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THESIS

FULL-TIME VS. PART-TIME: AN EVALUATION OF THE COMPETITIVENESS OF RESERVE OFFICERS BY COMMISSIONING SOURCE

by

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This research examines whether the quality of officers commissioned under the Reserve Officer Commissioning Program (ROCP) differs from those officers who entered the reserve component with a prior period of active service. As the ROCP matures, more officers serve in the Selected Marine Corps Reserve (SMCR) without serving their initial service obligation in the active component. Officers commissioned via the ROCP will not have the same saturation of active service. I seek to determine whether the concept that active component service improves an officer's performance is true. Using measures of performance and retention, I analyze whether there is a difference between ROCP officers when compared to reserve officers with prior active service. The results show that while certain variables contribute to a statistically significant difference in relative values between the two groups of officers, the value of these differences is too small to be economically meaningful. Ultimately, I find that the performance of ROCP officers and officers with prior active service is similar.

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FULL-TIME VS. PART-TIME: AN EVALUATION OF THE COMPETITIVENESS OF RESERVE OFFICERS BY COMMISSIONING SOURCE

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	Active Component
AR	Active Reserve
CFT	Combat Fitness Test
CSC	Command and Staff College
CSS	Combat Service Support
EWS	Expeditionary Warfare School
FITREP	Fitness Report
GCT	General Classification Test
GPA	Grade Point Average
HQMC	Headquarters Marine Corps
IADT	Inactive Duty Training
IRR	Inactive Ready Reserve
IMA	Individual Mobilization Augmentee
MCRISS	Marine Corps Recruiting Information Support System
MOS	Military Occupational Specialty
MSO	Mandatory Service Obligation
MCR	Marine Corps Reserve
SelRes	Selected Reserve
OCS	Officer Candidate School
OLS	Ordinary Least Squares
PES	Performance Evaluation System
PFT	Physical Fitness Test
PME	Professional Military Education
PMOS	Primary Military Occupational Specialty
PS	Prior Service
RV	Relative Value
RS	Reporting Senior
ROCP	Reserve Officer Commissioning Program
RC	Reserve Component
SMCR	Selected Marine Corps Reserve

TBS	The Basic School
TFDW	Total Force Data Warehouse
RTC	Reserve Training Center
YOS	Years of Service

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I. INTRODUCTION

A. BACKGROUND

The Reserve Officer Commissioning Program (ROCP) was created to correct the low company grade officer staffing experienced in the Selected Marine Corps Reserve (SMCR), beginning with the end of the officer augmentation program in the late 1990s and persisting up to the mid-2000s after the beginning of the Iraq war. In 2006 at the program's inception, company grade officer staffing in the SMCR fell to 21% of the table of organization values (Brockway, 2021). Since then, staffing rates have increased to approximately 80% (Brockway, 2021). Despite this success, many senior officers look upon the program with skepticism and perceive the quality of the officers to be lower than that of an officer who began their career in the active component.

This research examines the quality of officers serving in the Selected Reserve (SelRes) to determine if the quality of ROCP officers differs from those officers who entered the reserve component with a prior period of active service. As the ROCP matures, more officers serve in the SMCR without serving their initial service obligation in the active component. Officers commissioned via the Reserve Officer Commissioning Program will not have the same amount of active service. This research seeks to determine if the concept that active component service improves an officer's capabilities is true. Using measures of performance and retention, this research analyzes if there is a difference between ROCP officers when compared to reserve officers with prior active service.

B. RESEARCH QUESTION

> What are the differences between ROCP officers and those officers who joined the reserve component with prior active component service?

C. SCOPE

This thesis is a descriptive analysis of reserve component officers' quality through an examination of their performance evaluations, commendations, training performance, education, and career statistics. These variables are selected because they are often used by promotion boards when reviewing an officer's record for promotion. These variables will

be used to describe how ROCP officers compare to officers who join the Marine Corps Reserve (MCR) with a prior period of active service. Officers who joined the MCR following a period of active service are henceforth referred to as prior service (PS) officers.

D. METHODOLOGY

My study estimates t-tests, quantile regression, and survival analysis models to assess if there is a statistically significant difference between ROCP officers and PS officers, using Marine Corps Manpower Personnel data on reserve officers and their performance evaluations, Quantile regression allows me to examine the differences between ROCP and PS officer across their performance distribution, and to estimate the effects of different independent variables at defined quantiles. Survival estimates allow me to determine which group of officers serves longer. Combining these results provides a description of Reserve Officers and how they differ based on their accession source.

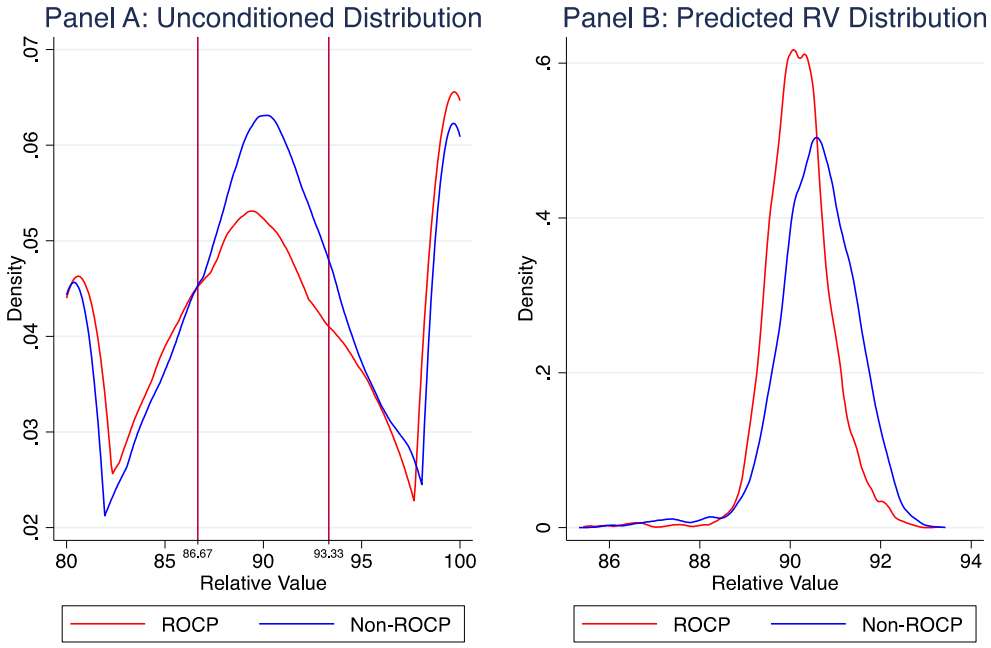
E. FINDINGS

I find that by and large, ROCP and prior service officers are similar in terms of their performance evaluations, commendations, training performance, education, and certain career statistics. The estimates suggest there is no statistically significant difference in the performance of ROCP officers from that of PS officers based on the relative values of their FitReps, both at processing and cumulatively. While some estimates show a statistically significant difference, the value of these differences is sufficiently low to provide no economic significance.

For instance, panel A of Figure 1 shows the raw relative value distributions of ROCP and PS officers at processing and cumulatively. Here we see a divergence in the middle third with PS officers having a quantity of reports in the middle third, while ROCP officer have slightly more reports in the lower and upper thirds. However, when taking into account military occupation skill (MOS) group, training performance, education and career descriptive characteristics, this trend is reversed. In panel B of Figure 1, which shows the adjusted or predicted relative values distribution, we see ROCP officers with more reports in the middle third, and no difference between the quantity of reports in the upper and lower thirds. This figure illustrates that once MOS characteristics and individual differences in

human capital such as training and education are taken into account, the performance evaluations of ROCP and PS officers are similar.

Figure 1. Relative Values Cumulatively



F. ORGANIZATION OF CHAPTERS

This research is organized into six chapters. Chapter II provides information on the reserve component, its manpower sources, and the ROCP. Chapter III reviews the existing literature relevant to this research. Chapter IV describes this study's data and methodology. Chapter V provides the results of this thesis. Chapter VI summarizes this research and identifies recommendations for future studies.

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II. BACKGROUND

A. INTRODUCTION

The unique service requirements of the reserve component are often misunderstood by those not affiliated with the MCR, therefore this background chapter addresses key reserve topics that are essential to understand the research. This chapter describes the organization of the MCR and the Marines Corps philosophy for reserve officer procurement.

B. ORGANIZATION OF THE MARINE CORPS RESERVE COMPONENT

Title 10 U.S.C. creates the reserve forces of the United States Military, calling for three specific elements of the reserve component. The Ready Reserve, the Standby Reserve, and the Retired Reserve. These reserve elements apply to all uniformed services and are further divided into reserve components by the services.

Within the Marine Corps, the Ready Reserve consist of reserve members who are required to train and are subject to mobilization (Headquarters, United States Marine Corps, 2018a). Members of the Standby Reserve are not required to train and are only subject to involuntary mobilization in the event of a national emergency as declared by Congress or a declaration of war (Headquarters, United States Marine Corps, 2018a). The Retired Reserve consists of all Marines, active and reserve, who have retired upon completing a minimum of 20 years of service and have been approved for retirement (Headquarters, United States Marine Corps, 2018a). The thesis is primarily focused on Ready Reserve officers because these members are participative by nature and receive evaluations, permitting comparison.

C. THE READY RESERVE

The Ready Reserve is further divided into the Selected Reserve (SelRes) and the Individual Ready Reserve (IRR). The SelRes is that part of the Ready Reserve consisting of Marines of SMCR units, Individual Mobilization Augments (IMA), Marines serving in

the Active Reserve (AR) program, and Marines serving on Initial Active Duty for Training (IADT). The categories of the SelRes are described in detail below:

- SMCR units are operational Marine Corps units, organized under Marine Forces Reserve. Service in the SMCR is characterized by training during one weekend per month and a two week period once per year (Dausman, 2016).

- Individual Mobilization Augments (IMA) are individual reserve Marines serving in a reserve status at an Active Component (AC) unit. The purpose of the IMA program is to provide an immediate manpower source to AC units for use in reaction to emerging crisis (Headquarters, United States Marine Corps, 2018a).

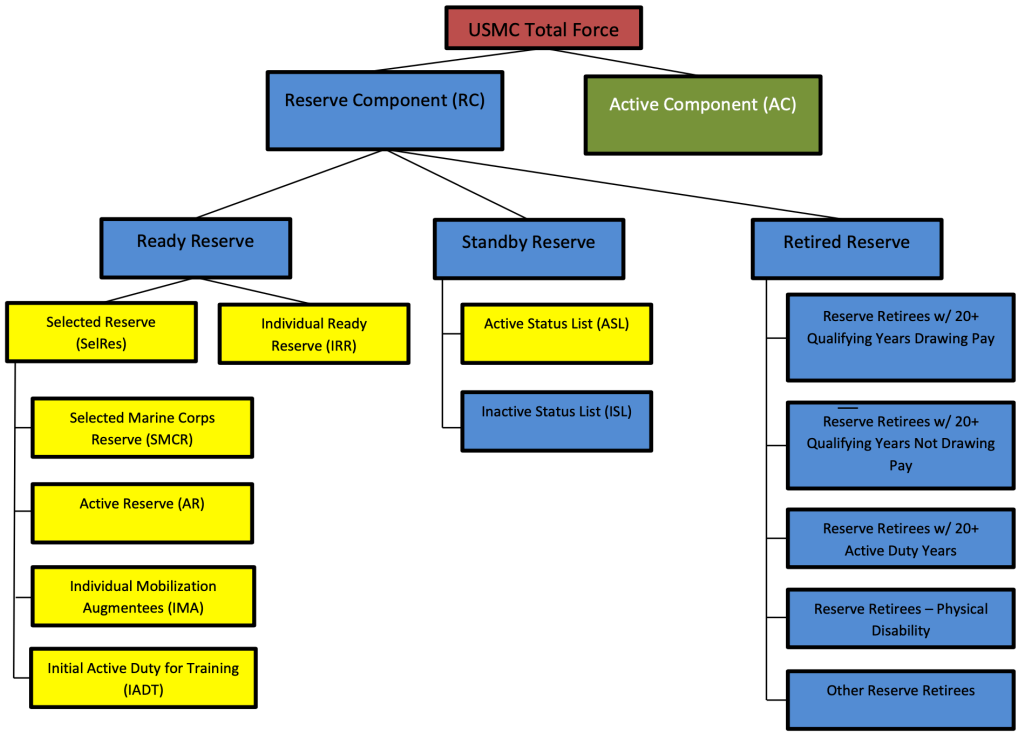
- The Active Reserve (AR) Program is a cadre of well-trained and experienced RC Marines who serve on full-time active duty to facilitate the activation and mobilization of RC Marines, and assist the AC with its Total Force integration roles and responsibilities (Headquarters, United States Marine Corps, 2019).

- Initial Active Duty for Training (IADT) - Marines in this category are in the process of completing their initial accession training (Dausman, 2016).

The Individual Ready Reserve (IRR) is a Service manpower pool, comprised primarily of individuals who have completed training, have served previously in the AC or SelRes, and are available for mobilization. IRR Marines have either not completed their Military Service Obligation (MSO) or have completed their MSO and desire to maintain their service affiliation without being assigned to a SelRes billet and are not accunatable to a mandatory service requirement (Headquarters, United States Marine Corps, 2018a).

While Reserve Marines generally have the freedom to choose how and in which area of the MCR they want to serve, each area has different service requirements. Marines in the SelRes are required to participate in 48 inactive duty training periods per year and complete a 2-week annual training period. However, members of the IRR must only maintain their contact information and attend a single muster event each year. The differences in service requirements often contribute to the decision Reserve Marines make regarding how they serve. Figure 2 summarizes the various component of the MCR.

Figure 2. Organization of the Marine Corps Reserve



Source: Components highlighted in yellow are elements of the Reserve Active-Status List (RASL) (Headquarters, United States Marine Corps, 2018, p. 1-5).

D. RESERVE OFFICER PROCUREMENT

The Marine Corps has two sources of procurement for Reserve officers. Non-prior Service officers are recruited by an Officer Selection Officer and enter service with no commissioned service. Prior Service Officers are officers who began their career with a period of active service before transitioning to the MCR. This section provides a brief history of reserve officer procurement and shows the necessity of the ROCP.

1. Augmentation

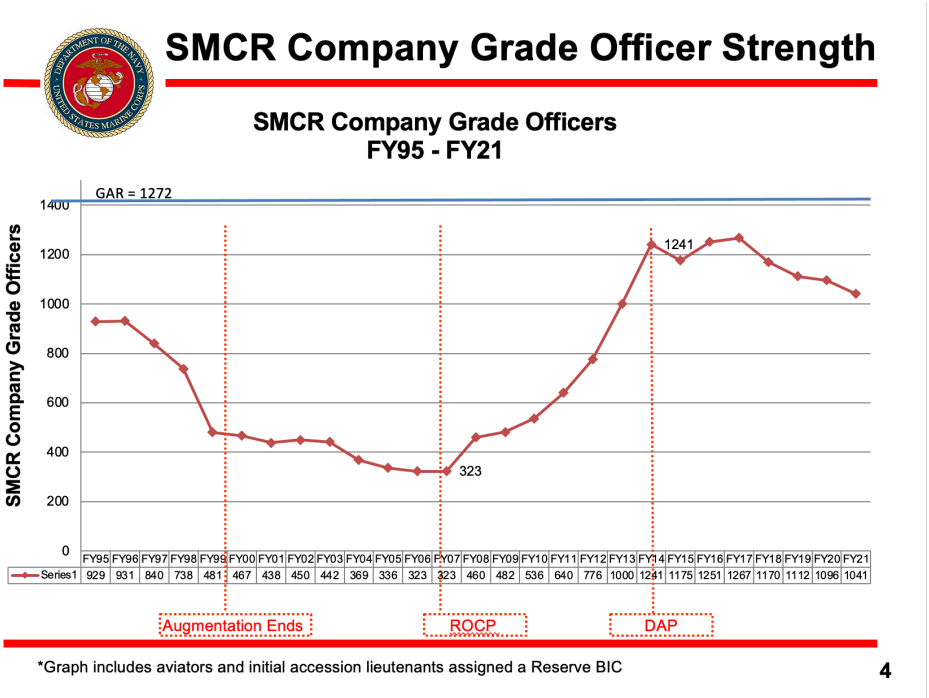
The augmentation system provides the MCR a stable source of officers allowing for a relatively high level of officer staffing. After 1996 all officers were required to complete one year of active service from a reserve component before appointment as a regular active officer (*National Defense Authorization Act for Fiscal Years 1992 and 1993*, 1991). The Marine Corps used an augmentation program to choose which officers would

receive an active-duty appointment. Those who were not augmented completed their mandatory service obligation with either an active or reserve unit. The augmentation program went through several changes and continued until it officially ended in 2005.

2. The Period between Augmentation and the Creation of ROCP

The changes to the augmentation program caused a gradual reduction in the number of officers available to the MCR. One of these changes occurred in 2000 when the Marine Corps began to automatically offer augmentation to all officers promoted to captain (Garza, 2014). A sharp reduction in the officer staffing levels of the MCR correlates with this policy change and is observed in Figure 3, which shows an approximately 25% staffing rate of company grade officers across the SMCR in the years leading up to the beginning of the ROCP. Anecdotally, as an enlisted member of the MCR serving between 1999 and 2007, I did not encounter a single Marine lieutenant during this period, despite serving in units that would typically have lieutenants within their ranks.

Figure 3. SMCR Company Grade Officer Staff between 1995 and 2021. Source: Brockway (2021).



3. The ROCP

The terrorist attacks of September 11th and the subsequent Global War on Terrorism drastically changed how the Marine Corps used its reserve forces. No longer just a strategic source of manpower, SMCR units were consistently found in the Global Force Management deployment rotations in support of Operations Iraqi Freedom and Enduring Freedom. The consequences of the increased use of the MCR combined with the staffing shortages in its company grade officer ranks is highlighted in a letter by First Sergeant David H. Foster to the Marine Corps Gazette. 1stSgt Foster who served as the Inspector-Instructor First Sergeant at a reserve unit described the staffing shortfalls at his company, saying the sole officer in his company was a Lieutenant Colonel who served as the Company's Commander (D. Foster, personal communication, September 2004) He goes on to say that the platoons in his company were all led by Sergeants, a position normally filled by Second Lieutenants. This personal description of staffing shortages reinforces the numerical representation found in Table 2.

The Marine Corps created the ROCP to correct the shortages of company grade officers in the SMCR and prepared the MCR for future operational employment. General Michael Hagee, the Commandant of the Marine Corps, in his White Letter to the Total Force in October 2006 stated:

> For decades, the Active Component has served as the primary source of officer accessions into the Marine Corps Reserve. As our regular officer accession practices have evolved into an all regular force, the pipeline of officers transitioning into the Reserve force has significantly decreased. Therefore, our reserve has been manned by more senior officers, often in billets more appropriate to a junior grade. As the demands on our Reserve has grown in support of the Global War on Terror, we have found ourselves with a significant shortage of junior officers in key leadership positions. (M. Hagee, personal communication, October 2006)

The increase in SMCR unit activations combined with severe shortages of company grade officers at the platoon level was the genesis for the ROCP. Since the inception of the ROCP, company grade officer staffing in the SMCR has increased to over 80% (Brockway, 2021).

E. CONCLUSION

Fifteen years of commissioning officers directly into the MCR has had several positive effects. First and foremost, the staffing rates of company grade officers have increased from record lows of approximately 25% to over 85% (Brockway, 2021). Initially created to address the requirements the service faced during the Global War on Terrorism period, the ROCP has grown into a positive source of manpower for the Marine Corps Reserve and had become a permanent accession source for the SMCR.

Despite the successful increase in company grade officers in the SMCR, concerns remain as to the viability and longevity of ROCP officers. Many question whether the officers commissioned under the ROCP will have the experience necessary to serve successfully later in their careers. To answer this question, my thesis explores the quality of reserve officers by examining the characteristics of an officer's record, using variables that a promotion board would review when considering an officer for promotion

III. LITERATURE REVIEW

A. INTRODUCTION

Defining what is quality in a reserve officer is complex. Successful reserve officers tend to have a balance of multiple attributes. These attributes are the focus of studies that span manpower topics. For example, an officer of higher quality may be someone who has consistently participated in reserve service regardless of reserve component type (i.e., higher retention), who has received higher marks on Fitness Reports, and/or who has mobilizations spread throughout his or her career. On the other hand, lesser quality officers may have spent more time in the IRR (an indicator of poor retention), could have lower markings on their fitness reports, and may have mobilized less frequently. Most officers will not exhibit these extremes but will have varying combinations of these characteristics. This creates a wide variety of manpower topics to consider, such as attrition, mobilization, promotion, and performance evaluation. This review analyzes how reserve-specific topics combine with performance evaluations, promotion selection, and career experiences to form a definition of quality.

B. RESERVE SPECIFIC TOPICS

1. Reserve Affiliation

The concept of affiliation is unique to the reserve component and describes a Marine's decision to participate in the reserve component by serving in an SMCR unit or an IMA detachment. Headquarters Marine Corps (HQMC) has several sources of manpower that combine to meet the staffing requirements of the SMCR and IMA. Currently, transitioning officers account for 77% of the SMCR officer recruiting requirement (Ottingnon, 2022). Most Marines leave the active component before completing their mandatory service obligation, necessitating a required period of reserve service. Marines fulfill their remaining service obligation either through time in the IRR or by affiliating with a reserve unit.

Marines leaving the AC who choose to continue their service by affiliating with a reserve unit are a major source of manpower for the MCR. The decision to affiliate is the

focus of Volume 1 of a two-volume study (Dolfini-Reed, 2012). Using data from the Total Force Data Warehouse, MCRISS and deployment data from the Contingency Tracking System Dolfini-Reed (2002) studied how factors such as demographics and service characteristics contribute to the affiliation decisions of reserve officers who separated from the AC and transitioned to the reserve component (RC) between October 2001 and September 2011. The results of their study showed that reserve officers' affiliation decisions are not impacted by previous active component combat deployments. Activations from the reserve component and state unemployment rates also have no impact on affiliation decisions. This shows the propensity for service that reserve officers maintain after leaving the AC. Rather, factors such as race, family size, education level, and rank, increase the likelihood of affiliating with a drilling reserve unit. Lastly, activations occurring while serving in the IRR are the only variable they found that negatively impacted affiliation.

The concept of affiliating with a reserve unit is unique to the MCR and highlights the freedom of choice that is associated with reserve service. This is a key distinction between AC service. However, as mentioned in Chapter II, this is also an area that initially differentiates ROCP officers from those with prior service since ROCP officers do not have the freedom to move between the IRR and the SelRes during their first four years of service. Understanding these differences is important when designing studies that compare these two groups of officers.

2. Reserve Attrition and Retention

a. Defining attrition

Attrition in the reserve component is not like active component attrition. Reserve Marines have many ways to serve. The SelRes is comprised of Marines serving in a SMCR unit, as a member of an IMA detachment, or in the AR Program. These categories require consistent participation in the reserve component. Service in the IRR requires no consistent participation. Reserve Marines can move between the SelRes and the IRR on their own accord, giving reserve Marine's flexibility that allows them to discontinue their

participation and return later. Without a participation requirement, joining the IRR is often equated to leaving the service.

The freedom of reserve Marines to move across reserve components causes researchers to describe attrition in different ways. The way a researcher describes attrition is reflective of the perspective of their study. For example, Dausman (2016) developed a Markov model for SMCR manpower inventory management, which focused strictly on the SMCR. As such he defined attrition as any departure from the SMCR (Dausman, 2016). Other researchers attempted to account for reentry into the SelRes from the IRR by counting the length of time spent in the IRR. For example, Schulte and Dolfini-Reed (2012) defined attrition as the first time a Marine switched to the IRR and stayed there for at least five months. The models developed in this study will similarly account for IRR switching using the Schulte and Dolfini-Reed method.

b. Analysis of attrition

The mandatory service requirements for first-term reserve officers are like those for active officers as described in Chapter II. Officers commissioned directly into the reserve component, must serve their first four years as a member of an SMCR unit. With the remaining four years of their initial service obligation, ROCP officers have the same flexibility as officers who transitioned to the reserve component from active service (Headquarters, United States Marine Corps, 2016). To make an apples-to-apples comparison, my research would have to account for the effects the mandatory SMCR participation has on ROCP officers. Accounting for these effects is not as simple as comparing ROCP officers only after they've completed their mandatory drill participation period, because during this initial period ROCP officers are forced to become accustomed to the uniqueness of reserve service. During this period ROCP officers will naturally accept the unique circumstances of reserve service. Whereas a former AC officer has the freedom to attrite if reserve service disagrees with their personal perceptions of how Marine Corps service should be.

Much of the research into reserve attrition and continuation focuses on the reserve enlisted population. However, a group of researchers from the Center for Naval Analysis

has presented studies that discuss reserve officers' attrition. Schulte and Dolfini-Reed (2012) highlighted the factors which influence officers' continuation decisions. They found that as officers increase in rank they were less likely to leave the SelRes (Schulte & Dolfini-Reed, 2012, p. 43). This may be reflective of the fact that as an officer progresses through the ranks, they become incrementally closer to retirement and therefore are influenced by the decision based on their retirement prospects. In the same study, Schulte and Dolfini-Reeds also show that the decision to remain in the SelRes is positively correlated with a state's unemployment rate. As unemployment rises, so does the rate at which officers leave the SelRes. This may be explained by the challenges related to balancing a civilian career with the requirements of reserve service. In poor economic times, officers may be less willing to make sacrifices to their civilian careers for reserve requirements.

3. The ROCP

Very little literature exists that focuses on the direct commission of officers into a reserve component of the armed forces. Griffin and Dolfini-Reed (2017) is the sole study into the ROCP. Commissioned by HQMC when the ROCP was approximately 10 years old, the research team sought to determine the effects of commissioning officers directly into the reserve component (Griffin & Dolfini-Reed, 2017). Their findings helped to answer several concerns from decision makers and formulate future policy with regards to the ROCP. The areas that the researchers focused on began with a comparison of the performance of ROCP officers and their active component counterparts during initial accession training, The Basic School (TBS) and Officer Candidate School (OCS). Next, they conducted a survival analysis to determine how long ROCP officers served in the SelRes after completing their initial service requirement.

ROCP officers perform comparably to their active component peers during initial accession training at Officer Candidate School and the Basic School. To examine performance, the researchers used a logistics regression to analyze the difference in the mean attrition rate at OCS, and the performance scores at TBS. This analysis shows that while ROCP officers attrite from OCS at higher rates, the difference is not statistically significant. The examination of TBS performance yielded similar results that showed a 1-

point lower GPA score for reserve officers, on average (Griffin & Dolfini-Reed, 2017, p. 20). While the researchers found this difference to be statistically significant, decision makers should seek to determine if this is economically significant. The purpose of this study is to help answer this question by determining if TBS performance has an impact on the career progression of reserve officers.

There is a positive relationship between the amount of time a ROCP officer spends on active duty (from the reserve component) and their continuation rate in the SMCR. The researchers right-censored their data, limiting their analysis to those who commissioned between 2007 and 2011 (Griffin & Dolfini-Reed, 2017). 17% of ROCP officers fail to complete their initial service obligation of four years, of those that do complete their initial service obligation, 80% remain in the SMCR to the 54 month mark, and 65% stay to the 60 month mark (Griffin & Dolfini-Reed, 2017, p. 25). Using logistic regressions, the researchers show a strong positive correlation between the ROCP officers with active-duty time, and the likelihood they not only complete their initial service obligation, but also the likelihood they will continue to the 54- and 60-month marks. Their results show 89% of officers with active-duty experience will complete their initial service obligation, compared to 72% for those who do not. Additionally, the researchers show that 73% of officers with active-duty time will continue to 54 months, and 59% will continue to 60 months, while 44% and 30% of those without will continue to the same time frames (Griffin & Dolfini-Reed, 2017, p. 29). While these findings certainly bode well for the longevity of the ROCP, as the researchers note. The results are limited by the amount of data available at the time of this study. Further analysis could expand on these results to examine the effects of active-duty time on the career progression of reserve officers as they become eligible for promotion to the field grade officer ranks.

C. STUDIES OF QUALITY

Quality has different meanings to different people and is strongly informed by culture, experience, and precedence. Many researchers have conducted studies that attempted to measure quality, each defining quality in different ways. Stoltenberg (2017) recognized that quality is not truly measurable; in the conclusion to his thesis he says,

"Quality is a nebulous term that has different meanings to different people or organizations and statistical analyses of quality may not capture the whole picture" (Stolzenberg, 2017). This is an important distinction to understand as the Marine Corps begins to fulfill the goals the Commandant of the Marine Corps set forth in his talent Management 2030 initiative.

Researchers have used a mixture of independent variables to describe quality. A few examples are fitness report marks, awards profiles, service characteristics—such as time in service, commissioning source, and MOS, Training performance—such as fitness tests and marksmanship scores, and experiences—such as specific key billets or the number of combat deployments. This certainly isn't an exhaustive list but provides insight into the variables that should be included in this research.

The Fitness Report (FITREP) is the primary means that Reporting Seniors (RS) use to communicate a Marine's potential for promotion to the promotion selection board (Headquarters, United States Marine Corps, 2018b). It provides a summary of a Marine's performance and can be used to build a picture of a Marine's experience and career development. The fitness report covers objective training information such as marksmanship and physical fitness scores, but also includes a more subjective ranking system called the performance-anchored rating scale composed of five areas, each containing different attributes, 14 in total (Headquarters, United States Marine Corps, 2018b). The 14 attributes are assigned a value on a scale of 1–7, which is then used to generate an average value for the report. Using the fitness report average a relative value (RV) is generated based on the overall evaluation history of a given RS. The RV places a FITREP on a scale of 80–100. Two specific RVs are available. The first is RV at processing and is found using the RSs average when the report was written. The second is RV cumulative and is found using the RSs cumulate average accounting for all reports written after the specific report in question. RV allows the board to see Marines grouped by the number of reports they have that are in the top, middle and bottom third of this scale. This system allows the FITREP to be used to quantify the quality of Marines as determined by the totality of their Reporting Seniors and Reviewing Officers..

Several studies have shown a correlation between relative values and various career milestones, including career designation, promotion to various grades, and retention. For

example, Stolzenberg (2017) used various components of the FITREP to predict the probability of promotion to Lieutenant Colonel. He found a strong correlation between RV and individual FITREP attributes with the probability of promotion to Lieutenant Colonel. Regarding specific attributes, he found that seven were strongly correlated with promotion, with Performance and Setting the Example being the most significant. Dunst (2018) used RVs as part of his examination of the overall evaluation system finding significant variance in how RVs change as an RS learns about the Marines they report on. They were also significant differences by race. Part of the study conducted by Garza (2014) showed a positive correlation between the probability of career designation and the number of reports an officer has with an RV average binned in the upper third when compared to the lower third. The literature shows that data from a FITREP is often a key variable, however it combines with an officer's awards profile, career experience, and training history to contribute to the overall picture of quality. These other attributes, while less important should be considered as part of any model that attempts to define officer quality.

While the literature tends to rely on many of the same independent variables to describe quality, the dependent variables used vary widely. An example of this is seen in Ergun's (2003) study where he defined quality as the achievement of various career milestones. His research sought to determine if officers from different commissioning sources achieved career milestones at different rates. The career milestones Ergun focused on were TBS performance, achievement of 10 years of commissioned service, and promotions to Major and Lieutenant Colonel. Other studies have used the achievement of specific grades or career designation as a proxy for quality as well but more narrowly define the population of interest.

D. CONCLUSION

The existing body of research identifies the relevant independent variables that contribute to quality. These variables such as length of service characteristics, training performance variables, education levels, and MOS Groupings are common across many studies. However, each study takes a different perspective defining the dependent variable as attainment of a predefined career milestone such as career designation, promotion to

specific ranks, or selections for command. This is a key distinction across the literature, and reinforces the statement that quality means different things to different people.

This study is differentiated by its focus on reserve officers. While there is extensive research that attempts to describe the quality-of-service members, few papers focus specifically on reserve forces. My thesis offers an understanding of how ROCP officers may differ from officers with prior active service. This concept will become more important as ROCP officer become more prevalent in the SelRes,

IV. DATA AND METHODOLOGY

A. DATA DESCRIPTION

1. Data Sources and Preparation

The primary data for this study is provided by the HQMC Total Force Data Warehouse (TFWD). TFDW is a repository of personnel and training information from systems across the Marine Corps. The data in TFDW is stored based on an individual's ID and by sequence numbers that equate to a specific monthly entry. Variables available cover recruiting and accession information, basic personnel information and training and performance records.

The data for my study includes TFWD sequences 203 to 390 which equates to monthly snapshots of all officers from January 2006 to August 2021. I combine a database from the National Bureau of Economic Research (NBER) containing zip code pairs and the distance between then with the TFDW data set to provide the distance between an officer's home and their Reserve Training Center (RTC) by zip code. The initial data set contains 4,287,348 observations and 47,402 individual Marines. The initial data set is in panel form organized by an officer's encrypted ID and the sequence number on each observation.

I first create an indicator variable to identify ROCP officers. An officer's source of entry code determines their commissioning program. All Marines have a source of entry codes that reflect the recruiting program through which they joined the service. I create the ROCP indicator using the specific entry codes that apply to ROCP.

The Marine Type variable is a categorical variable that describes the component that a Marine serves. This variable changes throughout a Marines Career. Reserve officers have a Marine Type code that reflects the area of the MCR in which they serve. ROCP officers conducting initial accession training, OCS, TBS and MOS school begin with the Marine Type Code "IADT" to reflect this training, which is changed to SMCR after they complete training and join their first SMCR unit. Because all ROCP officers are required to serve their first four years in the SMCR, I changed the IADT Marine Type to SMCR.

PS officers begin with Marine Type "active duty." Since this is a study of reserve officers, I drop all observations with Marine type of active duty. This cuts out the active portion of a PS officers' career, and marks the first sequence in which they appear in the data the same month they joined the SelRes. Lastly, I drop observations where dates of commission occur before the beginning of the ROCP program.

The component code variables are categorical variables that describe the type of service a Marine is performing. Reserve Marines have two component code categories. The Component Code depicts active-duty service, and the Reserve component Code shows different types of reserve service. When a reserve Marine is not serving on active duty, their Component Code is blank. Periods of active duty that occur during a reserve Marines career are shown as changes to the Component Code variable. Using these changes, I created an variable that indicates if a Marine is on active duty during the given TFDW sequence. I then sum the number of times this occurs for each Marine to give a count of months they serve on active duty. Using the component code variable allows me to limit this count of active service months to only those that occur from the reserve component. For PS officers this excludes their time in the active component, and for ROCP officers, this excludes their time on active duty for initial accession training. The more time a reserve officer spends on active duty may indicate a higher level of experience.

Similar to how I use the component code to count the number of months on active duty, I also use the component code to count the number of times a reserve officer is mobilized. The distinction between months on active-duty and the total number of mobilizations is important because of the many different types of active duty a reserve Marine may perform. Each type of active-duty results in different experiences associated with the duties assigned during that period. Although an examination of active experiences and the duties performed during active service is beyond the scope of this study, I recognize that mobilization is a unique form of active service for reserve Marines, one that typically is conducted in support of a named operation and is associated with duties that are more important to the service than other types of active duty.

The dispersed nature of SMCR units often requires reserve officers to commute to the RTC where they are assigned. Although the cost of this travel is reimbursable up to

$500 for those who live further than 150 miles from their RTC, it does not cover other non-monetary costs which may contribute to a reserve officer's decision to leave the SMCR (Dempsey, 2021). To account for this, I create a distance variable by first matching the zip codes of a reserve officer's primary residence and their SMCR unit, to the zip codes pairs from the 500-mile distance file from the NBER. I then record the distance from this file as the distance a reserve officer travels to their reserve unit. To supplement the distance variable, I also create an indicator variable to show if an officer lived less than 50 miles, between 50 and 150 miles and over 150 miles from their RTC. These distances are reflective of the distances required to earn various entitlements for travel.

I create several variables to describe the characteristics of an officer's career. First, I use the date associated with an observations sequence number and an officer's Pay Entry Base Date to create a variable to measure an officers total Years of Service (YOS). Next, I create a variable to measure years of commissioned service by subtracting the date of commission from an observations sequence date. I count the months spent serving in the SelRes by subtracting the date of the first sequence they enter the data from their attrite date. I also create a categorical variable to show the cohort each officer belongs to using their date of commission. Using a categorical variable, I group officers by their PMOS to assess any differences based on MOS groups. The MOS groups I use are Combat Service Support, containing the PMOSs: 0102, 0203, 0204, 0206, 0207, 0402, 0602, 3002 and 5803; Combat Arms, containing the PMOSs: 0302, 0303, 0802, 1302, 1803; and Aviation Ground, containing the PMOSs: 6002, 6602, 7208, 7210 7220. I limit my analysis to these PMOSs because these are the only ones available to ROCP officers.

I also create variables to describe the education an officer has received. First, I create three indicator variables to show an officer level of civilian education; less than college includes education levels below a bachelor's degree, the variable college shows those with a bachelor degree, and another indicator variable coveres all degrees beyond the bachelor level. Next, I create indicator variables to show the level of Professional Military Education an officer has completed. These variables indicate completion of the Expeditionary Warfare School, and Command and Staff College.

The last step in preparing the data for analysis is to merge the data files together. I merge the data using an individual's encrypted ID number and the observations' sequence number. I create two analytical data sets for the analyses below. In one file, the unit of observation is an individual Fitness Report. I merge this FitRep data with the TFDW dataset using ID and sequence date, matching the sequence year from the TFDW data to the to or end date of each FitRep. This final data set contains 26,225 FitRep observations for 5,160 unique individuals. The second analytical data set I use for survival analysis. Its unit of observation is an individual-month and it contains more than 240,000 observations.

2. Dependent Variables

As I discuss in the literature review, the definition of quality is frequently tied to the achievement of a career milestone, such as career designation, promotion to specific grades or selection for command. Only the first five ROCP cohorts have the length of commissioned service necessary for promotion to Major, and none of those have the length required for promotion to Lieutenant Colonel or command selection. Without a career benchmark to use as a proxy for quality, my study uses variables that our promotion boards review as they make promotion decisions.

I define quality as a combination of relative value and retention. The Marine Corps Manual on its Performance Evaluation System (PES) specifically refers to relative value as a "boardroom metric" (Headquarters, United States Marine Corps, 2018b). The PES manual goes on to describe relative value as a metric that compares how a FitRep compares to all other FitReps a given Reporting Senior has written on Marines of the same grade. The total relative values of all FitReps written on a Marine provide the promotion board a simple way to compare the performance markings of a single Marine against all others in competition with them.

The second variable I use to describe quality is a measurement of the amount of time a reserve officer participates with a training reserve unit. Unlike the active component, reserve retention is more fluid because a reserve Marine has the freedom to move amongst the reserve components, making retention more of a measurement of the amount of time reserve officers participate. Forty-eight training periods are the minimum amount of

training periods to maintain good standing (Headquarters, United States Marine Corps, 2018a). I use retention to four, eight, ten, and sixteen years as measures of the length of an officer's participation. These time frames generally align with officer promotion timelines. Table 1 describes the dependent variables I use to depict quality in reserve officers.

Table 1. Description of Dependent Variables

Dependent Variables					
Variables	Count	Mean	SD	Min	Max
Relative Value at Processing	3838	94.78	5.562	80	100
Relative Value Cumulatively	3838	94.58	5.746	80	100
Attrite before 4 years of service	5160	0.31	0.462	0	1
Attrite before 8 years of service	5160	0.43	0.495	0	1
Attrite before 10 years of service	5160	0.44	0.496	0	1
Attrite before 16 years of service	5160	0.45	0.497	0	1

3. Independent Variables

The independent variables I use in this study are categorized into five areas designed to describe a reserve officer and their career. Tables 2–6 provides summary statistics of the independent variables.

Demographics include race, age, and marital status. Ethnicity is missing from the data provided by TFDW. The average age of reserve officer in my data is 33 years.

Table 2. Description of Demographic Variables

Demographic Variables					
Variables	Count	Mean	SD	Min	Max
Age	5160	33.55	4.485	20.9	62.1
Married	5160	0.62	0.485	0	1
Male	5160	0.92	0.267	0	1
Race	5160	4.99	0.089	2	5

Education variables depict the levels of civilian education and Professional Military Education (PME) obtained by the officers in the sample. I use three categories to describe civilian education. The variable showing officers with less than a bachelor's degree is necessary due to an enlisted-to-officer commissioning program that offers commissioning before a bachelor's degree is obtained. This accounts for a small portion of the population.

The variables describing PME depict an officers' completion of PME given their grade. Captains are required to complete the Expeditionary Warfare (EWS) School before promotion to Major, and Majors are required to complete the Command and Staff College (CSC) before promotion to Lieutenant Colonel. Both variables reflect completion of these PME courses while holding the appropriate grade.

Table 3. Description of Education Variables

Education Variables					
Variables	Count	Mean	SD	Min	Max
Level of Civilian Education	5160	2.29	0.569	0	3
PME complete for Grade	5160	0.27	0.442	0	1

The training performance variables include variables that reflect an officer's mental aptitudes, physical fitness, and marksmanship abilities. The General classification Test (GCT) evaluates an officer's math, reading, and reasoning skills to measure their mental aptitude (Garza, 2014). The GCT variable is a continuous variable that shows the maximum GCT score they have obtained.

The Physical Fitness Test (PFT) and the Combat Fitness Test (CFT) are annual training requirements for all Marines that gauge their level of physical fitness. Both are scored on a 300-point scale, and officers are culturally expected to maintain a first-class score which equates to a minimum of 235 points. The PFT and CFT score variables are continuous variables that account for an officer's maximum score obtained each year.

The Marine Corps Combat Marksmanship Program divides marksman qualifications into three categories, Expert Sharpshooter, and Marksman (Headquarters,

United States Marine Corps, 2014). The Rifle and Pistol Qualification variables are categorical variables that account for marksmanship qualification.

Table 4. Description of Training Performance Variables

Training Performance Variables					
Variables	Count	Mean	SD	Min	Max
GCT	5160	10.46	34.334	0	153
PFT	5099	275.32	27.085	0	300
CFT	5041	290.08	28.971	0	300
Rifle	5160	1.5	0.705	0	3
Pistol	5160	1.86	0.789	0	3

The career characteristics variables show attributes of an officer career that describe how long they have serviced, the number of times they have mobilized, how far they travel to participate as a reserve member, and their commendations. The Years of Service Variable capture an officer's total years of service, both active and reserve, and include any prior enlisted time. The Years of Reserve Service variable provide the number of years an officer has served in the SelRes. The months of active-duty variable shows the total number of months an officer has served on active duty from the reserve component. Higher values may depict higher levels of experience. Of note, the years of reserve service variable do not include any active-duty time an ROCP officer spent in initial accession training. A mobilization count is included as a separate variable because, even though a mobilization is a form of active duty, this type of active duty is always linked to a named operation and therefore may describe an additional level of experience. The number of awards variable is a count of the total number of personal awards an officer has received. Personal awards may be indicative of a higher level of performance. Lastly, a commuting distance variable is included in this category to show how far a reserve officer travels from their primary residence to their Reserve Training Center. Officers who travel further to serve in key billets may be considered more committed.

Table 5. Description of Career Characteristics Variables

Career Characteristic Variables					
Variables	Count	Mean	SD	Min	Max
Months of Active Service (from the RC)	5160	7.03	12.892	0	147
Number of mobilizations	5160	0.26	0.573	0	4
Distance Category (<50, 50–150 >150 miles)	5160	3	0.072	1	3
Number of Awards	5160	3.16	3.216	0	49

The last MOS category contains four categorical variables that group officers based on their MOS. Table 7 depicts the specific MOSs that compose each category. Of note, the CSS, Air Ground and Combat Arms groups only contain MOSs that are open to ROCP officers.

Table 6. Description of MOS Group Variables

MOS Groups					
Variables	Count	Mean	SD	Min	Max
CSS MOSs	5160	0.39	0.487	0	1
Air Ground MOSs	5160	0.07	0.248	0	1
Combat Arms MOSs	5160	0.32	0.465	0	1
MOSs not open to ROCP	5160	0.5	0.500	0	1

Table 7. MOS Groups

Group	MOSs
CSS MOSs	0102, 0203, 0204, 0206, 0207, 0402, 0602, 3002, 5803
Air Ground MOSs	6002, 6602, 7208, 7210, 7220
Combat Arms MOSs	0302, 0303, 0802, 1302, 1802

My final dataset includes ROCP officers and PS officers, who have a date of commission after the Reserve Officer Commissioning Program began. I removed PS officers with the rank of Second Lieutenant since these are typically newly commissioned officers who are assigned to an SMCR unit for accountability before attending the Basic School and therefore are not relevant to my research.

B. METHODOLOGY

The primary goal of my research is to determine the differences between ROCP officers and PS officers. I accomplish this goal through a statistical analysis using STATA 16. I describe these differences using a variety of techniques including t-tests, quantile regression, survival analysis and kernel density estimations.

I begin my analysis using t-tests to determine any differences in the mean values between PS and ROCP officers in their dependent and independent variables. I report the mean values and t-tests that show any significant differences at the 95% confidence level.

Following the t-test, to provide a visual representation of the differences in the relative values of ROCP and PS officers, I estimate and display kernel densities. Kernel density estimators approximate the distribution of relative values to provide a graphical representation of the differences between ROCP and PS officers across the distribution.

Next, I estimate quantile regression models to determine how the independent variable categories correlate with the performance of officers in the SelRes. These five variable categories have been found to be significant in previous studies as discussed in the previous chapters (Ergun, 2003; Garza, 2014; Stolzenberg, 2017b). Specifically, the following equation depicts the quantile regression function $Q_\tau(y\ )$ I estimate for each quantile τ in the performance outcome *y* distribution. I first separately relate each category of independent variables *x* (e.g., demographic variables) with variation in the relative value distributions of SelRes officers, and then I include all the categories into *x*. Interactions of each independent variable with the ROCP indicator show the difference between the two groups.

$$Q_\tau(y_i) = \beta\ (\tau)x_i \quad i = 1, \ldots, n$$

where the dependent variable, y_i, is a Marine's Relative Value on their Fitness Report *i* and *x* is a vector including the independent variables described in Tables 2–6 above. $\beta\ (\tau)$ is the vector of regression coefficients estimated at the τth quantile. I implement simultaneous quantile regressions for the different τ's and obtain the variance-covariance of quantile regression coefficients using bootstrapping.

Koenker (2005) describes quantile regression as providing a more complete view of the relationships between stochastic variables. Unlike Ordinary Least Squares (OLS) which fits a model relating independent variables to the mean of the dependent variable by minimizing squared deviations to this conditional average, quantile regressions can examine those relationships across the conditional distribution of the dependent variable by minimizing absolute deviations at defined quantiles.

Using quantile regression in my study allows me to explore whether the effects of the independent variables vary across percentiles of the Relative Values distribution. I use the 25th, 50th and 75th percentiles to correspond to the bottom, middle, and top quarter of the overall distribution. This approach allows my analysis to take on a similar appearance to how relative values are presented on the MBS and in the promotion board room (Headquarters, United States Marine Corps, 2018b).

Meanwhile, survival analysis is a statistical technique that analyzes the length of time until a particular event (e.g., attrition) occurs. To determine the differences in retention between ROCP and PS officers, I estimate a Cox Proportional Hazards model. To characterize duration or the length of time spent in the Reserve Component, I use the variable SelRes-months measuring the total number of months an officer serves in the SelRes before attrition occurs. Attrition is indicated by the attrite variable where attrite=1 if an officer attrites, and attrite=0 if they have not. The equation representing the model I estimate is:

$$h(m|x) = h_0(m)e^{x\beta_x}$$

where h() indicates the hazard for attrition at month m and h_0 indicates the baseline hazard.

The Cox proportional hazards model assumes the hazard rate is proportionally affected by covariates. The hazard rate is not an absolute proportion, instead $h(m|x)$ indicates the probability an officer attrites in the next month given they have survived to the current month m, and given the x covariates.

The covariate of interest, rocp, is the indicator variable that takes the value of one if an officer is an ROCP officer and zero if they are a PS officer. When the covariate of interest is a categorical variable, nonparametric methods such as Kaplan and Meier are useful for comparing the survival experiences between the two. I also use a Kaplan-Meier survival estimate to provide a graphical representation of the amount of time reserve officers serve in the SelRes.

To account for a reserve officer's ability to move between the SelRes and IRR, I needed to ensure that any switch to the IRR was permanent. Using the TFDW sequence number, I searched for any gaps in the sequences greater than five. If an officer had a gap of more than five sequences, I labeled the last sequence present in the data as their survival failure observation. Previous studies found five months in the IRR to be indicative of attrition (Schulte & Dolfini-Reed, 2012).

C. CONCLUSION

This chapter describes the data and the empirical models I estimate. I explain the methods I use to clean, and merge the data sets, and the variables I create to achieve my analysis. Variable descriptions and summary statists are presented to describe the final data set. Finally, I outline the quantile regression and survival models I estimate in this study.

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V. RESULTS

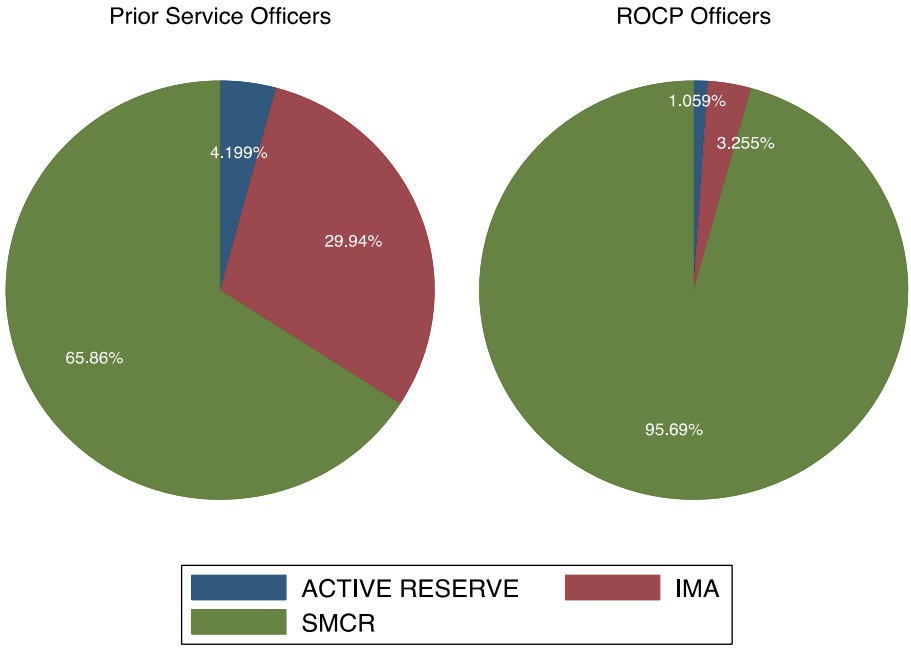
A. INTRODUCTION

I first present general trends in the reserve officer population to show the relative proportions of ROCP officers serving across the SelRes compared to that of Prior Service officers. I present similar comparisons across the MOSs open to ROCP officers and by grade. Then I map where reserve officers live in relation to where RTC are located. Lastly, I show the results from the quantile regression and survival estimates.

B. GENERAL TRENDS

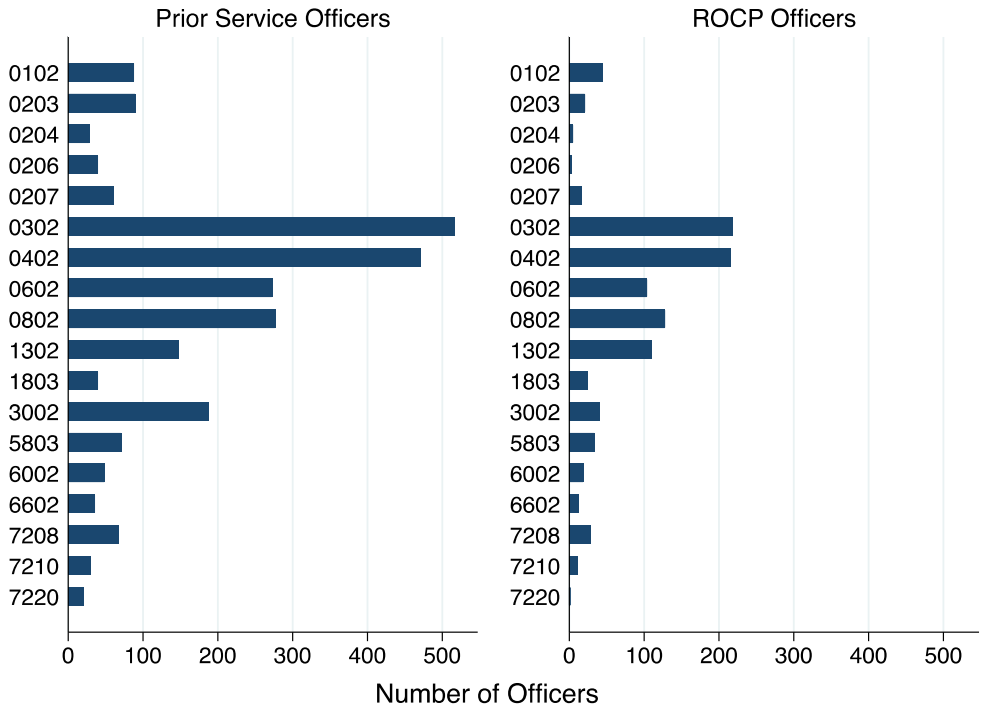
Figure 4 shows the percentage of officers that serve in the reserve components. Not surprisingly, most officers serve in the SMCR. However, a significantly higher percentage of ROCP officers serve in the SMCR, and a significantly higher percentage of prior service officers serve in the IMA. This is reflective of the HQMC recruiting plans for reserve officers that recruits prior service officers IMA units and ROCP officers for SMCR units (Ottingnon, 2022), and suggests that officers tend to serve longer in the component for which they were recruited.

Figure 4. Officer Participation across the Reserve Components



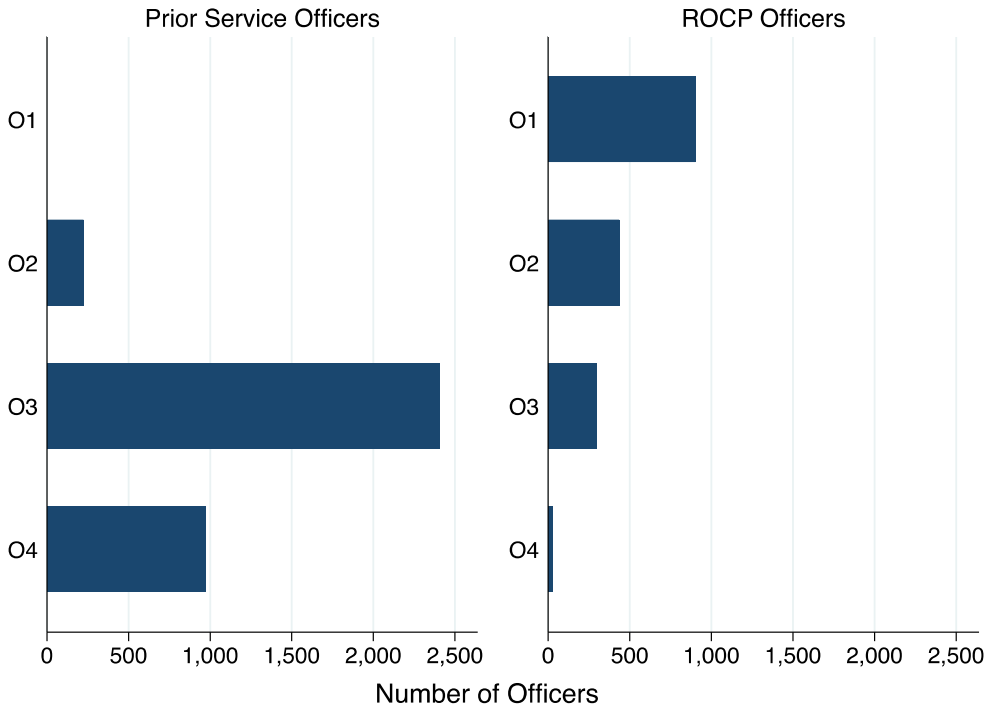
ROCP Officers serve in MOSs at similar proportions as Prior Service officers. Figure 5 shows the distribution of reserve officers across MOSs. The MOSs included in this graph is limited to the MOSs open to ROCP officers while at TBS. This graph shows PS and ROCP officers are distributed across the MOSs similarly. The preponderance of officers are in Infantry (0302), Logistics (0402), Communications (0602) or Artillery (0802).

Figure 5. Officer Proportions by MOS



Prior service officers begin their service with a required four-year period in the active component. The time in grade requirements for promotion to First Lieutenant and Captain prevents Second Lieutenants and most First Lieutenants from transitioning to the reserve component while serving in these grades. As discussed in the background chapter, this lack of junior company grade officers was part of the reason the ROCP came to exist. Conversely, all ROCP officers enter reserve service as Second Lieutenants. Therefore, the rank distribution of ROCP officers, takes on the pyramid shape that is typical of the military rank structure. Figure 6 highlights these differences.

Figure 6. Officer Proportions by Grade



C. SUMMARY STATISTICS

Table 8 provides summary statistics for the officers in my final sample. I present the summary statistics for two groups, ROCP officers and prior service officers. ROCP officers include 9974 observations and Prior Service Officers contain 16251 observations. I conduct a t-test of the hypothesis that there is no significant difference in means between ROCP officers and PS officers across the variables of interest. The differences in column 3 of Table 8 show the magnitude of the mean difference between the two officer categories, and the number of stars indicate the level of statistical significance of that difference (p-value of the tested hypothesis). Those variables whose difference has a negative value indicate that Prior Service officers have a lower mean score than ROCP officers.

The summary statistics show there is not a significant difference between mean relative values of ROCP and PS officers in aggregate. This is the first indication that ROCP officers perform similarly to PS officers. The differences between the remaining variables

show significance at the 99% confidence level, but do not amount to an economically significant difference. For example, the differences in PFT and CFT scores are statistically significant at the 99% confidence level, with ROCP officers scoring 8.42 and 8.20 more points on average, respectively, on a 300-point scale. However, not only is the magnitude of this difference small, but the average scores in all cases equate to high first-class scores, which is culturally expected of Marine Officers.

As expected, the career lengths of reserve officers show statistically significant difference. In terms of years of total service, PS officers have an average of 5.6 more years served than ROCP officers, which is to be expected given the lower density of Lieutenants found in the PS officer category. The average amount of time PS officers spend in the active component before transitioning to the RC can be found by subtracting the amount of total service from the amount of reserve service of PS officers. This yields 4.31 years of active service. Comparing this number to the number of months ROCP officers spend on active duty (from the RC) shows the potential for an imbalance in experience between the two categories of officers. Further analysis should be conducted to determine how active-duty experience impacts the long-term capabilities and performance of reserve officers.

Table 8. Summary Statistics for ROCP and PS Officers

	ROCP		Prior Service		Difference
Variable	Mean	SD	Mean	SD	(PS – ROCP)
RS Relative Value at Processing	91.32	6.22	91.27	5.88	-0.05
RS Relative Value Cumulatively	90.94	6.39	90.83	6.06	-0.11
Age	30.29	4.41	33.83	3.78	3.53***
Married	0.43	0.49	0.67	0.47	0.25***
Male	0.96	0.19	0.9	0.29	-0.06***
Less Than Bachelor's	0.04	0.18	0	0.05	-0.03***
Bachelor's Degree	0.84	0.37	0.79	0.4	-0.05***
Post Graduate Degree	0.36	0.48	0.31	0.46	-0.05***
EWS completed as Capt	0.93	0.26	0.89	0.31	-0.03**
CSC completed as Maj	0.55	0.5	0.56	0.5	0
GCT Score	5.22	24.76	0.22	5.23	-5.00***
PFT Score	270.49	32.01	262.07	44.61	-8.42***
CFT Score	285.33	34.35	277.13	47.69	-8.20***
Rifle Marksmen	0.06	0.23	0.08	0.28	0.02***
Rifle Sharpshooter	0.28	0.45	0.24	0.43	-0.03***
Rifle Expert	0.72	0.45	0.73	0.45	0
Pistol Marksmen	0.21	0.41	0.2	0.4	-0.01*
Pistol Sharpshooter	0.38	0.48	0.41	0.49	0.03***
Pistol Expert	0.49	0.5	0.49	0.5	0
Years of Service	5.94	4.8	11.34	3.88	5.40***
Years of Reserve Service	8.7	4.01	7.03	3.67	-1.67***
Years of Commissioned Service	4.16	3	9.75	3.2	5.59***
Months of Active Service (from RC)	17.21	18.55	6.97	12.01	-10.24***
Number of Mobilizations	0.45	0.73	0.19	0.46	-0.26***
Commuting Distance to RTC by category	3	0.07	2.99	0.1	-0.00**
Number of Personal Awards	2.39	3.33	4.36	3.57	1.97***
CSS MOSs	0.34	0.47	0.38	0.49	0.04***
Air Ground MOSs	0.05	0.21	0.06	0.24	0.01***
Combat Arms MOSs	0.34	0.48	0.27	0.44	-0.07***
MOSs not available to ROCP officers at TBS	0.27	0.44	0.29	0.45	0.02**

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Kernel density estimation of relative values further shows how the performance of ROCP officers is similar to those of PS officers. Figures 7 and 8 depict these estimates for the relative values at processing and cumulatively. Overall, the plots for both ROCP and PS officers are very close to one another. The graphs are divided into thirds to mirror the manner that relative values are presented in the Marine Corp promotion system. The relative values at processing and cumulatively appear to diverge primarily in the middle third, with more prior service officers scoring in the middle third while slightly more ROCP score at the top and bottom thirds. These differences are not overly different, however, indicating that both groups of officers perform similarly to one another.

Figure 7. Relative Values at Processing

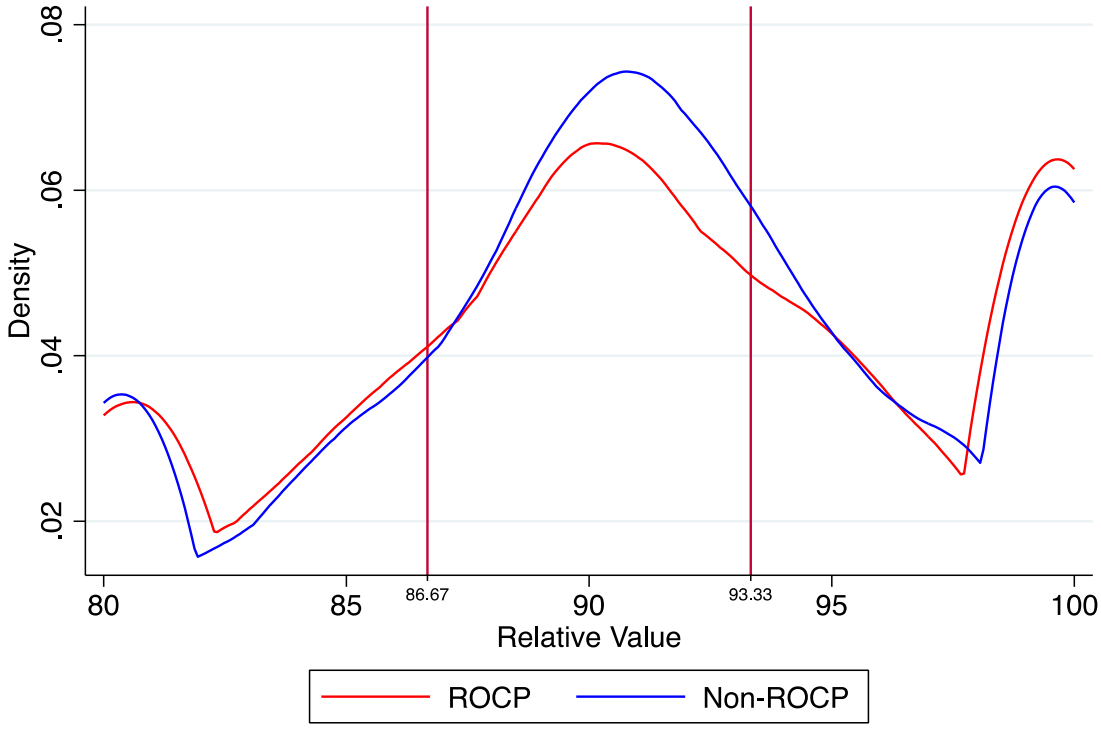
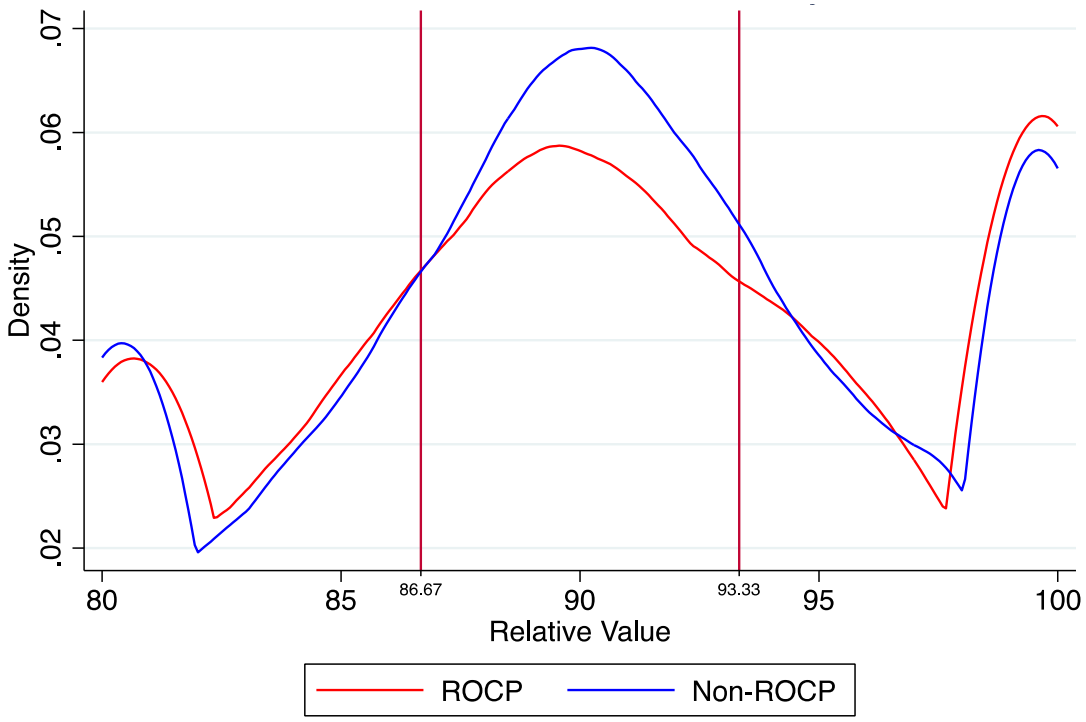


Figure 8. Relative Value Cumulative



D. QUANTILE REGRESSIONS

I present the results of the quantile regressions based on the categories of variables previously described in Chapter IV and provide results at the 25th, 50th, 75th quantiles. Due to space constraints, only the ROCP and interaction variables are presented in the tables. I begin with models regressing relative values at processing and then with cumulative relative values as the dependent variable. The results from my quantile regression suggest that there is no difference in the performance of ROCP and PS officers. The coefficients provided in Tables 9–13 show the expected change in relative values at processing based on a change in an independent variable, while holding all other variables constant. The constants displayed in Tables 9–13 represent the relative value for PS officers at those percentiles.

1. Relative Values at Processing

a. MOS groups

The first model correlates an officers' MOS with the relative values of their FitReps, utilizing the MOS group variable. The MOS Group variable was introduced in Chapter IV, and divides the MOSs into three categories, CSS, Air Ground, and Combat Arms MOSs. This grouping indicates the distinct sub-cultures of each group of MOSs; I expect relative values to differ across these communities. While the linear coefficients on MOS Groupings are significant as expected (see the appendix, Table 20), the coefficients on these MOS variables interacted with ROCP are not significant at any of the quantiles tested. Table 9 shows that the relative values of ROCP versus PS do not significantly vary within these broad MOS groups.

Table 9. Effects of MOS Group on Relative Value at Processing

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	-1.134**	-0.137	1.310
	(0.5240)	(0.3639)	(0.8634)
CSS MOSs x ROCP	0.415	0.003	-0.169
	(0.7057)	(0.3791)	(0.9743)
Air Ground MOSS x ROCP	0.464	-0.834	-1.370
	(1.0645)	(0.9037)	(1.8269)
Combat Arms MOSs x ROCP	1.089	0.148	-1.320
	(0.6757)	(0.4701)	(0.8732)
Constant	87.672****	91.542****	95.821****
	(0.1842)	(0.1338)	(0.1889)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

b. Demographic variables

The next model examines the impact of an officer's demographics on their relative values, and whether these impacts vary for ROCP versus PS officers. ROCP versus PS officers from two race categories show a significant difference in their relative values. Black ROCP officers have relative values that are 19 points lower than black PS officers, at the 25th quantile, and 17 points lower at the 50th quantile or median. This indicates that black ROCP officers have evaluations that are lower than black PS officers. Additionally, ROCP officers who did not provide a race also have lower relative values, by 13 points at the 25th and 50th quantiles and nine points at the 75th quantile. Assuming not providing race information on their personnel forms was not intentional, this may be indicative of a general lack of attention to detail that is also later observed by their reporting seniors and results in lower relative values.

The coefficients on the ROCP variable at the 25th quantile has significantly higher RVs by 13.71 points. This continues at the 50th Quantile, 13.61 points more, and at the 75th quantile, 10.47 points more than PS Officers. This is evidence that at all quantiles, ROCP officers have higher performance that PS officers. However, this only occurs when conditioning on demographics, but not when conditioning on MOS groupings (Table 9), training performance (Table 11), education (Table 12) and career characteristics (Table 13). I infer from this that while unconditionally ROCP officer might have higher RVs than PS officers, once job characteristics are taken into account, there is no statistical difference across the distribution in RVs between ROCP and PS officers as described in Chapter 1.

Table 10. Effects of race on Relative Value at Processing

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	13.171**	13.612****	10.469**
	(5.2906)	(3.4701)	(4.1179)
Married x ROCP	0.470	0.165	-0.348
	(0.4051)	(0.3029)	(0.4772)
Black x ROCP	-19.117**	-17.022**	0.737
	(8.8479)	(8.5232)	(9.1919)
White x ROCP	-7.452	-8.655	-11.457
	(6.6011)	(5.3729)	(7.2277)
Race not Provided x ROCP	-13.711***	-13.641****	-9.343**
	(5.0797)	(3.3357)	(4.0307)
Constant	85.490****	85.490****	89.531****
	(4.0333)	(3.1344)	(3.5116)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

c. Training Performance variables

The training performance category includes variables that capture an officer's physical and mental capabilities. These include their PFT and CFT scores, marksmanship qualifications and GCT score. PFT is the only variable in this category that has a significant effect on relative values for ROCP versus PS. A one-point increase in an ROCP officers PFT scores increase their relative values by 0.012 points at the 50th quantile and 0.019 points at the 75th quantile, compared to PS officers at the same quantiles. Given the fact that the range of possible PFT scores is 0–300, a tenths of a point change is not meaningful, despite the difference being significant at the 95% confidence level.

Table 11. Effects of Training Performance Metrics on Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	0.480	-5.230**	-2.328
	(4.7218)	(2.5387)	(3.5937)
GCT Score x ROCP	-0.004	0.001	-0.017
	(0.0142)	(0.0176)	(0.0113)
PFT Score x ROCP	0.001	0.012**	0.019**
	(0.0050)	(0.0055)	(0.0085)
CFT Score x ROCP	-0.005	-0.003	-0.004
	(0.0051)	(0.0052)	(0.0069)
Pistol Experts x ROCP	0.045	2.617	-3.802
	(3.8467)	(2.5648)	(4.4491)
Pistol Sharpshooter x ROCP	0.930	3.149	-2.757
	(3.7378)	(2.5553)	(4.2509)
Pistol Marksmen x ROCP	0.949	3.110	-2.674
	(3.8199)	(2.6401)	(4.4103)
Rifle Expert x ROCP	-0.369	-0.420	2.440
	(2.6039)	(1.9896)	(2.5371)
Rifle Sharpshooter x ROCP	-0.292	-0.344	1.966
	(2.6673)	(1.9683)	(2.7394)
Rifle Marksmen x ROCP	-1.876	-1.852	-0.001
	(2.5473)	(1.9799)	(2.6116)
Constant	82.899****	88.287****	91.342****
	(3.4684)	(1.4739)	(2.1143)
Observations	14954		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

d. Education variables

The education category of variables includes two types of education. The PME complete variable includes the completion of Command and Staff College as Majors, and Expeditionary Warfare a School as Captains. Although Professional Military Education is required for all officers, completing the required course for an ROCP officer grade does not cause a statistically significant change in relative value, compared to PS officers. Level of civilian education is the second variable in this category. ROCP officers who hold a

bachelor's degree have relative values that are 1.66 points lower than PS officers with a bachelor's degree. This is significant at the 95% confidence level.

Table 12. Effects of Education on Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	1.474*	0.134	1.488
	(0.7986)	(1.4905)	(1.5909)
PME Complete x ROCP	-0.234	0.201	-0.646
	(0.4032)	(0.4565)	(0.5072)
Less than a Bachelors Degree x ROCP	-4.059	-1.782	-1.427
	(2.6151)	(1.9683)	(1.9154)
Bachelors Degree x ROCP	-1.665**	0.021	-0.289
	(0.7742)	(1.4869)	(1.6091)
Postgraduate Degree x ROCP	-1.143	0.102	-0.601
	(0.7078)	(1.5052)	(1.5642)
Constant	87.762****	91.370****	95.455****
	(0.4583)	(0.3711)	(0.4363)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

e. Career descriptive variables

The final category of variables examines how career characteristics change relative values between PS versus ROCP officers. Two coefficients in this category are statistically significant. Years of service is significant at the 90% level at the 25th quantile, 99% at the 50th quantile and 95% at the 75th quantile. At the 25th quantile, every additional year of service for ROCP officers yields a 0.077-point increase to relative value compared to PS. At the 50th quantile, every additional year of service yields a 0.106-point increase in relative value. And at the 75th quantile every additional yar of service yields a 0.-point increase in relative value. However, like other coefficients with significance, these values are not economically meaningful.

Table 13. Effects of Career Characteristics on Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	-3.144	-0.350	4.330
	(3.6464)	(5.1566)	(3.7437)
Years of Service x ROCP	0.077*	0.106***	0.100**
	(0.0443)	(0.0345)	(0.0470)
Reserve Years of Service x ROCP	-0.036	-0.018	-0.044
	(0.0454)	(0.0430)	(0.0458)
Years of Commissioned Service X ROCP	-0.067	-0.107*	-0.160
	(0.0816)	(0.0593)	(0.1115)
Months of Active Service (from RC) x ROCP	-0.006	-0.007	0.016
	(0.0202)	(0.0130)	(0.0133)
Number of Mobilizations x ROCP	0.199	-0.075	-0.600
	(0.5099)	(0.4078)	(0.4721)
Commuting Distance to RTC between 50–150 miles x ROCP	7.869*	0.514	-4.094
	(4.2613)	(4.3023)	(4.5194)
Commuting Distance to RTC >150 Miles x ROCP	3.278	0.752	-2.565
	(3.8367)	(5.1307)	(3.8709)
Constant	88.183****	93.313****	95.703****
	(1.7445)	(0.8337)	(1.8026)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

2. Cumulative Relative Values

The results from quantile regression on cumulative relative values are similar to those observed for relative values at processing. Tables 14–18 present the results of these regressions.

a. MOS groups

Table 14 displays coefficients from the MOS group model. The combat arms coefficients, at the 25th quantile, is statistically significant at the 90% confidence level. ROCP officers with combat arms MOS have relative values 1.089 points higher, at the 25th quantile. None of the other coefficients in this category are significant. While the linear coefficients on MOS Groupings are significant as expected (see the appendix, Table 25), the coefficients on these MOS variables interacted with ROCP are not at any of the quantiles tested.

Table 14. Effects of MOS Group on Cumulative Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	-1.134**	-0.137	1.310
	(0.5728)	(0.4352)	(0.8680)
CSS MOSs x ROCP	0.415	0.003	-0.169
	(0.7817)	(0.5157)	(0.8541)
Air Ground MOSs x ROCP	0.464	-0.834	-1.370
	(0.9685)	(0.8879)	(1.7023)
Combat Arms MOSs x ROCP	1.089*	0.148	-1.320
	(0.6293)	(0.4965)	(0.9355)
Constant	87.672****	91.542****	95.821****
	(0.1598)	(0.1146)	(0.2099)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

b. Demographic variables

Several of the coefficients in the demographic variable category show significance at varying levels. Black ROCP officers have relative values that are 19 points lower, at the 25th quantile with 99% confidence, and 17 points lower at the 50th quantile with 95% confidence than black PS officers. White ROCP officers have relative values that are 7.5 points lower at the 25th quantile, 8.7 points lower at the 50th quantile and 11.5 points lower

at the 75th quantile than with PS officers. Lastly, ROCP officers who do not provide a race have relative values that are 13 point lower at the 25th and 50th quantile and nine points lower at the 75th quantile, than PS officer without a race reported.

Table 15. Effects of race on Cumulative Relative Value

	25th Quantile	50th Quantile	75th Quantile
	q25	q50	q75
ROCP	13.171****	13.612****	10.469**
	(3.3846)	(3.2149)	(4.1973)
Married x ROCP	0.470	0.165	-0.348
	(0.3683)	(0.2750)	(0.3352)
Black x ROCP	-19.117***	-17.022**	0.737
	(6.2642)	(6.6790)	(8.2231)
White x ROCP	-7.452*	-8.655*	-11.457**
	(4.4529)	(4.5441)	(5.5002)
Race not Provided x ROCP	-13.711****	-13.641****	-9.343**
	(3.4216)	(3.1965)	(4.2403)
Constant	85.490****	85.490****	89.531****
	(3.9105)	(4.7196)	(4.2223)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

c. Training Performance variables

The PFT coefficient is significant at the 99% confidence level at the 50th quantile, and 95% confidence at 75th quantile. Every additional point on the PFT yields an increase in relative values by 0.012-points at the 50th quantile, and an increase of 0.019 points at the 75th quantile. The remaining coefficients are insignificant.

Table 16. Effects of Training Performance Metrics on Cumulative Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	0.480	-5.230***	-2.328
	(4.2354)	(1.9497)	(4.3881)
GCT Score x ROCP	-0.004	0.001	-0.017
	(0.0146)	(0.0258)	(0.0114)
PFT Score x ROCP	0.001	0.012***	0.019**
	(0.0051)	(0.0047)	(0.0080)
CFT Score x ROCP	-0.005	-0.003	-0.004
	(0.0048)	(0.0036)	(0.0050)
Pistol Expert x ROCP	0.045	2.617	-3.802
	(4.0899)	(2.1881)	(3.9555)
Pistol Sharpshooter x ROCP	0.930	3.149	-2.757
	(4.2358)	(2.3160)	(3.9885)
Pistol Marksmen x ROCP	0.949	3.110	-2.674
	(4.2699)	(2.2760)	(4.0114)
Rifle Expert x ROCP	-0.369	-0.420	2.440
	(1.5142)	(1.9070)	(2.5861)
Rifle Sharpshooter x ROCP	-0.292	-0.344	1.966
	(1.4996)	(2.0313)	(2.6373)
Rifle Marksmen x ROCP	-1.876	-1.852	-0.001
	(1.5928)	(2.1088)	(2.4141)
Constant	82.899****	88.287****	91.342****
	(3.3379)	(1.9222)	(2.3377)
Observations	14954		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

d. Education Variables

The coefficient showing ROCP officers with less that a bachelor's degree is significant at the 99% level. ROCP officer without a bachelor's degree have relative values that are 4.1 points lower. However, it should be noted the data contain no PS officers without a bachelor's degree, because it is a requirement for commissioning into the active component.

Table 17. Effects of Education on Cumulative Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP=1	1.474	0.134	1.488
	(0.9915)	(1.1052)	(1.7687)
PME Complete x ROCP	-0.234	0.201	-0.646
	(0.3001)	(0.3183)	(0.5244)
Less than a Bachelors Degree x ROCP	-4.059***	-1.782	-1.427
	(1.5431)	(1.1894)	(2.5130)
Bachelors Degree x ROCP	-1.665	0.021	-0.289
	(1.0135)	(1.0856)	(1.7878)
Postgraduate Degree x ROCP	-1.143	0.102	-0.601
	(1.0434)	(1.1221)	(1.7289)
Constant	87.762****	91.370****	95.455****
	(0.4835)	(0.2708)	(0.4626)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

e. Career Descriptive Variables

The coefficient showing the years of service ROCP officers have is significant at the 95% level. Each additional year of service an ROCP officer has increases cumulative relative values by 0.106-points at the 50th quantile. The remaining coefficients are not significant.

Table 18. Effects of Career Characteristics on Cumulative Relative Value

	25th Quantile q25	50th Quantile q50	75th Quantile q75
ROCP	-3.144	-0.350	4.330
	(5.2288)	(5.3881)	(5.8127)
Years of Service x ROCP	0.077	0.106**	0.100
	(0.0576)	(0.0492)	(0.0652)
Years of Reserve service x ROCP	-0.036	-0.018	-0.044
	(0.0677)	(0.0325)	(0.0574)
Years of Commissioned Service x ROCP	-0.067	-0.107	-0.160
	(0.0751)	(0.0683)	(0.1125)
Months of Active Service (from RC) x ROCP	-0.006	-0.007	0.016
	(0.0130)	(0.0083)	(0.0147)
Number of Mobilizations x ROCP	0.199	-0.075	-0.600
	(0.3074)	(0.2708)	(0.3841)
Commuting Distance to RTC 50–150 miles x ROCP	7.869	0.514	-4.094
	(6.0465)	(5.4341)	(5.4065)
Commuting Distance to RTC >150 miles x ROCP	3.278	0.752	-2.565
	(5.4231)	(5.3583)	(5.6240)
Constant	88.183****	93.313****	95.703****
	(2.5649)	(1.2891)	(1.9157)
Observations	15022		
R-Squared			

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Recall the kernel density plots that showed the relative values at processing and cumulatively appear to diverge in the middle third with PS officers tending to have more reports with RVs in the middle third, while ROCP officer have slightly more reports at the top and bottom thirds. However, this trend is reversed when relative values are conditioned on job characteristics such as MOS grouping, training performance trends, education, and career characteristics. The quantile regressions above show that once these job characteristics are conditioned on, there is no statistically significant difference between ROCP and PS officers (as indicated by the coefficient on ROCP).

Figures 9 and 10 show the adjusted or predicted relative values when conditioned on MOS grouping, training performance trends, education, and career characteristics. In these kernel density plots, more ROCP officers are observed with RVs in the middle third, but the same amount with reports in the upper and lower thirds.

Figure 9. Predicted Relative Values at Processing

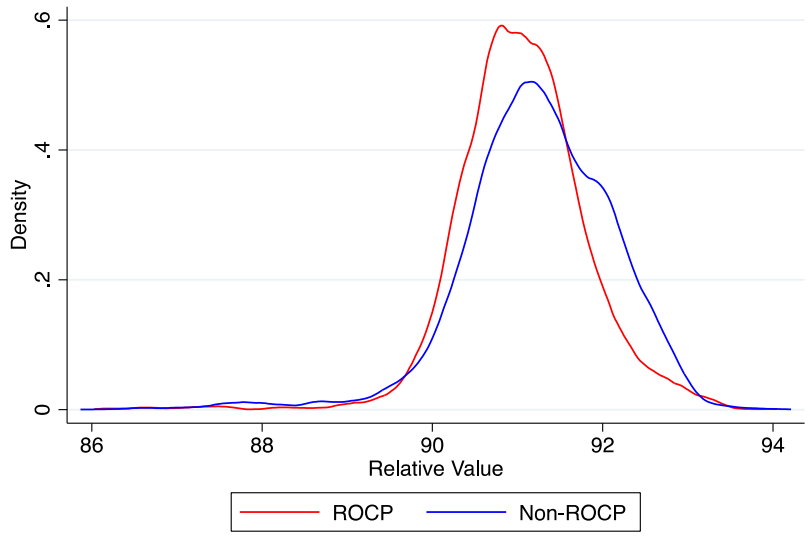
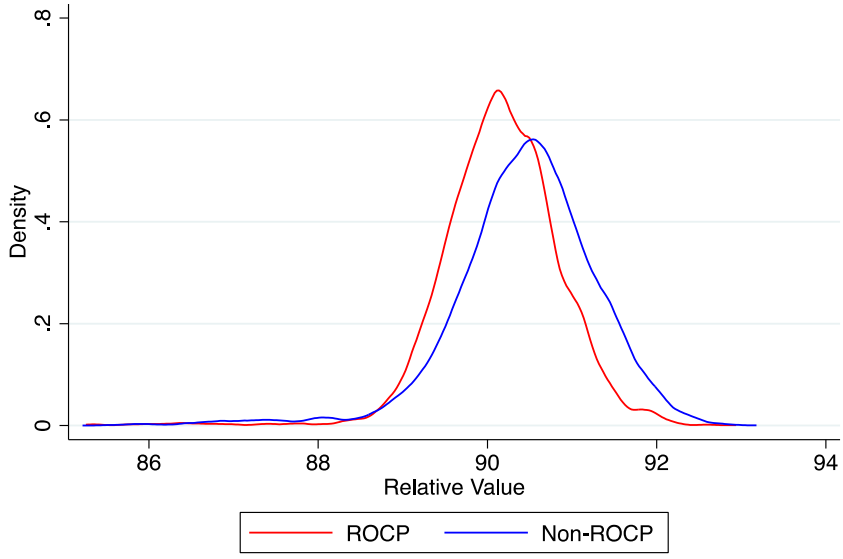


Figure 10. Predicted Relative Values Cumulatively



E. RETENTION TRENDS

I use survival and duration analysis to examine how lon reserve officers serve in the SelRes before transitioning to the IRR and at what time event does this occur. Table 19 present the survival model results and the linear probability model results for ROCP officers and PS officers, respectfully. All the coefficients are statistically significant, at the 99.9% confidence level. The probability of attrition for ROCP officers is 48.3%, and the probability of attrition for PS officers is 93%. Compared to PS officers, ROCP officers have a 0.7-percentage points lower probability of attrition at four years of SelRes Service and 0.4-percentage point lower probability of attrition at 8, 10 and 16 years.

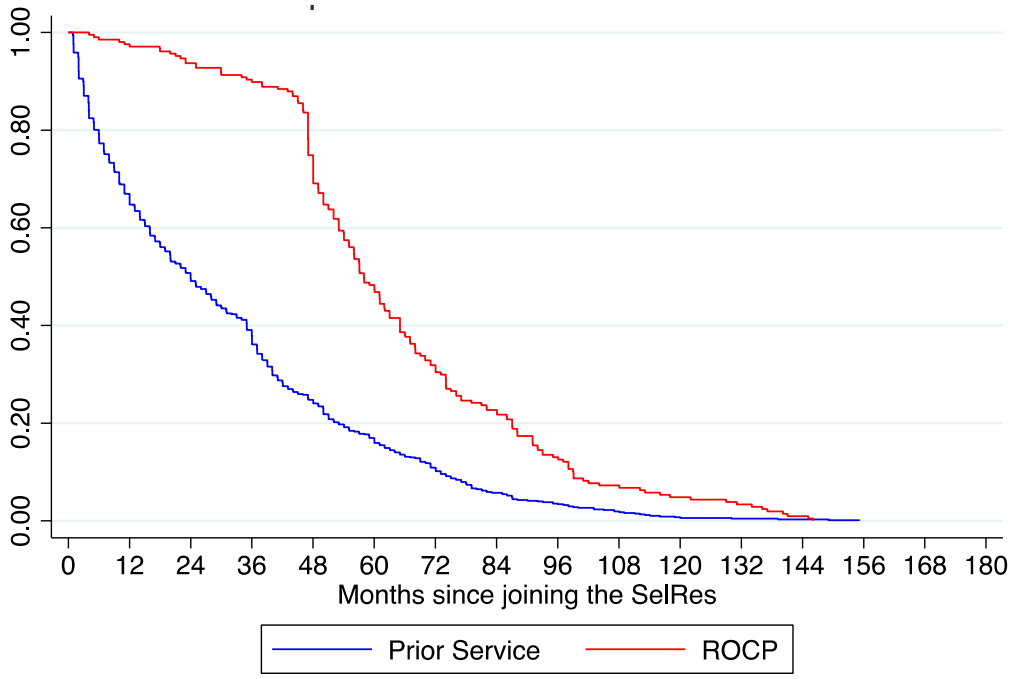
Table 19. Probability of Attrition ROCP Officers

	(1) ROCP Hazard Ratio	(2) PS Hazard Ratio	(3) LPM: IRR<4 Years	(4) LPM: IRR<8 Years	(5) LPM: IRR<10 Years	(6) LMP: IRR<16 Years
ROCP	0.517***		-0.007***	-0.004***	-0.004***	-0.004***
	(0.022)		(0.000)	(0.000)	(0.000)	(0.000)
Prior Service		1.933***				
		(0.082)				
Constant			0.010***	0.012***	0.012***	0.013***
			(0.000)	(0.000)	(0.000)	(0.000)
Observations	2643	2643	236316	236316	236316	236316
R^2			0.001	0.000	0.000	0.000

Standard errors in parentheses.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 11 provides a graphical representation of the survival curve and shows that ROCP officers are significantly less likely to attrite than PS officers. This figure suggests a large drop in survivability of ROCP officers at 48 months when their mandatory service obligation expires. However, this analysis does not account for the absence of a participating requirement for PS officers

Figure 11. Survival Graph for Reserve Officers



VI. FURTHER RESEARCH, RECOMMENDATIONS AND CONCLUSION

A. SUMMARY

This study is a descriptive analysis that assesses the quality of reserve officers through an examination of their performance and retention. My objective is to find quantitative evidence showing the difference in the performance of ROCP officers compared to PS officers. As ROCP officers become more prevalent in the SelRes, the foundational experience gained from service in the active component that they lack may leave them unprepared for future service in positions of higher responsibility. To answer my research question, I use several econometric techniques including t-tests, quantile regression, kernel density estimations, and survival analysis to examine how the performance and retention of ROCP officers differs from that of PS officers.

Estimates from my t-test shows no statistically significant difference in the relative values of ROCP officers when compared to those of PS officers. However, many of the independent variables showed a significant difference. The lengths of service, both active and reserve, is of particular interest. ROCP officers tend to serve 10 months more of active service from the reserve component, beyond their initial accession training. This suggests that ROCP officer may have even more of an active service foundation than senior reserve leaders believe.

Quantile regression estimates further provide evidence that there is no difference in the performance of ROCP officer from PS officers, this time across the performance distribution and not just at the mean. While some estimated differences are statistically significant, the magnitudes are sufficiently low to provide no economic significance.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

a. Promotion trends

My review of the literature finds that other researchers tend to use the achievement of a predefined career milestone as their definition of officer quality. I was unable to take a similar analytical approach, because reserve officers do not undergo career designation,

and too few ROCP officers have obtained the necessary years of service for promotion to fill grade officer ranks. Further research should be conducted to determine if ROCP officers are promoted at similar rates as PS officers.

b. Active-duty experiences

My research shows that ROCP officers serve on active duty from the reserve component, after competing initial accession training, at higher rates than PS officers. This suggests that ROCP officers are building the experience base necessary for future success. However, a qualitive study should be conducted to review the experiences ROCP officers gain while on active duty. Is their active-duty time spent in positions that help prepare them for the future, or are they serving in less meaningful ways as their active component counterparts?

c. Billet availability and assignments

The data shows that on average, reserve officers travel 137 miles to their RTCs. Programs exist to encourage officers to commute to their RTC, and studies have been conducted that show use of travel reimbursement programs helps to increase inactive duty training attendance by 24% (Schulte, 2014). However, additional studies should be conducted to determine if the officers who commute to their RTC perform better or worse than those that live in the same area as their reserve unit.

APPENDIX: FULL QUANTILE REGRESSION TABLES

Table 20. Effects of MOS Group on Relative Value at Processing Full Table

	25th Percentile	50th Percentile	75th Percentile
CSS MOSs	-0.302	-0.498***	-0.340
	(0.2603)	(0.1650)	(0.3052)
Air Ground MOSs	-1.109**	-0.836***	-0.682
	(0.5207)	(0.3216)	(0.4967)
Combat Arms MOSs	0.124	-0.039	0.810**
	(0.2633)	(0.1384)	(0.3853)
ROCP	-0.932	-0.020	1.574*
	(0.5715)	(0.4602)	(0.9337)
CSS MOSs x ROCP	0.275	-0.043	-0.315
	(0.7814)	(0.5113)	(1.0019)
Air Ground MOSs x ROCP	0.864	-0.552	-1.942
	(0.8362)	(0.7073)	(1.3924)
Combat Arms MOSs x ROCP	0.845	0.055	-1.618
	(0.7015)	(0.5410)	(1.1745)
Constant	87.462****	91.408****	95.475****
	(0.1661)	(0.1182)	(0.2883)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 21. Effects of race on Relative Value at Processing Full Table

	25th Percentile	50th Percentile	75th Percentile
Married	0.777****	0.692****	0.805***
	(0.1855)	(0.1397)	(0.2767)
ROCP	19.524***	9.443*	5.805**
	(7.2826)	(4.8541)	(2.4171)
Married x ROCP	0.476	0.101	-0.349
	(0.3389)	(0.2444)	(0.4624)
Asian	-10.126	-8.019	-1.860
	(6.6262)	(5.4731)	(2.4858)
Black	9.142*	-1.315	-5.858**
	(5.3373)	(3.9794)	(2.3190)
White	3.984	-1.689	2.471
	(6.1605)	(4.6533)	(6.4110)
Race not Provided	7.550	0.921	0.742
	(5.3849)	(3.9733)	(2.3630)
Asian x ROCP	0.000	0.000	0.000
	(.)	(.)	(.)
Black x ROCP	-25.477****	-12.893	5.402
	(7.5218)	(9.6427)	(7.2638)
White x ROCP	-13.805*	-4.485	-6.792
	(7.9166)	(5.4051)	(6.1290)
Race not Provided x ROCP	-20.028***	-9.415*	-4.711*
	(7.2551)	(4.9024)	(2.4893)
Constant	79.223****	89.765****	94.195****
	(5.4085)	(3.9558)	(2.3460)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 22. Effects of Training Performance Metrics on Relative Value Full Table

	25th Percentile	50th Percentile	75th Percentile
GCT Score	0.003	-0.009	0.006
	(0.0203)	(0.0215)	(0.0185)
ROCP	4.335	-5.468*	-1.521
	(5.7276)	(3.2954)	(6.4266)
GCT Score x ROCP	-0.002	0.019	-0.014
	(0.0239)	(0.0210)	(0.0198)
PFT Score	0.021****	0.011****	0.008**
	(0.0038)	(0.0025)	(0.0033)
PFT Score x ROCP	-0.001	0.011**	0.015*
	(0.0044)	(0.0052)	(0.0081)
CFT Score	0.004	0.002	0.006***
	(0.0036)	(0.0018)	(0.0021)
CFT Score x ROCP	-0.003	-0.002	-0.006
	(0.0050)	(0.0051)	(0.0083)
Pistol Expert	4.665	0.518	3.442*
	(3.0337)	(1.2593)	(2.0874)
Pistol Sharpshooter	4.578	0.333	3.232
	(2.9610)	(1.2260)	(1.9670)
Pistol Expert x ROCP	-4.979	2.173	-3.327
	(3.9288)	(1.9504)	(3.7968)
Pistol Sharpshooter x ROCP	-4.371	2.558	-2.414
	(3.9921)	(2.0625)	(3.7530)
Pistol Marksmen x ROCP	-4.258	2.511	-2.640
	(3.9924)	(2.0083)	(4.1298)
Rifle Expert	-1.454	-0.946	-2.734**
	(1.3559)	(0.7556)	(1.2863)
Rifle Sharpshooter	-2.180	-1.219	-3.062**
	(1.4357)	(0.8335)	(1.2268)
Rifle Marksmen	-1.652	-1.216	-3.390***
	(1.2735)	(0.7435)	(1.2954)
Rifle Expert x ROCP	0.735	0.605	2.840
	(2.1638)	(1.6507)	(3.1886)
Rifle Sharpshooter x ROCP	0.907	0.633	2.240
	(1.9281)	(1.6920)	(3.2891)
Rifle Marksmen x ROCP	-0.668	-0.671	0.627
	(2.2521)	(1.6431)	(3.1984)
Constant	77.515****	88.242****	91.253****
	(3.5461)	(1.5241)	(2.1911)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 23. Effects of Training Performance Metrics on Relative Value Full Table

	25th Percentile	50th Percentile	75th Percentile
PME Complete for Grade	1.200****	0.802****	0.701****
	(0.1934)	(0.1267)	(0.1547)
ROCP	1.718***	0.611	2.297
	(0.6220)	(1.4752)	(1.6996)
PME Complete for Grade x ROCP	-0.347	-0.488	-1.257****
	(0.3266)	(0.3398)	(0.3510)
Less than a Bachelors degree	0.880	0.436	0.389
	(1.4969)	(1.2645)	(2.0833)
Bachelors degree	-1.311***	-0.770**	-0.221
	(0.4284)	(0.3412)	(0.6025)
Postgraduate Degree	-0.748*	-0.415	0.780
	(0.4000)	(0.3499)	(0.6711)
Less than a Bachelors degree x ROCP	-4.302**	-2.259	-2.236
	(1.7562)	(2.0045)	(2.8611)
Bachelors degree x ROCP	-1.845***	-0.450	-1.039
	(0.6476)	(1.4537)	(1.6670)
Postgraduate Degree x ROCP	-1.312**	-0.289	-1.407
	(0.6678)	(1.4170)	(1.6389)
Constant	87.838****	91.456****	95.105****
	(0.4122)	(0.3916)	(0.6232)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 24. Effects of Career Characteristics on Relative Value Full Table

	25th Percentile	50th Percentile	75th Percentile
Years of Service	-0.205****	-0.148****	-0.267****
	(0.0603)	(0.0405)	(0.0457)
ROCP	-2.691	0.064	2.643
	(5.3234)	(4.5188)	(2.7282)
ROCP x Years of Service	0.176*	0.184***	0.278****
	(0.0903)	(0.0652)	(0.0684)
Years of Reserve Service	0.160****	0.046***	0.022
	(0.0266)	(0.0163)	(0.0259)
Years of Reserve Service x ROCP	-0.056	-0.042	-0.068
	(0.0504)	(0.0411)	(0.0513)
Years of Commissioned Service	0.313****	0.234****	0.357****
	(0.0529)	(0.0315)	(0.0413)
Years of Commissioned Service x ROCP	-0.147	-0.193***	-0.400****
	(0.1227)	(0.0607)	(0.0978)
Months of Active Service (from RC)	0.015	0.016**	0.018*
	(0.0101)	(0.0071)	(0.0100)
Months of Active Service (from RC) x ROCP	-0.012	-0.014*	0.002
	(0.0153)	(0.0086)	(0.0195)
Number of Mobilizations	-0.445**	-0.074	0.178
	(0.2156)	(0.2048)	(0.1760)
Number of Mobilizations x ROCP	0.161	-0.003	-0.272
	(0.3632)	(0.3125)	(0.4012)
Commuting Distance < 50 Miles	-3.461	-3.302	-5.202***
	(4.4999)	(3.0648)	(1.6598)
Commuting Distance to RTC >150 Miles	-2.882	-3.447*	-2.841***
	(2.2920)	(1.9684)	(1.0050)
Commuting Distance to RTC 50–150 Miles x ROCP	7.453	0.382	-2.634
	(6.9249)	(5.8987)	(2.8831)
Commuting Distance to RTC by category >150 Miles x ROCP	2.695	0.483	-0.675
	(5.4284)	(4.5756)	(2.7954)
Constant	88.073****	93.494****	97.530****
	(2.2483)	(2.0505)	(1.0838)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 25. Effects of MOS Group on Cumulative Relative Value Full Table

	25th Percentile	50th Percentile	75th Percentile
CSS MOSs	-0.302	-0.498***	-0.340
	(0.2020)	(0.1579)	(0.2254)
Air Ground MOSs	-1.109***	-0.836***	-0.682
	(0.3446)	(0.2632)	(0.4317)
Combat Arms MOSs	0.124	-0.039	0.810***
	(0.2631)	(0.1597)	(0.2973)
ROCP	-0.932	-0.020	1.574
	(0.5839)	(0.5173)	(1.2089)
CSS MOSs x ROCP	0.275	-0.043	-0.315
	(0.7092)	(0.5240)	(1.3806)
Air Ground MOSs x ROCP	0.864	-0.552	-1.942
	(0.7654)	(0.4958)	(1.4118)
Combat Arms MOSs x ROCP	0.845	0.055	-1.618
	(0.7351)	(0.6194)	(1.3737)
Constant	87.462****	91.408****	95.475****
	(0.1559)	(0.1688)	(0.2300)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 26. Effects of race on Cumulative Relative Value Full Table

	25th Percentile	50th Percentile	75th Percentile
Married	0.777****	0.692****	0.805***
	(0.2159)	(0.1508)	(0.2853)
ROCP	19.524****	9.443**	5.805
	(5.5288)	(4.5172)	(5.2273)
Married x ROCP	0.476	0.101	-0.349
	(0.3954)	(0.2213)	(0.4023)
Asian	-10.126	-8.019*	-1.860
	(6.3847)	(4.4324)	(4.1944)
White	9.142*	-1.315	-5.858
	(5.2558)	(5.6073)	(5.1772)
Black	3.984	-1.689	2.471
	(6.2255)	(7.2702)	(7.8472)
Race not Provided	7.550	0.921	0.742
	(5.2285)	(5.5797)	(5.1799)
Asian x ROCP	0.000	0.000	0.000
	(.)	(.)	(.)
White x ROCP	-25.477****	-12.893*	5.402
	(7.3218)	(7.7201)	(8.6381)
Black x ROCP	-13.805**	-4.485	-6.792
	(6.6258)	(6.2261)	(7.6625)
Race not Provided x ROCP	-20.028****	-9.415**	-4.711
	(5.5938)	(4.4962)	(5.1494)
Constant	79.223****	89.765****	94.195****
	(5.2434)	(5.5982)	(5.1917)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 27. Effects of Training Performance Metrics on Cumulative Relative Value Full Table

	25th Percentile	50th Percentile	75th Percentile
GCT Score	0.003	-0.009	0.006
	(0.0190)	(0.0119)	(0.0136)
ROCP	4.335	-5.468**	-1.521
	(5.7578)	(2.6441)	(6.4811)
GCT Score x ROCP	-0.002	0.019	-0.014
	(0.0240)	(0.0126)	(0.0178)
PFT Score	0.021****	0.011****	0.008**
	(0.0039)	(0.0030)	(0.0031)
PFT Score x ROCP	-0.001	0.011**	0.015**
	(0.0055)	(0.0048)	(0.0074)
CFT Score	0.004	0.002	0.006
	(0.0029)	(0.0026)	(0.0038)
CFT Score x ROCP	-0.003	-0.002	-0.006
	(0.0085)	(0.0052)	(0.0089)
Pistol Expert	4.665	0.518	3.442
	(3.4505)	(1.7706)	(2.7580)
Pistol Sharpshooter	4.578	0.333	3.232
	(3.4468)	(1.6973)	(2.7782)
Pistol Marksmen	4.444	0.177	3.432
	(3.5602)	(1.7212)	(2.8639)
Pistol Expert x ROCP	-4.979	2.173	-3.327
	(4.8593)	(2.7224)	(5.5515)
Pistol Sharpshooter x ROCP	-4.371	2.558	-2.414
	(4.7628)	(2.6231)	(5.5651)
Pistol Marksmen x ROCP	-4.258	2.511	-2.640
	(4.9307)	(2.6928)	(5.6841)
Rifle Expert	-1.454**	-0.946	-2.734*
	(0.6477)	(1.0853)	(1.5994)
Rifle Sharpshooter	-2.180***	-1.219	-3.062**
	(0.7031)	(1.0905)	(1.5449)
Rifle Marksmen	-1.652**	-1.216	-3.390*
	(0.7810)	(1.1401)	(1.7663)
Rifle Expert x ROCP	0.735	0.605	2.840
	(2.0772)	(1.4172)	(2.9970)
Rifle Sharpshooter x ROCP	0.907	0.633	2.240
	(2.0685)	(1.5366)	(3.0023)
Rifle Marksmen x ROCP	-0.668	-0.671	0.627
	(2.1331)	(1.5532)	(3.2730)
Constant	77.515****	88.242****	91.253****
	(3.9251)	(1.7327)	(2.6147)

Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 28. Effects of Education on Cumulative Relative Value

	25th Percentile	50th Percentile	75th Percentile
PME Complete for Grade	1.200****	0.802****	0.701****
	(0.1921)	(0.1230)	(0.2093)
ROCP	1.718**	0.611	2.297*
	(0.7969)	(1.2132)	(1.2316)
PME Complete for Grade x ROCP	-0.347	-0.488**	-1.257***
	(0.4428)	(0.2113)	(0.4182)
Less Than a Bachelors degree	0.880	0.436	0.389
	(0.9789)	(0.7735)	(1.4703)
Bachelors Degree	-1.311****	-0.770*	-0.221
	(0.2904)	(0.3988)	(0.7458)
Postgraduate Degree	-0.748**	-0.415	0.780
	(0.2915)	(0.4047)	(0.7613)
Less Than a Bachelors degree x ROCP	-4.302**	-2.259	-2.236
	(1.7590)	(1.7760)	(2.1103)
Bachelors Degree x ROCP	-1.845**	-0.450	-1.039
	(0.8681)	(1.2231)	(1.3620)
Postgraduate Degree x ROCP	-1.312	-0.289	-1.407
	(0.8214)	(1.2774)	(1.2901)
Constant	87.838****	91.456****	95.105****
	(0.2417)	(0.3526)	(0.7004)

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table 29. Effects of Career Characteristics on Cumulative Relative Value
Full Table

	25th Percentile	50th Percentile	75th Percentile
Years of Service	-0.205***	-0.148****	-0.267****
	(0.0660)	(0.0358)	(0.0391)
ROCP	-2.691	0.064	2.643
	(5.4965)	(5.4025)	(5.4810)
ROCP x Years of Service	0.176**	0.184****	0.278****
	(0.0750)	(0.0482)	(0.0637)
Years of Reserve Service	0.160****	0.046**	0.022
	(0.0256)	(0.0228)	(0.0380)
Years of Reserve Service x ROCP	-0.056	-0.042	-0.068
	(0.0513)	(0.0501)	(0.0593)
Years of Commissioned Service	0.313****	0.234****	0.357****
	(0.0712)	(0.0392)	(0.0481)
Years of Commissioned Service x ROCP	-0.147	-0.193****	-0.400****
	(0.1201)	(0.0584)	(0.1210)
Months of Active Service (from RC)	0.015	0.016**	0.018**
	(0.0146)	(0.0079)	(0.0090)
Months of Active Service (from RC) x ROCP	-0.012	-0.014*	0.002
	(0.0175)	(0.0083)	(0.0155)
Number of Mobilizations	-0.445	-0.074	0.178
	(0.3719)	(0.2234)	(0.2482)
Number of Mobilizations x ROCP	0.161	-0.003	-0.272
	(0.4995)	(0.2955)	(0.4564)
Commuting Distance to RTC by category 50–150 Miles	-3.461	-3.302	-5.202**
	(3.6902)	(2.7253)	(2.3319)
Commuting Distance to RTC by category >150 Miles	-2.882*	-3.447**	-2.841*
	(1.7246)	(1.4288)	(1.5197)
Commuting Distance to RTC by category 50–150 Miles x ROCP	7.453	0.382	-2.634
	(5.8905)	(5.3550)	(6.2696)
Commuting Distance to RTC by category >150 Miles x ROCP	2.695	0.483	-0.675
	(5.2673)	(5.4004)	(5.2767)
Constant	88.073****	93.494****	97.530****
	(1.7414)	(1.5082)	(1.7760)

Robust standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

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