

# THE MILITARY AS A TRAINER: A STUDY OF PROBLEMS IN MEASURING CROSSOVER

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## Introduction

Problems of government employment continue to be of relevance for study by those interested in industrial relations and human resources. Especially vital is a study of the most pervasive as well as the largest manpower activity, the military.

This report is concerned with the impact of military manpower training on the individual. The economic benefits of military service might take either of two forms; general capital advantage, which would increase the marginal productivity of the veteran vis-a-vis the non-veteran, regardless of civilian occupation, and specific capital advantage, which is related to the set of occupations defined as having this capital as a component.

This research is a part of a larger study which treats the military as a variable set and examines the impact of it on a set of dependent factors.<sup>1</sup> Whereas the purpose of this part of the study is to examine the partial effect of the military on the economy through the direct training system, the method employed may be useful in evaluating alternative training institutions.

## I. The Problem

A design was chosen to test the factors accounting for the utilization or non-utilization of skills acquired in the military. It was assumed that age at entry, education prior to service, region, and interest in the military for training purposes are significant in the utilization of particular occupational training. The age at entry was interpreted as an index of occupational attachment that varied inversely with transfer. Thus, draftees, who have traditionally been older than enlistees, were thought to make less use of their training. It was assumed that component of entry, independent of age, similarly varied inversely with transfer; that is, volunteers leaving the service, who had a wider selection of military occupations, would be more likely to apply their chosen experience. The veteran's interest in the military for training purposes as well as the relation of the military occupation to pre-military experience were both assumed to affect transfer positively, although not necessarily additively. Aptitude, education, and region are variables with a more complex impact on crossover. The set of variables used in the study and the hypotheses with respect to each appear in our forthcoming study.

Both prior research and casual observation suggested that the findings would indicate non-transfer of human capital

and the reasons for non-transfer should be probed. Specifically, do the reasons suggest policy parameter adjustments on either supply or demand factors and, in turn, are the variables perceptual or existential?

## II. Study Design

Basic to the overall study design is the idea of convergence of occupational structures. Setting aside activities or occupations which are purely military, another set of activities exists in the military which is obviously transferable to the civilian sector. As a consequence of technological developments in both the military and civilian employment sectors, the occupational structures have converged, with less emphasis on "people-killing" and more on technical, administrative, and service activities. The hypothesis, therefore, was the more alike the occupations, the greater the probability that skill would be transferred. This assumed that convergence is real and that capital holders would pursue the use of the capital and employers would accept and ascribe economic value to a veteran's experience.

The design then became fixed upon a categorization of military skills on the basis of apparent convergence (See Table I). The ten groups reflect significant areas of the military training effort, yet a variety of occupations, employers, and prospects in addition to varying degrees of openness and trade influence.

We assumed, following custom, that the military may have a value (positive) abstracted from any occupational benefit that may accrue through the training.<sup>2</sup> For this reason, infantry was chosen as a benchmark and a proxy for the military.

While it would be valuable to generalize results, we are unable to do this because of the self-selective nature of the military. The differences between the services are significant for such manpower variables as procurement and training.

We opted to limit the analysis to the Army and the Navy, which substantially cover all reasonable occupational categories, and to consider only enlisted male non-careerists.

Time out of service was maximized, and it was assumed that utilization as a function of time would vary by occupational category, the constraint on time being the increased likelihood of response loss, hence potential bias in the sample.

As a consequence, the standby reserves were chosen for the defined population. This minimized the task of sample selection. In procedures to be described

elsewhere, we sampled, located, and interviewed the population. A telephone survey was chosen because of population characteristics, the nature of the questions asked, and the higher cost of data acquisition by other means. The response is shown in Table I.

The data for the study were derived from three sources, two of which are relevant to this report. The Army record was used to supply data on pre-employment education and work experience, aptitude and work experience in the military, and basic demographic data. In the survey, relations between pre-service and service experience were ascribed in dichotomized form, as were the relations between pre-service and post-service occupation, both primary and moonlighting. These relationships were set on a three-point scale. The post-service occupations were not necessarily complete, but covered a maximum of three positions, including the first, current, and prior to current position. The occupations were coded according to the Dictionary of Occupational Titles (1966).

The specific problem discussed below, is part of the second stage of the analysis for the Army group. It is intended to illustrate the technique used as well as to illuminate the problem.

### III. The Procedure for Analysis

While the impact of military training might take many economic forms, we concentrated on the differential effects of such training on adjusted annual income. The hypothesis was that investment in human capital in military vocational fields increased post-military individual earnings. The ten occupational groupings referred to above were used to test this hypothesis. Each of ten groups (except infantrymen) represented potential streams of lifetime earnings in excess of the increment yielded by military life *per se*.

This hypothesis was first tested by analysis of covariance. In that stage of analysis, we compared the income of each occupational group with that of the infantrymen, cleansed of six independent variables: Educational level, number of dependents at time of exiting service, age, ability index, number of post-service jobs held, and relation of post-service occupation to military vocational training. Two conclusions emerged: (a) The difference between the occupational groups and the base group was nil, and (b) within an occupational group, income was positively related to occupational crossover. These conclusions are inconsistent if the military training caused the post-service earnings to expand. Alternatively, the response may be attributed to other variables which were correlated with (b).

The inconsistency was examined with additional explanatory variables. One set of variables involved pre-military occupational experience and raised the question of effects due to draftee versus volunteer mix. Draftees, as opposed to enlistees, are older and more likely to have had pre-service job experience at the time of induction. It was also observed that the infantry group contained the highest percentage of draftees. This data led to a test of the relation between pre-service occupational experience and post-military economic activity.

This hypothesis was examined for overall patterns by pooling all occupational groups. Then the data was disaggregated for the ten occupational groups to clarify relations which may emerge from the aggregate.

Four variables directly or indirectly related to pre-service occupational experience used in the test are:

- $Z_1$  = A dummy variable representing the existence or absence of any pre-service job. Coded 1 for affirmative and 0 for negative.
- $Z_2$  = A dummy variable indicating the relation of the pre-service job to military activity. Coded 1 if related and 0 if not.
- $Z_3$  = A continuous variable ranging directly from 0 to 3 according to the percentage of post-service time in occupations held before the service.
- $Z_4$  = A continuous variable ranging from 0 to 6. Summing the post-service experience weighted by time and the degree of ascribed relation to the military vocational training (0=no relationship; 1=somewhat related; 2=highly related).<sup>3</sup>

The test was performed with least squares regression lines on the ten pooled groups and then separately for the various occupational groupings. Each of these four variables was inserted separately into four different regressions, in which the effects of the five independent variables had been nullified using the linear effect for the variable. The dependent variable, average annual post-service earned income, was adjusted to comparable 52-week periods. These four variables were inserted into separate regressions because of their relatively high correlation to each other and the consequent statistical problems associated with multi-collinearity and interaction.

### IV. All Group Results

The corresponding means, partial regression coefficients, and t-values for each of the four variables is shown in Table II. We note the following:

1. Pre-service occupation was highly significant ( $t=3.5$ ), positively

- related to income ( $b=460$ ), and held by 88 per cent ( $Z_1=.88$ ).
2. For 26 per cent ( $Z_2=.26$ ) military vocational training was related to a pre-service job, highly significant ( $t=3.1$ ), and was positively related to income ( $b=287$ ).
  3. One-third of the post-service time ( $Z_3=1.0$ )<sup>4</sup> was spent in occupations held prior to military service. This variable is significant ( $t=3.6$ ) and positively related to income. The b-value indicated that income would increase \$402 ( $3 \times \$134$ ) if all post-service employment were related to pre-service jobs.
  4. This variable was significant only at the 80 per cent level and was positively related to income ( $b=29$ ). The b-value of 29 indicated that if all post-service time were in a job highly related to military vocational training, earnings would be increased by \$174 more per year ( $6 \times \$29$ ).

That individuals are benefitting in post-military economic life from their pre-service occupation was indicated by the positive relationship of  $Z_1$  to income. This suggestion was reinforced when we observed that  $Z_1$  was not correlated with the other variables (age, ability index, etc.) used in the analysis.

Two explanations for the high correlation shown in  $Z_2$ , between pre-service occupation and military vocational assignment are:

1. Individual preference for a related occupation.
2. Military preference for pre-service experience.

The positive relation of the variables to income is reasonable. The relation of military to pre-service employment,  $Z_1$ , points toward pre-military service as an explanation for the income gain. This is reinforced by  $Z_3$ , the distribution of post-service time in occupations related to pre-military activity. This is especially true for infantrymen where  $Z_1$  was only significant at the 85 per cent level, but the partial regression ( $b=628$ ) was larger than the pooled groups. This may explain the lack of an income difference between the infantry and other groups.

The partial regression coefficients for  $Z_1$  and  $Z_3$  were approximately equal ( $b=400$ ). The income effect appeared invariant to whether or not individuals pursue their pre-service activity; but veterans with related military vocational training. This confirms our conclusion (a) that military vocational training was without economic benefit.

Despite this, a positive income effect was evidenced for individuals with post-service time in jobs highly related to their military vocational training ( $Z_4$ ). This positive effect led to conclusion (b), although the magnitude of the  $Z_4$

effect was relatively low compared with  $Z_1$  and  $Z_3$  (174 versus 400).

#### V. Disaggregation Results

Disaggregation at the level of the ten occupational groups yielded the results shown in Table III.

1. Pre-service job experience ( $\bar{Z}_1$ ) varied little among the occupational groups.  $Z_1$  was significant and positively related to income as observed in the aggregate.
2. The relation between military service and pre-military occupation showed considerable variety among the groups. The statistic, as in the total group, was positively related to income except in II and X and was significant.
3. Post-service time spent in pre-service occupations ( $\bar{Z}_3$ ) also demonstrated little variation among the groups, and was both significant and positively related to income.
4. The proportion of individuals who accepted a post-service job related to their military vocational training ( $\bar{Z}_4$ ) was variant among the groups.  $Z_4$  showed a positive relation to income, and was significant.

The problem of the relation of pre-military and post-military experience was broached by dichotomizing the total sample by  $Z_2$  and  $Z_4$  to observe the pre-service experience of these two groups. For  $\bar{Z}_4$ , a continuous variable, arbitrarily, respondents were assigned to the non-transfer group if their value was 0 to 2.

The comparison of regressions from the two  $Z$  partitions revealed that those with a pre-service job related to military vocational training earned significantly higher incomes. However, they were also a little older and had fewer jobs. A higher percentage of veterans with pre-service related jobs were draftees; but draftee status was significant only for those with a pre-service related occupation. The relation of  $Z_2$  to income for the group was large and positive -- more than \$400 per year.

The regression comparisons highlighted that a larger percentage of individuals with pre-service jobs related to their military vocation had a post-service job related to their military vocation ( $Z_4$ ). Moreover, being in a related post-service job was significant and positively related to income for those with pre-service related jobs and the reverse for those without a pre-service related job. Furthermore, individuals without a pre-service related job demonstrated a significant and positive income effect from obtaining a post-service job related to prior service. Thus, these individuals (similar to those who had a pre-service related job) are not benefitting but are using

their pre-service occupational experience.

We dichotomized  $Z_4$  at 2 -- the group that was 2 or greater was called the high-transfer group ( $\bar{Z}_4=3.8$ ), and below 2, the low-transfer group ( $\bar{Z}_4=.18$ ). Average income was greater for the former group -- more draftees than volunteers, with a high percentage of pre-service occupational experience. The percentage of high-transfer group with a pre-service job related to their military vocation was three times as great as the low-transfer group. Relatively more of the high-transfer group had vocational preferences and were trained and served in these preferences. Finally, a larger percentage of the high-transfer group returned after the service to pre-service jobs ( $Z_3$ ).

These observations strongly reinforce the argument of the previous section concerning the post-service impact of pre-service occupational experience.

#### Summary and Conclusions

It is unquestionable that little use is being made of service-related experience, but the cause is moot. While for some the mere association of an occupation with the military is noxious, this does not appear to be significant. Similarly, the argument that the experience is valueless would appear wrong. Ex post the experience is not deleterious nor is the training poor, unplanned, or ineffective. For methodological reasons, the explanation should be integral to economic analysis for relevance and to enrich the theory. This is possible in the case at hand.

In other phases of the study, we observed that a primary reason for non-transfer in all occupational groups was low pay, while the vast majority of those who had jobs related to their service indicated they had not received any economic advantage, either through pay or title, from their service experience. The explanation may lie in the hiring practices of firms. Recent studies indicate that employers do not hire semi-finished workers. Whether it is the cost of determining how to use these individuals or the cost of further training them to the level of an internally produced worker, there are costs which, at the margin, including the calculation of uncertainty, diminish the rate of return for a semi-employed veteran compared with the internally produced factor. At the same time, the seniority system encourages employees to continue with their pre-

viously set occupations, and discourage outsiders. Further, the training for this group may be below a minimum threshold level.

A major obstacle in this study is the tenuous design by which tasks are aggregated into occupations. Despite efforts to identify occupations of respondents, the use of this data is of little significance. The difficulties lie in the categories per se. The degree of cross-over and the direct monetary returns are continuous rather than dichotomous variables. Both at a moment of time and through time, transfer and benefits can vary in intensity. Thus, a descriptive variable to cover a period of time is difficult to produce and interpret.

This illuminates a general problem between data gathering and processing on one hand and analytical manipulations and analysis on the other. Whereas the technique employed in this study allowed one to design the data, it also created problems. The intensity of detail was bought at the price of significance. Our ability to collect and maneuver data is below our capacity to digest the surfeit of material.

#### Informational Footnotes

- [1] This paper was supported by grants from the Ford Foundation and the U.S. Office of Education. It is preliminary to a larger study covering a wide array of topics. The authors wish to thank the above organizations and the Computer Science Center at the University of Maryland for their support. We also wish to express appreciation to William B. Clatanoff, Jr. for his aid and comments.
- [2] We have no evidence on the sign or magnitude of the general capital effect as it relates to occupational or other groupings. It is unlikely to be invariant in the groupings chosen. In this paper benefits when conjectured could be negative or positive.
- [3]  $Z_4 = 3 \left[ \sum_{i=1}^{M_t} \frac{R_i M_i}{M_t} \right]$   
 $i=1, 2, \text{ or } 3$   
 $R_i=0, 1, \text{ or } 2$ ; Relation of the  $i$ th job to the service  
 $M_i$ =Months in the  $i$ th job  
 $M_t$ =Months covered
- [4] When referred to below  $b$  should be interpreted as  $(bZ_1)$ .

Table I. OCCUPATIONAL CLASSIFICATION, SAMPLE SIZE <sup>a</sup>  
AND RESPONSE Rate, 1966

Career Group <sup>b</sup>	Number in Sample	Percent Interviewed
I. Combat-Infantry	712	28%
II. General Military - Duty Soldier	173	40%
III. Police	478	45%
IV. Electronic Data <sup>c</sup> Equipment Skills	209	55%
V. Esoteric Skills <sup>d</sup>	179	55%
VI. Radio, Radar, TV, and Auto Repair	504	46%
VII. Trades Related to Telephone	160	49%
VIII. Operatives- Construction and Repair	560	43%
IX. Teamster and General Ware- housing	218	38%
X. Business and Service Activi- ties	1,228	46%

a - Universe drawn from Standby Reserves, with indicated PMOS 2-5 years from active duty. (Non-career)

b - These are composed of series of occupations.

c - Operation and repair

d - High formal training on sophisticated military equipment

TABLE II

The Magnitude and Significance of Four Variables  
Related to Pre-Service Occupation for Total Sample

5847 = Average Income

<u>Variable</u>	<u>Mean</u>	(b) <u>Regression Coefficient</u>	<u>t-value</u> <sup>t.95=1.96</sup>
Z <sub>1</sub>	.88	460	3.5
Z <sub>2</sub>	.26	287	3.1
Z <sub>3</sub>	1.0	134	3.6
Z <sub>4</sub>	1.2	29	1.3

TABLE III

Mean, Partial Regression, and t-value  
for Four Variables by Occupational Groups

Occupational Groups <sup>a</sup>	<u>Z<sub>1</sub></u>			<u>Z<sub>2</sub></u>			<u>Z<sub>3</sub></u>			<u>Z<sub>4</sub></u>		
	<u><math>\bar{Z}</math></u>	<u>b</u>	<u>t</u>	<u><math>\bar{Z}</math></u>	<u>b</u>	<u>t</u>	<u><math>\bar{Z}</math></u>	<u>b</u>	<u>t</u>	<u><math>\bar{Z}</math></u>	<u>b</u>	<u>t</u>
I	0.9	628	1.4	---	---	---	1.1	28	.2	.5	25	.2
II	0.9	566	.9	0.1	-1257	1.4	.9	30	.7	.7	-55	.5
III	0.9	541	1.6	0.1	368	0.9	1.1	69.7	.7	.7	153	✓2.3
IV	0.9	562.7	1.1	0.6	550	✓2.1	.8	-261	.7	2.3	-31	.5
V	0.8	-314	.5	0.1	749	1.5	1.2	19	.1	.7	-13	.1
VI	0.8	481	1.3	0.3	169	.6	.9	173	1.5	1.3	38	.5
VII	0.9	1407	✓2.2	0.4	347	.6	1.3	406	✓2.1	2.1	79	.9
VIII	0.9	-740	1.5	0.4	503	✓2.1	1.2	8.9	.1	1.9	131	✓2.5
IX	0.8	121	.2	0.2	152	.4	1.1	90	.7	.9	-89	.9
X	0.8	622	*2.8	0.2	-104	.5	.9	193	*2.8	1.1	-91	✓2.5
Total	0.8	460	*3.5	0.2	287	*3.1	1.0	134	*3.6	1.2	28.5	1.1

<sup>a</sup>See Table I for definition of groups.

\*significant to .99 level

✓significant to .95 level