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An Analysis of the Effects of Military Service on Retirees' Civilian Earnings

by

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ABSTRACT

This thesis analyzes differences in earnings between U.S. military retired veterans and non-retired veterans with similar demographic characteristics. Using data from the 1987 National Survey of Veterans (SOVIII) Files, the analysis first examines the frequency distribution of the explanatory variables. It then employs Heckman's two stage regression technique to correct for the selectivity bias that distorts the estimates obtained using Ordinary Least Squares. A log-earnings model is specified based on human capital theory. The intent of the model is to measure the effects of retired versus non-retired veteran status on the post-service earnings of male veterans. The findings reveal a statistically significant loss of post-service income incurred by male retired veterans. It was also determined, however, that increases in education had a statistically significant effect on earnings for both retired and non-retired veterans. Applying the results of this U.S. study to the Republic of China (R.O.C.), it is recommended that the R.O.C. Armed Forces conduct a study to determine whether a similar post-retirement earnings deficit applies. If such an effect exists, policies might be developed to compensate for this effect, thereby contributing to obtaining the most highly qualified members of the career military.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

A. BACKGROUND

The task of recruiting high quality personnel is a continuing, highly challenging problem facing the four branches of the Armed Forces of the United States. The structure of military compensation plans directly affects the ability of the services to recruit high-quality personnel. However, the number of retirees has risen by roughly 80% during a 13 year period (1970 - 1982), and the level of expenditures on retirement compensation (net of inflation) has increased by nearly 150%. [Ref. 1] Both officer and enlisted personnel are eligible to retire at relatively young ages (late 30s to middle 40s), and the retirees usually begin a second career in the civilian labor market following separation from the service. Thus, military retirees receive two incomes over a lengthy period of their lives, the military pension and the earnings from their civilian jobs. If it were determined that average earnings in post-retirement civilian jobs were sufficiently high, one might evaluate whether the structure of military pensions might be changed without affecting the quality or quantity of new recruits. Confronting large budget deficit problems, the U.S. Armed Forces must continue to attract top quality men and women capable of operating high technology equipment and weapons systems to achieve the first and foremost determinant of military capability-readiness. With the downsizing of the military and the current political climate, manpower planners and recruiters must

efficiently use their sparse recruiting resources to target only those people who have the greatest potential for service and retention.

A changing environment also has affected Taiwan, R.O.C. Armed Forces, which now face a new and uncertain geo-political environment. It is important, therefore, to understand the effect of military service in the Taiwanese Armed Forces on retirees' civilian earnings.

B. RESEARCH QUESTIONS

The primary research question for this thesis is: Are there differences between the post-service earnings of U.S. military retirees and the post-service earnings of U.S. military veterans who served between two and six years with similar demographic characteristics? The secondary research question is: How can these results be applied to the recruiting policy and compensation policy for R.O.C. Armed Forces officers.

C. SCOPE AND LIMITATIONS

The effects of military service on the post-service earnings of retirees is becoming an increasingly important issue. Therefore, this thesis attempts to analyze the effects of military service on retirees' civilian earnings. A review of the literature on veterans' post-service earnings was conducted to gain some insight on the topic. However, the conclusions of this review appear to be contradictory. Therefore, a statistical model was specified to relate earnings of retirees to their level of education, marital status, age, race,

and years of potential labor market experience. Within this model, Probit analysis was employed to correct for expected selectivity bias. The sample employed in this thesis was extracted from the 1987 Survey of Veterans (SOVIII). The intent of the model is to measure the effects of military service and retiree status on the post-service earnings of retirees.

The data set is divided into three subsamples: retirees and non-retirees, retirees and drafted non-retirees, and retirees and volunteer non-retirees. The post-service earnings of retirees in these three groups is the subject of this research effort. The data set used in this study includes a sample of military veterans between the ages of 37 and 62 who were employed full-time and year-round, with the exception of those veterans who were disabled, full-time students or had earnings below $5,000. Also, due to the fact that there were relatively few female veterans in the population, female veterans were deleted from this study.

D. ORGANIZATION

This study is composed of five chapters. Following the Introduction and Background in Chapter I, Chapter II reviews Previous Studies and Literature related to this area of research. Chapter III describes the data files that were employed in this study. A detailed explanation of the model specification, a description of the variables and a selectivity bias analysis is also provided in Chapter III. Chapter IV presents the empirical results of this study using multivariate analysis. Results were analyzed with and without

correction for selectivity bias to compare the differences of the two models. Chapter V is divided into two parts, and includes conclusions and recommendations based on the results of the empirical analysis. The first part discusses the results in terms of the U.S. Armed Forces; and the second part seeks to determine the implications of the analysis for the R.O.C. Armed Forces, and to offer suggestions for altering R.O.C. recruiting and compensation policy.

II. LITERATURE REVIEW OF PREVIOUS STUDIES

Several authors have performed research in the field of post-service civilian earnings of veterans. A summary of these works is presented in Appendix A. [Ref. 2, 3, 4, 5, 6, 7]

This thesis reviews four recent studies on post-service earnings. The first study by Hirschkowitz found that black veterans' wage growth rates were not as great as those of whites, and found education to be the primary contributor to wage growth rate [Ref. 6]. The second study by Mehay concluded that nonwhites appear to reap the largest earnings premiums from military service, especially if the service is the Navy, Air Force, or Marine Corps. This study also pointed out that white veterans appear to benefit more than nonwhite veterans from occupational transfer, especially Navy veterans, who have a 20.7 percent occupational transfer rate to the civilian sector [Ref. 8]. The third work by Miller concluded that veteran status appears to have a slightly negative impact on post-service earnings of military personnel, on the average. The Air Force and Navy had positive and statistically significant returns from both military on-the-job training and formal schooling of approximately ten percent, the Marine Corps had a small positive return, and the Army had a negative return [Ref. 7]. The fourth study by Sliepcevic found that, in the long run, female veterans earn somewhat higher incomes than their civilian contemporaries, other things being equal. 'Gender gap' was also taken into

account and it was shown that white female veterans earn approximately 70 percent of the earnings of male veterans [Ref. 9].

A. HIRSCHKOWITZ (1988)

The thesis, *Post Service Earnings Growth Rates of Military Veterans in the Era of the All-Volunteer Force,* studied two major questions. They were:

- How do civilian earnings of veterans compare to earnings of non-veterans over time?
- How does the human capital accumulated by the veteran during his years of military service compare to that accumulated by his non-military cohorts? [Ref. 6]

The data used for this analysis were the 1971 and 1981 segments of the National Longitudinal Survey (NLS) of young men between 14 and 24 years of age in 1966. The prime advantage of the NLS design is that it provides a year-by-year labor history from the end of the formal schooling period until 1981, eliminating the need for job experience proxies that had been used in the past. Hirschkowitz restricted the sample to respondents represented in both the 1971 and 1981 surveys. No other observations were eliminated except those that had missing data. Thus, the survey contained a relatively homogeneous sample of males within a ten year age range. The final sample size was 1561.

The research used annual earnings from 1971 to 1981 to estimate the earnings growth potential of veterans and non-veterans. Hirschkowitz' model in this study was based on the work of Edward Lazear [Ref. 6]. He defined a veteran as one who had completed at least 18 months of active service. For his first hypothesis, Hirschkowitz

tested whether earnings factors were different for black veterans, black non-veterans, white veterans and white non-veterans. His results indicated that blacks had a significantly lower wage growth rate (13%) than whites. Also, blacks did not achieve the same levels of education as whites, a fact consistent with previous research.

Within a segregated, black-only sample, veteran status was not significant. This finding may be indicative of a trend in the United States toward integration and equality for blacks, particularly during the 1970's. The necessity for blacks to bridge the economic gap may not be as significant as it once was, thus black veterans may be losing their primary advantage over black non-veterans [Ref. 6].

To determine the effects of military experience on the annual earnings growth rate of veterans, Hischkowitz conducted a similar regression analysis by including two independent variables. They were:

- The increase in months of military experience from 1971 to 1981.
- General transferable training.

He concluded that there were no significant returns to either an increase in months of military experience from 1971 to 1981 or general transferable training.

B. MEHAY (1991)

Mehay's paper, *Post-Service Earnings of Veterans: Evidence from the Reserves,* tested the following effects:

- Effects of Veteran Status and Branch of service.

- Occupational Transfer Effects.
- Difference in Veterans' Earnings by Race.

The data set used for this study was the 1986 Reserve Components Survey (RCS), which sampled 60,120 members of the Selected Reserve. The respondents of the RCS were divided between those who had served on active duty prior to entering the reserves (and returning to civilian life), and those who had not. That is, some reservists were active duty veterans and some were not.

Because the author controlled for certain variables in this study, he created selectivity bias in his model. First, as entrance standards for the reserve and active components are essentially the same, both the veterans and non-veterans in the sample were qualified for active military duty. The sample of reservists was not random because of the application of military entrance standards to the youth population. A second source of selectivity bias was encountered because all survey respondents had demonstrated a positive taste for military service.

To ensure that individuals were compared at similar points in their civilian careers, Mehay restricted reservist-veterans to those with six years or less of active duty. This restriction allowed a test of the impact of military service for the vast majority of volunteers who left the military after one tour, or at most two tours of active duty [Ref. 8]. Also, Mehay deleted women from the following subsections: Coast Guard reservists, officers, full-time students, currently unemployed, and working part-time in order to obtain a homogeneous sample. To minimize coding or response errors in the earnings

variables, weekly wages and yearly income were used to measure civilian earnings reported in the RCS. Observations showing a gross inconsistency between these two measures were eliminated. These restrictions resulted in a usable sample of 23,484 observations, of whom 44.6 percent were veterans.

Mehay analyzed the data in three phases. The first phase tested the effects of veteran status and branch of service on post-service earnings. A small, slightly significant, negative coefficient on the veteran status variable pointed out that military experience did not necessarily increase income in a civilian job. This finding is consistent with earlier studies (Bryant, Wilhite, Daymont, Andrisani), but conflicts with the results of the Mangum and Ball (1989) study, which found that the ability to transfer military skills to civilian employment is a major factor augmenting civilian earnings.

On the basis of this regression, Mehay concluded that the difference between the earnings of male veterans and non-veterans is slight. Furthermore, he found out that negative effects of military service are associated primarily with the Army. In contrast Navy, Air Force, and Marine Corps veterans earn from 2 to 4 percent more than their non-veteran counterparts. It is plausible to attribute the observed positive effects of service in the Navy or Air Force to the high proportion of technical specialties in those branches, and the negative effect of Army service to its high proportion of combat arms specialties. The Marine Corps is also dominated by combat-related specialties, nonetheless, they still experienced positive post-service earnings. One explanation offered by Mehay

for the success of Marine Corps veterans is that enlistment standards may be more strictly enforced.

The second phase tested the impact of military training and the transfer of military skills to civilian jobs on earnings in the AVF era. According to previous studies, the transferability of military skills to civilian employment is a major factor augmenting civilian earnings. These studies also found that, if those who leave the service transfer their occupational skills to the civilian sector as if they are only changing employers, they will fare better than those who are not able to transfer skills and must change both employers and occupations. Mehay observed that the occupational transfer rate in the RCS sample was the highest for the Navy (20.7 percent), followed by the Air Force (14.1 percent), Marine Corps (9.4 percent), and the Army (8.8 percent). The low proportion of Army veterans who transfer military specialties is explained by the fact that the Army reserve components are dominated by combat arms units, which enlist a high percentage of personnel with no prior active military service.

The second phase consisted of three steps to test the wage effects of occupational transfer. The first step included occupational transfer and veteran status as a two independent variable specification. A regression model showed that occupational transfer yielded a return of 5.1 percent and white veterans underwent an immediate significant income loss of 2 percent upon exiting the military. Non-white veterans experienced a slight increase in earnings. The second step added the number of years since discharge variable in the regression analysis. With this, the negative effect of veteran status became

insignificant. Mehay suggests that the small veterans earnings penalty was associated with the lack of civilian job experience, rather than a direct result of military service. The third step evaluated the differential impact of occupational transferability across branches. The result was an earnings increase between 10 and 13 percent for Navy, Air Force, and Marine Corps. In contrast, Army veterans who transferred occupations to the civilian sector earned about seven percent less. An explanation of this result shows that the negative return of Army veterans is only derived from Army-specific skills rather than a true occupational transfer.

The third phase of Mehay's study separated veterans' earnings by race. The impact of race on annual income for white veterans was negative and significant, but it was insignificant for nonwhites. Although both whites and nonwhites suffer an earnings penalty for service in the Army, only nonwhites reap the gains of the racial differential from service in the Navy, Air Force, and Marine Corps. A specification was run to estimate the effects of occupational transfer for nonwhites and whites. The results showed that occupational transfer generates an income premium of 7.4 percent for white veterans, but displays no effect for nonwhites. Also, for both whites and nonwhites, it was found that Army veterans who transfer skills earn less.

C. MILLER (1991)

In his article, *Post-Service Earnings of Veterans: A Survey and Further Research*, Miller tested the impact of military service on post-service civilian earnings in the era of the All-Volunteer Force. The data set for this study, as in the Mehay study, was based on an edited compilation of responses to the 1986 Reserve Component Survey. Veterans were defined in this study as reservists with prior active duty in the regular components. Miller separated the data set into two samples, one to estimate models of annual income and the other models of weekly earnings. The original data set consisted of 60,120 observations. Two more homogeneous samples were created after deleting observations who were Coast Guard members, officers, women, and not employed. The final sizes for the annual earnings sample and weekly earnings sample were 32,636 and 28,297, respectively. A standard Mincer human capital earnings function was estimated, using Ordinary Least Squares methodology. The model specifications were used to estimate the effect of:

- Veteran status
- Race
- Military formal education
- Military or reserve on-the-job training
- Similarity of civilian occupation to military occupation

These models were applied to both annual and weekly earnings samples. Miller ran 20 regression models and analyzed the data in four phases.

The first phase consisted of two steps. In the first step, an annual earnings model was run using a dummy variable for veteran status in the full sample. The most important findings of this step were that:

- Veterans earned 0.3 percent less than non-veterans
- Earnings for blacks were eight percent lower than for non-blacks

The second step separated the sample by race and branch of service. When the sample was split into black and non-black subsets, the coefficients for the veteran status variable for both groups (black and non-black) were negative. However, the veteran status coefficient was significant for non-blacks, but insignificant for blacks. Therefore, Miller concluded that military service is more beneficial for blacks than non-blacks and may provide a bridging effect to facilitate increased civilian earnings potential for blacks. Separating the observations by service showed that Marine Corps veterans received a 14 percent post-service income premium, Navy veterans received a 6 percent premium, and Air Force veterans received a 5 percent premium, whereas Army veterans incurred an 8 percent penalty for their military experience. Miller concluded that the positive returns to the non-Army branches were due to the high proportion of servicemen in technical specialties.

In the second phase of his study, Miller used annual income models using training variables to estimate the effect of military formal schooling and on-the-job training. The Army was used as the base case for both models. The results revealed that the coefficients for the rest of the services were both positive and significant. Miller concluded that post-

service earnings do appear to be influenced by both formal military schooling and on-the-job training for veterans as a whole, and training in the Air Force and the Navy seems to have a more direct correlation with the civilian job market.

The third phase examined occupational transfer effects. A dummy transfer variable was used to represent the similarity between a veteran's civilian job and his reserve or national guard occupational specialty. When the study considered veterans as a whole, an increase in annual earnings of approximately five percent was found across all services, collectively. Positive returns were still acquired for all services when considering the effects between services. Navy veterans received a significantly greater return to post-service earnings than the other services.

A weekly earnings regression model was run in the fourth phase of Miller's study. The results were quite similar to those of the annual sample. A few differences were noted, as listed below:

- The black veterans in the weekly earnings sample had six percent greater negative earnings.
- Being married had a significant positive effect on earnings in both samples, but more so in the annual sample by six percent.
- Having children had a significant positive effect in the weekly sample, but a slightly negative and insignificant effect in the annual sample.

D. SLIEPCEVIC (1993)

In his thesis, *An Analysis of Post-Service Career Earnings of Female Veterans,* Sliepcevic concluded that women who transfer military-acquired skills to the civilian labor force tend to improve their economic status relative to their civilian counterparts, all other factors being equal.

This study uses information obtained from the 1986 Reserve Components Survey. The researcher deleted all observations who were employed part-time, unemployed, full-time students, or homemakers. The sample was limited to enlisted members who had successfully completed at least one active duty tour (more than two years) and achieved a rank of E-3 or higher. [Ref. 9] Separate regressions were run for males and females, veterans and non-veterans, in an effort to capture the effects of prior service on civilian wages for both genders. Sliepcevic summarized the effects of military service on post-service earnings as follows:

- **The Effect of Veteran Status for Females**. The data sets were separated into two groups: all females and post-1973 All-Volunteer Force females. Both groups of females had positive returns for transferring military-acquired skills and for changes in earnings, with both statistically insignificant. This reflected some desire on the part of civilian employers to hire veterans with these skills and also indicated that female veterans are not penalized for their active duty affiliation. Female veterans with civilian jobs similar to those held in the military experienced annual income increases averaging nearly four percent per year for a ten-year period, but slightly less after that. Married females with children earned over five percent less than single females. This earnings penalty was explained by the fact married women with children tend to have less time to invest in their own human capital [Ref. 9].

- **The Effect of Veteran Status for Males.** Sliepcevic found that the two groups of male veterans, all and post-1973, showed positive returns on military-acquired skill transference, 7.2 percent and 2.2 percent, respectively. He concluded this could be a factor of a higher demand for military-acquired training [Ref. 9]. Similarly, the return on years of civilian labor market experience resembled the observed value for females' returns on years of experience, approximately five percent and six percent more, respectively. Finally, he found being a married male with children had a positive effect on annual income.

- **The Results for Race**. When the veteran-related variables of race and gender were measured for the four groups (white males and females, nonwhite males and females) after one year of civilian experience, all of the regression results were positive. Nonwhite males and females had the highest returns to their incomes (23.3 percent and 27.7 percent, respectively). This result could be an indication that the military is an effective "bridge" for minorities to get into higher paying occupations. [Ref. 9]

E. SUMMARY OF PAST STUDY FINDINGS

Although this review of previous studies produced some inconsistent findings, it was useful to classify studies according to their purpose. First, all studies were conducted at different times. Second, the data sets used varied among the studies. Third, in some cases the same data sets were used with different methodologies, resulting in different conclusions. Finally, different definitions of "veteran" status might change the consequences of the study. [Ref. 5] Four categories of study emerged from this review of previous research:

1. The Effects of Transferability of Occupational Skills

Several previous studies have examined:

- The post-service skill transfer of veterans.
- The question of whether occupational training received in the military service affects post-service earnings capacity.

Most of these studies found that there is a significant amount of skill transfer between military-provided training and civilian employment. However, some military occupational specialties correspond better to civilian sector occupations than others. Mangum and Ball (1989) found that approximately one-half of those surveyed reported that military training helped them find a civilian job, while about one-third of the veterans actually transferred their military-acquired skills. Bolin (1980) found evidence to support the hypothesis that employers use the military as a hiring screen for the individual's first job. Skill transfer for individuals was highest for men in electronic equipment repair, medical/health service, administrative/functional support, electrical/mechanical repair, and craftsmen in service support. Conversely, it was lowest for men in combat arms, communication/intelligence, and other technical areas. These results were similar for women, except that women had lower scores in skill transfer for the fields of electrical/mechanical repair and craftsmen but were higher in medical/health services and administrative/functional support [Ref. 10]. It has been concluded by Mangum and Ball [Ref. 11] that the transfer of military-acquired occupational skills is an important determinant of post-service earnings. Fredland and Little (1980) pointed out that military vocational training yielded a premium to long-term earnings for those who use such training on the

job, but not for those who don't use it. The benefit to the individual from the military vocational training is based on how recent the training was, with more recent training being more beneficial. Norrblom (1976) found that wages do depend on the amount and type of training received in the military. If there is no match between the military and civilian occupations, then there is no impact on earnings capability.

2. The Differential Effects of Military Service on Race

Martindale and Poston (1979), Lopreato and Poston (1979), Little and Fredland (1979), De Tray (1980), Charamette and Thomas (1982), Mehay (1991), and Sliepcevic (1993) found that black veterans earn more than black non-veterans, supporting the bridging effect hypothesis. In contrast, Hirschkowitz (1988) found that, when comparing black veterans to white veterans, black veterans did not receive positive returns to military service. However, when black veterans were compared to black non-veterans, black veterans experienced earnings advantages over black non-veterans. Fredland and Little (1979), Higgins (1984), and Goldberg and Warner (1986) also found that white veterans also earn more than non-white veterans. In general, returns from military service have been positive for blacks but inconclusive for whites, when compared against non-veterans of the same race.

3. Earning Differentials for Vietnam Veterans

The earnings differences for Vietnam Veterans is more controversial than for other wars because of the unique nature of the Vietnam era for several reasons. First, the active duty time for the Vietnam veterans was shorter than for other wars. Second,

the Vietnam veteran returned home facing an economic slowdown. Third, the birth cohorts of the Vietnam veterans were considerably larger than for those of previous war eras. However, the findings of previous studies were inconclusive. Detray (1980), Hess (1980), Reams (1983), Higgins (1984), and Goldberg and Warner (1986) also found that Vietnam veterans earned more than non-veterans. Berger and Hirsch (1983), Reams (1983), Jackson (1986), Cohany (1987), and Soyak (1987) found that Vietnam veterans' earnings were approximately equal to non-veterans. Villamez and Kasarda (1976), Rosen and Taubman (1986), Schwartz (1986), Angrist and Krueger (1989), and Angrist (1990) found that Vietnam veterans earned less than non-veterans. [Ref 7]

III. CONSTRUCTION OF PROBABILITY MODEL

A. DATA SOURCES

The data set for this analysis was derived from the 1987 National Survey of Veterans (SOVIII) designed by the Veterans Administration and conducted by the Census Bureau. The sample consists of 11,439 individuals who were identified as veterans in the Census Bureau's Current Population Survey (CPS) between April 1986 and January 1987. Personal interviews were conducted with these individuals in July, August, and September of 1987. Interviewers administered a 73 item questionnaire to a total of 9,442 respondents.

The 1987 National Survey of Veterans is best described as an area-probability sample covering the entire United States and weighted to agree with Census Bureau estimates of the U.S. population by age, sex, and race. An area-probability sample is a sample that includes veterans in outgoing rotation panels of Current Population Surveys. The CPS is a monthly nationwide survey given to obtain information on employment status and other characteristics of the population. One-eighth of the households in the CPS are dropped from the sample on a monthly basis and replaced by new households to avoid overburdening respondents and to keep response rates high. Households being rotated out of the CPS between April 1986 and January 1987 were examined for veteran status for

inclusion in the 1987 National Survey of Veterans. The Census Bureau then went into the field to interview these veterans. [Ref. 12]

The data set used in this study was divided into three basic subsamples:

- Retired veterans and non-retired veterans
- Retired veterans and non-retired drafted veterans
- Retired veterans and non-retired volunteer veterans

The sample was divided to capture the value of active duty experience and military-acquired skills when transferred to the civilian workforce. Figure 1 shows a breakdown of the groups used in these three subsamples.

The period of service (i.e., the exact years served) and other aspects of military service are often critical factors in determining Veterans Administration Program eligibility. These aspects are also important in assessing the current and future needs of the veteran population. Approximately 83% of the nation's 26,143,000 veterans served during *at least* one wartime period (Figure 2). This 83% figure is broken down to include: 38% serving during World War II, 20% during the Korean conflict, and 31% during the Vietnam era. The remaining 17% of the veterans had served solely during peacetime, with one-third of this group serving after the Vietnam era. [Ref. 12]

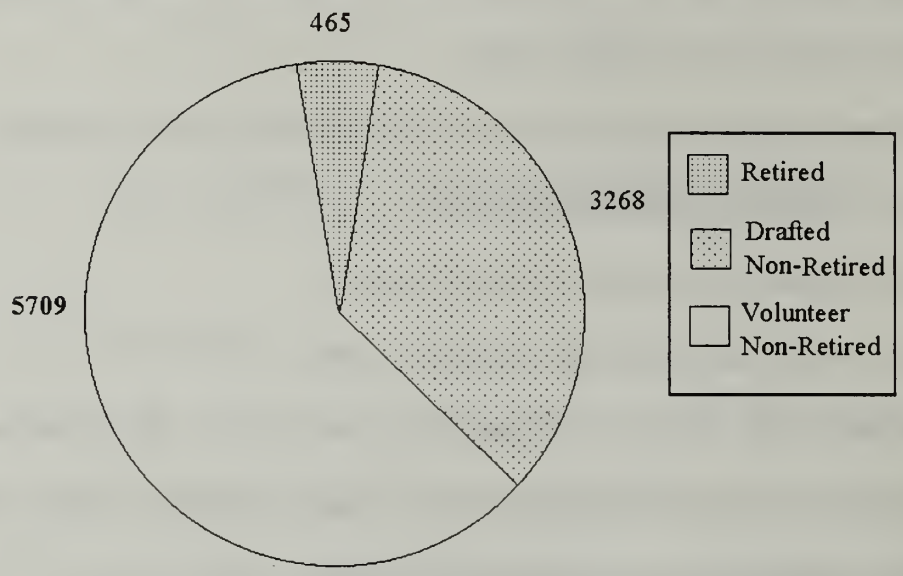
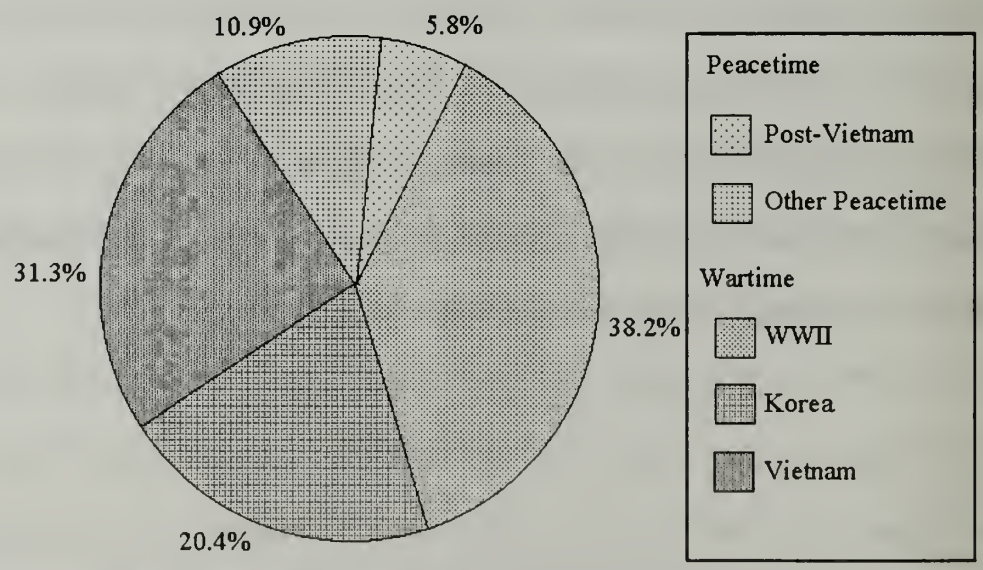


Figure 1. Distribution of Retired Veterans, Non-retired Drafted, and Non-retired Volunteer Veterans



Figures are greater than 100% because some veteran's have served in multiple conflicts

Figure 2. Distribution of Total Veterans' Wartime and Peacetime Service

B. SAMPLE SELECTION

All surveys include some respondents who do not meet the requirements of that particular study. The first step in data analysis is to choose which observations are to be retained and which are to be deleted. The first observations that were omitted in this study were those with missing responses about their education level. This figure included six observations. After this deletion, 465 retired veterans and 8,971 non-retired veterans remained in the 1987 SOV III data base. Table 1 shows the sample size remaining in the SOV as various sample selection rules were enforced for both retired veterans and non-retired veterans. The selection rule for non-positive earnings and disability status reduced the sample size for retired veterans by 52% and non-retired veterans by 60%. The four remaining rows of Table 1 show additional deletions for sex/age, years of service, full-time students, and for those who were not employed full-time and year-round. As there were only 229 female respondents in the survey, they were all deleted. Only retired veterans with ages between 37 and 62 years were retained, the hypothesis being that the earliest possible age of retirement is 37 if a person joined the service at age 17 and retired after 20 years. It was also hypothesized that few 62 year olds would be employed full-time, as they would be eligible for early Social Security benefits. To compare retired veterans' earnings to non-retired veterans' earnings, the years of service for the non-retired veterans was restricted to between two and six years. Any respondents who were students in 1986 were also deleted. To provide a homogeneous sample, a

further restriction was made to include only full-time, year-round (FTYR) employed veterans with incomes above $5000 in 1986. Following all restrictions, the final sample size was 142 retired veterans and 2,984 non-retired veterans.

TABLE 1 Sample Size Remaining in 1987 SOV After Deletions

Deletion	Retired Veterans	Non-Retired Veterans
No deletions (original sample size)	465	8,977
Earnings = 0	244	5,302
Disability	185	4,390
Sex/age	168	3,512
Years of service	168	3,364
Students	168	3,363
Full-time year-round	142	2,984

Note: Deletions are cumulative.

C. THE ANALYSIS OF VARIABLES

For the analysis of this data, a log-earnings model was specified based on human capital theory. The variables of this model were analyzed as follows:

1. Dependent Variable

The dependent variable used in this study was LNEARN, the natural logarithm of annual earnings in 1986. The semi-logarithmic form is primarily used to reduce the positive skewness in most earnings distributions. [Ref. 2] Reducing the

skewness enhances the statistical fit of the equation. In the 1987 Survey of Veterans, respondents were asked to indicate whether they received income in 1986 from a variety of income sources. The question pertaining to annual earnings specifically asked for all income, not just that from the respondents' main civilian job. It is derived from the question, " During 1986, how much did you earn from all jobs before deductions for taxes or anything else? Include wages, salary, tip, bonuses, commissions, etc." The minimum value was $5,000 and maximum $100,000 in the original data set. The answers below $5,000 were deemed to be questionable because a minimum wage of $2.50 per hour in 1981 would produce an income of $4,550 if a person worked 35 hours a week [Ref. 5]. Thus, the lowest acceptable income of respondents was derived by multiplying the lowest full-time working hours by minimum working wages. For results less than $5,000, responses were considered as missing. Cases of zero or missing earnings in 1986 were then deleted.

2. Independent Variables

The selection of independent variables and the expected signs of these variables were determined from previous research. Appendix B provides a summary of the variables used in the estimation equation (hypothesized signs are described in Section III-E).

Dummy variables were used for the respondents' race (black, other race), marital status (divorced versus non-divorced, single versus non-single), and respondents' family responsibility. Earnings variations due to the race of an individual can be a

significant factor. Based on the findings of previous research on discrimination, being black or any race other than white was expected to negatively affect earnings. Although white veterans reported lower annual civilian wages than their non-veteran cohorts, Reams reported significant gains made by blacks as a result of military service. [Ref. 3] The dummy variable "BLACK" or "OTHRACE" was used here to indicate whether the respondent was "black" and whether the respondent was "other race". Marital status (NOWDIV, NOWSGL) has long been determined to be a significant contributing factor in estimating wages and earnings. [Ref. 6] *A priori,* being divorced or single was expected to have a negative effect on earnings since divorced or single individuals generally do not have great family financial responsibilities that require a more stable employment history. [Ref. 13] "NOWDIV" and "NOWSGL" is a dummy variable representing whether or not the respondent was divorced or single in 1986. The individual was considered to be divorced or single only if he was actually divorced or single at the time of the survey. Family responsibility was used to determine respondent's work incentive. Individuals with spouses that work will earn, on average, less than those with spouses that are not working. This is based on the human capital theory that, with two incomes, some of the impetus to seek higher wages is lessened since the "burden" of support is shared. Similarly, individuals living with children under eighteen will earn, on average, more than those living without children under eighteen. This is based on the same theory that, with one income, some of the impetus to seek higher wages is raised since the "burden" is increased. The dummy variables "SPOUSEWK" and "KIDLT18" were used here to

indicate whether the respondent had a working spouse or not, and whether or not the respondent had children under eighteen living with him.

The respondent's years of education and years of work experience were controlled with the continuous variables "EDU", "EXP" and "EXPSQ". Years of experience was computed by taking the respondent's age and subtracting the years of education completed, and then subtracting six additional years to represent the years prior to formal schooling. *A priori*, increases in education and experience were expected to cause an increase in an individual's productivity and therefore a correlative increase in income. A squared term for years of experience was used to capture any diminishing returns to increases in this attribute. [Ref. 13] Years of education ranged from eight to eighteen, based on highest grade completed. Because multicollinearity was found between the age, years of education and years of military service variables, only years of education was used in the regression model.

The dummy variable "RETIRED" was used to distinguish retired veterans' status from non-retired veterans' status. If the respondent served on active duty in the Armed Forces, the National Guard, or the Reserves for 20 or more years, he was considered to be a retired veteran. Early works by Cooper (1981), Danzon (1980), and Goldberg and Warner (1983) have tried to determine how military retirees have fared in the civilian labor market. Unfortunately, findings in these studies were inconclusive. [Ref. 1]

No previous studies were found on the income of drafted retirees in the labor force. Therefore, as additional dummy variable "DRAFTEDR" used to examine the separate effect on earnings of a retired veteran having first been drafted into the military. As will be seen in Figure 4 of section IV, the number of individuals who were members of this category was small. However, the variable permits us to distinguish between the earnings of "volunteer" retired veterans and "drafted" retired veterans.

The dummy variables, "ADD_SCHG", "ADD_TRNG" and "ADD_OTHR", represent whether or not the respondent has attended high school, college, vocational training, technical, business, or flight school; or received on-the-job training, apprentice training or tutorial assistance since his release from active duty. The dummy variable "ONLYJOB" was used to indicate whether the respondent has had only one job since leaving the military. The expected positive signs for the coefficients of the dummy variables, "ADD_SCHG", "ADD_TRNG", "ADD_OTHR", and "ONLYJOB", are fairly straight forward, since a veteran who has taken on-the-job training, apprentice training, tutorial assistance, attended high school, college, vocational training, technical, business, flight school or has held only one job since leaving the military is much more likely to be in the labor force than one who has not. Mangum and Ball (1987) found that skill transference for individuals who received training in the military was significantly lower than for those trained in civilian apprenticeships and employer-provided training programs, but not significantly different from those who received training through sources such as vocational/technical institutes or proprietary business colleges. [Ref.10] Hirschkowitz

(1988) reported that tenure with a specific firm or company should result in greater wage returns to the individual for two reasons. First, in moving from job to job, many individuals lose work time; thus they lose work experience, resulting in a minimal yet present loss of wages for each week of lost time. Second, with increasing tenure, many individuals manage to convey a sense that their skills are indispensable and they are irreplaceable.

The dummy variable "OFFICERR" was used to indicate whether the respondent was a retired officer. Cooper concluded in his study that "the retired military officers earn 25 percent less than comparably aged and educated non-retired veterans." [Ref. 14] However, some studies stressed that the reason for this may be due to military retirees who do not work full time. [Ref. 5] So, the income effect for retired military officers was expected to be inconclusive.

The dummy variable "VIETNAM" measures the income effect for the Vietnam veterans who served on active duty during the Vietnam era. Schwartz concluded that Vietnam veterans are not worse off than their non-veteran counterparts, but they have a lower rate of return on their education. [Ref. 15] Chamarette (1982) found negative returns to Vietnam-era Veterans. [Ref. 2] Reams stated that returns to military service were negative for white Vietnam-era veterans, while the results were inconclusive for blacks. [Ref. 3]

The effect of moving within county, state and between states in the last year and in the last five years also was investigated. Dummy variables "CNTY_1", "ST_1", "BTST_1", CNTY_2", "ST_2", and "BTST_2" take into account the effect of these moves. Greenwood (1975) pointed out that the expected income at each alternative destination is likely to enter importantly into an individual's decision. [Ref. 16]. Gallaway indicated that people who migrated from a region generally had higher incomes than the people who stayed. [Ref. 17] The effect of migration should presumably be positive.

Many previous studies have addressed the effects of occupational transfer and branch of service on post-service earnings. This information was not available, however, for use in this study.

D. MODEL DESCRIPTION

1. Model Specification

The model specification used to describe and decompose the determinants of an individual's income takes on the form of the standard Mincer log-earnings function. The statistical earnings function is: [Ref. 18]

$$\ln y_i = f(s_i, x_i, z_i) + u_i, \qquad \textbf{3-1}$$

where $ln\ y_i$ is the natural log of earnings or wages for the ith individual; s_i is a measure of schooling or educational attainment; x_i indexes the human capital stock of experience, such as years of labor force experience or on-the-job training; z_i represents other factors

affecting earnings, such as the race, gender, and/or geographical region of the individual; and u_i is a random disturbance term reflecting unobserved ability characteristics and the inherent randomness of earnings statistics. It is usually assumed that u_i is normally distributed with mean zero and constant variance. An initial specification of the log-earnings model and predicated signs of the regression coefficients appear in Figure 3.

2. The Analysis of Selectivity Bias

Suppose, one is studying the wages of women. It is possible to know the actual wages of those women who are working, but it is not possible to know the "reservation wage" (the minimum wage at which an individual will work) for those who are not. Or suppose one is studying automobile purchasing behavior using a random survey of the population. For those who happened to buy a car, the expenditure can be recorded; but for both those who did not and those who did purchase a car, one cannot measure the maximum amount they would have been willing to pay for an automobile. In both of the examples just described, the dependent variable is censored---information is missing for the dependent variable, but the corresponding information for the independent variables is present. It can be shown that ordinary least-squares estimation of the censored regression model generates biased and inconsistent parameter estimates. The term "bias" refers to the potential misestimate of the effect of the treatment (or program) on the outcome. Selectivity bias is a concern whenever the assignment to treatment and control groups is not random, and is conditional on observable explanatory variables used in the analysis, if any.

LOG-EARNINGS $= f$

- (-) NOW DIVORCED
- (-) NOW SINGLE
- (-) BLACK
- (-) OTHER RACE
- (+) POTENTIAL LABOR MARKET EXPERIENCE
- (-) POTENTIAL LABOR MARKET EXPERIENCE SQUARDED
- (+) YEARS OF SCHOOLING
- (+) CHILDREN LESS THAN EIGHTEEN LIVE IN HOUSEHOLD
- (-) SPOUSE WORKS
- (?) RETIRED OFFICER
- (?) DRAFTED RETIRED VETERAN
- (+) TAKEN ON-THE-JOB TRAINING
- (+) ATTEND SCHOOL
- (+) TUTORIAL ASSISTANCE
- (+) ONLY JOB SINCE RELEASED
- (?) RETIRED VETERAN
- (?) VIETNAM VETERAN
- (+) MOVED WITHIN COUNTY LAST YEAR
- (+) MOVED WITHIN STATE LAST YEAR
- (+) MOVED BETWEEN STATES IN LAST YEAR
- (+) MOVED WITHIN COUNTY IN LAST 5 YEARS
- (+) MOVED WITHIN STATE IN LAST 5 YEARS
- (+) MOVED BETWEEN STATES IN LAST 5 YEARS

Figure 3. Log-Earnings Model

Ross and Warner (1976) stated that the selectivity bias problem may be described as follows. Veterans who chose civilian jobs that were related to their military jobs did so because they could earn more in these jobs than they could in unrelated jobs. Similarly, those veterans who chose unrelated jobs did so because they could earn more in unrelated jobs. The data sample is thus sorted into one group of veterans whose best earnings opportunities were in related jobs and another group whose best earnings opportunities were in unrelated jobs. As a result of this sorting process, the average of the observed earnings of those individuals who took related civilian jobs will be an upward biased estimate of the true average earnings opportunity available to veterans in related civilian jobs. Likewise, the average of the observed earnings of those individuals who took unrelated civilian jobs will be an upward biased estimate of the true average earnings opportunity available to veterans in unrelated civilian jobs. While these observed average earnings are both upward-biased estimates of the true earnings opportunities available to veterans in related and unrelated jobs, respectively, the difference in these upward biased earnings averages may either overstate or understate real differences in earnings opportunities. As Maddala (1976) shows, it is possible that no real earnings difference exists, even though the data indicate a difference (in which case all the difference in observed earnings average is due to self-selection). It is also possible that a real difference exists even when the data indicate no difference. In the former case, the data contain a positive selectivity bias while in the latter case, the selectivity bias is negative. [Ref. 19]

The issue of selectivity bias is then pervasive in empirical research in economics because the assignment of observations with regard to the different statuses, as defined by the predictor or by the explanatory variables of interest, is seldom random. Thus, there should be a common ground in the methods used to analyze selectivity bias in program evaluation and econometrics.

3. Censored Regression Models

The Censored Regression Model is a simple technique for handling selectivity bias. The dependent variable in this type of analysis is censored----e.g., information is missing for the dependent variable, however, there is corresponding information for the independent variable. The ordinary least-squares estimation of the censored regression model will generate biased and inconsistent parameter estimates. Suppose earnings is determined by the following model:

$$Y_i = \alpha + \beta X_i + \varepsilon_i, \qquad \textbf{3-2}$$

where Y_i represents the earnings of male veterans working full-time jobs, and X_i represents factors affecting the market earnings relationship. The error term of Eq. 3-2, is assumed to be normally distributed with mean zero and standard deviation equal to σ.

The actual earnings of working male veterans, Y_i, are known, but the "reservation earnings" (the minimum earnings for which an individual will work), Y_i^R, are unknown for both those who are working and those who are not. Suppose that the reservation earnings relationship is given by:

$$Y_i^R = \gamma_o + \gamma_1 X_i + \gamma_2 Z_i + \nu_i, \qquad \text{3-3}$$

where Z_i represents variables that affect Y_i^R but not Y_i and ν_i is a normally distributed error term with mean zero and constant variance. For example, non-wage income might be an example of variable included in Z_i that affects the reservation earnings relationship but does not affect the market earnings relationship. Suppose Y_i^* is defined as the difference between Y_i and Y_i^R. Then:

$$\begin{aligned} Y_i^* &= Y_i - Y_i^R \geq 0, \qquad Y_i > 0, \\ Y_i^* &= Y_i - Y_i^R < 0, \qquad Y_i = 0. \end{aligned} \qquad \text{3-4}$$

Because the individual chooses not to work when $Y_i^* < 0$, an ordinary least-squares estimation of the market earnings model (Eq. 3-2) will yield biased and inconsistent estimates of α and β. This can be seen easily by calculating the mean of ε_i for those individuals who choose to work. For least squares to be unbiased and consistent, this mean must equal zero. However, because $Y_i > 0$,

$$Y^* = (\alpha - \gamma_0) + (\beta - \gamma_1) X_i - \gamma_2 Z_i + \varepsilon_i - \nu_i \geq 0. \qquad \text{3-5}$$

Therefore,

$$\varepsilon_i - \nu_i \geq -(\alpha - \gamma_0) - (\beta - \gamma_1) X_i + \gamma_2 Z_i. \qquad \text{3-6}$$

If ρ is the population correlation between ε_i and ν_i, then it can be shown that[1]

$$E(\varepsilon_i | \varepsilon_i - \nu_i \geq -(\alpha - \gamma_0) - (\beta - \gamma_1)X_i + \gamma_2 Z_i) = \frac{\rho\sigma f(\alpha + \beta X_i)}{F(\alpha + \beta X_i)} = \rho\sigma\lambda_i, \qquad \textbf{3-7}$$

where

$$\lambda_i = f(\alpha + \beta X_i)/F(\alpha + \beta X_i), \qquad \textbf{3-8}$$

f is the probability density function of a standardized normal variable, and F is the corresponding cumulative distribution function.

Given consistent estimates of λ_i, one can employ a relatively simple two-stage estimation process that yields consistent estimates of α and β. In the first stage, λ_i is estimated by utilizing the probit model:

$$P_i = F(\alpha + \beta X_i), \qquad \textbf{3-9}$$

where P_i equals the probability of receiving positive earnings. This Probit model is estimated with a maximum-likelihood technique by distinguishing those observations for which $Y_i > 0$ from those for which $Y_i = 0$. From the estimated parameters $\hat{\alpha}$ and $\hat{\beta}$ of the probit model, $\hat{\lambda}_i$ may be calculated using Eq. (3-8).

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[1] Heckman, James J., "The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Variables and a Simple Estimator for Such Models", *Annals of Economic and Social Measurement*, 1976.

The second stage of the two-stage estimator uses the following OLS model:

$$Y_i = \alpha + \beta X_i + \rho\sigma\hat{\lambda}_i + \nu_i, \qquad \textbf{3-10}$$

where $\hat{\lambda}_i$ has been added as an additional explanatory variable and ν_i is an error term with expected value equal to zero. Because $\hat{\lambda}_i$ approaches λ_i as the sample size gets larger, the ordinary least-squares estimation of (Eq. 3-10) yields consistent estimates of α and β. One also obtains an estimate of the product of the probability distribution parameters ρ and σ. [Ref. 20]

IV. EMPIRICAL ANALYSIS OF MODELING RESULTS

A. DESCRIPTIVE STATISTICS

As has been indicated, the final sample for the data analysis contained only male respondents who reported full-time jobs with a positive annual income above $5,000. Figure 4 shows the distribution of veterans by retired, non-retired, volunteer and drafted status, and Figure 5 gives a breakdown of retirees and non-retirees by race. Tables 2 through 6 present descriptive statistics for the resulting retired veterans and non-retired veterans samples; Table 2 for the 1986 sample by retired and non-retired veteran status, Tables 3 and 4 by race, and Tables 5 and 6 by volunteer versus drafted veterans. Included in the tables are the means, standard deviations, and the results of sample means tests for the explanatory variables used below in the earnings models. Each table was analyzed for differences in demographic characteristics. T-tests were performed on each variable to determine whether differences in the means of the characteristics of retired veterans and non-retired veterans were statistically significant. The comparison of subsample means gives an overall indication of group homogeneity.

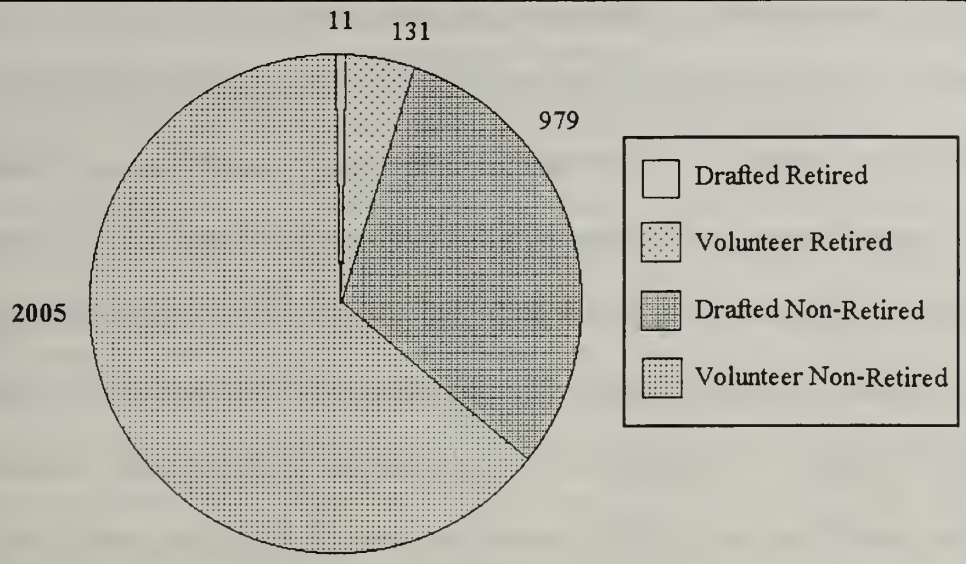

Figure 4. Number of Veterans by Retired vs. Non-Retired Status and Volunteer vs. Drafted in Final Sample.

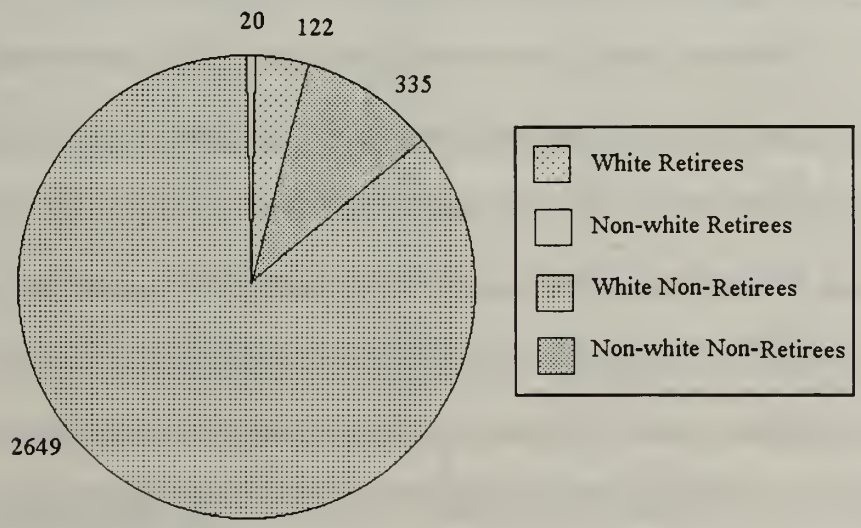

Figure 5. Number of Retired and Non-Retired Veterans by Race in Final Sample.

1. Similarities and Differences by Retired Status

Table 2 calculated a t-test of differences in the means of the characteristics of retired veterans and non-retired veterans. The average annual income of $34,895 for retired veterans was less than for non-retired veterans by $1,984, or 6 percent. This difference is statistically insignificant at the ten percent level. The average age of the retired veterans was approximately 50, compared to 46 for non-retired veterans, a significant difference. In addition to being an older group, the average education level of retired veterans exceeded that of non-retired veterans by approximately half a year. Also, retired veterans were less likely to take on-the-job training or apprentice training after leaving the military. The racial composition of the two groups was similar. Divorced and single retired veterans numbered less than non-retired veterans by 7 percent and 73 percentage points, respectively. Retired veterans had a lower proportion of children under 18 years old living with them than non-retired veterans.

The retired veterans were less mobile than non-retired veterans in the last year; only 9.2 percent of them had switched jobs within county, 1.4 percent within state, and no one between states. This is a small difference when compared to the non-retired veterans who had switched within county (5.6 percent), state (1.7 percent), or between states (1.2 percent) in the last year. Similarly, the retired veterans were also less mobile in the last five years, with 15.5 percent of them switching jobs within county, 3.5 percent within state, and 9.9 percent between states. Similarly, these figures were close to the non-retired veterans, 16.7, 6, and 5.4 percent, respectively.

TABLE 2 Comparison of 1986 Descriptive Statistics for Retired Veterans and Non-Retired Veterans

VARIABLE NAME	RETIRED VETERANS		NON-RETIRED VETERANS		T-TEST STAT
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
INCOME	34,895.880	16,667.194	36,880.281	19,302.637	1.376
AGE	49.894	5.939	46.361	8.271	-6.784*
NOWDIV	0.127	0.326	0.129	0.335	0.312
NOWSGL	0.044	0.118	0.052	0.222	3.531*
EDUC	14.183	2.252	13.645	0.328	-2.592*
EXP	31.711	6.561	28.715	8.822	-5.220*
EXPSQ	1,048.373	416.176	902.355	528.174	-4.029*
BLACK	0.056	0.299	0.118	0.280	-0.898
OTHRACE	0.092	0.202	0.027	0.162	-0.898
SPOUSEWK	0.528	0.501	0.526	0.444	-0.898
KIDLT18	0.352	0.448	0.484	0.448	2.396**
ONLYJOB	0.017	0.202	0.101	0.302	3.309*
OFFICER	0.275	0.448	0.074	0.261	-5.303*
DRAFTED	0.074	0.268	0.328	0.470	10.400*
ADD_SCHG	0.408	0.118	0.484	0.500	1.673***
ADD_TRNG	0.254	0.448	0.111	0.470	2.835*
ADD_OTHR	0.056	0.217	0.039	0.444	-0.898
VIETNAM	0.444	0.231	0.444	0.302	-23.316*
CNTY_1	0.092	0.299	0.056	0.074	-1.457
ST_1	0.017	0.118	0.017	0.130	0.271
BTST_1	0.056	0.448	0.012	0.111	6.120*
CNTY_2	0.448	0.448	0.167	0.470	0.374
ST_2	0.035	0.185	0.060	0.238	1.537
BTST_2	0.099	0.299	0.054	0.226	-1.754***
N	142		2,984		

* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

This difference in migration levels between retired and non-retired veterans is statistically insignificant at the ten percent level, except migration between states in the last year and in the last five years.

Retired veterans were more likely to change jobs after they were released from the military than were non-retired veterans. Only 4.2 percent of retired veterans kept the same civilian job after release from the military. This figure is statistically significant when compared to the 10.1 percent for non-retired veterans.

Two possible reasons were found for the differences in retired and non-retired veterans' post-service earnings. The first is that a veteran who had held only one job since leaving the military was much more likely to earn higher pay than one who had made several job changes. The second reason was that there were more Vietnam veterans in the retired group. Some studies have found that Vietnam-era veterans suffered earnings penalties as a result of their military service (Angrist, 1990; Angrist and Krueger, 1989; Schwartz, 1986; Villamez and Kasarda, 1976; Rosen and Taubman, 1986).

Retired veterans had higher levels of education, 14.18 years compared to 13.64 years for non-retired veterans. This difference was statistically significant at the one percent level. It was expected that the higher educational levels of retired veterans would cause an increase in their productivity, and therefore, a correlative increase in income. But the effect of the higher educational levels of retired veterans may have been offset by the non-retired veterans' greater on-the-job training and apprentice training.

2. Similarities and Differences by Race

The descriptive statistics for the retired and non-retired white and non-white samples are presented in Tables 3 and 4. The average annual income of non-white retired veterans in Table 3 was less than that of whites by $5,582, or 18 percent. The difference between incomes is statistically significant at the five percent level. The average age of the non-white retired veterans group was one year higher than that of the white retired veterans. The marital status and on-the-job training levels were very similar for the two groups. The non-white retired veterans were significantly less mobile; no one had switched within county, state, or between states in the last year. Gallaway investigated the effect of migration on an individual's earnings and found that people who migrated from a region generally had higher incomes than the people who stayed. [Ref. 17]. The lower mobility may explain, in part, the lower average income observed for non-white retired veterans.

When the non-retired veterans sample was separated by race, Table 4, the average income of the non-white veterans was $8,839 or 30 percent lower than the white veterans. This may be attributed to demographic differences. The non-white group has proportionately more single and divorced, two groups that historically have lower incomes. The average age of the non-white veterans was seven months less than that of white retired veterans group. The average years of education of the non-white retired

TABLE 3 Comparison of 1986 Descriptive Statistics for White and Non-white Retired Veterans

VARIABLE	NON-WHITE		WHITE		T-TEST STAT
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
INCOME	30,100.000	10,243.869	35,682.090	17,401.417	-2.502**
AGE	50.750	4.666	49.754	6.128	0.694
NOWDIV	0.200	0.410	0.107	0.310	1.191
NOWSGL	0.000	0.000	0.016	0.128	-1.420
EDUC	13.600	0.016	14.279	2.283	-1.252
EXP	33.150	5.019	31.475	6.770	1.058
EXPSQ	1,122.850	348.569	1,036.164	426.247	0.694
SPOUSEWK	0.600	0.000	0.016	0.502	0.694
KIDLT18	0.300	0.074	0.000	0.482	-0.523
ONLYJOB	0.000	0.000	0.049	0.217	-2.502**
OFFICER	0.000	0.366	0.200	0.458	-1.347
DRAFTED	0.000	0.308	0.074	0.262	0.694
ADD_SCHG	0.366	0.510	0.402	0.000	0.405
ADD TRNG	0.366	0.000	0.200	0.427	1.067
ADD_OTHER	0.000	0.000	0.058	0.049	-2.714*
VIETNAM	0.000	0.224	0.000	0.049	0.132
CNTY-1	0.000	0.002	0.164	0.310	-3.791*
ST-1	0.000	0.000	0.016	0.128	-1.420
BTST-1	0.000	0.000	0.000	0.000	———
CNTY-2	0.000	0.308	0.164	0.372	-0.729
ST-2	0.000	0.224	0.000	0.049	0.485
BTST-2	0.100	0.366	0.000	0.049	0.023
N	20		122		

* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL

TABLE 4 Comparison of 1986 Descriptive Statistics for White and Non-White Non-Retired Veterans

VARIABLE	NON-WHITE		WHITE		T-TEST STAT
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
INCOME	29,033.743	14,309.529	37,872.576	19,624.659	-10.112*
AGE	45.791	8.229	46.433	3.275	-1.338
NOWDIV	0.499	0.463	0.121	0.326	3.132*
NOWSGL	0.495	0.268	0.369	0.215	1.676***
EDUC	13.322	2.334	13.686	0.131	-2.593*
EXP	28.469	9.078	28.746	8.790	-0.543
EXPSQ	892.630	544.844	903.585	526.121	-0.358
SPOUSEWK	0.495	0.501	0.531	0.369	-1.437
KIDLT18	0.478	0.500	0.451	0.109	0.905
ONLYJOB	0.499	0.268	0.103	0.304	0.942
OFFICER	0.078	0.153	0.500	0.271	-5.684*
DRAFTED	0.427	0.495	0.304	0.055	4.097*
ADD_SCHG	0.463	0.499	0.482	0.500	-0.682
ADD_TRNG	0.463	0.499	0.367	0.482	1.181
ADD_OTHR	0.500	0.495	0.500	0.109	-1.037
VIETNAM	0.487	0.501	0.438	0.369	1.676***
CNTY_1	0.063	0.063	0.055	0.228	0.598
ST_1	0.095	0.121	0.017	0.131	-0.325
BTST_1	0.078	0.121	0.482	0.109	0.409
CNTY_2	0.200	0.478	0.163	0.369	1.619
ST_2	0.054	0.226	0.061	0.239	-0.512
BTST_2	0.042	0.201	0.055	0.229	-1.159
N	335		2,649		

* SIGNIFICANT AT THE 0.01 LEVEL

*** SIGNIFICANT AT THE 0.1 LEVEL

veterans was three percent lower than that of the white retired veterans group. Fewer years of education has been shown to result in lower incomes.

3. Similarities and Differences of Drafted vs. Volunteer Veterans

The descriptive statistics for the volunteer and drafted retired and non-retired veterans samples are presented in Tables 5 and 6, respectively. In the retired veterans sample, Table 5, the average annual income of draftees is less than that of volunteers by $9,185 or 26 percent. The difference is statistically significant at the one percent level. The average experience level of the draftees group was 15 percent higher than for the volunteer groups. Increased experience has been shown to result in higher wages. However, the effects of experience may be offset by the volunteers' observed higher mobility within county in the last one year and within state in the last five years, a statistically significant difference at the five percent level. The draftees were less mobile; not one of them had switched within county, between states in the last one year, or within state in the last five years. The mobility differential may explain, in part, the lower income observed for draftees. Also, the draftees were more likely to switch jobs; no one kept the same job often being released from the military. Holding only one job since leaving the military may explain, in part, the higher average income observed for the volunteers.

In the non-retired veterans sample, Table 6, the average income of the draftees group was seven percent, or $2,755, lower than the volunteer group. This may

TABLE 5 Comparison of 1986 Descriptive Statistics for Volunteer and Drafted Retirees

VARIABLE	VOLUNTEER		DRAFTED		T-TEST STAT
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
INCOME	35,607.489	16,923.732	26,421.273	10,388.225	2.652*
AGE	49.580	5.583	53.636	8.080	-1.523
NOWDIV	0.800	0.310	0.273	0.900	-1.157
NOWSGL	0.046	0.123	0.210	0.000	1.420
EDUC	14.229	2.272	13.36	2.014	0.837
EXP	31.351	6.046	36.000	9.000	-1.592
EXPSQ	1,020.664	386.688	1,378.364	607.09	-1.922***
BLACK	0.092	0.210	0.182	0.405	-0.724
OTHRACE	0.046	0.210	0.000	0.000	2.498**
SPOUSEWK	0.500	0.500	0.364	0.505	1.135
KIDLT18	0.351	0.900	0.364	0.505	-0.083
ONLYJOB	0.046	0.000	0.210	0.302	-2.498**
OFFICER	0.210	0.456	0.090	0.000	1.422
ADD_SCHG	0.397	0.182	0.000	0.522	-0.983
ADD_TRNG	0.252	0.046	0.273	0.900	-0.151
ADD_OTHR	0.046	0.210	0.000	0.302	-0.486
VIETNAM	0.300	0.226	0.909	0.302	0.515
CNTY-1	0.000	0.000	0.210	0.000	3.784*
ST-1	0.008	0.182	0.000	0.000	-0.983
BTST-1	0.046	0.046	0.000	0.000	———
CNTY-2	0.046	0.046	0.091	0.302	0.607
ST-2	0.182	0.182	0.000	0.000	2.271**
BTST-2	0.092	0.290	0.182	0.405	-0.724
N	131		11		

* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

TABLE 6 Comparison of 1986 Descriptive Statistics for Volunteer and Drafted Non-Retired Veterans

VARIABLE	VOLUNTEER		DRAFTED		T-TEST STAT
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
INCOME	37,784.095	19,964.210	35,029.264	17,738.026	3.820*
AGE	45.54	7.95	48.04	8.66	-7.62*
NOWDIV	0.101	0.480	0.014	0.345	-1.050
NOWSGL	0.069	0.010	0.055	0.228	-0.545
EDUC	13.756	2.379	13.419	2.495	3.578*
EXP	27.783	8.463	30.625	9.037	-8.114*
EXPSQ	843.448	496.004	1,022.997	570.160	-8.420*
BLACK	0.069	0.254	0.118	0.323	3.820*
OTHRACE	0.020	0.480	0.500	0.164	-0.182
SPOUSEWK	0.538	0.499	0.504	0.500	1.751***
KIDLT18	0.476	0.500	0.499	0.492	3.442*
ONLYJOB	0.077	0.266	0.488	0.491	-5.762*
OFFICER	0.095	0.297	0.025	0.155	8.852*
ADD_SCHG	0.518	0.500	0.488	0.491	5.896*
ADD_TRNG	0.390	0.488	0.332	0.471	3.042*
ADD_OTHR	0.037	0.132	0.043	0.203	-0.710
VIETNAM	0.095	0.499	0.499	0.491	3.410*
CNTY-1	0.058	0.234	0.050	0.168	0.952
ST-1	0.020	0.488	0.010	0.101	2.270**
BTST-1	0.014	0.488	0.008	0.095	1.186
CNTY-2	0.164	2.379	0.132	0.345	3.773*
ST-2	0.069	0.252	0.043	0.228	2.770*
BTST-2	0.066	0.248	0.030	0.170	4.672*
N	2005		979		

* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

be attributed to the different distribution of individuals. The draftees group had proportionately more blacks and other races, two groups that historically have had lower incomes. Although nearly twice the proportion of draftees as volunteers had kept the same job since leaving the military, this statistically significant advantage was offset by the volunteer group's observed higher average migration, on-the-job training or additional schooling since leaving the military, and the occurrence of children under eighteen living in the same household. All of the above differences between retired and non-retired veterans were statistically significant when a t-test was applied. The differences may explain, in part, the higher income observed for volunteers.

B. MULTIVARIATE ANALYSIS

1. Methodology

In this section, the analysis of the previous section is extended to include multivariate analysis, allowing an examination of the effect of each demographic characteristic on full-time earnings, holding all other variables constant. This section presents the overall results for three basic subsamples of retired and non-retired veterans using Heckman's two-stage regression technique which combines the multivariate Probit model with the Ordinary Least-Squares regression model.

For each subgroup, two specifications were constructed. Each specification included two stages. The first stage created a new independent variable called the MILLS RATIO that was included in the second stage as an explanatory variable to correct for selectivity bias. In the initial specification, the two stages included all of the relevant independent variables as discussed above. In the alternative specification, the first stage remained the same as in the initial specification. However, the second stage of the alternative specification retained only those variables with a t-statistic greater than one in the second stage of the initial specification. Additionally, each Ordinary Least Squares model was run twice for the initial specification of each subsample. In the first estimation, the model included the MILLS RATIO independent variable. In the second, this variable was deleted to display the results without any adjustment for selectivity bias. The results obtained when the MILLS RATIO was excluded are presented in Appendix C.

Another interesting feature of the analysis should be noted. In all of the cases considered, the variables retired veteran (RETIRED) and drafted retired veteran (DRAFTEDR) were included. Even though Fig. 4 of Chapter IV indicates that only eleven members of the final sample were drafted retired veterans, there has been no study identified that examines the effect of being a member of this category on post-retirement earnings. The inclusion of both dummy variables permits the estimation of the separate effects on earnings of being a volunteer retired veteran and a drafted retired veteran.[2]

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[2]Regressions were also run with the drafted retired veteran variable excluded. The qualitative findings for retired veterans was similar.

The results are presented in Tables 7 to 15 providing the signs and magnitudes of the estimated coefficients for the Probit models and Ordinary Least Square models specified. The t-statistic of the coefficient estimates are listed in parentheses to indicate whether a coefficient is statistically significant or not.

2. Retired Veterans and Non-Retired Veterans

a. Initial Specification

Tables 7 and 8 display the results of the Probit and Ordinary Least-Squares models for the retired and non-retired veterans subsample. The purpose of the first stage, the Probit model, was to estimate the Mill's ratio, which is included as an independent variable in the second stage to obtain consistent estimates of the coefficients of the independent variables. As shown in Table 7, the Probit model obtained a "Chi-Square" value of 258.275, indicating that the model fits the data fairly well.

Although the primary purpose for employing the Probit model is to estimate the Mill's ratio, one interesting finding should be reported. Each year of additional schooling reduced the likelihood of receiving full-time earnings at the five percent level of significance. Further analysis of this issue, however, is beyond the scope of this thesis.

The initial specification of the second stage, the OLS model, presented in Table 8 indicated that (volunteer) retired veterans earn 12.3 percent less than their non-retired veteran counterparts. This negative effect is statistically significant at the five percent level. This result is consistent with the earlier findings on retired veterans

earnings of Goldberg and Warner (1983). Other variables, however, had a positive effect on earnings. An individual keeping the same job earned 14 percent higher than those who had changed jobs. Thus, retired veterans who changed their jobs suffered lower income levels than retired veterans who kept the same job.

The coefficients of the socio-economic variables in the regression analysis using all veterans affected earnings in the expected ways, given known information about earnings determination from the human capital literature. For example, Table 8 shows that earnings are a positive function of education attainment and increase

TABLE 7 Probit Analysis of Likelihood of Full-time Earnings for Retired Veterans and Non-Retired Veterans

INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE[1]
NOW DIVORCED	-0.107 (-1.039)
NOW SINGLE	-0.190 (-1.321)
BLACK	-0.060 (-0.548)
OTHER RACE	0.251 (1.089)
POTENTIAL LABOR MARKET EXPERIENCE	-0.003 (-0.077)
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001 (-1.685)***
YEARS OF SCHOOLING	-0.040 (-2.321)**
CHILDREN LESS THAN EIGHTEEN	0.184 (2.193)**
SPOUSE WORKS	0.186 (2.509)**
RETIRED OFFICER	-0.284 (-0.984)
DRAFTED RETIRED VETERAN	-0.361 (-0.939)
TAKEN ON-THE-JOB TRAINING	-0.043 (-0.633)
ATTEND SCHOOL	0.069 (0.866)
TUTORIAL ASSISTANCE	0.208 (1.113)
ONLY JOB SINCE RELEASED	0.767 (3.668)*
RETIRED VETERAN	0.245 (1.181)
VIETNAM VETERAN	-0.236 (-1.782)***
MOVED WITHIN COUNTY LAST YEAR	0.033 (0.217)
MOVED WITHIN STATE LAST YEAR	0.303 (0.969)
MOVED BETWEEN STATES LAST YEAR	-0.747 (-3.217)*
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.160 (-1.628)
MOVED WITHIN STATE IN LAST 5 YEARS	-0.298 (-1.966)**
MOVED BETWEEN STATES IN LAST 5 YEARS	-0.166 (-1.076)
INTERCEPT	2.766 (-4.396)
SAMPLE SIZE	3,454

[1] ( ) T-STATISTIC IN PARENTHESES
(-2.0) TIMES LOG LIKELIHOOD RATIO (df=23) 258.275

* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

TABLE 8 Regression Results of Earnings Model for Retired Veterans and Non-Retired Veterans: Initial Specification

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE [1]
NOW DIVORCED	-0.151 (-4.922)*
NOW SINGLE	-0.327 (-7.521)*
BLACK	-0.207 (-7.024)*
OTHER RACE	-0.128 (-2.471)**
POTENTIAL LABOR MARKET EXPERIENCE	0.047 (5.661)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001 (-4.019)*
YEARS OF SCHOOLING	0.089 (17.239)*
CHILDREN LESS THAN EIGHTEEN	0.045 (2.009)**
SPOUSE WORKS	-0.087 (3.898)*
RETIRED OFFICER	-0.001 (-0.016)
DRAFTED RETIRED VETERAN	-0.205 (-1.360)
TAKEN ON-THE-JOB TRAINING	0.034 (1.909)***
ATTEND SCHOOL	-0.003 (-0.149)
TUTORIAL ASSISTANCE	-0.010 (-0.227)
ONLY JOB SINCE RELEASED	0.140 (3.536)*
RETIRED VETERAN	-0.123 (-2.252)**
VIETNAM VETERAN	0.014 (0.399)
MOVED WITHIN COUNTY LAST YEAR	-0.014 (-0.357)
MOVED WITHIN STATE LAST YEAR	-0.022 (-0.308)
MOVED BETWEEN STATES LAST YEAR	0.005 (0.051)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.022 (-0.832)
MOVED WITHIN STATE IN LAST 5 YEARS	0.009 (0.203)
MOVED BETWEEN STATES IN LAST 5 YEARS	-0.002 (-0.041)
MILLS RATIO	0.117 (0.421)
INTERCEPT	8.464 (56.888)
SAMPLE SIZE	3,126
R-SQUARE	0.2173
ADJ. R-SQUARE	0.2113
F STATISTIC	35.879

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

at a decreasing rate with potential labor market experience. Earnings are a negative function of whether the individual member of the sample is minority, single, or divorced.

For a compassion of the initial specification of the earnings in Table 8, excluding the correction for selectivity bias, see Appendix C, Table 16. The results are quite similar.

b. Alternative Specification

From the OLS model, thirteen explanatory variables are shown to have t-statistics grater than one. Table 9 contains the results of the OLS model for an alternative specification in which only these variables are retained.

The increase in the t-statistic of the Mill's ratio from 0.421 in the initial specification to 0.830 obviously shows increased statistical significance for this variable. The adjustment for sample selectivity bias is clearly seen to be more appropriate in the alternative specification. For the remaining variables, the small increase in the t-statistics as compared to the results of the initial specification indicates that the variables in the alternative specification had higher statistical significance. The retired veterans paid a 11.5 percent earnings penalty, slightly lower than the results of the initial specification. The coefficient of this variable is significant at the one percent level. From the alternative specification, eleven other explanatory variables (listed in Figure 6) are shown to be statistically significant in affecting earnings at the ten percent level. The effect of these other variables on earnings is consistent with the earlier predictions for the signs of the coefficients of these variables.

TABLE 9 Regression Results of Earnings Model for Retired Veterans and Non-Retired Veterans: Alternative Specification

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE [1]
NOW DIVORCED	-0.157 (-5.383)*
NOW SINGLE	-0.328 (-7.807)*
BLACK	-0.207 (-7.074)*
OTHER RACE	-0.126 (-2.492)**
POTENTIAL LABOR MARKET EXPERIENCE	0.047 (6.231)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001 (-4.860)*
YEARS OF SCHOOLING	0.089 (23.029)*
CHILDREN LESS THAN EIGHTEEN	0.046 (2.234)**
SPOUSE WORKS	-0.087 (-4.246)*
DRAFTED RETIRED VETERAN	-0.207 (-1.431)
TAKEN ON-THE-JOB TRAINING	-0.033 (-1.930)***
ONLY JOB SINCE RELEASED	0.145 (4.481)*
RETIRED VETERAN	-0.115 (-2.814)*
MILLS RATIO	0.137 (0.830)
INTERCEPT	8.486 (69.688)
SAMPLE SIZE	3,126
R-SQUARE	0.2169
ADJ. R-SQUARE	0.2134
F STATISTIC	61.543

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

P+	P-
POTENTIAL LABOR MARKET EXPERIENCE	POTENTIAL LABOR MARKET EXPERIENCE SQUARED
YEARS OF SCHOOLING	NOW DIVORCED
ONLY JOB SINCE RELEASED	NOW SINGLE
CHILDREN LESS THAN EIGHTEEN	BLACK
TAKEN ON-THE-JOB TRAINING	OTHER RACE
	RETIRED VETERAN
	SPOUSE WORKS

Figure 6. Significant (at the ten percent level) Background Characteristics for Retirees and Non-Retirees, Indicating Positive (p+) and Negative (p-) Influence

Notice that when one compares the coefficients in the alternative specification with those estimated in the original specification, there are no marked changes. The increase of the t-statistics for all of the independent variables indicates that these coefficients are quite robust, and increases confidence in the alternative specification.

3. Retired Veterans and Drafted Non-Retired Veterans

a. Initial Specification

The Probit model was first run with the variables listed in Table 10. Four variables in this model are statistically significant at the ten percent level. The

TABLE 10 Probit Analysis of Likelihood of Full-time Earnings for Retired Veterans and Drafted Non-Retired Veterans

INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE[1]
NOW DIVORCED	0.070 (0.426)
NOW SINGLE	-0.298 (-1.392)
BLACK	-0.076 (- 0.504)
OTHER RACE	0.523 (1.404)
POTENTIAL LABOR MARKET EXPERIENCE	0.053 (0.958)
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.002 (-2.109)**
YEARS OF SCHOOLING	-0.034 (- 1.170)
CHILDREN LESS THAN EIGHTEEN	0.074 (0.534)
SPOUSE WORKS	0.385 (3.311)*
RETIRED OFFICER	-0.361 (-1.206)
DRAFTED RETIRED VETERAN	-0.278 (-0.709)
TAKEN ON-THE-JOB TRAINING	-0.111 (-1.023)
ATTEND SCHOOL	-0.024 (-0.176)
TUTORIAL ASSISTANCE	0.100 (0.378)
ONLY JOB SINCE RELEASED	0.874 (2.926)*
RETIRED VETERAN	0.240 (0.932)
VIETNAM VETERAN	-0.253 (-1.093)
MOVED WITHIN COUNTY LAST YEAR	0.334 (1.201)
MOVED WITHIN STATE LAST YEAR	0.420 (0.725)
MOVED BETWEEN STATES LAST YEAR	-0.725 (-1.625)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.134 (-0.766)
MOVED WITHIN STATE IN LAST 5 YEARS	-0.489 (-1.867)***
MOVED BETWEEN STATES IN LAST 5 YEARS	-0.725 (-0.421)
INTERCEPT	1.852 (1.754)
SAMPLE SIZE	1,267

[1] ( ) T-STATISTIC IN PARENTHESES
(-2.0) TIMES LOG LIKELIHOOD RATIO (df=23) 128.190

* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

model has a "Chi-Square" value of 128.190, indicating that the Probit model again fits the data fairly well.

The coefficients of the initial specification of the OLS model for all retired veterans and drafted non-retired veterans subsample are presented in Table 11. Retired veterans had a negative earnings return for their military service. However, the return for retired veterans was statistically less significant than for the subsample that included all non-retired veterans. However, the negative sign for the coefficient does indicate that retired veterans receive comparatively low earnings in their second careers. Even though less significant, when retired veterans are compared to drafted non-retired veterans, they fare slightly better.

The coefficient of CHILDREN LESS THAN EIGHTEEN is now statistically insignificant. This may be explained in that the age of the retired and drafted non-retired veterans subsample is obviously higher, so there are fewer children under eighteen living with these veterans. When compared to the retired and non-retired veterans earnings model, containing eleven significant variables, the retired and drafted non-retired veterans earnings model had nine significant variables. See also Appendix C, Table 17 which provides regression results of the earnings model without correcting for selectivity bias.

b. Alternative Specification

Table 12 provides the results of the OLS model of an alternative specification in which variables with t-statistics higher than one are retained. The Mill's

TABLE 11 Regression Results of Earnings Model for Retired Veterans and Drafted Non-Retired Veterans: Initial Specification

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE [1]
NOW DIVORCED	-0.165 (-3.605)*
NOW SINGLE	-0.274 (-3.788)*
BLACK	-0.191 (-4.579)*
OTHER RACE	-0.199 (-2.291)**
POTENTIAL LABOR MARKET EXPERIENCE	0.035 (2.245)**
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001 (-1.543)
YEARS OF SCHOOLING	0.088 (10.984)*
CHILDREN LESS THAN EIGHTEEN	0.038 (1.133)
SPOUSE WORKS	-0.099 (-2.274)**
RETIRED OFFICER	0.005 (0.054)
DRAFTED RETIRED VETERAN	-0.237 (-1.622)
TAKEN ON-THE-JOB TRAINING	0.019 (0.607)
ATTEND SCHOOL	-0.004 (-0.106)
TUTORIAL ASSISTANCE	0.015 (0.235)
ONLY JOB SINCE RELEASED	0.159 (2.786)*
RETIRED VETERAN	-0.110 (-1.746)***
VIETNAM VETERAN	0.060 (1.034)
MOVED WITHIN COUNTY LAST YEAR	-0.057 (-0.828)
MOVED WITHIN STATE LAST YEAR	-0.087 (-0.592)
MOVED BETWEEN STATES LAST YEAR	-0.293 (-1.518)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.011 (-0.249)
MOVED WITHIN STATE IN LAST 5 YEARS	0.050 (0.603)
MOVED BETWEEN STATES IN LAST 5 YEARS	0.057 (0.727)
MILLS RATIO	0.148 (0.456)
INTERCEPT	8.588 (32.833)
SAMPLE SIZE	1,121
R-SQUARE	0.2280
ADJ. R-SQUARE	0.2111
F STATISTIC	13.485

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

TABLE 12 Regression Results of Earnings Model for Retired Veterans and Drafted Non-retired Veterans: Alternative Specification

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE [1]
NOW DIVORCED	-0.170 (-3.829)*
NOW SINGLE	-0.293 (-4.215)*
BLACK	-0.194 (-4.697)*
OTHER RACE	-0.176 (-2.120)**
POTENTIAL LABOR MARKET EXPERIENCE	0.040 (2.788)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001 (-2.238)**
YEARS OF SCHOOLING	0.086 (12.733)*
CHILDREN LESS THAN EIGHTEEN	0.041 (1.222)
SPOUSE WORKS	-0.084 (-2.181)**
DRAFTED RETIRED VETERAN	-0.250 (-1.785)***
ONLY JOB SINCE RELEASED	0.178 (3.475)*
RETIRED VETERAN	-0.104 (-1.873)***
VIETNAM VETERAN	0.048 (0.865)
MOVED BETWEEN STATES LAST YEAR	-0.285 (-1.696)***
MILLS RATIO	0.309 (1.225)
INTERCEPT	8.552 (33.709)
SAMPLE SIZE	1,121
R-SQUARE	0.2263
ADJ. R-SQUARE	0.2158
F STATISTIC	21.543

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

ratio has increased in statistical significance, as the t-statistic has increased from 0.456 to 1.225. Retired veterans paid a 10.4 percent earnings penalty in the alternative specification, a slightly lower value than the initial specification. This variable is now significant at the ten percent level. Eleven other variables are also statistically significant at the ten percent level. Note that when one compares the coefficients in the alternative specification with those estimated in the original specification, there are no marked changes. Once again, this increases confidence in the alternative specification. These coefficients are, therefore, quite robust. As indicated in Figure 7, the earnings model estimated in the alternative specification had twelve significant variables at the ten percent level. While the variable representing drafted retired veteran is significant at the ten percent level, there were only eleven individuals in the sample who were members of this category. Therefore the large negative coefficient for this variable needs to be interpreted cautiously. See also Appendix C, Table 17 which provides regression results of the earnings model without correcting for selectivity bias.

P+	P-
POTENTIAL LABOR MARKET EXPERIENCE	POTENTIAL LABOR MARKET EXPERIENCE SQUARED
YEARS OF SCHOOLING	NOW DIVORCED
ONLY JOB SINCE RELEASED	NOW SINGLE
TAKEN ON-THE-JOB TRAINING	BLACK
	OTHER RACE
	RETIRED VETERAN
	DRAFTED RETIRED VETERAN
	SPOUSE WORKS

Figure 7. Significant (at the ten percent) Background Characteristics for Retirees and Drafted Non-Retirees, Indicating Positive (p+) and Negative (p-) Influence

4. Retired Veterans and Volunteer Non-Retired Veterans

a. Initial Specification

Table 13 displays the results of the Probit model for the retired and volunteer non-retired veteran subsamples. The coefficients of the initial specification of the OLS model for retired veterans and volunteer non-retired veterans are presented in Table 14. Retired veterans experienced a 14.8 percent earnings penalty, a value that is statistically significant at the five percent level. This number is the highest of the three subgroups discussed in this thesis. This may result from the fact that the recruitment

TABLE 13 Probit Analysis of Likelihood of Full-time Earnings for Retired Veterans and Volunteer Non-Retired Veterans

INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE[1]
NOW DIVORCED	-0.181 (-1.396)
NOW SINGLE	-0.110 (-0.568)
BLACK	-0.071 (-0.462)
OTHER RACE	0.146 (0.511)
POTENTIAL LABOR MARKET EXPERIENCE	-0.024 (-0.615)
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.000 (-0.664)
YEARS OF SCHOOLING	-0.041 (-1.949)***
CHILDREN LESS THAN EIGHTEEN	0.243 (2.374)**
SPOUSE WORKS	0.074 (0.794)
RETIRED OFFICER	-0.254 (-0.873)
DRAFTED RETIRED VETERAN	-0.422 (-1.093)
TAKEN ON-THE-JOB TRAINING	0.013 (0.156)
ATTEND SCHOOL	0.074 (0.765)
TUTORIAL ASSISTANCE	0.335 (1.305)
ONLY JOB SINCE RELEASED	0.673 (2.334)*
RETIRED VETERAN	0.221 (1.014)
VIETNAM VETERAN	-0.206 (-1.344)
MOVED WITHIN COUNTY LAST YEAR	-0.030 (-0.169)
MOVED WITHIN STATE LAST YEAR	0.275 (0.742)
MOVED BETWEEN STATES LAST YEAR	-0.892 (-3.423)*
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.155 (-1.321)
MOVED WITHIN STATE IN LAST 5 YEARS	-0.208 (-1.122)
MOVED BETWEEN STATES IN LAST 5 YEARS	-0.189 (-1.111)
INTERCEPT	3.073 (4.008)
SAMPLE SIZE	2,349

[1] ( ) T-STATISTIC IN PARENTHESES
(-2.0) TIMES LOG LIKELIHOOD RATIO (df=23) 154.022
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

TABLE 14 Regression Results of Earnings Model for Retired Veterans and Volunteer Non-Retired Veterans: Initial Specification

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE [1]
NOW DIVORCED	-0.131 (-3.074)*
NOW SINGLE	-0.363 (-6.821)*
BLACK	-0.184 (-4.600)*
OTHER RACE	-0.114 (-1.829)***
POTENTIAL LABOR MARKET EXPERIENCE	0.051 (5.296)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.000 (-3.687)*
YEARS OF SCHOOLING	0.089 (13.386)*
CHILDREN LESS THAN EIGHTEEN	0.038 (1.225)
SPOUSE WORKS	-0.088 (-3.587)*
RETIRED OFFICER	0.008 (0.083)
DRAFTED RETIRED VETERAN	-0.200 (-1.207)
TAKEN ON-THE-JOB TRAINING	0.032 (1.488)
ATTEND SCHOOL	0.008 (0.300)
TUTORIAL ASSISTANCE	-0.042 (-0.711)
ONLY JOB SINCE RELEASED	0.138 (2.675)**
RETIRED VETERAN	-0.148 (-2.497)**
VIETNAM VETERAN	0.018 (0.442)
MOVED WITHIN COUNTY LAST YEAR	-0.018 (-0.388)
MOVED WITHIN STATE LAST YEAR	0.004 (0.044)
MOVED BETWEEN STATES LAST YEAR	0.108 (0.737)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.007 (-0.150)
MOVED WITHIN STATE IN LAST 5 YEARS	-0.016 (-0.336)
MOVED BETWEEN STATES IN LAST 5 YEARS	-0.047 (-0.116)
MILLS RATIO	0.047 (0.116)
INTERCEPT	8.393 (45.266)
SAMPLE SIZE	2,147
R-SQUARE	0.207
ADJ. R-SQUARE	0.198
F STATISTIC	23.073

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

process may have selected individuals with higher ability levels than those of individuals who were drafted. Additional analysis of this issue, however, is required.

From the initial model, nine explanatory variables are shown to be statistically significant in affecting earnings. The effect of these variables on the earnings is consistent with the earlier discussion. For a comparison of these results with those obtaining without selectivity bias correction see Appendix C, Table 18, where the latter results are reported.

b. Alternative Specification

Table 15 provides the results of the OLS model run with the alternative specification. The Mill's ratio has increased markedly with a t-statistic change from 0.116 to 0.992. The retired veterans paid a 14 percent penalty, a little less than in the initial specification.

As before, the coefficient estimates do not vary greatly between the initial and alternative specifications. In the alternative model, nine explanatory variables (listed in Figure 8) are shown to be statistically significant (at the ten percent level) in affecting earnings. Therefore, the coefficients of the OLS model for retired and volunteer non-retired veterans may be considered robust.

TABLE 15 Regression Results of Earnings Model for Retired Veterans and Volunteer Non-Retired Veterans: Alternative Specification

DEPENDENT VARIABLE	LOG OF EARNINGS	
INDEPENDENT VARIABLE	COEFFICIENT	ESTIMATE [1]
NOW DIVORCED	-0.148	(-3.920)*
NOW SINGLE	-0.368	(-7.036)*
BLACK	-0.183	(-4.624)*
OTHER RACE	-0.110	(-1.777)***
POTENTIAL LABOR MARKET EXPERIENCE	0.052	(5.851)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001	(-4.648)*
YEARS OF SCHOOLING	0.089	(18.393)*
CHILDREN LESS THAN EIGHTEEN	0.046	(1.734)***
SPOUSE WORKS	-0.087	(-3.630)*
DRAFTED RETIRED VETERAN	-0.222	(-1.481)
TAKEN ON-THE-JOB TRAINING	0.030	(1.418)
ONLY JOB SINCE RELEASED	0.152	(3.578)*
RETIRED VETERAN	-0.140	(-3.270)*
MILLS RATIO	0.201	(0.992)
INTERCEPT	8.405	(56.276)
SAMPLE SIZE	2,147	
R-SQUARE	0.2059	
ADJ. R-SQUARE	0.2007	
F STATISTIC	39.488	

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

P+	P-
POTENTIAL LABOR MARKET EXPERIENCE	POTENTIAL LABOR MARKET EXPERIENCE SQUARED
YEARS OF SCHOOLING	NOW DIVORCED
ONLY JOB SINCE RELEASED	NOW SINGLE
CHILDREN LESS THAN EIGHTEEN	BLACK
	OTHER RACE
	RETIRED VETERAN
	SPOUSE WORKS

Figure 8. Significant Background (at the ten percent) Characteristics for Retirees and Volunteer Non-Retirees, Indicating Positive (p+) and Negative (p-) Influence

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The major conclusion of this study is that there appears to be is a significant difference between retired veterans' and non-retired veterans' post-service earnings, in the aggregate. Calculation of the earnings losses over a second career reveals numerically large losses for all retiree groups. The magnitude of these losses indicates that total earnings over the volunteer retirees' second careers are about 12 to 14 percent less than the total earnings achieved by comparable non-retired veteran workers with two to six years of service during the same period of the work life cycle. This finding is consistent with the Goldberg and Warner (1983) finding that military retirees earn less than civilians throughout their second career. It is worth noting that in the retired veterans and drafted non-retired veterans model, the penalty on the retired veterans' post-service earnings is reduced and has the smallest statistical significance of the three subgroups. However, in the retired veterans and volunteer non-retired veterans model, this penalty is the largest of the three models in this study. Possibly the recruitment process may have been selecting individuals with higher ability levels from the civilian population than are selected during a draft. Further analysis of this issue, however, is required.

The factors that seem to increase earnings by the largest magnitude are education, potential labor market experience, and having only one job since release from military service. It is also observed that veterans who are single, divorced, black, members of other race, or who have a working spouse experience a statistically significant negative post-service return. These finding was present in all three models discussed in this thesis.

The results of this study might have been more positive if it was possible to account for the fact that a transition period may be needed to effectively enter the private sector. As postulated by Borjas and Welch (1986), earnings differentials between military retired veterans and non-retired veterans are greatest immediately after retirement and may remain lower because of the retiree's inability to regain lost ground as they reenter the civilian sector.

The implications of these findings for military manpower might be noted. Every future recruit who decides whether to join the military or not can be expected to evaluate the monetary benefits of a military career by adding the incomes available at each point during the work life cycle, including both second-career earnings and pension payments to retirees. If retirees do not as well as their non-retired veteran counterparts during their second careers, as the findings in this thesis suggest, this would be taken into account in determining whether to make a career of the military. The formulation of a rational compensation package should take account of estimates of the earnings deficit in the second civilian career, labor supply responses to the size and terms of a military pension

plan, and estimates of earnings capacity as measured by the profile of potential hourly wages that a retired veteran would earn.

B. IMPLICATION FOR THE ROC ARMED FORCES

As stated in Chapter I, a changed environment has affected the Taiwan, R.O.C. Armed Forces, which now faces a new and uncertain geo-political environment. The R.O.C. Armed Forces must continue to attract the top quality men and women who are the first and foremost determinant of military readiness. Based upon the results of this study of U.S. veterans, the following recommendations are made:

- The R.O.C. Armed Forces should conduct a study to determine the earnings potential of retirees during their second careers.
- Based on the results of the relationship between education and significant positive post-service earnings in this thesis, the R.O.C. Armed Forces should examine the advantages of providing higher education to active duty personnel.
- In order to recruit high-quality potential recruits, the R.O.C. Armed Forces should study alternative methods of helping career members of the military find full-time civilian careers following military service.

APPENDIX A PREVIOUS STUDIES

Author and Purpose	Methodology	Results
Cutright, 1972 Analyzes determinants of earnings and measure the effects of military service on civilian earnings.	Compared Army Vets to non-vets, controlling for age, race, education, and I.Q.	Earnings of Vets are not higher than comparable non-vets.
Norrblom 1976 Examines economic effects of OJT and formal military training.	Regression analysis semi-log function. No comparison was made between vets and non-vets.	Formal vocational training has a positive effect on post-service earnings.
Lopreato & Poston 1977 Studies effects of bridging hypothesis of military service.	Compares earnings after regression analysis by vet status. Controlling for education, age, and employment.	Black vets convert educational attainment into earnings advantages better than black non-vets.
Knapp 1978 Tests the impact of military experience on post service earnings in the absence of a draft.	Cross-sectional study utilizing regression analysis controlling for veteran status, race, region of residence, military status, and military education experience.	Enlistment is a significant determinant of earnings. The profitability of military service as a human investment declines uniformly as education increases.
Martindale & Poston 1979 Examines earnings patterns for 3 groups of vets and non-vets.	Compares earnings after regression analysis by vet status. Controlling for education, race, marital status, and employment.	Blacks and Mexican Americans WWII are better able to convert their education, and marital status into higher earnings than non-vets.
Little & Fredland 1979 Examines earnings of vets/non-vets some 20 years after most served.	Cross-sectional study utilizing regression analysis controlling any factors that contribute to earnings.	Vets had a 5 to 10% premium on earnings.
Browning, Lopreato, & Poston 1979 Studies the effects of military service on civilian earnings of minority males.	Comparison of mean incomes controlling for race, education and occupation.	Minority vets earn more than minority non-vets, supporting the bridging environment hypothesis.

Author and Purpose	Methodology	Results
Fredland & Little 1980 Investigates specific attributes of the bridging hypothesis.	Regression analysis to determine effects of military service, and descriptive analysis to examine bridging variables.	Bridging hypothesis could not explain differences in earnings of vets & non-vets. Only educational differences could explain alone.
Fredland & Little 1980 Investigates returns to earnings from in-service vocational training received by World War II vets.	Compares earnings effects of civilian and military vocational training of vets & non-vets.	Military and civilian vocational training yields a premium to long-term earnings for those who use it on the job.
DeTray 1980 Examines earnings differences between vets/non-vets.	Cross-sectional study utilizing regression analysis controlling for many factors that contribute to earnings.	Vets earn more than non-vets. Training received in the military increases civilian wages.
Hess 1980 Examines the value of military service for initial entry into civilian employment.	Compares vets' & non-vets' initial employment earnings, controlling for many factors.	Initial job entry earnings of vets were higher than non-vets, but to a lesser degree during economic slowdowns.
Bolin 1980 Examines earnings effects from military and civilian vocational training.	Longitudinal study using regression analysis, controlling for many factors, including vocational training.	Vocational training received in the military is beneficial.
Bolin, Hess & Little 1980 Utilizes human capital approach to compare the values of vocational training over time.	Regression analysis controlling for many factors that contribute to earnings, in particular, the use of civilian and military training.	Use of military training does not have a positive effect. Vets with no in-service vocational training have a negative earnings effect from military.
Danzon 1980 Examines second career earnings loss of military retirees.	Regression analysis to examine earnings differences of military retirees and non-career vets.	Military retirees earn 10 to 20 percent less than non-career veterans.
Detray, Dennis N. 1980 Tests the proposition that civilian employees use veteran status as a productivity screen.	Longitudinal study using regression analysis, controlling age, vocational training, veteran status.	Military service provide civilian employers with valuable information on worker productivity.
Cooper 1981 Examines military retirees post-service earnings and employment.	Regression analysis to examine earnings differences of military retirees & non-retired veterans.	Military retirees earn 20% less than non-retired vets, but worked less. If working full time, they do very well in earnings.

Author and Purpose	Methodology	Results
DeTray 1982 Examines the hypothesis that vet status acts as a screening device for employers.	Regression analysis to examine earnings differences of military retirees and non-career vets.	Vet status was found to act as valuable screening device, but it could not account for the total difference in earnings capability.
Charamette & Thomas 1982 Compares earnings factors of vets/non-vets. Examines the earnings differences of vets/non-vets and the effect of military training.	Conducts a semi-log regression analysis to determine the effect of earnings factors on the annual income.	Black vets have earnings factor advantages over black non-vets. Reverse is true for whites. Vet status has no impact on earnings by itself. Military training does not have significant returns.
Rosen, Taubman 1982 Examines life cycle earnings patterns of white males over the 1951-1976 period.	Using regression analysis, compares earnings of white male vets, controlling for education, experience, unemployment, marital status, region, war period.	WWII vets experience significant positive effect on life cycle earnings, but Vietnam Vets experience a negative earnings effect.
Berger, Mark C. and Hirsch, Barry T. 1983 Examines the effect of military service on subsequent civilian earnings of Vietnam-era veterans.	Comparison of weekly earnings for vets and non vets by education level controlling for region, marital status, race, unemployment rate.	Small overall differences between earnings of Vietnam-era veterans and similar non-veterans.
Reams 1983 Examines the effect of military service or post service earnings for Vietnam-era vets.	Longitudinal study using regression analysis, controlling for individual traits, family characteristics, job environment and personal characteristics.	White Vietnam-era vets was an ineffective method of investment in human capital but inconclusive for black.
Higgins 1984 Tests the appropriateness of the log-linear equation in estimating life-time earnings. Explains the returns to vet status. Develops a full-time criterion. Test the minimum length of service criterion.	Log-linear regression analysis was conducted for every panel of NLS survey and pooled data by race and by vet status.	Log-linear function is proper for determining the relationship between human capital factors. Vet status is a good screening device. Full time job and minimum length of service criteria should be included in the analysis.

Author and Purpose	Methodology	Results
Goldberg & Warner 1986 Examines the effect of civilian and military experience on the earnings of vets with the objective of determining the substitutability of these two kinds of experience.	Regression analysis was conducted for determining the quadratic earnings equation.	White vets earn more than non-white vets. Vets trained in white collar occupations have higher earnings growth than veterans trained in blue collar occupations. Transferability of military experience to civilian labor market depends on the occupational category.
Schwartz 1986 Compares the earnings of Vietnam vets to those of Korean vets, both cases relative to non-vets.	Linear regression analysis was conducted, controlling for education, race, age, marital status.	Vietnam vets are worse off than their non-vet contemporaries in their rate of return per year of education. Korean vets were economically undistinguishable from non-vets.
Mangum, Ball 1986 Explores the transferability of training acquired through military service.	Longitudinal study using logistic regression analysis, controlling for many factors.	Military training transfer is a principle determinant of the economic value of the training. Vets who work in similar occupational specialties earn more than those who do not.
Jackson, 1986 Tests what effect the Vietnam war had on the labor market performance of young men aged 14 to 19 in 1966.	Longitudinal study using regression analysis, controlling for race.	Vietnam vets had little impact on the long-run labor market earnings. White vets significantly increased wages, but blacks did not significant. Military service helps the performance of white Vets classified a slow-ability and hurts those of high ability in the long run. Vets have a higher percentage of time employed than their civilian counterparts.
Daymont, Thomas and Andrisani, Paul J. 1986 Assesses the extent to which service in the military is a good career investment for young men.	Longitudinal study using regression analysis, controlling for life cycle, human capital, background variables.	Short term: Vets earn substantially less than non-vets after leaving the service, but they overtake non-vets within two or three years. Long Term: Young vets have a significant earnings advantage compared to their civilian counterparts.

Author and Purpose	Methodology	Results
Mangum, Ball 1987 Addresses the amount of skill transfer between military service and subsequent civilian employment.	Longitudinal study using regression analysis, controlling for education, experience, personal characteristics, labor market environment, occupation and skill transferred.	Significant amount of skill transfer exists between military training and civilian employment.
Cohary, Sharon R. 1987 Examines the labor market difficulties of Vietnam-era veterans, especially those with service-related disabilities.	Uses regression analysis to examine earnings differences of Vietnam-era vets (Vietnam theater and other Vietnam era) and non-vets.	No difference in probability of being in the labor force for veterans of all races. Participation for disabled varied depending on the severity of the injury. Vietnam-theater veterans had a greater unemployment rate than Vietnam-era veterans. Vietnam theater vets were likely to hold skilled jobs. Disabled veterans were likely to be unskilled laborers.
Soyak 1987 Examines the effect of military service and military training on post-service earnings of Vietnam vets.	Longitudinal study using regression analysis, controlling for any factors that contribute to earnings.	Vietnam vets do not have significant returns from either military training or time spent in the service.
Angrist, Joshua D. and Krueger, Alan B. 1989 Studies the effects of military service on civilian earnings of World War II Veterans.	Comparison of weekly wages, controlling for region.	Earnings of WWII vets are six to twelve percent less than comparable Veterans.
Mangum, Ball 1989 Investigates the relationship between military-provided training during the all volunteer force era and post-service earnings	Longitudinal study using logistic regression analysis, controlling for AFQT, labor market experience, race, training provider (military apprenticeship), occupation of training and using OLS regression, controlling for veteran status, tenure, health limitation.	Skill transfer is an important determinant of post-service earnings. Within two years after separation, Vets received higher earnings then their civilian peers.
Angrist, Joshua D. 1990 Examines the long-term labor market consequences of military service during the Vietnam era.	Using regression analysis, compares earnings by Vietnam Vets. Controls for race, civilian job experience.	White Vietnam vets earn substantially less than non-vets.

Author and Purpose	Methodology	Results
Bryant, Richard and Wilhite, Al 1990 Examines how military experience and military training effects differ among the branches of service.	Longitudinal study using regression analysis, including variables such as social, economic, demographic, military experience, military training.	Vets reduce wages earned. Military training exerts a positive influence on civilian wage. Among the branches of service, training received in Army and Marines does not offset wage reduction, while Navy training can. Training in the Air Force can increase civilian wages.

Source: Hirschkowitz, Martin R., *Post Service Earnings Growth Rates of Military Veterans in the Era of the All-volunteer Force* and Miller, Carolyn J., *Post-Service Earnings of Veterans: A Survey and Further Research*

APPENDIX B DESCRIPTION OF INCOME MODEL VARIABLES

VARIABLE	DESCRIPTION
RETIRED	= 1 if the observation is a retired veteran = 0 otherwise
BLACK	= 1 if the observation is black = 0 otherwise
OTHRACE	= 1 if the observation is Asian or Pacific Islander; American Indian, Aleut Eskimo; or Other = 0 otherwise
NOWDIV	= 1 if the observation is currently divorced, widowed, separated = 0 otherwise
NOWSGL	= 1 if the observation is currently single = 0 otherwise
SPOUSEWK	= 1 if the observation's spouse is employed full-time or part-time = 0 otherwise
KIDLT18	= 1 if the observation's children < 18 live with respondent = 0 otherwise
DRAFTEDR	= 1 if the observation is a retired veteran and was first drafted into the military = 0 otherwise
OFFICERR	= 1 if the observation is a retired veteran and was last released or discharged from active duty as a commissioned officer or a warrant officer = 0 otherwise
EXP	observation's age - years of education - 6 (a measure of potential labor market experience)

EXPSQ		EXP * EXP(a measure of potential labor market experience squared)
ADD_SCHG	= 1	the observation has attended high school, college, vocational, technical, business, or flight school
	= 0	otherwise
ADD_TRNG	= 1	the observation has taken on-the-job training or apprentice training
	= 0	otherwise
ADD_OTHR	= 1	the observation has taken tutorial training
	= 0	otherwise
EDU		ranges from 0 to 18 depending on highest grade completed
ONLYJOB	= 1	if the observation has held only one job since leaving the military
	= 0	otherwise
VIETNAM	= 1	if the observation served on duty in the Vietnam era
	= 0	otherwise
CNTY_1	= 1	if the observation moved within county in last year
	= 0	otherwise
ST_1	= 1	if the observation moved within state in last year
	= 0	otherwise
BTST_1	= 1	if the observation moved between states in last year
	= 0	otherwise
CNTY_2	= 1	if the observation moved within county in last 5 years
	= 0	otherwise
ST_2	= 1	if the observation moved within state in last 5 years
	= 0	otherwise
BTST_2	= 1	if the observation moved between states in last 5 years
	= 0	otherwise

APPENDIX C RESULTS WITHOUT CORRECTING FOR SELECTIVITY BIAS

TABLE 16 Regression Results of Earnings Model for Retired Veterans and Non-Retired Veterans: Without Correcting for Selectivity Bias

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE[1]
NOW DIVORCED	-0.147 (-5.037)*
NOW SINGLE	-0.321 (-7.764)*
BLACK	-0.205 (-7.024)*
OTHER RACE	-0.134 (-2.683)*
POTENTIAL LABOR MARKET EXPERIENCE	0.046 (6.075)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001 (-5.367)*
YEARS OF SCHOOLING	0.090 (20.146)*
CHILDREN LESS THAN EIGHTEEN LIVE TOGETHER	0.041 (2.023)**
SPOUSE WORKS	-0.092 (-4.862)*
RETIRED OFFICER	0.009 (0.100)
DRAFTED RETIRED VETERANS	-0.187 (-1.294)
TAKEN ON-THE-JOB TRAINING	0.035 (2.022)**
ATTEND SCHOOL	-0.005 (-0.235)
TUTORIAL ASSISTANCE	-0.015 (-0.367)
ONLY JOB SINCE RELEASED	0.128 (4.565)*
RETIRED VETERANS	-0.129 (-2.478)**
VIETNAM VETERANS	0.020 (0.680)
MOVED WITHIN COUNTY LAST YEAR	-0.014 (-0.369)
MOVED WITHIN STATE LAST YEAR	-0.031 (-0.445)
MOVED BETWEEN STATES LAST YEAR	0.034 (0.423)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.018 (-0.729)
MOVED WITHIN STATE IN LAST 5 YEARS	0.016 (0.412)
MOVED BETWEEN STATES IN LAST 5 YEARS	0.002 (0.055)
INTERCEPT	8.467 (56.959)
SAMPLE SIZE	3,126
R-SQUARE	0.2173
ADJ. R-SQUARE	0.2115
F STATISTIC	37.442

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL

TABLE 17 Regression Results of Earnings Model for Retired Veterans and Drafted Non-retired Veterans: Without Correcting for Selectivity Bias

DEPENDENT VARIABLE	LOG OF EARNINGS
INDEPENDENT VARIABLE	COEFFICIENT ESTIMATE
NOW DIVORCED	-0.168 (-3.702)*
NOW SINGLE	-0.261 (-3.949)*
BLACK	-0.189 (-4.559)*
OTHER RACE	-0.216 (-2.759)*
POTENTIAL LABOR MARKET EXPERIENCE	0.031 (2.435)**
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.000 (-1.842)***
YEARS OF SCHOOLING	0.089 (11.889)*
CHILDREN LESS THAN EIGHTEEN LIVE TOGETHER	0.036 (1.089)
SPOUSE WORKS	-0.113 (-3.720)*
RETIRED OFFICER	-0.019 (0.227)
DRAFTED RETIRED VETERANS	-0.218 (-1.557)
TAKEN ON-THE-JOB TRAINING	0.023 (0.797)
ATTEND SCHOOL	0.003 (-1.842)***
TUTORIAL ASSISTANCE	0.011 (0.164)
ONLY JOB SINCE RELEASED	0.140 (3.504)*
RETIRED VETERANS	-0.118 (1.985)**
VIETNAM VETERANS	0.071 (1.347)
MOVED WITHIN COUNTY LAST YEAR	-0.066 (-1.020)
MOVED WITHIN STATE LAST YEAR	-0.106 (-0.754)
MOVED BETWEEN STATES LAST YEAR	-0.248 (-1.496)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.007 (-0.162)
MOVED WITHIN STATE IN LAST 5 YEARS	0.068 (0.941)
MOVED BETWEEN STATES IN LAST 5 YEARS	0.061 (0.779)
INTERCEPT	8.624 (34.633)
SAMPLE SIZE	1,121
R-SQUARE	0.2278
ADJ. R-SQUARE	0.2116
F STATISTIC	14.072

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL
*** SIGNIFICANT AT THE 0.1 LEVEL

TABLE 18 Regression Results of Earnings Model for Retired Veterans and Volunteer Non-retired Veterans: Without Correcting for Selectivity Bias

DEPENDENT VARIABLE	LOG OF EARNINGS	
INDEPENDENT VARIABLE	COEFFICIENT	ESTIMATE
NOW DIVORCED	-0.129	(-3.486)*
NOW SINGLE	-0.362	(-6.892)*
BLACK	-0.184	(-4.644)*
OTHER RACE	-0.116	(-1.877)***
POTENTIAL LABOR MARKET EXPERIENCE	0.051	(5.458)*
POTENTIAL LABOR MARKET EXPERIENCE SQUARED	-0.001	(-4.715)*
YEARS OF SCHOOLING	0.090	(16.157)*
CHILDREN LESS THAN EIGHTEEN LIVE TOGETHER	0.036	(1.450)
SPOUSE WORKS	-0.089	(-3.756)*
RETIRED OFFICER	0.012	(0.132)
DRAFTED RETIRED VETERANS	-0.191	(-1.290)
TAKEN ON-THE-JOB TRAINING	0.032	(1.485)
ATTEND SCHOOL	0.007	(0.281)
TUTORIAL ASSISTANCE	-0.045	(-0.841)
ONLY JOB SINCE RELEASED	0.134	(3.416)*
RETIRED VETERANS	-0.150	(-2.702)*
VIETNAM VETERANS	0.020	(0.569)
MOVED WITHIN COUNTY LAST YEAR	-0.017	(-0.380)
MOVED WITHIN STATE LAST YEAR	0.001	(0.010)
MOVED BETWEEN STATES LAST YEAR	0.121	(1.283)
MOVED WITHIN COUNTY IN LAST 5 YEARS	-0.020	(-0.698)
MOVED WITHIN STATE IN LAST 5 YEARS	-0.005	(-0.118)
MOVED BETWEEN STATES IN LAST 5 YEARS	-0.014	(-0.316)
INTERCEPT	8.390	(45.628)
SAMPLE SIZE	2,147	
R-SQUARE	0.2069	
ADJ. R-SQUARE	0.1984	
F STATISTIC	24.087	

[1] ( ) T-STATISTIC IN PARENTHESES
* SIGNIFICANT AT THE 0.01 LEVEL
** SIGNIFICANT AT THE 0.05 LEVEL***SIGNIFICANT AT THE 0.1 LEVEL

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