30%)	42,891 (77%)
In Prior Quarter 2	487 (49%)	199 (29%)	131 (35%)	43,705 (78%)
In Prior Quarter 3	511 (52%)	227 (33%)	122 (32%)	42,895 (77%)
In Prior Quarter 4	531 (54%)	221 (32%)	130 (34%)	41,855 (75%)
In Prior Quarter 5	522 (53%)	234 (34%)	151 (40%)	41,288 (74%)
In Prior Quarter 6	518 (52%)	257 (38%)	166 (44%)	40,883 (73%)
In Prior Quarter 7	549 (55%)	260 (38%)	171 (45%)	40,295 (72%)
In Prior Quarter 8	551 (56%)	292 (42%)	170 (45%)	39,802 (71%)
Prior Employment				
In Both Quarters 1-2	390 (39%)	131 (19%)	80 (21%)	40,598 (73%)
In All Quarters 1-4	309 (31%)	95 (14%)	49 (13%)	35,580 (64%)
No Prior Employment				
In Quarters 1-2	444 (45%)	420 (61%)	215 (57%)	9,756 (18%)
In Quarters 1-4	323 (33%)	340 (50%)	168 (44%)	7,579 (14%)
Prior Employment in Focus Industry				
In Quarter 1 (Healthcare)	200 (20%)	--	--	5,283 (9%)
In Quarter 1-4 (Healthcare)	280 (28%)	--	--	6,301 (11%)
In Quarter 1 (Manufacturing)	--	19 (3%)	--	5,301 (10%)
In Quarter 1-4 (Manufacturing)	--	34 (5%)	--	6,058 (11%)
In Quarter 1 (Construction)	--	--	<10 (<3%)	2,873 (5%)
In Quarter 1-4 (Construction)	--	--	<10 (<3%)	3,558 (6%)
Earnings Amount ($)				
In Prior Quarter 1	1,902 (5,241)	785 (2,469)	1,028 (5,549)	6,681 (8,468)
In Prior Quarter 2	1,905 (3,560)	1,073 (3,322)	824 (2,046)	6,882 (8,396)
In Prior Quarter 3	2,328 (5,560)	1,352 (3,358)	935 (2,369)	6,925 (8,896)
In Prior Quarter 4	2,216 (4,456)	1,464 (3,452)	1,095 (2,677)	6,787 (9,027)
In Prior Quarter 5	2,380 (5,285)	1,617 (3,744)	1,172 (2,448)	6,646 (8,238)
In Prior Quarter 6	2,348 (4,547)	1,679 (3,519)	1,627 (5,800)	6,608 (8,327)
In Prior Quarter 7	2,354 (3,718)	1,983 (5,218)	1,460 (2,770)	6,488 (8,202)
In Prior Quarter 8	2,364 (4,506)	2,001 (3,680)	1,451 (2,855)	6,386 (8,147)

Note: Reported is the number of participants with sample proportion in parentheses; for prior earnings, reported is the sample mean with standard deviation in parentheses.

Our matching methods, as described in Section 2.2.4, were designed to reweight the comparison sample of ES participants to remove the differences in characteristics for the three program groups observed in Exhibits 7 and 8. The PSM methods were applied separately for each program using the following process:

- *Step 1: Merge data* – We merged the NFWS/SIF data for each program with ES and UI Wage Record data using participant personal identifiers.
- *Step 2: Produce propensity score* – We used a logit model to estimate the likelihood of program participation based on individual characteristics, employment history measures, and interactions between these. Using the results, we produced the propensity score for each participant and non-participant in the data – this score is equal to the predicted probability of program participation based on the individual characteristics. At this point, we omitted cases from each sample that were off the *common support* of the propensity score;[24] these were cases whose characteristics were such that they could not be matched.[25] We then reran the logit model on the remaining sample to produce a propensity score for all cases that were on the common support.
- *Step 3: Use propensity score to construct sample weight* – We weighted each comparison case by the odds ratio of the predicted propensity score, so that the weighted comparison sample had the same distribution on all control variables (i.e., the logit variables) as the treatment sample.

[24] In practice, the common support includes all cases with predicted propensity scores between the smallest propensity score observed for the treatment group and the largest propensity score observed for the comparison group. Propensity scores outside this range are based on extrapolation and therefore may be subject to serious bias (Caliendo M. and Kopeing S. *Some Practical Guidance for the Implementation of Propensity Score Matching.* Journal of Economic Surveys, Vol. 22, No. 1, 2008, pp. 21-72).

[25] In matching applications, it is common to omit a large number of comparison cases that do not provide useful matches for any treatment case. In implementing the matching process for the Health Careers program, 9,054 of the 55,754 ES participants were omitted because they failed to match program participants. Similarly, in the matching process of the Advanced Manufacturing and Construction Partnership, 13,361 and 18,895 ES cases were omitted, respectively. Such omissions do not bias our estimates because our focus is on estimating impacts for participants. On the other hand, if many treatment cases are omitted, the true impact of the full population of participants may not correspond to the estimated impact. Fortunately, given the large sample size of the ES comparison sample, it was not necessary to omit many treatment cases. None of the participants in Health Careers or in Construction Partnership were omitted, and only two participants in Advanced Manufacturing were omitted. Hence, there is essentially no bias due to failure to match participants to comparison cases.

- *Step 4: Compare treatment and weighted matched comparison sample (balancing test)* – Once matching was done, it was necessary to test if the implementation of the methods had been successful, that is, to assure that the treatment sample and the matched comparison group were truly matched in terms of their characteristics. We employed a *balancing test* based on a t-statistic for the differences in mean characteristics between the treatment and the matched comparison group. If matching was successful, the t-tests should yield no or very few statistically significant differences between the treatment and the matched comparison group. When differences were detected, the specification of the logit was modified to include additional interactions between available variables, and steps 1-4 were repeated until a successful matching was achieved.[26]

This process, implemented separately for each program, allowed us to construct a set of weights for the remaining ES sample so that the weighted ES sample had the same characteristics and prior employment measures as the treatment sample. This means that the only difference between the treatment and the matched comparison sample is that individuals in the treatment sample participated in the NFWS/SIF program. Thus, differences in the labor market outcomes between the treatment and the matched comparison sample constitute reliable estimates of the program's impacts.

The results of the balancing test are presented in Exhibits A, B, and C in the Appendix. As noted above, these results provide a test of whether the matched comparison group for each program has the same distribution of variables as the sample of program participants. In each of these

[26] At the conclusion of this process, the following control variables were used in the logit model: 1) individual characteristics – gender, race, education, age, LWIA, and quarter of program entry; 2) employment history measures – employment in each prior quarter 1-8, prior employment in both quarters 1-2, prior employment in all quarters 1-4, no prior employment in both quarters 1-2, no prior employment in any quarter 1-4, prior employment in focus industry in prior quarter 1, prior employment in focus industry in prior quarters 1-4, and earnings in prior quarters 1-8; and 3) interactions between gender and race, gender and age, gender and education, gender and quarter of entry, gender and prior earnings, gender and prior employment in focus industry, race and age, race and education, race and quarter of entry, race and prior earnings, race and prior employment in focus industry, education and age, education and quarter of entry, education and prior earnings, education, and prior employment in focus industry.

exhibits, we see that the matched comparison group is similar to the corresponding program sample.

Turning to particular program results, Appendix Exhibit A lists variable means for unemployed Health Careers program participants and the matched comparison sample. In 50 comparisons of means, we found that 49 are statistically insignificant, and only one is statistically significant; among participants, approximately 1.8 percent were coded as missing age, whereas the proportion is only 0.1 percent among the matched comparison group. Although statistically significant, this single difference is so small and affects so few cases that any resulting bias will be trivial. The comparable comparison for the Advance Manufacturing program and its matched comparison group similarly reveals 49 statistically insignificant differences and only one statistically significant difference, in program entry in quarter 4, 2011. Again, the difference is very small, and such a difference is unlikely to cause any important bias. Finally, in the case of the Construction Partnership program, we observe only one statistically significant difference. That difference is in the age missing group, where 0.8 percent of treatment group members and no matched comparison group members are coded as missing age. Again, this difference is very small so that any resulting bias is negligible.

The balancing tests showed that, with only one exception in each program, treatment group cases are observationally equivalent to matched comparison group cases. Nevertheless, we wanted to ensure that the few differences in characteristics remaining after the matching could not influence our results. We therefore applied a *bias adjustment* method to our estimates of program impact. This approach fits a linear regression model to the matched comparison sample for each outcome of interest and uses the results to adjust the impact estimate to account for differences in characteristics between treatment and the matched comparison group. We found that bias adjusted impacts were equivalent to the impact estimates reported in the following section, which further supports our confidence in the validity of the matching implementation.

4.2 Impact Results

Program impacts for each of the three programs were estimated by calculating mean differences in labor market outcomes between the treatment group and the matched comparison group, as described in Section 4.1.3. To assess the statistical significance of the impact estimates, we produced t-tests based on bootstrap standard errors. The results of the impact analyses are presented below, separately for each program.

Health Careers Program Impacts. Exhibit 9 presents the impact results for two outcomes: employment and employment in the healthcare industry. The two left columns of Exhibit 8 present the means and standard deviations of these outcomes for the treatment and the matched comparison group, respectively. The right column presents the treatment- matched comparison group difference, which is the estimated impact of the program on the outcome. The estimated impact expressed as a percent of the matched comparison group mean is shown in brackets.

The results in Exhibit 9 show that the Health Careers program was effective in helping unemployed participants to become employed in each of the four quarters after program entry. For example, 57.6 percent of treatment group members and 43.5 percent of matched comparison group members had positive earnings in quarter 1 after program entry. As the right column shows, the difference is .141 and is statistically significant at the 1 percent level. This means that the Health Careers program led to a 14.1 percentage-point increase in employment for unemployed participants. If we divide this impact by the weighted matched comparison group mean, we find that the program led to a 32 percent increase in quarter 1 employment. This impact was sustained through the entire four-quarter follow-up period: program participants were 37 percent more likely to be employed in quarters 2 and 3 and 40 percent more likely to be employed in quarter 4 than unemployed individuals in the matched comparison group.

Exhibit 9: Program Impacts on Employment, Health Careers

	Treatment Group	Matched Comparison Group	Program Impact [% Comparison Group]
Total Number of Participants	**992**	**46,701**	
Employed			
In Quarter 1	.576 (.495)	.435 (.496)	*.141 (.012)*** [+32%]*
In Quarter 2	.628 (.484)	.458 (.498)	*.170 (.016)*** [+37%]*
In Quarter 3	.649 (.478)	.473 (.499)	*.176 (.022)*** [+37%]*
In Quarter 4	.654 (.476)	.468 (.499)	*.185 (.019)*** [+40%]*
Employed in Healthcare			
In Quarter 1	.343 (.475)	.103 (.303)	*.240 (.012)*** [+233%]*
In Quarter 2	.338 (.473)	.087 (.282)	*.250 (.018)*** [+287%]*
In Quarter 3	.338 (.473)	.085 (.279)	*.253 (.020)*** [+297%]*
In Quarter 4	.334 (.472)	.083 (.275)	*.253 (.015)*** [+304%]*

Note: The two left columns report the mean and standard deviation for the treatment and the matched comparison group. The right column reports the estimated program impact with bootstrap standard errors in parentheses; in brackets is the program impact as a percentage of the matched comparison group mean. Statistical significance: *** = at 1 percent level.

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Exhibit 9 also shows that the program led to positive impacts on employment in healthcare. For example, in quarter 1 after program entry, 34.3 percent of unemployed participants were employed in healthcare, compared to 10.3 percent of the matched comparison group. The difference was 24.0 percentage points and was statistically significant at the 1 percent level – this translates into a 233 percent increase relative to the matched comparison group mean. This impact grew slightly over time and, in quarter 4 after program entry, program participants were about four times more likely than their matched comparison group peers to be employed in the healthcare industry. These results show that the Health Careers program was effective in helping participants not only to obtain employment following program entry, but also to promote their employment in the healthcare industry, which was a key program objective.

Exhibit 10 presents the program's impacts on job retention and earnings. As shown, the

program had positive impacts on job retention. In particular, 51.2 percent of treatment group members were employed in quarter 1 *and* in quarter 2 compared to 35.9 percent of matched comparison group members. The difference of 15.3 percentage points was statistically significant at the 1 percent level, which means that the program led to a 43 percent increase in job retention through quarter 2 after program entry. Similarly, the program led to a 53 percent and a 65 percent impact on job retention through quarter 3 and quarter 4, respectively. These results show that, in addition to helping participants to find employment in the first quarter following program entry, the program was effective in helping them to retain those jobs for at least four quarters after program entry.

Exhibit 10: Program Impacts on Job Retention and Earnings, Health Careers

	Treatment Group	Matched Comparison Group	Program Impact [% Comparison Group]
Total Number of Participants	**992**	**46,701**	
Job Retention			
Employed in Q1-2	.512 (.500)	.359 (.480)	*.153 (.018)**** [+43%]
Employed in Q1-3	.480 (.500)	.313 (.464)	*.166 (.021)**** [+53%]
Employed in Q1-4	.438 (.496)	.265 (.441)	*.173 (.018)**** [+65%]
Earnings ($)			
In Quarter 1	2,094 (3,822)	1,226 (2,362)	*868 (146)**** [+71%]
In Quarter 2	2,473 (3,319)	1,622 (2,707)	*851 (115)**** [+52%]
In Quarter 3	2,842 (3,511)	1,815 (2,917)	*1,027 (141)**** [+57%]
In Quarter 4	2,856 (3,703)	1,812 (2,945)	*1,043 (119)**** [+58%]

Note: The two left columns report the mean and standard deviation for the treatment and the matched comparison group. The right column reports the estimated program impact with bootstrap standard errors in parentheses; in brackets is the program impact as a percentage of the matched comparison group mean. Statistical significance: ***= at 1 percent level.

Since the program led to significant impacts on employment, we would expect Health Careers participants to have significantly higher earnings compared with workers in the matched comparison group. Exhibit 9 confirms this expectation. In quarter 1 after program entry,

treatment group members earned $868 (71 percent) higher earnings relative to matched comparison group members. Impacts on earnings were sustained through the entire follow-up period. These results provide evidence that the Health Career program was effective in helping unemployed participants to obtain higher earnings in the 12-month follow-up period than they would have earned in the absence of the program.

Advanced Manufacturing Program Impacts. Exhibit 11 shows that the Advanced Manufacturing program was effective in helping unemployed participants to find employment following program entry. In particular, the program's impact on employment in quarter 1 was 8.1 percentage points, which, in terms of the comparison group mean, translates into a 24 percent impact on employment. This impact grew over time and remained statistically significant through quarter 4 following program entry, when treatment group members were 14.6 percentage points (40 percent) more likely to be employed relative to their matched comparison group peers.

In addition, Exhibit 11 shows that only 4.1 percent of unemployed participants were able to obtain employment in manufacturing in quarter 1 after program entry. Although this proportion suggests that the program was not very effective in promoting the employment of participants in manufacturing, it was 2.5 percentage points higher than the proportion of matched comparison cases employed in that industry. This shows that the program led to a 156 percent increase in manufacturing employment over the matched comparison group mean. The impact on manufacturing employment remained positive and significant in quarter 2 (215 percent), quarter 3 (147 percent), and quarter 4 (167 percent) after program entry. These results show that the program was not very effective in promoting manufacturing employment, but did lead to improvements in this outcome relative to the matched comparison group.

Exhibit 11: Program Impacts on Employment, Advanced Manufacturing

	Treatment Group	Matched Comparison Group	Program Impact [% Comparison Group]
Total Number of Participants	**682**	**42,293**	
Employed			
In Quarter 1	.422 (.494)	.340 (.474)	*.082 (.020)*** [+24%]*
In Quarter 2	.478 (.500)	.362 (.481)	*.117 (.017)*** [+32%]*
In Quarter 3	.517 (.500)	.359 (.480)	*.158 (.022)*** [+44%]*
In Quarter 4	.512 (.500)	.366 (.482)	*.146 (.021)*** [+40%]*
Employed in Manufacturing			
In Quarter 1	.041 (.199)	.016 (.124)	*.025 (.007)*** [+156%]*
In Quarter 2	.041 (.199)	.013 (.113)	*.028 (.004)*** [+215%]*
In Quarter 3	.042 (.200)	.017 (.128)	*.025 (.006)*** [+147%]*
In Quarter 4	.032 (.176)	.012 (.107)	*.020 (.007)*** [+167%]*

Note: The two left columns report the mean and standard deviation for the treatment and the matched comparison group. The right column reports the estimated program impact with bootstrap standard errors in parentheses; in brackets is the program impact as a percentage of the matched comparison group mean. Statistical significance: *** = at 1 percent level.

Impact results in Exhibit 12 show that the program had positive impacts on job retention. Treatment group members were 7.6 and 7.3 percentage points more likely than their matched comparison group peers to be employed in both quarters 1 and 2 after program entry, respectively. These impacts represent a 28 and a 33 percent improvement over the matched comparison group mean in quarters 1 and 2, respectively. The impact on job retention was maintained through quarter 4, which shows that the program was effective in helping participants to find employment soon after entering the program and also to retain their employment for at least four quarters after program entry.

Finally, Exhibit 12 shows that the positive program impacts on employment and job retention led to positive impacts on earnings. In particular, treatment group members had $220 (24 percent) higher earnings in quarter 1 than matched comparison group members. This

difference grew over time and by quarter 4 treatment group members had 42 percent higher earnings. Overall, these results provide evidence that the Advanced Manufacturing program was successful in promoting participant employment and earnings in the entire 12-month period after program entry.

Exhibit 12: Program Impacts on Job Retention and Earnings, Advanced Manufacturing

	Treatment Group	Matched Comparison Group	Program Impact [% Comparison Group]
Total Number of Participants	**682**	**42,293**	
Job Retention			
Employed in Q1-2	.346 (.477)	.269 (.444)	*.076 (.019)**** [+28%]
Employed in Q1-3	.295 (.457)	.222 (.416)	*.073 (.026)**** [+33%]
Employed in Q1-4	.247 (.432)	.190 (.392)	*.057 (.021)**** [+30%]
Earnings			
In Quarter 1	1,146 (2,512)	925 (2,190)	*220 (84)**** [+24%]
In Quarter 2	1,580 (3,354)	1,249 (2,640)	*331 (130)*** [+27%]
In Quarter 3	1,830 (3,379)	1,393 (2,986)	*436 (130)**** [+31%]
In Quarter 4	2,157 (3,620)	1,516 (3,123)	*641 (183)**** [+42%]

Note: The two left columns report the mean and standard deviation for the treatment and the matched comparison group. The right column reports the estimated program impact with bootstrap standard errors in parentheses; in brackets is the program impact as a percentage of the weighted matched comparison group mean. Statistical significance: **= at 5 percent level; *** = at 1 percent level.

Construction Partnership Program Impacts. Impact estimates for the Construction Partnership program for employment and employment in construction are presented in Exhibit 13. Results show that 38.8 percent of treatment group members and 35.6 percent of matched comparison group members were employed in quarter 1; the 3.2 percentage-point difference was not statistically significant. However, the program did lead to significantly positive impacts on employment in subsequent quarters. As shown in Exhibit 13, the program increased the probability of employment by 16 percent in quarter 2, 13 percent in quarter 3, and 15 percent in quarter 4.

Exhibit 13: Program Impacts on Employment, Construction Partnership

	Treatment Group	Matched Comparison Group	Program Impact [% Comparison Group]
Total Number of Participants	**379**	**36,859**	
Employed			
In Quarter 1	.388 (.488)	.356 (.479)	.032 (.029) [+9%]
In Quarter 2	.441 (.497)	.380 (.485)	.061 (.028)** [+16%]
In Quarter 3	.439 (.497)	.387 (.487)	.052 (.023)** [+13%]
In Quarter 4	.451 (.498)	.391 (.488)	.061 (.037)* [+15%]
Employed in Construction			
In Quarter 1	.047 (.213)	.011 (.104)	.037 (.008)*** [+336%]
In Quarter 2	.045 (.207)	.012 (.109)	.033 (.010)*** [+275%]
In Quarter 3	.048 (.214)	.013 (.111)	.035 (.009)*** [+269%]
In Quarter 4	.048 (.214)	.011 (.104)	.034 (.012)*** [+309%]

Note: The two left columns report the mean and standard deviation for the treatment and the matched comparison group. The right column reports the estimated program impact with bootstrap standard errors in parentheses; in brackets is the program impact as a percentage of the matched comparison group mean. Statistical significance: *= at 10 percent level; ** = at 5 percent level; *** = at 1 percent level.

The program was not as effective as the Health Careers program to promote employment in construction, since less than 5 percent of participants were able to find employment in that industry in the four quarters after program entry. However, compared to the matched comparison group, the program did lead to increases in construction employment. For example, although only 4.7 percent of treatment group members were employed in construction in quarter 1, this exceeded the respective proportion of matched comparison group members by 3.7 percentage points. Compared to the matched comparison group mean, this impact is equivalent to more than fourfold increase in the probability of employment in construction. This impact was sustained throughout the 12-month follow-up period.

Exhibit 14 presents the estimated impacts on job retention and earnings. The results show that, although treatment group members had higher job retention rates than matched

comparison group members, the differences were not statistically significant. On the other hand, the program led to positive impacts on earnings in quarter 1 after program entry. The increase in unemployed participant earnings in quarter 1 was $244, a 29 percent impact over the matched comparison group mean. As shown in Exhibit 14, however, the impact on earnings was not sustained in subsequent quarters. Overall, the results show that the Construction Partnership program was effective in promoting the employment of unemployed workers, but had limited effectiveness in promoting employment in the construction sector. Finally, the program was not found effective in promoting job retention and earnings.

Exhibit 14: Program Impacts on Job Retention and Earnings, Construction Partnership

	Treatment Group	Matched Comparison Group	Program Impact [% Comparison Group]
Total Number of Participants	**379**	**36,859**	
Job Retention			
Employed in Q1-2	.290 (.454)	.281 (.449)	*.009 (.026)* [+3%]
Employed in Q1-3	.262 (.440)	.236 (.425)	*.026 (.020)* [+11%]
Employed in Q1-4	.212 (.409)	.204 (.403)	*.008 (.019)* [+4%]
Earnings			
In Quarter 1	1,070 (2,289)	830 (1,880)	*244 (121)*** [+29%]
In Quarter 2	1,277 (2,487)	1,160 (2,304)	*119 (151)* [+10%]
In Quarter 3	1,354 (2,540)	1,258 (2,502)	*99 (150)* [+8%]
In Quarter 4	1,402 (2,433)	1,276 (2,456)	*127 (150)* [+10%]

Note: The two left columns report the mean and standard deviation for the treatment and the matched comparison group. The right column reports the estimated program impact with bootstrap standard errors in parentheses; in brackets, is the program impact as a percentage of the weighted matched comparison group mean. **= statistically significant at 5 percent level.

4.3 Discussion of the Results

Using a quasi-experimental approach, we estimated the impacts of the three Ohio-based NFWS/SIF programs on the labor market outcomes of unemployed workers who entered those programs in the period January 2010 through December 2011. Before we discuss and compare the results across the three programs, we should emphasize that the three programs differed in a variety of ways, including focus industry, characteristics of participants, and services provided. These differences may be important in interpreting the impact results for each program and explaining the variation in impacts across the three programs.

Partly as a result of their different focus industries – healthcare, manufacturing, and construction – there were important differences in the characteristics of unemployed participants across the three programs (see Exhibits 7 and 8). The Health Careers program had much higher proportions of participants who were women, were white, and had more than a high school education relative to the other two programs. Interestingly, the vast majority of unemployed participants in Advanced Manufacturing and Construction Partnership were nonwhites, while Construction Partnership attracted a higher than expected proportion of women, considering the program's focus industry. In addition, Health Careers attracted higher proportions of participants with prior work experience and, perhaps more importantly, with prior work experience in the focus industry of the program, relative to the other two programs.

There were also key differences in the education and career models implemented by each program. The Health Careers program offered a wide range of services to participants, including job readiness training, NCRC preparation assistance, healthcare-focused training, and job search assistance. Program staff worked individually with participants to help them assess which types of services would best help them to achieve their goals. For example, participants with lower education and limited work experience had the option of participating in job readiness training and receiving NCRC assistance as a means of improving their employability before engaging in industry-specific training. Participants with relatively higher levels of education and better employment histories, and particularly those with experience in the

healthcare industry, had the option of participating in industry-focused training upon program entry as a means to help them access mid-level healthcare careers. Throughout the program, participants could receive job search assistance to help them identify and obtain jobs that suited their skills.

The Advanced Manufacturing program used an incremental approach to providing services, in which all program participants were first offered job readiness training and, upon completion, NCRC and MSSC certification training. Those who were successful in obtaining these certificates were then offered academic and career advancement services, including enrollment in undergraduate coursework and specialized apprenticeship programs to help them improve their manufacturing industry credentials and work experience. The Construction Partnership program used a different approach from that of the other two programs, in that its career pathways model was primarily based on pre-apprenticeship programs and on-the-job training. Both the Advanced Manufacturing and Construction Partnership programs offered participants the opportunity to receive personalized job search assistance throughout program participation.

Exhibit 15 provides a summary of the impact results for each program. The results show that all three programs were effective in assisting unemployed participants to become employed following program entry. The Health Careers and Advanced Manufacturing programs led to an immediate impact of 32 and 24 percent, respectively, on employment in quarter 1 after program entry. These impacts increased over time and in quarter 4 after program entry, both programs had a 40 percent impact on employment. The Construction Partnership program did not have a statistically significant impact on employment in quarter 1, but had positive impacts in quarters 2–4, although these were lower than the impacts of the other two programs.

Exhibit 15: Summary of Impact Results

	Health Careers	Advanced Manufacturing	Construction Partnership
Employed			
In Quarter 1	.141 (.012)*** [+32%]	.082 (.020)*** [+24%]	.032 (.029) [+9%]
In Quarter 2	.170 (.016)*** [+37%]	.117 (.017)*** [+32%]	.061 (.028)** [+16%]
In Quarter 3	.176 (.022)*** [+37%]	.158 (.022)*** [+44%]	.052 (.023)** [+13%]
In Quarter 4	.185 (.019)*** [+40%]	.146 (.021)*** [+40%]	.061 (.037)* [+15%]
Employed in Focus Industry			
In Quarter 1	.240 (.012)*** [+233%]	.025 (.007)*** [+156%]	.037 (.008)*** [+336%]
In Quarter 2	.250 (.018)*** [+287%]	.028 (.004)*** [+215%]	.033 (.010)*** [+275%]
In Quarter 3	.253 (.020)*** [+297%]	.025 (.006)*** [+147%]	.035 (.009)*** [+269%]
In Quarter 4	.253 (.015)*** [+304%]	.020 (.007)*** [+167%]	.034 (.012)*** [+309%]
Job Retention			
Employed in Q1-2	.153 (.018)*** [+43%]	.076 (.019)*** [+28%]	*.009 (.026)* [+3%]
Employed in Q1-3	.166 (.021)*** [+53%]	.073 (.026)*** [+33%]	*.026 (.020)* [+11%]
Employed in Q1-4	.173 (.018)*** [+65%]	.057 (.021)*** [+30%]	*.008 (.019)* [+4%]
Earnings			
In Quarter 1	868 (146)*** [+71%]	220 (84)*** [+24%]	*244 (121)*** [+29%]
In Quarter 2	851 (115)*** [+52%]	331 (130)** [+27%]	*119 (151)* [+10%]
In Quarter 3	1,027 (141)*** [+57%]	436 (130)*** [+31%]	*99 (150)* [+8%]
In Quarter 4	1,043 (119)*** [+58%]	641 (183)*** [+42%]	*127 (150)* [+10%]

Note: Reported is the estimated program impact with bootstrap standard errors in parentheses; in brackets, is the program impact as a percentage of the weighted matched comparison group mean. Statistical significance: *= at 10 percent level; **= at 5 percent level; ***= at 1 percent level.

A key objective of these programs was to promote the employment of unemployed workers in their respective focus industries. The analyses show that the Health Careers program was very effective in promoting employment in healthcare – overall, about a third of unemployed

participants in this program were employed in healthcare following program entry (see Exhibit 8). The impact results in Exhibit 15 show that, in fact, the program led to significant impacts on healthcare employment. This suggests that the program's impact on overall employment was driven, perhaps to a great extent, by its effectiveness in helping participants to obtain jobs in healthcare.

On the other hand, less than 5 percent of Advanced Manufacturing and Construction Partnership participants were employed in the program's focus industry (see Exhibits 11 and 13). Nevertheless, the results in Exhibit 15 show that, compared to the matched comparison groups, both programs led to significant improvements in employment in their respective focus industries. But the fact that a low proportion of participants were employed in the focus industry of each program and that the program impacts on focus industry employment were small in size, shows that the two programs were much less effective than the Health Careers program to promote employment in their focus industry.

The impact analyses yielded mixed results about the effectiveness of the three programs in helping unemployed participants find and retain their jobs for long periods after program entry. The most successful program in improving job retention was Health Careers, which led to a statistically significant impact of 65 percent on job retention in quarters 1–4; this means that the probability that unemployed participants would find a job in quarter 1 after program entry and retain that job for at least four quarters after program entry was increased by 65 percent. The Advanced Manufacturing program led to a 30 percent impact on job retention for the four quarters after program entry, which was substantial but lower than the impact of the Health Careers program. In contrast, there is no statistical evidence that the Construction Partnership program was effective in promoting job retention.

A common concern about providing training services to low-skill workers to facilitate their employment is that participants may experience lower earnings after program entry than they would have obtained in the absence of those services. This may be caused by two factors: (1)

completing the training program takes time which does not allow participants to actively look for a job in the initial period after program entry, and (2) the program may push participants to accept jobs that are a weak match for their skills. The analyses of program impacts on quarterly earnings provide evidence that these concerns are not valid in this context. The Health Careers program led to a 71 percent increase in earnings in quarter 1 after program entry, an impact that was sustained through quarter 4. Participants in Advanced Manufacturing experienced a 24 percent impact on earnings in quarter 1, an impact that gradually grew over time to 42 percent in quarter 4. The Construction Partnership program led to positive impacts on quarter 1 earnings (29 percent) but estimated program impacts on earnings in quarters 2–4 lacked statistical significance.

Overall, these results provide evidence that all three programs were effective in improving total employment for unemployed participants in the 12-month follow-up period. The Health Careers program was also very successful in placing program participants in healthcare jobs which was one of the key program objectives. Although there is evidence that the other two programs led to improvements in employment in their focus industries, their overall impacts on this outcome were modest. These results suggest that offering industry-focused training to low-skill workers can be an effective tool for promoting their overall employment even when it does not lead to substantial impacts on employment in the program's focus industry. The results also show that the Health Careers and Advanced Manufacturing programs were successful in promoting job retention and in assisting participants to achieve higher earnings for at least four quarters after program entry. In other words, these two programs were effective in helping participants to obtain jobs that were sustainable and paid higher earnings than the jobs that these participants would have obtained in the absence of the programs.

A key finding of the impact analyses is that there are differences in the results across the three programs. For example, the Health Careers program had large and positive impacts on all four key outcomes of interest, which exceeded or were at least equal to the impacts of the other two programs. The most obvious differences are in the impacts on job retention and earnings;

Health Careers had much higher impacts on these outcomes than the other two programs. In addition, Advanced Manufacturing led to positive impacts on all outcomes of interest which, with the exception of employment in the focus industry, exceeded those of the Construction Partnership. In fact, although the Construction Partnership had positive impacts on overall employment and led to an increase in construction employment relative to the matched comparison group, there is limited evidence that it had any impacts on job retention and earnings.

To some extent, these disparities may be attributed to the differences across the three programs in their focus industry, participant characteristics, and services provided. The Health Careers program focused on healthcare jobs which are typically less volatile and have lower unemployment rates than manufacturing and construction jobs, particularly during periods of relatively high unemployment. For example, as shown in Exhibit 16, the unemployment rate for the healthcare industry in Ohio was 5.1 percent in 2010, which was much lower than the overall unemployment rate in the state (10.7 percent). On the other hand, the manufacturing unemployment rate in Ohio was 11.7 percent, which was one percentage point higher than the overall unemployment rate in the state and more than two times the healthcare unemployment rate. The construction unemployment rate in Ohio was 19.8 percent, which was nearly four times higher than the unemployment rate for healthcare and nearly two times higher than the unemployment rate for manufacturing.[27]

Exhibit 16 also indicates the importance of each of the three sectors in the Ohio workforce as of 2010, as well as employment projections through 2020. As shown, there were a total of 5,368,900 workers in Ohio in 2010, of whom 726,730 (14 percent) were employed in healthcare, 620,450 (12 percent) in manufacturing, and 168,660 (3 percent) in construction. Therefore, construction was the least important employment sector of the three. Employment projections of the Ohio Department of Job and Family Services show that the healthcare industry was expected to grow by 183,150 workers by 2020, a 25 percent increase over the

[27] In 2010, the unemployment rate for the nation was 10.1 percent overall, 5.3 percent for healthcare, 10.7 percent for manufacturing, and 17.9 percent for construction.

2010 figures. The same projections show that manufacturing was expected to shrink by less than 1 percent and construction to grow by 23 percent. These figures indicate that healthcare and construction in Ohio were expected to experience higher than average growth in employment from 2010 through 2020, while manufacturing employment was expected to remain about the same.

Exhibit 16: Ohio Unemployment Rates and Employment Projections, 2010

	Healthcare	Manufacturing	Construction	Overall
Unemployment Rate, 2010	5.1%	11.7%	19.8%	10.7%
Total Employment, 2010 (% of overall employment in state)	726,730 (14%)	620,450 (12%)	168,660 (3%)	5,368,900 (100%)
Employment Projections, 2010-2020 (% change over 2010)	+183,150 (25%)	–2,840 (<1%)	+38,880 (23%)	+498,100 (+9%)

Note: Unemployment rates are based on authors' tabulations of the 2010 American Community Survey. Total employment and employment projections are from the Ohio Job Outlook of the Ohio Department of Job and Family Services (http://ohiolmi.com/proj/OhioJobOutlook.htm).

Based on these figures, the greater impacts estimated for the Health Careers program relative to the other two programs may be attributable to differences in the nature of the programs' focus industries. Health Careers focused on an industry that had very low unemployment, employed a relatively large share of the state's workforce, and was expected to grow substantially. In contrast, Advanced Manufacturing was targeting an industry with slightly higher than average unemployment, an important workforce share, but low growth prospects. Similarly, construction was an industry with very high unemployment rates and lower importance in Ohio's overall workforce.

The disparities in program impacts may also be partly attributed to the fact that the Health Careers program attracted different types of participants relative to the other two programs. For instance, Health Careers attracted relatively high proportions of participants with more than a high school education and with more extensive prior work experience, while the other two programs attracted primarily participants with no more than a high school education and with limited work experience. It is possible that participants with higher levels of education and

greater prior work experience were more likely to benefit from industry-focused training than participants with lower levels of education and weak prior work experience.

Another distinguishing characteristic of Health Careers was that it had among its program partners a set of large employers (i.e., large hospital systems) with very specific occupational training needs and well-defined job demand. These partner employers had the capacity to hire a large number of appropriately trained individuals graduating from the program. Although the Advanced Manufacturing and Construction Partnership programs partnered with a large pool of employers with specific workforce needs, many of these were small employers, who did not have the capacity to hire a large number of program graduates. These differences may have had a bearing on the effectiveness of these two programs in helping participants to access and retain high-quality jobs in their focus industries.

Finally, the disparities in the impact results between the Advanced Manufacturing and Construction Partnership programs may be attributed to the service delivery process. Advanced Manufacturing followed an incremental educational and career model in which participants received training and other services to accumulate industry credential and work experience. This model included basic skills training, credentials training, college-level coursework, and participation in pre-apprenticeship programs. In contrast, the approach used by the Construction Partnership program revolved around on-the-job training obtained through participation in pre-apprenticeship programs. Although each program was developed to fit employer needs, it is possible that the more systematic educational/career process followed by the Advanced Manufacturing program was more effective in helping participants to obtain sustainable jobs and/or jobs that offered higher earnings.

5. Conclusion

Since its establishment in 2007, NFWS has supported a wide range of programs that promote the employment and career advancement of low-skill individuals in in-demand industries. At the beginning of 2010, NFWS was supporting 30 active workforce partnership programs that

were responsible for identifying employer workforce needs in their local areas and developing workforce programs providing training and other services to low-income workers to prepare them to meet those needs. NFWS efforts were enhanced by a 2-year $7.7 million SIF grant awarded in 2010, which was partly used to support scaling up of the operations of those 30 programs.

In 2011, NFWS selected IMPAQ to conduct an evaluation of the 30 NFWS/SIF-funded workforce partnership programs, consisting of two components: (1) an outcome assessment study for all 30 programs to examine participation, services provided, and participant outcomes in the period January 2010 through December 2011; and (2) a quasi-experimental impact study to assess the impacts of selected programs on the labor market outcomes of participants during the same study period. Using a number of criteria, IMPAQ in consultation with NFWS identified 12 programs that were eligible for inclusion in the study, of which three were located in Ohio, seven in Pennsylvania, and two in Wisconsin.

This report presented the results of the quasi-experimental impact study of three Ohio-based NFWS/SIF programs – the Health Careers Collaborative of Greater Cincinnati, the Advanced Manufacturing Partnership, and the Construction Sector Partnership. These three programs were among the largest funded by NFWS/SIF and are broadly representative of the 18 NFWS/SIF programs eligible for this study since they: (1) served 2,055 of the 3,958 (52 percent) unemployed participants in the 12 eligible programs; (2) focused on healthcare, manufacturing, and construction, which were the focus industries of 9 of the 12 eligible programs; and 3) offered services that were representative of those offered by all eligible programs. Using a quasi-experimental approach, this impact study estimated the impacts of each program on the labor market outcomes of participants who were unemployed at program entry.

The study results show that all three programs led to significant positive impacts on overall employment in the 12-month period after program entry. The Health Careers program was also very effective in promoting participant employment in its focus industry, while the other

two programs had modest impacts on this outcome. The Health Careers and Advanced Manufacturing programs were also effective in assisting unemployed participants in finding employment soon after program entry and in retaining those jobs for up to at least one year after program entry. These two programs also had large positive impacts on participant quarterly earnings in the entire follow-up period. In contrast, the Construction Partnership did not lead to statistically significant impacts on job retention and earnings. Although all three programs had positive impacts on overall employment, the impact results show that the Health Careers program had higher overall impacts than the other two programs, and that the Advanced Manufacturing program had positive impacts on a wider range of outcomes than the Construction Partnership program. These disparities in program impacts may be attributed to a number of factors, including the fact that the Health Careers program focused on an industry which, during the study period, had lower unemployment and higher growth potential relative to the focus industries of the other two programs.

Overall, the results of this study show that all three Ohio-based NFWS/SIF programs were effective in helping unemployed participants to improve their labor market outcomes over the 12-month period following program entry. Given the fact that these three programs represent a wide range of NFWS/SIF programs in terms of their focus industry, services provided, and participant characteristics, the results of this study provide evidence that the NFWS model of supporting workforce programs that provide industry-focused training to low-skill unemployed workers to address local workforce needs is an effective reemployment policy.

APPENDIX

Exhibit A: Characteristics of Treatment and Matched Comparison Cases, Health Careers

	Treatment Group	Matched Comparison Group	*Difference*
Total Number of Participants	**992**	**46,701**	
Gender			
Men	.098 (.297)	.100 (.300)	*-.002 [.005]*
Women	.902 (.297)	.900 (.300)	*.002 [.005]*
Race			
White	.503 (.500)	.506 (.500)	*-.003 [.008]*
Black	.400 (.490)	.397 (.489)	*.003 [.008]*
Other Race	.096 (.294)	.096 (.294)	*.000 [.005]*
Missing	.001 (.032)	.001 (.032)	*.000 [.001]*
Education			
No High School Diploma	.081 (.272)	.077 (.267)	*.004 [.004]*
High School Diploma	.384 (.487)	.384 (.486)	*.000 [.008]*
Associate Degree, Some College	.458 (.498)	.458 (.498)	*.000 [.008]*
College Degree	.078 (.268)	.081 (.272)	*-.003 [.004]*
Age			
Less than 25 Years	.314 (.464)	.321 (.467)	*-.007 [.007]*
25-34 Years	.336 (.472)	.337 (.473)	*-.001 [.007]*
35-44 Years	.148 (.355)	.151 (.358)	*-.003 [.006]*
45-54 Years	.125 (.331)	.129 (.335)	*-.004 [.005]*
55-64 Years	.054 (.227)	.056 (.231)	*-.002 [.004]*
65+ Years	.005 (.071)	.005 (.071)	*.000 [.001]*
Missing	.018 (.134)	.001 (.030)	*.017 [.002]****
Local Workforce Investment Area			
Area 12 (Butler County)	.185 (.389)	.187 (.390)	*-.002 [.006]*
Area 13 (Hamilton County)	.794 (.404)	.793 (.405)	*.001 [.006]*
Other Areas	.020 (.141)	.021 (.143)	*-.001 [.002]*
Program Entry			
Quarter 1, 2010	.236 (.424)	.228 (.420)	*.008 [.007]*
Quarter 2, 2010	.077 (.266)	.077 (.266)	*.000 [.004]*
Quarter 3, 2010	.097 (.296)	.100 (.300)	*-.003 [.005]*
Quarter 4, 2010	.094 (.292)	.096 (.294)	*-.002 [.005]*
Quarter 1, 2011	.088 (.283)	.090 (.286)	*-.002 [.004]*
Quarter 2, 2011	.128 (.334)	.128 (.334)	*.000 [.005]*
Quarter 3, 2011	.151 (.358)	.157 (.364)	*-.006 [.006]*
Quarter 4, 2011	.130 (.337)	.124 (.330)	*.005 [.005]*

(Exhibit continues on next page)

(Exhibit A, continued from previous page)

	Treatment Group	Matched Comparison Group	*Difference*
Total Number of Participants	**992**	**46,701**	
Employment			
In Prior Quarter 1	.455 (.498)	.454 (.498)	*.001 [.008]*
In Prior Quarter 2	.491 (.500)	.487 (.500)	*.004 [.008]*
In Prior Quarter 3	.515 (.500)	.509 (.500)	*.006 [.008]*
In Prior Quarter 4	.535 (.499)	.532 (.499)	*.003 [.008]*
In Prior Quarter 5	.526 (.500)	.523 (.499)	*.003 [.008]*
In Prior Quarter 6	.522 (.500)	.524 (.499)	*-.002 [.008]*
In Prior Quarter 7	.553 (.497)	.555 (.497)	*-.002 [.008]*
In Prior Quarter 8	.555 (.489)	.562 (.496)	*-.007 [.008]*
Prior Employment			
In Both Quarters 1-2	.393 (.489)	.391 (488)	*.001 [.008]*
In All Quarters 1-4	.311 (.463)	.309 (.462)	*.002 [.007]*
No Prior Employment			
In Quarters 1-2	.448 (.497)	.450 (.497)	*-.002 [.008]*
In Quarters 1-4	.326 (.469)	.329 (.470)	*-.003 [.007]*
Prior Employment in Healthcare			
In Quarter 1	.202 (.401)	.202 (.402)	*.000 [.006]*
In Quarter 1-4	.282 (.450)	.279 (.449)	*.032 [.007]*
Earnings Amount			
In Prior Quarter 1	1,902 (5,241)	1,878 (5,251)	*24 [86]*
In Prior Quarter 2	1,905 (3,560)	1,897 (3,558)	*8 [71]*
In Prior Quarter 3	2,328 (5,560)	2,377 (5,907)	*-49 [90]*
In Prior Quarter 4	2,216 (4,456)	2,198 (4,320)	*18 [79]*
In Prior Quarter 5	2,380 (5,285)	2,320 (4,582)	*60 [84]*
In Prior Quarter 6	2,348 (4,547)	2,357 (4,509)	*-9 [80]*
In Prior Quarter 7	2,354 (3,718)	2,365 (3,771)	*-11 [70]*
In Prior Quarter 8	2,364 (4,506)	2,364 (3,987)	*0 [78]*

Note: Left and middle columns report mean with standard deviation in parentheses. The right column reports the treatment-matched comparison group difference with standard error in brackets. Statistical significance: *** = at the 1 percent level.

Exhibit B: Characteristics of Treatment and Matched Comparison Cases, Advanced Manufacturing

	Treatment Group	Matched Comparison Group	*Difference*
Total Number of Participants	**682**	**42,293**	
Gender			
Men	.657 (.475)	.661 (.473)	*-.004 [.008]*
Women	.343 (.475)	.339 (.473)	*.004 [.008]*
Race			
White	.208 (.406)	.212 (.409)	*-.004 [.006]*
Black	.757 (.429)	.752 (.432)	*.005 [.007]*
Other Race	.035 (.184)	.036 (.185)	*-.001 [.003]*
Missing	--	--	
Education			
No High School Diploma	.292 (.455)	.303 (.459)	*-.011 [.007]*
High School Diploma	.399 (.490)	.391 (.488)	*.008 [.008]*
Associate Degree, Some College	.273 (.446)	.271 (.444)	*.002 [.007]*
College Degree	.037 (.188)	.036 (.444)	*.001 [.001]*
Age			
Less than 25 Years	.213 (.409)	.209 (.407)	*.004 [.006]*
25-34 Years	.302 (.459)	.311 (.463)	*-.009 [.007]*
35-44 Years	.214 (.410)	.209 (.406)	*.005 [.006]*
45-54 Years	.186 (.390)	.184 (.387)	*.002 [.006]*
55-64 Years	.078 (.268)	.080 (.271)	*-.002 [.044]*
65+ Years	.007 (.085)	.007 (.084)	*.000 [.001]*
Missing	--	--	--
Local Workforce Investment Area			
Area 12 (Butler County)	.119 (.324)	.126 (.331)	*-.007 [.005]*
Area 13 (Hamilton County)	.874 (.332)	.867 (.340)	*.007 [.005]*
Other Areas	.007 (.085)	.008 (.087)	*-.001 [.001]*
Program Entry			
Quarter 1, 2010	.018 (.132)	.018 (.133)	*.000 [.002]*
Quarter 2, 2010	.043 (.202)	.043 (.202)	*.000 [.003]*
Quarter 3, 2010	.076 (.266)	.081 (.272)	*-.005 [.004]*
Quarter 4, 2010	.117 (.322)	.116 (.321)	*.001 [.005]*
Quarter 1, 2011	.213 (.409)	.214 (.410)	*-.001 [.006]*
Quarter 2, 2011	.180 (.385)	.182 (.386)	*-.002 [.006]*
Quarter 3, 2011	.128 (.334)	.135 (.342)	*-.006 [.005]*
Quarter 4, 2011	.226 (.418)	.212 (.408)	*.014 [.007]***

(Exhibit continues on next page)

(Exhibit B, continued from previous page)

	Treatment Group	Matched Comparison Group	*Difference*
Total Number of Participants	**682**	**42,393**	
Employment			
In Prior Quarter 1	.287 (.453)	.288 (.453)	*-.001 [.007]*
In Prior Quarter 2	.292 (.455)	.297 (.457)	*-.005 [.007]*
In Prior Quarter 3	.331 (.471)	.334 (.472)	*-.003 [.007]*
In Prior Quarter 4	.323 (.467)	.331 (.471)	*-.008 [.007]*
In Prior Quarter 5	.342 (.475)	.347 (.476)	*-.005 [.008]*
In Prior Quarter 6	.375 (.485)	.384 (.486)	*-.009 [.008]*
In Prior Quarter 7	.380 (.486)	.388 (.487)	*-.008 [.008]*
In Prior Quarter 8	.427 (.495)	.428 (.495)	*-.001 [.008]*
Prior Employment			
In Both Quarters 1-2	.192 (.394)	.195 (.396)	*-.003 [.006]*
In All Quarters 1-4	.139 (.347)	.142 (.350)	*-.003 [.005]*
No Prior Employment			
In Quarters 1-2	.613 (.487)	.609 (.488)	*.004 [.008]*
In Quarters 1-4	.497 (.500)	.492 (.500)	*.005 [.008]*
Prior Employment in Manufacturing			
In Quarter 1	.028 (.165)	.028 (.166)	*.000 [.003]*
In Quarter 1-4	.050 (.218)	.053 (.223)	*-.003 [.003]*
Earnings Amount			
In Prior Quarter 1	787 (2,472)	817 (2,514)	*-30 [59]*
In Prior Quarter 2	1,076 (3,326)	1,127 (3,436)	*-51 [69]*
In Prior Quarter 3	1,348 (3,358)	1,370 (3,336)	*-22 [60]*
In Prior Quarter 4	1,460 (3,452)	1,508 (3,466)	*-48 [70]*
In Prior Quarter 5	1,612 (3,743)	1,634 (3,535)	*-22 [72]*
In Prior Quarter 6	1,672 (3,515)	1,754 (3,757)	*-82 [72]*
In Prior Quarter 7	1,979 (5,222)	1,948 (4,263)	*31 [82]*
In Prior Quarter 8	1,996 (3,679)	2,067 (3,747)	*-71 [72]*

Note: Left and middle columns report mean with standard deviation in parentheses. The right column reports the treatment-matched comparison group difference with standard error in brackets. Statistical significance: ** = at the 5 percent level.

Exhibit C: Characteristics of Treatment and Matched Comparison Cases, Construction Partnership

	Treatment Group	Matched Comparison Group	*Difference*
Total Number of Participants	**379**	**36,859**	
Gender			
Men	.520 (.500)	.519 (.500)	*.001 [.008]*
Women	.480 (.500)	.481 (.500)	*-.001 [.008]*
Race			
White	.185 (.389)	.187 (.390)	*-.002 [.006]*
Black	.781 (.414)	.778 (.416)	*.003 [.007]*
Other Race	.032 (.175)	.032 (.177)	*.000 [.003]*
Missing	.003 (.051)	.003 (.052)	*.000 [.001]*
Education			
No High School Diploma	.166 (.373)	.167 (.373)	*-.001 [.006]*
High School Diploma	.554 (.498)	.552 (.497)	*.002 [.008]*
Associate Degree, Some College	.245 (.431)	.246 (.430)	*-.001 [.007]*
College Degree	.034 (.182)	.035 (.184)	*-.001 [.003]*
Age			
Less than 25 Years	.311 (.464)	.314 (.464)	*-.003 [.007]*
25-34 Years	.293 (.457)	.294 (.456)	*-.001 [.007]*
35-44 Years	.237 (.426)	.241 (.428)	*-.004 [.007]*
45-54 Years	.127 (.333)	.127 (.333)	*.000 [.005]*
55-64 Years	.021 (.144)	.022 (.145)	*-.001 [.002]*
65+ Years	.003 (.051)	.003 (.052)	*.000 [.001]*
Missing	.008 (.089)	.000 (.000)	*.008 [.001]****
Local Workforce Investment Area			
Area 12 (Butler County)	.140 (.347)	.143 (.350)	*-.003 [.006]*
Area 13 (Hamilton County)	.860 (.347)	.857 (.350)	*.003 [.006]*
Other Areas	--	--	--
Program Entry			
Quarter 1, 2010	.156 (.363)	.155 (.362)	*.001 [.006]*
Quarter 2, 2010	.203 (.403)	.204 (.395)	*-.001 [.006]*
Quarter 3, 2010	.193 (.395)	.194 (.395)	*-.001 [.006]*
Quarter 4, 2010	.198 (.399)	.199 (.399)	*-.001 [.006]*
Quarter 1, 2011	.069 (.253)	.068 (.252)	*.001 [.004]*
Quarter 2, 2011	.065 (.249)	.063 (.244)	*.002 [.004]*
Quarter 3, 2011	.053 (.224)	.054 (.225)	*-.001 [.004]*
Quarter 4, 2011	.063 (.244)	.063 (.244)	*.000 [.004]*

(Exhibit continues on next page)

(Exhibit C, continued from previous page)

	Treatment Group	Matched Comparison Group	*Difference*
Total Number of Participants	**379**	**36,859**	
Employment			
In Prior Quarter 1	.298 (.458)	.302 (.459)	*-.004 [.007]*
In Prior Quarter 2	.346 (.476)	.344 (.475)	*.002 [.008]*
In Prior Quarter 3	.322 (.468)	.323 (.468)	*-.001 [.007]*
In Prior Quarter 4	.343 (.475)	345 (.475)	*-.002 [.008]*
In Prior Quarter 5	.398 (.490)	.397 (.489)	*.001 [.008]*
In Prior Quarter 6	.438 (.497)	.432 (.495)	*.006 [.008]*
In Prior Quarter 7	.451 (.498)	.445 (.497)	*.006 [.008]*
In Prior Quarter 8	.449 (.498)	.446 (.497)	*.003 [.008]*
Prior Employment			
In Both Quarters 1-2	.211 (.409)	.214 (.410)	*-.003 [.006]*
In All Quarters 1-4	.129 (.336)	.131 (.337)	*-.002 [.005]*
No Prior Employment			
In Quarters 1-2	.567 (.496)	.568 (.495)	*-.001 [.008]*
In Quarters 1-4	.443 (.497)	.445 (.497)	*-.002 [.008]*
Prior Employment in Construction			
In Quarter 1	.013 (.114)	.014 (.116)	*-.001 [.002]*
In Quarter 1-4	.018 (.135)	.016 (.127)	*.002 [.002]*
Earnings Amount			
In Prior Quarter 1	1,028 (5,549)	1,045 (5,573)	*-17 [89]*
In Prior Quarter 2	824 (2,046)	836 (2,063)	*-12 [54]*
In Prior Quarter 3	935 (2,369)	952 (2,392)	*-17 [58]*
In Prior Quarter 4	1,095 (2,677)	1,109 (2,704)	*-14 [62]*
In Prior Quarter 5	1,172 (2,448)	1,186 (2,476)	*-14 [59]*
In Prior Quarter 6	1,627 (5,800)	1,645 (5,966)	*-18 [91]*
In Prior Quarter 7	1,460 (2,770)	1,459 (2,908)	*1 [63]*
In Prior Quarter 8	1,451 (2,855)	1,456 (2,867)	*-5 [64]*

Note: Left and middle columns report mean with standard deviation in parentheses. The right column reports the treatment-matched comparison group difference with standard error in brackets. Statistical significance: *** = at the 1 percent level.