NBER WORKING PAPER SERIES

TAXATION AND ON-THE-JOB TRAINING DECISIONS

Harvey S. Rosen

Working Paper No. 733

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge MA 02138

August 1981

I am grateful to Michael Leeds for his excellent assistance with the computations. I have received useful comments from James Brown, Jonathan Eaton, Nicholas Kiefer, Cordelia Reimers, and members of Harvard's Public Finance Seminar. The research reported here is part of the NBER's research program on Taxation, and project in Productivity. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER Working Paper #733
August 1981

Taxation and On-the-Job Training Decisions

ABSTRACT

This paper is an econometric analysis of the on-the-job training (OJT) decisions of a group of white American males during 1975. The data are obtained from the Panel Study of Income Dynamics, which asked a very careful series of questions concerning the individual's OJT status. Each individual's internal rate of return is estimated and used as an explanatory variable to predict the probability of taking OJT. The individual's marginal tax rate is also entered in the equation. The results suggest that income taxation has tended to increase the probability of being involved in OJT. I conjecture that this is because income taxation makes investment in physical capital a less desirable vehicle for carrying consumption into the future, and hence increases the attractiveness of human capital.

Professor Harvey S. Rosen
Department of Economics
Princeton University
Princeton, New Jersey 08544

(609) 452-4022

I. Introduction

The rich econometric literature on the impact of taxes upon hours of work has provided important results for students of tax policy. There is, however, a tendency to neglect the possibility that taxation may also affect other dimensions of labor supply. The purpose of this paper is to estimate the effect of income taxation on the decision to engage in one significant kind of human capital investment, on-the-job training (OJT). I study the OJT decisions of a group of white American males during 1975. The results suggest that income taxes have tended to increase the number engaging in OJT.

Section II discusses some conceptual problems that arise in an attempt to study econometrically taxes and OJT decisions. A simple theoretical and econometric framework for analysis is presented in Section III. The data are described in Section IV, and the results and their implications are laid out in Section V. A concluding section contains some caveats and suggestions for future research.

II. Background

Mincer [1974], Heckman [1976] and Blinder and Weiss [1976], among others, have provided careful theoretical discussions of the determinants of OJT decisions. The models differ to varying degrees, but they hold in common a view of OJT as an investment, the amount of which is sensitive to its rate of return. The econometric literature on the determinants of OJT is quite thin. Although OJT sometimes appears as an explanatory variable in wage generating equations (Duncan and Hoffman [1979]), not much has been done to explain OJT itself.[1]

---

1. An exception is the study of Duncan and Hoffman [1978], which is discussed below.

Perhaps the major reason for the dearth of attempts to study OJT econometrically is measurement problems. Unlike education, one cannot ask a simple question to discover how much of it a person has accumulated.[2] I attempt to deal with this problem by taking advantage of a special set of questions asked in the ninth wave of A Panel Study of Income Dynamics (Survey Research Center, 1976) corresponding to the year 1975:

1. "On a job like yours, how long [in months] would it take the average new person to become fully qualified?"

2. "How long [in months] have you held your present position?"

If the answer to the second question is less than or equal to that of the first, then the individual is classified as being in OJT, and otherwise, not. On this basis, about 30% of the sample were engaged in OJT.[3]

Do these questions lead to an adequate depiction of the individual's current OJT status? Duncan and Hoffman [1978] discuss this issue at length, but a few remarks seem appropriate here. One can certainly imagine situations in which the Panel Study responses will produce misleading inferences. For example, while those observed not to be in OJT at a point in time might be past the time of any further investment, they might also be on the verge of taking new jobs which will involve more OJT. Unfortunately, given the absence of similar questions on OJT for subsequent years, it is impossible

---

2. Of course, even for education the measurement issue is not straightforward, because one knows neither the consumption component of time spent at school, nor its "quality."

3. Individuals who claim that they are never fully trained for their jobs are classified as being in OJT.

to determine the likelihood of such classification errors.[4]

Another problem with the questions is that they tell us nothing about the intensity with which individuals undertake OJT. It is quite possible, for example, that even those who claim to be doing no OJT are actually devoting some fraction of their potential earnings to human capital formation, albeit a very small one. It may be useful, then, to think of the dichotomous variable derived from the Panel Study questions as telling us whether or not the individual devotes a "substantial" amount of time to OJT.[5]

Finally, one should note that for purposes of this paper, it is unnecessary to interpret the answer to question 1 as an exact value of the length of the OJT period. All that is required is information on whether the training period is longer than the individual's tenure, so that the OJT classification can be made.

It is clear, then, that the survey questions do not provide a perfect indicator of an individual's OJT status. I think, however, that it is a significant improvement over other measures available for a representative sample of individuals, and is worth exploiting.

A second major obstacle to empirical analysis of OJT is that one cannot observe its rate of return even ex post. It can be inferred from the shape of the age-earnings profile, but this requires that one make specific

4. In one attempt, I examined the personal characteristics of those who were classified as "not in OJT" -- but changed jobs the next year -- to see if they were similar to those who were classified as being in OJT. There was no indication that the job changers had the same characteristics as those who were classified as taking OJT.

5. It is often the case that the value of a dichotomous variable indicates that the individual is pursuing more than some threshhold amount of an activity, as opposed to a zero amount. For example, many individuals report that they give "no" charitable contributions, when, in fact they give small positive amounts. See Boskin and Feldstein [1975].

assumptions on the nature of the process that generated the profile.[6] In this paper, I adopt one of Mincer's [1974] formulations, the advantages and disadvantages of which are discussed in the next section.

The complications brought about by introducing taxes into this situation can be illustrated by a simple two-period model of lifetime utility maximization. Eaton and Rosen [1980] have shown that even in such a simple model, the direction of the impact of an income tax upon human capital accumulation is ambiguous. Intuitively, because the tax influences the utilization rate of OJT, i.e., hours of work, it changes the rate of return to OJT. Due to the familiar conflict of income and substitution effects, however, the effect of an income tax upon hours of work is itself ambiguous, and therefore so is the impact upon human capital accumulation. The unearned income component of the income tax introduces an additional effect. By making physical capital a less desirable vehicle for carrying consumption into the future, it increases the attractiveness of human capital investment, ceteris paribus.[7]

Even in a very simple model, then, the impact of taxes upon the OJT decision cannot be known a priori. The framework of this paper allows the data to determine the effect.

III. Framework

Following the lifetime utility maximization model, assume that at the beginning of his working life, an individual decides whether or not to put himself on a career path that involves a substantial amount of on-the-job training.

6, Some have argued that observed increases in earnings over time are due not to human capital, but to hierarchical considerations. (See Cain [1975].) In this paper, no attempt is made to 'prove' that human capital exists -- it is a maintained hypothesis.

7. This effect is a prominent feature of Heckman's [1976] model.

Although the OJT decision is made in a lifetime context, the Panel Study questions give us only a snapshot of each individual in the year 1975. If the answer to the Panel Study question indicates that the individual is involved in OJT during 1975, it is assumed that he is in the midst of a spell of OJT, and that his wage can be explained by the human capital wage generating model described below. The wages of individuals who are not in OJT are assumed to be governed by the same type of process, but it is expected that their age-wage profiles are much flatter. Such individuals may be past the time in which they invested substantially in OJT, or they may have chosen career paths which never included it at all.[8]

All models of optimal human capital accumulation imply that a key variable driving an individual's OJT decision is its internal rate of return. This suggests the following two-step procedure for investigating OJT decisions: (1) Estimate for each individual in the sample the internal rate of return to OJT. (2) Estimate the responsiveness of the probability of taking OJT to the rate of return and the individual's tax situation. These issues are now discussed in turn.

A. The Internal Rate of Return to OJT

As stressed above, the internal rate of return cannot be directly observed. It can be inferred from age-wage profiles, and such inference requires that an explicit wage generating model be specified. Mincer's [1974] formulation is tractable, yields interesting results, and has been employed in a wide variety of contexts. Under certain conditions, the i^{th} individual's wage rate (w_i) is related to his years of education (ED_i) and job experience (EXP_i) by the relation

---

8. As noted above, we are unable to account for the possibility that some of those not in OJT happen to be caught in the period after the completion of some training and before the beginning of additional training.

$$(3.1) \quad \ell nw_i = \ell nw_o + r_s ED_i + \rho k_o EXP_i - \frac{\rho k_o}{2T} EXP_i^2 + \ell n\left(1 - k_o + \frac{k_o}{T} EXP_i\right) ,$$

where w_o is the potential wage in the absence of human capital investments, r_s is the rate of return to education, k_o is the initial proportion of potential wages devoted to OJT, T is the number of years over which OJT takes place, and ρ is the increment to potential earnings each period that follows from a \$1 increase in expenditure (in terms of foregone earnings) on OJT.[9]

The wage function (3.1) is derived on the basis of a number of quite restrictive assumptions. For example, the proportion of potential earnings devoted to OJT is assumed to decline linearly with time, rather than determined by choice theoretic considerations.[10] Unfortunately, attempts to add more "realistic" assumptions to the human capital generating story have lead to non-linear specifications that are barely tractable from an estimation point of view. (See, e.g., Haley [1976].) In light of its simplicity and widespread use in other contexts, I adopt (3.1).[11]

The wage generating equation applies both to those who are engaged in OJT and those who are not, but one expects that the parameter values will differ between the two groups. Therefore, (3.1) is estimated separately for each.[12] Specifically,

---

9. The assumptions behind this formulation are discussed carefully by Mincer [1974]. He uses earnings as the dependent variable, but as Blinder [1976] has pointed out, in the presence of variable hours of work, the wage is more appropriate.

10. It also assumes constant returns to human capital investment, unlike the diminishing marginal returns postulated in many other models. For a detailed evaluation of the assumptions, see Blinder [1976].

11. In order to avoid the theoretical and statistical complications of determining simultaneously education and OJT, I assume in this paper that the former is predetermined. It is hoped that in future research the decisions will be modelled jointly.

12. Since the decision to take OJT is endogenous, there is a possibility that the estimated parameters may be inconsistent due to selectivity bias. However, application of the test suggested by Heckman [1979] indicates that such bias is not a problem in this sample. (In the wage generating equation for each group, the ratio of the coefficient on the inverse Mill's ratio to its standard error is less than 0.5 in absolute value.)

I append a normal error to each equation, and estimate the parameters by maximum likelihood.

Although our main point of interest in (3.1) is the parameter ρ, one should note that it is not quite the variable that drives the OJT decision. As Blinder [1976, p. 12] has pointed out, standard theoretical considerations suggest that the relevant magnitude is the internal rate of return, r, defined as the solution to

$$(3.2) \qquad 1 = \int_0^R \rho e^{-r\tau} d\tau = \frac{\rho}{r}(1-e^{-rR})$$

where R is the number of years remaining in the earnings span. Given a ρ estimated from (3.1), information on the individual's age, and an assumption on the age of retirement (R=65), r is straightforward to compute.[13]

With estimates of r for all members of the sample in hand, the only remaining step is to estimate how it affects the probability of taking OJT. I assume that

$$(3.3) \qquad \text{Prob[Choose OJT]} = [\text{Prob}(\alpha_o + \alpha_1 r_i) > \mu_1]$$

where μ_1 has a standard normal distribution and the α's are parameters. This is the well-known probit model, which can be estimated by maximum likelihood.

According to Equation (3.3) the internal rate of return captures all the information that is needed to make the OJT decision. One could argue that "tastes" for OJT might differ among individuals, so that a vector of

---

13. Note that if the individual is sufficiently close to retirement, the internal rate of return may actually be negative.

personal characteristics should be included. The notion that personal characteristics are "proxies" for the individual's access to capital markets would lead to the same conclusion. In order to avoid colinearity problems and to keep the specification as simple as possible, I conducted only a limited amount of investigation along these lines.[14] In some experiments, (3.3) was augmented with a non-labor income variable. This was intended to be a rough measure of non-human wealth, which might be related to the extent of the individual's access to capital markets, his tastes for human capital investment, and/or his attitudes toward risk.

B. Taxes

As shown in Section II, economic theory puts no constraints on how taxation affects the rate of return to human capital investments. Ideally, one would want to estimate how each of the various tax effects discussed there influences the OJT decision. To do so would require the construction of structural equations for hours of work, savings, the rate of return to OJT, and the OJT decision itself. Such a program is beyond the scope of this paper. Instead, I merely hypothesize that the probability of taking OJT is some function of both the pre-tax internal rate of return and the tax rate. At the outset it is assumed that the relationship can be written

$$(3.4) \qquad \text{Prob}\,[\text{choose OJT}_i] = \text{Prob}\,[(\alpha_o+\alpha_1 r_i+\alpha_2 t_i) > \mu_2] \quad ,$$

where t_i is the marginal tax rate, and μ_2 has a standard normal distribution.[15] The coefficient α_2, then, summarizes all the (possibly) conflicting effects of the income tax upon the OJT decision.

14. Willis and Rosen [1979, p. S19] also exclude essentially all "taste" variables from their probit equations for the college-going decision.

15. Note that although the probit index is linear in r_i and t_i, the expected probability of doing OJT is non-linear in these variables.

A complication is introduced by the progressivity of the tax system. An individual's decision to take OJT may influence his marginal tax rate. To purge the system of this simultaneity, I estimate a regression of t on a set of exogenous variables, and use the fitted values when estimating (3.4).[16] As usual, the selection of instruments is somewhat arbitrary. The variables used here are age, number of children, education, non-labor income, and dichotomous variables for the region and type of town in which the individual was raised.

IV. Data

The data are observations for the ninth wave of the Panel Study of Income Dynamics, corresponding to the year 1975 [Institute for Social Research, 1976]. The sample consists of white males under the age of 65, who were salaried or paid by the hour and not employed in agriculture. A few observations were omitted because of missing data on one or more of the variables, leaving a total of 1554.

The variables that appear in (3.1) are the wage, experience and education. The pre-tax wage is found by adjusting the Survey Research Center's hourly wage rate by a deflator to account for regional differences in price levels. Experience (EXP) is measured as years the individual has spent in the labor force since age 18. Education (ED) is also measured in years. The following are the other exogenous variables[17] used to form the fitted value of the marginal tax rate: AGE = age in years; CHILDREN = number of children living at home; NE = 1 if individual was raised in the northeast[18]; CITY = 1 if individual was raised in a city; TOWN = 1

16. A similar procedure is suggested by Johnson and Pencavel [1978] in their study of the determinants of hours of work.

17. Duncan and Hoffman [1978] use a similar set of exogenous variables in their reduced form equations to explain the OJT decision.

18. The following convention is used to define dichotomous variables: "X = 1 if ζ" means X takes the value of one if ζ is true for the individual, and zero otherwise.

if individual was raised in a town; NLINC = non-labor income, the sum of rent, interest, dividends, plus the imputed rental on owner-occupied houses and automobiles.[19] The value used for t is the marginal federal income tax rate as estimated by the Survey Research Center. (No attempt is made to correct for state and local income taxes.)

The mean values of the variables conditional upon the OJT decision and for the entire sample are reported in Table IV.1. One observation from the table is particularly noteworthy. Although the individuals classified as OJT takers are younger than those who are not, the mean difference is only about 4.5 years. The survey responses thus appear to be indicative of something other than just age differences.

V. Results

Before reporting results, it might be useful to restate briefly the procedure: (1) Estimate the wage function (3.1) separately for those who are engaged in OJT and those who are not. (2) For each individual, substitute the estimate of ρ from his group's wage equation into equation (3.2) in order to estimate his internal rate of return, r. (3) Estimate a probit equation for the OJT decision, using as explanatory variables the internal rate of return, marginal tax rate and (in some cases) non-labor income.

A. The Wage Function

In order to estimate (3.1), I append a normally distributed error term, and use maximum likelihood estimation. The numerical optimizations are performed using the Davidon-Fletcher-Powell and GRADX quadratic hill-climbing algorithms (Goldfeld and Quandt [1972]). The asymptotic standard

---

19. It is assumed that the rate of return on these durables is 6%, and the individual's equity in them is 50%.

TABLE IV.1

Means of the Variables*

Variable	OJT	No OJT	Entire Sample
ℓn w	1.333	1.258	1.281
	(.023)	(.014)	(.012)
ED	13.522	12.279	12.655
	(.126)	(.084)	(.072)
EXP	14.207	19.133	17.64
	(.475)	(.365)	(.298)
AGE	33.12	37.91	36.46
	(.485)	(.386)	(.301)
CHILDREN	1.166	1.905	1.682
	(.073)	(.067)	(.052)
NE	0.2427	0.231	0.234
	(.020)	(.013)	(.011)
CITY	0.366	0.280	0.306
	(.022)	(.014)	(.012)
TOWN	0.406	0.397	0.400
	(.023)	(.015)	(.012)
NLINC	1153	1483	1383
	(79.1)	(97.6)	(72.3)
t	0.237	0.227	0.232
	(.004)	(.002)	(.002)
No. Observations	470	1084	1554

* Variables are defined in the text. Numbers in parentheses are standard errors of the means.

errors of the estimates are computed by taking the square roots of the diagonal elements of the negative inverse Hessian matrix of the log likelihood function. Elements of the Hessian are in turn calculated as numerical differences of various log likelihood values. Unfortunately, the likelihood function turns out to be rather flat around the maximum value[20], and the second partials are therefore quite sensitive to the size of the intervals over which these differences were taken. One cannot, then, attach great confidence to the accuracy of the standard errors, although they are presented along with the parameter estimates below.

I report in the first column of Table V.1 the results when the wage equation is estimated using the subsample of all individuals in OJT. The estimates seem fairly reasonable. The approximately 5% rate of return to schooling is somewhat below values that have been reported in other studies (Mincer [1974].) The value for ρ implies that when an individual devotes 1 additional dollar of foregone income to OJT, his earnings increase by 12 cents per year for the rest of his life. A similar value is found by Mincer when he estimates a linear version of (3.1) and assumes T=20 (Mincer [1974], p. 94). The estimate of k_o suggests that about a third of an individual's potential initial earnings are devoted to OJT, which is slightly below Mincer's figure of 0.42. The value of T indicates that OJT continues over a period of about 26 years.[21]

---

20. Indeed, comparable values of the log likelihood function are achieved with parameter estimates that differ substantially from those reported below. These problems are not entirely unexpected given that the last term of (3.1) is almost linear in EXP for reasonable values of k_o and T. Note also that the coefficients and their standard errors are conditional upon a value of zero for the coefficient on the inverse Mill's ratio, a condition which was imposed after Heckman's [1979] test failed to indicate selectivity bias.

21. This figure is longer than most of the answers to the survey question "...how long... would it take the average new person to become fully qualified?" By the end of the 26 years, the fraction of potential earnings devoted to OJT is so small that it is unlikely to be perceived as a substantial amount of human capital investment. As suggested above, one expects that only the number of years in which a significant amount of OJT is taking place will appear in the answer to the survey question.

TABLE V.1

Estimated Parameters of the Wage Function*

	(1)	(2)	(3)	(4)
	OJT			No OJT
Parameter	All	College	Non-College	
ℓnw_o	0.4853 (0.2551)	0.6143 (0.2867)	0.5763 (0.2005)	0.2277 (.06198)
r_s	0.0498 (0.006873)	0.0418 (0.0183)	0.0348 (0.0161)	0.0607 (0.004510)
ρ	0.1293 (0.1163)	0.1260 (0.0170)	0.1896 (0.0530)	0.01598 (0.001714)
k_o	0.315 (0.1654)	0.3452 (.0361)	0.2167 (0.0319)	0.1194 (0.01396)
T	25.70 (5.790)	28.19 (5.93)	27.72 (2.76)	3.573 (0.1641)
log likelihood	-1015	-464.1	-386.3	-2789.8

* Variables are defined in the text. Numbers in parentheses are asymptotic standard errors.

It may be the case that the parameters of the wage function are not constant across the sample. I therefore estimated separate wage functions for those who had attended college and those who did not. These results are reported in the second and third columns of Table V.1. A likelihood ratio test rejects the hypothesis that they are identical. (The test statistic is 329.2.) I therefore use the ρ's in columns (2) and (3) as the bases for constructing internal rates of return. That is, conditional on being in OJT, if the individual went to college, a value of 0.1260 for ρ is inserted into equation (3.2); otherwise, a value of 0.1896.

Column 4 of Table V.I exhibits the results when the wage equation is estimated for those who are classified as not being in OJT.[22] Compared to those who do take OJT, human capital investment tends to add very little to future earnings -- the value of ρ in the fourth column is only about 12% the corresponding value in the first. Moreover, compared to their counterparts in column 1, the earnings paths of the individuals in column 4 are characterized by smaller fractions of initial potential earnings devoted to human capital accumulation (k_o = .1194) which fall off at a greater rate (T=3.6) . These results suggest that the Panel Study question is picking up a meaningful distinction between individuals.

B. Probit Equations

The probit estimates for the probability of being in OJT are presented in Table V.2.[23] The first column shows the probit estimates when the probability of OJT is a function of the internal rate of return, r , and

22. Attempts to break up this sample on the basis of education did not lead to significantly different results.

23. In all the probit equations exhibited, the internal rate of return and the marginal tax rate are entered linearly. Some equations were estimated with an interaction term. This term did not contribute significantly to the explanatory power of the equation, and its inclusion rendered all the coefficients unstable. (The t-statistic on the interaction term was 1.27.) In this sample, at least, a probit index linear in the tax rate and the internal rate of return appears to explain the data satisfactorily.

the fitted value of the marginal tax rate, $\hat{t}$. As expected, the probability that an individual will engage in on-the-job training increases with the internal rate of return. Consider now the coefficient on the marginal tax rate, the sign of which is theoretically indeterminate. The positive value suggests that individuals are induced by the income tax to engage in OJT. Apparently, the effect that dominates is the one which gives the individual an incentive to substitute human for physical capital as a means for carrying consumption into the future. (In the next section I discuss the quantitative significance of the coefficient.)

In column 2, the individual's non-labor income is added to the probit equation. The estimated coefficient suggests that increases in physical wealth are associated with a lower probability of taking OJT. Although the inclusion of wealth leaves the qualitative picture unchanged, it has a dramatic effect on the magnitude of the tax effect. This is a consequence of the colinearity introduced by the fact that NLINC is one of the instruments used to form $\hat{t}$. The question of the suitability of NLINC as an instrument thus arises. In a life-cycle model, asset accumulation is the subject of choice. Indeed, in such models doubts can be cast upon the exogeneity of practically any variable. If the variables used to form $\hat{t}$ are endogenous, it is not clear that using the fitted value is any better than using t itself. I therefore re-estimated the probit equation using the actual marginal tax rate rather than the fitted value. (See columns 3 and 4.) The main qualitative conclusion is the same -- an increase in the marginal tax rate increases the probability of taking OJT. But the quantitative results are much more in line with those of column 1.

C. Some Implications

It is not obvious which set of estimates in Table V.2 is "the best." Except for the results in column 2, those of the different specification do not differ

TABLE V.2

Probit Equations*

Variable	(1)	(2)	(3)	(4)
r	199.2 (93.77)	118.6 (58.51)	195.5 (92.48)	181.82 (88.21)
$\hat{t}$	5.36 (1.460)	76,73 (17.22)		
NLINC		- 1.622 (0.4751)		- 0.1832 (0.1276)
t			2.893 (1.427)	6.056 (2.141)
CONSTANT	- 3.557 (0.4246)	- 20.86 (4.403)	- 2.906 (0.407)	- 3.440 (0.5162)
log likelihood	-50.25	-17.66	-53.91	- 51.35

* Variables are defined in the text. Number in parentheses are asymptotic standard errors. NLINC is measured in thousands of dollars.

enormously. I somewhat arbitrarily choose the coefficients of column (1) as the basis for exploring the quantitative implications of the results. Perhaps the most sensible way to do this is to use the coefficients for some simple simulations. The problem is to determine how the number of men doing OJT would vary under tax systems with rate schedules different from those now in effect. For each individual in the sample, I use the probit equation from column 1 of Table V.2 to predict the probability of taking OJT, and multiply it by the individual's sample weight. I then recalculate the probability of taking OJT, with marginal tax rates 20% and 33% below those currently faced, and again multiply by sample weights.

The simulation results are reported in Table V.3. They suggest that if marginal tax rates were reduced by a third, the number of white men taking OJT would decrease by about 2.4%. The proportional decrease is greater for those over than under the age of 40 -- about 6.7% to 0.8%. For those who attended college, the tax induced decrease in the incidence of OJT is about the same as that for the population as a whole. The smaller tax cut of 20% brings about a smaller decrease in the proportion of white men taking OJT, about 1.7%.

Given the absence of other empirical studies of the tax impact upon human capital decisions, it is hard to determine whether or not these magnitudes are "reasonable." They seem to me to be well within the bounds of possibility.

V. Concluding Remarks

The purpose of this paper has been to assess the impact of income taxes upon a very important kind of human capital accumulation, on-the-job training. I took advantage of a careful set of questions from the 1975 wave of the Panel Study of Income Dynamics to classify individuals

TABLE V.3

Tax Simulations

	Status Quo	t Decreased 20%	t Decreased 33%
Entire Sample			
OJT	9,015,717	8,859,035	8,800,727
No OJT	20,513,783	20,670,465	20,728,773
Age ≤ 40			
OJT	6,606,970	6,568,496	6,554,089
No OJT	11,164,530	11,203,004	11,217,411
AGE > 40			
OJT	2,408,747	2,290,539	2,246,638
No OJT	9,349,253	9,467,461	9,511,362
No College			
OJT	3,883,514	3,819,151	3,794,851
No OJT	13,339,486	13,403,849	13,428,149
College			
OJT	5,132,203	5,039,884	5,005,876
No OJT	7,174,297	7,266,616	7,300,624

as OJT takers or non-OJT takers. Mincer's [1974] simple but elegant theory of human capital was employed to estimate internal rates of return to OJT. This internal rate of return, along with a tax variable, were used to explain the OJT decision in a probit equation. I found that the income tax tends to increase the probability that an individual engages in OJT. A decrease in marginal tax rates of one-third would decrease the incidence of OJT among white males by 2.4%.

The normative implications of this finding are not entirely clear. There have recently been claims that increases in federal income tax rates have generated serious decreases in the accumulation of physical capital (Boskin [1978]). Such analyses have ignored human capital accumulation. The results of this paper suggest that reductions in physical capital may have been accompanied by tax induced increases in human capital. Obviously, the two effects do not cancel out -- taxation distorts both decisions away from their first best values. Estimates of the welfare cost of income taxation should be extended to take into account human capital effects.[24]

---

24. An attempt along these lines using simulation techniques is reported in Driffill and Rosen [1981].

References

Blinder, Alan S., "On Dogmatism in Human Capital Theory," Journal of Human Resources XI:1, (Winter 1976) 8-22.

Blinder, A. and Y. Weiss, "Human Capital and Labor Supply: a Synthesis," Journal of Political Economy, 84:3 (June 1976) 449-472.

Boskin, Michael, "Taxation, Saving and the Rate of Interest," Journal of Political Economy 86, No. 2, (April 1978), pp. S3-S28.

Boskin, Michael J. and Martin Feldstein, "Effects of the Charitable Deduction on Contributions by Low Income and Middle Income Households," Harvard University, Working Paper, June 1975.

Cain, Glen G., "The Challenge of Dual and Radical Theories of the Labor Market to Orthodox Theory", American Economic Review LXV:2, (May 1975), 16-22.

Driffill, E. John and Harvey S. Rosen, "Taxation and Excess Burden: A Life Cycle Perspective," National Bureau of Economic Research, Working Paper, 1981.

Duncan, Greg J. and Saul Hoffman, "Training and Earnings," in Greg J. Duncan and James N. Morgan (eds.) Five Thousand American Families -- Patterns of Economic Progress, vol. vi, Ann Arbor: Institute for Social Research, 1978.

Duncan, Greg J. and Saul Hoffman, "On-The-Job Training and Earnings Differences by Race and Sex," Review of Economics and Statistics LXI:4, (November 1979), 594-636.

Eaton, J. and H. Rosen, "Taxation, Human Capital and Uncertainty," American Economic Review 70:4, (September 1980), 705-715.

Goldfeld, Stephen, and Richard E. Quandt, Nonlinear Methods in Econometrics, Amsterdam: North-Holland. 1972.

Haley, W., "Estimation of Earnings Profiles from Optimal Human Capital Accumulation," Econometrica 44:6 (November 1976), 1223-38.

Heckman, James, "A Life Cycle Model of Earning, Learning and Consumption," Journal of Political Economy 84:4, (August 1976), S11-S44.

Heckman, James, "Sample Bias as a Specification Error," Econometrica 47:1, (January 1979), 153-162.

Johnson, Terry R. and John H. Pencavel, "Labor Supply Functions for Female Heads of Households Estimated from Seattle-Denver Experimental Data: A Progress Report," SRI International, 1978.

Lee, Lung-Fei, "A Note on the Estimation of Probit Choice Model with Limited Dependent Variables," mimeo, University of Minnesota, December 1977.

Mincer, Jacob, Schooling, Experience, and Earnings, New York: Columbia University Press, 1974.

Rosen, Sherwin, "A Theory of Life Earnings," Journal of Political Economy 84:4, Part 2, (August 1976), S45-S68.

Stafford, F. and G. Duncan, "The Use of Time and Technology by Households in the United States," mimeo, University of Michigan, 1977.

Survey Research Center, A Panel Study of Income Dynamics, Institute for Social Research, Ann Arbor, Michigan, 1976.

Willis, R. and S. Rosen, "Education and Self Selection," Journal of Political Economy 87:5, (October 1979), S7-S37.