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INTRODUCTION

The decade of the 1960s witnessed a sharp increase in the use of benefit-cost analysis to examine questions of human capital formation and to evaluate specific manpower programs. In general, the evaluation of manpower programs is costly and time consuming because control groups are established and all subjects are traced through the program and follow-up period. This paper suggests a method for the evaluation of manpower programs by means of a standard national control group and a simple econometric model. In addition, it illustrates how this procedure was used to evaluate the performance of employment counselors in the State of California.[2]

BENEFIT-COST ANALYSIS AND CONTROL GROUPS

Calculation of the benefit derived from a human capital investment project requires one to subtract from the earnings of program participants the earnings they would have received if they had not been in the program. In general, the opportunity cost of such an investment program is the largest single cost item.[3] Establishment of a control group is a generally accepted means of estimating the appropriate costs to charge against the program.

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[1]The author wishes to acknowledge the advice and criticism of his colleagues William P. Butz, David H. Greenberg, and Gus Haggstrom.

[2]See F. W. Blackwell et al., *Performance Rewards for Services to the Employable Poor: A Proposed Incentive Pay System for Job Agents*, R-1028-HRD, The Rand Corporation, Santa Monica, June 1972.

[3]For example, Schultz has estimated that wages forgone while students are in high school account for three-fourths of the total cost of their education. See Theodore W. Schultz, *The Economic Value of Education*, Columbia University Press, New York, 1963, p. 28.

There are two major and related issues in the construction of a control group. First, since a control represents a statistical problem, what statistical procedures will be used? Second, what data base will be used? The traditional methodology requires a matched control group. A common approach is to use "no-shows" or similar people who are known to the agency but who do not apply for the specific treatment program. The self selection of those people implies that they are in fact different from the treatment population. An alternative to the traditional procedure is a national panel. This would require collecting data on an untreated group of individuals who may not have characteristics identical to those of the treatment group and using regression techniques to allow for differences. Haggstrom has shown that the choice of technique depends upon the size of the group in relation to the treatment population, as well as upon the estimated difference in mean response of the two groups in the absence of the treatment.[1]

Aside from the difficulty of formulating a control group, collecting information from control group members is expensive. For example, Borus and Buntz surveyed numerous evaluative studies of manpower programs and found an average cost per control group respondent of between $60 and $70, with a range of control group follow-up responses from 33 to 92 percent. The average response rate was about 60 percent.[2] In addition, the establishment of unique control groups to evaluate single manpower programs requires that the evaluation cannot take place until all follow-up information is collected and processed, sometimes at a delay of several years. A national control group would spread the cost over many individual manpower programs and could provide for interim program evaluations at the time of placement, before the full follow-up period.

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[1]Gus Haggstrom, *A Comparison of Alternative Methods for Estimating Treatment Effects*, The Rand Corporation, P-5067, August 1973.

[2]Michael Borus and Charles G. Buntz, "Problems and Issues in the Evaluation of Manpower Programs," *Industrial and Labor Relations Review*, Vol. 25, No. 2, January 1972, p. 239.

THE CALIFORNIA JOB AGENT PROGRAM

The technique of a national control group was used to evaluate job agents in California. In 1968 the California Legislature created the Department of Human Resource Development and the position of job agent. Job agents are special employment counselors who work with the disadvantaged and unemployed population. The legislation also provided that job agents be paid on an incentive basis, when performance measures were developed. The Rand Corporation was asked to help in determining appropriate measures of performance reward and to design an incentive pay system.

THE MODEL OF CLIENT INCOME GAIN

The principle upon which the incentive plan was based is that rewards should depend upon improvements in clients' earnings brought about through services provided by job agents. This is consistent with the objectives of most manpower programs, which have tried to increase the future income stream of program participants by reducing the time they are unemployed or by increasing their post-unemployment wages or job stability.

The net pecuniary benefits attributed to the job agent from income gain by an individual client can be estimated as:

$$\hat{\tau} = Y - \hat{Y} \qquad (1)$$

where $\hat{\tau}$ = the client's estimated net income gain (benefit)

Y = the client's actual money income in period T

$\hat{Y}$ = the client's predicted money income in period T, inferred from the behavior of people in the national control group.

To calculate the net benefit from participating in the program with Eq. (1), it is necessary to define a common period over which to measure and predict money income--that is, period T.[1]

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[1]The determination and treatment of an appropriate benefit period is an important step in any evaluative study. Ideally, one would like

One way a program can increase a client's earned income is to reduce his unemployment below what he would have expected had he not received program services. Similarly, net benefits from the program will be increased if his wage rate and number of days worked can be increased. The appropriate period over which to measure a client's income is equal to his predicted duration of remaining unemployment had he not participated in the program, plus a predetermined follow-up period. Therefore:

$$T = P + \hat{R} \qquad (2)$$

where T = benefit period

P = predetermined post-unemployment follow-up period

$\hat{R}$ = predicted duration of remaining unemployment, had the client not joined the program.

$\hat{R} = \hat{\sigma}h(A - \widehat{DU})/\hat{\sigma}$.[1]

It follows, then, that calculation of the client's income gain requires estimation of $DU = f(X)$ and the prediction of $\widehat{DU}$ for the client.

Furthermore, since earned income is not received during periods of unemployment,

$$\hat{Y} = \widehat{WR} \cdot \widehat{DW} \qquad (3)$$

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to measure the discounted (present value) stream of net earnings that occur for participation in the program over the working life of the client. Practically, it is possible to measure post-program earnings over only short periods of time--traditionally one or two years. The net effects of participation have been measured either in terms of rates of return, which require assumptions about the discount rate and the future stream of earnings for clients and members of the control group, or in terms of earnings over a simple, undiscounted payback period. In this paper, a client's income gain will be based on net earnings during a predetermined period.

[1] If the days the client has already been unemployed, A, are equal to zero, then $R = \widehat{DU}$; $\widehat{DU}$ is the predicted duration of unemployment. If A is positive, then $\hat{R}$ is the estimated value of $E(DU - A/DU \geq A)$. Furthermore, since this is equal to $\sigma h(A - U)/\sigma$, where $U = E(DU)$, $\sigma^2 = VAR(DU)$, $h(K) = E(Z - K/Z \geq K)$ and $Z \sim N(0, 1)$. Therefore $\hat{R}$ can be estimated by $\hat{\sigma}h(A - \hat{DU})/\hat{\sigma}$ where $\hat{\sigma}^2$ is the residual mean square resulting from the regression of DU on $f_1(X)$.

where $\widehat{WR}$ = predicted wage rate in follow-up period, P, if the client had not joined the program

$\widehat{DW}$ = predicted days worked in the follow-up period, if the client had not joined the program.

Therefore, it is also necessary to estimate $WR = f_2(X)$ and $DW = f_3(X)$.[1]

The expected behavior of a program client can be inferred from the actual behavior of a similar person in the control group. This requires modeling the economic behavior of control group members and estimating the model using appropriate statistical techniques. The three major factors that determined the net benefit derived from the program are the duration of unemployment and the wage rate and number of days worked in the subsequent period. Equation set (4) shows these three endogenous labor market variables as functions of both endogenous and exogenous variables in a simultaneous system. A discussion of the variables in this system appears in the following section.

$$\text{(a)} \quad DU = f_1(WR, X_1)$$

$$\text{(b)} \quad DW = f_3(WR, X_2) \qquad (4)$$

$$\text{(c)} \quad WR = f_3(DU, DW, X_3)$$

where DU = days unemployed

DW = days worked in period P

WR = wage rate in period P

X_1, X_2, X_3 = sets of exogenous variables--personal characteristics, previous work history, and education.

The simultaneous nature of the model requires that consistent estimates of the structural parameters of the model be obtained by two-stage

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[1] Although direct estimation of $Y = f(X)$, and prediction of $\hat{Y}$, is possible, carrying through the intermediate step of predicting $\widehat{WR}$ and $\widehat{DW}$ allows for interim program evaluation.

least squares (2SLS) regression. Equation set (4) can be estimated for people similar to program clients by using appropriate national control group data.

Equation (1) is a standard way of calculating the net benefit derived from a manpower program. It is unique only in that $\hat{Y}$ is statistically obtained from a national control group rather than from a control group specially constructed for the individual program. The full follow-up period must pass before actual post-program income, Y, is reported and the client's income gain can be calculated. However, program decisions cannot wait several years until all information has been received. One of the advantages of using a national control group is that an estimate of client income gain can be calculated when a client is first placed on a job. For example, at time of placement, more information is known than when the client first joined the program--the duration of unemployment and training and the wage rate and occupation at time of placement. Therefore:

$$\tilde{\tau} = \tilde{Y} - \hat{Y} \qquad (5)$$

where $\tilde{\tau}$ = client's estimated interim income gain
$\tilde{Y}$ = revised projection of money income in period T
$\hat{Y}$ = initial projection of expected money income in period T

and

$$\tilde{Y} = \widetilde{DW} \cdot WR\,[\hat{R} - R] \cdot WR \qquad (6)$$

where WR = wage rate at time of placement
R = duration of unemployment and training (total unproductive time) after joining the program
$\widetilde{DW}$ = revised projection of days worked in the follow-up period.[1]

[1] With the techniques of indirect least squares
$\widehat{DW} = a_0 + a_1\, WR^* + \beta\, X_2$

For example, if only the number of days of unemployment was reduced as a result of a client's participation in the program, his interim income gain would be $[\hat{R} - R]WR$. If the program was responsible only for an increase in the wage rate at placement, the client's interim income gain would be $[\widetilde{DW} \cdot WR] - [\widehat{DW} \cdot \widehat{WR}]$.

THE ECONOMIC MODEL

The three major factors necessary to calculate client income gain are the expected duration of unemployment and the expected number of days worked and wage rate in the follow-up period. Equation set (4) shows these factors as functions of exogenous and endogenous variables. Table 1 presents the individual variables and their hypothesized signs. The exogenous factors listed are generally included in job applications and on statistical profile reports of program participants.

Equation (4a) is suggested by the model of job search and unemployment developed by Mortensen.[1] From his theoretical formulation Mortensen has shown that the higher an individual's acceptance or reservation wage the longer he is likely to be unemployed, other things being equal. Mortensen also concludes that the greater the individual's skill, the greater the number of available job opportunities and the shorter the period he can expect to be out of work. If the clients wage at placement can be taken as a reasonable surrogate for his reservation wage, and his wage on his last job can be taken as a measure of his productivity, the former should be positively related to duration of unemployment and the latter negatively related.[2]

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where WR^* is the reduced form forecast. Therefore,
$\widetilde{DW} = a_0 + a_1\, WR + \beta\, X_2'$
where X_2' is the revised vector of client characteristics containing information on the occupation at time of placement.

[1] See Dale T. Mortensen, "Job Search, the Duration of Unemployment, and the Phillips Curve," *American Economic Review*, Vol. 60, No. 5, December 1970, pp. 848-850.

[2] *Ibid.* In the Mortensen model the duration of unemployment is shown to be a function of the distribution of all relative wage offers, the maximum acceptance or reservation wage. These factors also define the wage the individual can expect to receive after placement. If the expected and actual placement wages are equal and if the distribution

Table 1

EQUATION SET (4)

Variables	Equation (4a) $DU = f_1$	(4b) $DW = f_2$	(4c) $WR = f_3$
Endogenous variables			
DU			-
DW			-
WR	+	±	
Exogenous variables (X)	X_1	X_2	X_3
Family characteristics			
Marital status (married)	-	+	
Size	-	+	
Personal characteristics			
Sex (male)	-	+	+
Race (white)	-	+	+
Handicapped	+	±	-
Education	-	+	+
Vocational training	-		+
Age	-	+	+
Veteran	-	+	
Welfare	+	-	-
Work history, previous year			
Wage rate	-	+	+
Number of days worked	-	+	+
Number of days unemployed	+	-	-
Other factors			
Union membership	-		+
Occupation (blue collar)	±	±	±
Private transportation	-		
Physical location (rural)	+	-	-
Regional location (west)	-	+	+

Although skill levels and the placement wage rate should be prominent in determining the duration of unemployment, other characteristics are also important: family characteristics, personal characteristics,

and maximum wage offer are given, the expected duration of unemployment can be defined without information on the reservation wage rate. Mortensen suggests that employment opportunities and the maximum wage offer are functions of the characteristics of the person searching the job market. In particular, the duration of unemployment is a decreasing function of skill.

previous work history, and such other factors as location. Family factors should be important in determining the effort an unemployed individual expends looking for work. Certainly, being unemployed can be an unpleasant experience. However, it becomes more than that when other people depend upon the client's job for their well-being. Therefore, one might expect that married people and people who have large families would try harder to search the labor market and should experience shorter periods of unemployment.

The personal characteristics of the individual should also be important in determining how well he searches and how receptive future employers are likely to be. For example, there is some evidence that the labor market discriminates against females and minorities. The handicapped, the high school dropout, and welfare recipients are also likely to have difficulty in finding employment. However, people who have special training and people who have access to private transportation are likely to experience shorter periods of unemployment.

In general, yesterday's economic behavior should be an important predictor of tomorrow's behavior. People with strong work histories, as measured by number of previous days unemployed, number of days worked, and wage rate, are likely to have shorter periods of unemployment. Previous work history also acts as a proxy for other factors not explicitly included in the analysis. For example, it is likely that the job-related consequences of drug addiction are reflected in the previous work history of the addict. The model indicates that the economic behavior of an addict would probably be poorer than that of a nonaddict.

Occupation and union membership, urban location, and regional location also influence the length of time an individual can expect to be unemployed. For example, union members and people living in urban areas should have an advantage in their search of the job market.

In sum, equation (4a) shows that the duration of unemployment is a function of the wage rate the individual receives upon placement and a set of characteristics that helps to define him and his employment opportunities. In effect, equation (4a) approximates the reduced form of Mortensen's model.

Equation (4b) suggests that the labor supplied in the post-unemployment period depends upon the personal characteristics of the individual as well as on the prevailing wage rate. Economic literature is replete with discussions of the shape of the labor supply curve that suggest the effect of wage change on labor supplied is indeterminate and depends on the size of the income and substitution effects.[1] Many of the exogenous factors that are important in determining the duration of unemployment are also important in determining the number of days the individual is likely to work in the year following placement. For example, a person with a large family may feel the need for a larger income than a single person and therefore work more days.

Several factors included in equation (4a) are excluded in equation (4b). Vocational training should be helpful in a person's finding employment and even in determining the wage he is likely to receive. It is not included in equation (4b) since once someone is working his previous training should not affect his job stability. Similarly, union membership and previous occupation are probably not important in determining job stability.

Equation (4c) implies that the wage rate in the post-unemployment period is related to the number of days for which an employer is willing to hire the client, the length of job search (duration of unemployment), and the client's personal characteristics. For example, Kasper found that the average asking price of labor decreased over the duration of unemployment.[2] This is consistent with a declining marginal utility of leisure and a deteriorating household asset position over time and implies a negative relationship between the wage rate at placement and the duration of unemployment. Furthermore, there may be a negative relationship between number of days worked and the wage rate in the follow-up period. In certain types of seasonal work such as construction, employers pay premium wages to compensate workers for the loss of income when short-term jobs are ended.

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[1]For a review of supply curve theory see Richard Perlman, *Labor Theory*, John Wiley & Sons, Inc., New York, 1969, pp. 3-28.

[2]Hirschel Kasper, "The Asking Price of Labor and the Duration of Employment," *Review of Economics and Statistics*, Vol. 49, May 1967, p. 166.

The characteristics of the individual, his work history, and his location are likely to determine the wage rate he will receive after placement. In general, factors that are negatively associated with duration of unemployment and positively associated with job stability will have a positive sign in this equation. Some factors excluded from equation (4b), such as union membership and vocational training, are expected to be positively associated with higher wages and are included in equation (4c). Family characteristics, however, are excluded from this equation; such factors as family size are not expected to affect wage rates. Similarly, although the accessibility of private transportation may be important in determining the duration of unemployment, it should not affect the hourly wage rate after placement.

A NATIONAL CONTROL GROUP: THE INCOME DYNAMICS PANEL

The calculation of either the initial or revised expected money income requires the estimation of equation set (4). This section examines a set of survey data that can be used as a national control group and the data base upon which the model was estimated. The results of estimating the model are presented in the next section. A national control group should be randomly drawn from a population similar to that of participants in the program, and measures of economic behavior must be traceable over time. The Income Dynamics Panel (IDP) of the University of Michigan's Survey Research Center appears to provide an appropriate data source.[1]

The Income Dynamics Panel contains a representative cross-section of the United States as well as a supplemental sample of families known to have low incomes. Between 1968 and 1970 the representative cross-section sample netted 2,574 cases, and the supplemental sample netted 1,891 cases. These interviews were designed to collect information that explained short-term changes in the economic status of individuals and families.

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[1]For a complete discussion of this survey, see James N. Morgan and James D. Smith, *A Panel Study of Income Dynamics*, Vols. I-III, Institute for Social Research, Survey Research Center, University of Michigan, Ann Arbor, 1969.

The IDP members interviewed in the springs of 1968, 1960, and 1970 supplied information that portrayed their employment experience in 1967, 1968, and 1969. Since most manpower programs are reserved for individuals who are both unemployed and disadvantaged, the model was estimated using a subsample of IDP members who met the definition of disadvantaged used by the California Department of Human Resource Development and had some unemployment in 1968. As a result, number of days unemployed in 1968, number of days worked in 1969, and 1969 wage rate were the endogenous variables DU, DW, and WR. Factors that reflected previous employment experience--number of days worked in 1967, number of days unemployed, occupation, wage rate, and money income--were treated as exogenous personal characteristic variables.

STATISTICAL RESULTS: AN EXAMINATION OF THE LABOR MARKET BEHAVIOR OF THE DISADVANTAGED UNEMPLOYED

This section presents the regression results obtained by fitting the Income Dynamics Panel data to the model presented in equation set (4). Since the equations in set (4) are simultaneously determined, ordinary least squares may produce inconsistent estimates of structural parameters. Therefore, equation set (4) was estimated using two-stage least squares. Table 2 presents the reduced form estimates and Table 3 presents the 2SLS estimates. In both tables, triple asterisks indicate binary variables where zero equals "no" and one equals "yes." Double asterisks indicate variables are statistically significant[1] at the 5 percent probability level.

The reduced form equations express each endogenous variable as a function of the exogenous or predetermined variables.[2] In effect, the reduced form estimates of the coefficients account for not only the direct effect of the exogenous variables on a particular endogenous variable but also their indirect effect through the other endogenous variables in the system. The 2SLS estimates allow one to distinguish

[1] See P. J. Dhrymes, "Alternative Asymptotic Tests of Significance and Related Aspects of 2SLS and 2SLS Estimated Parameters," *Review of Economic Studies*, Vol. 36 (2), No. 106, pp. 213-226.

[2] For a derivation of the reduced form see E. Malinvaud, *Statistical Methods of Econometrics*, Rand McNally and Co., Chicago, 1966, p. 499.

Table 2

REDUCED FORM REGRESSION ESTIMATES

	Dependent Variables					
	1968 Days Unemployed (DU)		1969 Days Worked (DW)		1969 Wage Rate(¢/Hr) (WR)	
Explanatory Variables	Coef	T	Coef	T	Coef	T
Family size	-4.15	-2.27**	3.46	1.33	-.89	-.18
Married***	-60.15	-3.15**	71.35	2.63**	12.92	.25
Male***	-8.33	-.51	-51.38	-2.20**	-17.58	-.40
Physically handicapped***	-21.39	-2.41**	10.81	.86	-80.14	-3.37**
Vocational training***	34.11	3.78**	-8.02	-.63	83.64	3.46**
Welfare***	9.63	.84	-50.57	-3.12**	-83.80	-2.75**
White***	-33.94	-1.96**	94.48	3.85**	-69.46	-1.50
Spanish surname***	-3.62	-.32	-19.84	-1.24	-13.14	-.44
Veteran***	-15.25	-1.71**	39.06	3.08**	-18.96	-.79
Number of care in family	-13.91	-2.29**	.90	.10	3.02	.19
Age	2.17	3.58**	-.30	-.34	-.93	-.58
High-school dropout***	29.30	2.08**	10.90	.55	-6.57	-.17
Age x high-school dropout	-.32	-.66	-1.34	-1.91**	3.01	2.28**
1967 income	.01	3.39**	-.004	-.85	.04	4.80**
1967 days worked	-.34	-5.18**	.26	2.73**	-.58	-3.26**
1967 wage rate	-16.79	-3.67**	8.59	1.32	-26.44	-2.16**
1967 days unemployed	.06	.88	-.05	-.52	.43	2.28**
Recent long-term unemployment***	16.17	1.92**	-6.98	-.58	-5.11	-.23
Labor union***	-15.00	-1.29	-6.79	-.41	116.27	3.73**
1967 blue collar***	-20.87	-1.72**	-20.84	-1.21	78.61	2.42**
1969 blue collar***	-9.88	-1.11	81.75	6.46**	-1.78	-.08
Rural area***	24.99	3.20**	-27.49	-2.48**	-5.63	-.27
Western States***	-26.12	-2.77**	30.76	2.30**	-36.66	-1.46
Intercept	173.8	9.41	99.64	3.80	181.3	3.67
Standard error	45.48		64.59		121.7	
F-statistic	9.32		8.28		8.14	
R^2	.57		.54		.53	
Degrees of freedom	163		163		163	

** Significant at the .05 probability level.
*** Binary variables, 1 = yes, 0 = no.

Table 3

TWO-STAGE LEAST SQUARES REGRESSION ESTIMATES

	Dependent Variables					
	1968 Days Unemployed (DU)		1969 Days Worked (DW)		1969 Wage Rate (¢/Hr) (WR)	
Explanatory Variables	Coef	T	Coef	T	Coef	T
Endogenous						
1968 days unemployed					-1.29	-1.77**
1969 days worked					-1.16	-1.68**
1969 wage rate	.26	2.71**	-.06	-.89		
Exogenous						
Family size	-3.91	-1.72**	3.60	1.49		
Married***	-63.56	-2.65**	73.21	2.80**		
Male***	-3.70	-.18	-50.44	-2.16**	-81.86	-1.43
Physically handicapped***	-.27	-.02	2.00	.15	-90.69	-3.04**
Vocational training***	12.07	.86			118.86	3.34**
Welfare***	31.72	1.89**	-57.35	-3.68**	-128.83	-3.05**
White***	-15.64	-.73	90.21	3.82**	3.45	.05
Spanish surname***	-.16	-.01	-19.38	-1.28	-46.12	-1.09
Veteran***	-10.25	-.94	38.97	3.22**		
Number of cars in family	-14.71	-1.94**				
Age	2.42	3.18**	-.18	-.22	1.64	.76
High-school dropout***	31.04	1.76**	14.20	.74	45.03	.81
Age x high-school dropout	-1.12	-1.71**	-1.32	-1.95**	.88	.42
1967 income					.05	4.44**
1967 days worked	-.19	-2.94**	.18	2.64**	-.67	-2.43**
1967 wage rate	-9.82	-2.33**			-39.25	-2.32**
1967 days unemployed	-.05	-.52	-.04	-.37	.46	2.01**
Recent long-term unemployment***	17.51	1.66**	-7.21	-.61	8.82	.33
Labor union***	-45.64	-2.37**			88.32	2.36**
1967 blue collar***	-41.59	-2.46**				
1969 blue collar***	-9.41	-.84	83.26	6.76**	82.59	1.38
Rural area***	26.47	2.68**	-31.01	-2.98**	-3.32	-.12
Western states***	-16.46	-1.31	25.68	1.99**	-30.26	-1.03
Intercept	126.00	4.85	107.60	4.38	517.0	3.34

**Significant at the .05 probability level.
***Binary variable, 1 = yes, 0 = no.

between the direct and indirect effects. In other words, the 2SLS coefficient of a variable is estimated by holding all other exogenous and all endogenous variables constant. The reduced form estimates assume only that all other exogenous factors are constant.

The 2SLS estimates of equation (4a) are consistent with the hypotheses based on Mortensen's model[8] of job search. There is a positive and significant relationship between the duration of unemployment and the wage rate the individual receives after placement. A higher wage rate implies a higher reservation wage and results in a longer period of unemployment. Furthermore, there is a significant and negative relationship between the person's skill as measured by his previous wage rate and the period of time he remains unemployed. This may indicate that highly skilled people have better job opportunities and are thus able to secure employment in a shorter period of time.

Other factors that are significant and associated with reduced periods of unemployment are large family size, being married, having access to private transportation, having had stable work in the previous period, being a member of a union, and having been previously employed in a blue collar occupation. Factors significantly associated with increased duration of unemployment are being a welfare client, having a recent period of long-term unemployment, and living in a rural area.

Of particular note is the significant relationship between age and high school status (dropout). The estimates indicate that among the disadvantaged unemployed, high school graduates below the age of 28 have less unemployment than do high school dropouts. However, the graduate's advantage decreases with age. For example, at age 20 a dropout can expect 9 days *more* unemployment than a graduate. However, at age 30 the dropout can expect 3 days *less* unemployment than the graduate. The estimates appear to indicate that among the disadvantaged unemployed a high school diploma does not improve an individual's economic situation. In fact, since few high school graduates are in this group, the observed graduates are likely to be low achievers and may not be able to perform even as well as most dropouts. The deterioration of performance of graduates with age seems to support

this point.[1] Furthermore, the types of occupations in which these people are likely to find employment generally do not place a premium on formal education.

The 2SLS estimate of equation (4b) indicates that the wage rate is not significantly related to number of days worked in the post-unemployment period. The income and substitution effects may have balanced out. In general, the significant variables presented in Table 3 are consistent with their hypothesized signs. Significant factors positively associated with number of days worked in the year following placement are being married, being white, being a veteran, the number of days worked in the period before unemployment, finding employment in a blue collar job, and living in the western United States. Significant factors negatively related to number of days worked in the period following placement are being a welfare client and living in a rural area. Being a male is also significantly associated with reduced work. This is inconsistent with the original hypothesis. Among the disadvantaged unemployed, women appear to be more able to find jobs that provide stable employment. Occupation is another important factor in determining economic behavior. Among the disadvantaged, blue collar workers tend to have less unemployment and work more days after placement than other workers. This probably reflects the fact that the disadvantaged are relegated to the most menial of white collar jobs.

The estimates for equation (4c) indicate that the two endogenous variables, number of days unemployed and number of days worked, are significant and, as expected, negatively associated with the post-unemployment wage rate. This is consistent with a decrease in the reservation wage as the individual's marginal utility of leisure and household asset position decrease over the period of unemployment. Furthermore, the results are consistent with employers paying a premium wage for short-term employment positions. The results also

[1] Alexander found that among low-income workers, specific firm experience was more important in determining income than was age. It may also be that among the low-income (disadvantaged) workers, specific firm experience is also more important than a high school diploma. See Arthur J. Alexander, *Income, Experience, and the Structure of the Internal Labor Market*, P-4756, The Rand Corporation, Santa Monica, 1972, p. 18.

indicate that although being handicapped was not significant in determining unemployment or job stability, it is an important factor in determining the wage rate. The handicapped appear to earn substantially less than the nonhandicapped. Conversely, although vocational training did not help people find employment more quickly, it is a significant positive factor in determining the wage rate a person will receive. Likewise, union members earn significantly more than nonmembers. Welfare status is significant, as it has been in all equations. Being a welfare client has been associated with longer periods of unemployment, shorter work periods, and lower wages.

Previous work history is a significant factor in equation (4c). However, the negative sign on the variables for number of days worked and wage rate in 1967 does not represent the full effect that these variables have on the wage rate in the post-unemployment period. The 1967 income variable is, in effect, the interaction variable between these two factors. The net effect of having worked more or earned more in the period before unemployment is to increase the expected wage rate after placement. However, the result for the 1967 unemployment is not so easily explained. This factor is significant but not consistent with the expected sign.

A WORD OF CAUTION

The model and estimates described above are consistent with general principles of benefit-cost analysis and use standard econometric techniques and a carefully constructed data base. However, the statistical model may still be misspecified, and many important exogenous variables may still be missing from the analysis. There are two major concerns in this area.

First, fitting IDP data to the above model required several assumptions about the timing of the periods of employment and unemployment. Unemployment in 1968 was assumed to occur in a single period at the end of the year. Clearly, this may overstate duration of the initial period of unemployment. The first period of unemployment was also assumed to end on the last day of 1968, and any unemployment occurring in 1969 was assumed to occur after some period of employment. This

assumption may result in understating the initial period of unemployment. These assumptions were necessary if the employment situation during a standard follow-up period was to be estimated. They would be unnecessary if the time of unemployment was known.

Second, many important variables may not have been included in the analysis, and the control group may not adequately reflect the specific client population. For example, the control group is composed of a representative cross-section of the disadvantaged unemployed in the United States. However, if the client population is composed of people with unique characteristics or special handicaps, the control group would not adequately reflect the client population in this important dimension. Although variables that reflect previous work history implicitly account for some of the effect of such special factors, it is not known to what extent projections of expected money income would be biased. Further improvement and extensions in the data base will help improve the precision of the estimates, the projections of client income gain, and the usefulness of this technique as a policy tool.

SUMMARY AND CONCLUSIONS

The evaluation of any manpower program is difficult, costly, and time-consuming, largely because one must set up unique control groups each time one takes an evaluative study. But a single national control group, the IPD, could be a standard in the evaluation of numerous manpower programs.

Control groups are norms against which to measure the results of a program. For example, by observing the behavior of people similar to program clients in the control group, it is possible to infer the client's behavior had he not been in the program. The IDP data fitted to the economic model presented above allows the estimation of employment a client could have expected had he not joined the program and consequently the calculation of his net income gain from participating in the program. In addition, the techniques allow interim program evaluation at the time a client is placed, thereby eliminating the need for a substantial post-program follow-up before any evaluation can be made. As indicated by the data and estimates presented, this technique could become a valuable management and evaluative tool.

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