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THESIS

THE IMPACT OF FULLY-FUNDED GRADUATE EDUCATION AND RESIDENT JPME ON AVIATOR PROMOTION AND COMMAND SELECTION

by

Michael S. Orzell

March 1998

Thesis Co-Advisors: Julie A. Dougherty
Gregory E. Hildebrandt

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The purpose of this thesis is to examine the impact that FFGE and JPME have on aviator promotion to the ranks of Commander and Captain and on selection for command. This thesis accurately measures their impact by incorporating new measures of performance, namely good jobs. These two proxies for performance were developed to help capture those unmeasurable characteristics that do not show up on officer Fitness Reports. This study examines officers appearing before the 1988-1994 Commander and Captain promotion boards. Two separate Logit models are used to estimate the effects of these educational opportunities on promotion both before and after the start of the drawdown. Separate Logit regression models for command screen are also specified for these two time periods. Model results indicate that FFGE had a significant positive impact on Commander selection and a significant negative impact on command selection in the pre-FY90 period. The impact of JPME was significant and positive for promotion to Commander in both periods and for command screen in the pre-FY90 period. Joint Duty Assignment had a significant and negative impact on command selection in both periods. The results of these models may reflect changes in the policies of the aviation community toward FFGE and JPME as well as differences in the officers who choose the educational opportunities. This thesis provides evidence of difficulties in combining FFGE, JPME and JDA in an aviation career.

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Michael S. Orzell
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1986

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Author: _____
Michael S. Orzell

Approved by: _____
Julie A. Dougherty, Thesis Co-Advisor

_____
Gregory E. Hildebrandt, Thesis Co-Advisor

_____
Reuben T. Harris, Chairman
Department of Systems Management

ABSTRACT

The purpose of this thesis is to examine the impact that FFGE and JPME have on aviator promotion to the ranks of Commander and Captain and on selection for command. This thesis accurately measures their impact by incorporating new measures of performance, namely good jobs. These two proxies for performance were developed to help capture those unmeasurable characteristics that do not show up on officer Fitness Reports. This study examines officers appearing before the 1988-1994 Commander and Captain promotion boards. Two separate Logit models are used to estimate the effects of these educational opportunities on promotion both before and after the start of the drawdown. Separate Logit regression models for command screen are also specified for these two time periods. Model results indicate that FFGE had a significant positive impact on Commander selection and a significant negative impact on command selection in the pre-FY90 period. The impact of JPME was significant and positive for promotion to Commander in both periods and for command screen in the pre-FY90 period. Joint Duty Assignment had a significant and negative impact on command selection in both periods. The results of these models may reflect changes in the policies of the aviation community toward FFGE and JPME as well as differences in the officers who choose the educational opportunities. This thesis provides evidence of difficulties in combining FFGE, JPME and JDA in an aviation career.

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I. INTRODUCTION

A. BACKGROUND

This study examines the effect of fully-funded graduate education (FFGE) and Joint Professional Military Education (JPME) on the performance of Naval Aviation Officers by examining the Commander (O-5) and Captain (O-6) promotion results prior to and after the start of the Department of Defense downsizing. The impact of FFGE and JPME on the chance of an officer screening for command, another measure of performance, are also examined. Previous research has analyzed the effects of these two education opportunities on performance of all unrestricted line (surface, submarine and aviation) officers. However, the research has not looked directly at the aviation community by itself. The career path of aviation officers is drastically different from the other line communities and it is expected that the return on these education opportunities will also be different for aviators.

Human capital investment theory implies that the investment in human capital will increase earnings. "It is an implication of our *investment* model of educational choice that earnings rise with the level of education, for if they did not, the incentives for students to invest in more

education would disappear."[1] Due to the nature of the Navy's compensation system, Naval Officers are unable to directly realize the impact of more education on earnings. Naval officers are all payed according to rank. While some aviators receive bonuses for the type of aircraft they fly, the way increased productivity in the Navy is rewarded is through promotion. Therefore, pilots and NFOs with FFGE and/or JPME should promote at a higher rate than those without the extra education.

The Navy provides their officers with graduate education opportunities for several reasons. First and foremost, the Navy's personnel system is a closed hierarchical system. Officers start at the lowest rank in the officer corps and work their way up through a series of promotions that are based on performance. The Navy has determined that there are jobs that must be filled with higher ranking officers with postgraduate education in certain fields. The officers who must fill these billets cannot be hired into these important positions from outside the Navy due to the nature of this closed hierarchical system. Thus the Navy must provide the education to some of their officers.

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[1]Ehrenberg, Ronald G. and Smith, Robert S., *Modern Labor Economics*, HarperCollins Publishers, New York, 1994.

The Navy also provides the opportunity for graduate education to increase the productivity of their officer corps. Those officers with FFGE have acquired both general and firm-specific education. The general education provides the basis for the firm-specific education. It is this firm-specific education that qualifies an officer for those special jobs. Both the general and firm-specific education enhance the officer's productivity in all future jobs. The education has provided the tools to analyze and solve problems encountered on the job using the skills and techniques acquired in postgraduate school.

> The discipline in graduate education of tackling an original research problem that has no known right answer; of learning how to frame a question and how to approach it; of knowing how to interpret data, how to draw significant conclusions from them, and how to present and sell the validity of the result provides an extraordinarily effective approach to problem solving that is beneficial throughout a career.[2]

The third reason that graduate education is provided is its value as an incentive to stay in the military. FFGE is also seen as a benefit for Naval Officers. Selection for FFGE is based on "outstanding professional performance,

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[2]Naval Studies Board, *Technology for the United States Navy and Marine Corps, 2000-2035*, National Academy of Sciences, 1997.

promotion potential and a strong academic background."[3] The opportunity for FFGE provides those that are selected for this opportunity with a sense of accomplishment or a psychic reward for the past performance that earned them the opportunity. There is also the chance for personal gain in the future through access to challenging jobs that require postgraduate education or increased earnings upon leaving the Navy.

Competition among the services for choice joint duty assignments and the increased demands on the smaller Navy highlight the need for graduate education. The career paths of most unrestricted line officers leave little time for graduate education. The opportunity cost of leaving the cockpit for aviators or remaining operational for Surface Warfare Officers is seen as too great a price to pay for many. There is a difference in the opinion of many senior leaders in the Navy on the subject of fully-funded graduate education. While many senior leaders praise the merits of graduate education there are others who see it as a "non-operational" community priority.

Despite the value of graduate education for the Navy and its officer corps, there are changes that have been made

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[3]Director of Admissions, Naval Postgraduate School, Monterey, CA, *Naval Postgraduate School Catalog*, Academic Year 1998.

in the past several years which have had an impact on an aviator's ability to receive graduate education. It is largely due to these factors that the Aviation community drastically reduced the numbers of aviators it is sending to the Naval Postgraduate School and other fully-funded graduate education programs in recent and upcoming years. The Navy's Fiscal Year 1990 Officer Graduate and Undergraduate Education Quota Plan allotted 145 billets for graduate education for the aviation community.[4] By contrast the Fiscal Year 1998 plan has quotas for only 55 aviators.[5]

The smaller Navy of today is asked to do more with fewer personnel and assets. Joint Vision 2010 demands that Naval Officers master the complexities of new technologies and the advantages technology can bring to the battlefield.[6] Investment is hard in times of tight budgets and education is seen as an investment opportunity. The aviation community has felt pressure to meet operational demands and the current solution is to decrease FFGE opportunities for

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[4]Chief of Naval Operations, *Fiscal Year 1990 Officer Graduate and Undergraduate Education Quota Plan*, Washington, DC, September 1989.

[5]Chief of Naval Operations, *Fiscal Year 1998 Officer Postgraduate Education Quota Plan*, Washington, DC, November 1997.

[6]Chairman, Joint Chiefs of Staff, *Joint Vision 2010*, Washington, DC, June 1996.

Naval Aviators.

In 1986 Congress passed the Goldwater-Nichols Department of Defense Reorganization Act (GNA). This law placed greater emphasis on the importance of joint war fighting which requires joint education and experience. One of the objectives of GNA was to ensure that the services selected quality officers for joint duty. And in order to ensure that officers were prepared for joint duty, assignment to those billets now requires completion of Joint Professional Military Education. Promotion to flag or general officer requires designation as a Joint Duty Officer, indicating that the officer has both served in a joint duty assignment and has completed the necessary education to perform well in those positions.

The "Aviation Career Improvement Act of 1989" was enacted primarily to improve the retention of active duty military aviators. This law changed the requirement for aviators to remain eligible for flight pay. The law raised operational flying requirements from six to nine years of operational flying in the first twelve years of aviation service.[7] This meant that from the date of starting flight school an aviator must fill an operational flying or flight

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[7]Subcommittee on Manpower and Personnel of the Armed Services, United States Senate, Aviation Career Improvement Act, April 1989.

training billet for nine of the next twelve years in the Navy. In doing so, the Navy would be able to protect its investment in the training of aviators as well as minimizing the costs associated with maintaining flying proficiency and combat skills. It is obviously very expensive and time-consuming to train an aviator. If that aviator leaves the service as soon as he is eligible, chances are very good that the Navy will not have maximized its return on the investment in training. One of the "tools" the military uses to retain aviators is the policy of aviation career incentive pay (ACIP) or "flight pay".

All aviators receive ACIP beginning on the date they actually enter flight training and throughout their military careers as long as they remain physically qualified to fly and they meet the minimum requirements as prescribed by military regulations. The monetary amount of ACIP varies by years of flying service and currently ranges from a minimum of $125 to a maximum of $650 a month for "Phase I" ACIP. It was not until 1995 that the "required" disassociated sea tour became eligible for a waiver to meet these flight requirements. These disassociated sea tours have become an unofficial requirement for all aviators. Aviation community leaders have deemed it necessary for junior aviators to go to sea as part of the ship's crew or on deploying staffs.

This requirement ensures that the aviation community has enough shipboard qualified aviators to serve in leadership positions on major aviation capable ships. Thus, prior to 1995 the 18-24 months required of the FFGE program plus a disassociated sea tour could result in a $650 per month loss of pay. Since the 1995 waiver of the disassociated sea tour, aviators can receive FFGE and have disassociated sea tours without the fear of losing flight pay.

In 1989 the Navy also started a major downsizing that is just now coming to an end. The new requirements mentioned above and the downsizing have placed an ever changing emphasis on what is a priority for the Aviation community. Because of the varied and competing requirements placed on aviators careers it is important that the investment in education and the impact it has on aviator's careers be measured so that the Navy can determine if it is placing the correct amount of emphasis on education.

This study examines the effect of FFGE and JPME on performance by examining the O-5 and O-6 promotion results prior to and after the start of the Department of Defense downsizing. In addition, the study compares these results with an analysis that includes the assignment to "good jobs" in a squadron as an additional performance measure. Data are compiled from the O-5 and O-6 Promotion History Files,

Officer Master Files, and Fitrep Files.

The important questions investigated are:

How do fully-funded graduate education and resident Joint Professional Military Education impact the probability of promotion to O-5 and O-6 in the Aviation community?

Have the effects of fully-funded graduate education and resident Joint Professional Military Education changed since the start of the downsizing?

Is there a difference in the effects of having either fully-funded graduate education or resident Joint Professional Military Education compared with officers who have both educational experiences?

This thesis attempts incorporates new measures of performance not used in previous studies. Incorporating the variables for assignment to the "good jobs" in a squadron will help to control for traits that are not easily measured. It is commonly known that the best officers in a squadron are assigned the most challenging and important jobs. These officers may have identical grades on their fitness reports as others, however they may have traits or abilities that make them stand out, but are not graded by fitness reports. This thesis attempts to control for these traits by including "good jobs" in the models. The

reasoning behind this approach is that only one person can have the "good job" at a time while many people can have identical FITREP grades. This should help control for traits like drive and desire. These good jobs include Operations Officer (OPSO), Maintenance Officer (MO), Quality Assurance Officer (QAO), Flight Officer (FLTO) and billets as instructors in the Fleet Replacement Squadrons (FRS). The OPSO and MO jobs are the most important jobs in the squadron at the department head level. The QAO, FLTO and FRS jobs are some of the most demanding jobs for division officers.

This thesis examines the impact of GNA and the downsizing on officer promotion. The value of FFGE and JPME will be determined by quantifying the impact of resident JPME and FFGE on promotion. This will determine if the Navy is putting the right emphasis on the investment in education.

B. OBJECTIVES

This thesis examines the careers of pilots and naval flight officers (NFOs)up to their O-5 and O-6 promotion boards.

This study uses merged data files of officers having 1310 (pilot) and 1320 (NFO) designators used in previous

studies by Walsh[8] and Kovach.[9] These data files include the O-5 and O-6 promotion boards files from 1981-1994 and FITREP/UIC (Unit Identification Code) files of the individual officers. These data sets contain the demographic, performance, education and job history for all aviation officers who were considered for promotion. The promotion files also include the results of the promotion boards. Two separate models are analyzed to determine if there has been a shift in the importance of FFGE and Resident JPME.

As indicated above, the analysis incorporates some new measures of performance to isolate the impact of FFGE and JPME. Specifically, dummy variables for the "good jobs" will be included to measure the differences in performance not captured in previous studies. This will help control for performance since many officers receive good FITREPs but very few can have the "good jobs". Using this in conjunction with previously designated measures of performance will further define the model and better estimate the impact of FFGE and JPME.

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[8]Walsh, Daniel J., "Joint Professional Military Education and its Effects on the Unrestricted Line Naval Officer Career," Master's Thesis, Naval Postgraduate School, March 1997.

[9]Kovach, John P., "An Analysis of Naval Officers Serving on Joint Duty: The Impact of the 1986 Goldwater-Nichols Act," Master's Thesis, Naval Postgraduate School, March 1996.

It is true that promotion is a function of performance. Previous studies include demographics and prior experience as factors that also need to be included in any performance or promotion model. Variables like desire and drive that cannot be measured will be estimated by using proxies. Performance on FITREPs, undergraduate GPA, undergraduate major and FITREP information should be good estimates of those unmeasurable traits.

The purpose of this study is to determine whether the Navy values FFGE, utilization of the degree, resident JPME and joint duty assignment for its Aviation community officers. This study will also determine if GNA and the drawdown have changed the Navy's priorities. Knowing what assignments are career enhancing will enable aviation officers to plan their careers and future assignments with a sense of the direction the Navy has taken since the start of the drawdown.

The study is limited to the Aviation community to more accurately measure the value of these educational opportunities for officers with very similar career paths. The different aviation sub-communities (helicopter, tactical and prop) will not be analyzed independently due to the small numbers of observations available in the data sets.

C. ORGANIZATION OF THE STUDY

This study is organized in five chapters. Chapter II reviews previous studies in this area of research and summarizes the Navy's FFGE and JPME programs. Chapter III describes the data sets used in the study and explains the models used to measure the effects of FFGE and JPME. Chapter IV presents the results of the different regression models with a comparison of the models using "good jobs" as an estimation of performance and other unmeasurable traits. Chapter V summarizes the results, makes recommendations for further areas of research and provides conclusions about the Navy's view of FFGE and JPME and their value in the aviation community.

II. LITERATURE REVIEW AND BACKGROUND

This section reviews Human Capital Investment Theory, the Navy's Fully-Funded Graduate Education program, the Resident Joint Professional Military Education program and some previous studies related to this thesis.

A. HUMAN CAPITAL INVESTMENT THEORY

Naval Officers have two significant opportunities for education that constitute time away from their primary duties. The Navy offers an opportunity for Fully-Funded Graduate Education for all qualified officers and Resident Joint Professional Military Education for Lieutenant Commanders (O-4) and above. Naval Aviators that opt for these education benefits are paid full salaries and do not incur any significant monetary costs.

However, the non-monetary costs to the officers of these education opportunities include:

1. Opportunities to remain in operational flying billets. This could cause loss of flight pay if an individual has opted for other non-flying billets.

2. Exposure to warfare community where experience and reputation are important for advancement and consideration for the good community jobs.

3. "Psychic costs"[10] of moving to a new location and having to become a student again. These education opportunities normally present themselves years after graduation from undergraduate school. The stress of being put in the role of a student, in many cases after being an instructor, can be very great.

There are no significant out-of-pocket, direct expenses or foregone earnings. For the purposes of this thesis, the costs to the officer for these two educational opportunities are the same except for the time involved.

Earning a graduate degree through the FFGE option takes between 18 and 24 months. The Resident JPME Phase I takes 10 to 12 months and Phase II takes about 3 months. Some officers are able to complete both Phase I and II in one 12 month program.

JPME requires less of an investment of time when the time available is limited. This is especially true for aviators. The requirements to fill billets in disassociated sea tours, Navy staff positions, joint jobs and normal flying billets leaves very little time for full time education. An aviator's career path is also very constricted due to the long training time involved in basic

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[10]Ehrenberg, Ronald G. and Smith, Robert S., *Modern Labor Economics*, HarperCollins Publishers, New York, 1994.

flight training, advanced training, Fleet Replacement Squadron (FRS) training. FRS training is required after any tour in which an aviator's qualifications have expired. This time limit is a maximum of one year away from flying. Thus both resident JPME Phase I and FFGE require the aviators to spend extra time away from the fleet while in the FRS.

JPME is not available to officers until selection to O-4 (approximately 10 years of service). JPME is seen as having less of an opportunity cost and no negative impact on an aviator's career. The officer's community reputation has already been established and they have successfully selected to O-4. It is at this point that an officer is allowed to stay until retirement without any further promotions. The officers have little to lose if they attend JPME. They also have the opportunity to be considered for assignment to some very important and interesting joint duty assignments that are still operational in nature.

FFGE is available to aviators after their first operational flying tour (approximately 5 years of service). However, some aviators are advised against attending FFGE in favor of staying competitive by remaining operational. Aviation community leaders know that an officers' reputations are made early in their career and that

community reputation is very important. This means staying in jobs where they are being evaluated against others in their community.

FFGE consists of both general education which is applicable to many jobs and specific education designed to prepare the officer for a subspecialty. This subspecialty education enables the officer to perform specialized jobs. These jobs have been designated to be filled by officers with the proper education.[11]

Human capital investment theory states that the"[cost of] specific training, training of use only to one's employer, is shared by the worker and the firm. In the case of general training, in which employees acquire skills usable elsewhere, they alone pay the training costs."[12] This does not apply to FFGE and JPME. The Navy pays all the costs for both general and specific education. FFGE is both general and firm-specific while JPME is more firm-specific in nature.

This may be a factor in how the Navy "rewards" those people with the additional education. These people are eligible for special jobs and acquire special

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[11]Bureau of Naval Personnel (PERS-213), Officer Subspecialty System Handbook, January 1993.

[12]Ibid, p.298.

qualifications. While JPME is required by law for assignment to joint billets, FFGE is required by Navy regulations for assignment to sub-specialty jobs. Aviators with FFGE and/or JPME may be rewarded for their investment in education by promoting at different rates. These higher promotion rates could also be related to the increased performance of those officers with more education. This education may have improved the officer's analytical abilities, efficiency or provided new insight on common organizational problems. All of these reasons may impact promotions and enable the Navy to recoup some of their investment costs.

B. FULLY-FUNDED GRADUATE EDUCATION

FFGE can be obtained from the Naval Postgraduate School (NPS) and through the Navy's Civilian Institutions program. The officers that utilize these opportunities earn Master's degrees in approved programs. These programs give the officers who attend the general and specific education necessary to perform key jobs in the future. At the completion of their education they are assigned subspecialty codes. These codes were "developed as a means to define the graduate education requirements for the Navy".[13] NPS is the

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[13]Ibid.

primary source of FFGE for the Navy.[14]

C. RESIDENT JOINT PROFESSIONAL MILITARY EDUCATION

Senior level Resident JPME Phase I and II training is available at the National War College or the Industrial College of the Armed Forces. The other options for senior level training are taught in two phases. Resident Senior level Phase I is taught at the Air War College, Army War College, College of Naval Warfare and Marine Corps War College. Senior level Phase I credit can also be obtained through fellowships (until 1999) and foreign military schools. Resident Senior level Phase II is taught at the Armed Forces Staff College.[15]

Resident JPME Phase I is available at the intermediate level (O-4 & O-5) at the Air Command and Staff College, Army Command and General Staff College, College of Naval Command and Staff, Marine Corps Command and Staff College and the Naval Postgraduate School (National Security Affairs Program only). Intermediate level Phase I training was also available at foreign military schools and through some fellowships (until 1997). Resident JPME Phase II is only

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[14]See Fuchs [Ref. 5] for a complete summary of the Navy's fully-funded graduate education program.

[15]Chairman Joint Chiefs of Staff, Officer Professional Military Education Policy , 1996.

available at the Armed Forces Staff College.[16] Currently there are no institutions where both Phase I and Phase II is taught. Prior to 1990 the Armed Forces Staff College provided Phase I and II training.[17]

D. PREVIOUS STUDIES

Previous studies using the same data sets were conducted by Dr. William R. Bowman [Ref 3], Daniel J. Walsh [Ref 2], John P. Kovach [Ref 1] and Kim L. Fuchs [Ref 5].

1. Walsh

This thesis, titled "*Joint Professional Military Education and its Effects on the Unrestricted Line Naval Officer Career,*" analyzes the impact of JPME on O-4, O-5 and O-6 promotion outcomes from 1986 to 1994. The study uses a Logit nonlinear model to measure the different factors affecting promotion. Estimates from the models are interpreted using the notional person technique "to determine differences between marginal probabilities of promotion resulting from the differing effects of JPME across communities."[18]

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[16]Ibid.

[17]See Walsh [Ref 2] for a complete history and summary of the military's Joint Professional Military Education program.

[18]Walsh, Daniel J., "Joint Professional Military Education and its Effects on the Unrestricted Line Naval Officer," Master's Thesis, Naval Postgraduate School, March 1997.

The study contains an extensive review of the history of JPME, previous related studies, and human capital investment theory. The research indicates that, of all the services, the Navy has given the lowest priority to JPME. The Army and Air Force have 100 percent completion rates for JPME amongst their General Officers while the Marine Corps has a rate of over 90 percent completion. In contrast, the Navy has less than 30 percent JPME completion rate amongst their Flag Officers.[19]

The career paths of the different communities in the Unrestricted Line (URL) and the Navy's approach to JPME are also presented.

Walsh equates performance with promotion. This is a reasonable assumption since the system is designed such that people who perform better promote at higher rates. His models estimate the effects all methods of earning JPME Phase I and II credit on all URL communities. This assumes that these returns are the same for all URL communities. This may not be an accurate assumption as is indicated by the three different career paths discussed in the background section of the study. The career paths in the different communities have special priorities and requirements and JPME and FFGE may not have the same value in the different

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[19]Ibid.

communities. For example the submarine community places great emphasis on technical training and education. It can be expected that the value of a technical graduate degree will be greater in the submarine community. It would be inappropriate to assume this variable would have the same significance in the surface and aviation communities. The same can be said of variables like technical undergraduate major, graduate education, utilization of subspecialty school education, JPME and joint duty assignments.

The possibility of different returns towards promotion is accounted for by including dummy variables for each community. These dummy variables provide an estimate for the overall difference by community but will not help in the estimation of the individual variables in the promotion models.

The findings indicate that resident JPME increases the chance of promotion to O-6 only. URL officers completing graduate education prior to the O-5 promotion board increase their chances for promotion to O-5 only.

2. Kovach

This thesis, titled *"An Analysis of Naval Officers Serving on Joint Duty: The Impact of the 1986 Goldwater-*

Nichols Act"[20] examines the changes in the quality of officers assigned to joint duty and the effect joint duty has on their careers. The models in this study estimate the impact on promotion to O-4, O-5 and O-6. The extremely small number of O-3's with JPME makes the O-4 promotion model inappropriate. There are enough observations in the data set for the O-5 and O-6 promotion models.

Each promotion model is subdivided by time. One model is specified for promotions before and one for after FY 1990. The results of the pre-FY 1990 models indicate that those people with JPME are better performers than the average person but not better performers than the post-FY 1990 individuals with JPME. The post-FY 1990 model indicates better performance of officers with JPME than both the average officer and the pre-FY 1990 individuals with JPME. This model specification divided by time is important. The impact of the Goldwater-Nichols Act and the Navy's downsizing are both seen in this model.

Kovach's study failed to analyze the effects of JPME on aviator Commanding Officer/Executive Officer selection due to a problem with the coding of the data set. This is an area that would be of interest for future research. The

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[20]Kovach, John P., "An Analysis of Naval Officers Serving on Joint Duty: The Impact of the 1986 Goldwater-Nichols Act," Master's Thesis, Naval Postgraduate School, March 1996.

aviation community places great emphasis on operational tours and may reward those that have stayed operational with an increased chance for command. In this case FFGE may negatively impact screening for command. JPME may have little or no effect since in many cases resident JPME occurs after the command screening board. This result would be consistent with Walsh's study since JPME opportunities normally occur after the O-5 and command screen boards.

3. Bowman

Another study titled "*Career Progression of line officers and Graduate Education in the U.S. Navy*"[21] conducted by Dr. William Bowman of the U.S. Naval Academy included JPME. Its primary focus however was the impact of graduate education on performance. The study used several PROBIT models for each URL community. This method gives more accurate estimations of the effects of different education opportunities on promotion.

The study found that pilots that attend FFGE are more likely to promote to O-5. Those pilots that earn non-technical graduate degrees promote at even higher rates. FFGE was found to increase promotion opportunities to O-6 especially if the degree was either utilized as an O-4 or

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[21]Bowman, William R., Career Progression of Line Officers and Graduate Education in the U.S. Navy, Department of Economics, U.S. Naval Academy, Annapolis, MD, September 1996.

never utilized. Using the degree as an O-5 results in promotion rates that are the same as those officers without FFGE. Pilots with technical graduate degrees that utilize these degrees promote a rate of 15-30 percentage points lower than those without FFGE.

NFOs were found in general to have lower opportunities for promotion than other URL officers. Those with FFGE promote at a slightly higher rate. One interesting result is that those that utilize their graduate education prior to the O-5 board promote at a 10-15 percentage point lower rate than those who have not used their education. This is a lower promotion rate than those without FFGE. Of the NFOs with FFGE, those who have never utilized their degree promote at the highest rate among other NFOs. Those NFOs that do not utilize their degrees probably fill key community positions. Their selection to these "good jobs" is most likely based on performance and that may factor in their higher promotion rates.

The results indicate that NFOs are penalized for using their FFGE while pilots can utilize their degrees as O-5's without hurting their chances of promotion.

4. Talaga

This thesis analyzes the "*Impact of the Navy's fully-funded graduate education (FFGE) program on Surface Warfare*

Officer performance."[22] The Naval Postgraduate School (NPS) is used as a synonym for FFGE since 96% of FFGE for URL Officers is conducted at NPS. The measures of performance used are probability of promotion to O-4, percent of all LT FITREPs recommended for early promotion, and the probability of receiving an early promotion recommendation on the last Lieutenant FITREP.

The author includes an extensive literature review of research in the areas of human capital investment theory, personnel promotion, FITREPs, and selectivity bias. The research in all these areas was more than satisfactory and appropriate to the thesis. The performance measures identified for FITREPs showed a very realistic appreciation of how the previous FITREP system worked and the shortcomings of that system.

The existence of possible selectivity bias is identified. The author goes through extensive measures to control for this bias. The "Heckman" and "Barnow" methods are both employed to identify the existence of and correct for any bias. The findings show that selectivity does not bias the estimates of fully-funded graduate education in the

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[22]Talaga, Michael T., "An Econometric Analysis of the Effect of Fully-Funded Graduate Education on Performance for Surface Warfare Officers," Master's Thesis, Naval Postgraduate School, March 1994.

performance models used in the thesis.

The results of the regression models showed that FFGE was a highly significant and positive factor in promotion to O-4. The value of FFGE was not as large as LT FITREP performance and Department Head School attendance. FFGE is not a statistically significant factor in receiving early promotion recommendations on all LT FITREPs including the one prior to the promotion board.

The analysis of the impact of FFGE on Surface Warfare Officer (SWO) performance was designed as a tool to help prove that FFGE serves a useful purpose. The hypothesis is that FFGE increases productivity in the officers that earn masters degrees.

The goal of the thesis was to measure the impact of NPS on SWO performance. The expectation is that human capital investment theory is correct in this application. The author predicts that FFGE will improve performance. The design of the study follows the same format and functional form as previous research studies in human capital investment theory.

The true measure of FFGE would show how NPS improved the performance of individual students that attended the institution. The true measure of the impact of NPS on performance requires a comparison of relative performance

before and after NPS attendance. Did the student "get better"? If a SWO's performance, relative to their peers and all other factors being equal, improves after receiving FFGE then these results indicate a true positive return to FFGE.

The true payoff for graduate education does not generally take place prior to the O-4 selection board in most SWO's careers. The SWO career path requires them to go to sea duty following NPS. They do not have a chance to "pay back" their education for two to three years following graduation. The study could have also used the information in the literature review and followed the lines of the Cymrot study and looked at promotion to O-5 and O-6.[23]

5. Fuchs

This thesis is titled "*The Effects of the Utilization of Graduate Education on Promotion and Executive Officer/Command Screening in the Surface Community: 1986 - 1994*[24]" and is authored by LT Kim L. Fuchs. LT Fuchs analyzed the effect of graduate education on job performance of Surface Warfare Officers. In addition to obtaining the

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[23]Cymrot, Donald J., "Graduate Education and the promotion of Officers," Center for Naval Analysis, March 1986.

[24]Fuchs, Kim L., "The Effects of the Utilization of Graduate Education on Promotion and Executive Officer/Command Screening in the Surface Community: 1986-1994," Master's Thesis, Naval Postgraduate School, March 1996.

advanced degree, Fuchs examined the impact of utilization of the degree on performance. Technical versus non-technical degree effects on performance were compared and examined.

LT Fuchs reviewed both civilian and military studies on the effects of graduate education. The key military study cited was a 1995 study conducted by LT Fuchs' advisors, Mehay and Bowman. The author tied the 1995 study into his research by redefining the variable for successful officer performance. Fuchs uniquely defines performance as successful XO screen, CO screen and promotion to O-6 instead of using O-4 promotion as a criteria of successful performance. This was innovative because the XO/CO screen assumes promotion to O-4 and O-5. Performance becomes a joint outcome of successful promotion and XO/CO screen.

The results of the probit models showed that the graduate education and fully funded graduate education variables were both positive and significant for XO screen, CO screen and promotion to O-6. There was, however, selection bias in the XO screen variable. Though the author could not correct for this, the study did identify the presence and direction of the bias.

Neither technical nor non-technical education variables were significant for the XO screen. Both technical and non-technical education variables were significant and positive

with respect to the CO screen and O-6 promotion. Non-technical degrees had more of an impact on CO screen and O-6 promotion than technical degrees.

It was also determined that utilization of the sub-specialties benefitted those who performed pay back tours after their XO tours.

A key aspect of this study is LT Fuchs' selection of XO/CO screen as a more accurate measure of performance. Prior studies have looked for an earlier return on investment. LT Fuchs' model allows us to observe the presence of a return further downstream in an officer's career progression.

The data set of observations from the Navy's Officer Promotion History Files and Fitness Report Files covered 1986 through 1994. The author correctly realized this time frame included the initial stages of personnel downsizing. Fiscal year dummy variables were used in the model to account for this. They were found to be insignificant and were subsequently deleted from the model.

The model used a building block approach which allowed the author to progressively place controls in the formula. This was effective, though an individual's desire and will to succeed is still absent from the list of variables. The author made an attempt to control for this by including a

variable RAPPED for those officers that were recommended for accelerated promotion. This variable originates early in an officer's career and may still not be representative of the characteristics desired in order to be screened for command. Though the use of the joint screen/promotion was new in examining officer performance, the model itself followed the same functional form as previous studies.

The selection bias that existed at the XO screen level was found to be absent at the CO screen point. This may be explained by the thoroughness of the selection process of the XO board. Those who are successful beyond this level tend to be a more homogeneous group of SWOs. If this group is in fact homogeneous we would expect to see very little or no selection bias at the CO screen and O-6 promotion. LT Fuchs' findings support his conclusion. Fuchs does recommend the use of a bivariate probit model or instrumental variable techniques as a control for selection bias.

Fuchs makes the assumption that the graduate education received by Surface Warfare Officers is firm-specific in his human capital model. This firm-specificity will have the affect of increasing officer productivity and job tenure. In reality the curricula at the Naval Postgraduate School includes a balanced format of general education and Navy

specific applications. It is this author's opinion that the Navy's fully-funded graduate education takes more general and certainly less firm-specific than LT Fuchs asserts.

The statistical analysis of the data in Fuchs' study also reveals a greater return on investment if graduate degrees are utilized after the XO screen process.

His study defined performance of a SWO as success in the joint outcome of XO screen/O-4 promotion and CO screen/O-5 promotion. This unique method used to measure performance was insightful and accurate. Fuchs fully understood the old FITREP system. FITREPs were only used if they were competitive (rated with other officers in the command) and based on "close" observation. The author identified the grade inflation common to the old FITREP system and chose to use the areas that Commanding Officer's really employ to "break out" the top performers. This gave the best indication of true performance.

The author also chose to examine only the SWO community. This was an excellent choice for all the reasons stated in the thesis. The community an officer serves in has an important effect on where the top performers go for the best duty assignments. Including other communities in this study would have biased the results.

E. SUMMARY

This study builds upon the Walsh study by focusing specifically on the aviation community. It uses new measures of performance by looking at how assignment to "good jobs" affects promotion. As in the Kovach study, this thesis uses two models to measure the impact on promotion pre-FY 1990 and post-FY 1990 to determine if the drawdown has changed the Navy's priorities. The effects of FFGE and JPME on screening for command that Kovach was unable to accomplish will be measured. The effects of FFGE and JPME are measured as in the Bowman study with equal emphasis being placed on both education opportunities. The methods utilized in the Talaga and Fuchs studies with regard to using only competitive FITREPS and focusing on only one community are carried over into this thesis. The lessons learned from this study will provide insights into the career progression of aviation community officers and the priorities of the aviation community.

III. DATA AND METHODOLOGY

This chapter provides the background and sources for the data used in this study. It also describes the methodology used in the analysis of the data.

A. DATA SET DESCRIPTION

1. CDR (O-5) Promotion Data Set

This study evaluating the effects of JPME and FFGE uses two promotion data sets. The O-5 and O-6 promotion history files from Fiscal Year 1986 to 1994, provided by the Bureau of Naval Personnel(BUPERS), have been merged with a data set containing FITREP information provided by the Naval Personnel Research and Development Center (NPRDC). These data sets were originally constructed for a study by Dr. William R. Bowman.[25]

The data sets analyzed were limited to the O-5 and O-6 promotion board results due to the small numbers of officers that earn JPME credit prior to selection to O-4. The data was further limited to include only pilots and NFOs to more accurately measure the impact these two educational opportunities have in the aviation community. Pilots and NFOs also have very similar training paths and career requirements which differ significantly from other Navy

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[25]Bowman, William R., "Career Progression of Line Officers and Graduate Education in the U.S. Navy," Department of Economics, U.S. Naval Academy, Annapolis, MD, September 1996.

communities. This was another reason for limiting the study to the aviation community.

The O-5 Data set contains 3586 total observations. The pre- FY 1990 data set for promotion to O-5 contains 2116 observations and represents the pre-drawdown period. The post-FY 1990 data set for O-5 promotion includes 1886 observations and represents the post-drawdown Goldwater-Nichols era. The 2116 pre-FY90 plus the 1886 post-FY90 observations total 4002 observations. This is 416 more than the total observations and the difference represents the 416 officers whose records were reviewed at boards both pre-FY90 and post-FY90. This is possible because every officer is considered three times for promotion. These three looks are called below-zone (early), in-zone (normal), and above-zone (late). Most of the promotions at a promotion board occur in-zone. In fact, officers are not considered as failing to select until they have been considered "in-zone" for promotion.

Table 3.1 provides a summary of those aviators appearing before these O-5 boards. In general, it appears that those aviators with better undergraduate grades choose FFGE. The aviators that are selected for JPME are better performers and have been rewarded for this performance with the good division officer and department head jobs. The

table shows the average age at commissioning (AGE01) for aviators appearing before the O-5 board is lower than the average aviator with FFGE and higher than the average aviator with JPME. Aviators with FFGE are more often married than the average aviator. Aviators with FFGE have significantly better undergraduate performance (APC1) than the average aviator and the aviator with JPME. A definition of APC1 is provided in Table 3.3. In general, the lower the APC1 value the higher the undergraduate Qaulity Point Rating (QPR).

Table 3.1 Means for CDR Data Set

	ALL AVIATORS	N	AVIATORS WITH FFGE	N	AVIATORS WITH JPME	N
AGE01	22.948	3574	23	614	22.819	364
MARRIED	0.893	3586	0.901	617	0.885	365
APC1	2.447	3551	2.195	614	2.541	360
RAPPED4	0.977	3586	0.964	617	0.995	365
GOODDO	0.172	3586	0.149	617	0.192	365
GOODDH	0.06	3586	0.057	617	0.066	365
PIL	0.562	3586	0.47	617	0.523	365
FFGE	0.172	3586	1	617	0.044	365
JPME	0.101	3586	0.026	617	1	365

Aviators with JPME have better FITREP grades (RAPPED4) than the average aviator and aviators with FFGE have grades slightly lower than the average. Aviators that attend FFGE as O-4s have fewer opportunities to earn a FITREP that recommends them for early promotion. Aviators with JPME also have had more "good jobs" than the average

and aviators with FFGE have had fewer "good jobs" than the average. This holds true for both good division officer jobs (GOODDO) and good department head jobs (GOODDH).

Pilots (PIL)are more likely to attend JPME than FFGE. Very few aviators have both FFGE and JPME. This confirms what has already been discussed. The many constraints on Aviators careers provides very few opportunities for more education.

2. CAPT (O-6) and Command Screen Data Sets

The O-6 promotion data set was broken down in a similar way with pre-FY 1990 and post-FY 1990 data sets created. The only change was that this data set was first used to determine which aviators had screened for command. Previous studies had been unable to capture these results due to the coding of the data. Using Naval Officer Billet Codes (NOBC), those aviators with NOBC codes that matched the Commanding Officer code were given a value of 1 for command. Those officers that did not have the NOBC for Commanding Officer were given a value of 0. As discussed later in this thesis, this command variable is used as the dependent variable in the regression analysis to determine the effects on command selection. A separate model for O-6 promotion is then estimated with command selection as the key variable.

The command and O-6 promotion data sets have 2265

observations. The pre-FY90 data sets have 1172 observations and the post-FY90 data sets have 1370 observations. The pre-FY90 and post-FY90 data sets do not equal the combined data set for the same reason stated in the O-5 promotion data set section.

Table 3.2 shows the mean proportions for all aviators, those with FFGE and JPME. The numbers indicate, as in the O-5 data set, that officers with JPME are screened more thoroughly for on the job performance and those with FFGE are screened for undergraduate school performance. Table 3.2 also provides a profile of these different groups. Aviators with JPME are slightly older at commissioning than the average and older than those aviators with FFGE. Aviators with JPME are more often married than those with FFGE. Both groups are more often married than the average aviator. Aviators with FFGE have better undergraduate grades (APC1) than the average aviator and those with JPME. Aviators with JPME have lower undergraduate QPRs than those with FFGE and the average aviator.

Table 3.2 Means for CAPT Data Set

	ALL AVIATORS	N	AVIATORS WITH FFGE	N	AVIATORS WITH JPME	N
AGE	22.523	2256	22.378	415	22.525	570
MARRIED	0.942	2265	0.952	416	0.962	572
APC1	2.698	1964	2.305	315	2.79	504
RAPPED4	0.622	2265	0.565	416	0.652	572
RAPPED5	0.643	2265	0.596	416	0.673	572
GOODDO	0.102	2265	0.079	416	0.107	572
GOODDH	0.261	2265	0.214	416	0.25	572
COMMAND	0.521	2265	0.459	416	0.68	572
PIL	0.697	2265	0.647	416	0.738	572
FFGE	0.184	2265	1	416	0.121	572
JR JPME	0.128	2265	0.067	416	0.507	572
SR JPME	0.132	2265	0.099	416	0.523	572

Aviators with JPME have better performance as O-4s (RAPPED4) and O-5s (RAPPED5) than the average aviator while those with FFGE have poorer FITREPs than the average aviator as indicated by the RAPPED4 and RAPPED5 means. This may indicate that those aviators who are less single mindedly committed towards an exclusive flying career and more oriented toward a variegated naval career opt for FFGE in hopes of a better job match. Aviators with JPME have had good division officer jobs (GOODDO) more often than the average aviator. Aviators with FFGE are the least likely to have had good division officer jobs. The average aviator was more likely to have had a good department head job (GOODDH) than those aviators with JPME or FFGE. Aviators with JPME are a close second to the average aviator.

Pilots (PIL) are much more likely to attend JPME than

FFGE. Career constraints, leading up to the O-6 promotion board, leave very little time to attend FFGE and JPME. The career demands placed on aviators has created a system in which having FFGE and JPME is very difficult.

B. MODELS

1. CDR Data Set

The purpose of this thesis is to analyze the impact of FFGE and JPME on an aviator's promotion to O-5, O-6 and command selection. Figure 3.1 depicts those variables that influence promotion to Commander. FFGE and JPME are coded to only include those officers who attended these programs on a full-time basis. Those officers who earned their master's degree through the Naval Postgraduate School or through the civilian institution program are included in the FFGE group. Those officers who received JPME education through resident programs are included in the group with Resident JPME. FFGE rather than any graduate education is included in the promotion model because it represents a large monetary investment in education on the part of the Navy and the investment of time for the individual officer. Similarly, only those with resident (full-time) JPME are designated as having JPME.

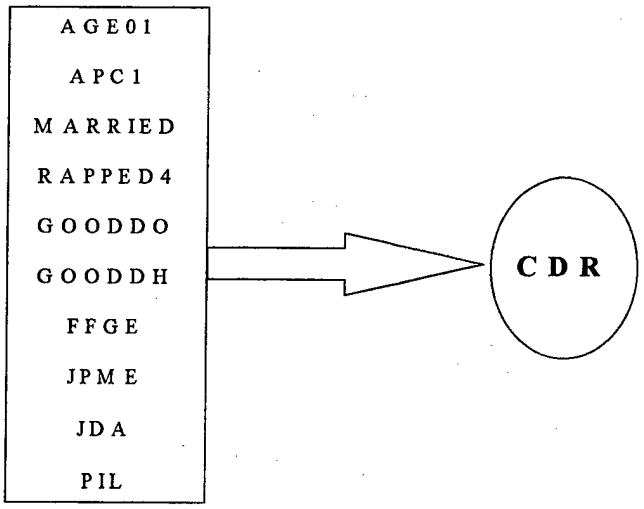

Figure 3.1 CDR Promotion Model

Utilization of these education programs was also originally included in the model. However, utilization of FFGE caused multicollinearity problems, and was subsequently eliminated from consideration. Utilization of JPME was included in the model. This utilization was determined by whether or not the individual officer had filled a joint duty billet as indicated by Additional Qualification Designators (AQDs).

Demographic information is also included in the model to control for an officer's background. Marital status (MARRIED), age at commissioning (AGE01) and undergraduate performance (APC1) are included to compensate for differing backgrounds.

Performance also needs to be included in the model and a way to measure this is through an officer's FITREPS. The most important performance factor for aviators at the O-5 promotion board is performance as a department head. To account for this the variable RAPPED4 was developed. RAPPED4 is a binary variable that takes on a value of 1 if an officer is recommended for early promotion on a competitive FITREP. A FITREP is considered competitive if an officer is rated amongst peers. FITREPS given upon transfer or not observed FITREPS are excluded from consideration. If the officer was not recommended for early promotion on any competitive FITREPs they were assigned a value of 0. To capture any differences in performance not captured in the demographics or FITREP measures, variables for "good jobs" were developed.

"Good jobs" are broken down into good division officer jobs and good department head jobs. Good division officer jobs include Quality Assurance Officer, Flight Officer and RAG instructor. If the officer had ever filled one of these billets they were considered as having a good division officer job and GOODDO was set equal to 1, otherwise it was set equal to 0. The variable GOODDH was developed in a similar way. If the officer had ever filled a billet as the Maintenance Officer or Operations Officer in a squadron they

were considered as having a good department head job and GOODDH was set equal to 1, otherwise it was set equal to 0.

To account for the differences in pilots and NFOs a dummy variable was included. The variable PIL is set equal to 1 if the officer was a pilot and 0 if the officer was a NFO. Table 3.3 provides a summary of the variables and their description.

Table 3.3 CDR Promotion Model Variable Name and Description

VARIABLE NAME	DESCRIPTION
AGE01	Age in years at commissioning
MARRIED	1=Married 0=Not married
APC1	0=College QPR of 3.60-4.0 1=College QPR of 3.20-3.59 2=College QPR of 2.60-3.19 3=College QPR of 2.20-2.59 4=College QPR of 1.90-2.19 5=College QPR of 0-1.89
RAPPED4	1=Recommended for Early Promotion as a LCDR 0=Not recommended for Early Promotion as a LCDR
FFUNDGE	1=Received Fully-funded graduate education 0=Did not receive Fully-funded graduate education
JRIRES	1=Received Junior Resident JPME education 0=Did not receive Junior Resident JPME education
JDA	1=Filled billet from Joint Duty list 0=Did not fill billet from Joint Duty list
PIL	1=Pilot 0=NFO
GOODDO	1=Filled a "good" Division Officer billet 0=Did not fill a "good" Division Officer billet
GOODDH	1=Filled a "good" Department Head billet 0=Did not fill a "good" Department Head billet

The final model specification was as follows:

$$PROMOTE = b + B1*MARRIED + B2*AGE01 + B3*APC1 + B4*RAPPED4 + B5*FFGE + B6*JPME + B7*JDA + B8*GOODDO + B9*GOODDH + B10*PILOT$$

This specification is used for the overall promotion model and also for the pre-FY90 and post-FY90 models.

2. CAPT and Command Data Set

The O-6 data set variables were constructed in the same way as the O-5 data set with one major exception. The variable command explained so much of the variation associated with being promoted to O-6 that a separate model was developed to identify both the direct and indirect effects of variables on promotion to O-6. The interactions of these two models is shown in Figure 3.2. In order to determine what affects command screen, a model was specified with the same variables as the O-5 promotion model. The following represents the command model:

$$COMMAND = b + B1*MARRIED + B2*AGE01 + B3*APC1 + B4*RAPPED4 + B5*FFGE + B6*JRIRES + B7*JDA + B8*GOODDO + B9*GOODDH + B10*PILOT$$

The other difference is that JPME has been further specified to identify the Junior (JRIRES)and Senior Resident courses (SRIRES). JRIRES is set equal to 1 if the officer attended a Junior Resident JPME program. The reason for specifying

JPME in this way was to account for whether the officer had attended either the Senior or the Junior Resident JPME program. This is not an option for officers appearing at the O-5 board. They would not yet have been eligible for the Senior JPME program prior to selection for O-5.

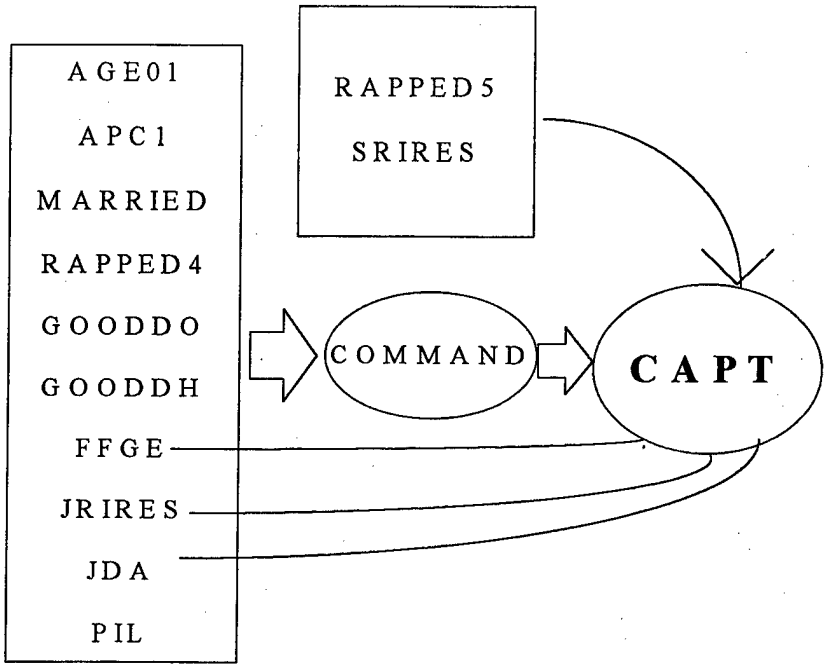

Figure 3.2 Command & CAPT Recursive Model

Some of the variables that impact command screen are also hypothesized to have an impact on selection to Captain, and the direct effect of these variables is included in the Captain model. The variable RAPPED5 is also included since at the O-6 board the officers will have O-5 FITREPS. It is

not included in the Command model because selection to O-5 and command screening occur at approximately the same time. Table 3.4 summarizes the variables used in the Command and O-6 models and provides a brief description. The O-6 model is as follows:

$$\text{PROMOTE} = b + B12*\text{RAPPED5} + B13*\text{COMMAND} + B14*\text{FFGE} + B15*\text{JRIRES} + B16*\text{SRIRES} + B17*\text{JDA}$$

Table 3.4 COMMAND & CAPT Promotion Model Variable Name and Description

VARIABLE NAME	DESCRIPTION
AGE01	Age in years at commissioning
MARRIED	1=Married 0=Not married
APC1	0=College QPR of 3.60-4.0 1=College QPR of 3.20-3.59 2=College QPR of 2.60-3.19 3=College QPR of 2.20-2.59 4=College QPR of 1.90-2.19 5=College QPR of 0-1.89
RAPPED4	1=Recommended for Early Promotion as a LCDR 0=Not recommended for Early Promotion as a LCDR
RAPPED5	1=Recommended for Early Promotion as a CDR 0=Not recommended for Early Promotion as a CDR
FFUNDGE	1=Received Fully-funded graduate education 0=Did not receive Fully-funded graduate education
JRIRES	1=Received Junior Resident JPME education 0=Did not receive Junior Resident JPME education
SRIRES	1=Received Senior Resident JPME education 0=Did not receive Senior Resident JPME education
JDA	1=Filled billet from Joint Duty list 0=Did not fill billet from Joint Duty list
PIL	1=Pilot 0=NFO
GOODDO	1=Filled a "good" Division Officer billet 0=Did not fill a "good" Division Officer billet
GOODDH	1=Filled a "good" Department Head billet 0=Did not fill a "good" Department Head billet

C. METHODOLOGY

Logit models are used to analyze the impacts of FFGE and JPME on promotion to O-5, O-6 and command screening. This statistical method was chosen because the dependent variable in all three models takes on a value of 0 or 1. The value of 1 means that the person was promoted or selected for command; a value of 0 indicates that the individual was not selected or "passed over" for promotion.

The data sets were analyzed using Statistical Application Software (SAS)[26] at the Naval Postgraduate School. The SAS system provided the means to collate and sort the large data sets involved in the study and to estimate the Logit model.

[26]Statistical Applications Software Institute, Inc., Cary, NC.

IV. ANALYSIS AND RESULTS

This chapter summarizes the results from the Logit models for promotion to O-5 (Figure 3.1), command screen and promotion to O-6 (Figure 3.2). The interpretation of the coefficients and the computation of the marginal effects from the regression models will be discussed separately. Those coefficients that achieve a 5% level of statistical significance are judged to be significantly different from zero in this study.

A. PARAMETER ESTIMATES AND DISCUSSION

1. Commander Logit Regression

The results from the separate regressions for the pre-FY90 and post-FY90 periods are summarized in Table 4.1. The results from these regressions show how these effects have changed during this important transition time for the U.S. Navy. The sign and significance of the parameter estimates are easily interpreted. The values of the parameter estimates can not be directly interpreted. This interpretation will be accomplished using the "notional person" technique in a later section.

Table 4.1 Parameter Estimates for Commander Promotion Models

	CDR LOGIT MODEL PRE FY90		CDR LOGIT MODEL POST FY90	
VARIABLES	PARAMETER	Pr > CHI-SQUARE	PARAMETER	Pr > CHI-SQUARE
INTERCEPT	2.1594	0.0027	2.5551	0.0077
MARRIED	0.4036	0.0063	0.464	0.0028
AGE01	-0.1302	0.0001	-0.1408	0.0001
APC1	-0.3049	0.0001	-0.1951	0.0007
FFUNDGE	0.3706	0.0072	-0.177	0.1789
RAPPED4	1.6197	0.0001	0.9925	0.1381
JRIRES	0.4524	0.0084	0.3848	0.0268
JDA	-0.3407	0.0604	0.0602	0.7447
PIL	0.3232	0.0013	0.6558	0.0001
GOODDO	0.3767	0.0073	0.0174	0.8929
GOODDH	-0.0629	0.7669	-0.1228	0.5243

The results from the models clearly indicate that the impact of FFGE (FFUNDGE) has changed from the pre-FY90 period to the post-FY90 period. FFGE clearly had a positive impact on performance and subsequent promotion to O-5 in the pre-FY90 period. The impact of FFGE on performance and selection to O-5 in the later period is not significant. This echoes the warnings of some aviation community leaders that superior performance is what promotion boards are using to select officers for promotion. At the same time, it should be appreciated that aviation community leaders only recommended FFGE for those officers with good performance records.

Junior Resident JPME (JRIRES) impact on performance and promotion shows that it is positive and significant in both

periods. It is surprising that the value of JRIRES did not increase between the periods due to the impact of Goldwater -Nichols. It is also surprising that the utilization of JPME or JDA was not significant in either period. Apparently, JDA does not help promotion significantly but it does not hurt either.

The positive and significant coefficients for the pilot variable are a little more difficult to interpret. Pilots are less likely to attend FFGE and more often receive JPME. They are also more likely to be offered monetary incentives or bonuses to stay in the Navy. These bonuses are more often offered to pilots due to the hiring practices of the airlines. Those pilots who feel that the Navy is not the best job match for them due to average or poor FITREPs may be more likely to leave the Navy than NFOs if the costs are low enough. The higher promotion numbers may just be the result of the relatively smaller pool of candidates for promotion of pilots than for promotions of NFOs. The drastically higher numbers for the post-FY90 era, therefore, may just reflect the higher rate of airline hiring which resulted in the Aviation Career Improvement Act (ACIA) discussed in Chapter II. On the other hand, the promotion boards may simply choose to promote pilots at a higher rate.

The O-5 data set analysis in Chapter III shows that

aviators attending FFGE are less often recommended for accelerated promotion than the average aviator. They were also less likely to have had good division officer and good department head jobs than the average aviator. NFOs were attending FFGE in higher percentages than pilots. Pilots opted for JPME in higher percentages than NFOs. It is important to consider these averages when reviewing the results from the regression.

These percentages emphasize what has been discussed earlier in this thesis. Those aviators with a better history of performance are opting to stay operational. They are taking the good division officer jobs at the FRS. They are staying in operational flying billets and active in their respective communities. Aviators, particularly pilots, are more likely to receive education in the form of JPME after they have completed their department head tours. One explanation for NFOs receiving FFGE more often than pilots is that there are fewer options for operational flying billets on shore duty for NFOs. Pilots are used in all the training squadrons including the squadron that trains NFOs. They have billets in all primary, intermediate and advanced training squadrons including all Fleet Replacement Squadrons. NFOs only have flying billets in their community FRS and the NFO training squadrons.

2. Command Logit Regression

The command regression analysis examines all Commanders that have stayed to the Captain selection board. The billets held since making Commander were screened for billet codes corresponding to the Commanding Officers (CO) billet code. If a Commander had filled a CO billet then they had successfully screened for command. There is one limitation to this approach. This method of modeling command screen does not capture those Commanding Officers that left the Navy prior to the Captain selection board. Including those who retire from the Navy, these numbers should be fairly small. If this shortcoming in the analysis has any effect, the impact of command screen on promotion to Captain will be upwardly biased. That is to say that screening for command may not have as large an effect on promoting to Captain as the regression results indicate. This bias occurs because those aviators successful enough to screen for command, but opt to leave the Navy prior to the Captain selection board, may leave because of below average or unsuccessful C.O. tours. Also, those not screened may be more likely to leave the Navy. These aviators may have self-selected out of the Navy.

The results of the Command Logit regression model are illustrated in Table 4.2. The sign and significance of the

parameter estimates are interpreted directly. The value of the parameter estimates will be transformed using the "notional person" technique in a later section. The results of the Logit model show that the impact of FFGE is negative in both periods and significant in the pre-FY90 period. This negative impact on screening for command shows the opportunity cost of leaving one's community. The negative impact of FFGE has lessened in the post-FY90 period. This may indicate that the navy is starting to value the importance of FFGE more in today's smaller navy, a navy that is going to need improved efficiency and effectiveness from all it's personnel.

JRIRES is both positive and significant in the pre-FY90 model, perhaps indicating the effect of receiving education when the opportunity cost is lowest. The JRIRES opportunity occurs most often after the department head tour or after the command tour. There are less shore duty operational flying jobs for LCDRs or CDRs at these times. These more senior aviators may have waited until later in their careers to obtain more education because of this reason. Since the beginning of the drawdown the impact of JRIRES is still positive but no longer significant.

There also seems to be an opportunity cost associated with JDA. It's impact on command screening is both negative

and significant in both eras. The only way to explain why this has not changed in the years since Goldwater-Nichols is that remaining operational is most important in screening for command. Taking the time to earn JPME and also utilizing it in a joint duty assignment may have too much of an opportunity cost. Attending JPME and having a JDA effectively takes an officer out of their community for at least four years.

The impact of being a pilot on command screen is similar to that of pilots promoting to Commander. The effect is both positive and significant. Again, this could be interpreted as less successful pilots self-selecting out of the Navy at a higher rate than less successful NFOs. This may be occurring due to the greater opportunities in the airline industry as discussed in the Commander model results.

Table 4.2 Parameter Estimates for Command Screen Models

	COMMAND LOGIT MODEL PRE FY90		COMMAND LOGIT MODEL POST FY90	
VARIABLES	PARAMETER	Pr > CHI-SQUARE	PARAMETER	Pr > CHI-SQUARE
INTERCEPT	1.6969	0.2592	-0.4216	0.668
MARRIED	0.4605	0.1401	0.6505	0.0144
AGE01	-0.1425	0.0296	-0.0185	0.6539
APC1	0.043	0.6202	-0.1401	0.0416
FFUNDGE	-0.4562	0.0387	-0.2643	0.1009
RAPPED4	0.9217	0.0001	0.0569	0.6599
JRIRES	0.8221	0.0003	0.2635	0.1471
JDA	-1.8585	0.0001	-0.8117	0.0001
PIL	0.8688	0.0001	0.8142	0.0001
GOODDO	-0.00147	0.9953	0.5091	0.0127
GOODDH	0.8715	0.0001	0.9248	0.0001

3. Captain Logit Regression

The Captain model attempts to estimate the effects of those variables that directly influence promotion to Captain. The results of the Captain models are shown in Table 4.3. The results of the analysis shows that command has the greatest impact on promoting to Captain. This makes sense since Command is an important goal and opens the door for later major command opportunities. Aviators who have not had CO jobs will not be eligible for major commands and follow-on selection to Admiral. Therefore command selection has the largest impact on promotion to Captain. The COMMAND variable is likely to include some bias. As indicated above, some of the aviators who have had CO jobs have left the Navy prior to the O-6 board. They also may have self-

selected out of the Navy due to sub-par performance as a CO. This loss of Commanding Officers with weaker performance will cause the COMMAND variable to be upwardly biased. Those not selected for command may also be more likely to leave.

RAPPED5 is positive in both models and significant only in the pre-FY90 model. This shows that those O-5s who have performed at a higher level are more often promoted. This just reinforces what has been presented earlier. Other things equal, superior performance is one of the most important factors in getting promoted. There is also an indirect effect on promotion to Captain as discussed above, prior superior performance in operational jobs helps successful aviators screen for COMMAND.

FFUNDGE, JRIRES, SRIRES and JDA are included in the Captain models to see if these variables have any direct effect on promotion to Captain. Recall from the command model that these variables indirectly affect promotion to Captain through their effect of command selection. None of these parameter estimates is significant, the signs of the coefficients, however, are worth noting. JDA is negative in both models. Again, this may just reflect the large opportunity cost of having two tours out of one's community. It may indicate that officers that elect JDA may have chosen

to leave their communities for the new challenges available to them in the area of joint duty. FFUNDGE is negative in the pre-FY90 model and positive in the later model.

The impact of JPME as explained by JRIRES is harder to interpret. Goldwater-Nichols legislation should have motivated the Navy to place more emphasis on JPME. JPME and joint duty officer designation are now requirements for selection to Admiral. However, these variables continue to have no direct impact on promotion to Captain. JRIRES is not significant and can be interpreted as having no impact on promotion. Command selection and performance would then be what is most important.

Table 4.3 Parameter Estimates for Captain Promotion Models

	CAPTAIN LOGIT MODEL		CAPTAIN LOGIT MODEL	
	PRE FY90		POST FY90	
VARIABLES	PARAMETER	Pr > CHI-SQUARE	PARAMETER	Pr > CHI-SQUARE
INTERCEPT	-4.2743	0.0001	-2.8662	0.0001
RAPPED5	1.3142	0.0001	0.0461	0.8163
COMMAND	5.8821	0.0001	4.5478	0.0001
FFUNDGE	-0.2522	0.4617	0.1957	0.4201
JRIRES	0.3709	0.3164	-0.0645	0.8118
SRIRES	0.00359	0.9921	0.0505	0.8389
JDA	-0.3366	0.4286	-0.0366	0.8701

B. NOTIONAL PERSON MARGINAL EFFECTS INTERPRETATION

In order to directly interpret the results of a Logit regression the parameter estimates must be converted to a marginal effect. A "notional person" is created in which a person was assigned a value of 0 for all dummy variables in the regression model. The value for continuous variables is set to the mean of the data set. The probability of promoting or screening is computed for this "notional person". The probability of promoting or screening, depending on which model was used, was then predicted by varying the dummy variables one at a time from zero to one and varying the continuous variables by one unit. The difference between these two probabilities is the marginal effect. This marginal effect allows us to examine the numerical impact these variables have on the chances of promoting or command selection.

1. Commander Model

The marginal effects interpretation of the two CDR models is very straight forward. Table 4.4 lists the results of the marginal effects computations. Interpreting the pre-FY90 results shows that being married increases an aviators chance of promoting by 6.7%. Increasing the age of an aviator at commissioning by one year causes a decreased chance of promotion of 1.8% holding all other variables

constant. A one unit increase in APC1 causes the chances for promotion to decrease by 4%.

The variables of most interest in this study are FFUNDGE and JRIRES. Attending FFUNDGE increases the chances of promotions by 6%. Attending JRIRES increases the probability of promotion by 6.8%. The opportunity cost of using the joint education is indicated by the 4.9% decrease in the probability of promoting if the aviator has a JDA.

Table 4.4 Marginal Effects for Commander Promotion Models

	CDR MODEL MARGINAL EFFECTS	
	PRE FY90	POST FY90
MARRIED	6.7%	9.7%
AGEO1	-1.8%	-2.6%
APC1	-4%	-3.5%
FFUNDGE	6%	-3.2%
RAPPED4	33.4%	22.4%
JRIRES	6.8%	7.9%
JDA	-4.9%	1%
GOODDO	5.5%	0.3%
GOODDH	-1.4%	-2.2%
PIL	4.5%	14%

2. Command Model

The marginal effects of the command selection model in Table 4.5 can be interpreted in the same way as the results of the Commander promotion model.

Table 4.5 Marginal Effects for Command Selection Models

	COMMAND MODEL MARGINAL EFFECTS	
	PRE FY90	POST FY90
MARRIED	8.5%	13.5%
AGE	-2.2%	-0.3%
APC1	0.7%	-2.4%
FFUNDGE	-6.4%	-4.4%
RAPPED4	18.7%	1%
JRIRES	16.4%	5%
JDA	-16.5%	-11.4%
GOODDO	0%	10.2%
GOODDH	17.5%	20%
PIL	17.5%	17.3%

3. Captain Model

The marginal effects interpretation of the Captain model is not as easy to interpret. The values of the "notional person" calculations are shown in Table 4.6. The value of the COMMAND variable may be positively biased due to the possible self-selection out of the Navy by less successful Commanding Officers. This was discussed earlier in this chapter.

Table 4.6 Marginal Effects for Captain Promotion Models

	CAPTAIN MODEL MARGINAL EFFECTS	
	PRE FY90	POST FY90
RAPPED5	3.6%	0.2%
COMMAND	81.9%	79%
FFUNDGE	-0.3%	1%
JRIRES	0.6%	-0.3%
SRIRES	0%	0.3%
JDA	-0.4%	-0.2%

The large impact of the COMMAND variable leaves very little explanatory room for the other variables in the regression.

The education variables that were of particular interest in this thesis are not directly significant and have little or no impact on promotion to Captain. As shown in Table 4.5, however, they do have an indirect effect on promotion to Captain through their effect on command.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis was undertaken to measure the impact that fully-funded graduate education and resident joint professional military education has on an aviators career. In particular, the impact on promotion to Commander (O-5), Captain (O-6) and command selection is investigated.

To isolate the effect of performance on promotion, two new proxies were developed. It is difficult to differentiate performance under the old FITREP system due to grade inflation. The aviation community places great emphasis on certain jobs in a squadron and community. The proxies for these good jobs were divided between good division officer jobs (GOODDO) and good department head jobs (GOODDH). When used in conjunction with competitive FITREPs, these variables provide an excellent measurement of performance.

The most surprising discovery from this analysis is the high opportunity cost of a joint duty assignment (JDA) on promotion to O-5 and particularly command selection. JDA's direct impact on promotion to O-6 is not significant but it is felt indirectly through command selection, the most important factor in promoting to O-6. The negative impact of this variable is surprising because of the importance

placed on JDA at aviation career briefs. While these briefs always stress performance, they also include three other important milestones as important for promotion. These milestones are JDA, qualification as Officer of the Deck (OOD) on the disassociated sea tour, and a Washington D.C. tour.

Another goal was to see if the impact of FFGE and JPME has changed since the start of the downsizing. The results show that the impact has changed. Successful promotion to Commander now indicates a decreased emphasis on FFGE and slightly more emphasis on JPME. Screening for command has shown the opposite effects. FFGE's impact has increased while JPME's impact has decreased. The Captain promotion model shows that FFGE and JPME have little or no direct effect on promotion. The indirect effect, however, is seen through the command model.

The third goal was to see if there was a difference in the individual effects of having JPME or FFGE with those individuals that may have both. To find out if the effect of having both FFGE and JPME was different from the sum of the effects of having either, an additional Logit regression was performed. The results of these regressions indicate that the value of this variable was not significant. However, the number of individuals with both FFGE and JPME

is fairly small.

B. RECOMMENDATIONS

This thesis suggests that JDA does not positively impact key measures of success in the Navy. The Goldwater-Nichols legislation was the beginning of a change in the military. The future military will rely more on joint operations as downsizing continues to occur. The aviation community needs to examine whether JDA is being given appropriate emphasis in command selection.

The analysis of data in Chapter III reveals that those aviators with FFGE were less often recommended for early promotion. Officers do not receive competitive FITREPS while attending FFGE. This causes a decreased opportunity to receive a FITREP in which they can be recommended for early promotion. Selection for FFGE is based on professional performance, academic background and promotion potential. While FFGE has firm selection requirements and those selected for FFGE have lower APC scores (higher undergraduate QPRs), there does not seem to be commensurate translation into career success. The characteristics of the aviators included in this study suggest that selection for JPME has the most important impact on performance.

The data also suggests, however, that those selected for FFGE may not be provided with the same opportunity to

attend JPME. This is supported by the small numbers of individuals appearing before the O-5 and O-6 promotion boards with both FFGE and JPME, and suggests that an aviator has time for only one of these opportunities during a very busy career. The results of the analysis indicate that given a choice JPME provides greater rewards.

Aviation Captains hold many significant positions outside operational command, for instance in the acquisition community, the Navy staff and the Joint staff. FFGE should be and is particularly helpful performing effectively in these positions. Many policy issues addressed in these jobs have a significant analytical component. Operational experience combined with FFGE may be the best way to prepare for these positions.

One recommendation is for the Navy to evaluate the hard choices individuals are facing. If it is determined that both FFGE and JPME are important, then opportunities for FFGE, JPME and JDA should be increased.

Another recommendation is to conduct further research using the "good jobs" concept. These jobs could be expanded to include specific community jobs, Admiral's Aides jobs, and any staff jobs of key value in the officer's community.

The impact of the other milestones, OOD qualification and Washington, D.C. duty, on promotion and command

selection. This type of analysis would provide a quantitative indicator of what influences promotion the most.

Further breakdown of the aviation community into three different components (tactical, helicopter and maritime) would also better estimate which of these sub-communities place the greatest emphasis on FFGE, JPME and utilization of these educations. This breakdown when used in conjunction with data using the new FITREP system should more accurately estimate the impact these variables have on promotion and command selection.

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