The 2021 Net Impact and Cost-Benefit Evaluation of Washington State's Workforce Development Programs

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WASHINGTON **Workforce**
Training & Education Coordinating
Board

Acknowledgements

Preface Concerning COVID-19

This report was written and published during the COVID-19 pandemic. The longitudinal data analyzed for this report was recorded before the outbreak. Prior to the pandemic, Washington state was experiencing record levels of low unemployment and economic growth. The previous net impact and cost-benefit study was published in 2016 and examined a cohort of education and training participants that exited their program during a period of sluggish growth and high unemployment in the aftermath of the Great Recession.

The full effect of the pandemic on the impact of the workforce education and training system is unknown. However, the findings of this report support the hypothesis that the public workforce training and education system has greater employment impact when the economy is weak than when it is strong. And has greater earnings impacts when the economy is strong rather than when it is weak.

In either case, the 2016 and 2021 net impact and cost-benefit studies demonstrate that the workforce training and education development system delivers measurable, and substantial returns on investment for individuals, taxpayers, and the economy. The net returns of these workforce training and education investments are $2.9 billion per year, or about 0.5% of Washington state's GDP.

Evidence suggests that the workforce training and education system will be an important economic driver throughout the post-pandemic recovery.

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Executive Summary

Background

The Workforce Training and Education Coordinating Board (Workforce Board), serves as the state's objective evaluator of public investments in workforce development and maintains a dashboard of annual performance outcomes. Every four years, the Workforce Board takes a closer look at the state's workforce development system to evaluate how well it is serving its customers by measuring the direct economic impact programs have on participants and the broader public. This Net Impact and Cost-Benefit Evaluation study is rigorous and detailed.

Taken together, these 12 programs serve 343,000 Washingtonians per year at an average total cost of $2.6 billion, which includes federal and state funds plus student tuition. The direct social impact – the total economic impact of these programs – is a net gain of $14.5 billion over five years, for a social ROI of $5.60 per $1.00 spent.

While most evaluations of workforce system programs identify average participant outcomes like earnings and employment, this study takes it a step further by using a quasi-experimental design to estimate the causal relationship between programs and participant outcomes. The findings produce employment, earnings, and social assistance outcomes that are attributed to program participation *itself* by isolating other influencing factors, such as prior employment history, education, gender, or race. This makes it possible to calculate the average net benefit of these programs for individual participants, and a return on investment to society and taxpayers.

Prior studies were contracted out to third parties. In 2018, the Workforce Board's research unit successfully replicated findings from previous studies to determine the feasibility of bringing the study in-house, and within an acceptable level of staff time. Bringing the study in-house was made possible by increased staff expertise and technical know-how in econometric research design, statistical programming, and project management. An independent review was conducted to validate the evaluation methodology used.

This new approach yields several advantages:

- Substantial cost-savings.
- Standardization of research design and evaluation methodology.
- Study repeatability and reproducibility.
- Increased research unit capabilities.

An additional benefit of bringing the study in-house has been the development of programming scripts that automate the data management, statistical work, and analyses required to generate well-documented findings. This makes it feasible to conduct the study on an annual basis and make incremental improvements to the process with acceptable fiscal commitment. Independent reviews can be conducted periodically to preserve the integrity of the study.

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In mid-2019, the Workforce Board research unit began working with partner agencies to provide administrative data for the study. Since that time, Washington has been severely disrupted by the COVID-19 pandemic – with various state agencies scrambling in the public health and economic recovery effort. Workforce development plays an important role in both overcoming this disaster and setting a future course for talent and prosperity for all.

The findings of this study reveal – in direct quantitative terms – the economic impact of workforce development programs. More frequent and consistent net impact and cost-benefit evaluation of these programs will be helpful to ongoing economic recovery, and workforce planning efforts.

Key Findings and Limitations

All programs evaluated in this study have a positive net impact on employment. However, the duration of the effect differs by program. All but one program achieves sizable, and statistically significant employment impacts in the short-term; that is, four quarters (or a year) after program exit. In most cases, the strength of the effect decreases over the longer term, between nine and 12 quarters after exit. These findings are consistent with the literature, where impact is often proportionate to the objective, intensity, and duration of service delivery – with impact effects decaying over time.

When reviewing the following table, please note that numbers that are statistically insignificant are shown in light gray font.

Summary of Program Impact on Participant Employment

Program	Short-term	Longer-term	Average
Workforce Innovation and Opportunity Act (WIOA) Adult	+2.4%	+0.6%[a]	+1.2%
WIOA Dislocated Worker	+13.3%	-2.5%[a]	+6.7%
WIOA Youth	+8.3%	-4.8%	+1.8%
Community and Technical College (CTC) Professional Technical Education	+6.8%	+1.6%	+4.2%
CTC Worker Retraining	+6.3%	0.0%[a]	+3.2%
CTC Basic Education for Adults	+0.5%[a]	+6.7%	+3.4%
CTC Integrated Basic Education and Skills Training (I-BEST)	+19.1%	+9.3%	+14.2%
Private Career Schools	+6.0%	0.0%[a]	+3.0%
Registered Apprenticeships	+3.1%	-1.9%[a]	+1.6%
Aerospace Training	+11.8%	+12.2%	+12.0%
WorkFirst	+3.6%	-4.4%	-0.4%
Division of Vocational Rehabilitation (DVR)	+13.5%	+1.5%[a]	+6.8%

[a] *Findings not statistically significant*

Workforce programs evaluated in this study also have a substantial and statistically significant impact on participant earnings. Average annual net benefits for participants are defined as the additional earnings directly attributed to participating in a workforce program, which includes

additional fringe benefits proportional to the earnings impact. Fringe benefits are health insurance coverage, paid sick leave associated with covered employment, and other factors. These fringe benefits have been converted to a dollar value in the participant net benefits impact estimate.

Participant costs include tuition (if applicable), estimated forgone earnings due to time spent in the program, increased tax burden due to higher wages, and reduced consumption of Unemployment Insurance benefits. In some cases, participant costs are negative. This includes instances where participation results in larger Unemployment Insurance benefits, or when participants earn more money during program participation, as is the case with Registered Apprenticeship programs.

Participant's return on investment (ROI) is estimated across a five- and 10-year time-period using a Net Present Value calculation discounted by the Social Security Administration's Cost of Living Adjustment of 1.3% annually. The ROI is the net gain for every dollar spent.

Summary of Program Impact on Net Benefits and Participant Cost-Benefit Findings

Program	Average Annual Net Benefits	5-Year ROI	10-Year ROI
Workforce Innovation and Opportunity Act (WIOA) Adult	+$4,104	$5.01	$5.18
WIOA Dislocated Worker	+$2,722	$1.03	$1.92
WIOA Youth programs	+$768	$14.54	$8.56
Community and Technical College (CTC) Professional Technical Education	+$15,071	$5.17	$5.60
CTC Worker Retraining	+$6,870	$0.05	$1.25
CTC Basic Education for Adults	+$2,228	$4.47	$4.89
CTC Integrated Basic Education and Skills Training (I-BEST)	+$6,396	$3.42	$4.14
Private Career Schools	+$8,108	$1.29	$2.41
Registered Apprenticeships	+$30,230	$19.58	$10.21
Aerospace Training	+$22,168	$4.01	$4.77
WorkFirst	+$2,137	$1.47	$2.42
Division of Vocational Rehabilitation (DVR)	+$2,240	$5.91	$4.63

Six programs achieve a positive taxpayer ROI over a five-year period. This increases to eight programs over a 10-year period. Programs with high costs and large foregone earnings during program participation take more time to recover investments and may therefore have negative economic impacts within the estimated 5-year period.

These 12 largely publicly funded workforce development programs are revenue positive over five- and 10-year periods and generate meaningful economic growth that would not have occurred if participants had not enrolled in these programs.

The taxpayer ROI considers increased taxable earnings based on federal income tax (Washington has no income tax), estimates derived from any changes in the share of state and local sales and excise taxes relative to earnings, and changes to Unemployment Insurance consumption, as a benefit. Taxpayer costs are based on program expenditure.

The Net Present Value calculation for taxpayer ROI applies a discount rate based on the White House Office of Management and Budget (OMB) guidelines concerning cost-benefit analyses for federal programs: 1.7% annually for 5-year periods, and 2% annually for 10-year periods.

All but one program achieves a positive social ROI over a five-year period, with all programs achieving a positive social ROI over a 10-year period. The social ROI is the net economic impact based on net participant earnings, which does not include fringe benefits, and includes an economic multiplier derived from the Washington Input-Output Model; a tool developed by the state's Office of Financial Management to estimate economic impacts based on a specific change to the economy.[1]

Increased tax burden and reduced Unemployment Insurance benefits are a benefit to taxpayers, but a cost to participants, and are therefore removed from the social ROI estimate. Program expenditure and tuition are both included in social ROI estimates. The Net Present Value calculation also includes both the Cost-of-Living Adjustment and the OMB discount rate.

Taken together, these 12 programs serve 343,000 Washingtonians per year at an average total cost of $2.6 billion, which includes federal and state funds plus student tuition. The direct social impact, that is – the total economic impact of these programs – is a net gain of $14.5 billion over five years, for a social ROI of $5.60 per $1.00 spent. [2]

From a taxpayer perspective the total cost is $1.6 billion (excluding student tuition and all private career school costs and benefits), with an estimated net gain in federal, state, and local tax revenues of $1.1 billion over five years, rising to $3.3 billion over 10 years, which is a net five-year taxpayer ROI of $0.67 per dollar spent, and a 10-year ROI of $2.02.

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[1] The multiplier is based on the net employment impact of programs and is only applied to first-year post-exit impacts, the system-wide multiplier effect is 0.523 of the earnings impact.

[2] All currency values in this study are inflation adjusted to Q1 2020 dollars.

These 12 largely publicly funded workforce development programs are revenue positive over five- and 10-year periods and generate meaningful economic growth that would not have occurred if these programs did not exist.

Summary of Social and Taxpayer Returns on Investment

Program	5-Year Social Return on Investment	10-Year Social Return on Investment	5-Year Taxpayer Return on Investment	10-Year Taxpayer Return on Investment
Workforce Innovation and Opportunity Act (WIOA) Adult	$13.38	$23.70	$3.16	$6.96
WIOA Dislocated Worker	$7.16	$10.66	$1.81	$4.62
WIOA Youth	$0.43	$0.88	-$0.79	-$0.66
Community and Technical College (CTC) Professional Technical Education	$6.48	$11.40	$0.75	$2.20
CTC Worker Retraining	-$0.04	$2.86	$0.52	$2.88
CTC Basic Education for Adults	$2.03	$3.47	-$0.80	-$0.59
CTC Integrated Basic Education and Skills Training (I-BEST)	$4.82	$6.82	-$0.34	$0.19
Private Career Schools	$1.84	$3.73	NA [a]	NA [a]
Registered Apprenticeships	$20.77	$31.46	$4.80	$7.75
Aerospace Training	$14.70	$23.27	$2.14	$5.34
WorkFirst	-$0.10	$0.66	-$0.62	-$0.31
Division of Vocational Rehabilitation (DVR)	$0.92	$1.68	-$0.39	$0.11
Workforce Development System	**$5.60**	**$9.66**	**$0.67**	**$2.02**

[a] *Private Career Schools are not directly funded by the public.*

Significant Return on Investment for Participants, Society and Taxpayers
In 2019, Washington's total Gross Domestic Product (GDP) was $613 billion.[3] The average economic impact of these programs is equivalent to 0.47% of annual output based on an annualization of the five-year social ROI, or about $2.9 billion.

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[3] Total Gross Domestic Product for Washington, 2019, not seasonally adjusted, Federal Reserve Economic Data (FRED), https://fred.stlouisfed.org/series/WANGSP

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The taxpayer breakeven point for the publicly funded workforce development system occurs, on average, three years after participants exit a program, assuming net earning impacts do not decay within 10-year ROI estimates. From a social ROI perspective, the economic breakeven point occurs even more quickly, within the first year. Individual program breakeven points are provided in their respective sections of this study.

Summary of Estimated Economic Impact and Taxpayer Breakeven Point

Program	5-Year Net Economic Impact ($ millions)	10-Year Net Economic Impact ($ millions)	Taxpayer Breakeven Point
Workforce Innovation and Opportunity Act (WIOA) Adult	+$153.6	+$271.2	0.8 years
WIOA Dislocated Worker	+$116.3	+$172.6	0.9 years
WIOA Youth	+$6.9	+$14.1	NA[b]
Community and Technical College (CTC) Professional Technical Education	+$8,469.3	+$14,872.6	3.2 years
CTC Worker Retraining	-$3.6	+$261.9	1.1 years
CTC Basic Education for Adults	+$383.4	+$688.4	NA[b]
CTC Integrated Basic Education and Skills Training (I-BEST)	+$193.5	+$273.2	NA[b]
Private Career Schools	+$736.0	+$1,494.3	NA[a]
Registered Apprenticeships	+$2,832.0	+$4,280.7	1.6 years
Aerospace Training	+$1,452.7	+$2,294.8	1.2 years
WorkFirst	-$12.3	+$83.4	NA[b]
Division of Vocational Rehabilitation programs (DVR)	+$121.6	+$222.1	10 years
Workforce Development System	**+$14,449.4**	**+$24,929.2**	**3 years**

[a] *Private Career Schools are not directly funded by the public.*
[b] *Taxpayer breakeven point does not occur within the estimated 10-year impact period.*

Note: Programs with high costs and large foregone earnings during program participation take more time to recover investments and may therefore have negative economic impacts within the estimated 5-year period.

There are several important considerations to keep in mind when evaluating the effectiveness of these programs. For example, many of a program's benefits are unobserved or intangible.

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Increased personal satisfaction, civic engagement, social justice, crime reduction, public health, and other outcomes are linked to public investments in education and training. Public costs, such as the consumption of some welfare benefits, may also be reduced following program participation.

Although the study accounts for changes in the consumption of Unemployment Insurance (UI) benefits attributed to program participation, it does not consider changes in other benefits such as the Supplemental Nutrition Assistance Program (SNAP), commonly known as food stamps, or other social assistance programs. The only exception in this study is the Department of Vocational Rehabilitation program, which measures a much broader range of social assistance, including Social Security Disability Insurance (SSDI), Supplemental Security Income (SSI), Workers' Compensation, and more.

Different Populations, Different Needs and Barriers
The programs evaluated in this study address different populations with different needs and barriers. Because of these differences, comparing program ROI, as a means of ranking program efficacy or allocating public resources between these programs, requires a closer look at participant barriers—and outcomes—over time.

Findings from more frequent and regularly conducted studies will help track specific program performance, measuring improvements or setbacks over multiple years and provide insights into larger trends in our state's workforce development system.

Finally, the study evaluates the impact of programs on participants within a relatively narrow observation window; a period of three years after participants exit. The economic impact of these programs is extrapolated over five- and 10-year periods, and assumes earnings impacts remain intact within those time periods, though discounted for the time-value of money. This is a reasonable assumption given that human capital investments in education and training have minimal impact decay rates.

However, evidence suggests that impact estimates from lower intensity services, such as self-service job searches at WorkSource offices and basic job referral assistance, tend to decay to zero in two quarters (six months) after program exit.[4] Future studies should more closely examine decay rates for other programs to investigate assumptions regarding impact longevity.

It is also likely that some program's earnings and employment impacts persist beyond a 10-year period; and may accumulate over the working lives of participants. The net impact of the workforce programs evaluated in this study are conservative estimates that may understate the broader, longer-term value these programs deliver individuals and the public. Even so, the findings of this study are statistically significant and net positive.

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[4] Return from Investments in Workforce Services: Texas Statewide Estimates for Participants, Taxpayers, and Society. King, Christopher T. et al., Ray Marshall Center for the Study of Human Resources, prepared for the Texas Association of Workforce Boards. August 2008.

Overview of the Study

The Workforce Training and Education Coordinating Board (Workforce Board) was established in 1991 to coordinate policy, planning, and evaluation of the state's workforce system. Among its specific responsibilities, the Workforce Board is required by Washington State RCW 28C.18.060(10) to "administer scientifically based net-impact and cost-benefit evaluations of the state training system." The objective of these evaluations is to determine the short-term and long-term impacts of program participation on employment, wages, hours worked, quarterly earnings, and receipt of Unemployment Insurance (UI) benefits and public assistance. Previous evaluations were conducted in 1997, 2002, 2006, 2009, and 2016.

The 2021 study estimates the net impacts, along with the private and social benefits and costs, of 12 workforce development programs administered in Washington. Past studies also included an evaluation of Secondary Career and Technical Education (CTE). This year's study is lacking data from Washington's middle and high schools, and thus this program was not evaluated. We expect to work closely with the Office of Superintendent of Public Instruction to include CTE in next year's report.

This year's report evaluates the following programs.

Programs serving job-ready adults:

- Workforce Innovation and Opportunity Act (WIOA) Adult program
- WIOA Dislocated Worker program
- Community and Technical College Professional-Technical Education
- Community and Technical College Worker Retraining
- Private Career Schools
- Apprenticeships
- Aerospace Training

Programs serving adults with employment barriers:

- WorkFirst
- Community and Technical College Basic Education for Adults (BEdA)
- Community and Technical College Integrated Basic Education and Skills Training (I-BEST)
- Division of Vocational Rehabilitation programs (DVR)

Programs serving youth:

- WIOA Youth program

The Net Impact Study uses difference-in-differences with propensity score matching.[5] It is a statistical matching technique that, in this case, attempts to estimate the net benefit, such as higher employment rates and earnings, of those who participate in workforce programs when compared to those with nearly identical, observable characteristics who do not.

To arrive at this impact requires reducing these characteristics, such as gender, work history, race, age, and education, into a conditional probability of individuals participating in a specific training. This is the propensity score. These individuals are then matched one-to-one with those who have not received training, forming two groups: treatment and comparison. The comparison group is constructed from a larger pool of individuals who have essentially the same propensity score as individuals from the treatment but did not participate. Propensity score matching seeks to remove any bias that influences treatment outcomes, such as education. It allows researchers to estimate more clearly the impact of an intervention—in this case, workforce training.

The analysis uses administrative data pulled from the universe of program participants. This includes the participant group itself; that is, the treatment group. The comparison pool is comprised of those who have registered to use the state's WorkSource employment centers and online job-search portals but did not participate in any 'treatment' programs. This pool of WorkSource registrants is part of the larger federal labor exchange program known as Wagner-Peyser.

Wagner-Peyser registrants that made lighter use of the WorkSource centers and did not participate in an identified workforce program, are the pool from which the comparison group is constructed. The average difference in measured outcomes, such as earnings, between the treatment and comparison group is taken for both groups in periods before and after the treatment takes place. The treatment effect is the difference between the 'pre-post' difference of the two groups.

After a successful propensity score matching procedure, mean differences in outcomes between the treatment and control group help tell the story of how much impact was directly attributed to participating in a particular workforce program, rather than outside factors, such as race and gender, past employment history, or economic conditions. For example, if both the treatment and the control group are subjected to the same economic factors at the same time, then those economic effects are 'cancelled out.' If the only remaining difference between the two groups is program participation, then program participation itself is the most likely reason for a change in earnings or employment.

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[5] This study follows the difference in difference and propensity score estimation procedures described by Joshua D. Angrist and Jörn-Steffen Pischke in Mostly Harmless Econometrics: An Empiricist's Companion, 2009, Princeton University Press.

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This study examines the following labor market outcomes:

- Employment rates

- Hourly wages

- Hours worked per quarter (three-month period)

- Quarterly earnings

- Receipt and quarterly amount of Unemployment Insurance (UI) benefits

Program costs borne by participants, such as tuition, increased tax burden because of higher wages, forgone earnings due to participation, and reduced public assistance, can then be subtracted from gains in earnings to arrive at an average net benefit for participants.

Additional tax revenues can be estimated based on higher taxable earnings among workforce program participants. Government savings can also be estimated due to reduced consumption of services. In many cases, workforce program participants receive less in unemployment benefit payouts, as their employment rates and prospects rise. An annualized taxpayer return on investment can then be calculated once program costs are considered.

Observation Period

This study looks at two time periods, and two participant cohorts. The first period is the fiscal year running from July 2014 to June 2015. This serves as the observation set used to estimate long-term net impacts. The second set, which stretches from July 2016 to June 2017, is used to estimate short-term impacts. The short-term set includes quarterly outcomes occurring within one year after program exit, while the long-term outcomes measure results up to three years after exit. The same data is collected six quarters (a year and a half) prior to program participation for both cohorts. This data is used to arrive at earnings and employment history in the propensity score matching procedure.

Participants are included in the treatment group if they enrolled in a workforce program within these specific time periods. An individual is considered part of the pool used in the comparison group if they connected with the state's WorkSource employment centers under the federal Wagner-Peyser program within these same time periods but did *not* consume any other services.

Wagner-Peyser registrants, not enrolled in any other programs, are a suitable comparison set because they share similar characteristics with participants in other programs – including having met eligibility requirements for receiving services.[6] The difference between general WorkSource customers and participants of workforce programs evaluated in this study is the intensity of services consumed. Whereas all treatment programs contain some form of training or education

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[6] Wagner-Peyser enrollees are not a suitable comparison for Division of Vocational Rehabilitation clients. The DVR comparison group is therefore constructed from DVR administrative data. Further explanation is provided in the DVR program section of the report.

component, the Wagner-Peyser registrants only access self-service components such as online job searches to match their education, skillsets, and experience with job postings and employer needs.

Participants and comparison cases are matched according to their observed employment in the quarters prior to program participation. Each participant is matched with a nonparticipant who had the same demographics and the same labor market experience up to the time of participation, with both enrolling in employment services in the same period. For example, a participant beginning a program in the first quarter of program year 2015 (July through September 2015) would be matched with a comparison case having the same demographic, employment, and earnings characteristics prior to the program starting.

Participants are considered as employed if they earned more than $100 within a quarter (three months).

Methodology for Net Impact Estimation

Net Impacts Problem Statement

To empirically determine whether Washington's workforce training and education programs increase employment and earnings, and by how much, suppose it was possible for an individual i, at time t, with a vector of characteristics X_{it}, to simultaneously be a participant in a program ($D_{it} = 1$), and not ($D_{it} = 0$) i.e., the counterfactual. The potential outcomes (Y_{it}) following participation in a program of these two hypothetical scenarios can be expressed as:

$$Y_{it} = \begin{cases} Y_{1_{it}} & \text{if } D_{it} = 1 \\ Y_{0_{it}} & \text{if } D_{it} = 0 \end{cases}$$

Because this is the same person within the same timeframe, the treatment effect – or net impact of the program for this individual – is the difference in outcomes ($Y_{1_{it}} - Y_{0_{it}}$).

$$= Y_{0_{it}} + \left(Y_{1_{it}} - Y_{0_{it}}\right)D_{it}$$

$$\underbrace{\phantom{= Y_{0_{it}} + \left(Y_{1_{it}} - Y_{0_{it}}\right)D_{it}}}$$

Treatment Effect

(Please note that the time subscript (t) will be dropped from the remainder of this section to simplify the notation.)

Such an experiment is obviously impossible. However, there is likely a distribution of both outcomes between comparable groups of people from a sufficiently large sample in the population. The comparison of expected (E) mean outcomes between groups, conditional on program enrollment status, can be linked to the average causal effect:

$$E[Y_i|D_i = 1] - E[Y_i|D_i = 0] = \underbrace{E[Y_{1_i}|D_i = 1] - E[Y_{0_i}|D_i = 1]}_{} + \underbrace{E[Y_{0_i}|D_i = 1] - E[Y_{0_i}|D_i = 0]}_{}$$

Observed difference in average outcomes, e.g.   Average treatment effect on the treated, i.e., participants   Selection bias

The average causal effect of having received training, for those enrolled in a program, or the treatment effect on the treated (*TOT*), can be expressed as:

$$E[Y_{1_i}|D_i = 1] - E[Y_{0_i}|D_i = 1] = E[Y_{1_i} - Y_{0_i}|D_i = 1]$$

This term captures the expected (E) average difference in outcomes, such as earnings, within a time-period, of those who had received training ($E[Y_{1_i}|D_i = 1]$), and what would have happened

to them had they not received training ($E[Y_{0_i}|D_i = 1]$), the counterfactual. The causal effect described in this term also captures the selection bias, that is, the difference in average Y_{0_i} between those who were enrolled in a training program and those who were not. The trouble with this is that these training programs are designed to help individuals who already have low employment and earnings prospects from the general population. A naïve comparison of participants versus non-participants introduces a negative bias that may completely obscure any positive effects of the program itself. This is because there is a systemic non-random difference in the characteristics between the comparison groups.

Random assignment overcomes this issue. Such an experiment would be ideal for measuring the net impact of an education or training program on employment and earnings outcomes for participants. In such a study, eligible individuals seeking program enrollment would be randomly assigned into either a treatment or control group, where those in the treatment group are enrolled in the program, and those in the control group are not. This solves the problem of non-random differences in the comparison groups.

Random assignment works because it minimizes selection and confounding bias by assuring that assignment is independent ($⫫$) of the potential outcome variables, such that:

$$\{Y_{0_i}, Y_{1_i}\} ⫫ D_i$$

Again, such a study is not feasible – not because it is impossible – but because state-subsidized workforce training and education programs are essentially an entitlement for anyone meeting the eligibility criteria. Therefore, the intervention cannot be randomly assigned. If someone is eligible to receive treatment, then they are entitled to that benefit.

Estimation of Net Impacts

This study overcomes the limitation of not being able to randomly assign treatment by taking advantage of administrative data that contains observations of numerous characteristics across individuals who were program eligible but for whatever reason decided not to participate in workforce training and education programs. A simple comparison of outcomes, such as earnings, for the participant and nonparticipants will still result in a biased estimate of the *TOT* effect unless D_i is independent of Y_{0_i}. However, given detailed characteristics of individuals and their employment histories that are available, we may be able to assume that the Conditional Independence Assumption (CIA) holds. This assumption implies that if we compare a participant and a nonparticipant with particular characteristics, on average they will not differ in terms of their potential outcome measures. This assumption is written:

$$\{Y_{0_i}, Y_{1_i}\} ⫫ D_i|X_i$$

If the CIA holds, matching individuals who received the treatment with a sample from a larger universe of individuals who did not receive the treatment removes selection bias but only if participants are matched to a characteristically similar group of non-participants on a one-to-one

basis. The effect, or difference, of treatment on the treated (δ_{TOT}) can be constructed based on the expectation of outcome Y_i given X_i:

$$\begin{aligned} \delta_{TOT} &\equiv E\big[Y_{1_i} - Y_{0_i}\,|\,D_i = 1\big] \\ &= E\big\{E\big[Y_{1_i} - Y_{0_i}|X_i, D_i = 1\big]\big|D_i = 1\big\} \\ &= E\big\{E\big[Y_{1_i}|X_i, D_i = 1\big] - E\big[Y_{0_i}|X_i, D_i = 1\big]\big|D_i = 1\big\} \end{aligned}$$

An impossible counterfactual again arises for an individual to simultaneously be a participant and not be a participant ($E\big[Y_{0_i}|X_i, D_i = 1\big]$). However, if the CIA holds, matching allows for a statistical analog where:

$$E\big[Y_{0_i}|X_i, D_i = 1\big] = E\big[Y_{0_i}|X_i, D_i = 0\big]$$

Therefore, the effect of treatment on the treated can be written as:

$$\begin{aligned} \delta_{TOT} &= E\big\{E\big[Y_{1_i}|X_i, D_i = 1\big] - E\big[Y_{0_i}|X_i, D_i = 0\big]\big|D_i = 1\big\} \\ &= E[\delta_X|\,D_i = 1] \end{aligned}$$

where δ_X is the difference in mean earnings by participant status at each value of X_i. With any value of X_i expressed as δ_X.

$$\delta_X \equiv E[Y_i|X_i, D_i = 1] - E[Y_i|X_i, D_i = 0]$$

Assuming these assumptions hold with a balanced and valid match, the net impact of a program for an individual on average is the difference in mean outcomes between participants and matched non-participants.

Matching Technique

This study uses propensity score matching. The propensity score simplifies all the variables in the vector (X_i) into a single dimension of the likelihood of a participant being in the treatment group as a value between 0 and 1 (refer to **Appendix A** for the list of program variables):

$$p(X_i) \equiv E[D_i|X_i] = P[D_i = 1 \mid X_i]$$

Given the assumption of CIA for the variables (X_i) , it is possible to show that the propensity score can be substituted for the full set of variables. In symbolic form,

$$\big\{Y_{0_i}, Y_{1_i}\big\} \perp\!\!\!\perp D_i|X_i \Rightarrow \big\{Y_{0_i}, Y_{1_i}\big\} \perp\!\!\!\perp D_i|p(X_i)$$

The comparison group is constructed from a subset of non-participants who have been matched on a one-to-one basis with participants. Observations are matched on the predicted probability, estimated using a logistic regression, of an individual being a participant based on their propensity

score $p(X_i)$. The tool used to construct the propensity scores for this study was R: A language and environment for statistical computing[7].

Participants and non-participants are then matched using the nearest neighbor algorithm, which the difference in propensity scores between individuals in the two groups. An exact match on gender is required. The procedure used the MatchIt[8] package for R.

If the matching process is successful, the X_i variables in the treatment and comparison samples will be balanced. This is tested by demonstrating that the mean outcomes between the two groups are not substantially different. Previous Net Impact and Cost-Benefit reports rely on the Cohen d statistic test, which is a standardized difference in means:

$$d = \frac{(\bar{Y}_0 - \bar{Y}_1)}{\sigma_0}$$

A general rule of thumb is that d should be less than .25. This study achieved $d < 0.10$, as determined by the precedent set-in past reports.

Statistically speaking, the Cohen d statistic only captures the first moment of the distribution, meaning it only captures the mean. The second moment captures the variance (σ^2). To test that the variances across X_i between the treatment and comparison groups are similar, the ratio of squared standard deviations for both groups should be close to one, such that:

$$v = \frac{\sigma_{D=1}^2}{\sigma_{D=0}^2}$$

$$v \approx 1$$

In this study, the mean and median v are approximately one, never exceeding +/- 0.06.

This model is designed to estimate the net impact of training and education programs, the attributable effect of program participation on an outcome. It is not attempting to explain outcomes. As such, this model is not designed to fully explain the outcomes in question per covariate. The model used to construct the propensity score focuses on explaining how significant certain characteristics of participants are at predicting an outcome – in this case, the probability of an individual being in the treatment group given a set of characteristics – which again, is used to match participants across groups.

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[7] R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/

[8] Daniel E. Ho, Kosuke Imai, Gary King, Elizabeth A. Stuart (2011). MatchIt: Nonparametric Preprocessing for Parametric Causal Inference. Journal of Statistical Software, Vol. 42, No. 8, pp. 1-28. URL http://www.jstatsoft.org/v42/i08/

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If the matching is done properly, the conditional independence assumption implies there is little difference in the distribution of unobserved variables affecting the outcome of interest, such as the motivation and drive of participants to succeed. Such unobserved variables can partially explain why certain outcomes take place. However, if these characteristics are equivalently distributed between the treatment and comparison group, then the difference in mean outcomes between the groups can be attributed to program effect.

The Wagner-Peyser non-participant universe offers a plausible case where this omitted variable bias will be minimized because registrants must actively seek out such assistance. Individuals in the training and education programs, on average, are assumed to be equally motivated and driven to improve their employment and earnings prospects as are Wagner-Peyser registrants.

Another matter of consideration is if the comparison group constructed from the universe of non-participants is matched with or without replacement. Replacement, as in replicating non-participants in the matching process with the treatment group, can make a closer match. When such replication occurs more frequently, this can artificially weaken the standard error in the net impact estimate, which can make the model look more precise than it is. In this sense, matching with replacement is not true one-to-one matching.

The nearest neighbor algorithm can be adjusted to require the distance between the treatment and comparison group meet a certain criterion. In this study, the radii matching, or caliper (a fraction of the standard deviation of the propensity score of treated units), is 0.005. By specifying such a caliper, the degree of replacement, may change depending on the program being evaluated because multiple treatment groups are being compared to the same universe of non-participants. This study is restricted to a maximum of three replacements per control unit.

Therefore, the characteristics of the treatment group will determine the construction of the matched comparison group from the parent universe. Treatment groups that contain numerous participants with specific yet uncommon characteristics in the universe of non-participants may require duplication of certain non-participants to ensure a match that fits within the caliper.

Estimation Procedure

The net impact can be estimated once the treatment and comparison groups have been successfully matched. The average treatment effect on the treated, for most programs evaluated in this study, is the mean of the difference-in-differences means:

> [(post-program outcomes for treatment cases minus pre-program levels) **minus**
> (outcomes for the comparison cases in the post-program period minus levels at
> the pre-program period)]

However, programs that contain participants that experienced a drastic change in their employment or earnings status only have post-program mean outcomes compared. This is

because records of previous employment or earnings may not exist, such as in the Youth and DVR programs (refer to **Comparison Group and Estimation Procedure by Program**):

*(post-program outcomes from treatment cases **minus** outcomes for the comparison cases in the post-program period)*

Comparison Group and Estimation Procedure by Program

Workforce Program	*Comparison Group Pool*	*Preferred Estimator*
WIOA Adults	Wagner-Peyser (age = [18,70])	Pre-Post Program Diff.-in-Diff.
WIOA Dislocated Workers	Wagner-Peyser (age = [18,70])	Pre-Post Program Diff.-in-Diff.
WIOA Youth	Wagner-Peyser (age = [14,22])	Post Program Diff.
CTC Workforce Education	Wagner-Peyser (age = [16,70])	Pre-Post Program Diff.-in-Diff.
CTC Worker Retraining	Wagner-Peyser (age = [16,70])	Pre-Post Program Diff.-in-Diff.
CTC Basic Education for Adults	Wagner-Peyser (age = [18,55])	Pre-Post Program Diff.-in-Diff.
CTC I-BEST	Wagner-Peyser (age = [18,55])	Pre-Post Program Diff.-in-Diff.
Private Career Schools	Wagner-Peyser (age = [16,70])	Pre-Post Program Diff.-in-Diff.
Registered Apprenticeships	Wagner-Peyser (age = [16,60])	Pre-Post Program Diff.-in-Diff.
Aerospace Training	Wagner-Peyser (age = [16,70])	Pre-Post Program Diff.-in-Diff.
DVR	DVR Administrative data	Post Program Diff.

This study uses the Zelig[9] package for R in the estimation procedure, which allows for weights based on the frequency of replication derived from the matching procedure, which was designed to work in conjunction with the MatchIt and Survival[10] packages. A simple weighted least squares regression without participant characteristic covariates is used to estimate the pre-post difference-in-difference, where the net impact is the interaction between the treatment and post-period variable. A post-program difference-in-difference also uses a weighted least squares regression, but only considers the treatment variable.

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[9] Choirat C, Honaker J, Imai K, King G, Lau O (2018). _Zelig: Everyone's Statistical Software_.
Version 5.1.6, http://zeligproject.org/, and
Imai K, King G, Lau O (2008). "Toward A Common Framework for Statistical Analysis and
Development." _Journal of Computational Graphics and Statistics_, *17*(4), 892-913,
http://j.mp/msE15.
[10] Therneau T (2020). _A Package for Survival Analysis in R_. R package version 3.1-12, https://CRAN.R-project.org/package=survival, and Terry M. Therneau, Patricia M. Grambsch (2000). Modeling Survival Data: Extending the Cox
Model. Springer, New York. ISBN 0-387-98784-3.

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Methodology for Cost-Benefit Analysis

The goal of this cost-benefit analysis is to estimate the average return on investment (ROI) across three major groups—participants, taxpayers, and more broadly, the economy. In other words, for every dollar invested in publicly funded workforce programs, what is the dollar return? The ROI is the ratio of net benefits compared with costs. To do this requires evaluating the difference between cost and benefits for both the public and workforce participants.

ROI for Workforce Program Participants
The estimated net benefits for workforce program participants examine Unemployment Insurance benefits, employment, hours worked, and earnings before, during, and after training. The downside of this approach is that the net benefits for some programs can be relatively slight. This is especially pronounced in programs that serve youth, and programs designed to help people with substantial barriers, including those living with disabilities, language barriers, and those who are low-income. Future studies could also consider other outcomes as a benefit, such as enrollment in higher education or reduced reliance on public assistance, such as the Supplemental Nutritional Assistance Program (SNAP), commonly known as food stamps.

But even with these limitations, calculating ROI can help policymakers understand immediate economic impacts, such as direct increases in tax revenues associated with higher earnings, program cost-benefit break-even points, and reduced reliance on public assistance programs. This is important for developing near-term economic development plans but falls short of estimating long-term economic impact.

Benefits
The benefits for ROI calculations include:

Earnings
Earning impacts are taken as the average impact from the short-term and long-term net impacts on earnings in the treatment group over five- and 10-year periods. Past net impact studies produced by the Workforce Board in consultation with the W.E. Upjohn Institute for Employment Research, calculated a lifetime shift in earnings. That is, how many additional dollars was a workforce program participant projected to earn over the course of his or her working life, to age 65. However, there is insufficient evidence to support a lifetime earnings extrapolation. This is especially difficult to judge, as earnings decay rates are unknown, as are the extent to which these decay rates may differ between programs. This study provides net impact estimates five-years and 10 years after participants exit a program.[11] This is a much closer to real-time calculation and is

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[11] Earnings impacts are used to estimate social and participant ROI, each of which are annually discounted through a net present value calculation that uses the Social Security Administration's Cost of Living Adjustment of 1.3% annually.

consistent with assumptions used in workforce program impact studies used in other states, such as Texas.[12]

That said, it is possible that the net impact from workforce education and training programs persists much longer, particularly with programs focused on high-skill, higher-wage career paths, such as Professional and Technical Education programs at Community and Technical Colleges as well as Registered Apprenticeships. It may be worth looking at longer-term impacts in future studies.

Foregone Earnings

Forgone earnings are calculated based on what participants are projected to have earned if they had *not* participated in a workforce program. This is unobservable and is inferred by taking the average pre-participation earnings of the treatment group and the post-participation earnings of the matched comparison group members minus how much a participant did earn while participating in a workforce program – and then multiplied by program length.[13] The calculation is derived as:

$$Forgone_i = \left[0.5 \times (\hat{E}_{1_i} + \bar{E}_{-1_i}) - \bar{E}_{0_i} \right] \times d_i$$

Where, $\bar{E}_{-1}, \bar{E}_0$ = average quarterly earnings for treatment group in the quarter preceding participation, and during participation period, respectively.

$\hat{E}_{1_i}$ = average quarterly earnings for matched comparison group in the quarter after participation of the treatment group

d = average program participation duration

i = indexes program

Forgone earnings estimates vary widely. The largest differences are the forgone earnings that occur for WIOA Dislocated Workers and Worker Retraining participants. These participants have often lost relatively high paying jobs. They also typically spend a longer period being retrained. Even so, their new jobs tend to pay less than their old ones.

Participants in most other workforce programs earn more *during* program participation. And in this case, foregone earnings are considered a benefit. Foregone earnings are also used to estimate tax liabilities as well, which are counted as benefit for taxpayers.

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[12] Return from Investments in Workforce Services: Texas Statewide Estimates for Participants, Taxpayers, and Society. King, Christopher T. et al., Ray Marshall Center for the Study of Human Resources, prepared for the Texas Association of Workforce Boards. August 2008.

[13] The method used to calculate forgone earnings is identical to the method developed by Kevin Hollenbeck and Wei-Jang Huang at the W.E. Upjohn Institute for Employment Research, which was used in prior net impact studies in Washington and adopted for us in the Texas study cited above.

A plausible explanation for why participants in most other programs earn more than what they lose in foregone earnings could be due to the brevity of the program they enroll in. Given that the observation periods are based on quarters, it is possible for a participant to have received training, and then become employed within that same three-month observation period. Also, for less intensive programs, or on-the-job training programs, a participant could have been employed while participating in the program at the same time.

Employment

Employment impacts, in terms of absolute counts, are fed into the 2012 Washington Input-Output Model. This tool was developed by the state's Office of Financial Management to estimate economic impacts based on a specific change to the economy. Changes in employment attributable to these programs, on a sector-by-sector basis, reverberate through the larger economy. Unlike the earnings impact, this multiplier effect is only counted once – in the first-year post exit – and only applied to the social ROI.

Fringe Benefits

Workers receive more than a paycheck for time spent on the job. Many employees also receive an array of benefits, including, paid vacations and sick leave, health insurance coverage, and retirement/savings plan contributions. Previous studies assumed a 40% multiplier to the average participant's lifetime earnings benefit. This assumption is grounded in empirical research conducted by the U.S. Bureau of Labor Statistics (BLS). As of March 19, 2019 – BLS reported that such benefits amounted to 31.4% (or nearly one third) of total compensation to civilian workers.[14] This study takes the same approach using these latest BLS estimates to calculate fringe benefits based on earnings outcomes. Fringe benefits are only applied to participant ROI estimates.

Employee Tax Liabilities

As workers earn more income, they pay more in taxes. Washington has no income tax, so increased tax collection comes from consumers spending more money as their incomes rise, with their contributions captured through sales tax collections. This increased tax burden is a cost to the participant, but a benefit to the public. More taxes mean increased government revenue is available for public programs—from health care assistance to building bridges and roads. Tax revenues extrapolated out to five- and 10-year estimates apply a net present value calculation using a discount rate based on the White House Office of Management and Budget (OMB) guidelines concerning cost-benefit analyses for federal programs: 1.7% annually for 5-year periods, and 2% annually for 10-year periods.

The following taxes are used for taxpayer ROI estimates and participant costs:

Federal Income and Payroll Taxes

A simple marginal tax rate is applied to the change in earnings based on the U.S. Department of the Treasury, Internal Revenue Service's (IRS) *Statement of Income (SOI) Tax Stats – Individual*

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[14] U.S. Bureau of Labor Statistics, U.S. Department of Labor, News Release USDL-19-0449, "Employer Costs for Employee Compensation – December 2018", https://www.bls.gov/news.release/pdf/ecec.pdf, accessed 14 June 2019.

Statistical Tables by Size of Adjusted Gross Income.[15] The total average change in tax liability per participant is then calculated for estimating the total change in taxes paid over a three-year period. This is calculated after the average participant exits a workforce training program. The tax rate used is based on the tax bracket associated with the average annual earnings of a program participant.

A key assumption is that employees will continue to work in covered employment (instead of becoming self-employed), and that their earnings will not exceed the earnings cap for payroll taxes.

Sales and Excises Taxes
Washington state relies on sales and excise taxes for revenues. This report uses findings from the *Who Pays? A Distributional Analysis of the Tax Systems in All 50 States, 6th Edition* by the Institute on Taxation & Economic Policy (ITEP), October 2018, to proxy the average change in sales and excise taxes paid to the state as a share of family income.[16] There are a few important considerations here. First, the ITEP tax index is based on average family income and expenditure, which likely has a somewhat different sales tax-to-income ratio than individuals because of differences in consumption habits between families and individuals on average. This study assumes the sales and excise tax rates for individuals within the same income bracket to be the same.

Unemployment Compensation
The net impact analysis of this study also estimates quarterly UI benefits as an outcome for all programs.

Costs
Costs include:

- Tuition payments paid by the individual.
- Program costs borne by the public.

Program Costs
Total program costs consist of the average cost paid directly by the participant, such as tuition, and the average per-participant cost of the program – which is recorded by the agency administering the program (refer to **Administering Agency for Programs**).

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[15] Internal Revenue Service, *SOI Tax Stats – Individual Statistical Tables by Size of Adjusted Gross Income, Table 1.1 & 15.3, 2016 & 2017 Taxable Years,* https://www.irs.gov/statistics/soi-tax-stats-individual-statistical-tables-by-size-of-adjusted-gross-income, expected to be published September 2019.

[16] The Institute on Taxation & Economic Policy (ITEP), *Who Pays? A Distributional Analysis of the Tax Systems in All 50 States, 6th Edition,* October 2018, pg. 127, https://itep.org/wp-content/uploads/whopays-ITEP-2018.pdf, accessed 17 June 2019.

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Administering Agency for Programs

Program	Administering Agency
WIOA Programs *(Adult, Dislocated Worker, and Youth)*	Employment Security Department
Community and Technical College Programs *(Aerospace, Workplace Education, Worker Retraining, Basic Education for Adults)*	State Board for Community and Technical Colleges
Registered Apprenticeships	Department of Labor and Industries
Private Career Schools	Private (Workforce Board oversight)
Vocational Rehabilitation Programs	Division of Vocational Rehabilitation

Comparison to Previous Studies

This iteration of the Net Impact and Cost-Benefits study follows the same methodological approach to impact estimations in terms of employment and earnings impacts as previous studies. The impact estimates from this and the 2016 study can therefore be compared.

Program	2016 Average Earnings Impact	2021 Average Earnings Impact	Difference
Workforce Innovation and Opportunity Act (WIOA) Adult	$1,462	$835	-$627
WIOA Dislocated Worker	$1,237	$806	-$431
WIOA Youth	-$402	$146	$548
Community and Technical College (CTC) Professional Technical Education	$1,244	$2,731	$1,487
CTC Worker Retraining	$1,096	$1,632	$537
CTC Basic Education for Adults	-$399	$381	$779
CTC Integrated Basic Education and Skills Training (I-BEST)	$668	$1,115	$447
Private Career Schools	$346	$1,461	$1,115
Registered Apprenticeships	$3,620	$5,471	$1,851
Aerospace Training	$3,028	$4,096	$1,068
Division of Vocational Rehabilitation (DVR)	$165	$565	$401

Note: WorkFirst was not included in the 2016 study

All programs apart from WIOA Adult and Dislocated Worker experienced substantial increases in quarterly earnings impacts. It is unclear why these two programs experienced a decline in earnings impacts. One plausible explanation could be an increase in the number of clients served that is proportionately larger than available funding. Overall, average earnings impact has increased by $650 after controlling for inflation.

However, employment impacts have moved in the opposite direction. Decreasing on average by 1.5%. The reason why changes in earnings and employment impacts have diverged is likely related to economic conditions, and not program performance. For example, the 2016 study examines program participants that exited between 2010 and 2011, and between 2012 and 2013. The average unemployment rate during those two periods was about 10% and 8%, respectively. The

unemployment rate for the 2016 study, which looks at exit cohorts between 2014 and 2015, and between 2016 and 2017, was about 6% and 5%.

Washington's economy improved substantially between these periods of study. During economic downturns, the effect of employment impact should be higher than economic boom times. This is because the control group would have greater opportunity on average to find a job when the economy is strong, therefore diminishing the estimated impact of the treatment group.

At the same time, the net earnings impact should also increase during an economic boom for the treatment group because training and job placement services would result in better employment options, i.e., higher wages, than during a downturn.

It is important to keep in mind that net program impact, on average, is positive for both studies.

Program	2016 Average Employment Impact	2021 Average Employment Impact	Difference
Workforce Innovation and Opportunity Act (WIOA) Adult	8.0%	1.2%	-6.8%
WIOA Dislocated Worker	9.5%	6.7%	-2.8%
WIOA Youth	4.1%	1.8%	-2.3%
Community and Technical College (CTC) Professional Technical Education	3.8%	4.2%	0.4%
CTC Worker Retraining	8.1%	3.2%	-4.9%
CTC Basic Education for Adults	0.4%	3.4%	3.1%
CTC Integrated Basic Education and Skills Training (I-BEST)	8.5%	14.2%	5.7%
Private Career Schools	2.1%	3.0%	1.0%
Registered Apprenticeships	3.4%	1.6%	-1.8%
Aerospace Training	15.2%	12.0%	-3.2%
Division of Vocational Rehabilitation (DVR)	11.7%	6.8%	-4.9%

Even though net impact estimates between the 2016 and 2021 study are comparable, the cost-benefit analyses are not. Substantial changes to the cost-benefit methodology have been made for this latest study. The most impactful changes were the assumptions used to extrapolate earnings.

The previous study assumed that earnings impacts were permanent over a program participant's working lifetime. If a participant exited a program at 30 years of age, the annual earnings impacts would persist for another 35 years on average. This is certainly plausible. Long-term longitudinal studies comparing years of educational attainment demonstrate this. However, there is no evidence to suggest that all the programs evaluated in this study have the same impact longevity. The decision was therefore made to only extrapolate for 5- and ten-year periods.

This reduced extrapolation results in a much lower return on investment (ROI) in absolute terms, but also anchors the return on investment to a more practical time frame. A time frame in which policymakers can consider program investments over more immediate budget cycles. For example, the taxpayer ROI for the Apprenticeship program in the 2016 study was $36 to $1 over 33 years. The 2021 study calculates the taxpayer ROI at $4.80 to $1 over 5 years, and $7.75 to $1 over 10 years.

These basic ROI ratios are typically what is reported, and when extrapolated over a long period of time, become larger. The benefit of using such basic ROIs is that they are easier to communicate but ignores the investment horizon.

When converted to an annualized ROI, the 2016 Apprenticeship taxpayer ROI, for example -- becomes an 11.6% annual return. The 2021 study's five-year and 10-year taxpayer ROI become 42.1% and 24.2% respectively.

If extrapolated out over 33 years, the 2021 Apprenticeship annualized ROI would be about 9.5%. The reason these returns decrease over time is because both studies apply a net present value depreciation. If $1 is invested at an 11.6% annual return and at 9.5%, the return on investments would be $36.14 and $36.82, respectively.

Results of Net Impact Analysis

Title I: WIA/WIOA Adult Program

Program Overview

WIOA Title I: Adult Employment and Training Activities (Adult), and its predecessor Workforce Investment Act (WIA) Title I: Adult, are overseen by regional Workforce Development Councils in each of Washington's 12 Workforce Development Areas. Each area hosts multiple 'one-stop' WorkSource employment centers serving nearby population clusters. These centers provide access to career and employment services regardless of age or employment status.

Local Workforce Development Councils forge industry partnerships with employers and emphasize career pathways for individuals accessing services. Although core WorkSource Center services, such as job search and job placement assistance, are available to everyone, the WIOA Title I Adult Service program provides more intensive services for individuals with low-income status and skills deficiencies. Intensive services may include career counseling, support services, such as childcare and transportation, and skills training. Training is accessed through individual training accounts, where participants, working with counselors, can choose a training provider, and the type of training available, within program guidelines. Support services are provided throughout the training period, if needed.

One of the most significant differences between the predecessor federal act, WIA, and the current workforce act, WIOA, is increased coordination across workforce programs administered by regional Workforce Development Councils. This coordination can boost enrollment of participants in multiple programs to help them advance their career and education goals. However, enrollment in multiple workforce programs complicates program evaluation. This report's period of study – which coincides with the transition period between WIA and WIOA – only considers participants who are not co-enrolled in more than one program. For example, participants who were enrolled in both WIOA Adult and Dislocated Worker Programs were dropped from the observation set.

Summary of Findings and Limitations

The WIA/WIOA Title I Adult program serves about 9,800 Washington residents each year at an average cost of $1,200 per person, with zero tuition costs incurred by participants.[17] This adds up to about $12 million dollars in federal expenditure, with a net economic impact of around $153 million over a five-year period, a social ROI of $13.38 per $1.00 spent.

Taxpayers realize an ROI of $3.16 per $1.00 over 5 years, and $6.96 over 10 years. A breakeven point occurs about 0.8 years on average after participants exit the program. This positive rate of

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[17] Expenditures and counts are based on WIOA Quarterly Performance Reports covering the observation period of this study.

return is explained by decreased use of unemployment benefits due to an average employment impact of 2.4% after exit within the first year, and increased tax revenue due to increased participant earnings. The estimated employment impact becomes statistically insignificant when compared to the comparison group within three years after program exit, an indication that employment impacts are temporary. However, long-term earnings impacts are statistically significant, with participants experiencing an average annual net benefit impact between the short- and long-term of about $4,104, which includes fringe benefits and reduced use of Unemployment Insurance benefits. Foregone earnings during program participation are about $580. ROI estimates assume this effect is constant over a 10-year period but is annually discounted for Net Present Value calculations.

There is one more important caveat to consider. Evidence suggests that impact estimates from lower intensity services, such as self-service and job referral components, which are components to the Title III: Wagner-Peyser, tend to decay to zero in two quarters (six months) after program exit.[18] Moreover, all Adult program participants are automatically enrolled in Wagner-Peyser. There is probably a confounding effect taking place. Future studies will consider exploring ways to control for any impacts biased by Wagner-Peyser co-enrollment and may also consider different impact decay rates for Title III services into the cost-benefit analysis for Title I participants.

Although, net impacts of participation in the Title I: Adult program were positive and statistically significant, it is possible that future positive impacts under WIOA Adult will be less pronounced if policy changes result in an increased number of participants without additional funding. Follow up studies are needed to explore this shift.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

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[18] Return from Investments in Workforce Services: Texas Statewide Estimates for Participants, Taxpayers, and Society. King, Christopher T. et al., Ray Marshall Center for the Study of Human Resources, prepared for the Texas Association of Workforce Boards. August 2008.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, WIA/WIOA Adult**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, WIA/WIOA Adult

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	2.4%*	0.6% [a]
	(1.4%)	(2.3%)
Hourly wage	$1.18*	$2.16***
	(0.55)	(0.48)
Quarterly hours	18.90**	46.97***
	(6.34)	(9.20)
Quarterly earnings	$406 [a]	$1,264***
	(289)	(213)
Quarterly UI Benefits	-$1.43 [a]	-$224.50***
	(31.62)	(50.79)

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.*
[a] Findings not statistically significant

Total Cost-Benefit Estimates, WIA/WIOA Adult

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$15,976	$31,375
Average Costs per Participant	$3,186	$6,056
Return on Investment	$5.01	$5.18
Society		
Net Benefits ($m)	$153.6	$271.2
Costs ($m)	$11.5	$11.5
Economic Multiplier Effect	0.506	0.506
Return on Investment	$13.38	$24.00
Breakeven Point (years)	0.4	0.4
Taxpayer		
Net Benefits ($m)	$36.3	$79.7
Costs ($m)	$11.5	$11.5
Return on Investment	$3.16	$6.96
Breakeven Point (years)	0.8	0.8

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

Title I: WIA/WIOA Dislocated Worker Program

Program Overview

The Dislocated Worker program serves people who have been terminated, laid off, or received notice of a termination or layoff and are unlikely to be able to return to their old occupation because of foreign competition, plant closures, substantial layoffs events, or industry changes that no longer require certain skills. The program can also accommodate displaced homemakers and self-employed individuals when they become out of work due to a natural disaster or economic shock.

Summary of Findings and Limitations

The WIA/WIOA Title I Dislocated Worker program serves about 4,770 Washington residents annually at an average cost of $3,460 per person, with zero tuition costs for participants.[19] This translates to about $16.2 million dollars in federal expenditure, with a net economic impact of approximately $116 million over a five-year period, a social ROI of $7.16 per $1.00 spent.

Taxpayers realize five-year ROI of $1.81 per $1.00 spent, and a 10-year ROI of $4.62. A taxpayer breakeven point occurs about one year on average after participants exit the program.

The Dislocated Worker program is an effective intervention effort in the short-term, achieving a 13.3% employment impact, and $6,564 earnings impact within the first year. Annual post-program earnings impact, averaged out between the short-term and long-term periods, are $3,224. The average annual net benefit, which includes fringe benefits and reduced use of Unemployment Insurance benefits, is $2,772. Total net benefits are less than the earnings impact because participants receive less unemployment benefit on average following program exit.

However, it's not clear whether the positive earnings impact persists for the five- and 10-year periods following program participation. Longer-term employment and earnings impacts are statistically insignificant, although the program does succeed in achieving large reductions in the consumption of UI benefits in the longer-term, indicating a return to stable employment. Moreover, participants in this program experience an estimated $6,808 in foregone earnings during the participation period of the program, likely due to reduced hours and/or becoming employed in a lower paying occupation during this time. These findings are consistent with workers who have experienced severe job displacement, in which their earnings may never fully recover.

Future studies should consider applying impact decay rates to earnings for five- and 10-year ROI calculations on programs that do not realize statistically significant results in longer-term estimates.

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[19] Expenditures and counts are based on WIOA Quarterly Performance Reports covering the observation period of this study.

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Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, WIA/WIOA Dislocated Worker**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Table 3: Net Impact Estimates, WIA/WIOA Dislocated Worker

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	13.3%***	-2.5% [a]
	(3.1)	(1.9%)
Hourly wage	$2.95*	-$0.13 [a]
	(1.14)	(0.65)
Quarterly hours	50.84***	-8.47 [a]
	(15.18)	(8.96)
Quarterly earnings	$1,641*	$-29 [a]
	(583)	(318)
UI Benefits	-$29.10 [a]	-$798.60***
	(77.30)	(66.50)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

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Total Cost-Benefit Estimates, WIA/WIOA Dislocated Worker

	5-Year Estimates	*10-Year Estimates*
Participant		
Average Net Benefits per Participant	$4,334	$13,595
Average Costs per Participant	$4,223	$7,079
Return on Investment	$1.03	$1.92
Society		
Net Benefits ($m)	$116.3	$172.6
Costs ($m)	$16.2	$16.2
Economic Multiplier Effect	0.512	0.512
Return on Investment	$7.16	$10.66
Breakeven Point (years)	1.1	1.1
Taxpayer		
Net Benefits ($m)	$29.3	$74.7
Costs ($m)	$16.2	$16.2
Return on Investment	$1.81	$4.62
Breakeven Point (years)	0.9	0.9

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

Title I: WIA/WIOA Youth Program

Program Overview

Young people aged 14 through 24, with educational or employment barriers can participate in this program, focusing on academic and employment success through different services such as:

- Guidance and counseling
- Tutoring
- Job training
- Mentoring
- Summer employment
- Work experience
- Leadership development
- Supportive services
- Follow-up services

Priority is given to those not attending school, which accounts for at least 75% of participants. Eligibility requirements include barriers such as: low-income status, being homeless, in – or having been in – foster care, an offender, either pregnant or parenting, or those with disabilities. To be eligible, those in school must be younger than 21, with additional eligibility requirements for English language learners, or those with basic skills deficiencies.

Summary of Findings and Limitations

The WIA/WIOA Title I Youth program serves about 3,350 Washington residents annually at an average cost of about $4,900 per person, with zero tuition costs for participants.[20] Total federal expenditure is about $16 million dollars, with a net economic impact of some $6.8 million over a five-year period, a social ROI of $0.43 per $1.00 spent.

Taxpayers do not realize an annualized return on investment within a 10-year post-exit period. Average annual net benefits impact for participants are $770. However, like the Dislocated Worker program, longer-term earnings impacts are statistically insignificant. There are no statistically significant impacts on UI benefits.

The program achieves an 8.3% increase in employment for participants within the first year of exit but shifts to a 4.8% drop in employment three years after exit. This is directly attributable to program participation, but it is not clear exactly why. It is possible this drop in employment and

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[20] Expenditures and counts are based on WIOA Quarterly Performance Reports covering the observation period of this study.

insignificant longer-term earnings outcomes could be due to enrollment into postsecondary training and education. Controlling for this type of outcome will need to be included in future studies.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, WIA/WIOA Youth**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, WIA/WIOA Youth

Average Treatment Effect by Type	*One Year After Exit*	*Three Years After Exit*
	8.3%**	-4.8%*
Employment rate	(3.2)	(2.1)
	1.05*	-$0.22 [a]
Hourly wage	(0.52)	(0.31)
	30.03**	-10.94 [a]
Quarterly hours	(13.25)	(8.26)
	$374*	-$81.5 [a]
Quarterly earnings	(193)	(131.8)
	-14.20 [a]	-1.37 [a]
UI Benefits	(23.8)	(18.77)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

Total Cost-Benefit Estimates, WIA/WIOA Youth

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$3,980	$6,869
Average Costs per Participant	$274	$802
Return on Investment	$14.54	$8.56
Society		
Net Benefits ($m)	$6.9	$14.1
Costs ($m)	$16.0	$16.0
Economic Multiplier Effect	0.463	0.463
Return on Investment	$0.43	$0.88
Breakeven Point (years)	8.3	8.3
Taxpayer		
Net Benefits ($m)	-$12.7	-$10.6
Costs ($m)	$16.0	$16.0
Return on Investment	-$0.79	-$0.66
Breakeven Point (years)	NA [a]	NA [a]

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

[a] Program does not achieve a breakeven point within 10 years of program exit.

Community and Technical College: Professional-Technical Education

Program Overview

Washington's 34 community and technical colleges offer professional-technical training that provides participants with skills required for specific occupations. Community and Technical College Professional-Technical Education training covers a broad range of occupational fields and credentials, including short-term certificates and two-year technical degrees.[21]

Summary of Findings and Limitations

Nearly 160,000 Washington residents enroll in community and technical college professional-technical education programs each year. That works out to an average cost of $5,734 per person, with $2,607 in tuition costs for participants.[22] This amounts to about $1.3 billion dollars in total federal and state expenditure plus tuition costs. The net economic impact over five years is about $8.5 billion, a social ROI of $6.48 per $1.00 spent.

Taxpayers realize a five- and 10-year ROI of $0.75 and $2.20 per $1.00 spent respectively, with a breakeven point occurring 3.2 years on average after participants exit the program. This positive rate of return is largely due to higher rates of employment post exit of 6.8% in the first year, and 1.6% after three years, as well as increased tax revenue due to increased participant earnings of between $12,440 and $9,404, one year and three years after exit, respectively. Participants experience an average annual net benefit impact of $15,100.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is statistically insignificant if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, Professional-Tech Ed.**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

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[21] Participants also enrolled in the Aerospace program were removed from the sample.
[22] Per person program costs provided by the State Board for Community and Technical Colleges.

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Net Impact Estimates, Professional-Tech. Ed.

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	6.8%***	1.6%**
	(0.8)	(0.7%)
Hourly wage	$5.84***	$4.60***
	(0.20)	(0.18)
Quarterly hours	108.73***	75.51***
	(3.47)	(3.13)
Quarterly earnings	$3,110***	$2,351***
	(94)	(87.3)
UI Benefits	$45.47***	$28.39**
	(10.04)	(11.56)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.

Total Cost-Benefit Estimates, Professional-Tech. Ed.

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$61,684	$119,395
Average Costs per Participant	$11,929	$21,313
Return on Investment	$5.17	$5.60
Society		
Net Benefits ($m)	$8,469.3	$14,873.6
Costs ($m)	$1,307.3	$1,305.7
Economic Multiplier Effect	0.512	0.512
Return on Investment	$6.48	$11.40
Breakeven Point (years)	0.8	0.8
Taxpayer		
Net Benefits ($m)	$673.9	$1,965.4
Costs ($m)	$897.6	$895.0
Return on Investment	$0.75	$2.20
Breakeven Point (years)	3.2	3.2

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

Community and Technical College Worker Retraining Program

Program Overview

The Worker Retraining program offers support to unemployed and dislocated workers, as well as transitioning military members and veterans, displaced homemakers, those formerly self-employed, and a small number of workers vulnerable to layoffs, providing them with access to job retraining for a new career. Program enrollments vary from year to year in response to layoffs and, during recessions, the need increases. The industries from which participants are laid off also vary over time. About one percent of Worker Retraining participants receive their training at private career schools. This evaluation, however, is limited to training at community and technical colleges. Qualified participants may receive financial assistance to help with tuition; receive help with the cost of attendance, including books and supplies; and in some instances, receive assistance with support services, such as childcare and transportation.

The primary intention of the Worker Retraining program is to provide short-term "bridge funding," which allows unemployed or dislocated workers to get connected to training right away, while other funding and support services are sought to help them pay their bills and continue their education and training. Even so, the median length of enrollment for participants is nearly a year and half, with many participants continuing to receive some level of support services, such as books, or reimbursement for childcare costs, for example.

Summary of Findings and Limitations

The Worker Retraining program serves about 11,000 Washington residents each year at an average cost of $5,900 per person, with $2,607 in tuition costs for participants. Over five years, the state invests $91.8 million, beyond tuition, resulting in a taxpayer ROI of $0.52 for each dollar spent. Foregone earnings among participants and other factors result in a negative social ROI of -$3.5 million for that five-year period. That breaks out further to -$0.04 per $1.00 spent. Even so, a longer look at return on investment yields positive results. Over a 10-year period, the economic impact increases to $261 million, with a social ROI of $2.86 for every dollar spent.

The reason for the drastic difference between five-year and 10-year impacts has to do with high front-loaded costs, especially foregone earnings, which at $23,000, are the highest of any program measured in this study. These substantial foregone earnings among program participants are consistent with the longer duration of the program (typically a year and a half) and reflects the significant loss in earnings that participants experience following job separation.

Nonetheless, the Worker Retraining program achieves a taxpayer breakeven point in 1.1 years after exit on average. This program also provides a positive five- and 10-year taxpayer ROI of $0.52 and $2.88, respectively. The reason for the higher taxpayer ROI versus social ROI has to do with lower public costs, where participants absorb both tuition and high foregone earnings.

The positive taxpayer ROI is also due to decreased use of unemployment benefits over the longer term, and increased employment in the short-term. Earnings impacts remain relatively intact in both the short- and longer-term. Participants experience increasing returns on their investment as costs become offset over time.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, Worker Retraining**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data can't show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, Worker Retraining

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	6.3%*** (1.6)	0.0% [a] (1.6)
Hourly wage	$3.61*** (0.47)	$2.84*** (0.48)
Quarterly hours	62.28*** (7.69)	31.09*** (7.58)
Quarterly earnings	$1,880*** (222)	$1,384*** (231)
UI Benefits	-$324.20 [a] (37.8)	-$683.40*** (46.8)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

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Total Cost-Benefit Estimates, Worker Retraining

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$785	$25,759
Average Costs per Participant	$15,040	$20,649
Return on Investment	$0.05	$1.25
Society		
Net Benefits ($m)	-$3.6	$261.8
Costs ($m)	$91.9	$91.7
Economic Multiplier Effect	0.505	0.505
Return on Investment	-$0.04	$2.86
Breakeven Point (years)	1.3	1.3
Taxpayer		
Net Benefits ($m)	33.2	$182.4
Costs ($m)	$63.5	$63.4
Return on Investment	$0.52	$2.88
Breakeven Point (years)	1.1	1.1

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

Basic Education for Adults at Community and Technical Colleges

Program Overview

Basic Education for Adults is provided by community and technical colleges and, to a lesser extent, community-based organizations. Basic Education for Adults provides instruction in reading, writing, speaking, listening, employability skills, digital literacy, and mathematics for adults whose skills are at or below the eighth grade level; high school completion instruction for adults who want to earn an adult high school diploma; GED test preparation for participants whose goal is to pass the high school equivalency examination; and academic skills development for transition into further education and other career pathways.

Summary of Findings and Limitations

The Basic Education for Adults program serves about 54,500 Washington residents each year at an average cost of $3,698 per person, with a $25 tuition fee for participants per quarter[23] – about $212 million dollars in federal and state expenditure, with a net economic impact of around $430 million over five years. That works out to a social ROI of $2.03 per $1.00 spent.

Taxpayers do not realize a net positive return on investment within 10 years, meaning a breakeven point does not occur within this period. However, the program achieves more than a 6.7% increase in employment for participants in the longer-term with modest gains in earnings. On average, participants experience an annual net benefit of $2,228.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is statistically insignificant if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, Basic Education for Adults**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

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[23] The $25 tuition fees were excluded from the analysis because these fees can be waived and are otherwise minimal.

Net Impact Estimates, Basic Education for Adults

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
	0.5% [a]	6.7%***
Employment rate	(1.0)	(0.9)
	$1.40***	$0.73***
Hourly wage	(0.19)	(0.18)
	38.23***	26.67***
Quarterly hours	(4.35)	(4.15)
	$596***	$165*
Quarterly earnings	(89)	(87)
	$74.12***	-$1.07 [a]
UI Benefits	(10.75)	(13.17)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

Total Cost-Benefit Estimates, Basic Education for Adults

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$8,210	$16,576
Average Costs per Participant	$1,836	$3,388
Return on Investment	$4.47	$4.89
Society		
Net Benefits ($m)	$431.0	$735.4
Costs ($m)	$212.6	$212.0
Economic Multiplier Effect	0.504	0.504
Return on Investment	$2.03	$3.47
Breakeven Point (years)	2.6	2.6
Taxpayer		
Net Benefits ($m)	-171.0	-$125.0
Costs ($m)	$212.6	$212.0
Return on Investment	-$0.80	-$0.59
Breakeven Point (years)	NA [a]	NA [a]

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.
[a] Program does not achieve a breakeven point within 10 years of program exit.

Community and Technical Colleges Integrated Basic Education and Skills Training (I-BEST) Program

Program Overview

The Integrated Basic Education and Skills Training program teaches participants literacy, work preparedness, and college readiness skills, including basic English and math skills. The program is designed to put participants on a path toward a college-degree and into living-wage jobs.

Summary of Findings and Limitations

The I-BEST program serves about 4,900 Washington residents each year at an average cost of $5,734 per person, with $2,607 in tuition costs for participants. That works out to a total cost of around $40.7 million dollars in federal and state expenditure, and tuition. The net economic impact over five years is $193.5 million, achieving a social ROI of $4.82 per $1.00 spent.

Taxpayers do not realize a return on investment within the first five years following program exit but do realize a small return of $0.19 per dollar spent within 10 years. A breakeven point is not achieved within this time-period. However, if these net impacts are held constant, a breakeven point could be achieved in about 14 years.

Nonetheless, the program is among the highest performing in terms of employment impact—nearly 20 percent higher a year after participants exit. Participants realize an average annual net benefit of about $6,400 per year.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, I-BEST**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, I-BEST

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	19.1%*** (3.0)	9.3%** (3.0)
Hourly wage	$3.85*** (0.64)	$0.91 [a] (0.58)
Quarterly hours	96.72*** (12.99)	32.50** (13.36)
Quarterly earnings	$1,838*** (305)	$391 [a] (279)
UI Benefits	$120.50** (39.9)	30.10 [a] (54.2)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

Total Cost-Benefit Estimates, I-BEST

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$24,308	$48,239
Average Costs per Participant	$7,111	$11,656
Return on Investment	$3.42	$4.14
Society		
Net Benefits ($m)	$193.5	$273.2
Costs ($m)	$40.1	$40.1
Economic Multiplier Effect	0.508	0.508
Return on Investment	$4.82	$6.82
Breakeven Point (years)	1.9	1.9
Taxpayer		
Net Benefits ($m)	-9.4	$5.2
Costs ($m)	$27.6	$27.5
Return on Investment	-$0.34	$0.19
Breakeven Point (years)	NA [a]	NA [a]

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.
[a] Program does not achieve a breakeven point within 10 years of program exit.

Private Career School programs

Program Overview
Private Career Schools are independent, privately owned businesses that provide training for a wide range of occupations, including licensed massage therapy, commercial driving, nursing assistants, and computer programming. No public state funds are appropriated for these programs. Students pay for programs using public and private grants and loans, and GI benefits. Some students may qualify for funding through the federal Workforce Innovation and Opportunity Act (WIOA).

The Workforce Training and Education Coordinating Board licenses and regulates private career schools offering programs below the degree level. Private career schools offering degree programs are overseen by the Washington Student Achievement Council. The Workforce Board also provides a "consumer report card" on Careerbridge.wa.gov, detailing completion rates, employment, and earnings of recent graduates, to help prospective students make informed education and career decisions at private career schools and other postsecondary programs. A little less than 5% of participants receive a bachelor's degree from a private career school, and another 5% on average receive an associate degree. About 90% of the award types are certificates or licenses.

Summary of Findings and Limitations
Private Career School programs serve about 35,200 Washington residents each year with participants paying an average tuition cost of $11,514. This translates to about $400 million dollars in tuition costs, with a total economic impact of around $736 million over five-years, a social ROI of $1.84 per dollar spent.

Taxpayers receive no return on investment because they do not fund these programs. However, these programs achieve a 6% increase in employment in the short-term, and annual earnings impacts of between $4,000 and $7,700 in the short- and longer-term, respectively. On average, participants experience an average annual net benefit of $8,100.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, Private Career Schools**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are

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statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, Private Career Schools

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
	6.0%***	-0.01 [a]
Employment rate	(1.0)	(1.1)
	$3.63***	$1.91***
Hourly wage	(0.27)	(0.30)
	76.2***	28.55***
Quarterly hours	(4.9)	(5.20)
	$1,925***	$997***
Quarterly earnings	(132)	(145)
	$71.58***	-$10.60 [a]
UI Benefits	(14.28)	(19.4)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

Total Cost-Benefit Estimates, Private Career Schools

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$21,756	$52,830
Average Costs per Participant	$16,868	$21,889
Return on Investment	$1.29	$2.41
Society		
Net Benefits ($m)	$736.0	$1,494.3
Costs ($m)	$400.1	$400.1
Economic Multiplier Effect	0.491	0.491
Return on Investment	$1.84	$3.73
Breakeven Point (years)	2.0	2.0
Taxpayer		
Net Benefits ($m)	NA [a]	NA [a]
Costs ($m)	NA [a]	NA [a]
Return on Investment	NA [a]	NA [a]
Breakeven Point (years)	NA [a]	NA [a]

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.
[a] Private career schools are not directly funded by the public.

Registered Apprenticeship

Program Overview
Registered Apprenticeships combine classroom studies with extensive on-the-job training under the supervision of a journey-level craft person or trade professional. Apprentices receive progressively increasing wages and may receive health, pension, and other benefits while learning occupational skills. This "earn while you learn" model has proven successful across a range of occupations—from childcare site coordinators to sheet metal workers. Apprenticeships require applicants be at least 16 years old (18 for construction trades), and most require at least a high school diploma or GED for entrance. Registered apprenticeship in Washington is governed by the Washington State Apprenticeship and Training Council and administered by the state's Department of Labor and Industries.

Summary of Findings and Limitations
Apprenticeship programs in Washington serve about 18,000 individuals annually at an average cost of $5,734 per person, with $1,963 in tuition costs for participants. This translates to about $136 million dollars in federal and state expenditure and tuition, with a total economic impact of around $2.8 billion within five years, a social ROI of $20.77 per dollar spent.

Taxpayers receive a return on investment of $4.80 per dollar spent over a five-year period, rising to $7.75 over 10 years. A breakeven point occurs at 1.6 years after exit on average. This positive rate of return is largely due to higher rates of employment after exit of 3.1% in the first two years and increased tax revenue due to increased participant earnings. Interestingly, longer-term employment impacts are statistically insignificant.

This lack of evidence for a long-term employment impact could be explained by the characteristics of apprenticeship participants, who are mostly white and already employed at the start of the program. The comparison group population with nearly identical characteristics are also likely to be employed in the post-exit observation period, meaning that Apprenticeship participants would have likely been able to find employment whether they participated in the program or not. Which employment sectors Registered Apprenticeships lead to is the more salient outcome to investigate as this program has among the highest earning impacts.

On average, participants experience an annual net benefit of $30,200, and a single foregone earnings cost of -$50,000. In this case, forgone earnings are a negative cost, where participants earn more during program participation than they would have had they continued working while not in the program. Total net benefits are $170,900 over five years, increasing to $286,000 over 10 years.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked,

quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, Apprenticeship**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, Apprenticeship

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	3.1%**	-1.9%[a]
	(1.5)	(1.6)
Hourly wage	$10.28***	$9.30***
	(0.56)	(0.59)
Quarterly hours	86.99***	63.24***
	(8.97)	(9.32)
Quarterly earnings	$5,919***	$5,023***
	(304)	(312)
UI Benefits	-$13.40[a]	$177.70***
	(40.3)	(45.5)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.[a] Findings not statistically significant

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Total Cost-Benefit Estimates, Apprenticeship

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$170,880	$286,173
Average Costs per Participant	$8,728	$28,019
Return on Investment	$19.58	$10.21
Society		
Net Benefits ($m)	$2,832.0	$4,280.7
Costs ($m)	$136.4	$136.1
Economic Multiplier Effect	0.473	0.473
Return on Investment	$20.77	$31.46
Breakeven Point (years)	0.4	0.4
Taxpayer		
Net Benefits ($m)	487.4	$784.7
Costs ($m)	$101.5	$101.2
Return on Investment	$4.80	$7.75
Breakeven Point (years)	1.6	1.6

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

Aerospace Training

Program Overview

Aerospace training programs prepare workers for a strategic industry in Washington that includes a wide array of high-skilled, high-paying jobs. The program offers science, technology, engineering, and math focused certificates and degrees. There is also some overlap with the community college professional-technical education program. However, participants that were also in the professional-technical education program were not trimmed from the Aerospace Training cohort because it would have removed too many participants from the study in which inferences could be drawn.

Summary of Findings and Limitations

The Aerospace program serves about 14,000 Washington residents each year at an average cost of $4,562 per person, with $2,607 in tuition costs for participants on average. This translates to about $98.8 million dollars in federal and state expenditure and tuition, with a total economic impact of around $1.5 billion, a social ROI of $14.70 per $1 spent.

Taxpayer investment achieves a breakeven point in 1.2 years on average after participants exit the program, and a 10-year taxpayer ROI of $5.34 – resulting in a total net impact of $334 million. This positive rate of return is due to higher rates of employment after exit and increased tax revenue due to increased participant earnings. On average, participants experience an annual net benefit of $22,200.

Although aerospace programs are like registered apprenticeships, there are certain key differences in participant characteristics. These differences could explain why aerospace programs have larger and more persistent employment impacts. For example, 30% more participants in apprenticeships were employed at the start of the program than aerospace participants. Employment history is tied to employment outcomes after participants exit a workforce program.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, Aerospace**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

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Net Impact Estimates, Aerospace

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	11.8%***	12.2%***
	(2.5)	(2.2)
Hourly wage	7.79***	$6.15***
	(0.84)	(0.71)
Quarterly hours	137.3***	126.8***
	(12.5)	(11.1)
Quarterly earnings	$4,507***	$3,684***
	(445)	(364)
UI Benefits	-$82.50*	-$21.8 [a]
	(42.5)	(48.6)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

Total Cost-Benefit Estimates, Aerospace

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$80,368	$164,618
Average Costs per Participant	$20,065	$34,506
Return on Investment	$4.01	$4.77
Society		
Net Benefits ($m)	$1,452.7	$2,294.8
Costs ($m)	$98.8	$98.6
Economic Multiplier Effect	0.584	0.584
Return on Investment	$14.70	$23.27
Breakeven Point (years)	0.4	0.4
Taxpayer		
Net Benefits ($m)	134.1	$334.0
Costs ($m)	$62.8	$62.6
Return on Investment	$2.14	$5.34
Breakeven Point (years)	1.2	1.2

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

WorkFirst Program

Program Overview

The WorkFirst program is designed to assist people receiving Temporary Assistance to Needy Families (TANF) benefits by providing career counseling and job search assistance, as well as subsidizing certain costs associated with completing an educational program. The program is a collaborative effort among families, case managers, and local community and partner agencies that helps participants build a stable foundation for employment, provide employment and training opportunities, and serves as a gateway to financial independence.

Summary of Findings and Limitations

The WorkFirst program serves about 16,300 Washington residents each year at an average cost of $5,304 per person, with $2,607 in tuition costs for participants. Total cost is about $127 million dollars in federal and state expenditure and tuition, with a total (negative) economic impact of -$12.3 million over a five-year period. However, a positive economic impact of $83 million is achieved over a 10-year period. The social ROI is negative in the first five years at -$0.10 per dollar spent, but rises to a positive $0.66 per $1.00 spent at the 10-year mark.

However, taxpayers do not see a return on investment within 10 years, and a breakeven point is not achieved. Still, if impacts are constant, a breakeven point occurs about 12.5 years after exit. On average, participants experience an annual net benefit of $1,240.

The statistically significant reduction in employment during the longer-term is concerning, and merits further investigation in future studies. It is possible that this program leads participants to enroll in higher education. Also, this program's connection with TANF could introduce unobserved bias when constructing the quasi-control group from the universe of Wagner-Peyser registrants. It could be that Wagner-Peyser is not a suitable comparison group. Indeed, WorkFirst has the weakest statistical match to the quasi-control group of any measured program, where the longer-term cohort is statistically different in terms of employment and earnings history. Ideally, the treatment and comparison group should be statistically identical following the matching procedure.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, WorkFirst**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are

statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, WorkFirst

Average Treatment Effect by Type	One Year After Exit	Three Years After Exit
Employment rate	3.6%***	-4.4%***
	(0.9)	(0.8)
Hourly wage	$1.61***	$0.17 [a]
	(0.16)	(0.14)
Quarterly hours	47.72***	14.27***
	(3.62)	(3.05)
Quarterly earnings	$657.30***	$136*
	(65.9)	(57)
UI Benefits	$77.59***	-$92.25***
	(12.31)	(13.62)

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.
[a] Findings not statistically significant

Total Cost-Benefit Estimates, WorkFirst

	5-Year Estimates	10-Year Estimates
Participant		
Average Net Benefits per Participant	$6,202	$14,099
Average Costs per Participant	$4,214	$5,832
Return on Investment	$1.47	$2.42
Society		
Net Benefits ($m)	-$12.3	$83.4
Costs ($m)	$127.0	$127.0
Economic Multiplier Effect	0.504	0.504
Return on Investment	-$0.10	$0.66
Breakeven Point (years)	5.0	5.0
Taxpayer		
Net Benefits ($m)	-53.0	-$26.2
Costs ($m)	$85.0	$84.8
Return on Investment	-$0.62	-$0.31
Breakeven Point (years)	NA [a]	NA [a]

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.
[a] Program does not achieve a breakeven point within 10 years of program exit.

Division of Vocational Rehabilitation

Program Overview

The Division of Vocational Rehabilitation (DVR) within the state's Department of Social and Health Services offers services to help individuals with disabilities become employed. Depending on the individual and his or her functional limitations, this may include part-time employment, self-employment, or supported employment. Services are based on the needs of the individual and include assessment; counseling; vocational, academic, and other training services; physical and mental restoration services; assistive technology; independent living services; mobility and transportation; communication services; and job search and placement.

To be eligible, DVR must certify the individual:

- Has a physical, mental, or sensory impairment that constitutes or results in a substantial impediment to employment.

- Requires vocational rehabilitation services to prepare for, enter, engage in, or retain employment.

- Can benefit from vocational rehabilitation services in obtaining a job.

Summary of Findings and Limitations

The DVR program serves about 12,100 Washington residents each year at an average cost of $11,165 per person, with zero tuition costs for participants. This translates to about $133 million dollars in federal and state expenditures, with a total economic impact of around $122 million over five years, and a social ROI of $0.92 per $1 spent.

The taxpayer return on investment at the five-year mark is negative at -$0.39 per dollar spent. Taxpayers receive a higher ROI at $0.11 per $1 spent 10 years after participants exit the program. A taxpayer breakeven point is achieved at 10 years after exit. However, like all other five- and 10-year estimates in this study, it assumes earnings impacts do not decay on average.

The program achieves a 13.5% increase in employment for participants in the shorter term after exiting the program and reduces welfare payments by $1,060 each year per participant on average, not including unemployment insurance benefits. Unemployment insurance benefits to the participant increase by about $212. Increased employment and reduced public assistance impacts are critical to achieving a positive taxpayer ROI.

On average, participants experience an annual net benefit of $2,240.

Net Impact Estimates are measured twice: one and three years after exit. The average treatment effect is the difference in outcomes between the treatment and matched comparison group. The outcomes are measured in terms of employment rate, hourly wage, quarterly hours worked, quarterly earnings, and quarterly Unemployment Insurance benefits received. The impact estimate

is considered *statistically insignificant* if there is no measurable difference between the treatment and matched control group outcomes.

When reading Net Impact Estimates charts (refer to **Net Impact Estimates, DVR**) please keep in mind that it includes results considered to be *statistically insignificant*. That is, the data cannot show whether there is a difference or not. To help clarify these results, numbers that are statistically insignificant are shown in light gray font. When results are statistically significant, asterisks are included to show their level of significance. Also, please note that all estimates are accompanied by their standard error in parentheses.

Net Impact Estimates, DVR

Average Treatment Effect by Type	*One Year After Exit*	*Three Years After Exit*
Employment rate	13.5%***	1.5% [a]
	(1.2%)	(1.3%)
Hourly wage	$2.00***	$1.45***
	($0.25)	($0.23)
Quarterly hours	36.85***	27.28***
	($4.65)	($4.79)
Quarterly earnings	$615.20***	$515.20***
	($96.70)	($97.00)
Quarterly UI Benefits	$33.58***	$70.86***
	($6.67)	($8.44)
Monthly SSI Benefits	$20.40*	$13.54*
	($8.00)	($8.11)
Monthly SSDI Benefits	$5.18	-$11.30 [a]
	($12.58)	($13.20)
Monthly TANF Benefits	-$2.57*	-$6.25***
	($1.59)	($1.56)
Monthly General Assistance (Aged, Blind, and Disabled)	-$2.48**	-$7.20***
	($0.88)	($1.09)
Monthly Workers Compensation	-$5.63*	$1.09 [a]
	($2.52)	($2.03)
Monthly VA Disability Compensation	-$4.41*	$1.52 [a]
	($1.89)	($1.90)
Other Public Supports (Monthly)	-$40.86***	-$47.97***
	($3.81)	($4.37)

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parenthesis.*
[a] Findings not statistically significant

Total Cost-Benefit Estimates, DVR

	5-Year Estimates	*10-Year Estimates*
Participant		
Average Net Benefits per Participant	$10,481	$18,281
Average Costs per Participant	$1,772	$3,946
Return on Investment	$5.91	$4.63
Society		
Net Benefits ($m)	$121.6	$222.1
Costs ($m)	$132.8	$132.5
Economic Multiplier Effect	0.522	0.522
Return on Investment	$0.92	$1.68
Breakeven Point (years)	4.9	4.9
Taxpayer		
Net Benefits ($m)	-51.3	$15.2
Costs ($m)	$132.8	$132.5
Return on Investment	-$0.39	$0.11
Breakeven Point (years)	10.0	10.0

NOTE: Breakeven estimates do not consider multiplier effects or foregone earnings and taxes during program participation.

Net Impact Diagnostics

Unmatched Participant Characteristics

This section provides descriptive data that compares the unmatched treatment group, for example, WIOA Title I: Adult participants, from those within the comparison universe, Title III: Wagner-Peyser.

Wagner-Peyser is a federal act that established a system of public employment offices. These career centers are known as WorkSource in Washington. WorkSource customers, served both in-person and remotely, receive varying degrees of assistance—from jobseekers hopping on computers to look for openings to workshops led by job counselors to more extensive education and training. Individuals registered in Wagner-Peyser services and served by Washington's education and training programs are excluded from the comparison universe.[24]

For DVR participants, Wagner-Peyser participants are not a suitable comparison group. The comparison group was therefore constructed by DVR using administrative data that identified eligible clients that had begun developing a rehabilitation plan – an early step in the vocational rehabilitation program – but did not complete it. Those in the treatment group successfully completed their rehabilitation plan.

These tables show the degree of difference between the unmatched treatment and comparison groups. Following the matching procedure, these two groups should ideally be statistically identical in terms of observed characteristics.

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[24] Statistical comparison of all programs in this study (apart from DVR) and Wagner-Peyser groups is based on a two-sided Welch's *t*-test or unequal variances *t*-test. Standard deviations are provided for continuous variables only.

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Descriptive Statistics for WIA/WIOA Adult and Wagner-Peyser Groups (Unmatched)

Demographics	2014/2015		2016/2017	
	Wagner-Peyser	WIA Adult	Wagner-Peyser	WIOA Adult
Female	42.4%	54.8%	42.0%	45.3%
Race:				
White	34.9%	58.6%	57.7%[††]	58.6%[††]
Black	3.6%	13.2%	5.2%	8.5%
Hispanic	11.7%[††]	12.5%[††]	15.6%	6.6%
Other	4.7%	12.4%	10.9%	16.0%
Missing	45.1%	3.3%	10.6%[††]	10.2%[††]
Mean, age at registration	40 (14)	39 (12)	44[††] (14)	44[††] (13)
Employed in quarter of program start	55.4%	32.0%	51.9%	54.2%
Disability	6.2%[††]	6.4%[††]	6.4%[††]	7.0%[††]
Veteran	8.7%[††]	8.1%[††]	8.8%	7.3%
West WA	63.8%	73.8%	71.3%	94.1%
Urban county	83.9%[††]	83.9%[††]	90.9%	93.5%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	30.6%	59.7%	62.0%
Mean quarterly earnings [a]	$4,751 (6,371)	$1,686 (2,950)	$6,617 (8,341)	$7,874 (9,203)
Mean earnings trend [b]	$46.80 (550.8)	$1.70 (378.0)	$92.60 (602.3)	$114.50 (635.2)
Mean earnings variance (in 10^6 $) [b]	17.6 (55.7)	5.3 (18.7)	27.6 (75.7)	36.9 (94.0)
Mean, share of prior quarters with job turnover	11.7%	6.7%	9.6%	9.1%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	6.0% (13.1)	8.7% (13.9)	8.0% (12.7)
Had earnings dip	54.1%	32.2%	53.6%[††]	54.6%[††]
Mean number of quarters since last dip	1.5 (1.9)	0.9 (1.6)	1.4[††] (1.8)	1.4[††] (1.8)
Mean percentage dip size in earnings	36.7% (40.9)	25.0% (39.9)	30.8% (35.0)	32.5% (37.4)
Sample Size	175,996	1,943	68,128	6,472

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted.

NOTE: Standard deviations in parentheses for continuous variables

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for WIA/WIOA Dislocated Worker and Wagner-Peyser Groups (Unmatched)

Demographics	2014/2015		2016/2017	
	Wagner-Peyser	WIA DW	Wagner-Peyser	WIOA DW
Female	42.4%	46.3%	42.0%[††]	43.8%[††]
Race:				
White	34.9%	72.2%	57.7%	66.3%
Black	3.6%	6.5%	5.2%[††]	4.6%[††]
Hispanic	11.7%	8.8%	15.6%	8.3%
Other	4.7%	10.5%	10.9%	13.7%
Missing	45.1%	2.0%	10.6%	7.1%
Mean, age at registration	40 (14)	47 (12)	44 (14)	47 (12)
Employed in quarter of program start	55.4%	22.6%	51.9%	47.8%
Disability	6.2%[††]	6.5%[††]	6.4%[††]	6.9%[††]
Veteran	8.7%	12.9%	8.8%	16.4%
West WA	63.8%	74.7%	71.3%	73.9%
Urban county	83.9%	87.1%	90.9%[††]	91.9%[††]
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	35.5%	59.7%[††]	61.0%[††]
Mean quarterly earnings [a]	4,751[††] (6,371)	4,409[††] (7,135)	6,617 (8,341)	7,738 (8,091)
Mean earnings trend [b]	$46.82 (550.8)	$6.97 (394.4)	$92.61 (602.3)	$40.15 (535.2)
Mean earnings variance (in 10^6 $) [b]	17.6[††] (55.7)	18.6[††] (68.6)	27.6[††] (75.7)	28.2[††] (58.5)
Mean, share of prior quarters with job turnover	11.7%	4.6%	9.6%	7.5%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	3.9% (9.5)	8.7% (13.9)	6.8% (11.8)
Had earnings dip	54.1%	32.4%	53.6%	47.1%
Mean number of quarters since last dip	1.5 (1.9)	0.8 (1.5)	1.4 (1.8)	1.2 (1.8)
Mean percentage dip size in earnings	36.7% (40.1)	23.7% (38.5)	30.8%[††] (36.0)	29.2%[††] (38.1)
Sample Size	175,996	2,523	68,128	1,361

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

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Descriptive Statistics for WIA/WIOA Youth and Wagner-Peyser Groups (Unmatched)

Demographics	2014/2015		2016/2017	
	Wagner-Peyser	WIA Youth	Wagner-Peyser	WIOA Youth
Female	42.4%	52.4%	42.0%	47.6%
Race:				
White	34.9%	48.1%	57.7%	45.0%
Black	3.6%	12.4%	5.2%	11.5%
Hispanic	11.7%	22.9%	15.6%	26.0%
Other	4.7%	14.6%	10.9%[††]	12.7%[††]
Missing	45.1%	1.9%	10.6%	4.7%
Mean, age at registration	40 (14)	18 (2)	44 (14)	19 (2)
Employed in quarter of program start	55.4%	19.2%	51.9%	32.9%
Disability	6.2%	13.6%	6.4%	11.7%
West WA	63.8%[††]	65.6%[††]	71.3%	61.6%
Urban county	83.9%[††]	82.8%[††]	90.9%[††]	89.6%[††]
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	16.8%	59.7%	29.1%
Mean quarterly earnings [a]	$4,751 (6,371)	$285 (858)	$6,617 (8,341)	$604 (1,508)
Mean earnings trend [b]	$46.82 (551)	$4.06 (550)	$92.61 (602)	$25.87 (369)
Mean earnings variance (in 10^6 $) [b]	17.6 (55.7)	0.5 (4.5)	27.6 (75.7)	0.9 (3.2)
Mean, share of prior quarters with job turnover	11.7%	2.9%	9.6%	5.8%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	1.9% (8.7)	8.7% (13.9)	4.5% (13.8)
Had earnings dip	54.1%	18.5%	53.6%	31.9%
Mean number of quarters since last dip	1.5 (1.9)	0.5 (8.8)	1.4 (1.8)	0.8 (1.5)
Mean percentage dip size in earnings	36.7% (40.1)	16.3% (35.5)	30.8% (36.0)	26.3% (41.3)
Sample Size	175,996	2,042	68,128	1,084

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for Professional-Tech. Ed. Program and Wagner-Peyser Groups (Unmatched)

	2014/2015		2016/2017	
Demographics	*Wagner-Peyser*	*Professional-Tech. Ed.*	*Wagner-Peyser*	*Professional-Tech. Ed.*
Female	42.4%	55.7%	42.0%	56.1%
Race:				
White	34.9%	62.1%	57.7%	59.2%
Black	3.6%	6.6%	5.2%	6.4%
Hispanic	11.7%	9.9%	15.6%	11.5%
Other	4.7%	13.5%	10.9%	14.1%
Missing	45.1%	6.5%	10.6%	7.4%
Mean, age at registration	40 (14)	31 (11)	44 (14)	31 (11)
Employed in quarter of program start	55.4%	44.9%	51.9%	50.6%
Disability	6.2%	7.4%	6.4%	7.8%
West WA	63.8%	79.5%	71.3%	80.5%
Urban county	83.9%	91.7%	90.9%	92.3%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	55.0%	59.7%	58.3%
Mean quarterly earnings [a]	$4,751 (6,371)	$3,153 (4,391)	$6,617 (8,341)	$3,338 (4,471)
Mean earnings trend [b]	$46.82 (551)	$62.78 (484)	$92.61[††] (602)	$95.38[††] (561)
Mean earnings variance (in 10^6 $) [b]	17.569 (55.7)	8.812 (29.0)	27.604 (75.7)	92.578 (29.4)
Mean, share of prior quarters with job turnover	11.7%	9.6%	9.6%[††]	9.8%[††]
Mean percentage of quarters with multiple jobs	9.9% (15.1)	8.9% (14.8)	8.7% (13.9)	9.7% (15.6)
Had earnings dip	54.1%	47.8%	53.6%	49.1%
Mean number of quarters since last dip	1.5 (1.9)	1.4 (1.9)	1.4 (1.8)	1.4 (2.0)
Mean percentage dip size in earnings	36.7% (40.9)	32.5% (40.4)	30.8% (36.0)	32.5% (39.8)
Sample Size	175,996	26,967	68,128	24,305

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for Worker Retraining and Wagner-Peyser Groups (Unmatched)

Demographics	2014/2015		2016/2017	
	Wagner-Peyser	Worker Retraining	Wagner-Peyser	Worker Retraining
Female	42.4%	55.9%	42.0%	53.7%
Race:				
White	34.9%	61.5%	57.7%[††]	58.7%[††]
Black	3.6%	9.4%	5.2%	8.1%
Hispanic	11.7%	9.7%	15.6%	12.4%
Other	4.7%	10.6%	10.9%	12.3%
Missing	45.1%	7.3%	10.6%	7.4%
Mean, age at registration	40 (14)	39 (12)	44 (14)	38 (12)
Employed in quarter of program start	55.4%	25.7%	51.9%	29.2%
West WA	63.8%	81.0%	71.3%	79.4%
Urban county	83.9%	90.7%	90.9%	89.2%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	51.2%	59.7%	48.9%
Mean quarterly earnings [a]	$4,751 (6,371)	$4,533 (5,704)	$6,617 (8,341)	$4,022 (5,515)
Mean earnings trend [b]	$46.82 (551)	-$34.75 (438)	$92.61 (602)	-$7.57 (500)
Mean earnings variance (in 10^6 $) [b]	17.569[††] (55.7)	16.333[††] (53.9)	27.604 (75.7)	13.728 (35.5)
Mean, share of prior quarters with job turnover	11.7%	8.8%	9.6%	8.7%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	7.7% (13.2)	8.7% (13.9)	7.8% (13.5)
Had earnings dip	54.1%	51.7%	53.6%	49.9%
Mean number of quarters since last dip	1.5 (1.9)	1.3 (1.7)	1.4 (1.8)	1.2 (1.7)
Mean percentage dip size in earnings	36.7% (40.1)	40.6% (44.1)	30.8% (40.0)	37.7% (43.1)
Sample Size	175,996	3,774	68,128	3,867

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for Basic Education for Adults Program and Wagner-Peyser Groups (Unmatched)

Demographics	2014/2015		2016/2017	
	Wagner-Peyser	BEdA	Wagner-Peyser	BEdA
Female	42.4%	56.0%	42.0%	57.4%
Race:				
White	34.9%	39.3%	57.7%	40.5%
Black	3.6%	12.7%	5.2%	10.8%
Hispanic	11.7%	22.3%	15.6%	22.0%
Other	4.7%	22.7%	10.9%	23.8%
Missing	45.1%	0.0%	10.6%	0.0%
Mean, age at registration	40 (14)	31 (10)	44 (14)	31 (10)
Employed in quarter of program start	55.4%	44.0%	51.9%	49.0%
Veteran	8.7%	2.2%	8.8%	2.1%
West WA	63.8%	76.3%	71.3%	73.2%
Urban county	83.9%	91.1%	90.9%	90.3%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	49.8%	59.7%	54.0%
Mean quarterly earnings [a]	$4,751 (6,371)	$2,315 (3,276)	$6,617 (8,341)	$2,524 (3,308)
Mean earnings trend [b]	$46.82 (551)	$82.35 (644)	$92.61 (602)	$125.64 (759)
Mean earnings variance (in 10^6 $) [b]	17.569 (55.7)	4.236 (16.7)	27.604 (75.7)	4.902 (15.1)
Mean, share of prior quarters with job turnover	11.7%	8.8%	9.6%	10.0%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	9.3% (17.8)	8.7% (13.9)	10.4% (18.4)
Had earnings dip	54.1%	42.2%	53.6%	44.0%
Mean number of quarters since last dip	1.5 (1.9)	1.2 (1.8)	1.4 (1.8)	1.2 (1.8)
Mean percentage dip size in earnings	36.7% (40.9)	30.3% (40.9)	30.8%[††] (36.0)	30.8%[††] (40.5)
Sample Size	175,996	13,199	68,128	13,585

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Note: Disabled dropped because of missing data

Descriptive Statistics for Private Career School and Wagner-Peyser Groups (Unmatched)

	2014/2015		2016/2017	
Demographics	*Wagner-Peyser*	*PCS*	*Wagner-Peyser*	*PCS*
Female	42.4%	53.2%	42.0%	56.7%
Race:				
White	34.9%	53.4%	57.7%	53.8%
Black	3.6%	7.7%	5.2%	7.9%
Hispanic	11.7%[††]	11.7%[††]	15.6%	14.3%
Other	4.7%	13.8%	10.9%	15.6%
Missing	45.1%	13.4%	10.6%	8.4%
Mean, age at registration	40 (14)	30 (11)	44 (14)	30 (11)
Employed in quarter of program start	55.4%	47.7%	51.9%	50.2%
Disability	6.2%	1.8%	6.4%	5.5%
Veteran	8.7%	10.5%	8.8%	12.5%
West WA	63.8%	78.2%	71.3%	77.7%
Urban county	83.9%	94.9%	90.9%	94.1%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	48.4%	59.7%	50.5%
Mean quarterly earnings [a]	$4,751 (6,371)	$2,801 (4,652)	$6,617 (8,341)	$3,048 (5,029)
Mean earnings trend [b]	$46.82 (551)	$86.71 (733)	$92.61 (602)	$115.14 (742)
Mean earnings variance (in 10^6 $) [b]	17.569 (55.7)	8.847 (38.1)	27.604 (75.7)	11.292 (54.7)
Mean, share of prior quarters with job turnover	11.7%	8.6%	9.6%	8.9%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	8.5% (15.6)	8.7%[††] (13.9)	8.9%[††] (15.9)
Had earnings dip	54.1%	42.4%	53.6%	43.4%
Mean number of quarters since last dip	1.5 (1.9)	1.2 (1.8)	1.4 (1.8)	1.2 (1.8)
Mean percentage dip size in earnings	36.7% (40.9)	28.8% (39.4)	30.8% (36.0)	29.1% (39.2)
Sample Size	175,996	17,840	68,128	18,088

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for Registered Apprenticeships and Wagner-Peyser Groups (Unmatched)

Demographics	2014/2015 Wagner-Peyser	2014/2015 Apprentice	2016/2017 Wagner-Peyser	2016/2017 Apprentice
Female	42.4%	12.5%	42.0%	11.3%
Race:				
White	34.9%	74.0%	57.7%	71.2%
Black	3.6%	5.5%	5.2%	6.2%
Hispanic	11.7%[††]	11.6%[††]	15.6%	12.9%
Other	4.7%	7.7%	10.9%	8.7%
Missing	45.1%	1.1%	10.6%	1.1%
Mean, age at registration	40 (14)	30 (10)	44 (14)	30 (9)
Employed in quarter of program start	55.4%	83.8%	51.9%	83.2%
West WA	63.8%	81.2%	71.3%	78.3%
Urban county	83.9%	91.5%	90.9%[††]	90.6%[††]
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	63.4%	59.7%	62.6%
Mean quarterly earnings [a]	$4,751[††] (6,371)	$4,546[††] (4,517)	$6,617 (8,341)	$4,740 (5,284)
Mean earnings trend [b]	$46.82 (551)	$104.09 (741)	$92.61 (602)	$163.88 (816)
Mean earnings variance (in 10^6 $) [b]	17.569 (55.7)	13.701 (20.4)	27.604 (75.7)	14.322 (22.8)
Mean, share of prior quarters with job turnover	11.7%	14.1%	9.6%	13.6%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	11.7% (15.6)	8.7% (13.9)	11.7% (15.3)
Had earnings dip	54.1%	59.4%	53.6%	58.5%
Mean number of quarters since last dip	1.5 (1.9)	1.7 (2.0)	1.4 (1.8)	1.7 (2.0)
Mean percentage dip size in earnings	36.7% (41.0)	40.1% (41.0)	30.8% (36.0)	37.7% (40.0)
Sample Size	175,996	2,944	68,128	3,452

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for Aerospace Program and Wagner-Peyser Groups (Unmatched)

	2014/2015		2016/2017	
Demographics	*Wagner-Peyser*	*Aerospace*	*Wagner-Peyser*	*Aerospace*
Female	42.4%	12.9%	42.0%	12.7%
Race:				
White	34.9%	61.3%	57.7%	60.0%
Black	3.6%	4.7%	5.2%[††]	4.5%[††]
Hispanic	11.7%	6.1%	15.6%	9.3%
Other	4.7%	18.1%	10.9%	16.2%
Missing	45.1%	8.8%	10.6%	8.9%
Mean, age at registration	40 (14)	32 (12)	44 (14)	33 (12)
Employed in quarter of program start	55.4%	50.8%	51.9%[††]	54.2%[††]
Disability	6.2%[††]	6.8%[††]	6.4%	8.5%
Veteran	8.7%	11.4%	8.8%	12.0%
West WA	63.8%	87.2%	71.3%	88.2%
Urban county	83.9%	94.7%	90.9%	93.5%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	64.2%	59.7%	66.0%
Mean quarterly earnings [a]	$4,751 (6,371)	$5,135 (5,960)	$6,617 (8,341)	$5,648 (6,685)
Mean earnings trend [b]	$46.82[††] (551)	$70.08[††] (712)	$92.61[††] (602)	$120.56[††] (672)
Mean earnings variance (in 10^6 $) [b]	17.569 (55.7)	15.751 (35.6)	27.604 (75.7)	18.176 (42.4)
Mean, share of prior quarters with job turnover	11.7%	10.4%	9.6%	10.2%
Mean percentage of quarters with multiple jobs	9.9%[††] (15.1)	9.2%[††] (15.3)	8.7%[††] (13.9)	8.6%[††] (13.8)
Had earnings dip	54.1%	57.1%	53.6%	80.8%
Mean number of quarters since last dip	1.5[††] (1.9)	1.6[††] (1.9)	1.4[††] (1.8)	1.5[††] (1.9)
Mean percentage dip size in earnings	36.7% (40.9)	39.4% (41.8)	30.8% (36.0)	32.8% (40.0)
Sample Size	175,996	2,032	68,128	1,689

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for WorkFirst Program and Wagner-Peyser Groups (Unmatched)

	2014/2015		2016/2017	
Demographics	*Wagner-Peyser*	*WorkFirst*	*Wagner-Peyser*	*WorkFirst*
Female	42.4%	72.3%	42.0%	72.5%
Race:				
White	34.9%	54.9%	57.7%	52.7%
Black	3.6%	14.5%	5.2%	13.9%
Hispanic	11.7%	14.5%	15.6%[††]	16.1%[††]
Other	4.7%	11.9%	10.9%	12.8%
Missing	45.1%	1.9%	10.6%	2.2%
Mean, age at registration	40 (14)	31 (9)	44 (14)	32 (9)
Employed in quarter of program start	55.4%	29.3%	51.9%	31.6%
West WA	63.8%	72.2%	71.3%[††]	71.9%[††]
Urban county	83.9%	89.5%	90.9%	90.0%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	57.8%	31.0%	59.7%	30.5%
Mean quarterly earnings [a]	$4,751 (6,371)	$1,213 (2,106)	$6,617 (8,341)	$1,242 (2,108)
Mean earnings trend [b]	$46.82 (551)	$7.42 (342)	$92.61 (602)	$26.42 (389)
Mean earnings variance (in 10^6 $) [b]	17.569 (55.7)	3.340 (11.8)	27.604 (75.7)	3.388 (11.4)
Mean, share of prior quarters with job turnover	11.7%	8.0%	9.6%	7.7%
Mean percentage of quarters with multiple jobs	9.9% (15.1)	5.5% (11.6)	8.7% (13.9)	5.9% (12.4)
Had earnings dip	54.1%	34.8%	53.6%	32.9%
Mean number of quarters since last dip	1.5 (1.9)	0.9 (1.7)	1.4 (1.8)	0.9 (1.6)
Mean percentage dip size in earnings	36.7% (40.9)	28.3% (42.0)	30.8% (36.0)	25.9% (40.4)
Sample Size	175,996	16,255	68,128	13,161

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

[††] Differences in means are not statistically significant at 0.05 level (t-test).

Descriptive Statistics for DVR Program Treatment and Comparison Groups (Unmatched)

Demographics	2014/2015		2016/2017	
	Comparison	Treatment	Comparison	Treatment
Female	44.2%[††]	45.7%[††]	44.9%[††]	44.0%[††]
Race:				
White	69.2%[††]	70.5%[††]	70.4%[††]	70.4%[††]
Black	9.0%	7.6%	8.2%[††]	7.3%[††]
Hispanic	10.9%	9.2%	11.0%[††]	10.5%[††]
Other	8.5%[††]	9.3%[††]	7.6%	9.5%
Missing	0.1%	1.3%	0.0%	0.3%
Mean, age at registration	38[††] (14)	38[††] (14)	38[††] (15)	38[††] (15)
Employed in quarter of program start	21.0%	30.6%	23.7%	31.4%
Veteran	2.1%[††]	1.8%[††]	2.4%	1.2%
West WA	70.3%	78.0%	66.7%	76.2%
Urban county	88.6%	90.2%	88.6%[††]	89.7%[††]
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	40.4%[††]	39.1%[††]	41.8%	34.8%
Mean quarterly earnings [a]	$1,959[††] (3,396)	$1,943[††] (3,511)	$2,063 (3,853)	$1,653 (3,134)
Mean earnings trend [b]	-$50.20 (439.6)	-$15.43 (362.9)	-$25.15[††] (489.6)	-11.337[††] (309.3)
Mean earnings variance (in 10^6 $) [b]	5.634[††] (18.693)	6.205[††] (27.706)	63.394[††] (32.469)	53.932[††] (22.186)
Mean, share of prior quarters with job turnover	8.0%	7.0%	8.0%	5.9%
Mean percentage of quarters with multiple jobs	6.2% (13.1)	5.4% (11.6)	6.4% (13.2)	4.8% (11.4)
Had earnings dip	32.9%[††]	33.9%[††]	32.8%	29.8%
Mean number of quarters since last dip	1.0[††] (1.8)	1.0[††] (1.7)	0.9[††] (1.7)	0.9[††] (1.7)
Mean percentage dip size in earnings	26.8%[††] (41.4)	27.4%[††] (41.7)	26.0% (40.5)	23.4% (39.5)
Public Support (DVR only) (prior to registration)				
Received Supplemental Security Income	$184.98 (328.2)	$133.79 (266.0)	$180.27 (323.4)	147.12 (279.1)
Received Social Security Disability Insurance payments	$263.10[††] (474.3)	$251.71[††] (470.3)	$244.93[††] (466.5)	$233.44[††] (466.6)
Received Temporary Assistance for Needy Families payments	$23.25 (99.4)	$11.72 (77.6)	$14.46[††] (78.91)	$11.63[††] (71.19)
General Assistance	$10.39[††] (53.6)	$9.20[††] (56.1)	$6.49[††] (49.33)	$6.04[††] (50.76)
Received Workers Compensation	$8.70[††]	$14.10[††]	$19.42[††]	$13.59[††]

Workforce
WASHINGTON Training & Education Coordinating
Board

	(120.2)	(166.8)	(222.7)	(242.8)
Received VA Disability Compensation	$5.65[††]	$5.04[††]	$7.45[††]	$3.71[††]
	(85.3)	(80.2)	(95.47)	(66.77)
Received other public support	$92.84[††]	$85.15[††]	$105.28	$74.50
	(221.7)	(531.2)	(297.7)	(227.1)
Sample Size	4,660	3,898	4,929	3,657

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are statistically significant at the 0.05 level (t-test) unless otherwise denoted. Monetary data in 201X $.
[a] Averages include observations with values of zero.
[b] Trend and variance calculations include quarters with zero earnings, if any.
[††] Differences in means are not statistically significant at 0.05 level (t-test).

Participation Model

One way to estimate the likelihood of an individual participating in treatment (or a workforce program, in this case) is through a logistic model. Also known as a predictive logit model, the model takes into consideration independent variables (covariates) that can influence the outcome including demographic characteristics, earnings and employment history. Also considered is the individual's industry of employment and education. This is assessed through their latest employment 2-digit sector codes in the North American Industry Classification System assigned to their employment record, and years of educational attainment (refer to **Appendix A** for the variable list).

It is important to keep in mind that demographic covariates should not be interpreted as a causal inference to program participation, but purely as control variables. That said, employment and earnings history are causally related to program participation as they precede participation and are not constant.

Logit models can be difficult to interpret, as each coefficient coincides with the log-likelihood of an observation being part of the treatment group. Although these coefficients can be transformed into an odds-ratio of being in the treatment within a degree of certainty by exponentiating the value, all else being held constant, it is still nonetheless challenging to interpret the magnitude of a coefficient.

Given that Logit models are difficult to interpret, it is best to focus on the sign of the coefficient (positive or negative). A positive value indicates increased likelihood of being in the treatment, and a negative value indicating decreased likelihood. For example, in the Logit Model for Participation in WIOA Title I: Adult, the larger the share of mean quarters for which an individual is employed decreases the probability that that individual will be in the treatment group (workforce program). Likewise, being female, Black, or Hispanic increases the likelihood of participation in the treatment.

Coefficient Estimates from a Logit Model of Participation in WIA/WIOA Adult Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.323***	0.067**
Race: (White is omitted category)		
Black	0.437***	0.379***
Hispanic	-0.28***	-0.059
Other	0.378***	0.357***
Missing	-0.191	-0.044
Mean, age at registration	-0.015***	-0.002
Employed in quarter of program start	0.059	0.124
Disability	-0.111	0.008
Veteran	-0.164*	-0.221***
West WA	0.765***	1.913***
Urban county	-0.137**	-0.509***
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	-0.202	-0.082
Mean quarterly earnings (in 10^5) [a]	-13.584***	0.311
Mean earnings trend (in 10^5) [b]	-12.998	2.944
Mean earnings variance (in 10^7) [b]	-0.051**	0.003
Mean, share of prior quarters with job turnover	-1.73***	-0.239
Mean percentage of quarters with multiple jobs	1.104***	-0.004
Mean number of quarters since last dip	-0.006	-0.02**
Mean percentage dip size in earnings	-0.083	0.256***
Constant	-2.434***	-3.337
Observations	89,023	63,228

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in WIA/WIOA DW Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.136***	-0.03***
Race: (White is omitted category)		
Black	-0.228***	-0.163
Hispanic	-0.488***	-0.601***
Other	0.063	0.262***
Missing	-0.757***	-0.237*
Mean, age at registration	0.014***	0.007***
Employed in quarter of program start	-0.678***	0.099
Disability	-0.327***	-0.255***
Veteran	0.091	0.564***
West WA	0.521***	-0.22**
Urban county	0.031	0.188
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	-0.751**	1.048***
Mean quarterly earnings (in 10^5) [a]	1.258**	-0.428
Mean earnings trend (in 10^5) [b]	6.440	-12.128***
Mean earnings variance (in 10^7) [b]	-0.014***	-0.006
Mean, share of prior quarters with job turnover	-4.05	-0.533
Mean percentage of quarters with multiple jobs	0.723	-0.482
Mean number of quarters since last dip	-0.075***	-0.006
Mean percentage dip size in earnings	0.234**	-0.237*
Constant	-2.725	-3.932
Observations	89,600	58,680

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in WIA/WIOA Youth Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.188***	-0.003
Race: (White is omitted category)		
Black	0.51***	0.559***
Hispanic	-0.321***	0.231***
Other	0.593***	0.056
Missing	-0.416***	-0.569**
Mean, age at registration	-0.677***	-0.575***
Employed in quarter of program start	-1.058***	-0.018
Disability	0.969***	0.869***
West WA	1.012***	0.315***
Urban county	-0.069	0.144
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	1.216***	0.495.
Mean quarterly earnings (in 10^5) [a]	-4049.804***	-20.613***
Mean earnings trend (in 10^5) [b]	668.508	-10.172
Mean earnings variance (in 10^8) [b]	0.0001	-0.0004**
Mean, share of prior quarters with job turnover	0.378	0.072
Mean percentage of quarters with multiple jobs	-0.46	-0.2
Mean number of quarters since last dip	0.028	0.023
Mean percentage dip size in earnings	-0.654***	-0.126
Constant	-3.247	7.784***
Observations	89,088	62,753

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in Professional-Tech. Ed. Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.293***	0.309***
Race: (White is omitted category)		
Black	-0.295***	-0.04
Hispanic	-0.483***	-0.305***
Other	0.435***	0.077***
Missing	0.301***	-0.224***
Mean, age at registration	-0.077***	-0.083***
Employed in quarter of program start	-0.618***	-0.143***
Disability	0.224***	0.37***
West WA	0.886***	0.576***
Urban county	0.581***	-0.082**
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	1.178***	1.585***
Mean quarterly earnings (in 10^5) [a]	-8.847***	-9.406***
Mean earnings trend (in 10^5) [b]	-4.768***	-15.519***
Mean earnings variance (in 10^7 $) [b]	-0.001	0.006*
Mean, share of prior quarters with job turnover	-2.055***	-1.615***
Mean percentage of quarters with multiple jobs	0.384***	0.37***
Mean number of quarters since last dip	0.05***	0.06***
Mean percentage dip size in earnings	-0.443***	-0.298***
Constant	1.277***	2.233***
Observations	112,626	84,510

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in the Worker Retraining Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.428***	0.316***
Race: (White is omitted category)		
Black	0.071	0.134**
Hispanic	-0.160***	-0.083
Other	0.222***	0.092*
Missing	-0.74***	-0.389***
Mean, age at registration	-0.022***	-0.036***
Employed in quarter of program start	-1.125***	-0.719***
West WA	0.875***	0.661***
Urban county	0.37***	-0.418***
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	0.283***	0.505***
Mean quarterly earnings (in 10^5) [a]	-0.189	-2.385***
Mean earnings trend (in 10^5) [b]	-14.143***	-18.313***
Mean earnings variance (in 10^7 $) [b]	-0.002***	-0.025***
Mean, share of prior quarters with job turnover	-0.880***	-0.492**
Mean percentage of quarters with multiple jobs	0.622***	0.55**
Mean number of quarters since last dip	-0.056***	-0.039**
Mean percentage dip size in earnings	0.472***	0.689***
Constant	-2.473***	-0.793***
Observations	106,996	68,617

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in Basic Education for Adults Program

	2014/2015	2016/2017
Demographics	Coefficient	Coefficient
Female	0.255***	0.372***
Race: (White is omitted category)		
Black	0.686***	0.779***
Hispanic	0.723***	0.558***
Other	1.292***	1.022***
Missing	-16.664	-16.562
Mean, age at registration	-0.067***	-0.074***
Employed in quarter of program start	-0.292***	0.074**
Veteran	-0.98***	-0.9***
West WA	1.115***	0.38***
Urban county	0.396***	-0.113**
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	1.774***	2.29***
Mean quarterly earnings (in 10^5) [a]	-10.705***	-15.377***
Mean earnings trend (in 10^5) [b]	2.877	4.944***
Mean earnings variance (in 10^7 $) [b]	-0.307***	-0.200***
Mean, share of prior quarters with job turnover	-2.001***	-1.297***
Mean percentage of quarters with multiple jobs	0.551***	0.648***
Mean number of quarters since last dip	0.032***	0.03***
Mean percentage dip size in earnings	-0.424***	-0.292***
Constant	0.689***	1.881***
Observations	116,482	73,934

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

·, *, **, *** indicate statistical significance at p = 0.10, 0.05, 0.01, and 0.001, respectively.

Note: Disabled dropped because of missingness

Coefficient Estimates from a Logit Model of Participation in Private Career School

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.048*	0.195***
Race: (White is omitted category)		
Black	-0.155***	0.264***
Hispanic	-0.432***	-0.205***
Other	0.552***	0.249***
Missing	-0.786***	-1.255***
Mean, age at registration	-0.072***	-0.077***
Employed in quarter of program start	-0.067**	0.251***
Disability	-1.411***	-0.961***
Veteran	0.258***	0.829***
West WA	0.967***	0.39***
Urban county	0.899***	0.232***
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	0.494***	0.94***
Mean quarterly earnings (in 10^5) [a]	-7.091***	-8.657***
Mean earnings trend (in 10^5) [b]	8.859***	3.706*
Mean earnings variance (in 10^7 $) [b]	0.012***	0.026***
Mean, share of prior quarters with job turnover	-3.225**	-1.864***
Mean percentage of quarters with multiple jobs	1.171***	0.704***
Mean number of quarters since last dip	0.022***	0.03***
Mean percentage dip size in earnings	-0.499***	-0.262***
Constant	0.081	1.244***
Observations	95,701	68,388

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

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Coefficient Estimates from a Logit Model of Participation in Registered Apprenticeships

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	-1.379***	-1.481***
Race: (White is omitted category)		
Black	-0.643***	-0.246***
Hispanic	-0.443***	-0.232***
Other	-0.508***	-0.589***
Missing	-2.942***	-2.486***
Mean, age at registration	-0.084***	-0.098***
Employed in quarter of program start	1.656***	2.049***
West WA	1.27***	0.584***
Urban county	0.935***	-0.023
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	0.271**	-0.490***
Mean quarterly earnings (in 10^5) [a]	-.847	3.352***
Mean earnings trend (in 10^5) [b]	-6.414	0.247
Mean earnings variance (in 10^7 $) [b]	-0.037***	-0.0545***
Mean, share of prior quarters with job turnover	-0.372	-0.035
Mean percentage of quarters with multiple jobs	0.647***	1.026***
Mean number of quarters since last dip	0.026*	0.041***
Mean percentage dip size in earnings	-0.211***	-0.104
Constant	-3.073***	-1.056***
Observations	106,113	68,179

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in Aerospace Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	-1.653***	-1.611***
Race: (White is omitted category)		
Black	-0.567***	-0.403***
Hispanic	-0.647***	-0.136
Other	0.697***	0.257***
Missing	0.53***	-0.141
Mean, age at registration	-0.083***	-0.084***
Employed in quarter of program start	-0.428***	-0.135**
Disability	-0.123	0.207**
Veteran	-0.051	0.291***
West WA	1.3***	1.042***
Urban county	0.922***	-0.208*
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	1.634***	2.098***
Mean quarterly earnings (in 10^5) [a]	-2.579***	-4.000***
Mean earnings trend (in 10^5) [b]	-3.604	-10.182**
Mean earnings variance (in 10^7 $) [b]	-0.020**	-0.002
Mean, share of prior quarters with job turnover	-2.117***	-0.835**
Mean percentage of quarters with multiple jobs	0.44**	-0.519**
Mean number of quarters since last dip	0.026	0.049***
Mean percentage dip size in earnings	-0.185**	-0.448***
Constant	-1.476***	-0.197
Observations	89,157	59,305

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Coefficient Estimates from a Logit Model of Participation in WorkFirst Program

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	1.11***	1.117
Race: (White is omitted category)		
Black	0.369***	0.541***
Hispanic	-0.498***	-0.415***
Other	0.617***	0.245***
Missing	-2.34***	-1.501***
Mean, age at registration	-0.054***	-0.065***
Employed in quarter of program start	-0.33***	0.14***
West WA	0.721***	0.439***
Urban county	0.502***	0.045
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	0.303***	0.662***
Mean quarterly earnings (in 10^5) [a]	-19.789	-0.929***
Mean earnings trend (in 10^5) [b]	-3.814*	-7.528**
Mean earnings variance (in 10^7 $) [b]	-0.023	-0.004
Mean, share of prior quarters with job turnover	0.038**	0.591***
Mean percentage of quarters with multiple jobs	-0.228***	-0.062
Mean number of quarters since last dip	-0.023	-0.043***
Mean percentage dip size in earnings	-0.043	0.145***
Constant	-1.186***	0.072***
Observations	119,603	78,079

[a] Average includes quarters with values of zero, if any.

[b] Trend and variance calculations include quarters with zero earnings, if any.

NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.

Coefficient Estimates from a Logit Model of Participation in DVR Programs

	2014/2015	2016/2017
Demographics	*Coefficient*	*Coefficient*
Female	0.049	-0.051***
Race: (White is omitted category)		
Black	-0.189**	-0.17
Hispanic	-0.124	0.049*
Other	0.003	0.102
Missing	2.459***	13.36
Mean, age at registration	-0.002	0.003
Employed in quarter of program start	0.62***	0.796***
Veteran	-0.075	-0.628***
West WA	0.425***	0.444***
Urban county	0.139*	0.083
Employment and Earnings *(prior to registration)*		
Mean, share of quarters employed	-0.009	-0.051
Mean quarterly earnings (in 10^5) [a]	-2.493**	-0.3.356***
Mean earnings trend (in 10^5) [b]	2.734***	8.495
Mean earnings variance (in 10^7 $) [b]	0.044***	0.0127
Mean, share of prior quarters with job turnover	-0.756**	-1.442
Mean percentage of quarters with multiple jobs	-0.366	-0.167
Mean number of quarters since last dip	0.008	0.028
Mean percentage dip size in earnings	0.034	-0.158
Public Support (DVR only) (prior to registration)		
Received Supplemental Security Income (in 10^5) [a]	-68.804***	-54.856***
Received Social Security Disability Insurance payments (in 10^5) [a]	-8.814.	-5.294
Received Temporary Assistance for Needy Families payments (in 10^5) [a]	-146.834***	-12.924
GA (in 10^5) [a]	-16.003	-0.619
Received Workers Compensation (in 10^5) [a]	31.496*	-0.302
Received VA Disability Compensation (in 10^5) [a]	-0.616	-0.00011277983
Received other public support (in 10^5) [a]	-6.138	-0.00039849629
Constant	0.174	0.483***
Observations	8,477	8,535

[a] Average includes quarters with values of zero, if any.
[b] Trend and variance calculations include quarters with zero earnings, if any.

*NOTE: * significant at the ≤ 0.10 level; ** significant at the ≤ 0.05 level; *** significant at the ≤ 0.01 level; Standard Error in parentheses.*

Propensity Score Matching

Predictive Quality

The propensity score is the predicted probability of an observation being in the treatment group based on the estimated coefficients from the logit model. The mean propensity score for the comparison group should be near zero and smaller than the mean propensity score for the treatment group. A logit model with mean propensity score of the comparison group that is near zero has substantial predictive power of being in the treatment group. However, how well a model predicts is not the same as how well it discriminates – that is, how well the model can tell the two groups apart.

How well the model discriminates between the treatment and control group is measured by the percent of observations in the control group that is at the 20th percentile of propensity scores in the treatment group. It is essentially a measure of how similar the treatment and control groups are. A model that approaches 80% is considered optimal. A score of 50%, for example, would mean the model does not discriminate particularly well between the treatment and the matched control. This would indicate that the two groups are not very distinct from each other, however, if the mean propensity score for the comparison group is small, near zero (<0.2), then the predictive power is sufficient for the matching procedure.

Indicators of Propensity Score (p-score) Model Quality for WIA/WIOA Adult Program Predictive Analyses

	2014/2015	2016/2017
Mean p-score, Adult	0.058	0.119
Mean p-score, Wagner-Peyser	0.020	0.086
Percentile Wagner-Peyser, at 20th percentile of Adult	68.0%	46.0%

Indicators of Propensity Score (p-score) Model Quality for WIA/WIOA Dislocated Worker Program Predictive Analyses

	2014/2015	2016/2017
Mean p-score, DW	0.080	0.025
Mean p-score, Wagner-Peyser	0.026	0.018
Percentile Wagner-Peyser, at 20th percentile of DW	62.1%	42.7%

Indicators of Propensity Score (p-score) Model Quality for WIA/WIOA Youth Program Predictive Analyses

	2014/2015	2016/2017
Mean p-score, Youth	0.539	0.453
Mean p-score, Wagner-Peyser	0.010	0.009
Percentile Wagner-Peyser, at 20th percentile Youth	98.7%	98.4%

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Indicators of Propensity Score (p-score) Model Quality for Professional-Tech. Ed. Program Predictive Analysis

	2014/2015	2016/2017
Mean p-score, Professional-Tech. Ed.	0.430	0.478
Mean p-score, Wagner-Peyser	0.167	0.192
Percentile Wagner-Peyser, at 20th percentile Professional-Tech. Ed.	69.7%	69.5%

Indicators of Propensity Score (p-score) Model Quality for Worker Retraining Program Predictive Analysis

	2014/2015	2016/2017
Mean p-score, Worker Retraining	0.079	0.106
Mean p-score, Wagner-Peyser	0.033	0.051
Percentile Wagner-Peyser, at 20th percentile in Worker Retraining	62.4%	59.5%

Indicators of Propensity Score (p-score) Model Quality for BEdA Program Predictive Analysis

	2014/2015	2016/2017
Mean p-score, BEdA	0.367	0.458
Mean p-score, Wagner-Peyser	0.080	0.121
Percentile Wagner-Peyser, at 20th percentile in BEdA	79.4%	79.4%

Indicators of Propensity Score (p-score) Model Quality for Private Career Schools Predictive Analysis

	2014/2015	2016/2017
Mean p-score, PCS	0.246	0.341
Mean p-score, Wagner-Peyser	0.074	0.123
Percentile Wagner-Peyser, at 20th percentile in PCS	68.6%	67.7%

Indicators of Propensity Score (p-score) Model Quality for Registered Apprenticeships Program Predictive Analysis

	2014/2015	2016/2017
Mean p-score, Apprenticeships	0.166	0.255
Mean p-score, Wagner-Peyser	0.022	0.037
Percentile Wagner-Peyser, at 20th percentile in Apprenticeships	83.7%	85.0%

Indicators of Propensity Score (p-score) Model Quality for Aerospace Program Predictive Analysis

	2014/2015	2016/2017
Mean p-score, Aerospace	0.140	0.141
Mean p-score, Wagner-Peyser	0.020	0.025
Percentile Wagner-Peyser, at 20th percentile in Aerospace	79.3%	74.1%

Indicators of Propensity Score (p-score) Model Quality for WorkFirst Program Predictive Analysis

	2014/2015	2016/2017
Mean p-score, WorkFirst	0.371	0.430
Mean p-score, Wagner-Peyser	0.099	0.116
Percentile Wagner-Peyser, at 20th percentile in WorkFirst	78.5%	80.0%

Indicators of Propensity Score (p-score) Model Quality for DVR Program Predictive Analysis

	2014/2015	*2016/2017*
Mean p-score, Treatment	0.569	0.603
Mean p-score, Control	0.512	0.536
Percentile Control, at 20th percentile in Control	38.5%	40.7%

Quality of Match

The treatment and control group are matched on a one-to-one basis using a nearest neighbor algorithm on the propensity score. Matching was conducted with replacement; no more than three replacements were allowed. The algorithm is required to find an exact match for female participants and within a caliper of .005. A high-quality match would have a mean D-statistic of close zero for the matched set, and the mean standardized ratio of covariate variance would be near one for both cohorts. All treatment and control groups for this study have been sufficiently matched.

Sample Size, Mean, and Median Standardized Differences Across All Covariates in Original and Matched Samples for WIA/WIOA Adult

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	89,023	3,630	63,228	10,811
Comparison observations	87,139	1,786	57,635	5,236
Treated observations	1,884	1,844	5,593	5,575
Mean standardized difference in covariates	1.63	0.02	0.17	0.01
Median standardized difference in covariates	0.54	0.01	0.06	0.01
Mean ratio of variance in covariates	0.91	1.01	0.98	1.00
Median ratio of variance in covariates	0.95	0.99	1.00	1.00

Note: Matched on 41 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences Across All Covariates in Original and Matched Samples for WIA/WIOA Dislocated Worker

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	89,600	4,732	58,680	2,055
Comparison observations	87,139	2,302	57,635	1,020
Treated observations	2,461	2,430	1,045	1,035
Mean standardized difference in covariates	0.85	0.02	0.25	0.02
Median standardized difference in covariates	0.36	0.02	0.26	0.02
Mean ratio of variance in covariates	0.91	0.97	0.96	0.98
Median ratio of variance in covariates	0.92	1.00	0.95	0.99

Note: Matched on 41 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for WIA/WIOA Youth

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	89,088	2,174	62,753	956
Comparison observations	87,139	856	61,764	439
Treated observations	1,949	1,318	989	517
Mean standardized difference in covariates	4.88	0.09	2.68	0.03
Median standardized difference in covariates	1.31	0.08	0.61	0.03
Mean ratio of variance in covariates	0.83	1.06	0.89	1.06
Median ratio of variance in covariates	0.89	0.96	1.01	1.01

Note: Matched on 41 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Professional-Tech. Ed. Programs

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	112,626	42,042	84,510	36,180
Comparison observations	87,139	16,819	61,764	13,736
Treated observations	25,487	25,223	22,746	22,444
Mean standardized difference in covariates	0.35	0.05	0.27	0.06
Median standardized difference in covariates	0.23	0.03	0.12	0.04
Mean ratio of variance in covariates	0.94	1.00	0.95	0.99
Median ratio of variance in covariates	1.01	1.00	1.00	1.00

Note: Matched on 39 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Worker Retraining

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	106,996	7,064	68,617	7,040
Comparison observations	103,348	3,455	64,918	3,412
Treated observations	3,648	3,609	3,699	3,628
Mean standardized difference in covariates	0.45	0.02	1.22	0.01
Median standardized difference in covariates	0.27	0.01	0.21	0.01
Mean ratio of variance in covariates	0.94	1.00	0.95	1.01
Median ratio of variance in covariates	0.88	1.01	0.98	1.00

Note: Matched on 39 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Basic Education for Adults

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	116,482	21,977	73,934	21,543
Comparison observations	103,348	9,279	60,428	8,438
Treated observations	13,134	12,698	13,506	13,105
Mean standardized difference in covariates	0.69	0.05	0.71	0.05
Median standardized difference in covariates	0.33	0.05	0.24	0.04
Mean ratio of variance in covariates	0.96	1.06	0.99	1.04
Median ratio of variance in covariates	1.00	1.00	1.01	1.00

Note: Matched on 40 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Private Career Schools

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	95,701	15,227	68,388	18,239
Comparison observations	87,139	6,910	57,635	7,735
Treated observations	8,562	8,317	10,753	10,504
Mean standardized difference in covariates	0.52	0.03	0.45	0.04
Median standardized difference in covariates	0.43	0.02	0.20	0.03
Mean ratio of variance in covariates	0.03	1.03	0.97	1.02
Median ratio of variance in covariates	0.02	1.00	1.01	1.00

Note: Matched on 41 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Registered Apprenticeships

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	106,113	4,958	68,179	5,763
Comparison observations	103,348	2,375	64,918	2,610
Treated observations	2,765	2,583	3,261	3,153
Mean standardized difference in covariates	0.74	0.01	0.76	0.03
Median standardized difference in covariates	0.19	0.01	0.28	0.02
Mean ratio of variance in covariates	0.82	0.99	0.88	1.01
Median ratio of variance in covariates	0.87	1.00	0.91	0.99

Note: Matched on 39 covariates, the Cohen d-statistic is the standardized difference in covariates
a Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Aerospace

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	89,157	3,561	59,305	2,965
Comparison observations	87,139	1,721	57,635	1,435
Treated observations	2,018	1,840	1,670	1,530
Mean standardized difference in covariates (Cohen d-statistic)	0.41	0.03	0.29	0.03
Median standardized difference in covariates	0.15	0.03	0.18	0.03
Mean ratio of variance in covariates	0.96	1.02	0.95	0.99
Median ratio of variance in covariates	1.00	1.01	1.00	1.00

Note: Matched on 41 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for WorkFirst

	2014/2015		**2016/2017**	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	119,603	27,890	78,079	21,717
Comparison observations	103,348	11,661	64,918	8,599
Treated observations	16,255	16,229	13,161	13,118
Mean standardized difference in covariates	1.41	0.08	1.20	0.07
Median standardized difference in covariates	0.58	0.09	0.48	0.05
Mean ratio of variance in covariates	0.84	0.97	0.87	0.99
Median ratio of variance in covariates	0.91	0.97	0.93	0.99

Note: Matched on 41 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Sample Size, Mean, and Median Standardized Differences across All Covariates in Original and Matched Samples for Department of Vocational Rehabilitation

	2014/2015		2016/2017	
	Unmatched Sample	*Matched Sample*	*Unmatched Sample*	*Matched Sample*
Total Sample Size [a]	8,477	6,710	8,535	6,933
Comparison observations	3,871	2,363	3,631	2,317
Treated observations	4,606	4,347	4,904	4,616
Mean standardized difference in covariates	0.11	0.00	0.23	0.02
Median standardized difference in covariates	0.01	0.00	0.12	0.02
Mean ratio of variance in covariates	1.13	1.02	0.92	0.99
Median ratio of variance in covariates	0.99	0.99	0.96	0.98

Note: Matched on 50 covariates, the Cohen d-statistic is the standardized difference in covariates
[a] Observations with missing fields are excluded.

Matched Participant Characteristics

There are minimal to no statistical differences in characteristics between the treatment and comparison group along demographics and employment histories following the matching procedure.

Descriptive Statistics for WIA/WIOA Adult and Wagner-Peyser Groups (Matched)

Demographics	2014/2015 Matched Wagner-Peyser	WIA Adult	2016/2017 Matched Wagner-Peyser	WIOA Adult
Female	54.4%	54.9%	44.2%	44.5%
Race:				
White	60.5%	60.8%	61.4%	61.5%
Black	12.3%	12.8%	8.2%	8.6%
Hispanic	13%	13.1%	7.2%	6.8%
Other	10.3%	9.9%	15.1%	15.2%
Missing	3.9%	3.5%	8.1%	7.9%
Mean, age at registration	39 (13)	39 (13)	45 (13)	45 (13)
Employed in quarter of program start	34.5%	32.4%	55.6%	55.9%
Disability	6.7%	6.6%	6.6%	6.7%
Veteran	8.6%	8.2%	6.6%	7.1%
West WA	73.3%	73.4%	94.6%	94.7%
Urban county	83.4%	83.8%	94.4%	94.1%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	31.2%	31.1%	64.3%	63.9%
Mean quarterly earnings [a]	$1,755 (3,065)	$1,708 (2,952)	$8,089 (9,887)	$8,276 (9,382)
Mean earnings trend [b]	-$1.68 (420.7)	-$1.54 (366.0)	$131.25 (720.1)	$123.07 (660.5)
Mean earnings variance (in 10^6 $) [b]	6.2 (13.7)	5.3 (18.7)	36.7 (99.7)	39.1 (97.7)
Mean, share of prior quarters with job turnover	6.9%	6.8%	9.5%	9.2%
Mean percentage of quarters with multiple jobs	6.1% (12.9)	6.1% (13.3)	8.4% (12.7)	8.1% (12.8)
Had earnings dip	33.9%	32.7%	56.7%	55.7%
Mean number of quarters since last dip	1.6 (1.6)	1.7 (1.6)	1.7 (1.8)	1.7 (1.8)
Mean percentage dip size in earnings	25.6% (40.0)	25.4% (40.0)	33.3% (36.7)	32.7% (37.2)
Sample Size	3,633		10,794	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for WIA/WIOA Dislocated Worker and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	WIA Dislocated Worker	Matched Wagner-Peyser	WIOA Dislocated Worker
Female	45.9%	46.2%	41.2%	41.1%
Race:				
White	73.0%	72.7%	65.9%	67.8%
Black	6.5%	6.7%	5.5%	4.9%
Hispanic	8.8%	9.0%	7.7%	7.7%
Other	9.4%	9.5%	13.3%	13.2%
Missing	2.2%	2.1%	7.5%	6.3%
Mean, age at registration	47 (14)	46 (12)	47 (14)	46 (12)
Employed in quarter of program start	24.3%	22.6%	47.6%	50.8%
Disability	7.2%	6.7%	6.7%	7.1%
Veteran	14.0%	12.6%	15.0%	15.4%
West WA	75.2%	74.7%	73.5%	72.7%
Urban county	86.5%	86.9%	93.0%	92.7%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	36.3%	35.7%	60.7%	61.5%
Mean quarterly earnings [a]	$4,418 (8,219)	$4,420 (7,136)	$7,571 (9,102)	$7,763 (8,137)
Mean earnings trend [b]	$5.19 (470.5)	$7.42 (396.1)	$61.03 (450.1)	$42.02 (543.3)
Mean earnings variance (in 10^6 $) [b]	18.3 (62.0)	19.0 (69.8)	26.4 (69.8)	28.9 (60.8)
Mean, share of prior quarters with job turnover	4.8%	4.7%	7.3%	7.7%
Mean percentage of quarters with multiple jobs	4.0% (9.2)	4.0% (9.6)	6.6% (10.6)	6.9% (11.9)
Had earnings dip	33.3%	32.7%	48.2%	47.1%
Mean number of quarters since last dip	0.8 (1.6)	0.8 (1.5)	1.2 (1.8)	1.2 (1.8)
Mean percentage dip size in earnings	24.8% (39.2)	24.1% (38.8)	28.1% (36.4)	28.7% (37.6)
Sample Size	4,732		2,055	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for WIA/WIOA Youth and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	WIOA Youth	Matched Wagner-Peyser	WIOA Youth
Female	49.4%	50.7%	44.0%	43.1%
Race:				
White	51.8%	53.3%	51.0%	48.9%
Black	11.7%	12.7%	6.2%	10.1%
Hispanic	28.4%	25.9%	30.1%	27.3%
Other	6.8%	5.8%	9.3%	9.3%
Missing	1.4%	2.2%	3.4%	4.4%
Mean, age at registration	19 (2)	19 (2)	20 (2)	20 (2)
Employed in quarter of program start	27.9%††	21.5%††	33.9%	37.1%
Disability	7.2%	8.9%	8.0%	8.7%
West WA	53.5%††	60.8%††	54.4%	56.1%
Urban county	82.2%	85.0%	91.3%	90.7%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	23.4%††	18.8%††	31.9%	34.8%
Mean quarterly earnings [a]	$459.09 (846)	$369.93 (1022)	$849.19 (1462)	$860.10 (1552)
Mean earnings trend [b]	$16.46 (287.5)	$14.57 (672.2)	$54.57 (403.1)	$66.48 (474.5)
Mean earnings variance (in 10^6 $) [b]	0.881 (4.7)	0.639 (5.5)	1.415 (3.6)	1.417 (4.3)
Mean, share of prior quarters with job turnover	5.2%††	3.5%††	7.6%	8.1%
Mean percentage of quarters with multiple jobs	3.9%†† (9.9)	2.6%†† (10.3)	6.0% (16.0)	6.8% (17.1)
Had earnings dip	28.6%††	20.7%††	36.4%	37.3%
Mean number of quarters since last dip	0.7†† (1.5)	0.5†† (1.3)	0.9 (1.4)	1.0 (1.6)
Mean percentage dip size in earnings	23.9%†† (40.7)	18.0%†† (36.8)	29.4% (40.9)	29.4% (41.7)
Sample Size	2,174		956	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by ††. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for Professional-Tech. Ed. Program and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	Professional-Tech. Ed.	Matched Wagner-Peyser	Professional-Tech. Ed.
Female	52.7%[††]	55.4%[††]	53.3%[††]	56.0%[††]
Race:				
White	64.7%[††]	62.3%[††]	60.7%[††]	59.3%[††]
Black	7.3%[††]	6.5%[††]	6.8%	6.3%
Hispanic	11.5%[††]	10.1%[††]	12.5%[††]	11.7%[††]
Other	10.6%[††]	13.4%[††]	12.4%[††]	14.2%[††]
Missing	5.9%	6.2%	7.5%[††]	7.0%[††]
Mean, age at registration	34[††] (11)	31[††] (11)	34[††] (11)	31[††] (11)
Employed in quarter of program start	46.5%	45.9%	49.1%[††]	51.0%[††]
Disability	7.9%	7.6%	7.9%	7.8%
West WA	74.8%[††]	79.2%[††]	78.0%[††]	80.6%[††]
Urban county	89.6%[††]	91.6%[††]	91.8%	92.2%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	56.0%	55.9%	56.9%[††]	58.6%[††]
Mean quarterly earnings [a]	$3,765[††] (4,506)	$3,221[††] (4,414)	$4,068[††] (4,717)	$3,398[††] (4,509)
Mean earnings trend [b]	$52.12[††] (502)	$64.11[††] (461)	$85.40 (537)	$95.51 (562)
Mean earnings variance (in 10^6 $) [b]	11.471[††] (29.0)	9.068[††] (29.5)	13.084[††] (32.3)	9.545[††] (30.2)
Mean, share of prior quarters with job turnover	10.3%[††]	9.9%[††]	10.0%	10.1%
Mean percentage of quarters with multiple jobs	9.3% (14.0)	9.1% (14.8)	9.5% (14.7)	9.8% (15.4)
Had earnings dip	50.3%[††]	48.9%[††]	52.3%[††]	49.9%[††]
Mean number of quarters since last dip	1.4 (1.9)	1.4 (1.9)	1.4[††] (1.8)	1.5[††] (2.0)
Mean percentage dip size in earnings	33.1% (40.0)	33.3% (40.6)	31.6%[††] (37.5)	33.2%[††] (40.0)
Sample Size	42,042		36,180	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for Worker Retraining and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	Worker Retraining	Matched Wagner-Peyser	Worker Retraining
Female	55.9%	56.2%	53.9%	54.1%
Race:				
White	63.6%	62.1%	60.0%	59.3%
Black	9.9%	9.4%	8.0%	8.0%
Hispanic	9.9%	9.8%	13.0%	12.6%
Other	9.2%	10.3%	12.0%	12.3%
Missing	7.4%	6.9%	7.0%	6.7%
Mean, age at registration	40 (13)	40 (12)	38 (13)	38 (12)
Employed in quarter of program start	26.0%	25.7%	30.0%	29.9%
West WA	79.8%	80.8%	78.5%	79.8%
Urban county	90.5%	90.5%	89.9%	89.3%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	51.1%	50.7%	46.6%	48.9%
Mean quarterly earnings [a]	$4,686 (5,920)	$4,491 (5,734)	$3,803 (5,379)	$4,040 (5,557)
Mean earnings trend [b]	-$8.10 (492)	-$31.94 (420)	$16.50 (510)	$6.75 (458)
Mean earnings variance (in 10^6 $) [b]	17.823 (35.2)	16.248 (54.8)	12.607 (31.1)	13.637 (35.6)
Mean, share of prior quarters with job turnover	8.9%	8.8%	8.3%	8.8%
Mean percentage of quarters with multiple jobs	7.8% (13.8)	7.7% (13.0)	7.8% (13.1)	7.9% (13.6)
Had earnings dip	50.3%	51.1%	49.1%	49.0%
Mean number of quarters since last dip	1.2 (1.7)	1.2 (1.7)	1.2 (1.6)	1.2 (1.7)
Mean percentage dip size in earnings	38.8% (44.1%)	40.1% (44.0)	34.9% (41.1)	36.6% (42.6)
Sample Size	7,064		7,040	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.

NOTE: Standard deviations in parentheses for continuous variables.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for Basic Education for Adults (BEdA) Program and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	BEdA	Matched Wagner-Peyser	BEdA
Female	54.5%[††]	56.1%[††]	55.1%[††]	57.7%[††]
Race:				
White	46.6%[††]	40.3%[††]	47.5%[††]	41.2%[††]
Black	12.2%	12.7%	9.7%[††]	10.7%[††]
Hispanic	23.6%	22.5%	23.4%[††]	22.2%[††]
Other	17.4%[††]	21.4%[††]	19.3%[††]	23.0%[††]
Missing	0.2%[††]	0.0%[††]	0.1%[††]	0.0%[††]
Mean, age at registration	32[††] (11)	31[††] (10)	33[††] (11)	31[††] (10)
Employed in quarter of program start	45.5%	44.0%	47.1%[††]	48.5%[††]
Veteran	3.2%[††]	2.3%[††]	2.8%[††]	2.1%[††]
West WA	73.7%[††]	75.6%[††]	70.7%	72.9%
Urban county	89.5%	91.0%	89.9%[††]	90.3%[††]
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	50.6%	49.7%	52.4%	53.1%
Mean quarterly earnings [a]	$2,643[††] (3,331)	$2,346[††] (3,313)	$2,872[††] (3,435)	$2,535[††] (3,344)
Mean earnings trend [b]	$62.14[††] (449)	$78.79[††] (641)	$107.05 (459)	$121.05 (758)
Mean earnings variance (in 10^6 $) [b]	5.330[††] (9.3)	4.341[††] (17.0)	6.607[††] (13.5)	4.910[††] (15.3)
Mean, share of prior quarters with job turnover	9.7%[††]	9.0%[††]	10.4%	10.1%
Mean percentage of quarters with multiple jobs	9.6% (16.0)	9.3% (17.7)	10.3% (16.2)	10.2% (18.1)
Had earnings dip	46.4%[††]	42.7%[††]	48.3%[††]	44.0%[††]
Mean number of quarters since last dip	1.2[††] (1.8)	1.2[††] (1.8)	1.2 (1.8)	1.2 (1.8)
Mean percentage dip size in earnings	32.4%[††] (40.6)	30.7%[††] (41.0)	30.6% (38.3)	30.9% (40.5)
Sample Size	21,977		21,543	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.
[a] Averages include observations with values of zero.
[b] Trend and variance calculations include quarters with zero earnings, if any.
Note: Disabled dropped because of missingness

Descriptive Statistics for Private Career School and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	Private Career Schools	Matched Wagner-Peyser	Private Career Schools
Female	47.8%	49.1%	47.7%††	52.4%††
Race:				
White	63.1%	63.3%	59.1%	59.0%
Black	8.5%	8.7%	8.7%	9.1%
Hispanic	12.1%	11.2%	14.2%	14.1%
Other	13.8%	14.5%	14.3%	15.1%
Missing	2.5%	2.2%	3.6%††	2.6%††
Mean, age at registration	33††	32††	34††	31††
	(12)	(12)	(12)	(12)
Employed in quarter of program start	48.6%††	46.5%††	49.7%	51.1%
Disability	2.4%	2.0%	3.8%††	2.9%††
Veteran	10.1%	9.2%	11.3%	11.3%
West WA	77.3%††	79.6%††	76.1%	77.1%
Urban county	92.6%††	93.7%††	92.9%	93.6%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	49.4%††	47.7%††	52.1%	51.3%
Mean quarterly earnings [a]	$3,503††	$3,0812††	$3,736††	$3,168%††
	(4,695)	(5,049)	(5,054)	(4,903)
Mean earnings trend [b]	$70.50	$83.01	$117.82	$124.42
	(532)	(686)	(647)	(750)
Mean earnings variance (in 10^6 $) [b]	12. 544††	10.171††	13.983††	10.897††
	(40.2)	(42.5)	(45.6)	(47.9)
Mean, share of prior quarters with job turnover	8.7%††	8.2%††	9.3%	9.1%
Mean percentage of quarters with multiple jobs	8.8%	8.4%	9.0%	9.2%
	(15.7)	(15.6)	(15.1)	(16.2)
Had earnings dip	43.1%††	40.4%††	47.5%††	44.5%††
Mean number of quarters since last dip	1.2	1.1	1.2	1.2
	(1.8)	(1.8)	(1.8)	(1.9)
Mean percentage dip size in earnings	27.9%	26.9%	29.3%	29.4%
	(38.1)	(38.4)	(37.5)	(39.0)
Sample Size	15,227		18,239	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by ††. Monetary data in 201X $.
[a] Averages include observations with values of zero.
[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for Registered Apprenticeships and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	Apprenticeship	Matched Wagner-Peyser	Apprenticeship
Female	13.9%	13.0%	13.8%	11.8%
Race:				
White	74.9%	75.0%	68.8%	71.7%
Black	5.6%	6.0%	7.2%	6.7%
Hispanic	13.6%	12.4%	15.5%	13.7%
Other	5.1%	5.3%	7.0%	6.7%
Missing	0.8%	1.3%	1.4%	1.2%
Mean, age at registration	31 (10)	31 (9)	31 (9)	30 (9)
Employed in quarter of program start	83.6%	84.2%	81.2%	83.4%
West WA	78.0%	80.1%	75.9%	78.0%
Urban county	91.1%	92.7%	92.7%	92.0%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	64.2%	64.1%	63.0%	63.4%
Mean quarterly earnings [a]	4,674 (4,836)	4,659 (4,597)	4,868 (5,358)	4,858 (5,377)
Mean earnings trend [b]	$98.15 (554)	$92.92 (593)	$157.76 (652)	$164.60 (817)
Mean earnings variance (in 10^6 $) [b]	13.915 (21.7)	13.961 (20.4)	15.279 (24.4)	14.695 (22.8)
Mean, share of prior quarters with job turnover	14.2%	14.2%	13.6%	13.7%
Mean percentage of quarters with multiple jobs	11.5% (15.6)	11.6% (15.2)	11.5% (15.3)	11.9% (15.3)
Had earnings dip	62.1%	60.4%	62.2%	59.1%
Mean number of quarters since last dip	1.7 (1.9)	1.7 (2.0)	1.7 (1.9)	1.7 (2.0)
Mean percentage dip size in earnings	40.7% (40.4)	41.0% (41.2)	37.9% (37.9)	37.9% (39.8)
Sample Size	4,958		5,763	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.
[a] Averages include observations with values of zero.
[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for Aerospace Program and Wagner-Peyser Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	Aerospace	Matched Wagner-Peyser	Aerospace
Female	13.7%	12.9%	14.1%	13.3%
Race:				
White	64.5%	63.5%	61.6%	60.1%
Black	5.8%	5.2%	4.8%	4.7%
Hispanic	7.3%	6.4%	8.9%	9.0%
Other	14.8%	15.8%	15.6%	16.3%
Missing	7.7%	7.9%	9.1%	8.7%
Mean, age at registration	33 (11)	33 (12)	34 (11)	33 (12)
Employed in quarter of program start	48.6%	49.0%	50.8%	51.7%
Disability	7.4%	7.3%	9.4%	8.9%
Veteran	11.6%	12.2%	14.1%	12.9%
West WA	84.8%	86.0%	85.6%	87.0%
Urban county	92.7%	94.2%	92.9%	93.4%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	63.0%	62.4%	64.0%	64.1%
Mean quarterly earnings [a]	$5,412 (6,287)	$5,091 (6,060)	$5,580 (6,702)	$5,622 (6,811)
Mean earnings trend [b]	$66.61 (557)	$44.87 (693)	$93.21 (637)	$96.02 (673)
Mean earnings variance (in 10^6 $) [b]	18.421 (36.5)	16.039 (37.0)	18.996 (57.0)	18.629 (44.1)
Mean, share of prior quarters with job turnover	11.0%	10.5%	10.0%	10.3%
Mean percentage of quarters with multiple jobs	9.3% (13.4)	9.0% (14.7)	8.4% (13.4)	8.6% (13.9)
Had earnings dip	58.0%	56.2%	55.2%	50.7%
Mean number of quarters since last dip	1.6 (1.9)	1.5 (1.9)	1.4 (2.0)	1.4 (1.9)
Mean percentage dip size in earnings	39.4% (42.0)	39.8% (42.3)	33.3% (38.8)	33.6% (40.3)
Sample Size	3,561		2,965	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.
[a] Averages include observations with values of zero.
[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for WorkFirst and Matched Wagner-Peyser Groups

Demographics	2014/2015		2016/2017	
	Matched Wagner-Peyser	*WorkFirst*	*Matched Wagner-Peyser*	*WorkFirst*
Female	65.7%	72.3%	63.4%[††]	72.5%[††]
Race:				
White	58.9%	55.0%	56.2%[††]	52.8%[††]
Black	12.5%	14.5%	10.6%[††]	13.8%[††]
Hispanic	16.2%	14.5%	18.1%[††]	16.1%[††]
Other	9.9%	11.8%	12.2%	12.8%
Missing	2.4%	1.9%	2.9%[††]	2.2%[††]
Mean, age at registration	32 (11)	31 (9)	33[††] (11)	32[††] (9)
Employed in quarter of program start	33.4%[††]	29.3%[††]	33.4%	31.6%
West WA	68.0%[††]	72.2%[††]	69.1%	71.9%
Urban county	88.1%	89.5%	89.7%	90.0%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	35.0%	31.1%	33.2%[††]	30.5%[††]
Mean quarterly earnings [a]	$1,467 (2,235)	$1,215 (2,108)	$1,498[††] (2,349)	$1,244[††] (2,112)
Mean earnings trend [b]	$15.53 (304)	$7.47 (342)	$38.85[††] (286)	$26.92[††] (389)
Mean earnings variance (in 10^6 $) [b]	4.322 (11.3)	3.346 (11.8)	4.421[††] (11.0)	3.397[††] (11.4)
Mean, share of prior quarters with job turnover	9.0%	8.0%	8.1%[††]	7.7%[††]
Mean percentage of quarters with multiple jobs	6.3% (11.6)	5.5% (11.6)	6.2%[††] (11.9)	5.8%[††] (12.4)
Had earnings dip	40.1%	34.9%	36.8%[††]	32.7%[††]
Mean number of quarters since last dip	1.0 (1.7)	0.9 (1.7)	0.9 (1.6)	0.9 (1.6)
Mean percentage dip size in earnings	31.2% (42.4)	28.4% (42.0)	25.9% (38.7)	25.8% (40.3)
Sample Size	27,890		21,717	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.
[a] Averages include observations with values of zero.
[b] Trend and variance calculations include quarters with zero earnings, if any.

Descriptive Statistics for DVR Treatment and Comparison Groups (Matched)

Demographics	2014/2015		2016/2017	
	Matched Comparison	Matched Treatment	Matched Comparison	Matched Treatment
Female	45.5%	45.1%	43.2%	43.6%
Race:				
White	70.2%	71.3%	69.4%	70.7%
Black	8.3%	7.9%	7.9%	7.4%
Hispanic	9.8%	9.3%	11.1%	10.4%
Other	9.6%	9.4%	8.9%	9.4%
Missing	0.0%	0.0%	0.0%	0.0%
Mean, age at registration	38 (14)	38 (14)	38 (15)	38 (15)
Employed in quarter of program start	24.1%[††]	28.7%[††]	27.8%	29.8%
Veteran	1.8%	1.8%	1.6%	1.1%
West WA	75.1%[††]	77.6%[††]	72.6%[††]	76.1%[††]
Urban county	89.5%	90.0%	89.3%	89.6%
Employment and Earnings (prior to registration)				
Mean, share of quarters employed	38.0%	38.0%	37.6%[††]	34.3%[††]
Mean quarterly earnings [a]	$1,839 (3,281)	$1,854 (3,347)	$1,767 (3,288)	$1,633 (3,131)
Mean earnings trend [b]	-$31.26 (317.3)	-$21.98 (292.4)	-$21.89 (384.5)	-$11.90 (277.4)
Mean earnings variance (in 10^6 $) [b]	5.309 (14.481)	5.525 (22.318)	4.994 (16.649)	5.335 (22.540)
Mean, share of prior quarters with job turnover	7.2%	6.8%	6.7%[††]	5.8%[††]
Mean percentage of quarters with multiple jobs	5.4% (.118)	5.2% (.112)	5.2% (11.7)	4.7% (11.3)
Had earnings dip	31.8%	33.2%	30.5%	29.3%
Mean number of quarters since last dip	.9 (1.7)	1.0 (1.7)	0.9 (1.7)	0.9 (1.7)
Mean percentage dip size in earnings	25.9% (.411)	27.0% (.416)	24.1% (39.7)	22.9% (39.1)
Public Support (DVR only) (prior to registration)				
Received Supplemental Security Income	$155.49 (297.60)	$137.63 (268.90)	$159.79 (302.70)	$149.58 (281.00)
Received Social Security Disability Insurance payments	$252.13 (468.0)	$249.45 (467.7)	$233.50 (450.80)	$228.51 (460.00)
Received Temporary Assistance for Needy Families payments	$15.72[††] (77.04)	$10.07[††] (70.47)	$11.69 (72.74)	$11.71 (70.86)
GA	$10.16 (53.46)	$9.38 (56.50)	$6.00 (46.77)	$6.07 (50.91)

Received Workers Compensation	$8.17	$12.07	$14.36	$14.20
	(107.00)	(140.90)	(186.80)	(250.30)
Received VA Disability Compensation	$5.60	$5.09	$6.94	$3.57
	(86.54)	(80.82)	(100.20)	(66.61)
Received other public support	$79.64	$78.18	$84.09	$72.55
	(189.70)	(249.20)	(199.40)	(215.90)
Sample Size	6,710		6,933	

NOTE: All differences in means (i.e., Wagner-Peyser mean minus program mean) are <u>NOT</u> statistically significant at the p-value=0.05 level (t-test), unless denoted by [††]. Monetary data in 201X $.

[a] Averages include observations with values of zero.

[b] Trend and variance calculations include quarters with zero earnings, if any.

Appendix A: Variable List

Program and participant identifier variables
-   Program name (string)
-   Cohort period (long or short) (binary)
-   Unique record level identifier (numeric)
-   Date of birth (date)
-   Program starting year and quarter (date)
-   Program exit year and quarter (date)
-   Has wage record flag (binary)

Demographic variables
-   Age at start of program (numeric)
-   Female flag (binary)
-   Race/ethnicity: White (binary)
-   Race/ethnicity: Black (binary)
-   Race/ethnicity: Hispanic (binary)
-   Race/ethnicity: Other (binary)
-   Race/ethnicity: Missing (binary)
-   Employed at start of program (binary)
-   Disabled (binary)
-   Veteran status (binary)
-   Urban resident (binary)
-   Western Washington resident (binary)
-   Year of education (categorical)

Public assistance variables (DVR only)
-   Monthly Social Security Disability Insurance (SSDI) payments (currency)
-   Monthly Social Security Supplemental (SSI) payments (currency)
-   Monthly Temporary Assistance for Needy Families payments (TANF) (currency)
-   Monthly General Assistance for Aged, Blind, and/or Disabled (currency)
-   Monthly Workers Compensation payments (currency)
-   Veteran Affairs Disability Payments (VA) payments (currency)
-   Monthly other public assistance payments (currency)

Prior Employment Variables
-   Prior industry employment based on North American Industry Classification System (NAICS) code (binary for each 2-digit NAICS code (20 classification codes)
-   Quarterly job turnover rate (numeric)
-   Percent of quarters with multiple jobs (numeric)
-   Mean quarterly earnings (currency)
-   Mean quarterly earnings variance (currency)
-   Quarterly earnings trend (currency)
-   Had earnings dip prior to program (binary)
-   Number of quarters since last earnings dip (numeric)
-   Earnings dip as percent of past earnings (numeric)

Outcome variables
-   Employment status (binary)
-   Average hourly wage per quarter
-   Average hours worked per quarter
-   Average quarterly Unemployment Insurance benefits