1993-09

The post-military earnings of female veterans

Mehay, Stephen L.; Hirsch, Barry T.

Monterey, California. Naval Postgraduate School

https://hdl.handle.net/10945/29465

NPS-AS-93-019

NAVAL POSTGRADUATE SCHOOL

Monterey, California

THE POST-MILITARY EARNINGS OF FEMALE VETERANS

Stephen L. Mehay
Barry T. Hirsch

September 1993

Approved for public release; distribution is unlimited.

Prepared for: Bureau of Naval Personnel
PERS-2
Washington, D. C. 20370-5000

NAVAL POSTGRADUATE SCHOOL
Monterey, California

RADM T. A. Mercer
Superintendent

Harrison Shull
Provost

This report was prepared and funded by The Bureau of Naval Personnel, PERS-02, Washington, D. C.

This report was prepared by:

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave Blank)*

2. REPORT DATE
September 1993

3. REPORT TYPE AND DATES COVERED
Technical Report

4. TITLE AND SUBTITLE
The Post-Military Earnings of Female Veterans

5. FUNDING NUMBERS
N0002293WRRD008

6. AUTHOR(S)
Stephen L. Mehay and Barry T. Hirsch

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES)
Department of Administrative Sciences
Naval Postgraduate School
Monterey, CA 93943

8. PERFORMING ORGANIZATION REPORT NUMBER
NPS-AS-93-019

9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Bureau of Naval Personnel
PERS-2
Washington, D. C. 20370-5000

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The civilian labor market performance of women veterans is examined, using both traditional data sets and a special survey of reservists that facilitates control for selection by the military and enlistees. Evidence from all data sets indicates that female veterans possess a higher level of measured earnings endowments than do nonveterans. Moreover, evidence from the reservist survey supports the hypothesis that unobserved ability and preferences ttoward the military are positively correlated with measured endowments. Absent control for unmeasured quality and preferences, the observed wage advantage of female veterans is accounted for entirely by differences in measured characteristics. Following their control, a wage disadvantage is found for female veterans, relative to their nonveteran counterparts. An exception is among nonwhite female veterans, who realize wage rates similar to nonveterans. The low returns to military service for women may result from the narrow opportunities for skill enhancement given women within the military, and an inability to transfer these skills to the civilian sector owing to the specificity of the training or occupational barriers facing civilian women.

14. SUBJECT TERMS

15. NUMBER OF PAGES
31

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
unclassified	Unclassified	Unclassified	Unlimited

THE POST-MILITARY EARNINGS OF FEMALE VETERANS

by

Stephen L. Mehay
Professor of Economics
Department of Administrative Sciences
U.S. Naval Postgraduate School
Monterey, CA 93943

and

Barry T. Hirsch
Professor of Economics
Department of Economics
Florida State University
Tallahassee, FL 32306

September 1993

The views expressed are solely those of the authors.

Abstract

The Post-Military Earnings of Female Veterans

The civilian labor market performance of women veterans is examined, using both traditional data sets and a special survey of reservists that facilitates control for selection by the military and enlistees. Evidence from all data sets indicates that female veterans possess a higher level of measured earnings endowments than do nonveterans. Moreover, evidence from the reservist survey supports the hypothesis that unobserved ability and preferences toward the military are positively correlated with measured endowments. Absent control for unmeasured quality and preferences, the observed wage advantage of female veterans is accounted for entirely by differences in measured characteristics. Following their control, a wage disadvantage is found for female veterans, relative to their nonveteran counterparts. An exception is among nonwhite female veterans, who realize wage rates similar to nonveterans. The low returns to military service for women may result from the narrow opportunities for skill enhancement given women within the military, and an inability to transfer these skills to the civilian sector owing to the specificity of the training or occupational barriers facing civilian women.

I. Introduction

In the last 15 years the representation of women in the U.S. military, as in other areas of the labor force, has grown dramatically, rising from only 1.9 percent of the enlisted force in 1973 to nearly 11 percent in 1990 (GAO, 1991). Recently, the policy of excluding women from certain military occupations, especially combat specialties, has come under intense scrutiny (Presidential Commission, 1992). In early 1993, the Department of Defense removed some of the barriers that had prevented women from serving in non-traditional jobs (Pexton and Willis, 1993), and it appears that the military is poised to increase the steady-state flow of female entrants into its ranks. Such changes will increase the stock of female veterans in the civilian population, which by 1991 had reached 1.1 million (Department of Labor, 1992). Despite numerous changes in women's role in the military, few studies have investigated the civilian labor market experience of female service members following their military duty.

The purpose of this paper is to investigate the civilian labor market performance of women veterans. Our primary analysis uses a unique data set that deals with the special circumstances surrounding the enlistment and occupational assignment of women. The Reserve Components Surveys (RCS) (Defense Manpower Data Center, 1987a; 1987b) provide data on veteran and nonveteran reservists, a population whose members are more alike in numerous respects than a randomly selected sample of the civilian labor force. The survey's sample design controls for numerous background factors that affect individual enlistment behavior and that previously have not been measured. In addition to the RCS, we use standard labor market data from the Current Population Surveys (CPS) and the National Longitudinal Survey of Youth (NLSY) to examine veteran earnings.

The attractiveness of the RCS, as compared to the CPS and NLSY, stems from the expectation that selectivity is a particularly important factor bearing on female military participation. From the standpoint of the armed forces, the number of women allowed to enter the military has always been constrained by demand limitations. From the standpoint of potential recruits, the military constitutes a nontraditional occupation for women. Hence, controlling for the selection process may be more important for analyses of female veterans' earnings than it is for males.

Although prior research on the civilian earnings of veterans has been extensive, covering both the volunteer era and periods when conscription was used, the literature has concentrated almost exclusively on men.[1] To analyze veterans who served during conscription periods, researchers have used various labor market surveys, including the CPS, the Census, and the National Longitudinal Survey of Young Men. For the volunteer era, which began in 1973, most prior studies have relied solely on the National Longitudinal Survey of Youth (NLSY) (see Bryant and Wilhite, 1990; Phillips, et al., 1992). Because of differences between women and men in self selection, military demand restrictions, and occupational assignment, the experiences of males may not provide a reliable guide to the effects of military service on females.

A study by Mangum and Ball (1989; see, also 1987) is one of the few even to have included female veterans. The authors use the NLSY to examine the determinants of the transfer of military and other types of training, and the effect of skill transfer, veteran status, and post-school training on the annual earnings and hourly wages of men and women volunteer-era veterans. For women, the authors find that military training is less likely than various types of civilian training to be transferred to civilian jobs. Post-school occupational training does not appear to augment the wages of women, whereas it has a strong effect on men's wages. Measures of military service -- a veteran status dummy and time spent in the military -- are statistically insignificant in explaining women's hourly wages.

While Mangum and Ball offer preliminary evidence on the earnings of female veterans, further research is clearly warranted. Although two-thirds of the population of female veterans served during the pre-volunteer era (Cohany, 1990), Mangum and Ball must focus only on the volunteer period because of the young sample in the NLSY. A further drawback of the NLSY is that only a small number of female veterans from this period is available for analysis. Small sample sizes are likely to account for their estimated veteran status coefficient of 0.427 for women, implying a 53 percent wage premium for veteran women as compared to similar nonveteran women.[2] Finally, their estimates are not corrected for selection bias, a potentially important issue when examining occupational assignment, skill transfer, and earnings. In the present study, the Current Population Surveys and the Reserve Components Surveys are used because they offer large samples of female veterans and because they provide data on veterans from both draft and volunteer periods. The design of the RCS, moreover, provides a natural control for important types of selectivity.

Section II of this paper analyzes the Reserve survey, as well as providing supplementary evidence from the NLSY. Section III provides a similar analysis of female veteran and nonveteran earnings utilizing data from the CPS. Conclusions follow in Section IV.

II. The Reserve Components Survey: Background and Results

The 1986 Reserve Components Survey (RCS) sampled 60,120 officer and enlisted reservists.[3] Most reservists hold full-time civilian jobs and attend reserve drills for one weekend per month and for two weeks during the summer to train in their specialty. What makes the reserves a fertile ground for investigating veterans' earnings is that members are divided between those who have prior active duty service and those who do not; that is, some reservists are veterans and some are not. Furthermore, the RCS data provide implicit controls for both program selection and self selection.

Self-selection arises in veterans' earnings studies because recruits have chosen the military over other alternatives; in addition, veterans represent service members who have chosen to separate from the military at the expiration of their term of service. Both of these choices may hinge on unobserved characteristics. Censoring also occurs because veterans must meet fairly stringent physical, mental, and moral standards to qualify for enlistment, and a different set of standards (e.g., job performance) to be eligible for reenlistment. Because of the limited number of military jobs available to female recruits, censoring at the enlistment point is particularly important for women. If the factors that explain why some women enlist, and why some subsequently separate, are also correlated with earnings, selectivity may bias estimates of veteran status on civilian earnings.

The RCS data provide important controls for the heterogeneity that can bias earnings studies. Since entrance standards for both reserve and active duty are the same, all RCS respondents are qualified to serve on active duty. These entrance standards are based largely on mental ability tests (AFQT), education, moral background (criminal record, drug use, etc.), and physical or medical tests. Hence, differences in these important personal characteristics for the reserve population -- veterans and nonveterans alike -- are minimized. This contrasts to a random sample of the civilian population in which assignment to the treatment and control groups (i.e., veterans and nonveterans) is based partly on these characteristics, but they typically are not observed by the researcher.

A related source of selection bias is controlled in the RCS because of the similar preferences or positive military propensity shared by all reservists. In a random sample, preferences and alternative opportunities are major unobservables that explain why most otherwise qualified youth do not attempt to join the military. In sum, the comparison group design adopted here matches veterans with nonveterans who are similar in crucial respects, except for active duty service. By controlling for many of the unobserved pre-treatment taste and ability factors that account for the non-random assignment of the eligible population to the treatment and control groups, the data may yield more precise estimates of the economic return to military service.[4]

Several considerations bear on the civilian earnings potential of female veterans. Women have not only increased their representation in the military, they also have made dramatic inroads into nontraditional military occupations. The proportion of military women in "non-traditional" broad occupation categories increased from only 9.4 percent in 1972 to 45.0 percent in 1984, a six-fold increase (Eitelberg, 1988). Compared to their civilian counterparts, military women are now much more heavily represented in the nontraditional broad occupational categories of "electrical/repair," "communications/intelligence," and "electrical/mechanical." Conversely, military women are far less likely than civilian women to be working in traditional "functional support" jobs (Firestone, 1992). As a result of these differences, military women may acquire advanced skill training, some of which is general in nature and transferable to civilian employers. If skill acquisition differs significantly between nonveterans and veterans, female veterans may reap positive benefits from military service.

These gains are limited by the extent to which veterans' skills cannot be transferred to civilian jobs, either because they are military-specific, or because nontraditional civilian jobs for which veterans are trained either remain closed to women or are not sought out by female veterans. Civilian earnings also will be affected if female veterans have different attachment to the labor force than their nonveteran civilian peers. Finally, it has been shown that military experience for men is often not a good substitute for civilian job experience (Trost and Warner, 1979). Because of the importance of continuous job tenure to earnings, both male and female veterans may suffer the earnings penalty that typically accompanies a job change, especially if an occupation change is also involved.[5]

To estimate veteran-nonveteran wage differentials among women, earnings functions are specified using the log of hourly wages as the dependent variable. The RCS data are restricted to enlisted reservists who worked in paid civilian jobs. Observations with missing (and in a few cases implausible) values for any of the variables used in the analysis also were deleted. These restrictions resulted in a usable sample of 1,946 women, of whom 25.0 percent were veterans. Variables that capture general human capital include years of education, potential work force experience, and potential experience squared. Current labor force status was reflected in dummy variables for part-time status, government employment, and broad occupation and industry (one-digit census codes) categories. Demographic variables representing marital status (married, spouse present=1) and number of children are also included in the specification.

Separate earnings equations are estimated for veteran and nonveteran female civilian workers. This approach does not constrain the labor market rewards to other worker characteristics to be equal for veterans and nonveterans. Equations are estimated for the full sample and separately by race; they are also estimated separately for the draft and volunteer eras. For the 1986 population of reservist-veterans, enlistment dates coincide with the volunteer period (post-1973) for respondents who are 30 and under. The draft-era subsample, therefore, is restricted to those over age 30 and the volunteer era subsample to those 30 and under. It is unknown whether the earnings potential of female veterans will differ according to era of service. On the one hand, women have always been volunteers, even during conscription, and differences in enlistment behavior during the two eras may be slight. On the other hand, differences may arise because the most recent draft period included the Vietnam War and enlistment motives may differ between a draft/wartime period versus the volunteer/peacetime period. For example, enlistment motives during recent years have included the desire for employment and training; in contrast, during wartime non-economic motives may have been relatively more important.

The issue of minority representation in the armed forces continues to be heatedly debated. In 1989, racial and ethnic minorities accounted for 29 percent of the enlisted force, roughly twice their percentage in the civilian population (Office of the Assistant Secretary of Defense, 1990). A number of reasons have been advanced to explain why military service may augment the productivity of nonwhites more than whites. These include the argument that the military may be a more effective mechanism for nonwhites to make the transition from school to the civilian workforce -- the "bridging hypothesis" (Little and Fredland, 1979); that the general training and skills received in the military are more valuable to nonwhites; and that military service provides a more effective "screen" to employers. To account for these possible differences, earnings differences are estimated for nonwhites and whites.

Table 1 provides regression estimates from the RCS, along with means of the variables, from separate wage equations for female veterans and nonveterans of all eras and races. Consistent with the belief that selectivity is important, there are notable differences between the population of female reservists and the overall female labor force (compare the means in Table 1 with nonveteran means from the CPS presented in Table 4). In the RCS sample, the proportions of women who are nonwhite and work for the public sector are roughly twice as high for reservists as for civilian women in general. Conversely, among reservists the proportion of part-time workers is half what it is among the civilian labor force, and reservists are far less likely to be married. Among reservists, nonveterans have 1.3 years less potential experience and a higher percentage of nonwhites than veterans.

Among the notable results evident in Table 1 is a steep wage-experience profile among both veteran and nonveteran reservists. The estimated effect of experience for female reservists is much closer to that of males than of females in the largely nonreservist civilian labor force. For example, the experience-earnings profile for veterans in Table 2 is almost identical to that estimated for males by Mangum and Ball (1989, Table 2, p. 239). In contrast, the experience-earnings profile for females in the Mangum-Ball study is essentially flat, while subsequent results reported here from the CPS indicate an experience profile with an initial slope just half of that among reservists. This difference between reservists and nonreservists may be due to the differences in characteristics noted above, especially the higher labor force participation of female reservists. For example, while the labor force participation rate in 1986 for females in the CPS is almost identical for veterans and nonveterans at 54.7 percent (Roca, 1986), the rate for all female reservists in the RCS is 82.5 percent.

The results in Table 1 are used to decompose the veteran-nonveteran log wage gap ($\ln W^v - \ln W^n$), the results of which are displayed in column 1 of Table 2. This gap is decomposed into the log wage difference owing to differences in measured characteristics, referred to as the endowment effect, and differences in coefficients, referred to as the coefficient effect. Let superscripts v and n index veteran and nonveteran, X the means of the independent variables (i.e., measured characteristics), and β the regression coefficients. The endowment effect, $\beta^n(X^v - X^n)$, is computed by assuming the nonveteran wage structure applies to both groups of workers; it is shown in column 2 of Table 2. The coefficient effect, $X^v(\beta^v - \beta^n)$, is shown in column 3; this represents the adjusted veteran-nonveteran wage differential.

The overall unadjusted veteran wage differentials is small, but as indicated in column 2, veterans have substantially larger earnings endowments than do nonveterans. The coefficient effect or adjusted wage differential in column 3 of Table 2 indicates a sizeable wage penalty, of roughly 8 percent for veterans of all races and eras, after accounting for measured characteristics.[6] Women veterans who served during draft periods appear to suffer a larger wage penalty than those who served during the volunteer era. A result that appears in line with prior results for male veterans is that whites incur a larger penalty for military service than nonwhites; white female veterans are penalized nearly 12 percent whereas the differential for nonwhites is essentially zero. One feature of Table 2 is the consistently large and positive endowment effect. It appears that female veterans possess larger stocks of human capital and other characteristics that enhance their productivity in the civilian work force. These differences between veterans and nonveterans in productivity-enhancing characteristics are such that female veterans would earn sizeable wage premiums if they were paid according to the nonveteran wage structure.

Because of small sample sizes, the approach adopted in Table 2 (i.e., separate wage equation estimates by group) is not used to investigate wage differences by race, schooling groups, and period of service. The approach used in Table 3 involves pooling veterans and nonveterans and using interaction terms. The coefficient of the veteran status dummy variable in line 1 of Table 3, indicating a veteran penalty of approximately 9 percent, is similar to that reported previously based on separate equations. In line 2, the estimates by race indicate that the veteran penalty is 12 percent for whites, but only about 2 percent for nonwhites. While this approach does not allow the effects of other independent variables to differ by race, it seems clear that the relative performance of nonwhite female veterans in the civilian labor market is far less negative than among white veterans.

When veteran wage differentials are examined by schooling group, as shown in line 3, women with high school diplomas (or less) and those with some college experience an almost identical wage penalty of 10 percent. The differential for college graduates, however, is considerably less negative, and is statistically insignificant. The veteran wage penalty by era in line 4 is virtually identical to that observed in Table 2. There is some variation, however, in the return to military service by era between the races, as shown in line 5. White veterans incur penalties during both periods, while the coefficient for nonwhites is essentially zero for both periods.

This paper argues that the RCS data are superior to random surveys in terms of controlling for unobserved factors that affect both enlistment and separation (i.e., veteran status) and earnings. To provide a basis for examining this claim, veteran-nonveteran wage differentials are also computed using data from the NLSY and, in the next section, the CPS. In the NLSY, samples are not randomly assigned to treatment and control (i.e., veteran and nonveteran) groups but, rather, are determined based on taste and ability differences. The direction of the potential bias is unknown, although if AFQT scores and previously measured endowments are positively correlated, than adjusted differentials should be more negative following control for AFQT. The NLSY for 1984 is used for this comparison as this was the last year that the large sample of armed forces members (originally interviewed in 1979) were still in the survey. Even though the 1984 panel provided the largest sample of veterans in the NLSY, observations on only 191 female veterans are available. The specification is similar to that used for the RCS and, subsequently, the CPS (full results are available on request).

Table 2 also presents estimated wage differentials computed from the NLSY. Due to the young age of the NLSY respondents in 1984, these results can be compared only to the RCS results for the volunteer era. Note that AFQT scores are available in the NLSY to provide a partial control for military selection standards. The wage models are estimated with and without AFQT to determine how the presence of the control influences the measured wage effect of veteran status. Differences in the NLSY results with and without controlling for AFQT indicate positive selection into the military. That is, the veteran-nonveteran wage differential is less negative not controlling for AFQT than following control for AFQT. This is consistent with the relatively stringent enlistment standards for women throughout the volunteer period. Comparison of the NLSY results with those from the RCS, however, suggest that AFQT scores provide only a partial control for selectivity, based most likely on military entrance standards, whereas the RCS data provide controls for self selection as well as administrator selection.

III. Evidence from the Current Population Surveys

Further evidence is presented on the civilian earnings of female veterans and nonveterans, based on the Current Population Surveys (CPS) for 1989-1992. The CPS provides information on large representative samples of U.S. households. The CPS has not been used previously to examine the relative earnings of female veterans, owing in part to the fact that the CPS did not begin the regular recording of women's veteran status until the 1989 surveys, and in part because of the very small sample sizes of female veterans in each monthly public use survey. Our sample is constructed from the 48 monthly Current Population Survey (CPS) Outgoing Rotation Group (ORG) files conducted between January 1989 and December 1992. Each ORG file comprises the quarter sample of the CPS that is asked the questions on the earnings supplement (e.g., weekly earnings, hours worked, and union status). The CPS ORG "earnings microdata files" are not public use files, but are made available by the Data Services Group at the Bureau of Labor Statistics (BLS).

The CPS ORG files are well-suited for providing evidence on civilian earnings differences among relatively large and representative samples of the U.S. female (and male) veteran and nonveteran populations. Wage differentials can be measured unadjusted for wage correlates other than veteran status, or estimated conditional on measured individual and labor market characteristics. The major disadvantage of the CPS is that it is not well-suited to control for selectivity, or unmeasured quality and taste differences between veterans and nonveterans. This contrasts with the RCS, which controls for both military selection and self-selection by comparing veteran and nonveteran reservists, and the NLSY, which partially controls for both types of selectivity through the inclusion of AFQT scores. If there exists positive selection among female veterans, as suggested in the previous section, we would expect the CPS evidence on earnings to appear more favorable toward veterans than does evidence from the RCS and NLSY.

The CPS sample includes all employed female wage and salary workers ages 20 and over with positive weekly earnings and hours, whose principal activity during the survey week was not school. Of the total sample of 322,702 women, 3,331 (1.0 percent) are veterans. We measure the wage rate by usual weekly earnings divided by usual hours worked per week, in December 1992 dollars. The veteran-nonveteran logarithmic wage differential is 0.0649 indicating a 6.7 percentage wage advantage for female veterans relative to nonveterans.

The Appendix provides descriptive evidence for five-year birth cohorts on the percentage veteran, average wages by veteran status, mean years of schooling by veteran status, and percentage nonwhite by veteran status. The top panel of the table provides information for women. For purposes of comparison, the bottom panel contains the same information for men (the sample for men has been constructed identically to that for women). The percentage veteran is below 1 percent for all older female cohorts, except for the cohort born prior to 1930, which includes WWII-era veterans. The 1955-59 and 1960-64 cohorts have a somewhat higher percentage veteran, reflecting the increased participation of women in the military. As expected, the 1965-72 cohort has a relatively small number of female veterans who were out of the military, out of school, and in the civilian labor force by 1989-92. Average wage differences largely mirror differences in mean years of schooling. There is a wage advantage to most earlier cohorts of female veterans, corresponding to a schooling advantage of about one year. Recent cohorts of female veterans, however, have schooling and wage rates similar to their nonveteran counterparts. Just as is the case for males, nonwhites are underrepresented in the military among older cohorts, while being overrepresented among younger cohorts.

Table 4 provides sample means and regression coefficients from separate log wage equations for female veterans and nonveterans. Control variables in the regression equation are years of schooling completed, years of potential experience (age-schooling-5) and its square, race, marital status dummies (2), number of children, union status, part-time status, residence in a metropolitan area with one million plus population, public sector status (4), occupation dummies (5), industry dummies (13), Census region (8), and year dummies (3). Regression coefficients are broadly similar to those obtained from the RCS. Veterans have an approximate half year advantage in average schooling, and small advantages in the proportion union members and proportion full-time. Veterans are less likely, however, to reside in large metropolitan areas. A notable difference in mean characteristics is the greater proportion of veterans in relatively highly rewarded federal government and postal service jobs. Note that hiring preferences for veterans in these sectors account in part for these employment differences. One might argue, therefore, that inclusion of the public sector dummies biases downward estimates of the total effect of veteran status on earnings (the veteran-nonveteran differential is somewhat higher when these are excluded). Differences in coefficients include a larger intercept for veterans (this may reflect a higher but flatter wage gradient with respect to earnings determinants, and differences in wages between veterans and nonveterans in the omitted reference group), and coefficients on the marriage variables close to zero, as opposed to positive marriage coefficients of about .05 for nonveterans (a similar difference in coefficients is seen in the RCS sample).

Differences in veteran and nonveteran log wages can be decomposed into that portion explained by differences in endowments or characteristics (weighted by the nonveteran earnings structure), and that portion owing to differences in coefficients (evaluated using veteran means). Although this decomposition is not unique, the choice of nonveteran coefficient weights is appropriate in this case since female veterans comprise such a tiny part of the labor force. These results are presented in Table 2, where they can be compared to results obtained previously using the RCS and NLSY. The veteran log wage advantage of .0649 can be accounted for almost entirely by differences in measured characteristics, the endowment effect being .0615. The unexplained veteran-nonveteran difference is only .0034. Although not the focus of this paper, we note that an identical analysis for men reveals a larger unadjusted veteran log wage advantage (.1345), but one which is also accounted for by measured characteristics, in particular the higher average age (experience) among male veterans than nonveterans (the endowment effect is .1523 and unexplained difference -.0178).

While the CPS results for women are highly similar to the NLSY results excluding the AFQT measure, they differ substantially but in a predictable way with results from the RCS. Whereas the RCS (and the NLSY with AFQT included) show a wage disadvantage for female veterans relative to nonveterans, the CPS results indicate, on average, little wage difference between veterans and nonveterans. We believe an important reason for these differences is that selectivity bias is more serious in the CPS, given the absence of an explicit quality measure such as AFQT, or natural controls for unobservables such as that present in the sample of reservists. In the RCS, CPS, and NLSY, female veterans have superior endowments as compared to their nonveteran counterparts. For example, in the CPS unadjusted wage differentials are more favorable to veterans by roughly .06 log points, as compared to adjusted differentials.

Qualitative differences in female veteran premiums based on race and education are reasonably similar between the CPS and RCS surveys. Table 3 provides alternative estimates of veteran-nonveteran differences, based on pooled equations with appropriate interaction terms. Shown are the results of the following specifications (all equations include a full set of control variables): 1) veteran dummy only; 2) a veteran dummy and a nonwhite-veteran interaction term to allow separate estimates for whites and nonwhites; 3) separate coefficients by schooling group; 4) separate coefficients for draft-era and volunteer-era women (draft-era workers are defined as those who were age 21 or over in 1973); and 5) separate coefficients for white and nonwhite draft-era and volunteer-era women. To compare the CPS results for females to those for men, the right-hand side of the table provides equivalent estimates for males. The data source, time period, and sample selection criteria are identical for women and men.

Regression results with a veteran dummy variable (line 1) indicate a difference of, essentially, zero (.0033), matching our previous result (.0034) based on separate veteran and nonveteran equations. In line 2, separate estimates are provided by race. Whereas we find no significant difference in earnings between white veterans and nonveterans (-.0027), there is a small (.0349) but significant premium realized by nonwhite veterans, relative to their nonveteran counterparts. The evidence on racial differences is similar in the RCS and CPS samples. The suggestion from the data is that in contrast to whites, nonwhite veterans possess an unobserved productivity advantage relative to nonwhite nonveterans. We cannot discern from the data the source of the differential. This productivity advantage may be the result of selectivity by the armed forces, such that nonwhite recruits place higher in the ability distribution among the nonwhite population than do white recruits among the overall white population, or it may result directly from a relatively greater enhancement of skills acquired in military service by nonwhites than by whites. We suspect both are important sources of racial differences in veteran-nonveteran wage differences. Because we obtain a similar racial pattern of results in the RCS and CPS, even though the reservists sample already controls to some extent for military selection, we lean toward the latter explanation.

The pattern of veteran wage differentials with respect to schooling are found to be similar in both the CPS and RCS. Women with some college and those with a high school education or less realize similar differentials. By contrast, the wage differential is significantly higher (roughly .05 less negative in the RCS, or .04 more positive in the CPS) among college graduates. In the CPS, veteran-nonveteran differences are estimated to be -.007, -.009, and .033 for civilian workers with no more than a high school diploma, with some college, and with a college degree, respectively. This pattern with respect to schooling is similar to that found among males. Our schooling breakdown, which does not separate out workers with less than a high school diploma (among recent cohorts, very few women who have not completed high school are admitted into the military) masks the traditionally high returns to military service found for older, less-educated males (see Berger and Hirsch, 1983, for evidence). A compelling explanation for a more favorable veteran-nonveteran performance by college graduates is not readily evident. One possibility is that educational benefits provided to veterans permit them to make economically desirable but otherwise liquidity-constrained investments in schooling. Recent evidence by Angrist (1993) from the 1987 Survey of Veterans indicates that veteran benefits increase schooling levels by an average 1.4 years, with benefits accruing primarily to those attending college and graduate school. Returns to years of schooling following service are not particularly high (about 4.3 percent a year), however, resulting in an earnings increase of about 6 percent.

We next examine differences in veteran-nonveteran differences among women likely to have served during the draft and AVF eras. Differences in the veteran differential by time period of service are small and insignificant, reflecting, perhaps not surprisingly, little effect of the draft on women. It is important to note that with data covering a short time span (4 years for the CPS), we cannot distinguish between the effects of draft versus volunteer-era service, birth cohort, or age. In work not shown, we find little difference in veteran-nonveteran wage differentials when these are estimated separately either by 10-year birth cohorts or age groups. In fact, we had expected to find a veteran wage disadvantage for young women (below age 30) who are making the transition from military to civilian work, coupled with a steeper wage profile as catch-up takes place. Note that such a pattern of initially depressed earnings but faster wage growth is typical of the previous evidence reported for male veterans (and confirmed by us in results not shown). The literature on male veterans suggests that this pattern reflects some combination of age, cohort, draft-era, and year effects.

IV. Conclusions

Despite considerable attention and the increasing importance of women in the military, there exists little scholarly evidence on the relative civilian earnings of female veterans. This paper provides what we hope is a valuable step in that direction. Although deficiencies in available data place unavoidable limitations on such an analysis, we believe our study has advanced knowledge in this area. Data from the 1986 Reserve Components Surveys (RCS), the 1989-92 Current Population Surveys (CPS), and the 1984 National Longitudinal Survey of Youth (NLSY) have been used to estimate veteran-nonveteran wage differences in civilian employment. Each of the surveys has its advantages and disadvantages. The CPS provides relatively large and representative samples of the U.S. labor force, but provides no direct way to control for what are potentially important selectivity biases owing to selection by the military and recruits owing to unmeasured ability and taste differences between veterans and nonveterans. The NLSY provides a direct ability measure (the AFQT) and a large number of variables on socioeconomic and family background, but sample sizes are extremely small. Our principal analysis, therefore, has focused on the RCS. The data on reservists provide reasonable sample sizes of female veterans and nonveterans. At the same time, the sample provides a natural control for unobserved preferences and abilities, since selection criteria and perhaps tastes are similar among individuals serving in the active duty military and the reserves.

The evidence from all three data sets indicates that female veterans possess a higher level of measured earnings endowments than do nonveterans. Moreover, evidence from the RCS and NLS is consistent with the hypothesis that ability and other wage determinants unobservable in the CPS are positively correlated with measured endowments. In the civilian labor force, female veterans have a wage advantage (based on CPS mean wage differences), whereas among reservists wages of veterans display wage rates slightly below that of nonveterans. Using the CPS, all of the wage differential is accounted for by measured characteristics, whereas in the RCS and NLSY a modest veteran wage disadvantage, following control for measurable wage determinants, is evident. In both the RCS and CPS, veteran-nonveteran wage differentials are more favorable among nonwhites than among whites, are higher among college graduates than among those with less schooling, and are similar among draft-era and AVF-era cohorts.

The evidence presented here, at least for white women, provides little evidence to support the contention that military service provides work experience that is of superior value to that available in the civilian labor market. Under the most favorable estimates from the CPS, time spent in military service by white women has a value equivalent to time spent in the civilian labor market. And based on data from the RCS and the small NLSY sample, white female veterans are at an earnings disadvantage relative to their nonveteran counterparts. An exception to the above is the relatively better civilian wage performance evident in both the CPS and RCS among nonwhite female veterans. Negative wage differentials among recent veteran cohorts would be neither troubling nor surprising, if they were accompanied by faster wage growth. But we find no evidence of a steeper earnings-experience profile among female veterans, nor a wage performance relative to nonveterans that improves with age.

Given the relatively high recruiting standards the military has adopted for women, evidence of a veteran wage advantage would not have been surprising. At present, however, women are severely limited as to the occupations in which they may serve within the military. The low civilian returns to military service may result in part from the narrow opportunities for skill enhancement given women within the military, military training that is nontransferable to civilian jobs, or an inability to transfer these skills to the civilian sector owing to occupational barriers to women in jobs utilizing these skills.[7] If this is the case, enhanced opportunities for women in the military that are expected to accelerate, coupled with declining sex segregation in the civilian labor market, should produce more favorable civilian performance outcomes for future waves of female veterans.

Endnotes

[1]Mangum and Ball (1989) provide a brief survey of this literature. More recently, Angrist (1990) has addressed in some detail selectivity issues using information on date of birth for veteran and nonveteran birth cohorts affected by the draft lottery in the late Vietnam period (1970-1972).

[2]Despite the magnitude of this coefficient, it is not statistically significant. Their wage equation does not control for part-time status, a particularly important wage determinant among women (nonveteran women are more likely to work part-time than are veterans).

[3]The 1986 Reserve Components Surveys of Selected Reserve Officer and Enlisted Personnel (RCS) were conducted by the Department of Defense to assess a wide range of manpower issues and personnel policies. The population of the basic samples consisted of trained selected reservists. The surveys were administered to approximately 109,000 reservists. The population of reservists in 1986 was 1.1 million (Department of Defense, 1989). The member population was stratified by reserve component, reserve category, enlisted status, and sex; within most strata, the design provided for a 10 percent sample. The questionnaires were administered at reserve units during March and April 1986. The response rate for enlisted personnel was 59.7 percent, yielding usable responses for 60,120 persons.

[4]In this regard, the RCS shares some features with samples of siblings and twins that have been used in estimating the returns to education.

[5]There has been much debate on the relationship between tenure and earnings. For a summary of this debate, see Hutchens (1989); a recent contribution to this literature is Brown and Light (1992). The RCS provided no information on tenure in the civilian job.

[6]Logarithmic wage differentials are converted to percentage differentials by the approximation, $[\exp(\alpha)-1]100$, where α is the log differential.

[7]The military and civilian occupations and industries in which women are employed differ from those of nonveterans. To some extent, the military may provide a mechanism by which women can gain training and subsequent entry to nontraditional civilian jobs to which they might otherwise be excluded. We find weak evidence along these lines. When we estimate a log earnings equation from the CPS *excluding* occupation and industry dummies, the veteran differential increases from .003 to .017. Although both coefficients are quite small, the direction of change suggests that veteran status may provide access to women to occupations and industries that are somewhat higher paying than those obtained by otherwise similar nonveterans.

Table 1: Regressions for Separate Veteran and Nonveteran Log Wage Equations from the RCS Data

	Veterans			Nonveterans		
Variables	Means	Coeff.	|t|	Means	Coeff.	|t|
Education	13.636	.039	(3.286)	13.312	.036	(4.028)
Experience	11.953	.029	(2.433)	10.619	.032	(4.667)
Exper. sq. /100	1.903	-.050	(1.695)	1.601	-.040	(1.873)
Married	.357	.017	(0.404)	.317	.022	(0.068)
Public	.525	.051	(0.788)	.443	.069	(1.519)
Nonwhite	.288	.134	(2.908)	.401	-.001?	(0.017)
Children	.743	-.036	(1.597)	.669	.005	(0.325)
Part-time	.096	-.230	(3.239)	.124	.139	(3.137)
Industry		yes			yes	
Occupation		yes			yes	
R^2		.235			.180	
N		495			1,451	

Dependent variable is the log of the hourly wage; its mean is 2.005 for veterans and 2.030 for nonveterans.

Table 2. Decomposition of Veteran-Nonveteran Wage Differentials by Race and Era

Sample	Log Wage Gap	Endowment Effect	Coefficient Effect
RCS:			
All	-.0248	.0642	-.0891
White	-.0471	.0760	-.1232
Nonwhite	.0300	.0389	-.0088
Draft Era	-.1019	.0223	-.1243
Volunteer Era	.0179	.0879	-.0700
NLSY (Volunteer Era, All Women):			
Without AFQT	.0755	.0645	.0109
With AFQT	.0755	.0874	-.0118
CPS:			
All Women	.0649	.0615	.0034
All Men	.1345	.1523	-.0178

Log wage gap is the unadjusted difference in the means of the log wage. The endowment effect is the sum of the differences in explanatory variables times the nonveteran coefficients; the coefficient effect or adjusted differential is sum of the differences in coefficients times the veteran means. See the text for further discussion.

Table 3: Regression Results from the RCS and CPS Based on Alternative Specifications -- Female and Male Veteran-Nonveteran Differentials by Race, School Group, and Era

	RCS		CPS		CPS	
Specification	Females		Females		Males	
1. VET	-.0926	(3.411)	0.0033	(0.473)	-0.0154	(8.515)
2. VET	-.1262	(3.855)	-0.0027	(0.347)	-0.0158	(8.286)
NW*VET	.1064	(1.835)	0.0375	(1.958)	0.0031	(0.582)
3. VET*SCH<=12	-.1058	(2.649)	-0.0068	(0.612)	-0.0177	(7.790)
VET*SCH13-15	-.1012	(2.492)	-0.0086	(0.673)	-0.0272	(8.169)
VET*SCH16+	-.0472	(0.820)	0.0333	(2.320)	-0.0031	(0.916)
4. VET*DRAFT	-.1221	(3.133)	0.0090	(0.848)	-0.0096	(4.538)
VET*AVF	-.0690	(1.963)	-0.0011	(0.119)	-0.0294	(9.209)
5. WH*VET*DRAFT	-.1378	(3.064)	0.0032	(0.286)	-0.0096	(4.368)
NW*VET*AVF	-.0883	(1.233)	-0.0078	(0.743)	-0.0319	(9.291)
WH*VET*DRAFT	-.1171	(2.737)	0.0538	(1.578)	-0.0008	(0.135)
NW*VET*AVF	.0269	(0.446)	0.0334	(1.428)	0.0180	(2.000)
N	1,946		322,702		343,748	

RSC sample: Dependent variable is log of hourly wage. Also included in all equations are years of schooling completed, potential experience and its square, currently married, nonwhite, part-time, number of children, public sector worker, and dummies for broad industry and occupation.

CPS sample: Dependent variable is log of real hourly wage, in December 1992 dollars. Also included in all equations are years of schooling completed, potential experience and its square, married spouse present, ever married but spouse not present, union membership, nonwhite, part-time, number of children in primary family, federal (exc. postal), state, local, postal, and large metropolitan area. Also included are dummies for Census region, broad industry, broad occupation, and year.

Table 4: Variable Means and Regression Results for Separate Female Veteran and Nonveteran Log Wage Equations from the CPS

	Veterans			Nonveterans		
Variable	Mean	Coeff.	|t|	Mean	Coeff.	|t|
Education	13.606	0.054	(12.093)	13.162	0.056	(150.005)
Experience	20.366	0.015	(6.058)	20.760	0.015	(73.211)
Exp. sq./100	5.523	-0.025	(5.378)	5.905	-0.026	(65.017)
Married, w/ spouse	0.531	-0.019	(0.860)	0.585	0.057	(26.287)
Ever married w/o sp.	0.291	-0.000	(0.009)	0.212	0.046	(18.306)
Union	0.154	0.201	(8.783)	0.135	0.151	(64.278)
Nonwhite	0.160	-0.003	(0.141)	0.148	-0.041	(19.644)
Part time	0.213	-0.102	(5.126)	0.236	-0.127	(69.771)
Children	0.775	-0.017	(2.082)	0.737	-0.009	(11.064)
Federal	0.099	0.066	(1.972)	0.024	0.048	(8.793)
State	0.074	-0.014	(0.400)	0.053	-0.024	(6.459)
Local	0.101	-0.058	(2.017)	0.124	-0.083	(31.298)
Postal	0.022	0.140	(2.237)	0.006	0.131	(13.448)
Large CMSA/MSA	0.405	0.094	(5.848)	0.453	0.124	(78.627)
Region (8)		yes			yes	
Industry (5)		yes			yes	
Occupation (13)		yes			yes	
R-sq		.381			.411	
N		3,331			319,371	

Dependent variable is log of real wage rate. The mean of the dependent variable is 2.2595 for veterans and 2.1946 for nonveterans. Included variables are years of schooling completed, potential experience and its square, married spouse present, ever married but spouse not present, union membership, nonwhite, part-time, number of children in primary family, federal (exc. postal), state, local, postal, and large metropolitan area. Also included are dummies for Census region, broad industry, broad occupation, and year.

Appendix

Female and Male Veteran Status, Wages, Schooling, and Race, by Birth Cohort, 1989-92 CPS

Birth Cohort	N	VET	W^v	W^n	W^v/W^n	S^v	S^n	S^v-S^n	NW^v	NW^n
Females:										
< 1930	16,597	1.20	13.70	9.00	1.52	13.66	12.01	1.65	2.51	12.03
1930-34	16,888	0.89	12.97	10.20	1.27	13.40	12.41	0.99	3.97	13.29
1935-39	22,520	0.90	11.80	10.50	1.12	13.45	12.70	0.75	10.84	14.34
1940-44	30,928	0.81	14.16	11.03	1.28	13.90	13.04	0.86	9.60	14.18
1945-49	41,133	0.93	12.03	11.41	1.05	14.08	13.36	0.71	12.53	14.71
1950-54	46,859	1.06	11.86	11.33	1.05	14.30	13.45	0.84	16.73	15.82
1955-59	49,903	1.38	10.92	10.99	0.99	13.69	13.39	0.30	19.25	16.15
1960-64	48,629	1.28	9.83	10.17	0.97	13.07	13.44	-0.37	22.87	15.34
1965-72	49,245	0.68	7.96	8.07	0.99	12.80	13.15	-0.35	20.47	14.37
All	322,702	1.03	11.24	10.35	1.09	13.61	13.16	0.44	15.97	14.85
Males:										
< 1930	16,726	67.25	13.99	12.04	1.16	12.81	11.15	1.65	7.41	17.52
1930-34	19,156	64.20	16.22	14.31	1.13	13.04	11.57	1.47	7.72	17.40
1935-39	24,656	48.49	16.68	15.76	1.06	13.19	12.43	0.76	7.75	14.93
1940-44	31,966	40.12	17.00	16.37	1.04	13.45	12.99	0.46	8.37	14.72
1945-49	41,787	43.49	16.33	16.42	0.99	13.63	13.54	0.09	8.87	14.40
1950-54	48,716	22.23	14.47	15.44	0.94	13.29	13.63	-0.34	11.57	13.00
1955-59	54,453	13.03	12.83	14.01	0.92	12.95	13.32	-0.37	15.25	12.21
1960-64	54,213	10.53	11.05	12.09	0.91	12.66	13.15	-0.49	14.38	11.93
1965-72	52,075	5.94	8.71	8.89	0.98	12.44	12.62	-0.18	13.23	12.53
All	343,748	27.12	15.11	13.31	1.13	13.18	13.05	0.13	9.61	13.13

N is the CPS sample size, VET is the percentage veteran, W^v and W^n are the mean wages in December 1992 dollars for veterans and nonveterans, S^v and S^n are mean years of schooling for veterans and nonveterans, and NW^v and NW^n are the percentages nonwhite among veterans and nonveterans. Wage ratios and schooling differences are calculated prior to rounding.

References

Angrist, Joshua D., "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records." *American Economic Review* 80(3) June 1990, 313-336.

Angrist, Joshua D., "The Effect of Veterans Benefits on Education and Earnings." *Industrial and Labor Relations Review* 46(4) July 1993, 637-52.

Berger, Mark C. and Barry T. Hirsch, "The Civilian Earnings Experience of Vietnam-Era Veterans." *Journal of Human Resources* 18(4) April 1983, 455-479.

Brown, James N. and Audrey Light, "Interpreting Panel Data on Job Tenure." *Journal of Labor Economics* 10(3) July 1992, 219-57.

Bryant, Richard R. and Allen Wilhite, "Military Experience and Training Effects on Civilian Wages." *Applied Economics* 22(1) January 1990, 69-81.

Cohany, Sharon R., "Employment and Unemployment Among Vietnam Era Veterans." *Monthly Labor Review* 113(4) April 1990, 22-29.

Defense Manpower Data Center, *1986 Reserve Components Survey: Selected Reserve Officer and Enlisted Personnel -- User's Manual and Codebook.* Arlington, VA, 1987a.

_________, *Description of Officers and Enlisted Personnel in the U.S. Selected Reserve: 1986*. Arlington, VA, 1987b.

De Tray, Dennis, "Veteran Status as a Screening Device." *American Economic Review* 72(1) March 1982, 133-142.

Eitelberg, Mark J., *Manpower for Military Occupations.* Alexandria, VA: Human Resources Research Organization, 1988.

Firestone, Juanita M., "Occupational Segregation: Comparing the Civilian and Military Work Force." *Armed Forces and Society* 18(3) Spring 1992, 363-382.

Hosek, James and Christine Peterson, *Serving Her Country.* Santa Monica, CA: Rand Corporation, 1990.

Hutchens, Robert M., "Seniority, Wages, and Productivity: A Turbulent Decade." *Journal of Economic Perspectives* 3(4) Fall 1989, 49-64.

Low, Stuart A. and Michael B. Ormiston, "Stochastic Earnings Functions, Risk, and the Rate of Return to Schooling." *Southern Economic Journal* 57(4) April 1991, 1124-1131.

Little, Roger D. and J. Eric Fredland, "Veteran Status, Earnings, and Race: Some Long Term Results." *Armed Forces and Society* 5(2) Winter 1979, 244-60.

Mangum, Stephen L. and David E. Ball, "Military Skill Training: Some Evidence of Transferability." *Armed Forces and Society* 13(3) Spring 1987, 425-441.

_________, "The Transferability of Military-Provided Occupational Training in the Post-Draft Era." *Industrial and Labor Relations Review* 42(2) January 1989, 230-245.

Mehay, Stephen L., "Reserve Participation versus Moonlighting: Are They the Same?" *Defence Economics* 2(4) 1991, 325-338.

Office of the Assistant Secretary of Defense, *Official Guard and Reserve Manpower Strengths and Statistics: FY 1987.* Washington, DC, 1987.

__________, *Department of Defense Military Manpower Training Report Fiscal Year 1989.* Washington, DC, 1988.

__________, *Population Representation in the Military Services: Fiscal Year 1989."* Washington, DC, 1990.

Pexton, Patrick and Grant Willis, "A Woman's Place." *Navy Times*, July 12, 1993.

Phillips, Robert L., Paul J. Andrisani, and Curtis L. Gilroy, "The Economic Returns to Military Service: Race-Ethnic Differences." *Social Science Quarterly* 73(2), June 1992, 340-59.

Presidential Commission on the Assignment of Women in the Armed Forces, Report to the President. Washington, DC: U.S. Government Printing Office, November 15, 1992.

Roca, Maria, "Women Veterans Total One Million in First Half of 1986." *Monthly Labor Review* 109(12) December 1986, 30-31.

Schwartz, Saul, "The Relative Earnings of Vietnam and Korean-Era Veterans." *Industrial and Labor Relations Review* 39(4) July 1986, 564-572.

Thomas, Patricia J. "Enlisted Women in the Military," in Richard Cooper (ed.) *Defense Manpower Policy.* Santa Monica, CA: Rand Corporation, 1978.

Trost, Robert P. and John T. Warner, "The Effects of Military Occupational Training on Civilian Earnings: An Income Selectivity Approach." Alexandria, VA: Center for Naval Analyses, 1979.

U.S. Bureau of the Census, *Statistical Abstract of the U.S.: 1989.* Washington, DC, 1989.

U.S. Department of Defense, *Selected Manpower Statistics.* Washington, DC, 1989.

U.S. Department of Labor, Bureau of Labor Statistics, "Employment in Perspective: Women in the Labor Force," Report 823, Washington, DC, 1992.

U.S. General Accounting Office, "Military Personnel: Composition of the Active Duty Forces by Race of National Origin Identification and by Gender." Report GAO/NSIAD-91-134FS, Washington, DC, February 1991.

Distribution List

Agency	No. of copies
Defense Technical Information Center Cameron Station Alexandria, VA 22314	2
Dudley Knox Library, Code 52 Naval Postgraduate School Monterey, CA 93943	2
Office of Research Administration Code 08 Naval Postgraduate School Monterey, CA 93943	1
Library, Center for Naval Analyses 4401 Ford Avenue Alexandria, VA 22302-0268	1
Department of Administrative Sciences Library Code AS Naval Postgraduate School Monterey, CA 93943	1
DTLC Library Deputy Chief of Naval Operations Bureau of Naval Personnel PERS-23, Attn: Mr. Steven Cylke Washington, D.C. 20370-5000	1
Administrative Sciences Department Code AS/Mp Naval Postgraduate School Monterey, CA 93943	10