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NPRST-TN-09-9

September 2009

Career Analyzer Planning Tool (CAPT)

Amos Golan, Ph.D.
American University

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Navy Personnel Research, Studies, and Technology

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Reviewed and Approved by
David M. Cashbaugh
Institute for Force Management

Released by
David L. Alderton, Ph.D.
Director

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Navy Personnel Research, Studies, and Technology (NPRST)
Bureau of Naval Personnel (BUPERS-1)
5720 Integrity Dr.
Millington, TN 38055-1000
www.nprst.navy.mil

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 instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this 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 Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
09-30-2009	Technical N	1 April 2008 - 31 May 2009

4. TITLE AND SUBTITLE

Career Analyzer Planning Tool (CAPT)

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Amos Golan, Ph.D.
Jerry A. Crabb, M. A.

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AND ADDRESS(ES)

Navy Personnel Research, Studies, and Technology
Bureau of Naval Personnel
5720 Integrity Drive
Millington, TN 38055-1000

8. PERFORMING ORGANIZATION REPORT NUMBER

NPRST-TN-09-9

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Navy Personnel Research, Studies, and Technology
Bureau of Naval Personnel
5720 Integrity Drive
Millington, TN 38055-1000

10. SPONSOR/MONITOR'S ACRONYM(S)

NPRST

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

NPRST-TN-09-9

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The overall objective of this research is to analyze the impact of a Sailor's personal attributes and demographics as well as the prevailing macroeconomic conditions and Navy policy on a Sailor's career. In this study a transition probability for each Sailor is estimated. This model allows investigators to examine many different possible scenarios, such as promotion probability, given an individual's acquisition of new skills or training, changes in geographic location, or economic downturns. The technique used is an Information Theoretic, Generalized Cross Entropy (IT-GCE) method.

15. SUBJECT TERMS

JOB MATCH, FIRST ORDER MARKOV, PROMOTION PROBABILITY, RETENTION PROBABILITY, INFORMATION THEORETICS

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					Genni Arledge
a. REPORT UNCLASSIFIED	**b. ABSTRACT** UNCLASSIFIED	**c. THIS PAGE** UNCLASSIFIED	UNLIMITED	87	**19b. TELEPHONE NUMBER** *(include area code)* 901-874-2115 (DSN 882)

Foreword

The overall objective of this research is to analyze the impact of a Sailor's personal attributes and demographics as well as the prevailing macroeconomic conditions and Navy policy on a Sailor's career. In this study a transition probability for each Sailor is estimated. This model allows investigators to examine many different possible scenarios, such as promotion probability, given an individual's acquisition of new skills or training, changes in geographic location, or economic downturns. The technique used is an Information Theoretic, Generalized Cross Entropy (IT-GCE) method.

This report contains the econometric model, detailed data descriptions, results, and simulated experiments. Questions regarding this report should be directed to Mr. Jerry C. Crabb, (901) 874-2218 or DSN 882-2218, e-mail jerry.crabb@navy.mil.

David L. Alderton, Ph.D.
Director

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Introduction

The Sea Power 21 program advocates optimal resourcing for the fleet of tomorrow in order to gain more productivity. Currently, the transformation of the Navy is focusing on the optimal mix of civilians/military/contractors, capital, labor productivity, and removing barriers to gains in efficiency. To meet these demands, leadership is considering putting the resource allocation decisions in the hands of the most efficient levels of decision-making. This idea is one that the private sector has long recognized as profitable.

Force Utilization through Unit Readiness and Efficiency (FUTURE), a 5-year research and development program, blends economic theory, econometrics, and optimization and simulation in a virtual environment. It employs artificial intelligence and optimization techniques in order to create simulation-based decision support tools to determine resource allocation and cost-benefit determinations across units and battle groups. It is comprised of a web-based suite of tools that houses a simulation environment to assess the impact of alternative resource allocation policies on individuals, team, and unit efficiency and readiness. Through the use of science, technology, and re-engineering of manpower planning and distribution and assignment processes, it becomes possible to provide Naval units with more information and control over costs and will empower commanders to more efficiently provide combat readiness.

FUTURE will provide unprecedented visibility over costs, enable the Navy to see gains in efficiency with respect to human resources management, and build a simulation environment that will allow testing of how policies affect Sailor behavior. With greater knowledge and control over costs, the tools to analyze implications of their decisions, decision makers will be guided to decisions that optimally trade off readiness and cost. This can be an effective means of lowering manpower and personnel resource allocation costs while maximizing the Navy's human capital investment.

While the goal of FUTURE is to give more information to decision makers through the use of simulation, optimization, and economics, the goal of the Career Analyzer Planning Tool (CAPT) is to give the Sailor more visibility over career options and career paths. CAPT is a web-based tool that allows Sailors to examine how personal attributes such as educational level, acquisition of a Navy Enlisted Classification (NEC), and ratings, as well as the current macroeconomic climate affect their promotion potential. This tool not only provides Sailors with a probability of promotion to the next paygrade, but allows them to plan their career path in the Navy. A service member who aspires to make the Navy a career and eventually be promoted to E-9 would be able to use CAPT as an E-4 to see what needs to be done to achieve E-9 and gives an associated probability of achieving this paygrade. The objective of this research is to give Sailors more knowledge and control of their naval career much as the FUTURE program is giving decision makers more foresight and control of a units' personnel readiness.

Career Analyzer Planning Tool (CAPT): A Brief Overview

This report summarizes the Career Analyzer Planning Tool (CAPT) project. The objective of this project is to study the matching of Sailors and jobs throughout their career while taking into account promotions and (potential) retention. Therefore, in this project the job-match transition probability for each Sailor is estimated. That transition probability is conditional on the Sailor's personal attributes and demographics as well as on macroeconomic and Navy conditions/policies while taking into account the Sailor's potential employment and wage in the civilian market. The model developed in this project allows the user to investigate different scenarios (e.g., change in potential job-match trajectory due to new training/education, change in fleet or geographical location, change in Navy demand/supply, or forecasting an economic recession/expansion, etc.).

The basic econometric model, detailed data description and discussion, some preliminary results and reviews, as well as simulated experiments and sub-group analyses are presented and discussed. The econometric model developed is used to achieve the above objectives while using available data and ensuring ease of application and use as well as being econometrically efficient and correct.

The final results of estimating the conditional job transitions for four Navy skill groups: Administration, Nuclear, Surface Combat weapons and Aviation are presented. In each case two sets of estimates are done: starting at E-4 and starting at E-5. The estimation results show that the model developed is robust and provides good estimates. The econometric method used is an Information Theoretic, Generalized Cross Entropy (IT-GCE) method.

The following sections provide summaries of the basic model, the data, and the empirical model; followed by a brief summary of the estimated results of the final model for two of the four groups (Administration and Surface Combat Weapons) and a brief summary. The detailed data dictionary, sources, and related information are presented in Appendix A.

The Basic Model

The model developed and used in this project is a first-order Markov transition model. The basic states of nature (at each pay grade) are no job change, minor job change (Distributable Navy Enlisted Classification Code [DNEC] change), major job change (Unit Identification [UIC] change) and a change in both (UIC and DNEC). The transition probabilities are conditional on the individual's characteristics and performance, Navy supply and demand, past job changes, geographic location, education and training, sea time service, and macroeconomic conditions (past and present). The analytic model is similar in

structure to the Career Case Manager Technologies (CCMT) model, but with refinements and extensions. The econometric method is an IT-GME method which is a robust, semi-parametric estimation method using minimal distributional assumptions.

The Data

In this project four Navy skill groups are analyzed (Administration, Nuclear, Surface Combat Weapons and Aviation). Each individual in the data set is observed every three months from the first day the individual entered the data until the last day of the data, or until that individual exited the data (left the Navy or moved to a different, unobserved, skill group).

The four basic Navy data sets used are:

1. Billet data (October 2001–May 2008)
2. Stay Loss data (October 2001–May 2008)
3. Advancement event data (October 2001–September 2004)
4. Career observation data (October 2001–September 2004)

The complete data set used covers October 2001 through May 2008.

Macro economic data (See the data dictionary in Appendix A) and three other civilian data sets that allow estimation of the potential civilian employment and wage for each Sailor (by occupation) were added to the Navy data set. The three civilian data sets are:

1. American Community Survey (ACS, updated 2007 and done by the US Census Bureau). This data set has approximately three million observations and is used for estimating civilian pay and employment probability by occupation.
2. The Current Population Survey (CPS, March Supplement, 2008). This data set is used for estimating civilian wages and employment probability. This data set which is a correct sample of the U. S. populations is also used to create the necessary weights for the ACS data analysis.
3. The National Longitudinal Survey of Youth (1979 and 1997 cohorts). These two data sets are much smaller but contain information that does not exist in the other data sets such as aptitude tests, Armed Forces Qualification Test (AFQT) values, and background information on each individual. Further, these data allows researchers to study the behavior of individuals (veterans in particular) over time. These data sets are used to study veterans' behavior, major occupations taken by veterans, and allowed us to capture the effect of AFQT on wages and employment probabilities.

With the above data (four Navy data sets, three civilian data sets, and the macroeconomic data) the promotion-job transition model for each one of the four skill groups was estimated.

To overcome some of the missing information/data problems, the four Navy data sets were updated using detailed cross walks that were developed for this project. This solved most of the missing primary and secondary missing NECs. The estimation is skill group specific with Enlisted Management Code (EMC) dummies. Further, each Pay Grade (E-4 and E-5) is estimated separately. The detailed data dictionary is provided in Appendix A.

The Empirical Model

The CAPT model considers simultaneously promotion (or more precisely, "selected for promotion"), job change (either a DNEC change within UIC, or a UIC change, or a change of both: UIC and DNEC), and losses (both voluntary and involuntary). With that in mind, the above were considered as the basic "states" of nature (defined explicitly below). A first-order Markov Model was then used to estimate the probability of moving from one state to another within a 12-month period.

These transition probabilities are conditional on all personal attributes, socio-demographic information, performance, economic and civilian wage information, Navy supply and demand as well as other available Navy information and policies. Based on these estimates, different scenarios and sub-groups of interest can be evaluated and analyzed. In addition, the estimates are used to forecast the career (job and promotion) path into the future and to perform simulated experiments. These simulated experiments include changes in personal attributes (more education/training, higher Performance Mark Average [PMA], etc.), changes in Navy policies (increase/decrease in demand), and outside economic conditions (recession/expansion).

The states of nature in the model (the right hand side symbol is used in the tables and figures as shown in Appendix B) are:

- *Ei* with no job change (e.g., remained in E-4) = *Ei__*
- *Ei* with no UIC change but DNEC change = *Ei_D*
- *Ei* with UIC change and no DNEC change = *EiU_*
- *Ei* with changes in UIC and DNEC = *EiUD*
- *LO_V* = Voluntary Loss (within 3 months of EAOS: EAOS = 1)
- *LO_I* = Involuntary Loss (not within 3 months of EAOS: EAOS = 0).

where *Ei* = E-4, E-5, E-6, E-7 (or *i* = 4, 5, 6, 7). Given the available data and skill groups the first state is E-4.

Time Dimensions

Each individual is observed every three months. However, three months is too short a time period to find the real job-match-promotion transition process. Unlike a "simple" promotion model where there are strict Navy rules for minimal time in pay grade, in the current model there are no such rules (or the rules are unknown to the authors). Therefore, one of the tasks was to investigate empirically the best time scale that is consistent with observed Navy data. There are two basic cases that seemed logical to study: 6- and 12-month periods. Anything below a 6-month period is inconsistent with the current Navy rules and observed behavior. Anything longer than 12-months may miss important promotions or job changes at the lower pay grades. Therefore, researchers investigated two cases empirically: 6-months transitions and 12-months transitions. Based on a detailed study (that was done for all four skill groups) in the final stage of the project, the analysis is based on a 12-month period. (It is noted that the time horizon study included a study of the in-sample prediction accuracy and the out-of-sample forecasting accuracy of the two possible models. In all cases, the 12-months model is superior to the 6-months model.)

Empirical Results

For each skill group the final set of estimated, conditional transition probabilities are presented for each of the following:

- The complete transition matrix for 12 months time lag. The transitions are for a "job change and/or promotion within twelve months." The estimated transitions as well as actual observed values and predicted values for each skill are presented below. Two sets of such tables are reported in Appendix B: Starting at E-4 and starting at E-5.
- A 6-year forecast ("pushing out" the transitions).
- A graphical analysis of the promotion and/or job transitions.
- Transition tables of specific (within skill group) subgroups (e.g., EMC, education, gender, AFQT, PMA, etc.)
- Joint Career Path – Job Transition graphs.
- Simulated experiments based on individual's choices (e.g., education, performance), Navy choices (e.g., demand), and macro economic conditions (e.g., recession/expansion).
- The estimated parameters, their significant level (*t* statistic and *p* values) and the marginal effects (in percent) are provided as well for only one of the skill groups (Appendix B). The complete set of all estimated parameters, models, and data will be provided with the final report.

The model used for the above estimation is an IT-GME model that treats the errors as Poisson errors (and the relevant support space is constructed accordingly). This ensures efficiency and convergence. The model also takes into account left and right censoring in a manner similar to CCMT. Looking at the estimated transitions, the estimated coefficients, and the prediction (relative to correct counts) show that the model performs very well.

For completion two example sets are provided, Administration and Surface Combat Weapons. Each set of examples presents the transition matrix and the predicted and actual number of individuals in each cell of the transition matrix. A 7-year forecast ("pushing out" the transitions) is then presented. A basic set of figures that evaluate the promotion and the job transitions is then presented. The transition matrices of different subgroups within each skill group are then presented. A career path and job change graphs for the Surface Combat Weapons is also presented. It should be noted, however, that these "career paths" figures should be evaluated with caution as they are often based on small probabilities. They do provide a "relativity" measure among the four skills in terms of mean promotion speeds and mean job change behavior. A detailed set of simulated experiments is presented later in this report.

Appendix A provides a detailed data dictionary (and data sources). Appendix B provides tables and figures, and Appendix C provides the estimated parameters, basic statistics and marginal effects for the Surface Combat weapons skills. The variables shown in Appendix C are those used in all the models (though each skill group has different EMCs, DNECs and NECs).

Summary

The main objective of this research was to develop a framework for analyzing the job-match trajectory of Sailors while also taking into account promotions, retention, and all other available information (personnel characteristics, Navy policies, performance evaluations within the Navy, and exogenous macroeconomic and political conditions). Using data from 2001 through 2008, these effects were examined for four skill groups: Administration, Nuclear, Surface Combat Weapons, and Aviation. To achieve that goal, an Information Theoretic General Maximum Entropy first-order Markov transition model was developed and used. In addition to the estimates, simulated experiments and a sub-group analysis were done and are presented.

The main results of the research are:

1. The best time horizon to use when analyzing skill groups is the 12-month time period. In all cases the 12-month time period is superior to the 3-, 6-, and 24-month horizons.

2. In all cases (skill groups) researchers observe no significant changes in promotion rates regardless of educational levels (no high school, high school, or high school plus).
3. As macroeconomic conditions such as GDP and interest rates increase, reenlistments and extensions decrease while attrition across the boards increases.
4. There are no significant differences in promotion for male vs. female or for those Sailors who have had no sea duty in the past vs. those with one or more sea duty assignments.

In future work it will be interesting to extend the model to the rest of the Navy skill groups and to further develop the model based on the forecasting results shown here.

Appendix A:
Data Dictionary

Table A-1
Data Dictionary

Variable	Description
Sex	Sailor's Gender (1=Male, 0=Female)
Education	Sailor's highest education level attained HSDIP = 1 (High School Diploma) HSPLUS = 1 (More than High School) NODIP = 1 (Less than High School) - Reference Category
Marital Status	Sailor's Marital Status MARRIED = 1 (Married) MARRIED = 0 (Not Married) – Reference category
Sea/Shore Duty	SS_SEA = 1 (Sea Duty) SS_SEA = 0 (Non Sea Duty) – Reference Category
Missing flags	FIRSTOBS = 1 (First observations therefore missing lagged values) MISSBILLET = 1 (Missing Billets data) MISSALLOWANCE = 1 (Missing allowances)
Change in ATC	SATCC_LO = 1 (No change in Sailor's ATC code since last promotion) SATCC_LO = 0 (Some change in Sailor's ATC code) - Reference category
Sea duties in past	SSC_LO = 1 (No sea duties in the past) SSC_LO = 0 (One or more sea duties in the past) – Reference category
PASS	PASS = 1 (if INDSCORE > 0 & INDSCORE >= CYCLECUT & PMA > 0) PASS = 0 – Reference category
AFQT_N	From raw data (between 30 and 99)
Age & AgeSQ	Age of Sailor and its square
Seamonth & Seamonth2	Number of months of sea duty (cumulative) and its square (from raw data)
TIR & TIR2	Time in rank and Time in rank square (from raw data)
TIJ2	Time in job (computed from raw data)
MOS & MOS2	Months of service and Months of service squared (from raw data)
SeamonthbyMOS & SeamonthbyMOSSQ	Ratio of Seamonths to Months of Service (cumulative) and its square (computed from raw data)
VacbyTak & VacbyTakSQ	Ratio of Vacancies by Takers and Vacancies by Takers Square (computed from raw)
PNA	PNA score (from raw data)
PASS_PNA	PASS and PNA score interaction term
INDSCORE	Individual Score (from raw data) – The value of the Final Multiple

Table A-1
Data Dictionary

Variable	Description
PASS_INDSCORE	PASS and Individual score interaction term
LUICCHANGES	Number of UIC changes since last period
LNECCHANGES	Number of NEC changes since last period
INSCBYCCUT	Individual Score by Cyclecut
DEMAND_1	The number of job postings (from the billets data) that the Sailor would qualify for today. The search is done within Skill Group, Paygrade, and Period. A Sailor is qualified if one of his NECs matches either the primary or the secondary NEC code requirement posted in the billet data.
SUPPLY1_1	The number of other Sailors that have similar qualifications as a sailor today. The search is done within Skill Group, Paygrade, and Period. Another Sailor is said to have similar qualifications as the current Sailor if he (she) has at least one NEC similar to the current Sailor. The search is not based on time in rank. A different version of this variable (based on time in rank at least 5 months) was tried and we did not eventually use it.
BASE_PAY_R	Base Pay (in 2006 dollars)
ALLOWANCES_R	Allowances (in 2006 dollars)
CTSRB_R	SRB in 2006 dollar value
SRB_CAP	SRB Caps (in 2006 Dollars)
A_PR52_AF	Probability of employment in civilian sector - computed from ACS/NLS with AFQT corrections
A_CW52_AF	Expected Civilian Wage (in 2006 dollars) – computed from ACS/NLS with AFQT correction (assuming a 52 week full time equivalent)
PMA Categories	PMA Scores in categories (Skill Group Specific reference category) PMA1 = 1 (PMA score <= 2) PMA2 = 1 (2 < PMA Score <= 3.2) PMA3 = 1 (3.2 < PMA Score <= 3.6) PMA4 = 1 (3.6 < PMA Score <= 3.8) PMA5 = 1 (3.8 < PMA Score)
PMA Categories & PASS interactions	PASS_PMA# = 1 (interaction between PMA category and PASS)
FLTCONC##	Fleet concentration dummy variables (skill group specific reference)
DNEC####	DNEC Dummy variables (Skill group specific reference)

Table A-1
Data Dictionary

Variable	Description
EMC_####	EMC dummy variables (Skill group specific reference)
LINT	Lagged interest rate
LQUNEMP	Lagged Quarterly Unemployment rate
L2QUNEMP	2nd Lagged Quarterly Unemployment rate
LARGDP	Lagged Annual Real GDP
L2ARGDP	2nd Lagged Annual Real GDP
LNASDAQ	Lagged NASDAQ

Appendix B:
Tables and Figures

Table B-1
12-month analysis from E-4

Administration from E-4			
	E-4	**E-5**	**E-6**
Estimated Transition			
E4_D	0.002	0	0
E4U_	0.181	0	0
E4UD	0.027	0	0
E5_	0.117	0.596	0
E5_D	0.001	0.006	0
E5U_	0.063	0.205	0
E5UD	0.017	0.047	0.004
E6_	0	0.028	0.614
E6_D	0	0	0.009
E6U_	0	0.014	0.213
E6UD	0	0.002	0.068
E7_	0	0	0.025
E7U_	0	0	0.008
E7UD	0	0	0.004
LO_I	0.109	0.071	0.048
LO_V	0.022	0.030	0.007
Estimated Transition			
E4_	2363	35	0
E4_D	12	0	0
E4U_	1001	0	0
E4UD	150	0	0
E5_	650	3716	0
E5_D	6	39	2
E5U_	351	1279	0
E5UD	94	292	18
E6_	0	177	2931
E6_D	0	0	45
E6U_	0	88	1015
E6UD	2	14	324
E7_	0	0	117
E7U_	0	0	37
E7UD	0	0	20
LO_I	304	446	229
LO_V	122	185	32

Table B-1
12-month analysis from E-4

	Administration from E-4		
	E-4	E-5	E-6
	Actual Number of Individuals		
E4_	2363	35	0
E4_D	12	0	0
E4U_	943	8	0
E4UD	144	2	0
E5_	816	3579	10
E5_D	7	38	1
E5U_	420	1234	2
E5UD	72	342	2
E6_	0	251	2901
E6_D	0	2	43
E6U_	0	100	1031
E6UD	0	26	326
E7_	0	0	110
E7U_	0	0	38
E7UD	0	0	23
LO_I	605	467	239
LO_V	152	153	44

Table B-2
12-month analysis from E-5

Administration from E-5		
	E-5	**E-6**
Estimated Transition		
E5_	0.585	0.000
E5_D	0.006	0.000
E5U_	0.201	0.000
E5UD	0.055	0.000
E6_	0.032	0.611
E6_D	0.000	0.009
E6U_	0.014	0.216
E6UD	0.004	0.068
E7_	0.000	0.026
E7U_	0.000	0.008
E7UD	0.000	0.004
LO_I	0.077	0.049
LO_V	0.025	0.009
Estimated Number of Individuals		
E5_	3624	0
E5_D	39	1
E5U_	1247	0
E5UD	342	0
E6_	196	2914
E6_D	0	45
E6U_	89	1029
E6UD	27	322
E7_	0	124
E7U_	0	38
E7UD	0	21
LO_I	478	231
LO_V	152	44

Table B-2
12-month analysis from E-5

Administration from E-5		
	E-5	E-6
	Actual Number of Individuals	
E5_	3579	10
E5_D	38	1
E5U_	1234	2
E5UD	342	2
E6_	251	2901
E6_D	2	43
E6U_	100	1031
E6UD	26	326
E7_	0	110
E7U_	0	38
E7UD	0	23
LO_I	467	239
LO_V	153	44

Table B-3
Twelve months pushing forward (*t* = 1, 2, ..., 7 years)

T = 1	E-4	E-5	E-6
E4_	0.456	0.000	0.000
E4_D	0.002	0.000	0.000
E4U_	0.181	0.000	0.000
E4UD	0.027	0.000	0.000
E5_	0.117	0.596	0.000
E5_D	0.001	0.006	0.000
E5U_	0.063	0.205	0.000
E5UD	0.017	0.047	0.004
E6_	0.000	0.028	0.614
E6_D	0.000	0.000	0.009
E6U_	0.000	0.014	0.213
E6UD	0.000	0.002	0.068
E7_	0.000	0.000	0.025
E7U_	0.000	0.000	0.008
E7UD	0.000	0.000	0.004
LO_I	0.109	0.071	0.048
LO_V	0.022	0.030	0.007
T = 2	**E-4**	**E-5**	**E-6**
E4_	0.308	0.000	0.000
E4_D	0.001	0.000	0.000
E4U_	0.121	0.000	0.000
E4UD	0.018	0.000	0.000
E5_	0.197	0.509	0.003
E5_D	0.002	0.005	0.000
E5U_	0.083	0.175	0.001
E5UD	0.021	0.040	0.004
E6_	0.006	0.052	0.556
E6_D	0.000	0.000	0.008
E6U_	0.003	0.022	0.193
E6UD	0.001	0.005	0.061
E7_	0.000	0.001	0.047
E7U_	0.000	0.000	0.015
E7UD	0.000	0.000	0.008
LO_I	0.196	0.135	0.092
LO_V	0.143	0.055	0.013

Table B-3
Twelve months pushing forward (t = 1, 2, ..., 7 years)

T = 3	E-4	E-5	E-6
E4_	0.206	0.000	0.000
E4_D	0.001	0.000	0.000
E4U_	0.081	0.000	0.000
E4UD	0.012	0.000	0.000
E5_	0.233	0.435	0.004
E5_D	0.002	0.005	0.000
E5U_	0.091	0.150	0.002
E5UD	0.022	0.035	0.003
E6_	0.014	0.069	0.503
E6_D	0.000	0.001	0.008
E6U_	0.006	0.027	0.174
E6UD	0.002	0.007	0.056
E7_	0.000	0.003	0.067
E7U_	0.000	0.001	0.021
E7UD	0.000	0.001	0.012
LO_I	0.267	0.191	0.132
LO_V	0.062	0.078	0.018
T = 4	**E-4**	**E-5**	**E-6**
E4_	0.138	0.000	0.000
E4_D	0.001	0.000	0.000
E4U_	0.054	0.000	0.000
E4UD	0.008	0.000	0.000
E5_	0.243	0.371	0.006
E5_D	0.002	0.004	0.000
E5U_	0.090	0.128	0.002
E5UD	0.021	0.030	0.003
E6_	0.024	0.082	0.455
E6_D	0.000	0.001	0.007
E6U_	0.010	0.031	0.158
E6UD	0.002	0.008	0.050
E7_	0.001	0.002	0.027
E7U_	0.000	0.002	0.027
E7UD	0.000	0.001	0.015
LO_I	0.326	0.240	0.168
LO_V	0.079	0.097	0.024

Table B-3
Twelve months pushing forward (*t* = 1, 2, ..., 7 years)

T = 5	E-4	E-5	E-6
E4_	0.092	0.000	0.000
E4_D	0.000	0.000	0.000
E4U_	0.036	0.000	0.000
E4UD	0.005	0.000	0.000
E5_	0.236	0.317	0.007
E5_D	0.002	0.003	0.000
E5U_	0.086	0.109	0.002
E5UD	0.020	0.025	0.003
E6_	0.032	0.090	0.412
E6_D	0.000	0.001	0.006
E6U_	0.013	0.034	0.143
E6UD	0.003	0.009	0.046
E7_	0.002	0.009	0.102
E7U_	0.001	0.003	0.032
E7UD	0.000	0.001	0.018
LO_I	0.375	0.284	0.201
LO_V	0.094	0.113	0.028
T = 6	**E-4**	**E-5**	**E-6**
E4_	0.0622	0.000	0.000
E4_D	0.000	0.000	0.000
E4U_	0.024	0.000	0.000
E4UD	0.004	0.000	0.000
E5_	0.221	0.271	0.008
E5_D	0.002	0.003	0.000
E5U_	0.079	0.093	0.003
E5UD	0.019	0.022	0.003
E6_	0.040	0.095	0.373
E6_D	0.000	0.001	0.006
E6U_	0.015	0.035	0.129
E6UD	0.004	0.010	0.041
E7_	0.003	0.012	0.116
E7U_	0.001	0.004	0.037
E7UD	0.001	0.002	0.020
LO_I	0.417	0.323	0.231
LO_V	0.108	0.128	0.033

Table B-3
Twelve months pushing forward (*t* = 1, 2, ..., 7 years)

T = 7	E-4	E-5	E-6
E4_	0.041	0.000	0.000
E4_D	0.000	0.000	0.000
E4U_	0.016	0.000	0.000
E4UD	0.002	0.000	0.000
E5_	0.202	0.232	0.008
E5_D	0.002	0.003	0.000
E5U_	0.072	0.080	0.003
E5UD	0.017	0.019	0.003
E6_	0.046	0.098	0.338
E6_D	0.001	0.001	0.005
E6U_	0.017	0.036	0.117
E6UD	0.005	0.011	0.037
E7_	0.004	0.015	0.130
E7U_	0.001	0.005	0.041
E7UD	0.001	0.003	0.023
LO_I	0.453	0.358	0.258
LO_V	0.120	0.140	0.037

Table B-4
Subgroup analysis by EMC

	E-4	E-5	E-6
Sample: EMC = B610			
E4_	0.35	0.004	0
E4_D	0.01	0	0
E4U_	0.131	0.001	0
E4UD	0.026	0	0
E5_	0.174	0.492	0.001
E5_D	0.004	0.019	0.003
E5U_	0.093	0.175	0.001
E5UD	0.017	0.053	0
E6_	0	0.091	0.469
E6_D	0	0.001	0.021
E6U_	0	0.037	0.171
E6UD	0	0.009	0.055
E7_	0	0	0.086
E7U_	0	0	0.056
E7UD	0	0	0.021
LO_I	0.15	0.086	0.094
LO_V	0.044	0.032	0.023
Sample: EMC = B700			
E4_	0.345	0.003	0
E4_D	0.063	0.001	0
E4U_	0.108	0.001	0
E4UD	0.052	0	0
E5_	0.142	0.437	0.001
E5_D	0.007	0.037	0.001
E5U_	0.065	0.147	0.001
E5UD	0.028	0.127	0
E6_	0	0.086	0.436
E6_D	0	0.004	0.051
E6U_	0	0.032	0.16
E6UD	0	0.013	0.093
E7_	0	0	0.47
E7U_	0	0	0.038
E7UD	0	0	0.03
LO_I	0.157	0.088	0.124
LO_V	0.033	0.023	0.02

Table B-4
Subgroup analysis by EMC

	E-4	E-5	E-6
Sample: EMC = B710			
E4_	0.387	0.004	0
E4_D	0.008	0	0
E4U_	0.17	0.001	0
E4UD	0.029	0	0
E5_	0.155	0.498	0.001
E5_D	0.002	0.008	0.001
E5U_	0.081	0.18	0.001
E5UD	0.015	0.057	0
E6_	0	0.099	0.48
E6_D	0	0.001	0.015
E6U_	0	0.038	0.169
E6UD	0	0.011	0.073
E7_	0	0	0.077
E7U_	0	0	0.045
E7UD	0	0	0.036
LO_I	0.121	0.078	0.085
LO_V	0.031	0.025	0.018
Sample: EMC = B720			
E4_	0.359	0.004	0
E4_D	0.009	0	0
E4U_	0.13	0.001	0
E4UD	0.061	0	0
E5_	0.168	0.485	0.001
E5_D	0.002	0.013	0.003
E5U_	0.077	0.153	0.001
E5UD	0.029	0.104	0
E6_	0	0.097	0.468
E6_D	0	0.001	0.012
E6U_	0	0.034	0.158
E6UD	0	0.012	0.066
E7_	0	0	0.065
E7U_	0	0	0.067
E7UD	0	0	0.048
LO_I	0.128	0.07	0.091
LO_V	0.037	0.027	0.022

Table B-5
Subgroup analysis by education

	E-4	E-5	E-6
Sample: Highest Education Level–No High School			
E4_	0.358	0.004	0
E4_D	0.013	0	0
E4U_	0.159	0.001	0
E4UD	0.023	0	0
E5_	0.167	0.491	0.001
E5_D	0.002	0.008	0
E5U_	0.092	0.192	0.001
E5UD	0.016	0.051	0
E6_	0	0.098	0.482
E6_D	0	0.001	0.015
E6U_	0	0.038	0.17
E6UD	0	0.009	0.06
E7_	0	0	0.078
E7U_	0	0	0.042
E7UD	0	0	0.034
LO_I	0.135	0.08	0.097
LO_V	0.035	0.027	0.021
Sample: Highest Education Level—High School			
E4_	0.365	0.004	0
E4_D	0.01	0	0
E4U_	0.157	0.001	0
E4UD	0.033	0	0
E5_	0.169	0.501	0.001
E5_D	0.002	0.009	0.001
E5U_	0.09	0.185	0.001
E5UD	0.017	0.057	0
E6_	0	0.097	0.468
E6_D	0	0.001	0.013
E6U_	0	0.039	0.18
E6UD	0	0.009	0.057
E7_	0	0	0.087
E7U_	0	0	0.054
E7UD	0	0	0.033
LO_I	0.126	0.073	0.088
LO_V	0.032	0.024	0.019

Table B-5
Subgroup analysis by education

	E-4	E-5	E-6
Sample: Highest Education Level—High School and Higher			
E4_	0.399	0.004	0
E4_D	0.005	0	0
E4U_	0.156	0.001	0
E4UD	0.025	0	0
E5_	0.156	0.49	0.001
E5_D	0.002	0.013	0
E5U_	0.081	0.183	0.001
E5UD	0.013	0.046	0
E6_	0	0.096	0.379
E6_D	0	0.002	0.015
E6U_	0	0.039	0.143
E6UD	0	0.008	0.044
E7_	0	0	0.14
E7U_	0	0	0.097
E7UD	0	0	0.079
LO_I	0.129	0.09	0.082
LO_V	0.034	0.028	0.018

Table B-6
Subgroup analysis by sea duty status

	E-4	E-5	E-6
Sample: On Sea Duty			
E4_	0.365	0.004	0
E4_D	0.01	0	0
E4U_	0.157	0.001	0
E4UD	0.029	0	0
E5_	0.164	0.484	0.001
E5_D	0.002	0.011	0.001
E5U_	0.094	0.199	0.001
E5UD	0.017	0.061	0
E6_	0	0.096	0.462
E6_D	0	0.001	0.013
E6U_	0	0.042	0.189
E6UD	0	0.009	0.056
E7_	0	0	0.091
E7U_	0	0	0.057
E7UD	0	0	0.031
LO_I	0.13	0.07	0.082
LO_V	0.032	0.022	0.017
Sample: Not on Sea Duty			
E4_	0.367	0.004	0
E4_D	0.009	0	0
E4U_	0.157	0.001	0
E4UD	0.036	0	0
E5_	0.172	0.512	0.001
E5_D	0.002	0.008	0
E5U_	0.084	0.175	0.001
E5UD	0.016	0.052	0
E6_	0	0.098	0.462
E6_D	0	0.001	0.013
E6U_	0	0.037	0.167
E6UD	0	0.009	0.056
E7_	0	0	0.09
E7U_	0	0	0.055
E7UD	0	0	0.04
LO_I	0.123	0.077	0.093
LO_V	0.033	0.026	0.02

Table B-7
Subgroup analysis by gender

	E-4	E-5	E-6
Sample: Male			
E4_	0.374	0.004	0
E4_D	0.008	0	0
E4U_	0.159	0.001	0
E4UD	0.024	0	0
E5_	0.17	0.504	0.001
E5_D	0.002	0.01	0.001
E5U_	0.088	0.183	0.001
E5UD	0.016	0.054	0
E6_	0	0.097	0.46
E6_D	0	0.001	0.014
E6U_	0	0.039	0.176
E6UD	0	0.009	0.057
E7_	0	0	0.089
E7U_	0	0	0.062
E7UD	0	0	0.035
LO_I	0.125	0.073	0.087
LO_V	0.032	0.024	0.018
Sample: Female			
E4_	0.353	0.004	0
E4_D	0.012	0	0
E4U_	0.153	0.001	0
E4UD	0.045	0	0
E5_	0.165	0.495	0.001
E5_D	0.002	0.008	0
E5U_	0.092	0.188	0.001
E5UD	0.018	0.059	0
E6_	0	0.097	0.469
E6_D	0	0.001	0.012
E6U_	0	0.039	0.178
E6UD	0	0.008	0.054
E7_	0	0	0.093
E7U_	0	0	0.042
E7UD	0	0	0.04
LO_I	0.129	0.075	0.09
LO_V	0.031	0.024	0.02

Table B-8
Subgroup analysis by marital status

	E-4	E-5	E-6
Sample: Married			
E4_	0.371	0.004	0
E4_D	0.009	0	0
E4U_	0.156	0.001	0
E4UD	0.034	0	0
E5_	0.168	0.501	0.001
E5_D	0.002	0.01	0.001
E5U_	0.088	0.182	0.001
E5UD	0.017	0.058	0
E6_	0	0.098	0.461
E6_D	0	0.001	0.013
E6U_	0	0.039	0.176
E6UD	0	0.009	0.055
E7_	0	0	0.094
E7U_	0	0	0.059
E7UD	0	0	0.036
LO_I	0.123	0.073	0.086
LO_V	0.032	0.024	0.018
Sample: Unmarried			
E4_	0.363	0.004	0
E4_D	0.01	0	0
E4U_	0.158	0.001	0
E4UD	0.03	0	0
E5_	0.168	0.5	0.001
E5_D	0.002	0.009	0
E5U_	0.091	0.188	0.001
E5UD	0.016	0.054	0
E6_	0	0.096	0.467
E6_D	0	0.001	0.013
E6U_	0	0.039	0.18
E6UD	0	0.009	0.058
E7_	0	0	0.081
E7U_	0	0	0.051
E7UD	0	0	0.037
LO_I	0.129	0.075	0.092
LO_V	0.032	0.024	0.02

Table B-8
Subgroup analysis by "Pass"

	E-4	E-5	E-6
Sample: Never have Pass = 1			
E4_	0.402	0.005	0
E4_D	0.012	0	0
E4U_	0.166	0.001	0
E4UD	0.032	0	0
E5_	0.147	0.496	0.001
E5_D	0.002	0.009	0
E5U_	0.072	0.172	0.001
E5UD	0.014	0.052	0
E6_	0	0.103	0.467
E6_D	0	0.001	0.01
E6U_	0	0.04	0.17
E6UD	0	0.01	0.066
E7_	0	0	0.065
E7U_	0	0	0.018
E7UD	0	0	0.018
LO_I	0.121	0.081	0.153
LO_V	0.031	0.028	0.031
Sample: Sometimes have Pass = 1			
E4_	0.354	0.004	0
E4_D	0.009	0	0
E4U_	0.159	0.001	0
E4UD	0.033	0	0
E5_	0.175	0.506	0.001
E5_D	0.002	0.008	0.001
E5U_	0.096	0.188	0.001
E5UD	0.018	0.057	0
E6_	0	0.098	0.477
E6_D	0	0.001	0.013
E6U_	0	0.04	0.183
E6UD	0	0.009	0.058
E7_	0	0	0.081
E7U_	0	0	0.053
E7UD	0	0	0.026
LO_I	0.124	0.066	0.087
LO_V	0.031	0.022	0.019

Table B-8
Subgroup analysis by "Pass"

	E-4	E-5	E-6
Sample: Always have Pass = 1			
E4_	0.345	0.003	0
E4_D	0.006	0	0
E4U_	0.116	0.001	0
E4UD	0.024	0	0
E5_	0.186	0.46	0.001
E5_D	0.003	0.013	0.001
E5U_	0.098	0.178	0.001
E5UD	0.018	0.054	0
E6_	0	0.089	0.426
E6_D	0	0.001	0.012
E6U_	0	0.036	0.162
E6UD	0	0.008	0.05
E7_	0	0	0.116
E7U_	0	0	0.07
E7UD	0	0	0.063
LO_I	0.166	0.107	0.081
LO_V	0.04	0.034	0.017

Table B-9
Subgroup analysis by months at sea

	E-4	E-5	E-6
Sample: Spent less than / equal to half of their months of service at sea			
E4_	0.362	0.004	0
E4_D	0.01	0	0
E4U_	0.138	0.001	0
E4UD	0.04	0	0
E5_	0.168	0.498	0.001
E5_D	0.002	0.007	0.001
E5U_	0.088	0.187	0.001
E5UD	0.016	0.055	0
E6_	0	0.096	0.467
E6_D	0	0.001	0.01
E6U_	0	0.041	0.178
E6UD	0	0.009	0.052
E7_	0	0	0.084
E7U_	0	0	0.044
E7UD	0	0	0.036
LO_I	0.142	0.076	0.105
LO_V	0.034	0.025	0.021
Sample: Spent more than half of their months of service at sea			
E4_	0.368	0.004	0
E4_D	0.01	0	0
E4U_	0.165	0.001	0
E4UD	0.027	0	0
E5_	0.168	0.502	0.001
E5_D	0.002	0.01	0
E5U_	0.09	0.184	0.001
E5UD	0.017	0.057	0
E6_	0	0.097	0.456
E6_D	0	0.001	0.017
E6U_	0	0.038	0.176
E6UD	0	0.009	0.061
E7_	0	0	0.098
E7U_	0	0	0.071
E7UD	0	0	0.036
LO_I	0.121	0.073	0.068
LO_V	0.031	0.024	0.015

Table B-10
Subgroup analysis by AFQT score

	E-4	E-5	E-6
Sample: First quartile of AFQT			
E4_	0.361	0.004	0
E4_D	0.006	0	0
E4U_	0.172	0.001	1
E4UD	0.032	0	0
E5_	0.17	0.507	0.001
E5_D	0.002	0.006	0
E5U_	0.09	0.191	0.001
E5UD	0.016	0.053	0
E6_	0	0.099	0.48
E6_D	0	0.001	0.012
E6U_	0	0.041	0.187
E6UD	0	0.008	0.05
E7_	0	0	0.084
E7U_	0	0	0.053
E7UD	0	0	0.022
LO_I	0.12	0.067	0.091
LO_V	0.03	0.022	0.019
Sample: Second quartile of AFQT			
E4_	0.37	0.004	0
E4_D	0.006	0	0
E4U_	0.165	0.001	0
E4UD	0.032	0	0
E5_	0.17	0.504	0.001
E5_D	0.002	0.008	0
E5U_	0.088	0.189	0.001
E5UD	0.016	0.056	0
E6_	0	0.098	0.464
E6_D	0	0.001	0.011
E6U_	0	0.04	0.18
E6UD	0	0.009	0.051
E7_	0	0	0.089
E7U_	0	0	0.054
E7UD	0	0	0.035
LO_I	0.122	0.068	0.094
LO_V	0.031	0.022	0.019

Table B-10
Subgroup analysis by AFQT score

	E-4	E-5	E-6
Sample: Third quartile of AFQT			
E4_	0.364	0.004	0
E4_D	0.013	0	0
E4U_	0.156	0.001	0
E4UD	0.033	0	0
E5_	0.166	0.499	0.001
E5_D	0.003	0.009	0
E5U_	0.089	0.181	0.001
E5UD	0.018	0.057	0
E6_	0	0.097	0.455
E6_D	0	0.001	0.016
E6U_	0	0.039	0.174
E6UD	0	0.009	0.059
E7_	0	0	0.094
E7U_	0	0	0.057
E7UD	0	0	0.04
LO_I	0.126	0.077	0.085
LO_V	0.032	0.025	0.018
Sample: Fourth quartile of AFQT			
E4_	0.37	0.004	0
E4_D	0.013	0	0
E4U_	0.134	0.001	0
E4UD	0.031	0	0
E5_	0.166	0.49	0.001
E5_D	0.003	0.014	0.002
E5U_	0.09	0.178	0.001
E5UD	0.017	0.058	0
E6_	0	0.094	0.452
E6_D	0	0.001	0.013
E6U_	0	0.037	0.168
E6UD	0	0.009	0.063
E7_	0	0	0.094
E7U_	0	0	0.059
E7UD	0	0	0.045
LO_I	0.14	0.085	0.083
LO_V	0.035	0.028	0.018

Table B-11
Surface combat weapons: 12-month analysis from E-4

	E-4	E-5	E-6
Estimated Transition			
E4_	0.379	0.000	0.000
E4_D	0.007	0.000	0.000
E4U_	0.063	0.000	0.000
E4UD	0.034	0.000	0.000
E5_	0.266	0.474	0.000
E5_D	0.006	0.032	0.000
E5U_	0.040	0.093	0.000
E5UD	0.035	0.155	0.000
E6_	0.000	0.069	0.550
E6_D	0.000	0.005	0.032
E6U_	0.000	0.003	0.102
E6UD	0.000	0.022	0.185
E7_	0.000	0.000	0.043
E7U_	0.000	0.000	0.006
E7UD	0.000	0.000	0.016
LO_I	0.156	0.097	0.057
LO_V	0.014	0.051	0.009
Estimated Number of Individuals			
E4_	1208	0	0
E4_D	230	0	0
E4U_	199	0	0
E4UD	110	0	0
E5_	846	1628	0
E5_D	19	110	0
E5U_	127	320	0
E5UD	111	533	0
E6_	0	238	1370
E6_D	0	17	80
E6U_	0	10	255
E6UD	0	74	461
E7_	0	0	107
E7U_	0	0	15
E7UD	0	0	39
LO_I	496	332	143
LO_V	46	177	22

Table B-11
Surface combat weapons: 12-month analysis from E-4

	E-4	E-5	E-6
	Actual Number of Individuals		
E4_	1069	39	0
E4_D	21	1	0
E4U_	180	7	0
E4UD	102	4	0
E5_	914	1574	17
E5_D	26	104	1
E5U_	156	293	1
E5UD	145	503	3
E6_	0	265	1358
E6_D	0	21	77
E6U_	0	36	238
E6UD	0	87	457
E7_	0	0	107
E7U_	0	0	16
E7UD	0	0	41
LO_I	501	358	141
LO_V	71	147	34

Table B-12
Surface combat weapons: 12-month analysis from E-5

	E-5	E-6
Estimated Transition		
E5_	0.477	0.000
E5_D	0.030	0.000
E5U_	0.088	0.000
E5UD	0.151	0.000
E6_	0.066	0.557
E6_D	0.005	0.032
E6U_	0.007	0.098
E6UD	0.024	0.183
E7_	0.000	0.045
E7U_	0.000	0.006
E7UD	0.000	0.015
LO_I	0.109	0.051
LO_V	0.044	0.012
Estimated Number of Individuals		
E5_	1616	0
E5_D	103	1
E5U_	297	0
E5UD	511	0
E6_	223	1386
E6_D	17	80
E6U_	25	245
E6UD	80	456
E7_	0	113
E7U_	0	15
E7UD	0	38
LO_I	368	127
LO_V	149	30

Table B-12
Surface combat weapons: 12-month analysis from E-5

	E-5	E-6
	Actual Number of Individuals	
E5_	1574	17
E5_D	104	1
E5U_	293	1
E5UD	503	3
E6_	265	1358
E6_D	21	77
E6U_	36	238
E6UD	87	457
E7_	0	107
E7U_	0	16
E7UD	0	41
LO_I	358	141
LO_V	147	34

Table B-13
Surface combat weapons: Pushing forward (t = 1, 2, ..., 7 years)

12 Months			
T = 1	**E-4**	**E-5**	**E-6**
E4_	0.379	0.000	0.000
E4_D	0.007	0.000	0.000
E4U_	0.063	0.000	0.000
E4UD	0.034	0.000	0.000
E5_	0.266	0.474	0.000
E5_D	0.006	0.032	0.000
E5U_	0.040	0.093	0.000
E5UD	0.035	0.155	0.000
E6_	0.000	0.069	0.550
E6_D	0.000	0.005	0.032
E6U_	0.000	0.003	0.102
E6UD	0.000	0.022	0.185
E7_	0.000	0.000	0.043
E7U_	0.000	0.000	0.006
E7UD	0.000	0.000	0.016
LO_I	0.156	0.097	0.057
LO_V	0.014	0.051	0.009
T = 2	**E-4**	**E-5**	**E-6**
E4_	0.183	0.000	0.000
E4_D	0.003	0.000	0.000
E4U_	0.030	0.000	0.000
E4UD	0.017	0.000	0.000
E5_	0.292	0.357	0.000
E5_D	0.014	0.024	0.000
E5U_	0.051	0.070	0.000
E5UD	0.070	0.147	0.000
E6_	0.024	0.106	0.478
E6_D	0.002	0.007	0.028
E6U_	0.001	0.012	0.089
E6UD	0.007	0.035	0.161
E7_	0.000	0.004	0.081
E7U_	0.000	0.001	0.011
E7UD	0.000	0.002	0.029
LO_I	0.265	0.175	0.107
LO_V	0.039	0.091	0.016

Table B-13
Surface combat weapons: Pushing forward (t = 1, 2, ..., 7 years)

12 Months			
T = 3	**E-4**	**E-5**	**E-6**
E4_	0.089	0.000	0.000
E4_D	0.002	0.000	0.000
E4U_	0.015	0.000	0.000
E4UD	0.008	0.000	0.000
E5_	0.265	0.269	0.000
E5_D	0.015	0.018	0.000
E5U_	0.049	0.053	0.000
E5UD	0.074	0.088	0.000
E6_	0.048	0.127	0.416
E6_D	0.003	0.008	0.024
E6U_	0.005	0.018	0.077
E6UD	0.016	0.042	0.140
E7_	0.001	0.011	0.113
E7U_	0.000	0.002	0.015
E7UD	0.001	0.004	0.041
LO_I	0.344	0.239	0.150
LO_V	0.065	0.122	0.023
T = 4	**E-4**	**E-5**	**E-6**
E4_	0.043	0.000	0.000
E4_D	0.001	0.000	0.000
E4U_	0.007	0.000	0.000
E4UD	0.004	0.000	0.000
E5_	0.221	0.202	0.000
E5_D	0.014	0.014	0.000
E5U_	0.042	0.040	0.000
E5UD	0.066	0.066	0.000
E6_	0.068	0.137	0.362
E6_D	0.004	0.008	0.021
E6U_	0.008	0.021	0.067
E6UD	0.022	0.045	0.122
E7_	0.005	0.020	0.141
E7U_	0.001	0.003	0.019
E7UD	0.002	0.007	0.051
LO_I	0.405	0.291	0.188
LO_V	0.088	0.145	0.029

Table B-13
Surface combat weapons: Pushing forward (t = 1, 2, ..., 7 years)

12 Months			
T = 5	**E-4**	**E-5**	**E-6**
E4_	0.021	0.000	0.000
E4_D	0.000	0.000	0.000
E4U_	0.003	0.000	0.000
E4UD	0.002	0.000	0.000
E5_	0.177	0.153	0.000
E5_D	0.011	0.010	0.000
E5U_	0.034	0.030	0.000
E5UD	0.055	0.050	0.000
E6_	0.080	0.139	0.314
E6_D	0.005	0.008	0.018
E6U_	0.011	0.023	0.058
E6UD	0.026	0.046	0.106
E7_	0.009	0.029	0.166
E7U_	0.001	0.004	0.023
E7UD	0.003	0.010	0.060
LO_I	0.453	0.335	0.221
LO_V	0.107	0.164	0.033
T = 6	**E-4**	**E-5**	**E-6**
E4_	0.010	0.000	0.000
E4_D	0.000	0.000	0.000
E4U_	0.002	0.000	0.000
E4UD	0.001	0.000	0.000
E5_	0.138	0.115	0.000
E5_D	0.009	0.008	0.000
E5U_	0.027	0.023	0.000
E5UD	0.044	0.038	0.000
E6_	0.087	0.136	0.273
E6_D	0.005	0.008	0.016
E6U_	0.013	0.023	0.051
E6UD	0.029	0.045	0.092
E7_	0.014	0.038	0.188
E7U_	0.002	0.005	0.026
E7UD	0.005	0.014	0.067
LO_I	0.491	0.370	0.249
LO_V	0.123	0.178	0.038

Table B-13
Surface combat weapons: Pushing forward (t = 1, 2, ..., 7 years)

12 Months			
T = 7	**E-4**	**E-5**	**E-6**
E4_	0.005	0.000	0.000
E4_D	0.000	0.000	0.000
E4U_	0.001	0.000	0.000
E4UD	0.000	0.000	0.000
E5_	0.107	0.087	0.000
E5_D	0.007	0.006	0.000
E5U_	0.021	0.017	0.000
E5UD	0.034	0.028	0.000
E6_	0.089	0.129	0.238
E6_D	0.005	0.008	0.014
E6U_	0.014	0.022	0.044
E6UD	0.030	0.043	0.080
E7_	0.020	0.047	0.206
E7U_	0.003	0.006	0.028
E7UD	0.007	0.017	0.074
LO_I	0.521	0.400	0.274
LO_V	0.136	0.189	0.042

Table B-14
Simulated experiments: Aviation from E-4, education experiments

	E-4	E-5	E-6
No High School			
E4_	0.413	0.005	0
E4_D	0.033	0.001	0
E4U_	0.059	0	0
E4UD	0.085	0.001	0
E5_	0.144	0.508	0.003
E5_D	0.022	0.06	0
E5U_	0.02	0.058	0
E5UD	0.04	0.171	0.001
E6_	0	0.078	0.55
E6_D	0	0.009	0.048
E6U_	0	0.009	0.066
E6UD	0	0.027	0.167
E7_	0	0	0.05
E7U_	0	0	0.005
E7UD	0	0	0.013
LO_I	0.141	0.06	0.079
LO_V	0.042	0.014	0.016
High School			
E4_	0.415	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.076	0.001	0
E5_	0.147	0.51	0.003
E5_D	0.023	0.06	0
E5U_	0.02	0.058	0
E5UD	0.041	0.17	0.001
E6_	0	0.078	0.551
E6_D	0	0.008	0.045
E6U_	0	0.009	0.069
E6UD	0	0.027	0.17
E7_	0	0	0.045
E7U_	0	0	0.006
E7UD	0	0	0.014
LO_I	0.144	0.059	0.079
LO_V	0.041	0.014	0.016

Table B-14
Simulated experiments: Aviation from E-4, education experiments

	E-4	E-5	E-6
	High School Plus		
E4_	0.414	0.005	0
E4_D	0.036	0.001	0
E4U_	0.054	0	0
E4UD	0.08	0.001	0
E5_	0.147	0.519	0.003
E5_D	0.022	0.059	0
E5U_	0.019	0.056	0
E5UD	0.039	0.163	0.001
E6_	0	0.079	0.543
E6_D	0	0.007	0.04
E6U_	0	0.009	0.069
E6UD	0	0.026	0.155
E7_	0	0	0.044
E7U_	0	0	0.007
E7UD	0	0	0.044
LO_I	0.143	0.06	0.078
LO_V	0.045	0.015	0.017

Table B-15
Simulated experiments: Aviation from E-4, PMA experiments

	E-4	E-5	E-6
PMA Category LT 4			
E4_	0.417	0.005	0
E4_D	0.033	0.001	0
E4U_	0.055	0	0
E4UD	0.078	0.001	0
E5_	0.137	0.495	0.003
E5_D	0.021	0.059	0
E5U_	0.019	0.058	0
E5UD	0.038	0.166	0.001
E6_	0	0.083	0.562
E6_D	0	0.011	0.058
E6U_	0	0.01	0.074
E6UD	0	0.029	0.173
E7_	0	0	0.016
E7U_	0	0	0.004
E7UD	0	0	0.005
LO_I	0.154	0.067	0.085
LO_V	0.047	0.016	0.018
PMA Category 4			
E4_	0.421	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.078	0.001	0
E5_	0.143	0.506	0.003
E5_D	0.022	0.058	0
E5U_	0.02	0.058	0
E5UD	0.04	0.172	0.001
E6_	0	0.08	0.567
E6_D	0	0.008	0.047
E6U_	0	0.009	0.07
E6UD	0	0.026	0.166
E7_	0	0	0.033
E7U_	0	0	0.004
E7UD	0	0	0.011
LO_I	0.144	0.061	0.081
LO_V	0.041	0.014	0.016

Table B-15
Simulated experiments: Aviation from E-4, PMA experiments

	E-4	E-5	E-6
	PMA Category 5		
E4_	0.409	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.078	0.001	0
E5_	0.151	0.513	0.003
E5_D	0.024	0.063	0
E5U_	0.021	0.058	0
E5UD	0.041	0.168	0.001
E6_	0	0.076	0.538
E6_D	0	0.008	0.043
E6U_	0	0.009	0.07
E6UD	0	0.028	0.173
E7_	0	0	0.056
E7U_	0	0	0.007
E7UD	0	0	0.017
LO_I	0.143	0.058	0.077
LO_V	0.041	0.013	0.015

Table B-16
Simulated experiments: Individual score (final multiple) experiments

	E-4	E-5	E-6
Indscore Increase by 10%			
E4_	0.424	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.075	0.001	0
E5_	0.153	0.513	0.003
E5_D	0.024	0.061	0
E5U_	0.022	0.06	0
E5UD	0.043	0.17	0.001
E6_	0	0.08	0.569
E6_D	0	0.008	0.047
E6U_	0	0.009	0.072
E6UD	0	0.028	0.174
E7_	0	0	0.033
E7U_	0	0	0.005
E7UD	0	0	0.012
LO_I	0.131	0.052	0.07
LO_V	0.036	0.012	0.013
Indscore Increase by 20%			
E4_	0.433	0.005	0
E4_D	0.034	0.001	0
E4U_	0.059	0	0
E4UD	0.074	0.001	0
E5_	0.158	0.514	0.003
E5_D	0.025	0.062	0
E5U_	0.023	0.061	0
E5UD	0.043	0.169	0.001
E6_	0	0.084	0.588
E6_D	0	0.009	0.051
E6U_	0	0.01	0.076
E6UD	0	0.029	0.179
E7_	0	0	0.018
E7U_	0	0	0.003
E7UD	0	0	0.008
LO_I	0.119	0.046	0.061
LO_V	0.032	0.01	0.011

Table B-17
Simulated experiments: Vacancy/taker ratio experiments

	E-4	E-5	E-6
Vacants/Takers Ratio Increase by 10%			
E4_	0.416	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.078	0.001	0
E5_	0.147	0.51	0.003
E5_D	0.023	0.06	0
E5U_	0.02	0.058	0
E5UD	0.041	0.17	0.001
E6_	0	0.078	0.551
E6_D	0	0.008	0.046
E6U_	0	0.009	0.069
E6UD	0	0.027	0.17
E7_	0	0	0.045
E7U_	0	0	0.006
E7UD	0	0	0.015
LO_I	0.142	0.059	0.078
LO_V	0.041	0.014	0.016
Vacants/Takers Ratio Increase by 20%			
E4_	0.416	0.005	0
E4_D	0.035	0.001	0
E4U_	0.058	0	0
E4UD	0.079	0.001	0
E5_	0.146	0.51	0.003
E5_D	0.022	0.06	0
E5U_	0.02	0.058	0
E5UD	0.041	0.17	0.001
E6_	0	0.079	0.551
E6_D	0	0.008	0.046
E6U_	0	0.009	0.069
E6UD	0	0.028	0.17
E7_	0	0	0.045
E7U_	0	0	0.006
E7UD	0	0	0.015
LO_I	0.142	0.059	0.078
LO_V	0.041	0.014	0.016

Table B-17
Simulated experiments: Vacancy/taker ratio experiments

	E-4	E-5	E-6
Vacants/Takers Ratio Decrease by 10%			
E4_	0.415	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.077	0.001	0
E5_	0.147	0.51	0.003
E5_D	0.023	0.061	0
E5U_	0.02	0.058	0
E5UD	0.041	0.17	0.001
E6_	0	0.078	0.55
E6_D	0	0.008	0.045
E6U_	0	0.009	0.069
E6UD	0	0.027	0.168
E7_	0	0	0.047
E7U_	0	0	0.006
E7UD	0	0	0.015
LO_I	0.144	0.06	0.08
LO_V	0.041	0.014	0.016
Vacants/Takers Ratio Decrease by 20%			
E4_	0.415	0.005	0
E4_D	0.035	0.001	0
E4U_	0.057	0	0
E4UD	0.076	0.001	0
E5_	0.147	0.51	0.003
E5_D	0.023	0.061	0
E5U_	0.02	0.058	0
E5UD	0.041	0.17	0.001
E6_	0	0.078	0.55
E6_D	0	0.008	0.044
E6U_	0	0.009	0.069
E6UD	0	0.027	0.167
E7_	0	0	0.049
E7U_	0	0	0.006
E7UD	0	0	0.015
LO_I	0.145	0.06	0.08
LO_V	0.041	0.014	0.016

Table B-18
Simulated experiments: Macro-economic conditions experiments

	E-4	E-5	E-6
	LQUNEMP*1.5, L2QUNEMP*1.5		
E4_	0.832	0.023	0
E4_D	0.028	0.001	0
E4U_	0.007	0	0
E4UD	0.019	0.001	0
E5_	0.072	0.587	0.003
E5_D	0.012	0.078	0.001
E5U_	0.003	0.019	0
E5UD	0.013	0.124	0
E6_	0	0.092	0.601
E6_D	0	0.013	0.065
E6U_	0	0.009	0.064
E6UD	0	0.041	0.234
E7_	0	0	0.009
E7U_	0	0	0.002
E7UD	0	0	0.003
LO_I	0.01	0.009	0.012
LO_V	0.004	0.003	0.004
	LQUNEMP*2.0 L2QUNEMP*2.0		
E4_	0.957	0.092	0
E4_D	0.013	0.002	0
E4U_	0	0	0
E4UD	0.003	0	0
E5_	0.02	0.57	0.003
E5_D	0.004	0.085	0.001
E5U_	0	0.005	0
E5UD	0.002	0.076	0
E6_	0	0.092	0.573
E6_D	0	0.017	0.083
E6U_	0	0.008	0.052
E6UD	0	0.051	0.283
E7_	0	0	0.002
E7U_	0	0	0.001
E7UD	0	0	0.001
LO_I	0	0.001	0.001
LO_V	0	0.001	0.001

Table B-18
Simulated experiments: Macro-economic conditions experiments

	E-4	E-5	E-6
LQUNEMP*2.0, L2QUNEMP*2.0, L2ARGDP*0.9, LINT*0.25, LNASDAQ*0.6			
E4_	0.936	0.66	0
E4_D	0.02	0.002	0
E4U_	0.001	0	0
E4UD	0.004	0	0
E5_	0.031	0.652	0.004
E5_D	0.003	0.052	0
E5U_	0	0.004	0
E5UD	0.003	0.078	0
E6_	0	0.091	0.652
E6_D	0	0.016	0.093
E6U_	0	0.005	0.04
E6UD	0	0.031	0.195
E7_	0	0	0.011
E7U_	0	0	0
E7UD	0	0	0
LO_I	0.001	0.002	0.003
LO_V	0	0.001	0.001
LQUNEMP*0.75, L2QUNEMP*0.75, LARGDP*1.1, L2ARGDP*1.1, LINT*1.1, LNASDAQ*1.1			
E4_	0.515	0.006	0
E4_D	0.03	0.001	0
E4U_	0.052	0	0
E4UD	0.064	0.001	0
E5_	0.149	0.548	0.003
E5_D	0.019	0.054	0
E5U_	0.02	0.06	0
E5UD	0.036	0.156	0.001
E6_	0	0.081	0.575
E6_D	0	0.007	0.039
E6U_	0	0.008	0.063
E6UD	0	0.03	0.186
E7_	0	0	0.049
E7U_	0	0	0.006
E7UD	0	0	0.014
LO_I	0.087	0.038	0.051
LO_V	0.029	0.01	0.012

Table B-19
Surface Combat Weapons from E-5: Education experiments

	E-5	E-6
No High School		
E5_	0.417	0.005
E5_D	0.031	0
E5U_	0.089	0
E5UD	0.144	0.001
E6_	0.115	0.512
E6_D	0.008	0.024
E6U_	0.02	0.08
E6UD	0.04	0.164
E7_	0	0.059
E7U_	0	0.018
E7UD	0	0.024
LO_I	0.097	0.091
LO_V	0.038	0.024
High School		
E5_	0.428	0.005
E5_D	0.027	0
E5U_	0.086	0
E5UD	0.134	0.001
E6_	0.112	0.495
E6_D	0.009	0.027
E6U_	0.022	0.09
E6UD	0.041	0.166
E7_	0	0.063
E7U_	0	0.012
E7UD	0	0.024
LO_I	0.101	0.094
LO_V	0.038	0.023

Table B-19
Surface Combat Weapons from E-5: Education experiments

	E-5	E-6
High School Plus		
E5_	0.421	0.005
E5_D	0.036	0.001
E5U_	0.094	0
E5UD	0.136	0.001
E6_	0.11	0.473
E6_D	0.01	0.028
E6U_	0.025	0.097
E6UD	0.037	0.144
E7_	0	0.072
E7U_	0	0.008
E7UD	0	0.06
LO_I	0.101	0.092
LO_V	0.031	0.018

Table B-20
Surface Combat Weapons from E-5: PMA Experiments

	E-5	E-6
PMA Category LT 4		
E5_	0.413	0.005
E5_D	0.024	0
E5U_	0.086	0
E5UD	0.133	0.001
E6_	0.115	0.514
E6_D	0.01	0.027
E6U_	0.026	0.106
E6UD	0.041	0.165
E7_	0	0.034
E7U_	0	0.006
E7UD	0	0.011
LO_I	0.113	0.107
LO_V	0.038	0.024
PMA Category 4		
E5_	0.422	0.005
E5_D	0.03	0
E5U_	0.087	0
E5UD	0.136	0.001
E6_	0.114	0.507
E6_D	0.009	0.026
E6U_	0.022	0.09
E6UD	0.041	0.167
E7_	0	0.051
E7U_	0	0.012
E7UD	0	0.021
LO_I	0.102	0.096
LO_V	0.038	0.024

Table B-20
Surface Combat Weapons from E-5: PMA Experiments

	E-5	E-6
PMA Category 5		
E5_	0.432	0.005
E5_D	0.027	0
E5U_	0.087	0
E5UD	0.135	0.001
E6_	0.113	0.482
E6_D	0.009	0.026
E6U_	0.022	0.084
E6UD	0.042	0.162
E7_	0	0.084
E7U_	0	0.013
E7UD	0	0.032
LO_I	0.098	0.088
LO_V	0.037	0.022

Table B-21
Surface Combat Weapons from E-5: Individual score (final multiple) experiments

	E-5	E-6
INDSCORE Increase by 10%		
E5_	0.416	0.005
E5_D	0.027	0
E5U_	0.085	0
E5UD	0.131	0.001
E6_	0.124	0.52
E6_D	0.01	0.027
E6U_	0.024	0.092
E6UD	0.046	0.175
E7_	0	0.043
E7U_	0	0.009
E7UD	0	0.017
LO_I	0.1	0.088
LO_V	0.038	0.022
INDSCORE Increase by 20%		
E5_	0.405	0.004
E5_D	0.027	0
E5U_	0.082	0
E5UD	0.126	0.001
E6_	0.136	0.539
E6_D	0.011	0.028
E6U_	0.027	0.096
E6UD	0.051	0.183
E7_	0	0.027
E7U_	0	0.006
E7UD	0	0.011
LO_I	0.1	0.084
LO_V	0.038	0.021

Table B-22
Surface Combat Weapons from E-5: Vacancy/Taker ratio experiments

	E-5	E-6
Vacants/Takers Ratio Increase by 10%		
E5_	0.424	0.005
E5_D	0.028	0
E5U_	0.086	0
E5UD	0.137	0.001
E6_	0.113	0.495
E6_D	0.009	0.026
E6U_	0.022	0.089
E6UD	0.041	0.166
E7_	0	0.063
E7U_	0	0.012
E7UD	0	0.025
LO_I	0.101	0.094
LO_V	0.037	0.023
Vacants/Takers Ratio Increase by 20%		
E5_	0.422	0.005
E5_D	0.029	0
E5U_	0.085	0
E5UD	0.138	0.001
E6_	0.113	0.494
E6_D	0.009	0.025
E6U_	0.023	0.09
E6UD	0.042	0.166
E7_	0	0.065
E7U_	0	0.011
E7UD	0	0.026
LO_I	0.102	0.094
LO_V	0.037	0.023

Table B-22
Surface Combat Weapons from E-5: Vacancy/Taker ratio experiments

	E-5	E-6
Vacants/Takers Ratio Decrease by 10%		
E5_	0.43	0.005
E5_D	0.028	0
E5U_	0.086	0
E5UD	0.134	0.001
E6_	0.113	0.497
E6_D	0.009	0.027
E6U_	0.022	0.088
E6UD	0.041	0.165
E7_	0	0.063
E7U_	0	0.013
E7UD	0	0.024
LO_I	0.1	0.093
LO_V	0.037	0.023
Vacants/Takers Ratio Decrease by 20%		
E5_	0.434	0.005
E5_D	0.028	0
E5U_	0.086	0
E5UD	0.132	0.001
E6_	0.112	0.497
E6_D	0.009	0.027
E6U_	0.022	0.088
E6UD	0.041	0.164
E7_	0.	0.064
E7U_	0	0.014
E7UD	0	0.024
LO_I	0.1	0.093
LO_V	0.037	0.023

Table B-22
Surface Combat Weapons from E-5: Macro economic conditions experiments

	E-5	E-6
LQUNEMP*1.5, L2QUNEMP*1.5		
E5_	0.621	0.008
E5_D	0.018	0
E5U_	0.042	0
E5UD	0.098	0.001
E6_	0.134	0.663
E6_D	0.007	0.024
E6U_	0.038	0.171
E6UD	0.026	0.116
E7_	0	0
E7U_	0	0.002
E7UD	0	0.001
LO_I	0.005	0.005
LO_V	0.01	0.007
LQUNEMP*2.0, L2QUNEMP*2.0		
E5_	0.719	0.01
E5_D	0.009	0
E5U_	0.017	0
E5UD	0.056	0.001
E6_	0.127	0.662
E6_D	0.005	0.016
E6U_	0.053	0.248
E6UD	0.013	0.061
E7_	0	0
E7U_	0	0
E7UD	0	0
LO_I	0	0
LO_V	0.002	0.002

Table B-22
Surface Combat Weapons from E-5: Macro economic conditions experiments

	E-5	E-6
LQUNEMP*2.0, L2QUNEMP*2.0, LARGDP*0.9, L2ARGDP*0.9, LINT*0.25, LNASDAQ*0.6		
E5_	0.080	0.017
E5_D	0.007	0
E5U_	0.01	0
E5UD	0.044	0.001
E6_	0.101	0.78
E6_D	0.001	0.004
E6U_	0.019	0.133
E6UD	0.007	0.046
E7_	0	0.002
E7U_	0	0.01
E7UD	0	0.003
LO_I	0.002	0.003
LO_V	0.001	0.001
LQUNEMP*0.75, L2QUNEMP*0.75, LARGDP*1.1, L2ARGDP*1.1, LINT*1.1, LNASDAQ*1.1		
E5_	0.53	0.007
E5_D	0.02	0
E5U_	0.058	0
E5UD	0.097	0.001
E6_	0.112	0.525
E6_D	0.009	0.027
E6U_	0.021	0.088
E6UD	0.043	0.183
E7_	0.	0.044
E7U_	0	0.011
E7UD	0	0.019
LO_I	0.065	0.065
LO_V	0.046	0.03

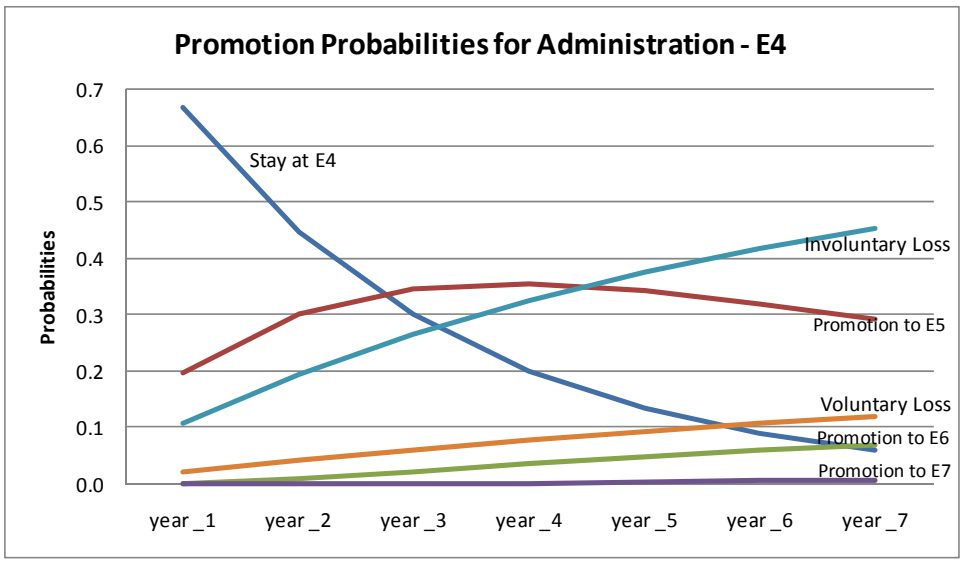

Figure B-1. Promotion probabilities for administration E-4.

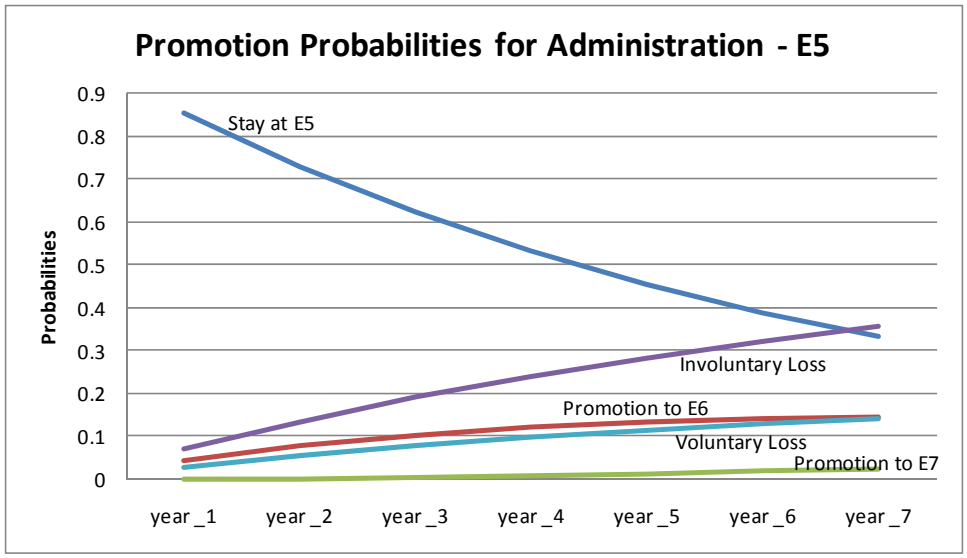

Figure B-2. Promotion probabilities for administration E-5.

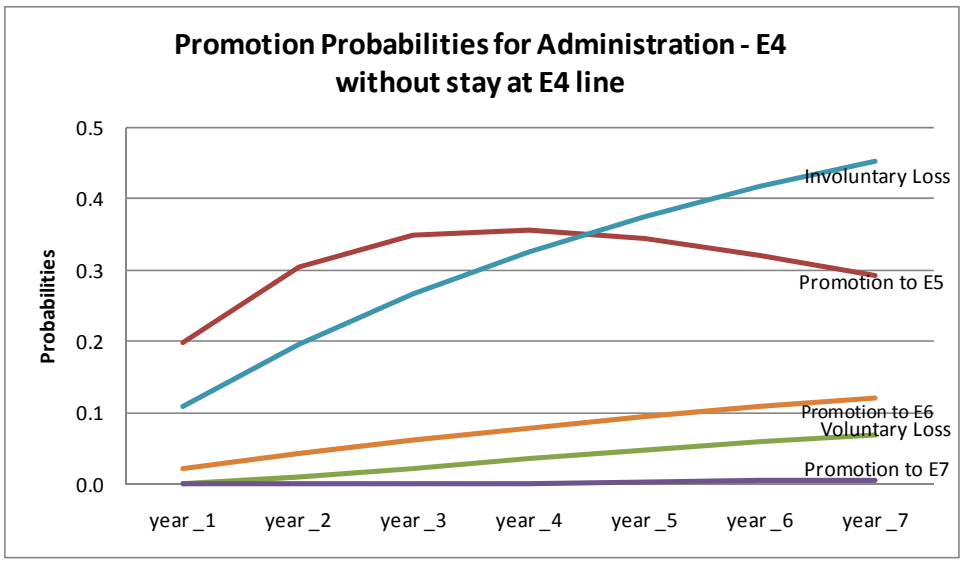

Figure B-3. Promotion probabilities for administration E-4, without stay at E-4 line.

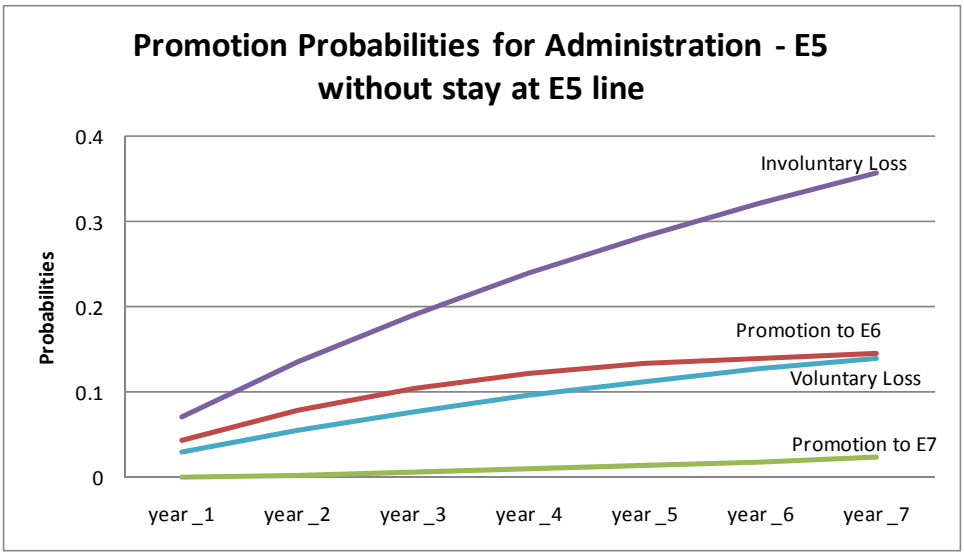

Figure B-4. Promotion probabilities for administration E-5, without stay at E-5 line.

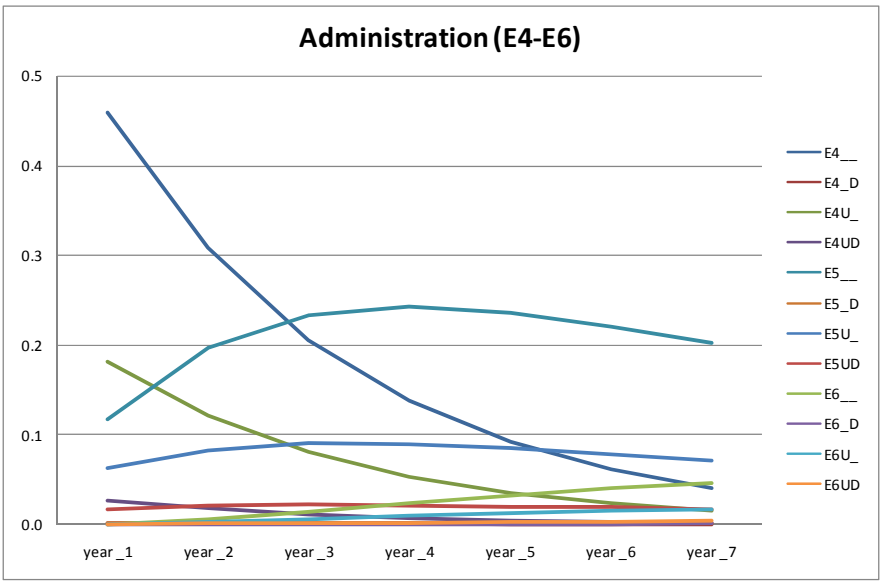

Figure B-5. Job transition admininstation (E-4 to E-6).

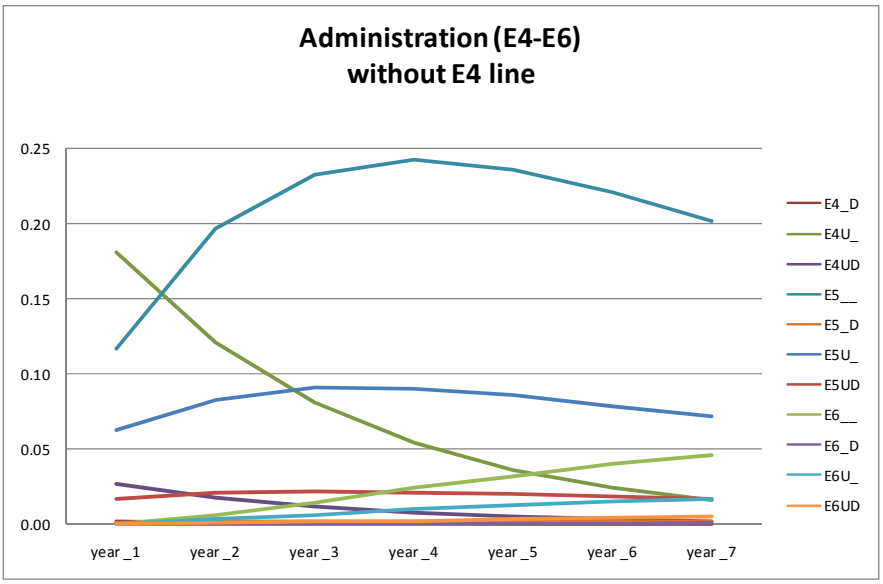

Figure B-6. Job transition administration (E-4 to E-6), without E-4 line.

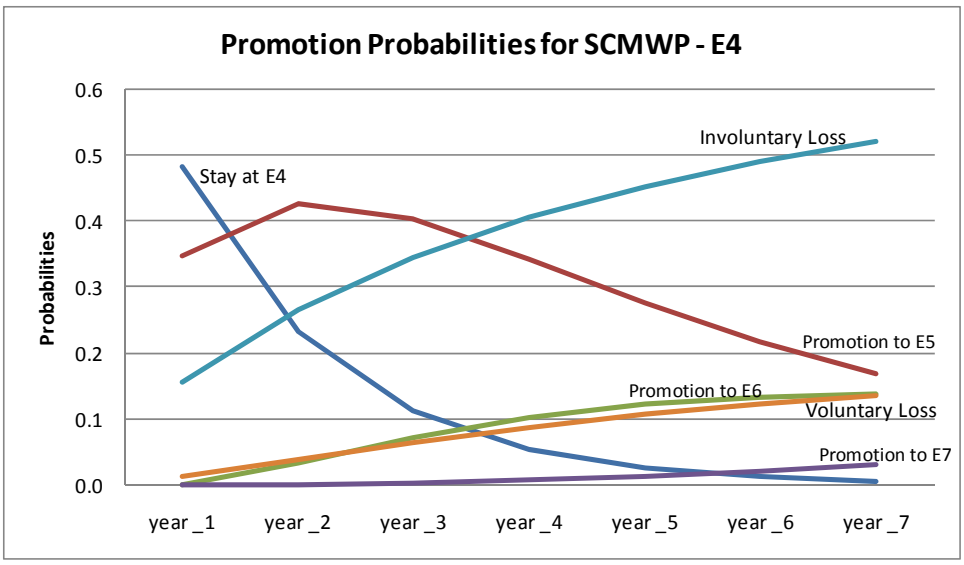

Figure B-7. Promotion probabilities for SCMWP – E-4.

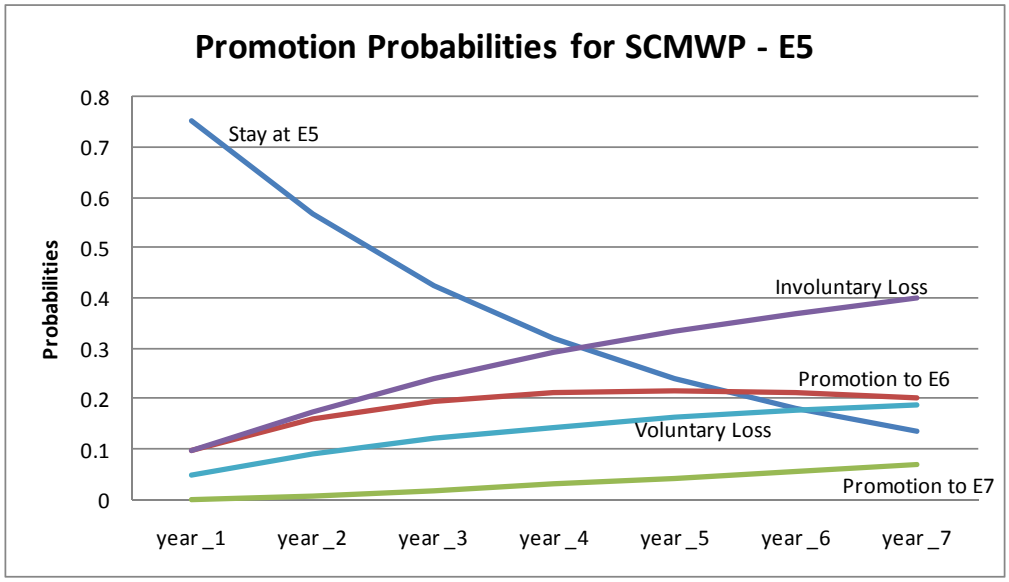

Figure B-8. Promotion probabilities for SCMWP – E-4.

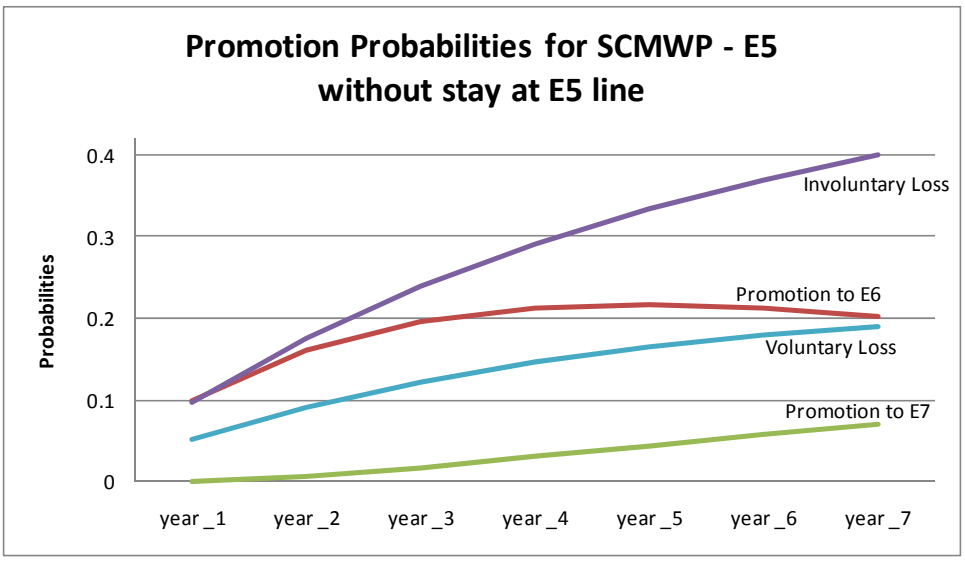

Figure B-9. Promotion probabilities for SCMWP – E-5, without stay at E-5 line.

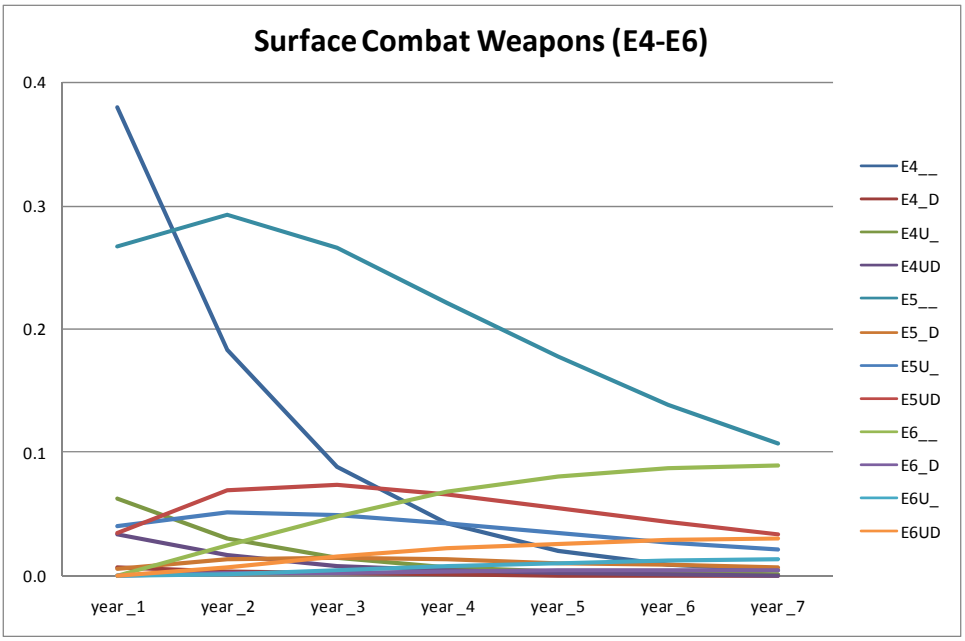

Figure B-10. Job transition for Surface Combat Weapons (E-4 to E-6).

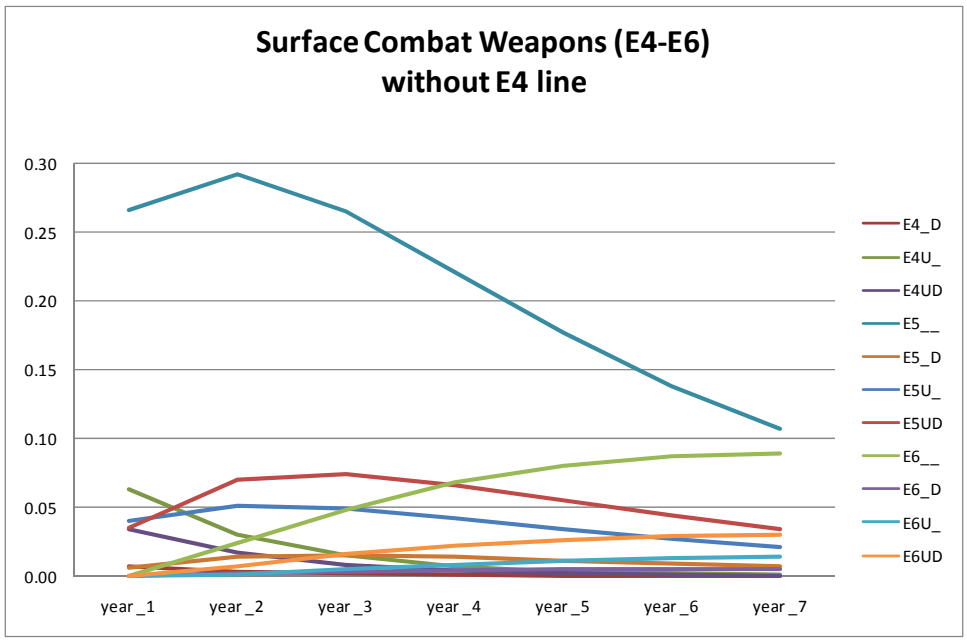

Figure B-11. Job transition for Surface Combat Weapons (E-4 to E-6), without E-4 line.

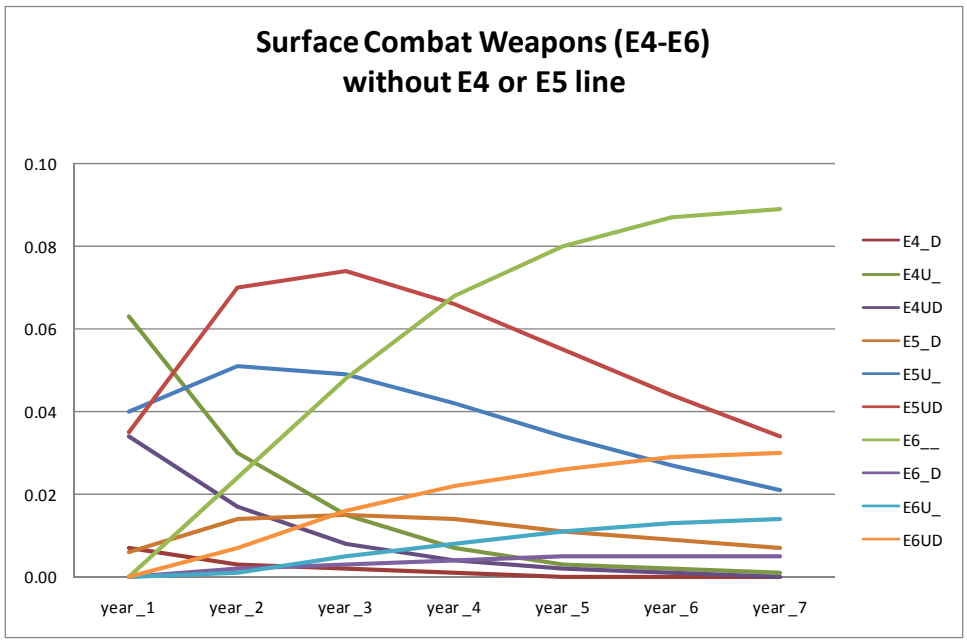

Figure B-12. Job transition for Surface Combat Weapons (E-4 to E-6), without E-4 or E-5 lines.

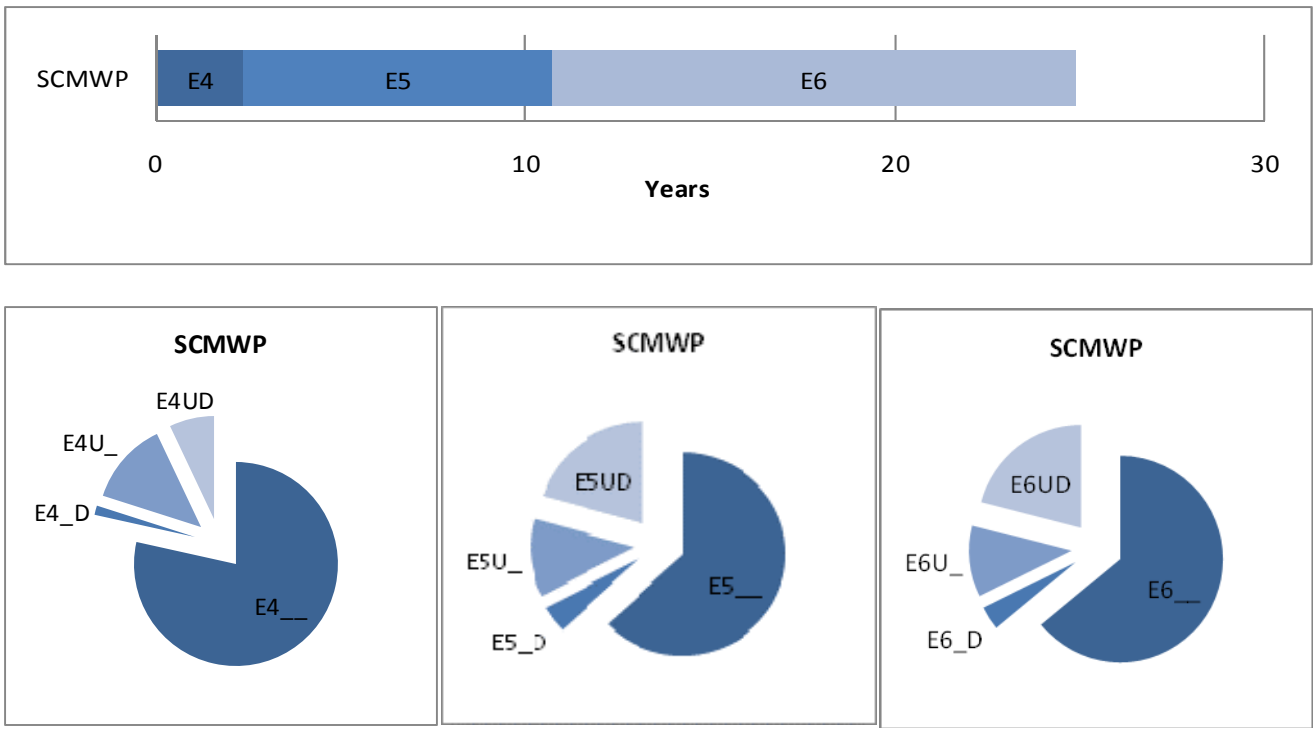

Figure B-13. Career path: 12-months Surface Combat Weapons.

Appendix C:
Macroeconomic Variables

Table C-1:
Macroeconomic variables

Unemp	Unemployment rate	National Unemployment rate –frequency is monthly	Bureau Of Labor Statistics
Lunemp	Lag of Unemployment rate	Lag of national unemployment rate – frequency is monthly	Bureau Of Labor Statistics
L2Unemp	2-Lag of Unemployment rate	2-Lags of national unemployment rate – frequency is monthly	Bureau Of Labor Statistics
Uneme	Unemployment rate by education	National Unemployment rate by education – frequency is monthly	Bureau Of Labor Statistics
Luneme	Lag of Unemployment rate by education	Lag of national unemployment rate by education – frequency is monthly	Bureau Of Labor Statistics
L2uneme	Lag of Unemployment rate by education	2-Lags of national unemployment rate by education – frequency is monthly	Bureau Of Labor Statistics
QUnemp	Unemployment rate	National Unemployment rate –frequency is quarterly	Bureau Of Labor Statistics
LQunemp	Lag of Unemployment rate	Lag of national unemployment rate – frequency is quarterly	Bureau Of Labor Statistics
L2QUnemp	2-Lag of Unemployment rate	2-Lags of national unemployment rate – frequency is quarterly	Bureau Of Labor Statistics
QUneme	Unemployment rate by education	National Unemployment rate by education – frequency is quarterly	Bureau Of Labor Statistics
LQuneme	Lag of Unemployment rate by education	Lag of national unemployment rate by education – frequency is quarterly	Bureau Of Labor Statistics

Table C-1:
Macroeconomic variables

L2Quneme	2-Lags of Unemployment rate by education	2-Lags of national unemployment rate by education – frequency is quarterly	Bureau Of Labor Statistics
SNP	S & P 500	S & P 500 – frequency monthly	Commodity Research Bureau
LSNP	Lag of S & P 500	Lag of S & P 500 – frequency monthly	Commodity Research Bureau
L2SNP	2-Lags of S & P 500	2-Lags of S & P 500 – frequency monthly	Commodity Research Bureau
LSSNP	Lag of semi annual S & P 500	Lag of Semi annual S & P 500 – frequency semi-annual	Commodity Research Bureau
L2SSNP	2-Lag of semi annual S & P 500	Lag of Semi annual S & P 500 – frequency semi-annual	Commodity Research Bureau
LASNP	Lag of annual S & P 500	Lag annual S & P 500 – frequency semi-annual	Commodity Research Bureau
L2ASNP	2-Lag of annual S & P 500	2-Lag of annual S & P 500 – frequency annual	Commodity Research Bureau
NASDAQ	NASDAQ Composite Index	Monthly	Commodity Research Bureau
LNASDAQ	Lag of NASDAQ Composite Index	Monthly	Commodity Research Bureau
L2NASDAQ	2-Lag of NASDAQ	2-Lag of NASDAQ – frequency monthly	Commodity Research Bureau
INT	Interest rates-mortgage	Real Interest rates-mortgage -– frequency monthly	Federal Reserve Bank of St Louis

Table C-1:
Macroeconomic variables

LINT	Lag of interest rates	Lag of real interest rates -– frequency monthly	Federal Reserve Bank of St Louis
L2INT	2-Lag of interest rates	2-Lag of real interest rates -– frequency monthly	Federal Reserve Bank of St Louis
QINT	Interest rates-mortgage	Real Interest rates-mortgage -– frequency quarterly	Federal Reserve Bank of St Louis
LQINT	Lag of interest rates	Lag of real interest rates -– frequency quarterly	Federal Reserve Bank of St Louis
L2QINT	2-Lag of interest rates	2-Lag of real interest rates -– frequency quarterly	Federal Reserve Bank of St Louis
QRGDP	Real GDP	Real GDP - quarterly	Bureau of Economic Analyses
LQRGDP	Lag of real GDP	Lag of real GDP - quarterly	Bureau of Economic Analyses
L2QRGDP	Lag of real GDP	Lag of real GDP - quarterly	Bureau of Economic Analyses
ARGDP	Real GDP	Real GDP - annual	Bureau of Economic Analyses
LARGDP	Lag of real GDP	Lag of real GDP - annual	Bureau of Economic Analyses
L2ARGDP	Lag of real GDP	Lag of real GDP -annual	Bureau of Economic Analyses

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