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THESIS

FACTORS AFFECTING POST-SERVICE WAGE GROWTH FOR
VETERANS

by

Donald Bert Nuckols Jr.

December 1991

Thesis Advisor:
Co-Advisor:

Stephen L. Mehay
Linda Gorman

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FACTORS AFFECTING POST-SERVICE WAGE GROWTH FOR
VETERANS

by

Donald B. Nuckols Jr.
Lieutenant, United States Navy
B.S., University of Minnesota, 1986

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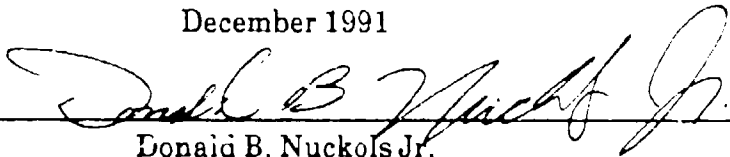
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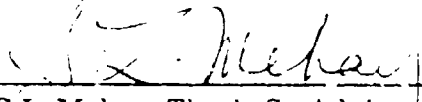
NAVAL POSTGRADUATE SCHOOL

December 1991

Author:


Donald B. Nuckols Jr.

Approved by:


S.L. Mehay, Thesis Co-Advisor


L. Gorman, Thesis Co-Advisor


David R. Whipple, Chairman
Department of Administrative Sciences

ABSTRACT

This thesis analyzes factors affecting the post-service earnings and wage growth of veterans. The 1979-1987 National Longitudinal Survey of Youth was the source for the data. Log-earnings regression models were estimated for the 1982 and 1985 surveys. Veteran status was found to have a negative effect on earnings in 1982, but had no effect on earnings in 1985. The most important single factor affecting earnings in these two years was the local unemployment rate. It was also discovered that the determinants of earnings in 1982 differed significantly between civilians and veterans. Earnings growth equations were estimated for the period 1982 until 1985. Veteran status was found to have a large positive effect on wage growth. This effect disappears after approximately five years.

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I. INTRODUCTION

A. Thesis Objectives

Since the abolition of the draft in the early 1970's, the Department of Defense has relied on volunteerism to meet military manpower requirements. Initially, recruitment and retention were adversely affected by America's failure in the Vietnam War. To some, the move to an all-volunteer force made it seem as if the country was erecting a barrier between itself and the military [Ref:1, pg. 154]. Compounding this problem was the fact that military wages were not competitive with civilian wages. For those individuals who volunteered for service, the disparity between military wages and civilian wages was the largest contributor to low retention and dissatisfaction with the military. This wage differential was partially eliminated by a series of pay increases during the early 1980s. The pay increases improved satisfaction with the military and helped recruit the needed numbers of personnel for the growing armed forces.

Coupled with the pay increases was an increase in many of the non-pecuniary benefits provided by the military such as additional housing, counseling, and family support services. These, too, helped recruitment and retention of the quality (upper-mental group, high school graduates) individuals

required to function in the increasingly technical military. In a study of satisfaction of Marine Corps enlistees [Ref: 2, pp 3-5], Cavin found that there was no such thing as overall satisfaction, except as an average of specific kinds of satisfaction with military life. The three kinds of satisfaction that he found significant were personal fulfillment in the military, military family stability, and military fringe benefits.

As enlistment quotas were met, all branches of the service began to extol the virtues of the training received while in the military as another benefit. While the net effect of military training was controversial, studies of military compensation revealed that the prospects of attractive post-service employment and earnings were possibly important determinants of both enlistment and separation behavior [Ref: 3, pp. 1-2]. The ensuing public policy debate (over compensation for veterans) sparked additional studies on the post-service earnings experiences of veterans. Unfortunately, they produced conflicting findings; studies done on Vietnam-era veterans showed that military service had a negative effect on earnings, although for post-Vietnam era veterans some studies found a positive effect on earnings due to military service. The lower earnings of Vietnam War veterans has been variously attributed to society's reluctance to accept these veterans into the civilian labor force, and to the fact that the majority of individuals serving in Vietnam

were from lower socio-economic backgrounds than the usual demographic composition of the military.

Today, America is reducing the size of its armed forces. President Bush proposed a "New World Order," a less-threatening world in which America's military is smaller, but still capable of, "deterrence, forward presence, and crisis response." Reducing the amount of manpower in the armed forces, without reducing the effectiveness of the services, requires that the military attract and retain quality individuals. Recruitment and retention of this type of person requires careful attention to both pecuniary and non-pecuniary benefits. Pecuniary benefits are primarily functions of budgetary constraints, but some non-pecuniary benefits are actually 'by-products' of military service. Important among these 'by-products' is the prospect of increased earnings and wage growth from enlisting (or accepting a commission) in the military.

This study investigates whether enlisted veterans receive a benefit from military service in the form of higher civilian earnings. It compares the civilian wage growth of veterans with that of non-veterans. It differs from previous studies in that it attempts to determine whether labor market conditions at the time of separation influence a veteran's civilian earnings experiences. Particular attention is given to the direct impact of both national and local-area

unemployment rates on veterans' post-service annual earnings and earnings growth.

B. Background

Labor economics is primarily concerned with how employers and employees respond to changes in wages, prices, profits, and the non-pecuniary aspects of the employment relationship [Ref: 4, pg. 3]. Two of the basic assumptions underlying labor economics are that resources are scarce, and that people will exhibit rational behavior.

Scarcity implies that virtually all resources are limited and that therefore there is a cost attached to every decision made by an employer or employee. Perhaps the most important resource to people is time. When individuals choose to enlist in the military, they have foregone the opportunity to work elsewhere, attend school, or have more time to spend pursuing other activities. Similarly, when the military chooses to employ (enlist) someone, the 'cost' of training, feeding, and outfitting that individual is in the form of forgone purchases of other labor or capital resources. These decisions that employers and employees make, when viewed over time, are assumed to be rational.

Rationality is the assumption that, on average, employers and employees will behave consistently in a manner that will improve their well-being. The well-being of an employee will vary for each individual case, but tendencies to behave in a

particular way seem to hold true overall, and this allows predictions to be made about future behavior. Likewise, employers tend to exhibit predictable responses to events in order to maximize their firm's well-being (increased profits or performance).

1. Human Capital

Certain types of activities that pay off over time in the form of improvements in an individual's productive capacity are referred to as investments in human capital. Examples of such investments are general formal education or specific job training. The assumption of rationality implies that an individual will make a human capital investment if the present value of the returns from this investment outweighs the costs associated with the investment. Individuals might benefit from investment in human capital because of the broader job opportunities made available by the investment, or from their increased productivity and the associated increase in their earnings. With this same assumption, it can also be concluded that an organization will invest in its employees' human capital if the returns to the organization as increased output or profits are greater than the costs.

Human capital investments by the military take the form of on-the-job training and classroom education. Outside of the public education system, the military is probably the largest institutionalized source of training in the United

States [Ref: 5, pp. 69-70]. These investments are costly to the Department of Defense, which is interested in maximizing its return on its investment. Some of the training and instruction provided by the military is applicable only to jobs within the military, and is of little or no use to individuals pursuing post-service employment; this is termed job-specific training. Other training may apply to civilian as well as military jobs; this is termed general training.

2. Unemployment

Being unemployed or facing the prospect of unemployment will affect an individual's earnings and decisions. Here, too, the rationality assumption predicts that individuals facing unemployment will act in a predictable fashion. When unemployment is high, those individuals who are already employed are more likely to want to keep their current jobs and forego searching for a higher paying job. All workers, employed or unemployed, are also more likely to make additional investments in human capital. Employers will tend to be more selective during periods of high unemployment, because they can afford to search for individuals with better qualifications since the quantity of labor supplied exceeds the quantity of labor demanded. Conversely, when unemployment is low, individuals are more likely to change jobs in hopes of increasing earnings or job satisfaction. At the same time, employers will be more likely to invest in the human capital

of their employees, hoping that this will provide an incentive for them to stay with the organization.

C. Organization of the Study

Chapter II contains a review of previous studies of veterans' post-service earnings. The literature presented ranges from a summary of prior studies, Stolzenberg and Winkler [Ref. 6], to recent research on post-service wage growth, Hirschkwotiz [Ref. 8]. The theory and methodology for this thesis is based on the information discussed in this chapter.

Chapter III is a description of the data used in this study. A summary of the sample selection and data analysis is presented, as is the methodology and specification of the models used for earnings and wage growth.

Chapter IV contains the data analysis and results of the estimations of earnings and wage growth. Regression results and the effects of the explanatory variables on earnings and wage growth estimates are discussed in detail.

Chapter V is the conclusion and contains recommendations for further research.

II. LITERATURE REVIEW

Literature and research conducted on the post-service earnings of veterans have used both cross-sectional data sets and longitudinal data sets. Prior studies on both types of data, including studies that looked at retirees' post-service earnings, were reviewed in an attempt to be more thorough, and to provide more ideas for methodology and model specification.

A. Background Literature

1. Stolzenberg and Winkler [Ref. 6]

The report by Stolzenberg and Winkler summarized the literature on voluntary terminations from military service through 1981, and prescribed their recommendations for future methodology concerning this subject.

The first major topic of the report was the definition of job quits. To them, a quit is, "a termination of employment by an employee in advance of any implicit or explicit time limit on the term of his/her employment with a particular employer." They follow this definition with an explanation about why it is often difficult to distinguish between voluntary terminations (quits) and involuntary terminations (firings) in both civilian and military employment.

In the civilian case, laws are designed to protect workers from unfair or indiscriminate firings, and to guarantee a workers' right to quit if he is so inclined. The problem here is that employers may harass undesirable workers, causing an employee to quit. In doing so, they have 'masked' a firing as a quit, and skewed the number of involuntary terminations downward.

For the military, laws limit the situations under which an individual can voluntarily terminate his service. The authors contend that because of this, the statistical distribution of length of service has a higher mean than it would if the military was subject to civilian termination laws. They also highlighted a problem with determining voluntary and involuntary terminations from the military. While voluntary termination is virtually impossible for reasons other than personal or family hardship, a dissatisfied military employee could begin to exhibit undesirable behavior (violating the Uniform Code of Military Justice), and as a result, induce an involuntary termination from the military. This means that data on involuntary terminations (firings) is likely to be overstated, and that voluntary terminations may be more frequent than is recorded. It is for this reason that Stolzenberg and Winkler recommend that all mid-first-term attrition and nonreenlistment (although, in fact, not everyone is eligible

to reenlist) be treated as a voluntary termination from military service.

They continued their discussion of quits by summarizing factors that have been shown to affect quits. The authors feel that pay has been proven to have a reciprocal relationship with quitting, but not to the extent that high pay removes the likelihood of quitting. To them, a job with unusually high pay may be nothing more than a very undesirable job with a justifiably large compensating pay differential. They conclude that pay is important, but it is difficult to determine its total effect on an individuals' decision to quit. Also stressed is the importance of including nonpecuniary benefits when evaluating a compensation package.

Other factors found to affect quits are job security and dispute resolution. These two factors are related in that they both refer to how employees perceive their relationship with an employer. If the probability of involuntary termination increases, the employee will be more likely to quit. Similarly, if dispute resolution between employees and employers becomes less effective, employees may feel that the employer is less attached to them, and this may increase their probability of quitting.

Stolzenberg and Winkler conclude by recommending that future research on voluntary terminations from military service should, "attend to a wide range of factors that

appear to affect the quit decision rather than focusing on one at the exclusion of others." Simply stated, all factors should be included in any attempt to determine a reason for an individual to voluntarily terminate from the service. Also they suggest that future research should more closely mirror civilian literature on civilian job quits. They specifically state that using game theory as a way to analyze the possible interaction between employee and employer, might provide useful information on voluntary terminations from military service.

B. Review of Post-Service Earnings Studies

1. Cooper [Ref. 3]

The results of Cooper's study on post-service earnings and employment were primarily based on data collected from the 1977 Department of Defense Retiree Survey. He sought to estimate earnings and to find the determinants of earnings from samples of retired military officers and enlisted personnel. Cooper felt that the best way to perform the analysis would be to account for earnings and labor force involvement (hours worked or seeking work) simultaneously; the results of fully-estimated simultaneous equations would provide more definitive results than a step-by-step procedure. Because of limitations within his data, he settled for a three-stage approach that he was convinced would be "strongly suggestive".

Cooper's three-stage estimation technique was designed to obtain estimates of a retiree's post-service earnings differential. Cooper's used answers to qualitative questions such as, "not working, but looking", and "not working, not looking", to make a qualitative judgement of whether the amount of time the retirees spent working was voluntary or involuntary. He explained that early leavers, veterans who left before retirement, were chosen as a basis for comparison because they shared similar characteristics with retirees, namely, passing the same physical and mental entry requirements to join military service. He went on to say that the screening performed by the military (manifested in retention and promotion criteria and selection) could result in selection bias if retirees were more capable and productive than the early leavers. His results are based on the assumption that comparably aged and educated early leavers are a good baseline for what retirees would have earned if they had not chosen a career in the military.

The first step was to estimate the determinants of earnings for early leavers. Using OLS regression models, Cooper estimated coefficients for the officer and enlisted samples. Next, the coefficients obtained from the first stage were combined with retirees' characteristics to generate estimates of post-service earnings for the retirees with the same characteristics as the early leavers. This estimate was then used as an adjustment to the retirees'

actual post-service earnings to obtain an estimate of the retirees' earnings differentials. The adjustment was Cooper's attempt to determine the amount of the earnings differential that was the result of voluntary actions.

Cooper found that age, age-squared, education, location, and race were important determinants of earnings, and that military retirees had much higher earnings and employment rates than had been previously thought. He attributed this difference to the fact that most previous studies had used recent retirees, who, he estimated, endured approximately five years with earnings that were less than those of their early leaver peers. After five years, however, retirees proceed to earn more than their early leaver counterparts. Cooper called this the "transition effect" (see Figure 1), and felt that the period of low wages could be partially explained by the significant number of retirees (especially officers) who return to school after leaving the military. Coupled with this was the retirees' voluntary decision to work fewer hours due to the large non-wage income received as a result of military service. The non-wage income is further supplemented by the fact that most retirees choose to live in lower cost-of-living areas or in close proximity to a military base. The results of his analysis led him to estimate that after the a five year transition period to the civilian workforce, only 1% of retirees are involuntarily employed.

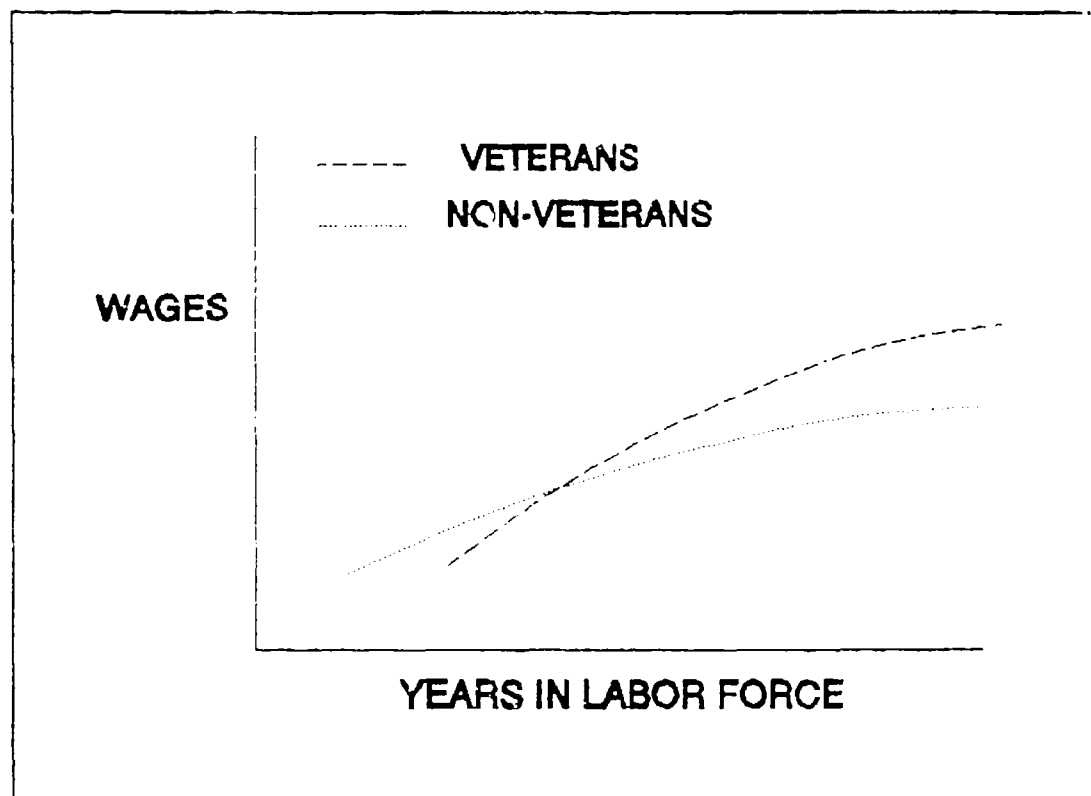


Figure 1: Cooper's Transition Effect

2. Bryant and Wilhite [Ref. 5]

Bryant and Wilhite sought to explain the post-service earnings of veterans by separately accounting for time spent in the military, and time spent in the military receiving training. Bryant and Wilhite performed their analysis on the National Longitudinal Survey of Youth (NLSY). Respondents to the survey were between the ages of 14 and 21 in 1979, and were resurveyed yearly until 1985. They chose to use the NLSY because it contained variables which measured hourly wage rates, time in the military, and the numerous demographic characteristics which may affect

post-service earnings differentials. They felt that the wage rate was a preferred variable because it theoretically reflects the value of an individual's productivity. Also, Bryant and Wilhite decided that using a dummy variable for military service was inappropriate (since military service could provide either a positive or negative wage earnings experience), and the availability of a duration of service variable allowed a direct test of the effect of length of service on wages. Bryant and Wilhite recognized that the results of their study could have limited applications since the individuals in the survey were young (all individuals were less than 31 years old), but felt that, "being able to compare the wages of veterans and nonveterans at similar points in their worklife would be an improvement over previous studies."

They began their study with a review of literature on post-service earnings, and highlighted the conflicting findings from previous attempts to determine if a premium existed for veterans in their civilian careers. Bryant and Wilhite discussed two previously advanced hypotheses that would be the focus of their research. The first hypothesis was that the military was a 'bridging environment' which allowed a transition from pre-military life to the civilian workforce, had been based on the idea that military service provided discipline and desirable work habits to service members. Assuming these general traits are provided by the

military, military experience would increase post-service wages. They went on to say that there was a possibility that military experience was of little use in the civilian workplace, leading to "an older worker with few skills and lower wages."

The second hypothesis emphasized military training as a factor that increased the stock of human capital. Bryant and Wilhite then discussed the fact that the human capital acquired from military training must be transferable to the civilian labor market in order to result in higher wages for the veteran. The fact that these hypotheses could overlap and work in opposite directions, was the reason why Bryant and Wilhite attempted to separate the effects of training and time in service.

Two restrictions were imposed on their sample: the respondents must have been interviewed in 1985 (some of the original 12,686 individuals had been dropped from the survey for various reasons), and they had to have been a full-time worker in 1985. Imposing these restrictions, their subsample consisted of 5,631 individuals between the ages of 21 and 30.

Bryant and Wilhite estimated the natural log of the 1985 wage rate as a function of human capital, military service, demographic, and economic control variables. The estimated model had a significance level of .01 and an adjusted R-squared of .29, suggesting that it explained a

significant amount of variation in the wage rate. Virtually all of Bryant and Wilhite's demographic variables (gender, race, marital status, age, age-squared, and education-squared) were found to be statistically significant at the .01 level using a two-tailed test. The coefficients from these variables showed that females earned 25% less than males, and nonwhites earned 8% less than whites. The military tenure and the military tenure x military training interaction term were the only significant military service variables. Military tenure had a small negative (-.7%) effect on wages, but one month of military training was found to cancel the negative effect of five months of military tenure in the interaction term. Job tenure had a positive effect, as expected, and was significant at the .01 level. The unemployment rate variable was negative and significant.

To measure the effect that serving in a particular service might have on earnings, they substituted a set of four service-specific tenure variables for the military tenure variable, replaced the military training variable with four service specific training variables, and reestimated the wage equation. They found that time spent in the Army, Navy, and Marine Corps yielded negative and significant coefficients at the .10 level, suggesting that time spent in one of these three services had a negative effect on wages. Tenure in the Air Force produced a

coefficient that was not significantly different from zero. Navy and Air Force training was found to be positive and significant at the .05 level. They concluded from this that while time in the Navy reduces wages, the training provided by the Navy helps to offset this reduction with a positive effect on wages. Also, Air Force service time increases wages due to the neutral effect of tenure and the positive effect of Air Force training.

3. Borjas and Welch [Ref. 7]

Borjas and Welch performed a regression analysis which attempted to settle the conflicting findings about retirees' civilian earnings. Critics of the military pension system used results by Cooper, which suggested that retirees earn approximately 7% more than their civilian peers [Ref. 3], to argue that the costs of military pensions could be reduced. Proponents of the military pension system pointed to other studies which found that military retirees earn less than civilians throughout their second career.

Borjas and Welch used data from the 1977 Department of Defense Retiree Survey (DRS) and the March 1977 Current Population Survey (CPS). The 1977 DRS contains earnings information comparable to the 1977 CPS, and also provides useful data on retirees' age, education, length of service, branch of service, and promotion history. Disabled veterans were deleted, as were females, individuals with less than 20

years service, retirees not between 37 and 64 years of age, and observations having earnings less than or equal to zero. After imposing a final restriction that all individuals must have been full-time workers, the 1977 DRS yielded a sample of 771 officers and 747 enlisted men. The 1977 CPS was the comparison sample, which was restricted to male non-retired veterans meeting the same earnings and full-time employment status criteria of the DRS sample; 8,246 individuals from the 1977 CPS were found to meet the criteria.

The officers, enlisted men, and non-retired veterans were treated as three different samples for the purposes of Borjas and Welch's analysis. Borjas and Welch first tried to determine the wage differentials between these three samples by pooling them. Using dummy variables for officers (1=officer, 0=otherwise), and enlisted (1=enlisted, 0=otherwise), they estimated a model for the natural log of wages as a function of the dummy variables and numerous socioeconomic variables. The socioeconomic variables included labor market experience, education, region, and race. Both the officer and enlisted dummy variables were found to be negative and statistically significant, leading Borjas and Welch to conclude that retirees do not earn as much as their non-retired peers.

They then sought to determine the effect of the socioeconomic variables on each of the individual samples by estimating the natural log of earnings for each sample. The

regression model for the non-retired veterans used the same independent variables as in the pooled regression, less the dummy variables for officers and enlisted, but the models for officers and enlisted men had variables added to capture an individual's military history. The results from estimating these models reinforced Borjas and Welch's initial conclusion that military retirees earn less than non-retired veterans. Another interesting conclusion was that retirees who returned to school had likely faced limited civilian career paths as a result of their military occupations, and were attempting to "retool themselves for the types of jobs available in the civilian labor market."

4. Hirschowitz [Ref. 8]

Hirschowitz sought to examine the effect of changes in socioeconomic variables on wage growth. For his analysis he used the 1971 and 1981 segments of the National Longitudinal Survey of Young Men (NLS). His model for wage growth was derived from the work of Edward Lazear on wage growth [Ref. 9]; Table 2.1 is a summary of the variables used in his research.

TABLE 2.1

Summary of Hirschowitz' Wage Growth Variables

<u>VARIABLE NAME</u>	<u>EXPLANATION</u>
<u>DEPENDENT VARIABLE</u>	
1.LOG(EARNX.81-EARNX.71)	Log change in annual earnings 1971 to 1981
<u>EXPLANATORY VARIABLES</u>	
2.EDUC.71	Educational level in 1971
3.EDUC.D2	Increase in educational level between 1971 and 1981
4.AGE.71	Respondents age in 1971
5.HOURS.D2	Change in usual number of hours worked per week between 1971 and 1981
6.BLACK	Dummy variable indicating race as BLACK=1, OTHER=0
7.MRSTA.7	Dummy variable indicating marital status in 1971, MARRIED=1, NON-MARRIED=0
8.MILEX.D2	Increase in months of military experience 1971 to 1981
9.TNEMP	Time in years that respondent was unemployed between 1971 to 1981
10.TENUR.81	Time in years that respondent was continuously employed in current firm
11.VET.81	Dummy variable indicating whether respondent was a veteran, VET=1, NON-VET=0
12.TTYPE.81	Indicates the type of training received in the military, later truncated into GENTRA for transferable training

(Source: Hirschowitz, M.R., Post Service Earnings Growth Rates of Military Veterans in the Era of the All-Volunteer Force, Master's Thesis, Naval Postgraduate School, Monterey, California, June 1988, page 53.)

Two separate regressions were estimated by Hirschowitz. Both equations contained the same

socioeconomic variables except that one equation also included a veteran status dummy variable to model exposure to the military, and the other used the military experience variable to explain the military's effect on wage growth. The sample sizes were 1,839 and 1,560 respectively.

The regression that included the veteran status dummy variable yielded only two insignificant variables, time unemployed, and transferable training. Hirschowitz argued that the unemployment variable was understandably insignificant because virtually his entire sample had reported being employed 52 weeks out of each year. Similarly, relatively few people in the sample reported transferable military training. He noted that the veteran status dummy variable had a positive and significant effect on wage growth, and only respondent's age in 1971 and the race dummy variable (BLACK) had a statistically significant negative effect on wage growth.

Coefficient estimates for the model using the military experience variable yielded practically the same significant coefficients, with one notable exception. The military experience variable (MILEX.D2) was statistically insignificant. This was attributed to the fact that most of the sample contained respondents with little change in military experience during this time period. Once again, Hirschowitz found the transferable military training variable to be statistically insignificant (although more

significant than when used with the veteran status dummy variable), and the age and race variables had a significant negative effect on wage growth.

Hirschowitz concluded that his study showed that veteran status has a positive effect on wage growth. Furthermore, he reinforced the findings of prior studies on race effects on wages, by showing that blacks have lower wage growth rates in his sample. He found that, of the socioeconomic variables, education had the largest positive effect on wage growth rates. Hirschowitz recommended a similar study that should focus on post service wage growth rates of non-Vietnam War veterans, and that as data becomes available, an attempt should be made to model military experience more effectively.

C. Summary

Race, marital status, gender, education, and age have repeatedly been shown to explain some of the variance in earnings and wage growth. Regression models estimating earnings and wage growth must contain these variables, or it is likely these models are misspecified. However, the effect of veteran status on earnings and wage growth remains uncertain, as does the proper form of the variable used to model veteran status.

III. DATA AND METHODOLOGY

A. Data

The original concept of this thesis was to compare longitudinal data on a military cohort drawn from the 1987 Survey of Veterans (SOV), to a civilian cohort taken from the 1979-1987 National Longitudinal Survey of Youth (NLSY). It was found that the SOV data made available to the Naval Postgraduate School did not contain suitable variables for the analysis, thus cohort analysis could only be performed on the NLSY data set. For a detailed description of the 1987 Survey of Veterans, please refer to Appendix A.

An analysis of earnings and wage growth requires longitudinal cross-sectional data. For this reason, this study used the 1979 through 1987 National Longitudinal Survey of Youth (NLSY). The survey contains males and females who were between the ages of 14 and 22 in 1979. The survey was conducted by the Center for Human Resource Research (CHRR) of the Ohio State University, and received funding and support from the Department of Defense and the Armed Services for the interviews of 1,280 youth that were in the military in 1979 [Ref: 8, pg 23]. Respondents to the survey were drawn from three groups: a cross-sectional sample designed to be representative of non-

institutionalized civilian youth, a supplemental sample designed to oversample civilian Hispanic, black, economically disadvantaged non-Hispanic and non-black youth, and a military sample designed to represent the population aged 17-21 serving in the military as of September 30, 1978 [Ref: 8, pg 23].

In 1979, there were few veterans present in the NLSY. It was necessary to wait until the 1982 survey before a sufficient number of the initial military cohort had left the service; there were 458 veterans in the 1982 survey. Also, because the Department of Defense ceased funding the survey of the 1,280 respondents in the initial military cohort in 1986, 1985 became the last survey year which included information on these individuals. For these reasons wage growth was estimated between 1982 and 1985.

1. Sample Selection for Earnings Analysis

Prior studies of veterans' earnings typically omitted observations with earnings less than or equal to zero. Also, a restriction was normally placed on the sample requiring that all individuals were employed full-time. This study included individuals who were part-time employees.

Observations reporting earnings less than or equal to zero in 1982 and 1985, observations with missing values, and response codes which indicated that a response was not

required, were discarded. Since the dependent variable for both earnings models was **civilian** annual earnings, additional deletions were made to remove individuals still in the military in 1982 for the 1982 earnings equation, and in 1985 for the 1985 earnings equation.

a. Data Analysis

The initial variables used in the estimation of earnings were derived from prior studies. The list and description of the explanatory variables used for both the 1982 sample and the 1985 sample are given in Table 3.1.

TABLE 3.1

Summary of Preliminary Variables to Estimate Earnings

<u>VARIABLE NAME</u>	<u>DEFINITION</u>	<u>EXPECTED SIGN</u>
<u>DEPENDENT VARIABLE</u>		
1.LNEARN	The natural log of earnings in 1982 or 1985	(+)
<u>EXPLANATORY VARIABLES</u>		
2.NATLOC	The local-national unemployment rate, in percent	(-)
3.HIGHGR	Highest grade completed	(+)
4.EDSQR	HIGHGR**2	(-)
5.AFQT	Standardized AFQT score	(+)
6.AGE	The respondent's age (in years)	(+)
7.AGESQ	AGE**2	(-)
8.MALE	Dummy variable for gender (1=male)	(+)
9.BLAHIS	Dummy variable for race (1=nonwhite)	(-)
10.MARRIED	Dummy variable for marital status (1=married)	(+)
11.DCOLLEG	Dummy variable for attending college (1=college student)	(-)
12.PARTIME	Dummy variable for currently having a part-time job (1=employed less than 35 hours a week)	(-)
13.VET	Dummy variable for veteran status (1=veteran)	(-)
14.DURCIV	The amount of time (in years) elapsed since an individual left military service	(+)

Literature and theory suggest that local unemployment rates will have an inverse relationship with earnings. Since each individual's local unemployment rate was recorded in each year of the NLSY, an attempt was made to capture the effect on earnings by including the NATLOC variable in the analysis. NATLOC is an ordinal categorical variable constructed by subtracting the national unemployment rate for the particular year from the respondent's reported average local unemployment rate category. When NATLOC was positive, the local unemployment rate was higher than the national unemployment rate. Since above-average local unemployment implies less demand for labor (quantity of labor supplied exceeds the quantity demanded), earnings would be expected to be lower, and jobs less available. Thus the sign of NATLOC would be expected to be negative.

The study of human capital acquisition has shown that in most cases, additional schooling received by individuals leads to increased earnings. As a result, the highest grade of education completed, HIGHGR, was expected to enhance earnings. However, studies have shown that the relationship between education and earnings is not linear, and that the effects of a higher education on earnings actually begin to level-off later in workers' careers. For this reason, a squared term for highest grade of education completed, EDSOR, was included.

The Armed Forces Qualification Test standardized score, AFQT, was included to see if it, too, was a good qualitative measure of human capital. The main reasons for including AFQT were to control for inherent ability differences, and to control for selection into the military. AFQT was expected to have a positive effect on earnings.

AGE was expected to have a positive effect on earnings because it represents potential labor market experience. Since the effect of experience on earnings should increase at a declining rate, AGESQ was included. The coefficient of AGESQ was expected to be negative.

Most previous work done to estimate earnings has found that earnings may differ by gender. Some earlier studies have found males to have higher earnings and wages than their female counterparts, and because of this, the MALE coefficient was expected to be positive.

The possibility that race is correlated with earnings was the reason for the inclusion of a dummy variable for race, BLAHIS, BLAHIS=1 when the respondent was either black or hispanic, and BLAHIS=0 when the respondent was white. Most recent studies on earnings have shown that whites earn more than blacks or hispanics, so a negative coefficient sign for BLAHIS was expected.

A dummy variable to capture the effects of marriage, MARRIED, was used in the model because studies have shown marriage to be correlated with earnings.

Normally this effect has been positive, and as a result, MARRIED was expected to have a positive coefficient.

Since part-time workers were included in the sample being analyzed, and since part-time workers are likely to earn less than equivalent full-time workers, it seemed reasonable to add a dummy variable to represent part-time workers, PARTIME. The assumption that part-time workers have lower earnings was why the coefficient for PARTIME was expected to have a negative sign.

Approximately one-third of the part-time workers were college students, so a dummy variable, DCOLLEG, was used to show the effects of college attendance on earnings. College students are likely to earn less than full-time workers, and because of this, DCOLLEG's coefficient was expected to be negative.

Prior studies have used various estimation techniques to model the effect of veteran status on earnings. It was decided to use two variables in this thesis. The first variable, VET, differentiated between respondents with prior military service and those with none. The second variable, DURCIV, helped to separate the veterans by the length of time spent in the civilian labor market by each veteran after leaving the service. Siding with the majority of research reviewed for post-service earnings of veterans, VET was expected to have a negative coefficient. Cooper's study [Ref. 3] suggested that retired veterans earn

more than their non-retired peers eventually, and because of this, the length of time out of the military, DURCIV was expected to have a positive coefficient.

The summaries of the descriptive statistics are given in Table 3.2 for the full 1982 sample, and in Table 3.4 for the full 1985 sample. There are also tables showing the descriptive statistics for the veteran cohorts in each year; Table 3.3 contains information on veterans in the sample prior to 1982, and Table 3.5 contains information on veterans in the sample prior to 1985. Finally, tables containing the labor force status of the veterans, non-veterans, and the total sample are given in Table 3.6 for 1982 and Table 3.7 for 1985. Of the 458 veterans present in the 1982 sample, only 319 veterans remained after deleting observations using the sample selection criteria. An even larger loss of veterans occurred in the 1985 sample, where only 216 of 849 veterans remained after deleting observations with earnings less than or equal to zero.

TABLE 3.2
Summary of Descriptive Statistics for 1982
Total Sample

<u>VARIABLE</u>	<u>MEAN</u>	<u>STD DEV</u>	<u>MIN</u>	<u>MAX</u>	<u>VALID N</u>
1.1982 Earnings (EARN82=\$)	5121.97	5624.72	15	75001	9817
2.Local-National Unemployment Rate ¹ (NATLOC=%)	-.01	.03	-.06	.06	9712
3.Highest Grade Completed (HIGH82=years)	12.21	1.92	0	18	9771
4.Age (AGE=years)	21.09	2.04	18	25	9817
5.Marital Status (MARRIED=1)	.24	.43	0	1	9817
6.Black or Hispanic (BLAHIS=1)	.37	.48	0	1	9817
7.Gender (MALE=1)	.51	.49	0	1	9817
8.AFQT score (AFQT=std score)	184.13	43.01	83	258	9817

¹ 1982 Average National Unemployment Rate 10.8% [Ref:10]

TABLE 3.3

Summary of Descriptive Statistics for 1982
Veterans

<u>VARIABLE</u>	<u>MEAN</u>	<u>STD DEV</u>	<u>MIN</u>	<u>MAX</u>	<u>VALID N</u>
1.1982 Earnings (EARN82=\$)	4499.90	5212.59	20	27000	431
2.Local-National Unemployment Rate ² (NATLOC=%)	-.01	.03	-.06	.06	410
3.Highest Grade Completed (HIGH82=years)	12.16	.82	9	18	428
4.Age (AGE=years)	22.72	1.27	18	25	431
5.Marital Status (MARRIED=1)	.39	.49	0	1	431
6.Black or Hispanic (BLAHIS=1)	.24	.43	0	1	431
7.Gender (MALE=1)	.76	.43	0	1	431
8.AFQT score (AFQT=std score)	195.76	42.26	83	256	431

²1982 Average National Unemployment Rate 10.8% [Ref:10]

TABLE 3.4

Summary of Descriptive Statistics for 1985
Total Sample

<u>VARIABLE</u>	<u>MEAN</u>	<u>STD DEV</u>	<u>MIN</u>	<u>MAX</u>	<u>VALID N</u>
1.1985 Earnings (EARN85=\$)	7401.29	8009.71	5	100001	8365
2. Local-National Unemployment Rate ³ (NATLOC=%)	.01	.03	-.05	.10	7759
3. Highest Grade Completed (HIGH85=years)	12.65	2.18	0	20	8365
4. Age (AGE=years)	23.60	2.26	19	28	8336
5. Marital Status (MARRIED=1)	.35	.48	0	1	8365
6. Black or Hispanic (BLAHHIS=1)	.40	.49	0	1	8365
7. Gender (MALE=1)	.51	.49	0	1	8365
8. AFQT score (AFQT=std score)	182.48	42.92	83	258	8365

³ 1985 Average National Unemployment Rate 6.9% [Ref:10]

TABLE 3.5

Summary of Descriptive Statistics for 1985
Veterans

<u>VARIABLE</u>	<u>MEAN</u>	<u>STD DEV</u>	<u>MIN</u>	<u>MAX</u>	<u>VALID N</u>
1.1985 Earnings (EARN85=\$)	2896.92	6170.19	10	47000	259
2.Local-National Unemployment Rate ⁴ (NATLOC=%)	.01	.03	-.03	.10	248
3.Highest Grade Completed (HIGH85=years)	12.20	1.15	8	19	258
4.Age (AGE=years)	25.10	1.76	20	28	259
5.Marital Status (MARRIED=1)	.31	.46	0	1	259
6.Black or Hispanic (BLAEIS=1)	.31	.50	0	1	259
7.Gender (MALE=1)	.72	.45	0	1	259
8.AFQT score (AFQT=std score)	190.37	43.68	83	256	259

⁴ 1985 Average National Unemployment Rate 6.9% [Ref:10]

It is important to note the decrease in the number of veterans available for analysis between 1982 and 1985 (Table 3.3 and Table 3.5, respectively). The sample of veterans for these two years consist primarily of different individuals. An inability to obtain information from members of the initial military cohort (in the 1979 survey) after they left the service resulted in a large number of missing observations for these individuals. Because the veterans in 1982 and 1985 are different, it was decided that estimating two equations for earnings was appropriate.

Another interesting statistic is the **decrease** in average earnings for the veteran samples analyzed in 1982 and 1985. This might be explained by the smaller sample size in 1985, but it is probably due to the increase in the percent of veterans employed part-time (Tables 3.6 and 3.7).

TABLE 3.6
Labor Force Frequencies for 1982

LABOR FORCE STATUS	PERCENTAGE OF VETERANS (%)	PERCENTAGE OF CIVILIANS (%)	PERCENTAGE OF TOTAL (%)
Unemployed	22.7	17.6	17.8
College Student	22.0	20.1	20.2
Employed Part-time	75.6	66.8	67.2

TABLE 3.7

Labor Force Status Frequencies for 1985

LABOR FORCE STATUS	PERCENTAGE OF VETERANS (%)	PERCENTAGE OF CIVILIANS (%)	PERCENTAGE OF TOTAL (%)
Unemployed	6.7	15.3	15.1
College Student	4.7	12.8	12.6
Employed Part-time	85.2	54.6	55.5

2. Sample Selection for Wage Growth Analysis

Prior literature and common sense dictated that the sample contain observations which had reported answers to both the 1982 and 1985 surveys. The literature also suggested the deletion of part-time workers and individuals reporting earnings less than or equal to zero. The same restrictions were imposed on the wage growth sample that were used on the 1982 and 1985 earnings samples. Observations with earnings less than or equal to zero were deleted, but part-time employees were retained in the sample as long as they had responded to the survey in both 1982 and 1985.

a. *Data Analysis*

The initial variables used in the estimation of wage growth were derived from previous research, and were similar to the variables used in the analysis of earnings. Emphasis for the variable selection for wage growth equations was finding variables which captured a change in human capital acquired by an individual. The list and descriptions of the variables used are included in Table 3.8.

TABLE 3.8

Summary of Preliminary Variables to Estimate Wage Growth

<u>VARIABLE NAME</u>	<u>DEFINITION</u>	<u>EXPECTED SIGN</u>
<u>DEPENDENT VARIABLE</u>		
1.LDEARN	The natural log of the percent earnings change from 1982-1985	(+/-)
<u>EXPLANATORY VARIABLES</u>		
2.DNATLOC	Change in local-national unemployment rate	(-)
3.HIGH82	Highest grade completed in 1982	(+)
4.E82QR	HIGH82**2	(-)
5.AFQT	Standardized AFQT score	(+)
6.AGE82	The respondent's age in 1982	(+)
7.AGE82SQ	AGE82**2	(-)
8.MALE	Dummy variable for gender (1=male)	(+)
9.BLAHIS	Dummy variable for race (1=nonwhite)	(-)
10.DMARRY	Dummy variable for change in marital status (1=change in marital status)	(+)
11.DEDUC	Change in education level completed between 82 and 85,	(+)
12.WKUTOT	Total number of weeks unemployed during 1982-1985	(-)
13.WORKMO	Change in number of hours worked per week	(+)
14.DFULL	Dummy variable for change from part-time worker in 1982 to a full-time worker in 1985	(+)
15.DVET	Dummy variable for veteran status in 1982 (1=veteran)	(-)
16.DURCIV	The amount of time elapsed since an individual left the military (in years)	(-)

Previous attempts to estimate wage growth models suggested that it was important to capture both the individual's initial quality of human capital (measured by age, education, etc.), and the changes in his human capital that occurred during the period being estimated.

The initial variables that measured an individual's stock of human capital in 1982 included several variables that were defined above: HIGH82, E82OR, AFOT, AGE82, AGE82SQ, BLAHIS, MALE, and DVET. The expected signs for the coefficients of these variables are the same as in the analysis of earnings.

DNATLOC was included to capture the effect (on earnings) of changing economic and labor market conditions. The value of the variable was either positive or negative, depending on whether the difference between local and national unemployment rates increased or decreased between 1982 and 1985. Theory suggests that an increase in the difference between local and national unemployment rates has a negative effect on earnings, and as a result, the coefficient for DNATLOC was expected to be negative.

Another labor market condition-related variable was the total number of weeks individuals were unemployed between 1982 and 1985, WKUTOT. It was logical to assume that the longer individuals are unemployed, the lower their earnings, and the lower their wage growth.

Contrasting with the effects of unemployment are the additional hours worked by individuals over time, WORKMO, and a change from part-time jobs to full-time employment, DFULL. Both of these variables are expected to have a positive effect on wage growth.

Just as prior work had found that marital status had a positive effect on earnings, research by Hirschowitz found that a change in marital status had a significant positive effect on earnings. In this case, a dummy variable for a change in marital status, DMARRY (change in marital status over the period=1 and others=0), was expected to have a positive coefficient.

An important investment in human capital is obtaining additional education. While the years that individuals spend in school are likely to have an immediate negative effect on earnings, once the schooling is completed, the return from this investment should increase earnings over the long-term. The variable used to capture this, DEDUC (change in highest grade completed over the period=1 and others=0), was expected to have a positive sign for its coefficient.

A dummy variable for veteran status, DVET (veteran=1 and others=0), was included for analysis of veteran status on wage growth. An explanatory variable to model the time since an individual was in the service, DURCIV, was also included in the analysis of wage growth.

It is thought that the longer individuals have been out of the service, the less important any possible negative effects caused by military service (being out of the civilian labor market, and possibly not learning marketable civilian skills) will be. This assumption lead to the expectation of DURCIV having a positive coefficient.

A summary of the various demographic characteristics for the total sample can be found in Table 3.9, and a summary of the veterans' characteristics are contained in Table 3.10.

An analysis of the following two tables reveals some interesting information about the sample used for estimating wage growth. The first interesting statistic is that the average veteran was unemployed almost two months more than a civilian between 1982 and 1985. Another statistic of note is that the average veteran experienced higher wage growth than his civilian counterpart. This might be explained by the greater likelihood of veterans obtaining full-time employment during these years.

TABLE 3.9

Summary of Descriptive Statistics for 1982-1985
Total Sample

<u>VARIABLE</u>	<u>MEAN</u>	<u>STD DEV</u>	<u>MIN</u>	<u>MAX</u>	<u>VALID N</u>
1.Change in Local-National Unemployment Rate (DNATLOC)	0.02	.028	-.081	.159	5864
2.Change in education level completed (DEDUC)	0.53	.950	0	3	6312
3.Change to full-time job (DFULL)	0.28	.448	0	1	6338
4.Total weeks unemployed, 1982-1985 (WKUTOT)	12.72	21.311	0	148	6026
5.Log of the % change in earnings, 1982- 1985 (LDWAGE)	0.63	1.216	-6.29	6.21	6338

TABLE 3.10

Summary of Descriptive Statistics for 1982-1985
Veterans

<u>VARIABLE</u>	<u>MEAN</u>	<u>STD DEV</u>	<u>MIN</u>	<u>MAX</u>	<u>VALID N</u>
1.Change in Local-National Unemployment Rate (DNATLOC)	.019	.033	-.051	.129	55
2.Change in education level completed (DEDUC)	.322	.730	0	3	59
3.Change to full-time job (DFULL)	.433	.499	0	1	60
4.Total weeks unemployed, 1982-1985 (WKUTOT)	19.88	27.54	0	136	58
5.Log of the % change in earnings 1982- 1985 (LDWAGE)	.991	1.75	-6.29	4.89	60

B. Methodology

1. Model for Earnings Equations

The initial model used to explain the variance in earnings used the conventional semi-log specification. Ordinary least squares (OLS) was used to estimate the

coefficients of the log-earnings equations. The equations used to estimate annual earnings in 1982 and 1985 were specified as follows:

$$\begin{aligned} \text{LNEARN} = & B_0 + B_1*(\text{NATLOC}) + B_2*(\text{HIGHGR}) + \\ & B_3*(\text{EDSQR}) + B_4*(\text{AFQT}) + B_5*(\text{AGE}) + \\ & B_6*(\text{AGESQ}) + B_7*(\text{MALE}) + B_8*(\text{BLAHIS}) + \\ & B_9*(\text{MARRIED}) + B_{10}*(\text{DCOLLEG}) \\ & B_{11}*(\text{PARTIME}) + B_{12}*(\text{VET}) + B_{13}*(\text{DURCIV}) \end{aligned}$$

2. Model for Wage Growth Equation

The model used for estimating wage growth was similar to the one used by Hirschskowitz. It too assumed a log-linear relationship between wage growth and the explanatory variables. The initial equation used to estimate wage growth between 1982 and 1985 was specified as:

$$\begin{aligned} \text{Log (EARN85-EARN82)} = & B_0 + B_1*(\text{DNATLOC}) + B_2*(\text{HIGH82}) \\ & + B_3*(\text{E82QR}) + B_4*(\text{AFQT}) + B_5*(\text{AGE82}) \\ & + B_6*(\text{AGE82QR}) + B_7*(\text{MALE}) + B_8*(\text{BLAHIS}) \\ & + B_9*(\text{DMARRY}) + B_{10}*(\text{DEDUC}) \\ & + B_{11}*(\text{WKUTOT}) + B_{12}*(\text{WORKMO}) \\ & + B_{13}*(\text{DFULL}) + B_{14}*(\text{VET82}) \\ & + B_{15}*(\text{DURCIV}) \end{aligned}$$

3. Dependent Variable Section

a. Earnings Variable

The dependent variable, LNEARN, is the natural log of the earnings reported in the 1982 and 1985 earnings equations. All non-positive earnings were deleted from the two samples.

b. Wage Growth Variable

The dependent variable, LDWAGE, is the natural log of the adjusted percent change in earnings between 1982 and 1985. The adjusted percentage change was equal to the percentage change in earnings from 1982 to 1985 added to a constant. It was found that when the constant=1, the adjusted percentage change was forced to fall within the domain of the log function, and did not effect the estimates of the coefficients. A decrease in earnings between 1982 and 1985 resulted in an adjusted percentage change (in earnings) between the values of 0 and 1, this in turn resulted in LDWAGE being negative.

IV. DATA ANALYSIS AND RESULTS

A. Earnings Regression Models

1. Estimation of 1982 Earnings

Table 4.1 contains the results of estimating 1982 earnings. Only one explanatory variable, EDSQR, was found to be statistically insignificant. This might be viewed as an expected result for a sample containing only young people; theory suggests that the relationship between education level and earnings is linear early in an individuals' career, and the presence of a negative squared term for education would have little effect. The signs of all the other estimated coefficients were consistent with theory, and the coefficients themselves were all significant to at least the .08 level (two-tailed test). The adjusted R-squared of .442 indicates that approximately 44% of the variance of earnings was explained by the model.

The net effect of veteran status on earnings is the result of adding the estimated coefficient of VET to the product of DURCIV, in years, multiplied by its coefficient. The log-linear model specification allows the coefficients to be read directly as a percentage effect on earnings. Initially, the net effect is negative; when a veteran has been in the civilian labor market one year, he receives 40%

less earnings than a comparable (all other variables equal) civilian. The net effect of veteran status becomes zero after approximately three years of civilian work experience, and becomes positive beyond 3 years.

Correlations between the variables were calculated, and a listing of the correlation coefficients is given in Table 4.2. Of particular interest is the racial variable's large negative correlation ($-.38$) with AFQT score. This is in accord with prior research results suggesting that blacks and hispanics do not fare as well as whites on the Armed Forces Qualification Test. Also of note is the large negative correlation ($-.32$) between AGE and PARTIME. This seems to indicate that as workers age, they are less likely to be part-time workers.

TABLE 4.1

Results from Estimation of 1982 Earnings
Including Veterans

<u>VARIABLE</u>	<u>BETA</u>	<u>STD ERROR</u>	<u>PROBABILITY</u>
INTERCEPT	-.423	1.255	.736
SIGNIFICANT EXPLANATORY VARIABLES			
NATIOC	-1.803	.322	.001
HIGHGR	.063	.026	.078
AFQT	.002	.001	.001
AGE	.695	.118	.001
AGESQ	-.014	.003	.001
MALE	.276	.022	.001
BLAHIS	-.090	.024	.001
MARRIED	.136	.027	.001
DCOLLEG	-.185	.029	.001
PARTIME	-1.360	.024	.001
VET	-.633	.169	.001
DURCIV	.236	.097	.015
INSIGNIFICANT EXPLANATORY VARIABLES			
EDSQR	.001	.002	.584
<u>EQUATION CHARACTERISTICS</u>			
R-squared	.442		
Adj. R-squared	.441		
F-statistic	561.997	Significance	.001
N cases	7830		

TABLE 4.2

Correlation Matrix for 1982 Earnings Equation

	V E T	M A T L O C	H I G H G R	A G E	B L A H I S	M A R R I E D	M A L E	D C C O L L E G	D U R C I V	E D S Q R	A F Q T	A G E S Q	P A R T I M E
VET	1.00												
MATLOC	-.03	1.00											
HIGHGR	-.01	-.09	1.00										
AGE	.17	-.05	.31	1.00									
BLAHIS	-.07	-.08	-.14	-.04	1.00								
MARRIED	.07	.03	-.05	.28	-.11	1.00							
MALE	.11	.00	-.12	.00	.02	-.10	1.00						
DCOLLEG	.00	-.03	.35	-.13	-.03	-.19	-.02	1.00					
DURCIV	.95	-.03	.00	.17	-.06	.07	.09	.01	1.00				
EDSQR	-.02	-.10	.99	.34	-.14	-.04	-.11	.35	-.02	1.00			
AFQT	.04	-.03	.54	.11	-.38	.00	-.06	.31	.04	.53	1.00		
AGESQ	.16	.05	.31	.99	-.04	.28	.00	-.13	.17	.33	.11	1.00	
PARTIME	.04	.06	-.01	-.32	.03	-.14	-.07	.25	.01	-.01	.02	-.32	1.00

Separate 1982 earnings models were estimated for samples of veterans and civilians. A Chow Test was performed, and it yielded a significant F-statistic. This means that the effect of the earnings determinants are not similar for the two groups, and that a separate model could be used to estimate earnings for veterans and civilians. The results of the separate estimations can be found in Table 4.3.

TABLE 4.3

Comparison of Coefficients for Civilian and Veteran
1982 Earnings Equations

<u>VARIABLE</u>	<u>CIVILIAN COEFFICIENT</u>	<u>VETERAN COEFFICIENT</u>
INTERCEPT	-.228	-6.539
NATLOC	*-1.781	-1.142
HIGHGR	.059	1.298
EDSQR	*-.001	-.053
AFQT	*.003	.001
AGE	*.678	.594
AGESQ	*-.014	-.012
MALE	*.268	*.553
BLAHIS	*-.088	-.098
MARRIED	*.127	*.348
DCOLLEG	*-.182	-.168
PARTIME	*-1.363	-1.436
N Cases	7510	319
* = significant @ .01 level (two-tailed test)		
Adj. R-squared	.446	.343

The first noticeable item in Table 4.3 is that virtually all the coefficients for the civilian sample are significant, whereas very few of the coefficients for the veterans sample are significant. This means that the model for 1982 earnings does a better job estimating civilian earnings than it does for veterans' earnings. This is

supported by the higher adjusted R-squared for the civilian equation. It definitely shows that NATLOC, AFQT, AGE, BLAHIS, and DCOLLEG have less significant effects on the veterans sample, but do have an effect on civilian earnings.

2. Estimation of 1985 Earnings

The same earnings equation was estimated for the 1985 sample, and the results of the regression are displayed in Table 4.4. In 1985, more explanatory variables were found to be insignificant. EDSQR, BLAHIS, VET, and DURCIV were estimated to have no effect on 1985 earnings. The effect of race, BLAHIS, on earnings has gone from negative in 1982 to no effect in 1985; the possible reason for this seems unclear. Also, the earnings effects of the two veteran status variables, VET and DURCIV, have virtually disappeared. This could be due to the presence of older veterans in the 1985 survey, which by this time would be indistinguishable (in terms of civilian labor skills) from their non-veteran peers. The rest of the coefficients for the explanatory variables had the expected sign and all were significant at the .01 level (two-tailed test).

The adjusted R-squared for the 1985 earnings equation was .471. This was an improvement over the explanatory power of the 1982 earnings equation, and an encouraging result (as was the adjusted R-squared for 1982

earnings) with regard to the theoretical background for estimating what factors affect earnings.

In the 1985 sample, the two veteran status variables are statistically insignificant. This group of veterans did not experience any effect on earnings as a result of their past military service.

Separate regressions were performed for the 1985 earnings equation using separate samples of veterans and civilians. A Chow Test was performed on the residuals of these two regressions and the residual sum-of-squares from the pooled regression. The test resulted in a small F-statistic, meaning that the coefficients are not statistically different for the two models.

TABLE 4.4
Results from Estimation of 1985 Earnings
Including Veterans

<u>VARIABLE</u>	<u>BETA</u>	<u>STD ERROR</u>	<u>PROBABILITY</u>
INTERCEPT	3.064	1.152	.008
SIGNIFICANT EXPLANATORY VARIABLES			
NATLOC	-2.286	.325	.001
HIGHGR	.091	.029	.002
AFQT	.003	.001	.001
AGE	.340	.096	.001
AGESQ	-.006	.002	.003
MALE	.329	.020	.001
MARRIED	.108	.022	.001
DCOLLEG	-.150	.032	.001
PARTIME	-1.340	.021	.001
INSIGNIFICANT EXPLANATORY VARIABLES			
EDSQR	-.001	.001	.314
BLAHIS	-.028	.022	.205
VET	-.123	.140	.376
DURCIV	.046	.043	.283
<u>EQUATION CHARACTERISTICS</u>			
R-squared	.472		
Adj. R-squared	.471		
F-statistic	531.175	Significance	.001
N cases	7820		

B. Wage Growth Regression Model

1. Estimation of 1982 to 1985 Wage Growth

The results from estimating wage growth for 1982-1985 are contained in Table 4.5. It appears that the dummy variable for veteran status in 1982, DVET, had the largest positive effect on wage growth. This large effect was probably due to the small number of veterans (60) remaining in the survey and giving responses to all the questions required in the analysis. DURCIV, the variable used to capture time since an individual left military service, also had a large effect on wage growth, but in this case, it was negative. Analyzing the two variables as a whole, it seems that veteran status has a significant positive effect on wage growth for about five years, at which time the negative effect of the time since leaving the military causes the net effect to be zero. This suggests that after approximately five years, a veteran has the same earnings as his non-veteran peers.

Two results are particularly interesting. The first is that the dummy variable for race, BLAHIS, had a small, but significant and positive effect on wage growth. This possibly lends support to the 'bridging hypothesis', and is a different result from Hirschowitz's wage growth estimations. Hirschowitz found that non-whites had lower

wage growth than their white peers. Also of interest is the small negative effect that MALE had on wage growth.

TABLE 4.5

Results from Estimating 1982-1985 Wage Growth

<u>VARIABLE</u>	<u>BETA</u>	<u>STD ERROR</u>	<u>PROBABILITY</u>
INTERCEPT	4.411	1.516	.004
SIGNIFICANT EXPLANATORY VARIABLES			
E82SQ	.004	.002	.021
AGE82	-.321	.142	.023
AGE82SQ	.006	.003	.065
MALE	-.060	.026	.022
BLAHIS	.093	.029	.001
DEDUC	.049	.020	.015
WORKMO	.029	.001	.001
DFULL	.279	.040	.001
DVET	3.740	1.283	.003
DURCIV	-.756	.285	.008
INSIGNIFICANT EXPLANATORY VARIABLES			
DNATLOC	-.342	.473	.471
HIGH82	-.059	.044	.182
AFQT	.001	.001	.675
DMARRY	.014	.030	.631
WKUTOT	-.001	.001	.480
<u>EQUATION CHARACTERISTICS</u>			
R-squared	.445		
Adj. R-squared	.442		
F-statistic	185.207	Significance	.001
N cases	3487		

Both unemployment variables, DNATLOC and WKUTOT, were found to have no effect on wage growth. A possible explanation for this could be that the nation's economy improved in terms of jobs and spending in the mid-80's.

Whenever time-series data is used in estimating coefficients with OLS, there is a possibility that autocorrelation, a non-zero covariance between the error-term of one time interval and the error-term of another subsequent time interval. A Durbin-Watson test was performed, and yielded a d-statistic equal to 1.934. In general, when the d-statistic is close to 2, we can assume that 1st-order autocorrelation does not exist.

V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

The most important conclusions from this thesis are that military experience had a negative short-term effect on the level of earnings, but exhibited a positive effect on earnings over longer periods of time. This effect on wage growth eventually disappeared after four to five years. The sizes of the coefficients for the two veteran status variables seem to be unusually large, and their magnitude is probably due to the short time-period during which wage growth is being analyzed.

The 1982 earnings equation, which contained veterans who had a maximum of two tours of duty, showed that the most important factor affecting earnings was relative local unemployment levels. This seems logical since at that time, the country was experiencing one of its worst recessions. Factors having a positive effect on earnings included: age, gender, and being married, the most important of these being age. A negative earnings effect was noted for blacks and hispanics, an expected result given previous studies in this area.

In the analysis of 1985 earnings, local unemployment again was the most important negative factor. Of note in 1985 was that being a veteran no longer had a negative effect on earnings. Similarly, race did not affect earnings during this survey year. Males were seen to be increasing their advantage over females in earnings, and the level of education an individual had completed also appeared to have a more positive effect on earnings.

B. Recommendations

A measure of local unemployment should be included as a variable in future estimates of veterans' earnings.

Undoubtedly, the reason that it has not been used in the past is because of lack of availability. In this study it has been shown that local unemployment rates are significant factors affecting earnings and studies not including them are risking misspecification errors in their models.

Another variable that is suggested for future use is AFQT scores. In both years analyzed, the AFQT score was a significant variable for the explanation of the variance in earnings. Again, the problem with using AFQT as a variable is lack of availability.

For future wage growth analysis, data need to be available for a longer time-period than three years. A longer time span would allow more changes to occur in the

explanatory variables, and a more thorough analysis of the determinants of temporal earnings patterns.

There is still need for further research on the veterans' earnings and wage growth. This study showed that veteran status had a short-run negative effect on earnings, but that veteran status also implied a positive effect on wage growth. This does not completely answer one of the current policy questions concerning the expected manpower reductions: Should the government provide financial assistance to individuals being forced to leave the military to help ease their transition into the civilian labor market? The results from this study indicate that a one-time separation pay would help alleviate the earnings loss in transition to the civilian labor force. But, with current federal budget constraints, can the government justify this expense when veterans display accelerated wage growth? Future studies are necessary to answer these questions with somewhat greater precision.

APPENDIX A: 1987 Survey of Veterans (SOV)

The complete 1987 Survey of Veterans data set contains 9442 observations with 1608 variables. The survey was conducted by the U.S. Bureau of the Census for the Veterans Administration (VA). Most of the variables concern health-care and the utilization of VA medical services, but there are also numerous variables for specific types of income.

The SOV data has been made available to the Naval Postgraduate School in Monterey, California, and can be accessed from the mainframe computer by using the access code: MSS.N8067.SOV SAS. Also, a permanent format library was developed by Melissa Potter for use with the SOV data set: the name and access code is: MSS.N8067.SOV.FORMLIB.

Frequencies of various demographic measures in the SOV data set were conducted during the preliminary stages of this thesis which involved investigating alternate data sources for analyzing veterans' earnings. The frequencies of variables analyzed for this particular study are found in the tables that follow this text.

It should be noted that the SOV data at the Naval Postgraduate School does not contain variables that allow direct computation of an individual's age, or dates of enlistment and separation. These were removed from the data

sent to NPS for Privacy Act reasons.

DEMOGRAPHIC FREQUENCIES FOR 1987 SURVEY OF VETERANS

GENDER

<u>VARIABLE NAME= Q2</u>	<u>FREQUENCY</u>	<u>PERCENT</u>
MALE	9213	97.6
FEMALE	229	2.4

MARITAL STATUS

<u>VARIABLE NAME= Q14A</u>	<u>FREQUENCY</u>	<u>PERCENT</u>
MARRIED	7396	78.3
WIDOWED	351	3.7
DIVORCED	807	8.5
SEPARATED	207	2.2
NEVER MARRIED	676	7.2
REFUSED TO RESPOND	3	0.0
N/A	2	0.0

EDUCATION BEFORE SERVICE

<u>VARIABLE NAME= Q15A</u>	<u>FREQUENCY</u>	<u>PERCENT</u>
NO FORMAL SCHOOL	14	0.1
ELEMENTARY SCHOOL	849	9.0
HIGH SCHOOL GRAD	6266	66.4
TRADE/TECHNICAL	246	2.6
COLLEGE-ONE YEAR	544	5.8
COLLEGE-TWO YEARS	459	4.9
COLLEGE-THREE YEARS	143	1.5
COLLEGE-FOUR YEARS	662	7.0
COLLEGE-FIVE YEARS	114	1.2
COLLEGE-SIX YEARS	139	1.5
N/A	6	0.1

DEMOGRAPHIC FREQUENCIES FOR 1987 SURVEY OF VETERANS

YEARS OF SERVICE

<u>VARIABLE NAME= Q13C</u>	<u>FREQUENCY</u>	<u>PERCENT</u>
LESS THAN 1 YEAR	404	4.3
1-2 YEARS	3627	38.4
3-5 YEARS	4303	45.6
6-10 YEARS	552	5.8
11-15 YEARS	57	0.6
16-20 YEARS	177	1.9
21-30 YEARS	248	2.6
31 YEARS OR MORE	21	0.2
NONE	7	0.1
DON'T KNOW	8	0.1
N/A	38	0.4

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