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## **Assessment of the effect of WorkSource job-search services**



**Employment  
Security  
Department**  
WASHINGTON STATE



# Assessment of the effect of WorkSource job-search services

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## Executive summary

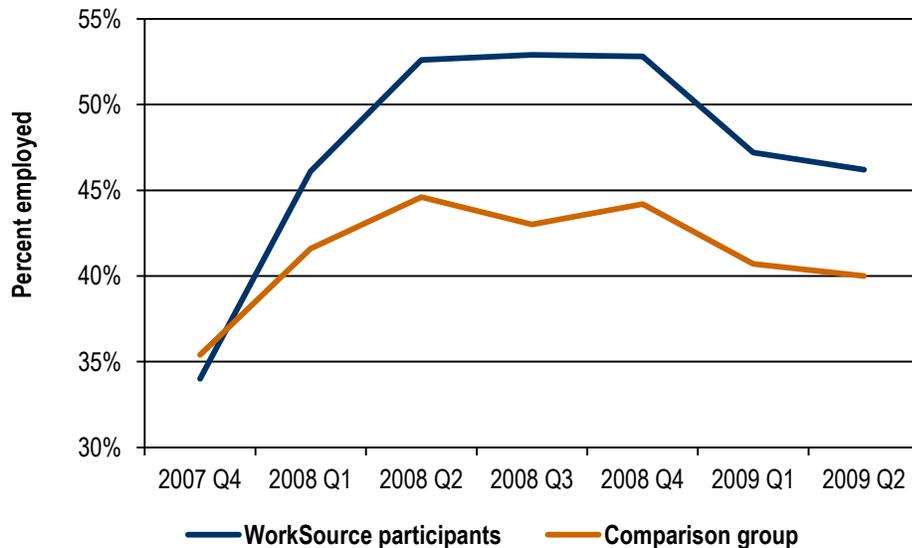
WorkSource is a statewide partnership of the Employment Security Department, local workforce development councils, community colleges, other state agencies and nonprofit organizations that work together to provide employment and training services to job seekers. Job referrals directly connect participants with prospective employers. Other services, such as assistance with résumé writing and job-interviewing techniques, provide participants with the skills needed to successfully find and keep a job.

Besides the benefits to participants, policy-makers expect programs like WorkSource to also provide a net benefit to *society*. These social benefits include higher earnings and other benefits resulting from increased productivity. The Return on Investment (ROI) is commonly used to measure this benefit to society because it accounts for the distribution of costs and benefits over time. For these reasons, in addition to analyzing the effects of the program on participants' own employment and earnings, we also report social ROI as an indicator of WorkSource program effectiveness.

Like many other publicly funded programs, WorkSource requires an up-front investment of resources for both the program participant and the state, with an expectation that future benefits will outweigh the costs. When individuals participate in WorkSource activities, they may be forgoing more immediate job opportunities and instead be investing in improved prospects for the future. Thus, we may see an initial drop in earnings relative to comparison-group individuals, but higher relative earnings in the future.

The study period included fourth-quarter 2005 through second-quarter 2009. The recession began nationally in fourth-quarter 2007. In the first follow-up quarter (second-quarter 2008), individuals receiving WorkSource services earned significantly more than a comparison group of non-participants (*Figure 5*) and were more likely to be employed (*Figure 1*). WorkSource participants earned an average of \$1,980 more than comparison-group members over the seven quarters we analyzed. More importantly, the earnings difference was maintained through the end of our study period (second-quarter 2009), which corresponded to the depths of the Great Recession. This verifies that WorkSource provides a sustained benefit to participants.

**Figure 1.** WorkSource participant and comparison-group employment  
 Washington state, fourth-quarter 2007 through second-quarter 2009  
 Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse



*WorkSource participants were more likely to be employed than comparison-group members from first-quarter 2008 through second-quarter 2009.*

We found that WorkSource provided a high social return on investment. The Employment Security Department has estimated the average cost of WorkSource services during the period covered by this analysis as \$340 per individual. Assuming a service cost per individual of \$500, social ROI was 12 percent for males and 16 percent for females per year. At \$100 per individual, social ROI was 18 percent for males and 34 percent for females per year. Such a high social ROI demonstrates that WorkSource is an effective use of both participants’ and public resources.

For the period immediately following participation, individuals participating in WorkSource services earned less, on average, than a comparison group of individuals with similar characteristics. But this amounted to the equivalent of only about 30 hours of earnings, a small price to pay for the additional wages earned later.

The accompanying report and appendices provide more detailed information on our results.

## Research design

Analyzing the benefits of WorkSource job-search services is challenging because we don’t know how successful participants would have been at finding employment if they hadn’t used WorkSource. In this situation, the best way to analyze program effectiveness is to compare individuals participating in WorkSource services (treatment group) to a comparison group of individuals that has similar characteristics but did not receive services during a specified period (treatment period).

Although this is a challenge, we were able to use the information that is collected on unemployment-insurance claimants to identify a “comparison group” of individuals with characteristics similar to individuals receiving WorkSource services. The factors used to do this are discussed in detail in the “Method of Analysis” section of this report.

We thus identified two groups, each composed of 4,467 individuals, all of whom were unemployed during the entire third quarter of 2007:

- The *treatment group* included individuals who participated in WorkSource during a six-month treatment period (fourth-quarter 2007 and first-quarter 2008).
- The *comparison group* included individuals who did not participate in WorkSource during that same six-month period (but may have participated in WorkSource at other times).

We compared employment results for the two groups during a follow-up period (through second-quarter 2009) on two measures:

- Whether they were employed; and
- How much they earned.

Besides providing the difference in average wages between the two groups, we calculated the social return on investment (ROI), which compares the benefits of the program to the dollar investment made in it. A detailed discussion of ROI may be found in the “Social Return on Investment” section of this report.

Please refer to the “Methods of Analysis” section for a more detailed discussion of the methodology used to perform our analysis.

## Accounting for selection bias

We were able to mitigate a great deal of potential bias through careful research design. The treatment- and comparison-group members were chosen from the same pool (unemployment-insurance claimants) and had similar if not identical characteristics. However, there were characteristics that either weren’t measured or were not measurable that may have influenced employment outcomes. These included health status and motivation. While we could not know for certain the effects of such factors on our results, we were confident that, given the strength of the results, WorkSource is providing a valuable service to participants and a positive return on investment to society.



# Introduction

## The WorkSource services study

WorkSource is Washington state's federally required one-stop employment system – part of the nationwide American Job Centers. It is a partnership of workforce agencies that offer a comprehensive array of employment and training services. WorkSource offers many services to help job seekers find work, including:

- Skill assessments;
- Job listings, referrals and hiring events;
- Résumé and application assistance;
- Internet access for job searches;
- Workshops on résumés, interviewing and other programs;
- Computers, copiers, fax machines, phones and other office equipment;
- Access to information about unemployment benefits; and
- Referrals to training and other community resources, such as food banks, child-care assistance and public transportation.

This study assessed the effect<sup>1</sup> on before-tax earnings of WorkSource job-search services, both prior to and during the recent Great Recession. The study period included fourth-quarter 2005 through second-quarter 2009. The recession began nationally in fourth-quarter 2007; it took hold of the state's economy in midsummer of 2008. *Figure 2* shows the period of observation for the study and Washington's quarterly unemployment rate.

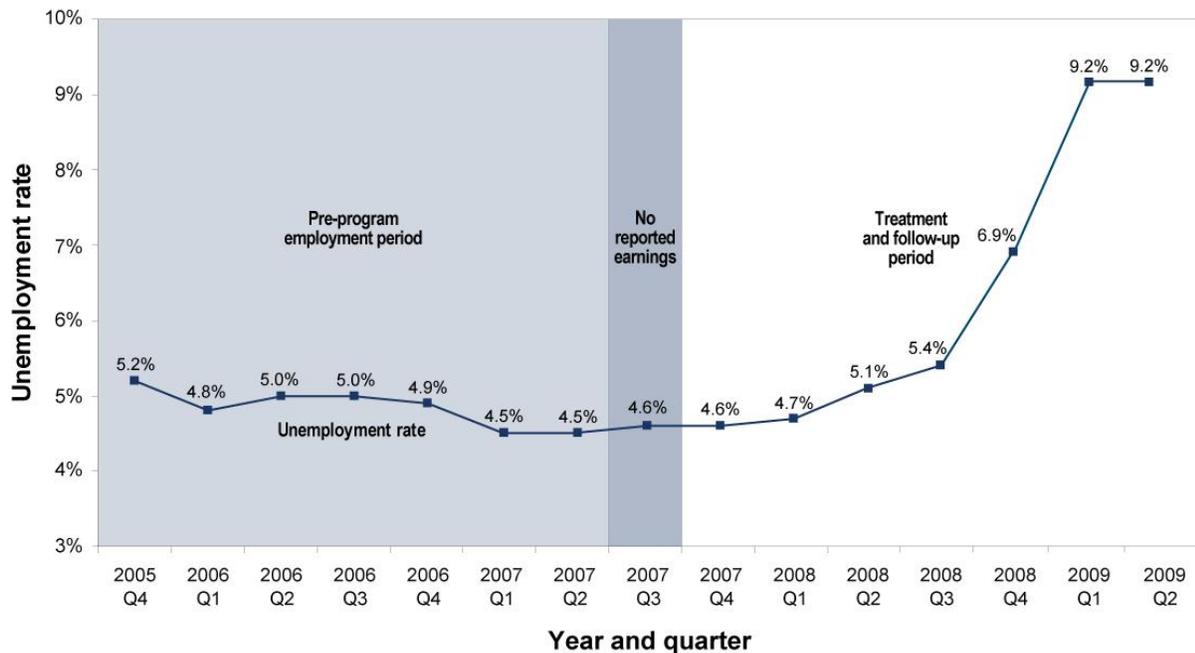
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<sup>1</sup> We measured total quarterly before-tax earnings. Subtracting all taxes from earnings would yield an estimate of private or individual earnings benefits.

**Figure 2.** Study period and unemployment rates

Washington state, fourth-quarter 2005 through second-quarter 2009

Source: Employment Security Department/LMEA; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics



*The recession took hold of Washington's economy during third-quarter 2008.*

This study pertained to current and former unemployment-insurance claimants who received WorkSource job-search services from fourth-quarter 2007 through first-quarter 2008. These claimants were matched against statistically comparable current and former claimants who did not receive WorkSource job-search services from fourth-quarter 2007 through first-quarter 2008.

Both the treatment and comparison groups had no reported wages covered by the unemployment-insurance system during third-quarter 2007. The labor-market experiences of both the treatment and comparison groups were then compared over the period from fourth-quarter 2007 through second-quarter 2009. *Appendix 1* provides further details on the treatment and comparison groups.

## Previous research on employment and training programs

Numerous studies have been done across the nation on employment and training programs, including net impact assessments of job-search services. Please see *Appendix 7* for a thorough discussion of these. Although many of these studies either did not use rigorous statistical techniques or had inconclusive results, six had statistically significant results on net earnings. Earnings following program participation were greater for participants than comparison-group individuals in all six studies, ranging over a six-month period from \$256 to \$1,339, and averaging \$754.

We estimate the net benefits of WorkSource participation to have been \$1,980 over a seven-quarter period, which falls within the range of these six studies.

## Method of analysis

This study expanded the analysis of a previous study published in November 2009 entitled: “Assessment of the Impact of the WorkSource Job-Search Services: UI Claimants Receiving WorkSource Job-Search Services Compared to UI Claimants Receiving No WorkSource Services of Any Kind.”<sup>2</sup> As with the earlier study, the present study employed a non-experimental design.

Current and former unemployment-insurance claimants who received WorkSource job-search services (the treatment group) during a two-quarter period – from fourth-quarter 2007 through first-quarter 2008 (the treatment period) – were compared to a matched comparison group of current or former unemployment-insurance claimants who received no WorkSource job-search services of any kind during that same period.

To be included in the treatment or comparison group, individuals had to meet the following criteria:

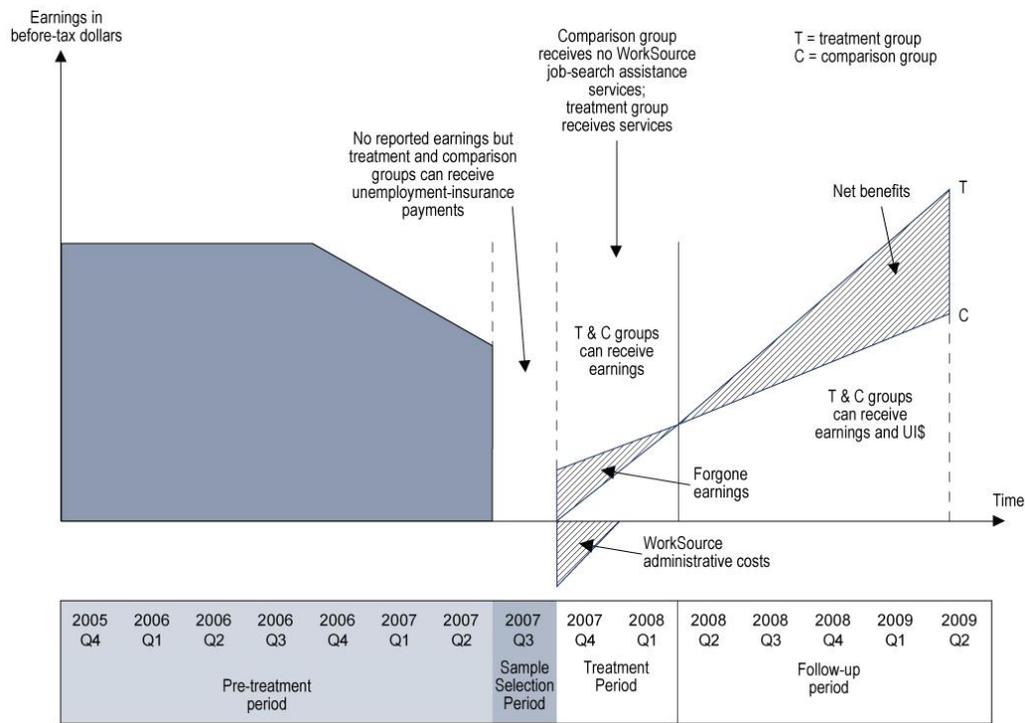
- Former unemployment-insurance claimants – specifically, received at least one week of unemployment benefits from fourth-quarter 2005 through first-quarter 2008;
- Not receiving job-search services through a union – specifically, not a member of a union that provided job-search services;
- Unemployed during the entire third-quarter 2007 – specifically, had no reported insured wages during third-quarter 2007;
- Potential past use of any WorkSource services – specifically, both the treatment group and the comparison group may have received some WorkSource services, including job-training services, from fourth-quarter 2005 through second-quarter 2007; and
- Washington residents for the entire study period – specifically, lived in the state from fourth-quarter 2005 through second-quarter 2009.

*Figure 3* provides a depiction of the study period and process. This figure shows that the study tracked individuals and their labor-market experiences for eight quarters prior to the treatment period (fourth-quarter 2005 through third-quarter 2007). It identifies the quarter in which the treatment and comparison groups were matched (third-quarter 2007) and the quarters of treatment and follow-up (fourth-quarter 2007 through second-quarter 2009).

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<sup>2</sup> Bodeutsch, Gary, Ernst Stromsdorfer and Michele Petritz. “Assessment of the Impact of the WorkSource Job-Search Services: UI Claimants Receiving WorkSource Job-Search Services Compared to UI Claimants Receiving no WorkSource Services of Any Kind.” Washington State. Employment Security Department. Labor Market and Economic Analysis branch. Olympia, Wash., November 5, 2009.

**Figure 3. Stylized time path to assess net impacts of WorkSource job-search services Washington state, fourth-quarter 2005 through second-quarter 2009**  
 Source: Employment Security Department/LMEA<sup>1</sup>



<sup>1</sup> The treatment- and comparison-group members must have received at least one unemployment benefit payment during the period of fourth-quarter 2005 through first-quarter 2008.

*The program evaluation began with fourth-quarter 2007.*

## Matching

Matching based on observable variables was employed in an effort to reduce selection bias that can exist in the net-impact estimates. Two types of matching were employed. We first matched exactly on gender, eligibility for unemployment benefits<sup>3</sup> and absence of any reported earnings in employment covered by unemployment insurance during third-quarter 2007.

This exact match was then complemented with propensity-score matching based on a one-to-one match with replacement of the comparison-group member back into the matching sample.<sup>4</sup> The propensity score was an estimate of the probability that an individual, based on the variables used

<sup>3</sup> Appendix 2 describes the conditions for eligibility to receive unemployment benefits. In effect, these conditions describe a person who has a very strong attachment to the labor force. Matching on this eligibility thus matched individuals who shared a strong attachment to the labor force and employment and helped reduce selection bias.

<sup>4</sup> In some cases, a comparison-group member was matched against two or more treatment-group members. In such cases, for the logit analysis of employment, one of the matched pairs was randomly selected and the rest discarded. This action reduced the analysis sample for estimating the net impact on employment from about 10,000 observations to about 9,000. For the ordinary least squares (OLS) estimate of net impact on earnings, all matched pairs were retained, and the matched pairs were weighted appropriately to account for the fact that matching was conducted with replacement of the comparison-group member back into the matching sample.

to estimate the propensity score, would be a member of the treatment group, regardless of whether the individual was actually a treatment-group member or a member of the comparison group. *Appendix 3* describes the method of matching used in this study and its conceptual rationale. The treatment and comparison groups had very similar attributes on the characteristics we measured. *Appendix 1* includes a series of tables that demonstrate the similarity between the two groups, prior to the treatment period, on the following attributes:

- Socio-demographic characteristics (*Figure A1-1*);
- Workforce development area (*Figure A1-2*);
- Industry at time of most recent layoff (*Figure A1-3*);
- Primary occupation (*Figure A1-4*);
- Total quarters employed (*Figure A1-5*);
- Number of quarters with no reported earnings (*Figure A1-6*); and
- Average quarterly before-tax earnings by quarter (*Figure A1-7*).

In addition, the similarity of the two groups is evidenced by the similar distribution of propensity scores for treatment and comparison groups, as indicated in two charts in *Appendix 3* (*Figures A3-2* and *A3-3*).

## Estimation of net impacts

Net program impacts were estimated for two outcome variables for the sample as a whole and for males and females, taken separately, by quarter, from the fourth-quarter 2007 through the second-quarter 2009.<sup>5</sup> These outcome variables were:

- Quarterly before-tax earnings; and
- Probability of ever being employed in a given quarter.

We used ordinary least squares (OLS) to estimate the net impacts for quarterly before-tax earnings. We used logit to estimate the net program impact for probability of ever being employed in a given quarter. *Appendix 4* defines the variables used in the analysis of both the propensity functions and the net-impact estimations and provides additional detail on the models we used to estimate net impacts.

As noted, we estimated net-impact outcomes for seven quarters, beginning in fourth-quarter 2007, which was the first quarter in which WorkSource provided job-search services to the treatment group but not the comparison group.<sup>6</sup> While the Great Recession began in fourth-quarter 2007 for the nation as a whole, the recession did not significantly affect Washington state's economy until third-quarter 2008. (See *Figure 2*.)

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<sup>5</sup> Males and females are analyzed separately, both in the exact matching and in estimating the propensity functions and the net program impacts. Research confirms that the two genders behave differently in the labor market for a variety of social, economic and institutional reasons.

<sup>6</sup> By starting the net-impact analysis at the time the WorkSource job-search services treatment began, we estimated the average forgone earnings attributable to the treatment experience. Then, at some point during the follow-up period, treatments tapered off, and ended, and net benefits, if any, accrued. This approach yielded a net forgone earnings stream of lost earnings and a subsequent positive earnings stream directly from the program and labor market experience of the study sample. (See *Figure 3*.)

## The data

We used three databases for this study. The first was the Unemployment-Insurance (UI) Wage File which reports individual worker quarterly before-tax earnings, quarterly hours worked and information on the firm reporting the data. This file is static, meaning that the historical data in the file, once recorded, do not change in any given quarter or year as time advances.

The second data set was the UI Benefits File, which is not static. Data in this historical file can change for any given period as new information is available to update the file. We used the UI Benefits File to identify the individuals to analyze in this study. It also provided additional variables such as age, education, gender, race/ethnicity and employer location.

The third database (the Service, Knowledge & Information Exchange System, or SKIES) provided detail on the number and types of job-search services received at the WorkSource offices.

We used the following variables to explain the probability of ever being employed in a given follow-up quarter:

1. Program treatment – whether the individual was a treatment-group member or a comparison-group member;
2. Total number of jobs held from fourth-quarter 2005 through second-quarter 2007;
3. Age;
4. Gender;
5. Before-tax earnings in fourth-quarter 2005 through second-quarter 2007;
6. Education;
7. Industry of most-recent layoff prior to third-quarter 2007;
8. Workforce development area of the employer as of third-quarter 2007;
9. Race/ethnicity; and
10. Number of WorkSource services of any kind received from fourth-quarter 2005 through second-quarter 2007.

Please refer to *Appendix 4* for detailed specifications of these variables.

We used the same set of explanatory variables to estimate the net impact on quarterly before-tax earnings in a given follow-up quarter, plus one additional variable: the probability of ever being employed in the specific quarter being estimated.<sup>7</sup>

We included variables 3, 5 and 6 as measures of a worker's marginal productivity; similarly variables 5 and 7 attempted to measure the marginal revenue of the worker's product, based on the assumption that a worker will typically remain in the same or a related industry after treatment. In reality, many workers losing jobs were dislocated due to economic dynamics, which would appear in the data to be a loss of productivity or revenue. Variable 8 identifies the labor market environment in which the worker, at least initially, sought re-employment. This variable helps reduce statistical bias, which we explain further in *Appendix 3*.

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<sup>7</sup> This is an instrumental variable that ranges in value from 0 to 1. The variable accounts for the condition that one must first be employed in order to receive earnings. It is estimated by logit.

Variable 10, the number of visits of any kind that an unemployment-insurance claimant made to a WorkSource office or offices from fourth-quarter 2005 through second-quarter 2007,<sup>8</sup> performed two functions. First, the variable indexed the amount of prior knowledge of the labor market and the job-search skills a worker brought to the job-search process, up to third-quarter 2007. This prior knowledge is a form of human capital – knowledge of the labor market and how to land a job. However, depending on the type of service received, the value of this knowledge decays over time as the available labor market knowledge, prior to the treatment, becomes more obsolete. Second, and perhaps more important for helping to identify and control for classical selection bias, the variable served as an index of the desire to find a job. It was an important behavioral control for the intensity of job-search behavior prior to fourth-quarter 2007. Thus, it helped to reduce classical selection bias in the estimated net impacts. And, to the extent that this behavior represented ingrained habits, it was stable over time. Thus, its effect on job search did not necessarily decay over the follow-up period.

## Results

We assessed the net impacts of WorkSource on participants using two measures:

- Are WorkSource participants more likely to be employed following program participation than comparison-group individuals?
- Do WorkSource participants earn more following program participation than comparison-group individuals?

Quarterly before-tax earnings are the more important indicator of WorkSource program effectiveness because earnings encompass the duration of employment and the quality of jobs.

### Are WorkSource participants more likely to be employed following program participation than comparison-group individuals?

*Figure 4* compares the percent of treatment (WorkSource participants) and comparison individuals ever employed during each of the seven quarters beginning with fourth-quarter 2007, which was the first of the two quarters where treatment-group individuals participated in WorkSource and comparison individuals did not.

Both male and female WorkSource participants were less likely to be employed during fourth-quarter 2007 than comparison-group individuals, which is not surprising, given the investment being made by participants in WorkSource programs during this and/or the subsequent quarter. The pattern then shifted. Employment prospects were better for both male and female participants than comparison-group individuals during first-quarter 2008. The differential between the two groups increased during the next three quarters, reaching almost a 10-percentage-point difference between the groups. Although the differential then decreased as the Great Recession kicked in, individuals who received WorkSource job-search services during late 2007/early 2008 were still considerably more likely to be employed than comparison-group individuals through second-quarter 2009. This suggests that WorkSource programs had a sustainable positive effect on participants more than a year after participation.

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<sup>8</sup> Each day of service represents one or more visits. So, for example, a sign-in in both the morning and afternoon of a given day represents one service day.

**Figure 4.** The percentage of individuals in treatment and comparison groups that were employed, by quarter and gender

Washington state, fourth-quarter 2007 through second-quarter 2009

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Year	Males and females			Males only			Females only		
	Treatment	Comparison	Difference	Treatment	Comparison	Difference	Treatment	Comparison	Difference
2007 Q4	34.0%	35.4%	-1.4%	34.8%	35.7%	-0.9%	32.7%	34.9%	-2.2%
2008 Q1	46.1%	41.6%	4.5%	45.8%	41.0%	4.8%	46.3%	42.4%	3.9%
2008 Q2	52.6%	44.6%	8.0%	52.5%	43.7%	8.8%	52.7%	45.7%	7.0%
2008 Q3	52.9%	43.0%	9.9%	53.2%	41.9%	11.3%	52.4%	44.3%	8.1%
2008 Q4	52.8%	44.2%	8.6%	52.1%	42.5%	9.6%	53.6%	46.2%	7.4%
2009 Q1	47.2%	40.7%	6.5%	45.1%	38.7%	6.4%	49.6%	43.1%	6.5%
2009 Q2	46.2%	40.0%	6.2%	44.4%	37.9%	6.5%	48.4%	42.5%	5.9%

*WorkSource participants were more likely to be employed than comparison-group members from first-quarter 2008 to second-quarter 2009.*

Note that these data were not subject to statistical significance tests, so we can't say with certainty that these results are significantly different from each other. However, we did find a similar pattern when we analyzed earnings by quarter that was statistically significant, which is discussed in the next section.

### Do WorkSource participants earn more following program participation than comparison-group individuals?

We found a similar pattern when analyzing quarterly earnings as we found analyzing the percentage of individuals employed:

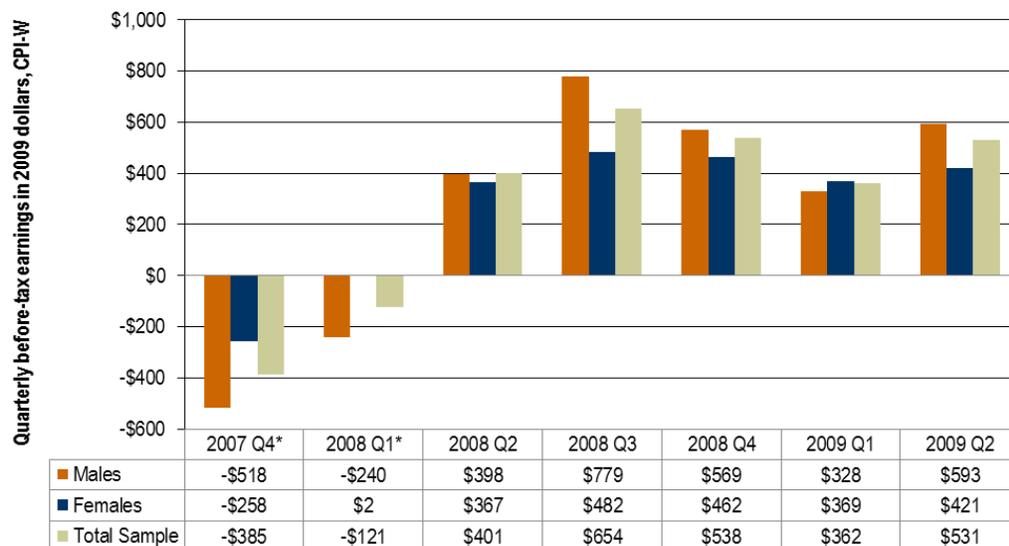
- On average, both male and female WorkSource participants earned less than comparison-group individuals during fourth-quarter 2007.
- Participants earned slightly less than comparison-group individuals during first-quarter 2008, but the results were not statistically significant.
- Participants earned considerably more than comparison-group individuals during subsequent quarters, and this difference was maintained through the end of the study period (second-quarter 2009).

Figure 5 provides detailed quarterly data on our findings.

**Figure 5.** Difference in average quarterly before-tax earnings between the treatment and comparison groups,<sup>9</sup> 2009 inflation-adjusted dollars, CPI-W

Washington state, fourth-quarter 2007 through second-quarter 2009

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse; SKIES Services table



\*Treatment period for WorkSource service recipients.

*Before-tax earnings are consistently higher for both males and females starting in second-quarter 2008.*

### Earnings during the treatment period

Analyzing the results of the first two quarters that correspond to the treatment period is challenging because the differences in average earnings may have been affected by differences in the timing of getting a job between the two groups. Regardless, we were not surprised to find lower earnings by participants since participating in WorkSource programs is an investment of time that potentially serves two purposes, the more immediate being getting a job now. WorkSource programs also improve prospects for employability, which is a longer-term investment both for the participant and for society, but is also time consuming. Thus, participants may have to forego some earnings to improve future prospects.

The earnings differential between participants and comparison-group individuals during the first treatment quarter reflect the forgone earnings of WorkSource participants in fourth-quarter 2007. To provide context for this investment, we determined the earnings of participants prior to participating in WorkSource and compared these to forgone earnings.<sup>10</sup> For the 12-month period from fourth-quarter 2005 through third-quarter 2006, treatment-group males earned an average of \$36,391, or \$700 per week. Treatment-group females earned \$29,775, or \$573 per week. *Figure 5* shows male WorkSource participants had forgone \$758 in wages during fourth-quarter 2007 and first-quarter 2008, which is equivalent to slightly more than one week of wages. Female participants had forgone \$258 in wages during fourth-quarter 2007, which is less than half a week of wages. From this perspective, participants' investment in WorkSource programs was relatively small compared to the benefits they received during the follow-up period.

<sup>9</sup> We used separate statistical analyses for the three groups: Males, Females and Total Sample. Net impact estimates for the Total Sample are therefore not a weighted average of the males and females groups.

<sup>10</sup> The pre-treatment earnings are presented in *Figure A1-7* in *Appendix 1*.

### Earnings during the follow-up period

To analyze the longer-term, sustained effectiveness of WorkSource, we looked at earnings for the follow-up period – the five quarters following the treatment period. We found that both female and male participants' earnings were significantly higher, on average, than comparison-group individuals, and this difference was sustained throughout the five quarters we analyzed. The earnings differential declined during first-quarter 2009, the depths of the Great Recession, from \$538 to \$362, but then rebounded to \$531 during the next quarter (*Figure 5*).

### Net earnings during treatment and follow-up periods

Overall, participants' wages were \$1,980 higher than comparison-group individuals over the seven quarters – \$2,150 higher for males, and \$1,843 higher for females. Participants had lower earnings than comparison-group individuals during the first two quarters, but subsequently higher earnings for participants more than made up for these initial losses. And these higher earnings were sustained for the subsequent five quarters. We can therefore conclude that WorkSource programs provide longer-term benefits to participants, and thus fulfill the important goal of providing participants with the job-search services needed to improve their job prospects.

In order to determine the benefit of WorkSource to society as a whole, we need to consider the timing of the benefits as well as the costs of providing services. To do this, we calculated the social return on investment (ROI), which is discussed in the next section.

### Social return on investment (ROI) for net before-tax earnings

#### What is social return on investment?

The quarterly patterns of earnings are difficult to place in a policy context unless one summarizes the program cost and program earnings stream over time. It is particularly important to account for the timing of costs and benefits in this analysis, because the costs of providing WorkSource services occur up front, and the benefits don't begin to accrue until later. The return on investment (ROI) method estimates whether an investment of resources today, in this case in WorkSource job-search services, produces benefits in the future. ROI accommodates the timing of costs and benefits, and is expressed as a percentage return on the initial investment over time, which is helpful when deciding which programs to fund among worthy alternatives. Using ROI, we were able to compare investments of different sizes on a level playing field.

ROI will be different for program participants, taxpayers and society. We used social ROI in this analysis because this measure includes the costs of providing WorkSource services to participants, which best reflects the net benefits of the program. *Figure 6* illustrates how costs and benefits accrue to the program participants, taxpayers and society; we describe these costs and benefits in detail. The benefit categories relate to increased earnings and include benefits realized by participants, taxpayers who pay for the programs and society as a whole. The top row indicates that as earnings increase, both the worker and society benefit from the increase in purchasing power and longer-term employment. The next row indicates that taxpayers benefited from the increased tax collection from participant before-tax earnings, although taxes (and other deductions) are a cost for the participant. The third row indicates that as earnings increase, benefit payments (such as unemployment benefits) will decline – again, a benefit for the taxpayer.

The cost categories relate to program expenditures borne by the participants, taxpayers and society. The job-search services are offered at no cost to the participants, as the first row indicates. The costs of job-search services are incurred by the taxpayer and society. The second row indicates forgone earnings represent a cost to the participant and society, the opposite of the top row in the benefit category. The third cost row indicates program job-search service costs are borne by the taxpayer.

**Figure 6.** Accounting for costs and benefits of an investment for participants, taxpayers and society  
 Source: Employment Security Department/LMEA

How the return on investment analysis allocates costs and benefits to different groups			
Benefit categories	WorkSource participant	Taxpayers <sup>1</sup>	Society <sup>2</sup>
Change in worker earnings and fringe benefits <sup>3</sup>	Greater net earnings	No benefit	Reimburse social costs
Change in taxes (federal income, sales and payroll)	More taxes paid	Tax revenues up	No overall benefit
Change in public benefits received	Fewer benefits received	Benefit savings	No overall benefit
Cost categories	WorkSource participant	Taxpayers	Society
Program expenditures	No cost	Cost to taxpayers	Cost to society
Forgone earnings while receiving WorkSource job-search services	Cost to participants	No cost	Cost to society
Forgone payroll tax receipts	No earnings, no cost	Cost to taxpayers	No cost to society

<sup>1</sup>“Taxpayers” includes all individuals who are not WorkSource participants and are paying taxes.

<sup>2</sup>“Society” is a combination of WorkSource participants, taxpayers and others, and thus includes all individuals in society. Criteria in this column were used for calculating “social ROI.”

<sup>3</sup>Net earnings are after taxes; gross earnings are before taxes.

*Costs and benefits vary for participants, taxpayers and society.*

Because of the competition for scarce public resources, ROI should not only be positive, but it should be greater than the ROI of other worthy projects. It should also be greater than the cost of capital, which for Washington state government is usually around four or five percent.

## Results

Figure 7 indicates the estimated social return on investment (ROI). The Employment Security Department has estimated the average cost of WorkSource services during the program treatment period as about \$340 for each participant, based on program records.<sup>11</sup> Because these costs varied among participants, we reported: 1) a low estimate that assumed combined job-search services cost society \$100/per participant; and 2) a high estimate that assumed combined job-search services cost society \$500 per participant.

<sup>11</sup> This estimate is based on expenditures for all WorkSource programs and services during the six-month treatment period for the total number of participants who received job-search services.

Social ROI was high for both males and females using either the \$100 or \$500 cost assumption for the delivery of job-search services. Although we cannot accurately adjust these results to determine what the social ROI would be using the \$340 average WorkSource cost per participant noted previously, we can say for certain that it would be above 12.1 percent for males and above 15.8 percent for females, which are the returns using the \$500 cost estimate.

The capital borrowing rate for the state of Washington is around 4 or 5 percent. The social ROI was much higher than this borrowing rate. The implication is that WorkSource job-search services represent a worthy investment of government dollars, at least for this cohort of individuals.

**Figure 7. Social ROI of job-search services under different participant cost assumptions**  
 Washington state, fourth-quarter 2007 through second-quarter 2009  
 Source: Employment Security Department/LMEA

Participants	Average cost assumption	
	\$100	\$500
Males and females	23.4%	14.1%
Males only	17.8%	12.1%
Females only	33.7%	15.8%

*The ROI well exceeds state borrowing costs of 4 to 5 percent using either job-search services cost assumption.*

## Conclusions

Our analysis indicates that WorkSource had a positive net impact on this cohort of individuals for both participants and society. We found the same pattern of differences between WorkSource participants and comparison-group individuals both in terms of employment and wages:

- During fourth-quarter 2007, comparison-group individuals were more likely employed and earned higher wages, on average, than participants.
- During first-quarter 2008, participants were more likely employed than comparison-group individuals. Participant males had lower wages than comparison-group individuals, but the difference was so small that it was statistically insignificant. Female wages were almost the same between groups.
- Starting with second-quarter 2008, and through the remaining four quarters covered in our analysis, WorkSource participants were considerably more likely to be employed, and earned significantly more than comparison-group individuals.
- This pattern held during the early stages of the Great Recession (first-quarter 2009), though the differences were a bit less than during the two preceding quarters.
- Social return on investment was high for both male and female participants, regardless of whether we assumed a low or high estimate of program costs.

## Caveats

Analysis of WorkSource was difficult because we didn't have a randomized control group. We therefore used the best approach available to us to estimate the net impact of WorkSource, which included identifying individuals with similar characteristics to WorkSource participants who were eligible to receive job-search services but chose not to. Following are the limitations to our approach:

- The results of this study pertain only to the net effect of WorkSource job-search services on unemployment-insurance claimants.
- Individuals in both groups had a strong attachment to the labor force and were therefore likely to benefit from WorkSource job-search services for that reason alone.
- The results pertain only to claimants who remained in the state throughout the study period.
- The study does not estimate the net effect of WorkSource job-search services for the WorkSource program as a whole. For example, WorkSource participants that were not receiving unemployment benefits were not included in the study. Therefore, the results cannot be generalized to all WorkSource participants, which include walk-in participants and WorkFirst clients.
- Though we have statistically controlled for key observable characteristics that affect participation in WorkSource job-search services – earnings history and labor force transitions and receipt of WorkSource services of any kind prior to fourth-quarter 2007, in particular – there is unknown selection bias remaining in these results, due mainly to unmeasured and un-measurable variables that were not accounted for by our estimation method. These missing variables were not available and therefore not included in the analysis.
- It is possible that some unemployment-insurance claimants may have displaced other equally qualified unemployed workers in the economy. We do not have estimates of the displacement effect, but to the extent that it occurs, the net benefits of this study may be overestimated. (See *Appendix 6*.)



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# Appendices

## Appendix 1

### Supplemental descriptive statistics on matched treatment and comparison groups

This appendix includes demographic, employment and income information on individuals in the treatment group (WorkSource job-search service participants) and the comparison group. **The data in this appendix reveal the similarities in characteristics between the two groups.**

Data sets include:

- Socio-demographic characteristics (*Figure A1-1*);
- Workforce development area (*Figure A1-2*);
- Industry at time of most recent layoff (*Figure A1-3*);
- Primary occupation (*Figure A1-4*);
- Total quarters employed (*Figure A1-5*);
- Number of quarters with no reported earnings (*Figure A1-6*); and
- Average quarterly before-tax earnings by quarter (*Figure A1-7*).

Descriptive statistics are all based on the third-quarter 2007 sample draw edited for inconsistencies and anomalies in the employer report on hours worked by an employee in the UI Wage File.

**Figure A1-1.** Socio-demographic characteristics of the treatment and comparison groups

Washington state, third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Characteristic at start of program treatment	Male N = 2,505				Female N = 1,966			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Age in years on September 30, 2007	42.2	12.4	40.5	12.3	42.4	12.3	41.3	12.4
Labor market experience in years <sup>1</sup>	24.1	12.2	22.6	12.1	24.0	12.2	23.0	12.4
<b>Education</b>	<b>Number</b>	<b>Percent</b>	<b>Number</b>	<b>Percent</b>	<b>Number</b>	<b>Percent</b>	<b>Number</b>	<b>Percent</b>
Less than high school	314	12.5%	338	13.5%	169	8.6%	161	8.2%
GED	76	3.1%	83	3.3%	53	2.7%	60	3.0%
High school graduate	953	38.1%	60	39.4%	659	33.6%	735	37.4%
Some college but no degree	276	11.0%	270	10.8%	287	14.6%	280	14.3%
Associate (AA or AAS) degree	379	15.1%	280	14.6%	361	18.4%	342	17.4%
Bachelor's (BA or BS) degree	381	15.2%	342	14.3%	330	16.8%	291	14.8%
Master's degree	116	4.6%	291	3.6%	95	4.8%	88	4.5%
Doctorate degree	8	0.3%	12	0.5%	10	0.5%	7	0.4%
<b>Total</b>	<b>2,503</b>	<b>100.0%</b>	<b>2,503</b>	<b>100.0%</b>	<b>1,964</b>	<b>100.0%</b>	<b>1,964</b>	<b>100.0%</b>

<sup>1</sup>Labor market experience was defined as current age minus five years minus total years in school.

**Figure A1-2. Workforce development area of the treatment and comparison groups<sup>1</sup>**

Washington state, third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Workforce Development Area (WDA)	Male				Female			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
WDA 1 - Olympic (Clallam, Jefferson and Kitsap counties)	80	3.2%	85	3.4%	72	3.6%	74	3.8%
WDA 2 - Pacific Mountain (Grays Harbor, Lewis, Mason, Pacific and Thurston counties)	181	7.2%	180	7.2%	151	7.7%	148	7.5%
WDA 3 - Northwest (Island, Whatcom, San Juan and Skagit counties)	90	3.6%	97	3.9%	82	4.2%	77	3.9%
WDA 4 - Snohomish WDA (Snohomish County)	161	6.4%	170	6.8%	159	8.1%	161	8.2%
WDA 5 - Seattle-King WDA (King County)	935	37.4%	911	36.4%	679	34.6%	694	35.3%
WDA 6 - Tacoma-Pierce WDA (Pierce County)	190	7.6%	185	7.4%	170	8.6%	165	8.4%
WDA 7 - Southwest WDA (Clark, Cowlitz and Wahkiakum counties)	162	6.5%	158	6.3%	146	7.4%	137	7.0%
WDA8a - North Central WDA (Chelan and Okanogan counties)	33	1.3%	25	1.0%	29	1.5%	30	1.5%
WDA 8b - North Central WDA (Adams, Douglas and Grant counties)	23	0.9%	32	1.3%	13	0.7%	16	0.8%
WDA 9 - South Central WDA (Kittitas, Klickitat, Skamania and Yakima counties)	59	2.4%	64	2.5%	75	3.8%	81	4.1%
WDA 10a- Eastern WDA (Ferry, Lincoln, Pend Oreille and Stevens counties)	18	0.7%	16	0.6%	14	0.7%	15	0.8%
WDA 10b - Eastern WDA (Asotin, Columbia, Garfield, Walla Walla, and Whitman counties)	31	1.2%	34	1.4%	19	1.0%	18	0.9%
WDA 11- Benton-Franklin WDA (Benton and Franklin counties)	62	2.5%	62	2.5%	53	2.7%	55	2.8%
WDA 12 - Spokane WDA (Spokane County)	182	7.3%	180	7.2%	172	8.8%	162	8.3%
99 Out of state	296	11.8%	304	12.1%	130	6.6%	131	6.7%

<sup>1</sup>Workforce development areas (WDAs) 8 and 10 were split into two separate sub-WDAs, based on geography of the employer.

**Figure A1-3.** Industry at time of most recent layoff of the treatment and comparison groups  
Washington state, third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Industry at time of most recent layoff	Male				Female			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
NAICS 11, 21 — agriculture, forestry, fishing, hunting and mining	92	3.7%	116	4.6%	13	0.7%	20	1.0%
NAICS 22, 48-49 — utilities, transportation and warehousing	117	4.7%	101	4.0%	37	1.9%	48	2.4%
NAICS 23 — construction	337	13.5%	351	14.0%	77	3.9%	59	3.0%
NAICS 31, 32, 33 — manufacturing	350	14.0%	376	15.0%	126	6.4%	145	7.4%
NAICS 42, 44, 45 — wholesale trade and retail trade	375	15.0%	382	15.3%	308	15.7%	295	15.0%
NAICS 51 — information	70	2.8%	66	2.6%	59	3.0%	51	2.6%
NAICS 54, 55 — professional, scientific, technical and management of companies and enterprises	124	4.9%	106	4.2%	131	6.7%	131	6.7%
NAICS 56 — administrative and support and waste management and remediation services	211	8.4%	188	7.5%	156	7.9%	159	8.1%
NAICS 61 — educational services	31	1.2%	29	1.2%	58	2.9%	60	3.0%
NAICS 62 — healthcare and social assistance	63	2.5%	65	2.6%	286	14.6%	274	14.0%
NAICS 71-72 — arts, entertainment, recreation and accommodation and food services	135	5.4%	136	5.4%	175	8.9%	190	9.7%
NAICS 81 — other services except public administration	74	3.0%	76	3.0%	90	4.6%	98	5.0%
NAICS 92 — public administration	186	7.4%	173	6.9%	141	7.2%	134	6.8%
Information not available	219	8.8%	222	8.9%	89	4.5%	81	4.1%

**Figure A1-4.** Occupation of longest attachment in the two-year period prior to treatment of the treatment and comparison groups

Washington state, fourth-quarter 2005 through third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Occupation of longest attachment	Male				Female			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Management	318	12.7%	320	12.8%	268	13.7%	274	13.9%
Business and financial operations	82	3.3%	82	3.3%	112	5.7%	115	5.9%
Computer and mathematical	102	4.1%	98	3.9%	39	2.0%	38	1.9%
Architecture and engineering	78	3.1%	68	2.7%	10	0.5%	6	0.3%
Life, physical and social sciences	28	1.1%	27	1.1%	32	1.6%	31	1.6%
Community and social services	6	0.2%	5	0.2%	33	1.7%	31	1.6%
Legal	7	0.3%	11	0.4%	25	1.3%	23	1.2%
Education, training and library	14	0.6%	11	0.4%	45	2.3%	40	2.0%
Arts, design, entertainment, sports and media	34	1.4%	39	1.6%	40	2.0%	44	2.2%
Healthcare practitioners and technical	17	0.7%	22	0.9%	71	3.6%	70	3.6%
Healthcare support	5	0.2%	5	0.2%	52	2.7%	57	2.9%
Protective service	49	1.9%	48	1.9%	20	1.0%	17	0.9%
Food preparation and serving related	81	3.2%	86	3.4%	124	6.3%	127	6.5%
Building and grounds cleaning and maintenance	47	1.9%	49	2.0%	33	1.7%	35	1.8%
Personal care and service	31	1.2%	31	1.2%	101	5.1%	102	5.2%
Sales and related	175	7.0%	186	7.4%	173	8.8%	171	8.7%
Office and administrative support	142	5.7%	158	6.3%	582	29.6%	577	29.4%
Farming, fishing and forestry	135	5.4%	134	5.4%	14	0.7%	20	1.0%
Construction and extraction	359	14.3%	372	14.9%	22	1.1%	19	1.0%
Installation, maintenance and repair	205	8.2%	198	7.9%	14	0.7%	16	0.8%
Production	306	12.2%	300	12.0%	97	4.9%	98	5.0%
Transportation and material moving	250	10.0%	230	9.2%	54	2.8%	48	2.4%
Military specific	32	1.3%	23	0.9%	3	0.2%	5	0.2%

**Figure A1-5.** Total quarters ever employed in covered employment in the two-year period prior to treatment of the treatment and comparison groups

Washington state, fourth-quarter 2005 through third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Quarters ever employed	Male				Female			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
None	0	0%	0	0%	0	0%	0	0%
One	0	0%	0	0%	0	0%	0	0%
Two	17	0.7%	14	0.6%	5	0.2%	2	0.1%
Three	61	2.4%	64	2.6%	37	1.9%	26	1.3%
Four	223	8.9%	218	8.7%	87	4.4%	93	4.7%
Five	382	15.3%	369	14.7%	237	12.1%	251	12.8%
Six	646	25.8%	648	25.9%	459	23.4%	482	24.5%
Seven	1,174	46.9%	1,190	47.5%	1,139	58.0%	1,110	56.5%
<b>Median</b>	<b>6</b>		<b>6</b>		<b>7</b>		<b>7</b>	
<b>Mean</b>	<b>6</b>		<b>6</b>		<b>6.3</b>		<b>6.3</b>	
<b>Standard deviation</b>	<b>-1.1</b>		<b>-1.1</b>		<b>-1</b>		<b>-1</b>	

**Figure A1-6.** Number of quarters with no reported covered earnings of the treatment and comparison groups

Washington state, fourth-quarter 2005 through third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Number of quarters with no reported covered earnings	Male				Female			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
One	1,174	46.9%	1,190	47.5%	1,139	58.0%	1,110	56.5%
Two	646	25.8%	648	25.9%	459	23.4%	482	24.5%
Three	382	15.3%	369	14.7%	237	12.1%	251	12.8%
Four	223	8.9%	218	8.7%	87	4.4%	93	4.7%
Five	61	2.4%	64	2.6%	37	1.9%	26	1.3%
Six	17	0.7%	14	0.6%	5	0.2%	2	0.1%
Seven	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Eight	0	0.0%	0	0.0%	0	0.0%	0	0.0%
<b>Average quarters</b>	<b>2</b>		<b>1.9</b>		<b>1.7</b>		<b>1.7</b>	
<b>Standard deviation</b>	<b>-1.1</b>		<b>-1.1</b>		<b>-1</b>		<b>-1</b>	

**Figure A1-7.** Average quarterly before-tax earnings in the two-year period prior to treatment of the treatment and comparison groups

Washington state, fourth-quarter 2005 through third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Year and quarter	Male				Female			
	Treatment group		Comparison group		Treatment group		Comparison group	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
2005 Q4	\$8,664	\$9,015	\$8,661	\$9,067	\$7,201	\$6,703	\$7,289	\$6,536
2006 Q1	\$8,411	\$8,744	\$8,390	\$8,265	\$7,125	\$6,051	\$7,192	\$6,003
2006 Q2	\$9,516	\$8,292	\$9,463	\$7,720	\$7,648	\$5,944	\$7,728	\$5,753
2006 Q3	\$9,800	\$7,828	\$9,711	\$7,310	\$7,801	\$6,077	\$7,922	\$5,714
2006 Q4	\$10,340	\$8,264	\$10,299	\$7,801	\$8,132	\$6,158	\$8,116	\$5,481
2007 Q1	\$8,872	\$8,921	\$8,919	\$8,563	\$7,201	\$6,374	\$7,305	\$6,626
2007 Q2	\$6,440	\$8,647	\$6,245	\$8,605	\$4,878	\$6,301	\$4,875	\$7,288
2007 Q3	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

## Appendix 2

### The unemployment-insurance population from which the study sample was drawn

Analysis of WorkSource is difficult because we didn't have a randomized control group. Statisticians recognize the challenge of identifying a comparison group of individuals when a randomized control group isn't available, and have devoted a significant amount of effort to identify potential bias and mitigate for it to the extent possible.<sup>12</sup>

To help mitigate potential bias resulting from differences between the treatment and comparison groups, the two groups for the present study came from the same population that was eligible to receive unemployment-insurance benefits. (See RCW 50.20.010; RCW 50.04.030.) Both groups were selected at the same point of time under the additional constraint that neither group had any reported before-tax quarterly earnings in covered employment in the quarter the study sample was selected. These individuals had a rigorously defined, common set of characteristics that made them eligible to receive unemployment-insurance benefits. These unemployment-insurance eligibility-determining characteristics indicated a relatively strong and consistent attachment to the labor force and to employment. These characteristics were:

1. The individual was able to work and was available for work in any trade, occupation, profession or business to which he or she was reasonably suited.
2. The individual must have been ready, able and willing, immediately, to accept any suitable work which may have been offered to him or her.
3. The individual must have been actively seeking work pursuant to customary trade practices and through other methods when so directed by the Commissioner (of the Employment Security Department) or the Commissioner's agents. If a labor agreement or dispatch rules applied, customary trade practices must have been in accordance with the applicable agreement or rules.
4. The individual had been unemployed for a waiting period of one week.
5. The individual participated in reemployment services if he or she had been referred to reemployment services pursuant to the Worker Profiling and Reemployment System, unless:
  - The individual had completed such services; or
  - The individual had justifiable cause to not participate in such services.

These five characteristics were conditioned on the following:

1. The benefit year of an eligible claimant equaled the 52 consecutive-week period beginning with the first day of the calendar week in which the individual filed an application for an initial determination (of unemployment-insurance benefit eligibility) and thereafter the 52 consecutive-week period beginning with the first day of the calendar week in which the individual next filed an application for an initial determination after the expiration of the individual's last preceding benefit year.

The benefit year determination was further conditioned on the requirement that the individual had earned wages in employment in not less than 680 hours of the individual's base year. These 680 hours of employment could not have been used to establish some prior benefit year.

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<sup>12</sup> See Heckman, Ichimura and Todd, (1997) for a detailed analysis of treatment/comparison-group matching applied to job-training programs.

In effect, we matched exactly on all of the characteristics stated previously.

#### *The net-impact analysis sample for the WorkSource job-search services study*

The analysis group for this study was derived from the Benefit Payment History table of the unemployment-insurance administrative database. (The design of the net-impact analysis is modeled in *Figure 3*). Treatment-group individuals received WorkSource job-search services at least once during the six-month period including fourth-quarter 2007 and first-quarter 2008, while those in the comparison group did not during that time period. Members of either group may have received any WorkSource services, including job-training services, from fourth-quarter 2005 through third-quarter 2007, and from second-quarter 2008 onwards.

Individuals in both groups met the following criteria:

- Current or former unemployment-insurance claimants – specifically, received at least one week of unemployment benefits from fourth-quarter 2005 through third-quarter 2007;
- Not receiving job-search services through a union – specifically, not members of a union that provides job-search services;
- Unemployed during the entire third-quarter 2007 – specifically, had no reported insured wages during third-quarter 2007;
- Potential past use of any WorkSource services – specifically, both the treatment group and the comparison group may have received some WorkSource services, including job-training services, from fourth-quarter 2005 through third-quarter 2007; and
- Washington residents for the entire study period – specifically, lived in the state from fourth-quarter 2005 through second-quarter 2009.

#### *Discussion*

The issue in developing a statistically usable match was first to find individuals who either were receiving, about to receive or had stopped receiving unemployment benefits during a given time period – fourth-quarter 2005 through first-quarter 2008. Conditioned on that set of facts, the issue was to determine those individuals who were unemployed in the sense that they were not reporting any insured earnings, for the third-quarter 2007 time period. This period, third-quarter 2007, was the sample selection period.

Receiving unemployment benefits at some time during fourth-quarter 2005 through first-quarter 2008 period helped to statistically identify individuals who had a relatively strong attachment to the workforce. In addition, it turned out that many of this group of individuals had received WorkSource services of some kind during the period fourth-quarter 2005 through third-quarter 2007 (*Appendix 5, Figure A5-3*). This receipt of services constituted a predetermined variable that helped to statistically identify those individuals with a propensity to use WorkSource services – a critical factor in reducing classical selection bias.

## Appendix 3

### Justification for and method of propensity-score matching

#### Introduction

The study sample consisted of individuals who were eligible for and who were receiving unemployment-insurance benefits. In addition, these individuals received no unemployment-insurance-covered reported earnings during third-quarter 2007.

As a non-experimental evaluation design, the net-impact estimates of this study were subject to selection bias. This appendix discusses the methods used in the study to attempt to correct for selection bias. In this study, we used exact matching of treatment individuals with comparison-group individuals on the basis of: 1) gender; 2) no earnings in third-quarter 2007; 3) not being members of a union that provides job-search services; and 4) eligibility for and receipt of unemployment-insurance benefits. (See *Appendix 2*.)

We also matched each treatment individual with a comparison-group individual based on fitted values of a propensity function that estimated the probability that an individual would be a member of the treatment group, irrespective of whether that individual was actually in the treatment or comparison group. The propensity function was estimated separately for each gender.

#### The matching method

Heckman, Ichimura and Todd [H-I-T, (1997 and 1998)] identify four conditions for a successful, that is, statistically unbiased, evaluation using matching methods for a non-experimental social program evaluation:

1. The treatment- and comparison-group members have the same distributions for each unobserved attribute, whether unmeasured, such as health or un-measurable, such as artistic ability.
2. The treatment- and comparison-group members have the same distributions for each observed attribute, such as age.
3. Each observed attribute, such as education, is measured exactly the same way for both treatment- and comparison-group members.
4. Treatment- and comparison-group members reside and function in a common economic environment [H-I-T, (1997), page 606].

H-I-T argue that while most non-experimental evaluations focus on attempting to account for bias due to unmeasured and un-measurable attributes (condition 1), the major sources of bias in non-experimental evaluations come from conditions 2, 3 and 4. This study focuses on reducing bias from these three sources.

#### Difference-in-differences (DID)

H-I-T and other analysts point out that complementing a conceptually correct matching method with a difference-in-differences (DID) specification of the dependent variable, such as earnings, further reduces the sources of selection bias in a non-experimental study. We employed the difference-in-differences approach in the estimation of quarterly before-tax earnings. Earnings experience from fourth-quarter 2005 through second-quarter 2007 was used as the pre-follow-up reference period.

Bias due to selection on unmeasured and immeasurable variables not accounted for in the differencing remains a problem, even though this source of bias is argued to be “a relatively small part of [the total] bias as conventionally measured” [H-I-T, (1997), page 606]. The absolute bias due to the remaining unmeasured or unmeasurable variables can still be large.

For the present study, we accounted for the sources of bias due to conditions 2, 3 and 4 listed by H-I-T as follows:

- With respect to condition 2, *Figures A3-2 and A3-3* provides the distributions of the fitted probabilities of the propensity function between the treatment and the comparison groups, by gender). For two significant digits (e.g., 56 percent, not 56.09 percent) we performed a one-to-one match of treatment- and comparison-group members for the fitted propensity scores. When a comparison-group member was matched more than once against a treatment-group member, one of the two or more matched was randomly selected into the analysis sample. Those pairs not selected were discarded.
- With respect to condition 3, all variables used in the analysis were measured identically for both the treatment and the comparison groups.
- With respect to condition 4, we included a detailed local labor market variable – the state workforce development area (WDA) of the employer.
  - This variable, composed of 14 categorical groups of counties, adjusted for impacts on the treatment and comparison groups that are common to a given WDA. Two of the 12 WDAs were further split into two distinct geographic areas each, yielding 14 groups.
  - The variable enters as an explanatory variable in the propensity function in the form of 15 separate regressors. (See “Explanatory variables for outcomes” in *Appendix 4*.) There was an additional regressor for individuals whose labor market location was defined as “out of state.”
  - Finally, this variable also helped to adjust for the actions of WorkSource program managers in choosing and providing the differential mix of job-search services to their program participants.

#### *Matching on fitted values from a propensity function*

Using observable variables for both the treatment and comparison groups, matching is an effort to reproduce the context of a random-assignment experiment based on those observable variables. Blundell and Costa Dias, (2002) state the issue succinctly:

“The main purpose of matching is to re-establish the conditions of an experiment when no randomized control group is available.”

For matching to result in an unbiased estimate of net program effect, two key assumptions must be satisfied:

- Selection into program treatment depends *only* on the observable characteristics of the treatment and comparison groups.
- All individuals in the treatment group have a counterpart in the non-treated population and anyone in that non-treated population constitutes a possible member of the treatment group.

Both of these assumptions can be strong or unrealistic, assumptions. With respect to the first assumption, it is clear that selection into a program treatment may depend on unmeasured and thus omitted variables, such as an individual's physical health or on omitted variables that cannot be measured cardinally, such as one's motivation to work. With respect to the second assumption, it is the case that anyone in the non-treated population could have been a possible member of the treatment group. However, if the available matching population is small relative to a tightly specified treatment group, it may not be possible to successfully match all individuals of the treatment group with a member of the available comparison group. For the present study, we had sufficient sample to perform a one-to-one match with replacement of the matching cases into the matching pool for all individuals in the study who were in the treatment group. For some treatment-group members we had multiple matching candidates. A random selection process performed the match in these cases.

We had an exact match on the following variables:

1. Gender;
2. Zero earnings during third-quarter 2007;
3. Not being members of a union that provides job-search services;
4. Unemployment-insurance benefits eligibility – a detailed set of employment behavioral characteristics (see *Appendix 2*); and
5. Receipt of unemployment-insurance benefits.

#### *Specification of variables for the propensity function*

As noted, we estimated the propensity function separately for males and females, conditioned on the four exact match variables.

- *Dependent variable.* We had a binary treatment case – an individual either received WorkSource job-search services (treatment individual, or participant) or the individual did not (comparison individual), during the period from fourth-quarter 2007 through first-quarter 2008.
- *Explanatory variables for the propensity function.* We fitted the propensity function for male treatment plus comparison individuals and for female treatment plus comparison individuals, using the following variables that were measured immediately prior to being selected into the study (i.e., third-quarter 2007):
  1. Workforce development area (WDA) – 15 categories, including the previously mentioned 14 groups covering the 12 WDAs plus one “out of state” category.
  2. Occupation (SOC) – 23 categories, identified by Standard Occupational Code.
  3. Quarterly before-tax earnings prior to the third-quarter 2007 (EARN) – seven variables, one for each pre-treatment quarter, starting with fourth-quarter 2005 and ending with second-quarter 2007. See *Appendix 4* for the exact definitions of the variables that were used in the analysis. We trimmed the quarterly earnings data prior to fourth-quarter 2007 at five standard deviations from the mean. This procedure eliminated the very few extreme outliers in the sample data.
  4. An employment transition variable (TRANSITION) – four categories by seven matched pairs. This quarter-to-quarter employment transition in covered employment variable measured whether employment, quarter-to-quarter, continued, ended or began between contiguous quarters during each of the quarters preceding the fourth-quarter 2007.

The TRANSITION variable included four possible outcomes for each pair of contiguous quarters:

- i. Ever employed in contiguous quarters, “t” and “t+1” = 1; 0 otherwise.
- ii. Never employed in contiguous quarters, “t” and “t+1” = 1; 0 otherwise.
- iii. Ever employed in quarter “t,” never employed in quarter “t + 1” = 1; 0 otherwise.
- iv. Never employed in quarter “t,” ever employed in quarter “t+1” = 1; 0 otherwise.

Each of these employment transition outcomes is represented as a separate bivariate dummy variable to characterize a given contiguous pair of quarters. The variables were coded for each contiguous pair of quarters, starting with fourth-quarter 2005 and first-quarter 2006, as one pair; first-quarter 2006 and second-quarter 2006 as the second pair; etc. through second-quarter 2007 and third-quarter 2007 as the seventh pair.

Figure A3-1 provides a heuristic example of the coding as follows, for a randomly chosen individual.

**Figure A3-1. Illustrative example of transition periods**

Washington state, fourth-quarter 2005 to third-quarter 2007

Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Transition period: quarter “t” compared to quarter “t + 1”	Ever employed in contiguous quarters	Never employed in contiguous quarters	Ever employed in quarter “t,” never employed in quarter “t + 1”	Never employed in quarter “t,” ever employed in quarter “t + 1”
2005 Q4 vs. 2006 Q1	0	1	0	0
2006 Q1 vs. 2006 Q2	0	1	0	0
2006 Q2 vs. 2006 Q3	0	0	0	1
2006 Q3 vs. 2006 Q4	1	0	0	0
2006 Q4 vs. 2007 Q1	1	0	0	0
2007 Q1 vs. 2007 Q2	1	0	0	0
2007 Q2 vs. 2007 Q3	1	0	0	0

The logit function we employed automatically kicks out dummy regressors that are linear combinations of two or more of these regressors.

H-I-T, (1997) on page 615 argued that unemployment dynamics, rather than earnings dynamics, predict participation in Job Training Partnership Act programs (a precursor to the current federal Workforce Investment Act programs), which they define as a type of job-search activity. We could not distinguish in our data among the labor market states of employment, unemployment and out of the labor force. Thus, the transition variable was our key labor market transition variable. However, using a different population to estimate the effects of unemployment beneficiary mandatory job search, Black, Galdo and Smith, (2007) argued the opposite of H-I-T. We included both variables (EARN and TRANSITION) in our propensity function estimator and we argue that both serve to statistically identify the propensity functions estimated.

***The matching method***

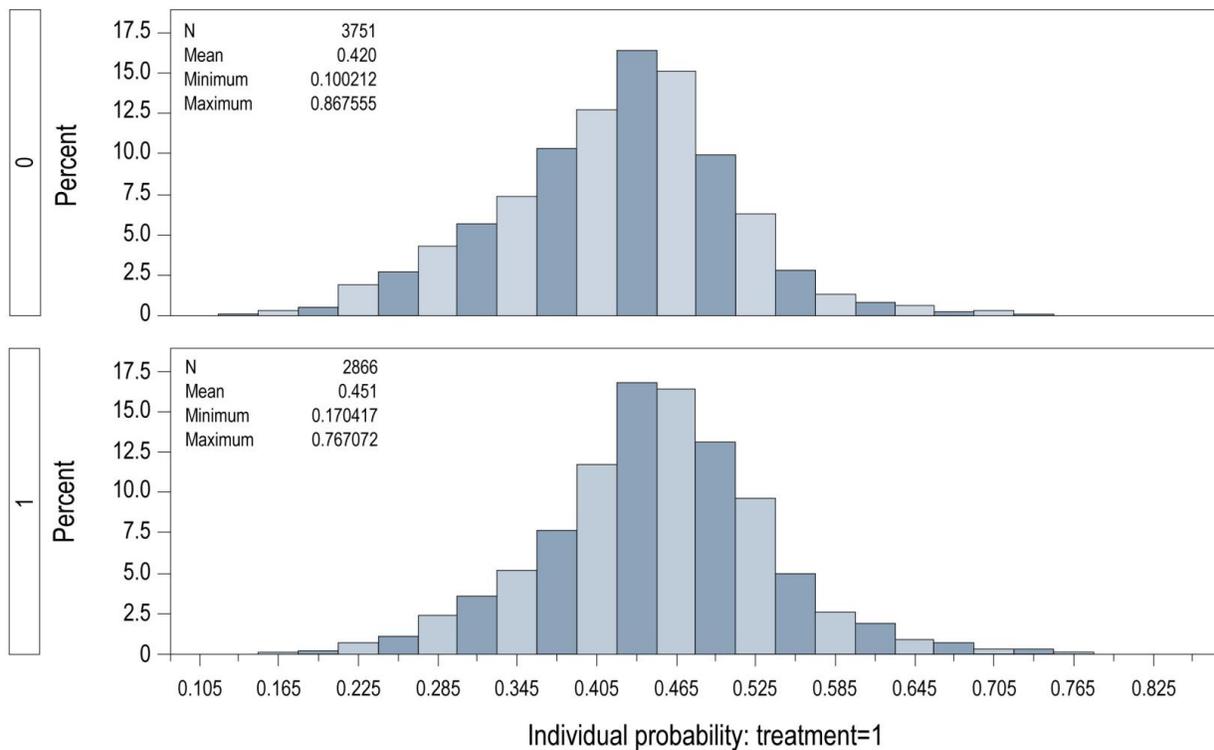
We matched on a one-to-one basis at a two-digit probability estimate. When a comparison-group member was used to match against two or more treatment-group members, one of the matches was randomly chosen to include in the study sample. The rest were discarded. This resulted in a reduction of the study sample from about 10,000 observations to about 9,000 observations.

**Common support**

Figures A3-2 and A3-3 display the distributions of the fitted probabilities that were estimated for each gender by treatment and comparison group. Note that there was excellent overlap (common support) of the fitted probabilities for both males and females between the treatment- and comparison-group samples, but especially for the females. Note also that these distributions were plotted prior to the matching process. They contain all observations used to estimate the propensity functions.

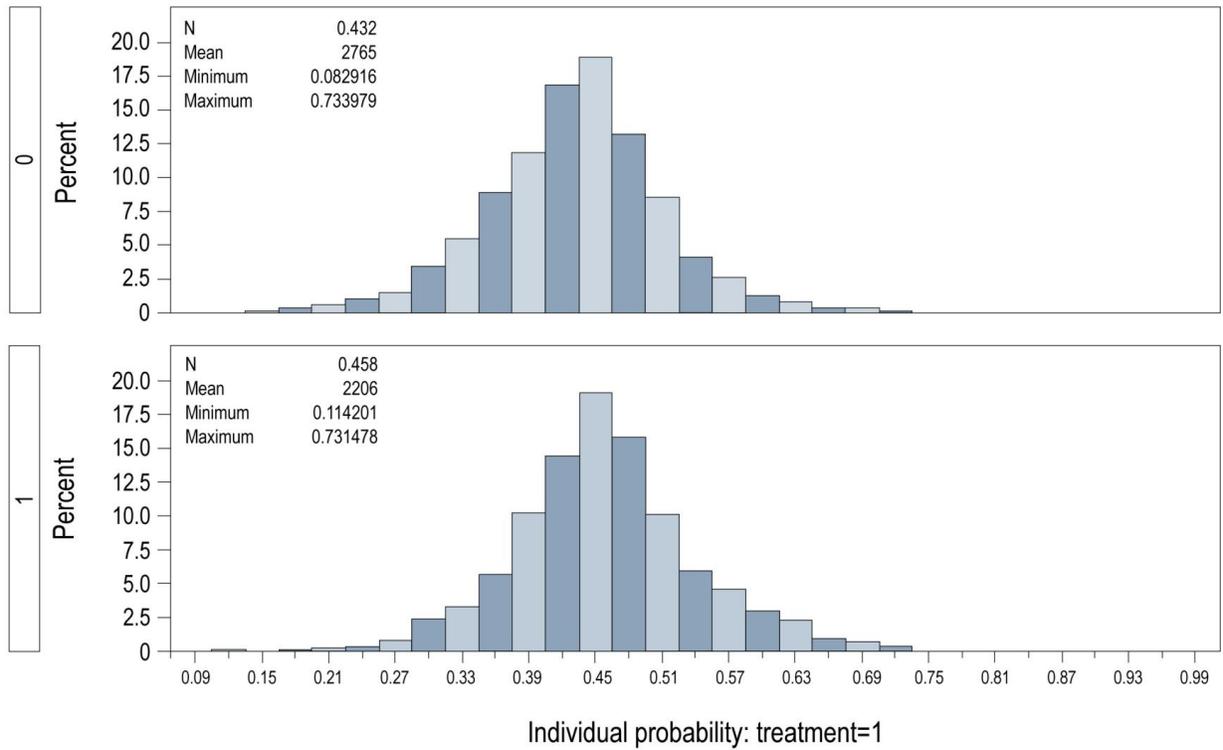
1. Each member of the treatment group had one or more exact matches in the comparison group.
2. None of the fitted probabilities equals either zero (0) – cannot be a member of the treatment group – or one (1) – was uniquely a member of the treatment group. The presence of fitted values that were either 0 or 1 would imply that the propensity function was poorly estimated.
3. For males and females, the distributions of the fitted probabilities for both the treatment group and the matched comparison group were essentially normal. The mean fitted probability for the female treatment group was 0.458; for the female comparison group, it was 0.432. The mean fitted probability for the male treatment group was 0.451; for the male comparison group, it was 0.42.

**Figure A3-2.** Male propensity scores<sup>1</sup> before one-to-one matching, n = 6,617  
Washington state, fourth-quarter 2005 through third-quarter 2007  
Source: Employment Security Department/LMEA



<sup>1</sup>The control group is marked "0" on the vertical axis, the treatment group is marked "1." The score incorporated location of employer, occupation, earnings and employment transition variables.

**Figure A3-3.** Female propensity scores<sup>1</sup> before one-to-one matching, n = 4,971  
 Washington state, fourth-quarter 2005 through third-quarter 2007  
 Source: Employment Security Department/LMEA



<sup>1</sup>The control group is marked "0" on the vertical axis, the treatment group is marked "1." The score incorporated location of employer, occupation, earnings and employment transition variables.

## Appendix 4

### Definition and discussion of key variables used in the analysis and the statistical models employed to estimate net WorkSource job-search services effects.

Our analysis used three multivariate statistical models. These models required three different types of variables.

This appendix first identifies the key variables and statistical models. It then specifies the group of variables used to statistically estimate the propensity function used to make the one-to-one match; the employment function to estimate net effects of the program on the probability of employment; and the earnings function to estimate the effects of the program on before-tax earnings. Finally, the variables themselves are defined in exact detail.

#### *The key variables*

The three types of variables we used in our analysis include:

- **Policy treatment variables** defined the program treatment. They measured the type and amount of program services delivered to and received by the program participant.
- **Policy outcome variables** measured the desired outcome of a program's objective(s) such as improved earnings or employment as a result of the receipt of program services.
- **Explanatory variables** helped adjust for economic and social factors that can obscure the effect of policy treatment variables. Examples include an individual's employment and earnings history prior to the receipt of program services; an individual's marital status; and an individual's gender. The estimated effect of the **policy outcome variables** was then net of the effects of these **explanatory variables**.

#### *The multivariate statistical models*

##### ***Propensity function model***

The first of our multivariate statistical models identified individuals for comparison to WorkSource participants. This model helped control for selection bias through a detailed one-to-one matching of customers who received WorkSource job-search services (*the treatment group*) with workers with similar characteristics who comprised *the comparison group*.

It estimated the probability that an individual could be a member of the program treatment group regardless of whether the individual was actually a member of the treatment group or was a member of the comparison group. Estimated probabilities from this model were used to match the treatment- and comparison-group members on a one-to-one basis, where the estimated matching probability for each individual was greater than 0.0 and less than 1.0. (Probability runs from 0.0 – an event will certainly not happen, to 1.0 – an event will happen with certainty.) Thus, for example, a treatment-group individual with an estimated propensity probability of 0.76 was matched with a comparison-group individual with the same estimated propensity probability. This matching process in effect matched each treatment-group individual with each comparison-group individual on *all of the explanatory variables* that were used to estimate the propensity function model.

The other two models estimated the impact of the program treatment or services, holding constant the effects of the **explanatory variables**. These models were estimated for each of the seven quarters from fourth-quarter 2007 through second-quarter 2009. Fourth-quarter 2007 and first-quarter 2008 were the two quarters when the treatment group received some WorkSource job-search services and the comparison group received none. This was the program treatment period. The two models measured different outcomes:

#### *Probability of ever becoming employed model*

This model measured the difference in the probability of ever being employed for each of the two program treatment period quarters, and the five post-treatment follow-up quarters, taken separately, for the treatment group versus the comparison group.

#### *Quarterly before-tax earnings model*

For the program treatment period, this model measured the difference in the quarterly before-tax earnings for each of the two program treatment quarters and five post-treatment follow-up quarters.

#### *Specification of the multivariate statistical models*

This section of the appendix includes a general description of the three models and the variables used in each.

#### *Propensity function model*

- The **policy outcome variable** for this model measured whether the individual was a member of the treatment group or a member of the comparison group. The treatment-group member received WorkSource job-search services and the comparison-group member did not. This was a qualitative variable coded “1” for the individual who was a treatment-group member and “0” for the individual who was a comparison-group member. This binary treatment variable allowed us to estimate the probability that an individual would be a treatment-group member based on the following explanatory variables, regardless of whether he or she was an actual member of the treatment group or the comparison group. Estimated probabilities from this model were used to control for selection bias.
- The **explanatory variables** in this model were:
  - Workforce development area
  - Occupation
  - Pre-program quarterly before-tax earnings
  - Employment transition variable.

This model was estimated for males and females, taken separately. All individuals had zero covered earnings in the third-quarter 2007; all were legally eligible to receive unemployment benefits; all had received some unemployment benefits during the period fourth-quarter 2005 through third-quarter 2007.

### *Probability of ever becoming employed model*

- The **policy outcome variable** measured whether an individual is ever employed in a given quarter, beginning with fourth-quarter 2007 and ending with second-quarter 2009. This was a categorical variable where employment (working in an occupation covered by the unemployment-insurance program) equaled “1” and unemployment (not working in an occupation covered by the unemployment-insurance program) equaled “0.” The measured outcome was the probability of being employed, a statistic that ranged between 0.0 (not employed at all) and 1.00 (fully employed).
- The variables in this model were:
  - **Policy treatment variable:** The individual was a member of the treatment group (= “1”) or a member of the comparison group (= “0”).
  - **Explanatory variables**
    - **Age in years**
    - **Age in years squared** (This accounted for the nonlinear change in earnings as one gets older.)
    - **Education**
    - **Pre-treatment quarterly earnings**, by quarter, for fourth-quarter 2005 through second-quarter 2007. Note: both treatment- and comparison-group members had zero earnings in third-quarter 2007.
    - **Industry attachment** for the industry of longest attachment during the period fourth-quarter 2005 through second-quarter 2007.
    - **Workforce development area** of the employer as of third-quarter 2007
    - **Race/ethnicity**
    - **Number of WorkSource services received** in the period fourth-quarter 2005 through second-quarter 2007.

### *Quarterly before-tax earnings model*

- The **policy outcome variable** measured the quarterly before-tax earnings, for each quarter taken separately, from fourth-quarter 2007 through second-quarter 2009. Fourth-quarter 2007 and first-quarter 2008 were the quarters in which members of the treatment group, but not members of the comparison group, received job services. Those were the treatment quarters. The statistical estimates provided a measure of earnings forgone during the two-quarter job-search services treatment period. The five quarters from second-quarter 2008 through second-quarter 2009 were the quarters in which net positive earnings, if any, occurred as a result of the job-search services received during the two-quarter treatment period.
- The variables in this model were:
  - **Policy treatment variable:** The individual was a member of the treatment group (=“1”) or a member of the comparison group (=“0”).
  - **Explanatory variables**
    - **Age in years**
    - **Age in years squared** (This accounted for the nonlinear change in earnings as one gets older.)
    - **Education**
    - **Pre-treatment quarterly earnings**, by quarter, fourth-quarter 2005 through second-quarter 2007. Note: both treatment- and comparison-group members had zero earnings in third-quarter 2007.

- **Industry attachment** for the industry of longest attachment during the period fourth-quarter 2005 through second-quarter 2007.
- **Workforce Development Area** of the employer as of third-quarter 2007
- **Race/ethnicity**
- **Number of WorkSource services received in the period fourth-quarter 2005 through second-quarter 2007**
- **The estimated probability of ever being employed** in each of the seven follow-up quarters in question – fourth-quarter 2007 through second-quarter 2009.

*Detailed list of variables*

*Policy treatment variables*

- The set of all job-search services received and the set of all WorkSource job-search services = 1; 0, otherwise (TREATMENT)
- Disaggregated job-search services:
  - Received job-referral services only = 1; 0, otherwise (SERV-REFERRALONLY)
  - Received job-referral services and any combination of job-search services = 1; 0, otherwise (SERV\_REFERRALPLUSOTHER)
  - Received any services other than job-referral services = 1; 0, otherwise (SERV\_NOREFERRAL)

*Policy outcome variables*

We trimmed the before-tax quarterly earnings variable at five standard deviations from the means of the male and female cohorts.

- Probability of ever being employed in covered employment in the given year and quarter (conditioned on having valid hours estimates) (PROBEMP):
  - Probability of ever being employed in 2007 Q4: ever employed = 1; 0, otherwise
  - Probability of ever being employed in 2008 Q1: ever employed = 1; 0, otherwise
  - Probability of ever being employed in 2008 Q2: ever employed = 1; 0, otherwise
  - Probability of ever being employed in 2008 Q3: ever employed = 1; 0, otherwise
  - Probability of ever being employed in 2008 Q4: ever employed = 1; 0, otherwise
  - Probability of ever being employed in 2009 Q1: ever employed = 1; 0, otherwise
  - Probability of ever being employed in 2009 Q2: ever employed = 1; 0, otherwise
- Total before-tax quarterly earnings in dollars (inflation-adjusted dollars, 2009 = 100, CPI-W) (TOTEARN):
  - Total before-tax quarterly earnings in 2007 Q4
  - Total before-tax quarterly earnings in 2008 Q1
  - Total before-tax quarterly earnings in 2008 Q2
  - Total before-tax quarterly earnings in 2008 Q3
  - Total before-tax quarterly earnings in 2008 Q4
  - Total before-tax quarterly earnings in 2009 Q1
  - Total before-tax quarterly earnings in 2009 Q2

### *Explanatory variables for outcomes*

- Employer workforce development areas (WDA); third-quarter 2007: The regressors were:
  1. 1 Olympic (Clallam, Jefferson and Kitsap counties) = 1; 0, otherwise
  2. 2 Pacific Mountain (Grays Harbor, Lewis, Mason, Pacific and Thurston counties) = 1; 0, otherwise
  3. 3 Northwest (Island, San Juan, Skagit and Whatcom counties) = 1; 0, otherwise
  4. 4 Snohomish (Snohomish County) = 1; 0, otherwise
  5. 5 Seattle-King (King County) = 1; 0, otherwise
  6. 6 Tacoma-Pierce (Pierce County) = 1; 0, otherwise
  7. 7 Southwest (Clark, Cowlitz and Wahkiakum counties) = 1; 0, otherwise
  8. 8a North Central (Chelan and Okanogan counties) = 1; 0, otherwise
  9. 8b North Central (Adams, Douglas and Grant counties) = 1; 0, otherwise
  10. 9 South Central (Kittitas, Klickitat, Skamania and Yakima counties) = 1; 0, otherwise
  11. 10a Eastern (Ferry, Lincoln, Pend Oreille and Stevens counties) = 1; 0, otherwise
  12. 10b Eastern (Asotin, Columbia, Garfield, Walla Walla and Whitman counties) = 1; 0, otherwise
  13. 11 Benton-Franklin (Benton and Franklin counties) = 1; 0, otherwise
  14. 12 Spokane W (Spokane County) = 1; 0, otherwise
  15. 99 out of state = 1; 0, otherwise. This variable is an aggregate of the following:
    - a. Twenty observations were coded “out-of-state” due to only one location for the employer which was “statewide” but was then traced to an out-of-state address in the unemployment-insurance EMPLOYER table.
    - b. Three observations were coded as “out-of-state” that did not have an employer listed in BUSINESSLOCATION and were not identified via the EMPLOYER table.
    - c. A total of 1,815 observations for whom CLAIMEMPLOYER was filled in but the “employeraccountnumber” began with 9999, designating “out-of-state.”
    - d. A total of 370 federal employees for whom there was no Washington state location associated with the federal employer.
    - e. This edit for categorical variable “99 out of state” totaled 2,208 observations or a 13.8 percent reduction of the entire study sample of 16,032 individuals.
- Occupation by Standard Occupational Classification (SOC): The most recent occupation recorded from fourth-quarter 2005 through second-quarter 2007. This occupational definition was chosen since it was the occupation from which the individual had his or her most recent attachment to the labor force. This is the occupation which the recent recession directly impacted.
  1. Management = 1; 0, otherwise
  2. Business and financial operations = 1; 0, otherwise
  3. Computer and mathematical = 1; 0, otherwise
  4. Architecture and engineering = 1; 0, otherwise
  5. Life, physical and social science = 1; 0, otherwise
  6. Community and social service = 1; 0, otherwise
  7. Legal = 1; 0, otherwise
  8. Education, training and library = 1; 0, otherwise
  9. Arts, design, entertainment, sports and media = 1; 0, otherwise
  10. Healthcare practitioners and technical = 1; 0, otherwise
  11. Healthcare support = 1; 0, otherwise
  12. Protective service = 1; 0, otherwise

13. Food preparation and serving related = 1; 0, otherwise
  14. Building and grounds cleaning and maintenance = 1; 0, otherwise
  15. Personal care and service = 1; 0, otherwise
  16. Sales and related = 1; 0, otherwise
  17. Office and administrative support = 1; 0, otherwise
  18. Farming, fishing and forestry = 1; 0, otherwise
  19. Construction and extraction = 1; 0, otherwise
  20. Installation, maintenance and repair = 1; 0, otherwise
  21. Production = 1; 0, otherwise
  22. Transportation and material moving = 1; 0, otherwise
  23. Military specific = 1; 0, otherwise
- Industry by North American Industrial Classification System (NAICS) of longest attachment in the two-year period prior to treatment:
    1. 11,21: Agriculture, forestry, fishing, hunting, mining = 1; 0, otherwise
    2. 22,48,49: Utilities, transportation and warehousing = 1; 0, otherwise
    3. 23: Construction = 1; 0, otherwise
    4. 31,32,33: Manufacturing = 1; 0, otherwise
    5. 42,44,45: Wholesale trade, retail trade = 1; 0, otherwise
    6. 51: Information = 1; 0, otherwise
    7. 52,53: Finance, insurance, real estate and rental and leasing = 1; 0, otherwise
    8. 54,55: Professional, scientific, technical, management of companies and enterprises = 1; 0, otherwise
    9. 56: Administrative and support and waste management and remediation services = 1; 0, otherwise
    10. 61: Educational services = 1; 0, otherwise
    11. 62: Healthcare and social assistance = 1; 0, otherwise
    12. 71,72 Arts, entertainment, recreation, accommodation and food services = 1; 0, otherwise
    13. 81: Other services (except public administration) = 1; 0, otherwise
    14. 92: Public administration = 1; 0, otherwise
    15. Not ascertained = 1; 0, otherwise
  - Total number of jobs each individual held in the two-year period prior to receipt of unemployment-insurance benefits, WorkSource job-search services or both (N\_JOBS)
  - Total number of WorkSource job-search services received prior to program (fourth-quarter 2005 through second-quarter 2007) (PRIORSERV):
    - 0; 0, otherwise
    - 1 – 3; 0, otherwise
    - 4 – 6; 0, otherwise
    - 7 – 9; 0, otherwise
    - 10 – 12; 0, otherwise
    - 13 – 15; 0, otherwise
    - 16 – 18; 0, otherwise
    - 19 – 21; 0, otherwise
    - 22 – 30; 0, otherwise
    - 31 – 40; 0, otherwise
    - 41 – 50; 0, otherwise

- 51 – 100; 0, otherwise
- 101 – 200; 0, otherwise
- 201 – 350; 0, otherwise
- Age in years on September 30, 2007 (AGEYRS)
- Experience, defined as age in years as of September 30, 2007, minus five, minus total years of schooling (EXPERIENCE)
- GENDER: Male = 1; female = 0
- Education
  - Education less than high school = 1; 0, otherwise (EDUC\_LESS\_THAN\_HS)
  - GED = 1; 0, otherwise (EDUC\_GED)
  - High school graduate = 1; 0, otherwise (EDUC\_HS)
  - Some college but no degree = 1; 0, otherwise (EDUC\_HGHR\_ED\_NO\_DEGREE)
  - Associate degree = 1; 0, otherwise (EDUC\_ASSOC\_DEGREE)
  - Bachelor's degree = 1; 0, otherwise (EDUC\_BACHELORS)
  - Master's degree = 1; 0, otherwise (EDUC\_MASTERS)
  - Doctorate degree = 1; 0, otherwise (EDUC\_PHD)
- Race/Ethnicity
  - White = 1; 0, otherwise (ETHN\_WHITE)
  - Asian/Pacific Islander = 1; 0, otherwise (ETHN\_ASIAN-PAC)
  - African American/Black = 1; 0, otherwise (ETHN\_BLACK)
  - Hispanic/Latino, not Black = 1; 0, otherwise (ETHN\_HISPANIC)
  - American Indian/Alaskan Native = 1; 0, otherwise (ETHN\_USINDIAN\_ALASKAN)
  - Race/ethnicity unknown = 1; 0, otherwise (ETHN\_NOTAVAIL)
- Inflation-adjusted (2009 = 100) quarterly before-tax earnings for each quarter from fourth-quarter 2005 through second-quarter 2007, the seven quarters prior to the quarter in which the individuals were selected into the study population frame. (All individuals had zero earnings in third-quarter 2007.) (EARN)
  1. Total before-tax quarterly earnings in fourth-quarter 2005
  2. Total before-tax quarterly earnings in first-quarter 2006
  3. Total before-tax quarterly earnings in second-quarter 2006
  4. Total before-tax quarterly earnings in third-quarter 2006
  5. Total before-tax quarterly earnings in fourth-quarter 2006
  6. Total before-tax quarterly earnings in first-quarter 2007
  7. Total before-tax quarterly earnings in second-quarter 2007

### *Specification of the statistical models estimated*

For every statistical model, the propensity function and the net-impact equations were estimated separately for males and females. Thus, gender interacted with each of the explanatory variables in each of the models being estimated. Actual variable names are indicated by capital letters in the following lists.

#### *The propensity function*

Logit (a unit of measurement) was used to estimate the propensity function. The following explanatory variables were used to estimate the propensity function:

1. Employment TRANSITION<sup>13</sup>: four regressors for each pre-fourth-quarter 2007 pair of quarters. Ever employed in contiguous quarters entered the intercept.<sup>14</sup>
2. EARN: seven variables, one for each pre-treatment quarter, starting with fourth-quarter 2005 and ending with second-quarter 2007.
3. Employer WDA: 15 regressors. The regressor defined as 5 Seattle-King WDA (King County) entered the intercept.
4. SOC: 23 regressors. Production occupations entered the intercept.

We argue that TRANSITION, EARN and WDA were the variables that identified this function. SOC was added for additional statistical adjustment.

#### *Probability of ever being employed in a covered occupation during a given quarter (PE)*

We used logit to estimate the probability of ever being employed function. We used the following explanatory variables to estimate each of the seven year/quarter probability of employment functions for the models that were estimated with the total sample. For models estimated for males and females, taken separately, we omitted GENDER from the equations being estimated:

1. TREATMENT and the disaggregated specification of treatment. (We estimated separate models for each of disaggregated treatment specifications.)
2. AGEYRS
3. AGE-YRS<sup>2</sup> Squaring age yielded a non-linear relation between age and earnings over time.
4. GENDER
5. Education. Eight regressors. High school graduate enters the intercept.
6. EARN seven variables, one for each pre-fourth-quarter 2007 year and quarter, starting with fourth-quarter 2005 and ending with second-quarter 2007. All observations had zero earnings in third-quarter 2007.
7. NAICS 15 regressors. The NAICS for manufacturing entered the intercept.
8. Employer WDA 15 regressors. WDA 5 for Seattle-King County entered the intercept.
9. Race/Ethnicity six regressors. White entered the intercept.
10. PRIORSERV Total number of WorkSource job-search services received prior to event window of program treatment for the period fourth-quarter 2005 through second-quarter 2007. Zero services (0) entered the intercept.

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<sup>13</sup> This variable is explained in detail in *Appendix 3*.

<sup>14</sup> The intercept is a mathematical requirement to achieve a unique solution to the regression equation.

### *Quarterly before-tax earnings (E)*

We used ordinary least squares (OLS) to estimate the earnings function. We specified the dependent variable in difference-in-differences (DID) form. Thus,  $(E_{T_{post}} - E_{T_{pre}})$  and  $(E_{C_{post}} - E_{C_{pre}})$  defined the dependent variable for the treatment and comparison groups, respectively. We used the following explanatory variables (as previously described) to estimate each of the seven year/quarter earnings functions for the models that we estimated with the total sample. For models estimated for males and females, taken separately, we omitted GENDER from the equations being estimated:

1. TREATMENT and the disaggregated specification of treatment (We estimated separate models for each of the treatment specifications.)
2. A fitted variable that estimated the probability of an individual ever being employed in a given follow-up year and quarter.
3. GENDER
4. N\_JOBS
5. AGEYRS
6. AGE-YRS<sup>2</sup> Squaring age yielded a non-linear relation between age and earnings over time.
7. Education. Eight regressors. High school graduate entered the intercept.
8. Race/Ethnicity. Six regressors. White entered the intercept.
9. Pre-fourth-quarter 2007 quarterly before-tax earnings. Seven variables, one for each pre-fourth-quarter 2007 year and quarter, starting with fourth-quarter 2005 and ending with second-quarter 2007. All individuals had zero earnings in third-quarter 2007.
10. Employer WDA: 15 regressors. WDA 5 for Seattle-King County entered the intercept.
11. NAICS 15 regressors. The NAICS for manufacturing entered the intercept.
12. PRIORSERV Total number of WorkSource job-search services received prior to event program treatment (fourth-quarter 2005 through second-quarter 2007.) Zero services (0) entered the intercept.

## Appendix 5

### Detail on the structure of job-search services

This appendix includes detailed data on the job-search services received by treatment- and comparison-group individuals.

**Figure A5-1.** Number of treatment-group individuals receiving each WorkSource job-search service, by gender Washington state, fourth-quarter 2007 through first-quarter 2008<sup>1</sup>

Source: Employment Security Department/LMEA, SKIES Services table

Type of job-search service received during the treatment period only <sup>2</sup>	Male				Female				Total male 2007 Q4 + 2008 Q1		Total female 2007 Q4 + 2008 Q1	
	2007 Q4		2008 Q1		2007 Q4		2008 Q1		N	Percent	N	Percent
	N = 1,988		N = 1,037		N = 1,661		N = 634					
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Staff-assisted job matching	1,405	70.7%	557	53.7%	1,216	73.2%	342	53.9%	1,962	65.9%	1,558	68.9%
Job search review program services	1,017	51.2%	334	32.2%	956	57.6%	231	36.4%	1,351	46.5%	1,187	53.5%
Provision of labor market information	970	48.8%	399	38.5%	829	49.9%	223	35.2%	1,369	46.8%	1,052	47.1%
Initial assessment	937	47.1%	447	43.1%	752	45.3%	264	41.6%	1,384	45.8%	1,016	44.5%
Job referral	875	44.0%	440	42.4%	797	48.0%	265	41.8%	1,315	43.4%	1,062	46.4%
Job search and placement assistance	839	42.2%	393	37.9%	727	43.8%	215	33.9%	1,232	40.8%	942	41.5%
Job-search planning	822	41.3%	341	32.9%	739	44.5%	205	32.3%	1,163	38.8%	944	41.9%
Employment referral	539	27.1%	229	22.1%	469	28.2%	129	20.3%	768	25.6%	598	26.5%
Module 1 orientation of WorkSource services <sup>2</sup>	487	24.5%	284	27.4%	306	18.4%	143	22.6%	771	25.6%	449	19.7%
Résumé assistance	487	24.5%	174	16.8%	437	26.3%	132	20.8%	661	22.5%	569	24.0%
Resource room assistance	206	10.4%	120	11.6%	177	10.7%	79	12.5%	236	10.9%	256	11.4%
All other services except the above	1,903	55.0%	612	59.0%	914	55.0%	386	60.9%	1,705	56.1%	1,300	56.8%

<sup>1</sup> A participant could receive more than one type of service per quarter and could receive services in only one of the two quarters or in both quarters.

<sup>2</sup> These data represented services received only during fourth-quarter 2007 through first-quarter 2008. Both the treatment group and the comparison group received services during fourth-quarter 2005 through third-quarter 2007. Thus, while only 25.6 percent of the males and 19.7 percent of the females received Module 1 – orientation of WorkSource services during fourth-quarter 2007 through first-quarter 2008, a much higher proportion of the treatment and comparison groups received this particular service prior to fourth-quarter 2007. The same was true of the other services provided in this table.

**Figure A5-2.** Quarter of first WorkSource service,<sup>1</sup> by treatment- and comparison-group individuals  
Washington state, fourth-quarter 2005 through second-quarter 2009  
Source: Employment Security Department/LMEA, SKIES Services table

Quarter of first service (any type)	Male			Female		
	Treatment	Comparison	Total	Treatment	Comparison	Total
	N = 2,503	N = 2,503	N = 5,006	N = 1,964	N = 1,964	N = 3,928
2005 Q4	257	134	391	144	96	240
2006 Q1	132	101	233	79	63	142
2006 Q2	114	83	197	65	72	137
2006 Q3	98	68	166	82	66	148
2006 Q4	108	68	176	68	40	108
2007 Q1	110	91	201	74	74	148
2007 Q2	472	607	1,079	462	680	1,142
2007 Q3	512	360	872	532	342	874
2007 Q4	465	0	465	327	0	327
2008 Q1	235	0	235	131	0	131
2008 Q2	0	53	53	0	23	23
2008 Q3	0	27	27	0	15	15
2008 Q4	0	24	24	0	12	12
2009 Q1	0	30	30	0	12	12
2009 Q2	0	17	17	0	9	9
<b>Total with a service</b>	<b>2,503</b>	<b>1,663</b>	<b>4,166</b>	<b>1,964</b>	<b>1,504</b>	<b>3,468</b>
<b>No service received</b>	<b>0</b>	<b>840</b>	<b>840</b>	<b>0</b>	<b>460</b>	<b>460</b>

<sup>1</sup>WorkSource services include any type of service, not just a job-search services, except for fourth-quarter 2007 through first-quarter 2008.

**Figure A5-3.** Percentages of individuals in treatment and comparison groups that received WorkSource services at least once by study period  
Washington state, fourth-quarter 2005 through second-quarter 2009  
Source: Employment Security Department/LMEA, SKIES Services table

Study period and quarters	Number of quarters	Male and female		Male only		Female only	
		Treatment	Comparison	Treatment	Comparison	Treatment	Comparison
Pre-treatment - 2005 Q4 through 2007 Q2	7	50.7%	50.2%	51.6%	46.0%	49.6%	55.5%
No earnings - 2007 Q3	1	53.8%	42.8%	48.6%	37.1%	60.4%	50.1%
Treatment - 2007 Q4 through 2008 Q1	2	100%	0.0%	100%	0.0%	100%	0.0%
Post-treatment - 2008 Q2 through 2009 Q2	5	38.2%	21.9%	40.9%	21.6%	34.8%	22.3%
Number of individuals		4,467	4,467	2,503	2,503	1,964	1,964

## Appendix 6

### The issue of potential displacement

Displacement occurs when an individual who received employment or training services from a government subsidized program receives a job that might have otherwise gone to an equally qualified individual who had not received such services. The larger the number of individuals served by the program relative to the available pool of jobs, the greater the likelihood of some displacement occurring. Our study sample included a maximum of 10,092 individuals, of half of whom were members of the treatment group. During third-quarter 2007, these individuals represented 15.0 percent of the unemployment first-payment beneficiaries and 3.5 percent of the seasonally unadjusted unemployed. There was the possibility of some displacement among the individuals who received unemployment benefits and therefore, among the total unemployed.

*Figure A6-1* shows the relationship between individuals receiving at least one unemployment-benefit-payment and the total number of unemployed in the state, by year and quarter of the study follow-up period. The fifteen-quarter study period began during a time of full employment in Washington state – fourth-quarter 2005 – and ended during the recent deep recession – second-quarter 2009. Those receiving unemployment benefits were 22.9 percent of the total quarterly unemployment statewide in third-quarter 2007, when the study sample was drawn. This percentage ranged up to 42.0 percent of statewide unemployed in fourth-quarter 2008 before falling back to 25.1 percent in second-quarter 2009. Thus, the possibility of displacement and the displacement proportion were likely to change over the business cycle.<sup>15</sup>

**Figure A6-1.** Proportional relationship between the number of unemployment claimants receiving first payment, total quarterly unemployment and total quarterly employment, not seasonally adjusted  
Washington state, third-quarter 2007 through second-quarter 2009  
Source: Employment Security Department/LMEA, Unemployment Insurance Data Warehouse

Year and quarter	Total quarterly employment	Total quarterly unemployment	Unemployment benefits first payments, <sup>1</sup> quarterly	Unemployment benefits first payments as a percent of total quarterly unemployed	Unemployment benefits first payments as a percent of total quarterly employed
Q3 2007	3,260,145	146,809	33,593	22.9%	1.0%
Q4 2007	3,279,925	152,586	53,328	34.9%	1.6%
Q1 2008	3,261,797	179,348	57,163	31.9%	1.8%
Q2 2008	3,285,495	168,685	43,055	25.5%	1.3%
Q3 2008	3,317,939	181,862	42,267	23.2%	1.3%
Q4 2008	3,295,118	215,239	90,346	42.0%	2.7%
Q1 2009	3,214,273	312,206	111,654	35.8%	3.5%
Q2 2009	3,220,114	314,921	78,978	25.1%	2.5%

<sup>1</sup>This statistic is defined as the number of individuals who received their first payment in a benefit year in that quarter. This statistic was used as a proxy for “beneficiaries.”

<sup>15</sup> The absolute number of individuals who are subject to the requirement to show evidence of job-search activity will increase as the total number of unemployment first-payment individuals increases.

Two conceptual issues existed which had potentially opposite effects on displacement. First, relative to the unemployed, unemployment recipients were likely to have a more stable employment and earnings history, suggesting that they could be relatively more productive individuals. If they were relatively more productive, then their use of WorkSource job-search services would displace otherwise equally qualified individuals among the unemployed who did not use or have access to such services.

Second, however, Blundell, et al., (2004) argue that the mandatory job-search program (in England) could conceivably lower market wage rates and induce employers to actually hire more workers, mitigating some or all of the displacement described above.

In view of these two different arguments, the net direction and amount of displacement was not clear. It would depend, among other things, on how the unemployment recipients and the unemployed were distributed across the economy by region, occupation and industry, to list the obvious factors. We simply noted the issues here and did not attempt to adjust for potential displacement in this study.

## Appendix 7

### Previous research: a general assessment

A previously published literature review summarized evaluations of unemployment-insurance reforms across the nation up to 1995.<sup>16</sup> A thorough review of research and evaluation of U.S. employment and training programs, including government-sponsored research on job-search services after 1995, was summarized by Wandner.<sup>17</sup> Wandner's detailed analysis supports the findings of Meyer, (1995) and an additional meta-analysis based on studies conducted from 1995 through 2007.<sup>18</sup> (See *Figure A7-1*.)

Most of the summary by Meyer, (1995) was based on results from classical experiments with random assignment. The summary is as follows:

1. Job-search experiments demonstrate that increased enforcement of job-search rules and added job-search services (jointly) reduce the amount of unemployment benefits received and reduced the level of unemployment. The net effects were positive.<sup>19</sup>
2. The exact combination of optimal job-search services was not clear, but some combination of job-search workshops and individualized attention seemed appropriate.
3. Speeding up an unemployment-insurance claimant's return to work did not appear to significantly reduce earnings and may increase total earnings.
4. It is clear that some form of enforced work test was necessary to mitigate the leisure value of time out of work while receiving unemployment benefits.

### Detail on the net impact of job-search services

*Figure A7-1* describes 12 of the more reliable net-impact assessments that have been conducted over more than 20 years. Seven of these studies were based on classical random-assignment designs. The 12 studies range over a variety of states plus the District of Columbia. The latest classical experiment ended in 1996.<sup>20</sup> The latest non-experimental<sup>21</sup> study ended in 2005.<sup>22</sup> The 12 U.S. studies display small variations in the definition of job-search services.

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<sup>16</sup> See: Meyer, Bruce D. "Lessons from the U.S. Unemployment-Insurance Experiments." *Journal of Economic Literature*. Vol. XXXIII. No.1. March 1995.

<sup>17</sup> See: Wandner, Stephen A. *Solving the Reemployment Problem: From Research to Policy*. Kalamazoo, Michigan. W.E. Upjohn Institute for Employment Research. 2010.

<sup>18</sup> See: Card, David, Jochen Kluve and Andrea Weber. "Active Labor Market Policy Evaluations: A Meta-analysis." CESifo Working Paper No. 2570. Category 4: Labour Markets. March 2009.

<sup>19</sup> Though actual point estimates of net impact are not provided, an extensive meta-analysis of job-search assistance programs over the period from 1995 through 2007 reports that "Job-search assistance programs have relatively favorable short-run impacts..." Card, Kluve and Weber. "Active Labor Market Policy Evaluations: A Meta-analysis." CESifo Working Paper No. 2570. Category 4: Labour Markets, March 2009. The results refer to active labor-market programs in the United States, England and Europe.

<sup>20</sup> See: Black, Dan A., Jeffrey A. Smith, Mark C. Berger and Brett J. Noel. "Is the Threat of Reemployment Services More Effective Than the Services Themselves? Evidence from Random Assignment in the UI System." *American Economic Review*. Vol. 93. No. 4, December 2003.

<sup>21</sup> Heckman, Ichimura and Todd, (1997, 1998) use the term "non-experimental" rather than "quasi-experimental." We adopt their terminology in this study.

<sup>22</sup> See: Heinrich, Carolyn J., Peter R. Mueser and Kenneth R. Troske. Workforce Investment Act Non-Experimental Net Impact Evaluation. Final Report. Impaq International, LLC. Columbia, Maryland, December 2008.

This assessment of previous research found two types of estimates of net effects: first, the net impact on the number of weeks of unemployment benefits received – a measure of the benefits to government and the taxpayer; second, the net impact on earnings – a measure of benefits to society.<sup>23</sup> Those net effects that met conventional levels of statistical significance, an alpha of 0.05 or better, are identified with an asterisk (\*) in *Figure A7-1*.<sup>24</sup>

#### *Prior research on net impacts for weeks of unemployment benefits received*

There are 11 statistically significant estimates that analyzed the effects of receiving unemployment benefits. The range of estimates was from 0.41 fewer weeks to 2.2 fewer weeks after receiving services. The statistically significant median estimate falls at 0.72 fewer weeks. The mean of the statistically significant estimates is 0.91 fewer weeks.<sup>25</sup> We did not estimate the effect on the receipt of unemployment benefits in the present study.

#### *Prior research on net earnings impacts*

There are a number of estimates of net earnings impacts among the 12 studies reported in *Figure A7-1*. We chose 17 of these estimates for discussion. Eleven of these estimates are either not statistically significant or the author(s) did not report the level of statistical significance. The earnings estimates for an average of six months, in 2009 dollars, regardless of statistical significance, ranged from a loss of \$654 (not statistically significant) to a gain of \$1,484 (not statistically significant). For the six statistically significant estimates, which ranged from gains of \$256 to \$1,339, the mean earnings effect was \$754. Study 3 in *Figure A7-1*, which focused on Washington in the late 1980s, estimated mean earnings at \$281.

Including all the estimates based on previous research, regardless of research design, sign of impact, gender and statistical significance, the mean impact dropped to \$382 over a six-month period.<sup>26</sup> The corresponding mean impact in our study was a gain of \$1,177. Thus, the estimates of net program effects on earnings for the present study were higher than the estimates found in the evaluation literature discussed here. However, the findings of the present study fell within the range of the estimates reviewed.

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<sup>23</sup> Not all of the studies state explicitly whether earnings are measured before or after taxes.

<sup>24</sup> An alpha of 0.05 indicates that the chances are only one out of 20 that the true effect is not statistically different from zero.

<sup>25</sup> Meyer's estimates put the statistically significant net effect at about minus 0.5 weeks. See Meyer, (1995), page 124.

<sup>26</sup> When calculating an average effect from a set of diverse estimates, exclusion of estimates that are not statistically significant results in a biased estimate of the average effect. The bias could be positive or negative. Including the statistically insignificant estimates in the average over-weights the estimates that have low statistical reliability. Again, the bias can run in either direction. The 12 studies did not always provide the standard errors of their estimated program effects. Thus, we could not calculate the weighted mean of these studies.

**Figure A7-1.** Selected research on the net-impact of job-search services  
 Selected states and the District of Columbia, 1985 through 2005  
 Source: Employment Security Department/LMEA

Study name, nature of treatment and authors	Location of study	Time period of program analysis	Classical (C) or Non-experiment (N)	Effect on weeks of unemployment benefits received	Effect on earnings in dollars		Net impact: earnings first two quarters in 2008 dollars	Net impact: earnings first two quarters in 2009 dollars
					Current dollars	2008 Dollars		
1. <i>Charleston Claimant Placement and Work Test Demonstration</i> (Three job-search assistance (JSA) treatments: 1) two interviews and job-search session; 2) two interviews only; 3) one interview only.) Corson, Walter, David Long and Walter Nicholson (1985)	South Carolina	February 1983 to December 1983	C	1) -0.76* 2) -0.61 3) -0.55	1) \$152 2) \$264 3) \$110  (Year after start of unemployment claim)	1) \$326 <sup>1</sup> 2) \$571 <sup>1</sup> 3) \$238 <sup>1</sup>	1) \$163 <sup>1</sup> 2) \$286 <sup>1</sup> 3) \$119 <sup>1</sup>	1) \$162 <sup>1</sup> 2) \$285 <sup>1</sup> 3) \$119 <sup>1</sup>
2. <i>New Jersey UI Reemployment Demonstration (JSA services only.)</i> Corson, et al. (1989) and Anderson, Patricia C., Walter Corson and Paul Decker (1991)	New Jersey	July 1986 to June 1987	C	-0.47*	\$554  (Net benefit year)	\$1,069	\$535	\$533
3. <i>Washington Alternative Work Search Experiment (Intensive work-search assistance with two-day job-search workshop.)</i> Johnson, Terry R. and Daniel H. Klepinger (1991)	Washington	July 1986 to August 1987	C	-0.47	\$292  (Year after start of unemployment claim)	\$563	\$282	\$281

Study name, nature of treatment and authors	Location of study	Time period of program analysis	Classical (C) or Non-experiment (N)	Effect on weeks of unemployment benefits received	Effect on earnings in dollars		Net impact: earnings first two quarters in 2008 dollars	Net impact: earnings first two quarters in 2009 dollars
					Current dollars	2008 Dollars		
<p>4. <i>Evaluation of the Maryland Unemployment Insurance Work Search Demonstration</i> (T1 = Report four employer contacts weekly; T2 = Two employer contacts required weekly, but no reporting; T3 = Report two employer contacts weekly plus a four-day job-search workshop; T4 = Report two employer contacts weekly, and both are verified.) Klepinger, Daniel H., Terry R. Johnson, Jutta M. Joesch and Jacob M. Benus (1997)</p>	Maryland	Jan. 1, 1994 to Dec. 31, 1994	C	<p>T1 = - 0.7*  T2 = + 0.4  T3 = - 0.6*  T4 = - 0.9*</p>	<p>T1 = \$54  T2 = 347*  T3 = \$163  T4 = \$124</p> <p>(Net benefit year)</p>	T2 = \$504*	T2 = \$257*	T2 = \$256*
<p>5. <i>Kentucky Worker Profiling and Reemployment Services Experiment</i> (Mandatory employment and training services to claimants with high probability of exhausting unemployment benefits.) Black, Dan A., Jeffrey A. Smith, Mark C. Berger and Brett J. Noel (2003)</p>	Kentucky	October 1994 to June 1996	C	-2.2*	<p>\$1,054</p> <p>(Year after start of unemployment claim)</p>	\$1,489	\$1,489	\$1,484

Study name, nature of treatment and authors	Location of study	Time period of program analysis	Classical (C) or Non-experiment (N)	Effect on weeks of unemployment benefits received	Effect on earnings in dollars		Net impact: earnings first two quarters in 2008 dollars	Net impact: earnings first two quarters in 2009 dollars
					Current dollars	2008 Dollars		
6. <i>Assisting Unemployment-Insurance Claimants: The Long-Term Impact of the Job-Search Assistance Demonstration</i> (Structured job-search assistance for claimants with the greatest need for services.) Decker, Paul D., Robert B. Olsen, Lance Freeman and Daniel H. Klepinger	District of Columbia	June 1995 to June 1996	C	-1.13*	\$635*  (Year after start of unemployment claim)	\$884*	\$442*	\$440*
7. <i>Assisting Unemployment-Insurance Claimants: The Long-Term Impact of the Job-Search Assistance Demonstration</i> (Structured job-search assistance for claimants with the greatest need for service.) Decker, Olsen, Freeman and Klepinger (2000)	Florida	March 1995 to March 1996	C	-0.41*	-\$4  (Year after start of unemployment claim)	-\$6	-\$3	-\$3
8. <i>Evaluation of Worker Profiling and Reemployment Services (WPRS) Systems.</i> (Evaluates the WPRS system.) Dickinson, Katherine P., Suzanne D. Kreutzer and Paul T. Decker (1999)	Delaware, Kentucky and New Jersey	1994 Q4 to 1995 Q1	N	Delaware -0.45 Kentucky -0.72* New Jersey -0.55*	Delaware -\$464 Kentucky \$49 New Jersey \$416*	Delaware -\$656 Kentucky \$69 New Jersey \$588*	Delaware -\$656 Kentucky \$69 New Jersey \$588*	Delaware -\$654 Kentucky \$69 New Jersey \$586*

Study name, nature of treatment and authors	Location of study	Time period of program analysis	Classical (C) or Non-experiment (N)	Effect on weeks of unemployment benefits received	Effect on earnings in dollars		Net impact: earnings first two quarters in 2008 dollars	Net impact: earnings first two quarters in 2009 dollars
					Current dollars	2008 Dollars		
9. <i>Measuring the Effect of Public Labor Exchange (PLX) Referrals and Placements in Washington and Oregon</i> (PLX job referrals based on UI program administrative data.) Jacobson and Petta (2000)	Washington and Oregon	1987 to mid-1995	N	-2.1*	Not directly estimated	Not directly estimated	Not directly estimated	Not directly estimated
10. <i>Work Force Investment Act Non-Experimental Net Impact Evaluation</i> . (JSA Core services and JSA intensive services.) Heinrich, Mueser and Troske (2008)	12 states: Connecticut, Indiana, Kentucky, Maryland, Missouri, Minnesota, Mississippi, Montana, New Mexico, Tennessee, Utah and Wisconsin	June 2003 to June 2005	N	Not estimated	Females: \$969* Males: \$1,182*  (First two quarters following program entry)	Females: \$1,102* Males: \$1,344*	Females: \$1,102* Males: \$1,344*	Females: \$1,098* Males: \$1,339*
11. <i>An Evaluation of the Impact of ES Referrals on Applicant Earnings</i> . (Receipt of job search United States Employment Service (ES) services, particularly job referrals versus non-receipt of job referrals.) Johnson, Terry R., Katherine P. Dickinson and Richard W. West (1985)	27 states (30 ES offices)	July 1980 to May 1981	N	Not estimated	Females: \$325* Males: -\$98  Six months after applying for ES services	Females: \$810* Males: -\$244	Females: \$810* Males: -\$244	Females: \$807* Males: -\$243

Study name, nature of treatment and authors	Location of study	Time period of program analysis	Classical (C) or Non-experiment (N)	Effect on weeks of unemployment benefits received	Effect on earnings in dollars		Net impact: earnings first two quarters in 2008 dollars	Net impact: earnings first two quarters in 2009 dollars
					Current dollars	2008 Dollars		
12. <i>Evaluation of the Strengthening the Connections Between Unemployment Insurance and the One-Stop Delivery Systems Demonstration Projection Wisconsin</i> [Within WPRS, a mixture of "light touch" (45.4 percent) and intensive services (54.6 percent). Comparison group had access to and used self service/information job-search services.] Almandsmith, Sherry, Lorena Ortiz Adams, and Han Bos (2006)	Wisconsin	July 2003 to December 2005	N	-0.6	- \$31  First quarter 2006	- \$33	- \$66	- \$66

\*Statistically significant at an alpha of 0.05 or better; that is, the chances are no more than one in 20 that the true effect is zero.

<sup>†</sup>The level of statistical significance was not indicated.