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TECHNICAL
R E P O R T



The Effect of Military Enlistment on Earnings and Education

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Summary

Military compensation is one of the Department of Defense's most important means for attracting and retaining a force of young men and women qualified to meet the nation's national security objectives. As such, it is natural to want to compare military compensation with the compensation service members might receive were they to work in the civilian economy instead. Interpreting the difference in earnings between veterans and nonveterans, though, is complicated by the fact that individuals who do and do not serve in the military differ in ways that are likely to influence their earnings. The selective nature of military service makes it difficult to determine whether the observed difference in earnings is attributable to military service or to differences in the characteristics of these individuals.

In the research reported here, we refine comparisons between the earnings of enlistees and non-enlistees employing an approach first implemented by Angrist (1998). The core assumption we make is that an enlistee drawn at random from the pool of military applicants will be more similar to a randomly selected applicant that did not enlist than to a randomly selected non-applicant. Thus, we assume that differences in the earnings of military applicants who do and do not ultimately enlist will provide a better estimate of the causal effect of enlistment than will differences in the earnings of enlistees and all non-enlistees combined (i.e., non-enlisted applicants and non-applicants). We further assume that the rich set of applicant characteristics recorded on the military application record, information that is not found in the typical survey, controls adequately for any remaining differences between applicants who do and do not enlist that are correlated with earnings. Although this assumption, which Angrist refers to as the assumption of "selection on observables," is quite strong, it is perhaps not unreasonable in this particular context, in which the sample is restricted to individuals with a common propensity to apply for military service and the available control variables are those that the military uses to screen applicants for service.

Our analysis expands on the work of Angrist (1998) in several important ways. First, we employ data on more recent cohorts of military applicants (individuals applying for military service between 1989 and 2003). Second, we follow military applicants for as many as 18 years following application, allowing us to estimate longer-run effects of enlistment on earnings. Third, our estimates account for military allowances and bonuses, which constitute a significant portion of military earnings. Fourth, our estimates are conditioned on a broader range of observable differences between enlistees and non-enlistees, including earnings prior to application. Finally, our analyses consider not only how enlistment affects earnings, but also how it affects a critical determinant of earnings, college education.

Data and Methods

We employ administrative data on military applicants applying for active-component enlisted service between 1989 and 2003. We restrict our sample to the typical qualified applicant: individuals 17 and older with at most a high school diploma (excluding those with varying levels of postsecondary education) who meet the military's minimum enlistment standards with respect to aptitude, health, and drug and alcohol use. We obtained longitudinal earnings data for each of these applicants from military pay files and the Social Security Administration. Our measure of earnings captures virtually all cash compensation paid to these individuals from military and civilian sources. Data on college enrollment and degree attainment for a subsample of applicants were obtained from the National Student Clearinghouse, a nonprofit organization that contracts with institutions of higher education to verify college enrollment and degree receipt for student loan agencies. The earnings data span 1994 to 2007, and the college enrollment and degree attainment data span 1991 to 2010.

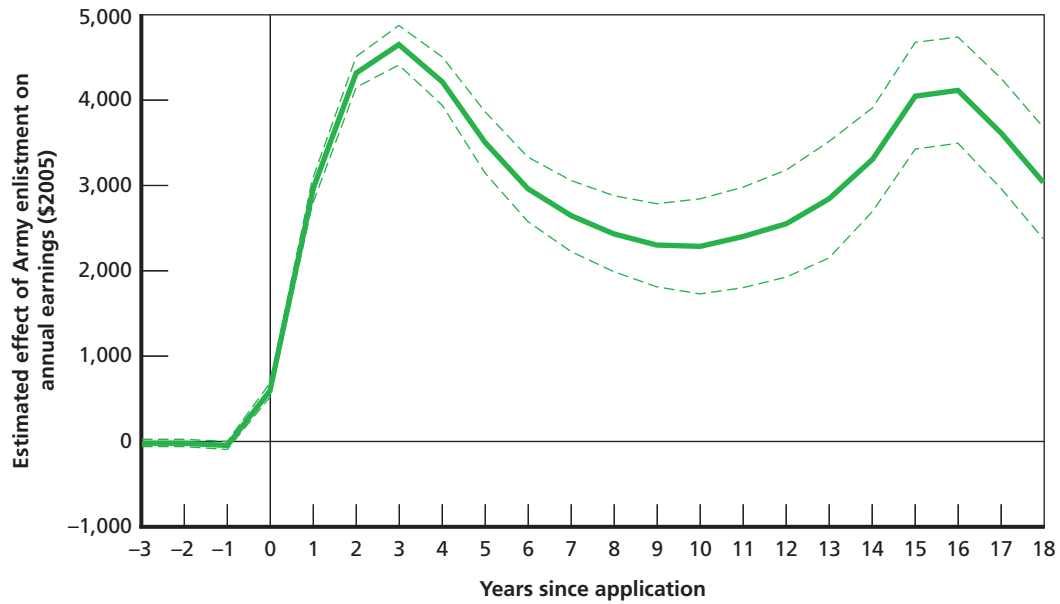
With these individual-level longitudinal administrative data, we estimate the effect of enlistment on earnings and education by years since application, controlling for age, gender, year of application, service, race/ethnicity, educational attainment, and scores on the Armed Forces Qualification Test (AFQT). Our earnings model also controls for earnings prior to application.

Although we believe these data allow for better estimates of the effect of enlistment on earnings and education than are typically found in the literature, we acknowledge several limitations with our approach. First, it could be that we do not fully control for differences between enlistees and non-enlistees that are correlated with earnings and education. As such, our estimates could still be biased estimates of the true causal effect of enlistment on earnings and education. Second, we estimate the effect of ever having enlisted rather than the effect of a specific length of military service. Although we observe years of military service in our data, it is less plausible that the covariates available on the applicant record are sufficient to control for differences in enlistees who serve for different periods of time; therefore, comparing the educational attainment or earnings of such persons would confound the potential effects of individual differences on outcomes with those of military service. Third, we estimate the effect of enlistment on cash compensation rather than on total compensation, which would include the value of health, deferred, and in-kind benefits. While we know exactly what those benefits are in the military context, assigning a cash-equivalent value to them can be difficult. Furthermore, while we can directly observe the cash compensation of applicants that do not enlist, we do not observe their noncash benefits. Making the necessary imputations for all of our 15 applicant cohorts is beyond the scope of this study.

Results

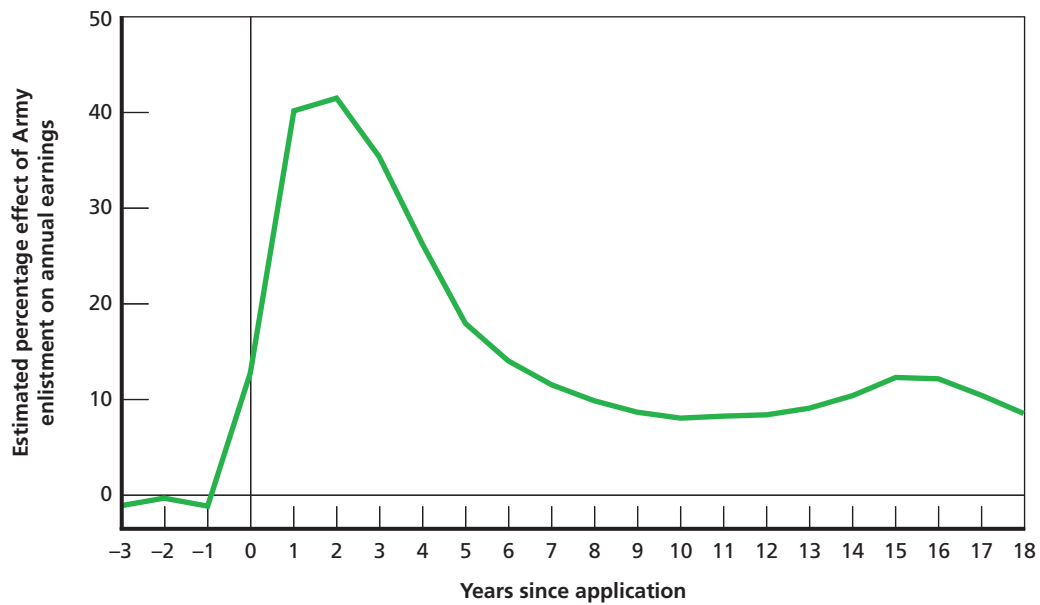
Figure S.1 graphs the average estimated effect of Army enlistment on annual earnings for individuals applying for active-component service between 1989 and 2003. Figure S.2 graphs these effects as a percentage of non-enlistee earnings. In both figures, data points above the horizontal line at zero indicate a positive effect of enlistment on earnings, and points below that line indicate a negative effect of enlistment on earnings. The dashed lines denote the estimated 95 percent confidence interval surrounding these estimates.

Figure S.1
Estimated Effect of Army Enlistment on Annual Earnings (\$2005), by Years Since Application



NOTES: Sample restricted to Army applicants. Dashed lines denote 95 percent confidence intervals.
 RAND TR995-S.1

Figure S.2
Estimated Percentage Effect of Army Enlistment on Annual Earnings, by Years Since Application



NOTES: Sample restricted to Army applicants. Percentages are computed relative to the earnings of non-enlistees.
 RAND TR995-S.2

Since we control for differences in pre-application earnings, applicants who do and do not enlist have nearly identical earnings prior to the year of application. In the first three to four years following application (years 0–3), the figures show a strong positive effect of Army enlistment on earnings. The positive estimated effect of enlistment peaks two years following application, at 42 percent, and then declines through the 10th year following application.

Differences in the timing of postsecondary education between enlistees and non-enlistees likely account for some of the pattern in earnings effects we observe. In the years immediately following application, enlistees are working full-time in an occupation that pays relatively well for someone with only a high school education. Had these individuals not enlisted, some fraction of them would have attended college instead and, as a result, would likely have been working less than full-time, consequently earning comparatively little. By three years following the year of application, however, a large fraction of enlistees will have separated from the active component.¹ Many of these individuals will attend college when they separate and presumably work relatively little in those years. Meanwhile, had these individuals never enlisted, they would be further along in their schooling or their civilian careers at this juncture.

Differences in civilian employment and work experience are also likely to contribute to the pattern of estimated earnings effects. Military employment offers stable full-time work, whereas the civilian jobs individuals typically hold in the first few years after high school are characterized by high turnover. Between four and eight years following application, when enlistees are separating from the military in large numbers, those that do not go to college enter civilian jobs with less civilian work experience than they otherwise would have, which could lead to lower earnings, all else equal.

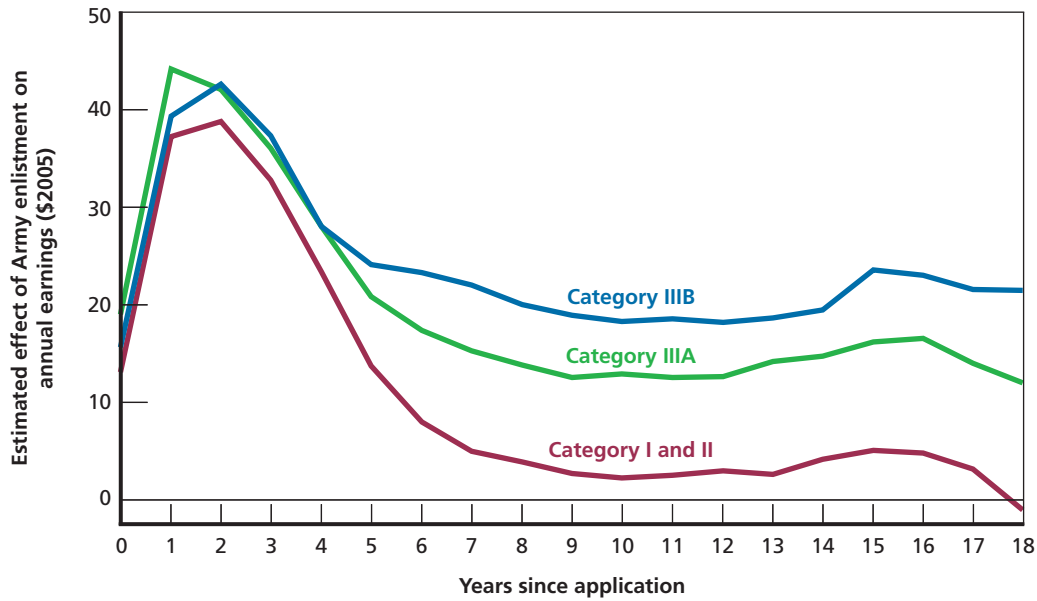
The estimates presented in Figures S.1 and S.2 indicate that the positive effect of Army enlistment on earnings persists in the longer run. By 14–18 years following application, our estimates imply that Army enlistment increases annual earnings, on average, by 11 percent.

Figure S.3 shows that these estimated earnings effects are considerably stronger for individuals scoring between the 31st and 50th percentiles of the AFQT distribution (Category IIIB). We also find, conditional on AFQT, that enlistment increases the earnings of African Americans and Hispanics substantially more than it does for whites. We find little difference between men and women in the impact of Army enlistment on earnings.

Our college enrollment and degree attainment estimates clearly indicate that Army enlistment delays college education, but our relatively small sample for the Army makes it impossible to draw firm conclusions about the longer-run effect of Army enlistment on educational attainment (see the wide confidence intervals surrounding the two- and four-year college degree attainment estimates in Figure S.4 in year 18). However, when we examine a larger sample covering all services combined (see Figure S.5), our estimates indicate a small positive longer-run effect of enlistment on two-year college degree attainment and a small negative effect of enlistment on four-year college degree attainment. The college degree attainment estimates for all services combined are statistically indistinguishable from those for the Army alone.

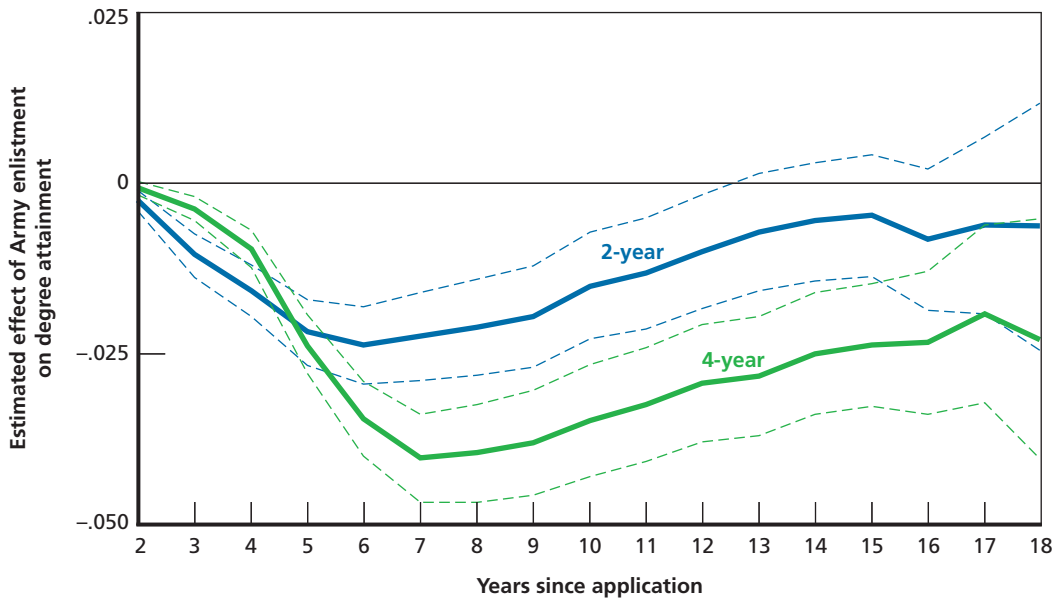
¹ Year 3 after the application year corresponds to the fourth year of service in our analysis, since year 0 is the year of application.

Figure S.3
Estimated Percentage Effect of Army Enlistment on Annual Earnings, by Years Since Application and AFQT Category



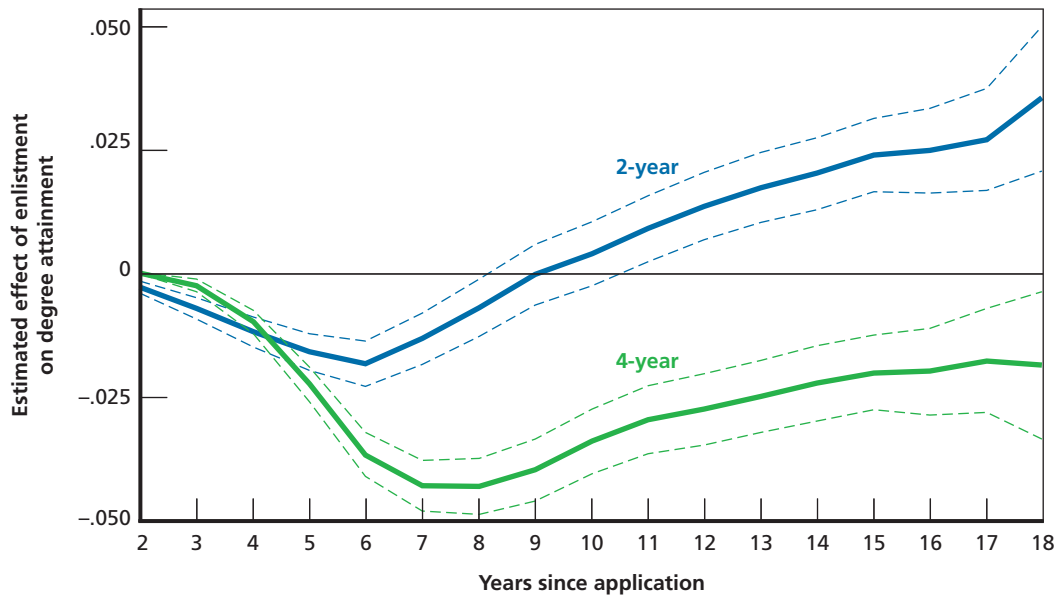
NOTE: Sample restricted to Army applicants.
 RAND TR995-S.3

Figure S.4
Estimated Effect of Army Enlistment on College Degree Attainment, by Years Since Application



NOTES: Sample restricted to 1991–1994 Army applicant cohorts. Dashed lines denote 95 percent confidence intervals.
 RAND TR995-S.4

Figure S.5
Estimated Effect of Enlistment on College Degree Attainment, by Years Since Application: All Services Combined



NOTES: Sample restricted to 1991–1994 applicant cohorts. Dashed lines denote 95 percent confidence intervals.

RAND TR995-S.5

Discussion

A strong, positive, short-run effect of enlistment on earnings is perhaps unsurprising, since the alternative to military service for many young men and women is college rather than full-time work. In addition, it could very well be that the military must offer a relatively high wage in order to induce individuals to choose enlistment and the risks and hardships it entails. That enlistment might convey longer-run benefits in the labor market is perhaps of greater significance for military manpower policy.

There are at least three potential explanations for these longer-run, positive earnings effects. First, it could be that enlistment induces enlistees to obtain more formal education than they otherwise would have obtained and that this greater educational attainment has returns in the labor market. We find, at best, weak evidence in support of this hypothesis. On the one hand, our estimates clearly indicate that enlistment causes enlistees to delay their college education. All else equal, we might expect such a delay to depress longer-run labor market earnings. However, our estimates also indicate that enlistment increases the likelihood that enlistees will obtain a two-year college degree, although these estimates are statistically significant only when looking at all services combined. The increase in two-year degree attainment does not emerge until 16–18 years following enlistment, and the value of obtaining such a degree at that age might be much less than at some earlier age. Moreover, for AFQT Category I and II enlistees, the evidence suggests that the increase in two-year degree attainment comes at the expense of four-year degree attainment. The overall effect of enlistment on two-year college degree attainment is small in both absolute and relative terms, suggesting that it is unlikely

that these education effects could account for the substantial longer-run earnings effects we estimate.

If enlistment does not have a strong effect on educational attainment, then what explains the longer-run earnings effects we observe? Two possibilities are that (1) military service develops other skills that are valued in the labor market and (2) the military pays above-average wages in order to compensate individuals for their sacrifice and service (a “compensating wage differential”). We do not directly test these alternative hypotheses, but we do find that the positive effect of enlistment on longer-run earnings is concentrated among enlistees who are still serving in the military. The earnings of Category IIIA and IIIB Army enlistees still serving in the military between 14 and 18 years following enlistment are 125 and 155 percent higher, respectively, than the earnings of comparable non-enlistees. By contrast, Category IIIA and IIIB Army enlistees who have separated by 14–18 years following enlistment earn 3 and 6 percent more than comparable non-enlistees, respectively. Category I and II Army enlistees still serving at that juncture earn 84 percent more than comparable non-enlistees, but those enlistees who have separated earn 6 percent less.

The magnitude of the differences in earnings estimates between enlistees who do and do not continue to serve in later years suggests that some of the longer-run earnings effects are attributable to a compensating wage differential. For Category I and II enlistees, it seems likely that this differential explains all of the positive longer-run earnings gains observed for that group as a whole, since the correlation between enlistment and earnings of those who have separated from active-component service is actually negative and our estimates further suggest that enlistment could cause Category I and II enlistees to obtain less formal education than they otherwise would have. Category IIIA and IIIB enlistees, on the other hand, appear to benefit from enlistment even after they separate, although their earnings gains are fairly modest. This suggests that military service may, in fact, help at least some individuals develop skills that convey longer-run benefits in the civilian labor market.

In the All-Volunteer era, the overriding objective of compensation policy is to attract and retain the force necessary to meet the nation’s national security objectives. If individuals believe they will be well served by this experience, more might be willing to enlist. Furthermore, from a societal perspective, the electorate might be more willing to support putting young men and women at risk for the sake of national defense if it believes these individuals will benefit financially. The estimates reported in this document suggest that, for the bulk of the enlisted force, military service provides tangible benefits in terms of longer-term earnings. On average, these individuals will earn more and obtain as much, or more, formal education as they otherwise would have. The evidence for the highest-aptitude youth is mixed. Clearly, in the short run, these individuals experience substantial earnings gains as a result of military service. However, those earnings gains erode over time and, for those who do not remain in the military, eventually turn slightly negative, perhaps because enlistment delays college and permanently lowers the likelihood they will obtain a four-year college degree.