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Abstract

Training, Wages, and the Human Capital Model

Using recent data from the National Longitudinal Survey of Youth, this study examines the predictions of the human capital model concerning the relationship between training, starting wages, and wage growth. As implied by the model, training, particularly employer financed training, is positively related to wage growth. Company financed training also appears to be portable across jobs, or to have a general component. In addition, there is some evidence that workers pay for initial training through a reduced starting wage. The results provide partial support for the human capital model.

1. Introduction

Enhancing the skills of American workers through increased job training is often deemed necessary for the United States to compete in the global market. Yet primarily due to a lack of data, there is little research into the role training plays in increasing the productivity and wages of workers. While there are a number of theories as to why wages increase over an individual's work life, a commonly accepted interpretation of this relationship is that wages increase over time due to investments in human capital, particularly investments in job training.

The human capital model (Becker 1962; Mincer 1962) suggests that an individual's decision to invest in training is based upon an examination of the net present value of the costs and benefits of such an investment. Individuals are assumed to invest in training during an initial period and receive returns to the investment in subsequent periods. Workers pay for training by receiving a wage which is lower than what could be received elsewhere while being trained. Since training is thought to make workers more productive, workers collect the returns from their investment in later periods through higher marginal products and higher wages.

Human capital models usually decompose training into specific training, which increases productivity in only one firm, and general training, which increases productivity in more than one firm. Purely general training is financed by workers, and the workers receive all of the returns to this training. In contrast, employees and employers will share in the costs and returns of specific training. Despite these differences between general and specific training, the model predicts that both forms of training lower the starting wage and increase wage growth.

Recent improvements in the available data on training have produced a growing body of literature which analyzes the different aspects of the human capital model and documents the consequences of training. In particular, most studies find that training received from the current employer is associated with increased wage growth (Duncan and

Hoffman 1979; Mincer 1988; Barron, Black, and Loewenstein 1989, 1993; Brown 1989; Altonji and Spletzer 1991; Bartel 1995). However, there have been only limited tests of other aspects of the human capital model. For instance, Barron, Black, and Loewenstein (1989) and Parsons (1989) both find no statistically significant relationship between training and the starting wage. Also, although Barron, Berger, and Black (1993) find that training has a negative effect on the starting wage, the estimated effect is small relative to the impact of training on productivity.

In addition, there is mixed evidence as to whether training is specific or general. Lynch (1992), using data from the early years of the National Longitudinal Survey of Youth (NLSY), concludes that company training is primarily firm-specific. In contrast, a recent study using the NLSY data by Loewenstein and Spletzer (1998) indicates that firms often pay the direct costs of training that takes place outside the workplace. They find that these employer financed forms of training have a lasting impact on wages for those who switched employers after training, suggesting that these forms of training are general. They hypothesize that firms and workers enter into wage contracts that allow firms and workers to share in the costs and returns to general training.

Similarly, others have suggested that alternatives to the traditional human capital model should be considered. For instance, Bishop (1996) offers a number of possible explanations as to why employers might finance general training, such as uncertainties about workers' skills, liquidity constraints, and the presence of federal regulations. Similarly, Acemoglu and Pischke (1996) attempt to explain why German firms pay for apprenticeship training, a form of training that offers a number of skills that are not firm-specific. The authors hypothesize that firms pay for general training because the current employer has more information about a worker's ability than potential employers. The existence of this asymmetric information provides the firm with some monopsony power and allows the firm to extract rents from the worker. Since the firm obtains part of the worker's marginal product, it has an incentive to provide training and increase the

worker's marginal product. The worker may be reluctant to pay for the training, however, since the worker receives only part of the return from the training.

Despite these recent analyses of the human capital model, no study to date has directly tested the predictions of the traditional human capital model relating to starting wages, wage growth, and the specificity of training. For instance, Loewenstein and Spletzer (1998) examine the relationship between training and wage levels in a particular year, but do not examine the relationship between training and starting wages or wage growth. They also use data from a relatively short time period (1988 to 1991), so that their results only reflect the short-term effects of training on wages.

In this paper, recent data from the NLSY over a relatively long time horizon (1986 to 1996) are used to directly test the implications of the standard human capital model. Measures of time spent in training programs are the key variables of interest. To preview the results, there is evidence that some forms of initial training are inversely related to the starting wage. Employer-financed training appears to be portable across employers, or to have a general component. Training that is financed by employers is also particularly effective in enhancing wage growth. Taken together, the results provide partial support for the traditional human capital model.

The paper proceeds as follows. In the next section, a description of the data used here is provided. Section 3 presents results from estimating the impact of training on starting wages, while Section 4 provides estimates from wage growth equations. Section 5 offers some concluding remarks.

2. The Data

In this analysis, data from the National Longitudinal Survey of Youth (NLSY) are used to examine the impact of prior and current training on starting wages and wage growth. A number of previous studies using the NLSY, such as that by Lynch (1992) and Parsons (1989) have used information from the 1979-86 surveys, where time spent in

private sector training is only available for programs that last over a month. In subsequent years, the training questions in the survey were changed so that respondents were asked about all types of training (up to four programs) since the last interview, regardless of duration.[1] Consequently, this past research using the pre-1986 data from NLSY captures the effects of participation in relatively formal training programs. Lynch (1992) reports a company training incidence of 4.2 percent, while the more recent NLSY data indicate that the incidence is about 20 percent (U.S. Bureau of Labor Statistics 1993), suggesting that early NLSY data miss the majority of training events.

The NLSY is a sample of approximately 10,000 young men and women who were between the ages of 14 and 22 in 1979 and who have been interviewed annually from 1979 to 1994.[2] After 1994, the survey moved to a biennial interview cycle. It is possible to create a measure of hours spent in training programs taken after the 1986 interview date by taking the product of answers to separate questions about the number of weeks of training and hours per weeks of training. The training programs exclude any training received through formal schooling.

Also, while the measures of training are more comprehensive than those available from the 1979-86 surveys, it is important to mention that they do not capture the extent of informal training. Methods of informal training such as observing coworkers, learning by doing, and speaking with supervisors, which are notoriously difficult to measure and quantify, are not included in these training variables. Hence, while the NLSY contains the most complete data currently available on training, the training measures used here may not fully capture the effects of all forms of training on wages.

A key feature of the NLSY is that it garners information in an event history format, in which dates are collected for the beginning and ending of important life events. In particular, the starting dates and ending dates of all jobs are recorded, as well as are the timing of training programs. Based upon the timing of these events it is possible to create

measures of training received on the current job along with measures of training received prior to the current job.

While the earlier years of the NLSY data primarily provide information on where the training took place, the more recent data include information both on training location and on who pays the direct costs of this training. Incorporating data on the payer of the direct costs of training is particularly important when estimating the effects of training on the starting wage. Presumably, even though some employers pay for the explicit costs of training, employees indirectly pay for "company paid" training through a lower starting wage.

The issue of who pays for the training is also important since many company training programs take place "off-the-job." For instance, classes which offer training in the latest developments in the field, such as changes in accounting laws, advancements in computer technology, or new medical techniques may not take place at the work site, but instead may be directly financed by the employer. Yet there may also exist some forms of training that take place "on-the-job," but are financed by the employee. In particular, seminars or classes which provide more general skills, such as those in management, leadership, public speaking, or a foreign language may occur at the work site but be paid for by the worker.

Consequently in this analysis, training is separated into categories based upon location and payer.[3] Since the focus here is primarily on the effect of company or "on-the-job" training on wages, location is divided into categories of "on-site" and "off-site," and payer is broken into "company paid" and "other paid," where "other paid" includes training paid for by the individual, family, government, or other external sources.[4] The resulting four categories are: on-site, company paid; on-site, other paid; off-site, company paid; and off-site, other paid. When estimating the impact of training on starting wages and wage growth, these categories are also broken into training received at the current job and training received prior to the current job.

The primary sample used here is restricted to those who were working for pay and not enrolled in school in 1996, who started the 1996 job after the 1986 interview date, and with nonmissing information on other variables used in the analysis (details of sample creation are provided in the Appendix). The employment restriction does not imply that the respondent was working at the 1996 interview date, but he or she had to be working at some time over the interview year. The resulting sample is a group of 5,459 men and women who were age 31 to 39 in 1996, and it is important to note that the results are specific to this age cohort.

Since the sample is limited to those who began the 1996 job after the 1986 interview date, complete data on training received while working with the current employer are available for all sample members. While information on training received prior to the 1996 job is incomplete, the impact of previous training may also be partially captured by the previous experience variables. If training, particularly specific training, is associated with greater job attachment, restricting the sample to those with less than ten years of tenure may result in a sample that is less apt to receive training than if the sample included those with more than ten years of tenure (approximately 16 percent of workers in 1996). If so, the full impact of training on wages may not be completely captured in this analysis due to this sample restriction.[5]

Table 1 provides information on the receipt of training and time spent in training by sample members. Over one-half of the sample participated in some form of training over the ten year period. Approximately 31 percent of the sample received on-site, company paid training, while nearly 20 percent received company paid training which took place outside the work place. About 17 percent participated in off-site training which was not employer financed, while close to four percent received training at the work site which was not directly financed by the firm. The percentage of individuals receiving company training is slightly higher than that suggested by previous research, which indicates that between 4 and 25 percent of workers receive company training (Bishop 1996), although

the samples, time frame, and measures of training vary substantially across studies.[6] In particular, most prior studies examine training received from the current employer, whereas in this study training received from multiple employers over an extended time frame is analyzed.

Individuals spent on average about 132 hours, or about 13 hours per year, in training over the time period. Training recipients (excluding those with zero hours of training) spent about 256 total hours in training. Recipients of off-site, other paid training spent on average over 330 hours in these programs, which is more than any other source. This category includes training received from vocational/technical schools, business schools, and correspondence courses, and these programs are probably more formal than some of the on-the-job training programs. It should also be noted that the standard deviations for each of the forms of training are relatively large, implying a wide dispersion in the hours of training received.

3. Training and Starting Wages

The NLSY collects information on the current wage rate of all jobs held. In addition, in the year in which a job begins, respondents are asked about their starting wage at the job (specifically, the question reads, "How much did you earn when you first started working for (EMPLOYER)?"). Respondents can report earnings over any time frame (hour, day, month, etc.). For those who do not report an hourly wage, one is constructed using usual hours worked over the time frame. Hence, the NLSY is one of the few data sets that allows for an examination of the relationship between initial training and starting wages.[7]

The impact of training on starting wages is estimated by specifying the following wage equation:

$$\ln w_s = \alpha_o T_o + \alpha_p T_p + \beta X + \varepsilon \qquad (1)$$

where ln w_s is the log starting wage rate of the job held in 1996, T_o is training received within the first six months of employment at the current job, T_p is training received prior to the current job, X is a vector of worker and firm characteristics, and ε is a standard error term.[8] The X vector includes variables such as a quartic in prior work experience, sex, race/ethnicity, education, firm size, urban residence, local unemployment rate, union status, and marital status. In addition, an individual's score on the Armed Forces Qualifying Test (AFQT) is included and taken to be a measure of ability.[9]

As mentioned, except for a few prior studies, the impact of prior training on wages has been ignored, since creating a measure of past training (T_p) requires the use of longitudinal or quality retrospective data. The human capital model predicts that initial training received at the current job is negatively related to the starting wage ($\alpha_o < 0$). Prior training has a positive impact on the wage if training is general ($\alpha_p > 0$), but has no impact if training is firm-specific ($\alpha_p = 0$).

Estimating the impact of training on wages is complicated by the fact that individuals may be nonrandomly selected into training based on unmeasured factors. The individual and firm characteristics that are available in the NLSY, including a measure of ability, are used here to control for individual heterogeneity between training recipients and non-recipients. In order to provide additional controls for job type, the wage equations are estimated with and without industry and occupation controls in the vector of explanatory variables. These broad industry and occupation categorical variables should provide a crude measure of the nature of a worker's job. In addition, these variables may be a proxy for the extent of informal training that is received on the job. Still, unobserved characteristics of workers and firms that are positively correlated with both initial training and starting wages may affect the estimates of training on wages.[10]

Table 2 presents estimates from log starting wage equations. For ease of presentation, only the estimates of the training, education, and ability coefficients are presented. The estimates in Model 1 for the full sample indicate that training received in

the first six months of employment is negatively related to the starting wage, although the estimate is not statistically significant.

Training received while employed at previous jobs is positively related to the starting wage, indicating that training is portable across jobs, or is general. The results also indicate that education and ability (as measured by AFQT percentile) are positively related to starting wages, as might be expected. Although the estimated education coefficient is somewhat smaller than that often found in the returns to education literature, it is similar to such studies that use the cohort-based NLSY (Cawley, Heckman, and Vytlacil 1998). Evaluated at the sample means, the implied elasticities suggest that a ten percent increase in previous training increases starting wages by less than .05 percent, while similar increases in education and ability do so by approximately 7.5 percent and 1.5 percent, respectively. Hence, the impact of training on starting wages relative to education and ability is small.

Model 2 presents estimates when the different types of training are used as independent variables as opposed to the aggregate training measures. The estimates indicate that three of the four forms of initial training are negatively related to starting wages. In particular, training in the "off-site, other paid" category has a negative and significant association with starting wages at the ten percent significance level. For this type of training, there is an implicit cost of reduced worker productivity during the training period even though the employer does not pay the explicit cost of this training. This result suggests that employees pay the implicit costs of this initial training through a reduced starting wage.

The results in Model 2 also indicate that previous company financed training, both on-site and off-site, is positively related to the starting wage. Hence these forms of prior training are valued by subsequent employers and appear to have a general component. These results suggest that firms are particularly effective in providing skill enhancements that are useful to other employers. It is somewhat surprising, however, that both forms of

previous “other paid” training are unrelated to wages. These results may suggest that these forms of training that are not financed by the employer are not particularly effective in enhancing productivity. It may also be true that these forms of training are taken for consumption purposes.

Model 3 presents estimates when industry and occupation variables are included as additional covariates in the starting wage regression. The estimates for the training variables are only slightly changed with the inclusion of the industry/occupation dummies. When the starting wage regressions are estimated separately by gender, there is some indication of a negative correlation between certain forms of initial training and starting wages for males. In particular, on-site, company paid training and off-site, other paid training are marginally significant at the .13 and .15 levels, respectively. Also, both forms of company paid training are portable across employers for males, whereas only off-site, company paid training is portable for females.

These results indicate that training has a general component, and there is some evidence that workers pay for training through a lower starting wage, although the presence of a negative relationship between training and starting wages depends on the training measure used. It is important to reemphasize, however, that due to the limitations of the training measures and restrictions in the nature of the sample imposed by the data, the inverse relationship between training and starting wages may be understated by these estimates. Also, unobserved characteristics of workers and firms may prevent the negative relationship between initial training and starting wages from being more evident. Despite these limitations, the regression estimates provide some indications that there is an inverse relationship between initial training and starting wages, as predicted by the human capital model.

4. Training and Wage Growth

The impact of training on wage growth is estimated using the specification:

$$\ln (w_c/w_s) = \gamma_c T_c + \gamma_p T_p + \theta\, Y + \nu \qquad (2)$$

where w_c is the current wage at the 1996 job, T_c is training received at the current job, T_p is training received at prior jobs, Y is similar to the previously defined X vector but also includes a quartic in tenure at the current job, and ν is the error term. The human capital model predicts that current training is positively related to wage growth ($\gamma_c > 0$), while previous training should have no impact on wage growth ($\gamma_p = 0$). Similar to the starting wage equations, specifications that include and exclude industry and occupation controls as additional covariates are estimated.

The results from estimating equation (2) are presented in Table 3. The results for the full sample in Model 1 indicate that training received at the current job is positively related to wage growth, which is similar to the findings from most prior studies (Duncan and Hoffman 1979; Mincer 1988; Barron, Black, and Loewenstein 1989, 1993; Brown 1989; Altonji and Spletzer 1991; Bartel 1995). Also, as predicted by the human capital model, prior training is unrelated to wage growth. In addition, the results suggest that education and ability are positively related to wage growth. The implied elasticities indicate that a ten percent increase in training at the current job increases wage growth by .03 percent, while a ten percent increase in education and ability does so by .8 percent and .4 percent, respectively. Hence the estimates suggest that the impact of training on wage growth relative to education and ability is fairly small.

When the disaggregated training measures are included in Model 2, the results imply that company financed training at the current job, both on-site and off-site, is positively related to wage growth. When the industry and occupation dummy variables are included as additional regressors in Model 3, there is little change in the results. Also, when the wage growth equations are estimated separately by gender, both forms of current company paid training are positively related to wage growth for males, while only on-site, company paid training is significantly related to wage growth among females.

The results for company paid training are of interest given that the starting wage estimates indicate that this form of training has a general component. Hence, on-site and off-site company sponsored training, which are the most common forms of training, appear to enhance productivity, both at the current firm and at other firms. It is surprising, however, that the other forms of training received at the current job have no estimated impact on wage growth. Similar to the results in the prior section, the wage growth results suggest that training that is not financed by the employer, or is in the "other paid" category, is either ineffective in enhancing productivity or is taken largely for consumption purposes.

5. Conclusions

This study uses recent data from the National Longitudinal Survey of Youth to examine the predictions of the human capital model concerning the relationship between training and wages. The results indicate that training received at the current employer is positively related to wage growth, as predicted by the human capital model. Training, particularly training that is financed by employers, has a general component, or is portable across employers. While finding strong empirical support for the predicted negative relationship between initial training and starting wages is somewhat elusive, the data provide some indications of an inverse relationship. Given that the typical worker spends about a day and a half in training per year, the time costs of training are relatively low. Consequently, it is likely that firms can recoup the costs of training not only through a lower starting wage, but also through small changes in non-pecuniary aspects of the job, such as reduced perquisites or fringe benefits. Taken together, these results provide partial support for the traditional version of the human capital model.

The finding that firms often pay the explicit costs of training that is portable across employers is consistent with variants of the human capital model that introduce factors such as implicit contracts, uncertainties about workers' skills, or transactions costs into

the human capital framework. Yet since the results also suggest that workers implicitly pay for some forms of training through a reduced starting wage, the conventional human capital model may require relatively minor modifications in order for its predictions to be consistent with the observed relationship between training and wages. In addition, it is again important to mention that estimating the relationship between training and wages is largely a function of the quality of data on training, as training is in many ways a difficult concept to measure and quantify. For instance, the training measures used in this analysis do not capture time spent in informal training. If those workers who do not participate in formal training instead receive informal training in lieu of formal training, the estimated impact of training on wages will be biased towards zero. Improved data on training should allow for additional tests of the traditional human capital model versus possible alternatives.

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Notes

1. Although no training questions were included in the 1987 survey, the training questions in the 1988 survey refer to all training programs dating back to the 1986 interview. Respondents were asked about training in each survey after 1988.
2. The Youth survey includes oversamples of blacks and Hispanics.
3. The only type of training in which categorization is somewhat ambiguous is apprenticeships. Apprenticeships often involve both on-the-job training along with course work which may take place off-site. In this analysis, apprenticeships are included in the "on-site" category, although the results for the most part are unaffected if apprenticeships are considered "off-site" (96 sample members participated in apprenticeships).
4. Another reason that the components of the "other paid" category are grouped together is because cell sizes within each of these components are relatively small, particularly when subdivided into previous and current training. The primary component of "other paid" training is self or family (59.9 percent), followed by government (17.6 percent).
5. Results from a probit estimation describing those with ten or more years of tenure are provided in the Appendix. For the most part, those with long tenures are more likely to be male, white, married, have high AFQT scores, work in large firms, and to live in areas with low unemployment rates. When a selectivity correction term based upon this probit is included in the wage regressions, there is little impact on the estimated coefficients.

6. Since individuals can participate in more than one form of training, the participation in any forms of training is less than the sum of the percentages for the different types of training.
7. The CPI-U is used to convert all wages to 1996 dollars. The average starting wage is $11.72.
8. The results for initial training and starting wages are fairly similar if the definition of "initial training" is made more restrictive to include only training received in the first three months of employment, or made more expansive to include training in the first year of employment.
9. The AFQT was administered to all respondents in 1980. The score used in the estimations is the percentile ranking of the score based upon the respondent's age when the test was taken.
10. Attempts were made to control for unobserved heterogeneity through the inclusion of individual fixed effects in the wage equations. The use of a fixed-effects specification, however, requires restricting the sample to those individuals who changed jobs at least twice between 1986 and 1996. The results from a fixed-effect starting wage regression for this restricted sample indicates that the estimate for initial training becomes larger (less negative) when using fixed effects, suggesting that the unobservables are actually negatively correlated with training receipt. Hence, any gain from using a fixed-effects specification appears to be mitigated by the sample restrictions necessary to perform the estimation.

Table 1. The Incidence and Duration of Training from 1986 to 1996

	Percent Who Received Training	Mean Hours of Training	Mean Hours of Training Among Training Recipients
Any form of training	51.46	131.67 (371.80)	255.90 (486.72)
Type of training			
On-site, company paid	31.15	48.87 (216.56)	152.00 (360.91)
On-site, other paid	3.96	5.19 (86.79)	131.10 (417.91)
Off-site, company paid	19.51	20.48 (137.48)	105.02 (296.77)
Off-site, other paid	17.31	57.13 (249.79)	330.04 (520.18)

Notes: The number of observations is 5459. Standard deviations are in parentheses.

Table 2. Log Starting Wage Regressions

Variable	All Model 1	All Model 2	All Model 3	Males	Females
Training in first six months at current job					
Any form	-.075 (1.15)				
On-site, company paid		-.068 (.79)	-.058 (.65)	-.167 (1.51)	.026 (.16)
On-site, other paid		-.132 (.19)	-.271 (.40)	-3.37 (1.18)	-.064 (.09)
Off-site, company paid		.263 (1.37)	.261 (1.41)	.186 (.93)	.654 (1.06)
Off-site, other paid		-.177* (1.70)	-.175* (1.75)	-.188 (1.44)	.132 (.78)
Training at previous jobs					
Any form	.054** (2.78)				
On-site, company paid		.078** (2.23)	.080** (2.35)	.106** (2.81)	-.044 (.45)
On-site, other paid		.002 (.02)	-.016 (.21)	.019 (.24)	-.601 (.97)
Off-site, company paid		.182** (3.31)	.168** (3.17)	.171** (3.07)	.482* (1.82)
Off-site, other paid		.104 (.37)	.017 (.62)	-.013 (.30)	.015 (.43)
Education	.058** (16.32)	.058** (16.23)	.041** (10.79)	.047** (9.55)	.069** (13.30)
AFQT percentile	.004** (10.53)	.004** (10.39)	.003** (8.93)	.004** (8.28)	.004** (6.84)
Industry/occupation dummy variables included?	No	No	Yes	No	No
$\bar{R}^2$	.28	.28	.34	.27	.25
Number of observations	5459	5459	5459	2805	2654

Table 2 (Cont.)

Notes: Numbers in parentheses are t-statistics. Additional covariates include controls for female, black, Hispanic, a quartic in experience, firm size, union, urban, and married (see Appendix for means of all variables).

* Statistically significant at the 10-percent level.

** Statistically significant at the 5-percent level.

Table 3. Wage Growth Regressions

Variable	All Model 1	All Model 2	All Model 3	Males	Females
Training at current job					
Any form	.154** (5.12)				
On-site, company paid		.233** (5.41)	.222** (5.10)	.257** (4.20)	.198** (3.24)
On-site, other paid		.016 (.06)	-.040 (.15)	.457 (1.06)	-.288 (.89)
Off-site, company paid		.161** (2.37)	.153** (2.25)	.203** (1.98)	.115 (1.26)
Off-site, other paid		.081 (.33)	.027 (.48)	.034 (.41)	.003 (.05)
Training at previous jobs					
Any form	-.015 (1.09)				
On-site, company paid		-.017 (.70)	.023 (.94)	-.027 (.99)	.034 (.53)
On-site, other paid		.021 (.37)	.021 (.37)	-.003 (.05)	.110 (.27)
Off-site, company paid		-.041 (1.08)	-.041 (1.07)	-.048 (1.19)	-.078 (.45)
Off-site, other paid		-.010 (.55)	-.006 (.32)	-.047 (1.46)	.013 (.54)
Education	.008** (3.15)	.008** (3.09)	.006** (2.08)	.006* (1.73)	.008** (2.19)
AFQT percentile	.001** (2.36)	.001** (2.35)	.001 (1.45)	.001 (1.38)	.001** (2.11)
Industry/occupation dummy variables included?	No	No	Yes	No	No
$\bar{R}^2$	.05	.05	.05	.06	.04
Number of observations	5459	5459	5459	2805	2654

Table 3 (Cont.)

Notes: Numbers in parentheses are t-statistics. Additional covariates include those mentioned in the note in Table 2 as well as a quartic in tenure.

* Statistically significant at the 10-percent level.

** Statistically significant at the 5-percent level.

Appendix

Sample Creation

NLSY total sample		9964
Respondents in 1996		8636
Deletions:		Remaining sample:
Enrolled in school at 1996 interview date	331	8305
Missing AFQT	380	7925
Missing urban locality variable	139	7786
Missing firm size	160	7626
Missing industry	115	7511
Missing occupation	35	7476
Missing/invalid (nonpositive) wage	160	7316
Nonworker	816	6500
Started job prior to 1986 interview date	1041	5459

Appendix (Cont.)

Sample Means/Probit for Tenure > 10 years

Variable	Sample Means	Tenure > 10 years Probit
Female	.486	-.325** (5.25)
Black	.306	-.346** (4.57)
Hispanic	.185	-.128 (1.53)
Education	13.08	-.003 (.20)
Armed Forces Qualifying Test percentile	38.74	.007** (5.25)
Prior experience (in weeks/1000)	.489	-10.62** (5.40)
Experience^2	.284	40.66** (3.35)
Experience^3	.181	-113.04** (4.27)
Experience^4	.123	83.61** (4.95)
Firm > 1000 employees	.366	.127** (2.17)
Urban locality	.801	.038 (.54)
Local unemployment rate	6.79	-.025** (2.48)
Married	.560	.233** (4.06)
Professional and Technical	.172	.258* (1.71)
Manager	.131	.452** (3.09)

Appendix (Cont.)

Variable	Sample Means	Tenure > 10 years Probit
Sales	.046	.183 (.95)
Clerical	.163	.184 (1.27)
Operative	.141	-.053 (.36)
Craft Worker	.115	.470* (3.24)
Service and Private Household	.162	.025 (.17)
Agriculture and Mining	.030	.100 (.60)
Construction	.081	-.158 (1.12)
Transportation	.073	-.049 (.42)
Wholesale and Retail Trade	.171	-.410** (3.98)
Finance	.055	.090 (.66)
Business	.085	-.185 (1.44)
Personal Services and Entertainment	.066	-.500** (3.28)
Professional Services	.212	-.156 (1.56)
Public Administration	.058	.016 (.14)
Constant		.824** (3.42)
Log-likelihood		-1424.8
Number of observations	5459	6500

Appendix (Cont.)

Notes: Absolute value of t-statistics are in parentheses. The omitted occupational category is laborers and farmers and the omitted industrial category is manufacturing.

*Statistically significant at the 10-percent level.

**Statistically significant at the 5-percent level.