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Survey Non-Response Bias in the Evaluation of the Ready to Work Partnership Grant Program

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When conducting an impact evaluation of a training program, such as the Department of Labor’s Ready to Work (RTW) Partnership Grant Program (see Box 1 on page 2), follow-up surveys of study members are a potentially valuable way to measure outcomes. The RTW Evaluation included an experimental impact study (i.e., using random assignment) to assess the impact of the RTW program. For that evaluation, earnings and employment outcomes were measured in administrative data for essentially the full study sample, but training and service receipt outcomes were measured only in an 18-month follow-up survey. Like almost all such surveys, most study members responded to the survey, but some did not. Sometimes the survey did not reach a study member; sometimes a study member was reached but chose not to respond. Such non-response can result in survey non-response bias; that is, differences in estimates when using only survey respondents relative to what the estimates would have been for the full sample.

In an effort to minimize such survey non-response bias, evaluations typically apply weights when estimating impacts on outcomes measured in a survey. These weights make the sample of survey respondents more similar to the full study sample

in terms of baseline characteristics.¹ The extent to which such weights eliminate survey non-response bias is unclear (Barnow and Greenberg, 2015, 2019).

When a survey is the only means to measure outcomes, an evaluation can calculate the level of non-response to the survey, but cannot explore the magnitude of bias introduced by that non-response. To assess whether impacts estimated on *survey respondents alone* vary from impacts estimated on the *full* sample, an evaluation must have data on outcomes for everyone in the sample. But for outcomes measured with survey data (“survey-based outcomes”), the evaluation—by definition—does not have outcomes for the full sample. This is because the study lacks data for those who did not respond to the survey.

However, when an evaluation also has administrative data on outcomes which is available for the *full* sample, it can explore the magnitude of the survey non-response bias associated with that survey.² Specifically, using outcomes measured in the administrative data (“administrative-based outcomes”), it is possible to compare estimated impacts for the full sample to estimated impacts for survey respondents alone.³

KEY FINDINGS

- Using administrative and survey data collected as part of the Ready to Work (RTW) Evaluation, this study finds no clear evidence that non-response to the follow-up survey generated “survey non-response bias” in estimated impacts on two outcomes measured for the full study sample in administrative data.
- Namely, for earnings and employment, calculating impacts on survey respondents provided estimated impacts that were not statistically significantly different than impacts estimated on the full sample (respondents and non-respondents). Because the RTW Evaluation was an experimental impact study, estimates of impact using the full sample provides a strong estimate of the true impact of the program.
- Although evaluations normally apply weights based on baseline characteristics when estimating impacts with survey-based outcomes, those weights may not address survey non-response bias, or provide impact estimates that are more similar to those for the full sample, if the outcomes for survey respondents are different from the outcomes for non-respondents.
- For earnings and employment, in the RTW Evaluation applying non-response weights did not substantially decrease the difference in estimated impacts between survey respondents and the full sample, although there remained no clear evidence of bias in the weighted estimate of impact.
- A lack of evidence of survey non-response bias in impacts estimated on RTW outcomes measured in administrative data (where data availability for both survey respondents and non-respondents allows a test for bias), suggests there is no clear reason to be concerned about non-response bias in impacts estimated on outcomes measured in RTW survey data (where lack of data for non-respondents does not allow a direct test).

A statistically significant difference in these two impact estimates—for everyone versus survey respondents alone—suggests that the non-response to the survey generated bias. The magnitude of this bias can vary by outcome. However, assessing the magnitude and direction of bias evident in estimated impacts for *administrative-based outcomes* can provide insight on the likely magnitude and direction of bias captured in estimated impacts on *survey-based outcomes*. And comparing the estimated impacts using survey respondents before and after applying survey non-response weights can assess the extent to which those weights address this bias.

This brief reports results of such an exploration using data collected for the evaluation of the RTW Partnership Grant program. Additional detail on the RTW program and its evaluation are provided in Box 1 and in Appendix Section A.1.

BOX 1: THE READY TO WORK PARTNERSHIP GRANT PROGRAM

In 2014 the U.S. Department of Labor (DOL) provided RTW grants to 23 partnerships of workforce agencies, training providers, employers, and other local organizations. These grantee RTW programs, operating from 2015 to 2019, provided customized services, including occupational training, employment readiness and job search services, and work-based training, to prepare long-term unemployed and underemployed workers for employment in higher-paying middle- and high-skill jobs.

DOL also funded an evaluation to understand the implementation and impact of the RTW programs offered by four grantees. For more information on the RTW program and evaluation, see Appendix Section A.1.

1 Why Survey Non-Response Might Matter

1. Why Survey Non-Response Might Matter

Experimental impact studies can provide strong evidence of the impact of a program on its participants. Such studies randomly assign program applicants either to a program group (who are offered the program) or to a control group (who are not offered the program). Random assignment ensures that there are no systematic differences between the two groups at “baseline”—that is, when they enter the study. (This can be assessed by comparing the baseline characteristics of the two groups.) Thus, differences in outcomes between the two groups—the impacts—are due either to the program or to chance (Fisher, 1935). Evaluations use conventional statistical methods to identify how likely a given impact estimate (or one more extreme) would occur by chance if the program actually had no impact. Through these methods, experimental impact studies provide strong estimates of the impact of the given program.

This argument for random assignment, however, requires maintaining the comparability of the two groups—that is, comparing *everyone* in the program group to *everyone* in the control group. This is feasible for outcomes measured for all members of the study sample—as is often (nearly) true for administrative data. However, if outcomes are measured only for some study members—as in a survey—bias can arise if the outcomes for those with available data vary from the outcomes for those with no data (Little and Rubin, 2019).

Some outcomes of interest are not available through administrative data; for example, receipt of training and services. To measure such outcomes, evaluations often field a survey.⁴ Even well-conducted surveys with good contact information and intensive follow-up often have response rates below 80 percent. If the average outcomes for study members who respond to the survey are systematically different from the average outcomes for study members who do not respond, then estimated impacts from a survey-based analysis could differ from the estimated impacts if everyone had responded to the survey (Barnow and Greenberg, 2015, 2019).

In an effort to address this potential survey non-response bias, evaluations estimate impacts on survey-based outcomes applying non-response weights. Those weights use baseline characteristics to place more weight on the outcomes of survey respondents whose characteristics are more similar to those study members who did not respond to the survey. When analyses use weights, average baseline characteristics among the survey respondents are by construction similar to the average characteristics among the full sample. But to the extent that the correlation between survey response and outcomes is unrelated to baseline characteristics, these weights will not address survey non-response bias captured in impacts estimated on survey-based outcomes.

2 Who Responds? Who Does Not?

2. Who Responds? Who Does Not?

To measure impacts on outcomes not available in administrative data—such as service receipt, educational attainment, and job characteristics—the RTW Evaluation fielded a follow-up survey approximately 18 months after random assignment. Of the 3,612 study members, the evaluation team conducted survey interviews with 2,848, for an overall response rate of 79 percent.⁵

As a first step to assess whether survey non-response may have generated bias for the RTW Evaluation, this section reports tests of whether those sample members who responded to the survey vary systematically from those sample members who did not. Using data collected prior to random assignment from two sources, Exhibit 1 compares the baseline characteristics of survey respondents to the baseline characteristics of survey non-respondents. Demographic characteristics are from a Baseline Information Form collected from all study members prior to random assignment. Quarterly employment and earnings for the seven quarters prior to study entry are from the National Directory of New Hires (NDNH) and are available for essentially

BOX 2: STUDY SAMPLE AND DATA SOURCES

This analysis studies survey non-response bias for the sample of applicants to the four RTW grantee programs included in the RTW Evaluation. It pools the four grantee program samples included in the evaluation to yield a total sample of 3,553 applicants.

To measure outcomes the analysis uses data collected in a follow-up survey conducted approximately 18 months after random assignment, and administrative data on quarterly earnings from the National Directory of New Hires. The analysis also uses information on applicant demographics collected at application to the RTW program (between 2015 and 2018). See Appendix Section A.2 for more detail on these data sources.

the full sample (98 percent).⁶ The last column of Exhibit 1 reports the differences between the two groups; an asterisk indicates which differences are statistically significantly different from zero (i.e., clearly not due to chance).

2 Who Responds? Who Does Not?

Exhibit 1: Baseline Characteristics of Survey Respondents and Non-Respondents

Baseline Characteristic	Full Study Sample Mean	Survey Respondent Mean	Survey Non-Respondent Mean	Respondent/Non-Respondent Difference
Gender (%)				
Women	48	49	46	3
Men	52	51	54	-3
Race (%)				
Asian	11	11	13	-2
Black or African American	26	26	26	0
White	54	54	52	3
American Indian or Alaskan Native	1	1	1	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Other or multiple races	8	7	9	-1
Hispanic Ethnicity (%)	7	7	9	-3*
Age (%)				
28 years or younger	11	10	14	-4*
29 to 38 years	22	21	27	-6*
39 to 48 years	24	25	22	3
49 to 58 years	30	31	26	6*
59 years or older	12	13	11	2
Marital Status (%)				
Married	40	42	34	8*
Widowed/divorced/separated	20	19	21	-2
Never married	36	35	40	-6*
Living with a partner	4	4	5	0
One or more own children in household age 6 or younger (%)	15	15	15	0
Education Level (%)				
High school diploma or less	10	8	14	-6
Some college credit but no degree	13	12	15	-3
Technical or associate's degree	16	15	18	-3
Bachelor's degree	40	42	32	10*
Master's degree or more	22	22	21	1

2 Who Responds? Who Does Not?

Baseline Characteristic	Full Study Sample Mean	Survey Respondent Mean	Survey Non-Respondent Mean	Respondent/Non-Respondent Difference
Earnings before Random Assignment (RA):				
Q7 pre-RA (\$)	7,580	7,853	6,545	1,307*
Q6 pre-RA (\$)	7,633	7,918	6,550	1,367*
Q5 pre-RA (\$)	7,157	7,415	6,174	1,241*
Q4 pre-RA (\$)	7,234	7,489	6,264	1,225*
Q3 pre-RA (\$)	6,774	6,947	6,116	831
Q2 pre-RA (\$)	5,280	5,482	4,511	971*
Q1 pre-RA (\$)	2,941	3,024	2,625	399
Employment Before Random Assignment (RA):				
Q7 pre-RA (%)	59	59	59	0
Q6 pre-RA (%)	59	60	59	1
Q5 pre-RA (%)	58	58	58	1
Q4 pre-RA (%)	57	57	55	2
Q3 pre-RA (%)	54	54	53	1
Q2 pre-RA (%)	48	49	48	1
Q1 pre-RA (%)	38	38	36	2

KEY: Q=quarter; RA=random assignment.

SOURCE: Baseline Information Form (BIF) and National Directory of New Hires (NDNH).

SAMPLE: 3,553 individuals who applied to one of four RTW grantee programs included in the RTW Evaluation who had available data from the NDNH; includes 2,813 survey respondents and 740 non-respondents.

NOTES: Reported difference might not equal the difference between the survey respondent mean and survey non-respondent mean because of rounding. Statistically significant differences at the $p < .05$ level (using two-sided t-tests) are indicated by * in the "Difference" column. See Appendix Exhibit A.4-1 for more detail.

As shown, average characteristics of respondents and non-respondents are statistically significantly different for some, but not all, baseline characteristics. Compared to respondents, non-respondents are younger at application to the program (e.g., a higher percentage are younger than age 30) and are less well educated (e.g.,

a lower percentage have a bachelor's degree). A lower percentage are married, and a higher percentage are Hispanic. On average, non-respondents also have lower earnings (by 15 percent or more) between one and two years before applying to the RTW program.

3 Estimating Impacts for Survey Respondents versus the Full Sample

3. Estimating Impacts for Survey Respondents versus the Full Sample

That there are statistically significant differences in baseline characteristics between survey respondents and survey non-respondents makes it plausible that there is survey non-response bias; that is, average outcomes and impacts estimated on survey respondents differ from average outcomes and impacts estimated on the full sample.

Because we do not have survey data for non-respondents, we cannot directly assess the magnitude of non-response bias in survey-based outcomes. However, because we have administrative data for both survey non-respondents and respondents, we can assess the magnitude of non-response bias for administrative-based outcomes. This section does so by estimating the presence, magnitude, direction, and

statistical significance of survey non-response bias in two outcomes for the RTW Evaluation measured with administrative data: average quarterly earnings and any employment in the fifth and sixth calendar quarters after random assignment (Q5-Q6).⁷ In particular, this section explores: *How different are means and estimated impacts for these two outcomes on survey respondents from corresponding estimates for the full sample?*

Using the NDNH data, for the fifth and sixth quarters after random assignment, approximately the same time as the RTW 18-month follow-up survey, Exhibit 2 reports average quarterly earnings and any employment, and the impact of the offer of the RTW program on these two outcomes. Because the evaluation has NDNH data for 98 percent of the full sample, the impacts reported in the first row of Exhibit 2 (row [A]) have essentially no non-response bias.

Exhibit 2: Estimated Impact for NDNH-Measured Earnings and Employment (Q5-Q6)

Sample	Average Quarterly Earnings Q5 and Q6			in	Ever Employed during Q5 or Q6		
	Mean (\$)	Impact (\$)	Standard Error (\$)		Mean (%)	Impact (pp)	Standard Error (pp)
[A] Full Sample	8,084	-339	277		72.3	-0.1	1.5
[B] Survey Respondents, Unweighted	8,282	-239	314		73.6	-0.6	1.6
[C] Survey Respondents, Weighted	8,139	-190	307		73.5	-0.5	1.6

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 3,553 applicants to one of four RTW grantee programs included in the RTW Evaluation who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 2,813 respondents to the RTW 18-month follow-up survey. Impacts are estimated controlling for all covariates used as controls in one or more of the four program-specific impact analyses conducted as part of the Interim Impact Report for the RTW Evaluation (Herr, Klerman, Martinson, and Copson, 2022; see its Section E.4 for the full list). The first row (marked [A]) reports impacts estimated on the full sample, the second row (marked [B]) reports impacts estimated on the sample of survey respondents without applying survey non-response weights, and the third row (marked [C]) reports impacts estimated on the sample of survey respondents after applying survey non-response weights. None of the impact estimates are statistically different from zero. See Section A.4 of the appendix for the corresponding results separately for the four RTW grantee programs included in the RTW Evaluation.

3 Estimating Impacts for Survey Respondents versus the Full Sample

The next two rows of Exhibit 2 report the estimated impacts when estimated only on survey respondents, without applying survey non-response weights (row [B]) and applying weights (row [C]; see discussion of these results below).⁸ Differences between the estimated levels and impacts in rows [A] and [B] arise only due to survey non-response bias. Everything else is the same. Thus, if the outcomes for the survey respondents accurately represent the outcomes for all study members, then the estimated impacts on employment and earnings in row [B] would be similar to the estimated impacts in row [A].

Although this comparison of row [B] to row [A] provides insight on the magnitude of survey non-response bias in the RTW 18-month follow-up survey, it is not the most useful comparison. This is because, like impact evaluations in general, the RTW Evaluation applied survey non-response weights when estimating impacts

on survey-based outcomes. Thus, to understand the magnitude of survey non-response bias that remains in the evaluation’s reported impact estimates, it is most useful to compare the estimated impact for the full sample (row [A] of Exhibit 2) to the estimated impact for survey respondents after applying the evaluation’s survey non-response weights (row [C]).

Exhibit 3 reports the level of bias—that is, the difference in estimates using survey respondents versus using the full sample—first without applying weights (labeled “Unweighted”), and second after applying the evaluation’s non-response weights (labeled “Weighted”). The first row reports the level of survey non-response bias that arises from the RTW follow-up survey without using non-response weights. The second row reports the level of survey non-response bias that remains using non-response weights.

Exhibit 3: Estimated Bias for NDNH-Measured Earnings and Employment (Q5-Q6)

Bias	Average Quarterly Earnings Q5 and Q6				in Ever Employed during or Q6				Q5
	Mean (\$)	Impact (\$)	Standard Error (\$)	Relative Bias (%)	Mean (%)	Impact (pp)	Standard Error (pp)	Relative Bias (%)	
Unweighted ([B] – [A])	198	101	143	36	1.3	-0.5	0.8	-36	
Weighted ([C] – [A])	56	149	144	54	1.2	-0.4	0.8	-30	

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 3,553 applicants to one of four RTW grantee programs included in the RTW Evaluation who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 2,813 respondents to the RTW 18-month follow-up survey. Bias in the means (“Mean”) calculated as the difference in the means between the sample of survey respondents (row [B] of Exhibit 2 for unweighted, row [C] of Exhibit 2 for weighted) and the full sample (row [A] of Exhibit 2); reported difference may not be equal to the difference in the Exhibit 2 values because of rounding. Bias in impacts (“Impact”) estimated as described in Appendix Section A.3; in practice this provides a value equal to the difference in the impacts between the sample of survey respondents (row [B] of Exhibit 2 for unweighted, row [C] of Exhibit 2 for weighted) and the full sample (row [A] of Exhibit 2). Standard error quantifies the precision of the estimated bias in the impacts; none are statistically different from zero. Relative bias calculated as the ratio of the difference in impacts (“Impact” column in this exhibit) divided by the standard error of the impact estimate when calculated in the full sample (row [A] of Exhibit 2). See Section A.4 of the appendix for the corresponding results separately for the four RTW grantee programs included in the RTW Evaluation.

3 Estimating Impacts for Survey Respondents versus the Full Sample

In particular, for the earnings and employment outcomes and for both unweighted and weighted measures, in Exhibit 3 the first number reported (“Mean”) is the bias in the estimated mean, calculated as the difference between the average outcome for the full sample (row [A] in Exhibit 2) and the average outcome for the survey respondents (row [B] for unweighted, and row [C] for weighted). The second number (“Impact”) is the bias in the estimated impact, calculated as discussed in Appendix Section A.3, and also equal to the difference in the estimated impact between the full sample (row [A]) and the survey respondents (row [B] or [C]). The third number (“Standard Error”) is a measure of uncertainty in the estimated bias in the estimate of impact; estimated biases that are significantly different from zero would be noted with an asterisk in the “Impact” column. The fourth number (“Relative Bias”) reports the magnitude of the bias in the estimate of impact as a percentage of the standard error of the estimated impact for the full sample (row [A] in Exhibit 2).

Earnings

Level of earnings—The difference in average quarterly earnings between the full sample and survey respondents is small, without or with survey non-response weights. In the full sample, average quarterly earnings in Q5-Q6 are \$8,084 (row [A] of Exhibit 2). Considering only survey respondents without applying weights, average earnings are about 2 percent higher (\$8,282, row [B]). Applying the survey non-response weights drops this difference to less than 1 percent (\$8,139, row [C]). Thus, survey non-response did not have a large effect on the measure of average earnings; that is, estimates using only survey respondents are similar to estimates using the full sample.

Impact on earnings—In the full sample, the estimated impact of the offer of the RTW program on average quarterly earnings in Q5-Q6 is -\$339 (row [A] of Exhibit 2). This estimate is not statistically different from zero. There is therefore no clear evidence that the RTW

programs increased participants’ earnings. As noted above, because this impact is calculated on (almost) the full sample, this estimate has essentially no non-response bias.

Using only survey respondents, before applying weights the estimated impact on earnings is -\$239 (see row [B] of Exhibit 2)—an upward bias of \$101, reflecting a relative bias of 36 percent (see “Impact” and “Relative Bias” in the first row of Exhibit 3, respectively). This bias is not statistically different from zero (as indicated by the lack of an asterisk in the “Impact” column), meaning there is no clear evidence of non-response bias, although the estimated magnitude of the bias is not small.

After applying the survey non-response weights—built to address the difference in characteristics between those who did and did not respond to the survey—the bias in the estimated impact does not decline. Instead, the weighted estimate of impact is somewhat less negative than the unweighted estimate, -\$190 (see row [C] of Exhibit 2), an upward bias of \$149, reflecting a somewhat larger relative bias of 54 percent (see second row of Exhibit 3). This estimated bias is also statistically insignificantly different from zero, meaning that there is no clear evidence of non-response bias, although the relative bias is larger than before applying non-response weights. Furthermore, for this outcome, although the bias in the estimated impact is not significantly different whether or not weights are applied, using weights that were built to address possible non-response bias does not provide an estimate closer to the full-sample impact.

Employment

Employment levels—The difference in average employment between the full sample and survey respondents is small, without or with survey non-response weights (less than 1.5 percentage points, see Exhibit 3). In the full sample, the percentage employed in either Q5 or Q6 is 72.3 percent (see row [A] of Exhibit 2). Considering only survey

3 Estimating Impacts for Survey Respondents versus the Full Sample

respondents without using weights, the average employment rate is less than 2 percent higher (73.6 percent, see row [B]). Using survey non-response weights leaves average employment almost unchanged (73.5 percent, see row [C]). Thus, as for earnings, survey non-response did not have a large effect on the estimate of average employment. Unlike for earnings, however, weighting does not reduce this admittedly small amount of bias.

Impacts on employment—In the full sample the estimated impact of the offer of the RTW program on any employment in Q5 or Q6 is -0.1 percentage points (see row [A] of Exhibit 2). This impact estimate is not statistically significantly different from zero, meaning there is no clear evidence that the RTW programs increased participants' employment.

Using only survey respondents, without weights the estimated impact is -0.6 percentage points (see row [B] of Exhibit 2). The implied survey non-response bias is -0.5 percentage points, a relative bias of -36 percent (see first row of Exhibit 3).

This estimated bias is not statistically significantly different from zero, meaning that there is no clear evidence of non-response bias. Thus, for both average quarterly earnings and any employment, there is no clear evidence of bias in the estimated impact due to non-response to the RTW follow-up survey, although in both cases the absolute value of the estimated magnitude of the bias is not small (36 percent).

Applying the survey non-response weights makes only a small difference in the estimated impact and the bias captured in that estimate. After weighting, the estimated impact on employment is -0.5 percentage points (see row [C] of Exhibit 2), with a somewhat smaller estimated bias of -0.4 percentage points, and a relative bias of -30 percent (see second row of Exhibit 3). Again, this estimated bias is not statistically significantly different from zero, meaning that there is no clear evidence of non-response bias. Thus, whereas for earnings using survey non-response weights does not reduce the relative bias, for employment applying the weights decreases the bias very slightly.

4 Summary and Discussion

4. Summary and Discussion

This analysis assesses the potential importance of survey non-response bias in an evaluation with a sample size of 3,553 study members in which the follow-up survey had a relatively high response rate of 79 percent. The analysis assesses estimates of the magnitude of survey non-response bias on two outcomes, earnings and employment, measured in NDNH data available for essentially the full study sample for the RTW Evaluation. If there were no bias generated by non-response to the RTW follow-up survey, estimated impacts on these NDNH-based outcomes calculated using only survey respondents would be similar to estimated impacts calculated using the full sample. If, however, this comparison for NDNH-based outcomes found evidence of survey non-response bias, and that bias remained after applying non-response weights, this would suggest two conditions: (1) that non-response to the survey generated bias, and (2) that even with non-response weights, the reported impacts estimated on survey-based outcomes also might be biased.

Focusing on average quarterly earnings and any employment in the fifth and sixth quarters after random assignment, the approximate timing of the RTW follow-up survey, there is no clear evidence of non-response bias when comparing either the *levels* or the *impacts* of both earnings

and employment for survey respondents versus the full sample. This lack of clear evidence of non-response bias applies both before and after applying survey non-response weights, although in both cases applying weights does not bring the estimated impact substantially closer to the full-sample result. For employment the estimated impact is largely unchanged, and for earnings the estimated impact moves further away from the full-sample result. However, although the analysis finds no clear evidence of bias, the estimated *relative* bias—the magnitude of that bias—is not small. After applying non-response weights, the absolute value of the relative bias is 54 percent for earnings and 30 percent for employment. This suggests that this analysis—even with a sample of 3,553—only has the ability to detect even larger non-response biases.

In sum, for these two NDNH-based outcomes this analysis finds no clear evidence of survey non-response bias, although the analysis only has the ability to detect quite large bias. Thus, although one cannot directly assess the magnitude or direction of non-response bias for survey-based outcomes—because by definition the evaluation lacks data for the non-respondents—these findings provide no clear reason for concern that the results of the RTW Evaluation for outcomes measured in the follow-up survey reflect substantial non-response bias.

Appendix

This appendix provides background and additional detail for the analysis of the evidence of survey non-response bias in the evaluation of the Ready to Work (RTW) Partnership Grant program. Section A.1 provides additional information about the RTW grant program and its evaluation. Section A.2 provides additional technical detail on the data used for the analysis. Section A.3 describes the regression specification for the test for bias in the estimated impacts reported in Section 3. Section A.4 provides additional detail for the results reported in Section 3.

A.1 The Ready to Work Grant Program and Evaluation

The U.S. Department of Labor (DOL) funded the Ready to Work Partnership Grant Program to establish local programs that might prove effective in preparing long-term unemployed and underemployed U.S. workers for employment in higher-paying middle- and high-skill jobs (DOL/ETA, 2014). Per DOL guidance, targeted workers included those who had lost their jobs during or after the 2007-2009 recession and who either remained unemployed (for 27 consecutive weeks or more) or were underemployed (meaning those who had obtained short-term or part-time employment but had not yet found a full-time job in line with their previous level of skill or earnings). Operating between 2015 and 2019, the RTW programs were to use the funds to provide such workers with a range of customized services including staff guidance on career planning, occupational training, work-based training, employment readiness courses, and job search assistance.

To understand the implementation of the RTW grant program and its impact on participants' outcomes, the RTW Evaluation, conducted by Abt Associates and MEF Associates for DOL's Employment and Training Administration, included an implementation study and an

experimental impact study. See Martinson et al. (2017) and Copson et al. (2020) for the findings of the implementation study. See Klerman, Herr, Martinson, and Copson (2022) and Herr, Klerman, Martinson, and Copson (2022) for the results of the Interim Impact Study through 18 months after program application, and Klerman, Herr, and Martinson (2022) and Herr, Klerman, and Martinson (2022) for the results of the Final Impact Study through three to four years after program application.

The RTW Evaluation assessed the following four purposively selected RTW programs:

- Maryland Tech Connection (MTC), offered by the Anne Arundel Workforce Development Corporation (AAWDC) in Maryland, largely in the Baltimore/Washington, DC corridor;
- Skills to Work in Technology (STW-T) and Job Search Accelerator (JSA), offered by Jewish Vocational Service (JVS), in the San Francisco Bay Area;
- Finger Lakes Hired (FLH), offered by RochesterWorks! in the Rochester, NY area; and
- Reboot Northwest (Reboot NW), offered by Worksystems Inc. (WSI) in the Portland, OR / Vancouver, WA areas.

To estimate the impact of the RTW programs on participant outcomes, the evaluation used a random assignment experimental design. Over a three-year period (July 2015 to August 2018), grantees used a lottery-like process to randomly assign eligible applicants either to a program group that had access to the RTW program services or to a control group that was not offered the RTW services but had access to other resources in the community. The evaluation assessed impacts on services received, employment, and earnings. The follow-up period for the evaluation extended through late 2021.

A.2 RTW Data Sources

A.2 RTW Data Sources

This appendix describes the three primary data sources for the RTW Evaluation’s impact study. Section A.2.1 provides detail on the Baseline Information Form, completed by all applicants directly before they were randomly assigned. Section A.2.2 provides detail on the follow-up survey conducted approximately 18 months after random assignment. Section A.2.3 discusses the administrative data collected in the National Directory of New Hires.

A.2.1 Baseline Information Form

At the time of their application to the given RTW program, but before random assignment occurred, each study member completed a Baseline Information Form (BIF). This form collected detailed demographic and socioeconomic characteristics including education history; employment history; current barriers to employment and views about work; current wages and earnings; public benefits receipt; and total income. In addition, the BIF collected detailed contact information for the study member and up to three additional contacts to assist with locating efforts for the follow-up survey.

The analysis reported in this brief uses data collected in the BIF to compare the characteristics of those study members who responded to the 18-month follow up survey (“survey respondents”) to those who did not respond (“survey non-respondents”). The analysis also uses the RTW Evaluation survey non-response weights, which were created using baseline characteristics collected in the BIF. See Appendix Section A.1.5 of Herr, Klerman, Martinson, and Copson (2022) for detail on how these non-response weights were constructed.

A.2.2 18-Month Follow-Up Survey

The RTW follow-up survey was fielded starting 18 months after random assignment with all

study members for the four grantee programs included in the evaluation. For members of both the program and control groups, the survey collected information on receipt of training and related supports; receipt of job search assistance; completion of additional education and receipt of credentials; current employment status and barriers to employment; job characteristics (e.g., hours worked and usual work schedule); current earnings; receipt of public benefits; and total income.

The RTW Evaluation used these survey responses to characterize the experiences of study members, to measure outcomes 18 months after random assignment, and to measure the impact of the RTW program on these outcomes. See Appendix C of Herr, Klerman, Martinson, and Copson (2022) for more detail on survey methods for the 18-month follow-up survey.⁹

A.2.3 National Directory of New Hires

The RTW Evaluation used administrative data from the National Directory of New Hires (NDNH) as the primary source of earnings and employment information. The NDNH, which is compiled and maintained by the Office of Child Support Enforcement (OCSE) in the U.S. Department of Health and Human Services, is a national database of new hire date, quarterly wages, and Unemployment Insurance (UI) data submitted to OCSE by State Directories of New Hires, employers, and state workforce agencies, augmented with federal government payroll information.¹⁰

To collect NDNH data for the RTW study members, OCSE performed a match to a record in the Social Security Administration (SSA) database based on a combination of name and Social Security Number (SSN) before including that record in the NDNH dataset for use in the evaluation. OCSE only provided records for those study members who could be confirmed in the SSA database. Those study members who were not matched in the SSA database

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were considered “missing” for the purposes of the RTW Evaluation, because their employment records were not available. Fewer than 2 percent of all RTW study members failed to match name and SSN against the SSA master records.¹¹

Because the NDNH captures information for all federal jobs and all jobs covered by UI, it provided quarterly earnings data for almost the full study sample, with information from the vast majority of their jobs. These records do not, however, include information for jobs that are “off the books” or for other types of jobs for which workers do not receive a W-2 form, such as self-employment or work as an independent contractor, employment in service for a relative, domestic service, and some casual employment “not in the course of the employer’s business.”¹²

This brief’s analysis uses NDNH quarterly data on study members’ earnings in the seven quarters before random assignment (the earliest data available), and in the fifth and sixth quarters after random assignment, treating the quarter of random assignment as “quarter 0.” For each of these quarters, it also infers employment based on earnings (i.e., non-zero earnings).

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This section describes the regression specification for the test for bias in the estimated impacts reported in Exhibit 3 and Appendix Exhibits A.4-3, A.4-5, A.4-7, and A.4-9. The impact estimates reported in Exhibit 2 and Appendix Exhibits A.4-2, A.4-4, A.4-6, and A.4-8 are estimated as described in Appendix Section A.1 of the *Technical Appendix for the Interim Impact Study* (Herr, Klerman, Martinson, and Copson 2022).

To test for bias in the estimated impacts on average quarterly earnings and any employment in the fifth and sixth quarters after random assignment, the analysis builds a supplemental dataset which combines one record for each

individual in the full sample, plus a duplicate record for each survey respondent. This provides a sample size of 6,366 records: 3,553 records for the full sample, plus 2,813 records for the individuals in the survey sample. Thus, each member of the survey sample is included twice in this supplemental dataset.

Using this dataset, the analysis estimates the bias on the impact estimates by running a regression including the same set of variables as in the main specification (see the notes to Exhibit 2, and Appendix Exhibits A.4-2, A.4-4, A.4-6, and A.4-8 for detail), plus a binary variable indicating the duplicate records for the survey respondents, and the interaction of this “survey respondent” indicator variable with all of the other variables included in the model. (For a given individual among the survey respondents, for their entry as part of the full sample this “survey respondent” indicator is equal to zero, and for their entry as part of the survey respondents this indicator is equal to one.) The estimated bias of the given impact estimate is the coefficient on the interaction between the “survey respondent” indicator and the program group indicator.

To estimate the bias on the unweighted impact estimates, this analysis is run without weights. To estimate the bias in the weighted impact estimates, the analysis is run with weights that are equal to one for every “full sample” record and equal to the survey non-response weights for the “survey respondent” records. Namely, for a given individual among the survey respondents, for their entry as part of the full sample the weight is set equal to one, and for their entry as part of the survey respondents their weight is set equal to their survey non-response weight.

A.4 Detailed Results

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This section provides additional technical detail for the results reported in Section 3 on evidence of survey non-response bias in the evaluation of the Ready to Work program. Section A.4.1 provides additional detail on the characteristics of RTW study members who did and did not respond to the 18-month follow-up survey. Section A.4.2 provides grantee-specific results on the evidence of survey non-response bias measured for NDNH-based outcomes.

A.4.1 Baseline Characteristics of RTW Survey Respondents Versus Nonrespondents

Exhibit A.4-1 reports detailed results on the comparison of the baseline characteristics of those study members who responded to the RTW 18-month follow-up survey versus the characteristics of those who did not. This exhibit provides additional detail for the results reported in Exhibit 1.

Exhibit A.4-1: Baseline Characteristics of Survey Respondents and Non-Respondents

Baseline Characteristic	Full Study Sample Mean	Survey Respondent Mean	Survey Non-Respondent Mean	Respondent/Non-Respondent Difference	p-value
Gender (%)					
Women	48	49	46	3	.220
Men	52	51	54	-3	.220
Race (%)					
Asian	11	11	13	-2	.247
Black or African American	26	26	26	0	.990
White	54	54	52	3	.162
American Indian or Alaskan Native	1	1	1	0	.636
Native Hawaiian or Other Pacific Islander	0	0	0	0	.284
Other or multiple races	8	7	9	-1	.238
Hispanic Ethnicity (%)	7	7	9	-3**	.030
Age (%)					
28 years or younger	11	10	14	-4***	.004
29 to 38 years	22	21	27	-6***	<.001
39 to 48 years	24	25	22	3	.137
49 to 58 years	30	31	26	6***	.002
59 years or older	12	13	11	2*	.089
Marital Status (%)					
Married	40	42	34	8***	<.001
Widowed/divorced/separated	20	19	21	-2	.307
Never married	36	35	40	-6***	.005
Living with a partner	4	4	5	0	.598
One or more own children in household age 6 or younger (%)	15	15	15	0	.945

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Baseline Characteristic	Full Study Sample Mean	Survey Respondent Mean	Survey Non-Respondent Mean	Respondent/Non-Respondent Difference	p-value
Education Level (%)					
High school diploma or less	10	8	14	-6***	<.001
Some college credit but no degree	13	12	15	-3*	.052
Technical or associate's degree	16	15	18	-3*	.053
Bachelor's degree	40	42	32	10***	<.001
Master's degree or more	22	22	21	1	.393
Earnings before Random Assignment (RA):					
Q7 pre-RA (\$)	7,580	7,853	6,545	1,307***	.001
Q6 pre-RA (\$)	7,633	7,918	6,550	1,367***	.002
Q5 pre-RA (\$)	7,157	7,415	6,174	1,241***	.002
Q4 pre-RA (\$)	7,234	7,489	6,264	1,225***	.005
Q3 pre-RA (\$)	6,774	6,947	6,116	831*	.066
Q2 pre-RA (\$)	5,280	5,482	4,511	971**	.012
Q1 pre-RA (\$)	2,941	3,024	2,625	399	.180
Employment Before Random Assignment (RA):					
Q7 pre-RA (%)	59	59	59	0	.950
Q6 pre-RA (%)	59	60	59	1	.660
Q5 pre-RA (%)	58	58	58	1	.707
Q4 pre-RA (%)	57	57	55	2	.442
Q3 pre-RA (%)	54	54	53	1	.624
Q2 pre-RA (%)	48	49	48	1	.701
Q1 pre-RA (%)	38	38	36	2	.242

KEY: Q=quarter; RA=random assignment.

SOURCE: Baseline Information Form (BIF) and National Directory of New Hires (NDNH).

SAMPLE: 3,553 individuals who applied to one of four RTW grantee programs included in the RTW Evaluation who had available data from the NDNH; includes 2,813 survey respondents and 740 non-respondents.

NOTES: Reported difference might not equal the difference between the survey respondent mean and survey non-respondent mean because of rounding. Statistical significance based on two-sided hypothesis tests; significance levels are as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

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A.4.2 RTW Grantee Program-Specific Estimates of Survey Non-Response Bias

Section 3 reports results on the evidence of survey non-response bias in the full sample for the RTW Evaluation, when pooling the study samples for the four grantee programs included in the evaluation. This appendix section reports the corresponding results when considering the four grantee study samples separately.

To summarize the results presented in detail below, for the RochesterWorks! and WSI study samples, there is no clear evidence of bias generated by survey non-response in the estimated impacts on average quarterly earnings and any employment in the fifth and sixth quarters after random assignment (Q5-Q6), measured in the NDNH. For RochesterWorks!'s FLH program and WSI's Reboot NW program, this indicates that there is likely to be little bias in the estimated impacts on outcomes measured in the RTW 18-month follow-up survey.

In contrast, for the AAWDC study sample there is weak evidence of negative survey non-response bias on any employment in Q5 or Q6, while for the JVS study sample there is clear evidence of positive non-response bias on average quarterly earnings in Q5 and Q6. For AAWDC, after applying the survey non-response weights the estimated bias on employment is no longer statistically significant, although the magnitude of the bias remains large. For JVS, even after applying non-

response weights there remains clear evidence of positive bias in the estimated impact on earnings. For AAWDC, these findings suggests that the estimated impacts of AAWDC's MTC program on some survey-based outcomes may be biased downwards—picturing a number line, the impact estimate may be too far to the left (more negative) than the true impact. And for JVS, these results suggest that the estimated impacts of the JVS RTW programs on survey-based outcomes may be biased upwards—on the number line, the impact estimate may be too far to the right (more positive) than the true impact.

A.4.2.1 Anne Arundel Workforce Development Corporation's Maryland Tech Connection

This section reports findings on survey non-response bias for the Anne Arundel Workforce Development Corporation study sample. AAWDC's Maryland Tech Connection program was offered by seven Career Centers across Maryland and operated from May 2015 through October 2019. The program aimed to assist long-term unemployed and underemployed workers to find employment in advanced manufacturing, bioscience/biotechnology, cybersecurity, healthcare, and information technology (IT). To that end, MTC provided employment readiness courses, occupational training, work-based training, and job search assistance, along with financial and other supports.

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Exhibit A.4-2 reports the mean values and estimated impacts for the AAWDC study sample comparing results for the full sample versus survey respondents, corresponding to the pooled-sample results reported in Exhibit 2 above. Exhibit A.4-2 reports results on two outcomes measured with administrative data, available for essentially the full AAWDC study sample: average quarterly earnings in the fifth and sixth quarters after random assignment (Q5-Q6), and any employment in Q5 or Q6.

Exhibit A.4-2: Estimated Impact for NDNH-Measured Earnings and Employment (Q5-Q6), AAWDC

Sample	Average Quarterly Earnings in Q5 and Q6			Ever Employed during Q5 or Q6		
	Mean (\$)	Impact (\$)	Standard Error (\$)	Mean (%)	Impact (pp)	Standard Error (pp)
[A] Full Sample	8,443	-1,281**	537	72.4	-0.5	2.7
[B] Survey Respondents, Unweighted	8,679	-1,520**	598	74.3	-3.2	3.0
[C] Survey Respondents, Weighted	8,483	-1,451**	582	74.2	-2.9	3.0

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 1,022 applicants to the Maryland Tech Connection program offered by the Anne Arundel Workforce Development Corporation who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 826 respondents to the RTW 18-month follow-up survey. Impacts are estimated controlling for the set of covariates used as controls in impact analyses for the MTC program conducted as part of the Interim Impact Report for the RTW Evaluation (Herr, Klerman, Martinson, and Copson, 2022); see its Section E.4 for the full list. The first row (marked [A]) reports impacts estimated on the full sample. The second row (marked [B]) reports impacts estimated on the sample of survey respondents without applying survey non-response weights. The third row (marked [C]) reports impacts estimated on the sample of survey respondents after applying survey non-response weights. Statistical significance based on two-sided hypothesis tests; significance levels are as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

For these same outcomes, Exhibit A.4-3 reports results on evidence of survey non-response bias for the AAWDC study sample, corresponding to the pooled-sample results reported in Exhibit 3 above.

Exhibit A.4-3: Estimated Bias for NDNH-Measured Earnings and Employment (Q5-Q6), AAWDC

Bias	Average Quarterly Earnings in Q5 and Q6				Ever Employed during Q5 or Q6			
	Mean (\$)	Impact (\$)	Standard Error (\$)	Relative Bias (%)	Mean (%)	Impact (pp)	Standard Error (pp)	Relative Bias (%)
Unweighted ([B] – [A])	236	-216	244	-40	1.9	-2.6*	1.4	-94
Weighted ([C] – [A])	40	-146	241	-27	1.8	-2.2	1.5	-82

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 1,022 applicants to the Maryland Tech Connection program offered by the Anne Arundel Workforce Development Corporation who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 826 respondents to the RTW 18-month follow-up survey. Bias in the means (“Mean”) calculated as the difference in the means between the sample of survey respondents (row [B] of Exhibit A.4-2 for unweighted, row [C] of Exhibit A.4-2 for weighted) and the full sample (row [A] of Exhibit A.4-2); reported difference may not be equal to the difference in the Exhibit A.4-2 values because of rounding. Bias in impacts (“Impact”) estimated as described in Appendix Section A.3; for the AAWDC study sample in some instances the model-generated value is approximately but not exactly equal to the difference in the impacts between the sample of survey respondents (row [B] of Exhibit A.4-2 for unweighted, row [C] of Exhibit A.4-2 for weighted) and the full sample (row [A] of Exhibit A.4-2). Standard error quantifies the precision of the estimated bias in the impacts. Relative bias calculated as the ratio of the difference in impacts (“Impact” column in this exhibit) divided by the standard error of the impact estimate when calculated in the full sample (row [A] of Exhibit A.4-2). Statistical significance based on two-sided hypothesis tests; significance levels are as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

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Comparing the *levels* of the outcomes for the full AAWDC study sample versus for survey respondents alone, before applying non-response weights the level of both outcomes is approximately 3 percent higher among the survey respondents than among the full sample, suggesting some positive non-response bias (for earnings, \$8,679 in row [B] versus \$8,443 in row [A] of Exhibit A.4-2; for employment, 74.3 percent in row [B] versus 72.4 percent in row [A]). After applying the survey non-response weights, while average earnings fall to approximately the full sample average (\$8,483 in row [C] of Exhibit A.4-2), average employment is largely unchanged (74.2 percent in row [C]).

Comparing the estimated *impacts* for the full sample versus survey respondents, however, suggests some evidence of negative non-response bias. For the full sample, the estimated impact of the offer of the MTC program on average quarterly earnings in Q5-Q6 is -\$1,281 (statistically significantly different from zero, see row [A] of Exhibit A.4-2). This is evidence that MTC led to a decrease in average quarterly earnings from 1 year to 1.5 years after random assignment. In contrast, the estimated impact on any employment in Q5 or Q6 is -0.5 percentage points (not statistically significant, see row [A]), suggesting no impact on employment.

Before applying survey non-response weights, for both earnings and employment the estimated impact when using the survey respondents alone is more negative than for the full sample. For earnings, the estimated impact is -\$1,520 (see row [B] of Exhibit A.4-2), a bias -\$216, reflecting a relative bias of -40 percent, although the estimated bias is not statistically significantly different from zero (see first row of Exhibit A.4-3). For employment, the estimated impact is -3.2 percentage points (see row [B] of Exhibit A.4-2), a bias of -2.6 percentage points (see first row of Exhibit A.4-3). This result reflects a much larger negative relative bias of -94 percent, and is weakly statistically significantly different from zero (see first row of Exhibit A.4-3; statistical significance is noted in the “Impact” column).¹³

Thus for employment but not earnings there is weak evidence of negative non-response bias in the estimated impact before applying non-response weights.

After applying the survey non-response weights, the estimated impacts on both earnings and employment move closer to the estimated impacts for the full sample, and there is no clear evidence of non-response bias for either outcome, although for employment the magnitude of the bias is only somewhat reduced. For average quarterly earnings the bias is reduced to -\$146 (see second row of Exhibit A.4-3) from -\$216 before weighting (see first row), for a relative bias of -27 percent which remains statistically insignificantly different from zero (see second row). For employment the bias is reduced to -2.2 percentage points (see second row of Exhibit A.4-3) from -2.6 percentage points (see first row). The negative relative bias remains a substantial -82 percent, however this estimate is no longer statistically significantly different from zero (see second row). In sum, after applying survey non-response weights there remains no clear evidence of negative bias in the estimated impacts on either earnings or employment, although the relative bias for the estimated impact on employment is large both before and after applying non-response weights.

A.4.2.2 Jewish Vocational Service’s Ready to Work Programs

This section reports findings on survey non-response bias for the Jewish Vocational Service study sample. Between May 2015 and October 2019 JVS operated two programs under the RTW grant in the San Francisco Bay Area. From the start of the RTW grant JVS operated a single program, Skills to Work in Technology. The program comprised three separate courses that provided training for employment in IT: Business Administration Bootcamp, Digital Marketing, and Salesforce® Administration. Partway through the grant period, JVS implemented its second program, Job Search Accelerator. This two-week program focused on job search and readiness skills.

A.4 Detailed Results

Exhibit A.4-4 reports the mean values and estimated impacts for the JVS study sample comparing results for the full sample versus survey respondents, corresponding to the pooled-sample results reported in Exhibit 2 above. Exhibit A.4-4 reports results on two outcomes measured with administrative data, available for essentially the full JVS study sample: average quarterly earnings in the fifth and sixth quarters after random assignment (Q5-Q6), and any employment in Q5 or Q6.

Exhibit A.4-4: Estimated Impact for NDNH-Measured Earnings and Employment (Q5-Q6), JVS

Sample	Average Quarterly Earnings in Q5 and Q6			Ever Employed during Q5 or Q6		
	Mean (\$)	Impact (\$)	Standard Error (\$)	Mean (%)	Impact (pp)	Standard Error (pp)
[A] Full Sample	9,123	222	666	71.7	-0.9	2.8
[B] Survey Respondents, Unweighted	9,064	706	743	72.7	-0.1	3.0
[C] Survey Respondents, Weighted	8,939	882	737	73.1	-0.5	3.1

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 964 applicants to the Jewish Vocational Service's RTW programs who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 776 respondents to the RTW 18-month follow-up survey. Impacts are estimated controlling for the set of covariates used as controls in impact analyses for the JVS programs conducted as part of the Interim Impact Report for the RTW Evaluation (Herr, Klerman, Martinson, and Copson, 2022); see its Section E.4 for the full list. The first row (marked [A]) reports impacts estimated on the full sample. The second row (marked [B]) reports impacts estimated on the sample of survey respondents without applying survey non-response weights. The third row (marked [C]) reports impacts estimated on the sample of survey respondents after applying survey non-response weights. None of the impact estimates are statistically different from zero.

For these same outcomes, Exhibit A.4-5 reports results on evidence of survey non-response bias for the JVS study sample, corresponding to the pooled-sample results reported in Exhibit 3 above.

Exhibit A.4-5: Estimated Bias for NDNH-Measured Earnings and Employment (Q5-Q6), JVS

Bias	Average Quarterly Earnings in Q5 and Q6				Ever Employed during Q5 or Q6			
	Mean (\$)	Impact (\$)	Standard Error (\$)	Relative Bias (%)	Mean (%)	Impact (pp)	Standard Error (pp)	Relative Bias (%)
Unweighted ([B] – [A])	-59	670**	310	101	1.1	1.0	1.4	36
Weighted ([C] – [A])	-184	754**	312	113	1.5	0.5	1.5	19

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 964 applicants to the Jewish Vocational Service's RTW programs who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 776 respondents to the RTW 18-month follow-up survey. Bias in the means ("Mean") calculated as the difference in the means between the sample of survey respondents (row [B] of Exhibit A.4-4 for unweighted, row [C] of Exhibit A.4-4 for weighted) and the full sample (row [A] of Exhibit A.4-4); reported difference may not be equal to the difference in the Exhibit A.4-4 values because of rounding. Bias in impacts ("Impact") estimated as described in Appendix Section A.3; for the JVS study sample in some instances the model-generated value is only approximately equal to the difference in the impacts between the sample of survey respondents (row [B] of Exhibit A.4-4 for unweighted, row [C] of Exhibit A.4-4 for weighted) and the full sample (row [A] of Exhibit A.4-4). Standard error quantifies the precision of the estimated bias in the impacts. Relative bias calculated as the ratio of the difference in impacts ("Impact" column in this exhibit) divided by the standard error of the impact estimate when calculated in the full sample (row [A] of Exhibit A.4-4). Statistical significance based on two-sided hypothesis tests; significance levels are as follows: *** = 1 percent; ** = 5 percent; * = 10 percent.

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Comparing the *levels* of the outcomes for the full JVS study sample versus for the survey respondents, before applying non-response weights the level of both outcomes is very similar to the level in the full sample, suggesting little non-response bias (for earnings, \$9,064 versus \$9,123, see rows [B] and [A], respectively of Exhibit A.4-4; for employment 72.7 percent versus 71.7 percent, see rows [B] and [A], respectively). Counter to expectations, however, after applying the survey non-response weights, both averages move slightly further away from the full sample average (to \$8,939 and 73.1 percent, respectively, see row [C]), although they remain less than 2 percent different from the full-sample values.

Comparing the estimated *impacts* for the full sample versus survey respondents, however, there is evidence of statistically significant positive bias for the estimated impacts on earnings, although not for employment. For the full sample, the estimated impacts of the offer of the JVS programs on average quarterly earnings and any employment in Q5-Q6 is \$222 and -0.9 percentage points, respectively (see row [A] of Exhibit A.4-4). Neither impact estimate is statistically significantly different from zero, thus there is no clear evidence that the JVS programs had a positive impact on participants' earnings or employment between 1 year and 1.5 years after random assignment.

Before applying survey non-response weights, for both earnings and employment the estimated impact when using the survey respondents alone is larger than for the full sample. For earnings, the estimated impact is \$706 (see row [B] of Exhibit A.4-4). This reflects an estimated bias of \$670—a relative bias of 101 percent—which is statistically significantly different from zero at the 5 percent level (see first row of Exhibit A.4-5). For employment, the estimated impact is -0.1 percentage points (see row [B] of Exhibit A.4-4), a bias of 1.0 percentage points, reflecting a smaller relative bias of 36 percent that is not statistically significantly different from zero (see first row of Exhibit A.4-5).

Applying the survey non-response weights has a different influence on the results for these two outcomes. For employment, the weighted impact estimate is closer to the full sample estimate (-0.5 percentage points, see row [C] of Exhibit A.4-4), with a lower relative bias of 19 percent that remains not statistically significantly different from zero (see second row of Exhibit A.4-5). In contrast, for earnings, applying weights increases the estimated impact even further (to \$882, see row [C] of Exhibit A.4-4), reflecting an even stronger positive relative bias of 113 percent, which remains statistically significantly different from zero at the 5 percent level (see second row of Exhibit A.4-5). This statistically significant evidence of positive non-response bias for one of the two NDNH-measured outcomes that remains after applying non-response weights suggests that the estimated impacts of the JVS programs on some outcomes measured in the RTW 18-month follow-up survey may reflect a positive bias that may not be addressed by applying the evaluation's survey non-response weights.

A.4.2.3 RochesterWorks!'s Finger Lakes Hired Program

This section reports findings on survey non-response bias for the RochesterWorks! study sample. RochesterWorks! is the Workforce Investment Board (WIB) for Monroe County, which includes the city of Rochester, in western New York State. Between January 2015 and June 2019, the FLH program provided individualized services, including employment readiness courses, occupational training, and work-based training, designed to help participants find employment in the advanced manufacturing, healthcare, and IT industries. Integral to the FLH program design was the role of the Education and Employment Specialist, who assessed participants' skills and service needs at program entry, made referrals to services, and worked with FLH participants throughout their time in the program.

A.4 Detailed Results

Exhibit A.4-6 reports the mean values and estimated impacts for the RochesterWorks! study sample comparing results for the full sample versus survey respondents, corresponding to the pooled-sample results reported in Exhibit 2 above. Exhibit A.4-6 reports results on two outcomes measured with administrative data, available for essentially the full RochesterWorks! study sample: average quarterly earnings in the fifth and sixth quarters after random assignment (Q5-Q6), and any employment in Q5 or Q6.

Exhibit A.4-6: Estimated Impact for NDNH-Measured Earnings

Sample	Average Quarterly Earnings in Q5 and Q6			Ever Employed during Q5 or Q6		
	Mean (\$)	Impact (\$)	Standard Error (\$)	Mean (%)	Impact (pp)	Standard Error (pp)
[A] Full Sample	6,505	13	537	74.9	0.1	3.5
[B] Survey Respondents, Unweighted	6,828	-3	622	76.3	0.7	3.8
[C] Survey Respondents, Weighted	6,710	8	596	76.4	0.8	3.9

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 595 applicants to RochesterWorks! Finger Lakes Hired program who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 468 respondents to the RTW 18-month follow-up survey. Impacts are estimated controlling for the set of covariates used as controls in impact analyses for the FLH program conducted as part of the Interim Impact Report for the RTW Evaluation (Herr, Klerman, Martinson, and Copson, 2022); see its Section E.4 for the full list. The first row (marked [A]) reports impacts estimated on the full sample. The second row (marked [B]) reports impacts estimated on the sample of survey respondents without applying survey non-response weights. The third row (marked [C]) reports impacts estimated on the sample of survey respondents after applying survey non-response weights. None of the impact estimates are statistically different from zero.

For these same outcomes, Exhibit A.4-7 reports results on evidence of survey non-response bias for the RochesterWorks! study sample, corresponding to the pooled-sample results reported in Exhibit 3 above.

Exhibit A.4-7: Estimated Bias for NDNH-Measured Earnings and Employment (Q5-Q6), RochesterWorks!

Bias	Average Quarterly Earnings in Q5 and Q6				Ever Employed during Q5 or Q6			
	Mean (\$)	Impact (\$)	Standard Error (\$)	Relative Bias (%)	Mean (%)	Impact (pp)	Standard Error (pp)	Relative Bias (%)
Unweighted ([B] – [A])	323	-18	260	-3	1.4	1.2	1.9	34
Weighted ([C] – [A])	205	-9	264	-2	1.4	1.3	2.0	37

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 595 applicants to RochesterWorks! Finger Lakes Hired program who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 468 respondents to the RTW 18-month follow-up survey. Bias in the means ("Mean") calculated as the difference in the means between the sample of survey respondents (row [B] of Exhibit A.4-6 for unweighted, row [C] of Exhibit A.4-6 for weighted) and the full sample (row [A] of Exhibit A.4-6); reported difference may not be equal to the difference in the Exhibit A.4-6 values because of rounding. Bias in impacts ("Impact") estimated as described in Appendix Section A.3; for the RochesterWorks! study sample in some instances the model-generated value is approximately but not exactly equal to the difference in the impacts between the sample of survey respondents (row [B] of Exhibit A.4-6 for unweighted, row [C] of Exhibit A.4-6 for weighted) and the full sample (row [A] of Exhibit A.4-6). Standard error quantifies the precision of the estimated bias in the impacts. Relative bias calculated as the ratio of the difference in impacts ("Impact" column in this exhibit) divided by the standard error of the impact estimate when calculated in the full sample (row [A] of Exhibit A.4-6). None of the estimates of bias in impacts are statistically different from zero.

A.4 Detailed Results

Comparing the *levels* of the outcomes for the full RochesterWorks! study sample versus for survey respondents alone, there is evidence of positive non-response bias. Before applying non-response weights, the level of both outcomes is higher when calculated in the survey respondents alone than among the full sample; by five percent for earnings (\$6,828 versus \$6,505, see rows [B] and [A] of Exhibit A.4-6, respectively), and by 2 percent for employment (76.3 percent versus 74.9 percent, see rows [B] and [A], respectively). After applying survey non-response weights, average earnings move closer to the level for the full sample (to \$6,710, see row [C] of Exhibit A.4-6), but average employment is nearly unchanged. In net, for both outcomes, the weighted average for survey respondents is approximately 2 to 3 percent higher than the average for the full sample (percentages not shown).

Comparing the estimated *impacts* for the full sample versus survey respondents, however, there is no clear evidence of survey non-response bias. For the full sample, the estimated impacts of the offer of the FLH program on average quarterly earnings and any employment in Q5-Q6 are very close to zero, \$13 and 0.1 percentage points, respectively (see row [A] of Exhibit A.4-6). Neither impact estimate is statistically significantly different from zero, thus there is no clear evidence that the FLH program had a positive impact on participants' earnings or employment between 1 year and 1.5 years after random assignment.

Both before and after applying non-response weights, there is no clear evidence of survey non-response bias in the estimated impacts on either earnings or employment. For earnings, using only the survey respondents generates an estimated impact that is largely unchanged from the estimate for the full sample (-\$3 unweighted and \$8 weighted, compared to \$13 in the full sample, see Exhibit A.4-6). These estimates reflect a negative relative bias of -3 percent and -2 percent, respectively, and neither estimated bias is statistically significantly different from zero

(see Exhibit A.4-7). In contrast, for employment the impacts estimated on survey respondents are larger than for the full sample, both before and after applying non-response weights (0.7 percentage points unweighted and 0.8 percentage points weighted, compared to 0.1 percentage points in the full sample, see Exhibit A.4-6). Both estimates reflect a similar level of relative bias (34 and 37 percent, respectively, see Exhibit A.4-7), although neither estimated bias is statistically significantly different from zero. Overall, for the RochesterWorks! study sample these results show no clear evidence of bias in the estimated impacts on the NDNH-measured outcomes, which suggests that there is likely to be little bias in the estimated impacts of the FLH program on outcomes measured in the RTW 18-month follow-up survey.

A.4.2.4 Worksystems Inc.'s Reboot NW Program

This section reports findings on survey non-response bias for the Worksystems Inc.'s study sample. WSI, the WIB for Oregon's Multnomah and Washington Counties, administered Reboot NW in partnership with two other WIBs to offer the program across six counties in the Portland/Vancouver metropolitan area from April 2015 through June 2019. The Reboot NW program was designed to assist underemployed and long-term unemployed workers find skilled positions in the advanced manufacturing and IT/software development industries. To do so, Reboot NW provided employment readiness courses, occupational training, work-based training, and job search assistance, along with financial and other supports.

A.4 Detailed Results

Exhibit A.4-8 reports the mean values and estimated impacts for the WSI study sample comparing results for the full sample versus survey respondents, corresponding to the pooled-sample results reported in Exhibit 2 above. Exhibit A.4-8 reports results on two outcomes measured with administrative data, available for essentially the full WSI study sample: average quarterly earnings in the fifth and sixth quarters after random assignment (Q5-Q6), and any employment in Q5 or Q6.

Exhibit A.4-8: Estimated Impact for NDNH-Measured Earnings and Employment (Q5-Q6), WSI

Sample	Average Quarterly Earnings in Q5 and Q6			Ever Employed during Q5 or Q6		
	Mean (\$)	Impact (\$)	Standard Error (\$)	Mean (%)	Impact (pp)	Standard Error (pp)
[A] Full Sample	7,668	-227	558	71.2	-0.4	2.9
[B] Survey Respondents, Unweighted	7,947	-216	643	71.9	-0.6	3.3
[C] Survey Respondents, Weighted	7,864	-223	622	71.3	-0.3	3.3

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 972 applicants to Worksystems Inc.'s Reboot Northwest program who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 743 respondents to the RTW 18-month follow-up survey. Impacts are estimated controlling for the set of covariates used as controls in impact analyses for the Reboot NW program conducted as part of the Interim Impact Report for the RTW Evaluation (Herr, Klerman, Martinson, and Copson, 2022); see its Section E.4 for the full list. The first row (marked [A]) reports impacts estimated on the full sample. The second row (marked [B]) reports impacts estimated on the sample of survey respondents without applying survey non-response weights. The third row (marked [C]) reports impacts estimated on the sample of survey respondents after applying survey non-response weights. None of the impact estimates are statistically different from zero.

For these same outcomes, Exhibit A.4-9 reports results on evidence of survey non-response bias for the WSI study sample, corresponding to the pooled-sample results reported in Exhibit 3 above.

Exhibit A.4-9: Estimated Bias for NDNH-Measured Earnings and Employment (Q5-Q6), WSI

Bias	Average Quarterly Earnings in Q5 and Q6				Ever Employed during Q5 or Q6			
	Mean (\$)	Impact (\$)	Standard Error (\$)	Relative Bias (%)	Mean (%)	Impact (pp)	Standard Error (pp)	Relative Bias (%)
Unweighted ([B] – [A])	279	-73	291	-13	0.7	-0.3	1.7	-9
Weighted ([C] – [A])	196	-25	291	-4	0.0	0.1	1.7	2

KEY: Q = quarter after random assignment; pp = percentage points.

SOURCE AND FOLLOW-UP PERIOD: National Directory of New Hires (NDNH) through six quarters after random assignment.

NOTES: The full sample includes 972 applicants to Worksystems Inc.'s Reboot Northwest program who were successfully matched in the NDNH. Of these, the survey respondents sample consists of the 743 respondents to the RTW 18-month follow-up survey. Bias in the means ("Mean") calculated as the difference in the means between the sample of survey respondents (row [B] of Exhibit A.4-8 for unweighted, row [C] of Exhibit A.4-8 for weighted) and the full sample (row [A] of Exhibit A.4-8); reported difference may not be equal to the difference in the Exhibit A.4-8 values because of rounding. Bias in impacts ("Impact") estimated as described in Appendix Section A.3; for the Reboot NW study sample in some instances the model-generated value is approximately but not exactly equal to the difference in the impacts between the sample of survey respondents (row [B] of Exhibit A.4-8 for unweighted, row [C] of Exhibit A.4-8 for weighted) and the full sample (row [A] of Exhibit A.4-8). Standard error quantifies the precision of the estimated bias in the impacts. Relative bias calculated as the ratio of the difference in impacts ("Impact" column in this exhibit) divided by the standard error of the impact estimate when calculated in the full sample (row [A] of Exhibit A.4-8). None of the estimates of bias in impacts are statistically different from zero.

A.4 Detailed Results

Comparing the *levels* of the outcomes for the full WSI study sample versus for the survey respondents, there is some evidence of positive non-response bias for earnings, but little evidence of bias for employment. Before applying non-response weights, average quarterly earnings in Q5-Q6 are almost 4 percent higher among survey respondents than in the full sample (\$7,947 versus \$7,668, see rows [B] and [A] of Exhibit A.4-8, respectively). Applying non-response weights brings that level down somewhat (to \$7,864, see row [C] of Exhibit A.4-8), although it remains approximately 3 percent higher than the level for the full sample. In contrast, for employment the unweighted average among survey respondents is only 1 percent higher than among the full sample (71.9 percent versus 71.2 percent, see rows [B] and [A] of Exhibit A.4-8, respectively), and after applying weights the two levels are essentially equal (71.3 percent versus 71.2 percent, see rows [C] and [A] of Exhibit A.4-8, respectively).

Comparing the estimated *impacts* for the full sample versus survey respondents, there is no

clear evidence of survey non-response bias for either earnings or employment. Before applying non-response weights, for both outcomes the estimated impacts are almost identical when estimated using only survey respondents versus using the full sample (-\$216 versus -\$227 for earnings, and -0.6 percentage points versus -0.4 percentage points for employment, see rows [B] and [A] of Exhibit A.4-8, respectively). After applying survey non-response weights, both impact estimates remain very similar to the estimate for the full sample. Furthermore, for both the unweighted and weighted estimates, the bias in the estimated impacts for both earnings and employment reflect a small relative bias (between 2 percent and -13 percent, see Exhibit A.4-9), and none are statistically significantly different from zero. Overall, because these results show no clear evidence of bias in the estimated impacts on the NDNH-measured outcomes, these results suggest that there is likely to be little to no bias captured in the estimated impacts of the Reboot NW program on outcomes measured in the RTW 18-month follow-up survey.

Endnotes:

- ¹ Little and Rubin (2019) provide a general discussion of missing data (of which survey non-response bias is a leading case). Barnow and Greenberg (2015, 2019) provide a discussion of survey non-response in labor market evaluations.
- ² The analyses in this brief compare administrative measures for survey respondents versus measures for the entire sample to assess the magnitude of survey non-response bias. The analyses do not address other possible differences between estimates using administrative data and estimates using survey data in assessing the impact of a given program. These differences include (1) the high cost of survey data relative to administrative data; (2) the decrease in statistical precision when using survey data arising from smaller sample sizes because of survey non-response; (3) the possibility of errors in survey reports of outcomes, and the corresponding measurement error in survey-based estimates of impact; and (4) differences in information captured in the two data sources (e.g., the National Directory of New Hires does not capture earnings for those who are self-employed or work as independent contractors or who are paid “under the table,” whereas the RTW survey asks respondents to report all sources of income). The analyses in this brief are not informative on these additional issues.
- ³ In practice the evaluation would only report impacts estimated on the full sample; this comparison is done solely for assessing the bias generated by non-response to the survey.
- ⁴ Because fielding a survey can be costly, some evaluations will choose to try to survey only a subset of study members. In order to maintain the comparability of the program and control groups in the survey sample, the evaluation must choose that subset based on a baseline characteristic or other factor that is not influenced by the program itself (e.g., dates of application to the program).
- ⁵ The sample size of 3,612 is the sample size at the time of random assignment less study members who subsequently withdrew from the study. Withdrawals included 4 members of the control group and 1 member of the program group from the Anne Arundel Workforce Development Corporation (AAWDC) study sample, 10 members of the control group and 2 members of the program group for the Jewish Vocational Service (JVS) study sample, 5 members of the control group for the RochesterWorks! study sample, and 3 members of the control group and 4 members of the program group for the Worksystems Inc.(WSI) study sample. In sum, the sample attrition rate was 0.4 percent of the program group and 1.2 percent of the control group. Although sample attrition can be another reason why estimated impacts do not compare all members of the program group to all members of the control group, as is true here, such rates are generally much lower than rates of survey non-response. The smaller sample size of 3,553 reported in Box 2 and in the notes to Exhibits 1, 2 and 3 reflect the subset of the full sample (98.4 percent) who were successfully matched to the National Directory of New Hires (NDNH). See Appendix Section A.2.3 for more detail on this matching process.
- ⁶ The NDNH aggregates employer-reported information on earnings collected from state workforce agencies for all jobs covered by unemployment insurance, augmented with federal government payroll information. Study members are matched to the NDNH based on social security number and name. Less than 2 percent of the RTW study sample were not matched to the NDNH data. See Section A.2.2 of the appendix for more information on the NDNH.

⁷ Average quarterly earnings in the fifth and sixth quarter after random assignment (Q5-Q6) is the “confirmatory outcome” for the RTW Evaluation’s Interim Impact Report (Klerman, Herr, Martinson, and Copson, 2022), the evaluation’s main indicator of the extent to which a given RTW program had impact by six quarters (1.5 years) after random assignment. (The RTW Evaluation treats the calendar quarter of random assignment as “quarter 0.”)

⁸ See Appendix Section A.1.5 of Herr, Klerman, Martinson, and Copson (2022) for detail on how the RTW Evaluation created survey non-response weights for outcomes measured in the 18-month follow-up survey. Note that the results in row [B] of Exhibit 2 report the estimated impacts on employment and earnings when applying an equal weight to all survey respondents.

⁹ The survey questionnaire can be accessed through the following website: https://www.reginfo.gov/public/do/PRAViewIC?ref_nbr=201605-1291-001&icID=221648.

¹⁰ See https://www.acf.hhs.gov/sites/default/files/documents/ocse/a_guide_to_the_national_directory_of_new_hires.pdf for a guide to the National Directory of New Hires.

¹¹ Because wage records must be matched to study members by SSN, this analysis may underestimate earnings if an individual’s SSN was reported incorrectly by the worker or employer to the state agency, or by the worker to RTW grantee staff.

¹² Because contract work is relatively more common in the Information Technology (IT) sector (<https://blog.talentwave.com/research-reveals-the-top-10-industries-for-independent-workers>), and all four RTW grantees focused on IT as one of their target sectors, it is possible that the analysis is systematically missing such earnings data for study members working as IT contract workers.

¹³ The estimated bias on any employment in Q5 or Q6 is significantly different from zero at the 10 percent level, with a p -value of .071.

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