WORKING PAPER
ALFRED P. SLOAN SCHOOL OF MANAGEMENT

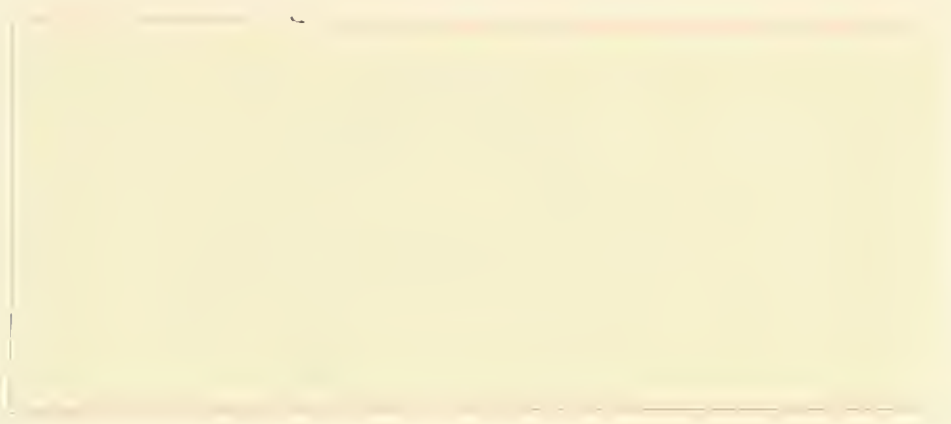
THE IMPACT OF PRIVATE SECTOR TRAINING ON RACE AND GENDER WAGE DIFFERENTIALS AND THE CAREER PATTERNS OF YOUNG WORKERS

by

Lisa M. Lynch

WP# 3353-91-BPS November, 1991

MASSACHUSETTS
INSTITUTE OF TECHNOLOGY
50 MEMORIAL DRIVE
CAMBRIDGE, MASSACHUSETTS 02139



THE IMPACT OF PRIVATE SECTOR TRAINING ON RACE AND GENDER WAGE DIFFERENTIALS AND THE CAREER PATTERNS OF YOUNG WORKERS

by

Lisa M. Lynch

WP# 3353-91-BPS November, 1991

FINAL DRAFT REPORT

Department of Labor grant number E-9-J-9-0049

The Impact of Private Sector Training on Race and Gender Wage Differentials and the Career Patterns of Young Workers

by

Lisa M. Lynch*
M.I.T. and NBER

Submitted July, 1991

I would like to thank the participants of seminars at Boston University, Columbia, M.I.T., Northwestern, LSE, NBER, the Sloan conference on the Longitudinal Analysis of Labor Market Interventions at Yale University, and the Department of Labor for helpful comments on a previous draft. I also benefitted from comments by Dan Black, James Heckman, Peter Kuhn, Edward Lazear, Jacob Mincer, Michael Pergamit, Fabio Schiantarelli, Nachum Sicherman, James Walker, and Andy Weiss. Thorough research support was provided by Andrea Ichino and Pam Loprest. This project was funded by the U.S. Department of Labor, Bureau of Labor Statistics under Grant Number E-9-J-9-0049. Opinions stated in this document do not necessarily represent the official position or policy of the Department of Labor.

Note: Sections of this report have appeared in Lynch (1991a) and Lynch (1991b).

TABLE OF CONTENTS

I. Executive Summary

Objectives

While the returns to a college degree or government training programs in the U.S. have been widely documented, there has been relatively little analysis of the returns to other forms of human capital investment that non college graduates undertake. This has been due primarily to the lack of appropriate data for this type of analysis. However, using the unique features associated with the National Longitudinal Survey Youth Cohort, NLSY, this study analyzes how personal characteristics including employment histories and local demand conditions determine the probability of receiving training and their effects on wages, wage growth, and employment mobility of workers. More specifically, some of the issues addressed here include the relative importance of training and tenure for wage determination and the rate of return to company provided training versus training from for-profit proprietary institutions and regular schooling. The portability of company training from employer to employer and the existence of differentials in the returns to training by union status, race and gender are also investigated. Finally, the impact of different types of training investment on the probability of leaving an employer are examined.

Methodology

Using a standard human capital framework this report first estimates the varying rates of return to training, schooling and tenure by race and gender for young workers. To control for possible selection issues arising with the non random probability of receiving training, two stage estimation procedures are applied. In addition a first difference equation

is estimated to control for the effect of unobserved time invariant individual fixed effects. The study then presents estimates on the impact of different types of training on the probability of leaving an employer using a Cox proportional hazards model with time varying covariates.

Findings

This report shows that private sector training plays a significant role in the determination of wages and wage growth of the 70 percent of young workers in the U.S. who do not graduate from college. Specifically, when private sector training is divided into different types (on-the-job training, off-the-job training, and apprenticeships) some very different patterns emerge. For example, the characteristics that appear to influence the probability of receiving training are primarily race and gender. Women and nonwhites are much less likely to receive training within a firm either through an apprenticeship or other forms of on-the-job training. This differential pattern in the acquisition of training by race and gender may be a partial explanation of the persistent wage gap between males and females and whites and nonwhites. Schooling raises the probability of receiving off-the-job training and apprenticeships but it had a smaller impact on the probability of receiving firm provided on-the-job training.

All types of training raise wages significantly. In particular, this paper shows that on average, for this sample of non-college graduates, off-the-job training from proprietary institutions can be useful for increasing wages. This is in contrast to a recent study by Leigh (1989). The prime difference between this study and that of Leigh is that this study allows for off-the-job training to have an effect not only on current wages but on future wages as

well. In addition, it is shown that longer training spells have a larger effect on wages. While workers receiving off-the-job training may receive lower wages during their training spells they are more likely to use that training to leave their low wage employer and move to a better paying job.

Finally, while on-the-job training with the current employer increases wages with the current employer, this type of training seems to be quite firm specific since on-the-job training from a previous employer is never significant for current wages. At the same time, there seems to be some evidence that if general training is being given to any group of workers on the job it is for those who have not completed high school.

Implications

While this project has attempted to shed new light on the skill formation process of young workers and the consequences of this on their wages and patterns of mobility there are still many issues that remain unresolved. This paper has modeled the determinants of the duration of the first job after school, not subsequent employment. As the NLSY age future research should examine for example how some of the gender, race and educational differences change over time. It would also be interesting to examine the hazard rates by broad industry and occupational categories. Finally, it would be important to see how robust the findings are after additional work is done to address the endogeneity issue for training.

Nevertheless, there is a story that emerges from the results in this report for young workers and private sector training. Company training in the U.S. is very firm specific, even for young workers in their first job. Young workers entering the labor market can receive

both 'good' and 'bad' draws from the labor market. There are some workers who get a 'bad' draw who appear to move to better employment by investing in off-the-job training. Those in 'good' jobs are more likely to obtain on-the-job training which results in higher wages and a lower probability of leaving the firm. These effects are particularly strong for women.

The finding that on-the-job training is primarily specific is consistent with recent findings from the Hudson Institute which surveyed 645 firms in the U.S. and found that only 8 percent had any sort of general remedial on-the-job training programs[16]. The fact that U.S. firms are more willing to invest in firm specific training than in general training is understandable given the inability to "capture" the returns on investments in general training. However, whether or not U.S. firms will be able to remain competitive with this strategy in the future, given the characteristics of the new entrants into the workforce and the skill demands of new technology, is questionable.

II. Introduction

While there have been numerous studies devoted to examining the impact of governmental training programs on workers who have experienced difficulties in the labor market, there has been remarkably little research on the actual occurrence and consequences of training provided by the private sector. Since one possible explanation of the lower productivity growth in the U.S. relative to countries such as Germany and Japan is that firms in the U.S. underinvest in their workers, it is crucial to have a better understanding of the human capital strategies of firms and workers and of their consequences.

Obtaining an estimate on how much is currently being spent on training by the private sector in the U.S., however, is extremely difficult to determine. It has been estimated by Carnevale (1986) that $150 billion are spent annually on K-12 education, and as much as $210 billion are spent annually on formal and informal training by the private sector. Approximately $25 billion of the $210 billion are spent on young workers entering their first job[1]. Training Magazine, in its annual survey of training by firms with 100 or more employees, reported that in 1988 over $45 billion were spent on formal training while Bartel (1989) reported an even larger number of $55 billion for formal training from the private sector in 1987 using firm survey data. Finally, Mincer (1989) calculated that as much as $148 billion may have been spent on formal training programs by employers in 1987 using individual data. Therefore, given the $25 billion or more spent by the private sector on training for young workers, the issue is not that U.S. firms do not invest in their workers, but rather that the nature and the size of these investments may not be enough for the new

entrants in the 1990's.

The difficulty in documenting the actual investment in training in the U.S. is due in large part to the lack of a comprehensive, representative and longitudinal survey of firms and their human resource management policies. As a result, we know little about who receives training, what types of training programs are provided and where, the degree of firm specificity and portability of firm provided training, the impact of training on the wages and wage growth of workers, and the effect of training on the probability of remaining with an employer. Consequently many have had to infer the impact of training on wages from the shape of wage profiles. Apart from the fact that this is a rather unsatisfactory way to test human capital theory, there are several alternative theories which imply rising wage profiles that have little to do with productivity enhancing training.

One of the primary ways young workers acquire training is through schooling - in particular by completing college. The returns to a college degree have been documented by many, (see Katz and Revenga (1989) and Blackburn, Bloom and Freeman (1989) as examples of recent papers) but we know relatively little about the skill development process of the more than 70 percent of young workers who do not finish college. Yet, these are the young workers who are viewed by many as being unready for the new jobs and realities of the 1990's. Where do young workers who do not graduate from college acquire training after school? Is it from on-the-job training or from for-profit proprietary business and vocational institutions? What happens to those young people who do not even finish high school? Are they able to obtain the necessary general and specific skills training to become productive workers?

Several studies have attempted to use various measures of private sector training and examine the impact of training on wages directly rather than inferring the effect from the shape of wage profiles. These studies include Mincer (1983, 1988), Brown (1983, 1989), Lillard and Tan (1986), Pergamit and Shack-Marquez (1986), and Barron et. al. (1987). However, each of these papers is subject to different limitations. Some of the more critical issues include the lack of complete employment, training and schooling histories on individuals in the various surveys, difficulties in measuring the amount of private sector training the respondent received, and problems in distinguishing firm-specific from general types of training.

It is possible, however, to overcome many of these problems and gain new insight into private sector training in the U.S. using longitudinal data from the National Longitudinal Survey youth cohort, NLSY. This data set, despite its limitations, does allow one to reconstruct for the first time the entire formal training history for an individual from the moment they enter the labor market. This event history includes both the occurrence and duration of each training spell. Given the current debate about the need for more knowledgeable workers in the 1990's to deal with the demands of new technologies, firms may be increasingly required to switch from informal on-the-job training to more structured formal training programs. An empirical analysis of formal training programs and of their consequences, therefore, would be useful. Moreover, the NLSY data allow the researcher to distinguish between different sources of private sector training -- company provided training, training from for-profit proprietary institutions, and apprenticeships.

While it is not possible in a single report to investigate all aspects of training

investments for young workers, this study analyzes how personal characteristics including employment histories and local demand conditions determine the probability of receiving training and their effects on wages, wage growth, and employment mobility of workers. More specifically, some of the issues addressed here include the relative importance of training and tenure for wage determination and the rate of return to company provided training versus training from for-profit proprietary institutions and regular schooling. The portability of company training from employer to employer and the existence of differentials in the returns to training by union status, race and gender are also investigated. Finally, the impact of different types of training investment on the probability of leaving an employer are examined.

III. Private Sector Training and Wages: Theoretical Framework and Data

Many theories have been advanced to explain individual variation in wages and why wage profiles slope upwards. According to Becker's (1964) and Mincer's (1974) fundamental work, wage profiles slope upwards as human capital or skills increase with experience. Therefore, as workers acquire more training there should be an increase in their productivity and consequently in their earnings. Firm specific training will have some effect on wages in the form of a premium paid to reduce turnover, but since specific training is not portable, the size of the premium may not be as large as that paid for general training. Therefore, the magnitude of the impact of training on wages will depend in part on the degree of specificity of the training received and in part on who pays for the training. For example, in a standard human capital model one would expect that individual workers would pay for general training while firms would pay for and provide firm specific training.

Some firms may provide general training but in this case you would expect to observe wages negatively related to training as firms finance this general training investment by paying workers a lower wage. At the completion of general training, wages should rise substantially. Legislated or social minimum wages, however, may cause firms to be unable to reduce wages sufficiently to cover these general training costs and consequently make firms reluctant to provide general training.

While human capital theory provides one explanation about why wages are more or less upwardly sloping for workers there are alternative explanations of upward sloping wage profiles that have little to do with training. Specifically, Stiglitz (1975) and Lazear (1981) discuss how firms offer upward-sloping wage profiles to discourage "shirking" among workers. An alternative explanation (see Salop and Salop (1976) and Rothschild and Stiglitz (1976)) might be that firms use upward sloping profiles to discourage "movers" from seeking employment elsewhere. Recent papers by Abraham and Farber (1987), Altonji and Shakotko (1987) and Topel (1987) have examined the importance of job matching in explaining upward sloping wage profiles. These studies have examined whether or not (in the absence of data on training) the inclusion of tenure in a wage equation simply measures job specific returns (such as training) or captures the fact that workers in long jobs are either better workers, in better jobs, or in better worker-employer matches. If some measure of job-match quality is not included in the estimation then it is argued that the coefficient on tenure is biased upwards.

These alternative models of compensation should not be viewed as mutually exclusive; the most likely case is that compensation is affected by some combination of

human capital and other factors. The purpose of some of the recent studies on wages, however, has been to show that after controlling for job match quality, the impact of tenure or seniority on wages is small and to infer from this that human capital investments such as training have a negligible role in the determination of wages. But without detailed information on the type of training undertaken, it is difficult to sort out the real returns to human capital investments and whether they reflect general or specific capital, or other factors.

Since the NLSY data on training specify starting and ending dates of all training spells across all employers it is possible to distinguish between completed and uncompleted spells of on-the-job training, ON-JT, from a current employer and ON-JT from a previous employer. In human capital theory if employer provided training is primarily general then wages for workers receiving this type of training should be lower during a training spell and higher afterwards. Specific training, however, will have an ambiguous effect on current wages since employers and employees will share both the costs and the returns associated with specific training. Therefore, if ON-JT is primarily general then the coefficient on an interrupted spell of training with the current employer should be negative. The impact of a completed spell of ON-JT with a previous or current employer on wages should be positive. However, if "better" workers are more likely to receive ON-JT, then simply including a measure of ON-JT in a wage equation without controlling for the selection of these "better" workers into training will result in an upward bias on all of the estimated training coefficients. This means, for example, that a significant and positive coefficient on training from a previous employer may be due to selection bias or evidence that employer

provided training is general and portable for young workers. If instead this coefficient is insignificant then the training is not portable and, therefore, suggests that it is primarily firm specific.[2]

Being able to understand the degree of specificity of firm provided training is of particular importance in judging policies that subsidize employers who hire young workers. If the subsidy is motivated by a belief that when employers hire young workers the training that is provided is quite general, then it is important to see whether or not this is in fact an appropriate characterization of firm provided training in the U.S. A test of this assumption will be important in deciding the level of government support and the degree of monitoring of employer provided training for young workers. In addition, given that European and Japanese employers invest substantially in general training, especially for younger workers, finding out that private sector training in the U.S. is quite firm specific reveals an interesting difference in the nature of training between the U.S. and its competitors.

As noted above, before examining the impact of training on the wages of young workers, it is necessary to examine the characteristics of those individuals who actually receive training. This is interesting in its own right and because it helps in tackling the issue of sample selection bias in the wage equation. The selection bias in the wage equation is very similar to the "treatment selection" problem in the evaluation of the effectiveness of government training programs (see Lalonde (1986) and Heckman and Hotz (1989) for excellent surveys on this). If individuals are not randomly assigned to training then the actual return to training in a wage equation may be biased upwards if this selection is not controlled for.

In order to model the acquisition of private sector training it is important to realize that there are two possible agents who may influence the probability of a worker receiving training -- the individual worker and/or the firm. Firms are more likely to invest in those individuals who they believe will be more attached to the firm. Therefore, tenure on the job, total work experience, educational background and other demographic characteristics are expected to influence the firm's investment decision. For example, firms may decide not to invest in advanced training for their female employees because they believe that women are more likely to leave the firm. If they leave early in their tenure with the firm the firm would not have sufficient time to recoup its training investment. In addition as Lazear (1979) has discussed, the narrowing of the black/white and male/female wage differentials since the passage of affirmative action legislation may have been accompanied by a different form of discrimination that resulted in a widening gap in the job-experience induced rate of wage growth. In other words, as employers responded to affirmative action legislation by paying higher wages to women and blacks they may have at the same time reduced the amount of training provided to these groups. Therefore, starting wages might be the same but wage growth would be much slower due to less training investment.

Individuals who do not receive training within the firm due to direct discrimination or statistical discrimination may respond by obtaining "visible off-the-job" training to improve their productivity and opportunities in other firms. This individual investment in training could also be used as a signal of their commitment to the workforce. There is some evidence of this type of behavior in the schooling decisions of blacks (see Lang and Ruud (1986)).

Technological requirements of the occupation and industry will also affect firms' training decisions. Those industries or occupations characterized by rapid technological change are more likely to need to provide skills training (see Lillard and Tan (1986)). Firm size is also expected to influence the probability of receiving company provided training. Larger firms may have better developed internal labor markets that rely on internal training and development of employees in the firm. In addition, the larger size may also lower the marginal costs of training workers. Unfortunately information on firm size is not collected every year in the NLSY so this important determinant of training is not included in this analysis.

Finally, schooling may affect an individual's probability of receiving training. In particular, additional years of schooling may signal a certain "stick-to-it-ness" and an interest and aptitude in learning. On the other hand, workers with poorer initial skills due to fewer years of schooling may require additional training to get up to speed. In this study of non-college graduates it will be particularly interesting to observe the importance of finishing high school for the probability of acquiring employer provided training.

Previous studies on the role of training in wage determination have been limited by the nature of the data available for analysis. To highlight some of these problems Table 1 shows the different questions contained in a selection of surveys most commonly used. Very few of these questions actually ask about the training the respondent has acquired on the current or past jobs. For example, the question used by Brown (1989) from the Panel Study of Income Dynamics, PSID, on training is how long it took the "average" person to become qualified for the job, not how long the respondent actually took to become qualified. In the

older NLS cohorts analyzed by Mincer (1983, (1988)) and Lillard and Tan (1986), the data collected relate to training received or used on the current job. One is not able to observe when the training actually took place or whether other types of training had been undertaken by the respondent. Incomplete information on the total amount of training received is also a limitation with the Current Population Survey, CPS, data used by Pergamit and Shack-Marquez (1986). The CPS questions are unlikely to provide information on the training experience of older workers if this training was acquired from previous employers. Therefore, cross sectional analysis of the impact of training on wages using the CPS data will have to carefully control for cohort effects. The Employment Opportunity Pilot Project, EOPP, data used by Barron et. al. (1987, 1989) are interesting since they provide a good measure of the "representative" length (and costs) of training to an employer. However, the data collected are restricted to information on the most recent hire in the firm. If the most recent hire is more likely to be in a position of high job turnover then it is possible that the training investment observed is an underestimate of what more "representative" employees in the firm receive. In addition, the EOPP firms were predominately low wage firms and not representative of all firms in the U.S.. Many of these limitations are overcome with the new NLSY.

The NLSY is a survey of 12,686 males and females (who were 14 to 21 years of age at the end of 1978) and contains detailed data on education, jobs, military service, training programs marital status, health and attitudes of young workers. The respondents have been interviewed every year since 1979 on all aspects of their labor market experience. The response rate in 1985 was over 95 percent of the original cohort. The data on types of

training (other than governmental training or schooling) received are some of the most comprehensive data available on private sector training. Respondents were asked about what types of training they had received over the survey year (up to 3 spells not just the longest) and the dates of training periods by source. Potential sources of training included business college, nurses programs, apprenticeships, vocational and technical institutes, barber or beauty schools, correspondence courses and company training. All of the types of training programs are independent from training received in a formal regular schooling program which is included in the schooling variables. However, the questions ask about only those spells of training that lasted at least 4 weeks (they did not have to be full time). This suggests that the NLSY measure of training is more likely to capture formal training spells than informal on-the-job training. Therefore, tenure on the job will capture both returns to seniority and returns to training programs lasting less than 4 weeks such as informal on-the-job training.

For the analysis of the impact of training on wages a subsample of the 12,686 respondents has been selected. I have excluded the military subsample from the analysis (1280 respondents) and all college graduates. The final sample is composed of individuals who had completed their schooling by the 1980 interview date (where "completed" is defined as not returning to school by the 1983 interview date). The completion of schooling requirement reduces the sample size substantially given the age structure of the NLSY (4000 respondents are still 17 or less in 1980). In addition, these individuals had to have wage observations at both the 1980 and 1983 interview dates.[3] This last restriction does not imply that the respondent had to be working at the interview date since the wage data used are

wages in current or last job over the survey year. These selection criteria yield a final sample of 3064 individuals that will be used in the empirical work. Using a constructed weekly event history of private sector training, employment, and schooling for this subsample it is possible to examine the patterns and outcomes of training for non-college graduates.[4]

The training data are separated into three categories -- company training (ON-JT), apprenticeships (APPT), and training obtained outside the firm (OFF-JT). OFF-JT includes training obtained from business courses, barber or beauty school, nurses programs, vocational and technical institutes and correspondence courses. Each of these three types of training are allowed to have different types of returns. Since the data are longitudinal it is possible to distinguish between spells of training in each of these categories received during employment with a previous employer and spells received during current employment. In addition, for training received on the current job, it is possible to identify both completed and uncompleted spells of training.

In Table 2 characteristics of this sample are presented. The primary source of formal training for this sample comes from "off-the-job" in terms of the percentage of the sample -- 14.7 percent -- who have experienced this type of training; only 4.2 percent of the sample have had on-the-job training, and 1.8 percent have been apprentices. The number of women and nonwhites who are in apprenticeship programs is particularly small and this needs to be kept in mind when interpreting some of the results in the next section. The number of individuals in company training may also seem small compared to numbers that have been found in other surveys such as the employer EOPP survey. However, when the EOPP data are restricted to a spell of 4 weeks or more of training, as in the NLSY, the percentages are

remarkably similar[5]. The average length of time spent in these formal training programs is quite long. The average spell length of an apprenticeship is 63 weeks, of OFF-JT is 41 weeks, and of ON-JT is 31 weeks. Finally, Table 2 shows that there are distinct differences in the types of training received and the duration of this training by race and gender.

IV. Private Sector Training and Wages: Empirical Results

Table 3 presents estimates of the probabilities of an individual receiving each of the three types of training at some time up to the 1983 interview date as a function of their 1983 characteristics. Differentiating among these various types of training reveals some interesting patterns. The probability of investing in off-the-job training is lower if the youth is male or has longer tenure on the job.[6] On the other hand, company provided formal on-the-job training is concentrated among white married unionized males with greater work experience[7] but tenure in 1983 is not significant. At the same time it is lower for those who live in high unemployment areas. This suggests that as unemployment rises firms find it more difficult to provide expensive formal on-the-job training to new young entrants. Finally, the most important determinants for participating in an apprenticeship include being white, unionized, and male. Interestingly, living in an high unemployment area means you are more likely to have participated in an apprenticeship program. This may be explained by the fact that most apprenticeships are in construction and manufacturing which experienced very high unemployment rates during this period.

The role of schooling in training decisions varies by type of training. For this sample of non college graduates when schooling is included as years of completed schooling in each of the equations it is never significant. However, when the schooling variable is broken into

the categories - less than high school, high school graduate and post high school but not college graduate- some different patterns emerge. Staying on in school to complete a high school degree or some post high school experience significantly increases the probability of receiving off-the-job training and (marginally) formal company provided on-the-job training. Most apprentices have a high school degree but it is less likely that someone who has some post high school education will participate in an apprenticeship program.[8]

The fourth column in Table 3 examines the probability of individuals in the 1983 survey year to have participated in company provided training in 1983 as a function of their 1983 characteristics. The previous three columns use characteristics in 1983 to predict the probability of having ever received training by type (even prior to 1983). While this increases the number of observations with training it does not allow for the examination of how previous spells of training increase the probability of future training and the actual impact of current tenure on current ON-JT probabilities. In column 2 tenure in 1983 was not significant in explaining the probability of ever having received training during the 1980-83 period, whereas experience was significant. In contrast, by specifying the timing correctly, column four shows that tenure with the current employer increases the probability of receiving ON-JT and those individuals who have had training with a previous employer are much more likely to receive on-the-job training in the future.

Finally, I have also included broad industry and occupation dummies in the probits for on-the-job training, off-the-job training and apprenticeship. Although the detailed results are not reported here for reasons of space, a few summary comments are in order.[9] The inclusion of industry and occupation dummies did not change very much any of the

coefficients for the ON-JT and OFF-JT probits. However, there are some changes in the apprenticeship probit. The local unemployment rate and being male became insignificant factors when industry and occupation were added but being white, a high school graduate and a union member still raised the probability of participating in an apprenticeship. As expected, apprenticeships are more common in the construction industry and among technical workers and craft workers. For the ON-JT probits, those employed as managers, sales workers, clerical staff or craft workers were more likely to have experienced a spell of formal company provided training while those in the wholesale and retail industry were significantly less likely to have received ON-JT. For OFF-JT, there were two very different occupations that were more likely to have acquired this type of training - professional and technical workers, and service workers. None of the industry dummies were significant for off-the-job training.

Keeping these differential patterns in the acquisition of training in mind, I now examine how these three types of training affect the wages of non-college graduates. Log wages of young workers are regressed on a function of tenure, work experience, schooling, training, and other factors. The training variables are divided into OFF-JT, ON-JT and apprenticeships, APPT. These variables are further separated into training received while employed with a previous employer and the current employer. Finally, I allow completed and uncompleted spells of APPT and ON-JT from the current employer to have different effects on current wages[10]. The additional factors in the wage equation include the local unemployment rate, the number of jobs held since finishing school, whether or not the respondent lives in an urban area, marital status, race, gender, coverage by a collective

agreement, and health. Equation 1 in Table 4 presents results from a standard log wage equation specification excluding the training variables where the dependent variable is the log of wages in 1983. Equations 2 and 3 in Table 4 include the training variables, with equation 3 also adding broad industry and occupation categories. Equation 4 contains the Heckman correction for sample selection. The sample selection issue will be discussed later and I first focus on the results of equations 1-3 in Table 4.

One of the striking findings is the insensitivity of the estimated coefficients on tenure to the inclusion of the training variables. It appears the training and tenure are basically uncorrelated since the coefficient on tenure does not alter between equations 1 and 2. The tenure variable is always significant in the wage equation although there are many factors it may be capturing. Specifically, the training variables in the NLSY are good measures of spells of formal training lasting at least one month but they may not capture all spells of informal on-the-job training. In this case, the tenure variable is capturing both a pure "tenure" effect plus the returns to informal training. In addition, as shown in the job-matching literature, tenure may represent job match quality so its coefficient is biased upwards (see Topel for a discussion of the size of this bias). Finally, a positive tenure effect could reflect incentives provided by the firm to reduce shirking and/or to lower turnover.

Equations 2 and 3 in Table 4 show the significant role that training plays in wage determination. Even after controlling for industry and occupation the various training measures have a significant impact on wages. Periods of off-the-job training and apprenticeship training acquired before the current employer raise wages significantly. Weeks of on-the-job training and apprenticeship with the current employer also raise wages.

Other variables that significantly raise wages include total work experience, years of school, living in an urban area, male, white, married and coverage by a collective agreement. Being disabled or living in an area with high local unemployment depresses wages significantly. Adding industry and occupation dummies to the estimated wage equation slightly reduces the size of the effect of training on wages but the training variables that were significant without industry and occupation dummies remain significant when they are added. Workers employed in the mining, construction and transportation industries earn more relative to those in manufacturing while those in wholesale and retail trade, business, repair, personal and professional related services earn less. Professional, managerial and craft workers all earn a wage premium relative to laborers and farmers.

In order to have a better sense of how the different training variables affect wages relative to other factors such as tenure and schooling, Table 5 presents calculations of hourly wages for different characteristics of the sample. This table shows that training, especially company provided on-the-job training and apprenticeships, raises wages substantially. The impact of one more year of school or one more year of current tenure (keeping experience the same) raises wages to almost to the same amount as 6 months of off-the-job training. The return to additional schooling and tenure is even smaller relative to the return to 6 months of on-the-job training from the current employer. The latter raises wages by almost ten percent while off-the-job training obtained before the current job raises wages by almost 5 percent. We know from Table 3 that women and nonwhites are much less likely to receive on-the-job training. However, Table 5 shows that if, for example, a nonwhite male obtains 6 months of off-the-job training he can cut the gap in earnings between himself and

a white male with no training in half. White and nonwhite female wages rise as well with off-the-job training but the gap between female and male wages remains quite large. These findings on the role of training obtained from "for-profit" proprietary institutions is important for the current debate on whether or not Graduate Student Loans and Pell grants should be continued to be granted to students in these institutions. Some cities have expressed concern about the ability of these institutions (see INTERFACE (1989)) to provide training to welfare recipients. However, this paper shows that on average for this sample of non-college graduates that off-the-job training from proprietary institutions has a sizeable impact on wages.

Some other interesting findings contained in Table 4 concern the variables that are not significant. For example, spells of on-the-job training acquired before the current job have no impact on current wages. This suggests that ON-JT is not portable from employer to employer for young workers who are not college graduates. This may be because formal ON-JT for these workers is more firm specific than general. It may also be because those trained workers who change employers are not as able as those workers who receive on-the-job training but do not leave their employer[11]. However, equation 4 in Table 3 indicates that having received training from a previous employer raises the probability of receiving training in the future which does not seem consistent with considering trained workers who change jobs as lower quality workers.

Off-the-job training acquired before current employment has a significant and positive impact on wages, while off-the-job training during current employment is not significant. This may be because young workers who are acquiring training from a proprietary institution

are planning to use this training to move to another employer and career track, or the findings may reflect the sharing of costs of this training with the current employer through lower wages. In the following section I examine in more detail the link between training and employer mobility. Unfortunately, it is difficult to identify from the NLSY data who is paying for the direct costs of training received off-the-job.

Table 6 presents the findings using the specification of equation 3 in Table 4 but broken down by various subsamples of interest according to gender, race, education and union status. It should be noted that given the sample composition, as shown in Table 2, some of the cell sizes (e.g. the number of women in apprenticeships) become extremely small. Nevertheless there are some interesting differences across these groups. For example, Johnson and Youmans (1970), Lewis (1986) and Mincer (1983) have discussed the potential impact of unions on wage profiles and job training. The evidence from many studies indicates that while unions raise the wages of their members, the wage profiles of union workers are flatter than that of their nonunion counterparts. The results presented here confirm those findings. The union wage premium for the sample as a whole is around 20 percent yet the equations in Table 6 show that nonunion workers' wages rise faster during training spells than union workers' wages.

Another interesting finding is what happens to the coefficient on current ON-JT when the sample is divided by educational level. While those who have a high school degree or some post high school schooling receive a wage premium for ON-JT, those who do not have a high school degree actually receive lower wages during an ON-JT spell. This suggests that firms may be providing more general training for those who do not complete high school

and the costs of this training are shared between the workers and the firm with workers receiving a lower wage during the training period. Another finding related to educational level is that the coefficients on race and gender become much less significant and smaller for those who have some post high school education. This seems to suggest that continuing on in school reduces the gap in wages between males and females and nonwhites and whites.

Before reaching any final conclusions on the basis of the results presented in Tables 4-6 it is necessary to discuss in more detail the possible sources of bias in the training estimates due to self-selection. As already mentioned, employers may only place employees in training programs who have some unobservable characteristic, "trainability", or individuals who are more motivated would be more likely to pursue off-the-job training. In either case the estimated coefficient on the various training measure will be biased upwards (i.e. the treatment selection problem).

A variety of ways to try to address this issue are described in Heckman (1979) and Heckman and Robb (1986). One method that I used was a "standard" Heckman two-stage procedure using the probits in Table 3 for ON-JT and OFF-JT with the appropriate inverse Mills ratios as regressors in the wage equation. The results of this procedure are presented in equation 4 in Table 4. This is a relatively straightforward procedure if the error terms in the two probit equations are not correlated. To examine whether or not this was an appropriate assumption for this sample I estimated a bivariate probit for the probability of receiving on-the-job training and off-the-job training (results available upon request) and found the correlation coefficient to be small (-0.12) with a t-statistic equal to -1.67. As

shown in equation 4 in Table 4, none of the previous findings are altered with the inclusion of the inverse Mills ratios (the lambdas) as regressors. Note that the lambdas are not significant in the equation. However, identification using this procedure rests primarily on functional form or somewhat artificial exclusions of explanatory variables[12]. This is a common problem with this procedure for this type of model since it is difficult to identify a variable that you would not include in both the probits and the wage equation.[13]

A second approach to deal with sample selection assumes that self-selection varies only across individuals and not over time for the individual. An individual's wage at time t can be expressed as:

$$\log (w_{it}) = Z'_{it}d + f_i + e_{it} \quad (1)$$

where Z' is a vector of variables affecting wages that vary for each individual over time, and f_i are all the characteristics which are individual specific but time invariant. The characteristics in f_i may be correlated with whether workers undergo training. Fitting equation (1) while omitting f_i will lead to bias in estimates of b. By differencing individuals' wages between 1983 and 1980, all time invariant effects (both observed and unobserved) drop out, and the coefficients may be estimated without bias.

The results from this second approach to sample selection are presented in Table 7. In the first column of results for the entire sample it is clear that additional weeks of off-the-job training and apprenticeships significantly raise wage growth. Additional weeks of ON-JT, however, are never significant for the entire sample or any sub-group. This suggests

that there may be some problem of selection bias for those who have some ON-JT. It may also be that the cell sizes here are too small for a significant effect to be found. The size and significance of the OFF-JT effect remains similar between the cross section and fixed effects models in Tables 6 and 7. The only change is that weeks of off-the-job training for those in a union job in 1983 is now a significant factor. The specification does not distinguish between training spells across different employers in the interval so there may be some workers who take a technical course in a proprietary institution that gets them into a union job at some later date.

Moving to a job that is covered by a collective agreement has a large and positive effect on the wage rate. Those employed in a nonunion job in 1980 and a union job in 1983 experienced significant wage growth over the period, while those working in a union job in 1980 and a nonunion job in 1983 experienced a large decrease in their wage. Changing jobs[15] at any time during the 1980-1983 period increases wage growth for the sample as a whole, but again there are differences across the various demographic groups. Only white females and all education groups except those with some post high school education have changes in their wage growth if they change employers. Finally, tenure on the job has a much larger return to nonunion employees than union employees, as expected from the earlier discussion on union wages in Table 6.

IV. Private Sector Training and Wages: Conclusions

While the returns to a college degree or government training programs in the U.S. have been widely documented, there has been relatively little analysis of the returns to other forms of human capital investment that non college graduates undertake. This paper has

shown that private sector training plays a significant role in the determination of wages and wage growth of the 70 percent of young workers in the U.S. who do not graduate from college. Specifically, when private sector training is divided into different types (on-the-job training, off-the-job training, and apprenticeships) some very different patterns emerge. For example, the characteristics that appear to influence the probability of receiving training are primarily race and gender. Women and nonwhites are much less likely to receive training within a firm either through an apprenticeship or other forms of on-the-job training. This differential pattern in the acquisition of training by race and gender may be a partial explanation of the persistent wage gap between males and females and whites and nonwhites. Schooling raises the probability of receiving off-the-job training and apprenticeships but it had a smaller impact on the probability of receiving firm provided on-the-job training.

All types of training raise wages significantly. In particular, this paper shows that on average, for this sample of non-college graduates, off-the-job training from proprietary institutions can be useful for increasing wages. The impact of these training variables also seems to be larger than the impact of tenure on wages. This paper does not argue that there is no role to be played by job matching or other explanations of rising wage profiles, but rather that when there is appropriate data on training, the impact of training on wages is quite large relative to other factors for young workers.

Finally, while on-the-job training with the current employer increases wages with the current employer, this type of training seems to be quite firm specific since on-the-job training from a previous employer is never significant for current wages. At the same time,

there seems to be some evidence that if general training is being given to any group of workers on the job it is for those who have not completed high school. The finding that on-the-job training is primarily specific is consistent with recent findings from the Hudson Institute which surveyed 645 firms in the U.S. and found that only 8 percent had any sort of general remedial on-the-job training programs[16]. The fact that U.S. firms are more willing to invest in firm specific training than in general training is understandable given the inability to "capture" the returns on investments in general training. However, whether or not U.S. firms will be able to remain competitive with this strategy in the future, given the characteristics of the new entrants into the workforce and the skill demands of new technology, is questionable.

Section V. Training and Mobility: Theoretical Framework and Data

The transition from school to work is typically a period in which many young workers experience a wide range of different jobs and experience some of their most rapid wage growth over their working life. Hall (1982) has estimated that the first ten years of an individual's working career will include approximately two-thirds of all life-time job changes. Topel and Ward (1988) found that over half of young male new entrants into the labor market held six or more jobs in their first ten years of work experience. Only one young male worker in twenty remained with their first employer for ten years in their sample. All of this suggests that young workers' early years in the labor market involve several employment transitions.

The purpose of this section of the report is to examine for young workers in their early years of work experience the determinants of leaving an employer. In particular, this

section focuses on the role of different types of training on the probability of leaving an employer. In the previous section of this report I reached the following conclusions. First, formal company provided training, or ON-JT, appears to be highly firm specific in the U.S. and, therefore, is not portable from employer to employer. Company provided training raises wages in the current job but has no effect on the wages earned in subsequent employment. Second, formal training received from 'for-profit' proprietary institutions, or OFF-JT, has little effect on the wages earned on the current job but it does raise the expected wage in subsequent employment. Finally, there are important differences by race, gender and education level in the probability of receiving different types of formal training and the impact this training has on wages and wage growth.

These findings have several implications for the impact of training on mobility. One implication is that if company provided training is primarily firm specific then the probability of leaving an employer should decline if a young worker has experienced some on-the-job training. An additional implication is that if workers participate in off-the-job training programs they are more likely to leave the current employer. In this case, off-the-job training allows a young worker to change career paths and find a 'better match'. Using data from the National Longitudinal Survey Youth cohort, NLSY, this part of the report examines in detail the factors which influence the probability of new entrants leaving their first job including the differential effects of company provided training, apprenticeships and training from 'for-profit' proprietary institutions.

There are a variety of explanations of why young workers change their employment status so often in the early years of their careers and then seem to 'settle down' into more

stable employment. In the unionized sector, where seniority rules determine layoff policies, young workers are more at risk of being laid off in a downturn. Even in the non-unionized sector, many firms use seniority as a major determinant of whom to lay off in a period of falling demand.

There are other explanations of the higher turnover rates of young workers, however, that have little to do with the state of demand. The three main theoretical explanations include job search, job matching and on-the-job training. Job search theory, as detailed by Lippman and McCall (1976), states that information about where to find a job and the nature of that job are difficult to acquire, especially for younger workers. Workers will accept employment and remain in that job as long as the wage paid in that job exceeds the alternative wage. Therefore, workers who earn more relative to their alternative wage are less likely to quit.

An alternative explanation of turnover behavior can be found in Jovanovic (1979a, 1979b, 1984). In the Jovanovic learning model both workers and firms 'learn' about the unobserved characteristics of each other over time. As tenure increases, the quality of the job match is revealed as firms observe workers' actual productivity and workers discover the non-pecuniary aspects of their job. In this model there are two countervailing forces for the relationship between tenure and the probability of leaving an employer. On the one hand, 'better' workers remain with employers longer leading to negative duration dependence in the probability of leaving a job. On the other hand, as 'bad' matches are revealed the turnover probability will rise over time.

The process of on-the-job training within the human capital model as described by

Mincer (1974) implies that as workers acquire firm-specific training, their productivity and, consequently wages, will rise. Therefore, the probability of leaving an employer will fall with training and tenure since the wage will rise relative to the alternative wage. In addition, employers will be less likely to lay off those workers in whom they have invested in specific skills. However, if most of the initial training for young workers is general, there will be either no effect on the quit probability or the quit probability may even rise.

All of these theories are not mutually exclusive and clearly some combination of all of these factors influences the probability of a young worker remaining with an employer. Consequently, it is not the purpose of this report to distinguish between these different theories. Rather, it would be more useful if precise data on employment spells and training could be found in order to establish the links between different types of training and turnover behavior.

There have been relatively few empirical studies which have attempted to examine the role of training, demand and other factors in predicting the probability of leaving an employer. This is primarily due to the lack of accurate data on the timing of private sector training and the lack of detailed employment histories for workers. Recent exceptions include Gritz (1988) and Mincer (1988). Gritz uses data from the early years of the NLSY and finds that private sector training (not distinguishing between different sources of training) increases the amount of time in total employment for females but decreases the amount of time males were employed. Gritz's study uses data from the very early years of the NLSY when most of the observed training spells occurred before the detailed employment history begins. Mincer uses data on training and mobility from the Panel Study

of Income Dynamics, PSID. The training variable comes from the answer to the following question in the 1976 and 1978 interviews: "On a job like yours how long does it take the average new person to become fully trained and qualified?" While this is potentially a very broad measure of training it does not measure how much training has actually occurred for the specific respondent. In addition, it captures training information for the current job, not previous employment.

Using data from the NLSY it is possible to examine in more detail than has been possible in the past, the role of training, the general state of demand, and other personal characteristics in determining turnover. The probability of leaving employment (for whatever reason) is also known as the hazard rate or failure rate in renewal theory. The hazard rate or turnover probability can be expressed as follows:

$$h(t) = g(t)dt/(1 - G(t)) \tag{2}$$

where g(t)dt is the probability of leaving an employer between time t and t+dt, 1 - G(t) is the probability of being employed at time t, and t is the duration of the current spell of employment. In this paper the following Cox proportional hazards model is used:

$$h(t;z) = h_0(t)e^{zB} \tag{3}$$

where $h_0(t)$ is an arbitrary and unspecified base-line hazard function and z is a vector of characteristics including training. The Cox model is convenient for dealing with right

censoring and it is nonparametric in the sense that it involves an unspecified base-line hazard instead of making further distributional assumptions such as those required for the Weibull or Log-logistic hazard. However, this means that it will not be possible to measure whether or not there is negative or positive duration dependence in employment, but this is not a key focus of this paper.

In a model of the role of training in the probability of leaving an employer it is important to be able to allow training to occur over time with the employer. Allowing for covariates such as training to be time dependent implies:

$$h(t;z(t)) = h_0(t)e^{z(t)B} \tag{4}$$

where z(t) is a vector of all fixed and time varying covariates. As discussed in Cox and Oakes (1984) the components of the vector z(t) can be divided into the following three categories of variables - treatments that vary with time; intrinsic properties of individuals/jobs that are time invariant; and exogenous time varying variables.

Obviously the different types of private sector training are the 'treatment' variables of interest. Examples of time invariant personal and job characteristics include gender, race, education, occupation, industry, union status, location of the job in an urban area, and whether or not the respondent is disabled. Time varying 'exogenous' variables for the purpose of this study include the local unemployment rate, marital status and the number of children.

For the analysis presented in this part of the report a different sample is used to

analyze mobility patterns than was used to examine the determinants of wages. This sample uses more recent years of the NLSY. As in the wage analysis I have excluded the 1280 respondents in the military subsample from the analysis. However, I have also deleted any respondent who has completed school before the 1979 interview year. The final sample is a pooled sample of young workers who have left school and not returned to school for at least four years ('permanently' out of school). Therefore, this sample is made up of 5 waves of school leavers -- those who left in 1979, 1980, 1981, 1982 and 1983. In addition, the respondents had to have obtained a job in the first year after 'permanently' exiting school. The estimated hazard models the determinants of the turnover probability for the first job after leaving school permanently for this sample. This sample has many more college graduates in it given the age structure of the NLSY compared to the sample used for the wage study. However, I do not include anyone who completed school before 1979, which substantially reduces the sample size. In addition, I do not attempt to model the decision to leave school over the period (1979-1983). Obviously this was a period in which many young people may have delayed entry into the labor market given the high unemployment rate. I include dummy variables for year of entry in the following analysis but future work would benefit from a complete modeling of the schooling/employment/training decisions taken by young workers.

Characteristics of this sample are presented in Table 8. As can be seen in Table 8, almost three quarters of the sample leave their first employer during the first four years after school. The average duration of employment (including those still employed after four years) is about a year and a half. Almost seventeen percent of the sample experienced some

form of formal training during their first job but the distribution of this job training by source varied substantially by demographic group. College graduates were much more likely to have received some form of ON-JT while those with just a high school diploma were more likely to have participated in some form of OFF-JT. Women were more likely than men to have received some form of OFF-JT but there was little difference in the probability of receiving ON-JT by gender (not controlling for other factors). It is important to note that some of the cell sizes for training by demographic group are extremely small and this needs to be kept in mind when interpreting some of the following results.

Table 9 presents more detailed information on the relationship between tenure on the job with the first employer and the various types of training. The first panel shows that over 80 percent of the sample have left their first employer by the fourth year in the labor market. Those who left their employer relatively early were much less likely to have had any formal ON-J-T (only 1.3 %) than those who stayed with their first employer 3 years of more (8.1%). The pattern is a bit different with participation in OFF-J-T programs. Almost a quarter of those who left their first job between 2-3 years received OFF-J-T. However, this percentage drops dramatically for those with 3 or more years on the job to only 11.7 percent.

The second panel is perhaps even more interesting. This panel shows, conditional on having participated in one of the types of private training, when that training spell begin during the tenure with the employer. As discussed in the previous sections on training and wage determination one view of training is that it is a 'test' (Weiss and Wang (1990)). In other words, firms use formal training programs as a way to avail themselves of private

information known only by the workers. Workers who fail the test leave the firms and those who pass do not leave. This would imply that we should observe ON-J-T occurring early in a workers's tenure with the firm. However, in this second panel we see that 60 percent of ON-J-T spells begin after one year on the job at the firm. This seems to be more consistent with a job matching story where firms(workers) make a determination within the first 6-12 months on whether or not there is a match, and if yes, the firm then invests in more costly formal ON-J-T. Since the measure of training used in this paper only captures spells that last 4 weeks it may be possible that shorter formal or informal training spells are used early in the career with an employer as an indication of match quality and longer training spells follow later.

Contrary to the timing of ON-J-T spells almost 60 percent of spells of OFF-J-T begin within the first year with an employer. This may be due to employees going outside the firm to obtain training that they need for their current job, or employees deciding that there is not a job match and seeking a training program that will allow them to leave their current employer and get a better job. Finally and not surprisingly, most apprenticeships begin very early in the tenure with an employer.

VI. Private Sector Training and Mobility: Empirical Results

The results obtained from estimating the Cox proportional hazard with time varying covariates are presented in Tables 10 and 11. The time varying covariates are indicted by an asterisk. The time invariant intrinsic characteristics of the individuals /jobs in Table 10, equation 1, that seemed to influence the probability of leaving an employer included being disabled, union status, race, and school level. Disabled respondents were more likely to

leave their employer while being employed in a job covered by a collective agreement or being a college graduate significantly lowered the probability of leaving the first employer. Blacks were more likely to have shorter durations on their first job than whites and hispanics. There was no significant effect on the length of time with the first employer by gender. However, there were significant differences in expected length of employment by school attainment. Those with a high school degree or less were more likely to leave their employer, whereas those with a college degree were less likely to leave.

Of the time varying 'exogenous' covariates the local unemployment rate was significant implying that those who lived in high unemployment areas were less likely to leave their employer. The hurdle for youths in high unemployment areas seems to be getting a job rather than keeping one. The number of children seemed to have no significant effect on the expected duration of the first job. Finally, those workers who were married were more likely to remain with their first employer.

With regards to the training variables, those young people who had some formal ON-JT were much less likely to leave their employer while those who participated in some form of OFF-JT were more likely to leave. This seems to suggest that ON-JT is more firm specific while OFF-JT is more 'general'. These findings are consistent with the results on training and wages.

In equation 2 the hazard is re-estimated including industry and occupation dummies. The inclusion of industry and occupation does not change the coefficients or significance of the variables in equation 1 with the exception of college which becomes insignificant. Those young workers employed in construction, wholesale and retail, and business, repair, personal

and professional services were much more likely to leave their employers than those in manufacturing. The only significant occupation was managers with managers more likely to remain with their first employer.

In equation 3 of Table 10 an additional variable is added which is the difference between the log of the current wage (which varies with time) and a log predicted wage. The predicted wage is obtained by the formula in Table 8 which uses the estimated coefficients from a log wage equation for the starting wage for this sample. Those individuals who are being paid less than their predicted alternative wage are more likely to leave their employer as shown in both equations 3 and 4 of Table 10. None of the previous findings from equations 1 and 2 are altered very much.

In Table 11 the proportional hazard is re-estimated for various demographic groups of interest. Now the results change dramatically depending upon which sub-group you examine. Again, it is important to remember that some of the cell sizes now are very small so care must be taken in interpreting the results in Table 11. Nevertheless, it is interesting to see how the results from the previous table change when the sample is divided into demographic categories of interest. For example, males, females, and blacks who are high school dropouts have a shorter expected duration on the first job after they leave school. However, being a male or black high school graduate has no effect on the duration of employment, while being a female high school graduate lowers the duration of employment. Male and black college graduates have longer expected durations of employment, while there is no effect of a college degree on the probability of females remaining with their first employer.

The differences by race and gender are even starker when one examine time varying regressors and the effect of training. For women, having additional children significantly lowers the expected duration of their first job relative to those women who do not have additional children. At the same time, there is no effect of children on the expected duration of male or black employment. Being married still lowers the probability of leaving an employer for males and women but there is no effect of marital status for blacks. Finally, ON-JT and OFF-JT are now insignificant determinants of the duration of employment for males and blacks. However, ON-JT increases the length of time in employment in the first job for women while OFF-JT increases their turnover probability.

When the sample is divided by educational attainment other interesting results emerge. For example, those who are high school graduates or had some post high school education and are covered by a collective agreement are less likely to leave their employer. For the sample as a whole there is no difference in the probability of leaving an employer between males and females. However, when the sample is divided by educational level, males are less likely to leave their employer than females if they have less than a high school degree or a college degree, but they are more likely to leave if they have had some post high school education. In addition, being black raises the probability of leaving an employer only if the young worker had a high school degree but was not significant for any of the other educational groups.

The number of children seems to affect the duration of employment with the first employer only for high school graduates, while marital status is significant only for college graduates and high school dropouts. In addition, the unemployment rate is now only

significant for high school graduates. Finally, ON-JT appears to lower the turnover probability if the respondent had a high school degree or less, while OFF-JT seems to raise this probability for those with a high school degree. Given the small cell sizes one must be cautious in drawing conclusions on variables that are insignificant, but the different effects of variables of interest by race and gender are quite striking.

VII. Private Sector Training and Mobility: Conclusions

This section of the report has focused on the link between training and the probability of leaving an employer. A high percentage of ON-J-T spells begin after young workers have remained with their employer for at least one year. This seems to be consistent with a job matching story where firms(workers) make a determination within the first 6-12 months on whether or not there is a match, and if yes, the firm then invests in more costly formal ON-J-T. In contrast to the pattern associated with ON-J-T spells, almost 60 percent of spells of OFF-J-T begin within the first year with an employer. This may be due to employees going outside the firm to obtain training that they need for their current job, or employees deciding that there is not a job match and seeking a training program that will allow them to leave their current employer and get a better job.

There are significant differences in the patterns of job mobility by race and gender. Overall there is no difference in the probability of leaving an employer by gender. However, when the sample is divided by race, gender, and educational attainment there are important differences between males and females. For example, children appear to have little affect on the probability of males leaving an employer. At the same time, they have a significant and positive effect on the probability of women not remaining with their

employer. Among high school dropouts and college graduates women are more likely than men to have shorter spells their first job, but there is no gender difference among high school graduates. In contrast, among those who have had some post high school education men are more likely to leave their employer.

Evidence presented in the previous sections of this report indicated that on-the-job training for young workers in the U.S. appeared to be quite firm specific whereas off-the-job training appeared more general. The results presented in Tables 10 and 11 seem to reinforce this conclusion. Those with on-the-job training are more likely to remain longer with their employer which would be consistent with firm specific training. Those who obtain off-the-job training are more likely to leave their employer and this would be consistent with off-the-job training being more general. However, when the sample is divided by race,gender and educational attainment we see that the training variables are only significant in the equation for females.

Overall it appears that blacks are more likely to leave their employer but this appears to only be true for those blacks who received just a high school diploma. There does not seem to be any significant difference in the results for hispanics relative to whites. Finally, there does seem to be some evidence that blacks who receive some on-the-job training have longer expected job durations in their first job.

While this part of the report has attempted to shed new light on the skill formation process of young workers and the consequences of this on their patterns of mobility there are still many issues that remain unresolved. This report has modeled the determinants of the duration of the first job after school, not subsequent employment. As the NLSY age

future research should examine how some of the gender, race, and educational differences change over time. It would also be interesting to examine the hazard rates by broad industry and occupational categories. Finally, it would be important to see how robust the findings are after additional work is done to address the endogeneity issue for training.

Nevertheless, there is a story that emerges from the results in this report for young workers and private sector training. Company training in the U.S. is very firm specific, even for young workers in their first job. Young workers entering the labor market can receive both 'good' and 'bad' draws from the labor market. There are some workers who get a 'bad' draw who appear to move to better employment by investing in off-the-job training. Those in 'good' jobs are more likely to obtain on-the-job training which results in higher wages and a lower probability of leaving the firm. These effects are particularly strong for women in spite of the fact that women are less likely to receive on-the-job training.

FOOTNOTES

[1] Kerns, David, CEO Xerox Corp. in W. Miller, "Employers Wrestle with Dumb Kids", Industry Week, July 4, 1988.

[2] Even if the training is entirely firm specific you might still expect in some cases to observe a positive effect of past training on wages with a future employer because if the employer providing the training gives some wage premium for specific training (to lower turnover) then the worker's reservation wage should be higher. The size of this effect, however, becomes an empirical question.

[3] Given the age structure of the sample the restriction that the respondent had to have completed all schooling by the 1983 interview date substantially reduces the sample. The restriction of having wage data further reduced the sample size but this effect was not as large. In addition, only about 120 respondents had completed college by 1980 who also had wage data. Therefore, future work with the next waves of the NLSY might examine the role of private sector training for college graduates.

[4] The data for the training variables come from the starting and ending dates of spells of training by source. These dates are given by month and year. In order to match this to the weekly employment and schooling histories I assume that all training commences and ends at the beginning of the month. In the case of a spell which has the same beginning and ending month I make the ending week the first week of the following month. If many spells of training were quite short in duration this approximation might be inappropriate. However, since all training spells have to be at least 4 weeks and the fact that the average duration of training for this sample is around six months this should not be too serious a problem.

[5] I would like to thank Dan Black for very kindly running the comparable numbers for the EOPP data. The EOPP data are of hours of training rather than weeks, however, he found that 3 percent of the EOPP sample had training of over 100 hours (one might assume 4 weeks of 25 hours per week) and 2 percent had training over 140 hours (4 weeks of 35 hours). The NLSY number for those in firm provided training lasting at least 4 weeks is 4.2 percent.

[6] Tenure is specified as total weeks on the current job. In an alternative specification tenure was represented by a series of dummy variables: less than 6 months; 6 months - 1 year; 1-2 years; and greater than 2 years. This had little impact on the findings presented here.

[7] Experience is total number of weeks of work since finishing school.

[8] The probits presented in Table 3 assume that the decision about when to finish school is exogenous with respect to decisions about post-schooling training. However, given

that more than 70 percent of U.S. youths do not finish college it is interesting to examine, conditional on completing school, how and who of the non-college graduates acquire training after school. Future work should examine a more complete model of human capital accumulation from school to training and government training programs.

[9] The industrial categories used and the percent in each (in ()) are: agriculture, forestry and fisheries (3.3); mining (1.3); construction (5.6); manufacturing (20.0) (omitted category); transport, commercial and public utilities (5.0); wholesale and retail (27.1); finance, real estate and insurance (5.4); business and repair services (5.9); personal services (6.9); professional and related services (15.2); and public administration (4.3). The occupation categories include: professional and technical (6.2); managers (3.8); sales (5.5); clerical (24.2); craft workers (10.3); operatives (18.2); laborers and farmers (10.7) (omitted category); service workers including private household (21.1). Detailed results are available from the author upon request.

[10] The coefficients on completed and uncompleted OFF-JT were never significantly different in any of the wage equation specifications.

[11] If you view training of young workers as a "test" as discussed in Weiss and Wang (1990), then this would be consistent with an argument that formal training programs are a method firms use to avail themselves of private information known by workers. Workers who "fail" the test leave the firm and those who "pass" do not leave. This discussion suggests that it would be important in future work to also examine the mobility patterns of these workers and the role of different types of training in the mobility pattern.

[12] The probits used from Table 3 were column 2 for ON-JT and column 1 for OFF-JT. The only differences between the explanatory variables included in the ON-JT probit and the wage equation are that education is entered as a series of dummy variables in the probit and as years of completed school in the wage equation. Industry and occupation dummies are only included in the wage equation.

[13] Another strategy to deal with selection that is less restrictive is to use instrumental variables and include the conditional expectation of weeks of training in the wage equation. To do this I first estimated individual probits for each of the types of training (separated into training from a previous employer and current employer). I then estimated, using OLS, separate equations, conditional on having experienced each of the types of training (also separated into current or previous employer), where the dependent variable was the number of weeks of training. I then created an expected value of weeks training by type for each observation using the probits and the OLS estimated coefficients and re-estimated the wage equation using I.V. The results (available from the author on request) are not reported for the sake of brevity but again they suggest that the conclusions reached above are not altered.

[14] In other words, there may be some young workers who take a technical course in

a proprietary institution that gets them into a union job at some later date. In this case the coefficient on OFF-JT might become positive and significant.

[15] These union dummies do not come out from strictly differencing but they reveal some interesting patterns.

[16] The change job variable is specified differently than it was in the cross section equation. In the cross section I included the number of jobs since finishing school. In the fixed effects I included simply a dummy variable equal to 1 if the respondent changed jobs at all in the 80-83 interval.

[17] from the New York Times, "Shortage of Skilled Workers is Expected", by E. Fowler, July 31, 1990, p. D16.

REFERENCES

Abraham, K. and Farber, H. (1987). "Job Duration, Seniority, and Earnings," American Economic Review, June, pp. 278-97.

Altonji, Joseph and Shakotko, Robert (1987). "Do Wages Rise with Job Seniority?", Review of Economic Studies, July, pp. 437-59.

Barron, J., Black, D. and Loewenstein, M. (1987). "Employer Size: The implications for search, training, capital investment, starting wages, and wage growth", Journal of Labor Economics, Jan., pp. 76-89.

Barron, J., Black, D. and Loewenstein, M. (1988). "Job Matching and On-the-Job Training", Journal of Labor Economics, Jan., pp. 1-19.

Bartel, Ann (1989). "Formal Employee Training Programs and Their Impact on Labor Productivity: Evidence from a human resource survey", NBER working paper no. 3026.

Blackburn, M., Bloom, D. and Freeman, R. (1989). "The Declining Economic Position of Less-Skilled American Males", NBER working paper no. 3186.

Brown, J. (1983). "Are Those Paid More Really No More Productive? Measuring the relative importance of tenure as on-the-job training in explaining wage growth", Princeton Industrial Relations papers.

Brown, J. (1989). "Why Do Wages Increase with Tenure?", American Economic Review, Dec., pp. 971-991.

Carnevale, A. (1986). "The Learning Enterprise: A Report on the Size and Scope of Training", Training and Development Journal, pp. 18-26.

Cox, D.R. and Oakes, D., Analysis of Survival Data, London: Chapman and Hall, 1984.

Gritz, R. Mark, "The Impact of Training on the Frequency and Duration of Employment", mimeo, University of Washington, 1988.

Hall, Robert, "The Importance of Lifetime Jobs in the U.S. Economy", American Economic Review, September 1982, 72, 716-24.

Heckman, J. (1979). "Sample Selection Bias as Specification Error", Econometrica, pp.153-161.

Heckman, J. and Hotz, J. (1989) "Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The case of manpower training", NBER working paper no. 2861.

Heckman, J. and Robb, R. (1986). "Alternative Identifying Assumptions in Econometric Models of Selection Bias", Advances in Econometrics, vol. 5, JAI Press, pp. 243-287.

INTERFACE (1989). Unfair at Any Price: Welfare recipients at New York Proprietary Schools, report, N.Y., N.Y..

Jovanovic, Boyan, "Job Matching and the Theory of Turnover", Journal of Political Economy, October 1979a, **87**, 972-90.

Jovanovic, Boyan, "Firm-Specific Capital and Turnover", Journal of Political Economy, December 1979b, **87**, 1246-60.

Jovanovic, Boyan, "Matching, Turnover, and Unemployment", Journal of Political Economy, February 1984, **92**, 108-22.

Katz, Lawrence and Revenga, Ana (1989). "Changes in the Structure of Wages: The U.S. versus Japan", NBER working paper no. 3021.

Lalonde, R. (1986) "Evaluating the Econometric Evaluations of Training Programs with Experimental Data", American Economic Review, pp. 604-620.

Lang, K. and Ruud, P. (1986). "Returns to Schooling, Implicit Discount Rates and Black-White Wage Differentials", The Review of Economics and Statistics, Feb., pp. 41-7.

Lazear, E. (1981). "Agency, Earnings Profiles, Productivity and Hours Restriction", American Economic Review, Sept. pp. 606-620.

Lazear, E. (1979). "The Narrowing of Black-White Differentials is Illusionary",American Economic Review, Sept. pp. 606-620.

Leigh, D. (1989) What Kinds of Training 'Work' for Noncollege Bound Youth?, paper prepared for GAO.

Lillard, L. and Tan, H. (1986). "Private Sector Training: Who gets it and what are its effects?", Rand monograph R-3331-DOL/RC.

Lippman, Steven and McCall, John, "The Economics of Job Search: A Survey, Part I", Economic Inquiry, June 1976, **14**, 155-89.

Lynch, Lisa M. (1991a) "The Role of Off-the Job vs. On-the-Job Training for the Mobility

of Women Workers", American Economic Review, May 1991, **81**, pp. 151-56.

Lynch, Lisa M. (1991b) "Private Sector Training and the Earnings of Young Workers", American Economic Review, forthcoming.

Miller, W. (1988). "Employers Wrestle with Dumb Kids", Industry Week, July 4.

Mincer, J. (1989). "Job Training: Costs, returns and Wage Profiles", NBER working paper No. 3208, Dec. 1989.

Mincer, J. (1988). "Job Training, Wage Growth and Labor Turnover", NBER working paper no. 2090, August.

Mincer, J. (1983). "Union Effects: Wages, Turnover, and Job Training", in Research in Labor Economics, pp. 217-252.

Mincer, J. (1974). Schooling, Experience and Earnings, New York: Columbia University Press.

Pergamit, M. and Shack-Marquez, J. (1986). "Earnings and Different Types of Training", mimeo, BLS and Board of Governors of the Federal Reserve.

Rothschild, M. and Stiglitz, J. (1976). "Equilibrium in Competitive Insurance Markets: An essay on the economics of imperfect information", Quarterly Journal of Economics, pp. 629-649.

Salop, J. and Salop, S. (1976). "Self-Selection and Turnover in the Labor Market", Quarterly Journal of Economics, pp. 619-627.

Stiglitz, J. (1975). "Incentives, Risk and Information: Notes towards a theory of hierarchy", Bell Journal of Economics, pp. 552-579.

Topel, R. (1987). "Wages Rise with Job Seniority", mimeo, University of Chicago.

Topel, R. and Ward, M. (1988). "Job Mobility and the Careers of Young Men", NBER working paper no. 2649.

Weiss, Andrew and Wang, Ruqu. (1990) "A Sorting Model of Labor Contracts: Implications for Layoffs and Wage-Tenure Profiles", mimeo, Boston University, June.

TABLE 1 - EXAMPLES OF TRAINING QUESTIONS

Data: Panel Study of Income Dynamics, 1976-1980

"On a job like yours, how long would it take the average person to become fully qualified?"

"Are you learning skills on the current job which could lead to a better job or promotion?"

National Longitudinal Survey, Young & Older Mens and Young Women Cohorts

"Do you receive or use additional training (other than schooling training) on your job?"

"What was the longest type of training you have had since the last interview?"

Current Population Survey, January 1983

"What training was needed to get the current or last job and what training is needed to improve skills on the current job?"

Employment Opportunity Pilot Project Survey, EOPP - Individual Survey

"Describe up to 4 training events occurring between 1/1/79 and the interview data in 1980" (approx. 1 1/2 years)

EOPP - Employer Survey

"Number of hours typically spent by a new employee in the position last filled watching other people doing the job rather than doing it himself during the first 3 months of employment"

"Number of hours a new employee in the position spends in formal training"

National Longitudinal Survey Youth Cohort, NLSY

"In addition to your schooling, military and government-sponsored training programs, did you receive any other types of training for more than one month?"

"Which category best describes where you received this training"
(Both questions asked for up to 3 training spells per year)

TABLE 2 - MEAN SAMPLE CHARACTERISTICS (unweighted)

Variable	All	White Males	White Females	Nonwhites
Wage 1980	$4.27	$4.75	$3.80	$4.11
Wage 1983	$5.59	$6.29	$5.05	$5.08
% Male	55%			
% Nonwhite	21%			
School years	11.97	11.83	12.14	11.94
Tenure'83 (wks)	99.48	100.73	101.25	94.01
Total Experience'83 (wks)	192.63	197.58	195.07	178.59
% Unemployment Rate	10.01	10.24	10.12	9.37
% in SMSA	71.7	70.2	71.2	75.5
% Healthy	95.8	96.4	95.2	95.3
% Married	29.4	29.2	38.0	15.0
# with ON-JT	128	77	37	14
# with OFF-JT	450	177	185	88
# Apprenticed	54	41	9	4
Duration of ON-JT (wks)	31.15	34.62	24.70	29.07
Duration of OFF-JT (wks)	40.90	43.47	39.51	38.67
Duration of APPT (wks)	63.46	74.78	18.78	48.0
Sample Size	3064	1320	1090	654

TABLE 3 - PROBITS FOR THE PROBABILITY OF RECEIVING TRAINING BY TYPE
T-Statistics in ()

Variable	Off-the-Job Probit	On-the-Job Probit	Apprentice Probit	On-the-Job in 1983
Constant	-1.26	-2.61	-3.07	-2.78
	(-7.87)	(-9.83)	(-8.75)	(-8.25)
Male	-0.17	0.28	0.48	0.10
	(-2.91)	(3.11)	(3.51)	(0.96)
Nonwhite	-0.04	-0.35	-0.51	-0.33
	(-0.59)	(-2.72)	(-2.52)	(-2.14)
Tenure	-0.001	-0.0008	-0.0006	0.002
	(-2.82)	(-1.21)	(-0.61)	(2.47)
Experience	0.0004	0.003	0.0006	0.002
	(0.71)	(3.37)	(0.46)	(1.65)
High School grad	0.35	0.19	0.34	0.07
	(4.59)	(1.72)	(2.13)	(0.51)
Post High School	0.19	0.21	0.14	0.10
	(2.28)	(1.59)	(0.75)	(0.64)
Union	-0.01	0.36	0.36	0.40
	(-0.09)	(3.63)	(2.69)	(3.56)
Unemployment Rate	0.01	-0.03	0.05	0.02
	(0.91)	(-2.14)	(2.60)	(1.21)
Married	-0.02	0.20	0.04	0.17
	(-0.28)	(2.27)	(0.29)	(1.59)
Number of Jobs	0.006	0.01	-0.01	-0.03
	(0.54)	(0.93)	(-0.71)	(-1.81)
Previous ON-JT	-	-	-	0.02
				(3.99)
Previous OFF-JT	-	-	-	-0.003
				(-0.75)
Previous Apprentice	-	-	-	-0.10
				(-0.50)
Log Likelihood	-1254.9	-495.94	-271.60	-334.77

Number of observations = 3064

TABLE 4 - DETERMINANTS OF LOG WAGES AT 1983 INTERVIEW DATE (N=3064)
T-Statistics in ()

Variable	Eq. 1	Eq. 2	Eq. 3	Eq. 4
Constant	0.70	0.72	0.82	0.81
	(8.76)	(8.96)	(10.19)	(10.15)
Tenure (wks)	0.0006	0.00067	0.0006	0.0006
	(5.66)	(5.97)	(5.69)	(5.66)
Experience (wks)	0.0018	0.0017	0.001	0.0015
	(11.91)	(11.68)	(10.23)	(10.30)
School	0.03	0.03	0.02	0.02
	(5.36)	(5.03)	(4.43)	(4.51)
Previous ON-JT (wks)	-	0.0006	0.0002	-0.0001
		(0.43)	(0.17)	(-0.06)
Previous APT (wks)	-	0.005	0.004	0.004
		(4.28)	(3.29)	(3.33)
Previous OFF-JT	-	0.002	0.002	0.002
(wks)		(5.00)	(5.23)	(3.07)
Current ON-JT (wks)	-	0.003	0.0026	0.002
(uncompleted)		(2.70)	(2.25)	(1.94)
Current ON-JT (wks)	-	0.0036	0.002	0.002
(completed)		(2.32)	(1.50)	(1.12)
Current APT (wks)	-	0.0026	0.0017	0.002
(uncompleted)		(2.49)	(1.70)	(1.67)
Current APT (wks)	-	0.002	0.001	0.001
(completed)		(1.66)	(1.03)	(1.05)
Current OFF-JT	-	0.0002	0.0002	-0.0002
(wks)		(0.27)	(0.26)	(-0.31)
Unemployment Rate	-0.007	-0.008	-0.004	-0.003
	(-3.63)	(-3.74)	(-2.05)	(-1.75)
SMSA	0.07	0.07	0.09	0.09
	(4.53)	(4.43)	(5.86)	(6.01)
Male	0.16	0.15	0.12	0.12
	(11.28)	(10.91)	(7.90)	(7.90)
Nonwhite	-0.09	-0.08	-0.08	-0.08
	(-5.18)	(-4.80)	(-4.76)	(-4.79)
Healthy	0.076	0.09	0.086	0.09
	(2.23)	(2.58)	(2.68)	(2.68)
Married	0.08	0.07	0.05	0.05
	(4.99)	(4.72)	(3.68)	(3.70)
Union	0.23	0.22	0.19	0.19
	(12.55)	(12.07)	(10.64)	(10.67)
Number of jobs	-0.001	-0.002	-0.002	-0.002
	(-0.53)	(-0.66)	(-0.73)	(-0.74)
Industry and	no	no	yes	yes
Occupation Dummies	no	no	yes	yes
Lambda1 (ON-JT probit)				0.008
				(0.38)
Lambda2 (OFF probit)				0.01
				(0.99)
R-squared	0.25	0.27	0.34	
or Log Likelihood				-1170.91

TABLE 5 - PREDICTED HOURLY WAGES BY SELECTED CHARACTERISTICS

Case 1.)	**White male, average characteristics:**	
	no training	$5.47
	24 wks previous OFF-JT	5.74
	24 wks completed current ON-JT	5.96
	24 wks previous apprenticeship	6.17
	24 wks completed current apprenticeship	5.74
	1 additional year of school	5.64
	1 additional year of tenure	5.65
Case 2.)	**Nonwhite male, average characteristics:**	
	no training	$5.00
	24 wks previous OFF-JT	5.24
	24 wks completed current ON-JT	5.45
	24 wks previous apprenticeship	5.64
	24 wks completed current apprenticeship	5.25
	1 additional year of school	5.16
	1 additional year of tenure	5.18
Case 3.)	**White female, average characteristics:**	
	no training	$4.71
	24 wks previous OFF-JT	4.94
	24 wks completed current ON-JT	5.14
	24 wks previous apprenticeship	5.31
	24 wks completed current apprenticeship	4.94
	1 additional year of school	4.85
	1 additional year of tenure	4.88
Case 4.)	**Nonwhite female, average characteristics:**	
	no training	$4.34
	24 wks previous OFF-JT	4.56
	24 wks completed current ON-JT	4.74
	24 wks previous apprenticeship	4.90
	24 wks completed current apprenticeship	4.56
	1 additional year of school	4.48
	1 additional year of tenure	4.49

*using the estimated coefficients from equation 2 in Table 4. Average characteristics are: single, high school graduate, 99 weeks of tenure on the job, 193 weeks of work experience, local unemployment rate of 10.01%, living in the inner city, healthy, not covered by a collective agreement, and 2 jobs since finishing school.

TABLE 6 - DETERMINANTS OF LOG WAGES AT 1983 INTERVIEW DATE BY DEMOGRAPHIC GROUP

Variable	White Males	White Females	Nonwhites	Union	Nonunion
Constant	0.96	0.81	1.05	0.93	0.84
	(7.61)	(5.99)	(5.96)	(4.76)	(9.52)
Tenure (wks)	0.0005	0.0006	0.0008	0.0007	0.0006
	(3.13)	(3.49)	(3.15)	(3.14)	(4.72)
Experience (wks)	0.002	0.0013	0.001	0.001	0.001
	(8.38)	(5.09)	(2.94)	(3.13)	(9.62)
School	0.02	0.03	0.006	0.04	0.02
	(2.79)	(3.34)	(0.46)	(2.67)	(3.48)
Previous ON-JT (wk)	0.0003	-0.001	-0.002	-0.0006	0.0006
	(0.17)	(-0.34)	(-0.70)	(-0.35)	(0.34)
Previous APT (wks)	0.004	-0.002	0.0007	0.002	0.004
	(3.12)	(-0.26)	(0.27)	(1.71)	(1.64)
Previous OFF-JT	0.002	0.002	0.003	0.0006	0.002
	(2.76)	(3.16)	(2.88)	(0.57)	(5.05)
Current ON-JT (wks)	0.003	0.003	-0.003	0.0005	0.004
(uncompleted)	(1.56)	(1.73)	(-0.45)	(0.25)	(2.51)
Current ON-JT (wks)	0.002	-0.004	0.017	-0.002	0.004
(completed)	(1.11)	(-0.71)	(1.79)	(-0.70)	(2.28)
Current APT (wks)	0.001	-0.05	-	0.00002	0.002
(uncompleted)	(1.38)	(-1.44)		(0.01)	(1.79)
Current APT (wks)	0.0007	-0.005	-	-0.001	0.002
(completed)	(0.58)	(-0.41)		(-0.59)	(1.23)
Current OFF-JT	-0.003	0.002	0.00007	-0.001	0.0005
	(-1.99)	(1.81)	(0.05)	(-0.61)	(0.60)
Unemployment Rate	-0.005	-0.007	0.0003	0.008	-0.007
	(-1.58)	(-2.17)	(0.06)	(1.86)	(-3.15)
SMSA	0.08	0.07	0.14	0.15	0.07
	(3.13)	(3.20)	(3.93)	(4.45)	(4.19)
Male	-	-	0.04	0.20	0.11
			(1.31)	(5.69)	(6.22)
Nonwhite	-	-	-	-0.17	-0.06
				(-4.92)	(-3.06)
Healthy	0.04	0.13	0.04	-0.04	0.12
	(0.71)	(2.79)	(0.59)	(-0.70)	(3.20)
Married	0.08	0.01	0.08	0.03	0.06
	(3.28)	(0.50)	(2.05)	(0.82)	(3.32)
Union	0.25	0.15	0.12	-	-
	(8.44)	(4.99)	(3.47)		
Number of jobs	-0.008	-0.005	0.01	-0.009	-0.0005
	(-2.00)	(-1.38)	(2.24)	(-1.35)	(-0.19)
Industry and	yes	yes	yes	yes	yes
Occupation Dummies	yes	yes	yes	yes	yes
R-squared	0.36	0.31	0.35	0.43	0.28
Sample Size	1320	1090	654	560	2504

TABLE 6 CONTINUED

Variable	Less than High School	High School degree only	Post High School but not College Grad
Constant	0.84	1.04	0.46
	(4.31)	(13.12)	(1.52)
Tenure (wks)	0.0004	0.0008	0.0005
	(1.64)	(5.32)	(2.36)
Experience (wks)	0.001	0.001	0.002
	(4.06)	(6.25)	(6.57)
School	0.04	-	0.05
	(2.24)		(2.68)
Previous ON-JT (wk)	-0.003	0.0006	0.001
	(-0.81)	(0.33)	(0.68)
Previous APT (wks)	0.005	0.003	0.004
	(1.37)	(2.02)	(1.43)
Previous OFF-JT	0.003	0.002	0.002
	(2.84)	(3.52)	(2.75)
Current ON-JT (wks)	-0.007	0.003	0.004
(uncompleted)	(-1.57)	(1.92)	(2.14)
Current ON-JT (wks)	0.002	0.002	0.0005
(completed)	(1.05)	(1.05)	(0.10)
Current APT (wks)	0.0008	0.001	0.003
(uncompleted)	(0.32)	(0.93)	(1.41)
Current APT (wks)	-	0.0008	0.03
(completed)		(0.74)	(1.25)
Current OFF-JT	-0.002	-0.00001	0.001
	(-0.95)	-(0.01)	(0.93)
Unemployment Rate	-0.002	-0.007	-0.002
	(-0.55)	(-2.72)	(-0.41)
SMSA	0.09	0.10	0.08
	(2.95)	(4.62)	(2.14)
Male	0.12	0.17	0.05
	(3.51)	(7.92)	(1.60)
Nonwhite	-0.06	-0.11	-0.06
	(-1.93)	(-4.70)	(-1.62)
Healthy	-0.03	0.17	-0.02
	(-0.50)	(3.98)	(-0.27)
Married	0.08	0.03	0.08
	(2.75)	(1.40)	(2.33)
Union	0.20	0.19	0.15
	(5.49)	(7.98)	(3.67)
Number of jobs	0.0002	-0.003	-0.001
	(0.04)	(-0.90)	(-0.27)
Industry and	yes	yes	yes
Occupation Dummies	yes	yes	yes
R-squared	0.31	0.39	0.33
Sample Size	766	1518	780

TABLE 7 - FIXED EFFECTS ESTIMATES
Dependent Variable: Log Wage (83) - Log Wage (80)

Variable	All	White	White Males	Nonwhites Females	Union	Nonunion
Constant	0.002 (0.05)	-0.05 (-0.93)	0.08 (1.65)	-0.03 (-0.41)	-0.01 (-.11)	0.02 (0.48)
Δ Experience (wks)	0.001 (5.90)	0.002 (5.32)	0.0007 (2.24)	0.001 (2.00)	0.0016 (2.83)	0.001 (5.24)
Δ Tenure (wks)	0.00066 (5.18)	0.0006 (2.99)	0.0007 (3.55)	0.0008 (2.54)	0.0004 (1.53)	0.0007 (4.87)
Δ ON-JT (wks)	-0.0002 (-0.17)	-0.001 (-0.69)	0.001 (0.81)	-0.003 (-0.65)	-0.002 (-1.20)	0.0007 (0.56)
Δ OFF-J-T (wks)	0.002 (4.38)	0.001 (1.55)	0.002 (2.39)	0.005 (4.02)	0.005 (3.07)	0.002 (3.66)
Δ APPT (wks)	0.002 (2.05)	0.002 (1.80)	-0.0002 (-0.03)	-0.004 (-0.47)	0.002 (1.76)	0.001 (1.21)
Job change dummy	0.07 (3.39)	0.05 (1.71)	0.07 (2.21)	0.09 (2.07)	0.08 (2.08)	0.06 (2.73)
Union83-Union80	0.13 (7.86)	0.20 (7.43)	0.11 (3.84)	0.05 (1.39)	0.07 (2.10)	-0.17 (-6.92)
R squared	0.06	0.09	0.05	0.05	0.06	0.06
Sample Size	3064	1320	1090	654	560	2504

TABLE 7 CONTINUED

Variable	Less than High School	High School Graduate	Post High School Grad
Constant	-0.03 (-0.42)	-0.07 (-1.45)	0.13 (2.18)
Δ Experience (wks)	0.001 (3.21)	0.001 (4.43)	0.001 (2.85)
Δ Tenure (wks)	0.0005 (1.80)	0.001 (5.03)	0.0004 (1.46)
Δ ON-JT (wks)	0.001 (0.44)	-0.0005 (-0.36)	-0.0006 (-0.28)
Δ OFF-J-T (wks)	0.004 (2.83)	0.003 (3.29)	0.002 (1.67)
Δ APPT (wks)	0.001 (0.35)	0.002 (1.66)	0.002 (1.15)
Job change dummy	0.09 (1.92)	0.09 (3.50)	-0.01 (-0.22)
Union83-Union80	0.13 (3.59)	0.16 (7.01)	0.08 (2.28)
R squared	0.06	0.08	0.03
Sample Size	766	1518	780

TABLE 8 - SAMPLE CHARACTERISTICS (N=2522)

Variable:			
Urban	72%	Urate (6-8.9%)*	36%
# of Children*	.15	Urate (9+%)*	37%
Disabled	4%	ON-JT*	3.7%
Married*	22.7%	OFF-JT*	11.8%
Union	15.4%	Apprentice*	1.1%
Black	21.2%	Year of entry 1979	16%
Hispanic	16.9%	" 1980	21%
Male	47.9%	" 1981	19%
Years of School	12.6	" 1982	23%
Tenure by year 4 (in 1st job (wks))	72.5	" 1983	21%
Log real wage*	$1.61		
Log predicted real wage[1]	$1.50		
% left first employer by 4th year	73.8%		

Notes:

* Denotes time-varying covariate

[1] This predicted wage is created from the following equation:

Log predicted starting wage = .64 + (.14*y1979) + (.07*y1980) + (.04*y1981) + (.03*y1982) + (.21*oc1) + (.06*oc2) + (.03*oc3) + (.03*oc4) + (.05*oc5) + (.03*oc6) - (.03*oc8) - (.06*in1) + (.07*in2) + (.05*in4) - (.15*in5) - (.07*in6) - (.12*in7) - (.33*in8) - (.1*in9) - (.05*in10) + (.13*male) + (.04*urban) + (.02*#children) - (.03*disabled) + (.02*marital) + (.15*union) + (.02*hispanic) - (.06*blk) + (.06*school) - (.03*medium urate) - (.06* high urate). All of the explanatory variables are evaluated at the first year of entry.

TABLE 8 (continued)

Industry		Occupation	
Ag.,Forestry,Fisheries, & Mining	4.0%	Professional & Technical	9.8%
Construction	5.5%	Managers	3.2%
Manufacturing (omitted category)	17.1%	Sales	5.4%
Transport & Utilities	3.4%	Clerical	24.0%
Wholesale & Retail	31.2%	Craft	8.6%
Finance, Real Estate, & Insurance	5.6%	Operatives	14.7%
Business & Repair Services category)	6.0%	Laborers & Farmers (omitted	11.4%
Personal Services	6.2%	Service Workers	22.9%
Professional Services	17.2%		
Public Administration	3.8%		

Percent with Training by Demographic Group

	ON-JT	OFF-JT	Apprentice	N
Male	3.8%	11.3%	1.9%	1208
Female	3.7	12.1	0.3	1314
Black	2.2	11.3	1.3	535
Less H.S.	1.8	4.8	1.1	363
High School	2.2	16.2	1.3	1363
Post H.S.	4.5	10.1	0.6	439
College +	8.9	4.7	0.9	357

TABLE 9 - Characteristics of Private Sector Training

Completed Tenure by % with Training by Type

Completed Tenure	% of sample	ON-JT	OFF-JT	APT
1 - 26 weeks	33%	1.3%	10.6%	0.7%
27 - 52 weeks	20%	1.5%	11.8%	0.9%
1 - 2 years	19%	2.6%	15.6%	2.4%
2 - 3 years	7%	6.6%	23.6%	0.5%
3 - 4 years	21%	8.1%	11.7%	0.8%

Conditional on having training in 1st job - when did it begin?

Year	ON-JT	OFF-JT	APT
During 1st year	39.8%	57.2%	69.4%
1st - 2nd year	25.6%	14.9%	8.3%
2nd - 3rd year	18.8%	18.1%	8.3%
3rd - 4th year	15.8%	9.7%	13.9%

Percent with Training by Demographic Group

	ON-JT	OFF-JT	Apprentice	N
Male	3.8%	11.3%	1.9%	1208
Female	3.7	12.1	0.3	1314
Black	2.2	11.3	1.3	535
Less H.S.	1.8	4.8	1.1	363
High School	2.2	16.2	1.3	1363
Post H.S.	4.5	10.1	0.6	439
College +	8.9	4.7	0.9	357

TABLE 10 - DETERMINANTS OF THE PROBABILITY OF LEAVING EMPLOYER

Variable	Eq. 1	Eq. 2	Eq. 3	Eq. 4
Urban	-.06	-.06	-.04	-.04
	(-1.31)	(-1.25)	(-0.95)	(-0.85)
# Children*	.09	.09	.09	.08
	(1.59)	(1.49)	(1.54)	(1.33)
Disabled	.22	.24	.22	.24
	(1.98)	(2.10)	(1.96)	(2.10)
Married*	-.22	-.22	-.21	-.21
	(-3.44)	(-3.41)	(-3.27)	(-3.25)
Union	-.28	-.22	-.27	-.21
	(-4.34)	(-3.32)	(-4.16)	(-3.21)
Black	.14	.11	.11	.09
	(2.41)	(1.98)	(1.99)	(1.50)
Hispanic	.05	.09	.04	.07
	(0.83)	(1.36)	(0.60)	(1.19)
Male	-.05	-.06	-.06	-.06
	(-1.20)	(-1.19)	(-1.32)	(-1.17)
Less than H.S.	.69	.61	.67	.58
	(8.51)	(7.32)	(8.22)	(6.95)
High School	.26	.23	.23	.18
	(4.16)	(3.62)	(3.65)	(2.89)
College	-.24	-.13	-.24	-.11
	(-2.79)	(-1.35)	(-2.73)	(-1.11)
Medium Urate*	-.17	-.16	-.18	-.17
	(-2.95)	(-2.74)	(-3.13)	(-2.88)
High Urate*	-.17	-.17	-.17	-.17
	(-2.74)	(-2.70)	(-2.83)	(-2.71)
ON-JT*	-.40	-.30	-.32	-.22
	(-2.62)	(-1.98)	(-2.12)	(-1.46)
OFF-JT*	.10	.09	.11	.10
	(1.51)	(1.40)	(1.70)	(1.49)
Apprentice*	.03	.08	.10	.14
	(0.13)	(0.40)	(0.48)	(0.67)
Log Wage Diff*	-	-	-.64	-.64
			(-10.04)	(-10.06)
Industry & Occupation dummies	no no	yes yes	no no	yes yes
Log Likelihood	-14697.7	-14640.7	-14644.4	-14592.0

Notes:

* denotes time varying covariates
Equations also include dummy variables for year of entry

TABLE 11 - DETERMINANTS OF THE PROBABILITY OF LEAVING EMPLOYER BY DEMOGRAPHIC GROUP

Variable	Males	Females	Blacks
Urban	-.06	-.03	-.01
	(-0.94)	(-0.37)	(-0.11)
# Children*	-.08	.20	.09
	(-0.71)	(2.83)	(0.89)
Disabled	-.14	.41	.53
	(-0.67)	(3.01)	(2.40)
Married*	-.36	-.13	-.05
	(-2.84)	(-1.66)	(-0.27)
Union	-.15	-.44	-.47
	(-1.73)	(-4.40)	(-3.67)
Black	.10	.10	-
	(1.30)	(1.17)	
Hispanic	.03	.02	-
	(0.35)	(0.26)	
Male	-	-	.05
			(0.44)
Less than H.S.	.39	.93	.55
	(3.48)	(7.72)	(3.14)
High School	.08	.31	.19
	(0.81)	(3.74)	(1.52)
College	-.53	-.04	-.54
	(-3.79)	(-0.32)	(-2.40)
Medium Urate*	-.18	-.16	-.15
	(-2.27)	(-2.02)	(-1.28)
High Urate*	-.23	-.10	-.34
	(-2.66)	(-1.17)	(-2.35)
ON-JT*	-.27	-.36	-.66
	(-1.19)	(-1.70)	(-1.43)
OFF-JT*	.03	.19	.08
	(0.27)	(2.09)	(0.57)
Apprentice*	-.03	.61	-.27
	(-0.13)	(1.21)	(-0.65)
Log Wage Diff*	-.55	-.79	-.62
	(-6.18)	(-8.44)	(-4.56)
Log Likelihood	-6337.3	-6879.4	-2546.9
Number of Obs.	1208	1314	535

Notes:

* denotes time varying covariates
Equations also include dummy variables for year of entry

TABLE 11 - DETERMINANTS OF THE PROBABILITY OF LEAVING EMPLOYER BY DEMOGRAPHIC GROUP (continued)

Variable	< H.S.	H.S.	Post H.S.	College
Urban	-.26	-.03	-.03	.08
	(-2.01)	(-0.54)	(-0.24)	(0.50)
# Children*	.06	.12	.11	-.03
	(0.40)	(1.61)	(0.88)	(-0.13)
Disabled	-.28	.40	-.25	.68
	(-0.92)	(2.80)	(-0.77)	(1.90)
Married*	-.53	-.04	-.16	-.55
	(-2.81)	(-0.52)	(-1.08)	(-3.22)
Union	-.19	-.20	-.46	-.32
	(-1.12)	(-2.47)	(-2.70)	(-1.55)
Black	.02	.15	.18	-.07
	(0.12)	(2.03)	(1.33)	(-0.33)
Hispanic	.20	.01	-.08	.10
	(1.45)	(0.15)	(-0.54)	(0.37)
Male	-.38	.005	.22	-.32
	(-3.03)	(0.08)	(1.93)	(-2.26)
Medium Urate*	-.15	-.18	-.15	-.12
	(-0.97)	(-2.38)	(-1.05)	(-0.74)
High Urate*	-.19	-.19	-.18	-.08
	(-1.10)	(-2.34)	(-1.18)	(-0.48)
ON-JT*	-1.19	-.35	-.26	-.12
	(-1.65)	(-1.34)	(-0.83)	(-0.48)
OFF-JT*	-.13	.11	.21	.03
	(-0.52)	(1.41)	(1.22)	(0.08)
Apprentice*	.22	-.20	.43	.58
	(0.43)	(-0.68)	(0.83)	(1.12)
Log Wage Diff*	-.34	-.76	-.84	-.67
	(-2.30)	(-8.30)	(-4.84)	(-4.00)
Log Likelihood	-1625.1	-7450.2	-1921.5	-1288.9
Number of Obs.	363	1363	439	357

Notes:

* denotes time varying covariates
Equations also include dummy variables for year of entry