



**NAVAL  
POSTGRADUATE  
SCHOOL**

**MONTEREY, CALIFORNIA**

**THESIS**

**VOLUNTARY EDUCATION OF ENLISTED SERVICE  
MEMBERS: AN ANALYSIS OF PROGRAM EFFECTS ON  
RETENTION AND OTHER OUTCOME MEASURES**

by

Douglas L. Barnard  
Elizabeth F. Zardeskas

September 2007

Co-Advisors:

Stephen Mehay  
Elda Pema

**Approved for public release; distribution is unlimited**

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE		Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE September 2007	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE Voluntary Education of Enlisted Service Members: An Analysis of Program Effects on Retention and Other Outcome Measures		5. FUNDING NUMBERS	
6. AUTHOR(S) LCDR Douglas L. Barnard, USN LCDR Elizabeth F. Zardeskas, USN		8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000		10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.	
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited		12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words)  This thesis analyzes the Navy's Tuition Assistance (TA) program. The thesis focuses on the effect of participation in TA on reenlistment and promotion outcomes for enlisted personnel. The statistical analysis is performed using data from: (1) Defense Manpower Data Center enlisted personnel files for cohorts Fiscal Years (FY) 1991-2001; (2) Military Entrance Processing Command accession information on those same cohorts; (3) and TA usage data from FY95-FY01 from the Navy Center for Personal and Professional Development. The analysis finds that sailors who use TA have a higher probability of reenlistment and promotion than those who do not. The successful completion of at least one college course results in even higher probabilities of reenlistment and promotion. These findings confirm the positive relationship between investment in human capital and reenlistment (i.e., retention) found in two previous military and one civilian study. The thesis recommends that future research on this topic include data sufficient to adjust for potential selection bias in the statistical estimates			
14. SUBJECT TERMS Voluntary Education (VOLED), Continuing Education, Enlisted Retention, Recruiting, Tuition Assistance, Quality of Life (QOL), Manpower Policy Issues		15. NUMBER OF PAGES 147	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

**VOLUNTARY EDUCATION OF ENLISTED SERVICE MEMBERS:  
AN ANALYSIS OF PROGRAM EFFECTS ON RETENTION AND OTHER  
OUTCOME MEASURES**

Douglas L. Barnard  
Lieutenant Commander, United States Navy  
B.S., Westminster College, 1993

Elizabeth F. Zardeskas  
Lieutenant Commander, United States Navy  
B.S., Radford University, 1990

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF MANPOWER SYSTEMS ANALYSIS**

from the

**NAVAL POSTGRADUATE SCHOOL  
September 2007**

Author: Douglas L. Barnard  
Elizabeth F. Zardeskas

Approved by: Dr. Stephen Mehay  
Co-Advisor

Dr. Elda Pema  
Co-Advisor

Robert N. Beck  
Dean, Graduate School of Business and Public  
Policy

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

This thesis analyzes the Navy's Tuition Assistance (TA) program. The thesis focuses on the effect of participation in TA on reenlistment and promotion outcomes for enlisted personnel. The statistical analysis is performed using data from: (1) Defense Manpower Data Center enlisted personnel files for cohorts Fiscal Years (FY) 1991-2001; (2) Military Entrance Processing Command accession information on those same cohorts; (3) and TA usage data from FY95-FY01 from the Navy Center for Personal and Professional Development. The analysis finds that sailors who use TA have a higher probability of reenlistment and promotion than those who do not. The successful completion of at least one college course results in even higher probabilities of reenlistment and promotion. These findings confirm the positive relationship between investment in human capital and reenlistment (i.e., retention) found in two previous military and one civilian study. The thesis recommends that future research on this topic include data sufficient to adjust for potential selection bias in the statistical estimates.

THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

I.	INTRODUCTION .....	1
A.	BACKGROUND .....	1
B.	THESIS OBJECTIVES AND RESEARCH QUESTIONS .....	2
C.	ORGANIZATION OF THE THESIS .....	4
II.	BACKGROUND OF THE VOLUNTARY EDUCATION PROGRAM .....	5
A.	HISTORY OF THE VOLUNTARY EDUCATION PROGRAM (VOLED) .....	5
B.	SERVICES EDUCATION PROGRAM/DOD PROGRAM .....	5
1.	Service Expenditures .....	6
2.	Voluntary Education Enrollments and Completions .....	7
C.	NAVY VOLUNTARY EDUCATION PROGRAM .....	9
1.	Navy College Program for Afloat College Education (NCPACE) .....	10
2.	Navy Tuition Assistance (TA) Program .....	11
III.	LITERATURE REVIEW .....	15
A.	"EFFECTIVENESS OF THE VOLUNTARY EDUCATION PROGRAM," CENTER FOR NAVAL ANALYSES (GARCIA ET AL., 1998) .....	15
1.	Introduction .....	15
2.	Data and Methodology .....	15
3.	Findings .....	17
B.	"TUITION ASSISTANCE USAGE AND FIRST-TERM MILITARY RETENTION," RAND (BUDDIN & KAPUR, 2002) .....	20
1.	Introduction .....	20
2.	Data and Methodology .....	21
3.	Findings .....	22
a.	<i>U.S. Marine Corps Results</i> .....	24
b.	<i>U.S. Navy Results</i> .....	25
C.	"THE EFFECT OF TUITION REIMBURSEMENT ON TURNOVER: A CASE STUDY ANALYSIS," NATIONAL BUREAU OF ECONOMIC RESEARCH (FLAHERTY, 2007) .....	27
1.	Introduction .....	27
2.	Findings .....	30
D.	"IMPACT OF THE ARMY CONTINUING EDUCATION SYSTEM (ACES) ON SOLDIER RETENTION AND PERFORMANCE: DATA ANALYSES," UNITED STATES ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES (STICHA ET AL., 2003) .....	35
1.	Introduction .....	35
2.	Data and Methodology .....	35
3.	Findings .....	37

E.	SUMMARY .....	42
IV.	QUICK POLL RESULTS .....	45
A.	BACKGROUND .....	45
B.	QUICK POLL DATA AND METHODOLOGY .....	47
C.	FINDINGS .....	48
D.	SUMMARY .....	50
V.	DATA AND DESCRIPTIVE STATISTICS .....	53
A.	INTRODUCTION .....	53
B.	DATA SETS .....	54
1.	MEPCOM Data .....	54
2.	DMDC Data .....	54
3.	CPPD Data .....	55
C.	VARIABLE DESCRIPTIONS .....	56
1.	Dependent Variables .....	56
2.	Independent Variables .....	56
D.	SAMPLES AND DESCRIPTIVE STATISTICS .....	59
1.	Characteristics of Restricted Sample .....	59
2.	Comparison of TA Users vs. Non-Users .....	66
3.	Comparison of Reenlistment Rates between TA Users and Non-Users .....	67
4.	Comparison of Promotion Rates between TA Users and Non-Users .....	68
VI.	METHODOLOGY AND RESULTS .....	71
A.	METHODOLOGY .....	71
1.	Model of Tuition Assistance Usage .....	72
2.	Model of First-Term Retention .....	72
B.	STATISTICAL ANALYSIS .....	74
1.	Determinants of Tuition Assistance Usage .....	74
VII.	SUMMARY AND CONCLUSIONS .....	89
A.	SUMMARY .....	89
B.	CONCLUSIONS .....	90
C.	RECOMMENDATIONS FOR FOLLOW-ON RESEARCH .....	91
	APPENDIX .....	93
	LIST OF REFERENCES .....	127
	INITIAL DISTRIBUTION LIST .....	129

## LIST OF FIGURES

Figure 1.	Amount Spent on Tuition Assistance per Fiscal Year by the U.S. Navy.....	13
Figure 2.	The Effect of Participation in College Education on Reenlistment. (First reenlistment, FY92 cohort.) (From: Garcia et al., 1998).....	17
Figure 3.	Effect of VOLED Participation on Promotion. (Cohort FY92 tracked for five years. Based on regression analysis) (From: Garcia et al., 1998).....	18
Figure 4.	Patterns of First-Term Retention by TA Usage in the Navy and Marine Corps (From: Buddin et al., 2002).....	23
Figure 5.	Patterns in TA Usage by Gender and Deployment Status in the Navy and Marine Corps (From: Buddin et al., 2002).....	23
Figure 6.	Estimated Effect of TA Usage on First-Term Reenlistment in the Marine Corps (From: Buddin et al., 2002).....	25
Figure 7.	Estimated Effect of TA Usage on First-Term Reenlistment in the Navy (From: Buddin et al., 2002).....	26
Figure 8.	Survival Rates by Degree for Employees Hired Before September 1, 1999 (From: Flaherty, 2007).....	33
Figure 9.	Survival Rates by Degree for Employees Hired After September 1, 1999 (From: Flaherty, 2007).	33
Figure 10.	College Attendance While in the Navy: Paygrade and Community (After: Uriell, 2006).....	48
Figure 11.	Barriers to Obtaining College Degree: Paygrade Group (From: Uriell, 2006).....	49

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF TABLES

Table 1.	VOLED Expenditures by Service and Year in Nominal and Constant Dollars (2006), (After: CPPD Voluntary education Fact Sheet).....	7
Table 2.	Voluntary Education Enrollments by Service (After: DOD Voluntary Education Online) *Navy Undergraduate Contains NCPACE Data.....	8
Table 3.	Completed Degrees by Service.....	9
Table 4.	Navy PACE Enrollments and Courses Taken (After: DOD Voluntary Education Online) *FY07 Data Incomplete.....	11
Table 5.	Mean Characteristics of Responding Establishments on Offering Tuition Reimbursement (From: Flaherty, 2007).....	29
Table 6.	Retention of Participants (Unconditional) (From: Flaherty, 2007).....	31
Table 7.	Retention of Non-Participants (Unconditional) (From: Flaherty, 2007).....	31
Table 8.	Probability of Participating in Tuition Reimbursement Program and Separating from Employer before 5 years (From: Flaherty, 2007).	32
Table 9.	Unweighted Sample Statistics for Soldiers in the Attrition Analysis (From: Sticha et al., 2003).....	37
Table 10.	Unweighted Sample Statistics for Soldiers in the Reenlistment Analysis (From: Sticha et al., 2003).....	39
Table 11.	Bivariate Probate Results (From: Sticha et al., 2003).....	41
Table 12.	The Effect of TA Usage and Other Explanatory Variables on Retention.....	43
Table 13.	Variable Descriptions Tabulated from MEPCOM, DMDC and NPDC data.....	56
Table 14.	Total Number of Accessions and Missing Date of Separation Information, Tabulated from MEPCOM, DMDC and NPDC data.....	58
Table 15.	Distribution (in percent) of Accessions by Gender, Race, Ethnicity by Fiscal Year of Accession (Standard Deviations), Tabulated from MEPCOM and DMDC Data (Restricted Sample).....	60
Table 16.	Average Age at End of First Fiscal Year of Service by Gender (Standard Deviations), Tabulated from MEPCOM and DMDC Data (Restricted Sample).....	60

Table 17.	Average Age at End of First Fiscal Year of Service by Race (Standard Deviations), Tabulated from MEPCOM and DMDC Data (Restricted Sample).....	61
Table 18.	Marriage and Dependents Comparison by Gender at End of Third Year of Service (Standard Deviation) Tabulated from MEPCOM and DMDC Data..	62
Table 19.	Marriage and Dependents Comparison by Race/Ethnicity at End of Third Year of Service (Standard Deviation), Tabulated from MEPCOM and DMDC Data.....	62
Table 20.	Education Level in Percent of Distribution at Accession by Gender (Standard Deviation), Tabulated from MEPCOM and DMDC Data.....	63
Table 21.	Education (Percent Distribution) at Accession by Race/Ethnicity (Standard Deviation), Tabulated from MEPCOM and DMDC Data.....	64
Table 22.	AFQT Percent Distribution at Accession by Gender (standard deviation) Tabulated from MEPCOM and DMDC Data.....	65
Table 23.	AFQT Percent Distribution at Accession by Race/Ethnicity (Standard Deviation), Tabulated from MEPCOM and DMDC Data.....	65
Table 24.	Distribution of TA Use and Successful Completion of at Least One Course, by Demographics (Tabulated from MEPCOM, DMDC, and NPDC Data).....	66
Table 25.	Distribution of Reenlistment by Demographics and Between TA Users vs. Non-TA Users, Tabulated from MEPCOM, DMDC, and NPDC Data.....	68
Table 26.	Distribution of Promotion Rates to E4 by Demographics and Between TA Users vs. Non-TA Users (Greater than 12 months Time in service), Tabulated from MEPCOM, DMDC, and NPDC Data.....	69
Table 27.	Distribution of Promotion Rates to E5 by Demographics and Between TA Users vs. Non-TA Users (Greater than 12 months Time in service), Tabulated from MEPCOM, DMDC, and NPDC Data.....	70
Table 28.	Baseline Probit Regression Estimates of Tuition Assistance Usage, Includes Completed and Non-Completed Courses.....	76
Table 29.	Probit Regression Estimates of Tuition Assistance Participation and Successful Course Completion for Sailors with at Least 36 Months of Service.....	77

Table 30.	Baseline Probit Regression Estimates of Reenlistment and Interaction Term Between Female and TA Use (Model Includes Rating Specific Dummies).....	79
Table 31.	Probit Regression Estimates of Reenlistment Comparing TA usage and Successful Course Completion.....	81
Table 32.	Distribution by Pay Grade and TA Usage at the End of the Fourth Year (TIS greater than 12 months), tabulated from DMDC and NPDC data.....	82
Table 33.	Baseline Probit Regression Estimates of Promotion to E-4 and E-5 (or Higher) by the End of the Fourth Year of Service (Models Include Rating-Specific Dummies).....	83
Table 34.	Probit Regression Estimates of Promotion to E-4 (or Higher) by the end of the Fourth Year of Service Comparing TA Usage and Successful Course Completion (Models Include Rating Specific Dummies).....	84
Table 35.	Probit Regression Estimates of Promotion to E-5 (or Higher) by the End of the Fourth Year of Service Comparing TA Usage and Successful Course Completion (Models Include Rating Specific Dummies).....	86
Table 36.	Baseline Probit Regression Estimates of Tuition Assistance Usage (includes completed and non-completed courses).....	93
Table 37.	Probit Regression Estimates of Tuition Assistance Usage (includes completed and non-completed courses) Controlling for the Effect of Rating.....	96
Table 38.	Baseline Probit Regression Estimates of Reenlistment and Interaction Term Between Female and TA Use (Model Includes Rating Specific Dummies).....	100
Table 39.	Original Sample Probit Regression Estimates of Reenlistment Unrestricted and Time in Service Greater than 36 months.....	104
Table 40.	Probit Regression Estimates of Reenlistment Comparing TA usage and Successful Course Completion.....	107
Table 41.	Probit Regression Estimates of Promotion to E-4 (or higher) by the end of the Fourth Year of Service.....	111

Table 42. Probit Regression Estimates of Promotion to E-5 (or higher) by the end of the Fourth Year of Service.....115

Table 43. Probit Regression Estimates of Promotion to E-4 (or higher) by the end of the Fourth Year of Service Comparing TA usage and Successful Course Completion.....119

Table 44. Probit Regression Estimates of Promotion to E-5 (or higher)by the end of the Fourth Year of Service Comparing TA usage and Successful Course Completion.....122

## ACKNOWLEDGMENTS

We express our deepest appreciation to Dr. Stephen Mehay and Dr. Elda Pema for their guidance, encouragement, and patience during our thesis process. We would also like to thank Mr. Richard Black-Howell for his assistance and guidance throughout this process.

I would like to express my heartfelt appreciation and thanks to my family for their unwavering support: my Mom and Dad, Linda and Harlan, who taught me that hard work pays off in the end; my children, Broderic and Cleo, for their patience and understanding when I wasn't able to be there; and finally, my wife, Janet for her patience, understanding and ability to take care of everything else so that I could focus on completing this thesis. --Doug

I would like to acknowledge my parents, Zeke and Diana Zardeskias for the love and support they have always given me. My heartfelt gratitude is further extended to my father who has stood behind me during this endeavor. Your undying support, knowledge, and strength held me together through the toughest times. Thank you Daddy!

Finally, I would like to express my sincere appreciation to my daughter, Victoria, who provided me with her unwavering support and understanding during our two years in Monterey. I couldn't have done it without you!

I have been blessed by such a wonderful and loving family. --Elizabeth

THIS PAGE INTENTIONALLY LEFT BLANK

## I. INTRODUCTION

### A. BACKGROUND

The Voluntary Education Program (VOLED) is provided through the Department of Defense for military service members to work on their academic skills, continuing education, and post-secondary education leading to associate, bachelor, masters, and doctorate degrees. This can be done through a number of programs: Military Tuition Assistance Program, Military Evaluations Program, Servicemember Opportunity Colleges (SOC), Independent Study and External Degree Program, Examinations Program, High School Diploma, and the Academic Skills Program.

There is a controversy over military spending on general education for service members and whether the military earns a return on these investments. Human capital theory states that employers should not invest in educating their employees outside knowledge needed for specific skills relevant to their jobs. Offering general training and/or education that is valuable elsewhere to employees may have the effect of encouraging workers to leave the organization. This thesis will look at the effects of offering general education to Navy enlisted personnel and analyze whether the Voluntary Education Program yields a return to the Navy's investment.

On the one hand, human capital theory suggests that employers should not offer general training or education to their employees because the employees can leave the organization and take that training elsewhere thus imposing

a potential economic loss on the organization. On the other hand, general education or training may be treated like a fringe benefit and as one component of the employee's compensation package. To that extent, the fringe benefit would tend to improve recruiting and retention. Finally, the general education will tend to yield direct on-the-job productivity benefits to the organization. The empirical evidence on whether offering or subsidizing general education via the voluntary education program is not conclusive. Some studies find that participants in such programs have higher retention whereas other studies find that participants have lower retention. This thesis will look at the effects of offering general education to Navy enlisted personnel and analyze whether the Voluntary Education Program yields a return to the Navy's investment.

## **B. THESIS OBJECTIVES AND RESEARCH QUESTIONS**

This thesis will undertake a qualitative and quantitative assessment of the Navy's Voluntary Education Program (VOLED) the goal is to analyze the effect of program participation on the enlisted sailor's first-term retention and promotion. The main objective is to determine if participation in TA increases the likelihood for Navy enlisted members to reenlist at the end of their first-term. This will be done by tracking the retention of Navy enlisted cohorts that were accessed from FY98 through FY02 and were followed through FY06 or separation. The analysis will contain both members who participated in TA and those who did not, and will compare their retention rates.

While the TA program may provide a recruiting incentive, its value as a retention tool is debatable.

According to human capital theory (Buddin, 2002), the returns from company-funded general-education programs accrue largely to the individual rather than to the sponsoring company. This increase in general skills may cause increased turnover by making employees eligible for more lucrative jobs outside of the company. This suggests that by providing voluntary education programs the Navy may actually be reducing enlisted retention by increasing sailors' knowledge and skills in areas other than for the Navy workplace.

The second objective is to assess the value of the program to the Navy and to program participants. The thesis uses secondary information derived from the Enlisted Education Quick Poll conducted October 2006 by Navy Personnel, Research, Studies, and Technology (NPRST). The Quick Poll surveyed a random sample of 6,109 active duty Navy enlisted personnel paygrades E2-E7.

As stated, the main objective of this thesis is to analyze the participation effects on the enlisted sailor's first-term retention and promotion. The thesis seeks to answer the following research questions:

1. Does participation in TA increase an enlisted member's probability of reenlisting and other career success measures, such as the probability of promotion?

2. What is the Navy's return on its investment (ROI) in the TA program? Is the program cost-effective? What non-quantitative outcomes are associated with the program (such as improvements in quality-of-life)?

### **C. ORGANIZATION OF THE THESIS**

This thesis is organized into six chapters. The first chapter is an introduction. Chapter II provides background on the Department of Defense voluntary education programs. Chapter III is a literature review of prior studies on the effects of voluntary education on enlisted member retention. Chapter IV will provide a qualitative analysis based on interviews conducted with program managers and the results of the Enlisted Education Quick Poll. Chapter V describes the data and descriptive statistics. The methodology used in the statistical analysis and results of the quantitative analysis are provided in Chapter VI. Chapter VII summarizes the study and provides a conclusion and recommendations based on the results.

## **II. BACKGROUND OF THE VOLUNTARY EDUCATION PROGRAM**

### **A. HISTORY OF THE VOLUNTARY EDUCATION PROGRAM (VOLED)**

The Federal government has provided education to service members since 1918 with the Vocational Rehabilitation Act, which provided grants for rehabilitation through the training of World War I veterans. In 1943, the Vocational Rehabilitation Act was amended to give veterans who were disabled during their military service assistance with transitioning to another area of employment.

The Servicemen's Readjustment Act (known today as the GI Bill) provided federal aid assistance for the education of veterans who were not disabled from 1944 through 1956 (U.S. News and World Report, 2007). In 1985 the Montgomery GI Bill-Active Duty brought about a new GI bill for individuals who initially entered in the military on active duty on or after July 1, 1985. Members of the Selected Reserve who had enlisted, reenlisted, or extended an enlistment after June 30, 1985 for a minimum six-year period were covered under the Montgomery GI Bill-Selective Reserve (Digest of Education Statistics, 2006).

### **B. SERVICES EDUCATION PROGRAM/DOD PROGRAM**

The Department of Defense (DOD) voluntary education program (VOLED) is one of the largest employer-sponsored education programs in the world. Each year over 300,000 armed forces service members participate in postsecondary

education courses. Service members are also able to use the DOD program to complete high school diplomas, attain a GED, or work on basic academic skills.

U.S. Code Section 2007 of Title 10 permits the Secretaries of each military department to pay all or a portion of the cost for its active duty service members to attend educational institutions. The National Defense Appropriations Act provides each Service with the funds for this off-duty education.

This allows members of the armed forces to attend training and education courses during off-duty periods. When an active duty member wishes to complete their high school diploma/GED, increase their literacy skill level, or attend technical training related to their military career, financial assistance is provided through the Secretary.

#### **1. Service Expenditures**

The expenditures for each military service on voluntary education programs are shown in Table 1. They have been converted to real 2006 dollars using the consumer price index obtained from the Bureau of Labor Statistics. DOD expenditures hit a peak in FY04 when it provided \$526.3 million dollars was spent on voluntary education programs for military service members. Both the Air Force and Army are showing a decline in the amount spent on voluntary education. At the same time the Navy and Marine Corps demonstrate a continuing increase on the amount spent to educate their personnel.

Table 1. VOLED Expenditures by Service and Year in Nominal and Constant Dollars (2006), (After: CPPD Voluntary education Fact Sheet)

FY	Nominal Dollars					Constant 2006 Dollars				
	Army	Navy	Marines	Air Force	Total	Army	Navy	Marines	Air Force	Total
1985	25.0	15.9	7.9	34.4	83.2	48.5	30.8	15.3	66.7	161.4
1986	65.8	21.6	9.8	40.0	137.2	126.3	41.5	18.8	76.8	263.4
1987	49.1	19.7	9.3	46.9	125.1	92.4	37.1	17.6	88.2	235.2
1988	27.1	18.8	7.6	43.4	96.9	49.7	34.5	13.9	79.6	177.6
1989	29.1	15.4	7.2	36.9	88.6	51.7	27.4	12.8	65.5	157.4
1990	32.6	18.6	7.3	36.2	94.7	55.7	31.8	12.5	61.9	161.8
1991	31.7	20.2	7.6	34.2	93.7	52.4	33.4	12.6	56.6	155.0
1992	38.2	24.5	9.5	46.9	119.1	61.6	39.5	15.3	75.6	192.1
1993	40.2	23.8	9.0	49.0	122.0	63.2	37.4	14.1	77.0	191.7
1994	38.2	24.4	9.7	57.6	129.9	58.6	37.4	14.9	88.4	199.3
1995	36.3	24.0	10.1	56.3	126.7	54.2	35.8	15.1	84.0	189.0
1996	36.1	20.8	10.9	53.1	120.9	52.2	30.1	15.8	76.8	174.9
1997	38.1	27.4	11.6	53.8	130.9	53.8	38.7	16.4	75.9	184.7
1998	38.2	30.9	13.0	49.4	131.5	52.9	42.8	18.0	68.5	182.3
1999	45.8	33.0	13.9	54.8	147.5	61.8	44.6	18.8	74.0	199.1
2000	48.5	35.8	16.7	56.2	157.2	62.8	46.3	21.6	72.7	203.4
2001	54.5	38.0	17.4	64.1	174.0	67.9	47.3	21.7	79.8	216.6
2002	58.9	42.6	18.5	67.2	187.2	71.7	51.8	22.5	81.8	227.8
2003	157.3	58.7	35.4	120.2	371.6	185.0	69.0	41.6	141.4	437.0
2004	217.4	71.3	37.7	140.6	467.0	245.0	80.4	42.5	158.5	526.3
2005	211.8	72.6	37.6	139.4	461.4	225.1	77.2	40.0	148.2	490.5
2006	140.9	95.2	45.5	149.4	431.0	140.9	95.2	45.5	149.4	431.0

## 2. Voluntary Education Enrollments and Completions

Table 2 provides the number of enrollments in various education components for the Army, Navy, Marine Corps, and Air Force. The Navy, Marine Corps, and Air Force all show gradual upward trends over the past three fiscal years of enrollment in the undergraduate and graduate college programs, while the Army shows a steady decline. It is possible that this decline for Army enrollments is due to the increased presence of U.S. Forces overseas. The Navy's undergraduate enrollment also includes the number of enrollments into the Navy College Program for Afloat College

Education (NCPACE). Note that course enrollment is not the same as the number of individuals participating, because an individual may participate in more than one course.

Table 2. Voluntary Education Enrollments by Service (After: DOD Voluntary Education Online) \*Navy Undergraduate Contains NCPACE Data

ENROLLMENTS					
	YEAR	High School	Basic Skills	Undergraduate	Graduate
<b>ARMY</b>	FY06	146	12616	238479	26178
	FY05	55	15577	255945	29541
	FY04	118	19072	319451	37018
<b>NAVY</b>	FY06	58	10004	176318*	15576
	FY05	63	10811	168927*	13261
	FY04	87	13547	165545*	12907
<b>MARINE CORPS</b>	FY06	8	3802	69839	4766
	FY05	6	1996	67447	4624
	FY04	7	2534	67503	4860
<b>AIR FORCE</b>	FY06	0	1450	225586	42229
	FY05	10	2239	238464	41317
	FY04	74	3236	269545	44648
<b>TOTAL DOD</b>	FY06	212	27872	710222	88749
	FY05	134	30623	730783	88743
	FY04	286	38389	822044	99433

Table 3 contains the number of completed degrees by service for the last three fiscal years. The overall number of degrees earned DOD wide is showing a growing trend towards degree completion by military service members. However, not all of these degrees were completed using support from the TA program.

Table 3. Completed Degrees by Service

<b>COMPLETED DEGREES</b>						
	<b>YEAR</b>	<b>High School/GED</b>	<b>Associates Degree</b>	<b>Baccalaureate Degree</b>	<b>Graduate Degree</b>	<b>Doctorate Degree</b>
<b>ARMY</b>	FY06	0	3206	1431	932	DNA
	FY05	0	2992	1357	828	DNA
	FY04	94	3675	1931	1496	DNA
<b>NAVY</b>	FY06	3	2185	1840	425	15
	FY05	7	1332	899	257	8
	FY04	374	1469	1367	370	2
<b>MARINE CORPS</b>	FY06	17	890	760	336	0
	FY05	6	660	841	299	2
	FY04	11	530	744	205	1
<b>AIR FORCE</b>	FY06	19	20352	3927	7129	0
	FY05	9	20858	2436	3746	0
	FY04	0	18098	4195	4155	2
<b>TOTAL DOD</b>	FY06	39	26633	7958	8822	15
	FY05	22	25842	5533	5130	10
	FY04	479	23772	8237	6226	5

**C. NAVY VOLUNTARY EDUCATION PROGRAM**

The Secretary of the Navy establishes the policy and responsibilities for the Navy and Marine Corps VOLED program in accordance with DOD directives and instructions (SECNAVINST 1560.4A, 2005). The Navy's VOLED program gives active duty Sailors and Marines the opportunity to further their education through the many sponsored programs available. This can be done by attaining high school diplomas/GEDs, working on basic academic skills, earning technical certifications, or earning college degrees.

The goal of the Navy's VOLED program is to cultivate the career potential of its Sailors and Marines by providing

opportunities to increase education levels. In addition to the personal benefits, the Navy looks to increase the retention and readiness of quality personnel and strengthen job performance, while promoting a culture of continuous learning (SECNAVINST 1560.4A, 2005). The Navy looks to do this by ensuring its members have the opportunity to participate in the VOLED programs regardless of mission or duty assignment.

**1. Navy College Program for Afloat College Education (NCPACE)**

The Navy assists sailors while deployed at sea by providing the opportunity to continue their education through Navy College Program for Afloat College Education (NCPACE). NCPACE is part of the Navy College Program and provides both academic skills courses and undergraduate and graduate college courses. The courses are offered through accredited colleges and universities and are provided tuition-free to sailors except for the costs of text books and other educational materials required (DoD Voluntary Education Online, 2007).

Instructor NCPACE involves college professors embarking with a ship during deployment and providing instruction to sailors on-board the ship. Technology NCPACE is used when professors are unable to embark with a ship so the class instruction is delivered through electronic media. Table 4 depicts the number of sailors who enrolled in NCPACE and the number of courses taken through both Instructor NCPACE and Technology NCPACE.

Table 4. Navy PACE Enrollments and Courses Taken (After: DOD Voluntary Education Online) \*FY07 Data Incomplete

FY	NCPACE TOTALS		Instructor NCPACE		Technology NCPACE	
	Enrollments	Courses	Enrollments	Courses	Enrollments	Courses
FY07*	6483	8359	2878	3698	3680	4661
FY06	15538	25105	8779	13903	7356	11202
FY05	13048	20918	7681	11873	5925	9045
FY04	12065	18269	7192	10888	5206	7381
FY03	15209	24221	9239	13618	6460	10603
FY02	15453	26169	9306	14730	6824	11439
FY01	17905	30638	11190	18696	7519	11942
FY00	16018	27558	10111	16320	6674	11238
FY99	13169	21172	7976	12511	5813	8661
FY98	9464	13357	6612	9486	3088	3871

**2. Navy Tuition Assistance (TA) Program**

This study will focus on the largest component of the VOLED program, the Tuition Assistance (TA) program. Prior to 2002, the TA program reimbursed sailors for 75 percent of tuition. In 2002, the amount of reimbursement was increased to 100 percent of the tuition and fees charged by educational institutions, not to exceed \$250.00 per semester hour (FY credit limit of 16), \$166.67 per quarter hour (FY limit of 24), and \$16.67 per clock hour (FY limit of 240). Requests for waivers to these amounts may not exceed \$4,500 each FY per the DOD program (DoD Voluntary Education Online, 2007). All Active Duty Naval Officers and enlisted personnel, along with Naval Reservists on continuous active duty are eligible for TA. To qualify, sailors are required to meet all of the following criteria (NAVADMIN 161/07, 2007):

-Advancement-eligible sailors must have taken and passed most recent advancement examination.

-Must pass (or be medically waived) from the most recent physical readiness test.

-Must not be under instruction in initial skills training or in a duty-under-instruction training status.

-Must be recommended for promotion or advancement (as applicable).

-Have not been awarded non-judicial or courts-martial punishment within the previous six months.

-Enlisted personnel with less than 20 years in-service are required to have at least one year remaining on their current enlistment contract prior to using TA.

-Officers will incur a minimum two-year service obligation commencing with completion (or withdrawal) of the program, which will be served concurrently with any other existing service obligation.

In fiscal year 2006 (FY06), the U.S. Navy spent \$127.9 million dollars on VOLED. The TA program represented 74 percent (\$95.2 million) of the total VOLED funding. Compared to previous years the amount expended on TA has increased considerably.

As Figure 1 shows, prior to 2001, the average spending on TA was around \$37.4 million per year (in constant 2006 dollars). However, after 2001 the TA budget experienced a marked increase, grown by an average of \$9.6 million per fiscal year. A possible explanation for the increase in spending may lie with the 2001 Executive Review of Naval Training. In addition to identifying areas of potential training improvement for the Navy, the study identified that the Navy was losing a large portion of its recruitable

market. According to Kennedy (2002) "...between 1974 and 1999, the number of non-college bound high-school graduates—the Navy’s traditional enlisted recruiting market—decreased by almost forty percent." This decrease was caused by a proportionate increase in college enrollment. The review recommended that the Navy increase the emphasis on off-duty education as a way to increase recruiting and retention prospects. Perhaps as a result of this renewed dedication to education, in 2002 the Navy changed the percent of tuition costs by the TA program covered from 75 percent to 100 percent.

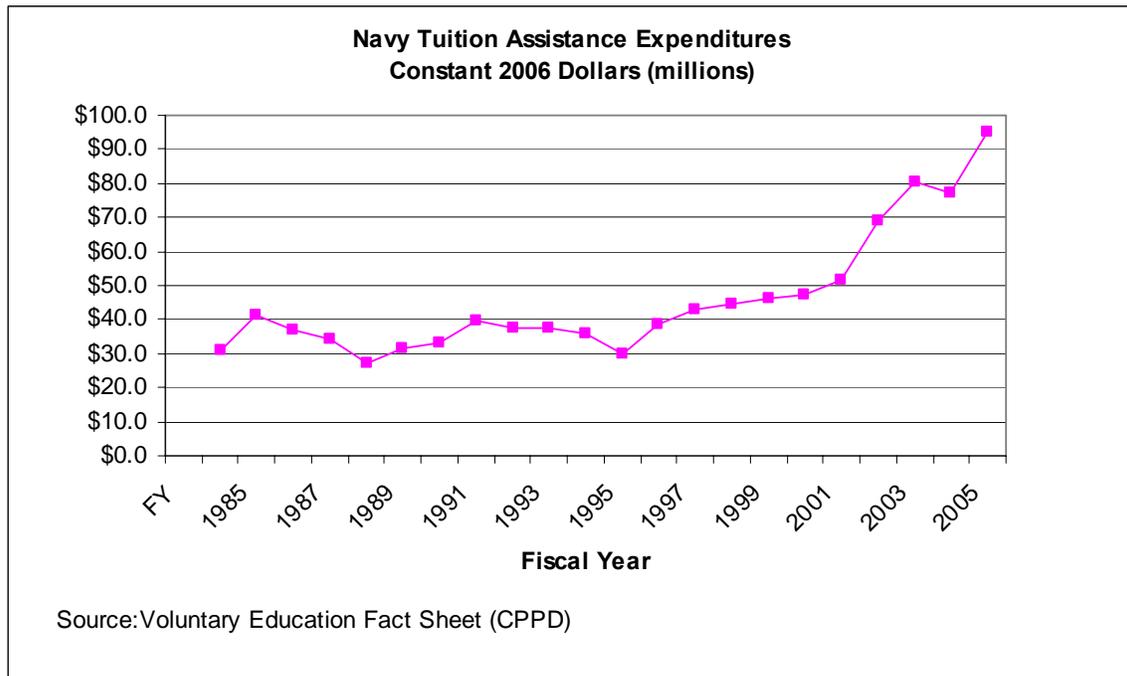


Figure 1. Amount Spent on Tuition Assistance per Fiscal Year by the U.S. Navy

Previous studies have looked at retention and promotion effects of providing education to military members. Chapter III will review four of the previous studies: (1) "Tuition Assistance Usage and First-Term Military Retention" (Buddin

& Kapur, 2002); (2) "Effectiveness of the Voluntary Education Program" (Garcia et al., 1998); (3) "Impact of the Army Continuing Education System (ACES) on Soldier Retention and Performance: Data Analysis" (Sticha et al., 2003); and "The effect of tuition reimbursement on turnover: a case study analysis," (Flaherty, 2007). The purpose of chapter III will be to compare the methodologies and results of these studies and to provide background for the statistical analysis in Chapters IV and V.

### **III. LITERATURE REVIEW**

This chapter reviews prior studies that have analyzed the military's Voluntary Education Programs. Four studies are reviewed—two for the Navy, one for the Army, and one for a civilian firm.

#### **A. "EFFECTIVENESS OF THE VOLUNTARY EDUCATION PROGRAM," CENTER FOR NAVAL ANALYSES (GARCIA ET AL., 1998)**

##### **1. Introduction**

The Garcia, et al. study evaluated the four major components of the VOLED program: Tuition Assistance, Program for Afloat College Education (PACE), the Academic Skills Learning Centers (ASLCs), and the Education Centers. The study tried to measure the effects of the VOLED program on promotion, demotion, cross-rating, and retention. It also attempted to monetize the benefits of the program and to compare them to the costs of the four components of the program.

##### **2. Data and Methodology**

CNA used an educational history file of active duty enlisted sailors from August 1992 through March 1997. This educational history file was constructed using Tuition Assistance data consisting of 510,000 records that contained information on individual students and courses. The file also contained data on 63,000 college and precollege Instructor-PACE courses, 22,000 Technology PACE records that covered college and academic skills courses, and on 20,200 Sailors who participated in the information and orientation

briefs for the PACE program. The analysis also included information on Navy schoolhouse costs (recruit training, A- and C-schools, team and fleet courses, and other training courses), which was used to estimate program benefits (Garcia et al., 1998).

The CNA study attempted to conduct a cost-benefit analysis on each instructional element of VOLED. The analysis specifically focused on the active duty enlisted sailor cohort of FY92 who enlisted with four-year obligations. A binomial probit model was used to analyze the effect of VOLED participation on enlisted retention. The dependent variable captured whether first-term sailors reenlisted or extended. The four-year obligors of the FY92 cohort were followed to their reenlistment decision or separation (Garcia et al., 1998, 55). The individuals who left the service prior to the completion of their contract obligation were considered in the group of individuals who decided not to reenlist. Selection bias was corrected for by using the Heckman two-step process to separate the effect of motivation on reenlistment. The two-step model used academic counseling as an instrumental variable (IV) (Garcia et al., 1998, 55).

CNA used guidelines set by the Office of Management and Budget to conduct the cost-benefit analysis. Incremental benefits and costs were measured to determine VOLED's cost effectiveness. Overhead was ignored since it is a cost that does not change with the enrollment level (assuming that the Education Centers were able to handle moderate increases without increasing their resources). However, the opportunity cost of resources was included since Sailors do

not produce while in training (Garcia et al., 1998). VOLED's potential positive impact on recruiting was discussed, but not included in the analysis due to the lack of data.

### 3. Findings

The CNA study found that all elements of VOLED were cost-effective and that college education obtained through the use of VOLED has a significant positive impact on enlisted retention. As shown in Figure 2, they found that sailors who attained 15 college credits reenlisted at a rate 6 percent higher than those who did not use VOLED, and sailors who attained 60 college credits reenlisted at a rate 18 percent higher. They stated that a sailor with 60-plus college credits was eligible for an Associate's degree and was significantly more likely to stay in the Navy. These finding seemed to refute the argument that college education hastens the departure of sailors seeking employment in the private sector.

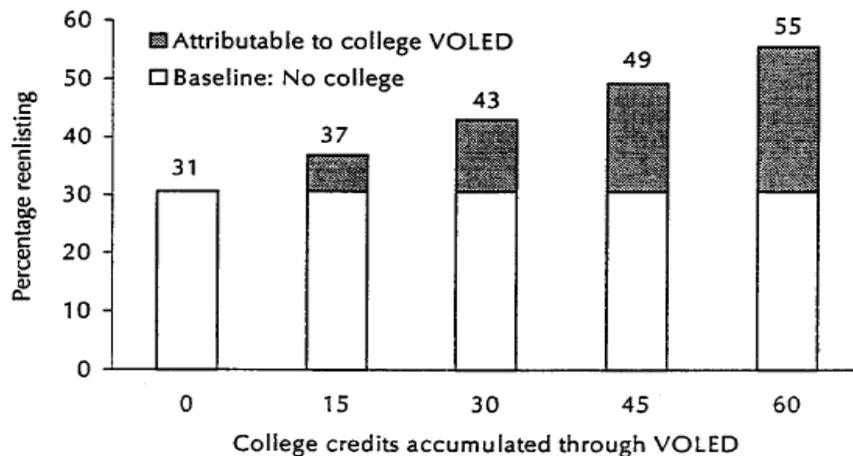


Figure 2. The Effect of Participation in College Education on Reenlistment. (First reenlistment, FY92 cohort.) (From: Garcia et al., 1998)

As shown in Figure 3, promotion to E5 within five years was 12 percent higher for those with 15 college credits and 23 percent higher for 60 college credits.

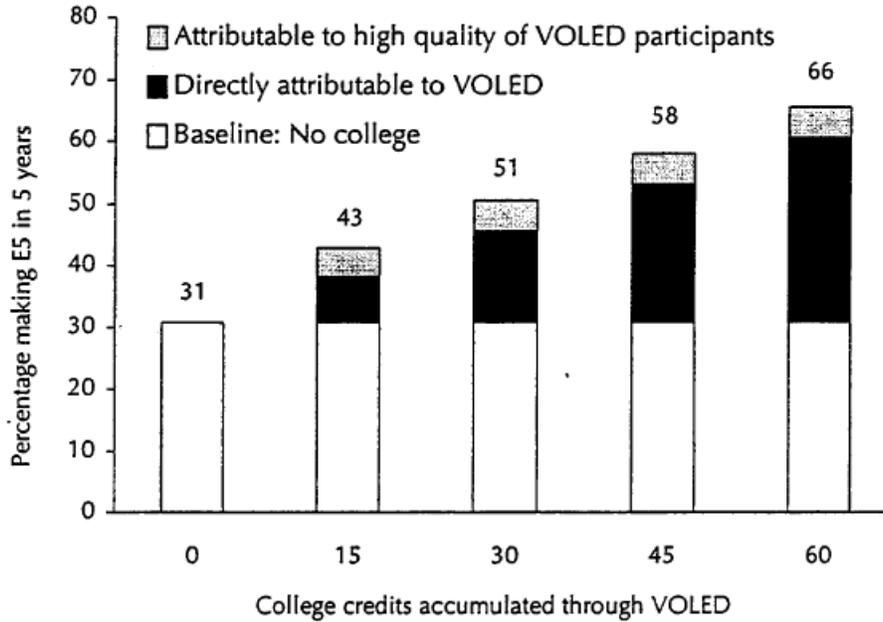


Figure 3. Effect of VOLED Participation on Promotion. (Cohort FY92 tracked for five years. Based on regression analysis) (From: Garcia et al., 1998)

An analysis of the paygrade attained after five years of service was conducted using an ordered probit model. The dependent variable for the model was the natural order of the five possible paygrade outcomes (E1-E5). The estimates of the ordered probit model are obtained via maximum likelihood estimation (Garcia, 1998, 54).

Selection bias was taken into account because of the possibility that sailors who participate in VOLED self-select themselves into the program. This was corrected by employing a Heckman two-step procedure. As an instrumental variable (IV) in the first stage the authors used the

member's participation in academic counseling aboard ship. They claimed that this variable predicted VOLED usage, but did not belong in the structural equation. The selection-corrected estimates were then interpreted as causal effects of VOLED participation. Judging by the magnitude and the significance of the Inverse Mills Ratio, the authors were able to separate the effect of motivation versus VOLED on promotion (Garcia et al., 1998, 51-53).

There were four main weaknesses of the CNA study. These weaknesses were discussed by Buddin (2005) in his later study that attempted to replicate and improve the CNA study. First, sailors who did not complete their obligated service (those who attrite prior to the end of the first term) were included in the sample used by CNA for the reenlistment analysis. This caused an upward bias in the estimated effect of VOLED on retention, since sailors who attrite would not have the same opportunity to use the VOLED program as those who survive.

Second, when compiling their data set, CNA included all areas of VOLED (i.e., TA, PACE, and academic skills). Participants in each component of VOLED would have different goals, so each type of VOLED may have different effects on retention. Aggregating all components tends to obscure the individual retention effects of each component.

Third, the instrumental variable (IV) used in the model may not have been a reliable instrument. CNA used participation in academic counseling onboard ship as their IV. This excludes individuals who were assigned to a shore-

based facility, who constitute the vast majority of VOLED users. Also, only a very small percentage of sailors used academic counseling.

The fourth weakness was that CNA attempted to project the impact of the VOLED program beyond the range of the data. This is misleading because initial training demands make it very unlikely that sailors will have opportunities to earn 60 credit hours during their initial enlistment. In fact, the average credits during this time frame are only 1.2 credit hours per sailor.

The analysis in this thesis will look at the effects of VOLED on enlisted sailor retention and promotion. The sample excludes sailors who did not complete their obligated service to avoid the potential bias encountered in the CNA study. It will also show the potential bias when the sample incorrectly includes attrites.

**B. "TUITION ASSISTANCE USAGE AND FIRST-TERM MILITARY RETENTION," RAND (BUDDIN & KAPUR, 2002)**

**1. Introduction**

RAND's National Defense Research Institute conducted a study on the effects of Tuition Assistance (TA) on retention in two areas. First, they looked at the factors that predict who participates in TA. Second, they evaluated the effect of participation in TA on first-term retention. This was done by comparing individuals who used TA and those who did not and whether the individuals who participated in TA were more likely to reenlist than those individuals who did not use TA for college courses.

## **2. Data and Methodology**

RAND used first-term enlistees in the Navy and Marine Corps who had completed their first term of obligated service and were contemplating a second term during the end of FY97 and the beginning of FY98. Additionally, the data contained information on the demographic background of these individuals, on whether they participated in TA in the two years prior to their reenlistment decision, on their deployments, and additional qualitative information gathered through 300 focus group interviews. The analysis sample excluded service members who left active duty prior to the end of their obligated service. This ensures sailors make reenlistment decisions are those who had the same period of eligibly to participate in the TA program.

Variables for deployment schedules were included in the models to account for the fact that individuals who were deployed had less opportunity to use the TA program than those who were not. Although the Program for the Afloat College Program (PACE) is available on ships while deployed, RAND still included deployments because being deployed can hinder the circumstances for participating.

To evaluate the effect of TA usage on retention, the authors obtained estimates by both bivariate probit and propensity score matching. These models were used to complement each other and to determine if the estimated effect of the TA program were robust (Buddin et al., 2002).

The bivariate probit model consisted of two equations, one for TA usage and one for retention. This model considers the endogeneity of TA usage by including instrumental variables (IVs) in the TA usage equation. The

IVs were based on the assumption that the selected variables (the member's distance from a four-year college at accession and the number of colleges offering courses on base) affect TA participation but do not affect retention.

A second approach used propensity score matching, creating a control group of sailors who were similar to TA users but who did not use TA. Retention models were then estimated via OLS (Buddin et al., 2002, 15). Propensity score matching has the advantage that the estimates do not depend on distributional assumptions of the variables.

### **3. Findings**

RAND found an overall TA usage rate of 8 percent for first-term sailors and 13 percent for first-term Marines. As shown in Figure 4, the results showed that TA participants are less likely to reenlist in the Navy and Marine Corps after their first term. Overall this varies very little with regard to whether an individual participated in TA. Many of the demographics had similar effects on the TA participation decisions of both Navy and Marine Corps personnel (Buddin et al., 2002, 24).

However, the results did show that TA usage varies considerably between men and women and by deployment status. Figure 5 shows the difference in TA usage rates by gender and deployments. Women in both the Navy and Marine Corps are more likely than men to participate in TA. It is also seen that individuals are less likely to use TA when deployed. This difference in women's usage and the lack of usage during deployment may possibly be due to the fact that women are less likely than men to deploy (Buddin et al.,

2002, 25). Their statistical model used a multivariate approach that sorts out these effects and isolates each contributing factor while holding demographic and military factors constant (Buddin et al., 2002, 26).

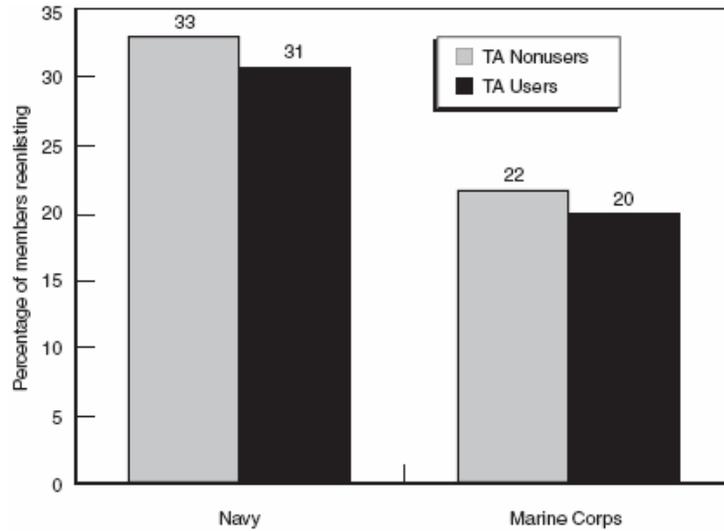


Figure 4. Patterns of First-Term Retention by TA Usage in the Navy and Marine Corps (From: Buddin et al., 2002)

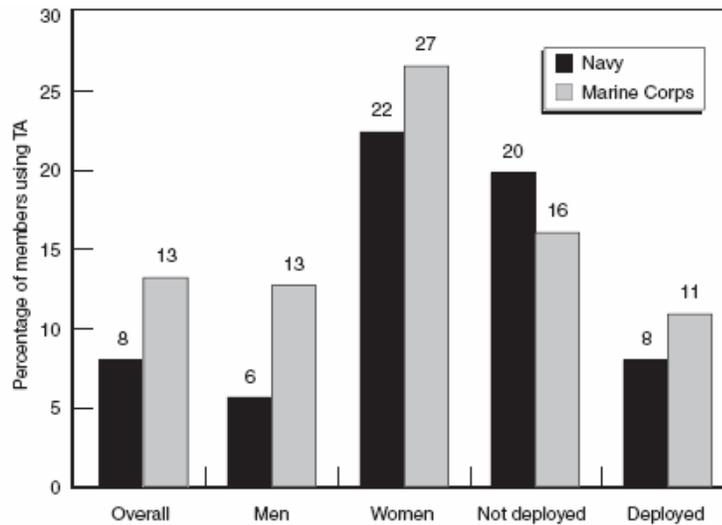


Figure 5. Patterns in TA Usage by Gender and Deployment Status in the Navy and Marine Corps (From: Buddin et al., 2002)

**a. U.S. Marine Corps Results**

The results of the RAND analysis show that 13 percent of Marines are likely to use the TA program within the last 24 months of their first term of service and that Marines who participate in TA had a 6 percent lower reenlistment rate than those who did not. RAND felt that the costs of the program may or may not outweigh the benefits of the program and that the program is not working as a retention tool for the Marine Corps (Buddin et al., 2002, 29-30).

Figure 6 shows that the unadjusted reenlistment rate for TA participants is 2 percentage points lower than for individuals who did not participate in TA. These results are misleading because some members may be inherently prone to participate in TA and reenlist. The bivariate probit model and propensity score model were used to show the direct contribution of TA participation on reenlistment. Using the propensity score model, this difference was found to be 4 percentage points and with the bivariate probit it shows a propensity for users to reenlist at a rate 6 percent lower than non TA users (Buddin et al., 2002, 37-38).

Buddin (2002) believes that these results provide consistent evidence that members of the Marine Corps who use TA are prone to leave for civilian employment or education alternatives.

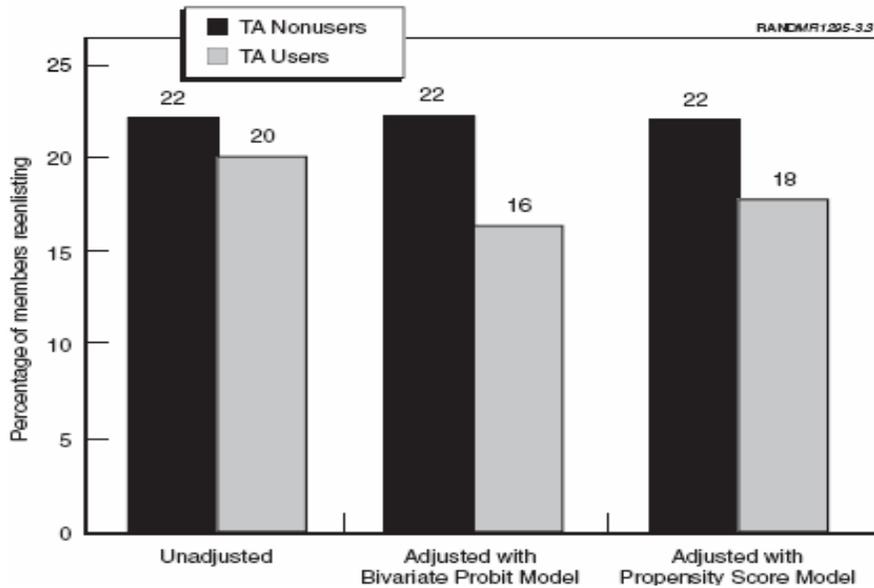


Figure 6. Estimated Effect of TA Usage on First-Term Reenlistment in the Marine Corps (From: Buddin et al., 2002)

***b. U.S. Navy Results***

The results showed that about 8 percent of sailors used TA during the last 24 months of their first term. It is assumed that this figure is low due to the fact that most sailors during this time period are assigned to sea duty, which reduces their opportunity to participate in the TA program.

The bivariate probit model results for the Navy showed that individuals who used TA were less likely to reenlist than those who did not participate in the TA program. The probability of an individual deciding not to reenlist was 9 percentage points lower for participants of the TA program (Buddin et al., 2002, 39), than for non-users.

Figure 7 shows that first-term sailors who participated in TA are less likely to reenlist than non-participants. Both models have been adjusted for differences in military characteristics and demographics that may possibly contribute to retention (Buddin, et al., 2002, 47). The bivariate probit model showed that non-TA participants reenlisted at a rate 9 percentage points higher than participants. In the propensity score model the reenlistment rate of users was 11 percentage points lower.

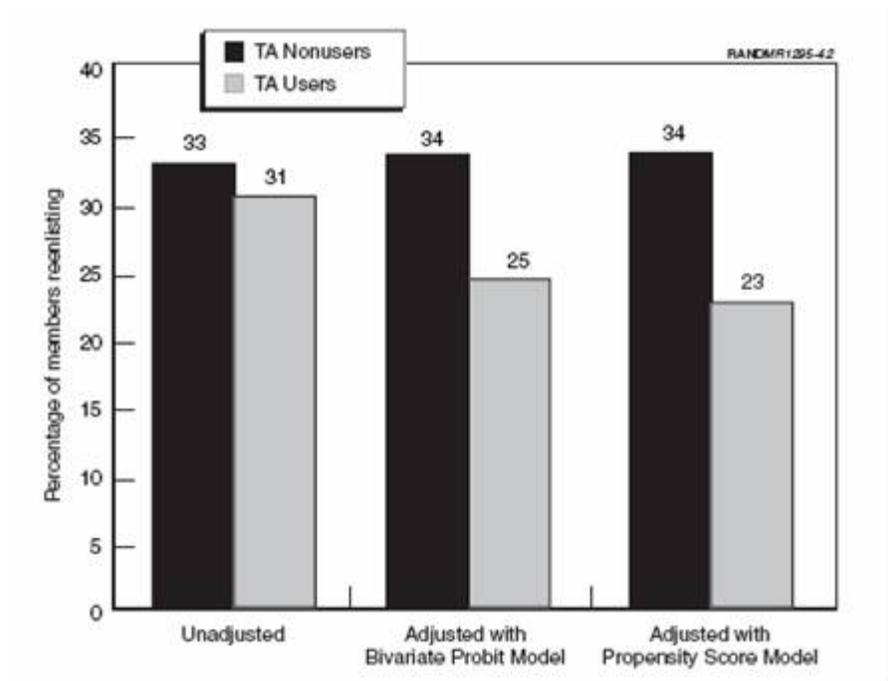


Figure 7. Estimated Effect of TA Usage on First-Term Reenlistment in the Navy (From: Buddin et al., 2002)

This result shows that participating in TA does not guarantee a sailor will reenlist. This leads RAND to conclude that TA users are more likely to leave the Navy for better job opportunities that are available due to their increased education levels.

RAND's results vary from CNA's dramatically in showing that TA participation does not appear to be associated with higher retention. This difference in results is most likely due to the fact that CNA's data set included individuals who did not complete their term of obligated service, effectively biasing upward the outcome of TA usage. The evidence from the RAND study shows that Marine Corps enlisted personnel who participate in the Tuition Assistance program also are not as likely to reenlist.

CNA's study found that individuals who accumulated 60 college credits (equivalent to an Associate's degree) or more are significantly more likely to stay in the Navy (Garcia et al., 1998, 33). However, RAND's study found that the median number of credit hours earned during the last 24 months of their first term was only six semester hours. This means it is nearly impossible for a first-term sailor to earn the required 60 semester hours. Accumulating college credits at this rate does not put participants on the fast track to earn a degree while in the military (Buddin et al., 2002, 26).

**C. "THE EFFECT OF TUITION REIMBURSEMENT ON TURNOVER: A CASE STUDY ANALYSIS," NATIONAL BUREAU OF ECONOMIC RESEARCH (FLAHERTY, 2007)**

**1. Introduction**

Flaherty's case study tested the theory of whether providing general education outside of the workplace increases employee retention. Firm-specific human capital is defined as having value only to the current employer,

while general human capital is valuable to both current and future employers. Applying Becker's theory of human capital, Flaherty predicts that employees will bear the full cost of general-skills training. Since employers face a risk of not getting a return on their investment in general training, employees often pay for their training directly by taking lower wages while attending the training (Flaherty, 2007, 2).

Many firms now offer tuition reimbursement programs for their employees who attend accredited academic institutions. Flaherty (2007) states that the primary reason employers offer these programs is so they can reduce employee turnover. Employees are typically eligible for this program after being employed with the firm for only six months. Only 20 percent of the firms surveyed had eligibility at one year of service.

Flaherty (2007) argues that workers have an incentive to invest in general human capital because they increase their opportunity to receive wages equal to the value of their marginal product in a competitive labor market. Firm-specific human capital reduces turnover as it maintains the employer-to-employee relationship. When the skills learned are general in nature, this relationship does not exist since employees can now take their new training and transfer it to other employment (Flaherty, 2007).

Flaherty (2007, 3) analyzed survey results of employer-provided training practices for a cross-section of non-agriculture private businesses that was conducted by the Bureau of Labor Statistics from May to August of 1995. Table 5 shows the mean characteristics of the surveyed firms

and whether they offered an academic tuition reimbursement program. Flaherty (2007, 4-5) found that firms with this program tend to offer increased benefits, have higher wages, and reduced separation rates, and employ more workers than firms without the program. Table 5 also shows that firms with the reimbursement program are more likely to hire trainers from outside of the firm and employ trainers from inside the firm (Flaherty, 2007).

Table 5. Mean Characteristics of Responding Establishments on Offering Tuition Reimbursement (From: Flaherty, 2007)

<b>Means of Firm Characteristics (SEPT95)</b>	<b>Full Sample</b>	<b>No Tuition Reimbursement</b>	<b>Offer Tuition Reimbursement</b>
<b>Number of Employees</b>	668	210	926
<b>Average Monthly Wage*</b>	\$2,966	\$2,470	\$3,267
<b>One of Multiple Establishments (0 or 1)*</b>	40.21%	31.33%	45.59%
<b>Separation Rate</b>	11.00%	16.89%	7.68%
<b>Total Number of Benefits (0 to 11)</b>	6.1	4.9	6.8
<b>Training Programs</b>			
Tuition Reimbursement Program	63.95%	-	100.00%
Hire In-house trainers	45.13%	23.47%	57.48%
Hire trainers from outside the firm	72.18%	50.67%	84.15%
<b>Occupation Composition</b>			
Managers	10.24%	8.65%	11.13%
Professionals	14.68%	8.14%	18.37%
Sales	7.80%	10.32%	6.39%
Administrative Support	13.37%	10.33%	15.08%
Service	7.97%	12.95%	5.16%
Production	45.90%	49.51%	43.87%
<b>Number of Firms</b>	1057	381	676

\*Not available for all States (N = 838; 522 offer tuition reimbursement and 316 do not).  
 Column 3 Significantly Different from Column 4 at 1% Level

The results from this survey also showed that 61 percent of firms who employ 50 or more employees offer tuition reimbursement programs. These survey results are comparable to the 1994 National Employer Survey of Education

Quality in the Workforce results that found 47 percent of firms who employ 20 or more employees offer reimbursement programs (Flaherty, 2007, 4).

Flaherty's statistical analysis of retention was conducted using data from a Case Study Program (CSP) of a single firm in the education sector that had implemented a tuition-reimbursement program in September 1999. Employees in this data set were employed between December 15, 1999 and September 1, 2001. The data included gender, race, age, start date, job characteristic, salary, as well as amount of tuition reimbursed and degree type.

## **2. Findings**

The statistical analysis tested for the relationship between employee turnover and participation in a firm's tuition reimbursement program. Flaherty found that offering general-skills training via the tuition reimbursement program significantly increased retention. Tables 6 and 7 show tabulations of the retention behavior of participants and non-participants in the tuition-reimbursement program. The data demonstrates that employees who participate in the program are less likely to leave the firm as compared to those employees who do not participate (Flaherty, 2007, 12-14).

Table 6. Retention of Participants (Unconditional) (From: Flaherty, 2007)

Year Hired	Number	% Leave before 3 Years	% Leave before 4 years	% Leave before 5 years
1999 or before	253	13.83%	20.95%	30.43%
2000	74	11.84%	19.74%	32.89%
2001	58	24.14%	31.03%	44.83%

Table 7. Retention of Non-Participants (Unconditional) (From: Flaherty, 2007)

Year Hired	Number	% Leave before 3 Years	% Leave before 4 Years	% Leave before 5 Years
1999 or before	5621	33.45%	39.35%	44.39%
2000	1378	41.51%	51.16%	58.85%
2001	983	41.20%	50.05%	56.97%

Table 8 gives the marginal effects from the bivariate probit maximum likelihood estimation of employees who were hired before the September 1999 program implementation. The table shows that participation in the program reduces the probability of separation, within five years, nearly 52 percent (Flaherty, 2007).

Table 8. Probability of Participating in Tuition Reimbursement Program and Separating from Employer before 5 years (From: Flaherty, 2007)

Probability of Pursuing an Graduate Degree in CSP and Separating from Employer before 5 years				
Bivariate Probit Model	Pr(Grad=1)		Pr(S=1)	
Hired Before Sept., 1999	dF/dX	St. Error	dF/dX	St. Error
Graduate Degree in CSP			0.2198	0.1951
Years of Service	0.0009	0.0007	-0.0339	.0026**
Years of Service - Squared	0.0000	0.0000	0.0008	.0001**
Female	0.0048	0.0033	0.0046	0.0152
Age	-0.0004	0.0012	-0.0588	.0046**
Age-squared	0.0000	0.0000	0.0006	0.0001**
Black	0.0116	0.0084	0.0237	0.0305
Hispanic	-0.0011	0.0052	-0.0560	.0258*
Asian	-0.0108	.0032**	-0.0790	.0180**
Non-Supervisor (Not Exempt)	-0.0097	.0034**	-0.0197	0.0164
Weekly Wage (in thousands), \$2001	-0.0106	.0044*	0.0219	.0102*
Participation in CSP by Peers (%)	0.0065	.0014**		
Correlation Between Errors	-0.4449	0.2120		
Log-Likelihood	-4200.2			
Observations	5826			

\* significant at 5% level \*\* significant at 1% level

The type of undergraduate degree pursued by the employee does change the separation rates. Figures 8 and 9 show that the probability of an employee leaving within five years for those hired before the implementation of the program is reduced by 40 percent, and is reduced by 60 percent for those hired after implementation (after September 1, 1999). For those employees who were hired after September 1, 1999 who pursued a graduate degree, their probability of leaving within five years is reduced by 50 percent (Flaherty, 2007, 18-19).

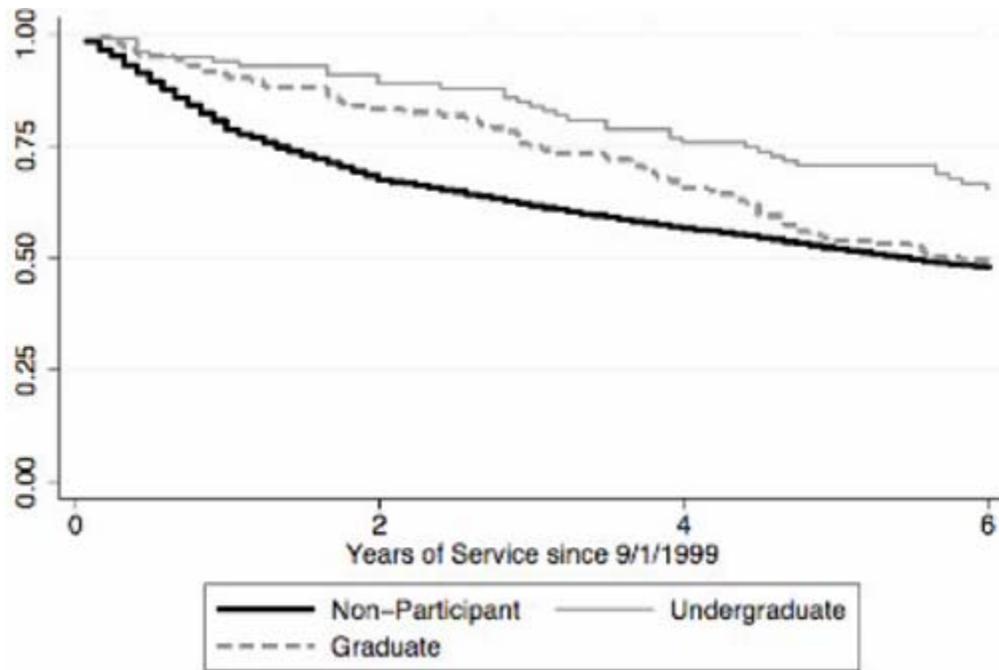


Figure 8. Survival Rates by Degree for Employees Hired Before September 1, 1999 (From: Flaherty, 2007)

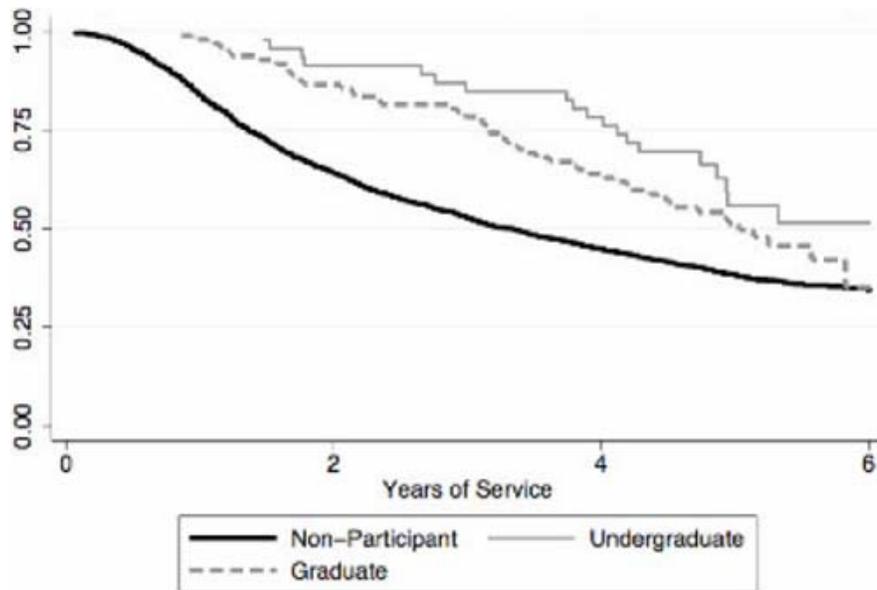


Figure 9. Survival Rates by Degree for Employees Hired After September 1, 1999 (From: Flaherty, 2007)

The correlation between the error terms in both models shows there is an unobserved variable affecting usage of the

tuition reimbursement program and leaving the firm. Flaherty states that her case study illustrates that workers who were predisposed to leave the firm are also more likely to participate in the tuition-reimbursement program. This suggests that these individuals intended to acquire skills through the program to make career changes (Flaherty, 2007, 21). It was noted that participation in the tuition-reimbursement program greatly reduced the separation rate. Flaherty (2007) finds that:

This is consistent with participants accumulating firm-specific human capital during the time period before they become eligible and during participation in the program, as well as possibly due to the increase in productivity of firm-specific skills from the interaction of these skills with general skills acquired through tuition reimbursement. Because those who participate stand to gain the most from participation in terms of wage increases and promotion opportunities, tuition reimbursement programs are effective at lowering the separation rate of the most ambitious and marketable employees.

Flaherty's results indicate that participation in the tuition-reimbursement program increases employee retention of those who were hired after September 1, 1999 when the program was implemented. It also shows increased retention for those employees who were hired before the implementation, and who then chose to utilize the program.

The results of this case study contradict the standard human-capital theory that a firm's investment in tuition-reimbursed general training increases turnover. The results indicate that individuals who participate in these programs have a lower rate of separation.

D. "IMPACT OF THE ARMY CONTINUING EDUCATION SYSTEM (ACES) ON SOLDIER RETENTION AND PERFORMANCE: DATA ANALYSES," UNITED STATES ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES (STICHA ET AL., 2003)

**1. Introduction**

The U.S. Army Research Institute conducted an analysis on the Army Continuing Education System (ACES) and its impact on soldier retention and performance. Some of the ACES components are TA, high school completion, academic skills training (FAST), and the Servicemembers Opportunity Colleges Army Degree (SOCAD) (Sticha et al., 2003). These programs are designed to meet the educational needs of soldiers and apply their Army skills to obtain academic credentials needed for a career outside of the Army.

The analysis focused on the effect of TA and FAST on first-term attrition and reenlistment (Sticha et al., 2003, 26). They also evaluated participation based on observed performance ratings by supervisors, the time it took to promote to their current rank, and the points soldiers earned toward their next promotion.

The FAST program, through ACES, aims to improve soldiers' education for their military career, while the TA program is looked at to both enhance their military career and make them more marketable for a career outside of the Army (Sticha et al., 2003, 27).

**2. Data and Methodology**

The Army Research Institute used an evaluation approach, using lessons learned from previous studies

performed by other services to study the effect of offering off-duty education on retention and soldier performance.

The sample used in this analysis contained enlisted soldiers who entered the Army from FY96 to FY98 and who were located at Army stations that held automated records of ACES participation. This data was combined with demographic information, selective reenlistment bonus (SRB) data, Montgomery GI Bill information, loss data, education background, and accession date (Sticha et al., 2003, 29). Soldiers in this data had to have a three-year enlistment, and to have completed at least two-and-a-half years of service to be considered eligible.

The data contained also active duty soldiers who completed a three- or four-year contract during October 1995 through September 2001 and were stationed where automated records of ACES programs was maintained. The resulting analysis database contained 43,831 records (Sticha et al., 2003, 29).

The bivariate probit model included whether the soldier had a three- or four-year contract. This was used to control for differences in military propensity. The analysis concentrated on two retention measures: (1) whether soldiers finish their first term of enlistment, and (2) whether soldiers who complete their first-term of service reenlist.

The bivariate probit model contained two equations—a TA participation equation and reenlistment equation—which allowed the error terms of the two equations to be correlated (Sticha et al., 2003, 34). The authors also

attempted to ensure that soldiers who reenlisted and those who did not had the same opportunity to participate in off-duty education.

### 3. Findings

The retention measures analyzed were whether soldiers completed their first enlistment and whether soldiers who completed their first term of service reenlisted. The reenlistment analysis investigated the impact of TA and FAST participation on a soldier's likelihood to reenlist. The focus was on TA since it is a much larger program and more likely to have an effect on retention.

Table 9. Unweighted Sample Statistics for Soldiers in the Attrition Analysis (From: Sticha et al., 2003)

Contract Year	Sample Size	Rate of Program Participation Through Beginning of Year		Attrition Rate
		TA	FAST	
<b>Year 1 Attrition Analysis</b> (analysis includes soldiers who reach 6 months of service)				
2-year contract	1,677	2%	1%	6%
3-year contract	13,987	1%	1%	11%
4-year contract	12,852	1%	1%	12%
<b>Year 2 Attrition Analysis</b> (analysis includes soldiers who reach 12 months of service)				
3-year contract	12,944	7%	5%	18%
4-year contract	11,678	8%	4%	19%

Table 9 displays unweighted descriptive statistics. Of the 28,516 soldiers in the sample, 1 percent participated in both the TA and FAST program during the first six months of their enlistment. Eleven percent of the soldiers separated between months seven and twelve of their obligated service. This rate is twice as high as soldiers who complete their contract of three or four years. (Sticha et al., 2003, 42)

Soldiers with shorter contracts had less opportunity to participate in TA than soldiers with longer contracts, as predicted. The FAST program occurs early in a soldier's career. So after two years of service contract length had no effect on FAST participation rates. Soldiers with longer contracts reenlisted at a slightly higher rate than those with shorter contracts (Sticha et al., 2003, 32).

Table 10 provides descriptive statistics from the reenlistment analysis sample. The overall reenlistment rate for the sample was 35 percent, with participation in TA at 28 percent and FAST participation at 21 percent. Soldiers with longer contracts participated in the TA program at a higher rate than those with shorter obligations, as the authors expected due to the increased opportunity for these individuals to participate.

Table 10. Unweighted Sample Statistics for Soldiers in the Reenlistment Analysis (From: Sticha et al., 2003)

Soldier Characteristic	Sample Size	Rate of Participation During First Enlistment		Reenlistment Rate
		TA	FAST	
<i>Overall</i>				
All	10,597	28%	21%	35%
<i>Initial Contract Length</i>				
3 Years	7,762	24%	22%	34%
4 Years	2,835	39%	18%	37%
<i>Grade at ETS</i>				
E1	130	20%	17%	13%
E2	551	18%	15%	23%
E3	4,141	23%	21%	36%
E4	5,642	32%	21%	36%
E5	133	54%	20%	47%
<i>Sex</i>				
Male	9,254	26%	20%	35%
Female	1,343	44%	26%	38%
<i>Marital Status at ETS</i>				
Single	9,170	28%	21%	33%
Married	1,427	30%	22%	46%
<i>Race</i>				
Black	2,874	29%	28%	42%
White	6,494	26%	16%	32%
Other	1,229	33%	28%	36%
<i>Hispanic Ethnicity</i>				
Hispanic	1,234	33%	29%	36%
Non-Hispanic	9,363	27%	20%	35%
<i>AFQT Category at Accession</i>				
I	251	36%	8%	23%
II	2,794	33%	11%	30%
IIIA	2,609	32%	17%	37%
IIIB	4,591	23%	29%	37%
IV	352	19%	31%	44%
<i>Highest Education at Accession</i>				
GED	1,350	24%	14%	42%
HS Graduate	8,663	28%	20%	34%
HS+	584	29%	22%	35%
<i>Accession Calendar Year</i>				
1995	804	28%	27%	29%
1996	4,072	32%	19%	34%
1997	3,675	28%	21%	34%
1998	2,046	20%	15%	41%

Bivariate probit model results are presented in Table 11 and show an estimated 7.6 percent increase in reenlistment rates of TA users and a 1.4 percent increase for FAST participants. The marginal effects are presented in column 1 of Table 11 (Sticha et al., 2003, 37). Significant and positive predictors of the reenlistment rate were found to be: TA and/or FAST participation, SRB level, having a four-year contract, being older, being Black, being male, being married, having a lower AFQT score, having a GED at accession, and having a higher pay grade at expiration of time of service.

These results were compared to the reenlistment effects of other programs and showed that the reenlistment effect was equivalent to a three-level increase in SRB. The ACES study found statistically significant positive effects on participation in the TA program on reenlistment (7 percent increase in likelihood of reenlisting) and attrition of first-term soldiers (using TA decreased the likelihood of attrition) (Sticha et al., 2003, 71).

The effects on soldier performance and promotion were also found to be positive. Enlisted soldiers in pay grades E5 and E6 with more semester hours earned through TA received higher performance ratings from supervisors. Additionally, these individuals tended to have more promotion points associated with their education that associated TA participation with early promotions to E6 (Sticha et al., 2003, 72)

Table 11. Bivariate Probate Results (From: Sticha et al., 2003)

Variable	Marginal Effect	Reenlistment Equation Coefficient	TA Equation Coefficient	Mean Value
TA participation	.076**	.964**		.279
FAST participation	.014**	.210**		.209
SRB	.006**	.093**		.613
Initial contract is 4 years (reference category is 3 years)	.022**	.149**	.159**	.268
Age at ETS	.0005	.125*	-.004	22.5
Female	.013	-.163**	.347**	.127
Married	.020**	.246**	.028	.135
Black	.023**	.197**	.123**	.271
Other Race	.011**	-.010	.160**	.116
Hispanic	.010	-.042	.180**	.116
AFQT category I (reference category is IV)	-.010	-.494**	.336**	.024
AFQT category II	.000	-.300**	.291**	.264
AFQT category IIIA	.007	-.150**	.242**	.246
AFQT category unknown	.006	.165*	-.062	.033
GED/Equiv. Exam	.014**	.323**	-.099*	.127
Post-high school education	-.014**	.005	-.251**	.055
Grade at ETS is E1 (reference category is E4V)	-.028**	-.613**	-.231	.012
Grade at ETS is E2	-.025**	-.285**	-.299**	.052
Grade at ETS is E3	-.008*	.036	-.160**	.391
Grade at ETS is E5	.054**	.044	.519**	.126
Field Artillery (CMF 13)	.003	-.119**	.160**	.223
Air Defense Artillery (CMF 14)	-.176**	-.115	-.229**	.068
Armor (CMF 19)	-.015**	-.012	-.260**	.057
Signal Operators (CMF 31)	-.002	-.099	.063	.084
Mechanical Maintenance (CMF 63)	-.008	-.121*	-.011	.084
Administration (CMF 71)	.040**	-.211	.690**	.016
Petro and Water (CMF 77)	-.008	-.201**	.058	.053
Transportation (CMF 88)	.020**	.452**	-.138	.040
Supply and Services (CMF 92)	.010	-.049	.187**	.165
Accession year is 1995 (reference category is 1996)	-.017**	-.111*	-.219**	.076
Accession year is 1997	-.001	-.035	.017	.345
Accession year is 1998	.006	.137**	-.037	.193
Intercept		-.975**	-1.039**	
State per capita expenditures for higher education	.00004		.0006**	452

\* p < .05; \*\* p < .01

However, due to the fact that the sample excluded individuals who were OCONUS (or were assigned to shore-installations during their first-term that did not have the automated data gathering program), the results may not be representative of the Army first-term population as a whole.

Due to this small sample size, the results of these findings must be considered provisional (Sticha et al., 2003, 42-43).

#### **E. SUMMARY**

Table 12 summarizes the results of the four studies reviewed above. Two studies—one by CNA, one for the Army (ACES)—found positive retention effects of the services TA program. The positive effects of TA on reenlistment found in the Army ACES results are smaller than the positive effects found in the CNA study; however, they are positive in contrast to the negative results found by RAND. The CNA study's results are complicated due to the fact that personnel who stay through their obligated service and those who do not are considered as having equal opportunity to utilize the TA program, which is an inaccurate assumption. Both ACES and RAND attempted to control for differing lengths of service and that some service members had greater opportunity to participate in the TA program. RAND corrected for this by only including in their analysis sample personnel who completed four years of obligated service, whereas ACES limited their sample to those in the first six months of service.

Table 12. The Effect of TA Usage and Other Explanatory Variables on Retention

STUDY	Effect of TA use on Retention	Positive Effect of Explanatory Variables on Retention					
		Gender	Enlistment Age	Pay Grade	Education Level at Enlistment	Aptitude (AFQT)	Marital Status
Garcia and Joy (1998)	+6 pct pts*	Female	Older	Higher	Higher	Higher	**
Budkin and Kapur (2002)	-9 pct pts	Female	**	Higher	Higher	Higher	Single
Sticha et al. (2003)	+7.6 pct pts	Female	Older	---	Higher	Higher	Married
Flaherty (2007)	Positive Effect***	Male	Younger	N/A	---	N/A	---

\* Six percentage point increase for 15 credits and increasing with number of credits taken  
 \*\* Not statistically significant  
 \*\*\*Looked at likelihood of leaving versus staying. Found general education reduced likelihood of leaving by over 50 pct pts.  
 N/A - Not applicable to study

THIS PAGE INTENTIONALLY LEFT BLANK

## IV. QUICK POLL RESULTS

### A. BACKGROUND

In 2006, the Naval Education and Training Command (NETC) tasked Navy Personnel, Research, Studies and Technology (NPRST) with conducting a Quick Poll on Enlisted Education Requirements (EER) and related issues. This was brought about by concerns for the education requirement that candidates for the E8 (Senior Chief) promotion boards, beginning with the FY11 E8 selection board, have acquired an Associates degree.

The Quick Poll survey is important to this study because it gives insight into sailors' beliefs regarding the importance of their educational development. The Quick Poll provides information on sailors' perceptions of barriers to gaining education, and by extension via TA. This qualitative data helps to complete the picture of why sailors choose to use TA, supplementing the quantitative data of who uses TA presented previously, and what the effect of TA participation is on job performance.

In November 2004, the Chief of Naval Operations announced the implementation of the Professional Military Education (PME) Continuum. The PME's objective is to provide future enlisted leaders with a knowledge base that will better prepare them to manage tomorrow's Fleet and be able to assume key Naval and Joint leadership roles. This will be accomplished by integrating Navy-Specific Professional Military Education (NPME), Joint Professional

Military Education (JPME), Leadership Development courses, and advanced education (NAVADMIN 263/04, 2004).

Joint Professional Military Education (JPME) provides sailors with an understanding of the principles of serving in a Joint status and supports SEAPOWER 21. The Leadership Development courses are designed to develop practical skills to enhance the sailor's performance as a leader in senior positions and roles (NAVADMIN 263/04, 2004).

Advanced education can be earned through degree programs, by taking courses that meet professional requirements, and/or earning certifications. This will continue to add to the ongoing development of technical and analytical knowledge, critical thinking skills, and competencies to lead (NAVADMIN 263/04, 2004).

In August 2005, the specifications for advanced education were announced by the Chief of Naval Operations and Chief of Naval Education and Training Command. They stated that in order to support the Navy's responsibility of ensuring sailors are adequately equipped for future challenges, a rating-relevant Associate's degree was now a requirement for eligibility for advancement to Senior Chief Petty Officer, commencing with the FY11 selection board (NAVADMIN 203/05, 2005) for both the active duty and reserve enlisted sailors.

The Senior Enlisted Education Initiative—Associate's Degree for E8 board eligibility was focused on rating-relevant education that would improve a sailor's performance and better prepare senior enlisted leadership for operational challenges. These rating-relevant degrees were to complement the skills and knowledge of the sailor in

their current job field, rating, and/or warfare specialty. With this added initiative, the demand for TA is directly affected.

## **B. QUICK POLL DATA AND METHODOLOGY**

The Enlisted Education Quick Poll was conducted from October 3 through October 10, 2006 to assess the concerns and opinions of the enlisted sailors on meeting the requirement of an Associate's degree for eligibility for advancement to Senior Chief Petty Officer (E8). The targeted survey population was E6 and E7 sailors; however, the population was expanded to enlarge the perspective by including paygrades E2-E5. The response rate was 32% of the 6,109-eligible sample who received the poll (Uriell, 2006).

The purpose of the Quick Poll survey was to determine the attitudes and opinions on educational goals, perceived barriers to advanced education, and the EER requirement of an Associate's degree for all E7s going up for advancement to E8. Thus, the responses to the Quick Poll survey provide background information on the VOLED program.

In order to generalize the findings to the entire Navy enlisted population, the results were weighted statistically. Seventy-one percent of the respondents were E2-E5s and only 29 percent were from the targeted population of E6-E7s (Uriell, 2006). Of the entire sample population, 50 percent had some college credit, 8 percent had earned an Associate's degree, and 5 percent had earned a Bachelor's degree or higher.

Figure 10 shows the variation in college attendance by enlisted community and paygrade. The table shows that

college-course-taking rises with pay grade. Seventy-two percent of the E6 and E7s in the sample reported having attended some college and 26 percent were currently attending classes.

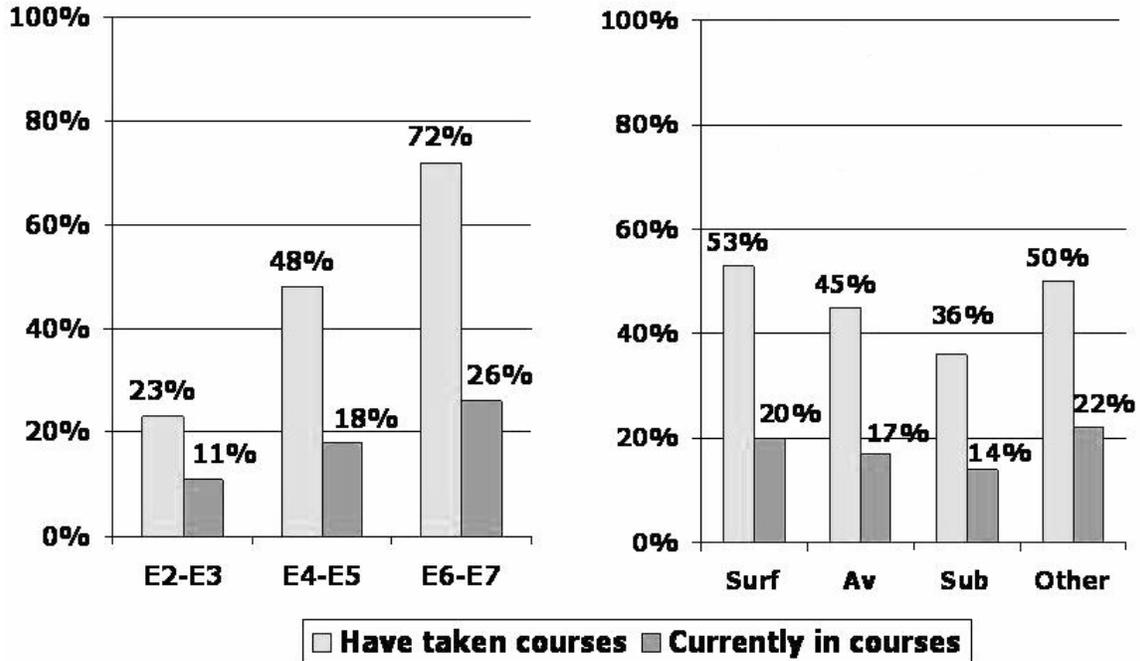


Figure 10. College Attendance While in the Navy: Paygrade and Community (After: Uriell, 2006)

### C. FINDINGS

The Quick Poll survey found that 89 percent of the E6-E7s felt a college education would help them personally and 84 percent thought it would benefit them professionally.

Although 64 percent of the E6-E7s felt their commands encouraged them to obtain a college degree, only 21 percent agreed it was easy to earn college credit while serving in the Navy. Of the E6s and E7s, 83 percent found it difficult

to schedule college courses and 76 percent felt a great deal of conflict between their educational needs and duty requirements (Uriell, 2006). Figure 11 lists the barriers faced by many of the Sailors in taking college degrees. The most common factors inhibiting sailors from earning their college degree are high OPTEMPO along with conflicts between work and education.

	Percent saying "Great Extent"/"Very Great Extent"		
	E2-E3	E4-E5	E6-E7
Lack of time/High OPTEMPO	43	48	50
Conflict between work and education	44	51	49
Family responsibilities	20	24	31
Annual tuition assistance limit	20	24	27
Computer/Internet Access	27	29	26
Costs (tuition, books, etc)	21	20	19
Lack of study location	18	21	14
Prerequisites/Access to needed courses	16	20	13
Supervisor support	22	21	12
Completing paperwork/enrollment process	16	19	11
Communicating with academic institution	16	17	11
Communicating with Navy College Office	16	14	9
Understanding educational process	14	10	8

*Education Quick Poll Question 10, sorted by E6-E7 paygrade group; those indicating "Not Applicable" not included*

Figure 11. Barriers to Obtaining College Degree:  
Paygrade Group (From: Uriell, 2006)

The results of this Quick Poll Survey can be misleading. They state that 93 percent of the E6-E7s were aware of the Enlisted Education Requirement (EER) and that 72 percent of the E6-E7s plan on meeting the EER (Uriell, 2006). The high percentage can be attributed to the fact that these two paygrades are immediately affected by the new requirement and many E6-E7s do want to complete the requirement to be eligible for their upcoming advancement boards. Some of the results are contradictory by stating

that few sailors have indicated difficulty completing college courses while serving in the Navy, while other results state that sailors have difficulty obtaining college education due to the lack of time and conflicts with duty.

**D. SUMMARY**

The concerns of sailors (expressed through the Enlisted Education Requirement Quick Poll survey and by sailors out in the Fleet) were brought to the attention of Navy leadership. These concerns began to worry senior leadership that the requirement was too aggressive and that many of the Chiefs would be unable to complete the requirement in time for the FY11 E8 selection board. The Master Chief Petty Officer of the Navy (SW/FMF) Joe Campa began to review the policy that mandates Chief Petty Officers have an Associate's degree to advance to E8 (Faram, 2006).

MCPON Campa found the key concern from the sailors was the notion that sailors on shore duty have ample resources available to them to complete the EER, while those who are serving on sea duty are at a disadvantage due to the lack of bandwidth and limited resources (Faram, 2006). MCPON Campa does not want anyone to be denied the opportunity for promotion based on a requirement they were unable to complete due to operational barriers.

In May 2007, MCPON Campa recommended to the Chief of Naval Operations Admiral Mullen that the controversial policy requirement be abandoned (Faram, 2007). The Chief of Naval Operations announced in June 2007 that the requirement of an Associate's degree for eligibility for advancement to

E8 was rescinded. The nine-month review recommended the need for a better balance between current operational and advancement requirements.

When cancelling this requirement, Admiral Mullen emphasized that the Navy remains strongly committed to the importance of advanced education and that education will continue to play a roll in enhancing the skills of the Navy's senior enlisted leaders (NAVADMIN 150/07, 2007).

THIS PAGE INTENTIONALLY LEFT BLANK

## V. DATA AND DESCRIPTIVE STATISTICS

### A. INTRODUCTION

This chapter discusses the data and statistical methods used in this thesis. It also provides descriptive statistics for the variables used in the statistical analysis.

The statistical analysis in this chapter is performed using data from three sources: the Military Entrance Processing Command (MEPCOM), Defense Manpower Data Center (DMDC), and the Center for Personal and Professional Development (CPPD) under the Naval Personnel Development Command (NPDC). Combining the information in the data sets provides information on career progression, sailor demographics and Tuition Assistance (TA) usage for active-duty enlisted personnel. The data is comprised of eight cohorts who enlisted in the Navy between FY94 through FY01 and follows them through the end of their first service contract and their first reenlistment opportunity or until they separate.

The analysis focuses on the effect of TA on sailors' promotion and retention outcomes. The primary period of interest is the first term of enlistment, as it is arguably the most critical for determining a sailor's career service. In addition, prior studies have focused on the first term of service. Restrictions placed on the data are described in the following sections.

## **B. DATA SETS**

### **1. MEPCOM Data**

The MEPCOM data provides information on Navy enlistees at the time of their accession. The variables captured are: race, ethnicity, marital status, education level, gender, Armed Forces Qualification Test score (AFQT), and length of initial contract.

### **2. DMDC Data**

The DMDC data provides information on active-duty Navy enlisted personnel cohorts for accession years FY94 through FY01 obtained from their enlisted personnel files. The file contains new information each year on variables that change over time (e.g., marital status) and captures career progression information on separation, reenlistment, and promotion. The sample was restricted in several ways. Only service members with four-year obligations (enlistment contracts) were included in our sample (called 4YO's). Since service obligations of greater than four years typically include accession at an advanced pay grade, including other than four-year obligors could bias our results.

To avoid bias in the estimate of the TA effect, enlistees who failed to complete their first term of service were dropped from the analysis samples. Sailors who left the Navy during their first term would not have had the same opportunity to use TA as those who completed their initial contracts. Additionally, the majority of first-term

attrition occurred in the first year of service, during the initial training phase, before enlistees were even eligible for TA.

Sailors with prior service were excluded from the sample. Since they served previously in the military and chose to return from civilian life, they presumably have a high propensity for future reenlistment.

### **3. CPPD Data**

The CPPD data provides information on all TA usage by active-duty Navy enlisted personnel from FY94 to FY06. The file contains information on: courses taken, course grade attained, authorized funding, cost of courses, type of course (i.e., high school, undergraduate, graduate) and waivers. The sample was restricted to active-duty enlisted personnel who participated in the TA program. The sample was restricted by removing officers and General Schedule (GS) federal employees because they were not the focus of the research question.

The sample also was restricted to service members who used TA for undergraduate college courses. Those who took high-school-level, remedial, or graduate-level courses were deleted in order to avoid mixing TA users with different goals.

Data on the FY94 cohort's first year of TA usage was not available. The average number of courses taken by all sailors their first year of Navy service by the other seven cohorts was 310.

## C. VARIABLE DESCRIPTIONS

### 1. Dependent Variables

This study measures the effect of TA usage on two outcomes: retention and promotion. Retention is defined as the enlisted service members (who are all 4YO's) remaining in the service beyond month 48 (first reenlistment opportunity). Promotion is defined as the service member's being promoted to paygrade E-5 prior to the end of the fourth year of service.

### 2. Independent Variables

Independent variables consist of demographics, career information and TA usage. Table 13 provides definitions of the variables.

Table 13. Variable Descriptions Tabulated from MEPCOM, DMDC and NPDC data

<b>VARIABLE DEMOGRAPHICS</b>	<b>DESCRIPTION</b>
Female	=1 if gender = female, 0 otherwise
White	=1 if race = Caucasian, 0 otherwise
Black	=1 if race = African American
Hispanic	=1 if race = Hispanic
Native	=1 if race = Native American
Asian	=1 if race = Asian or Pacific Islander
Other	=1 if race = unknown or none of above
CAT I	AFQT score between 93-99
CAT II	AFQT score between 65-92
CAT IIIA	AFQT score between 50-64

CAT IIIIB	AFQT score between 31-49
HS Dropout	=1 if member had no high school diploma at accession
High School Diploma	=1 if member had high school diploma at accession
Some College	=1 if member had college credits at accession
College Degree	=1 if member had college degree at accession
Married	Marital status 3 <sup>rd</sup> year in service (1=married, 0 otherwise)
Dependents	Dependents in 3 <sup>rd</sup> year of service (1=dependent[s], 0 otherwise)
FY94-FY01	Dichotomous variables for year of accession (1=accessed that year, 0 otherwise)
<b>CAREER INFORMATION</b>	
TIS	Time in service (in months). Calculated by subtracting Date of Separation (DOS) from Base Active Service Date (BASD). If no DOS info, September 30, 2006 used to calculate.
Paygrade	Categorical variable equivalent to numeric paygrade. Calculated for each FY.
Rating	Dichotomous variables for each Navy enlisted rating
<b>TUITION ASSISTANCE</b>	
Any TA Used	1=used TA for at least 1 college course, 0 otherwise
Passed Course	1=completed college course using TA, 0 otherwise
On-base	=1 if course taken on base
Off-base	=1 if course taken off base
Distance Learning	=1 if course taken via distance learning
Credit by Exam	=1 if earned course credit by taking exam
Doc_fy	Fiscal year course taken

The data did not contain a specific variable to capture reenlistment. To calculate reenlistment, time in service (in months) was estimated by subtracting Date of Separation (DOS) from Base Active Service Date (BASD). If no DOS info was in the record, September 30, 2006 was substituted as the DOS. As shown in Table 14, there were a total of 87,236 sailors whose records did not contain a DOS. It is unclear whether that omission is due to their not having separated from service or an administrative omission. Because the number of missing records increases with more recent accessions, missing DOS was treated as the sailor's having not separated from service.

Table 14. Total Number of Accessions and Missing Date of Separation Information, Tabulated from MEPCOM, DMDC and NPDC data

FY	Accessions	DOS Missing	DOS Present
1994	34671	6054	28617
1995	34062	5206	28856
1996	35918	6920	28998
1997	43033	9964	33069
1998	42093	11955	30138
1999	47185	14202	32983
2000	46971	14996	31975
2001	47987	17939	30048
Total	331920	87236	244684

## **D. SAMPLES AND DESCRIPTIVE STATISTICS**

### **1. Characteristics of Restricted Sample**

For analysis purposes the original sample is restricted to only those sailors who are 4YO's and excludes sailors with prior service. Unless specifically stated, the remaining descriptive statistics presented are for the restricted sample.

The descriptive statistics listed in Table 15 display the number of accessions by fiscal year and the gender and race/ethnic composition of the restricted sample. The sample consists of 331,920 total active-duty enlisted accessions, of which 274,412 were male and 57,508 were female. Overall the sample consists of: 62 percent White (219,599), 19 percent Black (67,173), 11 percent Hispanic (37,070), 3 percent Native American (9,305), 4 percent Asian (15,557), and 1 percent who claimed no race affiliation (3,027).

Table 16 shows that the average age of sailors at the end of their first year of service was 20.19. On average, men were slightly older than women. The number of observations evaluated for age varies from the restricted sample total due to missing age variables for 54,271 records.

Table 15. Distribution (in percent) of Accessions by Gender, Race, Ethnicity by Fiscal Year of Accession (Standard Deviations), Tabulated from MEPCOM and DMDC Data (Restricted Sample)

FY	n(obs)	Male	Female	White	Black	Hispanic	Native	Asian	Other
1994	34671	83%	17%	73%	16%	7%	1%	3%	0%
		0.375	0.375	0.444	0.364	0.261	0.081	0.173	0.047
1995	34062	82%	18%	69%	17%	9%	1%	4%	0%
		0.386	0.386	0.464	0.376	0.291	0.092	0.191	0.061
1996	35918	85%	15%	65%	17%	11%	1%	5%	1%
		0.354	0.354	0.476	0.379	0.307	0.119	0.210	0.071
1997	43033	85%	15%	62%	19%	10%	2%	5%	1%
		0.356	0.356	0.485	0.396	0.300	0.152	0.218	0.096
1998	42093	81%	19%	60%	19%	11%	3%	5%	1%
		0.392	0.392	0.490	0.396	0.311	0.180	0.222	0.098
1999	47185	82%	18%	59%	20%	11%	4%	5%	1%
		0.383	0.383	0.491	0.398	0.316	0.194	0.213	0.101
2000	46971	82%	18%	58%	21%	12%	4%	5%	1%
		0.387	0.387	0.494	0.405	0.326	0.188	0.209	0.108
2001	47987	82%	18%	57%	21%	13%	4%	4%	1%
		0.386	0.386	0.495	0.407	0.333	0.191	0.207	0.114
Total	331920	83%	17%	62%	19%	11%	3%	4%	1%
		0.378	0.378	0.485	0.393	0.309	0.161	0.207	0.093

Table 16. Average Age at End of First Fiscal Year of Service by Gender (Standard Deviations), Tabulated from MEPCOM and DMDC Data (Restricted Sample)

GENDER	OBSERVATIONS	AGE (YR 1)
Male	230019	20.19
		(2.63)
Female	47630	20.15
		(2.77)
Total	277649	20.19
		(2.65)

As Shown in Table 17, Asians had the highest average age at the end of the first fiscal year of service at 21. All other races averaged just over 20 years of age, with the lowest average held by Whites and Native Americans at 20.09.

Table 17. Average Age at End of First Fiscal Year of Service by Race (Standard Deviations), Tabulated from MEPCOM and DMDC Data (Restricted Sample)

RACE/ETHNICITY	OBSERVATIONS	AGE (YR 1)
White	170181	20.09
		(2.49)
Black	53556	20.26
		(2.82)
Hispanic	30831	20.21
		(2.73)
Native	7165	20.09
		(2.49)
Asian	13468	21.00
		(3.53)
Other	2448	20.46
		(3.05)
Total	277649	20.19
		(2.65)

Table 18 breaks down the differences in marriage and dependents, by gender at year three. Overall, 24 percent of the sample was married, and 50 percent had dependents by the end of their third fiscal year of service. There were 108,541 records missing information on marital status.

Table 18. Marriage and Dependents Comparison by Gender at End of Third Year of Service (Standard Deviation) Tabulated from MEPCOM and DMDC Data

GENDER	n(OBS)	MARRIED	n(OBS)	DEPENDENTS
Male	185475	23%	274412	49%
		(0.422)		(0.500)
Female	37904	27%	57508	51%
		(0.446)		(0.500)
Total	223379	24%	331920	50%
		(0.426)		(0.500)

A comparison of marriage and dependency rates by race/ethnicity is provided in Table 19. Hispanics had the highest marriage rate at 27 percent; and 52 percent of Blacks had dependents by the end of their third fiscal year in the Navy.

Table 19. Marriage and Dependents Comparison by Race/Ethnicity at End of Third Year of Service (Standard Deviation), Tabulated from MEPCOM and DMDC Data

RACE/ETHNICITY	n(OBS)	MARRIED	n(OBS)	DEPENDENTS
White	135060	24%	206589	50%
		(0.428)		(0.500)
Black	42796	21%	63201	52%
		(0.408)		(0.500)
Hispanic	25968	27%	35499	48%
		(0.445)		(0.500)
Native	5565	24%	8864	53%
		(0.430)		(0.499)
Asian	11984	22%	14899	39%
		(0.414)		(0.487)
Other	2006	24%	2868	48%
		(0.427)		(0.500)
Total	223379	24%	331920	50%
		(0.426)		(0.500)

Table 20 shows the education credentials of the sample at accession. Credentials were similar between men and women; however, men had higher dropout and General Educational Development test (GED) percentages, and slightly more women (by percentage) entered the service with a high school diploma or college degree than men.

Table 20. Education Level in Percent of Distribution at Accession by Gender (Standard Deviation), Tabulated from MEPCOM and DMDC Data

GENDER	OBSERVATIONS	NON-HS GRAD	GED	HIGH SCHOOL	SOME COLLEGE	COLLEGE DEGREE
Male	274412	4%	9%	86%	1%	1%
		(0.201)	(0.279)	(0.352)	(0.080)	(0.105)
Female	57508	2%	5%	91%	1%	2%
		(0.128)	(0.211)	(0.284)	(0.099)	(0.122)
Total	331920	4%	8%	86%	1%	1%
		(0.190)	(0.269)	(0.342)	(0.083)	(0.108)

Table 21 shows education levels at time of accession by race/ethnicity. Education credentials were similar by race/ethnic background. Native Americans had the highest percentage of non-high school graduates and GED holders (5 percent and 13 percent, respectively). Blacks had the highest percentage of high school graduates, while Native Americans had the lowest rate.

Table 21. Education (Percent Distribution) at Accession by Race/Ethnicity (Standard Deviation), Tabulated from MEPCOM and DMDC Data

RACE/ ETHNICITY	OBSERVATIO NS	NON-HS GRAD	GED	HIGH SCHOOL	SOME COLLEGE	COLLEGE DEGREE
White	206589	4%	8%	86%	1%	1%
		(0.195)	(0.276)	(0.350)	(0.085)	(0.112)
Black	63201	3%	5%	90%	1%	1%
		(0.172)	(0.224)	(0.299)	(0.073)	(0.100)
Hispanic	35499	4%	9%	86%	1%	1%
		(0.190)	(0.282)	(0.347)	(0.077)	(0.095)
Native	8864	5%	13%	80%	1%	1%
		(0.227)	(0.339)	(0.398)	(0.072)	(0.073)
Asian	14899	3%	7%	88%	1%	2%
		(0.163)	(0.248)	(0.329)	(0.106)	(0.135)
Other	2868	5%	8%	84%	1%	2%
		(0.218)	(0.276)	(0.369)	(0.108)	(0.131)
Total	331920	4%	8%	86%	1%	1%
		(0.190)	(0.269)	(0.342)	(0.083)	(0.108)

The mental category classification (based upon AFQT composite scores) of new accessions by gender is provided in Table 22. Men had a higher percentage of representation in the two upper mental group categories. The Navy did not allow enlistment for applicants who fell below mental category IIIb during the years of our sample.

Table 22. AFQT Percent Distribution at Accession by Gender  
(standard deviation) Tabulated from MEPCOM and DMDC  
Data

GENDER	OBSERVATIONS	CAT I	CAT II	CAT IIIa	CAT IIIb
Male	274412	6%	38%	25%	31%
		(0.230)	(0.484)	(0.435)	(0.463)
Female	57508	3%	33%	29%	34%
		(0.172)	(0.470)	(0.456)	(0.474)
Total	331920	5%	37%	26%	32%
		(0.221)	(0.482)	(0.439)	(0.465)

Table 23 provides comparisons of the mental categories by race/ethnicity. Whites had the highest representation in the top mental group categories, while Blacks had the lowest. The reverse was also true; Blacks had the largest percentage in the lowest mental group category, while Whites had the lowest.

Table 23. AFQT Percent Distribution at Accession by  
Race/Ethnicity (Standard Deviation), Tabulated from  
MEPCOM and DMDC Data

RACE/ETHNICITY	OBS	CAT I	CAT II	CAT IIIa	CAT IIIb
White	206589	7%	44%	26%	23%
		(0.255)	(0.496)	(0.438)	(0.421)
Black	63201	1%	19%	26%	54%
		(0.103)	(0.394)	(0.437)	(0.499)
Hispanic	35499	2%	28%	28%	42%
		(0.150)	(0.448)	(0.449)	(0.493)
Native	8864	5%	41%	28%	25%
		(0.222)	(0.492)	(0.450)	(0.435)
Asian	14899	4%	32%	25%	39%
		(0.200)	(0.466)	(0.434)	(0.487)
Other	2868	3%	32%	28%	37%
		(0.183)	(0.466)	(0.448)	(0.482)
Total	331920	5%	37%	26%	32%
		(0.221)	(0.482)	(0.439)	(0.465)

## 2. Comparison of TA Users vs. Non-Users

Information on the differences in demographic characteristics—race, marital status, education level, and mental category—by TA usage is provided in Table 24. Of the 331,920 sailors in the sample 49,426 used TA. Of those, 38,786 passed at least one course. Thus, 10,640 applied for TA but did not complete or failed the class(es). Table 24 shows women used TA at twice the rate of men (27 percent vs. 12 percent). Women also had a higher successful completion rate than men. Asians had the highest percentage of successful completion and Native Americans had the lowest. Sailors with some college had higher TA usage rates than those with other education levels. Sailors with higher entry-level education had more success in completion of courses.

Table 24. Distribution of TA Use and Successful Completion of at Least One Course, by Demographics (Tabulated from MEPCOM, DMDC, and NPDC Data)

<b>Variables</b>	<b>TA Usage Rate</b>	<b>Successful TA Usage Rate</b>
Male	12%	77%
Female	27%	81%
Age 17-21	17%	79%
Age 22+	10%	78%
White	13%	79%
Black	17%	77%
Hispanic	19%	79%
Native	13%	75%
Asian	22%	81%
Other	20%	80%
HS dropout	8%	73%
GED	10%	72%
HS grad	16%	79%

some college	22%	85%
college degree	10%	85%
CAT I	16%	79%
CAT II	17%	81%
CAT IIIa	15%	79%
CAT IIIb	12%	75%
Married	23%	79%
Dependents	8%	77%
Average Rate	15%	78%
Sample Size	331920	49278

### **3. Comparison of Reenlistment Rates between TA Users and Non-Users**

Table 25 displays the reenlistment rates for the restricted sample by demographic category and TA use. There were 129,670 sailors in the sample who reenlisted—a rate of 39 percent. According to the data, TA users reenlist at twice the rate of non-TA users. Sailors who were between 17 and 21 when they joined the Navy have a 45 percent reenlistment rate, which increases to 67 percent for those who use TA. Asians who use TA had the highest enlistment rate of any single demographic category.

Table 25. Distribution of Reenlistment by Demographics and Between TA Users vs. Non-TA Users, Tabulated from MEPCOM, DMDC, and NPDC Data

<b>Variables</b>	<b>Reenlistment Rate (Sample)</b>	<b>Reenlistment Rate (TA Users)</b>	<b>Reenlistment Rate (Non-TA Users)</b>
Male	39%	69%	35%
Female	38%	65%	27%
Age 17-21	45%	67%	40%
Age 22+	28%	70%	23%
White	37%	65%	33%
Black	42%	73%	36%
Hispanic	41%	68%	35%
Native	38%	69%	33%
Asian	54%	75%	48%
Other	42%	69%	35%
HS dropout	29%	68%	25%
GED	30%	70%	25%
HS grad	40%	68%	35%
some college	48%	67%	43%
college degree	42%	64%	39%
CAT I	52%	73%	49%
CAT II	43%	68%	38%
CAT IIIa	35%	65%	30%
CAT IIIb	35%	70%	30%
Married	60%	71%	57%
Dependents	24%	73%	20%
Average Rate	39%	68%	34%
Sample Size	331920	49426	96112

#### 4. Comparison of Promotion Rates between TA Users and Non-Users

Table 26 shows the promotion rate to E4 in the restricted sample. Overall, 47 percent of sailors advance to E4 by the end of the fourth year. The advancement rate

for sailors who used TA was 49 percent, compared to 44 percent for those who did not use TA. In every demographic category, those who used TA had higher advancement percentages than those that did not use TA.

Table 26. Distribution of Promotion Rates to E4 by Demographics and Between TA Users vs. Non-TA Users (Greater than 12 months Time in service), Tabulated from MEPCOM, DMDC, and NPDC Data

<b>Variables</b>	<b>Promotion Rate to E-4 (Sample)</b>	<b>Promotion Rate to E-4 (TA Users)</b>	<b>Promotion Rate to E-4 (Non-TA Users)</b>
Male	48%	59%	45%
Female	46%	60%	38%
Age 17-21	48%	60%	46%
Age 22+	44%	57%	40%
White	47%	59%	44%
Black	45%	58%	41%
Hispanic	50%	60%	47%
Native	44%	56%	42%
Asian	56%	61%	54%
Other	48%	62%	44%
HS dropout	39%	56%	36%
GED	39%	57%	36%
HS grad	48%	59%	46%
some college	49%	56%	46%
college degree	40%	52%	38%
CAT I	35%	44%	33%
CAT II	50%	61%	47%
CAT IIIa	48%	60%	45%
CAT IIIb	46%	59%	43%
Married	54%	58%	53%
Dependents	32%	57%	28%
Average Rate	47%	59%	44%
Sample Size	261706	49426	21280

Table 27 shows the promotion rate to E5 or higher in the restricted sample. Overall, 14 percent of sailors attained the rank of E5 by the end of the fourth year. Sailors who used TA had a 20 percent promotion rate, while only 12 percent of those who did not use TA advanced.

Table 27. Distribution of Promotion Rates to E5 by Demographics and Between TA Users vs. Non-TA Users (Greater than 12 months Time in service), Tabulated from MEPCOM, DMDC, and NPDC Data

<b>Variables</b>	<b>Promotion Rate to <math>\geq</math> E-5 (Sample)</b>	<b>Promotion Rate to <math>\geq</math> E-5 (TA Users)</b>	<b>Promotion Rate to <math>\geq</math> E-5 (Non-TA Users)</b>
Male	14%	23%	13%
Female	10%	15%	8%
Age 17-21	12%	18%	11%
Age 22+	19%	27%	17%
White	16%	24%	14%
Black	7%	14%	6%
Hispanic	11%	17%	10%
Native	17%	27%	15%
Asian	13%	17%	12%
Other	13%	16%	11%
HS dropout	10%	22%	8%
GED	11%	22%	9%
HS grad	13%	20%	12%
some college	28%	34%	26%
college degree	40%	39%	40%
CAT I	40%	48%	39%
CAT II	19%	26%	17%
CAT IIIa	10%	16%	9%
CAT IIIb	5%	10%	4%
Married	18%	22%	17%
Dependents	11%	22%	9%
Average Rate	14%	20%	12%
Sample Size	261706	49426	212280

## VI. METHODOLOGY AND RESULTS

### A. METHODOLOGY

Three basic models were estimated to measure the impact of various predictors on the likelihood of sailors using TA and the effect of TA participation and other control variables on first-term retention and promotion outcomes for enlisted personnel. Each model is estimated three times by changing model specifications or sample restrictions. The first specification provides baseline estimates and uses the restricted sample. For the TA usage and reenlistment models, the sample is further restricted to include only those with time in service greater than 36 months. The sample for the promotion model is restricted to include only those with at least 12 months of service. These restrictions eliminate a source of potential bias by excluding those who attrite prior to being reenlistment-or promotion-eligible (i.e., those who had no opportunity to make a reenlistment decision or be promoted).

Because the dependent variable in each model is binary, the estimates were obtained via probit. Marginal effects were calculated for small changes from the characteristics of the average sailor.

Our specifications are based on previous studies discussed in the preceding literature review. Dichotomous variables for each Navy enlisted rating were included in the models to control for financial and other unobserved factors that may influence the reenlistment decision and that varied by rating. For example, retention rates can vary

significantly across ratings. Since advancements in the Navy are based on vacancies, ratings with low retention will tend to have high advancement rates, which would tend to affect reenlistment decisions, all else equal. In addition, in ratings with low retention, sailors are offered higher selective reenlistment bonuses, which also will affect retention decisions.

The omitted category for each of the dummy variables in the models is based on the most frequent category in each group. For all models the omitted categories are: single, white, male, high school graduate, mental category II (AFQT percentile 65-92), and the machinist's mate rating.

### **1. Model of Tuition Assistance Usage**

The first model analyzes the factors that predict the likelihood of TA usage. The dependent variable is TA use in the first four years of service.

$$TAuse = \beta_0 + \beta_1(female) + \beta_2(black) + \beta_3(hispanic) + \beta_4(native) + \beta_5(asian) + \beta_6(other) + \beta_7(age) + \beta_8(married) + \beta_9(dependents) + \beta_{10}(CATI) + \beta_{11}(CATIIIA) + \beta_{12}(CATIIIB) + \beta_{13}(CATIV) + \beta_{14}(CATunk) + \beta_{15}(non\_highschool\_grad) + \beta_{16}(GED) + \beta_{17}(some\_college) + \beta_{18}(college\_grad) + \beta_{19}(fy95) + \beta_{20}(fy96) + \beta_{21}(fy97) + \beta_{22}(fy98) + \beta_{23}(fy99) + \beta_{24}(fy00) + \beta_{25}(fy01) + \beta_{26} \dots \beta_{81}(rating\_variables) + e_i$$

### **2. Model of First-Term Retention**

The dependent variable (reenlistment) for the following model is based on the individual sailor reenlisting at their first decision point (the fourth year of service).

$$\begin{aligned} \text{Re enlistment} = & \beta_0 + \beta_1(\text{everta}) + \beta_2(\text{female}) + \beta_3(\text{black}) + \beta_4(\text{hispanic}) + \beta_5(\text{native}) + \beta_6(\text{asian}) \\ & + \beta_7(\text{other}) + \beta_8(\text{age}) + \beta_9(\text{married}) + \beta_{10}(\text{dependents}) + \beta_{11}(\text{CATI}) + \beta_{12}(\text{CATIIIA}) + \\ & \beta_{13}(\text{CATIIIB}) + \beta_{14}(\text{CATIV}) + \beta_{15}(\text{CATunk}) + \beta_{16}(\text{non\_highschool\_grad}) + \beta_{17}(\text{GED}) + \\ & \beta_{18}(\text{some\_college}) + \beta_{19}(\text{college\_grad}) + \beta_{20}(\text{fy95}) + \beta_{21}(\text{fy96}) + \beta_{22}(\text{fy97}) + \\ & \beta_{23}(\text{fy98}) + \beta_{24}(\text{fy99}) + \beta_{25}(\text{fy00}) + \beta_{26}(\text{fy01}) + \beta_{27} \dots \beta_{82}(\text{rating\_variables}) + e_i \end{aligned}$$

### 3. Model of First-Term Promotion to E-4

The dependent variable (promotion) in the following model is defined as the sailor achieving the rank of E-4 or higher by the end of the fourth year of service. There were 69 records (less than 1 percent) of the sample missing this data; those records were subsequently dropped.

$$\begin{aligned} \text{PromE4} = & \beta_0 + \beta_1(\text{everta}) + \beta_2(\text{female}) + \beta_3(\text{black}) + \beta_4(\text{hispanic}) + \beta_5(\text{native}) + \beta_6(\text{asian}) \\ & + \beta_7(\text{other}) + \beta_8(\text{age}) + \beta_9(\text{married}) + \beta_{10}(\text{dependents}) + \beta_{11}(\text{CATI}) + \beta_{12}(\text{CATIIIA}) + \\ & \beta_{13}(\text{CATIIIB}) + \beta_{14}(\text{CATIV}) + \beta_{15}(\text{CATunk}) + \beta_{16}(\text{non\_highschool\_grad}) + \beta_{17}(\text{GED}) + \\ & \beta_{18}(\text{some\_college}) + \beta_{19}(\text{college\_grad}) + \beta_{20}(\text{fy95}) + \beta_{21}(\text{fy96}) + \beta_{22}(\text{fy97}) + \\ & \beta_{23}(\text{fy98}) + \beta_{24}(\text{fy99}) + \beta_{25}(\text{fy00}) + \beta_{26}(\text{fy01}) + \beta_{27} \dots \beta_{82}(\text{rating\_variables}) + e_i \end{aligned}$$

### 4. Model of First-Term Promotion to E-5

The dependent variable (promotion) in the following model is defined as the sailor achieving the rank of E-5 or higher by the end of the fourth year of service. There were 69 records (less than 1 percent) of the sample missing this data; those records were subsequently dropped.

$$\begin{aligned} \text{PromE5} = & \beta_0 + \beta_1(\text{everta}) + \beta_2(\text{female}) + \beta_3(\text{black}) + \beta_4(\text{hispanic}) + \beta_5(\text{native}) + \beta_6(\text{asian}) \\ & + \beta_7(\text{other}) + \beta_8(\text{age}) + \beta_9(\text{married}) + \beta_{10}(\text{dependents}) + \beta_{11}(\text{CATI}) + \beta_{12}(\text{CATIIIA}) + \\ & \beta_{13}(\text{CATIIIB}) + \beta_{14}(\text{CATIV}) + \beta_{15}(\text{CATunk}) + \beta_{16}(\text{non\_highschool\_grad}) + \beta_{17}(\text{GED}) + \\ & \beta_{18}(\text{some\_college}) + \beta_{19}(\text{college\_grad}) + \beta_{20}(\text{fy95}) + \beta_{21}(\text{fy96}) + \beta_{22}(\text{fy97}) + \\ & \beta_{23}(\text{fy98}) + \beta_{24}(\text{fy99}) + \beta_{25}(\text{fy00}) + \beta_{26}(\text{fy01}) + \beta_{27} \dots \beta_{82}(\text{rating\_variables}) + e_i \end{aligned}$$

## **B. STATISTICAL ANALYSIS**

The presentations of results of the probit models in this section are limited to focus variables in order to save space. The Appendix contains the tables of the full probit results for each model.

### **1. Determinants of Tuition Assistance Usage**

Table 28 provides the results of the baseline probit model of the predictors of tuition assistance usage. The model's coefficients are presented followed by the marginal effects for each coefficient. The dependent variable equals one for anyone who attempted a college-level course using TA.

The results presented in Table 28 indicate that females are 23.5 percentage points more likely to use TA than males. This may be due to the fact that females are less likely to be assigned to ratings with heavy sea duty. To check this hypothesis a model was specified that included dichotomous enlisted rating variables to control for unobserved effects related to specific jobs. However, Table 38 (Appendix), shows that controlling for job specific unobserved effects does not change the effect of gender on TA usage.

All race and ethnic groups, except Native Americans, are more likely to use TA than whites. A possible explanation is a difference in reasons for joining the navy between whites and minorities. Minorities may view military service as a vehicle for social advancement, and they may join with a higher propensity towards using the military benefits. Being married in the third year after accession increases the probability of using TA by around 3 percent;

however, having dependents by that time reduces the likelihood of TA use by 2 percentage points. The highest mental category is more likely to use TA, while all categories lower than category II are less likely to use it. Across educational categories, the only group more likely to use TA than high school graduates consists of those who joined the Navy with some college.

The results presented in Table 29 provide the estimates of the second and third probit models. The samples for both models are restricted to sailors with at least 36 months in service. First, the dependent variable is defined to equal one if the sailor used any TA. Next, the dependent variable is set equal to one if the sailor *successfully* completed any courses using TA. According to the findings presented in Table 29, conditional on taking a course via TA, females are 4.4 percentage points more likely to successfully complete a college course than their male counterparts. Hispanics and Asians are more likely, than Whites, to successfully complete courses and Native Americans are less likely. In the third year of service being married increases the probability of completing college courses by 2 percent, while having dependents decreases the likelihood by 2.2 percent.

Table 28. Baseline Probit Regression Estimates of Tuition Assistance Usage, Includes Completed and Non-Completed Courses

	Any TA Use (Sample= 4YO's / No Prior Service)	Marginal Effects
Female	0.698 (0.008)***	0.235 (0.003)***
Black	0.169 (0.009)***	0.051 (0.003)***
Hispanic	0.236 (0.010)***	0.073 (0.003)***
Native	-0.059 (0.020)***	-0.017 (0.006)***
Asian	0.273 (0.013)***	0.087 (0.005)***
Other	0.275 (0.031)***	0.088 (0.011)***
Age	0.014 (0.001)***	0.004 (0.000)***
Married	0.104 (0.011)***	0.031 (0.003)***
Dependents	-0.104 (0.011)***	-0.030 (0.003)***
CAT I	0.006 (0.014)	0.002 (0.004)
CAT IIIa	-0.103 (0.008)***	-0.029 (0.002)***
CAT IIIb	-0.294 (0.008)***	-0.082 (0.002)***
CAT IV	-0.391 (0.156)**	-0.096 (0.031)***
CAT Unknown	-0.083 (0.077)	-0.023 (0.021)
HS Dropout	-0.222 (0.020)***	-0.059 (0.005)***
GED	-0.107 (0.014)***	-0.030 (0.004)***
Some College	0.046 (0.034)	0.014 (0.010)
College Degree	-0.551 (0.031)***	-0.125 (0.005)***
Constant	-1.296 (0.026)***	
Mean of Dependent Variable	0.167	0.167
Observations	216797	216797
Pseudo R2	0.069	0.069
Standard errors in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 29. Probit Regression Estimates of Tuition Assistance Participation and Successful Course Completion for Sailors with at Least 36 Months of Service

	Any TA Use (>36 mos TIS)	Marginal Effects	TA Course Passed (>36 mos TIS)	Marginal Effects
Female	0.708 (0.008)***	0.243 (0.003)***	0.156 (0.014)***	0.044 (0.004)***
Black	0.174 (0.009)***	0.054 (0.003)***	-0.010 (0.017)	-0.003 (0.005)
Hispanic	0.232 (0.010)***	0.074 (0.003)***	0.063 (0.020)***	0.018 (0.006)***
Native	-0.057 (0.021)***	-0.017 (0.006)***	-0.072 (0.042)*	-0.021 (0.013)*
Asian	0.261 (0.014)***	0.085 (0.005)***	0.133 (0.028)***	0.037 (0.007)***
Other	0.272 (0.031)***	0.090 (0.011)***	0.116 (0.061)*	0.032 (0.016)**
Age	0.013 (0.001)***	0.004 (0.000)***	-0.003 (0.002)	-0.001 (0.001)
Married	0.098 (0.012)***	0.030 (0.004)***	0.071 (0.022)***	0.020 (0.006)***
Dependents	-0.097 (0.012)***	-0.029 (0.003)***	-0.075 (0.022)***	-0.022 (0.007)***
CAT I	0.007 (0.014)	0.002 (0.004)	-0.020 (0.030)	-0.006 (0.009)
CAT IIIa	-0.098 (0.008)***	-0.029 (0.002)***	-0.069 (0.017)***	-0.020 (0.005)***
CAT IIIb	-0.286 (0.008)***	-0.082 (0.002)***	-0.195 (0.017)***	-0.059 (0.005)***
CAT IV	-0.329 (0.161)**	-0.086 (0.036)**	0.295 (0.418)	0.075 (0.091)
CAT Unknown	-0.040 (0.080)	-0.012 (0.023)	-0.299 (0.147)**	-0.096 (0.052)*
HS Dropout	-0.213 (0.020)***	-0.059 (0.005)***	-0.154 (0.043)***	-0.047 (0.014)***
GED	-0.094 (0.014)***	-0.027 (0.004)***	-0.183 (0.028)***	-0.056 (0.009)***
Some College	0.042 (0.034)	0.013 (0.011)	0.215 (0.071)***	0.057 (0.017)***
College Degree	-0.519 (0.032)***	-0.125 (0.006)***	0.207 (0.078)***	0.055 (0.019)***
Constant	-1.232 (0.027)***		0.936 (0.054)***	
Observations	206447	206447	49229	49229
Pseudo R2	0.069	0.069	0.015	0.015
Mean Dependent Variable	0.227	0.227	0.785	0.785
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

### C. REENLISTMENT

The results of the baseline probit reenlistment model are presented in Table 30. TA usage is defined as =1 for anyone who used TA for college. According to the estimates presented in Table 30, those who used TA were 15.4 percentage points more likely to reenlist. Since the baseline reenlistment rate is 0.391, this means TA users had a reenlistment rate of 54.5 percent higher than non-TA. Females were 5.1 percentage points less likely to reenlist than males. To control for possible differences between females who used TA and those who did not, a second model was specified with an interaction term between females and TA use. The results of that model (presented in columns 3 and 4), show that females who use TA are 2.6 points more likely to reenlist than those who do not. All races were more likely to reenlist than Whites, with Blacks and Asians having the highest likelihood (9.3 and 12.5 points respectively). Being married or having dependents in the third year of service increased the probability of reenlistment. High school graduates were more likely to reenlist than those with those with any other education level at accession. Those who joined the Navy with some college experience were more likely to reenlist (than high school graduates), although this finding is not statistically significant.

Table 30. Baseline Probit Regression Estimates of Reenlistment and Interaction Term Between Female and TA Use (Model Includes Rating Specific Dummies)

	Reenlistment (Sample= 4YO's / No Prior Svc.)	Marginal Effects	Reenlistment With Interaction between Female and Any TA Use	Marginal Effects
Any TA Use	0.403 (0.007)***	0.154 (0.003)***	0.386 (0.008)***	0.148 (0.003)***
Female*Any TA			0.066 (0.016)***	0.026 (0.006)***
Female	-0.128 (0.008)***	-0.051 (0.003)***	-0.151 (0.009)***	-0.060 (0.004)***
Black	0.240 (0.008)***	0.093 (0.003)***	0.240 (0.008)***	0.093 (0.003)***
Hispanic	0.062 (0.009)***	0.024 (0.003)***	0.062 (0.009)***	0.024 (0.003)***
Native	0.037 (0.018)**	0.014 (0.007)**	0.037 (0.018)**	0.014 (0.007)**
Asian	0.328 (0.013)***	0.125 (0.005)***	0.328 (0.013)***	0.125 (0.005)***
Other	0.067 (0.029)**	0.026 (0.011)**	0.067 (0.029)**	0.026 (0.011)**
Age	0.010 (0.001)***	0.004 (0.000)***	0.010 (0.001)***	0.004 (0.000)***
Married	0.097 (0.011)***	0.038 (0.004)***	0.097 (0.011)***	0.038 (0.004)***
Dependents	0.105 (0.011)***	0.041 (0.004)***	0.106 (0.011)***	0.042 (0.004)***
CAT I	0.279 (0.013)***	0.107 (0.005)***	0.280 (0.013)***	0.107 (0.005)***
CAT IIIa	-0.253 (0.007)***	-0.100 (0.003)***	-0.253 (0.007)***	-0.100 (0.003)***
CAT IIIb	-0.295 (0.007)***	-0.117 (0.003)***	-0.295 (0.007)***	-0.117 (0.003)***
CAT IV	-0.069 (0.127)	-0.027 (0.051)	-0.070 (0.127)	-0.028 (0.051)
CAT Unknown	-0.253 (0.069)***	-0.101 (0.028)***	-0.254 (0.069)***	-0.101 (0.028)***
HS Dropout	-0.094 (0.017)***	-0.037 (0.007)***	-0.095 (0.017)***	-0.038 (0.007)***
GED	-0.088 (0.012)***	-0.035 (0.005)***	-0.088 (0.012)***	-0.035 (0.005)***
Some College	0.022 (0.032)	0.009 (0.013)	0.021 (0.032)	0.008 (0.013)
College Degree	-0.263 (0.025)***	-0.105 (0.010)***	-0.262 (0.025)***	-0.104 (0.010)***
Constant	-0.229 (0.024)***		-0.226 (0.024)***	
Observations	216793	216793	216793	216793

Pseudo R2	0.038	0.038	0.038	0.038
Mean Dependent Variable	0.391	0.391	0.391	0.391
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 31 presents the estimated effects of successful completed TA-reimbursed courses on reenlistment. There are two sets of coefficients presented along with the associated marginal effects. Both models are restricted to sailors with thirty-six months of service. The first model defines TA usage as =1 for anyone who used TA for college classes, while the second model defines TA usage as =1 only for those who successfully completed at least one class.

As shown in Table 31, among sailors who survive for at least 3 years of service those who use any TA, regardless of outcome of the course, are 12.1 percent more likely to reenlist. This finding also reinforces the issue noted previously in the literature review that inclusion of sailors who do not have equal opportunity to use TA in calculations will cause an overestimation of its effect. The 3.6 point drop in likelihood of reenlistment found between the baseline model (Table 30) and this model represents the bias for failing to restrict the sample to non-attrites. According to the results in Table 31, columns 3 and 4, successful completion of at least one course increases the likelihood of reenlistment by 0.6 points to 12.7 percent.

Table 31. Probit Regression Estimates of Reenlistment  
Comparing TA usage and Successful Course Completion

	Reenlistment Any TA Use <sup>1</sup> (Sample= > 36 mos TIS)	Marginal Effects	Reenlistment Successful TA (Sample= >36 mos TIS)	Marginal Effects
Any TA Use	0.319 (0.007)***	0.121 (0.003)***		
Successful TA Use			0.336 (0.008)***	0.127 (0.003)***
Female	-0.125 (0.008)***	-0.049 (0.003)***	-0.116 (0.008)***	-0.046 (0.003)***
Black	0.265 (0.008)***	0.101 (0.003)***	0.268 (0.008)***	0.102 (0.003)***
Hispanic	0.055 (0.009)***	0.021 (0.004)***	0.057 (0.009)***	0.022 (0.004)***
Native	0.047 (0.018)**	0.018 (0.007)**	0.047 (0.018)***	0.018 (0.007)***
Asian	0.318 (0.013)***	0.118 (0.005)***	0.318 (0.013)***	0.118 (0.005)***
Other	0.066 (0.030)**	0.026 (0.011)**	0.068 (0.030)**	0.026 (0.011)**
Age	0.008 (0.001)***	0.003 (0.000)***	0.008 (0.001)***	0.003 (0.000)***
Married	0.090 (0.011)***	0.035 (0.004)***	0.089 (0.011)***	0.034 (0.004)***
Dependents	0.121 (0.011)***	0.047 (0.004)***	0.122 (0.011)***	0.047 (0.004)***
CAT I	0.303 (0.013)***	0.113 (0.005)***	0.303 (0.013)***	0.113 (0.005)***
CAT IIIa	-0.256 (0.007)***	-0.101 (0.003)***	-0.256 (0.007)***	-0.101 (0.003)***
CAT IIIb	-0.292 (0.007)***	-0.115 (0.003)***	-0.293 (0.007)***	-0.115 (0.003)***
CAT IV	0.059 (0.139)	0.023 (0.053)	0.050 (0.139)	0.019 (0.053)
CAT Unknown	-0.196 (0.073)***	-0.077 (0.029)***	-0.188 (0.073)***	-0.074 (0.029)**
HS Dropout	-0.076 (0.017)***	-0.030 (0.007)***	-0.076 (0.017)***	-0.030 (0.007)***
GED	-0.066 (0.012)***	-0.026 (0.005)***	-0.063 (0.012)***	-0.025 (0.005)***
Some College	0.019 (0.033)	0.007 (0.013)	0.014 (0.033)	0.005 (0.013)
College Degree	-0.174 (0.026)***	-0.068 (0.010)***	-0.183 (0.026)***	-0.072 (0.010)***
Constant	-0.099 (0.025)***		-0.099 (0.025)***	
Observations	206443	206443	206443	206443
Pseudo R2	0.034	0.034	0.034	0.034
Mean Dependent	0.595	0.595	0.595	0.595

Variable				
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				
<sup>1</sup> Model includes rating dummies				

**D. PROMOTION**

Table 32 provides a comparison of pay grade distributions by the end of the fourth year of service for those who did and did not use TA. Relative to sailors who did not use TA those who used TA had a lower representation in paygrades E1-E3, and had higher representation E4 and E5. Thus, it appears that TA users were more likely to be promoted than other sailors.

Table 32. Distribution by Pay Grade and TA Usage at the End of the Fourth Year (TIS greater than 12 months), tabulated from DMDC and NPDC data

Paygrade 4th Year	TA Users		Non-TA Users	
	Freq.	Percent	Freq.	Percent
E0	11	0%	63	0.0%
E1	65	0%	1,481	0.9%
E2	194	0%	1,848	1.1%
E3	7,913	17%	29,136	17.5%
E4	29,187	61%	94,334	56.5%
E5	10,001	21%	24,971	15.0%
E6+	25	0%	522	0.3%
Total	47,503	100%	166,833	100.0%

Table 33 provides probit model results and marginal effects for promotion to E-4 and E-5 by the end of the fourth year of service. The models set the value of the dependent variable to 1 if the sailor used TA for college. According to the results, sailors who used TA had a

probability of 5.2 percentage point higher to promote to E-4 (Column 2) and 4.1 percent more likely to reach E-5 (Column 4) by the end of their fourth year of service. Females were less likely to promote to either rank than males. Hispanics and Asians were more likely to promote to E-4 than Whites. Whites were the most likely of any race to promote E-5. Being married had a positive effect on achieving E-5. Those sailors with dependents were 1.6 more likely to reach E-5 than those without dependents.

Table 33. Baseline Probit Regression Estimates of Promotion to E-4 and E-5 (or Higher) by the End of the Fourth Year of Service (Models Include Rating-Specific Dummies)

	Promotion to E4 Any TA Use (4YO / No PS)	Marginal Effects	Promotion to E5+ Any TA Use (4YO / No PS)	Marginal Effects
Any TA Use	0.132 (0.007)***	0.052 (0.003)***	0.186 (0.008)***	0.041 (0.002)***
Female	-0.065 (0.008)***	-0.026 (0.003)***	-0.208 (0.010)***	-0.040 (0.002)***
Black	-0.063 (0.008)***	-0.025 (0.003)***	-0.243 (0.011)***	-0.046 (0.002)***
Hispanic	0.038 (0.009)***	0.015 (0.003)***	-0.124 (0.012)***	-0.024 (0.002)***
Native	-0.042 (0.018)**	-0.017 (0.007)**	-0.031 (0.021)	-0.006 (0.004)
Asian	0.118 (0.012)***	0.046 (0.005)***	-0.112 (0.016)***	-0.022 (0.003)***
Other	0.026 (0.029)	0.010 (0.011)	-0.182 (0.038)***	-0.034 (0.006)***
Age	-0.003 (0.001)**	-0.001 (0.000)**	0.039 (0.001)***	0.008 (0.000)***
Married	0.001 (0.011)	0.000 (0.004)	0.048 (0.014)***	0.010 (0.003)***
Dependents	-0.026 (0.010)**	-0.010 (0.004)**	0.074 (0.014)***	0.016 (0.003)***
CAT I	-0.441 (0.012)***	-0.174 (0.005)***	0.677 (0.013)***	0.187 (0.004)***
CAT IIIa	-0.030 (0.007)***	-0.012 (0.003)***	-0.417 (0.009)***	-0.076 (0.001)***
CAT IIIb	-0.085 (0.007)***	-0.034 (0.003)***	-0.802 (0.010)***	-0.139 (0.001)***

CAT IV	-0.187	-0.074	-1.251	-0.117
	(0.127)	(0.051)	(0.311)***	(0.007)***
CAT Unknown	-0.350	-0.139	0.159	0.036
	(0.069)***	(0.027)***	(0.074)**	(0.018)**
HS Dropout	-0.087	-0.035	-0.210	-0.038
	(0.016)***	(0.007)***	(0.022)***	(0.003)***
GED	-0.104	-0.041	-0.165	-0.031
	(0.012)***	(0.005)***	(0.015)***	(0.003)***
Some College	0.000	0.000	0.208	0.048
	(0.032)	(0.012)	(0.035)***	(0.009)***
Constant	0.165		-2.174	
	(0.023)***		(0.030)***	
Observations	216808	216808	216808	216808
Pseudo R2	0.014	0.014	0.014	0.014
Mean Depn. Var.	0.374	0.374	0.107	0.107
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 34 analyzes promotion based on a restricted sample of those who survive at least one year of service. The results show that using TA increased the probability of a sailor promoting to E-4 by the end of the fourth year by 5.1 percentage points. For those sailors who passed a college course using TA their promotion probability was 3 points higher. However, the magnitude of this effect is relatively small as the overall promotion rate was .84.

Table 34. Probit Regression Estimates of Promotion to E-4 (or Higher) by the end of the Fourth Year of Service Comparing TA Usage and Successful Course Completion (Models Include Rating Specific Dummies)

	Promotion to E4 Any TA Use (>12 mon TIS)	Marginal Effects	Promotion to E4 Successful TA (>12 mon TIS)	Marginal Effects
Any TA Use	0.130	0.051		
	(0.007)***	(0.003)***		
Successful TA Use			0.140	0.055
			(0.007)***	(0.003)***
Female	-0.065	-0.026	-0.063	-0.025
	(0.008)***	(0.003)***	(0.007)***	(0.003)***
Black	-0.063	-0.025	-0.062	-0.024
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Hispanic	0.038	0.015	0.039	0.015

	(0.009)***	(0.003)***	(0.009)***	(0.003)***
Native	-0.042	-0.017	-0.042	-0.016
	(0.018)**	(0.007)**	(0.018)**	(0.007)**
Asian	0.118	0.046	0.118	0.046
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
Other	0.024	0.009	0.024	0.010
	(0.029)	(0.011)	(0.029)	(0.011)
Age	-0.003	-0.001	-0.002	-0.001
	(0.001)**	(0.000)**	(0.001)**	(0.000)**
Married	0.000	0.000	-0.000	-0.000
	(0.011)	(0.004)	(0.011)	(0.004)
Dependents	-0.026	-0.010	-0.026	-0.010
	(0.010)**	(0.004)**	(0.010)**	(0.004)**
CAT I	-0.441	-0.174	-0.441	-0.174
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
CAT IIIa	-0.030	-0.012	-0.030	-0.012
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IIIb	-0.085	-0.033	-0.085	-0.033
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IV	-0.172	-0.068	-0.175	-0.069
	(0.129)	(0.051)	(0.129)	(0.051)
CAT Unknown	-0.338	-0.134	-0.335	-0.133
	(0.070)***	(0.028)***	(0.070)***	(0.028)***
HS Dropout	-0.085	-0.034	-0.086	-0.034
	(0.017)***	(0.007)***	(0.017)***	(0.007)***
GED	-0.103	-0.041	-0.102	-0.040
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
Some College	-0.001	-0.001	-0.003	-0.001
	(0.032)	(0.012)	(0.032)	(0.012)
College Degree	-0.190	-0.075	-0.193	-0.077
	(0.025)***	(0.010)***	(0.025)***	(0.010)***
Constant	0.165		0.165	
	(0.024)***		(0.024)***	
Observations	215956	215956	215956	215956
Pseudo R2	0.014	0.014	0.014	0.014
Mean Depr. Var.	0.374	0.374	0.374	0.374
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 35 analyzes promotion to E-5. TA users have a promotion rate that is 4.0 points above that of non-users. For sailors with more than a year of service who successfully complete college courses using TA, the likelihood of promotion to E-5 increases to 4.9 points higher than for non-TA users.

Table 35. Probit Regression Estimates of Promotion to E-5 (or Higher) by the End of the Fourth Year of Service Comparing TA Usage and Successful Course Completion (Models Include Rating Specific Dummies)

	Promotion to E5+ Any TA Use (Sample= >12 mon TIS)	Marginal Effects	Promotion to E5+ Successful TA (Sample= >12 mon TIS)	Marginal Effects
Any TA Use	0.185 (0.008)***	0.040 (0.002)***		
Successful TA Use			0.218 (0.009)***	0.049 (0.002)***
Female	-0.209 (0.010)***	-0.040 (0.002)***	-0.211 (0.010)***	-0.040 (0.002)***
Black	-0.243 (0.011)***	-0.046 (0.002)***	-0.242 (0.011)***	-0.046 (0.002)***
Hispanic	-0.124 (0.012)***	-0.024 (0.002)***	-0.124 (0.012)***	-0.024 (0.002)***
Native	-0.029 (0.021)	-0.006 (0.004)	-0.029 (0.021)	-0.006 (0.004)
Asian	-0.112 (0.016)***	-0.022 (0.003)***	-0.113 (0.016)***	-0.022 (0.003)***
Other	-0.184 (0.038)***	-0.034 (0.006)***	-0.185 (0.038)***	-0.034 (0.006)***
Age	0.039 (0.001)***	0.008 (0.000)***	0.039 (0.001)***	0.008 (0.000)***
Married	0.046 (0.014)***	0.010 (0.003)***	0.045 (0.014)***	0.009 (0.003)***
Dependents	0.075 (0.014)***	0.016 (0.003)***	0.076 (0.014)***	0.016 (0.003)***
CAT I	0.676 (0.013)***	0.187 (0.004)***	0.676 (0.013)***	0.187 (0.004)***
CAT IIIa	-0.416 (0.009)***	-0.076 (0.001)***	-0.416 (0.009)***	-0.076 (0.001)***
CAT IIIb	-0.801 (0.010)***	-0.139 (0.001)***	-0.800 (0.010)***	-0.139 (0.001)***
CAT IV	-1.247 (0.312)***	-0.117 (0.007)***	-1.248 (0.312)***	-0.117 (0.007)***
CAT Unknown	0.120 (0.075)	0.026 (0.018)	0.124 (0.075)	0.027 (0.018)
HS Dropout	-0.208 (0.022)***	-0.038 (0.004)***	-0.207 (0.022)***	-0.038 (0.004)***
GED	-0.164 (0.015)***	-0.031 (0.003)***	-0.162 (0.015)***	-0.031 (0.003)***
Some College	0.211 (0.035)***	0.049 (0.009)***	0.208 (0.035)***	0.048 (0.009)***
College Degree	0.395 (0.026)***	0.100 (0.008)***	0.392 (0.026)***	0.099 (0.008)***
Constant	-2.164 (0.030)***		-2.167 (0.030)***	

Observations	215956	215956	215956	215956
Pseudo R2	0.144	0.144	0.144	0.144
Mean Depn. Var.	0.136	0.136	0.136	0.136
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

THIS PAGE INTENTIONALLY LEFT BLANK

## VII. SUMMARY AND CONCLUSIONS

### A. SUMMARY

The main objective of this thesis was to analyze Tuition Assistance (TA) participation effects on Navy enlisted sailors' reenlistment and promotion. The analysis of MEPCOM, DMDC, and NPCD data indicate that sailors who use TA for college reenlist at higher rates than those who do not. In fact, the mean reenlistment rate for the sample is 39.1 percent, but among those who use TA it is 54.6 percent. The successful completion of at least one college course results in a reenlistment rate of 72.2 percent. Successful completion of courses may be correlated with ability and motivation, therefore these results may be biased upward. To mitigate this problem all models were conditioned on mental categories. Sailors who participate in TA also exhibit a higher likelihood of advancing to E-4 or E-5 by the end of their fourth year of service. The promotion rates to E-4 and E-5 among the sample are 37.4 and 10.7 percent, respectively. For those sailors who use TA, the promotion rates are 42.6 and 14.8 percent to E-4 and E-5, respectively. Successful completion of at least one class has a positive effect on this promotion rate, increasing the rate for E-4 to 42.9 and for E-5 to 17.5 percent.

This analysis confirms the positive relationship between reenlistment (i.e., retention) and educational opportunities found in a previous study conducted by CNA (Garcia et al., 1998). CNA found that sailors who used TA were more likely to reenlist. Additionally, the

availability of more recent data that focuses on TA enrollments, participation, and completion rates, and the exclusion of sailors who attrite prior to their reenlistment opportunity make this analysis a refinement of CNA's study.

The RAND (Buddin et al., 2002) study found that service members who participate in TA are actually less likely to reenlist, leading them to conclude that TA users are more likely to leave the Navy after their first-term of service for better job opportunities. The data used in our study was insufficient to reproduce the instrumental variable used to control for selection bias in the RAND study. The findings presented here confirm RAND's theory that inclusion of sailors who attrite will upwardly bias the apparent effect of TA use on retention (i.e., cause the effect of TA use to be overestimated). However, in this analysis (unlike RAND's), the effect of TA use on retention and promotion remained positive.

An attempt at a direct comparison of the results cited in the Army's study and Flaherty's analysis is impractical due to differences between military services and civilian institutions, including differences in rules, climates, and policies. However, the basic findings of both studies match the results of the present analysis—investments in general human capital do not increase turnover rates.

## **B. CONCLUSIONS**

Educational opportunities have long been one of the main reasons sailors cite for joining the Navy. As the Navy continues to increase the importance of general education to

sailors' professional development and advancement, TA will take on an increasingly important role during a sailors' career.

This study cannot conclusively determine whether the Tuition Assistance program is cost-effective for the Navy because it lacked sufficient controls for elements beyond the effect of TA on sailor's promotion and reenlistment. In other words, the TA program may have an effect on other aspects of the Navy beyond the scope of this study (i.e., recruiting, sailor quality-of-life issues, etc.).

### **C. RECOMMENDATIONS FOR FOLLOW-ON RESEARCH**

Due to data limitations, this analysis was unable to control for selection bias. The thesis recommends that future research on this topic use a data set with sufficient variables to generate an instrumental variable to control for selection bias.

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX

Table 36. Baseline Probit Regression Estimates of Tuition Assistance Usage (includes completed and non-completed courses)

	Any TA Use (4YO's / No Prior Svc)	Marginal Effects
Female	0.698 (0.008)***	0.235 (0.003)***
Black	0.169 (0.009)***	0.051 (0.003)***
Hispanic	0.236 (0.010)***	0.073 (0.003)***
Native	-0.059 (0.020)***	-0.017 (0.006)***
Asian	0.273 (0.013)***	0.087 (0.005)***
Other	0.275 (0.031)***	0.088 (0.011)***
Age	0.014 (0.001)***	0.004 (0.000)***
Married	0.104 (0.011)***	0.031 (0.003)***
Dependents	-0.104 (0.011)***	-0.030 (0.003)***
CAT I	0.006 (0.014)	0.002 (0.004)
CAT IIIa	-0.103 (0.008)***	-0.029 (0.002)***
CAT IIIb	-0.294 (0.008)***	-0.082 (0.002)***
CAT IV	-0.391 (0.156)**	-0.096 (0.031)***
CAT Unknown	-0.083 (0.077)	-0.023 (0.021)
HS Dropout	-0.222 (0.020)***	-0.059 (0.005)***
GED	-0.107 (0.014)***	-0.030 (0.004)***
Some College	0.046 (0.034)	0.014 (0.010)
College Degree	-0.551 (0.031)***	-0.125 (0.005)***
fy95	0.013 (0.014)	0.004 (0.004)
FY96	-0.000 (0.014)	-0.000 (0.004)
FY97	0.049 (0.013)***	0.014 (0.004)***
FY98	0.157	0.048

	(0.013)***	(0.004)***
FY99	0.180	0.055
	(0.013)***	(0.004)***
FY00	0.208	0.064
	(0.013)***	(0.004)***
FY01	0.219	0.068
	(0.013)***	(0.004)***
AC	0.618	0.217
	(0.051)***	(0.020)***
AD	0.408	0.136
	(0.032)***	(0.012)***
AE	0.165	0.051
	(0.050)***	(0.017)***
AG	0.877	0.319
	(0.067)***	(0.027)***
AK	0.520	0.178
	(0.050)***	(0.019)***
AO	0.093	0.028
	(0.035)***	(0.011)**
AS	0.486	0.165
	(0.061)***	(0.023)***
AT	0.382	0.126
	(0.031)***	(0.011)***
AW	0.418	0.140
	(0.070)***	(0.026)***
AZ	0.696	0.247
	(0.046)***	(0.018)***
BM	0.540	0.186
	(0.582)	(0.225)
BU	0.493	0.168
	(0.048)***	(0.018)***
CE	0.599	0.209
	(0.112)***	(0.044)***
CM	0.087	0.026
	(0.085)	(0.026)
CTA	1.327	0.489
	(0.095)***	(0.033)***
CTI	0.465	0.158
	(0.371)	(0.140)
CTM	0.825	0.299
	(0.091)***	(0.036)***
CTO	0.810	0.293
	(0.057)***	(0.023)***
CTR	0.584	0.203
	(0.058)***	(0.023)***
DC	-0.321	-0.081
	(0.068)***	(0.015)***
DK	0.622	0.218
	(0.063)***	(0.025)***
DS	-0.443	-0.106
	(0.266)*	(0.049)**
DT	0.590	0.206
	(0.726)	(0.284)

EM	0.048	0.014
	(0.032)	(0.010)
EN	-0.149	-0.041
	(0.051)***	(0.013)***
EO	-0.034	-0.010
	(0.095)	(0.027)
ET	0.380	0.126
	(0.033)***	(0.012)***
FC	0.046	0.014
	(0.048)	(0.014)
FT	0.097	0.029
	(0.203)	(0.063)
GM	-0.003	-0.001
	(0.067)	(0.020)
HM	0.635	0.223
	(0.295)**	(0.116)*
HT	-0.129	-0.036
	(0.055)**	(0.014)**
IC	-0.008	-0.002
	(0.063)	(0.018)
JO	0.850	0.309
	(0.187)***	(0.074)***
MA	-0.623	-0.136
	(0.121)***	(0.018)***
MN	0.574	0.199
	(0.110)***	(0.043)***
MR	0.030	0.009
	(0.103)	(0.031)
MT	0.177	0.055
	(0.106)*	(0.035)
PC	0.459	0.155
	(0.105)***	(0.039)***
PH	0.651	0.229
	(0.107)***	(0.042)***
PN	0.708	0.252
	(0.050)***	(0.020)***
PR	0.410	0.137
	(0.065)***	(0.024)***
QM	0.085	0.026
	(0.066)	(0.021)
RM	0.440	0.148
	(0.032)***	(0.012)***
SH	0.032	0.009
	(0.059)	(0.018)
SK	0.442	0.149
	(0.042)***	(0.016)***
SM	0.026	0.008
	(0.074)	(0.022)
SW	0.181	0.056
	(0.089)**	(0.029)*
TM	0.301	0.097
	(0.066)***	(0.023)***
UT	0.526	0.181

	(0.105)***	(0.041)***
YN	0.926	0.338
	(0.033)***	(0.013)***
OS	0.148	0.045
	(0.028)***	(0.009)***
IS	0.733	0.262
	(0.051)***	(0.020)***
MS	0.003	0.001
	(0.034)	(0.010)
RP	0.921	0.337
	(0.092)***	(0.036)***
AMH	0.219	0.069
	(0.065)***	(0.022)***
EW	0.008	0.002
	(0.092)	(0.027)
STS	-0.207	-0.055
	(0.091)**	(0.022)**
STG	-0.027	-0.008
	(0.042)	(0.012)
GSM	-0.233	-0.062
	(0.071)***	(0.017)***
GSE	-0.421	-0.102
	(0.122)***	(0.023)***
AMS	0.188	0.059
	(0.046)***	(0.015)***
ABH	0.247	0.079
	(0.066)***	(0.023)***
ABF	-0.086	-0.024
	(0.086)	(0.023)
Constant	-1.296	
	(0.026)***	
Mean of Depn. Variable	0.167	0.167
Observations	216797	216797
Pseudo R2	0.069	0.069
Standard errors in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 37. Probit Regression Estimates of Tuition Assistance Usage (includes completed and non-completed courses) Controlling for the Effect of Rating

	Any TA Use No Rating Dummies	Marginal Effects	Any TA Use With Rating Dummies	Marginal Effects
Female	0.690	0.230	0.698	0.235
	(0.007)***	(0.003)***	(0.008)***	(0.003)***
Black	0.167	0.050	0.169	0.051
	(0.008)***	(0.003)***	(0.009)***	(0.003)***
Hispanic	0.233	0.072	0.236	0.073
	(0.010)***	(0.003)***	(0.010)***	(0.003)***
Native	-0.062	-0.017	-0.059	-0.017

	(0.020)***	(0.006)***	(0.020)***	(0.006)***
Asian	0.264	0.083	0.273	0.087
	(0.013)***	(0.004)***	(0.013)***	(0.005)***
Other	0.258	0.082	0.275	0.088
	(0.031)***	(0.010)***	(0.031)***	(0.011)***
Age	0.017	0.005	0.014	0.004
	(0.001)***	(0.000)***	(0.001)***	(0.000)***
Married	0.103	0.030	0.104	0.031
	(0.011)***	(0.003)***	(0.011)***	(0.003)***
Dependents	-0.100	-0.028	-0.104	-0.030
	(0.011)***	(0.003)***	(0.011)***	(0.003)***
CAT I	-0.005	-0.001	0.006	0.002
	(0.014)	(0.004)	(0.014)	(0.004)
CAT IIIa	-0.098	-0.028	-0.103	-0.029
	(0.008)***	(0.002)***	(0.008)***	(0.002)***
CAT IIIb	-0.303	-0.083	-0.294	-0.082
	(0.008)***	(0.002)***	(0.008)***	(0.002)***
CAT IV	-0.430	-0.102	-0.391	-0.096
	(0.154)***	(0.029)***	(0.156)**	(0.031)***
CAT Unknown	-0.119	-0.033	-0.083	-0.023
	(0.075)	(0.020)*	(0.077)	(0.021)
HS Dropout	-0.204	-0.054	-0.222	-0.059
	(0.020)***	(0.005)***	(0.020)***	(0.005)***
GED	-0.096	-0.027	-0.107	-0.030
	(0.013)***	(0.004)***	(0.014)***	(0.004)***
Some College	0.051	0.015	0.046	0.014
	(0.033)	(0.010)	(0.034)	(0.010)
College Degree	-0.537	-0.122	-0.551	-0.125
	(0.031)***	(0.005)***	(0.031)***	(0.005)***
FY95	0.009	0.003	0.013	0.004
	(0.014)	(0.004)	(0.014)	(0.004)
FY96	0.004	0.001	-0.000	-0.000
	(0.014)	(0.004)	(0.014)	(0.004)
FY97	0.039	0.012	0.049	0.014
	(0.013)***	(0.004)***	(0.013)***	(0.004)***
FY98	0.152	0.046	0.157	0.048
	(0.013)***	(0.004)***	(0.013)***	(0.004)***
FY99	0.186	0.057	0.180	0.055
	(0.013)***	(0.004)***	(0.013)***	(0.004)***
FY00	0.201	0.061	0.208	0.064
	(0.012)***	(0.004)***	(0.013)***	(0.004)***
FY01	0.209	0.064	0.219	0.068
	(0.012)***	(0.004)***	(0.013)***	(0.004)***
AC			0.618	0.217
			(0.051)***	(0.020)***
AD			0.408	0.136
			(0.032)***	(0.012)***
AE			0.165	0.051
			(0.050)***	(0.017)***
AG			0.877	0.319
			(0.067)***	(0.027)***
AK			0.520	0.178
			(0.050)***	(0.019)***

AO			0.093	0.028
			(0.035)***	(0.011)**
AS			0.486	0.165
			(0.061)***	(0.023)***
AT			0.382	0.126
			(0.031)***	(0.011)***
AW			0.418	0.140
			(0.070)***	(0.026)***
AZ			0.696	0.247
			(0.046)***	(0.018)***
BM			0.540	0.186
			(0.582)	(0.225)
BU			0.493	0.168
			(0.048)***	(0.018)***
CE			0.599	0.209
			(0.112)***	(0.044)***
CM			0.087	0.026
			(0.085)	(0.026)
CTA			1.327	0.489
			(0.095)***	(0.033)***
CTI			0.465	0.158
			(0.371)	(0.140)
CTM			0.825	0.299
			(0.091)***	(0.036)***
CTO			0.810	0.293
			(0.057)***	(0.023)***
CTR			0.584	0.203
			(0.058)***	(0.023)***
DC			-0.321	-0.081
			(0.068)***	(0.015)***
DK			0.622	0.218
			(0.063)***	(0.025)***
DS			-0.443	-0.106
			(0.266)*	(0.049)**
DT			0.590	0.206
			(0.726)	(0.284)
EM			0.048	0.014
			(0.032)	(0.010)
EN			-0.149	-0.041
			(0.051)***	(0.013)***
EO			-0.034	-0.010
			(0.095)	(0.027)
ET			0.380	0.126
			(0.033)***	(0.012)***
FC			0.046	0.014
			(0.048)	(0.014)
FT			0.097	0.029
			(0.203)	(0.063)
GM			-0.003	-0.001
			(0.067)	(0.020)
HM			0.635	0.223
			(0.295)**	(0.116)*
HT			-0.129	-0.036

			(0.055)**	(0.014)**
IC			-0.008	-0.002
			(0.063)	(0.018)
JO			0.850	0.309
			(0.187)***	(0.074)***
MA			-0.623	-0.136
			(0.121)***	(0.018)***
MN			0.574	0.199
			(0.110)***	(0.043)***
MR			0.030	0.009
			(0.103)	(0.031)
MT			0.177	0.055
			(0.106)*	(0.035)
PC			0.459	0.155
			(0.105)***	(0.039)***
PH			0.651	0.229
			(0.107)***	(0.042)***
PN			0.708	0.252
			(0.050)***	(0.020)***
PR			0.410	0.137
			(0.065)***	(0.024)***
QM			0.085	0.026
			(0.066)	(0.021)
RM			0.440	0.148
			(0.032)***	(0.012)***
SH			0.032	0.009
			(0.059)	(0.018)
SK			0.442	0.149
			(0.042)***	(0.016)***
SM			0.026	0.008
			(0.074)	(0.022)
SW			0.181	0.056
			(0.089)**	(0.029)*
TM			0.301	0.097
			(0.066)***	(0.023)***
UT			0.526	0.181
			(0.105)***	(0.041)***
YN			0.926	0.338
			(0.033)***	(0.013)***
OS			0.148	0.045
			(0.028)***	(0.009)***
IS			0.733	0.262
			(0.051)***	(0.020)***
MS			0.003	0.001
			(0.034)	(0.010)
RP			0.921	0.337
			(0.092)***	(0.036)***
AMH			0.219	0.069
			(0.065)***	(0.022)***
EW			0.008	0.002
			(0.092)	(0.027)
STS			-0.207	-0.055
			(0.091)**	(0.022)**

STG			-0.027	-0.008
			(0.042)	(0.012)
GSM			-0.233	-0.062
			(0.071)***	(0.017)***
GSE			-0.421	-0.102
			(0.122)***	(0.023)***
AMS			0.188	0.059
			(0.046)***	(0.015)***
ABH			0.247	0.079
			(0.066)***	(0.023)***
ABF			-0.086	-0.024
			(0.086)	(0.023)
Constant	-1.316		-1.296	
	(0.026)***		(0.026)***	
Observations	222950	222950	216797	216797
Pseudo R2	0.052	0.052	0.069	0.069
Mean Depn. Var.	0.167	0.167	0.167	0.167
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 38. Baseline Probit Regression Estimates of Reenlistment and Interaction Term Between Female and TA Use (Model Includes Rating Specific Dummies)

	<b>Reenlistment (4YO's / No Prior Svc.)</b>	<b>Marginal Effects</b>	<b>Reenlistment With Interaction between Female and Any TA Use</b>	<b>Marginal Effects</b>
Any TA Use	0.403	0.154	0.386	0.148
	(0.007)***	(0.003)***	(0.008)***	(0.003)***
Female*Any TA			0.066	0.026
			(0.016)***	(0.006)***
Female	-0.128	-0.051	-0.151	-0.060
	(0.008)***	(0.003)***	(0.009)***	(0.004)***
Black	0.240	0.093	0.240	0.093
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Hispanic	0.062	0.024	0.062	0.024
	(0.009)***	(0.003)***	(0.009)***	(0.003)***
Native	0.037	0.014	0.037	0.014
	(0.018)**	(0.007)**	(0.018)**	(0.007)**
Asian	0.328	0.125	0.328	0.125
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
Other	0.067	0.026	0.067	0.026
	(0.029)**	(0.011)**	(0.029)**	(0.011)**
Age	0.010	0.004	0.010	0.004
	(0.001)***	(0.000)***	(0.001)***	(0.000)***
Married	0.097	0.038	0.097	0.038
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
Dependents	0.105	0.041	0.106	0.042

	(0.011)***	(0.004)***	(0.011)***	(0.004)***
CAT I	0.279	0.107	0.280	0.107
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
CAT IIIa	-0.253	-0.100	-0.253	-0.100
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IIIb	-0.295	-0.117	-0.295	-0.117
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IV	-0.069	-0.027	-0.070	-0.028
	(0.127)	(0.051)	(0.127)	(0.051)
CAT Unknown	-0.253	-0.101	-0.254	-0.101
	(0.069)***	(0.028)***	(0.069)***	(0.028)***
HS Dropout	-0.094	-0.037	-0.095	-0.038
	(0.017)***	(0.007)***	(0.017)***	(0.007)***
GED	-0.088	-0.035	-0.088	-0.035
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
Some College	0.022	0.009	0.021	0.008
	(0.032)	(0.013)	(0.032)	(0.013)
College Degree	-0.263	-0.105	-0.262	-0.104
	(0.025)***	(0.010)***	(0.025)***	(0.010)***
FY95	-0.071	-0.028	-0.071	-0.028
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
FY96	0.060	0.023	0.060	0.023
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
FY97	0.206	0.080	0.207	0.080
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY98	0.318	0.122	0.319	0.122
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY99	0.261	0.101	0.261	0.101
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
FY00	0.173	0.067	0.173	0.067
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
FY01	0.041	0.016	0.041	0.016
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
AC	0.034	0.013	0.035	0.014
	(0.051)	(0.020)	(0.051)	(0.020)
AD	0.028	0.011	0.029	0.012
	(0.031)	(0.012)	(0.031)	(0.012)
AE	-0.096	-0.038	-0.095	-0.038
	(0.046)**	(0.018)**	(0.046)**	(0.018)**
AG	-0.069	-0.028	-0.068	-0.027
	(0.067)	(0.027)	(0.067)	(0.027)
AK	0.010	0.004	0.009	0.004
	(0.050)	(0.020)	(0.050)	(0.020)
AO	-0.009	-0.003	-0.009	-0.004
	(0.032)	(0.013)	(0.032)	(0.013)
AS	-0.057	-0.022	-0.055	-0.022
	(0.060)	(0.024)	(0.060)	(0.024)
AT	-0.153	-0.061	-0.150	-0.060
	(0.030)***	(0.012)***	(0.030)***	(0.012)***
AW	0.183	0.071	0.185	0.072
	(0.069)***	(0.026)***	(0.069)***	(0.026)***
AZ	-0.051	-0.020	-0.050	-0.020
	(0.046)	(0.018)	(0.046)	(0.018)

BM	-1.107	-0.391	-1.111	-0.391
	(0.620)*	(0.157)**	(0.620)*	(0.156)**
BU	-0.035	-0.014	-0.033	-0.013
	(0.047)	(0.019)	(0.047)	(0.019)
CE	0.162	0.063	0.164	0.064
	(0.114)	(0.043)	(0.114)	(0.043)
CM	0.109	0.042	0.110	0.043
	(0.076)	(0.029)	(0.076)	(0.029)
CTA	0.214	0.083	0.210	0.081
	(0.090)**	(0.034)**	(0.090)**	(0.034)**
CTI	-0.956	-0.349	-0.960	-0.351
	(0.385)**	(0.111)***	(0.385)**	(0.111)***
CTM	0.532	0.193	0.531	0.192
	(0.104)***	(0.033)***	(0.104)***	(0.033)***
CTO	0.127	0.049	0.127	0.049
	(0.058)**	(0.022)**	(0.058)**	(0.022)**
CTR	-0.054	-0.021	-0.054	-0.021
	(0.058)	(0.023)	(0.058)	(0.023)
DC	-0.081	-0.032	-0.079	-0.031
	(0.052)	(0.021)	(0.052)	(0.021)
DK	0.065	0.026	0.064	0.025
	(0.064)	(0.025)	(0.064)	(0.025)
DS	0.430	0.159	0.430	0.159
	(0.208)**	(0.070)**	(0.208)**	(0.070)**
EM	0.118	0.046	0.119	0.047
	(0.029)***	(0.011)***	(0.029)***	(0.011)***
EN	0.048	0.019	0.048	0.019
	(0.043)	(0.017)	(0.043)	(0.017)
EO	0.032	0.012	0.032	0.013
	(0.082)	(0.032)	(0.082)	(0.032)
ET	0.233	0.089	0.234	0.090
	(0.034)***	(0.013)***	(0.034)***	(0.013)***
FC	0.233	0.090	0.233	0.090
	(0.045)***	(0.017)***	(0.045)***	(0.017)***
FT	0.558	0.201	0.559	0.201
	(0.200)***	(0.062)***	(0.200)***	(0.062)***
GM	-0.158	-0.063	-0.156	-0.062
	(0.059)***	(0.023)***	(0.059)***	(0.023)***
HM	0.440	0.163	0.439	0.162
	(0.325)	(0.109)	(0.326)	(0.109)
HT	-0.075	-0.030	-0.073	-0.029
	(0.046)	(0.018)	(0.046)	(0.018)
IC	0.056	0.022	0.057	0.022
	(0.055)	(0.021)	(0.055)	(0.021)
JO	-0.124	-0.049	-0.125	-0.050
	(0.187)	(0.075)	(0.187)	(0.075)
MA	-0.198	-0.079	-0.198	-0.079
	(0.082)**	(0.033)**	(0.082)**	(0.033)**
MN	0.051	0.020	0.055	0.022
	(0.109)	(0.043)	(0.109)	(0.043)
MR	-0.098	-0.039	-0.096	-0.038
	(0.091)	(0.036)	(0.091)	(0.036)
MT	0.451	0.167	0.453	0.167

	(0.107)***	(0.036)***	(0.107)***	(0.036)***
PC	-0.090	-0.036	-0.092	-0.037
	(0.102)	(0.041)	(0.102)	(0.041)
PH	-0.044	-0.017	-0.046	-0.018
	(0.105)	(0.042)	(0.105)	(0.042)
PN	-0.088	-0.035	-0.089	-0.035
	(0.050)*	(0.020)*	(0.050)*	(0.020)*
PR	0.035	0.014	0.038	0.015
	(0.063)	(0.025)	(0.063)	(0.025)
QM	-0.010	-0.004	-0.010	-0.004
	(0.059)	(0.023)	(0.059)	(0.023)
RM	-0.065	-0.026	-0.066	-0.026
	(0.031)**	(0.012)**	(0.031)**	(0.012)**
SH	0.025	0.010	0.023	0.009
	(0.052)	(0.020)	(0.052)	(0.020)
SK	0.110	0.043	0.108	0.042
	(0.041)***	(0.016)***	(0.041)***	(0.016)***
SM	0.142	0.055	0.142	0.055
	(0.065)**	(0.025)**	(0.065)**	(0.025)**
SW	-0.043	-0.017	-0.040	-0.016
	(0.082)	(0.032)	(0.082)	(0.032)
TM	-0.061	-0.024	-0.061	-0.024
	(0.062)	(0.025)	(0.062)	(0.025)
UT	0.168	0.065	0.170	0.066
	(0.104)	(0.039)*	(0.104)	(0.039)*
YN	0.102	0.040	0.101	0.040
	(0.033)***	(0.013)***	(0.033)***	(0.013)***
OS	-0.004	-0.002	-0.004	-0.002
	(0.026)	(0.010)	(0.026)	(0.010)
IS	-0.144	-0.057	-0.143	-0.057
	(0.051)***	(0.020)***	(0.051)***	(0.020)***
MS	0.061	0.024	0.059	0.023
	(0.030)**	(0.012)**	(0.030)**	(0.012)**
RP	0.182	0.070	0.178	0.069
	(0.092)**	(0.035)**	(0.092)*	(0.035)**
AMH	-0.000	-0.000	0.002	0.001
	(0.060)	(0.024)	(0.060)	(0.024)
EW	-0.080	-0.032	-0.078	-0.031
	(0.082)	(0.033)	(0.082)	(0.033)
STS	0.058	0.023	0.059	0.023
	(0.075)	(0.029)	(0.075)	(0.029)
STG	0.040	0.016	0.040	0.016
	(0.037)	(0.015)	(0.037)	(0.015)
GSM	0.007	0.003	0.008	0.003
	(0.057)	(0.023)	(0.057)	(0.023)
GSE	0.001	0.000	0.001	0.000
	(0.093)	(0.037)	(0.093)	(0.037)
AMS	0.071	0.028	0.073	0.029
	(0.043)*	(0.017)*	(0.043)*	(0.017)*
ABH	-0.056	-0.022	-0.055	-0.022
	(0.061)	(0.024)	(0.061)	(0.024)
ABF	-0.057	-0.022	-0.057	-0.022
	(0.072)	(0.029)	(0.072)	(0.029)

Constant	-0.229		-0.226	
	(0.024)***		(0.024)***	
Observations	216793	216793	216793	216793
Pseudo R2	0.038	0.038	0.038	0.038
Mean Depn. Var.	0.391	0.391	0.391	0.391
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 39. Original Sample Probit Regression Estimates of Reenlistment Unrestricted and Time in Service Greater than 36 months

	Reenlistment Original Sample	Marginal Effects	Reenlistment (>36 Mos TIS)	Marginal Effects
Any TA Used	0.400	0.153	0.309	0.117
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
Female	-0.127	-0.050	-0.126	-0.049
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Black	0.231	0.090	0.254	0.096
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Hispanic	0.059	0.023	0.048	0.019
	(0.009)***	(0.003)***	(0.009)***	(0.003)***
Native	0.020	0.008	0.028	0.011
	(0.017)	(0.007)	(0.018)	(0.007)
Asian	0.318	0.121	0.296	0.110
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
Other	0.062	0.024	0.054	0.021
	(0.029)**	(0.011)**	(0.029)*	(0.011)*
Age	0.008	0.003	0.017	0.007
	(0.001)***	(0.000)***	(0.001)***	(0.000)***
Married	0.089	0.035	0.085	0.033
	(0.010)***	(0.004)***	(0.011)***	(0.004)***
Dependents	0.109	0.043	0.119	0.046
	(0.010)***	(0.004)***	(0.011)***	(0.004)***
CAT I	0.282	0.108	0.297	0.110
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
CAT IIIa	-0.248	-0.098	-0.252	-0.099
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IIIb	-0.291	-0.115	-0.290	-0.113
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IV	-0.150	-0.060	0.061	0.024
	(0.104)	(0.042)	(0.119)	(0.046)
CAT Unknown	-0.282	-0.112	0.012	0.005
	(0.024)***	(0.009)***	(0.029)	(0.011)
HS Dropout	-0.098	-0.039	-0.086	-0.034
	(0.016)***	(0.007)***	(0.017)***	(0.007)***
GED	-0.089	-0.035	-0.081	-0.032
	(0.011)***	(0.005)***	(0.012)***	(0.005)***
Some College	0.039	0.016	-0.009	-0.003

	(0.031)	(0.012)	(0.032)	(0.012)
College Degree	-0.233	-0.093	-0.217	-0.086
	(0.024)***	(0.009)***	(0.025)***	(0.010)***
FY95	-0.073	-0.029	-0.080	-0.031
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
FY96	0.063	0.025	0.062	0.024
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
FY97	0.203	0.079	0.191	0.073
	(0.011)***	(0.004)***	(0.012)***	(0.004)***
FY98	0.315	0.121	0.309	0.116
	(0.011)***	(0.004)***	(0.012)***	(0.004)***
FY99	0.261	0.101	0.254	0.096
	(0.011)***	(0.004)***	(0.012)***	(0.004)***
FY00	0.176	0.068	0.159	0.061
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
FY01	0.041	0.016	0.027	0.010
	(0.011)***	(0.004)***	(0.011)**	(0.004)**
AC	-0.003	-0.001	-0.005	-0.002
	(0.051)	(0.020)	(0.052)	(0.020)
AD	0.072	0.028	0.078	0.030
	(0.031)**	(0.012)**	(0.032)**	(0.012)**
AE	-0.153	-0.061	-0.174	-0.069
	(0.047)***	(0.019)***	(0.048)***	(0.019)***
AG	0.015	0.006	-0.029	-0.011
	(0.067)	(0.026)	(0.068)	(0.026)
AK	0.130	0.051	0.130	0.050
	(0.051)**	(0.019)***	(0.052)**	(0.019)**
AO	-0.022	-0.009	-0.025	-0.010
	(0.031)	(0.012)	(0.032)	(0.013)
AS	0.010	0.004	0.027	0.010
	(0.060)	(0.024)	(0.062)	(0.024)
AT	-0.139	-0.055	-0.168	-0.066
	(0.030)***	(0.012)***	(0.030)***	(0.012)***
AW	0.214	0.083	0.204	0.077
	(0.070)***	(0.026)***	(0.071)***	(0.026)***
AZ	0.060	0.024	0.038	0.015
	(0.046)	(0.018)	(0.047)	(0.018)
BM	-0.536	-0.210	-0.627	-0.246
	(0.555)	(0.206)	(0.559)	(0.206)
BU	-0.092	-0.036	-0.097	-0.038
	(0.047)**	(0.019)*	(0.048)**	(0.019)**
CE	0.118	0.046	0.144	0.055
	(0.109)	(0.042)	(0.114)	(0.042)
CM	0.047	0.018	0.056	0.022
	(0.074)	(0.029)	(0.077)	(0.029)
CTA	0.152	0.059	0.182	0.069
	(0.086)*	(0.033)*	(0.089)**	(0.032)**
CTI	-0.210	-0.083	-0.263	-0.104
	(0.357)	(0.142)	(0.358)	(0.143)
CTM	0.677	0.236	0.675	0.226
	(0.108)***	(0.031)***	(0.111)***	(0.029)***
CTO	-0.008	-0.003	-0.004	-0.002
	(0.058)	(0.023)	(0.059)	(0.023)

CTR	-0.079	-0.031	-0.104	-0.041
	(0.057)	(0.023)	(0.058)*	(0.023)*
DC	0.032	0.013	0.036	0.014
	(0.051)	(0.020)	(0.053)	(0.020)
DK	0.189	0.073	0.167	0.063
	(0.065)***	(0.025)***	(0.066)**	(0.024)***
DS	0.797	0.269	0.862	0.271
	(0.235)***	(0.060)***	(0.257)***	(0.056)***
DT	-0.545	-0.213	-0.476	-0.188
	(0.558)	(0.206)	(0.604)	(0.234)
EM	0.127	0.049	0.121	0.046
	(0.029)***	(0.011)***	(0.030)***	(0.011)***
EN	0.064	0.025	0.061	0.024
	(0.042)	(0.016)	(0.043)	(0.017)
EO	0.102	0.040	0.117	0.045
	(0.081)	(0.031)	(0.084)	(0.032)
ET	0.187	0.072	0.202	0.076
	(0.034)***	(0.013)***	(0.035)***	(0.013)***
FC	0.194	0.075	0.194	0.073
	(0.044)***	(0.016)***	(0.045)***	(0.017)***
FT	0.631	0.223	0.546	0.190
	(0.194)***	(0.057)***	(0.193)***	(0.057)***
GM	-0.056	-0.022	-0.058	-0.023
	(0.058)	(0.023)	(0.060)	(0.024)
HM	0.142	0.055	0.102	0.039
	(0.312)	(0.119)	(0.322)	(0.122)
HT	0.018	0.007	0.032	0.012
	(0.046)	(0.018)	(0.048)	(0.019)
IC	-0.001	-0.000	0.002	0.001
	(0.056)	(0.022)	(0.058)	(0.022)
JO	-0.128	-0.051	-0.146	-0.057
	(0.189)	(0.076)	(0.195)	(0.077)
MA	-0.103	-0.041	-0.069	-0.027
	(0.081)	(0.032)	(0.085)	(0.034)
MN	-0.093	-0.037	-0.071	-0.028
	(0.111)	(0.044)	(0.115)	(0.045)
MR	-0.055	-0.022	-0.050	-0.019
	(0.091)	(0.036)	(0.094)	(0.037)
MT	0.433	0.161	0.454	0.162
	(0.107)***	(0.036)***	(0.112)***	(0.035)***
PC	-0.032	-0.013	-0.037	-0.014
	(0.101)	(0.040)	(0.104)	(0.041)
PH	-0.060	-0.024	-0.056	-0.022
	(0.110)	(0.044)	(0.113)	(0.044)
PN	0.006	0.002	-0.021	-0.008
	(0.049)	(0.019)	(0.050)	(0.019)
PR	-0.032	-0.012	-0.012	-0.004
	(0.062)	(0.025)	(0.065)	(0.025)
QM	0.027	0.011	0.006	0.002
	(0.058)	(0.023)	(0.059)	(0.023)
RM	-0.048	-0.019	-0.072	-0.028
	(0.031)	(0.012)	(0.031)**	(0.012)**
SH	0.132	0.052	0.147	0.056

	(0.053)**	(0.020)**	(0.055)***	(0.020)***
SK	0.116	0.045	0.116	0.044
	(0.041)***	(0.016)***	(0.043)***	(0.016)***
SM	0.122	0.047	0.140	0.053
	(0.064)*	(0.025)*	(0.067)**	(0.025)**
SW	-0.181	-0.072	-0.186	-0.073
	(0.084)**	(0.034)**	(0.087)**	(0.034)**
TM	0.090	0.035	0.090	0.035
	(0.063)	(0.025)	(0.065)	(0.025)
UT	0.317	0.120	0.310	0.114
	(0.105)***	(0.038)***	(0.109)***	(0.037)***
YN	0.086	0.034	0.076	0.029
	(0.033)**	(0.013)***	(0.034)**	(0.013)**
OS	0.005	0.002	-0.003	-0.001
	(0.026)	(0.010)	(0.026)	(0.010)
IS	-0.112	-0.045	-0.139	-0.055
	(0.051)**	(0.020)**	(0.052)***	(0.021)***
MS	0.119	0.046	0.126	0.048
	(0.030)***	(0.012)***	(0.031)***	(0.012)***
RP	0.086	0.034	0.093	0.036
	(0.092)	(0.036)	(0.095)	(0.036)
AMH	0.006	0.002	-0.009	-0.003
	(0.060)	(0.024)	(0.062)	(0.024)
EW	-0.159	-0.063	-0.147	-0.058
	(0.077)**	(0.031)**	(0.080)*	(0.032)*
STS	0.060	0.024	0.045	0.017
	(0.074)	(0.029)	(0.077)	(0.029)
STG	0.086	0.034	0.082	0.032
	(0.037)**	(0.014)**	(0.038)**	(0.015)**
GSM	0.112	0.044	0.127	0.048
	(0.058)*	(0.022)**	(0.060)**	(0.022)**
GSE	0.219	0.084	0.255	0.095
	(0.096)**	(0.036)**	(0.102)**	(0.036)***
AMS	0.104	0.041	0.097	0.037
	(0.044)**	(0.017)**	(0.045)**	(0.017)**
ABH	-0.108	-0.043	-0.120	-0.047
	(0.061)*	(0.025)*	(0.063)*	(0.025)*
ABF	-0.082	-0.032	-0.069	-0.027
	(0.068)	(0.027)	(0.071)	(0.028)
Constant	-0.183		-0.275	
	(0.017)***		(0.023)***	
Observations	225899	225899	213732	213732
Pseudo R2	0.0371	0.0371	0.0346	0.0346
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 40. Probit Regression Estimates of Reenlistment Comparing TA usage and Successful Course Completion

	Reenlistment Any TA Use (> 36 mos TIS)	Marginal Effects	Reenlistment Successful TA (>36 mos TIS)	Marginal Effects
--	--	---------------------	--	---------------------

Any TA Use	0.319	0.121		
	(0.007)***	(0.003)***		
Successful TA Use			0.336	0.127
			(0.008)***	(0.003)***
Female	-0.125	-0.049	-0.116	-0.046
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Black	0.265	0.101	0.268	0.102
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Hispanic	0.055	0.021	0.057	0.022
	(0.009)***	(0.004)***	(0.009)***	(0.004)***
Native	0.047	0.018	0.047	0.018
	(0.018)**	(0.007)**	(0.018)***	(0.007)***
Asian	0.318	0.118	0.318	0.118
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
Other	0.066	0.026	0.068	0.026
	(0.030)**	(0.011)**	(0.030)**	(0.011)**
Age	0.008	0.003	0.008	0.003
	(0.001)***	(0.000)***	(0.001)***	(0.000)***
Married	0.090	0.035	0.089	0.034
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
Dependents	0.121	0.047	0.122	0.047
	(0.011)***	(0.004)***	(0.011)***	(0.004)***
CAT I	0.303	0.113	0.303	0.113
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
CAT IIIa	-0.256	-0.101	-0.256	-0.101
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IIIb	-0.292	-0.115	-0.293	-0.115
	(0.007)***	(0.003)***	(0.007)***	(0.003)***
CAT IV	0.059	0.023	0.050	0.019
	(0.139)	(0.053)	(0.139)	(0.053)
CAT Unknown	-0.196	-0.077	-0.188	-0.074
	(0.073)***	(0.029)***	(0.073)***	(0.029)**
HS Dropout	-0.076	-0.030	-0.076	-0.030
	(0.017)***	(0.007)***	(0.017)***	(0.007)***
GED	-0.066	-0.026	-0.063	-0.025
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
Some College	0.019	0.007	0.014	0.005
	(0.033)	(0.013)	(0.033)	(0.013)
College Degree	-0.174	-0.068	-0.183	-0.072
	(0.026)***	(0.010)***	(0.026)***	(0.010)***
FY95	-0.084	-0.033	-0.085	-0.033
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
FY96	0.050	0.019	0.050	0.019
	(0.012)***	(0.005)***	(0.012)***	(0.005)***
FY97	0.191	0.073	0.192	0.073
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY98	0.306	0.115	0.307	0.115
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY99	0.246	0.093	0.249	0.094
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY00	0.150	0.058	0.154	0.059
	(0.012)***	(0.004)***	(0.012)***	(0.004)***

FY01	0.021	0.008	0.030	0.012
	(0.011)*	(0.004)*	(0.011)***	(0.004)***
AC	0.032	0.012	0.038	0.015
	(0.052)	(0.020)	(0.052)	(0.020)
AD	0.031	0.012	0.036	0.014
	(0.032)	(0.012)	(0.032)	(0.012)
AE	-0.089	-0.035	-0.091	-0.036
	(0.048)*	(0.019)*	(0.048)*	(0.019)*
AG	-0.090	-0.035	-0.083	-0.033
	(0.068)	(0.027)	(0.068)	(0.027)
AK	0.001	0.000	0.001	0.000
	(0.051)	(0.020)	(0.051)	(0.020)
AO	-0.012	-0.005	-0.005	-0.002
	(0.032)	(0.013)	(0.032)	(0.013)
AS	-0.081	-0.032	-0.082	-0.032
	(0.061)	(0.024)	(0.061)	(0.024)
AT	-0.169	-0.067	-0.164	-0.065
	(0.030)***	(0.012)***	(0.030)***	(0.012)***
AW	0.181	0.069	0.186	0.071
	(0.070)**	(0.026)***	(0.070)***	(0.026)***
AZ	-0.075	-0.029	-0.057	-0.022
	(0.046)	(0.018)	(0.046)	(0.018)
BM	-1.051	-0.385	-1.072	-0.390
	(0.654)	(0.185)**	(0.653)	(0.182)**
BU	-0.048	-0.019	-0.040	-0.015
	(0.048)	(0.019)	(0.048)	(0.019)
CE	0.161	0.061	0.159	0.061
	(0.116)	(0.043)	(0.116)	(0.043)
CM	0.106	0.041	0.108	0.042
	(0.079)	(0.030)	(0.078)	(0.030)
CTA	0.190	0.072	0.198	0.075
	(0.090)**	(0.033)**	(0.090)**	(0.033)**
CTI	-1.016	-0.374	-0.995	-0.368
	(0.386)***	(0.113)***	(0.382)***	(0.113)***
CTM	0.528	0.186	0.531	0.186
	(0.107)***	(0.032)***	(0.107)***	(0.032)***
CTO	0.114	0.044	0.128	0.049
	(0.059)*	(0.022)**	(0.059)**	(0.022)**
CTR	-0.073	-0.028	-0.069	-0.027
	(0.059)	(0.023)	(0.059)	(0.023)
DC	-0.081	-0.032	-0.082	-0.032
	(0.054)	(0.021)	(0.054)	(0.021)
DK	0.073	0.028	0.078	0.030
	(0.065)	(0.025)	(0.065)	(0.025)
DS	0.398	0.144	0.392	0.142
	(0.213)*	(0.070)**	(0.213)*	(0.070)**
EM	0.104	0.040	0.108	0.041
	(0.030)***	(0.011)***	(0.030)***	(0.011)***
EN	0.036	0.014	0.037	0.014
	(0.044)	(0.017)	(0.044)	(0.017)
EO	0.002	0.001	0.011	0.004
	(0.083)	(0.032)	(0.083)	(0.032)
ET	0.228	0.086	0.236	0.089

	(0.035)***	(0.013)***	(0.035)***	(0.013)***
FC	0.229	0.086	0.232	0.087
	(0.046)***	(0.017)***	(0.046)***	(0.017)***
FT	0.574	0.199	0.568	0.197
	(0.209)***	(0.061)***	(0.209)***	(0.061)***
GM	-0.156	-0.062	-0.156	-0.061
	(0.060)***	(0.024)**	(0.060)***	(0.024)**
HM	0.393	0.143	0.401	0.146
	(0.325)	(0.107)	(0.328)	(0.108)
HT	-0.071	-0.028	-0.069	-0.027
	(0.047)	(0.019)	(0.047)	(0.019)
IC	0.075	0.029	0.080	0.031
	(0.057)	(0.022)	(0.057)	(0.022)
JO	-0.139	-0.055	-0.130	-0.051
	(0.190)	(0.075)	(0.189)	(0.075)
MA	-0.213	-0.084	-0.213	-0.084
	(0.084)**	(0.033)**	(0.084)**	(0.033)**
MN	0.026	0.010	0.054	0.021
	(0.110)	(0.043)	(0.110)	(0.042)
MR	-0.006	-0.002	0.000	0.000
	(0.097)	(0.038)	(0.097)	(0.038)
MT	0.416	0.150	0.414	0.150
	(0.109)***	(0.035)***	(0.109)***	(0.035)***
PC	-0.120	-0.047	-0.114	-0.045
	(0.103)	(0.041)	(0.104)	(0.041)
PH	-0.054	-0.021	-0.043	-0.017
	(0.107)	(0.042)	(0.107)	(0.042)
PN	-0.096	-0.038	-0.084	-0.033
	(0.051)*	(0.020)*	(0.051)	(0.020)
PR	0.051	0.020	0.063	0.024
	(0.065)	(0.025)	(0.065)	(0.025)
QM	0.004	0.002	0.010	0.004
	(0.061)	(0.024)	(0.061)	(0.024)
RM	-0.074	-0.029	-0.062	-0.024
	(0.032)**	(0.012)**	(0.032)*	(0.012)*
SH	0.030	0.012	0.038	0.015
	(0.053)	(0.021)	(0.053)	(0.021)
SK	0.106	0.041	0.113	0.043
	(0.042)**	(0.016)**	(0.042)***	(0.016)***
SM	0.119	0.045	0.128	0.049
	(0.067)*	(0.025)*	(0.067)*	(0.025)*
SW	-0.065	-0.026	-0.053	-0.021
	(0.083)	(0.033)	(0.083)	(0.033)
TM	-0.064	-0.025	-0.059	-0.023
	(0.063)	(0.025)	(0.063)	(0.025)
UT	0.187	0.071	0.186	0.071
	(0.107)*	(0.039)*	(0.107)*	(0.039)*
YN	0.091	0.035	0.108	0.042
	(0.034)***	(0.013)***	(0.034)***	(0.013)***
OS	-0.006	-0.002	0.003	0.001
	(0.026)	(0.010)	(0.026)	(0.010)
IS	-0.157	-0.062	-0.146	-0.058
	(0.052)***	(0.021)***	(0.052)***	(0.021)***

MS	0.062	0.024	0.065	0.025
	(0.031)**	(0.012)**	(0.031)**	(0.012)**
RP	0.155	0.059	0.156	0.060
	(0.093)*	(0.034)*	(0.093)*	(0.034)*
AMH	-0.005	-0.002	-0.003	-0.001
	(0.062)	(0.024)	(0.062)	(0.024)
EW	-0.050	-0.019	-0.046	-0.018
	(0.085)	(0.034)	(0.085)	(0.034)
STS	0.095	0.036	0.090	0.035
	(0.078)	(0.030)	(0.078)	(0.030)
STG	0.046	0.018	0.050	0.019
	(0.038)	(0.015)	(0.038)	(0.015)
GSM	-0.022	-0.008	-0.022	-0.008
	(0.058)	(0.023)	(0.058)	(0.023)
GSE	-0.044	-0.017	-0.052	-0.020
	(0.094)	(0.037)	(0.094)	(0.037)
AMS	0.060	0.023	0.059	0.023
	(0.044)	(0.017)	(0.044)	(0.017)
ABH	-0.081	-0.032	-0.064	-0.025
	(0.062)	(0.025)	(0.062)	(0.025)
ABF	-0.036	-0.014	-0.035	-0.014
	(0.075)	(0.029)	(0.075)	(0.029)
Constant	-0.099		-0.099	
	(0.025)***		(0.025)***	
Observations	206443	206443	206443	206443
Pseudo R2	0.034	0.034	0.034	0.034
Mean Depn. Var.	0.595	0.595	0.595	0.595
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 41. Probit Regression Estimates of Promotion to E-4 (or higher) by the end of the Fourth Year of Service

	Promotion to E4+ Any TA Use (4YO's / No Prior Svc.)	Marginal Effects
Any TA Use	0.074	0.018
	(0.008)***	(0.002)***
Female	-0.156	-0.040
	(0.009)***	(0.002)***
Black	-0.262	-0.069
	(0.009)***	(0.002)***
Hispanic	-0.122	-0.031
	(0.010)***	(0.003)***
Native	-0.063	-0.016
	(0.022)***	(0.006)***
Asian	-0.104	-0.026
	(0.015)***	(0.004)***
Other	-0.212	-0.057
	(0.034)***	(0.010)***

Age	0.044 (0.001)***	0.011 (0.000)***
Married	0.009 (0.012)	0.002 (0.003)
Dependents	0.063 (0.012)***	0.015 (0.003)***
CAT I	0.423 (0.022)***	0.084 (0.003)***
CAT IIIa	-0.412 (0.009)***	-0.110 (0.003)***
CAT IIIb	-0.661 (0.008)***	-0.180 (0.002)***
CAT IV	-0.648 (0.135)***	-0.204 (0.051)***
CAT Unknown	-0.160 (0.095)*	-0.042 (0.027)
HS Dropout	-0.112 (0.019)***	-0.029 (0.005)***
GED	-0.137 (0.014)***	-0.035 (0.004)***
Some College	0.373 (0.054)***	0.074 (0.008)***
College Degree	0.336 (0.045)***	0.068 (0.007)***
FY95	0.080 (0.014)***	0.019 (0.003)***
FY96	0.371 (0.014)***	0.077 (0.002)***
FY97	0.562 (0.014)***	0.109 (0.002)***
FY98	0.634 (0.014)***	0.119 (0.002)***
FY99	0.558 (0.013)***	0.109 (0.002)***
FY00	0.381 (0.013)***	0.080 (0.002)***
FY01	0.369 (0.013)***	0.078 (0.002)***
AC	0.386 (0.071)***	0.076 (0.011)***
AD	0.082 (0.036)**	0.019 (0.008)**
AE	0.172 (0.061)***	0.038 (0.012)***
AG	0.335 (0.096)***	0.068 (0.016)***
AK	0.258 (0.065)***	0.055 (0.012)***
AO	0.129 (0.038)***	0.029 (0.008)***
AS	0.423 (0.082)***	0.082 (0.012)***
AT	0.164	0.037

	(0.040)***	(0.008)***
AW	0.213	0.046
	(0.089)**	(0.017)***
AZ	0.254	0.054
	(0.060)***	(0.011)***
BU	0.066	0.015
	(0.056)	(0.013)
CE	0.303	0.062
	(0.147)**	(0.025)**
CM	-0.009	-0.002
	(0.088)	(0.021)
CTA	0.809	0.124
	(0.140)***	(0.011)***
CTI	0.076	0.018
	(0.446)	(0.100)
CTM	0.390	0.077
	(0.143)***	(0.022)***
CTO	0.461	0.087
	(0.083)***	(0.011)***
CTR	0.254	0.054
	(0.084)***	(0.015)***
DC	0.074	0.017
	(0.064)	(0.014)
DK	0.239	0.051
	(0.082)***	(0.015)***
DS	0.378	0.075
	(0.286)	(0.044)*
EM	0.153	0.034
	(0.037)***	(0.008)***
EN	0.141	0.032
	(0.053)***	(0.011)***
EO	0.046	0.011
	(0.095)	(0.022)
ET	0.179	0.040
	(0.045)***	(0.009)***
FC	0.200	0.044
	(0.059)***	(0.011)***
FT	0.083	0.019
	(0.245)	(0.054)
GM	0.055	0.013
	(0.072)	(0.017)
HM	-0.180	-0.048
	(0.363)	(0.104)
HT	0.090	0.021
	(0.056)	(0.012)*
IC	0.174	0.039
	(0.070)**	(0.014)***
JO	0.662	0.111
	(0.352)*	(0.035)***
MA	0.065	0.015
	(0.100)	(0.023)
MN	0.356	0.071
	(0.152)**	(0.024)***

MR	0.137 (0.113)	0.031 (0.024)
MT	0.223 (0.138)	0.048 (0.026)*
PC	0.267 (0.138)*	0.056 (0.025)**
PH	-0.042 (0.127)	-0.010 (0.032)
PN	0.058 (0.063)	0.014 (0.014)
PR	0.189 (0.081)**	0.042 (0.016)***
QM	0.321 (0.079)***	0.066 (0.013)***
RM	0.322 (0.043)***	0.066 (0.007)***
SH	0.148 (0.063)**	0.033 (0.013)**
SK	0.380 (0.055)***	0.075 (0.009)***
SM	0.537 (0.091)***	0.097 (0.011)***
SW	0.139 (0.100)	0.031 (0.021)
TM	0.240 (0.077)***	0.051 (0.014)***
UT	0.079 (0.124)	0.018 (0.028)
YN	0.327 (0.042)***	0.067 (0.007)***
OS	0.321 (0.033)***	0.066 (0.006)***
IS	0.190 (0.068)***	0.042 (0.013)***
MS	0.099 (0.035)***	0.023 (0.008)***
RP	0.324 (0.113)***	0.066 (0.019)***
AMH	0.282 (0.082)***	0.059 (0.014)***
EW	0.086 (0.105)	0.020 (0.023)
STS	0.205 (0.099)**	0.045 (0.019)**
STG	0.175 (0.050)***	0.039 (0.010)***
GSM	0.164 (0.071)**	0.037 (0.014)**
GSE	0.144 (0.118)	0.032 (0.025)
AMS	0.143 (0.054)***	0.032 (0.011)***
ABH	-0.002	-0.000

	(0.070)	(0.017)
ABF	0.043	0.010
	(0.083)	(0.019)
Constant	0.033	
	(0.030)	
Observations	216788	216788
Pseudo R2	0.086	0.086
Mean Dep. Variable	0.876	0.876
Standard errors in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 42. Probit Regression Estimates of Promotion to E-5 (or higher) by the end of the Fourth Year of Service

	Promotion to E5+ Any TA Use (4YO's / No Prior Svc.)	Marginal Effects
Any TA Use	-0.130	-0.040
	(0.008)***	(0.002)***
Female	-0.054	-0.017
	(0.008)***	(0.003)***
Black	-0.160	-0.049
	(0.009)***	(0.003)***
Hispanic	-0.139	-0.042
	(0.010)***	(0.003)***
Native	-0.001	-0.000
	(0.019)	(0.006)
Asian	-0.234	-0.068
	(0.014)***	(0.004)***
Other	-0.187	-0.055
	(0.033)***	(0.009)***
Age	0.033	0.010
	(0.001)***	(0.000)***
Married	-0.001	-0.000
	(0.012)	(0.004)
Dependents	0.085	0.027
	(0.012)***	(0.004)***
CAT I	0.582	0.210
	(0.013)***	(0.005)***
CAT IIIa	-0.256	-0.077
	(0.008)***	(0.002)***
CAT IIIb	-0.447	-0.132
	(0.008)***	(0.002)***
CAT IV	-0.378	-0.103
	(0.150)**	(0.034)***
CAT Unknown	0.220	0.074
	(0.071)***	(0.025)***
HS Dropout	0.028	0.009
	(0.018)	(0.006)
GED	0.034	0.011
	(0.012)***	(0.004)***

Some College	0.126	0.041
	(0.033)***	(0.011)***
College Degree	0.254	0.087
	(0.025)***	(0.009)***
FY95	-0.042	-0.013
	(0.014)***	(0.004)***
FY96	-0.030	-0.009
	(0.014)**	(0.004)**
FY97	0.140	0.046
	(0.013)***	(0.004)***
FY98	0.301	0.102
	(0.013)***	(0.005)***
FY99	0.265	0.089
	(0.012)***	(0.004)***
FY00	0.304	0.102
	(0.012)***	(0.004)***
FY01	0.326	0.110
	(0.012)***	(0.004)***
AC	0.242	0.082
	(0.052)***	(0.019)***
AD	0.006	0.002
	(0.034)	(0.011)
AE	0.132	0.043
	(0.049)***	(0.017)***
AG	0.596	0.218
	(0.067)***	(0.027)***
AK	0.312	0.108
	(0.051)***	(0.019)***
AO	0.115	0.038
	(0.034)***	(0.012)***
AS	0.036	0.012
	(0.066)	(0.021)
AT	0.250	0.085
	(0.031)***	(0.011)***
AW	0.408	0.144
	(0.069)***	(0.026)***
AZ	0.493	0.177
	(0.046)***	(0.018)***
BM	0.467	0.167
	(0.576)	(0.224)
BU	0.153	0.051
	(0.050)***	(0.017)***
CE	-0.026	-0.008
	(0.125)	(0.039)
CM	-0.015	-0.005
	(0.084)	(0.026)
CTA	0.846	0.317
	(0.089)***	(0.035)***
CTI	-0.178	-0.053
	(0.402)	(0.111)
CTM	0.675	0.249
	(0.091)***	(0.036)***
CTO	0.178	0.059

	(0.060)***	(0.021)***
CTR	0.488	0.175
	(0.058)***	(0.023)***
DC	0.218	0.074
	(0.055)***	(0.020)***
DK	0.193	0.065
	(0.065)***	(0.023)***
DS	0.517	0.187
	(0.196)***	(0.077)**
DT	0.956	0.360
	(0.622)	(0.239)
EM	0.303	0.104
	(0.029)***	(0.011)***
EN	0.065	0.021
	(0.046)	(0.015)
EO	0.092	0.030
	(0.090)	(0.030)
ET	0.121	0.040
	(0.033)***	(0.011)***
FC	0.132	0.043
	(0.045)***	(0.015)***
FT	0.525	0.190
	(0.178)***	(0.070)***
GM	0.411	0.145
	(0.060)***	(0.023)***
HM	-0.632	-0.153
	(0.360)*	(0.061)**
HT	0.160	0.053
	(0.048)***	(0.017)***
IC	0.237	0.081
	(0.057)***	(0.020)***
JO	0.602	0.221
	(0.190)***	(0.076)***
MA	0.107	0.035
	(0.087)	(0.029)
MN	0.367	0.129
	(0.111)***	(0.042)***
MR	0.342	0.119
	(0.092)***	(0.035)***
MT	0.002	0.001
	(0.104)	(0.033)
PC	0.258	0.088
	(0.106)**	(0.039)**
PH	-0.012	-0.004
	(0.115)	(0.036)
PN	0.058	0.019
	(0.053)	(0.017)
PR	0.213	0.072
	(0.066)***	(0.024)***
QM	0.353	0.123
	(0.061)***	(0.023)***
RM	0.407	0.144
	(0.031)***	(0.012)***

SH	0.150	0.050
	(0.056)***	(0.019)**
SK	0.428	0.152
	(0.041)***	(0.016)***
SM	0.253	0.086
	(0.069)***	(0.025)***
SW	0.189	0.063
	(0.087)**	(0.031)**
TM	0.135	0.045
	(0.067)**	(0.023)*
UT	0.118	0.039
	(0.111)	(0.038)
YN	0.179	0.060
	(0.036)***	(0.013)***
OS	0.542	0.196
	(0.026)***	(0.010)***
IS	0.478	0.171
	(0.052)***	(0.020)***
MS	0.002	0.001
	(0.034)	(0.011)
RP	0.262	0.090
	(0.097)***	(0.036)**
AMH	0.255	0.087
	(0.062)***	(0.023)***
EW	0.293	0.101
	(0.084)***	(0.031)***
STS	0.009	0.003
	(0.080)	(0.025)
STG	0.195	0.066
	(0.038)***	(0.013)***
GSM	0.128	0.042
	(0.061)**	(0.021)**
GSE	0.220	0.074
	(0.097)**	(0.035)**
AMS	0.150	0.050
	(0.045)***	(0.015)***
ABH	-0.072	-0.022
	(0.071)	(0.021)
ABF	0.046	0.015
	(0.080)	(0.026)
Constant	-1.329	
	(0.025)***	
Observations	216797	216797
Pseudo R2	0.062	0.062
Mean Depn. Var.	0.503	0.503
Standard errors in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 43. Probit Regression Estimates of Promotion to E-4 (or higher) by the end of the Fourth Year of Service Comparing TA usage and Successful Course Completion

	Promotion E4+ Any TA Use (>12 Mos TIS)	Marginal Effects	Promotion E4+ Successful TA (>12 Mos TIS)	Marginal Effects
Any TA Use	0.074	0.017		
	(0.008)***	(0.002)***		
Successful TA Use			0.130	0.030
			(0.009)***	(0.002)***
Female	-0.156	-0.040	-0.164	-0.042
	(0.009)***	(0.002)***	(0.009)***	(0.002)***
Black	-0.263	-0.069	-0.264	-0.069
	(0.009)***	(0.002)***	(0.009)***	(0.002)***
Hispanic	-0.123	-0.031	-0.125	-0.032
	(0.010)***	(0.003)***	(0.010)***	(0.003)***
Native	-0.064	-0.016	-0.062	-0.016
	(0.022)***	(0.006)***	(0.022)***	(0.006)***
Asian	-0.104	-0.026	-0.108	-0.027
	(0.015)***	(0.004)***	(0.015)***	(0.004)***
Other	-0.215	-0.058	-0.218	-0.058
	(0.034)***	(0.010)***	(0.034)***	(0.010)***
Age	0.044	0.011	0.044	0.011
	(0.001)***	(0.000)***	(0.001)***	(0.000)***
Married	0.008	0.002	0.006	0.002
	(0.012)	(0.003)	(0.012)	(0.003)
Dependents	0.063	0.015	0.065	0.015
	(0.012)***	(0.003)***	(0.012)***	(0.003)***
CAT I	0.422	0.083	0.423	0.084
	(0.022)***	(0.003)***	(0.022)***	(0.003)***
CAT IIIa	-0.413	-0.110	-0.412	-0.110
	(0.009)***	(0.003)***	(0.009)***	(0.003)***
CAT IIIb	-0.662	-0.180	-0.659	-0.179
	(0.008)***	(0.002)***	(0.008)***	(0.002)***
CAT IV	-0.621	-0.194	-0.620	-0.193
	(0.138)***	(0.051)***	(0.138)***	(0.051)***
CAT Unknown	-0.179	-0.047	-0.176	-0.046
	(0.096)*	(0.027)*	(0.096)*	(0.027)*
HS Dropout	-0.111	-0.028	-0.109	-0.028
	(0.019)***	(0.005)***	(0.019)***	(0.005)***
GED	-0.137	-0.035	-0.135	-0.035
	(0.014)***	(0.004)***	(0.014)***	(0.004)***
Some College	0.378	0.075	0.375	0.074
	(0.054)***	(0.008)***	(0.054)***	(0.008)***
College Degree	0.332	0.068	0.335	0.068
	(0.045)***	(0.007)***	(0.045)***	(0.007)***
FY95	0.080	0.019	0.079	0.019
	(0.014)***	(0.003)***	(0.014)***	(0.003)***

FY96	0.371	0.077	0.371	0.077
	(0.014)***	(0.002)***	(0.014)***	(0.002)***
FY97	0.561	0.108	0.561	0.108
	(0.014)***	(0.002)***	(0.014)***	(0.002)***
FY98	0.635	0.119	0.634	0.119
	(0.014)***	(0.002)***	(0.014)***	(0.002)***
FY99	0.558	0.109	0.557	0.109
	(0.013)***	(0.002)***	(0.013)***	(0.002)***
FY00	0.380	0.080	0.379	0.080
	(0.013)***	(0.002)***	(0.013)***	(0.002)***
FY01	0.368	0.078	0.369	0.078
	(0.013)***	(0.002)***	(0.013)***	(0.002)***
AC	0.384	0.076	0.378	0.075
	(0.072)***	(0.011)***	(0.072)***	(0.011)***
AD	0.081	0.019	0.077	0.018
	(0.037)**	(0.008)**	(0.037)**	(0.008)**
AE	0.168	0.037	0.167	0.037
	(0.061)***	(0.012)***	(0.061)***	(0.012)***
AG	0.334	0.068	0.323	0.066
	(0.096)***	(0.016)***	(0.096)***	(0.016)***
AK	0.256	0.054	0.249	0.053
	(0.065)***	(0.012)***	(0.065)***	(0.012)***
AO	0.127	0.029	0.129	0.029
	(0.038)***	(0.008)***	(0.039)***	(0.008)***
AS	0.422	0.081	0.416	0.080
	(0.082)***	(0.012)***	(0.082)***	(0.012)***
AT	0.164	0.037	0.163	0.036
	(0.040)***	(0.008)***	(0.040)***	(0.008)***
AW	0.228	0.049	0.225	0.048
	(0.090)**	(0.017)***	(0.090)**	(0.017)***
AZ	0.259	0.055	0.255	0.054
	(0.061)***	(0.011)***	(0.061)***	(0.011)***
BU	0.071	0.017	0.068	0.016
	(0.057)	(0.013)	(0.057)	(0.013)
CE	0.302	0.062	0.292	0.061
	(0.147)**	(0.025)**	(0.147)**	(0.026)**
CM	-0.009	-0.002	-0.008	-0.002
	(0.088)	(0.021)	(0.088)	(0.021)
CTA	0.809	0.124	0.793	0.122
	(0.140)***	(0.011)***	(0.140)***	(0.011)***
CTI	0.075	0.017	0.069	0.016
	(0.446)	(0.100)	(0.445)	(0.100)
CTM	0.431	0.083	0.422	0.081
	(0.147)***	(0.021)***	(0.148)***	(0.021)***
CTO	0.458	0.086	0.452	0.086
	(0.083)***	(0.012)***	(0.083)***	(0.012)***
CTR	0.252	0.053	0.248	0.053
	(0.084)***	(0.015)***	(0.084)***	(0.015)***
DC	0.085	0.020	0.089	0.021
	(0.064)	(0.014)	(0.064)	(0.014)
DK	0.237	0.051	0.230	0.049
	(0.082)***	(0.015)***	(0.082)***	(0.015)***
DS	0.378	0.075	0.381	0.075

	(0.286)	(0.044)*	(0.286)	(0.044)*
EM	0.150	0.034	0.153	0.034
	(0.037)***	(0.008)***	(0.037)***	(0.008)***
EN	0.140	0.032	0.143	0.032
	(0.053)***	(0.011)***	(0.053)***	(0.011)***
EO	0.040	0.009	0.044	0.010
	(0.096)	(0.022)	(0.096)	(0.022)
ET	0.181	0.040	0.181	0.040
	(0.046)***	(0.009)***	(0.046)***	(0.009)***
FC	0.204	0.045	0.207	0.045
	(0.059)***	(0.011)***	(0.059)***	(0.011)***
FT	0.058	0.014	0.057	0.013
	(0.246)	(0.056)	(0.247)	(0.056)
GM	0.056	0.013	0.057	0.013
	(0.073)	(0.017)	(0.073)	(0.017)
HM	-0.180	-0.048	-0.190	-0.050
	(0.363)	(0.103)	(0.364)	(0.105)
HT	0.086	0.020	0.089	0.021
	(0.056)	(0.012)	(0.056)	(0.012)*
IC	0.168	0.037	0.171	0.038
	(0.071)**	(0.014)***	(0.071)**	(0.014)***
JO	0.662	0.110	0.658	0.110
	(0.352)*	(0.035)***	(0.353)*	(0.036)***
MA	0.064	0.015	0.070	0.016
	(0.100)	(0.023)	(0.100)	(0.022)
MN	0.356	0.071	0.356	0.071
	(0.152)**	(0.024)***	(0.152)**	(0.024)***
MR	0.145	0.033	0.147	0.033
	(0.114)	(0.024)	(0.114)	(0.024)
MT	0.222	0.048	0.222	0.048
	(0.138)	(0.026)*	(0.138)	(0.026)*
PC	0.264	0.056	0.263	0.055
	(0.138)*	(0.025)**	(0.138)*	(0.025)**
PH	-0.043	-0.011	-0.048	-0.012
	(0.127)	(0.032)	(0.127)	(0.032)
PN	0.057	0.013	0.051	0.012
	(0.063)	(0.014)	(0.063)	(0.014)
PR	0.189	0.041	0.189	0.042
	(0.081)**	(0.016)***	(0.081)**	(0.016)***
QM	0.328	0.067	0.328	0.067
	(0.080)***	(0.013)***	(0.080)***	(0.013)***
RM	0.323	0.066	0.321	0.066
	(0.044)***	(0.007)***	(0.044)***	(0.007)***
SH	0.157	0.035	0.161	0.036
	(0.063)**	(0.013)***	(0.063)**	(0.013)***
SK	0.377	0.075	0.373	0.074
	(0.055)***	(0.009)***	(0.055)***	(0.009)***
SM	0.536	0.097	0.540	0.097
	(0.091)***	(0.011)***	(0.091)***	(0.011)***
SW	0.150	0.034	0.153	0.034
	(0.101)	(0.021)	(0.101)	(0.021)*
TM	0.234	0.050	0.232	0.050
	(0.077)***	(0.014)***	(0.077)***	(0.014)***

UT	0.076	0.018	0.070	0.016
	(0.125)	(0.028)	(0.125)	(0.028)
YN	0.329	0.067	0.321	0.066
	(0.042)***	(0.007)***	(0.042)***	(0.007)***
OS	0.324	0.066	0.326	0.066
	(0.034)***	(0.006)***	(0.034)***	(0.006)***
IS	0.193	0.042	0.189	0.041
	(0.068)***	(0.013)***	(0.068)***	(0.013)***
MS	0.095	0.022	0.096	0.022
	(0.035)***	(0.008)***	(0.035)***	(0.008)***
RP	0.324	0.066	0.309	0.063
	(0.113)***	(0.019)***	(0.113)***	(0.019)***
AMH	0.278	0.058	0.278	0.058
	(0.082)***	(0.015)***	(0.082)***	(0.015)***
EW	0.083	0.019	0.086	0.020
	(0.105)	(0.023)	(0.105)	(0.023)
STS	0.202	0.044	0.204	0.044
	(0.099)**	(0.019)**	(0.099)**	(0.019)**
STG	0.177	0.039	0.179	0.040
	(0.050)***	(0.010)***	(0.050)***	(0.010)***
GSM	0.161	0.036	0.164	0.036
	(0.071)**	(0.015)**	(0.071)**	(0.014)**
GSE	0.143	0.032	0.146	0.033
	(0.118)	(0.025)	(0.118)	(0.024)
AMS	0.141	0.032	0.139	0.031
	(0.054)***	(0.011)***	(0.054)**	(0.011)***
ABH	-0.002	-0.000	0.001	0.000
	(0.070)	(0.017)	(0.070)	(0.017)
ABF	0.036	0.009	0.037	0.009
	(0.083)	(0.019)	(0.083)	(0.019)
Constant	0.037		0.033	
	(0.030)		(0.030)	
Observations	215947	215947	215947	215947
Pseudo R2	0.086	0.086	0.087	0.087
Mean Deprn. Var.	0.844	0.844	0.844	0.844
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 44. Probit Regression Estimates of Promotion to E-5 (or higher) by the end of the Fourth Year of Service Comparing TA usage and Successful Course Completion

	Promotion E5+ Any TA Use (>12 Mos TIS)	Marginal Effects	Promotion E5+ Successful TA (>12 Mos TIS)	Marginal Effects
Any TA Use	-0.128	-0.039		
	(0.008)***	(0.002)***		
Successful TA Use			-0.098	-0.030

			(0.008)***	(0.002)***
Female	-0.054	-0.017	-0.064	-0.020
	(0.008)***	(0.003)***	(0.008)***	(0.003)***
Black	-0.162	-0.049	-0.164	-0.050
	(0.009)***	(0.003)***	(0.009)***	(0.003)***
Hispanic	-0.140	-0.042	-0.143	-0.043
	(0.010)***	(0.003)***	(0.010)***	(0.003)***
Native	-0.002	-0.001	-0.002	-0.000
	(0.019)	(0.006)	(0.019)	(0.006)
Asian	-0.234	-0.068	-0.237	-0.069
	(0.014)***	(0.004)***	(0.014)***	(0.004)***
Other	-0.188	-0.055	-0.191	-0.056
	(0.033)***	(0.009)***	(0.033)***	(0.009)***
Age	0.033	0.010	0.033	0.010
	(0.001)***	(0.000)***	(0.001)***	(0.000)***
Married	-0.000	-0.000	-0.001	-0.000
	(0.012)	(0.004)	(0.012)	(0.004)
Dependents	0.085	0.027	0.086	0.028
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
CAT I	0.581	0.209	0.581	0.209
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
CAT IIIa	-0.256	-0.077	-0.255	-0.077
	(0.008)***	(0.002)***	(0.008)***	(0.002)***
CAT IIIb	-0.449	-0.132	-0.445	-0.132
	(0.008)***	(0.002)***	(0.008)***	(0.002)***
CAT IV	-0.358	-0.098	-0.351	-0.097
	(0.151)**	(0.035)***	(0.151)**	(0.035)***
CAT Unknown	0.199	0.067	0.198	0.066
	(0.072)***	(0.026)***	(0.072)***	(0.026)***
HS Dropout	0.026	0.008	0.028	0.009
	(0.018)	(0.006)	(0.018)	(0.006)
GED	0.033	0.010	0.033	0.011
	(0.013)***	(0.004)***	(0.013)***	(0.004)***
Some College	0.129	0.042	0.130	0.043
	(0.033)***	(0.011)***	(0.033)***	(0.011)***
College Degree	0.244	0.083	0.252	0.086
	(0.025)***	(0.009)***	(0.025)***	(0.009)***
FY95	-0.044	-0.014	-0.044	-0.014
	(0.014)***	(0.004)***	(0.014)***	(0.004)***
FY96	-0.032	-0.010	-0.032	-0.010
	(0.014)**	(0.004)**	(0.014)**	(0.004)**
FY97	0.140	0.046	0.139	0.045
	(0.013)***	(0.004)***	(0.013)***	(0.004)***
FY98	0.301	0.102	0.298	0.101
	(0.013)***	(0.005)***	(0.013)***	(0.005)***
FY99	0.265	0.089	0.262	0.088
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY00	0.305	0.103	0.301	0.101
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
FY01	0.327	0.111	0.322	0.109
	(0.012)***	(0.004)***	(0.012)***	(0.004)***
AC	0.235	0.080	0.225	0.076
	(0.053)***	(0.019)***	(0.053)***	(0.019)***

AD	0.006 (0.034)	0.002 (0.011)	0.001 (0.034)	0.000 (0.011)
AE	0.129 (0.049)***	0.043 (0.017)**	0.127 (0.049)***	0.042 (0.017)**
AG	0.597 (0.067)***	0.218 (0.027)***	0.584 (0.067)***	0.213 (0.027)***
AK	0.315 (0.051)***	0.109 (0.019)***	0.308 (0.051)***	0.106 (0.019)***
AO	0.116 (0.034)***	0.038 (0.012)***	0.113 (0.034)***	0.037 (0.012)***
AS	0.041 (0.066)	0.013 (0.022)	0.035 (0.066)	0.011 (0.021)
AT	0.249 (0.031)***	0.085 (0.011)***	0.243 (0.031)***	0.082 (0.011)***
AW	0.413 (0.069)***	0.146 (0.027)***	0.406 (0.069)***	0.143 (0.027)***
AZ	0.496 (0.046)***	0.178 (0.018)***	0.481 (0.046)***	0.172 (0.018)***
BM	0.469 (0.576)	0.168 (0.224)	0.468 (0.575)	0.168 (0.224)
BU	0.152 (0.050)***	0.050 (0.017)***	0.144 (0.050)***	0.048 (0.017)***
CE	-0.024 (0.125)	-0.007 (0.039)	-0.031 (0.125)	-0.010 (0.039)
CM	-0.012 (0.084)	-0.004 (0.026)	-0.014 (0.084)	-0.004 (0.026)
CTA	0.847 (0.089)***	0.318 (0.035)***	0.828 (0.089)***	0.310 (0.035)***
CTI	-0.176 (0.402)	-0.052 (0.111)	-0.182 (0.401)	-0.054 (0.110)
CTM	0.683 (0.091)***	0.252 (0.036)***	0.672 (0.091)***	0.248 (0.036)***
CTO	0.183 (0.061)***	0.061 (0.021)***	0.168 (0.061)***	0.056 (0.021)***
CTR	0.491 (0.058)***	0.176 (0.023)***	0.482 (0.058)***	0.173 (0.023)***
DC	0.223 (0.055)***	0.075 (0.020)***	0.226 (0.055)***	0.076 (0.020)***
DK	0.190 (0.065)***	0.064 (0.023)***	0.181 (0.065)***	0.060 (0.023)***
DS	0.519 (0.196)***	0.187 (0.077)**	0.522 (0.196)***	0.188 (0.077)**
DT	0.958 (0.622)	0.361 (0.239)	0.929 (0.620)	0.350 (0.240)
EM	0.304 (0.029)***	0.105 (0.011)***	0.301 (0.029)***	0.104 (0.011)***
EN	0.067 (0.046)	0.022 (0.015)	0.067 (0.046)	0.022 (0.015)
EO	0.082 (0.090)	0.027 (0.030)	0.080 (0.090)	0.026 (0.030)
ET	0.121 (0.033)***	0.040 (0.011)***	0.112 (0.033)***	0.037 (0.011)***
FC	0.133	0.044	0.130	0.043

	(0.045)***	(0.015)***	(0.045)***	(0.015)***
FT	0.488	0.175	0.489	0.176
	(0.180)***	(0.070)**	(0.180)***	(0.070)**
GM	0.417	0.148	0.415	0.147
	(0.060)***	(0.023)***	(0.060)***	(0.023)***
HM	-0.631	-0.153	-0.633	-0.153
	(0.360)*	(0.060)**	(0.359)*	(0.060)**
HT	0.161	0.054	0.161	0.054
	(0.048)***	(0.017)***	(0.048)***	(0.017)***
IC	0.237	0.080	0.235	0.080
	(0.057)***	(0.021)***	(0.057)***	(0.021)***
JO	0.604	0.221	0.590	0.215
	(0.190)***	(0.076)***	(0.190)***	(0.075)***
MA	0.104	0.034	0.106	0.035
	(0.087)	(0.029)	(0.087)	(0.029)
MN	0.369	0.129	0.354	0.124
	(0.111)***	(0.042)***	(0.111)***	(0.042)***
MR	0.338	0.118	0.336	0.117
	(0.093)***	(0.035)***	(0.093)***	(0.035)***
MT	0.004	0.001	0.001	0.000
	(0.104)	(0.033)	(0.104)	(0.033)
PC	0.247	0.084	0.241	0.082
	(0.106)**	(0.039)**	(0.106)**	(0.038)**
PH	-0.010	-0.003	-0.022	-0.007
	(0.115)	(0.036)	(0.115)	(0.036)
PN	0.056	0.018	0.044	0.014
	(0.053)	(0.017)	(0.053)	(0.017)
PR	0.215	0.072	0.206	0.069
	(0.066)***	(0.024)***	(0.066)***	(0.023)***
QM	0.356	0.124	0.353	0.123
	(0.061)***	(0.023)***	(0.061)***	(0.023)***
RM	0.408	0.144	0.399	0.141
	(0.031)***	(0.012)***	(0.031)***	(0.012)***
SH	0.154	0.051	0.151	0.050
	(0.056)***	(0.019)***	(0.056)***	(0.019)**
SK	0.431	0.153	0.423	0.150
	(0.041)***	(0.016)***	(0.041)***	(0.016)***
SM	0.255	0.087	0.252	0.086
	(0.069)***	(0.025)***	(0.069)***	(0.025)***
SW	0.194	0.065	0.189	0.063
	(0.087)**	(0.031)**	(0.087)**	(0.031)**
TM	0.124	0.041	0.120	0.039
	(0.068)*	(0.023)*	(0.068)*	(0.023)*
UT	0.106	0.035	0.099	0.032
	(0.112)	(0.038)	(0.112)	(0.038)
YN	0.180	0.060	0.164	0.054
	(0.036)***	(0.013)***	(0.036)***	(0.012)***
OS	0.545	0.197	0.540	0.195
	(0.026)***	(0.010)***	(0.026)***	(0.010)***
IS	0.480	0.172	0.467	0.167
	(0.052)***	(0.020)***	(0.052)***	(0.020)***
MS	-0.001	-0.000	-0.001	-0.000
	(0.034)	(0.011)	(0.034)	(0.011)

RP	0.264	0.090	0.253	0.086
	(0.097)***	(0.036)**	(0.097)***	(0.035)**
AMH	0.252	0.086	0.248	0.084
	(0.063)***	(0.023)***	(0.063)***	(0.023)***
EW	0.299	0.103	0.297	0.102
	(0.084)***	(0.031)***	(0.084)***	(0.031)***
STS	0.014	0.004	0.016	0.005
	(0.080)	(0.025)	(0.080)	(0.025)
STG	0.190	0.064	0.188	0.063
	(0.038)***	(0.013)***	(0.038)***	(0.013)***
GSM	0.136	0.045	0.138	0.045
	(0.061)**	(0.021)**	(0.061)**	(0.021)**
GSE	0.222	0.075	0.227	0.077
	(0.097)**	(0.035)**	(0.097)**	(0.035)**
AMS	0.149	0.049	0.147	0.049
	(0.045)***	(0.015)***	(0.045)***	(0.015)***
ABH	-0.070	-0.021	-0.076	-0.023
	(0.071)	(0.021)	(0.071)	(0.021)
ABF	0.040	0.013	0.041	0.013
	(0.080)	(0.026)	(0.080)	(0.026)
Constant	-1.327		-1.329	
	(0.025)***		(0.025)***	
Observations	215956	215956	215956	215956
Pseudo R2	0.062	0.062	0.061	0.061
Mean Deprn. Var.	0.372	0.372	0.372	0.372
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

## LIST OF REFERENCES

- Buddin, R. & Kapur, K. (2002). Tuition Assistance Usage and First-Term Military Retention. *RAND*
- Buddin, R. & Kapur, K. (2005). The Effect of Employer-Sponsored Education on Job Mobility: Evidence from the U.S. Navy, *Industrial Relations*, Vol. 44 (2).
- Faram, M. D. (2006). MCPON: 'I am revisiting' degree requirement, *Navy Times Online*. Retrieved August 31, 2007, from <http://www.navytimes.com/legacy/new/1-292925-2157636.php>.
- Faram, M. D. (2007). Campa moves to pull plug on college degree requirements, *Navy Times Online*. Retrieved August 31, 2007, from [http://www.navytimes.com/news/2007/05/navy\\_degrequerement\\_chiefs\\_070517w/](http://www.navytimes.com/news/2007/05/navy_degrequerement_chiefs_070517w/).
- Flaherty, C. N. (2007). The Effect of Tuition Reimbursement on Turnover: A Case Study Analysis, *National Bureau of Economic Research, Working Paper 12975*.
- Flaherty, C. N. (2006). The Effect of Employer-Provided General Training on Turnover: Examination of Tuition Reimbursement Programs, *SIEPR Discussion Paper No. 06-25*.
- Garcia, F., Arkes, J., & Trost, T. (2002). Does employer-financed general training pay? Evidence from the US Navy. *Economics of Education Review*, 21, 19-27.
- Garcia, F. E., Joy, E. H. Capt., USN, & Reese, R. L. (1998). Effectiveness of the Voluntary Education Program. *CNA Research Memorandum 98-40*.
- Kraus, A. B., Griffis, H. S., & Golfin, P. A. (2000). Choice-Based Conjoint Study of Recruitment Incentives. *CNA Research Memorandum D0001428.A2*.
- Sticha, P. J., Dall, T. A., Handy, K., Espinosa, J., Hogan, P. F., & Young, M. C. (2003). Impact of the Army Continuing Education System (ACES) on Soldier Retention and Performance: Data Analysis. *U.S. Army Research Institute for the Behavioral and Social Sciences*.

NAVADMIN 203/05, DTG 191320ZAUG05, Subj: Senior Enlisted Education Initiative-Associates Degree for E8 Eligibility for Fiscal Year 2011 Selection Board.

NAVADMIN 166/06, DTG 091035ZJUN06, Subj: Tuition Assistance and Waiver Policy.

NAVADMIN 150/07, DTG 082159ZJUN07, Subj: Senior Enlisted Education Policy.

NAVADMIN 161/07, DTG 251315ZJUN07, Subj: Education Priorities and Management of Off-Duty Voluntary Education (VOLED).

SECNAVINST 1560.4A. (2005). Department of the Navy Voluntary Education (VOLED) Program.

Uriell, Z., Patrissi, G., Newell, C., & Whittam, K. (2006). Navy Quick Poll: Enlisted Education, Navy Personnel, Research, Studies, & Technology (NPRST).

United States Department of Veterans Affairs website online. Retrieved August 3, 2007, from <http://www.vba.va.gov/bln/vre/>.

Digest of Education Statistics. (2006). Retrieved July 14, 2007, from [http://nces.ed.gov/programs/digest/d06/ch\\_4.asp](http://nces.ed.gov/programs/digest/d06/ch_4.asp).

U.S. News and World Report. Retrieved August 3, 2007, from [http://www.usnews.com/usnews/documents/docpages/document\\_page76.htm](http://www.usnews.com/usnews/documents/docpages/document_page76.htm).

DoD Voluntary Education Online. Retrieved July 14, 2007, from <http://www.voled.doded.mil>.

## INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California
3. Academic Associate, Manpower Systems Analysis  
Dr. Stephen Mehay  
Monterey, California
4. Dr. Elda Pema  
Monterey, California
5. CAPT Dewes  
Commanding Officer  
Center for Personal and Professional Development  
Virginia Beach, Virginia
6. Dr. Mary Redd-Clary  
Director, Voluntary Education Center for Personal and  
Professional Development (CPPD)  
Center for Personal and Professional Development  
Virginia Beach, Virginia
7. LCDR Douglas L. Barnard  
Monterey, California
8. LCDR Elizabeth F. Zardeskas  
Monterey, California