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PROMOTION POLICIES AND CAREER MANAGEMENT - AN EMPIRICAL ANALYSIS OF BELOW-ZONE PROMOTION OF U.S. NAVY OFFICERS

by
Napoleón E. Rivero
Holger Schlüter

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Principal Advisor: Stephen Mehay

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LtCol (VEN) Napoleón E. Rivero, CDR (GEN) Holger Schlüter

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This thesis investigates the selection and promotion of officers in the U.S. Navy. This thesis develops multivariate models to estimate the effects of 'below-zone' early promotion on the career of officers and attempts to determine whether below-zone selection puts Navy officers on the fast-track for later promotion or whether, instead, it increases the probability that their subsequent career will stagnate. Outcome variables include: performance on fitness reports, screen for command; and promotion to the ranks of Commander (O-5) and Captain (O-6). Using data from the Navy Officer Promotion History Files, the thesis analyzed officers appearing before their respective promotion board between fiscal years 1986 and 1995. The data sets were further categorized into three major URL warfare communities (submarine, surface and aviation).

Ordinary Least Squares (OLS) and maximum likelihood logit regression models are employed to estimate the probability of being promoted, to screen for command, or having high fitness report scores in comparison to officers selected in-zone. The findings do not reveal evidence that officers earlier promoted below-zone incur later disadvantages in comparison to their fellow in-zone selected officers.

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PROMOTION POLICIES AND CAREER MANAGEMENT - AN EMPIRICAL ANALYSIS OF BELOW-ZONE PROMOTION OF U.S. NAVY OFFICERS

Napoleón E. Rivero
Lieutenant Colonel , Venezuelan National Guard
B.S. , Venezuelan National Guard Academy, 1981

Holger Schlüter
Commander , German Navy
M.S. , University of Hamburg Germany, 1985

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NAVAL POSTGRADUATE SCHOOL
March 1997

Authors: ______________________
Napoleón E. Rivero

____
Holger Schlüter

Approved by: ______________________
Stephen L. Mehay, Principal Advisor

____
William Bowman, Associate Advisor

____
Reuben T. Harris, Chairman
Department of Systems Management

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I. INTRODUCTION

A. BACKGROUND AND THEORETICAL FRAMEWORK

This thesis focuses on the selection and promotion of officers in the U.S. Navy. It discusses the purpose and success of "fast-track" and "below-zone" promotions and their value to an organization. The thesis analyzes the effects of below-zone promotion on the careers of officers and attempts to determine whether it puts Navy officers on the fast-track for later promotion or, instead, leads to voluntary departures from the Navy or to stagnation in subsequent careers. For example, do those who select early later experience lower fitness report (FITREP) scores or lower administrative screen rates because their length of service is junior to the rest of their new cohort? Also, do FITREP rankings and promotion recommendation practices reward performance or longevity ? The data are derived from the Navy Officer Promotion History files provided by Drs. Stephen Mehay (Naval Postgraduate School) and Prof. William Bowman (Naval Academy) from original Navy Bureau of Personnel records. This thesis will discuss the theoretical aspects of early promotion in civilian venues and will apply them to possible effects on personnel issues in the U.S. Navy.

The practice of early promotions (or fast-track promotions)[1] are commonplace in the civilian world (external labor market) and in the military (an internal labor market)

[1] "Below-zone" promotion means that an officer is considered for promotion junior to officers who are "in-zone" , who are considered eligible in the active duty list of their respective cohort. This common terminology will be found in several different terms: Deep selection, early promotion or fast-track promotion. The latter is common lingo of labor economics. Throughout this thesis the military terms will be used interchangeably, "fast-track promotion" will be used as term in a labor economics context.

because they put the most capable workers into leadership positions early and increase the amount of time they can stay in high-ranking positions before legal retirement. In the military, deep-selection for fast-track promotions results in selection of the very best officers, those who are 'head and shoulders'[2] above their peer group.

> Nothing is more vital to the U.S. than the maintenance of highest leadership available in all fields of endeavor.

This applies to the U.S Navy, as well as to government, industry and the economy as a whole. Many aspects of this phenomenon applicable to the Navy are also found in the civilian labor market, as the Navy's personnel system is characterized as an "internal labor market":

> A high proportion of those in higher paid jobs have been promoted from lower paid jobs within the same organization, and new entrants are for the most part appointed only at specific points in the hierarchy, these are the characteristics of the internal labor market structure documented by Doeringer and Piore (Malcolmson, 1971, p. 488).

It is important to acknowledge the difference between the two labor market concepts, however, the Navy's remedies for below-zone promotion problems are not always different from possible measures in the corporate world.

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[2] The Secretary of the Navy Mr. Charles Thomas used the phrase 'head and shoulders' and proposed rapid advancement in a letter to the President. L.S. Sabin, "Deep Selection," U.S. Naval Institute Proceedings, 86:3, March 1960, p.46 in: J.C. Mape, "A method to Improve the Selection of Naval Officers for Early Promotion", U.S. Naval Postgraduate School, Master's Thesis, Monterey, California 1964.

B. THE CURRENT SITUATION

After the cold war ended, the U.S. Navy underwent many changes. With the drawdown, the reduction of the budget, and the new challenges of different kinds of war scenarios, manpower structures and policies had to be adjusted.

The current statutory procedures governing the promotion of officers on the active duty list are embodied in Title 10 of the US Code. These procedures evolved from the consolidation of separate statutory provisions of the military services when the Defense Officer Personnel Management Act, or DOPMA, was enacted in 1980 (and still in force after 1989). The DOPMA not only consolidated but, to a large extent, standardized the procedures the military services must follow in selecting officers for promotion.

It is difficult to deny the fact that the present selection system is highly successful. In general, this system has enjoyed the confidence of the officers themselves, who realize that only the most able should be permitted to advance up the promotion ladder. The determination of those "best fit" is based primarily upon the "Report on the Fitness of Officers," the most valuable source of information in each officer's official record. As will be seen, the information readily available from a fitness report does not always contain a high degree of validity required by a selection board. In addition to machine readable information used in this thesis, specific text on the "back-side" is used by promotion board members when evaluating officers. This written information is not available for this research study. This dilemma exists in every selection, but is intensified in the process of selection for early promotion, as the policy of early promotion requires the board to select those whose performance is exemplary.

The Navy, by permitting early selection, recognizes the fact that in general, there will be within each year group a small percentage of officers who are "head and shoulders" above the rest of the group. It is to the Navy's advantage to rapidly promote such individuals in order to utilize their abilities more efficiently.

In terms of early promotion, downsizing of the Navy has led to a dilemma in selecting future leaders and developing attractive career patterns. Although a smaller Navy has fewer opportunities for long-term careers and appears to be less attractive for new entrants, a large number of accessions still are needed to meet continuing challenges in high technology and demanding warfare areas and scenarios. What if downsizing reduces equal proportions in all grades ? Then downsizing is no real change in promotion probabilities. It only occurs when the reduction of O-6's is higher than those of O-1 to O-3's. So the Navy has to select its future leaders from a smaller number of available officers, but a higher competition occurs only when downsizing is not equally proportioned.

But, still, in a smaller Navy, the same requirements imposed on an officer remain despite the changing tasks of today's military. In a smaller Navy with more demanding jobs, one can expect the requirements on officers seeking promotions to be even greater. The career patterns and the 'tickets to punch' are still in force and lay a burden on young officers who are looking forward to a career.

> 'What have we done to ourselves?' asks Vice Admiral Skip Bowman, Chief of Naval Personnel. He refers to a frenzy of ticket punching sparked by legislated and service-driven requirements, stiffer competition for

> command and new technologies. . . .Admiral Bowman and his staff have been examining ways to manage officer careers better. . . .[A]t the same time, the very brightest officers are not being moved fast enough into assignments that best serve the Navy's needs (Philpott, 1996, pp. 50-55).

Several requirements in an officer's career highlight the importance of early promotion:

- The Goldwater-Nichols-Act of 1986 mandated that every officer serve in a joint duty billet before he can reach flag rank. In order to qualify for joint duty billets, an officer must have the requisite joint education or experience.
- The Defense Officer Personnel Management Act (DOPMA) of 1980 has not changed.[3]
- The acquisition of full-time graduate education for officers (in order to meet the challenging technology and managerial environments of the future) takes at least two years off a career pattern. However, it is desperately needed under the competitive environment with other services and under joint duty.
- The Navy itself requires standardized steps to acquire command: from department head to XO, XO to CO, while including graduate education, joint tours and a Washington tour.

To win this race against time, a system of early promotions is needed to increase the flow of personnel into the flag or command billets in a reasonable time. Early promotion is a tool to meet the Navy's demand for personnel with exemplary performance records and to sort them into high-level positions earlier so they can realize

[3] The DOPMA restricts the time on active duty for officers by rank and length of service unless a waiver is granted by the President or the Defense Secretary.

longer than the current 5.8 years in flag rank before retirement. Four-Star Admirals serve in 3.2 flag assignments over 6.2 years (Philpott, 1996). The percentage of deep selectees in the Navy ranges from 1.6 percent (Lieutenant Commanders) to 3.5 percent (Captains). The Navy wants to raise the figure to 15 percent. A raise in the DOPMA ceilings is an objective, too (Philpott, 1996, pp. 50-55). Apparently, the need for early promotion is increasing in the U.S. Navy. The following chapter will discuss the possible consequences of this policy.

C. POSSIBLE CONSEQUENCES OF EARLY PROMOTION

Several research questions can be identified: (1) Do early (below-zone) promotions help or hurt officers in either the long run or the short run? "Hurt" means that an officer gains less experience in his current job and, therefore, gets a lower fitrep score than he would have gotten if promoted in a normal time range. (2) Does a cohort-switch change one's average FITREP score? Being in a different cohort means an officer must compete with older and more experienced contemporaries. (3) How long does it take for an effect to emerge? The damage of a lower FITREP score can be remedied in junior ranks because opportunities for a second chance are given. In higher ranks, the damage might occur just before a desired command is achieved; thus, good officers are rejected even though they might have been successful had they stayed in their original cohort.

Also, is there a difference in early promotion rates by gender, ethnicity, or community? In other words, is equal opportunity reflected in early promotion probabilities, or do quotas still occur in higher and selected positions? Although this is not the main focus of the thesis, the setup of a model allows us to include demographic variables.

Additional questions that are examined include: How many officers are affected by early promotion, and what is the overall significance of early promotion? Additionally, are more officers harmed by promotion below-zone than are helped? That is, is the policy desirable in terms of net benefits? If the number of non-selected officers among the highest groups is statistically equal to the rest of the community, then we do not find anything wrong. However, non-selected officers among the early promotes might have done better had they remained in their initial cohort. This interesting question could be tested by comparing the results of one "in-zone" promoted cohort with the results of one "below-zone" cohort of a year earlier.

What proportion of officers are hurt and how many are really enhancing their careers? If only an insignificant number of the "early promotes" are hurt, the policy may still be considered an effective personnel tool. However, if this personnel policy harms even some officers, then the Navy might lose outstanding officers who might be well utilized in a different cohort or in other career paths.

Also, what is the impact of early promotion on joint-Service FITREPs ? How would joint assignments be influenced by early promotion? The FITREP policy across services is not standardized in terms of standards and grades (or even formulations). This can affect a joint FITREP upward or downward, which is undesirable. Not only is this unfair, but it also does not meet the requirement of having the best person for the best position at the best point in time.

What are the criteria for below-zone promotions, and are these optimal? The objectives of below-zone promotion are to provide incentives and to support career planning and utilization. But are the desired criteria for leaders and flag ranks equal to those measured in FITREPs ? If this is not the case, or if the FITREP criteria do not meet future challenges, then the Navy is selecting the wrong people. This thesis does not analyze the validity of FITREP scores, but both acknowledges that these scores are sometimes highly questionable and discusses alternate measures of performance.

II. *THEORETICAL DISCUSSION OF POTENTIAL EFFECTS OF EARLY PROMOTION*

The consequences of higher early promotion rates are, of course, intended to be positive for both the Navy and the individual as discussed in the previous chapter. The expected positive effects are that high performers are promoted earlier, selected and screened for command positions and can acquire more experience in a shorter time period in order to be utilized for senior Navy command positions [4]. However, two negative spillover effects might occur. First, there is a chance that a change of cohort might slow one's career, hurting both the individual and the Navy. The person is hurt because an outstanding officer is actually penalized for superior performance, and the Navy is hurt by not fully utilizing the individual. Second, the Navy may be worse off if officers who change cohorts are more likely to leave the Navy, even though they are, in fact, top performers (selection in the top one percent). In this case, the damage to the individual is limited since top performers are likely to have a high probability of finding a good civilian job. But the Navy faces a dilemma if below-zone promotion implies a career slowdown. This dilemma has personnel management and financial aspects.

A. *THE PERSONNEL MANAGEMENT ASPECTS OF EARLY PROMOTION*

A promotion is generally based on several criteria, including capability,

4 See Table 4 : means for performance outcomes of the observed O-4 and O-5's at selection board

education, experience and demand vacancies. This kind of evaluation in the Navy relies on fitness reports and the history of performance and fulfilled career path requirements. Prior to establishing a promotion policy, there must be a set of criteria for performance. The agreement on criteria for promotions (or in Navy terms, regulations and codes) starts with the conceptual determination of the Navy's objectives, then is broken down into ways of measurement and a definition of what constitutes a good and a bad score. The relevance of a criterion (i.e., if it is sufficient to meet the objectives) has to be determined as well. Criteria other than performance or career patterns include demand for the achieved positions, available billets and budget, necessity of the billet, age and other physical features, and at least clear comparability of the officers being compared. Some criteria may not be based on technical issues or performance background, but on subjective issues (whether they are official or just agreed upon unofficially) such as personal demographics, political correctness, representativeness or appearance and image and the like.

Although most of the latter are not desirable and are not put in writing, they might still be influential. Though these subjective issues may apply less to the military than they do to private firms with less strict observation, laws, regulations and less strict formal obligations, they may still exist. Who would deny that the assessment of a flag officer in picking his future aide is influenced by the personal hearing prior to appointment? Because human nature brings psychological factors into promotion decisions, it is very important to select the criteria for promotions clearly and to prevent irrelevant subjective standards. Normal (in-zone) promotions are less affected by this discussion than are below-zone promotions because the below-zone promotion is more visible (Moore, Trout, 1978) and, due to heavy competition, more "sensitive." Eliminating subjective criteria from the process is even more critical in early promotion considerations because such promotions are based not only on earlier achievements, but also on the probability of a successful future career. If an in-zone promotion is unsuccessful, we often say simply that he 'just didn't make it,' that the worker didn't live up to the expectations. We observe this situation daily in all work environments. But when a below-zone promotion fails, it becomes a different matter. No organization can afford to install a policy on any kind of promotions without the precise determination of criteria because a failure leads to lack of leadership and, hence, loss of organizational advantage. Fast-track promotions with the purpose of 'producing' leaders are, hence, even more devastating in its consequences when they fail. Not only does leadership advantage fail, but the trust of the remaining employees in their leadership and in their own chances for advancement also are diminished. So, if the Navy fails in the selection process for early promotion, the credibility of the entire promotion system is damaged. If this analysis finds evidence for negative consequences of below-zone promotions, it needs attention not only because of organizational efficiency, but also because of the morale and credibility effects.

B. HUMAN RESOURCE ASPECTS OF EARLY PROMOTION

Without a doubt, promotion involves issues of both motivation and fairness. Motivation involves awareness of incentives, and fairness involves credibility of the system. Another concern for credibility of the promotion system is equal opportunity for race and gender, as well as equal treatment for equal performance. A failure of the promotion system would occur if there is unequal treatment in terms of race, gender or ethnicity, or if the peer groups do not see the eligibility of the candidate (Muchinsky, 1993, p. 81). If credibility is low, then the incentives might also have low credibility. This could have either a neutral or negative impact on overall performance, as well as on the image of the Navy as an employer. But analyzing job satisfaction and credibility on performance rates as they relate to promotion is unnecessary when the policy of below-zone promotion is doing well. A lack of criticism of the Navy's promotion system would imply that the system is working. A positive result of research like in this thesis does not mean means to abandon future attention or further research on these sociological issues.

Another issue is the availability of personnel. In times of ample personnel supply, a less favorable system could work, but in times of greater personnel scarcity, it is important to have a credible system. Below-zone promotion provides an incentive and reward for good performance and helps recruiters because they can have confidence in the system they advertise.

Personnel planning issues came to the fore with the advent of the All-Volunteer Force in 1973. The "baby boomer" cohorts provided a ready supply of military manpower. But the recent drawdown and reduced budgets have renewed interest in personnel planning (Bartholomew, Forbes, and McClean, 1991, p. x). The literature review of this thesis reveals that there are only a few literature sources available from the late sixties, but the early arguments of Mape (1966) and Simanikas (1964) did not occur in the literature until the early 1990s (Philpot, 1996). So, the below-zone issue as a matter of personnel planning reflects, in part, the ease of recruiting. Below-zone promotion, therefore, is more than just a remedy for a personnel management problem; it is a long-term commitment to meet strategic human resource management objectives.

C. PROMOTION POLICIES AND OBJECTIVES

The objectives of the military's early promotion policies are numerous. (1) Deep selection is an incentive for competition and perseverance and encourages officers to perform better than their contemporaries rather than waiting for their in-zone promotion point. (2) Deep selection provides an instrument for selecting the best performers and bringing them into command positions earlier than others, thus saving time and reducing idle capacity of outstanding skills on the way to command. (3) Although the military is an internal labor market, it has to compete with the civilian labor market for the best available personnel not only at the initial entry point, but also at the retention points. Acquired management and leadership skills make an officer an interesting target for civilian employers and, therefore, the Navy must offer sufficient career opportunities in order not to lose their best personnel. (4) Early achievement of command level uses human resources more effectively and results in a top-level leadership that is still relatively young in age. This reduces age distance between "crew and Captain" and utilizes leaders in their peak physical and mental condition. (5) Early promotion brings officers into command level and allows them to remain for a longer time in their subsequent ranks as Captains or flags. This is important for a continous leadership process. For example, a one-star flag officer in his mid-40s not only can remain in his position longer, but also can achieve higher ranks in order to better utilize his experience and skills. (6) Being young in flag rank prevents officers from having to 'hurry' through flag rank positions. Time to acquire experience in these high positions ensures the leadership continuum, and the time of flag ranks on the job is less "compressed." (7) The Navy has to compete with other services in the joint arena. This is another argument for using early promotion to ensure that joint billets are filled with relatively young flags. If, for example, the Air Force could fill billets with younger generals for longer duty, it would clearly have an advantage in the field of manpower and, hence, in experience and influence over the Navy. (8) The same argument applies for competition and provision of personnel in the joint international arena. In the last decade, warfare conditions and participation have been more and more internationalized and joint in terms of peace-keeping and peace-enforcing missions. The U.S. military, as the executive force of U.S. foreign policies, is expected by its allies to assume leadership according to the United States' role as the sole remaining superpower in the world. An important factor in this leadership is the existence of outstanding and experienced generals and admirals. The U.S. Navy should have the capacity to assume leadership and, along with their allies, provide an adequate number of outstanding men and women (Philpott, 1996)

Some promotion policies and objectives differ in the corporate world. The labor economic aspects are as follows: (1) Due to fewer regulations and laws, civilian firms can be even more flexible in using fast-track promotions. (2) Profits and revenues determine the filling of positions and make fast-track promotions not only necessary, but vital for the growth of a firm. (3) The competitive labor market faces competition such that it must offer a competitive wage for the best personnel in higher management positions. Competition could cause top personnel to change jobs. Supply and demand forces apply more to private firms than to the military and, therefore, top personnel must be promoted in order to retain the best employees. (4) "Up or Out" is not a matter of regulation, but a matter of an implicit contract. In this case, the civilian employer faces the same challenges as the military - this will be discussed later in this thesis (Kahn and Huberman, 1988). (5) Training problems occur when private employers reorganize the firm. The Navy can be more or less assured that the education and military skills they have provided will be utilized. Whereas general training can be utilized by employees everywhere (making the Navy officer more attractive to the civilian market), specific training is costly and is not transferable. This difference between civilian-specific and military-specific training makes the investment (in an enhanced career pattern) for a civilian employer more risky (Ehrenberg and Smith, 1994). However, one could argue that military training is more specific than civilian training and the level of risk taking for the Navy as an employer is lower than for a civilian firm. Private sector employees face greater risk because private firm maximize profits, the Navy does not maximize profits so there is no need to get a return on investment. For the Navy there is hence less risk attached to education. (6) A firm has a more flexible wage profile and can react to market conditions more effectively. The investment in human capital is not fixed and can be adjusted in accordance with market conditions. (7) The point of turnover and promotion (and salary respectively) is easier to determine, and the optimal promotion ladder is not set by regulation or law.

All these arguments provide the necessary rationale for implementing a fast-track policy either in the military or in the civilian corporate world. However fast-track promotions can suffer from setbacks that must be dealt with in order to achieve the desired goals of efficiency, incentives, profits and maximized utilization of personnel. These potential setbacks are the focus of research undertaken in this thesis.

D. SELECTION PROBLEMS

Selecting officers for below-zone promotion can be done with the available data on the persons under consideration and with data from fitness reports. While we can predict the performance of officers on several variables, we still have to rely on historical information. The prediction of the effect of specific variables assumes that other important factors or variables can be either held constant or controlled in a multivariate model. The change of circumstances in this research occurs because a promotion below-zone brings the officer into a different competitive environment. The predictive matters change, therefore, and the best model cannot predict the probability when other variables are not controlled. For below-zone promotion, that means that the next available performance reports of early-promoted officers are compared with reports of officers who are still in their original cohort (in a less competitive situation). The selection of officers must predict from existing reports that they will perform at least as good as they did in their former cohort (before they got promoted early) .

Only a detailer can observe an individual - his ‘client’ - in order to check for possible negative effects of early promotion. This thesis is not the arena for comparing individuals, as the number of probands exceeds the possible analysis.

Another selection problem is the number of possible candidates for below-zone promotion. Each community needs a specific number of people to be promoted into higher ranks. The quota of representatives in higher Navy leadership positions cannot be drawn from the “best only.” The Navy has to look for the best from each community, meaning that the very best officer selected from, for example, the aviation community might not be as good as the third best from, say, the intelligence community. But the Intel officer may not be deep selected because he may be not needed in the future due to the fact that his community is smaller. Competition in this field has to be seen as a matter of community as well, causing unfair situations across with other communities. Unfair means that good performance is not the only argument for below-zone promotion: community, age, available billets and command desirability drive the efficiency here. This is the reason that, using individual observations, an early community change of identified high performers can help save very outstanding men for the future Navy. For this reason, we will include community variables in our models.

E. ALTERNATIVE PROMOTION POLICIES

This section will discuss alternative promotion practices and their value as a remedy for potentially negative impacts of below-zone promotion policies. Four alternative career flow structures are discussed. These are equivalent to those proposed in a RAND study (Thie and Brown, 1994).

Up-or-out policy: This highly selective policy has the goal of keeping only the best and maintaining a "young and vigorous officer corps." The "forcing mechanism" related to age appears to be highly effective for getting young officers into enhanced careers, but it encourages high rates of turnover and shorter times on one billet - the system in force (Thie and Brown, 1994).

Up-and-stay policy: This is an only partially selective policy, designed to maintain personnel because of their skills, and not necessarily to advance them. Some countries, such as Germany and Venezuela, use this secondary track to build a corps of careerists with a tenure-like contract in order to keep senior leadership and skills in the military (Thie and Brown). The selection process takes place early, with the assumption that the selectee will maintain his superior skills until he retires. But this is not an effective tool for early "flag-selection"; the respective countries use selection processes for early promotion at every point in time without using this policy to select high performers differently.

In-and out policy: This is also called "the lateral entry structure" and is designed to remedy personnel shortages and the application of labor market "rules" in the military. Thie (1994) does not believe that non-military accessions can be used in order to achieve young leadership quotas. A military leader has to grow through military experience in order to lead military units in command positions.

Mixed policy: The mixed policy applies characteristics of up-or-out, up-and-stay and in-and-out policies. As a general military advancement and career management policy, it is very useful in terms of skills and personnel scarcities. However, for early promotion and early selection processes, the "conservative" system of full career officers appears to be the best way of selecting high performers.

F. *LITERATURE REVIEW*

Promotion aspects are discussed under several contexts in the management literature. However, fast-track promotion or below-zone promotion are barely observable and appear to be of minor importance. In their 1990 book, *Managerial Literacy: What Today's Managers Must Know to Succeed,* Shaw and Webber included a comprehensive managerial literacy list of expressions and business terms. During their extensive survey, Shaw and Webber interrogated executive managers from 110 American companies and came up with 1300 business terms classified into nine functional areas. But promotion, promotion systems, fast-track promotion or similar terms did not appear. An analysis of trends and issues in U.S. Navy manpower stated:

> [T]he term manpower encompasses the requirements for human resources, and ways to reconcile requirements and supply to achieve organizational goals. . . . [A]ll Navy manpower research . . . really comes down to two questions: (1) How many people of what kind are needed . . . and (2) How can those people be obtained . . .? (Lockman, 1987)

Lockman's following reviews and manpower discussion do not mention promotion or even below-zone aspects as a popular manpower issue.

Muchinsky (1993) said that promotion is a result of training objectives and organizational criteria, but his organizational psychology approach did not focus on the managerial consequences of promotion aspects. Several other books did not discuss this important manpower issue.[5] Every year, 75,000 students who enter the labor market with an MBA or economic background will have to decide about promotions and are not prepared to approach this managerial challenge in any way (Shaw and Webber, 1990, p.34). Fortunately, the area of Operations Research provides scientific methods and models for manpower planning. In a 1989 address to the Manpower Society, David Bell said that "the crucial role of manpower planning is again being recognized by management" (Bartholomew, Forbes, and McClean, 1991, p. X). So Bartholomew, Forbes, McClean (1991) offer statistical methods and promotion pattern analyses in hierarchy models and Markov chain theory models. However, manpower planning does not entirely cover all aspects of promotion and advancement policies. In 1960, Vice Admiral(USN) L.S. Sabin commented on this issue:

> Not only does he [the early-promoted officer] deserve the reward of accelerated advancement, but the organization to which he is devoting his superior abilities is entitled to the benefit of this greater talents in a position of higher responsibility (Sabin, 1960).

Research about promotion in the Navy was conducted in the sixties: Mape (1964) analyzed in his sociometric research the validity of fitness reports used for the selection of below-zone promotes. Using data covering a 25-year period, he found that FITREP

[5] Holt: *Managerial Principles & Practices*, Ehrenberg/Smith: *Modern Labor Economics*, WEST Series of Organizational Behaviour, as a few examples, do not provide any tutorial background on this issue

reports do not provide sufficient information for justifying early promotion. He justified his arguments by providing general common errors used in appraisals like Halo effects, effects of central tendency and Leniency Error. He recommended peer ratings and appraisal training as a remedy. This research developed a model for selection boards to increase validity of the information from fitness reports:

> It is proposed here that peer ratings be adapted to the present selection system merely as a source of supplementary valid information. The more valid information available to selection boards, the more valid will be their selections (Mape, 1964, p. 3).

However, Mape does not discuss consequences of early promotion, but he strongly supports the concept of the selection of the fittest.

Uelman (1966) discussed the role of promotions in any organization and especially in the military. Using data from 1957 to 1966, Uelman noted the effect of below-zone promotion on the morale of officers ranking lieutenant and lieutenant commander. He observed low rates of below-zone promotion and reasoned why:

> The first of these [reasons] has to do with overall morale of the officer corps. This requires that the promotion system enjoy the confidence of those whose careers are affected by it. Any actions, such as early promotions, which tend to favor a few, must be firmly based on merit to avoid deterioration of this confidence. . . .There has probably been a hesitancy on part of the selection board to select extensively from below the zone for fear of shaking this general confidence . . . in the system (Uelman, 1966, pp.65-69).

In contrast to today's viewpoint that modern technology and complexity demands young and outstanding leaders, Uelman pleads for careful use of below-zone promotion:

> [T]he technological complexity of modern weapon systems [places] increasing demand on line officers of every rank. . . .[T]he author feels a

> one year reduction in time-in-grade, at each rank level, would provide the minimum time necessary to gain the experience required of the grade and, at the same time, provide sufficient time-in-grade for reliable evaluation for promotion to the next higher grade (Uelman, 1966, p. 72).

Uelman calls the exception from minimum time-in-grades "questionable," but he recommends higher rates of early promotion to demonstrate the opportunities and make careers more attractive for young men. He predicted higher promotion rates for below-zone officers and recommended deep selection for the purpose of achieving higher retention rates.

In an assessment of factors affecting promotion to the field grade level in the U.S. Marine Corps, Simanikas found that only very few got a promotion:

> The Marine Corps belief under the restricted officer concept is that it is essential that an officer have more than minimum time in grade to gain breadth of experience (Simanikas, 1966).

His research did not attempt to find distinct differences between promotion zones in terms of consequences.

Research on promotion probability was conducted by Long (1992), using other independent variables than the results of performance reports in order to predict promotion. He used, for example, marital status, race, sex, occupational field, combat experience and medals to explain promotion. He included all opportunities for promotion in his dependent variable without specifically distinguishing below-zone promotion from other types (Long, 1992). Although we neither apply a similar model nor are led by his results, we will attempt to analyze the effect of variables other than performance on below-zone promotion. For example, are groups of officers or specific communities significantly related to patterns of below-zone promotion?

Saw (1993) conducted another study on the probability of promotion to LCDR for submarine and surface warfare officers. He found evidence that the completion of a master's degree program (especially from NPS) enhances the probability of promotion if accompanied by high performance and a high Grade Point Average as a pre-commissioning factor (Saw; 1993). Saw included early (below-zone) selected officers together with selected in-zone officers in his promotion variable, but did not research if graduate education enhanced the probability of promotion . We attempt to include graduate education in the independent variable collection for our model in Chapter III.

Research on fast-track promotion issues in the economics literature is scant. Carmichael (1983) analyzed workers' observed wage profiles and promotion ladders and found that senior workers who climbed the promotion ladder of the firm are "earning more than their marginal product of labor". This outcome would support the fear that productivity in the long run is slowing down (and would end in less favorable performance reports). There are promotion and fast-track promotion criteria of compensation (Bernhardt, 1991), the consequences of early promotion on careers appear less important in the literature than issues regarding wages or turnover for outstanding employees.

> For instance, firms may be reluctant to place selected workers in training programs where they develop ... skills. The analysis can then explain why investment in better populations of workers is systematically greater. In turn, following the 'fast-track' argument, those workers who receive this training are more likely to be promoted in the future (Bernhardt, 1995, pp. 315-339).

Some interesting assumptions are made:

> Employees with more education are promoted more quickly. . . . Fast-Track promotion: workers who are promoted early are more likely to be promoted again, before more able, but less quickly promoted, workers (Baker et al, 1992).

The first assumption will be part of our research, to look for the effect of higher education on performance and on the probability of below-zone promotion.

Kahn and Huberman (1988) published a model about up-or-out contracts in law-firms and called this a bilateral "moral hazard problem" and "involuntary layoff" because people are pushed either to make partner or to leave the firm. Their observation of up-or-out-contracts did not include fast-track promotion, but mentioned an interesting viewpoint on the military:

> In many organizations, if promotion does not occur within some set in time, individuals are not retained even when it would appear productive to do so. . . . [I]n other professions similar cutoff levels . . . appear even though no special name is attached to them (Kahn and Huberman , 1988).

This raises questions about alternative promotion systems where capable personnel are not promoted, but are retained in lower positions in order to utilize their capabilities. For the Navy, we could derive an alternative when below-zone promotion fails in the long run. In particular, we should give officers who "skipped" a cohort a second chance when performance reports after below-zone promotions turn out to be lower. For example, an officer promoted below-zone may get an "above-zone" chance later. This means that the officer gets back into his original cohort, and the Navy saves a good officer who actually performs better in his initial cohort.

The dynamics of military promotion systems are analyzed by Moore and Trout (1978), who develop a theory of promotion. They work with qualitative matters and assume that promotion of the best is caused by a network of peers and superiors:

> The central argument is that performance, while a necessary standard for accessibility into a rather large pool of officers from which the elite will emerge, is nonetheless a minor influence on promotion and becomes even less discriminating as an officer's career progresses, whereas visibility . . . becomes the dominant influence (Moore and Trout, 1978, pp.452-468).

A 1994 RAND study analyzed alternative career (promotion) systems and defined five assumptions for alternative officer career management. Although not aimed directly at a below-zone promotion system, some proposed systems point in a direction that helps solve some problems of below-zone promotion.

Thie (1994) proposed:

> . . . different principles for regulations of flows into, within, and out of the officer corps, rules that provide for less turnover and greater stability, stable career advancement patterns that encourage longer careers, longer careers as the rule rather than the exception, greater use of lateral entry (p. 138).

For the purpose of this thesis, the RAND career paths provide remedies which are equal to the desired goals of below-zone promotion: stable patterns, longer careers and greater stability. RAND also suggested alternatives for adjusting DOPMA. Allowing longer career lengths solves the problem of "not long enough careers" for flag officers.

III. DATA AND METHODOLOGY

A. VARIABLE DEFINITION

1. Dependent Variables

Three separate regression models are estimated with three alternative performance measures. The dependent variables are regressed on a number of selected explanatory variables representing background and personal characteristics. The samples do not include officers who were passed over at one board and promoted at another because our focus was only on those officers who were reviewed below-zone or in-zone. An officer's relative position with respect to his group being considered for promotion is referred to as his "zone". When a particular cohort of officers is presented to a promotion board, they are said to be "in-zone." Those with less years of service but considered are called "below-zone", and those who have been passed over early, but who remain to be considered again but not selected early are above-zone. Promotion board outcomes are shown in Figure 1.

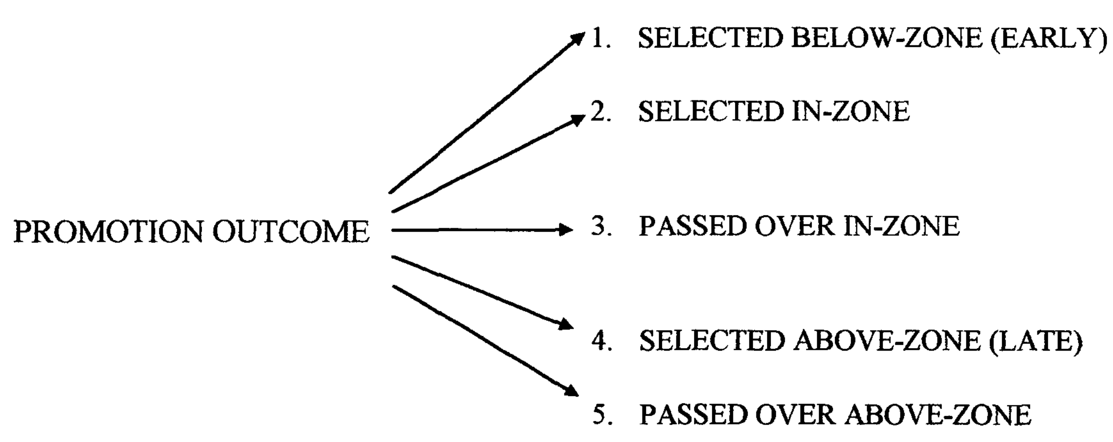

Figure 1. Promotion Outcomes in Data Set

For the purpose of this study, candidates in categories (3), (4), and (5) above were deleted from the data sets. For these models, two dependent variables were used; XOSCREEN is a binary variable which takes a value of one if the candidate was screened for command in the Commander data set; COSCREEN is a binary variable that was one of the conditions. A second dependent variable (PROMOTE) takes a value of one if the candidate was selected for below-zone promotion to the rank of Commander (0-5) in the Commander data set or below-zone promotion to Captain (0-6) in the Captain data set, and a value of zero if the candidate was in-zone for promotion. The last dependent variable (PERFORM) took a value of one if the candidate was a "good performer"[6] in both data sets, and a value of zero otherwise. A logit model was used to estimate the model's coefficients because this method avoids the unboundedness problem inherent in ordinary least square (OLS) estimates when working with dummy dependent variables.

2. *Independent Variables*

The independent (explanatory) variables for this study were selected from the background and personnel characteristics available in the data base. They were selected because of their use, in either identical or similar forms, in prior multivariate analyses of the effects of academic performance and graduate education on the promotion of senior U.S. Navy officers (Buterbaugh, 1995), graduate degrees and job success (Woo, 1986),

6 The term "good performer" is used in this thesis for officers with PRAP 4 (Commander promotion board) and PRAP 5 (Captain promotion board). If the respective PRAP is greater than .60 we consider an officer to be a good performer.

and academic achievement and job performance (Wise, 1975). The models are run on pooled (all URL) data sets, as well as on data sets restricted to specific designators.

The first category concerns personal demographics: including MALE, WHITE, and MWC, all binary variables equal to one if the observed candidate is male, caucasian, or married with a least one child, respectively. The same independent variables are used in all models, with a few exceptions. Because female officers are not represented in the data for the Submarine Community, the below-zone Surface Warfare Community (Captain data set), and the below-zone Pilot Community (Commander data set), the MALE variable was not used in these analyses. Similarly, the WHITE variable was not used in the below-zone SUB designator in the Captain data set.

Other factors that are likely to have some effect on whether or not an officer is screened for command, is an exemplary performer, or is selected for promotion are his or her undergraduate performance, the "quality" of the undergraduate institution attended, and whether or not the undergraduate degree was in a technical field of study (Wise, 1975; Talaga, 1994; Buterbaugh, 1995).

These attributes are reflected in binary variables (HIGHAVG, USNA, and TECH). HIGHAVG takes a value of one if the Academic Profile Code was 2 or 1; TECH takes a value of one if the undergraduate degree earned is in any engineering field or in one of the math intensive sciences, such as physics, chemistry, mathematics, operations research, or microbiology; USNA takes a value of one if the officer was graduated from the United States Naval Academy.

Three categorical variables for designator are created and used to control for the differences in "screened for command," "promotion," and "performance" across communities. These variables were SWO, SUB, and PLT, and represent the Surface Warfare, Submarine Warfare, and Aviation (Pilot and Naval Flight Officers together), respectively. One could argue that combining NFO's with pilots in a binary variable is not very useful because NFO's never entry the civilian market in their respective field (like pilots with transferable skills), but here we focus on the result for the entire community of naval aviation. Definitions of the dependent, categorical, and independent variables can be found in Table 1.

DEPENDENT VARIABLES	***DESCRIPTION***
XOSCREEN/COSCREEN	= 1 if screened for command by the data set = 0 otherwise
PROMOTE	= 1 if promoted to the next rank = 0 otherwise
PERFORM	= 1 if good performer = 0 otherwise
DESIGNATORS	
SWO	= 1 if Surface Warfare Officer = 0 otherwise
SUB	= 1 if Submarine Officer = 0 otherwise
PLT	= 1 if Pilot and Naval Flight Officer = 0 otherwise
INDEPENDENT VARIABLES	***DESCRIPTION***
MALE	= 1 if male = 0 otherwise
WHITE	= 1 if caucasian ethnicity = 0 otherwise
MWC	= 1 if married with at least one child = 0 otherwise
HIGHAVG	= 1 if Academic Profile Code is even 2 or 1 = 0 otherwise
TECH	= 1 if engineering or math intensive science undergraduate degree program = 0 otherwise
USNA	= 1 if Naval Academy graduate = 0 otherwise
BELOWZON	= 1 if Below-zone promotion Officer = 0 if In-zone promotion Officer

Table 1. Description of Dependent and Independent Variables

B. DATA SETS

The data set used in this thesis is based on the Navy Officer Promotion History Files, which were derived by Drs. William R. Bowman (U.S. Naval Academy) and Stephen Mehay (Naval Postgraduate School) from U.S. Navy Bureau of Personnel files. The files contain promotion board results for the years 1986 through 1995. In these files, the promotion board results are merged with the officer master record as of the time of the promotion board. Since the data base includes much more information than is necessary for this analysis, only certain aspects of it were chosen. The first and most important restriction placed on the data was the requirement that only officers who were considered for both below- and in-zone timing promotion be included in the data set. Above-zone promotions were excluded.

Two separate data sets were created (Commander/Captain data sets) by grouping these in below-zone and in-zone timing promotion. This study will look at the results of models run on the full data set, at the O-5 and O-6 level, on subsets depending on whether the officers were considered in-zone or below-zone, and on each of three URL communities.

1. Commander Data Set (O-5)

The Commander data set consists of 13,687 observations and 667 variables. All of the observations were read, but only 7,952 observations were used in computations. The number of officers promoted at lower board in the readable part of the data set is 4,599. That represents 67.7 percent of the entire readable data including the missing values. Besides, number and percentages are relatively small due to: (1) Only 2129 officers appear to be screened for command, representing 31 percent of the readable data set, (2) the selected zone promotion where the above-zone promoted officers were deleted.

This unfortunate reduction in sample size was unavoidable in order to keep the variables we need for the thesis. Of the candidates in the data set, only 234 were selected for early promotion to the rank of Commander (0-5). As Table 2 shows, only 2.9 percent were promoted early. Also, 31.3 percent were screened for command, 67.7 percent got promoted, and 15.8 percent had high FITREP marks. Table 2 also shows that 99 percent of the officers were male and 96.6 percent were white. USNA represented 30 percent of accessions, 57 percent of these candidates had undergraduate degrees in technical fields, and 74 percent of the sampled population were married with at least one child.

VARIABLES	*MEANS*
Sample Population	N = 7,952
XOSCREEN	.313
PROMOTE	.677
PERFORM	.158
MALE	.99
WHITE	.966
SWO	.306
SUB	.148
PLT	.546
HIGHAVG	.592
TECH	.569
USNA	.301
MWC	.738
BELOWZON	.029

Table 2. The Commander Data Set variables and means

2. *Captain Data Set (O-6)*

The Captain data set consists of 4,740 observations and 679 variables. Of the candidates in the data set, only 201 were selected for early promotion to the rank of Captain (0-6). As Table 3 shows, only 4.2 percent were promoted early. Also, 58.5 percent were screened for command, 53.2 percent got promoted, and 97 percent had high FITREP marks. Table 2 also shows that most of the candidates were male and white (99.9 and 98.7 percent, respectively). USNA as commissioning source was represented with 32 percent, over 36 percent of these candidates had undergraduate degrees in technical fields, and 84 percent of the sampled population were married with at least one child.

VARIABLES	*MEANS*
Sample Population	N = 4,740
COSCREEN	.585
PROMOTE	.532
PERFORM	.971
MALE	.999
WHITE	.987
SWO	.301
SUB	.109
PLT	.590
HIGHAVG	.403
TECH	.365
USNA	.318
MWC	.844
BELOWZON	.042

Table 3. The Captain Data Set variables and means

3. Comparison Rates

Table 4 shows comparisons of means for both Commander and Captain data sets, segmented into the below- and in-zone sub samples. The number of observations for both data sets fell when these restrictions of below- and in-zone timing promotion were applied to the sample.

Variables	*Commander Data Set (Means)* Below-zone	In-zone	*Captain Data Set (Means)* Below-zone	In-zone
Sample Population	N = 234	N = 7,718	N = 201	N = 4,539
XOSCREEN/ COSCREEN	.515	.307	.911	.569
PROMOTE	.971	.667	.943	.512
PERFORM	.145	.159	.993	.970
MALE	.996	.990	.995	.999
WHITE	.957	.966	.990	.987
SWO	.342	.305	.323	.300
SUB	.179	.147	.159	.107
PLT	.479	.548	.517	.593
HIGHAVG	.744	.587	.532	.397
TECH	.598	.568	.363	.365
USNA	.419	.297	.418	.313
MWC	.748	.738	.835	.844

Table 4. Variable means by promotion board (O-5 and O-6) and timing (Below and In-zone)

Table 4 allows us to compare below-zone promoted officers with in-zone promoted officers at the promotion board, and we find important information for the Commander data set: The promotion rate for below-zone officers is 97 percent (in-zone 67 percent); this shows a higher probability of being promoted if below-zone selection occurs (although we have to look at the number of observations where there are still more officers promoted in-zone). Below-zone promoted officers in the Commander data set are 51 percent more likely to be screened for command (in-zone 31 percent), and this is evidence for the higher expectations on below-zone promoted officers. The PERFORM variable shows only a small difference (14.5 and 15.9 percent respectively) from the advantage of in-zone selected officers. An explanation could be the tougher competition in the below-zone sample with more difficult positions and, therefore, more competitive FITREP situations. The gender and ethnicity variables both show a high representation of white male officers (> 96 percent). A considerable difference can be observed in the academic profile, where below-zone selected officers are represented with 74 percent (in-zone 59 percent) and in the recruiting source, where Naval Academy graduates are represented by 42 percent for below-zone (30 percent in-zone). The technical background and marital status are not really different. When splitting the sample into communities we do not find any apparent important difference between below- and in-zone.

The Captain data set shows the following means: The promotion rate for below-zone officers is 94 percent (in-zone 51 percent), this shows a higher probability to be promoted if below-zone selection occurs like in the Commander data set. Below-zone promoted officers in the Captain data set are 91 percent more likely to be screened for command (in-zone 57 percent). This is evidence for the higher expectations on below-zone promoted officers. The difference from the Commander data set is obvious, with higher percentages due to relatively more opportunities for command in higher ranks. The PERFORM variable again shows only a little difference (99 and 97 percent respectively) from the advantage of below-zone selected officers. The gender and ethnicity variables both show a high representation of white male officers (> 99 percent) and indicate that representation of females and minorities declines with rank. A difference can be observed in the academic profile, where below-zone selected officers are represented with 53 percent (in-zone 40 percent), but not as high as for Commanders. The recruiting source Naval Academy is represented with 42 percent for below-zone (31 percent in-zone). The technical background and marital status are not different ($\pm$ 1 percent). When splitting the sample into communities, we do not find considerable differences between below- and in-zone.

C. METHODOLOGY

This thesis examines the effects of below-zone promotion on the careers of officers and attempts to answer several questions: 1) Does below-zone selection put Navy officers on the fast-track for later promotion? 2) Instead, does below-zone selection increase the probability that officers will voluntarily leave the Navy ?

The binary nature of the dependent variables, XOSCREEN, COSCREEN, PROMOTE, and PERFORM, allow for estimation of multivariate models using both ordinary least-squares (OLS) and maximum likelihood procedures. In the first case, a linear regression model is specified and estimated, while in the second case, a non-linear LOGIT model is estimated. It is assumed that all of these dependent variables (XOSCREEN/COSCREEN, PROMOTE, AND PERFORM) are a function of numerous background and demographics factors. The dependent variables are regressed on each member's sex, race (white versus non-white), undergraduate major (technical versus nontechnical), school's academic quality, and marital and dependent status.

Identical models were specified for each subset of the pooled data (including below- and in-zone timing promotion), as sorted by community designator, as well as for the overall data set. This allowed for comparisons between officer communities and between each community and the entire sample population. The parameter estimates provided by the LOGIT model reflect the increase (or decrease) in the log of the odds ratio of being screened for command, being promoted, and being an exemplary ("good") performer, per unit increase in the explanatory variable being considered (Gujarati, 1988). Because each of the explanatory variables in the model is a dummy (binary) variable, the change in the log of the odds ratio of the outcome variable is seen only when the observed member possesses the attribute (male, white, etc.) in question. A more understandable interpretation of these LOGIT coefficients is to convert them to the change in probability of being screened for command, promoted, or a good performer, given that the member has the attribute under consideration. There are two ways to determine this probability. The estimate may be approximated by the formula: B*P(1-P) where B represents the LOGIT parameter estimate for a given explanatory variable, and P represents the probability of the observed member having the attribute under consideration for the overall sample (Gujarati, 1988). As an alternative, since identical linear probability models were specified, the parameter estimates derived as a result of the OLS regressions also approximate this result (the change in probability of the outcome) and are provided in tables with the LOGIT estimates in the following chapter. The reason for using OLS method is because OLS estimates provide the most convenient way of interpreting results, as they represent the calculated change in probability associated with a one unit change in each of the explanatory variables. With Ordinary least Squares we can obtain easily the regression coefficients by choosing those beta's that minimize the summed squares residuals for a particular sample (Studenmund, 1992)

IV. EMPIRICAL ANALYSIS

A. MULTIVARIATE ANALYSIS

As explained in the previous chapter, the models were estimated for all designators combined in each major data set (Commander and Captain) as well as for each separate community. These regressions were run separately in an attempt to distinguish different behaviors during below-zone promotion as compared with the in-zone promotion. This chapter will first present some descriptive statistics for the data sets, and will present the results of the multivariate regressions for the pooled data sets. The final section will give a comparison of the parameter estimates between below-zone and in-zone timing promotion.

1. Identification of Officer Performance Measure (O-5)

The principal focus of this thesis was to identify the effects of below-zone promotion on the career of officers and to determine whether below-zone selection puts Navy officers on the fast-track for later promotion or whether, instead, it causes career stagnation or separation. Preliminary analysis of this data set reveals that 31 percent of the officers are screened for command, 68 percent are promoted, and 16 percent exhibit superior performance. Figure 2 shows the complete data set as well as for individual communities.

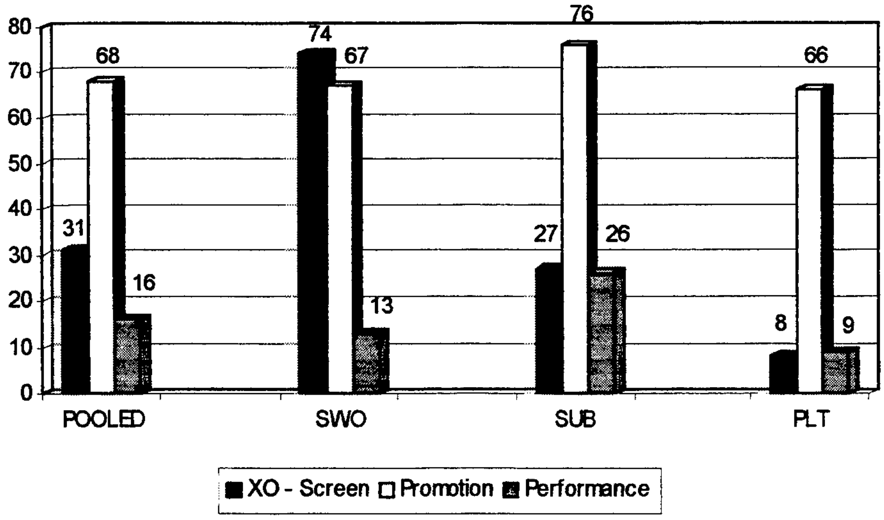

Figure 2. Mean Values of Alternative Measures of Officer Performance in URL Communities (Commander Data Set)

2. *Parameter Estimates for the Commander Data Set (Pooled)*

Both OLS and LOGIT models were estimated for the data set using all three dependent variables (XOSCREEN, PROMOTE, and PERFORM). This section presents the overall results for the grouped community designators, as well as for the individual models run on each community.

The parameter estimates for the LOGIT and OLS model on combined community designators are provided in Tables 5, 6, and 7, along with the estimated coefficients, and standard errors. The OLS estimates are the most easily interpreted results, as they closely represent the calculated change in probability associated with a one unit change in each of the explanatory variables. For the XOSCREEN model (Table 5), only six of the eight explanatory variables are statistically significant at a 0.05 level of significance in terms of their effect on screened for command. Below-zone Officers have higher probabilities of being screened for command by 15 percentage points. Likewise, higher probabilities of being screened for command are observed for those who are graduated from the U.S. Naval Academy. As indicated by the negative values on their coefficient estimates, officers whose undergraduate degrees were in math-intensive science or engineering fields were less likely to be screened for command by 6 percent. Although white officers represent 96.6 percent of the sample they were less likely to be screened for command by 1 percent.

Independent Variables	***LOGIT*** Coefficient Estimate (Standard Error)	***OLS*** Change in Probability
MALE	-1.2338 * (0.2695)	-0.2946
WHITE	-0.4835* (0.1417)	-0.1092
MWC	0.00808 (0.0602)	0.0017
HIGHAVG	- 0.00395 (0.0538)	- 0.0008
TECH	- 0.2852 * (0.0537)	- 0.0625
USNA	0.3564 * (0.0575)	0.0683
PERFORM	0.4019 * (0.0803)	0.0762
BELOWZON	0.9100 * (0.1533)	0.1506
Chi-square (Likelihood ratio test): 147.383		
Concordance Ratio: 0.527		
Note: * Significant at the 0.05 level		

Table 5. Parameter Estimates of the Commander Screened for Command Model for All Designators (Dependent Variable = XOSCREEN)

The likelihood ratio chi-square test statistic for this model, 147.383, tests the joint significance of all the explanatory variables included in the model. In this case, it is significant at the .05 level . The concordance ratio, in this case a value of 0.527, provides a admittedly weak measure of the predictive ability of the model.

For the PROMOTION to O-5 model (Table 6), six explanatory variables are statistically significant at a 0.05 level of significance in terms of their effect on promotion. The probability of being promoted to Captain appears to be positively influenced by having been selected below-zone at O-4 level (24 percent), by attendance at U.S. Naval Academy (13 percent), by having a high academic profile (10 percent), and by being married with at least one child (7 percent). Undergraduate degrees in math-intensive science or engineering fields were a detriment for being screened for command in this data set, and show a 3.2 percent difference in the probability of being promoted to Captain.

The likelihood ratio chi-square test statistic for this model was 334.196 and the concordance ratio was 0.592. For the PERFORMANCE model (Table 7), only three of the seven explanatory variables are statistically significant for this data set. The probability of being an exemplary ("good") performer appears to be positively influenced by those who are graduates of the U.S. Naval Academy (2 percent difference), officers whose undergraduate degrees were in math-intensive science or engineering fields (4 percent), and those whose Academic Profile Code was even 1 or 2 (3 percent). All other explanatory variables were insignificant at a 95 percent confidence level (0.05 level of significance). The likelihood ratio chi-square test statistic for this model was

62.941 and the concordance ratio was 0.544.

Independent Variables	*LOGIT* Coefficient Estimate (Standard Error)	*OLS* Change in Probability
MALE	-0.4333 (0.2697)	-0.1066
WHITE	0.1083 (0.1418)	0.0255
MWC	0.3013 * (0.0603)	0.0691
HIGHAVG	0.4301 * (0.0538)	0.0966
TECH	- 0.1338 * (0.0537)	- 0.0323
USNA	0.6173 * (0.0575)	0.1341
PERFORM	0.3081 * (0.0804)	0.0706
BELOWZON	1.2560 * (0.1535)	0.2372
Chi-square (Likelihood ratio test): 334.196		
Concordance Ratio: 0.592		
Note: * Significant at the 0.05 level		

Table 6. Parameter Estimates of the Commander Promotion Model for All Designators (Dependent variable = PROMOTION)

Independent Variables	*LOGIT* Coefficient Estimate (Standard Error)	*OLS* Change in Probability
MALE	- 0.2077 (0.3807)	- 0.0143
WHITE	0.1620 (0.2002)	0.0130
MWC	0.0538 (0.0851)	0.0041
HIGHAVG	0.2728* (0.0759)	0.0230
TECH	0.4165* (0.0756)	0.0373
USNA	0.2321* (0.0811)	0.0192
BELOWZON	0.1527 (0.2166)	0.0122
Logit Chi-square (Likelihood ratio test): 62.941		
Logit Concordance Ratio: 0.544		
Note: * Significant at the 0.05 level		

Table 7. Parameter Estimates of the Commander Performance Model for All Designators (Dependent variable = PERFORM)

3. Preliminary Analysis of the Captain Data Set (O-6)

Preliminary analysis of this data set reveals that 58 percent of the officers are screened for command, 53 percent are promoted, and 97 percent exhibit superior performance. Figure 3 shows the complete data set as well as for individual communities.

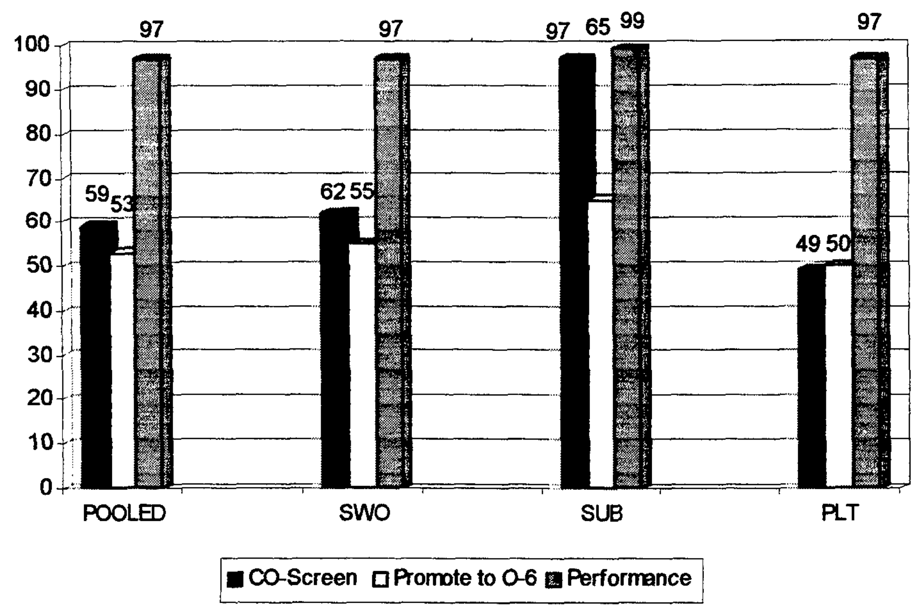

Figure 3. Mean Values of Alternative Measures of Officer Performance in URL Communities(Captain Data Set)

4. Parameter Estimates for the Captain Data Set (Pooled)

The parameter estimates for the LOGIT and OLS model on combined community designators using all three dependent variables (COSCREEN, PROMOTE, and PERFORM) , are provided in tables 8, 9, and 10, along with the associated signs, standard errors. BELOWZON appears to keep its significance as an officer progresses from the Commander promotion board to the Captain promotion board in both the COSCREEN and the PROMOTION models by 24 and 7 percent, respectively (Tables 8 and 9). But in the PERFORMANCE model BELOWZON is insignificant (Table 10), this is too due to the fact that there is insufficient variation in the dependent variable measure. This result is not expected because we assumed that below-zone promoted officers are significantly high performers and screened for command. MWC is significant in both the COSCREEN model (4.4 percent) and the PROMOTION model (0.8 percent). It is not significant in the PERFORMANCE model. This result is interesting but not surprising: Consistency and stability of family life is coherent with success and perseverance on the job. Another assumption could be the "visibility" of female Navy officers and maybe hidden prejudices against single male officers. A father of at least one child does not only act more likely as a role model and responsible family head - vice versa a stable family provides the secure background for professional advantage. The distribution of this variable and its base case (~ 60/40) enhances this argument. This outcome is expected (by common sense as well) and supports the general idea of the model .

In the COSCREEN model (Table 8), five of the eight explanatory variables are statistically significant for this data set. The probability of being screened for command appears to be positively influenced by attendance at U.S. Naval Academy (7 percent). Good performing officers also show a higher probability of being screened for command (50 percent). This is a considerably high percentage and desirable in that the best performers are being screened. The likelihood ratio chi-square test statistic for this model was 176.820 and the concordance ratio was 0.565.

Table 9 shows the parameters estimates of the Captain PROMOTION model. Only four of the eight explanatory variables are statistically significant for this data set. The probability of being promoted to Captain appears to be positively influenced by attendance at U.S. Naval Academy (.8 percent). Good performing officers also showed a high probability of being promoted (13 percent). The other explanatory variables (MALE, WHITE, HIGHAVG, and TECH) were insignificant at a 95 percent confidence level (0.05 level of significance). The likelihood ratio chi-square test statistic for this model was 192.558 and the concordance ratio was 0.564.

	LOGIT	*OLS*
Independent Variables	Coefficient Estimate (Standard Error)	Change in Probability
MALE	- 1.5744 (1.1975)	- 0.1410
WHITE	0.8466 * (0.3736)	0.1617
MWC	0.2687 * (0.1123)	0.0442
HIGHAVG	0.0398 (0.0822)	0.0061
TECH	0.1035 (0.0830)	0.0162
USNA	0.3994 * (0.0848)	0.0682
PERFORM	2.2804* (0.2703)	0.5050
BELOWZON	1.1829 * (0.1797)	0.2413
Chi-square (Likelihood ratio test): 176.820		
Concordance Ratio: 0.565		
Note: * Significant at the 0.05 level		

Table 8. Parameter Estimates of the Captain Screened for Command Model for All Designators (Dependent variable = COSCREEN)

Independent Variables	*LOGIT* Coefficient Estimate (Standard Error)	*OLS* Change in Probability
MALE	1.1337 (1.1777)	-0.0444
WHITE	0.5288 (0.3674)	0.0151
MWC	0.3386 * (0.01103)	0.0088
HIGHAVG	0.0237 (0.0807)	0.0005
TECH	- 0.1021 (0.0816)	- 0.0021
USNA	0.2976* (0.0833)	0.0076
PERFORM	0.0588 * (0.2659)	0.1307
BELOWZON	1.5168 * (0.1762)	0.0727
Chi-square (Likelihood ratio test): 192.558		
Concordance Ratio: 0.564		
Note: * Significant at the 0.05 level		

Table 9. Parameter Estimates of the Captain Promotion Model for All Designators (Dependent variable = PROMOTION)

For the PERFORMANCE model (Table 10), only one of the seven explanatory variables are statistically significant. The probability of being a good performer appears to be positively influenced only by those who show a high academic profile (6 percent). All other explanatory variables were insignificant at a 95 percent confidence level (0.05 level of significance). The likelihood ratio chi-square test statistic for this model was 16.217 and the concordance ratio was 0.583.

Independent Variables	*LOGIT* Coefficient Estimate (Standard Error)	*OLS* Change in Probability
MALE	1.1795 (3.9510)	-0.1846
WHITE	2.0326 (1.2320)	0.1002
MWC	0.4611 (0.3698)	0.04
HIGHAVG	0.8020* (0.2703)	0.0611
TECH	0.0942 (0.2736)	0.0094
USNA	0.4187 (0.2793)	0.0369
BELOWZON	0.5942 (0.5709)	0.0490
Chi-square (Likelihood ratio test): 16.217		
Concordance Ratio: 0.583		
Note: * Significant at the 0.05 level		

Table 10. Parameter Estimates of the Captain Performance Model for All Designators (Dependent variable = PERFORM)

5. Parameter Estimates for Specific Communities

Using the XO-Screen in the Commander Data Set we compare the parameter estimates by communities (Table 11). The only variable that is significant in all of the communities is USNA. These graduates are more likely to be screened for command than from other sources (Surface Warfare 4 percent, Submarine 5 percent, and aviation community is 2 percent). Below-zone promoted officers have a significantly higher probability to be screened for command when belonging to the submarine and aviation community (35 and 25 percent respectively). Technical background is significant only in the surface warfare community (by a negative 6 percent). This can be explained in reality by the lower opportunities for engineers to become CO's and to gain the chance to persevere in the classical warfare arenas. Other assumptions for less chances of engineers can be derived from theoretical leadership issues, for example: are engineers more thing-oriented than people-oriented or is the typical way of conducting business in the engineering field desirable for command positions ? The marital status 'married with children' has a significant positive influence for the submarine and aviation community (5 and 1 percent respectively). A high academic profile reduces the probability of being screened for command in the submarine community (-5 percent). This can be explained by the challenging education for the submarine community (for example nuclear training) which does not support an easy gathering of high scores. Fitrep scores are significant in the submarine community (9 percent higher probability).

	COMMUNITY***		
Independent Variables	***SWO***	***SUB***	***PLT***
MALE	-0.1188	**	0.0079
WHITE	0.0249	0.1204	0.0136
MWC	0.0294	0.0482*	0.0105*
HIGHAVG	0.0258	-0.0538*	0.0058
TECH	-0.0617*	-0.0259	-0.0064
USNA	0.0441*	0.0538*	0.0199*
PERFORM	0.0315	0.0936*	-0.0037
BELOWZON	0.0716	0.3525*	0.2531*
sample size	2431	1177	4344

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Screened for Command (from OLS estimates)
**** LOGIT model results may be found in appendices

Table 11. Parameter Estimates (OLS) for the XO-Screen Model by Community (Dependent variable = XOSCREEN)

Using the promotion model in the Commander data set we compare the parameter estimates by communities (Table 12). Overall significance for all communities are discovered for BELOWZON, USNA, and TECH variables. The BELOWZON variable is significant. The interpretation that the likelihood of being promoted increases when screened for below-zone promotion is redundant. USNA are more likely to be promoted by 12, 19, and 13 percentage points, respectively. TECH is significant with a positive result for the submarine community (17 percent) and negative for the surface warfare and aviation community (4 and 6 percent, respectively). This result for technical background candidates is of interest: while SWO and aviation community show negative significance the submarine community reflects positive impact of a technical background. Again when comparing this model with Table 11 we assume less importance of engineering skills for the operational billets in the SWO and aviation community and a higher importance of technical background in the submarine community (emphasis on nuclear education). So we assume this model reflects the real world and provides a satisfactory control device within this research. Being married with children (8 and 6 percent, respectively) as well as a high Academic Profile Code (7 and 10 percent, respectively) are significant for the surface warfare and aviation community.

	COMMUNITY*		
Independent Variables	***SWO***	***SUB***	***PLT***
MALE	-0.1521	**	-.0.0542
WHITE	0.0061	-0.2286	0.09
MWC	0.0783*	0.0690	0.0632*
HIGHAVG	0.0657*	0.1134	0.1032*
TECH	-0.0424*	0.1700*	-0.0579*
USNA	0.1157*	0.1898*	0.1349*
PERFORM	0.0316	0.0778	0.0965*
BELOWZON	0.1953*	0.2081*	0.2964*

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Promotion (from OLS estimates)
**** LOGIT model results may be found in appendices

Table 12. Parameter Estimates (OLS) for the Commander Promotion Model by Community (Dependent variable = PROMOTE)

Using the performance model in the Commander data set we compare the parameter estimates by communities (Table 13). A technical background increases the probability of better fitrep scores for the aviation community (3 percent). The same variable decreases the probability of better fitrep scores for the submarine community (7 percent). Why does a technical background reduce the probability of being screened for XO in the submarine community, when we generally assume that this community is very technically related ? Maybe the importance of the engineering field does not necessarily lead to higher fitrep scores and after all: the job of an XO is less related to the technical field but more to the warfare and leadership type of business of a ship. The contradiction in the sign for the submarine community (when comparing with Table 12) can be explained by the assumed more difficult and competitive way of awarding fitrep scores in the submarine community where technical skills and knowledge have to be on an especially higher standard, but when it comes to leadership (XO and CO) the technical skills are still important but play a secondary role. The below-zone variable does not provide any valuable information on fitrep scores for this respective group.

	COMMUNITY***		
Independent Variables	***SWO***	***SUB***	***PLT***
MALE	-0.0353	**	-0.0231
WHITE	-0.0091	0.1034	0.047
MWC	0.0325	0.0026	-0.0004
HIGHAVG	-0.0243	0.0181	0.0117
TECH	0.02491	-0.0712*	0.0261*
USNA	-0.0066	0.0331	0.0087
BELOWZON	0.0114	-0.0262	0.0358

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Performance (from OLS estimates)
**** LOGIT model results may be found in appendices

Table 13. Parameter Estimates (OLS) for the Commander Performance Model by Community (Dependent variable = PERFORM)

Using the CO-Screen in the Captain data set, we compare the parameter estimates by communities (Table 14) before below-zone selection. Few significant results are discovered for the submarine community. WHITE is significant for the aviation community; however, the representation of about 99 percent does not give us reason to analyze this variable any further. The below-zone promoted officers are more likely to be screened for command than in-zone promoted officers: 30 percent (Surface warfare community) and 19 percent (aviation community), respectively. This is a desired outcome and shows that the policy of below-zone promotion and its purpose, getting good officers into command positions early, is working (although there is not significance at the 95 percent confidence level for the submarine community). MWC works as a control variable again, the overall significance of the increasing probability for two communities when 'married with children' points at the stability of family background again. A technical background reduces the likelihood of being screened for command for the aviation community (2 percent). USNA graduates show a significantly higher probability of being screened for command surface warfare community (8 percent).

	COMMUNITY*		
Independent Variables	***SWO***	***SUB***	***PLT***
MALE	-0.2548	**	-0.0452
WHITE	0.0057	-0.0031	0.1628*
MWC	0.0939*	-0.0224	0.0289*
HIGHAVG	-0.0511	-0.0163	-0.0137
TECH	0.0374	-0.0074	-0.01877*
USNA	0.0840*	0.0904	-0.0037
PERFORM	0.5878*	0.8993	0.3017*
BELOWZON	0.3011*	0.0227	0.1879*

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Screened for Command (from OLS estimates)
**** LOGIT model results may be found in appendices

Table 14. Parameter Estimates (OLS) for the Captain Screened for Command Model by Community (Dependent variable = COSCREEN)

Using the Promotion Model in the Captain Data Set we compare the parameter estimates by communities (Table 15). This model again shows a decrease in promotion probability for minority officers in the aviation community (11 percent). BELOWZON shows high significance for all communities. But the surface warfare community shows only 3 percent when compared to the submarine and aviation communities (23 and 20 percent, respectively). Other variables showing considerable significance to increase the probability of being promoted are: Married with children for the surface warfare community (0.7 percent) and for the aviation community (2 percent). A high academic profile code appears in the SUB community (16 percent). A higher fitrep score is significant for the surface warfare (14 percent) and the aviation community (23 percent). This is (again) not surprising and is how we expect promotions to be based on performance variables like APC scores and fitreps. TECH has (again) a negative affect for the submarine community (15 percent). USNA shows no significant result in this model.

	COMMUNITY*		
Independent Variables	***SWO***	***SUB***	***PLT***
MALE	0.0791	**	-0.01736
WHITE	-0.0027	-0.4586	0.1148*
MWC	0.0065*	0.0683	0.0206*
HIGHAVG	-0.0026	0.15931*	-0.011
TECH	-0.0006	-0.1471*	-0.0074
USNA	0.0043	0.1164	0.00629
PERFORM	0.1359*	0.2584	0.2327*
BELOWZON	0.0320*	0.2325*	0.2023*

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Promotion (from OLS estimates)
**** LOGIT model results may be found in appendices

Table 15. Parameter Estimates (OLS) for the Captain Promotion Model by Community (Dependent variable = PROMOTE)

Using the Performance Model in the Captain Data Set we compare the parameter estimates by communities (Table 16). The only significant variable in any of the models is HIGHAVG. The likelihood of showing higher performance is 15 percent for below-zone selectees in the aviation community, but the coefficient is insignificant.

	COMMUNITY*		
Independent Variables	***SWO***	***SUB***	***PLT***
MALE	-0.2358	**	-0.0003
WHITE	0.1312	-0.0019	0.2139
MWC	0.0291	0.0010	0.0918
HIGHAVG	-0.0595	0.0022	0.1479*
TECH	0.0418	-0.0049	0.0103
USNA	-0.0641	-0.0013	0.0502
BELOWZON	-0.0583	0.0007	0.1526

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Performance (from OLS estimates)
**** LOGIT model results may be found in appendices

Table 16. Parameter Estimates (OLS) for the Captain Performance Model by Community (Dependent variable = PERFORM)

6. Differences in the Effect of Determinants in the Below-Zone and In-Zone Sub-Samples

This section will attempt to compare the effects of determinants in the below-zone and in-zone sub-samples, by all designators, and separately for each individual communities. The reason for computing separate models by zone is to determine whether the effect of explanatory variables is the same for individuals reviewed below and in-zone. Table 17 shows the parameter estimates for the OLS linear probability model for the screened for command model for combined community designators. The variables in the below-zone model are mostly insignificant due to the sample size. For the captain data set, only PERFORM is significant in the below-zone sub-sample. Higher fitrep scores in the captain data set increase the probability of being screened for command for the below-zone officers by 99 percent and for in-zone officers by 50 percent. These effects, however, seem suspect.

	COMMANDER DATA SET		***CAPTAIN DATA SET***	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	-0.3528	-0.2950*	-0.0037	-0.2039
WHITE	0.13133	-0.1226*	0.0039	0.19606*
MWC	-0.1533	0.0060	-0.0019	0.0582*
HIGHAVG	-0.0119	0.0010	-0.0033	0.0123*
TECH	0.0099	-0.06357*	-0.0028	0.0228
USNA	0.0246	0.06829*	0.0064	0.0826*
PERFORM	0.0647	0.0742*	0.9922*	0.5029*
sample size	234	7, 718	201	4,539

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Screened for Command (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 17. Parameter Estimates (OLS) for the Commander/Captain Screened for Command Model for Below-zone and In-zone Sub-samples. (Dependent variable = COSCREEN / XOSCREEN)

Table 18 shows the parameter estimates for the OLS linear probability model for the promotion model for combined communities designators estimated by sub-sample.

None of the below-zone variables are significant in both models except PERFORM in the captain data set. Again these results are suspect due to the poor explanatory power of the model for the below-zone sample.

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	-0.0059	-0.1057	0	0.0572
WHITE	-0.0014	0.0243	0	0.0076
MWC	0.0005	0.0687*	0	0.0045*
HIGHAVG	-0.0023	0.0989*	0	0.0004
TECH	-0.0010	-0.0322*	0	-0.0011
USNA	0.0002	0.1366*	0	0.0037*
PERFORM	0.0005	0.0701*	0.9949*	0.0618*
sample size	234	7,718	201	4,539

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Promotion (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 18. Parameter Estimates (OLS) for the Commander/Captain Promotion Model for Below-zone and In-zone Sub-samples. (Dependent variable = PROMOTE)

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	0.19469	-0.03536	-0.07802	0.08928
WHITE	-0.01868	0.01888	-0.06568	0.01871
MWC	-0.01214	0.01377*	0.00701*	0.19516*
HIGHAVG	0.02984	0.02409*	-0.00233	0.02727*
TECH	-0.0065	0.03682*	-0.01215*	0.01911
USNA	-0.02254	0.02049*	0.00302	0.0244
sample size	234	7,718	201	4,539

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Performance (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 19. Parameter Estimates (OLS) for the Commander/Captain Performance Model for Below-zone and In-zone Sub-samples. (Dependent variable = PERFORM)

Table 19 shows the parameter estimates for the OLS linear probability model for the performance model for combined community designators. None of the variables are statistically significant in both models. An analysis of the below-zone and in-zone promotion for the screened for command model, the surface warfare officer (SWO) community is shown in Table 20. The only comparison is possible for the captain data set for the PERFORM variable. Below-zone selected O-6's are 88 percent more likely for being screened for command than in-zone selected officers (56 percent), but small sample sizes again make these results problematic.

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	-0.1112	-0.11702	**	-0.2698
WHITE	0.0206	0.0197	**	0.0078
MWC	0.0012	0.0293	0	0.1005*
HIGHAVG	-0.0622	0.0285	0	-0.0531
TECH	-0.087	-0.064*	0	0.0344
USNA	-0.0448	0.0486*	0.0001	0.0807*
PERFORM	0.0321	0.0280	0.8829*	0.5637*
sample size	80	2351	65	1360

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Screened for Command (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 20. Parameter Estimates (OLS) for the Commander/Captain Screened for Command Model Surface Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = COSCREEN / XOSCREEN)

Based on the results of this analysis, screened for command rates for officers in the Submarine Warfare Community, as show in Table 21, seem to be unaffected by the explanatory variable and no variables are significant across both sub-samples for the Commander and Captain data set.

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	**	**	**	**
WHITE	0.3362	0.1221	**	0.0021
MWC	0.0279	0.0501*	**	-0.0316
HIGHAVG	-0.1440	-0.0535	**	-0.0260
TECH	-0.0686	-0.0284	**	-0.0100
USNA	0.0976	0.0560*	**	0.1171
PERFORM	0.2732	0.0915*	**	0.8649
sample size	42	1135	32	487

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Screened for Command (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 21. Parameter Estimates (OLS) for the Commander/Captain Screened for Command Model Submarine Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = COSCREEN / XOSCREEN)

The parameter estimate comparisons for the screened for command model, Aviation Warfare community (PLT) are provided in Table 22. For the Commander data set, MWC shows significance for both sub-samples. Being married with at least one child reduces screened for command probabilities by 14 percent for below-zone selectees but increases its probability by only 2 percent for in-zone selectees. The conclusion that enhanced careers jeopardize family life is tempting, but due to small sample size this is purely speculative.

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	**	0.0068	-0.0074	**
WHITE	0.2944	0.0086	-0.0075	0.0515*
MWC	-0.1437*	0.0164*	-0.0014	0.0048*
HIGHAVG	0.0626	0.0061	-0.0106*	-0.0017
TECH	0.0115	-0.0073	-0.0065	-0.0025*
USNA	-0.0591	0.0252*	-0.0004	-0.0005
PERFORM	-0.00408	-0.0038	**	0.1277*
sample size	112	4232	104	2692

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Screened for Command (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 22. Parameter Estimates (OLS) for the Commander/Captain Screened for Command Model Aviation Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = COSCREEN / XOSCREEN)

An analysis of the below-zone and in-zone samples for the promotion model for the Surface Warfare Officer (SWO) community is shown in Table 23. The only significant variable in the captain data set is PERFORM. In the below-zone sample high performing officers have a 92 percent higher probability of being promoted over 13 percent of the in-zone selected officers. Again, however, this results should be viewed cautiously.

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	-0.0036	-0.1534	**	0.0831
WHITE	-0.0015	-0.0045	**	-0.0029
MWC	0.0018*	0.0814*	-0.0014	0.0080*
HIGHAVG	-0.0058	0.0694*	-0.0025	-0.0026
TECH	-0.0005	-0.0416*	0.0026	0.0008
USNA	0.0005	0.1179*	0.0132	0.0044*
PERFORM	0.0009	0.0310	0.9236*	0.1351*
sample size	80	2351	65	1360

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Promotion (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 23. Parameter Estimates (OLS) for the Commander/Captain Promotion Model Surface Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable=PROMOTE)

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	**	**	**	**
WHITE	-0.0558	-0.2593	**	-0.4576
MWC	0.0057	0.0610	**	0.0712
HIGHAVG	0.0050	0.1087	**	0.1622*
TECH	-0.0365	0.1621*	**	-0.01507*
USNA	-0.0209	0.1837*	**	0.1091
PERFORM	0.0035	0.0752	**	0.2476
sample size	42	1135	32	487

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Promotion (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 24. Parameter Estimates (OLS) for the Commander/Captain Promotion Model Submarine Warfare Officers for Below-zone and In-zone sub-samples(Dependent variable =PROMOTE)

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	**	-0.0524	0.0009	**
WHITE	-0.0131	0.0916	-0.0120	0.0893*
MWC	0.0512	0.0613*	-0.0112	0.0150*
HIGHAVG	-0.0443	0.1048*	0.0018	-0.0007
TECH	-0.1365	-0.0583*	0.010	-0.0054
USNA	0.0378	0.1368*	-0.0021	0.0047
PERFORM	0.0221	0.0977*	**	0.1672*
sample size	112	4232	104	2692

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Promotion (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 25. Parameter Estimates (OLS) for the Commander/Captain Promotion Model Aviation Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = PROMOTE)

Using the promotion and performance model for the comparison of in-zone and below-zone samples in all analyzed communities ranking at the O-5 and O-6 point there are no significant variables (Tables 24-28).

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	0.0331	-0.0450	**	-0.2462
WHITE	0.0047	-0.0122	**	0.1299
MWC	-0.0015	0.0399	-0.0700	0.0353
HIGHAVG	0.0136*	-0.0324	0.0471	0.0535
TECH	-0.0001	0.0278	0.0580	0.00356
USNA	-0.0007	-0.0069	0.0623	-0.00564
sample size	80	2351	65	1360

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Performance (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 26. Parameter Estimates (OLS) for the Commander/Captain Performance Model Surface Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = PERFORM)

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	**	**	**	**
WHITE	-0.0637*	0.1815	**	-0.0018
MWC	0.0004	0.034	**	0.0010
HIGHAVG	-0.0598*	0.0155	**	-0.0020
TECH	0.0004	-0.0509*	**	-0.0049
USNA	-0.0005	0.0266	**	-0.0012
sample size	42	1135	32	487

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Performance (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 27. Parameter Estimates (OLS) for the Commander/Captain Performance Model Submarine Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = PERFORM)

	COMMANDER DATA SET		CAPTAIN DATA SET	
Independent Variables	BELOW-ZONE	IN-ZONE	BELOW-ZONE	IN-ZONE
MALE	**	-0.0239	**	**
WHITE	0.1203	0.0440	**	0.2268
MWC	0.0147	-0.0001	**	0.0952
HIGHAVG	-0.0022	0.0130	**	0.1533*
TECH	-0.0171	0.0287*	**	0.0106
USNA	-0.03051	0.0287	**	0.0539
sample size	112	4232	**	2692

Notes: * Significant at the 0.05 level
** Not included in model because of no variance in representation
*** Coefficients represent change in probability of Performance (from OLS estimates)
**** LOGIT model results may be found in Appendices

Table 28. Parameter Estimates (OLS) for the Commander/Captain Performance Model Aviation Warfare Officers for Below-zone and In-zone sub-samples (Dependent variable = PERFORM)

The results in this section are disappointing, but appear to be attributable to the small sample size in the below-zone sub-sample. Thus, the coefficients could not be reliably compared across the two sub-samples.

V. SUMMARY AND CONCLUSION

A. RESULTS

Officers at the O-5 promotion board level who are selected below-zone have a 15 percent higher probability of being XO-screened and a 24 percent higher probability of being promoted than those selected in-zone. The general conclusion for the Commander data set regarding below-zone promotion is that the probability of being screened for command and being promoted is higher, for all other factors there is no evidence for a considerable difference between the timing promotions (Table 29).

Officers at the O-6 promotion board level who are selected below-zone have a 24 percent higher probability of being CO-screened and a 7.2 percent higher probability of being promoted than those selected in-zone. For all other factors there is no evidence for a considerable difference between the timing promotions (Table 29).

	LCDR - CDR DATA SET	***CDR - CAPT DATA SET***
XO/CO SCREEN	15 %	24 %
PROMOTE	24 %	7.2 %
PERFORMANCE	not significant	not significant

Table 29. Impact of Below-Zone at lower Grade on Subsequent Officer Performance

The models XO/SCREEN, PROMOTION and PERFORMANCE with only below-zone selected officers reveal no significant explanatory variables for the O-5 promotion board. At the O-6 promotion board performance is the only significant variable for the COSCREEN and the PROMOTION models. Good performers are by 99 percent more likely to be selected below-zone. This should not be surprising and is an expected outcome to support the hypothesis that below-zone selection is a valid personnel policy. The PERFORMANCE model reveals results only for the O-6 promotion board, where a technical background and the marital status appear to have a small but significant impact (Table 30).

	LCDR - CDR DATA SET	***CDR - CAPT DATA SET***
XO/CO SCREEN	No significant results	PERFORM, 99 %
PROMOTE	No significant results	PERFORM, 99 %
PERFORMANCE	No significant results	MWC, 0.7 % TECH, - 1 %

Table 30. Significant Variables for the Below-Zone Models

The analysis of the purpose of below-zone promotion in the qualitative discussion reveals a lot of convincing arguments in support of the policy to be maintained. Selecting high-performing personnel for fast-track careers is a valuable policy for an organization. The quantitative analysis supports the view that officers on the fast-track are in general able to advance their careers at rates superior to that of their peers. The observations show that below-zone promoted officers have higher probabilities for being screened and promoted. Obviously is performance the most significant rewarding factor for below-zone promotion. The assumption that they are more likely to show lower later performance or are not as likely to be screened for command because of their different career path could not be supported.

B. RECOMMENDATIONS

This thesis analyzed the policy by comparing means of specific variables which appeared to be most important for an officer's career. Two other methodologies with a much higher effort could be considered: (1) Tracking of individuals and checking for setbacks associated with below-zone promotion - a method which needs to be applied carefully in terms of privacy. (2) A direct comparison of in-zone and below-zone cohorts which share the same career conditions with the method of including in-zone and above-zone officers from an older cohort would give a more complete test of the theory. (3) The construction of a retention model using below-zone, in-zone, and above-zone variables at the lower board could offer information about retention behavior and how the impact of this policy is for the Navy. However, all of these methods will suffer the same problem encountered here of small sample sizes, especially when comparing individual communities. The method used here provides a first analysis of the data for this problem and does not reveal evidence that the policy is hurting the Navy in any way. We do not think that the policy needs to be investigated more closely, but we are convinced that further research and frequent checking of the data should be considered. Even though the sample size turns out to be the main reason for non-significant results of this trial, we leave this section as an initial starting point for further research.

APPENDIX A. COMMANDER LOGIT MODEL RESULTS (ALL DESIGNATORS)

TABLE A.1 LOGIT RESULTS FOR COMMANDER SCREENED FOR COMMAND MODEL (ALL DESIGNATORS)

Data Set: WORK.ONE
Response Variable: XOSCREEN
Response Levels: 2
Number of Observations: 6696
Link Function: Logit

Response Profile

Ordered Value	XOSCREEN	Count
1	1	2113
2	0	4583

WARNING: 6991 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	8351.624	8220.241	.
SC	8358.433	8281.524	.
-2 LOG L	8349.624	8202.241	147.383 with 8 DF (p=0.0001)
Score	.	.	152.869 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.8744	0.3023	8.3678	0.0038	.	2.398	Intercept
MALE	1	-1.2338	0.2695	20.9625	0.0001	-0.067204	0.291	1=MALE; 0=FEMALE
WHITE	1	-0.4835	0.1417	11.6401	0.0006	-0.049556	0.617	1=WHITE; 0=OTHER
BELOWZON	1	0.9100	0.1533	35.2272	0.0001	0.086232	2.484	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.00808	0.0602	0.0180	0.8933	0.001962	1.008	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.00395	0.0538	0.0054	0.9414	0.001074	1.004	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.2852	0.0537	28.2462	0.0001	-0.078165	0.752	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.3564	0.0575	38.4806	0.0001	0.091074	1.428	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.4019	0.0803	25.0505	0.0001	0.072909	1.495	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 52.7%	Somers' D	= 0.163
Discordant	= 36.4%	Gamma	= 0.183
Tied	= 11.0%	Tau-a	= 0.070
(9683879 pairs)		c	= 0.581

TABLE A.2 LOGIT RESULTS FOR COMMANDER PROMOTION MODEL (ALL DESIGNATORS)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 6697
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	4591
2	0	2106

WARNING: 6990 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	8341.506	8023.310	.
SC	8348.315	8084.594	.
-2 LOG L	8339.506	8005.310	334.196 with 8 DF (p=0.0001)
Score	.	.	313.913 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.4355	0.3026	2.0716	0.1501	.	1.546	Intercept
MALE	1	-0.4333	0.2697	2.5802	0.1082	-0.023598	0.648	1=MALE; 0=FEMALE
WHITE	1	0.1083	0.1418	0.5830	0.4451	0.011100	1.114	1=WHITE; 0=OTHER
BELOWZON	1	1.2560	0.1535	66.9838	0.0001	0.119011	3.511	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3013	0.0603	24.9945	0.0001	0.073172	1.352	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.4301	0.0538	63.8388	0.0001	0.116868	1.537	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.1338	0.0537	6.2119	0.0127	-0.036687	0.875	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.6173	0.0575	115.2650	0.0001	0.157753	1.854	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.3081	0.0804	14.6904	0.0001	0.055881	1.361	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 59.2%	Somers' D	= 0.258
Discordant	= 33.4%	Gamma	= 0.279
Tied	= 7.5%	Tau-a	= 0.111
(9668646 pairs)		c	= 0.629

TABLE A.3 LOGIT RESULTS FOR COMMANDER PERFORMANCE MODEL (ALL DESIGNATORS)

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 6697
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	827
2	0	5870

WARNING: 6990 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	5008.914	4959.974	.
SC	5015.724	5014.449	.
-2 LOG L	5006.914	4943.974	62.941 with 7 DF (p=0.0001)
Score	.	.	62.953 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.4170	0.4269	32.0503	0.0001	.	0.089	Intercept
MALE	1	-0.2077	0.3807	0.2977	0.5853	-0.011313	0.812	1=MALE; 0=FEMALE
WHITE	1	0.1620	0.2002	0.6546	0.4185	0.016598	1.176	1=WHITE; 0=OTHER
BELOWZON	1	0.1527	0.2166	0.4973	0.4807	0.014471	1.165	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.0538	0.0851	0.4004	0.5269	0.013069	1.055	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.2728	0.0759	12.9185	0.0003	0.074122	1.314	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.4165	0.0756	30.3445	0.0001	0.114171	1.517	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.2321	0.0811	8.1928	0.0042	0.059318	1.261	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 54.4%	Somers' D	= 0.171
Discordant	= 37.3%	Gamma	= 0.187
Tied	= 8.3%	Tau-a	= 0.037
(4854490 pairs)		c	= 0.586

APPENDIX B. CAPTAIN LOGIT MODEL RESULTS (ALL DESIGNATORS)

TABLE B.1 LOGIT RESULTS FOR CAPTAIN SCREENED FOR COMMAND MODEL (ALL DESIGNATORS)

Data Set: WORK.ONE
Response Variable: COSCREEN
Response Levels: 2
Number of Observations: 2714
Link Function: Logit

Response Profile

Ordered Value	COSCREEN	Count
1	1	1691
2	0	1023

WARNING: 2026 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	3598.286	3437.465	.
SC	3604.192	3490.621	.
-2 LOG L	3596.286	3419.465	176.820 with 8 DF (p=0.0001)
Score	.	.	166.561 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-1.4749	1.2772	1.3335	0.2482	.	0.229	Intercept
MALE	1	-1.5744	1.1975	1.7286	0.1886	-0.028849	0.207	1=MALE; 0=FEMALE
WHITE	1	0.8466	0.3736	5.1363	0.0234	0.049611	2.332	1=WHITE; 0=OTHER
BELOWZON	1	1.1829	0.1797	43.3083	0.0001	0.144276	3.264	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.2687	0.1123	5.7283	0.0167	0.052518	1.308	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.0398	0.0822	0.2352	0.6277	0.010857	1.041	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.1035	0.0830	1.5547	0.2124	0.027531	1.109	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.3994	0.0848	22.1827	0.0001	0.104747	1.491	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	2.2804	0.2703	71.1616	0.0001	0.184893	9.781	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 56.5%	Somers' D	= 0.228
Discordant	= 33.7%	Gamma	= 0.252
Tied	= 9.8%	Tau-a	= 0.107
(1729893 pairs)		c	= 0.614

TABLE B.2 ***LOGIT RESULTS FOR CAPTAIN PROMOTION MODEL (ALL DESIGNATORS)***

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 2720
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	1591
2	0	1129

WARNING: 2020 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	3693.867	3517.308	.
SC	3699.775	3570.484	.
-2 LOG L	3691.867	3499.308	192.558 with 8 DF (p=0.0001)
Score	.	.	175.967 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-3.7682	1.2562	8.9989	0.0027	.	0.023	Intercept
MALE	1	1.1337	1.1777	0.9266	0.3357	0.020750	3.107	1=MALE; 0=FEMALE
WHITE	1	0.5288	0.3674	2.0718	0.1500	0.030955	1.697	1=WHITE; 0=OTHER
BELOWZON	1	1.5168	0.1762	74.1321	0.0001	0.185430	4.558	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3386	0.1103	9.4272	0.0021	0.066194	1.403	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.0237	0.0807	0.0861	0.7692	0.006453	1.024	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.1021	0.0816	1.5674	0.2106	-0.027157	0.903	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.2976	0.0833	12.7658	0.0004	0.078048	1.347	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	2.0588	0.2659	59.9658	0.0001	0.166746	7.837	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 56.4%	Somers' D	= 0.226
Discordant	= 33.8%	Gamma	= 0.251
Tied	= 9.8%	Tau-a	= 0.110
(1796239 pairs)		c	= 0.613

TABLE B.3 *LOGIT RESULTS FOR CAPTAIN PERFORMANCE MODEL (ALL DESIGNATORS)*

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 2720
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	2660
2	0	60

WARNING: 2020 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	578.352	576.134	.
SC	584.260	623.401	.
-2 LOG L	576.352	560.134	16.217 with 7 DF (p=0.0232)
Score	.	.	18.850 with 7 DF (p=0.0087)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	2.0176	4.1300	0.2387	0.6252	.	7.521	Intercept
MALE	1	-1.1795	3.9510	0.0891	0.7653	-0.021589	0.307	1=MALE; 0=FEMALE
WHITE	1	2.0326	1.2320	2.7219	0.0990	0.118971	7.634	1=WHITE; 0=OTHER
BELOWZON	1	0.5942	0.5909	1.0113	0.3146	0.072644	1.812	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.4611	0.3698	1.5542	0.2125	0.090142	1.586	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.8020	0.2703	8.8034	0.0030	0.218509	2.230	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.0942	0.2736	0.1184	0.7307	0.025043	1.099	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.4187	0.2793	2.2472	0.1339	0.109810	1.520	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 58.3%	Somers' D	= 0.301
Discordant	= 28.2%	Gamma	= 0.348
Tied	= 13.5%	Tau-a	= 0.013
(159600 pairs)		c	= 0.650

APPENDIX C. COMMANDER LOGIT MODEL RESULTS (BY DESIGNATORS)

TABLE C.1 LOGIT RESULTS FOR COMMANDER SCREENED FOR COMMAND MODEL (SURFACE WARFARE OFFICERS)

Data Set: WORK.ONE
Response Variable: XOSCREEN
Response Levels: 2
Number of Observations: 2107
Link Function: Logit

Response Profile

Ordered Value	XOSCREEN	Count
1	1	1569
2	0	538

WARNING: 324 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	2396.080	2379.751	.
SC	2401.733	2430.628	.
-2 LOG L	2394.080	2361.751	32.329 with 8 DF (p=0.0001)
Score	.	.	31.712 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	1.3341	0.4122	10.4755	0.0012	.	3.797	Intercept
MALE	1	-0.6134	0.3624	2.8656	0.0905	-0.047830	0.541	1=MALE; 0=FEMALE
WHITE	1	0.1578	0.2093	0.5687	0.4508	0.020864	1.171	1=WHITE; 0=OTHER
BELOWZON	1	0.5073	0.2839	3.1946	0.0739	0.049443	1.661	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.1885	0.1115	2.8580	0.0909	0.047458	1.207	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.1639	0.1011	2.6294	0.1049	0.045105	1.178	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.3403	0.1003	11.4977	0.0007	-0.093791	0.712	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.2922	0.1085	7.2495	0.0071	0.074982	1.339	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.2028	0.1492	1.8472	0.1741	0.037506	1.225	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 55.5%	Somers' D	= 0.166
Discordant	= 38.9%	Gamma	= 0.176
Tied	= 5.6%	Tau-a	= 0.063
(844122 pairs)		c	= 0.583

TABLE C.2 LOGIT RESULTS FOR COMMANDER SCREENED FOR COMMAND MODEL (SUBMARINE WARFARE OFFICERS)

Data Set: WORK.ONE
Response Variable: XOSCREEN
Response Levels: 2
Number of Observations: 919
Link Function: Logit

Response Profile

Ordered Value	XOSCREEN	Count
1	1	250
2	0	669

WARNING: 258 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1077.730	1047.187	.
SC	1082.554	1085.773	.
-2 LOG L	1075.730	1031.187	44.543 with 7 DF (p=0.0001)
Score	.	.	46.889 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-1.7050	0.6125	7.7496	0.0054	.	0.182	Intercept
WHITE	1	0.7317	0.5388	1.8441	0.1745	0.055932	2.079	1=WHITE; 0=OTHER
BELOWZON	1	1.7304	0.3945	19.2363	0.0001	0.180173	5.643	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3314	0.1677	3.9035	0.0482	0.080927	1.393	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.4926	0.2509	3.8534	0.0496	-0.081156	0.611	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.2147	0.2337	0.8444	0.3582	-0.037683	0.807	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.3654	0.1500	5.9350	0.0148	0.100590	1.441	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.5927	0.1679	12.4685	0.0004	0.144945	1.809	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 58.3%	Somers' D	= 0.265
Discordant	= 31.8%	Gamma	= 0.294
Tied	= 9.9%	Tau-a	= 0.105
(167250 pairs)		c	= 0.632

TABLE C.3 LOGIT RESULTS FOR COMMANDER SCREENED FOR COMMAND MODEL (PILOT OFFICERS)

Data Set: WORK.ONE
Response Variable: XOSCREEN
Response Levels: 2
Number of Observations: 3670
Link Function: Logit

Response Profile

Ordered Value	XOSCREEN	Count
1	1	294
2	0	3376

WARNING: 674 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	2050.120	2036.925	.
SC	2056.328	2092.796	.
-2 LOG L	2048.120	2018.925	29.196 with 8 DF (p=0.0003)
Score	.	.	72.810 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-3.4509	0.8692	15.7610	0.0001	.	0.032	Intercept
MALE	1	0.2379	0.7761	0.0940	0.7592	0.010353	1.269	1=MALE; 0=FEMALE
WHITE	1	0.3797	0.3873	0.9612	0.3269	0.032902	1.462	1=WHITE; 0=OTHER
BELOWZON	1	2.5256	0.3706	46.4404	0.0001	0.228920	12.499	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3036	0.1424	4.5466	0.0330	0.071828	1.355	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.1781	0.1223	2.1197	0.1454	0.048985	1.195	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.2379	0.1232	3.7331	0.0533	-0.065593	0.788	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.5189	0.1386	14.0280	0.0002	0.127079	1.680	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	-0.1327	0.2201	0.3637	0.5464	-0.020291	0.876	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 58.3%	Somers' D	= 0.241
Discordant	= 34.2%	Gamma	= 0.261
Tied	= 7.5%	Tau-a	= 0.036
(992544 pairs)		c	= 0.621

TABLE C.4 LOGIT RESULTS FOR COMMANDER PROMOTION MODEL (SURFACE WARFARE OFFICERS)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 2107
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	1423
2	0	684

WARNING: 324 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	2658.134	2578.219	.
SC	2663.787	2629.097	.
-2 LOG L	2656.134	2560.219	95.915 with 8 DF (p=0.0001)
Score	.	.	90.508 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.7359	0.3839	3.6750	0.0552	.	2.087	Intercept
MALE	1	-0.6400	0.3375	3.5965	0.0579	-0.049900	0.527	1=MALE; 0=FEMALE
WHITE	1	0.0281	0.1949	0.0207	0.8855	0.003710	1.028	1=WHITE; 0=OTHER
BELOWZON	1	1.1775	0.2643	19.8424	0.0001	0.114755	3.246	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3861	0.1038	13.8236	0.0002	0.097199	1.471	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.3195	0.0941	11.5180	0.0007	0.087915	1.376	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.1876	0.0934	4.0320	0.0446	-0.051723	0.829	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.5997	0.1011	35.2137	0.0001	0.153897	1.822	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.1481	0.1390	1.1355	0.2866	0.027385	1.160	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 60.1%	Somers' D	= 0.254
Discordant	= 34.7%	Gamma	= 0.268
Tied	= 5.2%	Tau-a	= 0.111
(973332 pairs)		c	= 0.627

TABLE C.5 *LOGIT RESULTS FOR COMMANDER PROMOTION MODEL (SUBMARINE WARFARE OFFICERS)*

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 919
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	710
2	0	209

WARNING: 258 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	987.428	937.617	.
SC	992.251	976.204	.
-2 LOG L	985.428	921.617	63.811 with 7 DF (p=0.0001)
Score	.	.	62.411 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.2845	0.6502	0.1914	0.6618	.	1.329	Intercept
WHITE	1	-0.9386	0.5720	2.6924	0.1008	-0.071748	0.391	1=WHITE; 0=OTHER
BELOWZON	1	0.9737	0.4189	5.4042	0.0201	0.101385	2.648	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.2891	0.1781	2.6363	0.1044	0.070606	1.335	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.4878	0.2664	3.3533	0.0671	0.080374	1.629	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.7649	0.2481	9.5058	0.0020	0.134233	2.149	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.8654	0.1592	29.5383	0.0001	0.238242	2.376	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.3275	0.1782	3.3778	0.0661	0.080093	1.388	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 63.0%	Somers' D	= 0.356
Discordant	= 27.3%	Gamma	= 0.395
Tied	= 9.7%	Tau-a	= 0.125
(148390 pairs)		c	= 0.678

TABLE C.6 *LOGIT RESULTS FOR COMMANDER PROMOTION MODEL (PILOT OFFICERS)*

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 3671
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	2458
2	0	1213

WARNING: 673 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	4660.360	4503.561	.
SC	4666.568	4559.435	.
-2 LOG L	4658.360	4485.561	172.799 with 8 DF (p=0.0001)
Score	.	.	161.156 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.0435	0.5017	0.0075	0.9309	.	1.044	Intercept
MALE	1	-0.2173	0.4479	0.2353	0.6276	-0.009453	0.805	1=MALE; 0=FEMALE
WHITE	1	0.3655	0.2235	2.6741	0.1020	0.031668	1.441	1=WHITE; 0=OTHER
BELOWZON	1	1.3892	0.2139	42.1833	0.0001	0.125898	4.012	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.2548	0.0822	9.6163	0.0019	0.060279	1.290	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.4208	0.0706	35.5234	0.0001	0.115719	1.523	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.2321	0.0711	10.6649	0.0011	-0.063971	0.793	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.5569	0.0799	48.5428	0.0001	0.136401	1.745	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.3929	0.1270	9.5722	0.0020	0.060066	1.481	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 58.2%	Somers' D	= 0.239
Discordant	= 34.3%	Gamma	= 0.258
Tied	= 7.5%	Tau-a	= 0.106
(2981554 pairs)		c	= 0.619

TABLE C.7 ***LOGIT RESULTS FOR COMMANDER PERFORMANCE MODEL (SURFACE WARFARE OFFICERS)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 2107
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	272
2	0	1835

WARNING: 324 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1622.957	1630.101	.
SC	1628.610	1675.325	.
-2 LOG L	1620.957	1614.101	6.856 with 7 DF (p=0.4441)
Score	.	.	6.816 with 7 DF (p=0.4483)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-1.6818	0.5352	9.8749	0.0017	.	0.186	Intercept
MALE	1	-0.2962	0.4712	0.3952	0.5296	-0.023096	0.744	1=MALE; 0=FEMALE
WHITE	1	-0.0704	0.2721	0.0669	0.7959	-0.009305	0.932	1=WHITE; 0=OTHER
BELOWZON	1	0.0835	0.3691	0.0511	0.8211	0.008136	1.087	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.2278	0.1449	2.4716	0.1159	0.057361	1.256	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.1965	0.1314	2.2375	0.1347	-0.054082	0.822	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.1774	0.1304	1.8493	0.1739	0.048895	1.194	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	-0.0506	0.1411	0.1284	0.7201	-0.012975	0.951	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 51.3%	Somers' D	= 0.104
Discordant	= 41.0%	Gamma	= 0.112
Tied	= 7.7%	Tau-a	= 0.023
(499120 pairs)		c	= 0.552

TABLE C.8 ***LOGIT RESULTS FOR COMMANDER PERFORMANCE MODEL (SUBMARINE WARFARE OFFICERS)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 919
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	247
2	0	672

WARNING: 258 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1071.775	1076.860	.
SC	1076.598	1110.623	.
-2 LOG L	1069.775	1062.860	6.915 with 6 DF (p=0.3288)
Score	.	.	7.055 with 6 DF (p=0.3158)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-1.2555	0.6137	4.1853	0.0408	.	0.285	Intercept
WHITE	1	0.5253	0.5406	0.9442	0.3312	0.040154	1.691	1=WHITE; 0=OTHER
BELOWZON	1	-0.1590	0.3960	0.1612	0.6881	-0.016554	0.853	1=BELOW-ZONE;0=IN-ZONE
MWC	1	-0.0151	0.1683	0.0081	0.9283	-0.003700	0.985	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.1018	0.2518	0.1635	0.6860	0.016779	1.107	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.4750	0.2341	4.1191	0.0424	-0.083359	0.622	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.1826	0.1504	1.4736	0.2248	0.050273	1.200	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 45.8%	Somers' D	= 0.095
Discordant	= 36.2%	Gamma	= 0.116
Tied	= 18.0%	Tau-a	= 0.038
(165984 pairs)		c	= 0.548

TABLE C.9 ***LOGIT RESULTS FOR COMMANDER PERFORMANCE MODEL (PILOT OFFICERS)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 3671
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	308
2	0	3363

WARNING: 673 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	2117.926	2107.129	.
SC	2124.134	2156.794	.
-2 LOG L	2115.926	2091.129	24.797 with 7 DF (p=0.0008)
Score	.	.	25.035 with 7 DF (p=0.0007)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.8634	0.8511	11.3195	0.0008	.	0.057	Intercept
MALE	1	-0.5811	0.7598	0.5850	0.4444	-0.025285	0.559	1=MALE; 0=FEMALE
WHITE	1	0.6771	0.3790	3.1910	0.0740	0.058665	1.968	1=WHITE; 0=OTHER
BELOWZON	1	0.5474	0.3628	2.2767	0.1313	0.049608	1.729	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.00843	0.1394	0.0037	0.9518	0.001995	1.008	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.2080	0.1197	3.0191	0.0823	0.057212	1.231	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.4228	0.1204	12.3412	0.0004	0.116556	1.526	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.1584	0.1356	1.3648	0.2427	0.038797	1.172	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 53.8%	Somers' D	= 0.171
Discordant	= 36.7%	Gamma	= 0.189
Tied	= 9.5%	Tau-a	= 0.026
(1035804 pairs)		c	= 0.586

APPENDIX D. CAPTAIN LOGIT MODEL RESULTS (BY DESIGNATORS)

TABLE D.1 LOGIT RESULTS FOR CAPTAIN SCREENED FOR COMMAND MODEL (SURFACE WARFARE OFFICERS)

Data Set: WORK.ONE
Response Variable: COSCREEN
Response Levels: 2
Number of Observations: 882
Link Function: Logit

Response Profile

Ordered Value	COSCREEN	Count
1	1	585
2	0	297

WARNING: 543 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1128.924	1078.576	.
SC	1133.706	1121.616	.
-2 LOG L	1126.924	1060.576	66.348 with 8 DF (p=0.0001)
Score	.	.	63.122 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-0.7887	1.6796	0.2205	0.6386	.	0.454	Intercept
MALE	1	-2.0061	1.5090	1.7674	0.1837	-0.052637	0.135	1=MALE; 0=FEMALE
WHITE	1	0.0262	0.5743	0.0021	0.9637	0.001803	1.026	1=WHITE; 0=OTHER
BELOWZON	1	1.2509	0.3356	13.8931	0.0002	0.146951	3.493	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.4095	0.2013	4.1356	0.0420	0.080576	1.506	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.2500	0.1478	2.8619	0.0907	-0.066829	0.779	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.1690	0.1569	1.1596	0.2816	0.042831	1.184	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.3682	0.1481	6.1802	0.0129	0.099431	1.445	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	2.9887	0.5200	33.0367	0.0001	0.226672	19.859	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 57.3%	Somers' D	= 0.244
Discordant	= 32.9%	Gamma	= 0.271
Tied	= 9.8%	Tau-a	= 0.109
(173745 pairs)		c	= 0.622

TABLE D.2 LOGIT RESULTS FOR CAPTAIN SCREENED FOR COMMAND MODEL (SUBMARINE WARFARE OFFICERS)

Data Set: WORK.ONE
Response Variable: COSCREEN
Response Levels: 2
Number of Observations: 313
Link Function: Logit

Response Profile

Ordered Value	COSCREEN	Count
1	1	305
2	0	8

WARNING: 206 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	76.462	88.692	.
SC	80.208	118.662	.
-2 LOG L	74.462	72.692	1.770 with 7 DF (p=0.9715)
Score	.	.	18.043 with 7 DF (p=0.0118)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.4738	7.5268	0.1080	0.7424	.	0.084	Intercept
WHITE	1	-0.0447	6.4256	0.0000	0.9945	-0.001392	0.956	1=WHITE; 0=OTHER
BELOWZON	1	0.2813	1.3944	0.0407	0.8402	0.040526	1.325	1=BELOW-ZONE;0=IN-ZONE
MWC	1	-0.3643	0.9879	0.1360	0.7123	-0.073700	0.695	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.2523	0.9522	0.0702	0.7911	-0.054125	0.777	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.1076	0.8168	0.0174	0.8952	-0.028126	0.898	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.8750	0.8022	1.1899	0.2753	0.232525	2.399	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	6.2247	3.6932	2.8407	0.0919	0.334903	505.059	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 75.7%	Somers' D	= 0.641
Discordant	= 11.6%	Gamma	= 0.735
Tied	= 12.8%	Tau-a	= 0.032
(2440 pairs)		c	= 0.820

TABLE D.3 LOGIT RESULTS FOR CAPTAIN SCREENED FOR COMMAND MODEL (PILOT OFFICERS)

Data Set: WORK.ONE
Response Variable: COSCREEN
Response Levels: 2
Number of Observations: 1519
Link Function: Logit

Response Profile

Ordered Value	COSCREEN	Count
1	1	801
2	0	718

WARNING: 1277 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	2103.244	2018.274	.
SC	2108.569	2066.207	.
-2 LOG L	2101.244	2000.274	100.969 with 8 DF (p=0.0001)
Score	.	.	93.238 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.3700	2.1037	1.2691	0.2599	.	0.093	Intercept
MALE	1	-0.8012	2.0219	0.1570	0.6919	-0.011334	0.449	1=MALE; 0=FEMALE
WHITE	1	1.2623	0.5048	6.2541	0.0124	0.071073	3.534	1=WHITE; 0=OTHER
BELOWZON	1	1.3923	0.2392	33.8867	0.0001	0.166352	4.024	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3235	0.1472	4.8326	0.0279	0.062554	1.382	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.1898	0.1084	3.0687	0.0798	-0.050560	0.827	1=H. AVERAGE; 0=L. AVERAGE
TECH	1	-0.2677	0.1085	6.0917	0.0136	-0.070254	0.765	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	-0.0484	0.1192	0.1650	0.6846	-0.011649	0.953	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	1.9110	0.3224	35.1384	0.0001	0.168760	6.760	1=GOODPERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 54.9%	Somers' D	= 0.216
Discordant	= 33.3%	Gamma	= 0.245
Tied	= 11.8%	Tau-a	= 0.108
(575118 pairs)		c	= 0.608

TABLE D.4 LOGIT RESULTS FOR CAPTAIN PROMOTION MODEL (SURFACE WARFARE OFFICERS)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 884
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	527
2	0	357

WARNING: 541 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1194.587	1151.984	.
SC	1199.372	1195.044	.
-2 LOG L	1192.587	1133.984	58.604 with 8 DF (p=0.0001)
Score	.	.	54.355 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-4.2661	1.6177	6.9548	0.0084	.	0.014	Intercept
MALE	1	1.9884	1.4534	1.8717	0.1713	0.052114	7.304	1=MALE; 0=FEMALE
WHITE	1	-0.2228	0.5532	0.1622	0.6872	-0.015342	0.800	1=WHITE; 0=OTHER
BELOWZON	1	1.2305	0.3232	14.4944	0.0001	0.144402	3.423	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3926	0.1939	4.0995	0.0429	0.077186	1.481	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.2089	0.1423	2.1557	0.1420	-0.055803	0.811	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.0454	0.1511	0.0902	0.7639	-0.011495	0.956	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.2754	0.1424	3.7389	0.0532	0.074417	1.317	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	2.5293	0.5008	25.5072	0.0001	0.191620	12.545	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 55.9%	Somers' D	= 0.218
Discordant	= 34.1%	Gamma	= 0.242
Tied	= 10.0%	Tau-a	= 0.105
(188139 pairs)		c	= 0.609

TABLE D.5 ***LOGIT RESULTS FOR CAPTAIN PROMOTION MODEL (SUBMARINE WARFARE OFFICERS)***

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 313
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	217
2	0	96

WARNING: 206 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	387.893	366.759	.
SC	391.639	396.728	.
-2 LOG L	385.893	350.759	35.134 with 7 DF (p=0.0001)
Score	.	.	33.338 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.5083	2.5760	0.0389	0.8436	.	1.662	Intercept
WHITE	1	-2.1239	2.1991	0.9328	0.3341	-0.066187	0.120	1=WHITE; 0=OTHER
BELOWZON	1	1.2818	0.4772	7.2139	0.0072	0.184689	3.603	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3047	0.3381	0.8121	0.3675	0.061645	1.356	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.7792	0.3259	5.7171	0.0168	0.167178	2.180	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.5991	0.2795	4.5940	0.0321	-0.156577	0.549	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.5327	0.2745	3.7651	0.0523	0.141556	1.704	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	1.5114	1.2640	1.4298	0.2318	0.081315	4.533	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 64.7%	Somers' D	= 0.418
Discordant	= 22.9%	Gamma	= 0.478
Tied	= 12.4%	Tau-a	= 0.179
(20832 pairs)		c	= 0.709

TABLE D.6 *LOGIT RESULTS FOR CAPTAIN PROMOTION MODEL (PILOT OFFICERS)*

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 1523
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	847
2	0	676

WARNING: 1273 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	2094.086	1994.331	.
SC	2099.415	2042.287	.
-2 LOG L	2092.086	1976.331	115.755 with 8 DF (p=0.0001)
Score	.	.	104.549 with 8 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Paramete Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.7605	2.1138	1.7056	0.1916	.	0.063	Intercept
MALE	1	-0.3634	2.0315	0.0320	0.8580	-0.005133	0.695	1=MALE; 0=FEMALE
WHIT	1	1.2050	0.5072	5.6445	0.0175	0.067759	3.337	1=WHITE; 0=OTHER
BELOWZ	1	1.7239	0.2388	52.1283	0.0001	0.207014	5.606	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.3191	0.1476	4.6765	0.0306	0.061760	1.376	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.0204	0.1087	0.0351	0.8515	-0.005422	0.980	1=H. AVERAGE; 0=L. AVERAGE
TECH	1	-0.1404	0.1089	1.6619	0.1974	-0.036821	0.869	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.1071	0.1197	0.8005	0.3709	0.025744	1.113	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	1.8756	0.3239	33.5252	0.0001	0.165425	6.525	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 55.1%	Somers' D	= 0.220
Discordant	= 33.1%	Gamma	= 0.249
Tied	= 11.8%	Tau-a	= 0.108
(572572 pairs)		c	= 0.610

TABLE D.7 — ***LOGIT RESULTS FOR CAPTAIN PERFORMANCE MODEL (SURFACE WARFARE OFFICERS)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 884
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	867
2	0	17

WARNING: 541 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	170.013	181.709	.
SC	174.798	219.985	.
-2 LOG L	168.013	165.709	2.304 with 7 DF (p=0.9411)
Score	.	.	5.951 with 7 DF (p=0.5455)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	1.7926	5.5293	0.1051	0.7458	.	6.005	Intercept
MALE	1	-1.2969	5.1925	0.0624	0.8028	-0.033991	0.273	1=MALE; 0=FEMALE
WHITE	1	2.6583	1.9743	1.8130	0.1781	0.183075	14.272	1=WHITE; 0=OTHER
BELOWZON	1	-0.4126	1.1547	0.1277	0.7208	-0.048418	0.662	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.2618	0.6927	0.1428	0.7055	0.051470	1.299	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.6068	0.5079	1.4272	0.2322	0.162089	1.834	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.3943	0.5398	0.5336	0.4651	0.099864	1.483	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.6684	0.5084	1.7283	0.1886	0.180589	1.951	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 57.6%	Somers' D	= 0.311
Discordant	= 26.5%	Gamma	= 0.370
Tied	= 15.9%	Tau-a	= 0.012
(14739 pairs)		c	= 0.656

TABLE D.8 ***LOGIT RESULTS FOR CAPTAIN PERFORMANCE MODEL (SUBMARINE WARFARE OFFICERS)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 313
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	310
2	0	3

WARNING: 206 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	35.857	45.342	.
SC	39.603	71.565	.
-2 LOG L	33.857	31.342	2.515 with 6 DF (p=0.8668)
Score	.	.	2.902 with 6 DF (p=0.8210)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	6.5500	10.5941	0.3822	0.5364	.	699.220	Intercept
WHITE	1	-0.8553	10.4080	0.0068	0.9345	-0.026653	0.425	1=WHITE; 0=OTHER
BELOWZON	1	0.7181	2.2583	0.1011	0.7505	0.103467	2.051	1=BELOW-ZONE;0=IN-ZONE
MWC	1	1.2356	1.5987	0.5973	0.4396	0.249980	3.440	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.9243	1.5414	0.3595	0.5488	-0.198309	0.397	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-1.4947	1.3203	1.2817	0.2576	-0.390621	0.224	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	-0.6432	1.2988	0.2453	0.6204	-0.170925	0.526	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 72.3%	Somers' D	= 0.640
Discordant	= 8.3%	Gamma	= 0.794
Tied	= 19.5%	Tau-a	= 0.012
(930 pairs)		c	= 0.820

TABLE D.9 ***LOGIT RESULTS FOR CAPTAIN PERFORMANCE MODEL (PILOT OFFICERS)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 1523
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	1483
2	0	40

WARNING: 1273 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	372.105	372.565	.
SC	377.433	415.192	.
-2 LOG L	370.105	356.565	13.540 with 7 DF (p=0.0600)
Score	.	.	13.455 with 7 DF (p=0.0618)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.9596	6.5036	0.0218	0.8827	.	2.611	Intercept
MALE	1	-0.00149	6.3115	0.0000	0.9998	-0.000021113	0.999	1=MALE; 0=FEMALE
WHITE	1	1.7382	1.5752	1.2177	0.2698	0.097737	5.687	1=WHITE; 0=OTHER
BELOWZON	1	0.9922	0.7414	1.7911	0.1808	0.119144	2.697	1=BELOW-ZONE;0=IN-ZONE
MWC	1	0.5219	0.4583	1.2969	0.2548	0.101000	1.685	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.9500	0.3368	7.9557	0.0048	0.253088	2.586	1=H. AVERAGE; 1=L. AVERAGE
TECH	1	0.0522	0.3382	0.0238	0.8774	0.013686	1.054	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.2671	0.3719	0.5158	0.4726	0.064192	1.306	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 56.2%	Somers' D	= 0.276
Discordant	= 28.6%	Gamma	= 0.325
Tied	= 15.2%	Tau-a	= 0.014
(59320 pairs)		c	= 0.638

APPENDIX E. COMMANDER LOGIT MODEL RESULTS (BELOW-ZONE PROMOTION)

TABLE E.1 LOGIT RESULTS FOR COMMANDER SCREENED FOR COMMAND MODEL (BELOW-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: XOSCREEN
Response Levels: 2
Number of Observations: 204
Link Function: Logit

Response Profile

Ordered Value	XOSCREEN	Count
1	1	105
2	0	99

WARNING: 30 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	284.628	289.845	.
SC	287.946	316.390	.
-2 LOG L	282.628	273.845	8.783 with 7 DF (p=0.2686)
Score	.	.	8.482 with 7 DF (p=0.2920)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	1.0609	2.1486	0.2438	0.6215	.	2.889	Intercept
MALE	1	-1.5079	2.0360	0.5485	0.4589	-0.058208	0.221	1=MALE; 0=FEMALE
WHITE	1	0.8775	0.6906	1.6147	0.2038	0.099599	2.405	1=WHITE; 0=OTHER
MWC	1	-0.7071	0.3346	4.4659	0.0346	-0.170308	0.493	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.0633	0.3182	0.0396	0.8423	0.015780	1.065	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.0523	0.2945	0.0315	0.8592	0.014261	1.054	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.1331	0.2907	0.2096	0.6471	0.036326	1.142	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.3734	0.4006	0.8687	0.3513	0.073087	1.453	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 55.9%	Somers' D	= 0.191
Discordant	= 36.9%	Gamma	= 0.205
Tied	= 7.2%	Tau-a	= 0.096
(10395 pairs)		c	= 0.595

TABLE E.2 LOGIT RESULTS FOR COMMANDER PROMOTION MODEL (BELOW-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 204
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	199
2	0	5

WARNING: 30 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	48.963	57.983	.
SC	52.281	84.528	.
-2 LOG L	46.963	41.983	4.980 with 7 DF (p=0.6624)
Score	.	.	5.472 with 7 DF (p=0.6026)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	7.2945	6.9447	1.1033	0.2935	.	999.000	Intercept
MALE	1	-2.2695	6.5809	0.1189	0.7302	-0.087604	0.103	1=MALE; 0=FEMALE
WHITE	1	-1.1009	2.2322	0.2433	0.6219	-0.124953	0.333	1=WHITE; 0=OTHER
MWC	1	1.2168	1.0815	1.2659	0.2605	0.293081	3.376	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-1.4846	1.0284	2.0841	0.1488	-0.370123	0.227	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.9267	0.9520	0.9476	0.3303	-0.252917	0.396	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.4032	0.9397	0.1841	0.6678	0.110048	1.497	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	1.5096	1.2948	1.3592	0.2437	0.295491	4.525	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 74.8%	Somers' D	= 0.581
Discordant	= 16.7%	Gamma	= 0.635
Tied	= 8.5%	Tau-a	= 0.028
(995 pairs)		c	= 0.790

TABLE E.3 *LOGIT RESULTS FOR COMMANDER PERFORMANCE MODEL (BELOW-ZONE PROMOTION)*

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 204
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	30
2	0	174

WARNING: 30 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	172.370	179.406	.
SC	175.688	202.632	.
-2 LOG L	170.370	165.406	4.964 with 6 DF (p=0.5484)
Score	.	.	5.118 with 6 DF (p=0.5288)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.8064	3.0320	0.8568	0.3546	.	0.060	Intercept
MALE	1	1.9247	2.8699	0.4497	0.5025	0.074293	6.853	1=MALE; 0=FEMALE
WHITE	1	-0.6412	0.9735	0.4338	0.5101	-0.072772	0.527	1=WHITE; 0=OTHER
MWC	1	-0.6224	0.4701	1.7528	0.1855	-0.149908	0.537	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.5174	0.4475	1.3367	0.2476	0.128982	1.678	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.1453	0.4155	0.1223	0.7266	0.039657	1.156	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	-0.5795	0.4082	2.0158	0.1557	-0.158171	0.560	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 57.4%	Somers' D	= 0.241
Discordant	= 33.3%	Gamma	= 0.266
Tied	= 9.3%	Tau-a	= 0.061
(5220 pairs)		c	= 0.621

APPENDIX F. COMMANDER LOGIT MODEL RESULTS (IN-ZONE PROMOTION)

TABLE F.1 LOGIT RESULTS FOR COMMANDER SCREENED FOR COMMAND MODEL (IN-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: XOSCREEN
Response Levels: 2
Number of Observations: 6492
Link Function: Logit

Response Profile

Ordered Value	XOSCREEN	Count
1	1	2008
2	0	4484

WARNING: 6961 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	8033.155	7933.782	.
SC	8039.934	7988.009	.
-2 LOG L	8031.155	7917.782	113.373 with 7 DF (p=0.0001)
Score	.	.	116.528 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.9332	0.3070	9.2408	0.0024	.	2.543	Intercept
MALE	1	-1.2448	0.2730	20.7850	0.0001	-0.068334	0.288	1=MALE; 0=FEMALE
WHITE	1	-0.5480	0.1453	14.2318	0.0002	-0.055968	0.578	1=WHITE; 0=OTHER
MWC	1	0.0297	0.0615	0.2337	0.6288	0.007220	1.030	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.00470	0.0548	0.0074	0.9316	0.001279	1.005	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.2958	0.0548	29.1295	0.0001	-0.081104	0.744	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.3679	0.0588	39.0776	0.0001	0.093712	1.445	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.4032	0.0822	24.0424	0.0001	0.072956	1.497	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 53.0%	Somers' D	= 0.147
Discordant	= 38.3%	Gamma	= 0.161
Tied	= 8.8%	Tau-a	= 0.063
(9003872 pairs)		c	= 0.573

TABLE F.2 LOGIT RESULTS FOR COMMANDER PROMOTION MODEL (IN-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 6493
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	4392
2	0	2101

WARNING: 6960 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	8177.181	7950.714	.
SC	8183.959	8004.941	.
-2 LOG L	8175.181	7934.714	240.467 with 7 DF (p=0.0001)
Score	.	.	235.139 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	0.4297	0.3033	2.0073	0.1565	.	1.537	Intercept
MALE	1	-0.4293	0.2698	2.5332	0.1115	-0.023567	0.651	1=MALE; 0=FEMALE
WHITE	1	0.1027	0.1435	0.5123	0.4741	0.010490	1.108	1=WHITE; 0=OTHER
MWC	1	0.2989	0.0607	24.2099	0.0001	0.072600	1.348	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.4402	0.0541	66.1544	0.0001	0.119780	1.553	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.1330	0.0541	6.0351	0.0140	-0.036468	0.875	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.6286	0.0581	116.9565	0.0001	0.160150	1.875	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	0.3051	0.0812	14.1042	0.0002	0.055201	1.357	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 57.9%	Somers' D	= 0.226
Discordant	= 35.3%	Gamma	= 0.243
Tied	= 6.9%	Tau-a	= 0.099
(9227592 pairs)		c	= 0.613

TABLE F.3 ***LOGIT RESULTS FOR COMMANDER PERFORMANCE MODEL (IN-ZONE PROMOTION)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 6493
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	797
2	0	5696

WARNING: 6960 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	4837.517	4785.499	.
SC	4844.295	4832.948	.
-2 LOG L	4835.517	4771.499	64.018 with 6 DF (p=0.0001)
Score	.	.	64.094 with 6 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-2.4331	0.4323	31.6731	0.0001	.	0.088	Intercept
MALE	1	-0.2512	0.3846	0.4268	0.5136	-0.013791	0.778	1=MALE; 0=FEMALE
WHITE	1	0.1956	0.2046	0.9143	0.3390	0.019978	1.216	1=WHITE; 0=OTHER
MWC	1	0.0759	0.0866	0.7689	0.3805	0.018445	1.079	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.2666	0.0771	11.9598	0.0005	0.072543	1.305	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.4270	0.0770	30.7356	0.0001	0.117054	1.533	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.2589	0.0828	9.7742	0.0018	0.065956	1.295	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 53.6%	Somers' D	= 0.175
Discordant	= 36.1%	Gamma	= 0.195
Tied	= 10.3%	Tau-a	= 0.038
(4539712 pairs)		c	= 0.587

APPENDIX G. CAPTAIN LOGIT MODEL RESULTS (BELOW-ZONE PROMOTION)

TABLE G.1 LOGIT RESULTS FOR CAPTAIN SCREENED FOR COMMAND MODEL (BELOW-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: COSCREEN
Response Levels: 2
Number of Observations: 140
Link Function: Logit

Response Profile

Ordered Value	COSCREEN	Count
1	1	127
2	0	13

WARNING: 61 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	88.548	91.212	.
SC	91.489	114.745	.
-2 LOG L	86.548	75.212	11.336 with 7 DF (p=0.1246)
Score	.	.	16.208 with 7 DF (p=0.0233)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-5.2777	6.0327	0.7654	0.3817	.	0.005	Intercept
MALE	1	-1.2711	3.5690	0.1268	0.7217	-0.059228	0.281	1=MALE; 0=FEMALE
WHITE	1	-1.4748	3.5124	0.1763	0.6746	-0.068718	0.229	1=WHITE; 0=OTHER
MWC	1	-0.4664	0.8548	0.2977	0.5853	-0.090304	0.627	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-1.0458	0.6161	2.8815	0.0896	-0.289067	0.351	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.7831	0.6445	1.4763	0.2244	-0.199883	0.457	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.8195	0.6138	1.7826	0.1818	0.225578	2.269	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	11.1799	3.4848	10.2925	0.0013	0.520938	999.000	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 68.9%	Somers' D	= 0.468
Discordant	= 22.0%	Gamma	= 0.515
Tied	= 9.1%	Tau-a	= 0.079
(1651 pairs)		c	= 0.734

TABLE G.2 LOGIT RESULTS FOR CAPTAIN PROMOTION MODEL (BELOW-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 141
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	134
2	0	7

WARNING: 60 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	57.686	62.307	.
SC	60.635	85.897	.
-2 LOG L	55.686	46.307	9.380 with 7 DF (p=0.2265)
Score	.	.	22.131 with 7 DF (p=0.0024)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-14.6975	8.0599	3.3253	0.0682	.	0.000	Intercept
MALE	1	-0.8771	4.7688	0.0338	0.8541	-0.040724	0.416	1=MALE; 0=FEMALE
WHITE	1	-0.4817	4.6927	0.0105	0.9182	-0.022367	0.618	1=WHITE; 0=OTHER
MWC	1	-1.1346	1.1411	0.9886	0.3201	-0.219023	0.322	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	-0.7860	0.8215	0.9156	0.3386	-0.217321	0.456	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.7439	0.8601	0.7481	0.3871	0.189504	2.104	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.7264	0.8186	0.7875	0.3749	0.199818	2.068	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	19.9694	4.6551	18.4020	0.0001	0.927186	999.000	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 68.0%	Somers' D	= 0.509
Discordant	= 17.2%	Gamma	= 0.597
Tied	= 14.8%	Tau-a	= 0.048
(938 pairs)		c	= 0.754

TABLE G.3 LOGIT RESULTS FOR CAPTAIN PERFORMANCE MODEL (BELOW-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 141
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	140
2	0	1

WARNING: 60 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	13.890	24.443	.
SC	16.839	45.085	.
-2 LOG L	11.890	10.443	1.447 with 6 DF (p=0.9629)
Score	.	.	2.108 with 6 DF (p=0.9095)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	6.1979	17.0160	0.1327	0.7157	.	491.714	Intercept
MALE	1	-0.0509	12.3438	0.0000	0.9967	-0.002362	0.950	1=MALE; 0=FEMALE
WHITE	1	-1.8424	12.1459	0.0230	0.8794	-0.085542	0.158	1=WHITE; 0=OTHER
MWC	1	-1.4705	2.9511	0.2483	0.6183	-0.283869	0.230	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	1.5933	2.1221	0.5637	0.4528	0.440495	4.920	1=H. AVERAGE;0=L. AVERAGE
TECH	1	1.2723	2.2237	0.3273	0.5672	0.324091	3.569	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	1.5054	2.1149	0.5066	0.4766	0.414097	4.506	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 80.7%	Somers' D	= 0.807
Discordant	= 0.0%	Gamma	= 1.000
Tied	= 19.3%	Tau-a	= 0.011
(140 pairs)		c	= 0.904

APPENDIX H. CAPTAIN LOGIT MODEL RESULTS (IN-ZONE PROMOTION)

TABLE H.1 LOGIT RESULTS FOR CAPTAIN SCREENED FOR COMMAND MODEL (IN-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: COSCREEN
Response Levels: 2
Number of Observations: 2574
Link Function: Logit

Response Profile

Ordered Value	COSCREEN	Count
1	1	1564
2	0	1010

WARNING: 1965 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	3450.147	3346.766	.
SC	3456.000	3393.591	.
-2 LOG L	3448.147	3330.766	117.381 with 7 DF (p=0.0001)
Score	.	.	113.495 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-1.1045	1.5195	0.5284	0.4673	.	0.331	Intercept
MALE	1	-1.9508	1.4523	1.8043	0.1792	-0.029974	0.142	1=MALE; 0=FEMALE
WHITE	1	0.8835	0.3770	5.4926	0.0191	0.052287	2.419	1=WHITE; 0=OTHER
MWC	1	0.2908	0.1142	6.4830	0.0109	0.056889	1.338	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.0646	0.0837	0.5961	0.4401	0.017584	1.067	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.1185	0.0844	1.9714	0.1603	0.031586	1.126	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.4032	0.0866	21.7019	0.0001	0.105323	1.497	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	2.2126	0.2706	66.8504	0.0001	0.182591	9.139	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 53.4%	Somers' D	= 0.178
Discordant	= 35.6%	Gamma	= 0.200
Tied	= 11.0%	Tau-a	= 0.085
(1579640 pairs)		c	= 0.589

TABLE H.2 LOGIT RESULTS FOR CAPTAIN PROMOTION MODEL (IN-ZONE PROMOTION)

Data Set: WORK.ONE
Response Variable: PROMOTE
Response Levels: 2
Number of Observations: 2579
Link Function: Logit

Response Profile

Ordered Value	PROMOTE	Count
1	1	1457
2	0	1122

WARNING: 1960 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	3533.615	3449.602	.
SC	3539.470	3496.443	.
-2 LOG L	3531.615	3433.602	98.013 with 7 DF (p=0.0001)
Score	.	.	93.141 with 7 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	-4.5504	1.4966	9.2452	0.0024	.	0.011	Intercept
MALE	1	1.9268	1.4304	1.8147	0.1780	0.029577	6.868	1=MALE; 0=FEMALE
WHITE	1	0.5543	0.3713	2.2289	0.1355	0.032773	1.741	1=WHITE; 0=OTHER
MWC	1	0.3640	0.1124	10.4956	0.0012	0.071227	1.439	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.0340	0.0824	0.1709	0.6793	0.009261	1.035	1=H. AVERAGE;0=L. AVERAGE
TECH	1	-0.1119	0.0831	1.8137	0.1781	-0.029808	0.894	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.3045	0.0851	12.7908	0.0003	0.079545	1.356	1=USNA SOURCE; 0=OTHERWISE
PERFORM	1	1.9978	0.2665	56.1860	0.0001	0.164708	7.373	1=GOOD PERFORM;0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 52.7%	Somers' D	= 0.161
Discordant	= 36.6%	Gamma	= 0.181
Tied	= 10.8%	Tau-a	= 0.079
(1634754 pairs)		c	= 0.581

TABLE H.3 ***LOGIT RESULTS FOR CAPTAIN PERFORMANCE MODEL (IN-ZONE PROMOTION)***

Data Set: WORK.ONE
Response Variable: PERFORM
Response Levels: 2
Number of Observations: 2579
Link Function: Logit

Response Profile

Ordered Value	PERFORM	Count
1	1	2520
2	0	59

WARNING: 1960 observation(s) were deleted due to missing values for the response or explanatory variables.

Criteria for Assessing Model Fit

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	564.399	562.611	.
SC	570.254	603.598	.
-2 LOG L	562.399	548.611	13.788 with 6 DF (p=0.0321)
Score	.	.	16.643 with 6 DF (p=0.0107)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio	Variable Label
INTERCPT	1	2.2869	4.8918	0.2186	0.6401	.	9.844	Intercept
MALE	1	-1.4816	4.7428	0.0976	0.7547	-0.022743	0.227	1=MALE; 0=FEMALE
WHITE	1	2.0575	1.2304	2.7962	0.0945	0.121653	7.826	1=WHITE; 0=OTHER
MWC	1	0.4906	0.3725	1.7349	0.1878	0.095991	1.633	1=MARRIED/CHILD;0=OTHERWISE
HIGHAVG	1	0.7937	0.2726	8.4749	0.0036	0.215892	2.211	1=H. AVERAGE;0=L. AVERAGE
TECH	1	0.0734	0.2754	0.0710	0.7899	0.019552	1.076	1=BIO/MTH/ENG;0=SOC/BUS/HUM
USNA	1	0.4032	0.2822	2.0408	0.1531	0.105317	1.497	1=USNA SOURCE; 0=OTHERWISE

Association of Predicted Probabilities and Observed Responses

Concordant	= 57.0%	Somers' D	= 0.276
Discordant	= 29.3%	Gamma	= 0.320
Tied	= 13.7%	Tau-a	= 0.012
(148680 pairs)		c	= 0.638

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   Annapolis, MD 21402

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   Mozartstrasse 29
   26389 Wilhelmshaven
   GERMANY

9. LT. COL Napoleón E. Rivero.. 2
   Venezuelan National Guard
   1225 LEAHY Rd.
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