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THESIS

**MARINE CORPS OFFICER ACCESSION: AN ANALYSIS
OF EFFECTS ON CAREER-LEVEL PROMOTION**

by

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March 2021

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CAREER-LEVEL PROMOTION**

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

ACT	American College Test
AFQT	Armed Forces Qualification Test
BOC	Basic Officer Course
CMC	Commandant of the Marine Corps
CO	Commanding Officer
ERR	Eastern Recruiting Region
FITREP	Fitness Report
G/FO	General/Flag Officer
GPA	grade point average
LtCol	Lieutenant Colonel
Maj	Major
M&RA	Manpower & Reserve Affairs
MARADMIN	Marine Administrative Message
MBS	Master Brief Sheet
MCRC	Marine Corps Recruiting Command
MECEP	Marine Enlisted to Commissioning Education Program
MMPR	Manpower Management Promotions Branch
MMRP	Manpower Management Records and Performance
MMSB	Manpower Management Support Branch
MOS	Military Occupational Specialty
NROTC	Naval Reserve Officer Training Corps
OCC	Officer Candidate Course
OCS	Officer Candidate School
OMPF	Official Military Personnel File
OSA	Officer Selection Assistant
OSO	Officer Selection Officer
OSS	Officer Selection Station
OST	Officer Selection Team
PFT	Physical Fitness Test
PLC	Platoon Leaders Class

RS	Recruiting Station
SECNAV	Secretary of the Navy
SAT	Scholastic Aptitude Test
SJA	Staff Judge Advocate
TIS	time in service
TBS	The Basic School
TFDW	Total Forces Data Warehouse
U.S.C.	United States Code
USNA	United States Naval Academy
WRR	Western Recruiting Region
YCS	years of commissioned service
YOS	years of service

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I. INTRODUCTION

This research provides a quantitative analysis of Marine Corps officer accession sources in relation to promotion probability. The thesis examines officers who attain the rank of major (Maj) and lieutenant colonel (LtCol) as these promotion benchmarks are indicative of an officer remaining in service until eligible for retirement. Multivariate regression models are used to analyze data on officers' careers to identify factors that predict promotion to major and lieutenant colonel. Specifically, this study aims to determine if one accession source is more successful than the others at producing career-level officers. Determining the characteristics of officers that attain the rank of major and lieutenant colonel in addition to estimating the relationship between these ranks and accession source can help shape policies affecting accession, retention, and separation outcomes of Marine officers.

A. BACKGROUND

The Marine Corps commissions hundreds of officers every year through multiple accession sources, each with their own varying acculturation period. Likewise, hundreds of officers separate from the Marine Corps every year voluntarily to pursue other opportunities and involuntarily due to not being selected for promotion. When officers are considered for career-level promotion benchmarks, the Marine Corps values certain individual characteristics that indicate an officer continues to have a high level of performance in positions of increasing responsibility. Using available personnel data, this research provides a study of what individual characteristics the Marine Corps values in its career-level officers and if accession source is an early indicator of career-level success. If accession source is found to be a significant factor in achieving certain promotion benchmarks, this research has the potential to influence officer procurement policies to increase the career longevity of officers and address the problem of retention.

B. RESEARCH QUESTIONS

- What are the individual characteristics the Marine Corps values in selecting career-level officers?

- Comparing the different accession sources, do any have a greater probability of producing career-level officers?

Model results indicate that the Marine Corps promotes officers that have a family-oriented lifestyle, have high performance on marksmanship and physical evaluations, receive high markings on annual evaluations, have deployment and joint-duty experience, and have master's degrees. Officers with occupational specialties related to aviation, acquisitions, and staff judge advocates are more likely to be promoted to major and lieutenant colonel when compared to officers with combat-arms specialties. This study's findings do not definitively indicate that accession source is a significant factor in determining whether an officer is promoted to major or lieutenant colonel.

C. SCOPE AND LIMITATIONS

The scope of this thesis encompasses an analysis of the traits associated with Marine officers promoted to major and lieutenant colonel. In the Marine Corps, the rank of major is equivalent to the grade of O4 and the rank of lieutenant colonel is equivalent to the grade of O5. These terms are used interchangeably in this research. The study includes data from the Total Force Data Warehouse System (TFDW), Manpower Management Records and Performance-30 (MMRP-30), and Manpower Studies and Analysis Branch (MPA). The data encompasses the cohorts of officers commissioned in years 2000–2010. The evaluation identifies personal attributes, demographics, and performance measures that are consistently correlated with promotion to major and lieutenant colonel. The methodology is primarily quantitative in nature, using statistical results to identify and infer which factors are most prevalent in predicting career-level promotion. The focus variables of accession source are evaluated using a logit multivariate analysis model to determine if specific accession sources are more likely to produce officers that are retained and promoted to major and lieutenant colonel.

D. ORGANIZATION OF THE STUDY

This thesis is organized into six chapters. Chapter II provides background on recruiting, accession, and promotion practices that are key to understanding the context of

this research. Chapter III provides a literature review essential to understanding historical research in relation to this topic. Chapter IV describes the data and preliminary findings using descriptive statistics while Chapter V focuses on the statistical methodology for evaluating factors predicting promotion to major and lieutenant colonel and presents the findings. Chapter VI includes conclusions and recommendations based on the analysis in this research.

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II. BACKGROUND

Chapter II provides the reader the context needed to understand the analysis in later chapters. First, the Marine Corps officer procurement process and relevant procedures are introduced. Second, the different accession sources and their associated acclimation periods are described. The third section outlines the importance and impact of The Basic School. The last section describes the promotion process of Marine Officers upon completion of the training pipeline.

A. MARINE CORPS OFFICER RECRUITING

Marine Corps Recruiting Command (MCRC) is responsible for the officer procurement process throughout the United States. MCRC is divided into an Eastern Recruiting Region (ERR) and a Western Recruiting Region (WRR). Each region is composed of multiple Marine Corps Districts (MCD) which contain numerous Recruiting Stations (RS). While each RS is responsible for meeting annual mission requirements for enlisted and officer recruiting, each RS has an Officer Selection Station (OSS) that is specifically responsible for officer procurement. Figure 1 details the regional and district structure of MCRC.

MARINE CORPS RECRUITING COMMAND

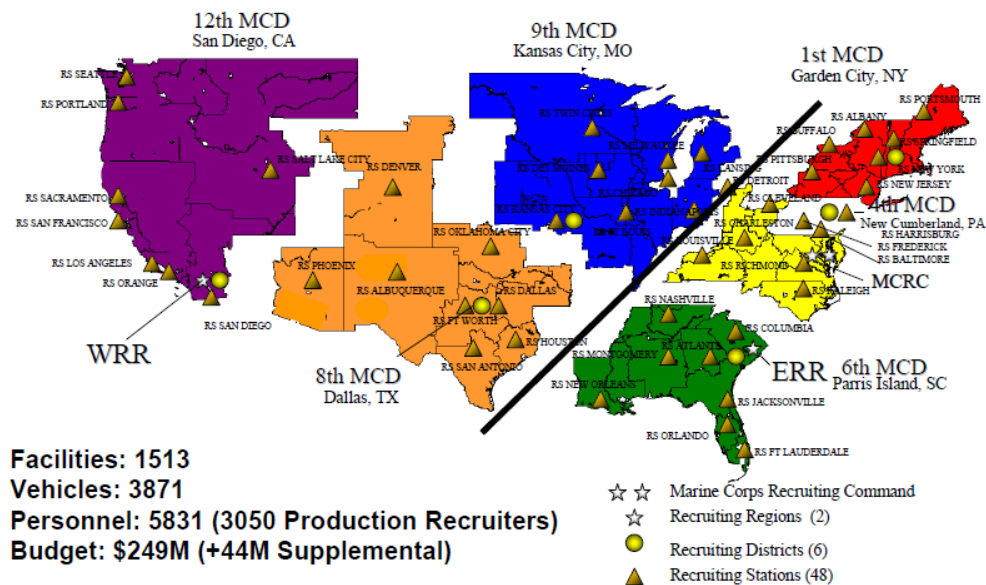


Figure 1. MCRC Regions and Districts. Source: Choike and Zeliff (2010).

Developing and meeting officer recruiting goals is a detailed process. Officer Selection Officers (OSO) along with an enlisted Office Selection Assistant (OSA) form an Officer Selection Team (OST). OSTs manage each OSS and are expected to meet their assigned officer recruiting goals, referred to as their mission assignment. Deputy Commandant (DC), Manpower and Reserve Affairs (M&RA) is responsible for achieving officer end-strength. DC, M&RA tasks the Commanding General (CG) of Marine Corps Recruiting Command (MCRC) with the annual recruiting mission (United States Marine Corps Recruiting Command [MCRC], 2015). MCRC executes the procurement process and awards contracts to the various accession sources based on requirements outlined within the mission assignment. These accession sources include the Officer Candidate Course (OCC) and Platoon Leaders Class (PLC) programs, the United States Naval Academy (USNA), and the Naval Reserve Officers Training Corps (NROTC). MCRC then assigns each region with a PLC and OCC mission based on this distribution. The regions then assign distributions to districts who in turn assign PLC and OCC missions to each RS. RS Commanding Officers (CO) then apportion each OSO their specific mission (MCRC,

2015). Upon receipt of their annual mission, OSOs execute the officer procurement process detailed in Figure 2.

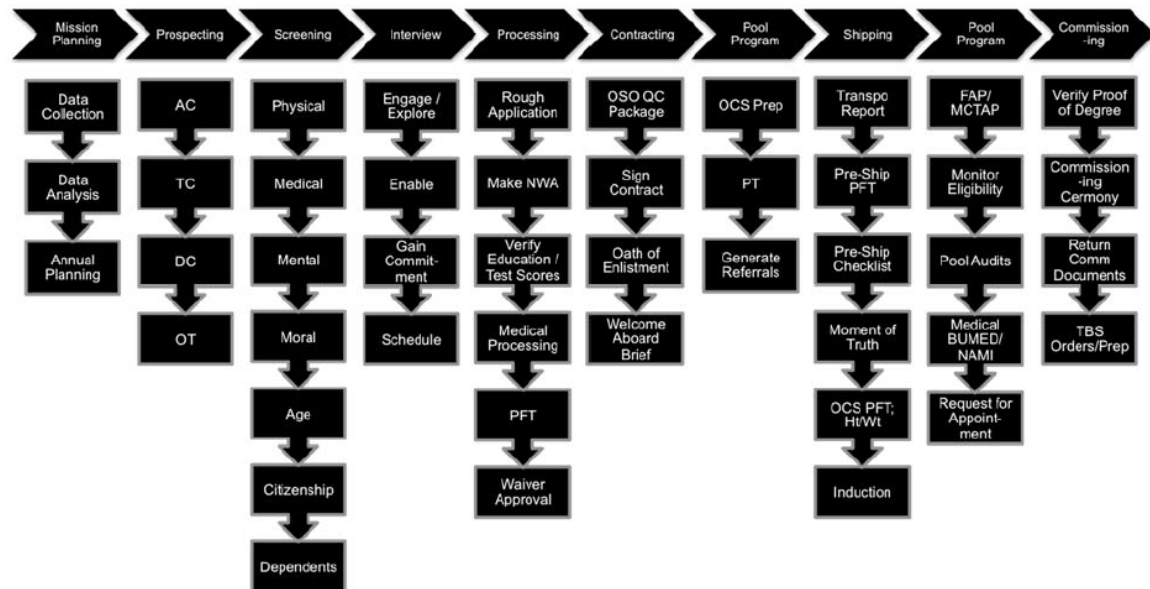


Figure 2. Officer Procurement Process. Source: MCRC (2015).

The officer procurement process is continuous year-round and begins with mission planning. Part of mission planning includes a market analysis in which OSOs compare candidate populations by population size, gender, and race to determine the best locations within their OSS area to conduct recruiting operations. With receipt of their annual mission and completion of market analysis, OSOs conduct annual planning in which they establish a college relations program and schedule their campus visits, with a priority given to visits that historically achieved mission categories that are challenging to meet (MCRC, 2015). Once mission planning is complete, the OST begins prospecting and screening potential officer applicants. Sound prospecting is the primary focus of the OST and is directly proportional to the number of successful contracts (MCRC, 2015). When potential PLC and OCC applicants are found, the OST meticulously screens the prospective applicants to ensure they meet physical, medical, mental, and moral prerequisites. If the prerequisites are met, the OST conducts interviews with the prospective applicants to communicate the opportunities the Marine Corps has to offer and to gauge each applicant's suitability and

level of commitment to pursuing a commission. If the OST recommends an applicant for contract following the interview, the next step is processing. Processing includes finalizing applications, verification of education and test scores, additional medical processing, and the applicant passing a Physical Fitness Test. Contracting is the next step in which the applicant signs a contractual obligation with the Marine Corps.

The PLC or OCC applicant then enters the OST's pool, which includes contracted applicants, contracted candidates selected to attend Officer Candidate School (OCS), partially trained candidates, fully trained candidates, and second lieutenants waiting to attend TBS. Pool management requires the OST to verify that candidates maintain program qualifications, motivation, physical and mental fitness, moral standards, and administrative readiness (MCRC, 2015). When contracted applicants complete the pool program and the date of training has arrived, OSTs ensure candidates report to OCS prepared for training. Figure 2 identifies this step as the shipping phase. Figure 2 also depicts two pool program phases, one before and after the shipping phase. This second pool program step may or may not occur depending on which accession program the applicant attends. Those applicants who commission immediately after completion of OCS do not re-enter the pool program, while applicants who still need to complete college degrees or need to attend additional training sessions do re-enter the pool program. Those who re-enter and do not re-enter become clearer in the next section that explains the different accession sources. The final step in the officer procurement process is commissioning, which occurs once the candidate has graduated OCS, completed college graduation requirements, and taken the oath of office during a commissioning ceremony.

The NROTC procurement process is different than the OCC and PLC process. The NROTC program is managed at the RS level by the RS Executive Officers, though they may receive assistance from OSTs in recruiting efforts. Applicants interested in an NROTC scholarship submit an online application and independently arrange for their Scholastic Aptitude Test (SAT) or American College Test (ACT) scores to be released to their RS (MCRC, 2015). If the applicants' initial application and test scores meet prerequisites, they are asked to report to their RS to complete additional application requirements and an interview. If the applicant completes all requirements, their package is forwarded to the

district headquarters. NROTC selection boards convene twice a year at the district level (MCRC, 2015). Once the district board results are released, each RS notifies applicants of their approval status. If awarded an NROTC scholarship, applicants are managed by NROTC staff until they are commissioned.

B. MARINE CORPS OFFICER ACCESSION SOURCES

There are six Marine Corps accession sources for officers: 1) USNA; 2) NROTC; 3) PLC; 4) OCC; 5) the Marine Corps Enlisted Commissioning Education Program (MECEP); and 6) the Enlisted Commissioning Program (ECP). Each accession source varies in length and has its own unique requirements for eligibility.

1. United States Naval Academy

The USNA is a military service academy that provides future Navy and Marine Corps officers with a four-year undergraduate education. USNA students are midshipmen and are on active duty in the Navy. Admission requirements are more strenuous than civilian institutions in that the admissions board evaluates applicant physical fitness, leadership potential, and commitment to be a midshipman and future naval officer. Applicants are also required to obtain a nomination from an official source such as a U.S. Senator, a U.S. Congressman, a presidential nomination, or an ROTC unit nomination. Acceptance to the USNA is extremely competitive. The 2020 matriculation class had a total of 15,699 applicants with only 1,426 offers of appointment, which equates to a 9% acceptance rate (USNA, 2020). For those accepted, full tuition, room and board, book stipends, and educational fees are provided. The academy offers midshipman a range of 25 academic majors and programs. In addition to the undergraduate curriculum, midshipmen are also required to take courses in naval science, engineering, navigation, weapon systems, leadership, ethics, military law, and physical fitness that prepare them for service as professional officers. The academy also has a Character Development Division that integrates the moral development of midshipmen into curriculum and training to instill the core values of honor, courage, and commitment (USNA, 2020).

All midshipmen are exposed to Marine Corps culture during their time at the academy. For those midshipmen that decide to pursue a commission in the Marine Corps,

they must receive acceptable scores on Marine Corps specific physical evaluations, have their company mentor recommendation, demonstrate leadership potential, and adhere to academic, military, conduct, and honor standards (USNA, 2020). Midshipmen that meet these criteria attend a program called Leatherneck in Quantico, Virginia between their junior and senior years. In this four-week program, midshipmen are trained in basic military skills such as land navigation, combat orders, combat tactics, and weapons familiarization, and are evaluated in leadership, physical training, and military skills (USNA, 2020). Each midshipman participating in Leatherneck is evaluated on leading a squad attack. Upon completion of Leatherneck, midshipmen return to finish their senior year and are commissioned into the Marine Corps upon graduation. USNA graduates are obligated to five years of service.

2. Naval Reserve Officer Training Corps

NROTC is another option for accession into the Marine Corps. The purpose of NROTC is “to educate and train men and women for service as commissioned officers in the Navy’s unrestricted line, the Navy Nurse Corps, and the Marine Corps” (Naval Education and Training Command [NETC], 2020). Applicants interested in the Marine Corps can apply for a Marine-option NROTC scholarship. Marine Corps specific requirements include an acceptable score on the physical fitness test and achieving a qualifying score on the Armed Forces Qualification Test (AFQT) and the SAT or ACT. For 2020 applicants, a minimum combined SAT score of 1000 or minimum ACT composite score of 22 was required in addition to a minimum AFQT score of 74 (NETC, 2020). Applicants accepted for NROTC scholarship programs are responsible for making their own plans for college enrollment. The only requirement is that they attend a college that either has an NROTC department located on campus or is affiliated with a nearby NROTC department in which they can participate. Applicants that are awarded scholarships receive full tuition, book stipends, and educational fees, but are responsible for paying their own room and board.

NROTC midshipmen attend their college’s undergraduate courses alongside their civilian student counterparts. In addition to the academic curriculum, NROTC midshipmen

must participate in courses on naval science, leadership, ethics, military law, and physical fitness that prepare them for service as professional officers. Marine-option midshipmen are exposed to Marine Corps culture during their first three years through weekly physical training, naval science courses, and periodic multi-day field exercises in which they learn basic military skills such as land navigation, combat orders, combat tactics, and weapons familiarization. Following their freshmen and sophomore years, NROTC midshipmen also attend multi-week summer training programs that familiarize them with Navy and Marine Corps occupational fields and culture.

Following their junior year, Marine-option midshipmen attend a six-week session at OCS. The mission of OCS is “to educate and train officer candidates in a challenging environment to screen candidates for the leadership, moral, mental, and physical attributes required of a Marine Corps officer” (USMC OCS, 2020). OCS is a rigorous assessment in which candidates are evaluated on the categories of academics, leadership, and physical fitness. OCS training includes combat conditioning, obstacle courses, close order drill, academic classes and discussions, the fire team assault course, leadership reaction courses, the stamina and endurance course, small unit leadership evaluation, and daily platoon staff evaluation (USMC OCS, 2020). OCS training events are meticulously scheduled and broken into five phases: In-processing, Transition, Adaptation, Decision-making & Execution, and Out-processing (USMC OCS, 2020). Upon completion of OCS, NROTC midshipmen return to their respective colleges for their senior year and are commissioned in the Marine Corps upon graduation. Midshipmen that participate in NROTC are obligated to four years of service.

3. Platoon Leaders Class

PLC is another accession option for students enrolled full time in an undergraduate university program. Interested students can apply for the PLC program any time prior to graduation. In addition to applicants meeting similar medical and physical requirements to their NROTC and USNA peers, PLC candidates must maintain a certain grade point average threshold during their time in college. PLC candidates attend two six-week OCS sessions or a single ten-week OCS session. The length of session they attend depends on

when they are accepted into the PLC program. For students accepted during their freshmen or sophomore years, they attend two six-week sessions called PLC Juniors and PLC Seniors. Students attend PLC Juniors during the summer after their freshmen or sophomore year and PLC Seniors the summer after their junior year. Students selected for the PLC program during their junior year attend a single ten-week OCS session the summer after their junior year. This ten-week OCS session is called PLC Combined. The OCS training and evaluation is the same as described in the previous section, the primary difference is the length of each session. Upon completion of OCS, PLC candidates return to their respective colleges for their senior year and are commissioned in the Marine Corps upon graduation. Officers that are accessed through PLC are obligated to four years of service (MCRC, 2015).

4. Officer Candidate Course

OCC is the accession source for students who are currently enrolled as seniors in a four-year undergraduate college program or individuals who already have their baccalaureate degree from a four-year university. OCC candidates attend a single ten-week OCS session following the completion of their academic requirements. Upon completion of OCS, OCC candidates are immediately commissioned in the Marine Corps. Service obligation for OCC graduates is four years of service (MCRC, 2015).

5. Marine Enlisted Commissioning Education Program

MECEP is an accession source for enlisted Marines interested in earning a commission but have not yet obtained a baccalaureate degree. To qualify for MECEP, an enlisted Marine must have three years or greater time in service, have achieved the rank of E-5, and completed 12 college credits. Marines must also have successfully completed the application process to a college with an NROTC department. If accepted into MECEP, the Marines attend a ten-week OCS session prior to being assigned to an NROTC unit. Upon OCS completion, MECEP Marines execute a permanent change of station move to the NROTC unit and college they choose to attend. Marines remain on active-duty status while in MECEP, receiving full pay and benefits and continuing to be promoted non-competitively during their time in college. They are responsible for all college costs, though

many choose to apply college benefits they have accrued during their enlistments. MECEP Marines are required to complete their baccalaureate program as quickly as possible, including attending summer courses. MECEP requires Marines to reenlist to maintain a four-year service obligation during their time in college. Upon receiving their baccalaureate degree, MECEP Marines are commissioned in the Marine Corps. (MCRC OCM, 2016).

6. Enlisted Commissioning Program

ECP is an officer accession source for enlisted Marines that have already completed a baccalaureate degree from an accredited university. ECP is available to Marines that have at least one-year active-duty time in service and a minimum of twelve months remaining on their current contract. Marines accepted for ECP attend a ten-week OCS session and immediately receive a commission in the Marine Corps upon graduation.

C. IMPACT OF ACCULTURATION PERIODS

In a RAND study published in 2001 on the future officer management system, the authors argue that the duration and intensity of an officer's accession process is a factor to be considered in their career progression (Thie et al., 2001). The authors term this exposure to military culture before commissioning as pre-entry acculturation and define five alternatives. In the first alternative, officers enter service without any prior acculturation. There is currently no accession pathway in the Marine Corps that follows this alternative. The second alternative is a high-intensity and short-duration educational environment. PLC and, even more so, OCC resemble this type of acculturation period in which the ten-week OCS session may be the only exposure an officer has to military culture before entering service. The third alternative is a low-intensity and long-duration educational environment. NROTC most closely resembles this type of acculturation period with up to four years of exposure to military culture, but not daily immersion. It must also be considered that in the case of the Marine Corps, NROTC candidates also receive the high-intensity and short-duration education of OCS, giving them additional exposure to military culture prior to entering service. The fourth alternative is a high-intensity and long-duration educational environment. The USNA most closely resembles this type of acculturation period with

future officers being fully immersed in military culture daily. Additionally, USNA midshipmen that commission in the Marine Corps also receive the high-intensity and short-duration experience of Leatherneck training. The fifth and final alternative is a medium-intensity and medium-duration experiential environment. The authors state that this fifth alternative represents prior enlisted service before commissioning as an officer. This alternative does not exist in the Marine Corps in isolation as enlisted Marines pursuing a commission attend OCS and are exposed to its high-intensity, short-duration educational environment (Thie et al., 2001).

Figure 3 contains the percentage of officers commissioned through each accession source in 2019. The number of officers is averaged across The Basic School (TBS) company size, so the important takeaway of the figure is the percentages. Combined, the USNA and NROTC accessed 27% of all officers commissioned in 2019. OCC and PLC are the primary accession sources used, commissioning a combined 63% of all officers in 2019. MECEP and ECP account for the final 10% of accessions.

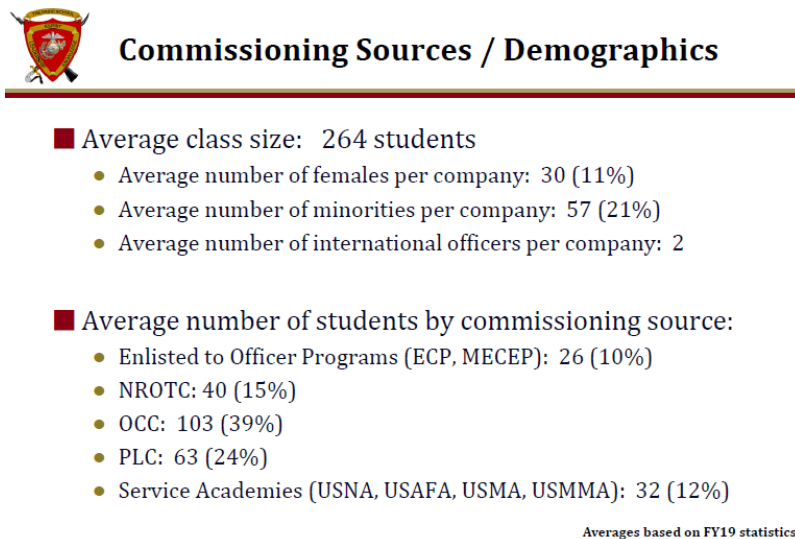


Figure 3. 2019 Average Distribution of Officer Accessions.
Source: Everly (2019, p. 39).

Based on the RAND study's theory that pre-entry acculturation plays a role in the quality of officer, the Marine Corps should access officers through either the USNA or

NROTC since they are the two accession sources that have elements of both long duration and high intensity acculturation periods. However, this is not feasible due to competing manpower requirements and costs. The Marine Corps can only commission up to 30% of the USNA graduates as the Navy requires a higher number of junior officers to fill the ranks of its larger force (USNA, 2021). Longer acculturation periods such as the USNA and NROTC are also going to be more expensive due to the time, faculty, and staff involved in managing these accession sources. Lastly, the changing demand for junior officers due to separation decisions and promotions requires a shorter-duration accession source to be available to ensure the manpower needs of the Marine Corps are met. Therefore, USNA and ROTC are used for longer-term planning in filling projected officer requirements, while PLC and OCC are used to fill additional demand and provide short-term flexibility in accessions. If accession source is a factor in the quality of career officers, there are also many other factors to consider. One aim of this study is to determine if and how much accession source is significant when considering other relevant factors of career success.

D. THE BASIC SCHOOL

The next step in Marine officers training after earning their commission is reporting to TBS in Quantico, Virginia. All officers despite which of the six accession sources they attend must successfully complete TBS before beginning their career in the Marine Corps. TBS's mission is to

train and educate newly commissioned or appointed officers in the high standards of professional knowledge, esprit-de-corps, and leadership in order to prepare them for duty as company grade officers in the Fleet Marine Force, with particular emphasis on the duties, responsibilities, and professional abilities required to serve as a rifle platoon commander. (Everly, 2019, p. 9)

The program of instruction newly commissioned officers attend at TBS is the Basic Officer Course (BOC). BOC trains seven companies per fiscal year, each company consisting of 250–300 student officers. Throughout the twenty-six weeklong course, BOC staff seek to instill five horizontal themes into the student officers.

- A Man or Woman of Exemplary Character
- Dedicated to Leading Marines and Sailors 24/7

- Able to Decide, Communicate, and Act in the Fog of War
- A Warfighter Who Embraces Our Naval Character and the Corps' Warrior Ethos
- Mentally Strong and Physically Tough (Everly, 2019, p. 9)

The rigorous BOC course is organized into five phases. Each phase builds upon each other and evaluates student officers in the categories of academics, military skills, and leadership. According to Everly's 2019 brief, Phase I is six weeks and consists of individual skills training such as martial arts, water survival training, rifle and pistol qualification, land navigation, tactical communications, and combat lifesaving. Phase II is six weeks and introduces decision-making and rifle squad leadership skills. Student officers are evaluated on tactical planning, combat orders, rifle squad weapons, day and night squad level live-fire, principles of fire support, scouting, patrolling, and reconnaissance. Phase III is six weeks and focuses on rifle platoon commander skills. Student officers receive instruction on rifle platoon tactics, field exercises, and live-fire, crew-served weapons, improvised explosive device training, counter insurgency operations, and administrative duties. Phase IV is the longest phase at eight weeks and encompasses basic Marine Air Ground Task Force (MAGTF) officer skills. Student officers are evaluated on motorized operations, military operations in urban terrain, and amphibious operations. Phase V focuses on the professional development of the student officers and is not a stand-alone phase but endures throughout BOC. This distributed phase includes instruction on leadership, ethics, biases, officership, resiliency, and a guest speaker lecture series. In total, BOC includes 1513 academic hours, including both classroom and field time, and 342 administrative hours (Everly, 2019).

Throughout BOC, student officers receive evaluations on their leadership, academics, and military skills, which encompass the course grading system. Leadership evaluations are primarily completed by the staff platoon commander, an active-duty Marine captain, and are based on student officer performance in garrison and field billets. The leadership category also includes the results of student officer peer evaluations, in which they rank each of their fellow student officers in their platoon. Academic evaluations include multiple written examinations administered during each phase. The military skills category evaluates each student officer in the practical application of warfighting abilities.

Marksmanship, land navigation, endurance course, obstacle course, and physical training evaluations are some of the 15 graded events included in this category.

Grade point averages (GPA) are assigned to each student officer based on their individual scores in the three evaluated areas. Based on these individual scores, class rankings of all the student officers in the company are assigned and the class is divided into a top-third, middle-third, and bottom-third. Once the class rankings are established, TBS staff begins the process of assigning students their Military Occupational Specialty (MOS). TBS assigns MOSs in a manner that ensures a quality spread throughout the MOS categories. This is the reason each class is divided into a top, middle, and bottom third. Available MOSs are distributed across each of the thirds to ensure officers of varying quality are assigned to each MOS.

Upon graduating TBS, Marine officers go on to attend their specific MOS school, which are located across the United States. While TBS is not technically considered part of accession in the Marine Corps, it is most definitely an extension of the acculturation period. TBS is a type of leveling field in which all Marine officers, no matter their commissioning source and what type of contract they have, must work together while also competing to master basic officership and rifle platoon commander skills. Additionally, an officer's performance at TBS has potential effects on their future promotion with the top 5% of graduates receiving career-designation status and all officers being assigned a precedence number based on their overall TBS class ranking that influences the precedence in which later promotions are awarded.

E. PROMOTION PROCESS

Marine officers begin to be eligible for promotion once they have completed the training requirements for their MOS and are assigned to their first unit where they begin to receive observed Fitness Reports (FITREPS), which are semi-annual or annual performance evaluations. The promotion process for all Department of Defense (DOD) officers is dictated by Title 10 of the United States Code (U.S.C.), which directs each military department to convene selection boards as needed to recommend officers for promotion to the next grade. Title 10 of the U.S.C. also provides guidelines to the military

departments on the composition of selection boards. Selection boards must consist of five or more officers and be appointed by the secretary of their respective department. Board members must be on active duty and serving in a grade higher than those officers being considered for promotion. Selection boards must include at least one officer from each military occupational category, or competitive category of the officers being considered for promotion (U.S.C. Title 10, 2011).

The Marine Corps maintains a five-year officer promotion plan for each competitive category by grade. It contains the quantity the board is authorized to select, promotion zone sizes, and skill guidance for each grade and category (HQMC, 2006). Promotion zones are categories of eligible officers encompassing the most senior officer to the most junior officer under consideration for selection. In accordance with the Officer Promotion Manual, the above-zone category includes officers that were in the in-zone category on the previous promotion board but were not selected for promotion. The in-zone category includes the primary population of officers being considered for selection and does not include any officers that have failed to be selected on a previous board. The below-zone category includes officers junior to those in the in-zone. If not selected, below-zone officers do not suffer a selection failure. The five-year officer promotion plan is updated by Manpower Plans and Policy Division annually, approved by the Secretary of the Navy (SECNAV), and serves as a planning tool for each selection board (HQMC, 2006).

The legal document that orders a selection board to convene is known as the precept. The precept provides instructions to the board and appoints a president, members, and recorders to the selection board (HQMC, 2006). Commandant of the Marine Corps (CMC) Manpower Management Promotions Branch (MMPR) is responsible for the publication of the precept. In addition to board members, the precept also includes additional guidance the CMC determines to be important for the board to consider when evaluating officers for selection. Both the promotion plan and precept must be signed by the SECNAV (HQMC, 2006).

Title 10 of the U.S.C. requires military departments to notify eligible officers at least 30 days prior to a selection board convening. The Marine Corps does this well in

advance through an administrative message (MARADMIN). This notice of convening includes information on the schedule of the selection board, the senior and junior officer of the in-zone population, the junior officer in the below-zone, and deadlines for eligible officers to meet submission requirements of required materials.

The information that is provided to selection boards on the officers being considered for selection is governed by law and regulations. Authorized information includes an officer's Official Military Personnel File (OMPF), Master Brief Sheet (MBS), written communication, and discrepancy notices (HQMC, 2006). An OMPF is a digital file containing fitness reports, education and course completion certificates, awards, an official photograph, and other service information. It is the most detailed document provided to the selection board. The MBS is a summary of the OMPF that consolidates important education, training, and performance information and aids board members in reviewing pertinent information. Title 10 of the U.S.C. authorizes eligible officers to submit written communication to the selection board. This communication can contain any information the eligible officer considers relevant to his or her case. Board members are the only selection board personnel allowed to submit discrepancy notices, which are written requests for clarification on information in an eligible officer's OMPF. Open-source information, current medical status, and third-party information are examples of unauthorized information that cannot be considered by board members. MMPR is responsible for ensuring that any information provided to the selection board, including discrepancy requests, are in accordance with Title 10, U.S.C. (HQMC, 2006). Figure 4 displays a screenshot of the digital boardroom, which is the interface board members use to populate eligible officer information and prepare their briefs.

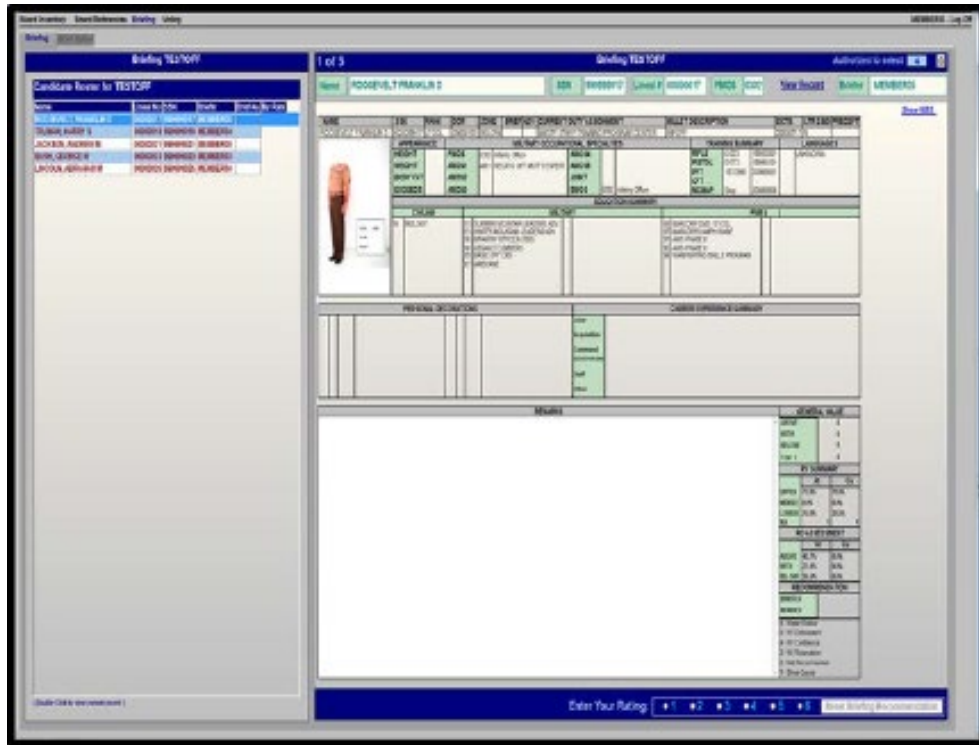


Figure 4. Example of the Digital Boardroom Brief Board Members Prepare to Brief on Eligible Officers. Source: MMRP (2020).

During the selection process, board members review and prepare their cases for each zone. Voting on above-zone cases occurs first in which board members brief and vote on the eligible officers in lineal precedence order. This zone is voted on first since above-zone officers have already received a failure of selection during the previous promotion board for the same grade. If an above-zone officer receives a single affirmative vote from a board member, that officer is classified as a premier case and go on to be briefed and voted on again with the in-zone cases (HQMC, 2006). Once above-zone cases have been voted on, board members are given additional time for case preparation. In the final session of the selection board, board members brief all their in-zone and premier cases. All board members are afforded the opportunity to contribute any comments after each case is briefed. Once all briefs are complete, each board member chooses which officers receive their selection vote. The number of officers the board has been authorized to select determines how many votes each board members casts (HQMC, 2006).

At the conclusion of a selection board, the CMC (MMPR) prepares a selection board report that contains a list of the eligible officers, a list of all officers selected for promotion, statistical analyses, the precept, notice of convening, and the promotion plan. Each board members and recorder must sign the board report. Board reports are then forwarded to the final approval authority for CMC and SECNAV endorsements. For those officers selected for promotion to the grade of major or above, Senate confirmation is required before the promotion can occur (HQMC, 2006). The CMC (MMPR) assembles a nomination package for each board requiring approval by the Senate. The CMC has established an advanced notification system in which lists of selected and non-selected officers are distributed down to O5 level commands. This allows commanders to personally inform their subordinates of their selection status instead of an impersonal notification via an administrative message. After a period has been allowed for advanced notification, board results are released publicly.

Eligible officers who were in the above-zone and in-zone populations and were considered but not selected for promotion incur a failure of selection. Officers who incur two failure of selections, meaning they are considered by two separate selection boards and are not selected, may be subject to mandatory separation or retirement (HQMC, 2006). For first lieutenants and captains, this typically means they separate once their service obligation is completed. For majors, the Marine Corps uses the selective continuation authority, which allows the service to retain majors with 15 years of service until they are eligible for retirement despite having incurred two failure of selections (U.S.C. Title 10, 2011).

F. SUMMARY

Chapter II describes the relevant aspects of the officer procurement process, providing information on how candidates are recruited and assigned to the various accession sources. The different accession sources are described in detail and provide insight into the different acclimation periods associated with each. Also discussed is the importance of TBS in developing Marine officers and its potential impact on the longevity of officer careers. Finally, the Marine Corps promotion process is summarized, providing knowledge on how the Marine Corps determines which officers to promote. This

background information gives readers an understanding of the context surrounding a Marine officer's career from recruiting to initial training to promotion selection and provides awareness of many of the variables that are included in the quantitative analysis of this research.

III. LITERATURE REVIEW

A. OVERVIEW

There is a considerable amount of prior research surrounding the factors related to the promotion of Marine Corps officers. Prior quantitative research typically includes accession source as a variable when evaluating factors related to promotion, though not frequently as the focus variables. From this research we can review the historical significance of accession source in relation to promotion. The criteria for the literature review include peer reviewed journals that apply accession source as variables in their research of various officer related topics and postgraduate theses that specifically evaluate promotion to major and lieutenant colonel with accession source applied as independent variables.

B. PROMOTION TO O4

Desrosiers's and Bradley's 2015 CNA study reviews the available literature on Marine performance factors dating back to the mid-1990's. While their study focuses on female and male performance comparisons as part of the plan to integrate females into combat arms occupational specialties, they include accession source as a factor in their research. Another 2016 CNA study by Schulte, Quester, Shuford, and Hiatt evaluates the performance of aviation and logistic officers from the 1980's to the 2010's. Their study also includes accession source as independent variables in their research. Both CNA studies evaluate factors related to officer performance and retention to ten years of service (YOS). This retention benchmark differs slightly from whether an officer is promoted to O4 but is aligned with the time in service requirements for O4 promotion consideration. Desrosiers also reviews the available literature on promotion to O4 outcomes.

The 2015 CNA literature review finds that MECEP is consistently a positive indicator of retention to ten YOS but that the other accession sources do not have consistent findings across multiple studies (Desrosiers & Bradley, 2015). The 2016 CNA findings indicate that the enlisted-to-officer accession sources are statistically significant and positive indicators of logistics and aviation officers remaining in service until at least ten

YOS (Shulte et al., 2016). Schulte et al study also finds that among logistics and aviation officers, OCC and PLC graduates are less likely to be retained to ten YOS when compared to USNA graduates. Regarding O4 promotion, Desrosiers finds that officers commissioned through OCC were more likely to be promoted to O4 compared to those from other accession sources.

Several postgraduate theses specifically evaluate the factors related to promotion outcomes. Salas's 2015 study compares the performance of Hispanic and non-Hispanic officer retention and performance in the Marine Corps. He aims to explain promotion outcome differences between these two populations using demographic, accession source, education, and performance factors derived from TFDW, MMRP-30, and CNA data on 7,880 officers commissioned in calendar years 1999 to 2004. One of the career benchmarks Salas models is promotion to O4.

Hoffman's 2008 research conducts an analysis of factors related to O4 promotion of Marine Corps officers. He first identifies significant factors in the selection for promotion to various grades with the goal of providing career counselors at Manpower and Reserve Affairs with a multivariate model to support the officer counseling process. At the time, only descriptive statistics were available to career counselors. He aims to provide career counselors with the ability to isolate individual variables and show officers their effect on promotion selection. His data from TFDW and Manpower Management Support Branch (MMSB) includes cross-sectional and panel data on 743 officers being screened in the 2006 major promotion board. Hoffman's analysis employs 41 variables including the dependent variable of grade select and independent variables of demographics, performance, Military Occupational Specialty (MOS) categories, combat service, accession source, and assignments. Hoffman develops six different models in which he progressively adds additional independent variables to measure the changes in marginal effects across the models.

O'Brien's 2002 study evaluates the impact enlisted commissioning programs have on the retention of Marine Corps officers. His intent is similar to that of this research in determining if graduates of specific accession sources have a greater propensity to remain in service to career level benchmarks, except his focus variables are the enlisted accession

sources. O'Brien's data from the Marine Corps Commissioned Officer Accession Career (MCCOAC) file includes cross-sectional data on officers commissioned from 1980 to 2000. O'Brien opts to use fewer explanatory variables than the comparative studies in this section by only applying commissioning programs, TBS graduation thirds, GCT scores, ethnicity groups, marital status, and MOS as explanatory variables. He evaluates accession source effects on two benchmarks, retention to ten years of commissioned service and retention to retirement eligibility. His retention to ten years of commissioned service model is discussed in this section.

Salas and Hoffman use a multivariate probit model to estimate promotion to O4 while O'Brien applies a logit model. Salas discovers in his O4 promotion model that USNA and MECEP are statistically significant and negatively correlated with promotion to O4. Salas's model estimated that USNA academy graduates were 10.67 percentage points less likely and MECEP graduates were 8.37 percentage points less likely to achieve promotion to O4 when compared to other accession sources. O'Brien estimates that PLC and OCC graduates are 47.3% and 57.1% less likely to remain in service when compared to USNA graduates, and that officers commissioned via MECEP were found to be 52% more likely to be retained until 10 years of commissioned service when compared to USNA graduates. It is important to remember that O'Brien uses retention to ten years of commissioned service as his dependent variable while Salas and Hoffman use promotion to O4. This distinction may explain the difference in the sign of MECEP between the Salas and O'Brien studies as MECEP graduates are likely to be retained until reaching ten years of commissioned service but may choose to retire instead of accepting promotion to O4. Still, these two studies differ on the sign of USNA, with Salas finding USNA to negatively impact promotion to O4 outcomes and O'Brien finding that USNA is a positive indicator relative to PLC and OCC in predicting retention to ten years of commissioned service. Interestingly, Hoffman's findings indicate that none of the accession sources are a statistically significant factor in promotion to O4.

Out of the 29 independent variables used in his analysis, Salas finds TBS performance, physical fitness, high rifle scores, awards, FITREP scores, and the MOSs of combat service support, aviation, aviation support, and law to be positive indicators of

promotion to O4 while having attended a top-rated college is a negative indicator of promotion to O4 (Salas, 2015). Out of the 38 independent variables Hoffman evaluates, marital status, physical fitness, FITREP scores, awards, and Professional Military Education (PME) are found to have a positive and statistically significant effects on promotion selection to O4 (Hoffman, 2008). O'Brien's model finds marriage and top-third TBS performance to be significant positive indicators of retention until 10 years of commissioned service while the combat service support MOS is a significant negative indicator of retention (O'Brien, 2002).

C. PROMOTION TO O5

Desrosiers's and Bradley's 2015 CNA study that reviews the available literature on Marine performance factors dating back to the mid-1990's includes research on factors related to O5 promotion. Desrosiers's study finds that when reviewing the available literature, there is no clear consensus on accession source being a significant factor in predicting promotion to O5. This result indicates that no accession source has a greater propensity to produce officers that achieve promotion to O5. A 2020 RAND study suggests that this trend of accession source not being relevant in promotions continues through promotion to the General and Flag Officer (G/FO) ranks (Jackson et al., 2020). Jackson's RAND study analyzed the different approach each military branch uses to develop and promote G/FOs. Her research determines that the importance of accession sources in promotion to G/FO is service dependent, with the Air Force, Army, and Navy having much higher service academy representation in the G/FO ranks when compared to the Marine Corps, which has higher representation of PLC, OCC, and NROTC accession sources within its general officer ranks (Jackson et al., 2020).

There are also several postgraduate theses specifically evaluate the factors related to promotion to O5 outcomes. Hoffman's 2008 study to identify significant factors in the selection for promotion to various grades and provide career counselors at Manpower and Reserve Affairs with a multivariate model to support the officer counseling process also includes a model predicting promotion to O5. His data from TFDW and Manpower Management Support Branch (MMSB) includes cross-sectional and panel data on 519

officers being screened in the 2006 lieutenant colonel promotion board. The variables and probit model development and progression are the same as discussed in the previous section on Hoffman's O4 promotion model except for the dependent variable being O5 grade selection.

A 2017 study by Stolzenberg undertook a quantitative analysis of various career and demographic factors to understand what qualities the Marine Corps values in its officers. His thesis uses promotion to lieutenant colonel as the benchmark of a successful officer career. The goal of the study was to create a baseline of what the Marine Corps considers to be quality characteristics in its officers that could then be used to guide future force shaping and personnel policies. The data for this study draws from the sample of officers considered for promotion to O5 during the 2013 to 2017 lieutenant colonel promotion boards, which contains 6,650 observations. TFDW provides variables on demographics, training, education, and experience information. MMRP provides the explanatory variables capturing officer performance derived from FITREPs. Stolzenberg estimates six different models, each progressively adding additional explanatory variables.

O'Brien's 2002 study to determine the effect enlisted commissioning sources have on officer retention also models retention until retirement eligibility. O'Brien's data from the Marine Corps Commissioned Officer Accession Career (MCCOAC) file includes cross-sectional data on officers commissioned from 1980 to 2000. The variables and the logit model are the same as discussed in the previous section on retention to ten years of commissioned service except for the dependent variable being retention to retirement eligibility, which is 20 years of service.

Hoffman's 2008 findings indicate that only the enlisted-to-officer programs are statistically significant and negatively correlated with an officer being promoted to O5, relative to USNA graduates. Stolzenberg's 2017 study indicates that PLC graduates are eight percentage points more likely and OCC graduates are ten percentage points more likely to be promoted to O5 when compared to USNA graduates, while NROTC is insignificant. O'Brien's 2002 research finds that accession source is not a statistically significant indicator in predicting promotion to O5 outcomes.

Out of the 38 independent variables Hoffman uses in his O5 promotion model, physical fitness, FITREP scores, combat experience, and PME are found to be positive indicators and statistically significant (Hoffman, 2008). Stolzenberg finds commendatory material, high FITREP scores, awards, physical fitness scores, combat experience, master's degrees, foreign language proficiency, and the female gender to be significant positive indicators while increased age and adverse material are negative indicators of promotion to O5 (Stolzenberg, 2017). O'Brien's findings indicate officers with top-third TBS performance, combat arms MOSs and combat service support MOSs are more likely to remain in service until retirement eligibility (O'Brien, 2002).

D. SUMMARY

Chapter III summarized historical research relevant to Marine Corps accession sources and their impact on promotion to career level benchmarks. For promotion to O4, Hoffman (2008) developed a model that predicts accession source is not a relevant factor in achieving this benchmark. Salas (2015) predicted that USNA and MECEP are negatively associated with officers being promoted to O4, and O'Brien (2002) predicted that PLC, OCC, and MECEP are positive indicators of an officer being retained to 10 years of commissioned service. These results are at odds with each other and are likely attributable to the difference in variables included in the models and the varying time frames the analyses cover.

For promotion to O5, Hoffman (2008) predicts that PLC and OCC are positively associated with O5 promotion, while O'Brien (2002) discovers that accession source is not a relevant factor in retention to retirement eligibility. Stolzenberg (2017) predicts that PLC and OCC are positive indicators of O5 promotion. Stolzenberg's and Hoffman's findings are generally aligned with each other, while the difference in O'Brien's findings may be attributed to the difference in the dependent variable, the limited number of independent variables used in his study, and the varying time frames from which the data is drawn.

The results of these studies serve as a comparative assessment for the outcomes of this research. Additionally, the model development approach applied by Hoffman and Stolzenberg serve as a blueprint for the development of models in this research in which

additional independent variable categories are progressively added to observe their effect on the significance of the accession source focus variables.

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IV. DATA AND INITIAL ANALYSIS

This chapter describes the datasets and their sources used in the statistical analyses. Dependent and independent variables are described in detail along with their descriptive statistics. Initial analysis examines the focus variables of accession source and the dependent variables of promotion to major and lieutenant colonel.

A. DATA SOURCES

This research uses data from three sources: (1) Total Force Data Warehouse System (TFDW); (2) Manpower Management Records and Performance-30 (MMRP-30); and (3) Manpower Studies and Analysis Branch (MPA). These datasets are de-identified using a unique identification number and then merged by matching individuals through the identification number.

1. TFDW

TFDW provided the largest dataset and contains the majority of variables used in this research. It includes longitudinal data for FY2000 to FY2020 commissioning cohorts and a total of 32,626 unique observations prior to data cleansing. Variables in this data set include demographics such as family status, gender, race, accession source, training, MOS information, and education. The TFDW demographic data is invaluable in comparing officers of similar and different backgrounds.

2. MMRP-30

MMRP-30 provided the dataset on officer performance captured in their FITREPs. It includes longitudinal data for FY2000 to FY2020 commissioning cohorts and a total of 31,859 unique observations before data cleansing. Variables in this dataset include all inputs required of FITREPs. For this research, Reviewing Senior (RS) cumulative relative value averages and Reviewing Officer (RO) cumulative assessment averages are used to represent officer performance over their career.

3. MPA

MPA is a part of the Manpower Plans and Policy Division within the Manpower and Reserve Affairs Department. MPA provided the dataset on officer performance at TBS. It includes cross-sectional data for FY2006 to FY2020 commissioning cohorts and a total of 20,679 unique observations before data cleaning. This dataset captures many performance attributes of officers during their time at TBS, but for this research an officer's overall class ranking at time of graduation is used to compare their performance to others. The fact that M&RA's TBS data only goes back to the FY2006 commissioning cohort means that this variable is not a factor in the promotion to O5 model.

B. SAMPLES

Each model uses a different sample from the officer population in this research. This is because only certain commissioning cohorts have achieved the time-in-service (TIS) required to be eligible for the promotion benchmarks in this study. For example, while the 2000 to 2020 database includes 30,151 unique officers, 23,609 of these officers either have not reached the TIS required for promotion to major or lieutenant colonel, separated before being eligible for promotion, or were passed over for promotion. Also, valid observations for variables were not always available for each officer in the sample populations. Some of these missing variables such as marksmanship and physical fitness scores were averaged-out to keep as many observations in the sample as possible. This process entails determining what the sample average is for a continuous variable and then inputting that average in place of the observation's missing value. However, if the missing variable was deemed critical such as accession source, the observation was removed from the sample.

1. Promotion to O4 Sample

The promotion to O4 sample consists of the officer population commissioned between 2000 and 2010. This time frame ensures only officers that have reached the nine-to-eleven-year TIS requirement to be eligible for promotion to major are included in this model. Figure 5 details the promotion to O4 sample by the number of officers commissioned in each cohort from 2000 to 2010. The total number of observations

included in this sample is 16,254 officers after removing observations that were either missing accession source information or had an accession source classification as ‘other’.

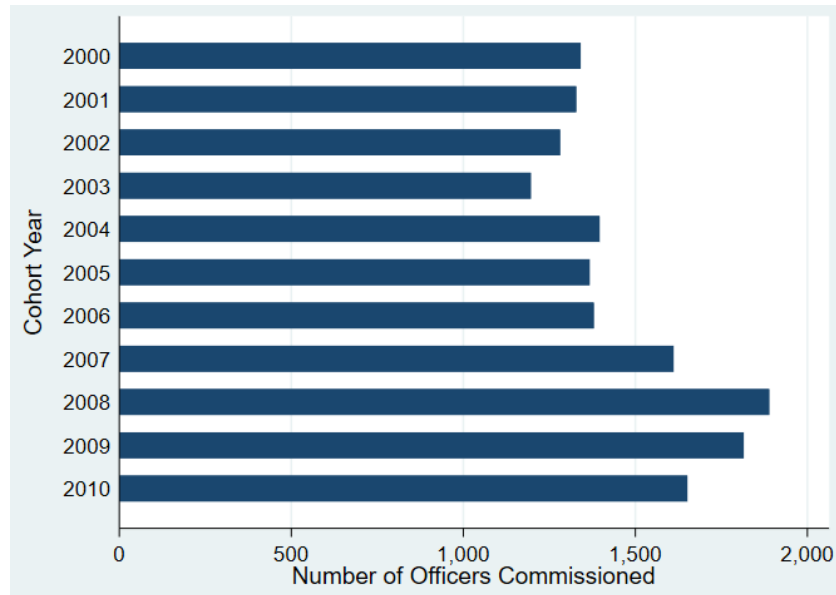


Figure 5. Number of Officers Commissioned by Cohort Year in Promotion to O4 Model.

2. Promotion to O5 Sample

The promotion to O5 sample consists of the officer population commissioned between 2000 and 2003. This time frame ensures only officers that have reached the fifteen-to-sixteen-year TIS requirement to be eligible for promotion to lieutenant colonel are included in this model. Figure 6 details the promotion to O5 sample by the number of officers commissioned in each cohort from 2000 to 2003. The total number of observations included in this sample is 5,146 officers after removing observations that were either missing accession source information or had an accession source classification as ‘other’.

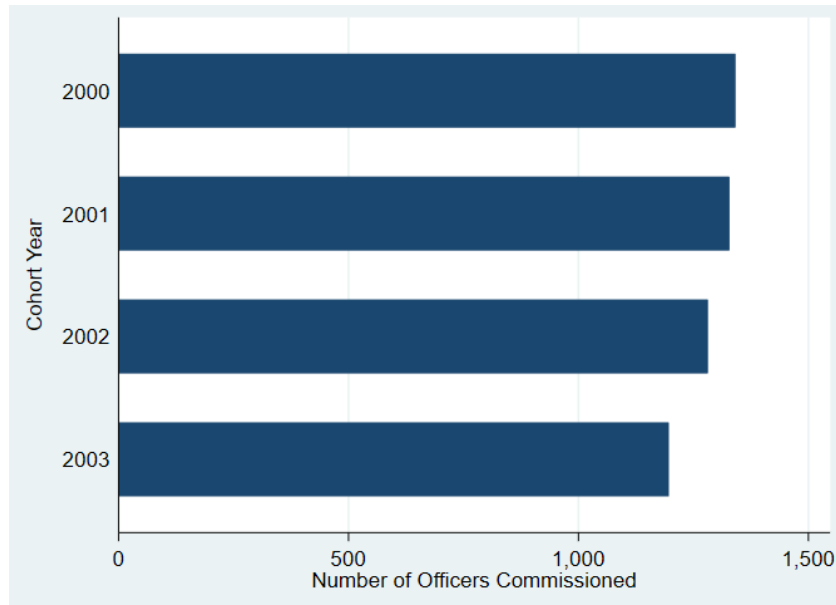


Figure 6. Number of Officers Commissioned by Cohort Year in Promotion to O5 Model.

C. VARIABLES

The models used in the statistical analysis include two different outcome (dependent) variables to represent achieving separate career level benchmarks. The same explanatory (independent) variables groups are included in each model with the only differences being due to the availability of data. Table 1 provides detailed information on each variable used in this study. The following section discusses each dependent and independent variable by variable group.

Table 1. Variable Descriptions.

Variable Name	Variable Type	Range
Dependent		
Promoted to O5	Binary	= 1 if promoted to LtCol
Promoted to O4		= 1 if promoted to Maj
Independent		
Demographics		
Family Status:		
Married	Binary	= 1 if married, 0 otherwise
Divorced		= 1 if divorced, 0 otherwise

Variable Name	Variable Type	Range
Single		= 1 if single, 0 otherwise
Number of Dependents	Continuous	0 - 10
<u>Gender:</u>		
Male	Binary	= 1 if male, 0 otherwise
Female		= 1 if female, 0 otherwise
<u>Race & Ethnicity:</u>		
White	Binary	= 1 if white, 0 otherwise
Black		= 1 if black, 0 otherwise
Native American		= 1 if native american, 0 otherwise
Native Hawaiian		= 1 if native hawaiian, 0 otherwise
Hispanic		= 1 if Hispanic, 0 otherwise
Non-Hispanic		= 1 if non-Hispanic, 0 otherwise
Accession Source		
USNA	Binary	= 1 if attended USNA
NROTC		= 1 if attended NROTC
PLC		= 1 if attended PLC
OCC		= 1 if attended OCC
MECEP		= 1 if attended MECEP
ECP		= 1 if attended ECP
Performance		
Average PFT Score	Continuous	93 - 300
Average Rifle Score		43 - 345
Average Pistol Score		74 - 397
TBS Top Third	Binary	= 1 if ranked in TBS top third
TBS Middle Third		= 1 if ranked in TBS middle third
TBS Bottom Third		= 1 if ranked in TBS bottom third
TBS Missing		= 1 if TBS ranking is missing
Cumulative Relative Value Average	Continuous	0 - 100
Cumulative RO Assessment Average		0 - 7.1
Adverse Fitness Reports		0 - 6
Personal Awards Received		0 - 16
MOS Grouping		
Combat Arms	Binary	= 1 if MOS is combat arms
Combat Service Support		= 1 if MOS is combat service
Aviation		= 1 if MOS is aviation
Aviation Support		= 1 if MOS is aviation support
Special MOS (JAG, Acquisitions)		= 1 if MOS is special mos
Experience		
Number of Combat Deployments	Continuous	0 - 18

Variable Name	Variable Type	Range
Joint Duty Assignment	Binary	= 1 if received a joint duty FITREP
Wounded in Action		= 1 if awarded the Purple Heart
Education		
General Classification Test Score	Continuous	60 - 160
Bachelor's Degree	Binary	= 1 if recipient of a bachelor's degree
Master's Degree		= 1 if recipient of master's degree
Doctorate Degree		= 1 if recipient of doctoral degree

1. Dependent Variables

The two dependent variables measure if an officer is selected for promotion to O4 and promotion to O5. These are binary variables, with a “1” outcome indicating an officer achieved promotion and “0” indicating an officer not being promoted. Using a dependent variable that denotes officers having been promoted to a specific grade allows the research to identify the factors that are associated with officers achieving that level of success. Table 2 provides summary statistics on the dependent variables. The promotion to O4 sample includes a total of 16,254 officers commissioned between 2000 and 2010. For the 2000 to 2010 cohorts, the percentage of officers that remain in service and are promoted to major is 38.9%. The promotion to O5 sample includes 5,146 officers commissioned between 2000 and 2003. The percentage of officers that remain in service and are promoted to lieutenant colonel for the 2000 to 2003 cohorts is 21.5%.

Table 2. Dependent Variable Summary Statistics

Dependent Variable	N	Mean	Std. Dev.	min	max
Promoted to O4	16254	.389	.488	0	1
Promoted to O5	5146	.215	.411	0	1

2. Independent Variables

The independent variables used to evaluate the factors impacting the different dependent variable outcomes are generally the same with the only exceptions occurring due to data limitations. These variables were selected based on previous research that

demonstrated their explanatory strength. They are grouped into demographic, accession source, performance, MOS, experience, and education categories.

a. Demographics

There are twelve demographic variables included in this analysis. Most of these variables are self-explanatory and binary in nature with a “1” outcome indicating an officer is a member of said demographic and a “0” indicating the opposite. The exception is the number-of-dependents variable which is continuous and indicates the total number of dependents of each officer. The difference in total observations between the number-of-dependents and other demographic variables is due to missing values for the dependents variable. Table 3 details the summary statistics for demographic variables.

Table 3. Demographic Summary Statistics.

Demographic Variables	N	Mean	Std. Dev.	min	max
Married	16254	.679	.467	0	1
Divorced	16254	.041	.198	0	1
Single	16254	.278	.448	0	1
Number of Dependents	15554	1.688	1.585	0	10
Male	16254	.92	.271	0	1
Female	16254	.08	.271	0	1
White	16254	.856	.351	0	1
Black	16254	.042	.2	0	1
Asian	16254	.034	.182	0	1
Other Race	16254	.012	.111	0	1
Hispanic	16254	.072	.258	0	1
Non-Hispanic	16254	.928	.258	0	1

The summary statistics demonstrate some major trends in the demographic make-up of Marine Corps officers in the samples. In respect to gender, the sample is male dominated with 92% of the sample population being male and 8% of the sample population being female. The samples are also predominately white in race, with white officers comprising 85.6%, black officers comprising 4.2%, and Asian officers comprising 3.4% of the sample population. The other race variable combines the race categories of native-American, native-Alaskan, native-Hawaiian, and pacific islander. Non-Hispanics also make up the majority the of sample population at 92.8% compared to 7.2% being Hispanic. While the Marine Corps applies an unbiased approach to promoting officers, there could

very well be differences in promotion rates based on gender, race, and ethnicity, which is why these explanatory variables are included in this study.

b. Accession Source

There are six accession sources from which officers may earn their commission and these were discussed in detail in Chapter I. Previous research tends to group these variables in with the demographic category, but since they are the focus variables of this study, they comprise their own category. These are binary variables and Table 4 displays the distribution of the sample population by which accession source they attended.

Table 4. Accession Source Summary Statistics

Accession Source	N	Mean	Std. Dev.	min	max
USNA	16254	.139	.346	0	1
NROTC	16254	.137	.343	0	1
PLC	16254	.307	.461	0	1
OCC	16254	.295	.456	0	1
MECEP	16254	.085	.279	0	1
ECP	16254	.038	.191	0	1

The distribution demonstrates how heavily the Marine Corps relies on PLC and OCC with a combined 60% of officers in the sample population having commissioned through these programs. Comparatively, the long-term and more costly accession sources of the USNA and NROTC commissioned a combined 27.6% of the officers in the sample.

c. Performance

Past performance is a strong predictor of future performance that the Marine Corps relies on to select which officers to retain and promote. Performance variables in this category include training events such as physical fitness and marksmanship, TBS graduation rankings, evaluations in the form of FITREP scores, and commendatory and derogatory events in the form of adverse FITREPs and awards received. High performance in these categories theoretically equates to a higher propensity for these officers to achieve mission accomplishment in future assignments compared to officers with lower

performance scores. Table 5 contains the summary statistics for performance variables used in this study.

Table 5. Performance Variables Summary Statistics

Performance Variables	N	Mean	Std. Dev.	min	max
PFT	16204	265.941	21.833	92.667	300
Rifle	16254	275.268	42.658	42.8	345
Pistol	16254	332.614	27.888	74	397
TBS Top Third	7888	.344	.475	0	1
TBS Middle Third	7888	.334	.472	0	1
TBS Bottom Third	7888	.322	.467	0	1
TBS Missing	16254	.515	.5	0	1
RV Cumulative	16222	89.437	9.494	0	100
RO Assessment	16224	5.021	.792	0	7.071
Adverse FITREP	16224	.115	.397	0	6
Total Awards	16254	3.228	2.336	0	16

The Physical Fitness Test (PFT) is an annual evaluation of every Marine's fitness level. In this sample, each officer's annual PFT scores are averaged to generate a mean PFT score that represents their fitness performance throughout their career. Rifle and pistol qualifications are also an annual requirement until an officer promotes to major, then the annual rifle qualification is no longer required. The same averaging process is applied to rifle and pistol scores in which each officer's marksmanship scores are averaged over their career. TBS performance is captured by binary variables that represent which third an officer's class ranking fell into upon graduation. The significant difference in total observations for these variables is due to TBS data only going back to 2006. As a result, TBS performance is not used as an explanatory variable for the promotion to O5 analysis as this sample only includes officers commissioned from 2000 to 2004.

Officer performance in each of their assignments following MOS school is captured in their RV and RO scores on their FITREPs. The RV cumulative variable and RO assessment variable used in this study are derived by averaging an officer's cumulative RV scores and cumulative RO assessment scores over their career. The adverse FITREP variable indicates how many derogatory evaluations an officer received over their career. Total awards is a continuous variable that captures how many personal awards an officer received throughout his or her career. Unit, campaign, and service awards are not included

in this variable as they are representative of organizational performance and this study aims to determine factors of individual performance.

d. MOS Grouping

The MOS groups were derived by combining similar occupation fields to evaluate if specific occupational groups are more or less likely to be promoted to major and lieutenant colonel when compared to the others. These are binary variables and Table 6 details the distribution of the sample population by MOS group.

Table 6. MOS Group Variables Summary Statistics

MOS Group Variables	N	Mean	Std. Dev.	min	max
Combat Arms MOS	16254	.231	.422	0	1
Combat Service MOS	16254	.395	.489	0	1
Aviation MOS	16254	.221	.415	0	1
Aviation Support MOS	16254	.049	.216	0	1
Special MOS	16254	.043	.202	0	1

The MOS groups include combat arms, combat service support, aviation, aviation support, and special. The group names are self-explanatory based on career paths except for the special MOS category, which includes Staff Judge Advocates (SJA) and Acquisition Officers. A detailed list of which MOS designators were placed in each MOS grouping is included in Appendix A.

e. Experience

Additional variables are used to account for experiences that are not captured in the training and performance variables and may have explanatory power when determining career level benchmarks. These variables include the number of combat deployments an officer experiences throughout his or her career, whether they served in a joint duty billet, and if they are wounded in action (WIA). Combat deployments is a continuous variable that is the sum of all the SECDEF designated contingency operations officers participate in throughout their career. Joint duty and WIA are binary variables indicating whether officers have served in at least one joint-designated billet or if they are a recipient of the purple heart award. Table 7 details the summary statistics of the experience variables.

Table 7. Experience Variables Summary Statistics

Experience Variables	N	Mean	Std. Dev.	min	max
Combat Deployments	14101	2.104	1.256	0	18
Joint Duty	16254	.09	.286	0	1
WIA	16254	.021	.144	0	1

f. Education

Table 8 displays the summary statistics of the education variables. The General Classification Test (GCT) is required of all officers prior to completing the contract process and attending an accession source. It is meant to be a standardized test that evaluates the overall intelligence of officer candidates. As a measure of overall knowledge, this research groups it with other education variables.

Table 8. Education Variables Summary Statistics

Education Variables	N	Mean	Std. Dev.	min	max
GCT	16254	123.852	9.659	60	160
Bachelor's Degree	16254	.766	.423	0	1
Master's Degree	16254	.172	.377	0	1
Doctorate Degree	16254	.012	.109	0	1

The bachelor's degree, master's degree, and doctorate degree variables are binary and indicate which degree type is the highest level of education an officer has obtained. For example, 76.6% of officers in this sample have bachelor's degree as their highest education level while 17.2% have earned master's degrees and 1.2% have earned doctorates.

D. PRELIMINARY ANALYSIS

This section offers summary statistics of the accession source focus variables in relation to the dependent variables of achieving promotion to major and lieutenant colonel. The subsections provide the number of observations, the mean percentage or ratio of officers that are promoted to the specified grade, the standard deviation, and total number of officers that achieved promotion by each accession source.

1. Promotion to O4

Table 9 compares the promotion rates of officers being promoted to major by accession source. Overall, 38.9% or 6,323 out of 16,254 officers in this sample achieve promotion to O4. The enlisted to officer programs of MECEP and ECP have the highest rates of promotion at 54.3% and 54.1% respectively. These high rates may be attributed to the difference in overall time in service and career decisions between officers commissioned via the enlisted to officer programs and other accession sources. Outside of the enlisted to officer programs, USNA graduates have the highest rate of promotion at 40.8% while NROTC graduates have the lowest rate at 35.1%.

Table 9. Promotion to O4 Rates by Accession Source

Accession Source	N	Mean	Std. Dev.	Promoted-to-O4
USNA	2,258	0.408	0.492	921
NROTC	2,220	0.351	0.478	780
PLC	4,990	0.372	0.483	1,855
OCC	4,789	0.352	0.478	1,684
MECEP	1,381	0.543	0.498	750
ECP	616	0.541	0.499	333
Overall	16,254	0.389	0.488	6,323

2. Promotion to O5

Table 10 compares the promotion rates of officers being promoted to lieutenant colonel by accession source. Overall, 21.5% or 1,104 out of 5,146 officers in this sample achieve promotion to O5. USNA graduates have the highest rate of promotion at 25.4% while the enlisted to officer programs have the lowest rates of promotion at 14.7% and 19.8% for MECEP and ECP, respectively. This is an interesting reversal of the high promotion to O4 rates the enlisted to officer programs achieve and is again likely due to the difference in overall time in service and their associated career decisions when compared to those commissioned from the other accession sources. Out of the non-enlisted to officer programs, OCC has the lowest promotion to O5 rate at 21%.

Table 10. Promotion to O5 Rates by Accession Source

Accession Source	N	Mean	Std. Dev.	Promoted-to-O5
USNA	646	0.254	0.436	164
NROTC	822	0.226	0.419	186
PLC	1,426	0.222	0.416	317
OCC	1,515	0.210	0.407	318
MECEP	530	0.147	0.355	78
ECP	207	0.198	0.400	41
Overall	5,146	0.215	0.411	1,104

E. SUMMARY

This chapter describes the datasets from TFDW, MMRP-30, and MPA that are cleansed and merged to use in this study. The sample size in the promotion to O4 analysis is 16,254 officers commissioned between 2000 and 2010. The sample size for the promotion to O5 analysis includes 5,146 officers commissioned between 2000 and 2003. A total of 43 variables are used to examine the factors predicting promotion to major and lieutenant colonel. Data limitations include the TBS performance data from MPA only going back to 2006 and therefore not being applied to the promotion to O5 model. Preliminary analysis indicates that on average, 38.9% of officers commissioned remain in service to reach promotion to major while 21.5% of officers remain in service to reach promotion to lieutenant colonel. The focus variables of accession source indicate that MECEP and ECP have the highest rate of promotion to O4 while the USNA has the highest rate of promotion to O5.

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V. METHODOLOGY AND RESULTS

The descriptive statistics provided in the previous chapter demonstrate significant differences in the mean promotion rates between accession sources, but further analysis is required to determine if accession source is significant when controlling for the effects of other factors relevant to promotion. Multivariate statistical analysis is needed to examine the independent effects of these variables. This chapter describes the multivariate statistical models that are used to evaluate promotion to major and lieutenant colonel, the hypothesized effects of variables, and the results of these models.

A. METHODOLOGY

Multivariate regression models are the most frequently applied tools for empirical analysis (Woolridge, 2013). This is because multivariate regression analysis enables researchers to control for many factors that simultaneously affect the dependent variable instead of using simple regression analysis of how single variable x affects variable y . Economic and social science outcomes are more complicated than single regression in that multiple variables have explanatory power. Multivariate regression analysis accommodates the analysis of many explanatory variables in relation to the dependent variable and therefore allows for more detailed and accurate predictive models. This study entails what is known as a limited dependent variable in which y is discrete and takes on a limited number of values, in this case the binary values of “0” or “1” indicating whether an officer achieved promotion to a specific rank. Logit and probit models are popular binary response models used in multivariate analysis. Figure 7 is an example of a binary response model where the probability of the dependent variable y being “1” is a function of the explanatory variables x . The coefficients β represent the effects of the independent variables on the dependent variable outcome (Woolridge, 2013). This research uses the logit model multivariate regression technique.

$$P(y = 1|x) = G(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k)$$

Figure 7. Binary Response Model. Source: Woolridge (2013).

This study models major and lieutenant colonel promotion as a function of the six independent variable categories of demographics, accession source, performance, MOS group, experience, and education. Figure 8 details the full econometric model specifications. The full models include the 43 independent variables discussed in the previous chapter, or in the case of the promotion to O5 model, 40 independent variables due to the unavailability of TBS performance data for that sample.

$$P(\text{promoted_O4}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}} + \beta_{\text{performance}} + \beta_{\text{MOS group}} + \beta_{\text{experience}} + \beta_{\text{education}})$$

$$P(\text{promoted_O5}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}} + \beta_{\text{performance}} + \beta_{\text{MOS group}} + \beta_{\text{experience}} + \beta_{\text{education}})$$

Figure 8. Full Econometric Models

Each model specification addresses the primary research questions in this study. The first question seeks to determine what characteristics the Marine Corps values when selecting officers for career-level service. The dependent variables of *promoted_O4* and *promoted_O5* represent the career-level benchmarks. The independent variable categories and their significance levels indicate what characteristics the Marine Corps values when selecting officers for these benchmarks. The second research question seeks to determine if accession source is predictive in nature of officers achieving promotion to major and lieutenant colonel. The coefficients of the accession source variables and their significance levels address this question.

The full model specifications are reached by progressively adding explanatory variable categories in an incremental approach. This technique allows for the comparison of changes in the marginal effects of the independent variable coefficients as additional explanatory factors are added. Five different models are estimated and are displayed in Figure 9. The first model analyzes the relationship between officer demographics and accession source on promotion outcomes. This model establishes a baseline to observe changes in the significance of accession source as additional explanatory variables are added. Models two through four add performance, MOS group, and experience categories. Model five is the full model with the final addition of education variables. These models are applied to both the major and lieutenant colonel promotion analyses.

Model 1: $P(\text{promoted}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}})$ Model 2: $P(\text{promoted}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}} + \beta_{\text{performance}})$ Model 3: $P(\text{promoted}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}} + \beta_{\text{performance}} + \beta_{\text{MOS group}})$ Model 4: $P(\text{promoted}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}} + \beta_{\text{performance}} + \beta_{\text{MOS group}} + \beta_{\text{experience}})$ Model 5: $P(\text{promoted}) = G(\beta_0 + \beta_{\text{demographics}} + \beta_{\text{accession source}} + \beta_{\text{performance}} + \beta_{\text{MOS group}} + \beta_{\text{experience}} + \beta_{\text{education}})$
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Figure 9. Model Specifications

B. RESULTS

This section presents the results of the models specified to answer the research questions. For ease of interpretation, the results of both models are displayed in an odds-ratio form. Emphasis is placed on the statistical significance and the magnitude of the positive or negative effect of the explanatory variables.

1. Promotion to O4

Table 11 presents the results of the promotion to O4 model. The reference group for this model is a single, white, non-Hispanic male who commissions through PLC, graduates in the middle-third of TBS, and has a combat arms MOS and a bachelor's degree. The sample includes a total of 16,254 officers commissioned between 2000 and 2010 and the sample probability of achieving promotion to major is 38.9%. The final model resulted in 21 variables significant at the $p < 0.05$ or $p < 0.01$ levels. The statistically significant variables are discussed in this section.

Table 11. Promotion to O4 Model Results in Odds Ratios

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
USNA	1.346*** (.082)	1.265** (.122)	1.183 (.123)	1.135 (.129)	1.043 (.124)
NROTC	1.136** (.071)	1.013 (.103)	1.19 (.13)	1.202 (.143)	1.185 (.145)
OCC	.996 (.048)	.911 (.072)	1.039 (.088)	1.094 (.102)	1.05 (.101)
MECEP	.936 (.065)	.41*** (.053)	.47*** (.064)	.51*** (.074)	.485*** (.073)
ECP	1.127 (.109)	.543*** (.097)	.555*** (.106)	.56*** (.111)	.541*** (.109)
Married	2.123*** (.141)	1.843*** (.184)	1.535*** (.165)	1.677*** (.198)	1.641*** (.199)
Divorced	5.202*** (.505)	3.538*** (.564)	2.89*** (.483)	2.786*** (.498)	2.524*** (.469)
Number of Dependents	1.878*** (.032)	1.588*** (.044)	1.555*** (.045)	1.565*** (.049)	1.535*** (.049)
Female	1.441*** (.105)	1.321** (.159)	1.267* (.164)	1.343** (.194)	1.207 (.181)
Black	.84* (.079)	1.358* (.228)	1.746*** (.313)	1.512** (.29)	1.471* (.297)
Asian	1.268** (.131)	1.287 (.212)	1.417** (.246)	1.592** (.308)	1.528** (.304)
Other Race	1.048 (.17)	.975 (.254)	1.086 (.301)	1.057 (.309)	1.038 (.316)
Hispanic	1.046 (.074)	1.193 (.143)	1.331** (.169)	1.27* (.178)	1.17 (.17)
PFT		1.001 (.002)	1.004** (.002)	1.005** (.002)	1.004* (.002)
Rifle		1.001 (.001)	1.01*** (.001)	1.011*** (.001)	1.011*** (.001)
Pistol		1.017*** (.001)	1.012*** (.001)	1.012*** (.002)	1.013*** (.002)
TBS Top Third		.7*** (.052)	.666*** (.053)	.641*** (.056)	.594*** (.054)
TBS Bottom Third		.865* (.068)	1.018 (.085)	1.012 (.093)	.975 (.092)

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
RV Cumulative		1.022 (.016)	1.023 (.018)	1.023 (.02)	1.015 (.02)
RO Assessment		4.116*** (.366)	6.429*** (.644)	6.806*** (.757)	6.461*** (.733)
Adverse FITREP		.343*** (.047)	.398*** (.058)	.374*** (.059)	.364*** (.059)
Total Awards		1.53*** (.034)	1.798*** (.045)	1.63*** (.045)	1.571*** (.045)
Combat Service MOS			1.172* (.103)	1.37*** (.129)	1.252** (.122)
Aviation MOS			10.219*** (1.09)	10.561*** (1.233)	10.64*** (1.264)
Aviation Support MOS			3.831*** (.61)	4.931*** (.913)	4.755*** (.902)
Special MOS			2.161*** (.331)	3.195*** (.649)	2.81*** (.719)
Combat Deployments				1.553*** (.064)	1.562*** (.067)
Joint Duty				1.653*** (.224)	1.701*** (.236)
WIA				.453*** (.125)	.483** (.137)
GCT					1 (.004)
Master's Degree					4.507*** (.494)
Doctorate Degree					1.331 (.48)
Observations	15554	7821	7821	6620	6620
Pseudo R ²	.186	.376	.44	.448	.472

Standard errors are in parentheses

*** $p < .01$, ** $p < .05$, * $p < .1$

USNA and NROTC accession sources have significant positive effects on promotion in Model 1, which includes only demographics and accession source variables. As additional variables related to performance, MOS, experience, and education are included, the effects of the accession sources are diminished. In the final model, only MECEP and ECP are statistically significant with both having negative effects on promotion to major. The odds of a MECEP graduate being promoted to major are 0.49 times relative to PLC graduates. ECP graduates' odds of promotion are 0.54 times relative to PLC graduates. USNA and NROTC are not statistically significant.

The demographic variables with the greatest effects on promotion to major include marital status, number of dependents, and officers of Asian race. The odds that married officers are promoted are 1.64 times greater than officers that are single while the odds that a divorced officer is promoted are 2.52 times greater than single officers. For each

additional dependent, an officer's odds of being promoted increases by 1.54 times. The only statistically significant race category is Asian officers, who are 1.53 times more likely to be promoted when compared to white officers.

The performance variables with a significant effect on promotion to major include rifle and pistol scores, TBS performance, RO assessments, adverse material, and awards. For every additional 10 points scored on the rifle and pistol qualifications, an officer's odds of promotion increase by 1.11 and 1.13 times, respectively. The odds of promotion for officers graduating in the top third of their TBS class are 0.59 times relative to officers graduating in the middle third. Interestingly, an officer's cumulative RV is not statistically significant in any of the models. However, an officer's cumulative RO assessment average is significant with an officer's odds of being promoted to Maj increasing by 6.51 times for every additional point in their RO assessment average. As expected, adverse material negatively impacts promotion outcomes with officers being 0.36 times less likely to achieve promotion to Maj for every additional adverse FITREP on their record. Conversely, for every additional personal award received an officer's odds being promoted increase by 1.57 times.

Every MOS category is statistically significant and a positive indicator of promotion to major compared to the combat arms category. Officers with a combat service support MOS are 1.25 times more likely to be promoted than officers in combat arms communities. Likewise, aviation support officers are 4.76 times more likely to be promoted to major than combat arms officers. These outcomes suggest that combat arms officers might be separating at a higher rate than their combat service support and aviation support peers prior to O4 promotion boards. Aviation officers are 10.64 times more likely to be promoted to major than combat arms officers. Higher odds of promotion within the aviation communities are expected as aviation MOSs entail specialized training that involve an officer signing longer service contracts. Members of the special MOSs are 2.81 times more likely to promote relative to combat arms MOSs. This indicates the desire of SJAs and acquisitions officers to remain in service as well as the Marine Corp's tendency to promote officers of these MOS groups.

The experience variables of combat, joint duty, and WIA are all statistically significant. For each additional combat deployment officers experience, their odds being promoted increases by 1.56 times. Officers that have served in a joint duty billet are 1.7 times more likely to be promoted to major when compared to officers who have no joint duty experience. Recipients of the purple heart are 0.48 times less likely to be promoted when compared to officers who have not been WIA. This negative correlation may be contributed to medical separations, decreased interest in continued service after experiencing a combat wound, or death.

Of the education variables, only a master's degree was statistically significant. Officers that earn a master's degree are 4.51 times more likely to achieve promotion to major when compared to officers with only a bachelor's degree. GCT and doctorate degrees were not statistically significant in this model.

2. Promotion to O4 Conditional

Table 12 presents the results of a promotion to O4 conditional model. The dependent variable in this model is whether an officer promotes to O4 given that the officer served at least nine years of commissioned service (YCS). MECEP and ECP graduates that are eligible for retirement or expected to be eligible within twelve months are removed from the sample. This model includes 7,336 officers that remained in service long enough to be considered for O4 promotion. Of these officers, 73.7% are promoted to O4. In this conditional model, only eleven explanatory variables are statistically significant.

Table 12. Promotion to O4 Conditional Model Results in Odds-Ratios

	Odds-Ratios	
USNA	1.156	(0.181)
NROTC	1.324	(0.224)
OCC	1.123	(0.140)
MECEP	0.958	(0.370)
ECP	1.225	(0.444)
Married	1.225	(0.211)
Divorced	1.463	(0.380)
Number of Dependents	1.271***	(0.054)
Female	0.862	(0.192)
Black	1.214	(0.353)
Asian	1.141	(0.296)

	Odds-Ratios	
Other Race	0.686	(0.284)
Hispanic	1.213	(0.256)
PFT	1.007*	(0.003)
Rifle	1.008***	(0.002)
Pistol	1.004	(0.002)
TBS Top Third	0.887	(0.115)
TBS Bottom Third	0.918	(0.115)
RV Cumulative	1.141***	(0.033)
RO Assessment	5.627***	(0.916)
Adverse FITREP	0.259***	(0.051)
Total Awards	1.369***	(0.060)
Combat Service MOS	1.231	(0.190)
Aviation MOS	2.470***	(0.405)
Aviation Support MOS	3.938***	(1.259)
Special MOS	1.494	(0.543)
Combat Deployments	1.226***	(0.070)
Joint Duty	1.219	(0.228)
WIA	1.142	(0.558)
GCT	1.003	(0.006)
Master's Degree	2.720***	(0.438)
Doctorate Degree	0.828	(0.383)
Observations	3517	
R^2		

Compared to the non-conditional promotion to O4 model, the accession sources of MECEP and ECP are no longer statistically significant due to controlling for officers likely to opt for retirement rather than promotion to O4. Marriage or prior marriage is no longer statistically significant, but the odds of being promoted increase by 1.27 times for each additional dependent. Rifle scores remain statistically significant with the odds of achieving O4 promotion increasing by 1.08 for every additional 10 points scored. PFT scores are statistically significant in this model with the odds of achieving promotion increasing by 1.07 for every additional 10 points scored. Both RV and RO scores are statistically significant, with an officer's odds of being promoted increasing by 1.14 times for every additional point in their RV cumulative average and 5.63 times for every additional point on their RO assessment average. While the odds of promotion for aviation and aviation support MOSs remain greater relative to combat arms MOSs, combat service support MOSs and special MOSs are no longer significant. Combat deployments remain a positive indicator of promotion as does an officer having a master's degree.

A notable difference between the two O4 promotion models is the significance of TBS performance. The non-conditional model indicates officers with top-third TBS

performance are less likely to promote relative to middle-third performers. In the conditional model, TBS performance is no longer statistically significant, but the sign indicates that officers graduating in the top-third of TBS are promoted to O4 at a lower rate compared to middle-third TBS graduates. Possible explanations include that the promotion board process results in fewer top-third graduates being selected for O4 promotion when compared to middle-third graduates, or that top-third TBS graduates are choosing to pursue career opportunities outside of the Marine Corps since officers with nine YCS may still opt to resign their commission prior to the promotion board or deny promotion once selected and exit service.

3. Promotion to O5

Table 13 presents the results of the promotion to O5 model. The reference group for this model is a single, white, non-Hispanic male, commissioned through PLC, with a combat arms MOS and bachelor's degree. The sample includes a total of 5,146 officers commissioned between 2000 and 2003 and the sample probability of achieving promotion to lieutenant colonel is 21.5%. The final model resulted in 18 variables significant at the $p < 0.05$ or $p < 0.01$ levels. The statistically significant variables are discussed in this section.

Table 13. Promotion to O5 Model Results in Odds-Ratios

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
USNA	1.376*** (.169)	1.1 (.188)	1.198 (.209)	1.128 (.201)	1.147 (.219)
NROTC	1.294** (.152)	.835 (.139)	.947 (.161)	.84 (.149)	.803 (.151)
OCC	1.048 (.103)	1.091 (.146)	1.13 (.156)	1.069 (.152)	1.088 (.159)
MECEP	.33*** (.049)	.136*** (.028)	.159*** (.033)	.164*** (.036)	.161*** (.036)
ECP	.621** (.122)	.136*** (.039)	.154*** (.045)	.186*** (.056)	.158*** (.048)
Married	3.118*** (.586)	2.059*** (.486)	1.875*** (.453)	2.157*** (.546)	1.952*** (.507)
Divorced	4.591*** (1.147)	3.393*** (1.11)	2.765*** (.923)	2.749*** (.945)	2.082** (.746)
Number of Dependents	1.614*** (.047)	1.362*** (.055)	1.34*** (.055)	1.321*** (.057)	1.264*** (.056)
Female	1.421** (.217)	1.299 (.284)	1.401 (.32)	1.722** (.408)	1.472 (.366)

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
Black	.809 (.151)	1.41 (.382)	1.595* (.443)	1.762** (.501)	1.573 (.464)
Asian	1.168 (.248)	1.336 (.394)	1.282 (.383)	1.305 (.393)	1.235 (.378)
Other Race	1.886* (.64)	3.215** (1.758)	2.865** (1.52)	3.431** (1.915)	3.608** (2.058)
Hispanic	1.009 (.138)	1.231 (.24)	1.292 (.255)	1.35 (.273)	1.287 (.269)
PFT		1 (.002)	1.001 (.003)	1 (.003)	.998 (.003)
Rifle		1.014*** (.002)	1.015*** (.002)	1.013*** (.002)	1.011*** (.002)
Pistol		1.007*** (.002)	1.006*** (.002)	1.007*** (.002)	1.006** (.002)
RV Cumulative		1.091*** (.034)	1.111*** (.036)	1.143*** (.038)	1.107*** (.039)
RO Assessment		14.615*** (2.681)	14.061*** (2.647)	14.574*** (2.864)	15.416*** (3.179)
Adverse FITREP		.138*** (.04)	.14*** (.042)	.136*** (.041)	.121*** (.038)
Total Awards		1.478*** (.036)	1.552*** (.041)	1.426*** (.04)	1.37*** (.04)
Combat Service MOS			.908 (.138)	1.021 (.166)	.891 (.152)
Aviation MOS			2.267*** (.353)	2.252*** (.369)	2.221*** (.381)
Aviation Support MOS			3.096*** (.763)	4.181*** (1.086)	3.323*** (.887)
Special MOS			2.896*** (.661)	4.494*** (1.121)	3.706*** (.992)
Combat Deployments				1.337*** (.051)	1.327*** (.052)
Joint Duty				1.465*** (.205)	1.496*** (.215)
WIA				.622 (.191)	.603 (.192)
GCT					.995 (.006)
Master's Degree					3.653*** (.432)
Doctorate Degree					2.533* (1.226)
Observations	4624	4609	4609	4182	4182
Pseudo R ²	.131	.513	.528	.53	.556

Standard errors are in parentheses

*** $p < .01$, ** $p < .05$, * $p < .1$

All accession sources besides OCC have statistically significant effects on promotion in Model 1, but as additional variables related to performance, MOS, experience, and education are included, the significance of the accession sources is diminished. In the final model, MECEP and ECP are statistically significant with both

having negative correlations with promotion to lieutenant colonel. A MECEP graduate is 0.16 times less likely to be promoted when compared to PLC graduates. ECP graduates are also 0.16 times less likely to be promoted relative to PLC graduates. USNA and NROTC are not significant.

The demographic variables with the greatest effects on promotion to lieutenant colonel include marital status, number of dependents, and officers of native races. Married officers are 1.95 times more likely to be promoted to lieutenant colonel than officers that are single while divorced officers are 2.08 times more likely to be promoted than singles. For each additional dependent, an officer's odds of being promoted increase by 1.26 times. Regarding race, officers of native American, native Alaskan, native Hawaiian and Pacific Islander descent are 3.60 times more likely to be promoted relative to white officers.

The performance variables with a significant effect on promotion to lieutenant colonel include rifle and pistol scores, average FITREP scores, adverse material, and awards. For every additional 10 points scored on the rifle and pistol qualifications, an officer's odds of promotion increase by 1.11 and 1.06 times, respectively. In the promotion to O5 model, both RS and RO evaluations are significant. For every additional point an officer has in their cumulative RV average, the odds of being promoted increase by 1.11 times. For every additional point in their cumulative RO assessment average, an officer's odds of being promoted to lieutenant colonel increases by 15.42 times. Adverse material negatively impacts promotion outcomes with officers being 0.12 times less likely to achieve promotion to lieutenant colonel for every additional adverse FITREP on their record. Personal awards remain a positive indicator of promotion, with every additional award an officer receives increasing their odds of promotion by 1.37 times.

Aviation, aviation support, and special MOSs are significant and positive indicators of promotion to lieutenant colonel when compared to combat arms MOSs. Officers with aviation and aviation support MOSs are 2.22 and 3.32 times more likely to be promoted to lieutenant colonel when compared to their combat arms peers. SJA officers and acquisition officers are 3.71 times more likely to achieve promotion to lieutenant colonel relative to officers in combat arms MOSs.

The experience variables of combat deployments and joint duty are statistically significant. For each additional combat deployment officers experience, their likelihood of being promoted increases by 1.33 times. Officers that have served in a joint duty billet are 1.50 times more likely to be promoted to lieutenant colonel when compared to officers who have no joint-duty experience. WIA is not statistically significant in promotion to O5 outcomes.

The master's degree was the sole statistically significant education variable. Officers that earn a master's degree are 3.65 times more likely to achieve promotion to lieutenant colonel when compared to officers with only a bachelor's degree. GCT was not statistically significant while a doctorates degree displayed positive effects on promotion, but only at a $p < .1$ significance level.

C. SUMMARY

This chapter describes the quantitative analysis methodology and the model results of this research. Logistic regression models are applied to determine what factors are predictive in the outcomes of promotion to major and lieutenant colonel. The results indicate USNA, NROTC, and OCC accession sources are not statistically significant in predicting promotion to career-level benchmarks. The enlisted-to-officer programs of MECEP and ECP are negatively correlated with promotion to O4 and O5, but when controlling for officers that have reached retirement eligibility before O4 promotion consideration, they are not statistically significant. Marriage, prior marriage, and dependents are positive indicators of promotion in the promotion to O4 and O5 models. Officers of Asian descent are more likely to remain in service and be promoted to major while officers of native descents are more likely to be promoted to lieutenant colonel relative to white officers.

Marksmanship scores are positively correlated with promotion in both models. Officers graduating in the top-third of TBS have lower odds of achieving promotion to major compared to middle-third graduates. However, when considering only the officers who remain in service until eligible for O4 promotion, TBS performance is no longer statistically significant. An officer's cumulative RV average is statistically significant in

the promotion to O4 conditional model and a positive indicator in the promotion to O5 model. RO assessment averages are positively correlated with both promotion benchmarks. As expected, adverse FITREPs are a significant negative indicator of promotion in all models.

Officers in service support, aviation, aviation support, and special MOSs have greater odds of achieving promotion to O4 compared to their peers in combat arms MOSs. When evaluating promotion to O4 conditional on nine YCS, service support and special MOSs are no longer statistically significant. In the promotion to O5 model, aviation, aviation support, and special MOSs remain statistically significant and positive indicators, but service support is no longer significant relative to combat arms. Experience factors measured by combat deployments and joint duty are both positive predictors in promotion to O4 and O5. Of the education variables, only master's degrees are statistically significant with officers who attain a master's degree being more likely to be promoted to O4 and O5 than officers with only a bachelor's degree. Table 14 is a summary and comparison of model outcomes.

Table 14. Summary of Variable Significance in Promotion to O4 and O5 Models.

Variable	Sign		
	Promotion to O4	Promotion to O4 Conditional	Promotion to O5
USNA	NS	NS	NS
NROTC	NS	NS	NS
OCC	NS	NS	NS
MECEP	-	NS	-
ECP	-	NS	-
Married	+	NS	+
Divorced	+	NS	+
Number of Dependents	+	+	+
Female	NS	NS	NS
Black	NS	NS	NS
Asian	+	NS	NS
Other Race	NS	NS	+
Hispanic	NS	NS	NS

Variable	Sign		
PFT	NS	+	NS
Rifle	+	+	+
Pistol	+	NS	+
TBS Top-Third	-	NS	N/A
TBS Bottom-Third	NS	NS	N/A
RV Cumulative	NS	+	+
RO Assessment	+	+	+
Adverse FITREP	-	-	-
Total Awards	+	+	+
Combat Service MOS	+	NS	NS
Aviation MOS	+	+	+
Aviation Support MOS	+	+	+
Special MOS	+	NS	+
Combat Deployments	+	+	+
Joint Duty	+	NS	+
WIA	-	NS	NS
GCT	NS	NS	NS
Master's Degree	+	+	+
Doctorate Degree	NS	NS	NS

+ = positive
 significance,
 - = negative
 significance,

NS = not significant

N/A = not applicable

VI. CONCLUSIONS AND RECOMMENDATIONS

This chapter discusses the interpretation of the promotion model outcomes in relation to the research questions and how the outcomes of the focus variables compare to historical research. This chapter closes with recommendations pertaining to policy implications and continued research topics.

A. CONCLUSIONS

The purpose of this study was to determine the individual characteristics the Marine Corps values in selecting career-level officers and if any accession source has a greater probability of producing career-level officers. This study defined career-level service as achieving promotion to major and lieutenant colonel and investigated each of these benchmarks. This section discusses the significance of the variable outcomes and how they relate to the research questions.

Through multivariate analysis, this research investigated what characteristics the Marine Corps tends to value in officers selected for career-level service. Overall, these characteristics include officers that value a family-oriented lifestyle, demonstrate the ability to perform well during marksmanship evaluations, receive high markings on annual evaluations, have combat deployment and joint-duty experience, and have master's degrees.

The premium placed on family may not be particular to Marine officers, but representative of the entire population. It is probable that the overall population has comparable results in that men and women of the same age and career progression as the officers in the sample make similar decisions about starting families and that these results are not unique to Marine officers.

The varying results of TBS performance and its effect on promotion is worth discussing. This study found that officers graduating in the top-third of their TBS class are less likely to be promoted to major. This negative correlation does not necessarily indicate that the top graduates of TBS are not performing as well as their peers and therefore failing to be promoted to major. Rather, this result may indicate that quality officers are choosing

to exit service and pursue careers outside of the military. Still, the TBS performance results of this research are contradictory to previous studies. O'Brien's 2002 study states that officers graduating in the top-third of TBS are more likely to be promoted to major. Possible factors explaining the difference between O'Brien's discoveries and this research is the timeframe of the data analyzed. O'Brien's model evaluated officers commissioned between 1980 and 2000 while this study analyzed the 2000 to 2010 commissioning cohorts. Many officers evaluated in this study were commissioned just prior to or following the September 11, 2001 terrorist attacks that resulted in the war on terror. This period of conflict may have impacted retention decisions. Potential factors include officers satisfying their initial service goals and opting to exit service, or frequent deployment cycles dissuaded long-term service for those officers most capable of achieving employment elsewhere. However, Salas's 2015 research on officers commissioned between 1999 and 2004 states that a higher TBS grade point average is associated with greater probabilities of retention to ten years of service. While his dependent variable and explanatory variable vary slightly from this research, the conflicting results suggest further analysis of TBS performance in relation to retention and promotion is warranted.

The second research question of this study sought to determine if any accession source is more successful in producing career-level officers. Chapter II discussed the different acclimation periods associated with the accession sources and hypothesized that programs with longer acculturation periods such as the USNA and NROTC have the potential to produce more officers that achieve career-level service. Descriptive statistics indicate that the USNA has the highest percent of officers that remain in service and promote to O4 and O5 compared to NROTC, PLC, and OCC with 40.8% of officers commissioned through the USNA being promoted to major and 25.4% being promoted to lieutenant colonel. Comparatively, the average percentages for all accession programs combined are 38.9% for major and 21.5% for lieutenant colonel. However, the multivariate analysis results do not support this hypothesis and indicate that none of the accession sources have a propensity to produce officers more likely to be promoted to major or lieutenant colonel when compared to the others.

The sign and magnitude of MECEP and ECP variables were expected based on different career timing considerations. Officers commissioned through these programs have already accrued time-in-service prior to commissioning and therefore reach retirement eligibility before graduates of OCC, PLC, USNA, and NROTC. Many MECEP and ECP officers reach retirement eligibility prior to the major and lieutenant colonel promotion selection boards and opt to retire rather than accept the additional service obligation associated with promotion.

B. RECOMMENDATIONS

The statistical analyses in this study are not conclusive enough to support absolute recommendations affecting accession source policy. There is some statistical evidence suggesting that USNA graduates have a higher likelihood of remaining in service and being promoted to major and lieutenant colonel compared to NROTC, PLC, and OCC graduates. Based on this evidence, one recommendation is for the Marine Corps to maximize the number of officers commissioned from the academy since USNA graduates comprise only 13.9% of the sample population in this study. While the Marine Corps may commission up to 30% of USNA graduates, only 25% of academy graduates commissioned into the Marine Corps in 2019 and 2020 (USNA, 2021). While there is a 5% margin that remains unused, there are likely other factors to be considered such as the needs of the Navy that prevents the Marine Corps from attaining the full 30%.

There is a considerable amount of historical research concerning the factors of officer promotion. Many of these studies have similar findings, but as discussed in the literature review and conclusions there are also some differences in variable significance. Specific to this research, the negative association top-level TBS performance has on promotion outcomes is particularly interesting and should be researched further. The statistical significance of accession source should continue to be investigated to determine if they are predictive of promotion outcomes. While this study focused on major and lieutenant colonel promotions, other promotion benchmarks should be analyzed. Below are several research topics related to officer performance and promotion that are recommended for continued research.

- Analysis of the relationship between TBS performance and promotion.
- Analysis of factors that predict promotion to colonel.
- Analysis of factors that predict the promotion of general officers.
- Analysis of the relationship between diversity, accession source, and promotion.

APPENDIX A. MOS DESIGNATOR GROUPS

Variable	Occupational Fields
Combat Arms MOS	0302, 0370, 0802, 1802, 1803, 7204
Combat Service MOS	0102, 0180, 0202, 0204, 0207, 0402, 0602, 1302, 3002, 3404, 4302, 4502, 5507, 5803
Aviation MOS	7509, 7518, 7523, 7525, 7532, 7543, 7556, 7557, 7562, 7563, 7534, 7565, 7566, 7588
Aviation Support MOS	7315, 7318, 7202, 6602, 6002
Special MOS	8059, 8061, 4402

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APPENDIX B. MODEL ESTIMATES

C. PROMOTION TO O4 LOGIT

Table 15. Promotion to O4 Logit Model Results

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
USNA	.297*** (.061)	.235** (.097)	.168 (.104)	.126 (.114)	.042 (.119)
NROTC	.128** (.062)	.013 (.102)	.174 (.109)	.184 (.119)	.17 (.122)
OCC	-.004 (.049)	-.093 (.079)	.038 (.085)	.09 (.093)	.049 (.096)
MECEP	-.066 (.07)	-.891*** (.128)	-.755*** (.137)	-.674*** (.146)	-.724*** (.15)
ECP	.12 (.097)	-.61*** (.179)	-.589*** (.191)	-.58*** (.198)	-.614*** (.202)
Married	.753*** (.067)	.611*** (.1)	.428*** (.107)	.517*** (.118)	.495*** (.121)
Divorced	1.649*** (.097)	1.263*** (.159)	1.061*** (.167)	1.025*** (.179)	.926*** (.186)
Number of Dependents	.63*** (.017)	.463*** (.027)	.441*** (.029)	.448*** (.031)	.428*** (.032)
Female	.365*** (.073)	.278** (.12)	.237* (.129)	.295** (.145)	.188 (.15)
Black	-.174* (.094)	.306* (.168)	.558*** (.179)	.413** (.192)	.386* (.202)
Asian	.237** (.104)	.252 (.165)	.348** (.174)	.465** (.193)	.424** (.199)
Other Race	.047 (.163)	-.025 (.26)	.082 (.277)	.056 (.292)	.037 (.304)
Hispanic	.045 (.071)	.177 (.12)	.286** (.127)	.239* (.14)	.157 (.145)
PFT		.001 (.002)	.004** (.002)	.005** (.002)	.004* (.002)
Rifle		.001 (.001)	.01*** (.001)	.011*** (.001)	.011*** (.001)
Pistol		.017*** (.001)	.012*** (.001)	.012*** (.002)	.012*** (.002)
TBS Top Third		-.357*** (.075)	-.407*** (.08)	-.444*** (.088)	-.521*** (.091)
TBS Bottom Third		-.145* (.079)	.018 (.083)	.012 (.092)	-.025 (.095)
RV Cumulative		.022 (.016)	.023 (.017)	.023 (.019)	.015 (.02)
RO Assessment		1.415*** (.089)	1.861*** (.1)	1.918*** (.111)	1.866*** (.113)
Adverse FITREP		-1.07*** (.137)	-.922*** (.146)	-.982*** (.157)	-1.012*** (.161)
Total Awards		.425*** (.022)	.587*** (.025)	.488*** (.028)	.452*** (.028)
Combat Service MOS			.159* (.087)	.314*** (.094)	.224** (.097)
Aviation MOS			2.324***	2.357***	2.365***

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
			(.107)	(.117)	(.119)
Aviation Support MOS			1.343*** (.159)	1.595*** (.185)	1.559*** (.19)
Special MOS			.771*** (.153)	1.162*** (.203)	1.033*** (.256)
Combat Deployments				.44*** (.041)	.446*** (.043)
Joint Duty				.503*** (.135)	.531*** (.139)
WIA				-.792*** (.276)	-.728** (.284)
GCT					0 (.004)
Master's Degree					1.506*** (.11)
Doctorate Degree					.286 (.361)
_cons	-2.251*** (.06)	-18.048*** (1.346)	-23.896*** (1.505)	-25.072*** (1.682)	-24.042*** (1.796)
Observations	15554	7821	7821	6620	6620
Pseudo R ²	.186	.376	.44	.448	.472

Standard errors are in parentheses

*** $p < .01$, ** $p < .05$, * $p < .1$

D. PROMOTION TO O4 LOGIT MARGINAL EFFECTS

Table 16. Promotion to O4 Logit Marginal Effects Results

Variable	Marginal Effects	S.E.
USNA (d)	0.010	(0.029)
NROTC (d)	0.041	(0.030)
OCC (d)	0.012	(0.023)
MECEP (d)	-0.158***	(0.029)
ECP (d)	-0.135***	(0.040)
Married (d)	0.115***	(0.027)
Divorced (d)	0.227***	(0.044)
Number of Dependents	0.102***	(0.008)
Female (d)	0.046	(0.037)
Black (d)	0.095	(0.050)
Asian (d)	0.104*	(0.050)
Other Race (d)	0.009	(0.073)
Hispanic (d)	0.038	(0.035)
PFT	0.001	(0.001)
Rifle	0.003***	(0.000)
Pistol	0.003***	(0.000)
TBS Top Third (d)	-0.122***	(0.021)

Variable	Marginal Effects	S.E.
TBS Bottom Third (d)	-0.006	(0.023)
RV Cumulative	0.004	(0.005)
RO Assessment	0.445***	(0.027)
Adverse FITREP	-0.242***	(0.038)
Total Awards	0.108***	(0.007)
Combat Service MOS (d)	0.054*	(0.023)
Aviation MOS (d)	0.525***	(0.020)
Aviation Support MOS (d)	0.365***	(0.037)
Special MOS (d)	0.253***	(0.059)
Combat Deployments	0.107***	(0.010)
Joint Duty (d)	0.131***	(0.035)
WIA (d)	-0.156**	(0.052)
GCT	-0.000	(0.001)
Master's Degree (d)	0.359***	(0.024)
Doctorate Degree (d)	0.070	(0.090)
Observations	6620	

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

E. PROMOTION TO O5 LOGIT

Table 17. Promotion to O5 Logit Model Results

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
USNA	.319*** (.123)	.095 (.171)	.181 (.175)	.12 (.179)	.137 (.191)
NROTC	.258** (.117)	-.18 (.166)	-.055 (.17)	-.174 (.177)	-.22 (.188)
OCC	.047 (.098)	.087 (.134)	.122 (.138)	.066 (.142)	.084 (.147)
MECEP	-1.109*** (.148)	-1.994*** (.205)	-1.838*** (.21)	-1.811*** (.217)	-1.824*** (.223)
ECP	-.476** (.196)	-1.997*** (.287)	-1.871*** (.292)	-1.681*** (.298)	-1.843*** (.306)
Married	1.137*** (.188)	.722*** (.236)	.628*** (.242)	.769*** (.253)	.669*** (.26)
Divorced	1.524*** (.25)	1.222*** (.327)	1.017*** (.334)	1.011*** (.344)	.734** (.358)
Number of Dependents	.479*** (.029)	.309*** (.04)	.293*** (.041)	.278*** (.043)	.234*** (.045)
Female	.351** (.153)	.262 (.218)	.337 (.228)	.544** (.237)	.386 (.249)
Black	-.212 (.187)	.343 (.271)	.467* (.278)	.566** (.285)	.453 (.295)
Asian	.156 (.212)	.289 (.295)	.248 (.299)	.266 (.301)	.211 (.306)
Other Race	.635* (.212)	1.168** (.295)	1.052** (.299)	1.233** (.301)	1.283** (.306)

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
	(.339)	(.547)	(.531)	(.558)	(.57)
Hispanic	.009 (.136)	.208 (.195)	.256 (.197)	.3 (.203)	.253 (.209)
PFT		0 (.002)	.001 (.003)	0 (.003)	-.002 (.003)
Rifle		.014*** (.002)	.015*** (.002)	.013*** (.002)	.011*** (.002)
Pistol		.007*** (.002)	.006*** (.002)	.007*** (.002)	.006*** (.002)
RV Cumulative		.087*** (.031)	.106*** (.032)	.134*** (.034)	.102*** (.035)
RO Assessment		2.682*** (.183)	2.643*** (.188)	2.679*** (.197)	2.735*** (.206)
Adverse FITREP		-1.979*** (.291)	-1.966*** (.303)	-1.995*** (.302)	-2.109*** (.314)
Total Awards		.391*** (.025)	.44*** (.026)	.355*** (.028)	.315*** (.029)
Combat Service MOS			-.097 (.152)	.021 (.163)	-.115 (.17)
Aviation MOS			.818*** (.156)	.812*** (.164)	.798*** (.172)
Aviation Support MOS			1.13*** (.246)	1.43*** (.26)	1.201*** (.267)
Special MOS			1.063*** (.228)	1.503*** (.249)	1.31*** (.268)
Combat Deployments				.291*** (.038)	.283*** (.039)
Joint Duty				.382*** (.14)	.403*** (.144)
WIA				-.476 (.307)	-.506 (.319)
GCT					-.005 (.006)
Master's Degree					1.295*** (.118)
Doctorate Degree					.929* (.484)
_cons	-3.263*** (.181)	-32.589*** (2.549)	-35.018*** (2.665)	-37.661*** (2.802)	-33.199*** (2.982)
Observations	4624	4609	4609	4182	4182
Pseudo R ²	.131	.513	.528	.53	.556

Standard errors are in parentheses

*** $p < .01$, ** $p < .05$, * $p < .1$

F. PROMOTION TO O5 LOGIT MARGINAL EFFECTS

Table 18. Promotion to O5 Logit Marginal Effects Results

Variable	Marginal Effects	S.E.
Promotion-to-O5		
USNA (d)	0.007	(0.010)
NROTC (d)	-0.010	(0.008)
OCC (d)	0.004	(0.008)
MECEP (d)	-0.053***	(0.006)
ECP (d)	-0.047***	(0.005)
Married (d)	0.029**	(0.009)
Divorced (d)	0.050	(0.031)
Number of Dependents	0.012***	(0.002)
Female (d)	0.022	(0.017)
Black (d)	0.027	(0.021)
Asian (d)	0.012	(0.018)
Other Race (d)	0.113	(0.078)
Hispanic (d)	0.014	(0.013)
PFT	-0.000	(0.000)
Rifle	0.001***	(0.000)
Pistol	0.000*	(0.000)
RV Cumulative	0.005**	(0.002)
RO Assessment	0.136***	(0.013)
Adverse FITREP	-0.105***	(0.015)
Total Awards	0.016***	(0.002)
Combat Service MOS (d)	-0.006	(0.008)
Aviation MOS (d)	0.047***	(0.012)
Aviation Support MOS (d)	0.099**	(0.033)
Special MOS (d)	0.113**	(0.035)
Combat Deployments	0.014***	(0.002)
Joint Duty (d)	0.023*	(0.009)
WIA (d)	-0.021*	(0.010)
GCT	-0.000	(0.000)
Master's Degree (d)	0.089***	(0.013)
Doctorate Degree (d)	0.070	(0.052)
Observations	4182	

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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