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# Workforce System Net Impact Estimates and Rates of Return: Performance Measures?

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# Background Studies

- (1) Hollenbeck & Huang, *Net Impact and Benefit-Cost Estimates of the Workforce Development System in Washington State*, 2003  
url: <http://www.upjohninstitute.org/publications/tr/tr03-018.pdf>
  
- (2) Hollenbeck & Huang, *Net Impact and Benefit-Cost Estimates of the Workforce Development System in Washington State*, 2006  
url: <http://www.upjohninstitute.org/publications/tr/tr06-020.pdf>
  
- (3) Hollenbeck & Huang, *Workforce Program Performance Indicators for The Commonwealth of Virginia*, 2008  
url: <http://www.upjohninstitute.org/publications/tr/tr08-024.pdf>
  
- (4) Hollenbeck & Huang, *Indiana*, in progress

# Methodology

- Net Impact (Definition)
  - Outcomes resulting from encountering a program relative to next best alternative
    - If program didn't exist, clients would be going to next best alternative

1. Outcomes — what and when
2. Resulting from
3. Encountering a program
4. Next best alternative

Outcomes	Washington	Virginia	Indiana
Employment	Defined as $\geq$ \$100 in a quarter	Defined as $\geq$ \$50 in a quarter <u>or</u> enrolled in school if $\leq$ 18	Defined as $\geq$ \$100 in a quarter
Earnings	Quarterly earnings totaled across all employers	Quarterly earnings totaled across all employers	Quarterly earnings totaled across all employers
Hours Worked per Quarter	Hours totaled across all employers	Not available	Not available
Hourly wages	Earnings divided by hours worked	Not available	Not available
Credential completion	Not available	Credential earned while in program or within 12 months of exit	Not available
Unemployment compensation	Benefits of at least \$1 in quarter	Not available	Benefits of at least \$1 in quarter
TANF/Food Stamp benefits	Benefits received by assistance unit that included participant of at least \$1 in quarter	Not available	Not available
Medicaid eligibility	State Medicaid administrative data indicated participant was “enrollee” during at least one day in quarter	Not available	Not available
<u>Time Periods:</u>			
Short term	3 full quarters after exit	2 full quarters after exit	Quarter 1 through 10 after exit
Long term	8–11 full quarters after exit in study 1; 9–12 full quarters after exit in study 2	4 full quarters after exit	

1. Outcomes — what and when
2. Resulting from
3. Encountering a program
4. Next best alternative

## Practice in these studies:

Participant  $\equiv$  exiting from a program during a particular 12 month period

## Implications:

1. May be completer or non-completer (can do subgroups)
2. Exit date sometimes difficult to determine
3. Entry may have occurred in prior years
4. Entry date sometimes difficult to determine
5. “Treatment” is black box

1. Outcomes — what and when
2. Resulting from
3. Encountering a program
4. **Next best alternative**

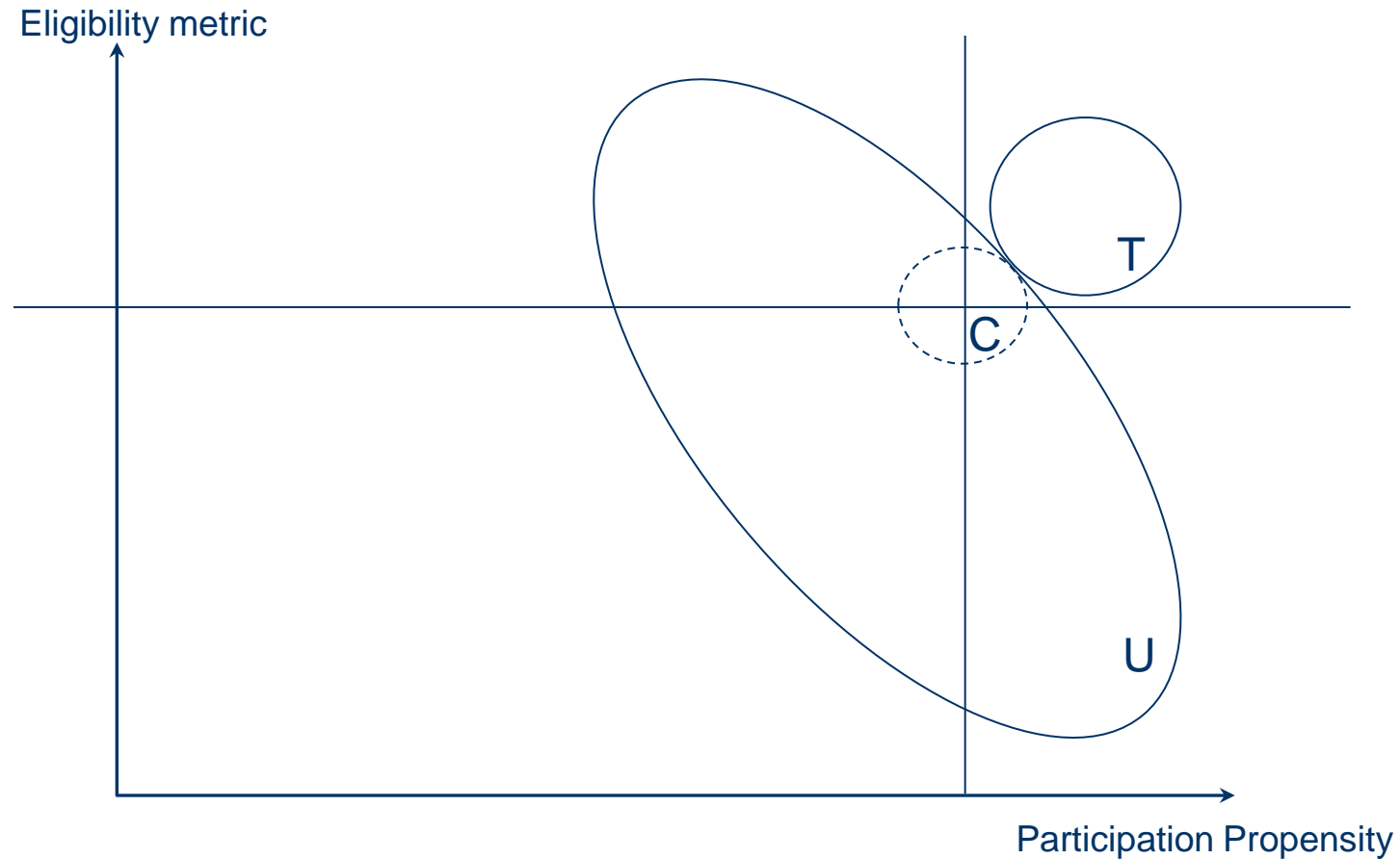
- Generally, we used exited from Job Service and not in another program
- For High School Voc., we used non-voc. students in high school database
- For Voc. Rehab and Visually Impaired we used “eligible, but not served”

1. Outcomes — what and when
2. Resulting from
3. Encountering a program
4. Next best alternative

- Needs to be estimated — can't be in two states of the world at same time
- Estimation Method #1: Random Assignment
  - “gold standard”
  - Expensive. May not be viable when programs are entitlements.
- Estimation Method #2: Pre-post
  - Generally only a last resort; problem is too many intervening factors
- Estimation Method #3: Quasi-experimental
  - Program participants — treatment
  - LE — comparison group



# Quasi-experiment Heuristic



**NOTE:** Two major problems in comparing U and T: (1) observable characteristics may differ (composition), and (2) unobservables.

# Estimation methods:

1. Whole sample: comparison of means, regression, blocking, kernel density estimation
2. Statistical matching:
  - a) Characteristics
  - b) Propensity score

**Key assumptions: “Support”**  $\rightarrow 0 < \text{prob}(T=1 | x) < 1$

**“Conditional Independence”**  $Y \perp (T|X), \text{ or } E(Y|T, X) = 0$

# Propensity score statistical matching:

Stage 1: Estimate “participation” model (usually by logit)

$$T_i = g(x_i, e) \quad T_i = 1, 0$$

Calculate predicted probability,  $\hat{T}_i$

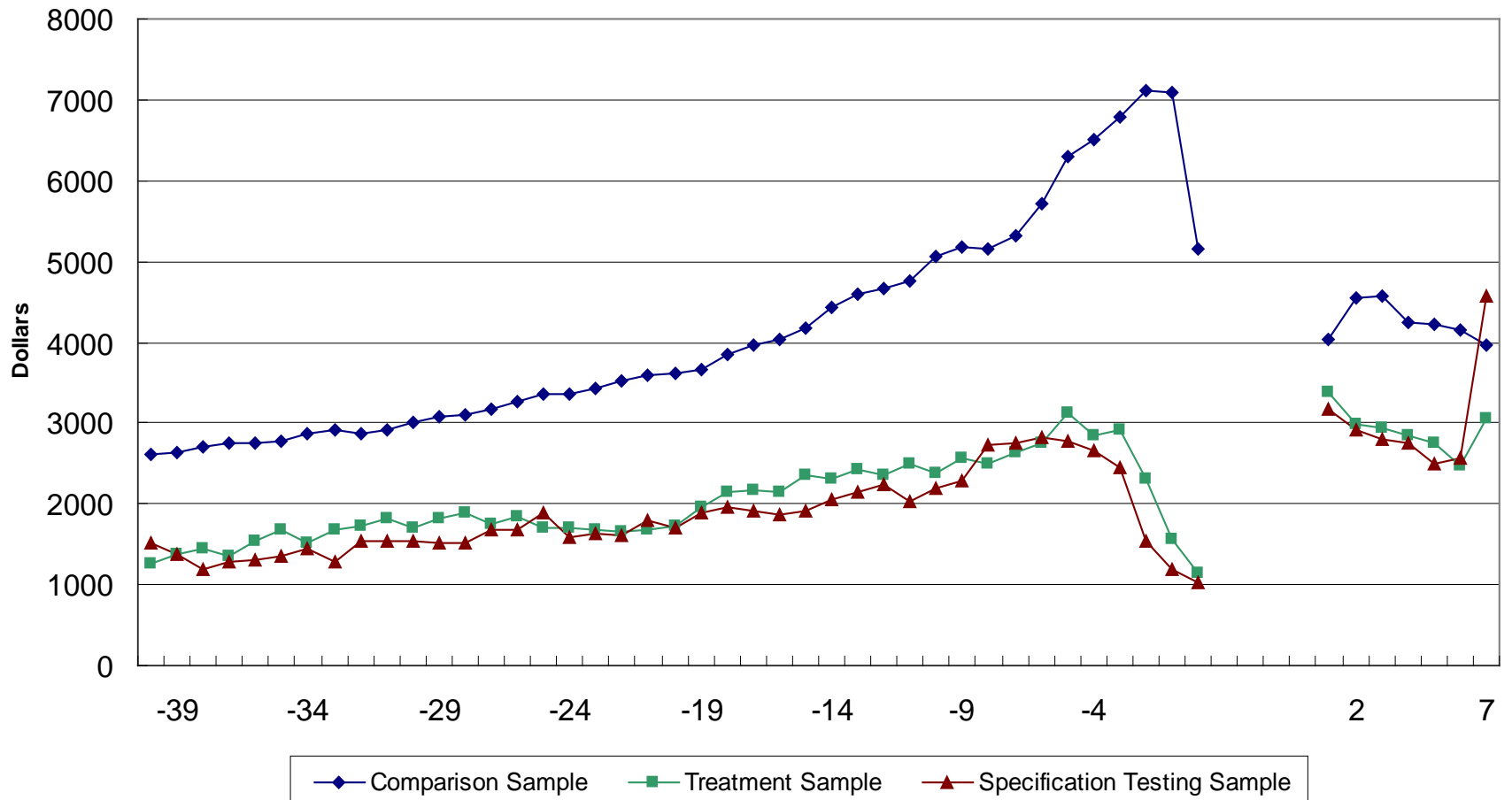
Stage 2: For each  $i \in T = 1$ , find

“closest”  $\hat{T}_j$  for  $j \in T = 0$

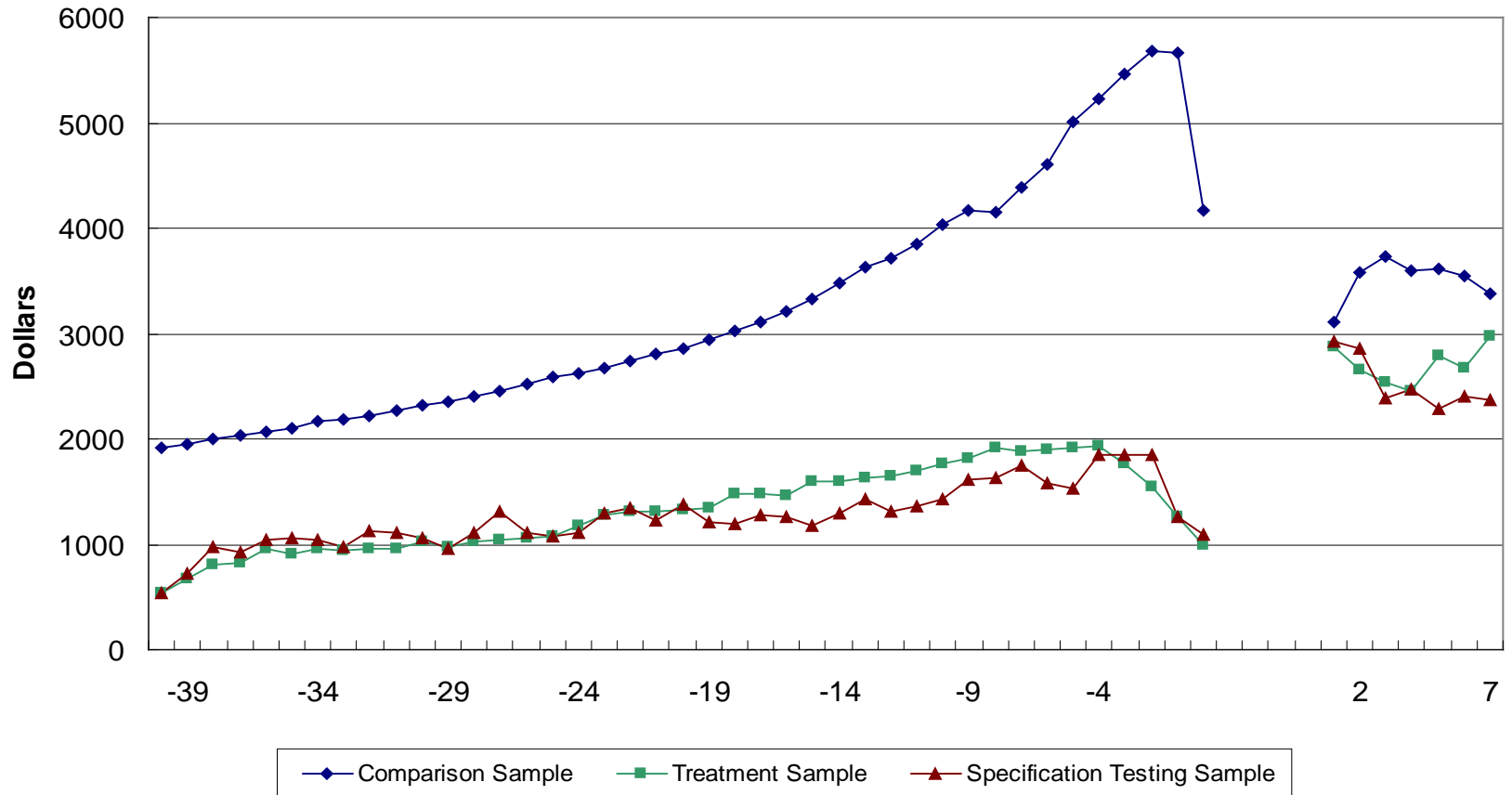
# Propensity score statistical matching options:

- Matching variables (specification of participation model) — mainly pre-program labor force, and also demographics and education at program entry
- With or without replacement
- With or without caliper
- Many-to-1 or 1-to-1

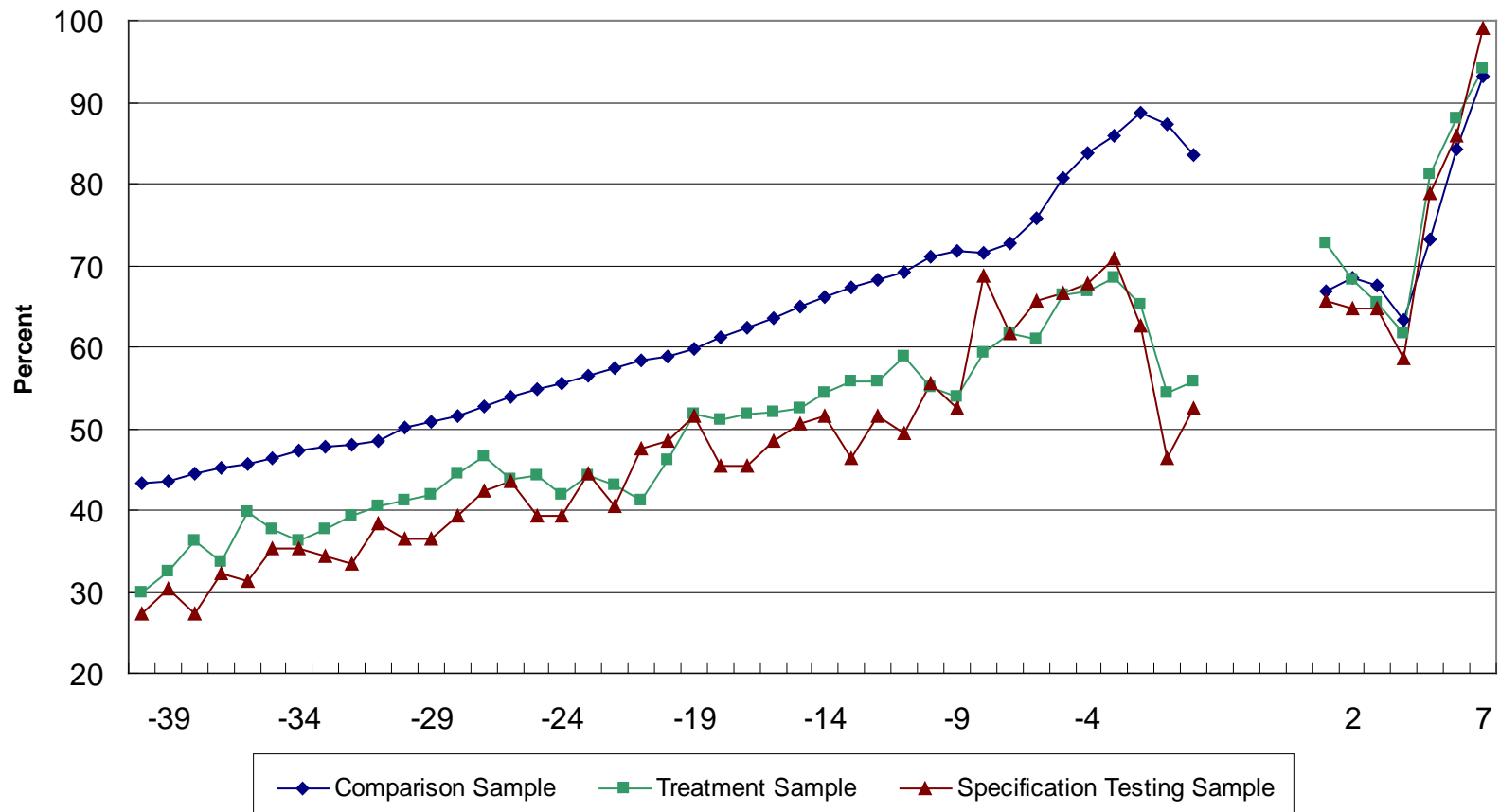
**Figure 2. Average Earnings, Male  
Comparison Sample: Full**



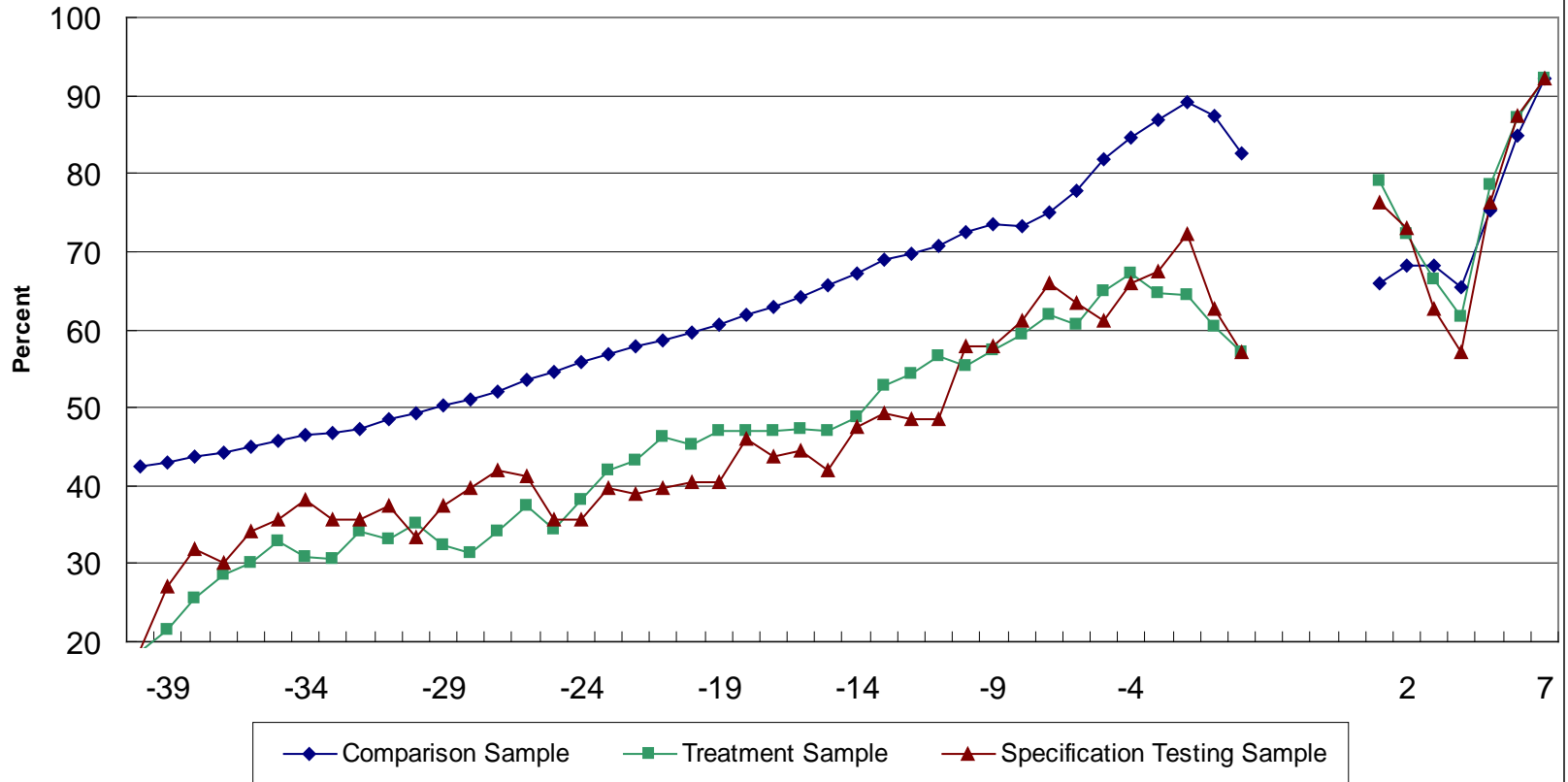
**Figure 3. Average Earnings, Female  
Comparison Sample: Full**



**Figure 4. Percent Employed, Male  
Comparison Sample: Full**



**Figure 5. Percent Employed, Female  
Comparison Sample: Full**





# Estimation (4 alternatives)

Outcome is stochastic process:

$$Y_{it} = f_1(X_i, e_i) \quad i \in T$$

$$Y_{jt} = f_0(X_j, e_j) \quad j \in C$$

1. Assume  $f_1$  and  $f_0$  are linear

$$Y_{it}(X_i) = \alpha_1 + \beta_1 X_i + e_i \quad i \in T$$

$$Y_{jt}(X_j) = \alpha_0 + \beta_0 X_j + e_j \quad j \in C$$

2. Assume same structure and T is non-interactive, separable.

$$Y_{it}(X_i) = \alpha + \beta X_i + \gamma T_i + e_i \quad T_i = 0, 1$$

- Unadjusted mean difference estimator:  $\bar{Y}_i \{i \in T\} - \bar{Y}_j \{j \in C\}$
- Regression adjusted mean difference:  $\hat{\gamma}$

# Estimation (2)

## 3. Add dynamic structure

$$Y_{it}(X_i, T_i) = \alpha + \beta_1 X_i + \beta_2 X_{it} + \gamma T_i + e_i + e_t + e_{it} \quad T_i = 0, 1$$

$$Y_{ib}(X_i) = \alpha + \beta_1 X_i + \beta_2 X_{ib} + e_i + e_b + e_{ib}$$

$$(Y_{it} - Y_{ib}) = \beta_2 (X_{it} - X_{ib}) + \gamma + (e_t - e_b) + (e_{it} - e_{ib})$$

- Unadjusted Difference-in-Difference Estimator:

$$\left( \overline{Y_{it} - Y_{ib}} \right) \{i \in T\} - \left( \overline{Y_{jt} - Y_{jb}} \right) \{j \in C\}$$

- Regression adjusted Difference-in-Difference estimator:  $\hat{\gamma}$   
(arguably controls for some unobservables)

**Table 4**  
**Long-Term Net Impact Estimates**

Program	Study	Outcome			
		Employment Rate	Quarterly Hours	Wage Rate <sup>c</sup>	Quarterly Earnings <sup>c</sup>
Federal Job Training (Adults)					
JTPA II-A	1	0.074***	23.9***	\$0.68**	\$645***
WIA I-B	2	0.066***	35.9***	\$0.67**	\$455***
Federal Job Training (Youth)					
JTPA II-C	1	0.053**	2.3	-\$0.71	-\$85
WIA I-B Youth	2	0.103***	31.1***	\$0.77***	\$325***
Dislocated Workers					
JTPA III	1	0.073***	26.6***	-\$0.10	\$554***
WIA I-B	2	0.064***	48.8***	\$0.97***	\$771***
Worker Retraining <sup>a</sup>	1	0.063***	35.1***	-\$0.53	\$503***
Worker Retraining <sup>a</sup>	2	0.046***	29.8***	\$0.18	\$306***
Education					
Secondary CTE	1	0.057***	27.1***	\$0.60***	\$536***
Secondary CTE	2	0.054***	35.5***	\$0.67***	\$426***
Comm. College Job Prep	1	0.070***	54.9***	\$2.02***	\$1,409***
Comm. College Job Prep	2	0.067***	39.7***	\$2.11***	\$1,034***
Private Career Schools	2	0.043***	21.0***	\$1.06***	\$351***
Adult Basic Ed. <sup>b</sup>	1	0.016*	-4.9	-\$0.26*	-\$53
Adult Basic Ed. <sup>b</sup>	2	0.059***	18.5***	-\$0.02	-\$27
Apprenticeships	1	0.053***	11.6*	\$4.42***	\$2,269***
	2	0.068***	20.3***	\$5.73***	\$2,340***
Disability Services					
Vocational Rehabilitation	2	0.110***	44.8***	\$1.38***	\$699***
Blind and Visually Impaired	2	0.203***	78.4***	\$5.73***	\$1,531***

**Notes:** Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State).

\*\*\* represents statistical significance at the 0.01 level; \*\* represents statistical significance at the 0.05 level; \* represents statistical significance at the 0.10 level.

<sup>a</sup> A state-funded program for dislocated worker training.

<sup>b</sup> As administered by the Community and Technical College system.

<sup>c</sup> In \$2005/2006.

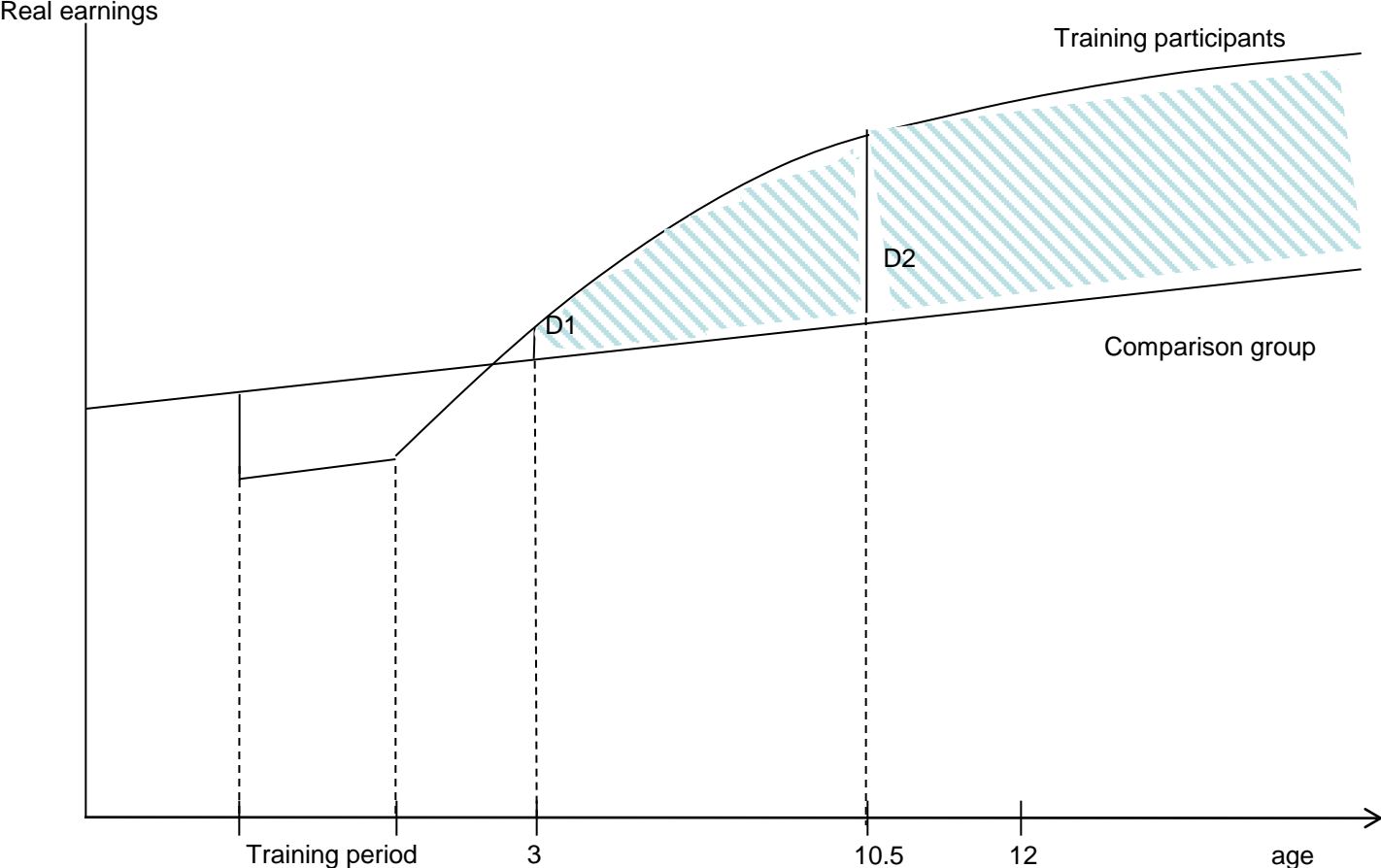
# Uses of Estimates

- Evaluation evidence
- Performance measures (other outcomes)
- Balanced scorecard
- Input to benefit-cost analysis

# Benefit-Cost Analyses and ROI

	Benefits	Costs
Participant	Discounted Net Earnings Discounted Fringe Benefits Discounted Tax Payments (negative benefits) Discounted Reduction in Transfer Payments (UI, TANF, FS, Medicaid) (negative benefits)	Foregone Earnings Tuition/Fees
Government	Discounted Tax Payments Discounted Reductions in Transfers	Provision of Services
Social	Discounted Net Earnings Discounted Fringe Benefits	Foregone Earnings Tuition/Fees Provision of Services

**Figure 2 Typical Earnings Profiles of a Training Participant and Comparison Group Member**



**Table 6**  
**Discounted Benefits and Costs and Rates of Return for Washington's Education and Training System**  
**over Working Lifetime, by Program**

Program	Study	Private			Public			Social		
		Benefits	Costs	r.o.i.	Benefits	Costs	r.o.i.	Benefits	Costs	r.o.i.
Federal Job Training (Adults)										
JTPA II-A	1	\$62744	\$ 403	20.52%	\$25,092	\$3,791	9.26%	\$87,836	\$4,194	13.23%
WIA I-B	2	38,928	-1,111	—	6,241	5,744	0.21%	45,170	4,633	15.14%
Federal Job Training (Youth)										
JTPA II-C	1	30,235	384	3.08%	6,770	2,605	6.08%	37,005	2,989	3.61%
WIA I-B Youth	2	29,002	0	—	8,282	6,617	0.07%	37,284	6,617	4.55%
Dislocated Workers										
JTPA III	1	81,327	13,640	5.19%	25,719	2,885	6.81%	107,046	16,525	5.53%
WIA I-B	2	49,201	10,746	5.00%	18,440	7,081	5.15%	67,641	17,827	5.04%
Worker Retraining <sup>a</sup>	1	70,012	18,631	2.86%	22,803	5,256	3.93%	92,815	23,887	3.08%
Worker Retraining <sup>a</sup>	2	23,938	8,952	2.82%	7,049	5,421	0.60%	30,987	14,373	2.14%
Education										
Secondary CTE	1	70,505	432	37.05%	13,389	974	10.39%	83,894	1,406	23.04%
Secondary CTE	2	43,491	-32	—	8,414	811	9.29%	51,905	779	43.97%
Comm. College Job Prep	1	103926	5,034	10.44%	31,235	7,748	3.55%	135,161	12,783	7.08%
Comm. College Job Prep	2	95,228	6,474	15.10%	14,873	7,523	2.20%	110,101	14,397	9.19%
Private Career Schools	2	35,089	308	— <sup>c</sup>	1,279	0	— <sup>c</sup>	36,368	308	— <sup>c</sup>
Adult Basic Ed. <sup>b</sup>	1	4,944	311	++	3,020	1,101	1.34%	7,964	1,412	5.75%
Adult Basic Ed. <sup>b</sup>	2	5,558	-146	—	-5,558	2,570	—	0	2,424	—
Apprenticeships	2	197896	-24465	—	49,288	2,668	24.25%	247,184	-21797	—
Disability Services										
Vocational Rehabilitation	2	56,560	-643	—	11,302	8,504	0.75%	67,862	7,861	11.99%
Blind and Visually Impaired	2	100799	1,059	++	20,094	24,358	-0.55%	120,893	25,417	7.39%

**Notes:** : Study 1 is Hollenbeck and Huang 2003 (Washington State); Study 2 is Hollenbeck and Huang 2006 (Washington State). Table entries are for average participant. Benefits include earnings, fringe benefits, and income-related transfers payments. Costs include tuition and fees (if any), foregone earnings, and public program costs per participant. \$ figures are in real \$2005/2006. – means that r.o.i. could not be calculated because of 0 or negative benefits or costs. ++ means r.o.i. is implausibly high.

<sup>a</sup> A state-funded program for dislocated worker training.

<sup>b</sup> As administered by the Community and Technical College system.

<sup>c</sup>No data collected on tuition or fees, so costs are partial. We therefore did not calculate r.o.i.

# Policy Implications

- 1) Can use administrative data to estimate net impacts of education and training programs  $\implies$  improved performance measures
- 2) Decomposing earnings impacts into employment, hours, and wage rates adds insight



# Policy Implications (Continued)

- 3) Public and society reap substantial returns on virtually all education and training programs
- 4) Implications for individual programs