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What Predicts Success in JTPA?

Test of a Three-Component Model

Carolyn Ball, Ph.D.

The Job Training Partnership Act (JTPA), an education and training program to assist the economically disadvantaged, is one of sixty or more programs Congress is considering consolidating. This program had great success in the late 1980s and early 1990s, but its value and support have been declining. This author examines whether JTPA should continue through a test of three employment theories: discrimination, signaling, and human investment using data from Maine's JTPA program. Findings indicate that while the program can reduce discriminatory barriers and negative signals such as welfare status, it does not consistently succeed as a training investment. Enrollment in an educational training program has a negative effect on an individual's ability to obtain a job, a particularly important finding, given the changes in welfare law. If it is to continue in some form, JTPA must be revised to better serve clients who need education.

In 1982, senators Daniel Quayle and Edward Kennedy crafted the Job Training Partnership Act (JTPA) (PL 97-300), which states administer by contracting with service providers to train and place economically disadvantaged individuals. Ten years later, Congress endorsed JTPA's continuation, increasing the emphasis on literacy and remedial education.

To continue to receive contracts, providers must meet the program's wage and placement performance standards. Based on its internal evaluation, JTPA has had a successful track record in New England and elsewhere (see Table 1 in Appendix A). Measured in program years that run from July 1 to June 30, it has consistently achieved about a 70 percent placement rate nationwide from Program Year (PY) '86 to PY '89, dipping downward with the recession in PY '90. This success has led the National Commission for Employment Policy to view performance standards as driving JTPA to success.¹ Additionally, many scholars view performance standards as the best measure of programs.²

Yet even with this strong record, JTPA may encounter difficulty as Congress considers merging more than sixty education and training programs into block grants.³ With the advent of the new welfare law, Temporary Aid to Needy Families (TANF), JTPA is again under scrutiny. Congress will undoubtedly expect JTPA to provide greater assistance to welfare clients, a group it has always served. Since TANF requires able-bodied individuals to work while receiving welfare, JTPA will have less flexibility in assisting individuals, about half of whom are welfare recipients. Quick placement will

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be a primary goal with education and training a secondary goal. Given these new pressures, should JTPA continue in its present form or be revised? To answer this question, I measure JTPA's success through the lens of three common theories of employment: discrimination, signaling, and human investment theory.

The Job Training Partnership Act is most closely associated with human capital investment theory. According to legislative intent, training is an investment in individuals and in the nation's economy, not a government expense.⁴ Signaling theory, on the other hand, predicts that employers choose employees based on such signals as education level, which identify an employee's potential productivity. And, of course, discrimination theory suggests that employers judge individuals on overt unalterable characteristics, not on ability. Each theory provides a different perspective on the JTPA's ability to assist participants.

To test these theories, I build exploratory regression models to measure success based on JTPA performance standards methodology. Success is measured by the outcomes measures of placements, post-training wages, and education (for those lacking a seventh-grade reading level or a general equivalency diploma) combined with placement. The data set for the models is from Maine's Title II-A adult program for PYs '89 to '91.

JTPA Performance Standards Methodology

What predicts success for the Job Training Partnership Act? The Department of Labor (DOL) measures it by two general categories of outcomes: placements and post-training wages. The specific outcomes vary, reflecting changes in the goals of JTPA, refinements in evaluation, and new data. For example, in PY '93 a new standard, placement combined with education, was added to reflect a legislative mandate to increase the literacy level of trainees.

After determining outcome measures, DOL creates ordinary least squares regression models. Unlike textbook models, which provide explanations, these models of regression are meant to be management tools which do not include all the factors that might affect outcomes. Models "hold constant those factors over which the service deliverer has little or no control."⁵ Therefore, JTPA models control for participant characteristics and area economic differences. JTPA models control for the difficulty of serving women, minorities, welfare recipients, and those who lack a high school education, groups that DOL has labeled "hard to serve."⁶ Success, then, occurs when service providers meet or exceed standards, a numerical range of acceptable performance.

Theory

Discrimination Theory

Employment discrimination research tells us that there are major differences in wages between men and women, minorities and whites, and black and white women.⁷ We also know that income and job stability increase with age although economists argue about discrimination through civil rights laws. On the other hand, these same people also receive higher wages.

Some studies emphasize discrimination as an explanation for wage disparities. For example, in his 1991 study, Clifford Adelman traced high school graduates in the years 1972 to 1984 to examine the achievements of men and women in the marketplace.⁹

Though women had higher aspirations, continued their education at the same rate as men, and had higher grade point averages in college, their pay was less than that of men. This held true even when men and women with no family responsibilities were compared.

In another study, a controlled experiment examined labor-force disparities.¹⁰ Black and white males were coached on interviewing, matched to control for characteristics such as age and physical appearance, and given fictitious indistinguishable résumés. The results indicated that blacks received fewer interviews and job offers than whites.

Studies of Job Training Partnership Act clients in Indiana, Ohio, and Tennessee also confirm the effect of gender and race on the placement and wages of participants.¹¹ But according to Kathryn Anderson, younger clients are more difficult to place than older clients, countering expectations of discrimination theory.¹²

JTPA performance standards models include indicators of protected status age, race, and gender, making data readily available to put the theory in operation. Based on this brief review, we expect that JTPA clients would feel the impact of discrimination, affecting the success of JTPA to place individuals.

Signaling Theory

Signals of life choice events are also theorized to affect a participant's chances of employment.¹³ Employers who cannot directly assess productivity consult a person's record of education or work experience to reduce uncertainty in the hiring decision. Race, gender, and age, which are unalterable, are distinguished from signals. For example, an individual can choose to invest in an education but cannot choose her race.

Obviously, research demonstrates that education is important in determining jobs and wages, and a few support the applicability of signaling.¹⁴ In one study, John Bishop found that signals, provided they were conspicuous, did have an effect.¹⁵ High school graduates with high-level skills did not receive wages any higher than those with low-level skills. The diploma rather than skill served as the signal of productivity.

Work experience or its lack because of welfare status can serve as a signal as well.¹⁶ Those who report their welfare status are less likely to be hired. Employers prefer to hire those who are not welfare recipients even when government provides incentives for hiring those who are.

JTPA studies confirm a statistically significant effect of welfare status and education.¹⁷ In fact, Anderson found that welfare status and education had a greater effect on placement than gender or age.¹⁸ Not surprisingly, then, we hypothesize greater success for high school graduates and those who do not receive welfare than for those who have no diploma and receive welfare. JTPA models always include education and welfare status as control variables.

Human Investment Theory

The mission of the Job Training Partnership Act is based on human investment theory more than on discrimination or signaling theory.¹⁹ Human investment theory assumes that public subsidies for training create higher incomes, higher associated taxes, and social spillovers (reduced health care costs, reduced crime) that assist both society and the individual. Government subsidizes training because employer and individual decisions lead to insufficient education and training.²⁰ Employers fail to provide general training because it is visible to other employers and may lead to turnover. Individuals often do not seek training on their own because they lack funds or perceive few rewards

for doing so. Thus, government-sponsored training programs such as JTPA close that gap by providing training.

JTPA research indicates that the type of training provided is critical to success (see Glossary for definitions). For example, research has found that on-the-job training consistently yields high placement rates, but by and large has less impact on earnings than other forms of training.²¹ Nationwide, however, more JTPA participants are enrolled in job search instruction, the least effective type of training.²²

It is fair, then, to conjecture that training has an impact on success but varies with the type of training. DOL performance models adjust for factors outside the control of service providers, so training activities are normally excluded. However, data on enrollment in the most common forms — on-the-job training, occupational training, educational training, and job search assistance — are collected and available.

Test of a Three-Component Model

To test the ability of the three theories to explain the success of the Job Training Partnership Act, I retain its methodology and measure success as placement, wages, and placement combined with educational training. Rather than assuming that one theory is more important than another, I view the theories as three components affecting success. The probability of success is estimated as a linear function of (unalterable characteristics) + (signals) + (training investments) + e , where e is a random error term. For clarity and simplicity, I use only the most common factors and outcome measures found in Department of Labor models and employment theories. The variables are gender and age to measure discrimination, education and welfare status to measure signaling, and the four types of training to measure investment. I exclude race in the exploratory models since there are very few nonwhites in Maine's population or client base. I use logit regression²³ for the two placement models and ordinary least squares regression for the wage model.

To determine the success of the Job Training Partnership Act, turn first to the placement models in Table 2, Appendix A. Interpreting logit regression is straightforward. The chi-square improvement indicates that each component of the model is statistically significant, improving the model's explanatory power as one moves from entering unalterable characteristics to training investments.²⁴ One can also examine the cases correctly predicted. For both the placement and education/placement models, adding the third component dramatically affects the explanatory power of the models. This is particularly true in the education/placement model, in which the cases correctly predicted increase by 8 percent.

The logit regressions, however, show that JTPA's success depends on which theory or component is viewed. First, as predicted by discrimination theory, JTPA has more difficulty placing older participants. Placements increase as participants become older, tapering off for the oldest participants. But gender is significant only in the education/placement model. The probability of being placed and having received educational training, all other factors held constant, is 61 percent for females and 73 percent for males.²⁵

JTPA has unexpected success overcoming signal barriers. Welfare recipients have a greater probability of being placed than non-welfare recipients. Being a dropout has significance only in the education/placement model, which one might expect. Even here

the difference is relatively small; the probability of dropouts being placed amounts to only 3 percent less than that of high school graduates. Signals that normally make it difficult to find a job have limited effect on Maine trainees.

As expected, the success of JTPA depends on the training. Since the act is based on human investment theory, this result is more troublesome for its future success as a stand-alone program. The placement model indicates that only on-the-job training is a positive investment. But for those who receive educational training, investment in any additional training, whether job search assistance or occupational training, is a positive benefit. This seems to indicate that there are two groups of trainees served, those who can use on-the-job training and those who need a greater investment for their future.

How do the three components affect success measured by post-training wages? The regression model in Table 3, Appendix A, shows that with each component, the R-square increases by about 2 percent, and all components work in the direction theorized. The investment component's impact, again, is highly dependent on the type of training provided. Only occupational training increases wages. On-the-job training has a negative impact while educational training is not significant. What appears to be happening is that service providers can, for the most part, overcome discrimination and negative signals when placing individuals, but wages are affected by all three components.

Strength of Theories

The reduced models in Table 4, Appendix A, with nonsignificant variables eliminated, give a clearer picture. If one views the Job Training Partnership Act as a means to overcome discrimination or signaling life events, the program has been successful. For example, signals have no significance in the education/placement model;²⁶ wages, however, are more difficult to equalize. When all other factors are removed or partialled, indicated in the last column of Table 4, female wages decrease by about .19 and dropout wages by about .12.

If one views JTPA through the lens of an investment strategy, the reduced models reveal greater problems. The probability of placement for those who receive educational training decreases by about .20 when all other variables are removed. This is a dramatic effect: receiving educational training is the most important variable in explaining the lack of success of JTPA as an investment. Only occupational training has an effect on increasing post-training wages and serves as an investment strategy..

The Relation of Theory and Practice

How do these theoretical results relate to practice? Before answering that question, one has to resolve a technical issue. Have the theories actually been tested? The R-square and the comparable chi-square indicate that critical factors were left out of the three-component models, biasing the results. The Center for Governmental Studies at Northern Illinois University, however, has found that performance standards models routinely explain 5 to 7 percent of the variance regardless of the demographic or economic data included.²⁷ Therefore, given similar modeling results, the three-component models show that service providers have been successful at overcoming discrimination and negative signals in their placement policies. In fact, Maine welfare recipients have a greater likelihood than non-welfare recipients of being placed.

To improve the success rate, however, JTPA service providers must be aware of creating a human investment strategy, particularly for their welfare clients. With the Work First philosophy DOL is embracing to support TANF legislation, greater emphasis has to be given to on-the-job training.²⁸ In the past, DOL frowned on such training, viewing it as a subsidy to employers who would teach individuals anyway. JTPA needs to increase its contacts with the business community to make on-the-job training possible for more than a small group of people. Job search assistance alone is not likely to benefit people even though it is the most common form of training nationwide.

The Job Training Partnership Act currently balances emphasis on placements with wage performance standards. Performance standards are expected to continue, but states will be receiving bonuses for welfare placements. This will make it more difficult for JTPA to improve educational opportunities and, hence, recipients' future wages. In Maine, virtually no welfare recipients have received both on-the-job training and educational training. Those entering JTPA in need of remedial education have been difficult to place, which is not likely to change. But if clients receive an additional investment in other forms of training, they will be placed and their wages may be comparable.

Finally, JTPA has to build upon its success in overcoming signal barriers for welfare clients by active involvement in helping individuals make decisions about their training and by obtaining resources for clients once they complete the program. Nationally, welfare recipient wages have risen steadily but only to an average of \$7.05 per hour for a thirty-six-hour week. On-the-job training can meet their short-term needs, but occupational training has greater success in increasing participant wages. Considering the Work First emphasis, however, fewer JTPA clients may see occupational training as a viable option. Welfare recipients, with some exceptions, must work. States that value higher wages for JTPA clients will have to request exemptions, since the act provides funding for only two years of schooling when many careers demand at least four years. ❀

Glossary

Educational training: conducted in an institutional setting, training designed to enhance participants' employability by upgrading basic skills, for example, remedial education, basic/GED education, literacy, and English as a second language. Educational training does not provide the technical skills and knowledge required to perform a specific job or group of jobs nor does it provide job search assistance such as résumé writing, interviewing skills, and so forth.

Job search assistance: activities designed to facilitate movement into the labor market including job-seeking skills, résumé writing, interviewing techniques and job referrals, labor-market information placement assistance, job clubs, counseling, and help in establishing and achieving employment goals.

Occupational training: conducted in an institutional setting, training designed to provide the technical skills and knowledge required to perform a specific job or group of jobs. Classroom vocational training is included in this category.

On-the-job training: provides the knowledge and skills necessary for full performance of a job while participants are engaged in productive work. Employers that provide on-the-job training may be reimbursed for their services.

Placement: includes only the formerly employed who are placed in an unsubsidized job, enter the armed forces, become self-employed, or enter a registered apprenticeship program.

Appendix A

Table 1
Comparison of Outcome Measures and Participant Mix

	Nationwide		Connecticut		Maine		Massachusetts		New Hamp.		Rhode Island		Vermont	
	PY89	PY90	PY89	PY90	PY89	PY90	PY89	PY90	PY89	PY90	PY89	PY90	PY 89	PY90
Percentage Placed	71	63	72	57	82	83	74	61	69	39	71	66	65	56
Average Hourly Wage	5.64	5.85	7.22	7.29	6.16	6.32	7.77	7.94	6.93	6.70	6.76	6.98	5.99	6.09
Percentage Female	56	58	59	64	68	67	58	64	65	78	49	43	50	45
Percentage Dropout	27	26	26	24	25	13	23	23	21	31	23	19	28	30
Percentage Welfare	28	31	43	51	30	39	44	45	38	59	26	24	47	53

Source: Data from U.S. Department of Labor, Employment and Training Administration.

Table 2

Logistic Regressions of Success

	Placed			Placed with Educational Training		
	B	B	B	B	B	B
<i>Unalterable Characteristics</i>						
Gender	0.259 ^a	0.124	0.089	0.511 ^a	0.326	0.562 ^a
Age	0.092 ^a	0.095 ^a	0.082 ^a	0.113 ^a	0.117 ^a	0.140 ^a
Agesq	-0.001 ^a	-0.001 ^a	-0.011 ^a	-0.001 ^a	-0.002 ^a	-0.002 ^a
<i>Signals</i>						
Welfare	0.507 ^b	0.390 ^b	—	0.766 ^b	0.441 ^a	
Dropout	-0.153	-0.018			-0.333	-0.128 ^a
<i>Investments</i>						
On-the-job training	—	—	1.748 ^a	—	—	—
Educational			-1.634 ^a	—	—	—
Occupational	—	—	-0.382 ^a	—	—	0.033 ^c
Job Search	—	—	—	—	—	0.905 ^c
<i>Explained Correctly</i>						
- 2LL	2539	2516	2377	644	629	570
Chi-square improvement	17.0 ^b	22.9 ^c	139.0 ^b	9.9 ^a	15.9 ^b	58.1 ^c

N = 2369 for the placement model.
N = 504 for the placement with educational training model.

Source: Data files of the Maine Department of Labor, Augusta, for PY '89 to PY 91'.

- Notes:
- Placed = 1 = Placed; 0 = Not placed.
 - Gender = 1 = Male; 0 = Female.
 - Age 22 through 70.
 - Dropout 1 = No GED; 0 = GED/high school diploma.
 - Welfare 1 = Welfare; 0 = Not on welfare.
 - Training 1 = Received training; 0 = Did not receive training.

^aSignificant at .05 level.
^bSignificant at .001 level.
^cSignificant at .0001 level.

Table 3

Ordinary Least Squares Regressions of Success

	Wage		
	B	B	B
<i>Unalterable</i>			
<i>Characteristics</i>			
Gender	0.6556 ^a	0.8315 ^a	0.9431 ^a
Age	0.1391 ^b	0.1257 ^b	0.1224 ^b
Agesq	-0.0017 ^b	-0.0015 ^b	-0.0015 ^c
<i>Signals</i>			
Welfare	—	-0.2612 ^d	-0.2758 ^d
Dropout	—	-0.8324 ^d	-0.8324 ^d
<i>Investments</i>			
OJT	—	—	-0.2861 ^d
Educational	—	—	0.0724
Occupational	—	—	0.4820 ^a
F	15.6700 ^a	16.2620 ^a	14.2200 ^a
R-square	0.0282	0.04788	0.06584
R-square Ch	0.0282	0.01966	0.01796

N = 1623

Source: Data files of the Maine Department of Labor, Augusta, PY '86 to PY '91.

^aSignificant at .0001 level.

^bSignificant at .001 level.

^cSignificant at .01 level.

^dSignificant at .05 level.

Table 4

Final Models

	Placement		Placement with Education		Wages	
	B	Rao	B	Rao	B	Partial
<i>Observed</i>						
<i>Characteristics</i>						
Gender	—	—	0.640 ^a	0.092	0.942 ^b	0.189
Age	0.083 ^a	0.045	—	—	0.122 ^b	0.083
Agesq	-0.001 ^a	-0.052	—	—	-0.002 ^b	-0.078
<i>Life Events</i>						
Welfare	0.414 ^b	0.070	—	—	-0.269 ^c	-0.056
Dropout	—	—	—	—	-0.275 ^b	-0.118
<i>Training</i>						
On-the-job	1.755 ^b	0.070	—	—	-0.298 ^c	-0.051
Educational	-1.635 ^b	-0.200	—	—	—	—
Occupational	-0.388 ^a	-0.044	0.970 ^d	0.133	0.479 ^b	0.105
Job Search	—	—	1.037 ^b	0.182	—	—
<i>Explained</i>						
Correctly	77.7%	—	73.05%	—	—	—
- 2LL	2377	580.59	—	—	F	16.210
Chi-square	178.41	—	73.718	—	R-sq	0.066
Chi-square improvement	7.04	—	7.837	—	R-sq Ch	0.020

N = 2369 for the placement model.
N = 501 for the placement with educational training model.
N = 1623 for the wage model

Note: In the placement with education model, job search rather than on-the-job training.
Only four individuals were enrolled in the latter and received educational training.

^aSignificant at .01 level.
^bSignificant at .0001 level.
^cSignificant at .05 level.
^dSignificant at .001 level.

Notes

1. National Commission for Employment Policy, *Evaluation of the Effects of JTPA Performance Standards on Clients, Services, and Costs*, NCEP Research Report 88-16 (Washington, D.C.: NCEP, 1988).
2. Joseph Wholey and Harry Hatry, "The Case for Performance Monitoring," *Public Administration Review* 52 (1992): 604-610.
3. Johnny Ray Youngblood, "Jobs for Nobody," *New York Times*, June 30, 1995, A19.
4. For a history, see Richard Fenno, *The Making of a Senator* (Washington, D.C.: CQ Press, 1989).
5. For details, see U.S. Department of Labor, Employment and Training Administration, *Guide for Setting Title II-A and Title III EDWAA Performance Standards for Program Year (PY) 1990* (Washington, D.C.: DOL, November 1990). DOL obtains aggregate data for service deliverers. At the state level the models are replicated with a series of dummy variables.
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7. For a discussion of wage differentials between men and women, see Elaine Sorenson, "Exploring the Reasons behind the Narrowing Gender Gap Earnings," Urban Institute Report 91-2 (Washington, D.C.: Urban Institute, 1991), and Clifford Adelman, *Women at Thirtysomething: Paradoxes of Attainment* (Washington, D.C.: U.S. Department of Education, June 1991). For minorities, see Jewelle Taylor Gibbs, *Young, Black, and Male in America* (Dover, Mass.: Auburn House, 1988); Norton Grubb and Robert Wilson, "Sources of Inequality in Earnings," *Monthly Labor Review* 112 (1989): 3-13; Margery Turner et al., *Opportunities Denied, Opportunities Diminished: Racial Discrimination in Hiring* (Washington, D.C.: Urban Institute, 1991); and James Smith and Finis-Welch, *Closing the Gap: Forty Years of Economic Progress for Blacks* (Santa Monica: Rand Corporation, 1986). For black and white women, see James Cunningham and Nadja Zalokar, "The Economic Progress of Black Women," *Industrial and Labor Relations Review* 45 (1992): 540-555.
8. Kevin Murphy and Finis Welch, "Empirical Age-Earnings Profiles," *Journal of Labor Economics* 8 (1990): 202-229.
9. Adelman, *Women at Thirtysomething*, vi, 7, 23.
10. Turner et al., *Opportunities Denied*, 42-55.
11. Carolyn Ball, "The Maine JTPA Program in the Workforce," paper prepared for the Maine Department of Labor, 1993; Carolyn Ball, "Wage and Gender Disparities in JTPA: A Response to GAO," paper presented at the Partnership for Careers in Employment and Training Conference, New Orleans, April 10-15, 1992; Dennis Benson and Jackie Rhoads, "Disparities in JTPA Services: Responding to Different Needs," paper presented at the Conference of the Partnership for Training and Employment Careers; Kathryn Anderson, "The Effect of Creaming on Placement Rates under the Job Training Partnership Act," *Industrial and Labor Relations Review* 46 (1993): 619, did not find race disparities in placements in Tennessee.
12. Anderson, "The Effect of Creaming," 619.
13. Michael Spence, "Job Market Signaling," *Quarterly Journal of Economics* 87 (1973): 355-374; Eugene Kroch and Kriss Sjoblom, "Schooling as Human Capital or a Signal," *Journal of Human Resources* 29 (1993): 156-175; John Bishop and Shani Carter, "The Worsening Shortage of College-Graduate Workers," *Educational Evaluation and Policy Analysis* 13 (1991): 221-246; John Bishop, "Underinvestment in Employer Training: A Mandate to Spend?" *Human Resource Development Quarterly* 4 (1993): 223-246.
14. Bishop and Carter, "The Worsening Shortage of College-Graduate Workers," 222. Adelman, *Women at Thirtysomething*, calls this the screening hypothesis. Education can screen individuals both into and out of jobs.
15. John Bishop, "Work Force Preparedness," in *Research Frontiers in Industrial Relations and Human Resources*, edited by D. Lewin, O. Mitchell, and P. Sherer (Madison, Wisc.: Industrial Relations Research Association, 1992): 447-488.

16. John Bishop, "Toward More Valid Evaluation of Training Programs," *Journal of Policy Analysis and Management* 8 (1989): 209-228.
17. For welfare status, see Benson and Rhoads, "Disparities in JTPA Services," and Anderson, "The Effect of Creaming," 619. For education, see Ball, "Wage and Gender Disparities."
18. Anderson, "The Effect of Creaming," 619.
19. Gary Becker, *Human Capital*, 3d ed. (Chicago: University of Chicago Press, 1993). According to David Hornbeck and Lester Solomon, *Human Capital and America's Future: An Economic Strategy for the '90s* (Baltimore, Md.: Johns Hopkins Press, 1991), human capital refers to the acquired skills, knowledge, and abilities of individuals.
20. Bishop, "Underinvestment in Employer Training," 220.
21. Ball, "The Maine JTPA program"; Ball, "Wage and Gender Disparities"; Benson and Rhoads, "Disparities in JTPA Services"; Stephen Bell and Larry Orr, "Is Subsidized Employment Cost Effective for Welfare Recipients?" *Journal of Human Resources* 29 (1994): 42-61; U.S. General Accounting Office (hereafter GAO), *Job Training Partnership Act Racial and Gender Disparities in Services*, HRD-91-148 (Washington, D.C.: GAO, 1991), 4; Howard Bloom et al., *The National JTPA Study* (Bethesda, Md.: Abt Associates, 1993).
22. GAO, *Job Training Partnership Act Racial and Gender Disparities*, 22.
23. The probability of placement =

$$z = \frac{1}{1 + e^{-z}}$$
 where:

$$z = \text{is a linear combination}$$

$$z = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + e$$
24. The probability of the observed results is measured mathematically as -2 times the log of likelihood, -2LL. If the model fit the data perfectly, -2LL would be zero. The chi-square improvement is the difference between -2LL as components are added.
25. This is the probability when the average age is thirty-four, the individual also received job search assistance, and the individual is not a high school dropout. For an explanation of logit modeling, see John Aldrich and Forrest Nelson, *Linear Probability, Logit, and Probit Models*, Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-001 (Beverly Hills: Sage Publications, 1984).
26. Rao (R) serves a similar function as the partial correlation in ordinary least squares. Small values indicate a small contribution to the model. Like a partial, Rao is affected by the other variables in the model.
27. Correspondence with John Baj, research associate, 1988 to 1995, Center for Governmental Studies, Normal, Illinois. See also John Baj et al., *A Feasibility Study of the Use of Unemployment Insurance Wage-Record Data as an Evaluation Tool for JTPA* (Washington, D.C.: National Commission for Employment Policy, 1991).
28. U.S. Department of Labor, *Implementation of Welfare-to-Work Grants* (Washington, D.C.: DOL, October 1997).