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Significant Factors in Predicting Promotion to Major, Lieutenant Colonel, and Colonel in the United States Marine Corps

27 March 2008

by

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Abstract

Multiple factors influence a Marine officer's probability of promotion. Currently, MMOA-4 counselors are not able to provide career advice based on statistical analysis of the multitude of variables that could be significant in an officer's potential to advance to the next higher grade. Development of a statistical counseling model provides MMOA-4 the ability to examine an officer's current predicted probability of promotion as well as his future potential for advancement—given a set of possible career choices. Such a model may increase the effectiveness of the career counseling process and potentially impact USMC officer retention and performance.

This study makes recommendations to improve the Marine Corps Performance Evaluation System (PES). The researcher's analysis of 8 years of fitness report data indicates that current procedures (which use raw numbers to evaluate the effects of the Reviewing Officer's (RO) assessment) should be changed to a percentile system. The current system only provides a generalized output that has limited value in fitness report analysis. The raw numbers of the comparative assessment limit the possibility of comparing officers across a grade for each RO. The exact value of the percentile system allows for officers to be differentiated and compared across grade. This is similar to the relative value system used for Reporting Senior (RS) markings. This new system will allow officers to be shown as below average, average or above average for each RO, similarly to what is currently being recorded by each RS. Ultimately, this would increase the effectiveness of retention, promotion, command, and resident school selections by empowering the board members with the ability to screen officers utilizing the RO percentile system.

Keywords: Marine Corps, Officer Promotions, Officer Career, Human Resource Management

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About the Author

Maj. Joel Hoffman, United States Marine Corps, is currently as a student in the Masters of Science program (with an emphasis on Manpower Systems) at the Naval Postgraduate School, Monterey, California. Maj. Hoffman completed his undergraduate studies at Indiana University in Bloomington, Indiana.   Prior to his current assignment, Maj. Hoffman served as an Administration Officer for Programs & Resources Department, Headquarters Marine Corps at the Pentagon. His next assignment will be as a Manpower Capabilities Analyst for Marine Corps Combat Development Command in Quantico, Virginia.

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I.   Introduction

> As our corps' postures for the long war, and in order to help meet the
> challenges of frequent deployments, I want our corps' leadership to initiate
> policies to ensure all Marines, first termers and career Marines alike, are
> provided the ability to deploy to a combat zone.[1]

General James T. Conway, USMC

A.   Background

The Marine Corps annually holds promotion boards to select its best-qualified
officers for promotion. Marine Officer careers are examined in detail during the
promotion board process. It is this examination that determines who qualifies for
promotion and who fails selection. It is incumbent on the officers to ensure they are
competitive for promotion; yet, it is the responsibility of the Marine Corps to ensure
that individual officers understand the factors that will make them competitive among
their peers. For this reason, Headquarters Marine Corps (HQMC) works to counsel
officers on those factors that will make them competitive for promotion.

Within Headquarters Marine Corps (HQMC), Manpower and Reserve Affairs
(M&RA) functions as the Commandant's principal organization for supporting the
human resource requirements of the Marine Corps. "Manpower & Reserve Affairs
assists the Commandant by planning, directing, coordinating, and supervising both
active and reserve forces" (HQMC, M&RA, PMD, 2007). Figure 1 provides the
organizational structure for M&RA—including the six divisions and Wounded Warrior
Regiment that comprise the command structure.

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[1] General Conway made this statement in ALMAR 002/07 while serving as the Commandant of the
Marine Corps (Headquarters Marine Corps (HQMC), 2007, January 23).

Figure 1.   Manpower & Reserve Affairs Task Organization
(Source: HQMC, M&RA, MMOA, Road Show Brief, 2007, August 5)
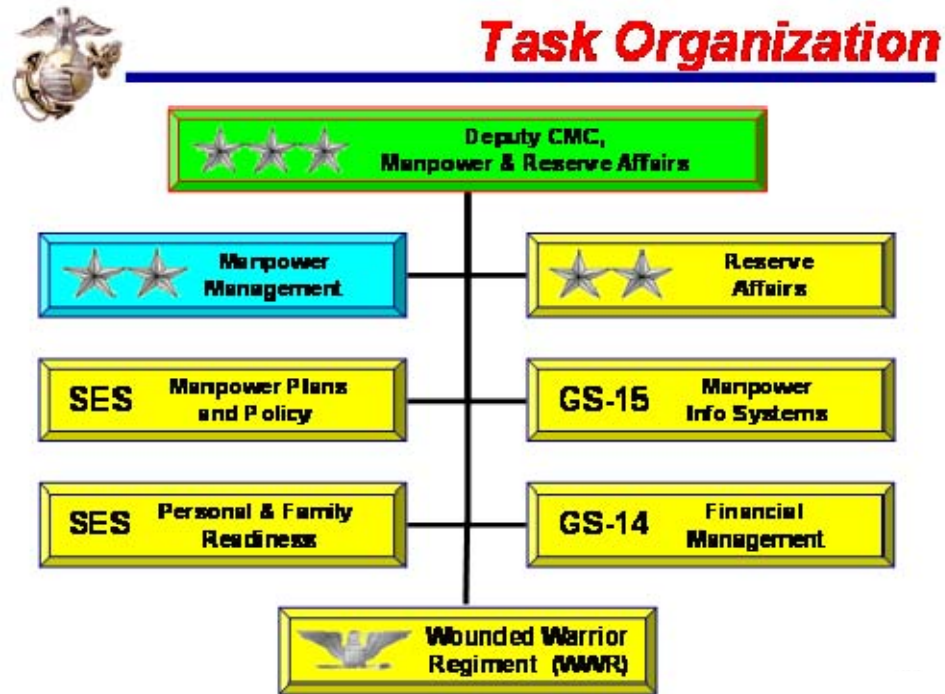
Within M&RA exists the Manpower Management (MM) Division. The MM Division is broken down into ten branches that encompass a variety of personnel support missions. Their mission states that:

> Manpower Management, under the direction of the Director, Personnel Management Division, is responsible for the administration, retention, distribution, appointment, evaluation, awarding, promotion, retirement, discharge, separation, and service records of commissioned officers, warrant officers, and enlisted personnel of the Marine Corps and Marine Corps Reserves. (HQMC, M&RA, MM, 2007)

Figure 2 provides the organizational structure for the MM Division.

Figure 2.   Manpower Management Task Organization
(Source: HQMC, M&RA, MMOA, Road Show Brief, 2007, August 5)

Finally, the Manpower Management Officer Assignments-4 (MMOA-4)—or Career Counseling Section—falls under the organizational structure of the Manpower Management Officer Assignments (MMOA) Branch within the MM Division. The Career Counseling Section exists to support Marines with their career decisions. The mission of the Career Counseling Section is as follows:

> Our mission is to provide, upon request, counseling to officers concerning competitiveness, future career decisions, and failure of selection for promotion to grades CWO-2 to O-6. Additionally, MMOA-4 provides advisory opinions to the Board for Correction of Naval Records, responses to General Officer Inquiries, and other staff actions concerning review of Official Military Personnel Files. (HQMC, M&RA, MM, MMOA-4, 2007a)

Figure 3 provides the task organization of MMOA, which contains the Career Counseling Section (MMOA-4).

Figure 3.   Task Organization for Officer Assignments
(Source: HQMC, M&RA, MMOA, Road Show Brief, 2007, August 5)
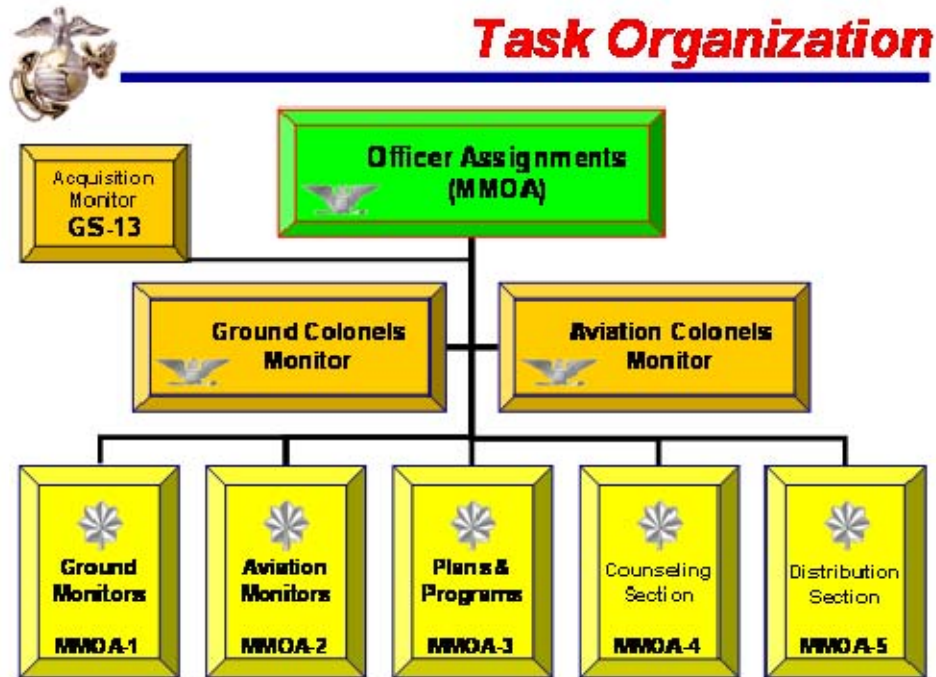
In keeping with its mission statement, the Career Counseling Section provides officers both with information regarding possible career paths as well as guidance regarding career planning. Figure 4 is an example of a possible career path for a ground officer that the Career Counseling Section uses to counsel officers. Within this career path exist assignments within the operating forces, supporting establishment, joint establishment and the appropriate level of schooling.

Figure 4.   Example Ground Career Path
(Source: HQMC, M&RA, MMOA-4, 2007)
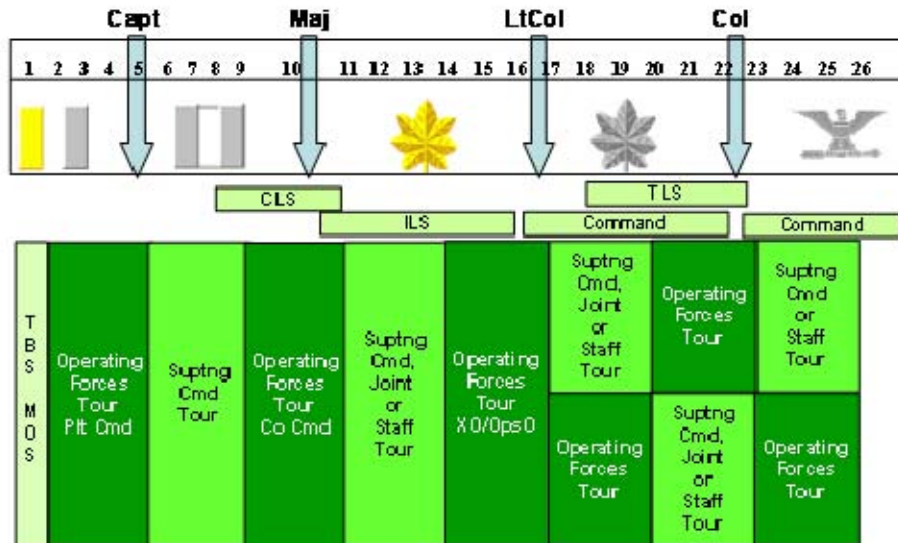
This is only an example of some of the possible assignments where a successful officer might serve.

In order for officers to understand where they are in regards to their career progression, the Career Counseling Section counsels officers on promotion flow points. Figure 5 provides the average Time in Service (TIS) for officer promotions, as of Fiscal Year (FY) 2007. The promotion flow points established in the figure are in accordance with the regulations set forth by the *Defense Officer Personnel Management Act* (*DOPMA*) (HQMC, M&RA, MM, 2007, June 27, Slide 1).

Figure 5. Fiscal Year 2007 Promotion Flow Points
(Source: HQMC, M&RA, MMOA-4, 2007)

Promotions Flow Points

Major
10 yrs 5 mos
(90%)

Colonel
21 yrs, 9 months
(52%)

0   5   10   15   20   25

years

Capt
4 yrs, 7 mos
(100%)

LtCol
15 yrs, 11 months
(selected: 70%)
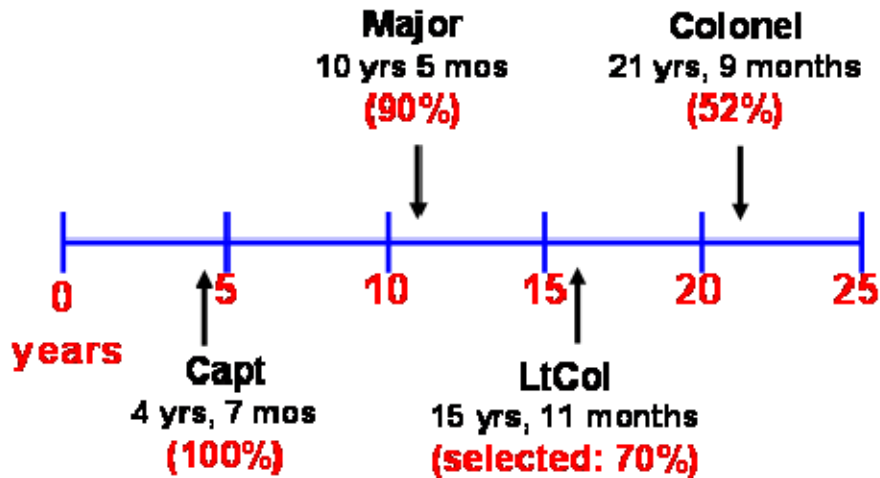
B.   Problem

There are multiple factors considered when an officer is a candidate for promotion. Potential factors considered in promotion would be strong performance, Professional Military Education (PME) completion, first-class Physical Fitness Test (PFT), Military Occupational Specialty (MOS) credibility, and proper military appearance in the official photograph (HQMC, M&RA, MM, 2007, June 27, Slide 5). Currently, the Career Counseling Section possesses the capability to counsel officers on descriptive statistics. For instance, they can inform officers that 70.1 percent of the in-zone officers that were selected for promotion to lieutenant colonel attended Intermediate Level School (ILS) (HQMC, M&RA, MM, 2006, September 22, p. 3). However, they do not possess the ability to counsel officers based on multivariate data analysis of variables that could be significant in predicting promotion. A multivariate data analysis system would be able to examine the predicted probability of selection for promotion while holding all other observable

factors constant. Additionally, a model based on multivariate data analysis would be able to assist the Career Counseling Section with the quantitative aspects of the officer counseling process.

C.   Purpose

First, the purpose of this research is to provide the career counseling section (MMOA-4) of Manpower and Reserve Affairs with multivariate data analysis and a model to support the officer counseling process. Additionally, this research will identify and evaluate significant factors in the selection for promotion. The results would be relevant both to officers in their efforts to advance their careers, and to the MMOA-4 in counseling them on promotion decisions. The current system is unable to examine the individual effects of key factors on selection for promotion. This is why the multivariate data analysis is superior to descriptive statistics. It will give the Career Counseling Section the ability to isolate a variable and to show the effect it has on promotion selection, while holding the other observable variables constant.

Second, this studies purpose is to improve the Performance Evaluation System (PES). The current system only provides a generalized output that has limited value in fitness report analysis. The raw numbers of the comparative assessment limit the possibility of comparing officers across a grade for each RO. The exact value of the percentile system allows for officers to be differentiated and compared across grade. This is similar to the relative value system used for Reporting Senior (RS) markings. This new system will allow officers to be shown as average, above average or below average for each RO, similarly to what is currently being recorded by each RS. Ultimately, this would increase the effectiveness of retention, promotion, command, and resident school selections by empowering the board members with the ability to screen officers with the RO percentile system.

D.   Research Questions

1.   Primary Research Question

What variables are significant in predicting promotion to major, lieutenant colonel, and colonel in the United States Marine Corps?

2.   Secondary Research Questions

a.   Since the beginning of the current Global War on Terror (GWOT), what effect does combat service have on an officer's likelihood for promotion?

b.   What effects do physical fitness levels have (as measured by the Physical Fitness Test (PFT)) on promotions?

c.   How significant are Fitness Reports (FITREPS) in predicting promotion?

E.   Scope and Limitations

The scope of the research will include a review of Marine Corps performance and promotion directives, an in-depth review of current promotion statistics, an evaluation of the Marine Corps Total Force System (MCTFS) data contained within the Total Force Data Warehouse (TFDW), and a discussion of the feasibility of converting Fitness Report information into useable data. The thesis will conclude with a recommendation for transitioning the Career Counseling Section to a system that uses quantitative data analysis for officer counseling.

The methodology for this research will primarily be quantitative and examined using personnel data from the MCTFS and the TFDW. The other research data will come from the Fitness Report Branch (MMSB) of Headquarters Marine Corps (HQMC). The Fitness Report Branch holds officer evaluations (fitness reports) that the researcher will examine in order to establish performance data. The data will focus on the captains, majors and lieutenant colonels that were in-zone for promotion on the Fiscal Year (FY) 2008 selection boards.

F. Organization of the Study

This research will be organized into six separate chapters. Chapter I provides an introduction into the general contents of the research. Chapter II examines the current promotion process within the United States Marine Corps. Chapter III reviews the current literature that relates to this study. Chapter IV analyzes the TFDW and fitness report data and describes the variables used in the study. Chapter V describes the models and results for the multivariate data analysis conducted in the study. The last chapter will provide a summary with conclusions, limitations, and recommendations.

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II.   Marine Corps Officer Promotions

> I guarantee you… if you have a six- to seven-year war and you don't get to the war zone, you needn't wonder what's going to happen when it's time for promotion.[2]

> Lieutenant General Ronald Coleman, USMC

A.   Laws, Instructions, and Orders Governing Promotion

The Marine Corps officer promotion system is based on a hierarchal structure of laws, instructions, and orders. In a military framework, the laws can be associated with strategic guidance, the instructions with operational guidance, and the orders with tactical guidance. The hierarchy originates with Congress establishing the foundation for the basis of promotions based on law. The Department of Defense (DoD) passes instruction down to the Secretary of the Army, Navy, and Air Force contained within a Department of Defense Instruction (DODINST). In turn, the Secretary of the Navy (SECNAV) establishes policies and procedures in the form of a Secretary of the Navy Instruction (SECNAVINST) for the Chief of Naval Operations (CNO) and the Commandant of the Marine Corps (CMC). Finally, the CMC provides clarifying information on the promotion process by issuing a Marine Corps Order (MCO) that is consistent and in-line with all of the above regulations.

1.   Promotion Process

Title 10, *United States Code* is the foundation for officer promotions within the Department of Defense (DoD). It gives the military departments direction for the promotion process. The process begins with the law establishing the requirement for selection boards within each military department. The law states:

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[2] Lieutenant General Coleman made this comment while serving as the Deputy Commandant for Manpower and Reserve Affairs. The statement was made at a Marine Corps Association meeting on 15 August 2007 and was published in the 27 August 2007 *Marine Corps Times.*

Whenever the needs of the service require, the Secretary of the military department concerned shall convene selection boards to recommend for promotion to the next higher permanent grade, under subchapter II of this chapter, officers on the active-duty list in each permanent grade from first lieutenant through brigadier general in the Army, Air Force, or Marine Corps and from lieutenant (junior grade) through rear admiral (lower half) in the Navy. (USC, 2004, Title 10, p. 611)

In the Department of the Navy (DoN), the selection board convenes when the Secretary of the Navy (SECNAV) releases the precept (Secretary of the Navy, 2006, March 28, p. 12). The precept identifies the members of the board—including the board president—and their responsibilities while serving on the promotion selection board (p. 12).

The law within *Title 10* also regulates the composition of the military department selection boards. The composition establishes requirements for grade, competitive category, active-duty, successive selection boards, and joint-duty assignments (USC, 2004, Title 10, pp. 612-613). The Department of Defense builds upon the law by tasking the Chairman of the Joint Chiefs of Staff (CJCS) with selecting an officer currently in a joint-duty billet to serve as a selection board member. This is conducted to ensure the selection board fairly evaluates those officers eligible for promotion that are serving or who have already served on joint duty (DoD, 1996, September 24, p. 2). In order for the Navy to maintain an ethical and impartial board, each member is required to take an oath. *Title 10* states:

Each member of a selection board shall swear that he will perform his duties as a member of the board without prejudice or partiality and having in view both the special fitness of officers and the efficiency of his armed force. (USC, 2004, Title 10, p. 613)

Safeguards are also in place to ensure that members of the board may ask their Service Secretary to be relieved as a board member if they believe they can not execute their duties without prejudice or partiality (DoD, 1996, September 24, p. 9).

Title 10 governs the minimum time period that an officer must be notified of an upcoming selection board. It requires that each officer must be notified at least

30 days prior to the convening of a selection board (USC, 2004, Title 10, p. 614). *Department of Defense Instruction 1320.14* (*DODINST 1320.14*) regulates that only the Secretary of the Military Department may personally address the selection board (DoD, 1996, September 24, p. 7). Within the boundaries of the law, each officer is authorized to communicate in writing, audio, or video with the promotion board (p. 9). This allows each officer the ability to incorporate material they feel may potentially help improve their opportunity for promotion.

Policy on what information may be provided to a selection board is established by *Title 10*. This exists to protect the interests of each officer that is eligible for promotion. Title 10 regulates the material contained in an officer's official military personnel file (OMPF) and any information that the Secretary of that military department views as important to the selection-board process (USC, 2004, Title 10, p. 614). Finally, information that is provided to the board must also be given to the officer in question. *Title 10* requires, "(i) that such information is made available to such officer; and (ii) that the officer is afforded a reasonable opportunity to submit comments on that information to the selection board" (p. 615).

The administrative procedures for the Secretary of each of the military departments are regulated by *Title 10*. These procedures are used when a service convenes a selection board. The law governs the number of officers that may be selected for promotion, names of the eligible officers, service records, guidance on the specific skills needed by the service, and any other information that may be relevant to the promotion board (p. 615). Additionally, the Secretary of Defense (SECDEF) and the Chairman of the Joint Chiefs of Staff (CJCS) work together to provide guidance to the Service Secretaries on the equal treatment of officers who are serving or have already served in a joint-duty assignment (p. 615). Finally, the law provides strict procedures for selection boards' ability to change material once it has been provided to the board in order to maintain the integrity of the promotion process.

Selection boards are provided specific direction on how an officer will be selected for promotion within the precept. The precept informs the board to select those officers that have continued to demonstrate strong performance during their military careers and have the ability to serve at the next grade. *Title 10* policy requires boards to select officers for promotion based on the following criteria: "considers best qualified for promotion within each competitive category considered by the board" (p. 616). Beyond selecting the best-qualified officer for promotion, selection boards isolate and identify certain skill sets that are important to that particular Service. *Department of Defense Instruction 1320.14* (*DODINST 1320.14*) specifies the requirements of identifying the need for critical skills to the Service Secretaries:

> Information or guidelines on the needs of the Service concerned for officers having particular skills, including guidelines or information on the need for either a minimum number, or a maximum number, of officers with particular skills in a competitive category. Information or guidelines on officers with particular skills must be furnished to the board as part of the written instructions provided to the board at the time the board is convened. (DoD, 1996, September 24, p. 6)

The boards are also provided detailed guidelines on how many officers may be selected within each of the promotion categories. The board is only limited to selecting 10 percent of officers from the below zone, and the board is authorized to exceed the allowable number of selections by up to 15 percent (USC, 2004, Title 10, p. 614).

As noted earlier, the board selects the best-qualified officer for promotion from those that have been identified with a particular skill set. With this criterion, the law goes on to define the exact responsibilities of the selection board when recommending an officer for promotion. The two criteria for selection are: "(1) the officer receives the recommendation of a majority of the members of the board; and (2) a majority of the members of the board finds that the officer is fully qualified for promotion" (p. 616).

To keep the selection-board process from being influenced by outside authorities, the law outlines the protections that are afforded to the board members. These protections are in place to ensure that an officer does not feel undue pressure or command influence in the execution of his duties while serving as a member of the selection board. Additionally, *Department of Defense Instruction 1320.14* (*DODINST 1320.14*) tasks the Secretaries of the military departments with providing written guidance to the members of the selection boards to maintain the integrity and fairness of the promotion selection board (DoD, 1996, September 24, p. 3). *Title 10* reinforces the fact that the selection-board process should be fair and uninfluenced by outside individuals or pressures. The law charges each Service Secretary with ensuring that the selection-board process is free from bias; in particular, no one must:

> (1) censure, reprimand, or admonish the selection board or any member of the board with respect to the recommendations of the board or the exercise of any lawful function within the authorized discretion of the board; or (2) attempt to coerce or, by any unauthorized means, influence any action of a selection board or any member of a selection board in the formulation of the board's recommendations. (USC, 2004, Title 10, p. 616)

The final procedure to ensure the fairness and integrity of the selection-board process is a random interview of members that were part of the promotion process. *Department of Defense Instruction 1320.14* (*DODINST 1320.14*) outlines that each Service Secretary must perform a random yearly interview of those individuals that were part of the selection-board process to ensure that the boards were in compliance with *Title 10* and other regulations (DoD, 1996, September 24, p. 3).

By law, each selection board has the responsibility to notify its Service Secretary of its results. The report delineates the names of all officers selected for promotion. Additionally, the report is certified with a signature from all members of the selection board (USC, 2004, Title 10, p. 617). The board members certify that they have given equal treatment to the records of all the officers considered for promotion. They also certify that the officers selected are the best qualified to continue to meet the requirements of their military department (p. 617). The board

then provides a list of those officers that are required to demonstrate a need to be retained on active duty (p. 617). Additionally, the board provides a list of those officers not selected for promotion because they did not want to be considered for promotion to the next grade (p. 617).

After the report has been certified by the selection board, *Title 10* requires that the results of the board be forwarded to the Secretary of the military department. The Service Secretary has the responsibility of examining the report and ensuring that it is compliance with the *Title 10* regulations. If the results of the selection board are not in accordance with the law, the report will be returned to the board for correction (USC, 2004, Title 10, p. 618). The returned report will identify the reasons why it is not in adherence with the law. The selection board has the responsibility to comply with the guidance from the Secretary, to correct the selection report and to ensure it is in compliance with the law. Once the report is in compliance, it is resubmitted to the Secretary for further review.

The process continues with the review of the report by the Chairman of the Joint Chiefs of Staff (CJCS). The CJCS reviews the report to ensure officers that have served or are serving in a joint-duty assignment were given equal treatment by the board members. Controls are in place to ensure that officers that were not given equal treatment due to their service in a joint-duty assignment are highlighted for further examination. The CJCS and the Service Secretary work together to rectify their disagreements through further proceedings, special selection boards, and other actions (p. 618). In the end, if the CJCS and the Service Secretary cannot agree upon the final results of the selection board, the case will be forwarded to the Secretary of Defense (SECDEF) for further action (p. 618).

The SECDEF has the responsibility to resolve the differences in the selection board results between the CJCS and the Service Secretary (p. 618). If this is not possible, the results of the selection board will still be forwarded to the President. The President is the only level in the selection-board process that possesses the authority to remove an officer that has been selected for promotion from the

selection list (p. 618). The release of the officers' names that have been selected for promotion is a regulated and strict process. The following rules apply for the release of officer names that have been selected for promotion in their respective Service:

> (A) In the case of officers recommended for promotion to a grade below brigadier general or rear admiral (lower half), such names may be disseminated upon, or at any time after, the transmittal of the report to the President. (B) In the case of officers recommended for promotion to a grade above colonel or, in the case of the Navy, captain, such names may be disseminated upon, or at any time after, the approval of the report by the President. (C) In the case of officers whose names have not been sooner disseminated, such names shall be promptly disseminated upon confirmation by the Senate. (p. 618)

The minimum time periods that an officer must serve in each grade are governed by the law within *Title 10*. These time requirements are in place to ensure that each service promotes officers at a similar pace. The time-in-grade requirements begin with second lieutenants and move up through the grade structure to brigadier general. The requirements also apply equally to the Navy grades. Second Lieutenants must serve a minimum of 18 months in grade; first lieutenants serve two years; captains, majors, and lieutenant colonels serve three years; colonels and brigadier generals serve in that capacity for one year (p. 619). Although the minimum requirement is established by *Title 10*, the Service Secretaries are given the authority to lengthen the time-in-grade requirements (p. 619). This authority can be used by the Service Secretary as a grade-shaping tool to either expand or shrink his respective service. Finally, the law outlines that each Service Secretary must provide officers at least two chances for selection for promotion to the next grade (USC, 2004, Title 10, p. 619).

The Service Secretaries are also given additional authority on which officers they select and do not select for promotion. *Title 10* allows each Secretary to select officers that are found to be exceptionally well-qualified from below the promotion zone (p. 619). Additionally, officers that are put on the active-duty list can only be ineligible for promotion for a period no longer than a year—as determined by their respective Service Secretary (p. 619). The purpose of this one-year period is to

allow the officer time to receive officer evaluations and to gain skills from serving on active duty (Secretary of the Navy, 2006, March 28, p. 7). Finally, the Service Secretaries may govern that officers will be ineligible for promotion to the next grade if they have a separation date that falls within 90 days of the start of their promotion board (USC, 2004, Title 10, p. 619).

Each Service Secretary is required to maintain an active-duty list for his service. This list is used to maintain a record of the seniority level of each officer who is serving on active duty (p. 620). The Department of Defense defines this list as, "A single list for the Army, the Navy, the Air Force, or the Marine Corps […] that contains the names of all officers of that Armed Force […] who are serving on active duty" (DoD, 1996, September 24, p. 15). Just as important as the active-duty list are the competitive categories established by each Service Secretary. *Title 10* outlines the importance of the competitive categories for promotion:

> Under regulations prescribed by the Secretary of Defense, the Secretary of each military department shall establish competitive categories for promotion. Each officer whose name appears on an active-duty list shall be carried in a competitive category of officers. Officers in the same competitive category shall compete among themselves for promotion. (USC, 2004, Title 10, p. 621)

The Marine Corps has established five competitive categories for officers—broken down by Unrestricted, Restricted (Limited Duty Officers), Warrant Officer and Chief Warrant Officer, Active Reserve, and Specialist Officers (HQMC, 2006, August 9, pp. 1-13).

The number of officers that are selected for promotion will be determined by the Service Secretary. The Service Secretaries are responsible for ensuring that they correctly quantify the correct number of officers required for promotion. This requirement is based on different mandates dictated in the regulations and set forth by the Secretary of Defense (USC, 2004 Title 10, p. 622). The Service Secretary will establish the required number of officers for promotion in accordance with projected mission objectives, officers needed to fill empty assignments, and the

requirement of necessary grade and competitive category (p. 622). The Marine Corps further refines the requirement by stating:

> Each selection board is authorized to select to the next higher grade a specific number of officers. The unrestricted portion of the promotion plan forecasts vacancies for a promotion year. Officer accessions, attrition, requirements, congressional and secretarial authorizations, and budgetary constraints all impact this variable. (HQMC, 2006, August 9, pp. 1-13)

Once the promotion numbers are identified, the Service Secretary will establish the required promotion zones. The promotion zones establish the population of officers that will be determined eligible for promotion. The Secretary of the Navy's (SECNAV) guidance is, "Promotion zones will be established to meet the separate promotion requirements of each competitive category. This may result in different promotion flow points and opportunity among the competitive categories" (Secretary of the Navy, 2006, March 28, p. 10). Table 1 outlines the guidance that is applied to promotion flow points for promotion to major, lieutenant colonel and colonel for the active-duty list officers. As noted above, this is only guidance for the Services as they establish their promotion flows. If necessary, the Services may depart from the promotion flow guidelines and promote at a different rate in order to meet the required manpower needs for each grade (p. 10).

Table 1.   Promotion Flow Points
(Source: Secretary of the Navy, 2006, 28 March, p. 10)

Promotion To Grade	Flow Point*	Variance	Opportunity	Variance
O4	10 years	+ -1 year	80 percent	+ -10 percent
O5	16 years	+ -1 year	70 percent	+ -10 percent
O6	22 years	+ -1 year	50 percent	+ -10 percent

*Years of active commissioned service plus all entry grade credit.

The promotion zones are based on five-year manpower requirement projections for each of the Services (USC, 2004 Title 10, p. 623). The Manpower Plans and Policy Division (MPP) is responsible for preparing the five-year officer

promotion plan for the Marine Corps (HQMC, 2006, August 9, pp. 1-11). The SECNAV establishes guidance to ensure that future vacant positions for the Navy and Marine Corps are filled for the first fiscal year the plan is in effect (Secretary of the Navy, 2006, March 28, p. 3). The plan is based on each Service's end-strength requirements by grade and competitive category (p. 3). This is why the number of required officers needed by each Service is important to the grade-shaping process. If the numbers are not correctly established, a ripple effect could occur over the next five years. This is why the Chief of Naval Operations (CNO) and Commandant of the Marine Corps (CMC) are required to submit a five-year promotion plan every year to the Secretary of the Navy (SECNAV) (p. 5).

The final step in the promotion process requires the Service Secretary to release the promotion list with the names of those officers that were selected for the next grade. For the Department of the Navy (DoN), the Secretary of the Navy (SECNAV) releases an All Navy (ALNAV) message which contains the list of those officers that were selected for promotion to the next grade (p. 18). The list categorizes the officers by their seniority in relation to their peers of the same competitive category (USC, 2004 Title 10, p. 624). The actual promotion of the officers is established by seniority of the promotion list and the needs of their Service (p. 624). Along with this list, the Secretary of the military department is responsible for providing the Secretary of Defense (SECDEF) with a race and ethnic profile, as seen in Table 2 (DoD, 1996, September 24, p. 22).

Table 2.   Race and Ethnic Profile Data
(Source: DoD, 1996, 24 September, p. 23)

RACE/ETHNIC PROFILE DATA FOR THE___PROMOTION BOARD -- APZ

	Female			Male			Total Female and Male		
	Considered	Selected	% Selected	Considered	Selected	% Selected	Considered	Selected	% Selected
White									
Black									
Hispanic									
Asian/Pac									
Amer. Ind.									
Other									
Total									

RACE/ETHNIC PROFILE DATA FOR THE___PROMOTION BOARD -- IPZ

	Female			Male			Total Female and Male		
	Considered	Selected	% Selected	Considered	Selected	% Selected	Considered	Selected	% Selected
White									
Black									
Hispanic									
Asian/Pac									
Amer. Ind.									
Other									
Total									

RACE/ETHNIC PROFILE DATA FOR THE___PROMOTION BOARD -- BPZ

	Female			Male			Total Female and Male		
	Considered	Selected	% Selected	Considered	Selected	% Selected	Considered	Selected	% Selected
White									
Black									
Hispanic									
Asian/Pac									
Amer. Ind.									
Other									
Total									

B.   Manpower Management Promotion Branch (MMPR)

The promotion process for the Marine Corps is managed by the Manpower Management Promotion Branch (MMPR) within Headquarters Marine Corps. Figure 6 shows the command structure of MMPR within the Manpower Management (MM) Division. The MMPR mission statement reads:

The mission of the Promotion Branch (MMPR) is to conduct regular and reserve promotion boards in order to ensure every Marine (officer and enlisted) has a fair and equitable opportunity for advancement to the next

grade. MMPR provides support operations for accurate, timely, and quality service associated with all aspects of the officer and enlisted promotion processes. (HQMC, M&RA, MM, MMPR, 2007)

Figure 6.   Manpower Management Task Organization
(Source: From HQMC, M&RA, MMOA, Road Show Brief, 2007, August 5)
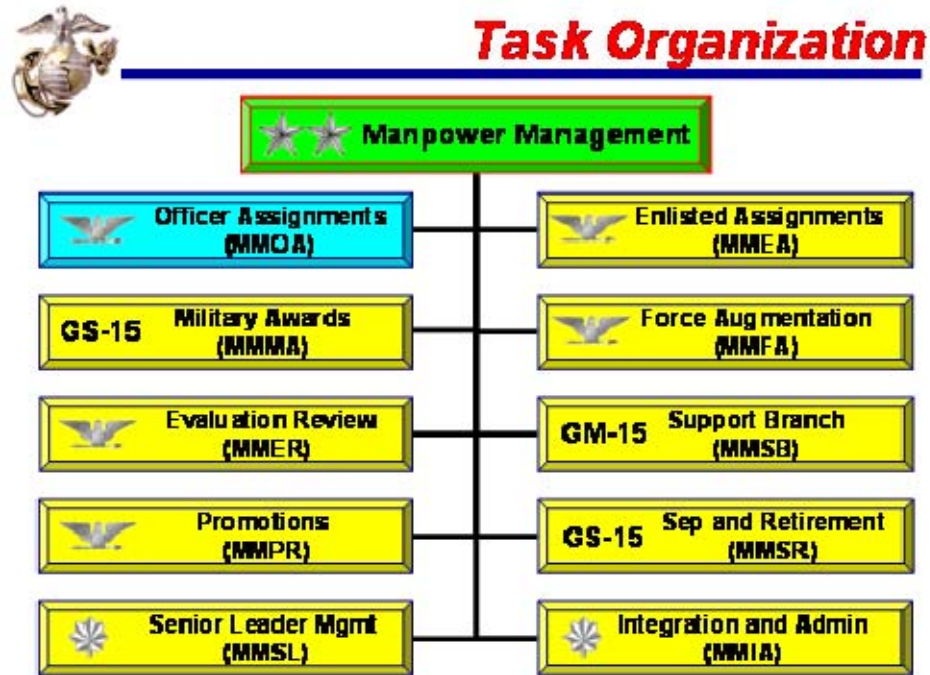
It is the responsibility of the Promotion Branch (MMPR) to ensure that the Marine Corps promotion process is conducted in accordance with the laws, instructions and orders previously described in this research. The exact execution of the numerous regulations governing promotions is critical and key to a fair and unbiased promotion process. The ability to select the best-qualified officers for promotion rests upon this principle. The MMPR ensures that the eligible officers are notified of an upcoming board, and it provides the conduit for that officer to communicate with the board. Additionally, the MMPR provides the administrative support that allows the promotion board to effectively fulfill the duties it has been assigned. By this branch's efforts, the fairness and integrity of the promotion process is maintained for the Marine Corps.

III. Literature Review

Our Nation has high expectations of her Marines. This is the result of the legacy of performance that has been handed down by generations of Marines who have worn the eagle, globe and anchor. Our discipline, pride, adherence to standards, selfless dedication to duty, and commitment to Country and Corps shape our warrior ethos. America expects, demands and deserves nothing but the best from the Marine Corps. Accordingly, our high standards of professional and personal performance, to include our physical fitness and military appearance, must be maintained and adhered to by every Marine.[3]

- General James T. Conway, USMC

A. Overview

Numerous studies have examined the factors that predict promotion in the Marine Corps. This study builds on that literature and generates new results for the factors that predict promotion. This chapter summarizes and evaluates prior studies on the determinants of promotion.

B. Promotion

1. Study by Long (1992)

Long (1992) analyzed the effect of background characteristics on the promotion to major, lieutenant colonel and colonel in the United States Marine Corps. He formulated his study to be used as a decision-making tool for Marine Officers in their careers. The source of his data was the Management Information (MI) Branch of Headquarters Marine Corps. The data included the officers that were in-zone for promotion for Fiscal Years (FY) 1986 to 1992.

The study found that being married, attending appropriate-level professional school and having a postgraduate degree were statistically significant and positively

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[3] General Conway made this statement in White Letter Number 05-07 while serving as the Commandant of the Marine Corps (HQMC, 2007, November 26).

correlated with promotion. Race, sex, and combat experience were determined to have no effect on promotion. Of note, the selection rate for those with combat experience was actually lower than those without combat experience for all three groups that were studied in his research.

One of the limitations of the study was that it did not include any measures of performance. As Fitness Reports are the primary tool used by promotion boards in selecting officers for promotion, the explanatory power of the model is greatly reduced when this variable is omitted from the study. Additionally, examining the effect of promotion based on duty assignment is limited because the data was a snapshot from when the promotion board convened. The data did not contain duty assignments over the career of each officer in the study.

2. Study by Hamm (1993)

The purpose of Hamm's (1993) research was to determine if minority officers attrited at higher rates and promoted at lower rates than other comparable officers. The study used composite thirds at The Basic School (TBS), selection to captain, and selection to major as a measure to determine success as an officer.

There were two sources of data used for the research. Data was collected from the Headquarter's Master Files (HMF) from the Manpower Analysis Branch and from The Basic School (TBS). The period of the data was for calendar years (CY) 1980 to 1991. The final data set had 17,870 observations for the 12-year period.

The study concluded that the composite-third assignment at TBS and selection rates to captain were lower for black officers. 8.35 percent of black officers were shown to be assigned to the top third of their TBS class, and they were shown to have the lowest selection rate to captain of all the racial/ethnic groups compared in the research. However, the study concluded that there were no differences among racial groups when officers were selected for major.

A limiting factor in the research was the low number of independent variables used to analyze the data. The study only used twenty independent variables. Numerous other variables could have been statistically significant and relevant in explaining promotion and composite thirds at TBS. Factors such as education level, fitness reports, assignments, and physical fitness levels may differ significantly among race groups, so the effect of race may be under or over-estimated.

3. Study by Grillo (1996)

Grillo (1996) also studied the difference in promotion rates for minorities and women. Unlike Hamm (1993), Grillo included education, dependents, awards, and performance index among the explanatory variables. The study also examined if the board precepts had an effect on promotion. The period studied was from Fiscal Year (FY) 1994 to 1995.

The Manpower Analysis Section of Headquarters Marine Corps was used as the source for the data. The data was a cross-section consisting of 1,519 observations of captains that were being considered for promotion for the FY 1994 and 1995 promotion boards. The study found that performance evaluations and awards had the greatest effect on the predicted probability of being selected to major. It concluded that racial and gender differences had no significant effect on the promotion probability after taking into account performance. Also, the targeted Primary Military Occupational Skills (PMOS) in the board precept had no effect on selection for promotion.

One of the limitations in the study was the small number of independent variables used in the model. The model was based on eight independent variables. The effect of these variables on promotion can be overstated because of omitted relevant variables. As in the Hamm (1993) study, including other variables such as assignments, combat experience, occupational field, and Armed Forces Qualification Test (AFQT) scores would potentially increase the model's explanatory power.

4. Study by Wielsma (1996)

Wielsma (1996) analyzed the factors that affect performance, retention, and promotion to major in the Marine Corps. The emphasis of the study was on the effect of graduate education on the three dependent variables. Numerous other variables were analyzed in the study; these were broken down into three main areas consisting of cognitive skills, affective traits, and demographic traits.

This study combined data from a variety of sources. The sources included the Defense Manpower Data Center (DMDC), Marine Corps Automated Fitness Report System (AFRS), the Headquarter's Master File (HMF), and the Official Military Personnel File (OMPF). The data set consisted of longitudinal data of 1,087 officers followed in time from 1980 to 1994. Of note, of the 1,087 officers that entered in the Marine Corps in 1980, only 455 were still in the sample when the major promotion board convened.

The study found that postgraduate education is associated with higher average performance levels, higher Basic School (TBS) rankings, being commissioned through the Naval Academy or Officer Candidate School, older officers, and being married. The composite ranking at the Basic School and having a postgraduate degree were statistically significant at the 0.01 level and being married at the 0.10 level in the promotion model. It is interesting to note that only three of the independent variables in the promotion model were statistically significant up to the 0.10 level.

Wielsma (1996) noted that the positive correlation between postgraduate education and promotion to major may be positively biased due to the model's failure to correct for the retention and selection issues in the sample. More able officers may be more likely to stay and also more likely to promote. Another limiting factor in the study was the postgraduate education variable. There was no difference made between how the postgraduate degree was obtained. Potential differences could affect the results of the study—for instance, if officers received the

degree from the Naval Postgraduate School (NPS) or worked on their off-duty time to get the degree.

5.   **Study by Branigan (2001)**

Branigan (2001) analyzed the factors that were correlated with retention and promotion to lieutenant colonel in the Marine Corps. The study's purpose was to examine the effect that graduate degrees had on promotion and retention to lieutenant colonel. The study's main focus was to analyze the effect of a graduate degree from the Naval Postgraduate School (NPS), specifically. The examination of different graduate education programs was one of the limitations identified in the Wielsma (1996) study.

The Manpower Plans Division of Headquarters Marine Corps and the Center for Naval Analyses (CNA) provided the data for this study. The data consisted of cross-sectional and longitudinal data. The cross-sectional data consisted of whether a major was selected for promotion from the in-zone population for the Fiscal Year (FY) 1998 to 2001 lieutenant colonel promotion boards. The longitudinal data consisted of multiple variables of interest in the sample for the time period of 1979 to 1984. The sample size of the promotion model was 1,627 officers.

The study used four separate promotion models to examine the effects of graduate education on promotion to lieutenant colonel. Interestingly, receipt of a combat fitness report was seen to be statistically insignificant in predicting promotion in all four models. The research did conclude that a Master's degree was statistically significant at the 0.01 level and positively correlated with promotion. The magnitude of the Master's degree fluctuated from 0.2157 to 0.1504 between the four models. Performance traits accounted for 0.0653 of the effect that the Master's degree had on promotion. Finally, it was illustrated that the non-NPS degrees had a greater effect than those from NPS on promotion.

A potential limitation in the study can be attributed to how the graduate education degrees were classified. Graduate degrees from Professional Military

Education (PME) schools were entered into the non-NPS graduate degree variable. This could be one of the reasons why the non-NPS degrees had a greater effect on promotion as compared to the NPS degrees. For officers to attend a formal PME school, they are screened and selected by a formal board. This would account for higher-quality officers attending resident PME and the greater impact that the non-NPS graduate degree had on promotion.

6. Study by Ergun (2003)

The Ergun (2003) study examined the factors that influenced retention to 10 years of commissioned service and promotion to major and lieutenant colonel in the Marine Corps. The focus of the study was to evaluate if the different commissioning sources had an impact on retention and promotion.

The study used three samples to conduct the statistical analysis. These consisted of the Marine Corps Commissioned Officer Accession Career (MCCOAC) file from the Center for Naval Analysis (CNA), 1951 to 1998 (old) Marine Corps Fitness Report File, and 1998 to 2001 (new) Marine Corps Fitness Report File. The MCCOAC file consisted of 28,058 observations; the old fitness report file had 1.3 million fitness reports on 48,306 officers; the new fitness report file had 52,366 fitness reports on 17,436 officers.

The sample size for the major and lieutenant colonel promotion models was significantly smaller than the data files explained above due to the attrition of officers from the start of their commissioned service. The sample size for the officers analyzed for promotion to major was 7,281, while the sample size for the lieutenant colonel model was 1,785.

The results of the study concluded that the source of commissioning had an impact on the performance of an officer. In regards to promotion, the officers that attended the Naval Academy had lower promotion rates to major when compared to the other commissioning sources, except for the Marine Corps Enlisted Commissioning Program (MECEP). Officers that had prior enlisted experience had

lower promotion rates to lieutenant colonel regardless of the commissioning program. However, both the MECEP and Enlisted Commissioning Program (ECP) were statistically significant at the 0.01 level and positively correlated with promotion to lieutenant colonel when compared to the Naval Academy source of entry.

Combat fitness reports were also examined in this study to see how they affect the Performance Index (PI). The reports were examined for the old- and new-style fitness reports for each grade level from second lieutenant to major. The study found having a combat fitness report was statistically significant (0.05 to 0.01 level) and positively correlated with a higher PI.

One of the limitations in the study was the method that was used to formulate the Performance Index (PI) for the fitness report data. The method used the old and new fitness reports to create a 100-point system using the markings within the reports. This method is relevant in capturing the reporting senior markings; however, it does not capture the ratings from the reviewing officer. With the reviewing officer being the senior officer on the fitness report, the values of his markings would have a considerable effect on the PI used in the model.

7. Study by Morgan (2005)

Morgan's (2005) research studied the factors that affected the retention and selection to major in the Marine Corps. The focus of the study was to examine the impact of an officer's career path on his progression in the Marine Corps. The primary research questions analyzed were whether the amount of time an officer spends in his primary military occupation specialty (PMOS) and the amount time spent in the Fleet Marine Force (FMF) effect the retention and promotion to major in the Marine Corps.

The study used two samples in the research analysis. The samples consisted of the Marine Corps Commissioned Officer Accession Career (MCCOAC) file and the Marine Corps Officer Fitness Report file. The MCCOAC file consisted of observations from 1980 to 1999 on officers starting at The Basic School (TBS) and

the fitness report file contained reports from 1950 to 1998. The final data set consisted of 10 separate groups established from Fiscal Years 1980 to 1989, with a sample size of 8956 observations.

The study concluded that the longer officers spent in their PMOSs and the FMF, the less likely they were to be promoted. When the time ratio increased above 60 percent of PMOS and FMF time, attrition increased, and promotion decreased. The commissioning source results were similar to that of the Ergun (2003) study. However, Morgan (2005) used the Platoon Leader Class (PLC) as the base variable instead of the United States Naval Academy (USNA) variable. This resulted in three variables being statistically significant at the 0.01 level and negatively correlated with promotion when compared to the PLC program. These variables were the Naval Reserve Officer Training Corps (NROTC), USNA, and a grouping of the enlisted commissioning programs (ECOMM).

In the study, about 30 percent of the officers had obtained a combat fitness report. Morgan (2005) examined the combat fitness report to determine the effect it had on attrition. The research showed that an officer's possession of a combat fitness report was statistically significant (0.01 level). Service in combat was seen to increase an officer's diversity, thereby lowering the attrition level.

A potential limitation in the study was the small number of independent variables used in the models. The results may be slightly overstated due to relevant variables missing from the models. Variables such as education levels, AFQT scores, and physical fitness test (PFT) scores could have some explanatory power in the promotion and attrition models and perhaps could be correlated with the time a person spent in his Primary Military Occupational Skill (PMOS) field.

8. **Study by Perry (2006)**

The purpose of the Perry (2006) study was to examine the factors that influence retention and promotion in the Marine Corps. The study focused on officers surviving to ten years of commissioned service, as well the factors that

affected promotion to major and lieutenant colonel. The main focus of the study was the effect of primary military occupational specialty (PMOS) on promotion and retention.

Like previous studies, this study used two samples. The MCCOAC and the Marine Officer Cohort data files were the two samples used in the research. The MCCOAC file contained 27,659 observations from Fiscal Years 1980 to 1999, while the Marine Officer Cohort file contained data from Fiscal Years 1980 to 2001. Due to the effects of attrition on the officer population, the sample size for the major and lieutenant colonel models were smaller than the total observations mentioned above. The major promotion model examined 11,776 observations, while the lieutenant colonel model had 5,737.

The primary research question in the study examined the effect of PMOS on promotion. The variable of infantry was used as the base variable for the different PMOS comparisons. The results of the study showed that being a pilot was negatively associated with promotion to major when compared to the base variable of infantry. Only three PMOSs were shown to be positively associated with promotion to major and lieutenant colonel. These PMOSs consisted of logistics, air command and control, and F/A-18 Pilot. Of particular interest was the married variable; this was found to be statistically significant and positively correlated with promotion in a majority of the previous studies. However, this variable was statistically insignificant for the logistic estimates for the major and lieutenant colonel promotion models.

This study contained the most detail and depth of the previous studies analyzed in this chapter. The detail from the description of the United States Marine Corps Human Resource Development Process to the manpower models used in this thesis was quite comprehensive. It provided the reader with a complete understanding of Perry's (2006) results and an insight into the potential benefits of his study.

C.   Summary

The eight studies in the literature review identified relevant variables that affect promotion. The research found valuable results for the variables of interest. The studies did not analyze the effect of physical fitness on promotion. Thus, research should be conducted to analyze this variable and observe the potential effect it might have on field-grade promotions in the Marine Corps.

Results differed when the combat service variable was analyzed in the different studies. Long (1992) and Branigan (2001) found combat service to have no effect on promotion. This is quite surprising for the Long (1992) study, since it was conducted following the Gulf War. Ergun (2003) showed that possessing a combat fitness report increased an officer's Performance Index (PI), while Morgan (2005) reported that such a FITREP decreased effects on attrition.

Four of the studies used fitness report data to examine the effect it had on promotion. The data consisted of the old and new style of fitness reports. However, the studies did not use the reviewing officer markings to analyze the effect these had on an officer's promotion. Reviewing officers are the senior officers on a fitness report, so their markings should carry the most weight by the nature of their seniority.

Since the Global War on Terror (GWOT), the current Marine Corps policy-makers have placed a greater emphasis on serving in combat and physical fitness. This renewed interest in combat service and physical fitness should have observable changes on the effects of promotion from what was reported in past research. The current data should reflect Marine Corps leadership's intent to establish a need for continued research of the factors that affect promotion.

IV. Data and Preliminary Analysis

> The completion of fitness reports is a critical leadership responsibility. Inherent in this duty is the commitment of our commanders and all reporting officials to ensure the integrity of the system by giving close attention to accurate marking, narrative assessment, and timely reporting. Every commander and reporting official must ensure the scrupulous maintenance of the PES. (HQMC, 2006, May 11, p. 2)

The purpose of this chapter is to describe the data used in this research. The dependent and independent variables will be described in detail. Additionally, the preliminary analysis will examine the factors that influence promotion to major, lieutenant colonel and colonel.

A. Data Sources

The data for this research was obtained from two separate sources. The first data source was the Total Force Data Warehouse (TFDW); the second source was the Manpower Management Support Branch (MMSB). The two sources were merged together to complete three separate samples for studying the promotion to major, lieutenant colonel and colonel.

1. TFDW & MMSB Data

The TFDW data used in this research consisted of cross-sectional and panel data. TFDW data operates on the basis of capturing data on a "snap-shot" basis. Prior to 1998, the data was captured every 3 months; this was changed to a monthly basis in 1998. The data for the major, lieutenant colonel and colonel selection boards was collected on the closest date to the board. For the lieutenant colonel and colonel board, the capture date of the data was 31 August 2006. The boards convened 6 September 2006 and 7 September 2006, respectively. The data for the major board that convened on 11 October 2006 was captured on 30 September 2006. The major, lieutenant colonel and colonel observations were 743, 519, and 196, respectively.

The TFDW data provided 41 of the 56 variables used in the analysis. It was the source for the dependent variable of grade select. The independent variables included demographics, performance (PFT, water qualification, awards), military occupational specialty categories, combat service, commissioning source, and assignments.

MMSB was used to collect the fitness report information on the officers in the research. Fitness report panel data was collected from 01 January 1999 to the date the board convened. Fitness report data was not collected before 1999, because prior to this time fitness reports included only qualitative information. The data collection provided independent performance variables of fitness report relative value measures and reviewing officer percentages. Additionally, assignment variables were produced to include the sum of commander, executive officer, primary staff, and other billets an officer served in as annotated on his fitness reports.

2. Data Issues

The Lineal Control Number (LCN) assigned to an officer was used as the unique identifier to identify the officers that were in-zone. The LCN was used to build the filter within TFDW to target the officers being observed in this research project. The Promotion Selection Board message from Headquarters Marine Corps (HQMC) was the source document used to identify those officers that were in-zone for promotion (HQMC, 2006, July 11, p. 2).

The captain, major, and lieutenant colonel samples pulled from TFDW contained 773, 530, and 228 observations, respectively. However, the actual in-zone population for the three groups was 744, 520, and 196. The main cause for the difference was the retiring population of officers that were included in the TFDW data. In other words, TFDW data included officers who were about to retire; however, officers who are within 90 days of retiring are not considered for promotion (HQMC, 2006, July 11, p. 1). Therefore, they were removed, and the original

sample was reduced to 743, 519, and 196, respectively. To confirm these results, the researcher also used information from the Manpower Management Promotion Branch (MMPR).

Utilizing the 90-day retirement window to remove officers from the sample and the actual list of in-zone officers supplied by Manpower Management Promotion Branch (MMPR), the three samples were able to come within one officer for the major and lieutenant colonel boards, and to match the colonel board. The data analyzed in this research as compared to the actual in-zone population is illustrated in Table 3.

Unless otherwise specified, the following tables were created by the author.

Table 3.   TFDW Data and In-zone Population Comparison

	TFDW Initial Officer Population	Officers Removed from Sample	New TFDW Officer Population	Actual In-zone Population	Difference in TFDW and Actual Population
Major Board	773	30	743	744	-1
Lieutenant Colonel Board	530	11	519	520	-1
Colonel Board	228	32	196	196	0

B.   Variables

A description of the variables that were used in the research are summarized in Table 4. The variables are explained in greater detail in the following paragraphs.

Table 4.   Description of Variables

Variables	Variable Description	Variable Type	Data Type	Range
Dependent				
Grade_select_O4	Selected for promotion to O4	Binary	CS	= 1 if selected = 0 otherwise
Grade_select_O5	Selected for promotion to O5	Binary	CS	= 1 if selected = 0 otherwise
Grade_select_O5	Selected for promotion to O6	Binary	CS	= 1 if selected = 0 otherwise

Independent				
Demographics				
Number_Depns	Number of dependents	Continuous	CS	0-10[a] 0-7[b] 0-8[c]
Years_Comm_Serv	Years of commissioned service	Continuous	CS	6-11[a] 13-19[b] 18-24[c]
Months_Grade	Months in current grade	Continuous	CS	58.2-69.3[a] 51.9-65.1[b] 47.9-55.0[c]
GCT_Total	General Classification Test Score	Continuous	CS	98-158[a] 95-154[b] 105-155[c]
Gender	Gender	Binary	CS	= 1 if Female = 0 otherwise
White	White Race	Binary	CS	= 1 if White = 0 otherwise
Black	Black/African American Race	Binary	CS	= 1 if Black = 0 otherwise
Other_race	American Indian, Alaskan Native, Asian, Native Hawaiian, or Other Pacific Island Race	Binary	CS	= 1 if Other_race = 0 otherwise
Marital_Status	Marital Status	Binary	CS	= 1 if Married = 0 otherwise
Greater_College	Doctorate, First-Professional, Post-Master's, or Master's degree	Binary	CS	= 1 if Greater_College = 0 otherwise
College	Bachelor's or Associate's degree	Binary	CS	= 1 if College = 0 otherwise
Less_College[4]	High School diploma or Occupational Program Certificate	Binary	CS	= 1 if Less_College = 0 otherwise
Performance				
PFT	Physical Fitness Test Score	Continuous	CS	139-300[a] 138-300[b] 127-300[c]
Water_Unq	Water Survival	Binary	CS	= 1 if Water_Unq

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[4] The Colonel Selection board data did not contain any "Less_College" observations.

	Unqualified			= 0 otherwise
Water_Qualified	Water Survival Class 1, 2, 3, 4, & WSQ	Binary	CS	= 1 if Water_Qualified = 0 otherwise
Water_Waiver	Medical or Commanding General Waiver	Binary	CS	= 1 if Water_Waiver = 0 otherwise
Water_CWSS_MCIWS	Combat Water Safety Swimmer or Instr. of Water Survival	Binary	CS	= 1 if Water_CWSS_MCIWS = 0 otherwise
RelVal_Cum_Low	Sum of Low Relative Value Markings	Continuous	Panel	0-8[a] 0-6[b] 0-4[c]
RelVal_Cum_High	Sum of High Relative Value Markings	Continuous	Panel	0-8[a] 0-6[b] 0-5[c]
RelVal_Cum_Avg	Mean of Relative Value for Markings	Continuous	Panel	81.85-99.07[a] 80.00-97.98[b] 84.90-99.07[c]
RelVal_Cum_sd	Standard Deviation of relative value markings	Continuous	Panel	1.37-10.72[a] 0-8.82[b] 1.75-9.46[c]
RO_PCT_Low	Sum of bottom 10 percent of Reviewing Officer markings	Continuous	Panel	0-9[a] 0-8[b] 0-6[c]
RO_PCT_High	Sum of top 100 percent of Reviewing Officer markings	Continuous	Panel	0-12[a] 0-10[b] 0-8[c]
RO_PCT_Avg	Mean of Reviewing Officer Percentage markings	Continuous	Panel	26.27-98.96[a] 29.35-97.80[b] 43.04-97.77[c]
RO_PCT_sd	Standard Deviation of Reviewing Officer markings	Continuous	Panel	2.08-42.47[a] 2.12-45.77[b] 3.93-38.31[c]
Personal_Awards	Sum of Personal Awards	Continuous	Panel	0-6[a] 0-7[b] 1-7[c]
Other_Awards	Sum of all Other Awards	Continuous	Panel	1-20[a] 3-21[b] 3-23[c]
Military Occupational Field				
Joint_MOS[5]	Completed a Joint Tour	Binary	CS	= 1 if Joint_MOS = 0 otherwise

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[5] The Major Selection board data did not contain any "Joint_MOS" observations.

Combat	Combat Military Occupational Group	Binary	CS	= 1 if Combat = 0 otherwise
Ground_Support	Ground Support Military Occupational Group	Binary	CS	= 1 if Ground_Support = 0 otherwise
Service_Support	Service Support Military Occupational Group	Binary	CS	= 1 if Service_Support = 0 otherwise
Aviation_Fixed	Aviation Fixed Military	Binary	CS	= 1 if Aviation_Fixed = 0 otherwise
Aviation_Rotary	Aviation Rotary Military Occupational Group	Binary	CS	= 1 if Aviation_Rotary = 0 otherwise
Aviation_Support	Aviation Support Military Occupational Group	Binary	CS	= 1 if Aviation_Support = 0 otherwise
Combat				
Crisis_Code	Currently Serving in Combat	Binary	CS	= 1 if Crisis_Code = 0 otherwise
Combat_Service1	Served 1 Tour in Combat	Binary	CS	= 1 if Combat_Service1 = 0 otherwise
Combat_Service2	Served 2 Tours in Combat	Binary	CS	= 1 if Combat_Service2 = 0 otherwise
Combat_Service3	Served 3 Tours in Combat	Binary	CS	= 1 if Combat_Service3 = 0 otherwise
Combat_Service4[6]	Served 4 Tours in Combat	Binary	CS	= 1 if Combat_Service4 = 0 otherwise
Commissioning				
OCS	Officer Candidate School	Binary	CS	= 1 if OCS = 0 otherwise
NROTC	Naval Reserve Officer Training Corps	Binary	CS	= 1 if NROTC = 0 otherwise
USNA	United States Naval Academy	Binary	CS	= 1 if USNA = 0 otherwise
ENLPGM	Contains MECEP, ECP, or MCP Commissioning Programs.	Binary	CS	= 1 if ENLPGM = 0 otherwise
Other_Source	Other Commissioning Source	Binary	CS	= 1 if Other_Source = 0 otherwise

[6] The Colonel Selection board data had the only "Combat_Service4" observations.

Assignment				
FMF_Unit	Currently Assigned to a FMF Unit	Binary	CS	= 1 if FMF_Unit = 0 otherwise
NONFMF_Unit	Currently Assigned to a Non-FMF unit	Binary	CS	= 1 if NONFMF_Unit = 0 otherwise
Billet_Cmdr	Sum of Commander Billets	Continuous	Panel	0-20[a] 0-9[b] 0-7[c]
Billet_XO	Sum of Executive Officer Billets	Continuous	Panel	0-11[a] 0-6[b] 0-7[c]
Billet_Pri_Stf	Sum of Principal Staff Officer Billets	Continuous	Panel	0-15[a] 0-13[b] 0-8[c]
Billet_Other	Sum of Other Billets	Continuous	Panel	0-23[a] 0-20[b] 0-16[c]
Ser_School_ALS	Attended Resident Appropriate Level School	Continuous	Panel	0-2
Ser_School_Other	Attended all Other Schools	Continuous	Panel	2-23[a] 4-22[b] 6-23[c]

Table Code
[a] Represents FY08 Major Selection Board data range
[b] Represents FY08 Lieutenant Colonel Selection Board data range
[c] Represents FY08 Colonel Selection Board data range
CS = Cross-sectional Data

1. Dependent Variable

The 52 dependent variable of Grade_select attained from the TFDW was used to determine whether an officer was selected for the next grade. This was a binary variable which resulted in a "0" or "1" outcome. A "0" resulted in an officer failing selection for the next grade, while a "1" was selection for the next higher grade. This variable was consistent for the major, lieutenant colonel, and colonel samples.

The in-zone promotion statistics for the three Fiscal Year 2008 promotion boards are illustrated in Table 5. As seen from the table, the opportunity for

promotion decreases with the increase in grade. There was a 36.4 percent difference in selection rate between the major and colonel selection boards. This is reflective of the hierarchy (pyramid structure) within the Marine Corps. Additionally, the eligible population decreases as the grade of the promotion board increases. There were almost four times as many captains eligible for promotion than there were eligible lieutenant colonels.

Table 5.   Promotion Statistics for FY08 In-zone Population
(Source: After MMPR, Selection Board Results, 2006, September 22)

	Eligible	Selected	Percentage
Major Selection Board	744	650	87.4 percent
Lieutenant Colonel Selection Board	520	338	65.0 percent
Colonel Selection Board	196	100	51.0 percent

2.   Independent Variables

The independent variables were broken down into six separate categories. The categories consisted of demographics, performance, military occupational field, combat, commissioning, and assignment. The variables ranged in type from binary to continuous as displayed in Table 4. Also, TFDW and MMSB were used to obtain the independent variables in the study. The categories for the independent variables will be discussed in further detail.

a.   Demographics

There were twelve demographic variables in the sample. The majority of the demographic variables were self-explanatory in terms of their composition. The descriptive statistics for the demographic variables for officers who were selected and not selected for promotion for the Major, Lieutenant Colonel, and Colonel Promotion Boards are shown in Tables 6, 7, and 8, respectively. The three race variables of White, Black, and Other_race contained missing observations. The missing observations occurred due to the "Declined to Respond" option existent within the race category. This resulted in the race category missing a total of 51, 12,

and 4 observations for the Major, Lieutenant Colonel, and Colonel Samples, respectively.

Table 6.   Demographic-descriptive Statistics of Captains Selected and Not Selected for Promotion

Captains Not Selected for Major					
Variables	N	Mean	Std. Dev.	Min	Max
Number_Depns	100	1.800	1.775	0	10
Years_Comm_Serv	99	8.646	0.577	7	11
Months_Capt	100	62.143	3.345	58	69
GCT_Total	100	124.630	8.890	99	143
Gender	100	0.060	0.239	0	1
White	92	0.761	0.429	0	1
Black	92	0.163	0.371	0	1
Other_race	92	0.076	0.267	0	1
Marital_Status	100	0.740	0.441	0	1
Greater_College	100	0.060	0.239	0	1
College	100	0.920	0.273	0	1
Less_College	100	0.020	0.141	0	1
Captains Selected for Major					
Variables	N	Mean	Std. Dev.	Min	Max
Number_Depns	643	1.939	1.466	0	7
Years_Comm_Serv	637	8.727	0.467	6	9
Months_Capt	643	62.954	3.191	58	69
GCT_Total	633	126.393	10.289	98	158
Gender	643	0.064	0.245	0	1
White	600	0.837	0.370	0	1
Black	600	0.107	0.309	0	1
Other_race	600	0.057	0.231	0	1
Marital_Status	643	0.798	0.402	0	1
Greater_College	643	0.137	0.344	0	1
College	643	0.855	0.352	0	1
Less_College	643	0.008	0.088	0	1

Table 7.   Demographic-descriptive Statistics of Majors Selected and Not Selected for Promotion

Majors Not Selected for Lieutenant Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
Number_Depns	184	2.804	1.477	0	7
Years_Comm_Serv	178	14.140	0.408	13	16
Months_Maj	184	57.639	5.171	52	65
GCT_Total	180	126.894	9.586	95	154
Gender	184	0.016	0.127	0	1
White	176	0.864	0.344	0	1
Black	176	0.102	0.304	0	1
Other_race	176	0.034	0.182	0	1
Marital_Status	184	0.875	0.332	0	1
Greater_College	184	0.288	0.454	0	1
College	184	0.701	0.459	0	1
Less_College	184	0.011	0.104	0	1

Majors Selected for Lieutenant Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
Number_Depns	335	2.755	1.448	0	6
Years_Comm_Serv	330	14.142	0.462	13	19
Months_Maj	335	58.076	5.231	52	65
GCT_Total	328	126.662	10.267	99	154
Gender	335	0.021	0.143	0	1
White	331	0.940	0.239	0	1
Black	331	0.042	0.202	0	1
Other_race	331	0.018	0.134	0	1
Marital_Status	335	0.904	0.294	0	1
Greater_College	335	0.352	0.478	0	1
College	335	0.639	0.481	0	1
Less_College	335	0.009	0.094	0	1

Table 8.   Demographic-descriptive Statistics of Lieutenant Colonels Selected and Not Selected for Promotion

Lieutenant Colonels Not Selected for Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
Number_Depns	96	3.208	1.458	0	8
Years_Comm_Serv	95	19.853	0.714	18	24
Months_LtCol	96	51.359	2.661	48	55
GCT_Total	94	127.713	10.743	105	155
Gender	96	0.021	0.144	0	1
White	94	0.883	0.323	0	1
Black	94	0.053	0.226	0	1
Other_race	94	0.064	0.246	0	1
Marital_Status	96	0.958	0.201	0	1
Greater_College	96	0.417	0.496	0	1
College	96	0.583	0.496	0	1

Lieutenant Colonels Selected for Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
Number_Depns	100	2.910	1.386	0	7
Years_Comm_Serv	100	19.800	0.586	19	22
Months_LtCol	100	51.404	2.811	48	55
GCT_Total	99	127.778	10.367	106	155
Gender	100	0.020	0.141	0	1
White	98	0.959	0.199	0	1
Black	98	0.041	0.199	0	1
Other_race	98	0.000	0.000	0	0
Marital_Status	100	0.880	0.327	0	1
Greater_College	100	0.650	0.479	0	1
College	100	0.350	0.479	0	1

The descriptive statistics analyzed in Tables 6, 7, and 8 identified some large differences between those officers that were selected for promotion, as compared to those officers not selected. For the Major Selection Board, captains that had greater than a college degree were selected at a rate of 13.7 percent—in contrast to those not selected, with a rate of 6.0 percent. This would result in a 8.9 percent higher probability of promoting for having more than a college education.

As the grade of the officer increased, the differences in the mean values of those officers that were selected and not selected for promotion increased for the Greater_College variable. Examining the O5 board in Table 7, 35.2 percent of majors selected for lieutenant colonel had greater than a college degree, while 28.8 percent of those not selected also held greater than a college degree. This would be a 9.7 percentage point difference for having more than a college education. Finally, the Colonel Selection Board displayed the largest differences for the Greater_College variable; 65.0 percent of lieutenant colonels that were selected held greater than a college degree; only 41.7 percent of those not selected had equivalent education. Greater than a college degree would result in a 22.9 percentage point difference between the select and not select groups.

b.   Performance

The performance variables include all the quantitative performance measures that are used to assess officers. The variables ranged from physical fitness test scores, water qualification levels, fitness report results, and the number of personal and other awards. The descriptive statistics for the performance variables of the officers that were selected or not selected for promotion for the three samples are described in Tables 9, 10, and 11.

Table 9. **Performance-descriptive Statistics of Captains Selected and Not Selected for Promotion**

Captains Not Selected for Major					
Variables	N	Mean	Std. Dev.	Min	Max
PFT	98	240.092	36.038	139.000	299.000
Water_Unq	100	0.000	0.000	0.000	0.000
Water_Qualified	100	0.940	0.239	0.000	1.000
Water_Waiver	100	0.050	0.219	0.000	1.000
Water_CWSS_MCIWS	100	0.010	0.100	0.000	1.000
RelVal_Cum_Low	100	1.730	1.711	0.000	7.000
RelVal_Cum_High	100	0.920	1.220	0.000	7.000
RelVal_Cum_Avg	100	87.917	3.179	81.845	96.383
RelVal_Cum_sd	99	5.495	1.698	1.806	10.721
RO_PCT_Low	100	2.580	2.147	0.000	9.000
RO_PCT_High	100	1.810	1.857	0.000	8.000
RO_PCT_Avg	100	58.8	0.151	0.289	0.927
RO_PCT_sd	100	28.3	0.061	0.109	0.425
Personal_Awards	100	1.670	1.064	0.000	4.000
Other_Awards	100	8.650	3.239	3.000	17.000

Captains Selected for Major					
Variables	N	Mean	Std. Dev.	Min	Max
PFT	628	259.213	26.679	166.000	300.000
Water_Unq	643	0.002	0.039	0.000	1.000
Water_Qualified	643	0.899	0.302	0.000	1.000
Water_Waiver	643	0.090	0.287	0.000	1.000
Water_CWSS_MCIWS	643	0.009	0.096	0.000	1.000
RelVal_Cum_Low	642	0.807	1.035	0.000	8.000
RelVal_Cum_High	642	1.597	1.469	0.000	8.000
RelVal_Cum_Avg	642	90.645	2.913	82.474	99.068
RelVal_Cum_sd	642	5.603	1.355	1.375	9.324
RO_PCT_Low	642	1.045	1.467	0.000	9.000
RO_PCT_High	642	2.670	2.200	0.000	12.000
RO_PCT_Avg	642	72.4	0.126	0.263	0.990
RO_PCT_sd	642	23.1	0.066	0.021	0.399
Personal_Awards	643	2.255	0.954	0.000	6.000
Other_Awards	643	9.358	3.308	1.000	20.000

Table 10.   Performance-descriptive Statistics of Majors Selected and Not Selected for Promotion

Majors Not Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
PFT	181	241.320	37.053	138.000	300.000
Water_Unq	184	0.011	0.104	0.000	1.000
Water_Qualified	184	0.924	0.266	0.000	1.000
Water_Waiver	184	0.054	0.227	0.000	1.000
Water_CWSS_MCIWS	184	0.011	0.104	0.000	1.000
RelVal_Cum_Low	184	1.082	1.280	0.000	6.000
RelVal_Cum_High	184	0.761	0.996	0.000	5.000
RelVal_Cum_Avg	183	88.931	3.038	80.000	95.851
RelVal_Cum_sd	183	5.268	1.661	0.000	8.823
RO_PCT_Low	184	1.853	1.742	0.000	8.000
RO_PCT_High	184	1.636	1.593	0.000	7.000
RO_PCT_Avg	184	64.1	0.143	0.294	0.909
RO_PCT_sd	184	26.6	0.063	0.058	0.458
Personal_Awards	184	2.457	1.163	0.000	6.000
Other_Awards	184	9.967	3.126	3.000	21.000

Majors Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
PFT	334	260.629	27.235	162.000	300.000
Water_Unq	335	0.009	0.094	0.000	1.000
Water_Qualified	335	0.901	0.298	0.000	1.000
Water_Waiver	335	0.063	0.243	0.000	1.000
Water_CWSS_MCIWS	335	0.027	0.162	0.000	1.000
RelVal_Cum_Low	334	0.392	0.684	0.000	4.000
RelVal_Cum_High	334	1.530	1.317	0.000	6.000
RelVal_Cum_Avg	334	92.353	2.593	84.196	97.975
RelVal_Cum_sd	334	5.341	1.364	1.725	8.673
RO_PCT_Low	334	0.545	0.857	0.000	4.000
RO_PCT_High	334	2.599	1.924	0.000	10.000
RO_PCT_Avg	334	79.0	0.099	0.454	0.978
RO_PCT_sd	334	20.9	0.070	0.021	0.416
Personal_Awards	335	3.161	1.128	0.000	7.000
Other_Awards	335	10.636	2.957	4.000	20.000

Table 11.   Performance-descriptive Statistics of Lieutenant Colonels Selected and Not Selected for Promotion

Lieutenant Colonels Not Selected for Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
PFT	89	242.045	36.903	127.000	300.000
Water_Unq	96	0.000	0.000	0.000	0.000
Water_Qualified	96	0.948	0.223	0.000	1.000
Water_Waiver	96	0.042	0.201	0.000	1.000
Water_CWSS_MCIWS	96	0.010	0.102	0.000	1.000
RelVal_Cum_Low	95	0.632	0.826	0.000	4.000
RelVal_Cum_High	95	1.326	1.143	0.000	5.000
RelVal_Cum_Avg	94	91.570	2.809	84.897	99.074
RelVal_Cum_sd	94	5.714	1.596	1.753	9.464
RO_PCT_Low	95	1.326	1.308	0.000	6.000
RO_PCT_High	95	2.368	1.732	0.000	7.000
RO_PCT_Avg	95	74.6	0.115	0.430	0.953
RO_PCT_sd	95	23.8	0.077	0.061	0.383
Personal_Awards	96	3.625	1.098	1.000	6.000
Other_Awards	96	11.688	3.291	3.000	19.000

Lieutenant Colonels Selected for Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
PFT	99	252.293	28.940	177.000	300.000
Water_Unq	100	0.010	0.100	0.000	1.000
Water_Qualified	100	0.920	0.273	0.000	1.000
Water_Waiver	100	0.050	0.219	0.000	1.000
Water_CWSS_MCIWS	100	0.020	0.141	0.000	1.000
RelVal_Cum_Low	100	0.260	0.579	0.000	3.000
RelVal_Cum_High	100	1.540	1.267	0.000	5.000
RelVal_Cum_Avg	100	93.284	2.123	87.813	98.091
RelVal_Cum_sd	100	5.026	1.457	1.831	9.039
RO_PCT_Low	100	0.580	0.781	0.000	5.000
RO_PCT_High	100	2.830	2.055	0.000	8.000
RO_PCT_Avg	100	83.0	0.075	0.623	0.978
RO_PCT_sd	100	19.5	0.065	0.039	0.318
Personal_Awards	100	4.170	1.256	2.000	7.000
Other_Awards	100	13.120	3.195	5.000	23.000

The PFT variable was one of the secondary research questions in this thesis. The Physical Fitness Test is based on three events: pull-ups (males) or flexed arm hang (females), crunches, and a 3-mile run. The scoring for the PFT is based upon a 0-to-300-point system. The minimum requirements to pass the test and the classifications for the PFT are described in Appendix A. Score, age, and gender are the three criteria that are used to compute a Marine's PFT score. Appendices B and C provide the female and male PFT scoring tables, respectively.

A large difference exists between the mean PFT values for officers selected for promotion than that of officers not selected for promotion in the three samples. Starting with the Major Sample, the officers that were selected for promotion had a 19.121-point difference over those that were not selected. The Lieutenant Colonel Sample was similar, with a 19.309-point difference. However, the Colonel Sample had the smallest difference, with a point value of 10.248. Overall, the officers who were selected for promotion had a higher mean PFT score in all three samples.

The Relative Value marking is the next variable in the Performance category that will be analyzed. To fully understand Relative Value markings, the researcher examined the Master Brief Sheet (MBS). A sample of the MBS Fitness Report listings, along with a detailed explanation of the document, is contained in Appendix D. The MBS in this Appendix shows an officer with four fitness reports. Examining the Annual (AN) Report, during which the Marine Reported On (MRO) was serving in the billet of "Operations Officer" from 04 May 1999 to 01 August 1999, the MRO received a Cumulative Relative Value of 96.11. As seen by the MBS, the RS average for the seven reports he had written was 4.13. In this example, the MRO received a score of 4.36, which equated to a Cumulative Relative Value of a 96.11. Therefore, this officer would have been 6.11 points above the average of 90.

The Marine Corps Fitness Report used to evaluate officer evaluations is displayed in Appendix E. The fitness report data were averaged for each officer. The first piece of information used to evaluate the effect of the fitness report on promotion was the Reporting Senior (RS) Cumulative Relative Value markings. The

Relative Value is a score assigned to each fitness report based on the average for that officer. Appendix F explains how the Relative Value is calculated for each officer who writes fitness reports as a Reporting Senior. As illustrated in Appendix F, the system is based on a numerical scale of 80 to 100. A fitness report with a score of 80 is the worst report written by that Reporting Senior for that particular grade; a 90 is the average for that RS; a 100 is the best report written by the RS.

For the reader to fully understand the Relative Value System, the researcher just explain the fitness report shown in Appendix E in more detail. Pages two thru four of the fitness report contain five categories labeled as Performance, Individual Character, Leadership, Intellect and Wisdom, and Fulfillment of Evaluation Responsibilities. The five categories are further separated into fourteen attributes. The attributes are marked on a scale using the letters A through H. The letter A represents a value of 1 (worst), the letter B represents a value of 2, up to the letter G, which represents a value of 7 (best). The letter H is used when the Reporting Senior (RS) does not observe that attribute with the Marine Reported On (MRO). To calculate the report average, the observed attributes are added and divided by the total number of observed attributes. Hypothetically, an officer who has a total score of 50 for all fourteen attributes would have a report average of 3.57.

To comprehend the Reporting Senior (RS) markings and the weight they carry, the researcher needed to integrate the report average and relative value. In the above hypothetical example, the officer received a report average of 3.57. This one observed report by the RS is not enough to generate a Relative Value. The Relative Value is generated by the RS when he writes two more reports on officers of the same grade as the individual with the 3.57 report. So, if the RS were to generate a 3.22 report and a 4.35 report, then there would be enough reports to calculate the Relative Value for that RS. In this example, the 3.22 would have a Relative Value of 80, the 3.57 a 90, and the 4.35 a 100. The Relative Value would change as the RS generated more fitness reports, and the values would be tracked under the Cumulative Relative Value.

By analyzing the Reporting Senior Cumulative Relative Values in Tables 9, 10, and 11, the researcher observed that a difference existed between the averages of those officers selected for promotion and those for officers not selected. For the Major Sample, the average for the officers not selected for promotion was 87.917. This score was 2.728 points lower than the average score for those officers that were selected (90.645). The greatest difference of 3.422 is found in the Lieutenant Colonel Sample. The average for the officers selected for Lieutenant Colonel was a 92.353, as contrasted to a score of 88.931 for those that were not selected. Finally, the Colonel Sample had the smallest margin (1.714) between the averages of the officers that were selected and those that were not selected. Those that were selected had a Cumulative Relative Value average of 93.284—in contrast to those not selected, with a value of 91.570.

The Cumulative Reviewing Officer (RO) Comparative Assessment Marking is another aspect of the fitness report the researcher analyzed. Appendix F explains how the RO profile is generated from the comparative assessment markings. Appendix G shows what a sample Reviewing Officer (RO) Comparative Assessment Profile would be like for an officer. The report comparative assessment (commonly called the Reviewing Officer pyramid) allows the reviewing officer to grade the Marine Reported On (MRO) with a numerical value of 1 to 8—as displayed in Table 7. A value of 1 means a Marine that is "Unsatisfactory," while an 8 is "The Eminently Qualified Marine." The values of 2 through 7 contain the remainder of the performance indicators. Unlike the reporting senior's relative value, the Reviewing Officer Comparative Assessment Profile only contains the raw numbers.

Figure 7.   Reviewing Officer Description and Comparative Assessment
(Source: HQMC, 2006, May 11)

Using Appendix F as the example again, the researcher examined the Reviewing Officer Markings for the officer whose RS Relative Value Markings were examined above. This officer received a comparative assessment marking of 5 from the RO. In this example for the RO, one officer received a comparative assessment marking of 2, two received a 3, seven received a 4, seven received a 5, and five received a 6. The RO in this example did not use the 0, 7, or 8 assessment markings.

By utilizing the comparative assessment markings, the researcher was able to convert the assessment markings into a percentile ranking. This was accomplished by conducting the following steps. First, the assessment markings by the Reviewing Officer (RO) were added together to get an aggregate number for the comparative assessment. This value represents the total number of fitness reports the RO has reviewed for that specific grade. Next, the number of assessment markings for each level of the pyramid was divided by the total to generate a row percentage for each level. The row percentage represented the individual percentile for the eight levels in the RO pyramid. Note, if the RO did not use a level in the comparative assessment, then the result would be a zero for that row percentage. Finally, a cumulative percentage was calculated by adding the row percentages together. This was accomplished by starting at the bottom of the pyramid (Assessment Mark

1) and adding the row percentages until the top of the pyramid was reached (Assessment Mark 8). The result would be a Cumulative Percentage for each level of the RO pyramid.

To put the above system into perspective, the example that was previously used from Appendix D will be utilized again. This example is illustrated in Table 8 using the Reviewing Officer (RO) who has reviewed 22 fitness reports. In this example, the RO has utilized five of the eight assessment markings in evaluating the MROs. As noted previously, the RO did not evaluate officers in the 1, 7, or 8 assessment marking blocks. From this example, the two officers who received an assessment mark of 3 were in the 13.63[rd] percentile for that reviewing officer. From the previous example of the officer serving in the operation's officer billet, his assessment marking of 5 put him in the 77.27[th] percentile for that RO.

Table 12.   Example of Reviewing Officer Percentile System

Assessment Mark	RO Report Distribution	Row Percentage	Cumulative Percentage
8	0	N/A	N/A
7	0	N/A	N/A
6	5	22.73 percent	100 percent
5	7	31.82 percent	77.27 percent
4	7	31.82 percent	45.45 percent
3	2	9.09 percent	13.63 percent
2	1	4.54 percent	4.54 percent
1	0	N/A	N/A

The researcher examined the differences in the Reviewing Officer Percentile Average (RO_PCT_Avg) variable for the three different samples as displayed in Tables 9, 10, and 11. Starting with the Major Sample, the average for the captain not selected for promotion was in the RO's 58.8th percentile, while the captain

selected was in the 72.4th percentile—resulting in a 13.6th percent difference between the two groups. For the Lieutenant Colonel Sample, the margin between the two groups would be slightly larger—with a 14.88 percentage point difference. The officers who were not selected for promotion were in the reviewing officer's 64.14th percentile, while those who were selected for promotion were in the 79.02th percentile. Once again, the Colonel Sample would show the smallest difference (8.84 percentage points) of the three samples. The lieutenant colonels that were not selected for promotion were in the 74.6th percentile, while those that were selected were in the 83rd percentile.

In addition to using the fitness report averages, the researcher also analyzed the differences attributed to the average number of low and high reports. The four variables used to examine this effect were: RelVal_Cum_Low, RelVal_Cum_High, RO_PCT_Low, and RO_PCT_High. The RelVal_Cum_Low was the sum of the low relative marking reports (80) given by the Reporting Senior (RS), while the RelVal_Cum_High was the sum of the high relative marking reports (100). The same methodology was applied to the Reviewing Officer (RO) Percentile System. The RO_PCT_Low contained the sum of the bottom 10 percent of the reports for the RO markings, while the RO_PCT_High contained the sum of the top 100 percent of the reports. The effect of all four variables was consistent among all three samples, as shown in Tables 9, 10, and 11. The officers who were not promoted in all three samples had higher RelVal_Cum_Low and RO_PCT_Low fitness report scores when contrasted to those officers who were selected for promotion. The opposite effect was observed for the RelVal_Cum_High and RO_PCT_High reports. The officers that were selected for promotion had a higher average of RelVal_Cum_High and RO_PCT_High reports.

c.   **Military Occupational Field**

The Military Occupational Field category contained seven independent variables based upon individual Military Occupational Specialties (MOSs). It should be noted that the Joint_MOS variable is a MOS variable. It takes on a value of "1"

when an officer has the Joint MOS of 9701 or 9702. As illustrated in Table 4, the Major Sample did not contain any observations for this variable. This is due to the policy of captains being too junior to be designated as a Joint Qualified Officer (JQO). Tables 13, 14, and 15 describe the Military Occupational Field (to include Joint_MOS) descriptive statistics of officers selected and not selected for promotion for the three samples.

Table 13.   Military Occupational Field-descriptive Statistics of Captains Selected and Not Selected for Promotion

Captains Not Selected for Major					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Combat	100	0.130	0.338	0	1
Ground_Support	100	0.360	0.482	0	1
Service_Support	100	0.070	0.256	0	1
Aviation_Fixed	100	0.240	0.429	0	1
Aviation_Rotary	100	0.120	0.327	0	1
Aviation_Support	100	0.080	0.273	0	1

Captains Selected for Major					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Combat	643	0.184	0.387	0	1
Ground_Support	643	0.373	0.484	0	1
Service_Support	643	0.058	0.233	0	1
Aviation_Fixed	643	0.166	0.373	0	1
Aviation_Rotary	643	0.159	0.366	0	1
Aviation_Support	643	0.061	0.239	0	1

Table 14.   Military Occupational Field-descriptive Statistics of Majors Selected and Not Selected for Promotion

Majors Not Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Joint_MOS	184	0.011	0.104	0	1
Combat	184	0.125	0.332	0	1
Ground_Support	184	0.277	0.449	0	1
Service_Support	184	0.043	0.204	0	1
Aviation_Fixed	184	0.196	0.398	0	1
Aviation_Rotary	184	0.245	0.431	0	1
Aviation_Support	184	0.114	0.319	0	1
Majors Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Joint_MOS	335	0.027	0.162	0	1
Combat	335	0.287	0.453	0	1
Ground_Support	335	0.275	0.447	0	1
Service_Support	335	0.090	0.286	0	1
Aviation_Fixed	335	0.146	0.354	0	1
Aviation_Rotary	335	0.140	0.348	0	1
Aviation_Support	335	0.063	0.243	0	1

Table 15.   Military Occupational Field-descriptive Statistics of Lieutenant Colonels Selected and Not Selected for Promotion

Lieutenant Colonels Not Selected for Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
Joint_MOS	96	0.042	0.201	0	1
Combat	96	0.250	0.435	0	1
Ground_Support	96	0.260	0.441	0	1
Service_Support	96	0.083	0.278	0	1
Aviation_Fixed	96	0.167	0.375	0	1
Aviation_Rotary	96	0.167	0.375	0	1
Aviation_Support	96	0.073	0.261	0	1
Lieutenant Colonels Selected for Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
Joint_MOS	100	0.170	0.378	0	1
Combat	100	0.290	0.456	0	1
Ground_Support	100	0.320	0.469	0	1
Service_Support	100	0.040	0.197	0	1
Aviation_Fixed	100	0.160	0.368	0	1
Aviation_Rotary	100	0.130	0.338	0	1
Aviation_Support	100	0.060	0.239	0	1

The Joint_MOS variable only showed a difference for the means of the lieutenant colonel sample. There was a total of 21 observations for the Joint_MOS variable in the Colonel Sample. Of the 21 officers, 4 were not selected for promotion, while 17 were selected for promotion. As described in the table, this equates to 4.2 percent (4 out of 96 officers) of those officers not selected for promotion, and 17 percent (17 out of 100 officers) of those officers selected for promotion to Colonel. The overall selection rate for the Joint_MOS variable was 80.95 percent. This was 29.95 percent higher than the in-zone selection rate of 51.0 percent.

Examining the Military Occupational Fields, the researcher found the Aviation_Fixed variable had the greatest margin for the Major Sample. Out of the

100 captains not selected for promotion, 24.0 percent (24 officers) were from the Aviation Fixed Occupational Field; however, from the 643 captains selected for promotion, only 16.6 percent (107 officers) were from this field. A 7.4 percentage point difference existed within in this field. Overall, the Aviation Fixed Occupational Field had an 81.7 percent selection rate (107 out of 131 officers). This was 5.7 percentage points lower than the overall in-zone population selection rate of 87.4 percent.

For the Lieutenant Colonel Sample, the Combat and Aviation_Rotary variables had the largest margins for the officer selection rates. Specifically, 28.7 percent (96 officers) of the 335 majors in the Combat Occupational Field were selected for lieutenant colonel, while 12.5 percent (23 officers) of the 184 majors from the Combat Occupational Field were not selected for promotion. The Combat Occupational Field had a 80.7 percent promotion rate (96 out of 119). This was 15.7 percentage points higher than the overall in-zone population promotion rate of 65.0 percent. The Aviation Rotary Occupational Field experienced the exact opposite effect as the Combat Occupational Field. The Aviation Rotary Occupational Field had 14.0 percent (47 officers) of the 335 majors selected for lieutenant colonel, while 24.5 percent (45 officers) of the 184 majors not selected for promotion would be from the Aviation Rotary Occupational Field. Overall, the Aviation Rotary Occupational Field had a 51.1 percent promotion rate (47 out of 92 officers). This was 13.9 percentage points lower than the overall in-zone population promotion rate of 65.0 percent.

Finally, the Ground Support Occupational Field for the Colonel Sample had a slight margin (6.0 percent) between the select and not-select groups. Out of the 96 lieutenant colonels not selected for promotion, 26.0 percent (25 officers) were from the Ground Support Occupational Field. From the 100 officers selected for promotion, 32.0 percent (32 officers) were from this field. Overall, the Ground Support Occupational Field had a 56.1 percent promotion rate (32 out of 57 officers).

This was 5.1 percentage points higher than the overall in-zone population promotion rate of 51.0 percent.

d.   Combat

The combat variables identify if an officer is currently serving in a combat zone (Crisis_Code) as well as the officer's number of previous combat tours (Combat_Service). The Combat_Service variable was represented by four separate variables. The variables were labeled as Combat_Service1, Combat_Service2, Combat_Service3, and Combat_Service4 and represented one, two, three, and four combat tours, respectively. The descriptive statistics for the combat variables of the officers that were selected or not selected for promotion for the three samples are described in Tables 16, 17, and 18.

Table 16.   Combat-descriptive Statistics of Captains Selected and Not Selected for Promotion

Captains Not Selected for Major					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Crisis_Code	100	0.130	0.338	0	1
Combat_Service1	100	0.750	0.435	0	1
Combat_Service2	100	0.110	0.314	0	1
Combat_Service3	100	0.010	0.100	0	1
Captains Selected for Major					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Crisis_Code	643	0.168	0.374	0	1
Combat_Service1	643	0.714	0.452	0	1
Combat_Service2	643	0.098	0.298	0	1
Combat_Service3	643	0.005	0.068	0	1

Table 17.   Combat-descriptive Statistics of Majors Selected and Not Selected for Promotion

Majors Not Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Crisis_Code	184	0.109	0.312	0	1
Combat_Service1	184	0.505	0.501	0	1
Combat_Service2	184	0.033	0.178	0	1
Combat_Service3	184	0.005	0.074	0	1
Majors Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Crisis_Code	335	0.125	0.332	0	1
Combat_Service1	335	0.707	0.456	0	1
Combat_Service2	335	0.101	0.302	0	1
Combat_Service3	335	0.009	0.094	0	1

Table 18.   Combat-descriptive Statistics of Lieutenant Colonels Selected and Not Selected for Promotion

Lieutenant Colonels Not Selected for Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Crisis_Code	96	0.073	0.261	0	1
Combat_Service1	96	0.625	0.487	0	1
Combat_Service2	96	0.135	0.344	0	1
Combat_Service3	96	0.010	0.102	0	1
Combat_Service4	96	0.000	0.000	0	0
Lieutenant Colonels Selected for Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Crisis_Code	100	0.120	0.327	0	1
Combat_Service1	100	0.810	0.394	0	1
Combat_Service2	100	0.160	0.368	0	1
Combat_Service3	100	0.030	0.171	0	1
Combat_Service4	100	0.010	0.100	0	1

The Crisis_Code variable's effect was consistent across all three samples. If an officer was serving in a combat zone after the promotion board convened, he had a higher average chance of being selected for promotion—as seen in Tables 16, 17, and 18. The difference between those selected in contrast to those not selected was fairly small for all three samples. The Colonel Sample displays the largest difference (4.7 percentage points) between the two groups. Out of the 96 lieutenant colonels not selected for promotion, 7.3 percent (7 officers) were serving in a combat zone. From the 100 officers selected for promotion, 12 percent (12 officers) were currently serving in a combat zone. Overall, the effect of serving in a combat zone had a 63.2 percent selection rate (12 out of 19 officers). This was 12.2 percentage points higher than the overall in-zone population selection rate of 51.0 percent.

The influence of the Combat_Service variable was the third secondary research question in this study. The combat service variable was annotated—with an officer having zero, one, two, three, or four combat tours. Only the Colonel Sample had one officer with four combat tours. The variables used to capture this were: Combat_Service1, Combat_Service2, Combat_Service3, and Combat_Service4. The variables were binary and took on a "1" or "0" value. For instance, the Combat_Service3 variable would have a value of "1" if an officer completed three combat tours. The following list contains the combat tours captured in the TFDW Data that were used to code the four variables: Persian Golf, Operation Just Cause (Panama), Operation Desert Storm, Operation Enduring Freedom (OEF), and Operation Iraqi Freedom (OIF). Observations for Operation Just Cause (Panama) were not found in the Lieutenant Colonel Sample.

It should be noted for the Combat_Service1 variable that the original sample from TFDW contained 79 missing observations for the three samples. The missing values were replaced utilizing the research capabilities of the Marine Corps Total

Force System (MCTFS).[7] The values of the observations that were replaced for the 79 missing values for the Combat_Service1 variable are displayed in Table 19. The data correction made it possible for the researcher to identify 42 officers that had one combat tour that were originally observed as a missing variable. Additionally, 9 officers were found to have two combat tours.

Table 19.   Replaced Missing Values for Combat_Service Variable

Combat Tours	Major Sample	Lieutenant Colonel Sample	Colonel Sample	Total
0	21	6	1	28
1	24	15	3	42
2	0	9	0	9
Total	45	30	4	79

The number of combat deployments for the three samples is contained within Table 20. Additionally, the table contains the percentage of officers who have deployed to a combat zone in comparison to the in-zone population. The percentage of combat deployments is relatively consistent among the three samples. The percentage of those officers that did not have a combat tour only fluctuated by 8.3 percentage points among the three samples. This is interesting because as the grade of an officer increases, the percentage of combat tours should increase due to an increase in experience associated with time. The rise in this percentage due to increased experience would be associated with those officers who served in the Persian Gulf or Operation Desert Storm in the early 1990s.

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[7] Chief Warrant Officer-4 Jeff Stocker, Defense Language Institution Marine Detachment Personnel Officer was instrumental in finding the exact values for the 79 missing observations.

Table 20.   Combat Deployments

Combat Tours	Major Sample		Lieutenant Colonel Sample		Colonel Sample	
	N	percent Population	N	percent Population	N	percent Population
0	209	28.1 percent	189	36.4 percent	55	28.1 percent
1	534	71.9 percent	330	63.6 percent	141	71.9 percent
2	74	10.0 percent	40	7.7 percent	29	14.8 percent
3	4	0.5 percent	4	0.7 percent	4	2.0 percent
4	0	n/a	0	n/a	1	0.5 percent

By examining the four Combat_Service variables in Tables 16, 17, and 18, the researcher found the Combat_Service1 variable has the greatest deviation among the four variables across all three samples. The largest differences in the means of those selected from those not selected for promotion were observed in the Lieutenant Colonel Sample. Of important note is that the differences in the mean of the Major Sample having the opposite effect of that observed in the other two samples.

Analyzing the Major Sample, the researcher found the Combat_Service1 variable had the smallest margin for the officer selection rate. As noted previously, the mean of this variable had the opposite effect than the other two samples. The Combat_Service1 variable showed that 71.4 percent (459 officers) of the 643 captains with one combat tour were selected for major; yet, 75.0 percent (75 officers) of the 100 captains with one combat tour were not selected for promotion. The captains with one combat tour had a 86.0 percent selection rate (459 out of 534). Surprisingly, this was 1.4 percentage points lower than the overall in-zone population selection rate of 87.4 percent.

The Lieutenant Colonel Sample experienced the opposite effect—with the largest margin in the means of those officers selected for promotion when compared against those officers not selected for promotion. The Combat_Service1 variable showed that 70.7 percent (237 officers) of the 335 majors selected for lieutenant colonel had one combat tour; yet, 50.5 percent (93 officers) of the 184 majors with

one combat tour were not selected. A difference of 20.2 percentage points existed between the means of those officers with one combat tour in the select group and those in the not select groups. Overall, the Combat_Service1 variable had a 71.8 percent selection rate (237 out of 330 officers). This was 6.8 percentage points higher than the overall in-zone population selection rate of 65.0 percent.

Finally, the effects of the Colonel Sample were similar to those of the Lieutenant Colonel Sample, but the magnitude was slightly lower. The Combat_Service1 variable showed that 81.0 percent (81 officers) of the 100 lieutenant colonels selected for colonel had one combat tour; yet, 62.5 percent (60 officers) of the 96 lieutenant colonels with one combat tour were not selected. An 18.5 percentage point difference existed between the means of the lieutenant colonels with one combat tour in the selected and not-selected groups. Overall, the Combat_Service1 variable had a 57.4 percent selection rate (81 out of 141 officers). This was 6.4 percentage points higher than the overall in-zone population selection rate of 51.0 percent.

e.   Commissioning

There were five variables identifying the commissioning source in the sample. The variables were binary, and they consisted of an officer being commissioned by one of the five programs: Officer Candidate School (OCS), Naval Reserve Officer Training Corps (NROTC), United States Naval Academy (USNA), Enlisted Programs (ENLPGM), and Other Source of Entry (Other_Source). The ENLPGM variable consisted of one of the three programs: Meritorious Enlisted Commissioning Education Program (MECEP), Enlisted Commissioning Program (ECP), or the Meritorious Commissioning Program (MCP). The Other_Source variable consisted mainly of interservice transfers and other military academy graduates. The descriptive statistics for the Commissioning variables for officers selected and not selected for promotion for the Major, Lieutenant Colonel, and Colonel Promotion Boards is demonstrated in Tables 21, 22, and 23.

Table 21.   Commissioning-descriptive Statistics of Captains Selected and Not Selected for Promotion

Captains Not Selected for Major					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
OCS	97	0.680	0.469	0	1
NROTC	97	0.072	0.260	0	1
USNA	97	0.062	0.242	0	1
ENLPGM	97	0.165	0.373	0	1
Other_Source	97	0.021	0.143	0	1
Captains Selected for Major					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
OCS	628	0.580	0.494	0	1
NROTC	628	0.110	0.313	0	1
USNA	628	0.108	0.311	0	1
ENLPGM	628	0.189	0.392	0	1
Other_Source	628	0.013	0.112	0	1

Table 22.   Commissioning-descriptive Statistics of Majors Selected and Not Selected for Promotion

Majors Not Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
OCS	183	0.612	0.489	0	1
NROTC	183	0.153	0.361	0	1
USNA	183	0.077	0.267	0	1
ENLPGM	183	0.115	0.320	0	1
Other_Source	183	0.044	0.205	0	1
Majors Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
OCS	335	0.582	0.494	0	1
NROTC	335	0.206	0.405	0	1
USNA	335	0.116	0.321	0	1
ENLPGM	335	0.066	0.248	0	1
Other_Source	335	0.030	0.170	0	1

Table 23. Commissioning-descriptive Statistics of Lieutenant Colonels Selected and Not Selected for Promotion

Lieutenant Colonels Not Selected for Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
OCS	92	0.533	0.502	0	1
NROTC	92	0.239	0.429	0	1
USNA	92	0.152	0.361	0	1
ENLPGM	92	0.054	0.228	0	1
Other_Source	92	0.022	0.147	0	1
Lieutenant Colonels Selected for Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
OCS	100	0.460	0.501	0	1
NROTC	100	0.290	0.456	0	1
USNA	100	0.140	0.349	0	1
ENLPGM	100	0.080	0.273	0	1
Other_Source	100	0.030	0.171	0	1

There were a total of 23 missing variables for the three samples. The Major Sample had 18 missing variables, leaving 725 commissioning observations. The Lieutenant Colonel Sample had the least amount of missing variables (only 1), leaving the data with 518 commissioning observations. Finally, the Colonel Sample was missing 4 commissioning observations, resulting in a total of 192 observations.

The mean characteristics on an officer being selected or not selected for promotion was consistent for some of the commissioning variables and was mixed for the others. The mean directional effect each commissioning variable had on an officer's selection for promotion is demonstrated in Table 24. The minus sign (-) in the table was used to symbolize that the mean of a variable was lower for those officers being selected than for those not selected, while the positive sign (+) symbolized that the mean of a variable was higher for those officers being selected than for those not selected. The OCS and NROTC were the only two consistent variables across all three samples. The OCS variable had a consistent downward

effect on the mean of those selected for promotion, while the NROTC had an upward effect on all three selection boards.

Table 24.   Commissioning Mean Directional Effect on Selection for Promotion

	Major Board	Lieutenant Colonel Board	Colonel Board
OCS	-	-	-
NROTC	+	+	+
USNA	+	+	-
ENLPGM	+	-	+
Other_Source	-	-	+

After examining the mean directional difference (Table 24), the researcher then annotated the largest magnitude for each sample. Starting with the Major Sample, the researcher discovered the OCS variable had the largest margin for the officer selection rate. As noted previously, the mean direction of this variable was downward. The OCS variable showed that 58.0 percent (364 officers) of the 628 captains with the OCS commissioning source were selected for major, while 68.0 percent (66 officers) of the 97 captains with an OCS commissioning source were not selected for promotion. The captains with the OCS commissioning source had a 84.7 percent selection rate (364 out of 430). This was 2.7 percentage points lower than the overall in-zone population selection rate of 87.4 percent.

The NROTC variable had the largest margins for the officer selection rates for the Lieutenant Colonel Sample, as displayed in Table 22. The NROTC variable demonstrated that 20.6 percent (69 officers) of the 335 majors with the NROTC commissioning source were selected for lieutenant colonel, while 15.3 percent (28 officers) of the 183 majors from the NROTC commissioning source were not selected for promotion. The NROTC commissioning source displayed a 71.1

percent promotion rate (69 out of 97). This was 6.1 percentage points higher than the overall in-zone population promotion rate of 65.0 percent.

Finally, the Colonel Sample was similar to the Major Sample; specifically, the OCS variable held the greatest mean difference between those officers selected for promotion and those officers not selected (as displayed in Table 23). Out of the 92 lieutenant colonels not selected for promotion, 53.3 percent (49 officers) were from the OCS commissioning source. From the 100 officers selected for promotion, 46.0 percent (46 officers) had a OCS commissioning source. Overall, the OCS commissioning source had a 48.1 percent selection rate (46 out of 95 officers). This was 2.9 percentage points lower than the overall in-zone population promotion rate of 51.0 percent.

f.   Assignment

The assignment category contained nine independent variables based upon unit, billet, and school characteristics. The assignment-descriptive statistics of officers selected and not selected for promotion for the three samples are described in Tables 25, 26, and 27.

Table 25. Assignment-descriptive Statistics of Captains Selected and Not Selected for Promotion

Captains Not Selected for Major					
Variables	N	Mean	Std. Dev.	Min	Max
FMF_Unit	100	0.210	0.409	0	1
NONFMF_Unit	100	0.790	0.409	0	1
Billet_Cmdr	100	2.100	3.368	0	14
Billet_XO	100	0.790	1.742	0	11
Billet_Pri_Stf	100	1.830	2.503	0	10
Billet_Other	100	9.050	4.003	0	17
Ser_School_ALS	100	0.190	0.465	0	2
Ser_School_Other	100	7.780	3.445	2	18
Captains Selected for Major					
Variables	N	Mean	Std. Dev.	Min	Max
FMF_Unit	643	0.345	0.476	0	1
NONFMF_Unit	643	0.655	0.476	0	1
Billet_Cmdr	642	3.022	3.852	0	20
Billet_XO	642	0.866	1.595	0	11
Billet_Pri_Stf	642	1.807	2.752	0	15
Billet_Other	642	9.221	4.206	0	23
Ser_School_ALS	643	0.369	0.520	0	2

Table 26. Assignment-descriptive Statistics of Majors Selected and Not Selected for Promotion

Majors Not Selected for Lieutenant Colonel					
Variables	N	Mean	Std. Dev.	Min	Max
FMF_Unit	184	0.272	0.446	0	1
NONFMF_Unit	184	0.728	0.446	0	1
Billet_Cmdr	184	0.995	1.800	0	9
Billet_XO	184	0.397	0.947	0	6
Billet_Pri_Stf	184	1.663	2.042	0	13
Billet_Other	184	9.071	3.597	1	20
Ser_School_ALS	184	0.196	0.398	0	1
Ser_School_Other	184	10.690	3.143	4	22

Majors Selected for Lieutenant Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
FMF_Unit	335	0.284	0.451	0	1
NONFMF_Unit	335	0.716	0.451	0	1
Billet_Cmdr	334	1.793	2.298	0	9
Billet_XO	334	0.581	1.106	0	5
Billet_Pri_Stf	334	1.599	1.761	0	9
Billet_Other	334	8.096	3.590	0	17
Ser_School_ALS	335	0.430	0.574	0	2
Ser_School_Other	335	10.991	2.919	4	22

Table 27.   Assignment-descriptive Statistics of Majors Selected and Not Selected for Promotion

Lieutenant Colonels Not Selected for Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
FMF_Unit	96	0.125	0.332	0	1
NONFMF_Unit	96	0.875	0.332	0	1
Billet_Cmdr	95	0.684	1.160	0	4
Billet_XO	95	1.168	1.602	0	5
Billet_Pri_Stf	95	1.179	1.618	0	7
Billet_Other	95	8.326	3.184	1	16
Ser_School_ALS	96	0.063	0.243	0	1
Ser_School_Other	96	11.563	2.623	6	20
Lieutenant Colonels Selected for Colonel					
Variables	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
FMF_Unit	100	0.170	0.378	0	1
NONFMF_Unit	100	0.830	0.378	0	1
Billet_Cmdr	100	2.550	1.877	0	7
Billet_XO	100	1.240	1.646	0	7
Billet_Pri_Stf	100	1.120	1.677	0	8
Billet_Other	100	6.620	2.929	1	13
Ser_School_ALS	100	0.290	0.478	0	2
Ser_School_Other	100	11.550	3.286	6	23

The unit variable consisted of FMF_Unit and NONFMF_Unit. The FMF_Unit variable represented an officer who was serving in a Fleet Marine Force (FMF) Unit at the time the promotion board convened. The NONFMF_Unit variable contained all other units.

The billets were separated into the following categories: Billet_Cmdr, Billet_XO, Billet_Pri_Stf, and Billet_Other. The Billet_Cmdr variable took on a value of "1" any time an officer was serving in the billet with the billet description of commander or commanding officer in the title on the fitness report. It should be noted that the acronym of CO was recognized as "commanding officer," and Cmdr was seen as "commander." The Billet_XO billet was recognized as an officer serving in an executive officer billet at any level in a command. The Billet_Pri_Stf was used to signify officers serving as a principal staff officer. This billet consisted of the following billet descriptions: S1, S2, S3, S4, S6, Administrative Officer, Intelligence Officer, Operations Officer, Logistics Officer, Communications Officer, Assistant Chief of Staff (AC/S) G-1, AC/S G-2, AC/S G-3, AC/S G-4, AC/S G-6, and any N staff billet. Finally, Billet_Other contained those observations that were not captured in one of the other three billet variables. The student billets were not contained within the billet variables. The Ser_School_ALS and Ser_School_Other captured the effects of the school billets. It should also be noted that these variables were from panel data, so their observations took on a range for each officer. For example, an officer could have (2) Billet_Cmdr, (3) Billet_XO, (4) Billet_Pri_Stf, and (3) Billet_Other fitness reports contained over the eight year period.

The school variables were based on the variables of Ser_School_ALS and Ser_School_Other. The Ser_School_ALS variable identifies officers who attended resident Appropriate Level School (ALS) for their grade. The Ser_School_ALS variable corresponded to Career Level Schools (CLS) for captains, Intermediate Level School (ILS) for majors, and Top Level School (TLS) for lieutenant colonels. The Ser_School_Other variable applied to all the other service schools that officers had attended during their career.

Within the assignment category, the means of the FMF_Unit variable had a large effect on the Major Sample, as seen in Table 25. Analyzing the 100 captains not selected for promotion, the researcher observed that 21.0 percent (21 officers) were serving in an FMF unit; however, from the 643 captains selected for promotion, 34.5 percent (222 officers) served in a FMF unit. A captain serving in a FMF Unit at the time the promotion board would have convened experienced a 91.4 percent selection rate to major (222 out of 243 officers). Also, within the Major Sample, the mean of 2.100 was observed for billet commander fitness reports for those not selected for promotion, while a 3.022 was the mean for those selected for major. Finally, 94.2 percent (213 out of 226 officers) of those captains that attended resident Career Level School were selected for promotion. This was 6.8 percentage points higher than the overall in-zone population selection rate of 87.4 percent.

Unlike the Major Sample, the Lieutenant Colonel Sample saw very little deviation in the FMF_Unit variable among those officers selected (28.4 percent) for promotion from those not selected (27.2 percent). Additionally, the researcher found a mean of 0.995 billet commander fitness reports for those not selected for promotion; he found a mean of 1.793 for those selected for promotion. Finally, 76.3 percent (116 out of 152 officers) of those majors that attended resident Intermediate Level School were selected for promotion. This was 11.3 percentage points higher than the overall in-zone population selection rate of 65.0 percent.

The Colonel Sample displayed some of the greatest differences for the assignment category. Similar to the Lieutenant Colonel Sample, there was a small difference between the select (17.0 percent) and not select (12.5 percent) mean values for those currently assigned to a FMF Unit. However, the Billet_Cmdr variable had the greatest difference for the three samples. A lieutenant colonel selected for promotion to colonel had almost 4 times as many commander billets than an officer not selected for promotion. As seen in Table 27, this is 2.550 commander billets in contrast to 0.684 billets. Also, attendance at resident Appropriate Level School (ALS) had the largest difference in the Colonel Sample.

The lieutenant colonels who attended resident Top Level School (TLS), experienced a selection rate of 81.8 percent (27 out of 33 officers). This was 30.8 percentage points higher than the overall in-zone population promotion rate of 51.0 percent.

C.   Summary

This chapter described the cross-sectional and panel data extracted from the TFDW, and the career information from the MMSB. The data consisted of 53 variables (including Grade_Select) that were used to examine the effect they would have on selection for promotion to major, lieutenant colonel, and colonel.

Table 28 summarizes the comparison between the means of those officers selected for promotion against those officers not selected. The table contains the difference in terms of positive and negative numbers. A negative number for the difference column represents that the mean value for the not-selected officer sample was higher than the mean value of the selected officer sample. A positive difference number for the samples displays the opposite effect.

Table 28. Mean Comparison of Select & Non-select Samples

	Mean Values for Major Sample			Mean Values for Lieutenant Colonel Sample			Mean Values for Colonel Sample		
	Selected	Not Selected	Difference	Selected	Not Selected	Difference	Selected	Not Selected	Difference
Demographics									
Number_Depns	1.939	1.8	0.139	2.755	2.804	-0.049	2.91	3.208	-0.298
Years_Comm_Serv	8.727	8.646	0.081	14.142	14.14	0.002	19.8	19.853	-0.053
Months_Grade	62.954	62.143	0.811	58.076	57.639	0.437	51.404	51.359	0.045
GCT_Total	126.393	124.63	1.763	126.662	126.894	-0.232	127.778	127.713	0.065
Gender	0.064	0.06	0.004	0.021	0.016	0.005	0.02	0.021	-0.001
White	0.837	0.761	0.076	0.94	0.864	0.076	0.959	0.883	0.076
Black	0.107	0.163	-0.056	0.042	0.102	-0.06	0.041	0.053	-0.012
Other_race	0.057	0.076	-0.019	0.018	0.034	-0.016	0	0.064	-0.064
Marital_Status	0.798	0.74	0.058	0.904	0.875	0.029	0.88	0.958	-0.078
Greater_College	0.137	0.06	0.077	0.352	0.288	0.064	0.65	0.417	0.233
College	0.855	0.92	-0.065	0.639	0.701	-0.062	0.35	0.583	-0.233
Less_College[a]	0.008	0.02	-0.012	0.009	0.011	-0.002	n/a	n/a	n/a
Performance									
PFT	259.213	240.092	19.121	260.629	241.32	19.309	252.293	242.045	10.248
Water_Unq	0.002	0	0.002	0.009	0.011	-0.002	0.01	0	0.01
Water_Qualified	0.899	0.94	-0.041	0.901	0.924	-0.023	0.92	0.948	-0.028
Water_Waiver	0.09	0.05	0.04	0.063	0.054	0.009	0.05	0.042	0.008
Water_CWSS_MCIWS	0.009	0.01	-0.001	0.027	0.011	0.016	0.02	0.01	0.01
RelVal_Cum_Low	0.807	1.73	-0.923	0.392	1.082	-0.69	0.26	0.632	-0.372
RelVal_Cum_High	1.597	0.92	0.677	1.53	0.761	0.769	1.54	1.326	0.214
RelVal_Cum_Avg	90.645	87.917	2.728	92.353	88.931	3.422	93.284	91.57	1.714
RelVal_Cum_sd	5.603	5.495	0.108	5.341	5.268	0.073	5.026	5.714	-0.688
RO_PCT_Low	1.045	2.58	-1.535	0.545	1.853	-1.308	0.58	1.326	-0.746
RO_PCT_High	2.67	1.81	0.86	2.599	1.636	0.963	2.83	2.368	0.462
RO_PCT_Avg	0.724	0.588	0.136	0.79	0.641	0.149	0.83	0.746	0.084
RO_PCT_sd	0.231	0.283	-0.052	0.209	0.266	-0.057	0.195	0.238	-0.043
Personal_Awards	2.255	1.67	0.585	3.161	2.457	0.704	4.17	3.625	0.545
Other_Awards	9.358	8.65	0.708	10.636	9.967	0.669	13.12	11.688	1.432
MOS Category									
Joint_MOS[b]	n/a	n/a	n/a	0.027	0.011	0.016	0.17	0.042	0.128
Combat	0.184	0.130	0.054	0.287	0.125	0.162	0.29	0.25	0.04
Ground_Support	0.373	0.360	0.013	0.275	0.277	-0.002	0.32	0.26	0.06
Service_Support	0.058	0.070	-0.012	0.090	0.043	0.047	0.04	0.083	-0.043
Aviation_Fixed	0.166	0.240	-0.074	0.146	0.196	-0.050	0.16	0.167	-0.007

Aviation_Rotary	0.159	0.120	0.039	0.140	0.245	-0.105	0.13	0.167	-0.037
Aviation_Support	0.061	0.080	-0.019	0.063	0.114	-0.051	0.06	0.073	-0.013
Combat									
Crisis_Code	0.168	0.13	0.038	0.125	0.109	0.016	0.12	0.073	0.047
Combat_Service1	0.714	0.75	-0.036	0.707	0.505	0.202	0.81	0.625	0.185
Combat_Service2	0.098	0.11	-0.012	0.101	0.033	0.068	0.16	0.135	0.025
Combat_Service3	0.005	0.01	-0.005	0.009	0.005	0.004	0.03	0.01	0.020
Combat_Service4[c]	n/a	n/a	n/a	n/a	n/a	n/a	0.01	0	0.010
Commissioning									
OCS	0.58	0.68	-0.100	0.582	0.612	-0.030	0.46	0.533	-0.073
NROTC	0.11	0.072	0.038	0.206	0.153	0.053	0.29	0.239	0.051
USNA	0.108	0.062	0.046	0.116	0.077	0.039	0.14	0.152	-0.012
ENLPGM	0.189	0.165	0.024	0.066	0.115	-0.049	0.08	0.054	0.026
Other_Source	0.013	0.021	-0.008	0.03	0.044	-0.014	0.03	0.022	0.008
Assignment									
FMF_Unit	0.345	0.21	0.135	0.284	0.272	0.012	0.17	0.125	0.045
NONFMF_Unit	0.655	0.79	-0.135	0.716	0.728	-0.012	0.83	0.875	-0.045
Billet_Cmdr	3.022	2.1	0.922	1.793	0.995	0.798	2.55	0.684	1.866
Billet_XO	0.866	0.79	0.076	0.581	0.397	0.184	1.24	1.168	0.072
Billet_Pri_Stf	1.807	1.83	-0.023	1.599	1.663	-0.064	1.12	1.179	-0.059
Billet_Other	9.221	9.05	0.171	8.096	9.071	-0.975	6.62	8.326	-1.706
Ser_School_ALS	0.369	0.19	0.179	0.43	0.196	0.234	0.29	0.063	0.227
Ser_School_Other	8.857	7.78	1.077	10.991	10.69	0.301	11.55	11.563	-0.013

Table Code
[a] Colonel Sample did not contain any "Less_College" observations.
[b] Major Sample did not contain any "Joint_MOS" observations.
[c] Colonel Sample contained the only "Combat_Service4" observations.

V.   Models and Results

Officers are selected for promotion for their potential to carry out the duties and responsibilities of the next higher grade based upon past performance as indicated in their official military personnel file. Promotions should not be considered a reward for past performance, but as incentive to excel in the next higher grade. (HQMC, 2006, August 9, p. 2)

A.   Overview

The researcher chose the Probit Model to examine the effects of the independent variables described in Chapter IV on the dependent variable of Grade_Select. Grade_Select is a binary variable with two potential outcomes: select for promotion (Grade_Select = 1) or not select for promotion (Grade_Select = 0). Wooldridge describes the Probit Model by explaining it is, "A model for binary responses where the response probability is the standard normal cumulative distribution function (cdf) evaluated at a linear function of the program" (Wooldridge, 2006, p. 868). He goes on to explain the meaning of the cdf as, "A function that gives the probability of a random variable being less than or equal to any specified real number" (p. 861).

The response probability for the binary response model is described in Figure 8. Within the figure, y represents the dependent variable of Grade_Select. The x variable represents the independent variables contained within the six categories of demographics, commissioning, performance, military occupational field, combat, and assignment. For instance, x_1 would be Number_Depns, x_2 Years_Comm_Serv, x_3 Years_Serv continuing on through the other independent variables until reaching x_{53} Ser_School_Other variable.

Figure 8.   Response Probability for Binary Response Model
(Source: Wooldridge, 2006, p. 583)

$$P(y = 1|\mathrm{x}) = P(y = 1|x_1, x_2, \ldots, x_k)$$

As mentioned earlier, the Probit Model is the multivariate statistical technique the researcher used to examine the effect of the independent variables on selection for promotion. The Probit Model is described in greater detail as illustrated in Figure 9.

Figure 9.   Probit Model
(Source: Wooldridge, 2006, p. 584)

In the Probit Model, G is the standard normal cumulative distribution function (cdf), which is expressed as an integral:

$$G(z) = \Phi(z) \equiv \int_{-\infty}^{z} \phi(v)dv,$$

where $\phi(z)$ is the standard normal density

$$\phi(z) = (2\pi)^{-1/2} \exp(-z^2/2).$$

B.   Major (O-4) Promotion Model

1.   Development of the Major Promotion Model

As stated earlier, the promotion model was developed from six categories of independent variables. The six categories were used to estimate the predicted probability of promotion. This was performed in a sequential order—starting with the independent variable category of demographics and progressing to the assignment category, as displayed in Table 29. The addition of different independent variable categories was used to analyze the change in marginal effects across the six models. The addition of variables to a model can cause the marginal effects of the variables to either increase or decrease in magnitude. Furthermore, the addition of independent variables can cause variables to become statistically significant (1 percent, 5 percent, or 10 percent level); or, it can have the reverse effect and cause the variables to become statistically insignificant. Wooldridge explains the meaning of statistically significant as, "Rejecting the null hypothesis that a parameter is equal

to zero against the specified alternative, at the chosen significance level"
(Wooldridge, 2006, p. 870).

Table 29.   Major Promotion Model Specifications
(Source: Author, 2008)

Model 1: Grade_Select_04 = ∫ (Demographics)

Model 2: Grade_Select_04 = ∫ (Demographics, Commissioning)

Model 3: Grade_Select_04 = ∫ (Demographics, Commissioning,
        Performance)

Model 4: Grade_Select_04 = ∫ (Demographics, Commissioning,
        Performance, Military Occupational Field)

Model 5: Grade_Select_04 = ∫ (Demographics, Commissioning,
        Performance, Military Occupational Field, Combat,)

Model 6: Grade_Select_04 = ∫ (Demographics, Commissioning,
        Performance, Military Occupational Field, Combat, Assignment)

Model 6 was the final promotion model—containing 38 of the independent variables. The base case for the model was a single white male captain who possessed an Associate's or Bachelor's degree; attended the United States Naval Academy; had a Water Qualification level of 1, 2, 3, 4, or was Water Survival Qualified (WSQ); had served in the military occupational field of combat; and was not serving in the Fleet Marine Force (FMF). The results for the model are shown in Table 30. The results contain the magnitude of the marginal effects, standard errors, statistical significance (1 percent, 5 percent, and 10 percent level) and the sign of the coefficient. A negative sign on the coefficient explains that the variable reduces the overall predicted probability of promotion, while a positive sign has the opposite effect and increases the overall predicted probability of promotion.

Table 30. Major Promotion Model Results
(Source: Author, 2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Demographics						
Number_Depns	-0.00219 (0.05062) [-0.00046]	-0.01253 (0.05304) [-0.00257]	-0.04934 (0.06265) [-0.00683]	-0.05240 (0.06326) [-0.00709]	-0.05657 (0.06482) [-0.00744]	-0.03964 (0.06695) [-0.00487]
Years_Comm_Serv	-0.09282 (0.21806) [-0.01937]	-0.11096 (0.22110) [-0.02280]	-0.16019 (0.24445) [-0.02217]	-0.23491 (0.24773) [-0.03176]	-0.27961 (0.25661) [-0.03677]	-0.26890 (0.25456) [-0.03303]
Months_Capt	0.04660 (0.03385) [0.00972]	0.05114 (0.03476) [0.01051]	0.03865 (0.03924) [0.00535]	0.04937 (0.03987) [0.00668]	0.05335 (0.04107) [0.00702]	0.05280 (0.04158) [0.00649]
GCT_Total	0.00875 (0.00684) [0.00183]	0.00642 (0.00732) [0.00132]	0.01053 (0.00872) [0.00146]	0.01155 (0.00898) [0.00156]	0.01188 (0.00911) [0.00156]	0.01129 (0.00939) [0.00139]
Female	0.01304 (0.26894) [0.00270]	0.02061 (0.27005) [0.00419]	0.09740 (0.33271) [0.01265]	0.14672 (0.34106) [0.01799]	0.17024 (0.34614) [0.01996]	0.11166 (0.36320) [0.01269]
Black	-0.18625 (0.19656) [-0.04209]	-0.22488 (0.20105) [-0.05087]	0.18093 (0.24868) [0.02260]	0.18947 (0.25383) [0.02298]	0.20377 (0.25765) [0.02381]	0.17487 (0.26031) [0.01935]
Other_Race	-0.20849 (0.25039) [-0.04811]	-0.25893 (0.26114) [-0.06030]	-0.18878 (0.31839) [-0.02946]	-0.23261 (0.32198) [-0.03651]	-0.28589 (0.32730) [-0.04521]	-0.15076 (0.33764) [-0.02050]
Marital_Status	0.25449 (0.18473) [0.05755]	0.29241 (0.18931) [0.06598]	0.46313 (0.22249)** [0.07770]	0.46951 (0.22332)** [0.07735]	0.45687 (0.22653)** [0.07303]	0.41306 (0.23261)* [0.06094]
Greater_College	0.48880 (0.22206)** [0.08204]	0.43208 (0.22787)* [0.07291]	0.28654 (0.25605) [0.03382]	0.32015 (0.26461) [0.03617]	0.27145 (0.26742) [0.03060]	0.39088 (0.27676) [0.03825]
Less_College	-0.51734 (0.68419) [-0.13943]					
Commissioning						
OCS		-0.18409 (0.24367) [-0.03713]	0.10504 (0.28659) [0.01475]	0.13115 (0.28917) [0.01807]	0.16539 (0.28910) [0.02228]	0.07204 (0.30053) [0.00894]
NROTC		0.18259 (0.31582) [0.03445]	0.25161 (0.36734) [0.03008]	0.24565 (0.36983) [0.02875]	0.28140 (0.37212) [0.03130]	0.31958 (0.38133) [0.03229]
ENLPGM		0.03770 (0.28701) [0.00764]	-0.05679 (0.33738) [-0.00807]	-0.02773 (0.34319) [-0.00380]	-0.04040 (0.34350) [-0.00541]	-0.18522 (0.36820) [-0.02487]
Other_Source		0.00510 (0.67742) [0.00105]	0.17355 (0.79401) [0.02119]	0.13540 (0.79254) [0.01659]	0.24014 (0.81013) [0.02643]	0.36912 (0.85862) [0.03418]
Performance						
PFT			0.00883 (0.00255)*** [0.00122]	0.00873 (0.00259)*** [0.00118]	0.00932 (0.00265)*** [0.00123]	0.00933 (0.00276)*** [0.00115]
Water_Waiver			0.27532 (0.29100) [0.03220]	0.24121 (0.29819) [0.02810]	0.23945 (0.30048) [0.02711]	0.15429 (0.30381) [0.01717]
Water_CWSS_MCIWS			-0.36902 (0.69550)	-0.43740 (0.68452)	-0.61444 (0.68304)	-1.23612 (0.73829)*

	[-0.06558]	[-0.07955]	[-0.12160]	[-0.31664
RelVal_Cum_Avg	0.08354	0.08117	0.08424	0.07859
	(0.03611)**	(0.03664)**	(0.03701)**	(0.03798)**
	[0.01156]	[0.01098]	[0.01108]	[0.00965]
RelVal_Cum_sd	0.02323	0.02578	0.02748	0.05670
	(0.05734)	(0.06001)	(0.06087)	(0.06306)
	[0.00322]	[0.00349]	[0.00361]	[0.00696]
RO_PCT_Avg	0.01078	0.01151	0.01039	0.00892
	(0.00825)	(0.00846)	(0.00862)	(0.00884)
	[0.00149]	[0.00156]	[0.00137]	[0.00110]
RO_PCT_sd	-0.05079	-0.05180	-0.05205	-0.05591
	(0.01476)***	(0.01484)***	(0.01497)***	(0.01529)***
	[-0.00703]	[-0.00700]	[-0.00684]	[-0.00687]
Personal_Award	0.22659	0.22386	0.25063	0.25343
	(0.08264)***	(0.08319)***	(0.08464)***	(0.08645)***
	[0.03136]	[0.03027]	[0.03296]	[0.03113]
Other_Award	0.00099	-0.00316	0.00928	-0.01432
	(0.02634)	(0.02665)	(0.02746)	(0.03122)
	[0.00014]	[-0.00043]	[0.00122]	[-0.00176]
MOS Category				
Ground_Support		-0.14337	-0.16006	0.09976
		(0.23680)	(0.24084)	(0.30219)
		[-0.01997]	[-0.02177]	[0.01200]
Service_Support		-0.50995	-0.56356	-0.08219
		(0.38736)	(0.39504)	(0.46610)
		[-0.09485]	[-0.10564]	[-0.01069]
Aviation_Fixed		-0.23890	-0.19832	0.40022
		(0.26776)	(0.27199)	(0.41357)
		[-0.03600]	[-0.02857]	[0.04081]
Aviation_Rotary		-0.11565	-0.10718	0.52572
		(0.28624)	(0.29080)	(0.42656)
		[-0.01659]	[-0.01490]	[0.04900]
Aviation_Support		-0.10327	-0.19467	0.19214
		(0.37530)	(0.38308)	(0.45089)
		[-0.01493]	[-0.02905]	[0.02068]
Combat				
Crisis_Code			0.09289	0.03235
			(0.21939)	(0.23027)
			[0.01167]	[0.00391]
Combat_Service1			-0.25130	-0.22744
			(0.18747)	(0.19233)
			[-0.03029]	[-0.02576]
Combat_Service2			-0.26642	-0.16471
			(0.24907)	(0.25957)
			[-0.04082]	[-0.02232]
Combat_Service3			-0.70076	-0.79340
			(0.72774)	(0.76797)
			[-0.14620]	[-0.16589]
Assignment				
FMF_Unit				0.29397
				(0.18529)
				[0.03377]
Billet_Cmdr				0.04897
				(0.03345)
				[0.00602]
Billet_XO				-0.03264
				(0.05500)
				[-0.00401]

Billet_Pri_Staff						0.01114 (0.03461) [0.00137]
Ser_School_CLS						0.35449 (0.18072)** [0.04354]
Ser_School_Other						0.05937 (0.02739)** [0.00729]
Constant	-2.31348 (1.43857)	-2.04732 (1.68377)	-11.34895 (3.69811)***	-11.11566 (3.76813)***	-11.31896 (3.81099)***	-11.67618 (3.93205)***
Observations	676	658	640	640	640	640
R squared	0.0298	0.0381	0.2492	0.2534	0.2643	0.2897
Coefficients on same line as variable						
Standard errors in parentheses						
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent						
Partial Effects in brackets						

The results of the six models changed as more variables were added to the separate models. Model 6, which contained all the variables in the model, ended up with eight statistically significant variables spread among the 1 percent, 5 percent, and 10 percent levels of significance. The Pseudo R-squared ranged among the six models from 0.0298 in Model 1 to 0.2897 in Model 6. Wooldridge describes the Pseudo R-squared in the terms of the R-squared by explaining, "Therefore, we can compute a pseudo R-squared for probit and logit that is directly comparable to the usual R-squared from the estimation of a linear probability model" (Wooldridge, 2006, p. 590). He goes on to define the R-squared as, "In a multiple regression model, the proportion of the total sample variation in the dependent variable that is explained by the independent variable" (Wooldridge, 2006, p. 868). Therefore, in Model 6, 0.2897 of the dependent variable (Grade_Select_O4) is explained by the independent variables used in the Probit Model.

The Less_College variable from the Demographic category was used in Model 1, as seen in Table 30. This variable was statistically insignificant in its effect on the predicted probability of a captain being selected for major. It should be noted that this variable was dropped from Model 2 when the Commissioning category was added. This resulted from missing observations in the Commissioning category that ended up removing the Less_College variable from Models 2 through 6.

The PFT variable in the Performance category of the independent variables was added in Model 3. This variable remained statistically significant at the 1 percent level for all the models. Of interest, the variable's magnitude remained consistent at 0.0012 for the partial effects for all of the models. The effects of this variable in percentage terms will be discussed later in this section.

Five of the statistically significant variables from Model 6 are analyzed in detail in Figures 10 through 14. The percent change caused by the partial effects was calculated by dividing the partial effect (dF/dx) of the variable by the model promotion rate. The figures make the partial effects of the variables easier to understand by comparing two Marines with similar backgrounds and qualifications. In the following figures, the captains are identical in all observable aspects relating to the research variables, except for the variable being analyzed. These aspects would include the independent variables of gender, marital status, number of dependents, race, education, Physical Fitness Test (PFT) scores, combat assignments, etc. Again, the only difference between the Marines being compared is in the variable being analyzed.

As evidenced in Figure 10, Marine B has a 4.1-percent greater predicted probability of being promoted than does Marine A due to the 29 point difference in the PFT scores. The value of 29 was chosen because it represented one standard deviation for the PFT variable. Additionally, 259 was designated as the score to represent Marine B, because it was the average PFT score for the captain that was selected for promotion from the summary statistics. As noted previously, the officers are identical in all the observable variables from the research data, except for the PFT variable. This demonstrates that high levels of physical fitness will increase a captain's opportunity for promotion.

Unless otherwise notes, the following figures were created by the author.

Figure 10. PFT Partial Effects for Major Promotion Board

PFT Partial Effects

➢ 04 Board: 1 Point Increase = 0.14% Increase in Predicted Probability of Promotion (Significant at 1%)

Marine A (Capt)

Marine B (Capt)

Marine A & B are identical twins in all observable aspects except PFT Score

PFT Score: 230

PFT Score: 259

Marine B has a 4.1% greater predicted probability of being promoted to Maj than Marine A.

As displayed in Figure 11, Marine B has a 3.6-percent greater predicted probability of being promoted than does Marine A due to the increase in one additional award. The award variable was statistically significant at the 1 percent level. Marine B was shown to have two personal awards, and Marine A was shown to have one award because this represented one standard deviation for the personal award variable. Additionally, the value of two was designated as the number of personal awards for Marine B, due to the fact that 2.3 was the average number of awards for the captain that was selected for promotion from the summary statistics.

Figure 11.   Personal Awards Partial Effects for Major Promotion Board

In Figure 12, Marine B has a 5-percent greater predicted probability of being promoted than does Marine A due to attending resident Career Level School (CLS) as a captain. Unlike the PFT and Personal Awards variables that were statistically significant at the 1-percent level, the resident CLS variable was statistically significant at the 5-percent level. Since the CLS variable was binary, the values chosen for Marine A (CLS = 0) matched those of the captain who did not attend CLS; Marine B (CLS = 1) represented the captain who did attend resident CLS. Overall, holding all the observable factors in the sample constant, resident schooling was shown to be an important factor in the selection for major.

Figure 12.   Resident Career Level School Partial Effects for Major Promotion Board

Resident Career Level School
Partial Effects

➤ 04 Board: Attending CLS = 5% Increase in
Predicted Probability of Promotion (Significant at
5%)

Marine A (Capt)   Marine B (Capt)

**Marine A & B are
identical twins in all
observable aspects
except for CLS.**

Did not attend CLS   Attended CLS

Marine B has a 5% greater predicted probability
of being promoted to Maj than Marine A.

The effects of the fitness report on promotion as recorded in the Reporting Senior's Cumulative Relative Value are analyzed in Figure 13. For the Major Promotion Board, this variable was statistically significant at the 5-percent level. The summary statistics for a captain (Marine B) that was selected for promotion had an average cumulative relative value of 90.6. Taking one standard deviation (3.1) from 90.6, the value of 87.5 is used to represent Marine A. To recap from Chapter 4, the value of 90 for the Cumulative Relative Value represents the average Marine Reported On (MRO) as compared to the other Marines that a Reporting Senior (RS) has evaluated for the same grade. As demonstrated in the figure, the difference of 3.1 between the two captains represented a 3.4-percent greater predicted probability of promotion for Marine B due to the increased cumulative relative value. Therefore, the Reporting Senior Cumulative Relative Value was shown to identify that increased performance as designated in the increased Cumulative Relative Value markings is correlated with an increase in promotion to major.

Figure 13.   Cumulative Relative Value Partial Effects for Major Promotion board

The effect of a captain's consistency on selection for major was analyzed by examining the Cumulative Reviewing Officer's standard deviation, as shown in Figure 14. A one-point increase in Cumulative Reviewing Officer Standard Deviation (RO_PCT_sd) variable resulted in a 0.8-percent decrease in the predicted probability of promotion for the Major Promotion board. The summary statistic for the captain that was selected for promotion resulted in a value of 21.5 for the RO_PCT_sd variable. By adding one standard deviation (6.8) to this value, the researcher can provide Marine A with a RO_PCT_sd value of 28.3. The one standard deviation difference between these two officers in the figure would result in Marine B having a 5-percent greater predicted probability of being promoted, due to the lower standard deviation value. This demonstrates that consistent performance is directly correlated with higher levels of selection for promotion.

Figure 14.   Cumulative Reviewing Officer Standard Deviation Partial Effects for Major Promotion Board

Cumulative RO Standard Deviation Partial Effects

➢ 04 Board: 1 Point Increase = 0.8% Decrease Increase in Predicted Probability of Promotion (Significant at 1%)

Marine A (Capt)   Marine B (Capt)

Marine A & B are identical twins in all observable aspects except RO Std Dev

RO Standard Deviation: 28.3   RO Standard Deviation: 21.5

Marine B has a 5% greater predicted probability of being promoted to Maj than Marine A.

2.   Interactive Major Promotion Model

A snapshot of the Interactive Major Promotion Model is shown in Table 31. The captain with the characteristics shown in the model has an 87.4 percent predicted probability of being promoted, with an error of plus or minus 8 percent. As the values for the variables in the model are changed, the predicted probability of promotion will either increase or decrease depending on the sign (negative or positive) of the coefficient. Additionally, the margin by which the predicted probability of promotion increases or decreases is directly related to the magnitude attributed to the coefficient. The characteristics of the captain displayed in the model have the same promotion rate as the average selection rate (87.4) established for the in-zone population in the Fiscal Year (FY) 2008 Major Promotion Board. Appendix H contains sample snap-shots of the Interactive Major Promotion Model—with different variables being changed in the model. The variables that have been changed are highlighted to display the "before" and "after" difference. The

magnitude of the change was one standard deviation for the variables in the appendix, unless the variable was binary. If the variable was binary, then the change was either a zero or one.

Table 31.   Interactive Major Promotion Model
(Source: Author, 2008)

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	87.4 percent
Error	+/- 8 percent
Major Board In-Zone Selection Percentage	87.4 percent

C. Lieutenant Colonel (O-5) Promotion Model

1. Development of the Lieutenant Colonel Promotion Model

Similar to the Major Promotion Model, the Lieutenant Colonel Promotion Model was developed from six categories of independent variables. The six categories were used to estimate the predicted probability of promotion, as seen in Table 32.

Table 32.   Lieutenant Colonel Promotion Model Specifications
(Source: Author, 2008)

Model 1: Grade_Select_05 = ∫ (Demographics)

Model 2: Grade_Select_05 = ∫ (Demographics, Commissioning)

Model 3: Grade_Select_05 = ∫ (Demographics, Commissioning, Performance)

Model 4: Grade_Select_05 = ∫ (Demographics, Commissioning, Performance, Military Occupational Field)

Model 5: Grade_Select_05 = ∫ (Demographics, Commissioning, Performance, Military Occupational Field, Combat,)

Model 6: Grade_Select_05 = ∫ (Demographics, Commissioning, Performance, Military Occupational Field, Combat, Assignment)

The results for the six model specifications developed in Table 32 are displayed in Table 33. Model 6 is the final promotion model and, thus, contains 40 of the independent variables. The base case for the model was a single white male major who possessed an Associate's or Bachelor's degree; attended the United States Naval Academy; had a Water Qualification level of 1, 2, 3, 4, or was Water Survival Qualified (WSQ); had served in the military occupational field of combat; and was not serving in the Fleet Marine Force (FMF). The Lieutenant Colonel Promotion Model results contain the magnitude of the marginal effects, standard errors, statistical significance (1 percent, 5 percent, and 10 percent level) and the

sign of the coefficient. A negative sign on the coefficient explains that the variable reduces the overall predicted probability of promotion to lieutenant colonel, while a positive sign has the opposite effect and increases the overall predicted probability of promotion.

Table 33.   Lieutenant Colonel Promotion Model Results
(Source: Author, 2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Demographics						
Number_Depns	-0.05261	-0.05313	-0.06445	-0.06686	-0.05850	-0.06362
	(0.04937)	(0.04991)	(0.06137)	(0.06394)	(0.06543)	(0.06805)
	[-0.01926]	[-0.01935]	[-0.02126]	[-0.02161]	[-0.01876]	[-0.01976]
Years_Comm_Serv	0.06884	0.11275	0.11720	0.06296	0.03330	0.02956
	(0.14474)	(0.15432)	(0.20893)	(0.20220)	(0.20600)	(0.21201)
	[0.02520]	[0.04107]	[0.03866]	[0.02035]	[0.01068]	[0.00918]
Months_Maj	0.00445	0.01749	0.03292	0.03773	0.04278	0.03963
	(0.01204)	(0.01317)	(0.01613)**	(0.01656)**	(0.01696)**	(0.01756)**
	[0.00163]	[0.00637]	[0.01086]	[0.01219]	[0.01372]	[0.01231]
GCT_Total	-0.00616	-0.01089	-0.00545	-0.00380	-0.00111	0.00149
	(0.00628)	(0.00667)	(0.00810)	(0.00868)	(0.00892)	(0.00929)
	[-0.00226]	[-0.00397]	[-0.00180]	[-0.00123]	[-0.00035]	[0.00046]
Female	0.32216	0.33891	0.42526	0.26327	0.45119	0.39985
	(0.50375)	(0.51650)	(0.57766)	(0.57403)	(0.63283)	(0.67556)
	[0.10890]	[0.11322]	[0.12069]	[0.07762]	[0.12208]	[0.10620]
Black	-0.55785	-0.58124	-0.08094	-0.20687	-0.22136	-0.22014
	(0.26090)**	(0.26344)**	(0.34775)	(0.35252)	(0.35442)	(0.36464)
	[-0.21666]	[-0.22544]	[-0.02727]	[-0.07056]	[-0.07526]	[-0.07282]
Other_Race	-0.46124	-0.44015	-0.29627	-0.33035	-0.39734	-0.57596
	(0.36758)	(0.36892)	(0.40026)	(0.41208)	(0.41521)	(0.42230)
	[-0.17900]	[-0.17018]	[-0.10524]	[-0.11636]	[-0.14107]	[-0.20682]
Marital_Status	0.38118	0.39111	0.09290	0.07008	0.12066	0.10812
	(0.22696)*	(0.22952)*	(0.29090)	(0.30348)	(0.30949)	(0.32052)
	[0.14597]	[0.14940]	[0.03131]	[0.02304]	[0.03986]	[0.03457]
Greater_College	0.22960	0.17881	0.24284	0.12220	0.15381	0.05911
	(0.12987)*	(0.13215)	(0.16458)	(0.17739)	(0.18104)	(0.19129)
	[0.08242]	[0.06415]	[0.07783]	[0.03892]	[0.04840]	[0.01823]
Less_College	-0.15925	-0.12876	-0.65055	-0.47339	-0.33455	-0.23832
	(0.58110)	(0.59466)	(0.74214)	(0.72285)	(0.75226)	(0.77018)
	[-0.05997]	[-0.04805]	[-0.24431]	[-0.17178]	[-0.11754]	[-0.07973]
Commissioning						
OCS		-0.50543	-0.14592	-0.22064	-0.22324	-0.23657
		(0.23029)**	(0.27576)	(0.27997)	(0.28252)	(0.29399)
		[-0.17937]	[-0.04777]	[-0.07043]	[-0.07069]	[-0.07245]
NROTC		-0.20870	-0.10480	-0.22527	-0.25049	-0.25648
		(0.24277)	(0.29026)	(0.29722)	(0.30114)	(0.31329)
		[-0.07783]	[-0.03523]	[-0.07583]	[-0.08408]	[-0.08380]
ENLPGM		-0.71924	-0.55171	-0.66536	-0.65298	-0.72770
		(0.29331)**	(0.36287)	(0.37929)*	(0.38746)*	(0.41380)*
		[-0.27873]	[-0.20214]	[-0.24395]	[-0.23806]	[-0.26284]
Other_Source		-0.76543	-0.63307	-0.45974	-0.34114	-0.24626
		(0.38961)**	(0.46801)	(0.50315)	(0.51634)	(0.53134)
		[-0.29733]	[-0.23612]	[-0.16557]	[-0.11948]	[-0.08225]
Performance						
PFT			0.00772	0.00734	0.00797	0.00819
			(0.00236)***	(0.00243)***	(0.00250)***	(0.00258)***
			[0.00255]	[0.00237]	[0.00256]	[0.00254]
Water_Unq			0.01670	-0.04470	0.08495	0.06183
			(0.70629)	(0.75708)	(0.78353)	(0.81912)
			[0.00548]	[-0.01465]	[0.02648]	[0.01879]

Water_Waiver	0.07069	0.08368	0.01912	-0.04749
	(0.33444)	(0.34067)	(0.34416)	(0.34616)
	[0.02286]	[0.02638]	[0.00610]	[-0.01497]
Water_CWSS_MCIWS	0.66278	0.89487	0.86554	0.81713
	(0.61239)	(0.65333)	(0.68077)	(0.68685)
	[0.17068]	[0.20100]	[0.19478]	[0.17947]
RelVal_Cum_Avg	0.17988	0.18190	0.19149	0.18774
	(0.03559)***	(0.03622)***	(0.03747)***	(0.03836)***
	[0.05933][	[0.05878]	[0.06141]	[0.05832]
RelVal_Cum_sd	0.10166	0.08595	0.07875	0.07761
	(0.05374)*	(0.05558)	(0.05615)	(0.05838)
	[0.03353]	[0.02778]	[0.02525]	[0.02411]
RO_PCT_Avg	0.02211	0.02203	0.01999	0.02289
	(0.00884)**	(0.00924)**	(0.00933)**	(0.00965)**
	[0.00729]	[0.00712]	[0.00641]	[0.00711]
RO_PCT_sd	-0.04292	-0.04583	-0.04797	-0.04524
	(0.01455)***	(0.01548)***	(0.01575)***	(0.01640)***
	[-0.01416]	[-0.01481]	[-0.01538]	[-0.01405]
Personal_Award	0.12710	0.08373	0.06139	0.05374
	(0.07078)*	(0.07365)	(0.07666)	(0.07928)
	[0.04192]	[0.02706]	[0.01969]	[0.01669]
Other_Award	0.01905	0.01669	0.00070	-0.00605
	(0.02770)	(0.02944)	(0.03089)	(0.03165)
	[0.00628]	[0.00539]	[0.00022]	[-0.00188]
MOS Category				
Joint_MOS		0.13273	0.15824	0.18149
		(0.51629)	(0.51703)	(0.54369)
		[0.04107]	[0.04811]	[0.05280]
Ground_Support		-0.17226	-0.13560	0.02865
		(0.23952)	(0.24218)	(0.29923)
		[-0.05704]	[-0.04435]	[0.00886]
Service_Support		-0.00484	-0.04119	0.18477
		(0.36463)	(0.36681)	(0.42844)
		[-0.00156]	[-0.01336]	[0.05400]
Aviation_Fixed		-0.68508	-0.68516	-0.50822
		(0.25049)***	(0.25737)***	(0.34573)
		[-0.24634]	[-0.24517]	[-0.17420]
Aviation_Rotary		-0.64315	-0.61216	-0.52180
		(0.24964)***	(0.25544)**	(0.34536)
		[-0.22918]	[-0.21634]	[-0.17829]
Aviation_Support		-0.77648	-0.76212	-0.69456
		(0.31046)**	(0.31492)**	(0.35598)*
		[-0.28718]	[-0.28049]	[-0.24962]
Combat				
Crisis_Code			-0.13572	-0.03066
			(0.24745)	(0.26405)
			[-0.04494]	[-0.00960]
Combat_Service1			0.39643	0.44834
			(0.17313)**	(0.17997)**
			[0.13124]	[0.14476]
Combat_Service2			0.31753	0.25146
			(0.39219)	(0.39603)
			[0.09215]	[0.07195]
Combat_Service3			-1.29900	-1.29024
			(0.91328)	(0.94077)
			[-0.48388]	[-0.48004]
Assignment				
FMF_Unit				-0.29499
				(0.18693)
				[-0.09548]
Billet_Cmdr				0.02993
				(0.05436)
				[0.00930]
Billet_XO				0.07883
				(0.08449)
				[0.02449]

Billet_Pri_Staff						0.00530
						(0.04621)
						[0.00165]
Ser_School_ILS						0.49777
						(0.18198)***
						[0.15463]
Ser_School_Other						0.03987
						(0.02952)
						[0.01239]
Constant	-0.26128	-0.59657	-22.21529	-21.20387	-22.31549	-22.94851
	(2.17298)	(2.27452)	(4.48130)***	(4.45872)***	(4.61111)***	(4.77577)***
Observations	485	484	480	480	480	480
R Squared	0.0226	0.0385	0.3639	0.3893	0.4031	0.4233
Coefficients on same line as variable						
Standard errors in parentheses						
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent						
Partial Effects in brackets						

Quite similar to the Major Promotion Models, the results of the six models changed as more variables were added to the separate models. Model 6, which contained all the variables in the model, ended up with nine statistically significant variables spread among the 1 percent, 5 percent, and 10 percent levels of significance. Six of the statistically significant variables from Model 6 are analyzed in detail in Figures 15 through 20. Consistent with the comparison done for the Major Board variables, the Lieutenant Colonel Board used the same type of figures to make the partial effects of the variables easier to understand and compared two similar Marines. The majors are identical in all observable aspects of the model, except for the variable being analyzed. For instance, these aspects could include gender, marital status, number of dependents, race, education, Physical Fitness Test (PFT) scores, combat assignments, etc. The only difference between the two majors being compared is the variable in question. The Pseudo R-squared ranged among the six models from 0.0226 in Model 1 to 0.4233 in Model 6. In Model 6, this would account for 0.4233 of the dependent variable (Grade_Select_O5) being explained by the independent variables used in the Probit Model.

As evidenced in Figure 15, a major that increases his PFT score by one point will increase his predicted probability for promotion by 0.38 percent, holding all else constant. In the example, Marine B would have a 12.2-percent greater predicted probability of being promoted than does Marine A because of the 32-point increase

in his PFT score. The 0.38 percent was calculated by dividing the 0.0012 partial effect (dF/dx) by the observed probability of promotion (.663) in the model. The 32 point difference was chosen to compare the difference between a 230- and a 262-point PFT score because it represented one standard deviation for the PFT Score variable. The PFT variable was statistically significant at the 1-percent level.

Figure 15. PFT Partial Effects for Lieutenant Colonel Promotion Board

As displayed in Figure 16, Marine B has a 21-percent greater predicted probability of being promoted than does Marine A for having one combat tour (as compared to Marine A's zero combat tours). The combat tour variable was statistically significant at the 5-percent level. The 21 percent was calculated by dividing the 0.14 partial effect (dF/dx) on the one combat tour variable by the observed probability of promotion (.663) in the model.

Figure 16. Combat Tour Partial Effects for Lieutenant Colonel Promotion Board

Holding all else constant, Marine B has a 23-percent greater predicted probability of being promoted than does Marine A due to attending resident Intermediate Level School (ILS) as a major, as shown in Figure 17. The ILS variable was statistically significant at the 1-percent level. Since the ILS variable was binary, the values chosen for Marine A (ILS = 0) was a major who did not attend resident ILS, and Marine B (ILS = 1) represented the major who attended resident ILS. The 23 percent was found by dividing the 0.155 partial effect (dF/dx) for the Intermediate Level School (ILS) variable by the observed probability of promotion (.663) in the model. Overall, holding all the observable factors in the sample constant, resident schooling was shown to be an important factor in the selection for lieutenant colonel.

Figure 17.   Resident Intermediate Level School Partial Effects for Lieutenant Colonel Promotion Board
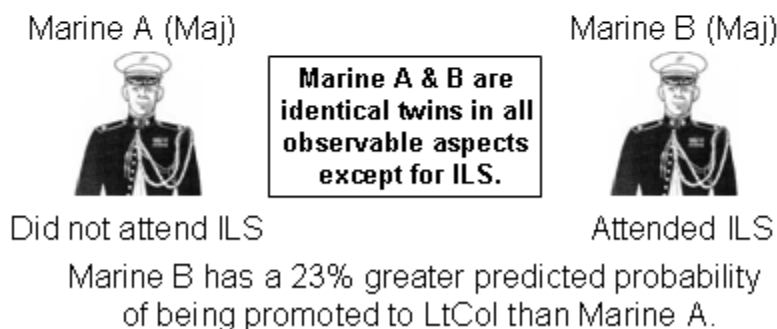
The partial effects of the Reporting Senior's Cumulative Relative Value are analyzed in Figure 18. This variable was statistically significant at the 1-percent level. An average cumulative relative value of 92.2 was used to represent Marine B in the figure. This value was quite similar to the summary statistics for average cumulative relative value (92.4) for the majors that were selected for lieutenant colonel. Taking one standard deviation (3.2) from 92.2, the value of 89 is used to represent Marine A. As demonstrated in the figure, the difference of 3.2 relative value points between the two majors resulted in a 28-percent greater predicted probability of promotion for Marine B due to the increased cumulative relative value. The 8.7 percent was calculated by dividing the 0.058 partial effect (dF/dx) on the Cumulative Relative Value variable by the observed probability of promotion (.663) in the model. The Reporting Senior Cumulative Relative Value displays that increased performance (as annotated in the increased Cumulative Relative Value markings) leads to an increase in promotion to lieutenant colonel.

Figure 18.   Cumulative Relative Value Partial Effects for Lieutenant Colonel Promotion Board

Similar to the partial effects of the Reporting Senior's Cumulative Relative Value shown in the above figure, the partial effects of the Cumulative Reviewing Officer Percentiles are analyzed in Figure 19. This variable was statistically significant at the 5-percent level. The summary statistics for the average percentile of the major that was selected for lieutenant colonel had an cumulative reviewing officer percentile of 79.0. The value of 79.0 was used to represent Marine B in the figure. One standard deviation represented by 13.6 percentile points was subtracted from 79.0 (Marine B), to obtain the value of 65.4 (Marine A). The difference of 13.6 percentile points between the two majors resulted in a 15-percent greater predicted probability of promotion for Marine B due to the increased cumulative reviewing officer percentile. In other terms, for every 1-percentage point increase in the cumulative reviewing officer percentile, the result will be a 1.1-percent increase in the predicted probability of promotion to lieutenant colonel. The 1.1 percent was calculated by dividing the 0.0071 partial effect (dF/dx) of the Cumulative Reviewing Officer Percentile variable by the observed probability of promotion (.663) in the

model. Consistent with the Reporting Senior Cumulative Relative Value results, the Cumulative Reviewing Officer Percentile variable demonstrates that increased performance as annotated in the increased Cumulative Reviewing Officer Percentile markings, results in a increase in promotion to lieutenant colonel.

Figure 19.   Cumulative Reviewing Officer Percentile Partial Effects for Lieutenant Colonel Promotion Board

The average of the Cumulative Reviewing Officer Percentile markings were shown to have a positive effect on promotion. Now, the researcher can analyze the consistency of a major's performance as captured by the Cumulative Reviewing Officer's Standard Deviation for its effect on promotion—as seen in Figure 20. Holding all other observable variables in the model constant, a one-point increase in Cumulative Reviewing Officer Standard Deviation (RO_PCT_sd) variable resulted in a 2.1-percent decrease in the predicted probability of promotion for a major in the sample. The summary statistic for the major that was selected for promotion resulted in a value of 20.9 for the RO_PCT_sd variable. By adding one standard deviation (7.3) to this value, the researcher can illustrate that Marine A will have a

RO_PCT_sd value of 26.6. The 7.3-point difference between these two officers has resulted in a 15-percent greater predicted probability of being promoted for Marine B. This demonstrates that consistent performance is directly correlated with higher levels of selection for promotion.

Figure 20.   Cumulative Reviewing Officer Standard Deviation Partial Effects for Lieutenant Colonel Promotion Board

2.   Interactive Lieutenant Colonel Promotion Model

A snapshot of the Interactive Lieutenant Colonel Promotion Model is shown in Table 34. As shown in the promotion model, the major with the characteristics shown in the model has a 65.0 percent predicted probability of being promoted, with an error of plus or minus 9 percent. As the values for the variables in the model are changed, the predicted probability of promotion will either increase or decrease depending on the sign (negative or positive) of the coefficient. Additionally, the margin by which the predicted probability of promotion increases or decreases is directly related to the magnitude attributed with the coefficient. The characteristics of the major displayed in the model have the same promotion rate as the average selection rate

(65.0 percent) established for the in-zone population in the Fiscal Year (FY) 2008 Lieutenant Colonel Promotion Board. Appendix I contains sample snapshots of the Interactive Lieutenant Colonel Promotion Model—with different variables being changed in the model. The variables that have been changed are highlighted to display the "before" and "after" difference. The magnitude of the change was one standard deviation for the variables in the appendix, unless the variable was binary. If the variable was binary, then the change was either a zero or one.

Table 34.   Interactive Lieutenant Colonel Promotion Model
(Source: Author, 2008)

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	**+/- 9 percent**
Lieutenant Colonel Board In-Zone Selection Percentage	65.0 percent

D.   Colonel (0-6) Promotion Model

1.   Development of the Colonel Promotion Model

Similar to the Lieutenant Colonel Promotion Model, the Colonel Promotion Model was developed from six categories of independent variables. The six categories were used to estimate the predicted probability of promotion as seen in Table 35.

Table 35.   Colonel Promotion Model Specifications
(Source: Author, 2008)

Model 1: Grade_Select_06 = ∫ (Demographics)

Model 2: Grade_Select_06 = ∫ (Demographics, Commissioning)

Model 3: Grade_Select_06 = ∫ (Demographics, Commissioning, Performance)

Model 4: Grade_Select_06 = ∫ (Demographics, Commissioning, Performance, Military Occupational Field)

Model 5: Grade_Select_06 = ∫ (Demographics, Commissioning, Performance, Military Occupational Field, Combat,)

Model 6: Grade_Select_06 = ∫ (Demographics, Commissioning, Performance, Military Occupational Field, Combat, Assignment)

The results for the six model specifications developed in Table 35 are displayed in Table 36. Model 6 is the final promotion model and, thus, contains 37 of the independent variables. The base case for the model was a single white male lieutenant colonel who possessed an Associate's or Bachelor's degree; attended the United States Naval Academy; had a Water Qualification level of 1, 2, 3, 4, or was Water Survival Qualified (WSQ); had served in the military occupational field of combat; and was not serving in the Fleet Marine Force (FMF). The Colonel Promotion Model results contain the magnitude of the marginal effects, standard errors, statistical significance (1 percent, 5 percent, and 10 percent level) and the sign of the coefficient. A negative sign on the coefficient explains that the variable

reduces the overall predicted probability of promotion to colonel, while a positive sign has the opposite effect and increases the overall predicted probability of promotion.

Table 36.   Colonel Promotion Model Results
(Source: Author, 2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Demographics						
Number_Depns	-0.04578	-0.02510	-0.03656	-0.01409	-0.08129	-0.09498
	(0.07859)	(0.08048)	(0.09389)	(0.09711)	(0.10580)	(0.14115)
	[-0.01818]	[-0.00995]	[-0.01438]	[-0.00554]	[-0.03194]	[-0.03682]
Years_Comm_Serv	-0.07607	-0.23573	-0.09109	-0.08482	-0.18449	0.17559
	(0.16303)	(0.19340)	(0.23598)	(0.23548)	(0.25332)	(0.31277)
	[-0.03022]	[-0.09348]	[-0.03581]	[-0.03336]	[-0.07249]	[0.06807]
Months_LtCol	-0.03575	-0.02828	-0.01339	-0.00258	0.00098	-0.06224
	(0.03968)	(0.04219)	(0.05011)	(0.05208)	(0.05461)	(0.07224)
	[-0.01420]	[-0.01122]	[-0.00527]	[-0.00102]	[0.00038]	[-0.02413]
GCT_Total	0.00405	0.00325	0.00440	0.00247	0.01668	0.03301
	(0.00932)	(0.01017)	(0.01156)	(0.01226)	(0.01375)	(0.01743)*
	[0.00161]	[0.00129]	[0.00173]	[0.00097]	[0.00655]	[0.01280]
Female	-0.30139	-0.28727	-0.00359	-0.26566	-0.71179	-1.11444
	(0.76123)	(0.76232)	(0.90378)	(0.93985)	(1.02953)	(1.42015)
	[-0.11963]	[-0.11417]	[-0.00141]	[-0.10558]	[-0.27449]	[-0.40675]
Black	-0.27332	-0.39225	-0.32650	-0.60756	-0.59149	-1.93451
	(0.45152)	(0.48469)	(0.64587)	(0.71452)	(0.74085)	(1.31138)
	[-0.10865]	[-0.15514]	[-0.12964]	[-0.23739]	[-0.23159]	[-0.57514]
Marital_Status	-0.78377	-0.79638	-0.85584	-0.99343	-0.99980	-1.67706
	(0.46038)*	(0.47282)*	(0.48599)*	(0.50856)*	(0.54045)*	(0.72039)**
	[-0.28038]	[-0.28222]	[-0.29120]	[-0.32631]	[-0.32691]	[-0.42506]
Greater_College	0.61750	0.68621	0.51487	0.51530	0.64366	0.87111
	(0.19659)* **	(0.20316)** *	(0.23640)**	(0.24417)**	(0.26764)**	(0.36107)**
	[0.24193]	[0.26752]	[0.20098]	[0.20121]	[0.24977]	[0.33035]
Commissioning						
OCS		-0.06756	0.20255	0.25008	0.16392	0.51244
		(0.31946)	(0.36091)	(0.38347)	(0.39888)	(0.50710)
		[-0.02679]	[0.07943]	[0.09800]	[0.06428]	[0.19591]
NROTC		0.06469	0.06590	0.10100	0.04765	0.00206
		(0.32073)	(0.35849)	(0.37117)	(0.38075)	(0.48758)
		[0.02561]	[0.02584]	[0.03955]	[0.01869]	[0.00080]
ENLPGM		0.33078	0.56414	0.84108	0.95525	2.23440
		(0.51913)	(0.64063)	(0.74470)	(0.79400)	(1.27157)*
		[0.12727]	[0.20438]	[0.28547]	[0.31333]	[0.45715]
Other_Source		1.13832	0.64347	0.48067	0.42137	-0.20851
		(0.75816)	(0.85421)	(0.88510)	(0.94936)	(1.10968)
		[0.35571]	[0.22602]	[0.17575]	[0.15568]	[-0.08222]
Performance						
PFT			0.00109	0.00213	-0.00041	0.00592
			(0.00375)	(0.00392)	(0.00419)	(0.00527)
			[0.00043]	[0.00084]	[-0.00016]	[0.00230]
Water_Waiver			0.78597	0.86804	1.15683	1.32574
			(0.56813)	(0.59949)	(0.61492)*	(0.69144)*
			[0.26789]	[0.28944]	[0.35141]	[0.36328]
Water_CWSS_MCIWS			-0.53455	-0.31693	-0.50953	0.35691
			(1.07562)	(1.08493)	(1.06694)	(1.23281)

	[-0.20991]	[-0.12590]	[-0.20055]	[0.13013]
RelVal_Cum_Avg	0.05641	0.04620	0.06615	0.02927
	(0.05684)	(0.05924)	(0.06386)	(0.08229)
	[0.02218]	[0.01817]	[0.02599]	[0.01135]
RelVal_Cum_sd	-0.18027	-0.18807	-0.19991	-0.20839
	(0.08515)**	(0.09177)**	(0.10040)**	(0.12830)
	[-0.07087]	[-0.07397]	[-0.07855]	[-0.08079]
RO_PCT_Avg	0.05254	0.05521	0.05793	0.08307
	(0.01945)***	(0.02100)***	(0.02240)***	(0.03260)**
	[0.02066]	[0.02171]	[0.02276]	[0.03220]
RO_PCT_sd	0.01975	0.02612	0.02188	0.02938
	(0.02342)	(0.02557)	(0.02715)	(0.03583)
	[0.00777]	[0.01027]	[0.00860]	[0.01139]
Personal_Award	0.13192	0.12962	0.06707	0.04362
	(0.11055)	(0.11798)	(0.12585)	(0.15636)
	[0.05187]	[0.05098]	[0.02635]	[0.01691]
Other_Award	0.07610	0.07106	0.04274	0.00227
	(0.04011)*	(0.04417)	(0.04720)	(0.05790)
	[0.02992]	[0.02795]	[0.01679]	[0.00088]
MOS Category				
Joint_MOS		0.46836	0.57281	0.62158
		(0.40575)	(0.43864)	(0.49461)
		[0.17430]	[0.20881]	[0.21820]
Ground_Support		0.47758	0.53723	0.13342
		(0.32379)	(0.34108)	(0.43622)
		[0.18234]	[0.20372]	[0.05134]
Service_Support		0.17497	0.14947	0.52846
		(0.54348)	(0.57246)	(0.71328)
		[0.06762]	[0.05787]	[0.18659]
Aviation_Fixed		0.29127	0.16797	-0.85570
		(0.37449)	(0.39094)	(0.55583)
		[0.11172]	[0.06516]	[-0.33081]
Aviation_Rotary		0.13168	0.11750	-0.85725
		(0.42034)	(0.43529)	(0.55777)
		[0.05126]	[0.04575]	[-0.33072]
Aviation_Support		-0.03486	-0.04120	-1.68747
		(0.56990)	(0.61708)	(0.92462)*
		[-0.01374]	[-0.01623]	[-0.54811]
Combat				
crisis_code			0.56828	0.52000
			(0.44382)	(0.52861)
			[0.20680]	[0.18601]
Combat_Service1			0.92225	0.78574
			(0.33822)***	(0.41704)*
			[0.35499]	[0.30515]
Combat_Service2			-0.48047	-1.05362
			(0.42113)	(0.52418)**
			[-0.18985]	[-0.39818]
Combat_Service3			1.45509	2.41944
			(1.15785)	(1.51833)
			[0.38650]	[0.41755]
Assignment				
FMF_Unit				-0.13510
				(0.45419)
				[-0.05289]
Billet_Cmdr				0.62490
				(0.12775)**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
						*
						[0.24225]
Billet_XO						0.16482
						(0.10901)
						[0.06389]
Billet_Pri_Staff						-0.00741
						(0.10348)
						[-0.00287]
Ser_School_TLS						0.45592
						(0.47051)
						[0.17674]
Ser_School_Other						0.00366
						(0.05912)
						[0.00142]
Constant	3.47261	6.26443	-8.07892	-8.30342	-9.51250	-15.47777
	(3.12868)	(3.79604)*	(7.07966)	(7.23821)	(7.55053)	(9.65540)
Observations	182	180	171	171	170	170
R Squared	0.0711	0.0925	0.2415	0.2577	0.3046	0.5000
Coefficients on same line as variable						
Standard errors in parentheses						
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent						
Partial Effects in brackets						

The results of the six models changed as more variables were added to the separate models. Model 6, which contained all the variables in the model, ended up with ten statistically significant variables distributed among the 1 percent, 5 percent, and 10 percent levels of significance. The ranges in the changes of the variables across the six models depended on the variable in question. The Pseudo R-squared ranged among the six models from 0.0711 in Model 1 to 0.5000 in Model 6. In Model 6, this would account for 0.5000 of the dependent variable (Grade_Select_O6) being explained by the independent variables used in the Probit Model.

For instance, the Greater_College variable had a partial effect of 0.24193 in Model 1, while Model 6 was 0.33035. The independent variable categories of commissioning, performance, MOS category, combat, and assignment accounted for a 0.08842 increase in the partial effect of the variable. Additionally, this variable went from the 1-percent level of significance in Model 1, to the 5-percent level in Model 6.

The Cumulative Reviewing Officer Percentile (RO_PCT_Avg) variable remained consistent from the introduction in Model 4, to the final of Model 6. The partial effect of this variable in Model 4 was recorded at 0.02066, while in Model 6 it was 0.03220. The independent variable categories of MOS Category, Combat, and Assignment only attributed a 0.01154 increase in the magnitude of the partial effect. In terms of statistical significance, this variable was similar to the Greater_College variable, since it also was reduced from a 1-percent level of significance to a 5-percent level.

Four of the variables from Model 6 are analyzed in detail in Figures 21 through 24. The figures make the partial effects of the variables easier to understand by comparing two similar Marines. These Marines are identical in all observable aspects, except for the variable being analyzed. These aspects could include months as a lieutenant colonel, commissioning source, gender, marital status, number of dependents, race, education, Physical Fitness Test (PFT) scores, combat assignments, etc. The only observable difference between the two Marines is the variable in question.

Holding all other observable variables constant, Marine B with one combat tour has a 54-percent greater predicted probability of being promoted than does Marine A, as displayed in Figure 21. The One Combat Tour variable was statistically significant at the 10-percent level for the Colonel Promotion Model. Since the Combat Tour variable was binary, the values chosen for Marine A (Combat_Service1 = 0) matched those of a lieutenant colonel who has not deployed to combat, and Marine B (Combat_Service1 = 1) represented the lieutenant colonel who had one combat tour. The 54-percent increase in predicted probability of promotion was calculated by dividing the 0.30 partial effect (dF/dx) of the Combat_Service1 variable by the observed probability of promotion (0.553) in the model. Overall, holding all the observable factors in the sample constant, having been deployed to combat was associated with a large magnitude for increased selection for colonel.

Figure 21. Combat Tour Partial Effects for Colonel Promotion Board

Combat Tour Partial Effects

➢ 06 Board: 1 Combat tour = 54% Increase in the
   Predicted Probability of Promotion (Significant at
   10% level)

Marine A (LtCol)   Marine B (LtCol)

| Marine A & B are
identical twins in all
observable aspects
except combat tours. |

No Combat tours   1 Combat tour

Marine B has a 54% greater predicted probability
of being promoted to Col than Marine A.

The Greater_College variable was statistically significant at the 5-percent
level for the Colonel Board. This variable was statistically insignificant for the Major
and Lieutenant Colonel Promotion Models. As displayed in Figure 22, Marine B has
a 60-percent greater predicted probability of being promoted than Marine A due to
his advanced degree. Marine B would need to have either a Master's, Post-
Master's, First-Professional, or a Doctorate Degree to be represented by the
Greater_College variable. The 60 percent was formulated by dividing the 0.33
partial effect (dF/dx) on the Greater_College variable by the observed probability of
promotion (.553) in the model. Overall, holding all the observable factors in the
sample constant, a lieutenant colonel that invests in his education beyond an
Associates or Bachelor's degree would greatly improve his opportunity for promotion
to Colonel.

Figure 22.   Post-college Education Partial Effects for Colonel Promotion Board

Post-college Education
Partial Effects

➤06 Board: Post-college Education = 60% Increase
in the Predicted Probability of Promotion
(Significant at 5% level)

Marine A (LtCol)   Marine B (LtCol)

**Marine A & B are
identical twins in all
observable aspects
except education.**

Bachelor's Degree   Master's Degree

Marine B has a 60% greater predicted probability
of being promoted to Col than Marine A.

The summary statistics showed that the lieutenant colonel that was selected
for promotion had an average of 2.6 commander billet fitness reports, as opposed to
the 0.7 of the lieutenant colonel who was not selected. Analyzing the model results
in Figure 23, a lieutenant colonel with one additional commander billet fitness report
will increase his predicted probability for promotion by 44 percent, holding all other
observable variables constant. The 44 percent was calculated by dividing the 0.242
partial effect (dF/dx) by the observed probability of promotion (.553) in the model. In
the example, Marine B would have an 88-percent greater predicted probability of
being promoted than does Marine A because of the additional two commander billet
fitness reports. The difference of 2 was selected as the comparison number
because the standard deviation for the Billet_Cmdr variable was 1.8. The 88-
percent increase in predicted probably of promotion can be attributed to the
command screening process for lieutenant colonel commands. Basically, the
command screening process already starts the process of differentiation of

performance among lieutenant colonels that will soon be accomplished at the Colonel Promotion Board.

Figure 23.   Commander Billet Partial Effects for Colonel Promotion Board

Commander Billet Partial Effects

➢06 Board: 1 Commander Billet = 44% Increase in the Predicted Probability of Promotion (Significant at 1% level)

Marine A (LtCol)   Marine B (LtCol)

Marine A & B are identical twins in all observable aspects except # of Cmdr billets.

1 Commander Billet   3 Commander Billets

Marine B has a 88% greater predicted probability of being promoted to Col than Marine A.

The Cumulative Reviewing Officer Percentile variable was statistically significant at the 5-percent level.   The summary statistics for the average percentile of the lieutenant colonel (Marine B) that was selected for colonel had a cumulative reviewing officer percentile of 83.0.   One standard deviation represented for the RO_PCT_Avg variable was 10.5 percentile points. The one standard deviation value was used as the difference to contrast Marine B (83.0) to Marine A (72.5). The difference of 10.5 percentile points between the two lieutenant colonels resulted in a 61-percent greater predicted probability of promotion for Marine B due to the increased cumulative reviewing officer percentile. Holding all other observable variables constant, for every 1-percentage point increase in the cumulative reviewing officer percentile, the result will be a 5.8-percent increase in the predicted probability of promotion to colonel. The 5.8 percent was calculated by dividing the 0.0322 partial effect (dF/dx) on the Cumulative Reviewing Officer Percentile variable by the

observed probability of promotion (.553) in the model. The Cumulative Reviewing Officer Percentile variable demonstrates that the Reviewing Officer (RO) (the senior officer on the fitness report) greatly influences increased promotion by the percentile he assigns to the lieutenant colonel he is evaluating.

Figure 24. Cumulative RO Percentile Partial Effects for Colonel Promotion Board

Cumulative RO Percentile
Partial Effects

➢06 Board: 1% Point Change = 5.8% Increase in the Predicted Probability of Promotion (Significant at 5% level)

Marine A (LtCol)   Marine B (LtCol)

Marine A & B are identical twins in all observable aspects except RO Percentiles.

RO Percentile: 72.5   RO Percentile: 83

Marine B has a 61% greater predicted probability of being promoted to Col than Marine A.

2. Interactive Colonel Promotion Model

A snap-shot of the Interactive Colonel Promotion Model is shown in Table 37. As shown in the promotion model, the lieutenant colonel with the characteristics shown in the model has a predicted probability of being promoted of 51.0 percent—with an error of plus or minus 19 percent. As the researcher changes the values for the variables in the model, the predicted probability of promotion will either increase or decrease depending on the sign (negative or positive) of the coefficient. Additionally, the margin by which the predicted probability of promotion increases or decreases is directly related to the magnitude attributed to the coefficient. The characteristics of the lieutenant colonel displayed in the model have the same promotion rate as the average selection rate (51.0 percent) established for the in-

zone population in the Fiscal Year (FY) 2008 Colonel Promotion Board. Appendix J contains sample snap-shots of the Interactive Colonel Promotion Model with different variables being changed in the model. The variables that have been changed are highlighted to display the "before" and "after" difference. The magnitude of the change was one standard deviation for the variables in the appendix, unless the variable was binary. If the variable was binary, then the change was either a zero or one.

Table 37.   Interactive Colonel Promotion Model
(Source: Author, 2008)

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	Greater_College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	81
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	3
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	**51.0 percent**
Error	+/- 19 percent
Colonel Board In-zone Selection Percentage	51.0 percent

VI.   Conclusions and Recommendations

Since the birth of our Nation, our liberty has been purchased by valiant men and women of deep conviction, great courage, and bold action; the cost has often been in blood and tremendous sacrifice. As America's sentinels of freedom, United States Marines are counted among the finest legions in the chronicles of war. Since 1775, Marines have marched boldly to the sounds of guns and have fought fiercely and honorably to defeat the scourge of tyranny and terror. We are Marines—that is what we do.[8]

— General James T. Conway, USMC

A.   Conclusions

The study of officer promotions has been examined over the years by many different individuals. The focus of the studies has remained fairly consistent in terms of certain observable aspects.   The consistency can be seen in a majority of the studies; indeed, most models include gender, race, education, and commissioning source as independent variables. However, the difference in the studies can be observed by examining each researcher's focus on the specific effects of certain variables on promotion. Past literature has studied the specific effects of Primary Military Occupational Specialty (PMOS), minority status, gender, education, commissioning source, and assignment patterns on promotion.

The focus of this research was to isolate and examine those factors that a promotion board would possibly consider when selecting or not selecting an officer for promotion. The researcher identified those variables examined to determine if an officer is the "best qualified" for promotion. The researcher felt this information could then be used as a tool by the Marine Corps Career Counselors to educate officers on their career choices.

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[8] General Conway made this statement in the 2007 Commandant of the Marine Corps Birthday Message (Headquarters Marine Corps (Conway, 2007, November 10).

Additionally, the researcher specifically wanted to examine the most recent data (Fiscal Year 2008 Promotion Board Data) available to analyze the effects of time on the importance of certain factors. With the Global War of Terror (GWOT) continuing in Afghanistan and Iraq, the effects of deployment to a combat zone on promotion was of significant interest. Also, with the high level of attention given to physical fitness in the Marine Corps, the researcher had an interest in analyzing the effects of increased Physical Fitness Test (PFT) scores. Finally, with the change of the fitness report in early 1999 to a quantitative system that could be measured, the researcher wanted to see if those markings had an effect on promotion.

The purpose of the study was to develop a useable promotion model for the Career Counseling Section (MMOA-4) of Manpower and Reserve Affairs (M&RA). The idea behind the model was to equip the career counselors with a tool that could be used to help officers make better career decisions. The model would give the counselors the ability to educate officers on the quantitative measures associated with their decisions.

The data for this research was obtained from two separate sources. The first data source was the Total Force Data Warehouse (TFDW); the second source was the Manpower Management Support Branch (MMSB). The two sources were merged together to complete three separate samples for studying the promotion to major, lieutenant colonel and colonel.

The TFDW data used in this research consisted of cross-sectional and panel data. The major, lieutenant colonel and colonel observations were 743, 519, and 196, respectively. The TFDW data provided 41 of the 56 variables used in the analysis. It was the source for the dependent variable of grade select. The independent variables were assigned to six categories of demographics, commissioning source, performance, military occupational field, combat service, and assignments.

MMSB was used to collect the fitness report information on the officers from 01 January 1999 to the date the board convened. Fitness report data was not collected before 1999 because of the qualitative nature of the old fitness reports. The data collection provided independent performance variables of fitness report relative value measures and reviewing officer percentages. Additionally, assignment variables were produced—to include commander, executive officer, primary staff, and other billets.

Three samples from the above data were produced to identify the statistically significant factors in predicting promotion to major, lieutenant colonel, and colonel. The explanatory power or goodness of fit of the models increased as the grade of the promotion board increased. The Pseudo R-squared for the major, lieutenant colonel, and colonel final model (Model 6) was 0.2897, 0.4233, and 0.5000 respectively. Therefore, examining the colonel model, 50 percent of the independent variables explained the effects of the dependent variable on whether a lieutenant colonel was selected for promotion.

As the grade of the promotion board increased, the number of statistically significant (1 percent, 5 percent, and 10 percent level) variables also increased. The major model had eight statistically significant variables; the lieutenant colonel model had nine, and the colonel model had ten. Tables 38, 39, and 40 contain only the independent variables that were statistically significant in the three models.

Table 38.   Major Promotion Model Statistically Significant Independent Variables
(Source: Author, 2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Demographics						
Marital_Status	0.25449 (0.18473) [0.05755]	0.29241 (0.18931) [0.06598]	0.46313 (0.22249)** [0.07770]	0.46951 (0.22332)** [0.07735]	0.45687 (0.22653)** [0.07303]	0.41306 (0.23261)* [0.06094]
Performance						
PFT			0.00883 (0.00255)*** [0.00122]	0.00873 (0.00259)*** [0.00118]	0.00932 (0.00265)*** [0.00123]	0.00933 (0.00276)*** [0.00115]
Water_CWSS_MCIWS			-0.36902 (0.69550) [-0.06558]	-0.43740 (0.68452) [-0.07955]	-0.61444 (0.68304) [-0.12160]	-1.23612 (0.73829)* [-0.31664
RelVal_Cum_Avg			0.08354 (0.03611)** [0.01156]	0.08117 (0.03664)** [0.01098]	0.08424 (0.03701)** [0.01108]	0.07859 (0.03798)** [0.00965]
RO_PCT_sd			-0.05079 (0.01476)*** [-0.00703]	-0.05180 (0.01484)*** [-0.00700]	-0.05205 (0.01497)*** [-0.00684]	-0.05591 (0.01529)*** [-0.00687]
Personal_Award			0.22659 (0.08264)*** [0.03136]	0.22386 (0.08319)*** [0.03027]	0.25063 (0.08464)*** [0.03296]	0.25343 (0.08645)*** [0.03113]
Assignment						
Ser_School_CLS						0.35449 (0.18072)** [0.04354]
Ser_School_Other						0.05937 (0.02739)** [0.00729]
Constant	-2.31348 (1.43857)	-2.04732 (1.68377)	-11.34895 (3.69811)***	-11.11566 (3.76813)***	-11.31896 (3.81099)***	-11.67618 (3.93205)***
Observations	676	658	640	640	640	640
R squared	0.0298	0.0381	0.2492	0.2534	0.2643	0.2897
Coefficients on same line as variable						
Standard errors in parentheses						
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent						
Partial Effects in brackets						

Table 39. Lieutenant Colonel Promotion Model Statistically Significant Independent Variables
(Source: Author, 2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Demographics						
Months_Maj	0.00445 (0.01204) [0.00163]	0.01749 (0.01317) [0.00637]	0.03292 (0.01613)** [0.01086]	0.03773 (0.01656)** [0.01219]	0.04278 (0.01696)** [0.01372]	0.03963 (0.01756)** [0.01231]
Commissioning						
ENLPGM		-0.71924 (0.29331)** [-0.27873]	-0.55171 (0.36287) [-0.20214]	-0.66536 (0.37929)* [-0.24395]	-0.65298 (0.38746)* [-0.23806]	-0.72770 (0.41380)* [-0.26284]
Performance						
PFT			0.00772 (0.00236)*** [0.00255]	0.00734 (0.00243)*** [0.00237]	0.00797 (0.00250)*** [0.00256]	0.00819 (0.00258)*** [0.00254]
RelVal_Cum_Avg			0.17988 (0.03559)*** [0.05933][	0.18190 (0.03622)*** [0.05878]	0.19149 (0.03747)*** [0.06141]	0.18774 (0.03836)*** [0.05832]
RO_PCT_Avg			0.02211 (0.00884)** [0.00729]	0.02203 (0.00924)** [0.00712]	0.01999 (0.00933)** [0.00641]	0.02289 (0.00965)** [0.00711]
RO_PCT_sd			-0.04292 (0.01455)*** [-0.01416]	-0.04583 (0.01548)*** [-0.01481]	-0.04797 (0.01575)*** [-0.01538]	-0.04524 (0.01640)*** [-0.01405]
MOS Category						
Aviation_Support				-0.77648 (0.31046)** [-0.28718]	-0.76212 (0.31492)** [-0.28049]	-0.69456 (0.35598)* [-0.24962]
Combat						
Combat_Service1					0.39643 (0.17313)** [0.13124]	0.44834 (0.17997)** [0.14476]
Assignment						
Ser_School_ILS						0.49777 (0.18198)*** [0.15463]
Constant	-0.26128 (2.17298)	-0.59657 (2.27452)	-22.21529 (4.48130)***	-21.20387 (4.45872)***	-22.31549 (4.61111)***	-22.94851 (4.77577)***
Observations	485	484	480	480	480	480
R Squared	0.0226	0.0385	0.3639	0.3893	0.4031	0.4233

Coefficients on same line as variable
Standard errors in parentheses
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent
Partial Effects in brackets

Table 40.   Colonel Promotion Model Statistically Significant Independent Variables
(Source: Author, 2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Demographics						
GCT_Total	0.00405 (0.00932) [0.00161]	0.00325 (0.01017) [0.00129]	0.00440 (0.01156) [0.00173]	0.00247 (0.01226) [0.00097]	0.01668 (0.01375) [0.00655]	0.03301 (0.01743)* [0.01280]
Marital_Status	−0.78377 (0.46038)* [−0.28038]	−0.79638 (0.47282)* [−0.28222]	−0.85584 (0.48599)* [−0.29120]	−0.99343 (0.50856)* [−0.32631]	−0.99980 (0.54045)* [−0.32691]	−1.67706 (0.72039)** [−0.42506]
Greater_College	0.61750 (0.19659)*** [0.24193]	0.68621 (0.20316)*** [0.26752]	0.51487 (0.23640)** [0.20098]	0.51530 (0.24417)** [0.20121]	0.64366 (0.26764)** [0.24977]	0.87111 (0.36107)** [0.33035]
Commissioning						
ENLPGM		0.33078 (0.51913) [0.12727]	0.56414 (0.64063) [0.20438]	0.84108 (0.74470) [0.28547]	0.95525 (0.79400) [0.31333]	2.23440 (1.27157)* [0.45715]
Performance						
Water_Waiver			0.78597 (0.56813) [0.26789]	0.86804 (0.59949) [0.28944]	1.15683 (0.61492)* [0.35141]	1.32574 (0.69144)* [0.36328]
RO_PCT_Avg			0.05254 (0.01945)*** [0.02066]	0.05521 (0.02100)*** [0.02171]	0.05793 (0.02240)*** [0.02276]	0.08307 (0.03260)** [0.03220]
MOS Category						
Aviation_Support				−0.03486 (0.56990) [−0.01374]	−0.04120 (0.61708) [−0.01623]	−1.68747 (0.92462)* [−0.54811]
Combat						
Combat_Service1					0.92225 (0.33822)*** [0.35499]	0.78574 (0.41704)* [0.30515]
Combat_Service2					−0.48047 (0.42113) [−0.18985]	−1.05362 (0.52418)** [−0.39818]
Assignment						
Billet_Cmdr						0.62490 (0.12775)*** [0.24225]
Constant	3.47261 (3.12868)	6.26443 (3.79604)*	−8.07892 (7.07966)	−8.30342 (7.23821)	−9.51250 (7.55053)	−15.47777 (9.65540)
Observations	182	180	171	171	170	170
R Squared	0.0711	0.0925	0.2415	0.2577	0.3046	0.5000
Coefficients on same line as variable						
Standard errors in parentheses						
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent						
Partial Effects in brackets						

As can be seen among the three models, some of the variables were statistically significant in more than one sample. Specifically, this research analyzed the three variables of combat service, physical fitness, and fitness reports in detail.

The difference of one combat tour was observed to be statistically significant at the 5- and 10-percent level for the Lieutenant Colonel and Colonel Boards respectively. The effect of one combat tour was calculated by taking the partial effect and dividing it by the model promotion rate. For the Lieutenant Colonel Board, holding all observable factors constant, a major with one combat tour would have a 21-percent increased predicted probability of promotion over a major with zero combat tours. Doing the same for the Colonel Board, a lieutenant colonel would increase his predicted probability of being promoted by 54 percent by having one combat tour.

The effects of physical fitness were not statistically significant for the Colonel Board. However, the Physical Fitness Test (PFT) score was statistically significant at the 1-percent level for both the Major and Lieutenant Colonel Promotion Boards. A captain who increased his PFT score by one point would increase his predicted probability of promotion by 0.14 percent. For a major, the 1-point increase would increase his chance by 0.38 percent. Therefore, a major who had a 262-point score on his PFT would have a 12.2-percent greater predicted probability of being promoted than a major with a 230 PFT.

The effects of the fitness report were examined using the Reporting Senior's (RS's) Cumulative Relative Value Markings. This variable was statistically significant at the 5-percent level for the Major Board and the 1-percent level for the O5 Board. The variable was positively correlated with an officer being selected for promotion. Holding all observable aspects in the model constant, a one-point increase in the Cumulative Relative Value would result in a 1.1 percent increase in promotion to major and an 8.7 percent increase in promotion to lieutenant colonel. A major with a Cumulative Relative Value of 92.2 would have a 28-percent predicted probability of being promoted over a major with a value of 89.

Next, the researcher wanted to examine the effects of the Reviewing Officer (RO) comparative assessment markings on promotion. Since the comparative assessment markings consisted only of raw numbers, a system had to be created to isolate the quantitative aspects of this variable. By utilizing the comparative assessment markings, the researcher was able to convert the assessment markings into a percentile ranking.

This was accomplished by conducting the following steps. First, the assessment markings by the Reviewing Officer (RO) were added together to get an aggregate number for the comparative assessment. This value represents the total number of fitness reports the RO has reviewed for that specific grade. Next, the number of assessment markings for each level of the pyramid was divided by the total to generate a row percentage for each level. The row percentage represented the individual percentile for the eight levels in the RO pyramid. Note, if the RO did not use a level in the comparative assessment, then the result would be a zero for that row percentage. Finally, a cumulative percentage was calculated by adding the row percentages together. This was accomplished by starting at the bottom of the pyramid (Assessment Mark 1) and adding the row percentages until the top of the pyramid was reached (Assessment Mark 8). The result would be a Cumulative Percentage for each level of the RO pyramid (See Table 12).

The Cumulative Reviewing Officer (RO) Percentile Average variable was created through the above methodology. This variable was statistically significant at the 5- percent level for the Lieutenant Colonel and Colonel Promotion Boards. The summary statistics displayed that major that was selected for promotion had a Cumulative RO Percentile average score of 79.0, as compared to the major who was not selected with a 64.1. Additionally, the summary statistics for the lieutenant colonel that was selected for promotion showed a percentile of 83.0, in contrast to the 74.6 for the lieutenant colonel who was not selected. Holding all observable aspects in the model constant, a 1-percentage point increase in the Cumulative RO Percentile average would result in a 1.1-percent increase in promotion to lieutenant

colonel and a 5.8-percent increase in promotion to colonel. A lieutenant colonel with a Cumulative RO Percentile average of 83 would have a 61-percent greater predicted probability of being promoted than a lieutenant colonel with a value of 72.5.

Finally, the researcher wanted to examine the effects of an officer's consistency on his predicted probability of being promoted. To capture this effect, a standard deviation variable was created for the RS Cumulative Relative Value Average and the Cumulative RO Percentile Average. The RO Percentile Standard Deviation variable was statistically significant at the 1-percent level for the MAJOR and Lieutenant Colonel Promotion Board models. Holding all observable aspects in the model constant, a one-point increase in the RO Percentile Standard Deviation would result in a 0.8-percent decrease in promotion to major and a 2.1-percent decrease in promotion to lieutenant colonel. A major with a RO Percentile Standard Deviation of 19.3 would have a 15-percent greater predicted probability of being promoted than a major with a value of 26.6.

1.   Limitations

One of the major limitations of the study was the sample size of the three samples used to estimate the predicted probability of promotion. The sample size was 743 for the MAJOR Board sample, 519 for the Lieutenant Colonel Board, and 196 for the Colonel Board. Additionally, missing values caused the sample size to decrease for all three samples. This resulted in the MAJOR Promotion Model consisting of 640 observations, the Lieutenant Colonel Model of 480 observations, and the Colonel Model of 170 observations.

Another limitation of the study was the use of cross-sectional data. The cross-sectional data captures the observation at one point in time. For instance, the FMF_Unit variable identifies an officer that is assigned to the Fleet Marine Force at the time the data is pulled. It does not identify the officer's assignment pattern over his entire career in the Marine Corps. The value of this variable is clearly limited,

since it only identifies a small part of an officer's career path. Additionally, this variable is limited in the fact it only compares FMF and non-FMF unit assignments. Other assignments (such as Marine Security Guard Duty, Recruiting Duty, or Drill Instructor Duty) may have some explanatory value in their effect on promotion.

B.   Recommendations

The first recommendation is for the Career Counseling Section (MMOA-4) to utilize the promotion model developed by this research. Three samples of this interactive model are shown in Tables 31, 33, and 35. This interactive promotion model can serve as a tool to enhance the career counseling process. The value of the model is not in the overall predicted probability of promotion that the model assigns to an officer. The value comes from the change an officer has some control over. For instance, in Appendix H, the model was run both for a captain who had not attended resident Career Level School (CLS) and for a captain who had resident attended CLS. The predicted probability of being promoted in the first example was 87.4 percent for all the characteristics that were entered into the model. In the second example (only changing the CLS variable), the captain who attended resident CLS had a 93.3 percent predicted probability of being promoted.

First, it is the researcher's opinion that the value of the model does not come from informing the captain that his predicted probability of promotion will increase from 87.4 to 93.3 percent. Instead, the captain should be informed that attending resident CLS may increase his predicted probability of being promoted by 5.9 percent. Second, the promotion models should not be used to show an officer the changes in predicted probability of promotion on the factors they have no control over, such as gender and race. The model should only be used to counsel officers on military-related factors (i.e., the CLS example above). More specifically, if adding the number of dependents increases the predicted probability of promotion, this is not the type of information the model was created to be used for. Finally, the model should only be distributed to MMOA-4 for their use in the career counseling process.

The second recommendation is for the Reviewing Officer (RO) Comparative Assessment in the fitness report to be changed to a percentile system. The current system utilizing raw numbers only gives a general view of where the Marine Reported On (MRO) falls among his peers. The percentile system is superior to the current system because it assigns an exact value (percentile) to the Reviewing Officer's (RO) markings. This gives the MRO the capability to identify exactly where he ranks among his peers. The percentile system would also allow command, promotion, and school boards to better differentiate among officers using this system. It would also give the RO a better idea on the potential impact he would be having on an officer's career by the percentile that was assigned to that officer. Finally, this system is consistent with the relative value system that is currently in place for the Reporting Seniors (RSs). The raw numbers from the RS's report average are put into perspective when they are assigned a relative value. This similar system should be followed for the RO comparative assessment markings.

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Appendix A. Marine Corps Physical Fitness Test Standards

1. <u>PFT Performance Requirements</u>. To successfully pass the PFT, Marines must complete the minimum acceptable performance requirements in each event and achieve an overall combined score for their age group as shown in table 2-1. Marines must be made aware that the minimum performance (points) in each event alone, will not total the points required for a passing score. Additional points must be earned in at least one event in order to achieve a 3rd Class PFT or better, per age group. Failure to meet the minimum requirements in any event constitutes a failure of the entire test, regardless of the total number of points earned for all three events. Marines on light or limited duty will complete the two events that they are medically qualified to participate in, and will receive credit for a PPFT. Paragraph 2202 further details the PPFT requirements.

AGE	PULL-UPS/ FLEXED-ARM	ABDOMINAL CRUNCHES	3.0 MILE RUN (MIN)	TOTAL POINTS	MIN SCORE	ADDNTL' POINTS NEEDED
17-26	3/15 (SEC)	50	28 (m) 31 (f)	105	135	30
27-39	3/15	45	29 (m) 32 (f)	94	110	16
40-45	3/15	45	30 (m) 33 (f)	88	88	0
46+	3/15	40	33 (m) 36 (f)	65	65	0

Table 2-1.--Minimum Acceptable Performance Requirements for PFT/PPFT Events.

2. Individual event scores for both males and females can be viewed in appendix G.

3. <u>PFT Classification Scores</u>. Table 2-2 shows the minimum score required, per age group, to earn each PFT classification score. Marines should be encouraged to continually strive to perform their best and not merely accept minimum performance.

AGE GROUPS

PFT CLASS	17-26	27-39	40-45	46+
1st	225	200	175	150
2nd	175	150	125	100
3rd	135	110	88	65

Table 2-2.--Minimum PFT Classification Scores.

(Source: Headquarters Marine Corps, 2002, May 10)

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Appendix B. Female PFT Scoring Table

Sec I: FEMALES

Points	Flexed-Arm Hang	Crunches	3-Mile Run
100	70 sec	100	21:00
99		99	21:10
98	69 sec	98	21:20
97		97	21:30
96	68 sec	96	21:40
95		95	21:50
94	67 sec	94	22:00
93		93	22:10
92	66 sec	92	22:20
91		91	22:30
90	65 sec	90	22:40
89		89	22:50
88	64 sec	88	23:00
87		87	23:10
86	63 sec	86	23:20
85		85	23:30
84	62 sec	84	23:40
83		83	23:50
82	61 sec	82	24:00
81		81	24:10
80	60 sec	80	24:20
79		79	24:30
78	59 sec	78	24:40
77		77	24:50
76	58 sec	76	25:00
75		75	25:10
74	57 sec	74	25:20
73		73	25:30
72	56 sec	72	25:40
71		71	25:50
70	55 sec	70	26:00
69		69	26:10
68	54 sec	68	26:20
67		67	26:30
66	53 sec	66	26:40
65		65	26:50
64	52 sec	64	27:00
63		63	27:10
62	51 sec	62	27:20
61		61	27:30
60	50 sec	60	27:40
59		59	27:50
58	49 sec	58	28:00
57		57	28:10
56	48 sec	56	28:20
55		55	28:30
54	47 sec	54	28:40
53		53	28:50
52	46 sec	52	29:00
51		51	29:10
50	45 sec	50	29:20
49		49	29:30
48	44 sec	48	29:40
47		47	29:50
46	43 sec	46	30:00
45		45	30:10
44	42 sec	44	30:20
43		43	30:30
42	41 sec	42	30:40
41		41	30:50
40	40 sec	40	31:00
39	39 sec	x	31:10
38	38 sec	x	31:20
37	37 sec	x	31:30
36	36 sec	x	31:40
35	35 sec	x	31:50
34	34 sec	x	32:00
33	33 sec	x	32:10
32	32 sec	x	32:20
31	31 sec	x	32:30
30	30 sec	x	32:40
29	29 sec	x	32:50
28	28 sec	x	33:00
27	27 sec	x	33:10
26	26 sec	x	33:20
25	25 sec	x	33:30
24	24 sec	x	33:40
23	23 sec	x	33:50
22	22 sec	x	34:00
21	21 sec	x	34:10
20	20 sec	x	34:20
19	19 sec	x	34:30
18	18 sec	x	34:40
17	17 sec	x	34:50
16	16 sec	x	35:00
15	15 sec	x	35:10
14	x	x	35:20
13	x	x	35:30
12	x	x	35:40
11	x	x	35:50
10	x	x	36:00
9	x	x	x
8	x	x	x
7	x	x	x
6	x	x	x
5	x	x	x
4	x	x	x
3	x	x	x
2	x	x	x
1	x	x	x

*Round up all values (e.g., 21:01 to 21:09 equals 99 points)

(Source: Headquarters Marine Corps, 2002, May 10)

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Appendix C. Male PFT Scoring Table

Sec II:	MALES				Points	Pull-ups	Crunches	3-Mile Run
Points	Pull-ups	Crunches	3-Mile Run		50	10	50	26:20
100	20	100	18:00		49		49	26:30
99		99	18:10		48		48	26:40
98		98	18:20		47		47	26:50
97		97	18:30		46		46	27:00
96		96	18:40		45	9	45	27:10
95	19	95	18:50		44		44	27:20
94		94	19:00		43		43	27:30
93		93	19:10		42		42	27:40
92		92	19:20		41		41	27:50
91		91	19:30		40	8	40	28:00
90	18	90	19:40		39		x	28:10
89		89	19:50		38		x	28:20
88		88	20:00		37		x	28:30
87		87	20:10		36		x	28:40
86		86	20:20		35	7	x	28:50
85	17	85	20:30		34		x	29:00
84		84	20:40		33		x	29:10
83		83	20:50		32		x	29:20
82		82	21:00		31		x	29:30
81		81	21:10		30	6	x	29:40
80	16	80	21:20		29		x	29:50
79		79	21:30		28		x	30:00
78		78	21:40		27		x	30:10
77		77	21:50		26		x	30:20
76		76	22:00		25	5	x	30:30
75	15	75	22:10		24		x	30:40
74		74	22:20		23		x	30:50
73		73	22:30		22		x	31:00
72		72	22:40		21		x	31:10
71		71	22:50		20	4	x	31:20
70	14	70	23:00		19		x	31:30
69		69	23:10		18		x	31:40
68		68	23:20		17		x	31:50
67		67	23:30		16		x	32:00
66		66	23:40		15	3	x	32:10
65	13	65	23:50		14	x	x	32:20
64		64	24:00		13	x	x	32:30
63		63	24:10		12	x	x	32:40
62		62	24:20		11	x	x	32:50
61		61	24:30		10	x	x	33:00
60	12	60	24:40		9	x	x	x
59		59	24:50		8	x	x	x
58		58	25:00		7	x	x	x
57		57	25:10		6	x	x	x
56		56	25:20		5	x	x	x
55	11	55	25:30		4	x	x	x
54		54	25:40		3	x	x	x
53		53	25:50		2	x	X	x
52		52	26:00		1	x	x	x
51		51	26:10					

* Round up all values (e.g., 18:01 to 18:09 equals 99 points)

(Source: Headquarters Marine Corps, 2002, May 10)

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Appendix D. Sample Master Brief Sheet Fitness Report Listings (MBS)

ADMINISTRATIVE SUMMARY					REPORTING SENIOR MARKINGS															REVIEWING OFFICER MARKINGS		
Grade	OCC	From	Months	Billet Description	Reporting Senior	Per	Pro	Cou	Eff	Ini	Lea	Dev	Set	Ens	Co	PME	Dec	Jus	Eval	Reviewing Officer	RO marks - same grade at processing	
BMOS	Type	To	Co	Adv	Command	Promote	Reports		Rpt Avg		RS Avg		RS High		Rpt at High		RV at Proc		Cum RV	Obser	Concur	RO marks - same grade cumulative
Capt	GC	19980801	9	Company Commander	LtCol B	F	F	D	E	D	E	E	E	D	D	C	E	E	C	Col T	0/1 0/2 1/3 3/4 2/6 1/6 0/7 0/8	
0302	N	19990503		1st Battalion 2d Marines	Yes	13 of 16		4.57		3.52		4.57		1		100.00		100.00		Suff	Yes	0/1 0/2 8/3 12/4 23/6 11/6 3/7 0/8
Maj	AN	19990504	3	Operations Officer	LtCol B	E	E	C	E	E	D	D	E	D	E	C	E	D	D	Col R	0/1 0/2 1/3 2/4 2/6 2/6 0/7 0/8	
0302	N	19990801		1st Battalion 2d Marines	Yes	4 of 7		4.36		4.13		4.50		1		96.11		96.11		Suff	Yes	0/1 1/2 2/3 7/4 7/6 6/6 0/7 0/8
Maj	CH	19990801	6	Operations Officer	LtCol B	E	E	D	E	E	D	D	E	D	E	C	E	E	D	Col A	0/1 0/2 1/3 3/4 2/6 1/6 0/7 0/8	
0302	N	20000119		1st Battalion 2d Marines	Yes	7 of 7		4.50		4.13		4.50		2		100.00		100.00		Suff	Yes	1/1 0/2 2/3 4/4 17/6 12/6 7/7 1/8
Maj	TR	20000119	3	BN Executive Officer	LtCol S	F	F	D	D	G	F	E	F	D	D	D	D	D	E	Col A	0/1 0/2 1/3 3/4 2/6 2/6 0/7 0/8	
0302	N	20000414		1st Battalion 2d Marines	Yes	6 of 14		4.93		4.46		4.93		1		100.00		100.00		Suff	Yes	1/1 0/2 2/3 4/4 17/6 12/6 7/7 1/8

A.   ADMINISTRATIVE SUMMARY

1.   GRADE. This information reflects the MRO's grade per section A, item 1e (Grade), of the fitness report.

2.   BMOS. This information reflects the billet MOS of the duty to which the MRO was assigned per section A, item h (BILMOS) of the fitness report.

3.   OCC. This information reflects the occasion for submitting the report per section A, item 3a (OCC) of the fitness report.

4.   TYPE DUTY. This information reflects the type of the MRO's duty per section A, item 3c (Type), of the fitness report. The letters indicating the type duty are "A" (Academic & Training Duty), "N" (Normal peace time reporting), "C" (Combat), "J" (Joint Duty), and "B" (both Combat and Joint).

5.   FROM DATE/TO DATE

a.   FROM DATE. This information reflects the beginning date of the reporting period per section A, item 3b (From) of the fitness report.

b.   TO DATE. This information reflects the ending date of the reporting period per section A, item 3b (To) of the fitness report.

6.   MONTHS. Number of months covered by the specific fitness report.

7.   COM. An "X" appearing under this column indicates that the MRO was subject to commendatory material during the reporting period per section A, item 6a (Marine Subject of Commendatory Material) of the fitness report.

8.   ADV. An "X" appearing under this column indicates the report is adverse. per section A, item 5a (Special Case: Adverse)or item 6b (Derogatory Material) or item 6c (Disciplinary Action) of the fitness report.

9.   BILLET DESCRIPTION. This information reflects the primary duty to which the MRO was assigned per section A, item 4 (Duty Assignment (descriptive title)), of the fitness report.

10. COMMAND. This information reflects the specific command or unit to which the MRO was assigned for duty per section A, item 2b, (RUC), of the fitness report.

B. REPORTING SENIOR MARKINGS

1. REPORTING SENIOR. This information reflects the name of the MRO's RS per section A, item 10 (Reporting Senior), of the fitness report.

2. MISSION/CHARACTER/LEADERSHIP/INTELLECT/EVAL RESP. This information reflects the markings from the Performance Anchored Rating Scales per section D (MISSION ACCOMPLISHMENT), E (INDIVIDUAL CHARACTER), F (LEADERSHIP), G(INTELLECT AND WISDOM), and H *(FULFILLMENT OF EVALUATION RESPONSIBILITIES) of the fitness report. Abbreviations for the individual attributes as reflected on the MBS are:

PER-Performance   LEA-Leading Subordinates   PME-Professional
PRO-Proficiency   DEV-Develop Subordinates   Military Education
COU-Courage   SET-Setting the Example   DEC-Decision Making
EFF-Effectiveness   ENS-Ensuring Well-Being   Ability
   Under Stress   of Subordinates   JUD-Judgment
INI-Initiative   CO-Communication Skills   *EVAL-Evaluation
                                                         Responsibilities

* Applies to MRO's with fitness reporting official responsibilities.

3. PROMOTE. This information reflects the RS's promotion recommendation for the MRO per section A, item 7 (Recommended for Promotion). A "NO" indicates not recommended for promotion. An "NA" indicates not applicable. An "ACC" indicates a recommendation for accelerated promotion.

4. REPORTS. The number before "of" indicates at processing what report this was the RS had submitted on Marines of this grade. The number after "of" is the total number of cumulative reports to date on Marines of this grade.

5. RPT AVG. This information reflects the report's average of the observed attributes.

6. RS AVG. This information reflects the cumulative average of all reports written by the RS on a Marine of that grade.

7. RS HIGH. This information reflects the highest fitness report average of any report written by the RS on a Marine of that grade.

8. RPT AT HIGH. This information reflects the number of reports the RS submitted which have a relative average of 100.

9. RV AT PROC. This column reflects the relative value of the MRO's fitness report based on the RS's rating history for Marines of the same grade as the MRO as of the time of processing of the MRO's report (see Appendix G).

10. CUM RV. This column reflects the cumulative relative value of all fitness reports written by the RS on Marines of this grade at the time the MBS is produced. NOTE: This percentage is a variable and will change as the RS writes additional reports on Marines of the same grade as the MRO's grade on the report in question.

C. REVIEWING OFFICER MARKINGS

1. REVIEWING OFFICER. This information reflects the name of the MRO's RO per section A, item 11 (Reviewing Officer), of the fitness report.

2. RO REMARKS -SAME GRADE AT PROCESSING. This information will show the RO's comparative assessment marks of section K, block 3 for all fitness reports of Marines of the same grade evaluated by the RO at the time the report was processed.

3. OBSER. This reflects the degree of observation the RO had of the MRO as indicated in section K, item 1.

4. CONCUR. This information reflects whether the RO concurs or does not concur with the RS's evaluation of the MRO per section K, item 2 (Evaluation) of the fitness report. A "YES" appearing in this column indicates the RO concurs with the report. A "NO" appearing in the column indicates the RO does not concur with the report.

5. RO MARKS – SAME GRADE CUMULATIVE. This information shows the cumulative comparative assessment (pyramid) marks of section K, block 3 of all reports ever reviewed by the RO on all Marines of the same grade as the MRO with the assessment of this fitness report highlighted by a square frame. NOTE: This number is dynamic and will change as the RO writes additional reports on Marines of the same grade as the MRO's grade on this report.

(Source: Headquarters Marine Corps, 2006, May 11)

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Appendix E. Marine Corps Fitness Report

USMC FITNESS REPORT (1610)
NAVMC 10835A (Rev. 1-01)(P
PREVIOUS EDITIONS WILL NOT BE USED

COMMANDANT'S GUIDANCE

DO NOT STAPLE
THIS FORM

The completed fitness report is the most important information component in manpower management. It is the primary means of evaluating a Marine's performance and is the Commandant's primary tool for the selection of personnel for promotion, augmentation, resident schooling, command, and duty assignments. Therefore, the completion of this report is one of an officer's most critical responsibilities. Inherent in this duty is the commitment of each Reporting Senior and Reviewing Officer to ensure the integrity of the system by giving close attention to accurate marking and timely reporting. Every officer serves a role in the scrupulous maintenance of this evaluation system, ultimately important to both the individual and the Marine Corps. Inflationary markings only serve to dilute the actual value of each report. Reviewing Officers will not concur with inflated reports.

A. ADMINISTRATIVE INFORMATION

1. Marine Reported On:
   a. Last Name   b. First Name   c. MI   d. SSN   e. Grade   f. DOR   g. PMOS   h. BILMOS

2. Organization:
   a. MCC   b. RUC   c. Unit Description

3. Occasion and Period Covered:
   a. OCC   b. From   To   c. Type

4. Duty Assignment (descriptive title):

5. Special Case:
   a. Adverse   b. Not Observed   c. Extended ☐ ☐ ☐

6. Marine Subject Of:
   a. Commendatory Material ☐   b. Derogatory Material ☐   c. Disciplinary Action ☐

7. Recommended For Promotion:
   a. Yes ☐   b. No ☐   c. N/A ☐

8. Special Information:
   a. QUAL   d. HT(in.)   g. Reserve Component
   b. PFT   e. WT   h. Future Use
   c. Status   f. Body Fat   i. Future Use

9. Duty Preference:
   a. Code   b. Descriptive Title
   1st
   2nd
   3rd

10. Reporting Senior:
    a. Last Name   b. Init   c. Service   d. SSN   e. Grade   f. Duty Assignment

11. Reviewing Officer:
    a. Last Name   b. Init   c. Service   d. SSN   e. Grade   f. Duty Assignment

B. BILLET DESCRIPTION

C. BILLET ACCOMPLISHMENTS

D. MISSION ACCOMPLISHMENT

1. PERFORMANCE. Results achieved during the reporting period. How well those duties inherent to a Marine's billet, plus all additional duties, formally and informally assigned, were carried out. Reflects a Marine's aptitude, competence, and commitment to the unit's success above personal reward. Indicators are time and resource management, task prioritization, and tenacity to achieve positive ends consistently.

| ADV | Meets requirements of billet and additional duties. Aptitude, commitment, and competence meet expectations. Results maintain status quo. | | Consistently produces quality results while measurably improving unit performance. Habitually makes effective use of time and resources; improves billet procedures and products. Positive impact extends beyond billet expectations. | | Results far surpass expectations. Recognizes and exploits new resources; creates opportunities. Emulated; sought after as an expert with influence beyond unit. Impact significant; innovative approaches to problems produce significant gains in quality and efficiency. | | N/O |

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

2. PROFICIENCY. Demonstrates technical knowledge and practical skill in the execution of the Marine's overall duties. Combines training, education and experience. Translates skills into actions which contribute to accomplishing tasks and missions. Imparts knowledge to others. Grade dependent.

| ADV | Competent. Possesses the requisite range of skills and knowledge commensurate with grade and experience. Understands and articulates basic functions related to mission accomplishment. | | Demonstrates mastery of all required skills. Expertise, education and experience consistently enhance mission accomplishment. Innovative troubleshooter and problem solver. Effectively imparts skills to subordinates. | | True expert in field. Knowledge and skills impact far beyond those of peers. Translates broad-based education and experience into forward thinking, innovative actions. Makes immeasurable impact on mission accomplishment. Peerless teacher, selflessly imparts expertise to subordinates, peers, and seniors. | | N/O |

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

JUSTIFICATION:

E. INDIVIDUAL CHARACTER

1. COURAGE. Moral or physical strength to overcome danger, fear, difficulty or anxiety. Personal acceptance of responsibility and accountability, placing conscience over competing interests regardless of consequences. Conscious, overriding decision to risk bodily harm or death to accomplish the mission or save others. The will to persevere despite uncertainty.

| ADV | Demonstrates inner strength and acceptance of responsibility commensurate with scope of duties and experience. Willing to face moral or physical challenges in pursuit of mission accomplishment. | | Guided by conscience in all actions. Proven ability to overcome danger, fear, difficulty or anxiety. Exhibits bravery in the face of adversity and uncertainty. Not deterred by morally difficult situations or hazardous responsibilities. | | Uncommon bravery and capacity to overcome obstacles and inspire others in the face of moral dilemma or life-threatening danger. Demonstrated under the most adverse conditions. Selfless. Always places conscience over competing interests regardless of physical or personal consequences. | | N/O |

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

2. EFFECTIVENESS UNDER STRESS. Thinking, functioning and leading effectively under conditions of physical and/or mental pressure. Maintaining composure appropriate for the situation, while displaying steady purpose of action, enabling one to inspire others while continuing to lead under adverse conditions. Physical and emotional strength, resilience and endurance are elements.

| ADV | Exhibits discipline and stability under pressure. Judgment and effective problem-solving skills are evident. | | Consistently demonstrates maturity, mental agility and willpower during periods of adversity. Provides order to chaos through the application of intuition, problem-solving skills, and leadership. Composure reassures others. | | Demonstrates seldom-matched presence of mind under the most demanding circumstances. Stabilizes any situation through the resolute and timely application of direction, focus and personal presence. | | N/O |

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

3. INITIATIVE. Action in the absence of specific direction. Seeing what needs to be done and acting without prompting. The instinct to begin a task and follow through energetically on one's own accord. Being creative, proactive and decisive. Transforming opportunity into action.

| ADV | Demonstrates willingness to take action in the absence of specific direction. Acts commensurate with grade, training and experience. | | Self-motivated and action-oriented. Foresight and energy consistently transform opportunity into action. Develops and pursues creative, innovative solutions. Acts without prompting. Self-starter. | | Highly motivated and proactive. Displays exceptional awareness of surroundings and environment. Uncanny ability to anticipate mission requirements and quickly formulate original, far-reaching solutions. Always takes decisive, effective action. | | N/O |

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

JUSTIFICATION:

NAVMC 10835B (Rev. 4-03) (P)

1. Marine Reported On:					2. Occasion and Period Covered:		
a. Last Name		b. First Name	c. MI	d. SSN	a. OCC	b. From	To

F. LEADERSHIP

1. LEADING SUBORDINATES. The inseparable relationship between leader and led. The application of leadership principles to provide direction and motivate subordinates. Using authority, persuasion and personality to influence subordinates to accomplish assigned tasks. Sustaining motivation and morale while maximizing subordinates' performance.

ADV	Engaged; provides instructions and directs execution. Seeks to accomplish mission in ways that sustain motivation and morale. Actions contribute to unit effectiveness.	Achieves a highly effective balance between direction and delegation. Effectively tasks subordinates and clearly delineates standards expected. Enhances performance through constructive supervision. Fosters motivation and enhances morale. Builds and sustains teams that successfully meet mission requirements. Encourages initiative and candor among subordinates.	Promotes creativity and energy among subordinates by striking the ideal balance of direction and delegation. Achieves highest levels of performance from subordinates by encouraging individual initiative. Engenders willing subordination, loyalty, and trust that allow subordinates to overcome their perceived limitations. Personal leadership fosters highest levels of motivation and morale, ensuring mission accomplishment even in the most difficult circumstances.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

2. DEVELOPING SUBORDINATES. Commitment to train, educate, and challenge all Marines regardless of race, religion, ethnic background, or gender. Mentorship. Cultivating professional and personal development of subordinates. Developing team players and esprit de corps. Ability to combine teaching and coaching. Creating an atmosphere tolerant of mistakes in the course of learning.

ADV	Maintains an environment that allows personal and professional development. Ensures subordinates participate in all mandated development programs.	Develops and institutes innovative programs, to include PME, that emphasize personal and professional development of subordinates. Challenges subordinates to exceed their perceived potential thereby enhancing unit morale and effectiveness. Creates an environment where all Marines are confident to learn through trial and error. As a mentor, prepares subordinates for increased responsibilities and duties.	Widely recognized and emulated as a teacher, coach and leader. Any Marine would desire to serve with this Marine because they know they will grow personally and professionally. Subordinate and unit performance far surpassed expected results due to MRO's mentorship and team building talents. Attitude toward subordinate development is infectious, extending beyond the unit.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

3. SETTING THE EXAMPLE. The most visible facet of leadership: how well a Marine serves as a role model for all others. Personal action demonstrates the highest standards of conduct, ethical behavior, fitness, and appearance. Bearing, demeanor, and self-discipline are elements.

ADV	Maintains Marine Corps standards for appearance, weight, and uniform wear. Sustains required level of physical fitness. Adheres to the tenets of the Marine Corps core values.	Personal conduct on and off duty reflects highest Marine Corps standards of integrity, bearing and appearance. Character is exceptional. Actively seeks self-improvement in wide-ranging areas. Dedication to duty and professional example encourage others' self-improvement efforts.	Model Marine, frequently emulated. Exemplary conduct, behavior, and actions are tone-setting. An inspiration to subordinates, peers, and seniors. Remarkable dedication to improving self and others.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

4. ENSURING WELL-BEING OF SUBORDINATES. Genuine interest in the well-being of Marines. Efforts enhance subordinates' ability to concentrate/focus on unit mission accomplishment. Concern for family readiness is inherent. The importance placed on welfare of subordinates is based on the belief that Marines take care of their own.

ADV	Deals confidently with issues pertinent to subordinate welfare and recognizes suitable courses of action that support subordinates' well-being. Applies available resources, allowing subordinates to effectively concentrate on the mission.	Instills and/or reinforces a sense of responsibility among junior Marines for themselves and their subordinates. Actively fosters the development of and uses support systems for subordinates which improve their ability to contribute to unit mission accomplishment. Efforts to enhance subordinate welfare improve the unit's ability to accomplish its mission.	Noticeably enhances subordinates well-being, resulting in a measurable increase in unit effectiveness. Maximizes unit and base resources to provide subordinates with the best support available. Proactive approach serves to energize unit members to "take care of their own," thereby correcting potential problems before they can hinder subordinates' effectiveness. Widely recognized for techniques and policies that produce results and build morale. Builds strong family atmosphere. Puts motto *Mission first, Marines always*, into action.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

5. COMMUNICATION SKILLS. The efficient transmission and receipt of thoughts and ideas that enable and enhance leadership. Equal importance given to listening, speaking, writing, and critical reading skills. Interactive, allowing one to perceive problems and situations, provide concise guidance, and express complex ideas in a form easily understood by everyone. Allows subordinates to ask questions, raise issues and concerns and venture opinions. Contributes to a leader's ability to motivate as well as counsel.

ADV	Skilled in receiving and conveying information. Communicates effectively in performance of duties.	Clearly articulates thoughts and ideas, verbally and in writing. Communication in all forms is accurate, intelligent, concise, and timely. Communicates with clarity and verve, ensuring understanding of intent or purpose. Encourages and considers the contributions of others.	Highly developed facility in verbal communication. Adept in composing written documents of the highest quality. Combines presence and verbal skills which engender confidence and achieve understanding irrespective of the setting, situation, or size of the group addressed. Displays an intuitive sense of when and how to listen.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

JUSTIFICATION:

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G. INTELLECT AND WISDOM

1.PROFESSIONAL MILITARY EDUCATION (PME). Commitment to intellectual growth in ways beneficial to the Marine Corps. Increases the breadth and depth of warfighting and leadership aptitude. Resources include resident schools; professional qualifications and certification processes; nonresident and other extension courses; civilian educational institution coursework; a personal reading program that includes (but is not limited to) selections from the Commandant's Reading List; participation in discussion groups and military societies; and involvement in learning through new technologies.

ADV	Maintains currency in required military skills and related developments. Has completed or is enrolled in appropriate level of PME for grade and level of experience. Recognizes and understands new and creative approaches to service issues. Remains abreast of contemporary concepts and issues.	PME outlook extends beyond MOS and required education. Develops and follows a comprehensive personal program which includes broadened professional reading and/or academic course work; advances new concepts and ideas.	Dedicated to life-long learning. As a result of active and continuous efforts, widely recognized as an intellectual leader in professionally related topics. Makes time for study and takes advantage of all resources and programs. Introduces new and creative approaches to services issues. Engages in a broad spectrum of forums and dialogues.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

2. DECISION MAKING ABILITY. Viable and timely problem solution. Contributing elements are judgment and decisiveness. Decisions reflect the balance between an optimal solution and a satisfactory, workable solution that generates tempo. Decisions are made within the context of the commander's established intent and the goal of mission accomplishment. Anticipation, mental agility, intuition, and success are inherent.

ADV	Makes sound decisions leading to mission accomplishment. Actively collects and evaluates information and weighs alternatives to achieve timely results. Confidently approaches problems; accepts responsibility for outcomes.	Demonstrates mental agility; effectively prioritizes and solves multiple complex problems. Analytical abilities enhanced by experience, education, and intuition. Anticipates problems and implements viable, long-term solutions. Steadfast, willing to make difficult decisions.	Widely recognized and sought after to resolve the most critical, complex problems. Seldom matched analytical and intuitive abilities; accurately foresees unexpected problems and arrives at well-timed decisions despite fog and friction. Completely confident approach to all problems. Masterfully strikes a balance between the desire for perfect knowledge and greater tempo.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

3. JUDGMENT. The discretionary aspect of decision making. Draws on core values, knowledge, and personal experience to make wise choices. Comprehends the consequences of contemplated courses of action.

ADV	Majority of judgments are measured, circumspect, relevant and correct.	Decisions are consistent and uniformly correct, tempered by consideration of their consequences. Able to identify, isolate and assess relevant factors in the decision making process. Opinions sought by others. Subordinates personal interest in favor of impartiality.	Decisions reflect exceptional insight and wisdom beyond this Marine's experience. Counsel sought by all; often an arbiter. Consistent, superior judgment inspires the confidence of seniors.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

JUSTIFICATION:

H. FULFILLMENT OF EVALUATION RESPONSIBILITIES

1. EVALUATIONS. The extent to which this officer serving as a reporting official conducted, or required others to conduct, accurate, uninflated, and timely evaluations.

ADV	Occasionally submitted untimely or administratively incorrect evaluations. As RS, submitted one or more reports that contained inflated markings. As RO, concurred with one or more reports from subordinates that were returned by HQMC for inflated marking.	Prepared uninflated evaluations which were consistently submitted on time. Evaluations accurately described performance and character. Evaluations contained no inflated markings. No reports returned by RO or HQMC for inflated marking. No subordinates' reports returned by HQMC for inflated marking. Few, if any, reports were returned by RO or HQMC for administrative errors. Section Cs were void of superlatives. Justifications were specific, verifiable, substantive, and where possible, quantifiable and supported the markings given.	No reports submitted late. No reports returned by either RO or HQMC for administrative correction or inflated markings. No subordinates' reports returned by HQMC for administrative correction or inflated markings. Returned procedurally or administratively incorrect reports to subordinates for correction. As RO nonconcurred with all inflated reports.	N/O

A	B	C	D	E	F	G	H
☐	☐	☐	☐	☐	☐	☐	☐

JUSTIFICATION:

NAVMC 10835D (Rev. 4-03) (P

PAGE 4 OF 5

1. Marine Reported On:				2. Occasion and Period Covered:		
a. Last Name	b. First Name	c. MI	d. SSN	a. OCC	b. From	To

I. DIRECTED AND ADDITIONAL COMMENTS

J. CERTIFICATION

1. I CERTIFY that to the best of my knowledge and belief all entries made hereon are true and without prejudice or partiality and that I have provided a signed copy of this report to the Marine Reported on.

_____ (Signature of Reporting Senior)

☐☐☐☐ ☐☐ ☐☐ (Date in YYYYMMDD format)

2. I ACKNOWLEDGE the adverse nature of this report and

☐ I have no statement to make

☐ I have attached a statement

_____ (Signature of Marine Reported On)

☐☐☐☐ ☐☐ ☐☐ (Date in YYYYMMDD format)

K. REVIEWING OFFICER COMMENTS

1. OBSERVATION: ☐ Sufficient ☐ Insufficient   2. EVALUATION: ☐ Concur ☐ Do Not Concur

3. COMPARATIVE ASSESSMENT: Provide a comparative assessment of potential by placing an "X" in the appropriate box. In marking the comparison, consider all Marines of this grade whose professional abilities are known to you personally.

DESCRIPTION		COMPARATIVE ASSESSMENT
THE EMINENTLY QUALIFIED MARINE	☐	
ONE OF THE FEW EXCEPTIONALLY QUALIFIED MARINES	☐ ☐	
ONE OF THE MANY HIGHLY QUALIFIED PROFESSIONALS WHO FORM THE MAJORITY OF THIS GRADE	☐ ☐ ☐	
A QUALIFIED MARINE	☐	
UNSATISFACTORY	☐	

4. REVIEWING OFFICER COMMENTS: Amplify your comparative assessment mark; evaluate potential for continued professional development to include: promotion, command, assignment, resident PME, and retention; and put Reporting Senior marks and comments in perspective.

5. I CERTIFY that to the best of my knowledge and belief all entries made hereon are true and without prejudice or partiality.

_____ (Signature of Reviewing Officer)

☐☐☐☐ ☐☐ ☐☐ (Date in YYYYMMDD format)

6. I ACKNOWLEDGE the adverse nature of this report and

☐ I have no statement to make

☐ I have attached a statement

_____ (Signature of Marine Reported On)

☐☐☐☐ ☐☐ ☐☐ (Date in YYYYMMDD format)

L. ADDENDUM PAGE

ADDENDUM PAGE ATTACHED: ☐ YES

NAVMC 10835E (Rev. 4-03) (P A-PES 16)

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(Source: Headquarters Marine Corps, 2006, May 11)

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Appendix F. Reporting Senior and Reviewing Officer Profiles

A. BACKGROUND. The RS Profile on pages 4 and 5 of this Appendix is a key tool for use in accomplishing the objectives of the PES and outlines the grading history of an RS (see paragraph 8012).

B. CONTENTS OF THE PROFILE

   1. The profile provides a cumulative rating history of all reports written by an RS. The RS profile does not include academic, end of service, extended, and not observed fitness reports in the number of reports; nor are they computed into the RS's cumulative averages.

   2. The profile lists the following information:

       a. Listing of grades (excluding general officers) for Marines eligible to receive fitness reports (GRADE).

       b. Average of the fitness report averages for all reports (excluding academic type, end of service, extended, and not observed reports) submitted by the RS for each grade (AVG).

       c. Total number of reports written by the RS for each grade (excluding academic, end of service, extended, and not observed reports) (# OF RPTS).

       d. The highest fitness report average submitted by the RS for a particular grade (HIGH).

       e. The lowest fitness report average submitted by the RS for a particular grade (LOW).

       f. The number of reports submitted by the RS that HQMC received 60 or more days after the end of the reporting period.

C. CALCULATING PROFILE DATA

   1. Fitness Report Average for an Individual Report.

       a. Each block in the marking gradient for each PARS has an assigned numeric value as follows: A=1, B=2, C=3, D=4, E=5, F=6, G=7, and H (not observed)=O. NOTE: Block H (not observed) has no value and does not factor into the calculation of the average.

       b. The average of observed attributes reflects the mean of the numeric value for all observed attributes on that report rounded to the nearest hundredth.

   2. Reporting Senior's Average of All Fitness Reports Written on Marines of Similar Grade. This average reflects the mean of the numeric value for all fitness reports (excluding academic type, end of service, extended, and not observed reports) written by the RS on Marines of similar grade.

   3. Reporting Senior's Highest Fitness Report Average of Any Report Written on Marines of Similar Grade. This value reflects the highest fitness

report average of any report written by the RS on Marines of similar grade (excluding academic type, end of service, extended, and not observed reports).

    4. Reporting Senior's Lowest Fitness Report Average of Any Report Written on Marines of Similar Grade. This value reflects the lowest fitness report average of any report written by the RS on Marines of similar grade (excluding academic type, end of service, extended, and not observed reports).

    5. The Number of Reports Submitted by the RS Received at HQMC 60 or More Days After the End of the Reporting Period. This number reflects the number of reports submitted by the RS that HQMC received 60 or more days after the end of the reporting period. NOTE: The basis for accountability for late submission of reports is HQMC tracking of reporting officials' signature dates. As an example: if the RS is timely in completing and forwarding the report to the RO (as evidenced by the signature date) responsibility will shift to another reporting official (RO, third officer, or senior Marine representative) or operational Battalion/Squadron command element, as appropriate.

D. RELATIVE VALUE OF A REPORT

    1. The relative value of a report reflects how the fitness report average of an individual report compares to:

        (a) The RS's average of all fitness reports written by the RS on Marines of the same grade.

        (b) The highest fitness report average of any report written by the RS on a Marine of the same grade as the MRO.

    2. The system will calculate the relative value for each report to reflect both:

        (a) The Relative Value at the Time of Processing. This numeric value reflects the relative value of the MRO's fitness report based on the RS's rating history for Marines of the same grade as the MRO as of the time of processing of the MRO's report. This number is a constant and once calculated, it will not change.

        (b) The Cumulative Relative Value. This numeric value reflects the cumulative relative value of the MRO's fitness report based on the RS's rating history for Marines of the same grade as the MRO. This number is a variable and will change as the RS writes additional reports on Marines of the same grade as the MRO.

        (c) The Fitness Report Average. The report's average of the observed attributes.

        (d) The Reporting Senior Cumulative Average. The cumulative average of all reports written by the RS on Marines of the same grade.

        (e) The Reporting Senior High. The highest fitness report average of any report written by the RS on a Marine of that grade.

    3. Once calculated, the relative value will appear on the MRO's MBS in numeric fashion on a 80 to 100 scale.

(a) A relative value of 100 indicates the report has the highest
fitness report average of any report written by the RS on a Marine of that
grade.

(b) A relative value of 80 indicates the report has the lowest
fitness report average of any report written by the RS on a Marine of that
grade.

(c) A relative value of 90 indicates the fitness report average
for the report is equal to the RS average. (The average of the fitness
report average for all reports written by the RS on Marines of the same
grade.)

4. Appendix K (MASTER BRIEF SHEET (MBS), FITNESS REPORT LISTING),
depicts how the relative value data is displayed on the MBS.

E. REVIEWING OFFICERS PROFILE

1. A comparative assessment of the Reviewing Officer's (RO) rankings for
all fitness reports of Marines of the same grade will be included on the
Master Brief Sheet (MBS).

2. This information will show the cumulative comparative assessment
(pyramid) marks of all fitness reports of Marines of the same grade evaluated
by this RO, with the assessment of each fitness report highlighted with
a frame, as seen in Appendix K.

3. This information will be displayed on a new row beneath the line of
fitness reports attributes in line with the RO name, and will be updated as
additional fitness reports are processed with the same RO.

4. When a fitness report is processed for posting to the OMPF, the RO
profile will be overlaid to the left of the pyramid in section K on page 5
of the report.

5. An example of a RO Comparative Assessment Profile is contained on pages
6 and 7 of this Appendix.

(Source: Headquarters Marine Corps, 2006, May 11)

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Appendix G. Reviewing Officer Comparative Assessment Profile

SSN: ___-__-____

As of: 20050228

Assessment Mark	Description
8	The eminently qualified Marine
7, 6	One of the few exceptionally qualified Marines
5, 4, 3	One of the many highly qualified professionals who form the majority of this grade
2	A qualified Marine
1	Unsatisfactory

MRO Rank   **# of Reports / Assessment Mark**

MRO Rank	/1	/2	/3	/4	/5	/6	/7	/8
COL	0 / 1	0 / 2	0 / 3	0 / 4	2 / 5	9 / 6	4 / 7	0 / 8

Total # of Reports: 15

MRO Rank	/1	/2	/3	/4	/5	/6	/7	/8
LTCOL	0 / 1	0 / 2	1 / 3	1 / 4	28 / 5	23 / 6	14 / 7	6 / 8

Total # of Reports: 73

MRO Rank	/1	/2	/3	/4	/5	/6	/7	/8
MAJ	0 / 1	0 / 2	0 / 3	1 / 4	7 / 5	12 / 6	8 / 7	0 / 8

Total # of Reports: 28

MRO Rank	/1	/2	/3	/4	/5	/6	/7	/8
SGTMAJ	0 / 1	0 / 2	0 / 3	0 / 4	0 / 5	2 / 6	4 / 7	2 / 8

Total # of Reports: 8

MRO Rank	/1	/2	/3	/4	/5	/6	/7	/8
SSGT	1 / 1	0 / 2	1 / 3	5 / 4	13 / 5	8 / 6	2 / 7	0 / 8

Total # of Reports: 30

MRO Rank	/1	/2	/3	/4	/5	/6	/7	/8
SGT	0 / 1	0 / 2	4 / 3	11 / 4	25 / 5	12 / 6	6 / 7	2 / 8

Total # of Reports: 60

Total # of Observed Reviews: 218

Total # Reports Over 60 Days Old: 12

(Source: Headquarters Marine Corps, 2006, May 11)

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Appendix H. Interactive Major Promotion Model Snapshot Examples

Major Promotion Model before Change to PFT Score

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	**87.4 percent**
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model after the Subtraction of 29 Points from the PFT Score

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	251
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	80.9 percent
Error	+/- 8 percent
04 Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model before Change to Relative Value Cumulative Average

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	**87.4 percent**
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model after Addition of 3.1 Relative Value Cumulative Average Points

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.6
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	91.7 percent
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model before Change to Reviewing Officer Percentile Standard Deviation

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	**87.4 percent**
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model after Subtraction of 7 Reviewing Officer Percentile Standard Deviation points

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	93.8 percent
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model before Change to Personal Awards

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	**87.4 percent**
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model after Addition of 1 Personal Award

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	3
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	**91.9 percent**
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model before Change to Career Level School (CLS)

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	0
Other Service Schools	10

Predicted Probability of Promotion	**87.4 percent**
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Major Promotion Model after Addition of Career Level School (CLS)

Promotion Factors for Major Board	Enter Here
Number of Dependents	2
Years of Commissioned Service	8.7
Months as a Captain	62
General Classification Test (GCT) Score	126
Gender	Female
Race	White
Marital Status	Married
Education	College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	280
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	90.5
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	69.1
Reviewing Officer Percentile Standard Deviation	26
Personal Awards	2
Other Awards	11
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	4
Executive Officer Billets	1
Principal Staff Officer Billets	2
Career Level School	1
Other Service Schools	10

Predicted Probability of Promotion	93.3 percent
Error	+/- 8 percent
Major Board In-zone Selection Percentage	87.4 percent

(Source: Author, 2008)

Appendix I. Interactive Lieutenant Colonel Promotion Model Snapshot Examples

Lieutenant Colonel Promotion Model before Change to PFT Score

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model after the Addition of 32 Points to the PFT Score

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	272
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	74.1 percent
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model before Change to Relative Value Cumulative Average

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model after Addition of 3.2 Relative Value Cumulative Average Points

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	95.2
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	83.8 percent
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model before Change to Reviewing Officer Percentile Average

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model after Addition of 13.6 Reviewing Officer Percentile Average Points

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	87.6
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	75.7 percent
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

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Lieutenant Colonel Promotion Model before Change to Reviewing Officer Percentile Standard Deviation

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model after Subtraction of 7.3 Reviewing Officer Percentile Standard Deviation Points

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	12.7
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	76.3 percent
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model before Change to Combat Service

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model after Addition of One Combat Service Tour

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	1
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	79.8 percent
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model Before Change to Intermediate Level School (ILS)

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	1
Other Service Schools	10

Predicted Probability of Promotion	**65.0 percent**
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Lieutenant Colonel Promotion Model after Removal of Intermediate Level School (ILS)

Promotion Factors for Lieutenant Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	14
Months as a Major	58
General Classification Test (GCT) Score	126
Gender	Male
Race	Black
Marital Status	Married
Education	Greater_College
Source of Entry	ENLPGM
Physical Fitness Test (PFT) Score	240
Water Qualification Level	Water Waiver
Relative Value Cumulative Average	92
Relative Value Cumulative Standard Deviation	4
Reviewing Officer Percentile Average	74
Reviewing Officer Percentile Standard Deviation	20
Personal Awards	3
Other Awards	10
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Combat
Serving in Combat During Board	Crisis Code
1 combat tour	0
2 combat tours	0
3 combat tours	0
Unit Assignment	NON-FMF Unit
Commander Billets	2
Executive Officer Billets	1
Principal Staff Officer Billets	2
Intermediate Level School	0
Other Service Schools	10

Predicted Probability of Promotion	45.5 percent
Error	+/- 9 percent
Lieutenant Colonel Board In-zone Selection Percentage	65.0 percent

(Source: Author, 2008)

Appendix J. Interactive Colonel Promotion Model Snapshot Examples

Colonel Promotion Model before Change to Education

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	Greater_College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	81
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	3
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	**51.0 percent**
Error	+/- 19 percent
Colonel Board In-zone Selection Percentage	51.0 percent

(Source: Author, 2008)

Colonel Promotion Model after Change from Greater_College to College

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	81
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	3
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	**19.9 percent**
Error	**+/- 19 percent**
Colonel Board In-zone Selection Percentage	**51.0 percent**

(Source: Author, 2008)

Colonel Promotion Model before Change to Reviewing Officer Percentile Average

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	Greater_College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	81
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	3
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	**51.0 percent**
Error	+/- 19 percent
Colonel Board In-zone Selection Percentage	51.0 percent

(Source: Author, 2008)

Colonel Promotion Model after Addition of 10.5 Reviewing Officer Percentile Average Points

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	Greater_College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	91.5
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	3
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	81.5 percent
Error	+/- 19 percent
Colonel Board In-zone Selection Percentage	51.0 percent

(Source: Author, 2008)

Colonel Promotion Model before Change to Number of Billet Commander Fitness Reports

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	Greater_College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	81
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	3
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	51.0 percent
Error	+/- 19 percent
Colonel Board In-zone Selection Percentage	51.0 percent

(Source: Author, 2008)

Colonel Promotion Model after Subtraction of Two Billet Commander Fitness Reports

Promotion Factors for Colonel Board	Enter Here
Number of Dependents	3
Years of Commissioned Service	20
Months as a Lieutenant Colonel	54
General Classification Test (GCT) Score	130
Gender	Male
Race	White
Marital Status	Married
Education	Greater_College
Source of Entry	Other Entry Source
Physical Fitness Test (PFT) Score	238
Water Qualification Level	Water Qualified
Relative Value Cumulative Average	93.1
Relative Value Cumulative Standard Deviation	5
Reviewing Officer Percentile Average	81
Reviewing Officer Percentile Standard Deviation	19
Personal Awards	4
Other Awards	13
Joint Military Occupational Specialty (MOS)	0
Military Occupational Specialty (MOS) Category	Ground Support
Serving in Combat During Board	No
1 combat tour	1
2 combat tours	1
3 combat tours	0
Unit Assignment	FMF Unit
Commander Billets	1
Executive Officer Billets	1
Principal Staff Officer Billets	5
Top Level School	0
Other Service Schools	12

Predicted Probability of Promotion	**11.0 percent**
Error	+/- 19 percent
Colonel Board In-zone Selection Percentage	51.0 percent

(Source: Author, 2008)

2003 - 2008 Sponsored Research Topics

Acquisition Management

- Software Requirements for OA
- Managing Services Supply Chain
- Acquiring Combat Capability via Public-Private Partnerships (PPPs)
- Knowledge Value Added (KVA) + Real Options (RO) Applied to Shipyard Planning Processes
- Portfolio Optimization via KVA + RO
- MOSA Contracting Implications
- Strategy for Defense Acquisition Research
- Spiral Development
- BCA: Contractor vs. Organic Growth

Contract Management

- USAF IT Commodity Council
- Contractors in 21st Century Combat Zone
- Joint Contingency Contracting
- Navy Contract Writing Guide
- Commodity Sourcing Strategies
- Past Performance in Source Selection
- USMC Contingency Contracting
- Transforming DoD Contract Closeout
- Model for Optimizing Contingency Contracting Planning and Execution

Financial Management

- PPPs and Government Financing
- Energy Saving Contracts/DoD Mobile Assets
- Capital Budgeting for DoD
- Financing DoD Budget via PPPs
- ROI of Information Warfare Systems
- Acquisitions via leasing: MPS case

- Special Termination Liability in MDAPs

Human Resources

- Learning Management Systems
- Tuition Assistance
- Retention
- Indefinite Reenlistment
- Individual Augmentation

Logistics Management

- R-TOC Aegis Microwave Power Tubes
- Privatization-NOSL/NAWCI
- Army LOG MOD
- PBL (4)
- Contractors Supporting Military Operations
- RFID (4)
- Strategic Sourcing
- ASDS Product Support Analysis
- Analysis of LAV Depot Maintenance
- Diffusion/Variability on Vendor Performance Evaluation
- Optimizing CIWS Lifecycle Support (LCS)

Program Management

- Building Collaborative Capacity
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Terminating Your Own Program
- Collaborative IT Tools Leveraging Competence

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