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USMC Squadron Command Climate and Marine Aviator Separations

March 2024

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ABSTRACT

A large body of literature studies the effects of economic factors on military aviator retention, yet it does not estimate the effects of individual career experiences on retention. In this paper, I estimate the association between Marine aviators' separation rates and squadron command climate using restricted-access data from Defense Organizational Climate Surveys (DEOCS) administered from 2014 to 2017. Using a squadron level fixed-effect methodology to control for service level and economy level characteristics, I find that squadron command climate does not have a significant effect on Marine aviator separation rates before nine or twelve years of commissioned time-in-service (TIS) for Marine aviators commissioned between Fiscal Years (FY) 2007 and 2012. In the observed population, I did find a significant correlation between Marine aviator lateral moves and squadron command climate, suggesting it does influence Marine aviator career decisions. However, the null result for separations suggests that Marine aviator separations from active duty are not affected by command climate at the squadron level, and that Marine aviator retention policy should focus on service-level nonmonetary and monetary policy across all aviator communities.

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I am deeply grateful to my wife and children for their unwavering support and understanding throughout this journey. Doing this together has made it all worth it. My family's patience while engaging in insightful conversations, or monologues, on leadership, economics, and organizational behavior has been invaluable.

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Additionally, I am thankful for the contributions of my peers and colleagues, whose diverse perspectives and strengths have enriched my understanding of the people side of this business. There are a lot of challenges we work toward solving, but none are more essential than enabling our fellow Marines and service members to serve to their full potential.

Above all, I count God's guidance, grace, and blessings throughout this season in Monterey. There are many tangible benefits to completing this tour, but the greatest is the personal and spiritual growth made possible through the fellowship and beauty of this community.

Finally, to all those who have supported me along the way, whether through words of encouragement or a kind ear, your presence has not gone unnoticed. Thank you.

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TABLE OF CONTENTS

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LIST OF FIGURES

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LIST OF TABLES

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LIST OF ACRONYMS AND ABBREVIATIONS

DEOCS	Defense Organizational Climate Survey
FY	Fiscal Year
M&RA	Manpower and Reserve Affairs
NDAA	National Defense Authorization Act
TIS	Time in Service (Years)
USMC	United States Marine Corps

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I. INTRODUCTION

The United States Marine Corps (USMC) is facing a shortage of qualified aviators and seeks to improve retention through increased monetary incentives similar to the rest of the United States military. The Marine Corps' indominable drive for leadership development and unit esprit de corps motivates the study into recommendations for non-monetary retention policy. I focus on understanding a Marine aviators' first operational assignment and the effects it has on future retention decisions. My primary research question is: does USMC squadron command climate affect Marine aviator separation? The answer to this question informs non-monetary policy actions to improve future retention without significant budget growth.

Central to the debate is how the Marine Corps will overcome a nearly 500 aviator shortfall to meet mission requirements when current projections show a growing deficit as training production is outpaced by separations from active duty (Manpower & Reserve Affairs, Aviation Officer Retention OPT PowerPoint Slides, 2023). The solution can incorporate increased training production, but it must also include increased retention. Potential solutions for improving Marine aviator retention today are foreshadowed by the sentiments of previous generations of military aviators. Surveys and reports as far back as the late 1970s show consistent patterns relating separation of military aviators to quality-of-life concerns and challenging working conditions. Decade after decade, reports highlight the role military aviators' career experience has in retention decisions, though there have been few quantitative studies to measure the relationship between working conditions and aviators' length of service. Discovering a connection could inform Marine aviator retention policy to develop effective non-monetary incentives and improve overall aviation and manpower policy.

Many studies into military aviator retention focus on the effects of monetary compensation to increase retention and they predominately estimate a positive correlation between retention and monetary incentives. However, budgets are limited and creating vast pay disparities between Marine aviators and other Marine officers does not align with other Marine officer policies and traditions. The United States military has numerous policies from the last four decades from retaining pilots, including increasing monetary incentives to keep up with inflation. However, in recent years increases to monetary incentives are more frequent, stressing their future affordability, and indicating they are likely losing their effectiveness.

I use historical survey results and personnel assignment data to understand the relationship between squadron command climate and Marine aviator separation decisions. Using quantitative models, I estimate the effects of command climate on separation using Defense Enrollment Eligibility Reporting System data from 2007 to 2022 covering all Marine aviators commissioned between FY2007 and 2012, and Defense Organizational Climate Survey (DEOCS) 4.0 results from operational squadrons from 2014 to 2017. The models establish a framework for identifying changes in separation behavior prior to nine years commissioned time-in-service (TIS) and twelve years commissioned TIS based on squadron command climate over time. I also use these models to measure the effects of squadron command climate on lateral moves away from Marine aviation, because lateral moves preclude Marine aviators from filling Marine aviation manpower requirements.

My results find that USMC squadron command climate does not significantly correlate to Marine aviator separation prior to nine or twelve years commissioned TIS for those commissioned between FY2007 and 2012. This null result suggests that, even though Marine aviators' report having issues with command climate factors, variations in command climate at the squadron level do not correlate to variations in Marine aviator separations from active duty. However, I do find that USMC squadron command climate correlates to lateral moves of Marine aviators still on active duty. For every one-point increase in mean squadron command climate, based on a four-point Likert scale, the probability of a Marine aviator lateral move decreases by 21.2 percentage points. The standard deviation of squadron command climate is 0.086, so the effect on the sample population is small, but it highlights the importance squadron command climate, specifically organizational effectiveness, has on influencing Marine aviators to continue serving in Marine aviation billets.

The remaining sections of this thesis are as follows: Chapter II covers a background into Marine aviator retention and military command climate, Chapter III covers a literature review of previous studies and models for military aviator retention and command climate, Chapter IV covers data and methodology, Chapter V covers results and analysis, and Chapter VI covers the conclusion and recommendations.

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II. BACKGROUND

This chapter provides a background to understand aviator manpower in the Marine Corps, command climate in the military, and historical and projected Marine Corps aviation manning levels. I use the term aviator throughout this thesis for standardization. It is synonymous with the term pilot used in some literature and studies. However, for simplicity in the data analysis, the use of aviators also includes Marine officers with a Naval Flight Officer primary military occupational specialty.

A. MARINE CORPS AVIATION

This section describes the aviator career road map, active-duty service commitment, and compensation policy for Marine aviators to provide an understanding of how the Marine aviator population is maintained. The Marine Corps aviator inventory has been low and is projected to stay low for some time. Figure 1 shows Manpower and Reserve Affairs (M&RA) target requirements by rank over time. This indicates that the primary manpower shortage is in company grade pilot requirements. However, the company grade shortage is unlikely to be improved by retention efforts based solely on the fact that most Marine aviators promote to Major around the same time they are first eligible for separation. This means the company grade aviator population can only grow meaningfully by reducing the time-to-train winged aviators or by training more aviators altogether.

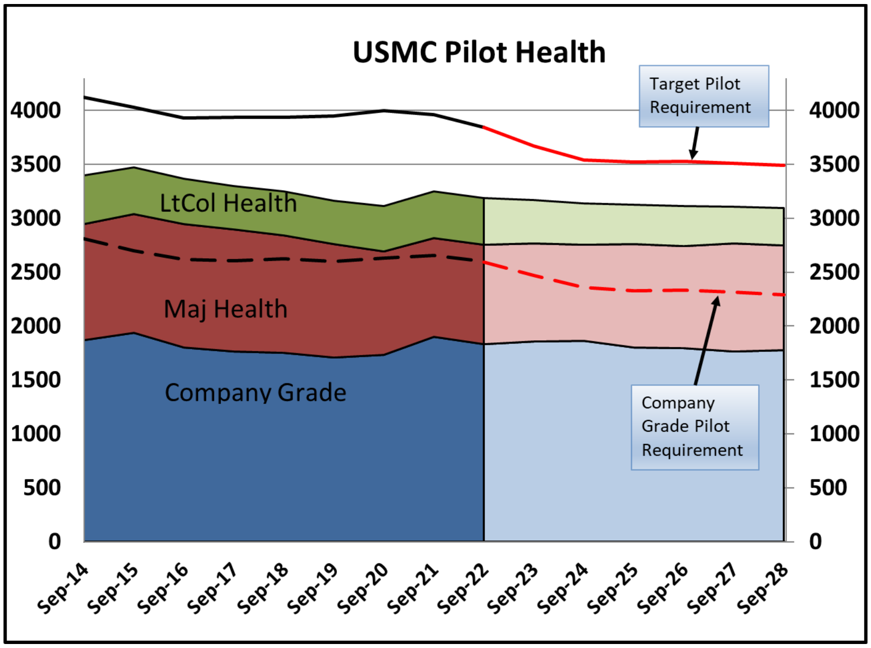

Figure 1. Marine Aviator Shortage. Source: Manpower & Reserve Affairs, Aviation Officer Retention OPT PowerPoint Slides (2023).

The career roadmap for a Marine aviator is similar across all type-model-series aircraft. There are some distinct differences in timing between different aviator types, like fixed-wing and rotary-ring, but the overall rotation between training, operational assignments, A-billets, and support assignments, b-billets, is the same. All Marine student naval aviators begin their training after officer commissioning with six months at The Basic School in Quantico, VA, followed by two to three years of undergraduate aviation training starting in Pensacola, FL. This initial training period is planned to take 2.6 to 3.7 years depending on aircraft-type; however, over the last four years the actual time-to-train has been 3.6 to 5.1 years, or roughly 1.5 to 2 years longer than the target goal (Aviation Planner, Manpower & Reserve Affairs, personal communication, February 21, 2024).

There are four advanced tracts for undergraduate aviation training based on the type of operational aircraft each aviator will fly as depicted in Figure 2. Based on performance and individual preference, student naval aviators are selected into one of these tracks after completing both four weeks of aviation preflight indoctrination training and six to nine months of primary flight training. There are two fixed-wing tracks: Maritime for KC-130

Hercules aircraft and Strike, or jet, for F/A-18 Hornet, AV-8 Harrier, EA-6B Prowler, and F-35 Lightning II jet aircraft. As of 2015, the Marine Corps no longer trains for the EA-6B Prowler. The two other tracks are rotary wing for CH-46 Sea Knight, CH-53 Super Stallion, AH-1 Cobra, and H-1 Huey helicopters, and tiltrotor for the MV-22 Osprey. As of 2012, the Marine Corps no longer trains for the CH-46 Sea Knight. Upon graduation from advanced training, Marines earn their "wings of gold" and are now Naval Aviators or Naval Flight Officers ready to train to fly operational fleet aircraft. This also initiates their active duty service commitment following aviation training, which, by law, requires a minimum of six years for all pilots and eight years for pilots of fixed-wing jet aircraft ("Minimum Service Requirements for Certain Flight Crew Positions," 1992). After completion of advanced flight training, aviators receive a primary military occupational specialty code for their aircraft and report to fleet replacement squadrons.

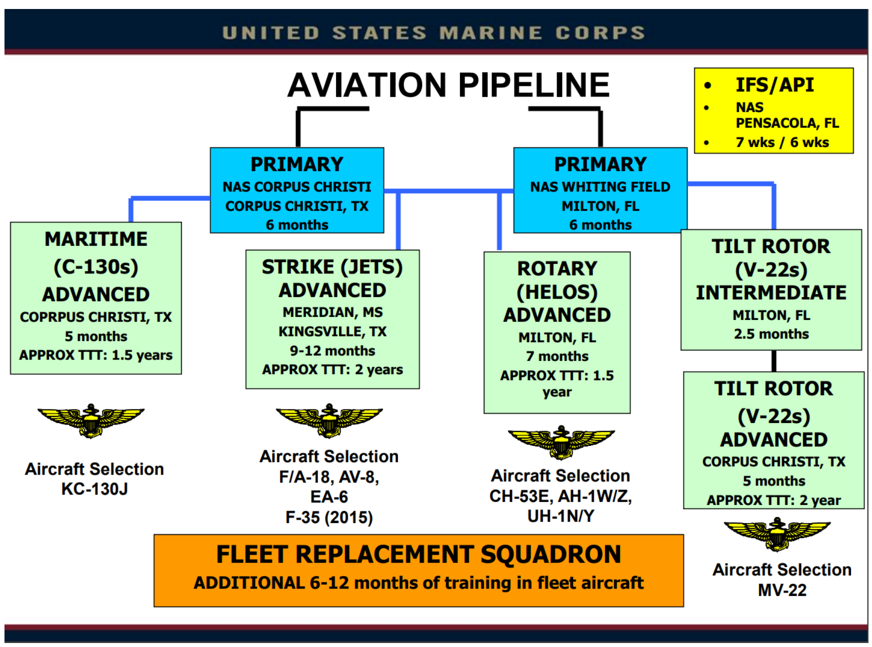

Figure 2. Marine Aviator Types. Source: United States Marine Corps (2016).

Marine aviation training continues at Fleet Replacement Squadrons for each type-model-series aircraft at locations across the country. Marine Light Attack Helicopter Training Squadron 303 at Camp Pendleton, California, trains AH-1 Cobra and UH-1 Huey pilots. Marine Heavy Helicopter Training Squadron 302 at New River, North Carolina, trains CH-53 Super Stallion pilots. Marine Medium Tiltrotor Squadron 204 trains MV-22 Osprey pilots. Marine Fighter Attack Training Squadron 101 at Miramar, California, trains F/A-18 pilots and weapons systems officers. Marine Attack Training Squadron 203 in Beaufort, South Carolina, trains AV-8 Harrier pilots and now F-35 Lightning II pilots. Unlike the other aircraft, KC-130 pilots train with operational Marine Aerial Refueler Transport Squadrons. After completion of training at fleet replacement squadrons, Marine aviators report to their first operational fleet squadron.

The first fleet tour is typically three years for fixed-wing pilots and four years for rotary wing and tiltrotor pilots. During this time, pilots will continue training in more advanced aviation tactics and deploy in support of Marine Global Force Management requirements. At the end of an aviator’s first fleet tour, there are multiple options for follow-on assignments. Based on preferences and performance, Marine aviators can extend their tour of duty in a fleet squadron, move to a flying or non-flying support assignment (B-Billet), or attend Professional Military Education.

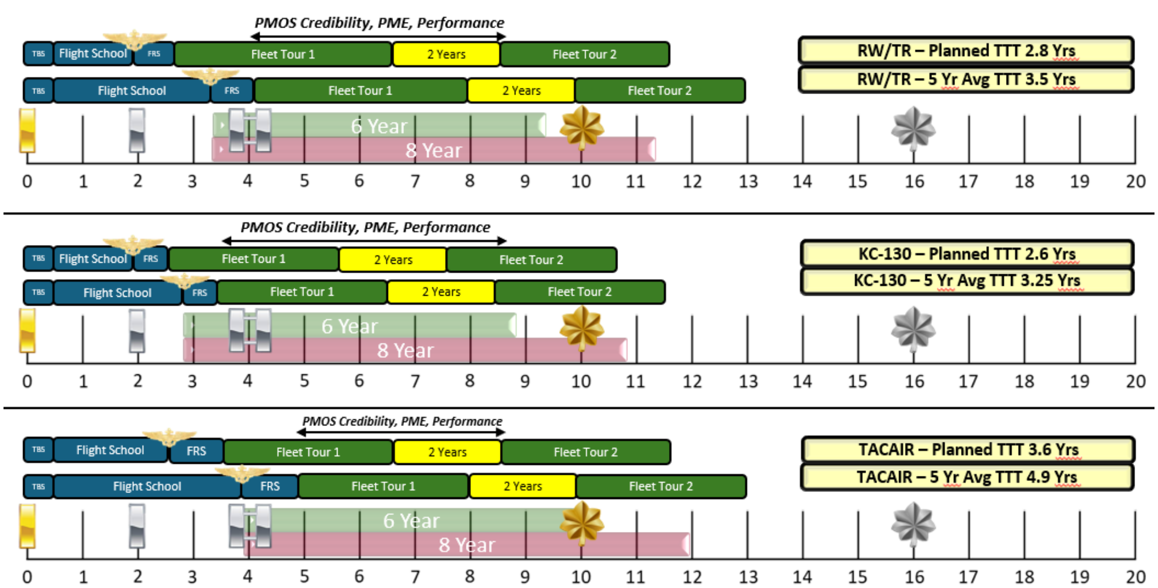

Figure 3. Marine Aviator Career Timeline. Source: Manpower and Reserve Affairs, Aviation Officer Retention OPT PowerPoint Slides (2023).

These follow-on assignments range from one to three years in length and often place Marine aviators within the final 14 months of their active duty service commitment. This means they can elect to resign from active duty prior to receiving another set of orders or returning to another fleet tour in their primary military occupational specialty. The quality of a Marine aviators first fleet tour is likely to affect their decision on whether to complete a second fleet tour if they are eligible to separate.

All Marine officers have a service obligation after commissioning which runs concurrently through The Basic School and all primary military occupational specialty training. For Marine aviators, there is an additional active duty service commitment from C.F.R 653 that begins after completion of undergraduate aviation training and does not run concurrently with initial training. There have been some changes to the active duty service commitment at the service level since 2010, but for the population in this study, the Marine Corps predominantly mirrors C.F.R. 653, requiring six years for rotary wing, tiltrotor, and maritime pilots and eight years for jet pilots. Accounting for all initial training, this means that typically Marine aviators have total obligated service ranging from nine to twelve years commissioned TIS.

There are two primary forms of monetary compensation designed to increase retention for Marine aviators. Aviation incentive pay, formally known as aviation career incentive pay, pays all aviators a monthly stipend based on a pay scale that increases with additional years of flight experience. This acts as a persistent compensating wage differential for aviators who remain on active duty and is in contrast to monetary incentives that are contingent on service obligation (Hosek et al., 2019). The second monetary compensation is the aviation bonus, formally known as aviation continuation pay, that is either paid as a lump sum or annually and requires committing to additional years of obligated service. This acts as a periodic compensating wage differential for aviators and a responsive retention tool for the Marine Corps. The maximum authorized payments for aviation incentive pay and the aviation bonus are set by Congress, but the actual payment amounts are set by M&RA leadership. The specific payment levels vary by primary military occupational specialty and are typically proportional to the severity of primary military occupational specialty specific aviator shortages. The congressionally set maximum for the aviation bonus has increased three times since it was first introduced in 1989 at $12,000. The first increase was to $25,000 in 1997 (Ryan, 1998), followed by an increase to $35,000 in 2017 and most recently to $50,000 in 2023. Congress also increased monthly Aviation Incentive Pay limits; from $840 to $1,000 in 2017 and then to $1,500 in 2023 through the National Defense Authorization Act (National Defense Authorization Act of Fiscal Year 2023, 2023). The frequency and magnitude of these monetary increases indicate that Marine aviator retention policy needs to find additional non-monetary solutions for increasing retention as increasing monetary incentives generates a significant cost on top of an already expensive Marine aviator manpower production model.

B. COMMAND CLIMATE

Command climate can mean many things to different people. This section covers the Marine Corps' concern for command climate, the evolution of command climate surveys in the military, and command climate trends in military aviation. There are many layers for understanding command climate beyond "the culture of a unit" (Doty & Gelineau, 2008). However, there are few ways of measuring command climate beyond capturing the perception of a command by the people in the command (Jones, 2003). Command climate is essential when accompanied with unit successes, but it is a cautionary tale when accompanied by unit failures. There are few quantitative studies of command climate to correlation with objective outcomes. According to Jones, it is sometimes considered to measure the performance of the commanding officer, but it is also measured by unit effectiveness and interpersonal interactions. It is influenced by both organizational level shortcomings and individual level failures (Jones, 2003). For this study, it goes beyond describing the leadership personality of the commanding officer by including perspectives of squadron's organizational effectiveness, and it considers service level factors by controlling across aviator and squadron types.

1. Command Climate in the Military

The Marine Corps places a high value on command climate, but there are varying opinions on how to measure it. In a 2010 *Marine Corps Gazette* article, Major Sean Griffin, USMC (Retired), critiques command climate surveys as only capturing Marines' quality of life. He argues that surveys do not account for how well a unit can actually perform its mission. He suggests "command climate is the commander's personal assessment of the ability of his command—personnel, materiel, and morale—to accomplish his mission" (Griffin, 2010, p. 56). He also cites a survey of senior enlisted leaders that finds the most detrimental factor for command climate is filling staffing goals with unqualified Marines just to meet table of organization manning requirements (Griffin, 2010). The unfortunate combination of these two points is that the commanders most in need of assessing their own command climate are the least likely to know how to do so. In another article, Lieutenant Colonel David Edson, USMCR, describes the use of organizational command climate surveys as reactive leadership and rather espouses proactive leadership using his command climate model in Figure 4.

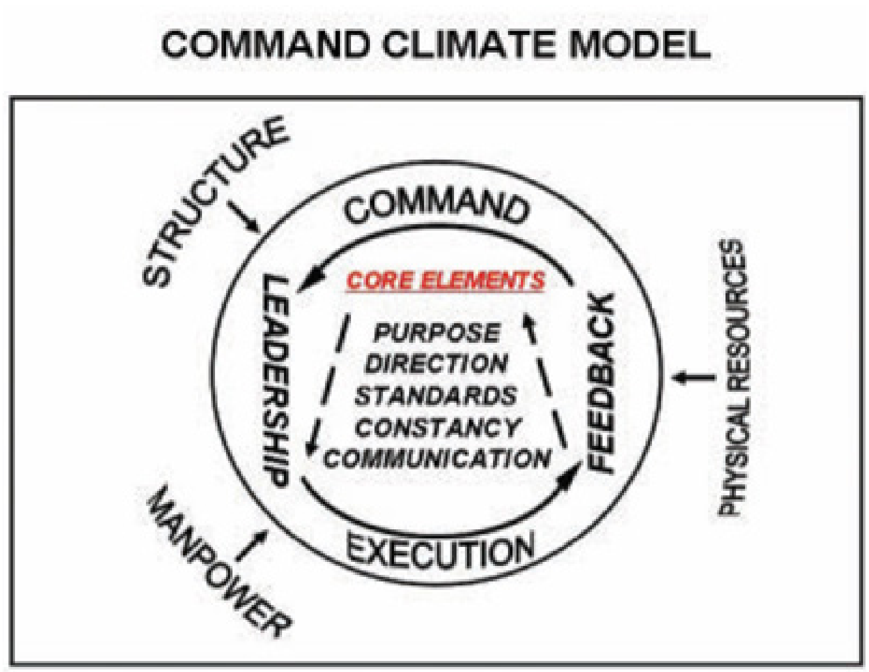

Figure 4. Proposed Command Climate Model. Source: Edson (2011).

Edson's model centers around a unit's leadership and mission to ultimately enable the unit's manpower, resources, and structure to thrive (Edson, 2011). Each of these perspectives credit command climate as critical to a unit's ability to accomplish its mission.

However, they recommend a method for assessing command climate that relies mostly on measuring mission accomplishment while not objectively considering if a unit accomplishes its mission despite certain command climate factors shortcomings. It is essential to get the perspective of multiple members of a unit to truly capture the command climate.

Claims that command climate affects military aviation retention is not a new phenomenon. Decades of military aviation surveys suggest certain command climate factors are more impactful than others. Assessments of military aviation manpower over the last four decades routinely produce indicators relating command climate and organizational policy to aviator decisions to separate from active-duty service. However, there are few quantitative studies that estimate the actual impact of command climate on separation over time, and it is uncertain if command climate is a contributing factor to retention. In a 1983 report concerning retention of United States Air Force instructor pilots, the authors conclude that the squadron work environment is the most significant factor in job satisfaction, but that indicators for whether to continue their Air Force career are determined by the Air Force as a whole (Harrel & Rhame, 1983, p. 100). However, subsequent congressional reports continue to point toward factors experienced at the squadron level related to understanding and improving retention. A 1998 Congressional Budget Office staff working paper on military pilot retention cited quality of life and civilian job opportunities as two general reasons for pilot separations (Smith, 1988). A decade later, a report by the Congressional Research Service determines that pilots are not separating because of pay issues, even though monetary incentives improve retention. Pilots separate for “family, personal, or quality of life issues,” that, when detailed, relate to events across the service (Ryan, 1998, p. 10). However, these elements are assessed by the organizational effectiveness factors in DEOCS 4.0 surveys at the squadron level. This provides an opportunity to correlate variations in organizational effectiveness at the squadron level to variations in separation decisions at the service level.

2. Evolution of Command Climate Surveys

The Marine Corps, as part of the Department of Defense, is the recipient of multiple iterations of command climate surveys. There are two primary surveys the Marine Corps uses. The command climate survey initiated by MARADMIN 316/13, is an annual survey at every Colonel and Lieutenant Colonel command to inform the sitting commander of current perceptions of their own command climate (United States Marine Corps, 2013). In other words, this survey informs real time decisions. Alternatively, the DEOCS, previously administered by Defense Equal Opportunity Management Institute and now by the Office of People Analytics, is an annual survey to inform organizational leadership of trends and behaviors across the force. In other words, DEOCS is meant to inform organizational level policy on service-wide command climate factors. DEOCS assessments rise significantly in response to the FY2013 NDAA requirement for periodic command climate surveys for every military command (McDonald, 2013). The DEOCS 4.0 version is administered from 2014 to 2017. This version of the survey asks human relations questions to capture Organizational Effectiveness, Equal Opportunity, Equal Employment Opportunity and Fair Treatment, Sexual Assault Prevention and Response, and Perceptions of Discrimination and Sexual Harassment (Defense Equal Opportunity Management Institute, 2013). There are slight changes to the survey with a DEOCS 4.1 update in 2018, but the next major change in 2020 includes fielding DEOCS 5.0 and changing to administration by the Office of People Analytics.

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III. LITERATURE REVIEW

This chapter reviews relevant research in military retention decision-making theory, research on military aviator retention and separation, and studies into the significance of command climate within military organizations. Dating back to the late 1970s, reports on military aviator retention have had similar characteristics to recent research findings such as reasons for separating, effectiveness of monetary incentives, and variation to individual reasons for continuing military service. Many policies and initiatives over the years seek to improve military aviator retention and see varying degrees of success.

A. DYNAMIC RETENTION MODEL

The dynamic retention model is an important structural model to model the individual decision to remain in the military as a function of changes in compensation policy and personnel policy (Gotz & McCall, 1984). Introduced in the early 1980s, Gotz and McCall suggest the dynamic retention model addresses two previous problems with analyzing retention: the optimal response problem for how to identify an individual's behavior toward seeking an optimal outcome, and the selection problem for how to capture differences between people without biasing the study results toward a particular group. The dynamic retention model addresses the optimal decision problem by accounting for individual differences in 'taste for military service' and uses sequential decision rules with assumptions that officers who remain in service longer have higher taste for military service. Separately, the selection problem is addressed by sequentially accounting for both sides of selection throughout an officer's career. Including when the service selects the officer for things like promotion or preferred orders and when the officer selects the service by not separating (Gotz & McCall, 1984). The dynamic retention model ultimately predicts retention behavior related to monetary incentives and economic condition under uncertainty, describes group dynamics, and leaves margin for unobservable shocks that affect individual decisions (Fernandez et al., 1985). A RAND report in 2016 applies the dynamic retention model to Air Force pilot retention using data from 1990 to 2012 and finds that the aviator retention pay needs to increase by 35% from $25,000 to $33,750 to make up for separations due to increases in civilian pilot hiring and pay opportunities (Mattock et al., 2016). A subsequent RAND report uses these results and the dynamic retention model again to estimate the cost effectiveness of retaining versus assessing Air Force pilots and finds that it is more cost-effective to retain more pilots through increased monetary incentives than it is to train more pilots (Mattock et al., 2019). Coincidently, these two reports precede Congressional increases to the maximum allowed bonus to retain military pilots.

B. MARINE AVIATOR INVENTORY MODELS

The Center for Naval Analysis uses different models for Marine Corps aviator inventory, but they still seek to meet service level manpower requirements and inform decisions on retention policy similar to the dynamic retention model. In 2006, the Center for Naval Analysis report predicts Marine Corps aviator inventory by counting if aviators are qualified and under contract to remain in service (Moskowitz et al., 2006, p. 21). This model uses the same method the Marine Corps traditionally uses to define manpower requirements and it also accounts for all primary assignment, A-billets, support assignment, B-billets, and patients, prisoners, trainees, and transients personnel requirements. One limitation of this model is its focus on "obligated" aviators and its assumptions for un-obligated aviators. For instance, an aviator only counts in the model if they are currently under their initial service obligation, an obligation from accepting aviation continuation pay, or is projected to be under either. This inherently under counts the share of aviators who continue service without any service obligation. Unfortunately, this study also makes two large assumptions about aviator retention decisions that are not based on historical averages or logical outcomes. First, they assume a 50% bonus take rate for the aviation continuation pay, and a 100% separation rate for aviators that do not take the bonus. If an aviator is not obligated, they no longer count in the model a mere six months after the end of their current or projected obligation. The authors acknowledge this assumption and characterize the assumption as being conservative. However, it is the worst-case scenario for aviator retention decision-making and it side steps any attempt to understand the factors affecting a Marine aviator's decision to leave service. Any estimate generated by the model will undoubtedly be lower than the actual inventory and artificially create a greater demand signal to increase Marine Corps retention efforts. This model may be effective for estimating Marine Corps aviator inventory, but it does little to estimate retention decisions with the effects of factors such as service experience, individual performance, and organizational effectiveness.

The Center for Naval Analysis develops later models for Marine aviator inventory to account for some military service factors, but they are limited in measuring shocks or disturbances in a Marines' career. In a 2018 report, the Center for Naval Analysis examines trends in aviator production and retention using data from FY2000 to 2012 to determine significant factors affecting Marine aviator inventory modeling. Their report identifies two significant areas not previously modeled. First, they suggest recruitment targets need to account for actual time-to-train aviators. From FY2000 to 2012, they find that flight training completion rates were stable, but that training time had increased by about one year for rotary wing and tiltrotor pilots and almost two years for jet pilots. This time-to-train element is essential for modeling Marine Corps inventory because it determines the actual capacity to add to the Marine aviator population and therefore informs achievable manpower requirements. Second, and more importantly, this report incorporates "career experience" into the model and finds a positive correlation between talent management and retention. However, the two proxy variables for talent management, the forward air controller and weapons and tactics instructor qualification, have a selection bias problem and they typically come with an additional service obligation that is not controlled for in their model (Griffin et al., 2018, p. i). Ultimately, this newer model identifies factors related to career experience that could have a significant impact on Marine aviator retention, but shortcomings in the quality of the data limit more actionable findings.

C. MODELING MONETARY INCENTIVES AND RETENTION

Studies repeatedly find positive correlations between monetary compensation and military pilot retention, but often the effects are not extremely large. I see this in 2016 and 2019 with Mattock's use of the dynamic retention model, but it also predates those reports. The effectiveness of monetary compensation for Marine aviator retention is cyclical and ties to both inflation and civilian airline hiring rates; two things the Marine Corps can only respond to within the monetary limits established by Congress. In 2006, Hansen uses the annualized cost of leaving framework to study the effects of compensation on aviator retention in the Navy from FY1984 to 2005 and finds that pay elasticity and retention are tied to civilian hiring of pilots. Hansen found that a 1% increase in basic pay results in a 0.55% increase in the retention rate. Additionally, a 1,000-person increase in commercial airline hiring results in a 2 to 3 percentage point decrease in retention (Hansen & Moskowitz, 2006). In a 1988 Congressional Budget Office report, analysis of bonus policy for military pilot retention finds that increases in retention of Navy pilots from 1979 to 1984 is because of the Navy's bonus program. They subsequently attribute the decline in retention from 1985 to 1987 to the effect inflation has on devaluing the fixed dollar amount of the bonus. This same report also finds that pilots leave the military due to military quality of life factors along with civilian job opportunities. However, the latter is not solely attributed to the pay differential between civilian and military pilots, but more so to the greater predictability of the work schedule as a civilian pilot (Smith, 1988, p. 12). This report indicates that military aviators are not seeking higher pay, but more so that bonuses act as a compensating wage differential for aspects of military service that are undesirable. These findings lead both the Air Force and Navy to simultaneously increase their pilot service-contracts and take many actions to improve the quality of life for active-duty pilots, including reducing their administrative burdens and increasing stability associated with permanent-change-of-station moves (Smith, 1988, p. 6). The fact that this report is from 1988 indicates that this is likely still an organizational issue and not a generational one.

D. MODELING DEPLOYMENTS AND RETENTION

There are a lot of career disturbances for a Marine aviator that can decrease aviator retention rates. In 2006, Smith models the effect of increased operational tempo in the Global War on Terror on Marine aviator retention. Smith creates three multivariate logistic regression models to evaluate if the number and type of deployment correlates to the probability a Marine separates from active duty. The analysis divides Marine aviators into three samples: all aviators from 1995 to 2005, Pre-9/11 aviators, and Post-9/11 aviators. The first model, "Total Deployment Model," evaluates the effects of deployments on aviator retention. The second model, "Non-Interacted Deployment Regression Model," evaluates the effects of hostile deployments and non-hostile deployments on aviator retention. The third model, "Interacted Deployment Regression Model," evaluates the effects of different combinations of hostile and non-hostile deployments on aviator retention (Smith, 2006. p.22-23). Each model controls for personal characteristics, such as age, race, gender, and marital status, military service characteristics, such as commissioning source, prior enlisted service, aviation continuation pay amount offered, type of aviator, weapons and tactics instructor or forward air controller qualification, and civilian economic conditions, such as commercial airline hiring and pay. The study finds that the effect of hostile and non-hostile deployments has a more negative impact on Marine aviator retention for Post-9/11 aviators than for Pre-9/11 aviators (Smith, 2006). However, the study has limited controls for separating generational effects from deployment effects.

It is important to note that not only did the frequency of deployments increase after 9/11, but so did the duration. Expected deployment time increased from six out of every 32 months for pre-9/11 aviators to seven out of every 14 months for post-9/11 aviators. This increased the disturbances for each deployment and caused the number of statistically significant variables in the model to jump from 3 to 14, respectively. The three variables were married-with-children, weapons and tactics instructor, and number and type of deployments. For post-9/11 aviators, additional variables including age, other military qualifications, commissioning source, and single-with-children were more significant. (Smith, 2006, p. 11). The data, methodology, and results of this study support identifying, in greater detail, the significance and variation of career related disturbances for Marine aviators to better understand what could become drivers of retention.

It is challenging to extrapolate from this study to the current Marine Corps aviator retention problem because of changes in society, geopolitics, and the economy over the last 20 years. The Marine Corps is entering a post-war era that is seeing a reduction in deployments and unit operational tempo, but retention of Marine aviators is still decreasing. The most significant disturbances Marine aviators experience today cannot be measured by counting the number of deployments and subsequently there are other characteristics of military service that should be studied to evaluate Marine aviator retention decision-making. Variables should also be added for unit level analysis to reveal variations in career disturbances that cannot be observed at the service level. This can provide more granularity on which military service factors have a significant impact on Marine aviator retention.

E. MODELING COMMAND CLIMATE

It is cliché to say perception is reality, but service-member's perceptions of command climate directly contribute to unit and individual performance assessments. Colonel Jones' emphasizes that service member perceptions are essential to understanding command climate. His definition of command climate as "a reflection of how organizational members feel about organizational factors such as job performance expectations, fairness of rewards and punishment, flow of communication, and example set by the organization's leaders" (Jones, 2003, p. 3). Command climate is connected to organizational effectiveness and challenges to sustaining effective progress. Quoting Lieutenant General Walker Ulmer, United States Army Retired, "our major difficulties emerge not from the character flaws of policymakers, but from a lack of adequate conceptual bases for…creating and sustaining a proper climate with our commands" (Jones, 2003, p. 2). Whether it is positive or negative, the impact of command climate is substantial and needs to be better understood. There are numerous elements of command climate and the most effective way of measuring them is using surveys to capture the perceptions of the target population.

In a 2013 survey of enlisted service members across three military services, including the Army, Coast Guard, and Marine Corps, finds that higher perceptions of toxic leadership within a command had a negative effect on units and service members. The study uses a DEOCS survey to measure the effect of toxic leadership on job satisfaction and organizational commitment. Unsurprisingly, toxic leadership was found to have a negative effect on both (Gallus et al., 2013). This study reveals that command climate can be measured and correlated to organizational effects. Using a singular survey, however, it is limited in its application to objectively measurable organizational outcomes. In this study, both the cause and effect are measured by the survey. Future research to determine correlation to objective outcomes like readiness or retention requires additional data and longer study periods.

The military has struggled with retaining aviators on and off for the last 40 years. The significance of economic factors on Marine aviation separation cannot be ignored, but cyclical factors related to combat deployments and the commercial airlines industry are unpredictable and uncontrollable. Service level and command level surveys and focus groups over the past four decades have identified factors internal to the military that contribute to individual aviator separation decisions. This indicates that non-cyclical factors affecting Marine aviator separation should be studied and considered for recommendations to Marine manpower policies on aviator retention. A predominant amount of research into military retention, specifically retention of Marine aviators, focuses on service level compensation and manpower policies related to labor market forces. This approach has some effectiveness to inform Marine Corps' decisions that specifically change policy and manage inventory of personnel to meet service requirements. Inherent in the results of these studies is how much these policies affect the decisions of individual service members. However, conducting service level studies does not account for the impact of a service member's experience on their retention decisions. This thesis includes squadron level indicators to better capture variations in individual experiences and responses related to retention decision making.

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IV. DATA AND METHODOLOGY

This chapter describes the datasets used in the analysis, along with the construction of the main variables and the summary statistics. The datasets for this analysis have restricted access through the Army's Person-Event Data Environment and all analysts must complete an Office of People Analytics best-practices acknowledgement prior to analyzing the data. This presents advantages and disadvantages. The advantages include getting data that measures squadron command climate over time without having to conduct additional surveys. The disadvantages include using personnel data that does not contain individual training or performance variables. The presentation of summary statistics and analysis of this dataset is at an aggregate level that does not require the same restrictions as the raw data.

A. DATA DESCRIPTION

The personnel data draws from the Defense Enrollment Employment Reporting System and provides demographics and unit assignments for all Marines commissioned between FY2007 and 2012. This dataset includes variables for race, sex, marital status, number of dependents, primary military occupational specialty, unit identification code, commissioning date, pay entry base date, and observation date. It contains quarterly observations for each Marine from FY2007 through 2022. The sample is restricted to all officers observed with a Marine aviator primary military occupational specialty code at any point in their career. I drop individuals who did not complete flight school, as indicated by never being observed with an operational type-model-series aircraft primary military occupational specialty code. However, I leave in those who at any time are winged aviators, but laterally move out of Marine aviation, as indicated by having a different primary military occupational specialty code in their final observation. My final personnel sample includes 2,016 Marine aviators commissioned from FY2007 to 2012.

The command climate data draws from the Defense Personnel Analytics Center and provides over 282,178 responses to DEOCS 4.0 surveys from 2014 to 2017. The data includes 59 questions and the unit identification code of each respondent. The 59 questions are listed in Appendix A. Each question uses a four-point Likert scale where a response of 1 is Strongly Disagree, 2 is Disagree, 3 is Agree, and 4 is Strongly Agree. There are eight questions listed in Table 1 that negatively correlate to command climate. I invert the Likert scale for these responses to simplify the analysis. I filter the observations to operational aviation squadrons and group the mean response of each question by squadron and observation year. I code an indicator for the number of respondents per survey-year to use to create a weighted-mean after merging the datasets. My final command climate sample contains 140 surveys for 62 squadrons from 2014 to 2017.

Table 1. DEOCS 4.0 Questions with Negative Correlation to Command Climate

Factor	Question
Hazing	Newcomers in this organization are pressured to engage in potentially harmful activities that are not related to the mission.
Hazing	Newcomers are harassed and humiliated prior to being accepted into the organization.
Hazing	Certain members are purposely excluded from social work group activities.
Hazing	To be accepted in this organization, members must participate in potentially dangerous activities that are not related to the mission.
Help Seeking Behavior	Seeking help for depression, suicidal thoughts, or Post Traumatic Stress Disorder (PTSD) would negatively impact a member's career.
Burnout	I feel mentally worn out.
Burnout	I feel emotionally worn out.
Burnout	I feel physically worn out.

I then merge the personnel and command climate datasets by unit identification code and observation year. The combination of commissioning years 2007 to 2012 and the DEOCS surveys from 2014 to 2017 corresponds to the most likely years a Marine aviator is in their first fleet squadron tour. From the combined dataset, I group by observations individual Marine aviator and create a weighted-mean of each command climate question using the count of survey respondents as the weight. This results in a single command climate observation with each Marine aviator's squadron command climate experience. This process also preserves the confidentiality of the DEOCS data by not identifying specific squadrons or respondents. The following sections will cover the independent and dependent variables in detail, followed by summary statistics.

B. INDEPENDENT VARIABLES

I code multiple indicators to prepare the dataset for analysis. I construct a binary indicator for race that is equal to 1 if the Marine is a racial minority and 0 if they are not a racial minority. The binary indicator for sex is equal to 1 if the Marine is a female and 0 if they are not female. To create a consistent measure of family factors, I code marital status as 1 if the Marine is married at five years commissioned time-in-service. Similarly, I code dependents as the number of dependents a Marine has at five years commissioned TIS and it remains this numerical value for all subsequent observations. These variables are captured in this way because marital status and number of dependents changes over time, and at later dates are more likely to be endogenous.

I create two fixed-effects indicators that bin Marine aviators by primary military occupational specialty code into aviator type and squadron type. The fixed effects for aviator type represents differences in training and active duty service commitments and mirrors the aviator pipeline tracks in Figure 1. Maritime is for aviators assigned to fly KC-130 aircraft and corresponds to shorter flight school training time and a six-year active duty service commitment. Jet is for aviators assigned to fly fixed-wing jet aircraft and corresponds to longer flight school training time and an eight-year active duty service commitment. Rotary wing is for aviators assigned to fly helicopters and corresponds to shorter flight school training time and a six-year active duty service commitment. Tiltrotor is for aviators assigned to fly MV-22 aircraft and corresponds to shorter flight school training time and a six-year active duty service commitment. The fixed effects for squadron type represents differences in squadron mission and community culture. Heavy helicopter is assigned for aviators that fly CH-53D/E helicopters. Medium Helicopter is assigned for aviators that fly CH-46 helicopters. It is noteworthy that this squadron type no longer exists in the Marine Corps as result of force design. Light Attack Helicopter is for aviators assigned that fly UH-1 or AH-1 helicopters. Attack is for aviators assigned AV-8 fixed-wing jet aircraft. Fighter Attack is for pilots and naval flight officers assigned to fly F/A-

18 or F-35 fixed-wing jet aircraft. Tactical Electronic is for pilots and naval flight officers assigned to fly EA-6 fixed-wing jet aircraft. It is again noteworthy that this squadron no longer exists in the Marine Corps due to force design. Refueler Transport is for aviators assigned to fly KC-130 fixed-wing aircraft. Medium Tiltrotor is for aviators assigned to fly MV-22 tiltrotor aircraft.

I create additional indicators from Marine aviators' career timeline. To control for variation in mean career lengths due to different starting times, I code commissioning year as a fixed-effects indicator for commissioning year cohorts. This variable is assigned a FY between 2007 and 2012 corresponding to a Marines' commissioning date. Next, I create a proxy variable for separation year using the date corresponding to each Marine's last recorded observation in the dataset if it is before the data cutoff on 30 September 2022.

Table 2. Independent Variables

Independent Variables	**Type**	**Description**
Personal Demographics		
Race	Binary	= 1 if Minority, 0 if not minority
Sex	Binary	= 1 if Female, 0 if not female
Marital Status at 5 years commissioned TIS	Binary	= 1 if Married at 5 years commissioned TIS, 0 if not married
Total Dependents at 5 years commissioned TIS	Integer	Value equals the number of dependents at 5 years
Professional Demographics		
Commissioning Year	Fixed Effects	= Commissioning FY
Aviator Type (Based on Primary Military Occupational Specialty code)	Fixed Effects	= Maritime if 7556, 7557 = Jet if 7509, 7518, 7523, 7525, 7543, 7588 = Rotary wing if 7562, 7563, 7564, 7565, 7566 = Tiltrotor if 7531, 7532
Squadron Type (Based on Primary Military Occupational Specialty code)	Fixed Effects	= Marine Heavy Helicopter if 7564, 7566 = Marine Medium Helicopter if 7562 = Marine Light Attack Helicopter if 7563, 7565 = Marine Attack if 7509 = Marine Fighter Attack if 7523, 7525 = Marine Tactical Electronic if 7543, 7588 = Marine Transport Refueling if 7556, 7557 = Marine Medium Tiltrotor if 7531, 7532

Independent Variables	Type	Description
Command Climate		
Squadron Score	Likert	= weighted-mean of all DEOCS questions based on a four point Likert Scale
Principal Component 1	Continuous	= weighted-mean of top 10 questions tied to Principal Component 1
Principal Component 2	Continuous	= weighted-mean of top 10 questions tied to Principal Component 2

I create three independent variables for measuring command climate from person-level DEOCS 4.0 question weighted-means. The first variable, squadron score, incorporates responses from all questions into an overall command climate value for each Marine aviator. The squadron score variable is the weighted-mean of all DEOCS 4.0 questions. I then use principal component analysis on the original squadron level dataset that included weighted-means for each question. This method identifies the questions with the greatest variability between the 140 squadron surveys in the dataset. This analysis removes potential noise from the command climate data as captured by squadron score. To complete the analysis, I standardize the values for all questions and first use parallel analysis of the Eigen values of each principal component, shown in Figure 5, to find how many principal components are notable. The scree plot in Figure 5 shows that only the first three components have notable variation in the data. The first two principal components, and their corresponding questions, account for 76.5% of the variation in the DEOCS 4.0 results at the squadron-year level. Including the third principal component accounts for 82.5% of the variation. However, I only use the first two principal components to maximize the impact of the variables while maintaining simplicity in the models.

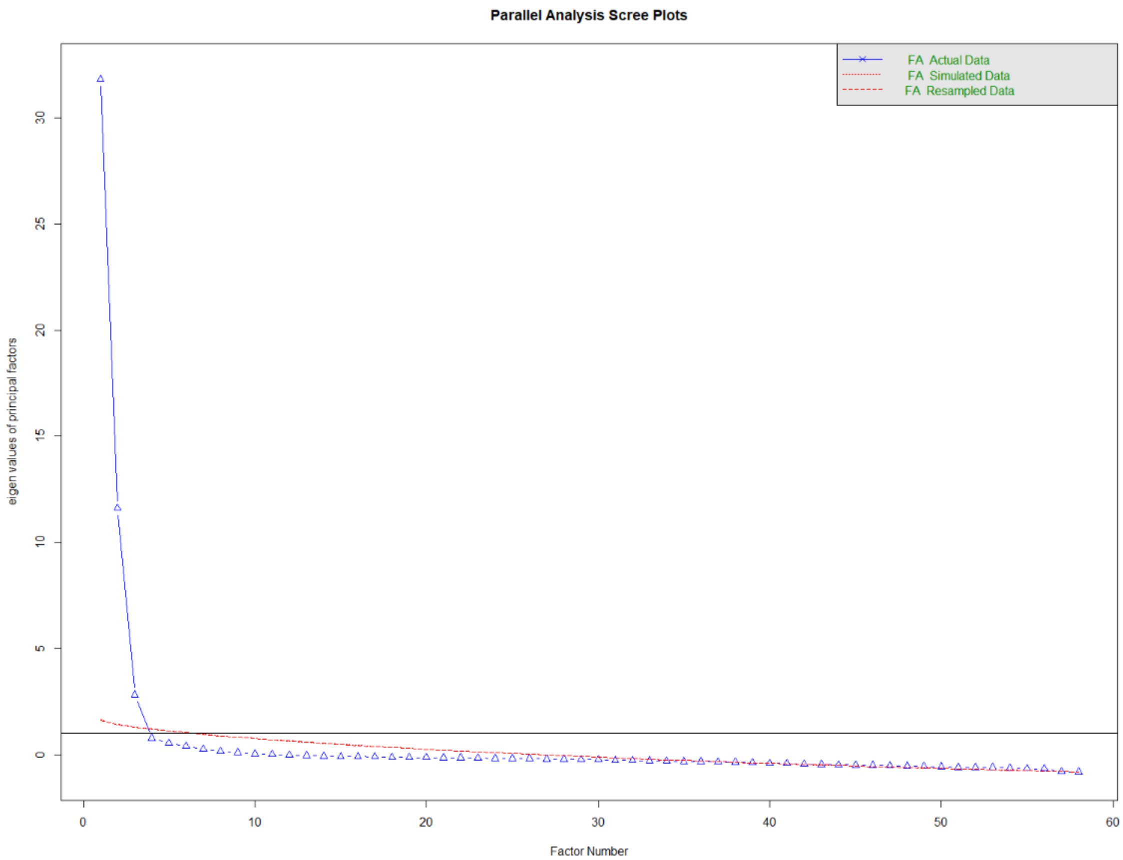
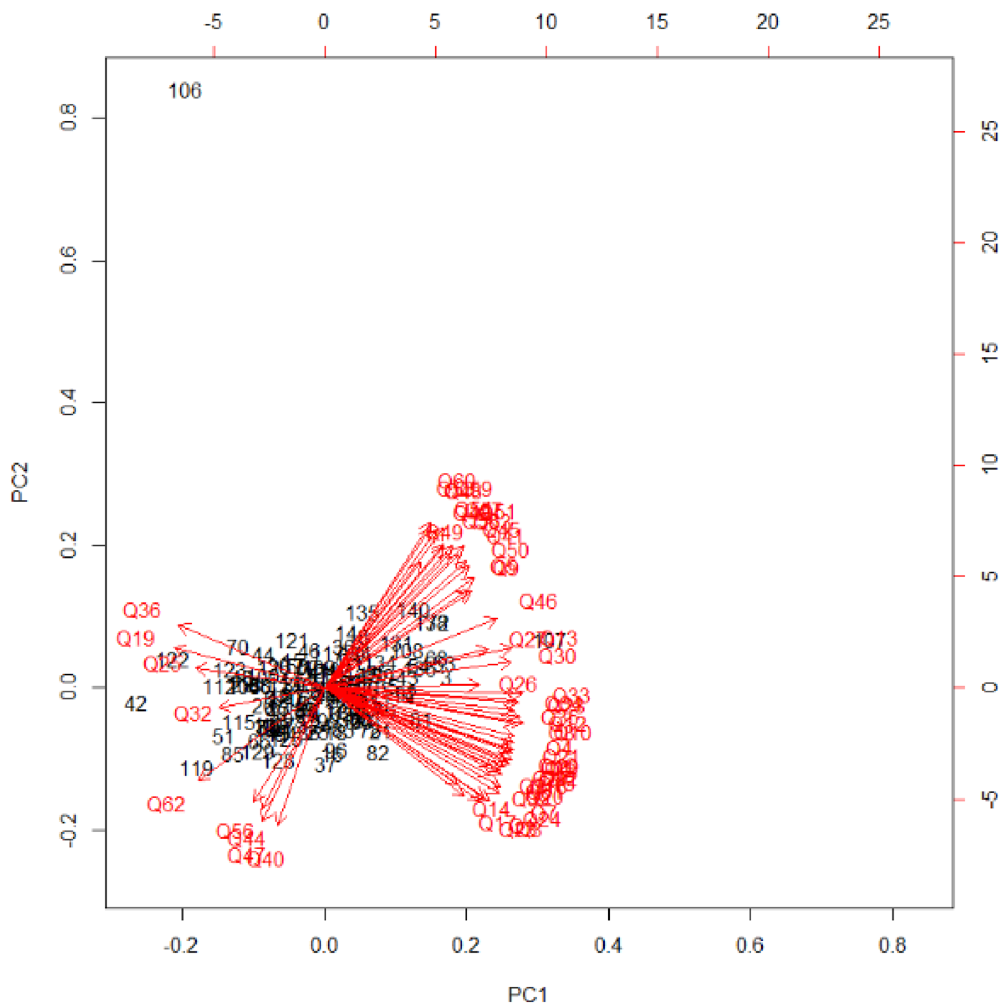


Figure 5. DEOCS 4.0 Principal Component Scree Plot

Analysis of the first two principal components, shown in a Biplot in Figure 6, reveal distinct groupings of questions, depicted with red vectors, and individual survey results, depicted with black vectors. This allows me to identify the top 10 questions influencing principal component 1 and 2.



This is a biplot depicts squadron-year weighted-means of all DEOCS 4.0 questions. Principal Component 1 is on the x-axis and Principal Component 2 is on the y-axis. The influence of each question is depicted by the red vectors. The influence of each squadron score is depicted by the black vectors.

Figure 6. DEOCS 4.0 Principal Component Biplot

The independent variables for principal component 1 and principal component 2 are response means of the corresponding top 10 questions. These questions are listed in Tables 3 and 4. It is important to note that the inclusion of these questions does not indicate any correlation to personnel separation factors. It primarily indicates that the mean responses to these questions have the greatest variation across different surveys instances. This further indicates that, between different USMC fleet squadrons, perceptions of command climate related to these questions have the greatest amount of variation. The questions in principal component 1 bin into organizational effectiveness, factors of organizational cohesion, job satisfaction, and trust. The questions in principal component 2 bin into equal opportunity factors of preventing discrimination and harassment. None of the questions with negative correlation were identified in the top 10 questions of principal component 1 or principal component 2. The following section will introduce and explain the dependent variables for this thesis.

Table 3. Top 10 DEOCS 4.0 Questions for Principal Component 1

Rank	Question
1	Members support each other to get the job done.
2	Members look out for each other's welfare.
3	I feel satisfied with my present job.
4	I feel a strong sense of belonging to this organization.
5	My organization makes good use of available resources to accomplish its mission.
6	Most days I am enthusiastic about my work.
7	I feel motivated to give my best efforts to the mission of my organization.
8	I trust that my organization's leadership will support my career advancement.
9	Members trust each other.
10	I am proud to tell others that I belong to this organization.

Table 4. Top 10 DEOCS 4.0 Questions for Principal Component 2

Rank	Question
1	Sexual harassment does not occur in my work area.
2	Leaders in my organization adequately respond to allegations of sexual harassment.
3	Qualified personnel of all races/ethnicities can expect the same training opportunities.
4	Qualified people of all religions can expect similar job assignments.
5	Racial comments are not used in my work area.
6	Qualified personnel of all religions can expect the same training opportunities.
7	People of all races/ethnicities can expect to be treated with the same level of professionalism.
8	Sexist slurs are not used in my work area.
9	Sexist jokes are not used in my work area.
10	Racial slurs are not used in my work area.

C. DEPENDENT VARIABLES

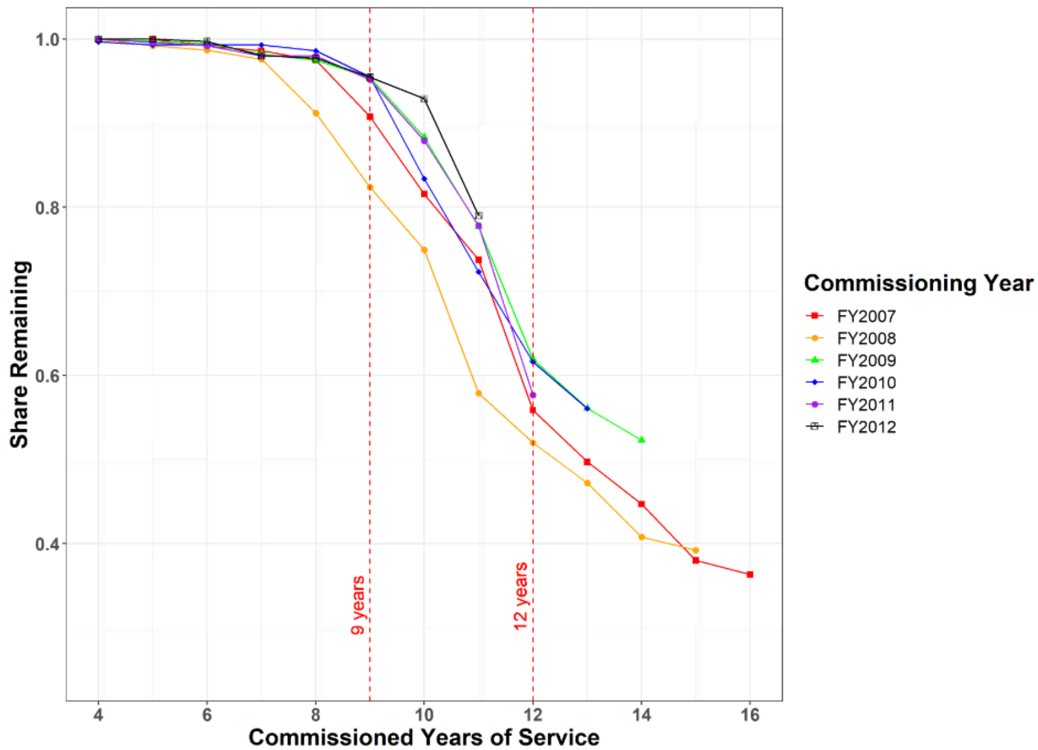
Informed by previous literature and an understanding of Marine aviators' background, the dependent variables estimate two outcomes: separation from active-duty and lateral move from an aviator primary military occupational specialty. The selection of nine and twelve years corresponds to the expected years of commissioned service for Marine aviators after completing their active duty service commitment. This accounts for three years of training between The Basic School and flight school for rotary wing, tiltrotor, and maritime aviators followed by a six-year active duty service commitment. The choice of twelve years accounts for four years of training between The Basic School and flight school for fixed-wing jet aviators followed by an eight-year active duty service commitment. These timelines also correspond to an increase in separations among Marine aviators observed in the following section. I cannot explicitly distinguish between voluntary or non-voluntary separation in this data. However, the assumption is that most separations are voluntary because there are few non-voluntary separations among Marine officers. Subsequently, the lateral move outcome is important because it captures an event that removes Marine aviators from being able to fill aviator manpower requirements. There are multiple reasons for a lateral move which can be voluntary or non-voluntary. Additionally, eligibility requirements change annually based on manpower requirements, which often precludes Marine aviators, an understaffed community, from even being eligible for voluntary lateral move. The lateral move variable uses a binary indicator equal to 1 if a Marine was assigned an aviator primary military occupational specialty code after completion of flight training but did not continue or finish their career as Marine aviator. A description of each dependent variable is listed below in Table 5.

Table 5. Dependent Variables

Dependent Variable	Type	Description
Separation before 9 Years Commissioned Service	Binary	= 1 if the individual separated before 9 years commissioned TIS
Separation before 12 Years Commissioned Service	Binary	= 1 if the individual separated before 12 years commissioned TIS
Lateral Move from Marine Aviation	Binary	= 1 if the Marine changed from aviation while on active duty

D. SUMMARY STATISTICS

To further understand the separations of Marine aviators in the sample, I code an indicator for separation year that is equal to the FY of the last observation for each Marine aviator, given that it occurs before the data cutoff on 30 September 2022. I plot Marine aviator separations by commissioning year, aviator type, and squadron type. Figures 7, 8, and 9, show the share of separations based on each category with years of commissioned TIS as a baseline. Figure 7 is grouped by commissioning years, which are influenced by changes in economic conditions, Department of Defense and service level policies, and other factors differently. It shows that for all cohorts, separations begin to increase initially after eight years and more significantly between nine and twelve years commissioned TIS. The latter corresponds to separation decisions following the combined expiration of both six and eight year active duty service commitments. By nine years commissioned TIS, approximately the first 5% of each commissioning year cohort has separated. This value is expected to primarily be made of up Marine aviators with a six-year active duty service commitment who separation at the earliest opportunity. However, at 10 years of commissioned TIS, approximately 25% of FY2008 Marine aviators have separated, while only approximately 8% of FY2012 have separated. This could be the result of a behavior change or the result of longer flight school training which delays the start of Marine active duty service commitment. By 12 years commissioned TIS each cohort has experienced approximately 38 to 48% separation rates. This provides a significantly larger population of separated Marine aviators to estimate the effects of squadron command climate. The variation between cohorts is the main reason why the analysis requires fixed-effects for commissioning year.

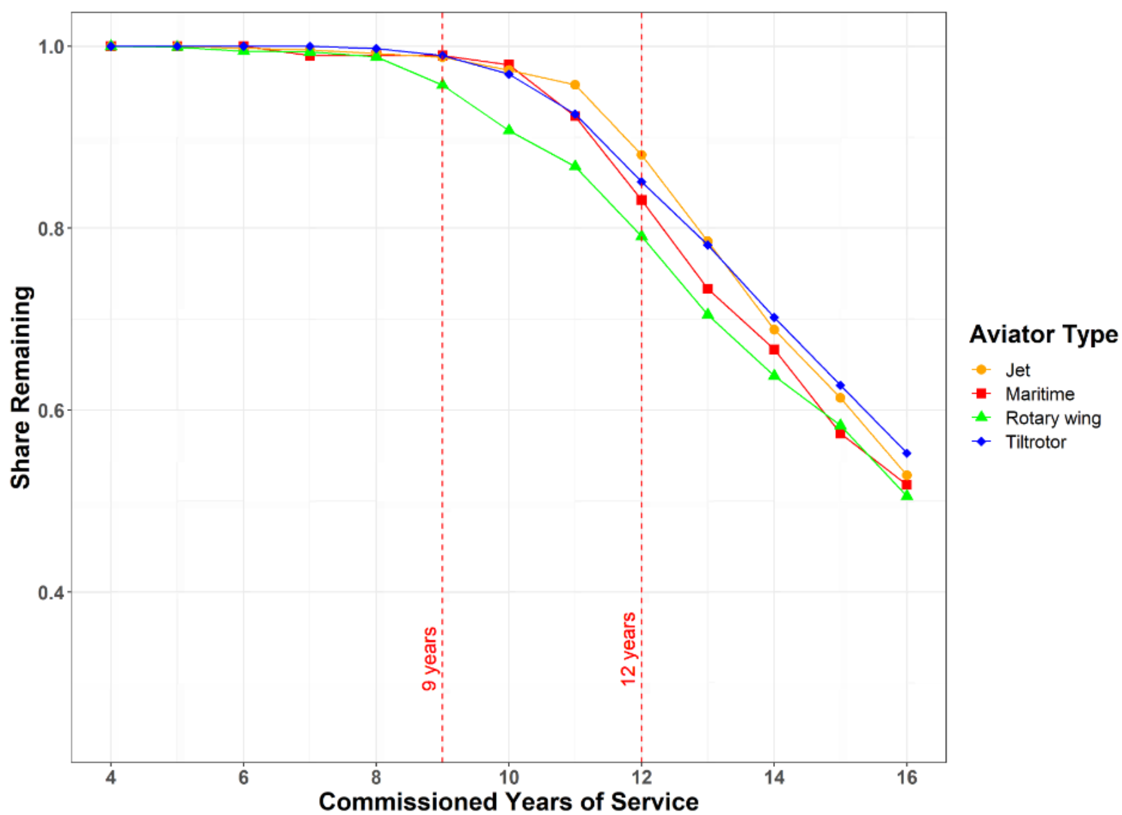


This plot shows the share of Marine aviators that separated between zero and sixteen years commissioned TIS. It is grouped by Commissioning-Year cohorts from FY2007 to 2012. The first dashed line is at nine years commissioned TIS and the second line is at twelve years.

Figure 7. Separations by Commissioning Year (FY2007–2012)

Figure 8 shows the same timeline with the share of separations grouped by aviator type. Aviator types vary in flight school duration and length of active duty service commitments. However, comparing the maritime, or KC-130, and rotary wing types, which have similar aviation training time and identical active duty service commitments, there very different separation rates. At ten years of commissioned TIS, approximately 9% of rotary wing aviators have separated whereas only approximately 3% of maritime aviators have separated. This indicates that other factors may influence separation decisions beyond training timelines and commitment lengths. Rotary wing aviators make up over 45% of all Marine aviators while maritime aviators make up under 10%, and each community has vesting different mission sets and deployment cycles. Also, notable for this sample, the aviation bonus was offered to maritime aviators starting in FY2018 (United States Marine Corps, 2017), while it was not offered to rotary wing aviators until FY2019 (United States

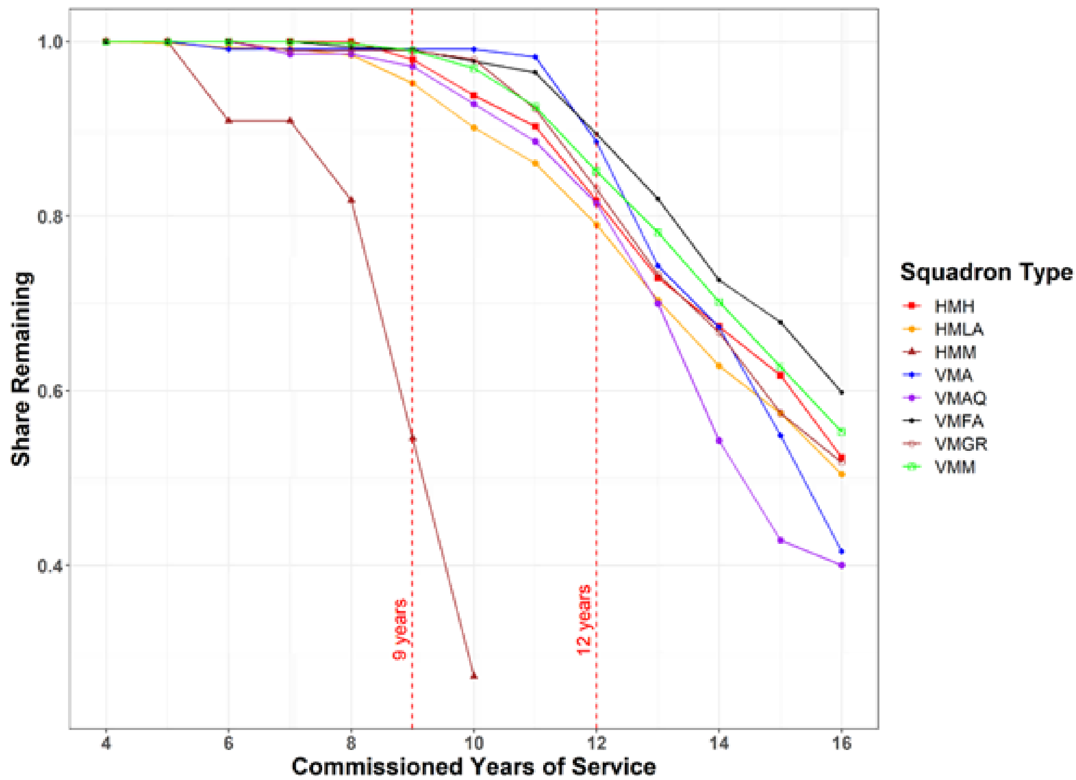
Marine Corps, 2018), and at a much lower rate. The unequal influence of monetary incentives across aviator types is not studied in this thesis, and it is controlled for by including an aviator-type fixed-effect. Overall, while those with shorter training periods and shorter contracts begin separating earlier than those with longer training periods and longer contracts, these two factors do not completely explain the variations between similar groups. This is the expected behavior between maritime and jet aviator types. For example, maritime aviators have shorter training and contracts and at eleven years, approximately 8% of maritime aviators have separated, while only approximately 4% of jet aviators have separated. However, this does not explain the difference between rotary wing separations and tiltrotor separations, which have a 5 percentage point difference at the same eleven year mark, despite having similar training and contract lengths.



This plot shows the share of Marine aviators that separated between zero and sixteen years commissioned TIS. It is grouped by aviator type and includes all Marine aviators commissioned between FY2007 and 2012. The first dashed line is at nine years commissioned TIS and the second line is at twelve years.

Figure 8. Separations by Aviator Type

To further understand particular variations between aviation communities, I create a squadron type group from primary military occupational specialty. Figure 9 shows the share of separations by squadron type and is similarly baselined for years of commissioned TIS. Unlike aviator type, squadron type controls variations between aircraft mission and community culture, as well as for force design changes that sun-downed Marine Medium Lift Helicopter Squadrons and Marine Tactical Electronic Squadrons. In the study population, aviators from these communities have fewer future opportunities to continue in their trained primary military occupational specialty and are given more eligibility for lateral moves and early retirement than other communities. However, by ten years commissioned TIS, approximately 75% of Marine Medium Lift Helicopter Squadron aviators, that did not laterally move to another community, separate from active duty, while only approximately 4% of the Marine Tactical Electronic Squadron aviators separate. There are variations in policies and timelines between the sun-down of these two communities that is not studied in this thesis, but it is controlled for by including squadron type fixed effects.



This plot shows the share of Marine aviators that separated between zero and sixteen years commissioned TIS. It is grouped by Squadron Type and includes all Marine aviators commissioned between FY2007 and 2012. The first dashed line is at nine years commissioned TIS and the second line is at twelve years. The following designations apply to squadron type: HMH, Marine Heavy Helicopter Squadron; HMLA, Marine Light Attack Helicopter Squadron; HMM, Marine Medium Helicopter Squadron; VMA, Marine Attack Squadron, VMAQ, Marine Tactical Electronic Squadron; VMFA, Marine Fighter Attack Squadron; VMGR, Marine Transport Refueling Squadron; VMM, Marine Medium Tiltrotor Squadron.

Figure 9. Separations by Squadron Type

Overall, the trend in separations across the different categories supports including fixed-effects for squadron and aviator types in the regressions. However, both aviator and squadron type are derived from primary military occupational specialty and are likely to have some collinearity, so these will not be included at the same time.

Summary statistics for the entire population of active-duty Marine aviators commissioned between FY2007 and 2012 are in Table 6. There are 2,016 Marine aviators in the population and 77.4% of them were in a fleet squadron when command climate was observed by at least one DEOCS 4.0 survey between 2014 and 2017. The mean commissioning age is fairly consistent across all cohorts at approximately 24 years old. The mean for commissioned TIS has more variation between FY cohorts and that is partially explained by varying start times. However, it could also be influenced by variations in separation rates or changes in prior-enlisted service rates over time, which is not captured in the data. Approximately 9.5% separate prior to completing nine years of commissioned TIS, with generally lower rates for junior cohorts. While this does indicate that separation rates before 9 years are decreasing, there are myriad potential causes that are not related to command climate or retention policy that are not covered by this thesis. Before twelve years, 45% of aviators separate with less of a trend between cohorts. Approximately 7% complete a lateral move, with a trend of lower rates for junior cohorts likely due to less time available to complete a lateral move.

Considering individual characteristics, 15.7% of the population is a racial minority and 4.5% is female. This indicates that most of the Marine aviator community is male and not a racial minority. At the five-year mark, 54.5% of the population is married and approximately 62% of those have no children. These characteristics are fairly consistent across each FY cohort. For military characteristics, the rotary wing community is the largest with 46.5% of the population and the maritime community is the smallest with 9.7% of the population. The squadron type breakdown further identifies aviation community size, with Marine Light Attack Helicopter squadrons accounting for 29.1% of the total population. Of note, the effects of Marine Medium Helicopter squadron and Marine Tactical Electronic squadron sun-down are visible in the decreasing numbers of each community.

The DEOCS 4.0 results are captured by three variables. The mean and standard deviation for each command climate variable is based on a four-point Likert scale. The average for squadron-score is 2.997, while the average for principal component 1 is 2.940 and principal component 2 is 3.216. The variation between principal component 1 and principal component 2 is a good indication that they capture two distinct aspects of command climate with principal component 1 generally having lower value responses. Furthermore, each component has the same standard deviation, indicating that the amount of variation across the total dataset is effectively captured by each principal component.

Table 6. Summary Statistics: Marine Aviators Commissioned FY2007–2012

	FY2007-2012	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
Count	2,016	358	375	394	289	248	352
DEOCS Surveyed	0.774	0.617	0.752	0.873	0.844	0.835	0.744
Commissioning Age Mean/(sd)	24.0 (1.80)	24.0 (1.85)	24.1 (1.78)	24.2 (1.85)	23.9 (1.67)	23.9 (1.71)	24.0 (1.89)
Commissioned Years Mean/(sd)	11.47 (2.08)	12.54 (2.76)	11.99 (2.37)	12.02 (1.83)	11.33 (1.55)	10.78 (1.14)	10.17 (0.75)
Outcome Variables							
Separated<9 TIS	0.095	0.145	0.123	0.071	0.104	0.073	0.048
Separated<12 TIS	0.450	0.478	0.509	0.404	0.401	-	-
Lateral Move	0.070	0.067	0.077	0.063	0.059	0.048	0.043
Individual Characteristics							
Minority	0.157	0.128	0.184	0.132	0.266	0.145	0.105
Female	0.045	0.042	0.048	0.046	0.042	0.065	0.034
Family at 5 years commissioned TIS							
Married	**0.545**	**0.536**	**0.549**	**0.503**	**0.626**	**0.556**	**0.523**
No Children	0.623	0.651	0.612	0.646	0.624	0.601	0.598
1 Child	0.222	0.229	0.223	0.197	0.221	0.232	0.234
2 Children	0.121	0.089	0.121	0.141	0.138	0.101	0.130
3 or more Children	0.034	0.031	0.044	0.015	0.017	0.065	0.038
Not Married	**0.455**	**0.464**	**0.451**	**0.497**	**0.374**	**0.444**	**0.477**
No Children	0.977	0.976	0.976	0.980	0.972	0.982	0.976
With Children	0.023	0.024	0.018	0.020	0.028	0.018	0.024
Aviator Type							
Maritime	0.097	0.053	0.080	0.122	0.125	0.129	0.085
Jet	0.245	0.330	0.235	0.26.6	0.218	0.194	0.205
Rotary Wing	0.465	0.480	0.528	0.434	0.439	0.440	0.457
Tiltrotor	0.193	0.137	0.157	0.178	0.218	0.238	0.253
Squadron Type							
HMH	0.169	0.176	0.181	0.165	0.152	0.165	0.168
HMLA	0.291	0.288	0.333	0.269	0.287	0.274	0.290
HMM	0.005	0.017	0.013	-	-	-	-
VMA	0.056	0.073	0.064	0.058	0.062	0.036	0.037
VMFA	0.154	0.207	0.152	0.157	0.107	0.117	0.162
VMAQ	0.035	0.047	0.019	0.051	0.048	0.040	0.006
VMGR	0.097	0.053	0.080	0.122	0.125	0.129	0.085
HMM	0.193	0.137	0.157	0.178	0.218	0.238	0.253
DEOCS Mean/(sd)							
Squadron Score	2.997	2.997	3.004	2.993	2.991	3.00	2.996
	(0.086)	(0.091)	(0.092)	(0.091)	(0.079)	(0.084)	(0.076)
Principal Component 1	2.940	2.940	2.949	2.931	2.933	2.943	2.941
	(0.086)	(0.091)	(0.092)	(0.091)	(0.79)	(0.084)	(0.076)
Principal Component2	3.216	3.209	3.216	3.217	3.213	3.223	3.219
	(0.086)	(0.091)	(0.092)	(0.091)	(0.079)	(0.084)	(0.076)

Notes: Designations for squadron type: HMH, Marine Heavy Helicopter Squadron; HMLA, Marine Light Attack Helicopter Squadron; HMM, Marine Medium Helicopter Squadron; VMA, Marine Attack Squadron, VMAQ, Marine Tactical Electronic Squadron; VMFA, Marine Fighter Attack Squadron; VMGR, Marine Transport Refueling Squadron; VMM, Marine Medium Tiltrotor Squadron.

E. METHODOLOGY

The section describes the linear probability model to estimate the relationship between USMC squadron command climate and Marine aviator separation. I estimate the probability of the separation outcomes as a function of the key independent variable for command climate at the point in a Marine aviators' career when they are performing their primary mission in a fleet squadron. Demographic differences between Marine aviators and differences within the Marine aviation community are also controlled for using additional independent variables. For additional details on each variable, refer to the previous section on data.

I estimate the probability of the separation outcomes, y_i, for individual i in command c as a function of command climate, CC_c, and other individual characteristics.

$$y_{ic} = \beta_o + \beta_1(CC_c) + \beta_2(CY_i) + \beta_3(AviationGroup_i) + \beta_4(female_i) + \beta_5(minority_i) + \beta_6(MS5_i) + \beta_7(DEP5_i) + u_{ic}$$

The command climate components, CC_c, are squadron score, which is the weighted-mean of all DEOCS questions, or principal component 1 and principal component 2, which is the weighted-mean of the top 10 questions associated with each respective principal component and accounts for over 75% of variation in survey responses across squadrons. The remaining independent variables are included in each iteration that uses different command climate components. These include fixed effects for commissioning year captured by the vector CY_i, from FY2007 to 2012, to account for variations in mean career length and changes in external conditions over time. To control for variations internal to Marine Corps aviation, the fixed effects for $AviationGroup_i$, is binned as either aviator type, which includes jet, rotary wing, tiltrotor, or maritime, or squadron type, which includes Marine Heavy Helicopter Squadron, Marine Light Attack Helicopter Squadron, Marine Medium Lift Helicopter Squadron, Marine Attack Squadron, Marine Tactical Electronic Squadron, Marine Fighter Attack Squadron, or Marine Transport Refueling Squadron. To control for personal differences, I include demographic indicators for sex, $female_i$, and race, $minority_i$, and family indicators for marital status, $MS5_i$, and number of dependents, $DEP5_i$, at five years of commissioned TIS.

The separation outcomes are separation prior to nine years commissioned TIS, separation prior to twelve years commissioned TIS, and lateral move prior to separation from active duty. I apply the model to each separation outcome including aviator-type as fixed effects. Since squadron-type is a more specific subgrouping of Marine aviator primary military occupational specialty, including both would create collinearity. For separation outcomes that find a statistically significant correlation to squadron command climate, I run the model again, substituting squadron type as the $AviationGroup_i$ fixed effect.

V. RESULTS AND ANALYSIS

This section describes the results of the three linear probability models applied to each outcome variable, separation before nine or before twelve years of commissioned service, and lateral move from aviation before leaving active-duty service, and analysis of demographics and command climate in Marine aviator separation decisions. The models indicate that USMC squadron command climate does not have a statistically significant effect on the separation decisions of Marine aviators. Furthermore, the models indicate that squadron command climate does have a statistically significant effect on lateral moves, and detailed analysis in this section explains possible reasons for this correlation.

As expected, model (1), which does not include command climate variables, shows that the outcomes for separation from active duty are statistically significant for commissioning year fixed-effects, and active duty service commitments, as measured by aviator type fixed-effects. Table 7 shows results for separation prior to nine years commissioned TIS. FY2007 is the excluded variable and except for the following year, FY2008, Marine aviators from each subsequent year are all less likely to separate prior to nine years commissioned TIS than FY2007. The variation ranges from 4.2 percentage points less for FY2010 and 9.9 percentage points less for FY2012 and is not a consistent decrease from year to year. Aviator-type fixed effects indicate only jet aviators have a lower probability of separating than maritime pilots. This is expected given that jet aviators are the only aviator type with an eight-year active duty service commitment. Demographics such as race, sex, marital status and number of dependents at five years of commissioned service are not significant for this separation outcome.

In models (2) and (3), the command climate variables are not significant for Marine aviator separation prior to nine years commissioned TIS. The confidence interval for squadron score in model (2) includes zero as a possible estimate, meaning this factor could have no effect on the outcome. Considering the confidence interval $(0.022 - 2 * 0.073, 0.022 + 2 * 0.073)$, model (2) estimates the effect of squadron score is between -12.4 percentage points to 16.8 percentage points. Considering the principal component estimates for command climate in model (3), there are some interesting insights from the results. First, the estimates have a negative coefficient for principal component 1 and a positive coefficient for principal component 2. This indicates that these factors are pulling the outcome variable in opposite directions. Second, the confidence interval for principal component 1 is $(-0.070 - 2 * 0.066, -0.070 + 2 * 0.066)$ -20.2 to 6.2 percentage points while the confidence interval for principal component 2 is $(0.165 - 2 * 0.110, 0.165 + 2 * 0.110)$ -5.5 to 38.5. This indicates that a higher score for principal component 1, organizational effectiveness, generally results in a lower probability of separating before nine years, while a higher score for principal component 2, preventing discriminating behaviors, generally results in a higher probability of separating before nine years. Ultimately, however, these models estimate that squadron level command climate does not have a significant, measurable effect on Marine aviator separation prior to nine years commissioned TIS.

Table 7. Models of Separation before Nine Years

	Dependent Variable		
	Separation Before Nine Years Commissioned TIS		
	Baseline	Squadron Score	Principal Components
	(1)	(2)	(3)
Squadron Score		0.022	
		(0.073)	
Principal Component 1			-0.070
			(0.066)
Principal Component 2			0.165
			(0.110)
Commissioned FY2008	-0.027	0.005	0.005
	(0.021)	(0.022)	(0.022)
Commissioned FY2009	-0.077***	-0.031	-0.033
	(0.021)	(0.021)	(0.021)
Commissioned FY2010	-0.042*	-0.002	-0.003
	(0.023)	(0.023)	(0.023)
Commissioned FY2011	-0.075***	-0.034	-0.036
	(0.024)	(0.024)	(0.024)
Commissioned FY2012	-0.099***	-0.045**	-0.046**
	(0.022)	(0.023)	(0.023)
Jet Aviator	-0.042*	-0.055*	-0.055*
	(0.025)	(0.024)	(0.024)
Rotary wing Aviator	0.018	-0.009	-0.008
	(0.023)	(0.023)	(0.023)
Tiltrotor Aviator	-0.019	-0.035	-0.040
	(0.025)	(0.027)	(0.027)
Female	0.030	0.024	0.025
	(0.032)	(0.031)	(0.031)
Minority	0.015	0.009	0.008
	(0.018)	(0.018)	(0.018)
Marital Status (5yr)	-0.021	-0.023	-0.023
	(0.018)	(0.018)	(0.018)
Number Of Dependents (5yr)	-0.012	-0.004	-0.004
	(0.009)	(0.009)	(0.009)
Constant	0.170***	0.056	-0.201
	(0.027)	(0.222)	(0.273)
Observations	2,016	1,561	1,561
R^2	0.027	0.017	0.019
Adjusted R^2	0.021	0.009	0.010
Residual Std. Error	0.290 (df = 2003)	0.246 (df = 1547)	0.246 (df = 1546)
F Statistic	4.663*** (df = 12; 2003)	2.080** (df = 13; 1547)	2.088** (df = 14; 1546)
Notes:			*p<0.1;**p<0.05;***p<0.01

Linear Probability Model. The excluded variables in this table are Commissioned FY2007 and maritime aviator type. Personnel data from Defense Enrollment Eligibility Reporting System from FY2004 to 2022. Command Climate data from DEOCS 4.0 from 2014 to 2017.

The results for separation prior to twelve years commissioned TIS are in Table 8. FY2011 and 2012 commissioning years are excluded from this outcome model because they do not have a mean greater than twelve years of commissioned service. Compared to the outcome for nine years of commissioned TIS in Table 7, this outcome has similar, non-significant results for commissioning year, aviator type fixed effects, and command climate effects. However, for this outcome the race indicator is statistically significant. According to the results in model (1), a racial minority Marine aviator is 16.9 percentage points more likely to separate prior to twelve years of commissioned service than a similar non-minority counterpart. This is a significant difference and indicates there are some factors in Marine aviation that influence racial minorities' decision to separate from active duty differently from the racial majority. Recalling from Table 6 in Chapter IV, racial minorities make up 15.7% of overall Marine aviators in the population and a future study with additional indicators could uncover causal factors for this correlation. Overall, the results from these first two outcomes indicate that USMC squadron command climate does not have a significant impact on Marine aviator separation from active duty prior to nine or twelve years of commissioned service.

Table 8. Models of Separation before Twelve Commissioned Years

	Dependent Variable		
	Separation Before Twelve Commissioned Years (TIS)		
	Baseline	Squadron Score	Principal Components
	(1)	(2)	(3)
Squadron Score		0.023	
		(0.167)	
Principal Component 1			-0.152
			(0.152)
Principal Component 2			0.282
			(0.246)
Commissioned FY2008	0.013	0.067	0.067
	(0.036)	(0.044)	(0.044)
Commissioned FY2009	-0.081**	-0.015	-0.019
	(0.036)	(0.042)	(0.042)
Commissioned FY2010	-0.107***	-0.045	-0.047
	(0.023)	(0.046)	(0.046)
Jet Aviator	-0.102*	-0.021	-0.024
	(0.050)	(0.058)	(0.058)
Rotary Wing Aviator	0.004	0.056	0.054
	(0.047)	(0.055)	(0.055)
Tiltrotor Aviator	-0.014	0.031	0.020
	(0.053)	(0.065)	(0.066)
Female	0.031	0.097	0.099
	(0.065)	(0.074)	(0.074)
Minority	0.169***	0.176***	0.173***
	(0.035)	(0.040)	(0.040)
Marital Status (5yr)	-0.013	-0.048	-0.047
	(0.038)	(0.042)	(0.042)
Number Of Dependents (5yr)	-0.007	0.005	0.004
	(0.019)	(0.021)	(0.021)
Constant	0.501***	0.293	-0.095
	(0.053)	(0.504)	(0.603)
Observations	1,416	1,091	1,091
R^2	0.036	0.036	0.037
Adjusted R^2	0.029	0.026	0.027
Residual Std. Error	0.490 (df = 1405)	0.484 (df = 1079)	0.484 (df = 1078)
F Statistic	5.220*** (df = 10; 1405)	3.664*** (df = 11; 1079)	3.478*** (df = 12; 1078)
Notes:			*p<0.1;**p<0.05;***p<0.01

Linear Probability Models. The excluded variables in this table are Commissioned FY2007 and Maritime aviator type. Personnel data from Defense Enrollment Eligibility Reporting System from FY2004 to 2022. Command Climate data from DEOCS 4.0 from 2014 to 2017.

The results in Table 9 are for the lateral moves outcome and include all commissioning years from FY2007 to 2012. Unlike the previous models, the intercept coefficient from model (1) is not statistically significant for estimating the outcome. This indicates that there is not a service level trend in lateral moves when controlling for the observed independent variables. However, both models incorporating indicators for command climate are significant. Across models (2) and (3), the estimates on the indicators for personal and professional characteristics are relatively constant so I will cover them at the same time. Similar to the previous outcomes, commissioning year fixed effects are only marginally significant for this outcome between FY2007 and 2008. Unlike the previous outcomes, aviator type fixed effects are not significant, indicating lateral moves do not vary significantly across these binned groups when controlling for command climate. However, for demographics, females are approximately 4.5 percentage points more likely than males and racial minorities are approximately 4.2 percentage points more likely than non-minorities to laterally move out of aviation. Furthermore, at five years TIS, family factors indicate the estimated likelihood of laterally moving is approximately 3 percentage points lower for those that are married. Each additional dependent increases the likelihood of a lateral move by 1.1 percentage points. However, the timing of a Marines' lateral move is uncertain in the data, so interpreting the implications of these family factors is limited.

The command climate indicators for squadron score, principal component 1, and principal component 2 are based on a four-point Likert scale. For the analysis, this means that all values for these variables are positive and correlate proportionally to the outcome based on the sign of the coefficient. In model (2), the coefficient on squadron score is -0.212. With a negative sign, this means higher squadron scores result in a lower probability of a lateral move. Simply put, for every one point change in squadron score, the probability of lateral move decreases by 21.2 percentage points. However, the standard deviation of squadron score is just 0.086, so a standard deviation increase in the squadron score is associated with a 1.82 percentage point $(= 0.086 * 0.212 * 100)$ decrease in the probability of a lateral move. Moving from the worst-scoring squadron (2.67) to the best-scoring squadron (3.39) would increase the squadron score by 0.72, so the largest possible effect would be an $(= 0.72 * 0.212 * 100)$ a 15.2 percentage point decrease.

Understanding the results of model (3) in the same way, the marginally significant coefficient of -0.118 for principal component 1 estimates that a standard deviation increase in principal component 1 $(= 0.086 * 0.118 * 100)$ results in a 1 percentage point decrease in the probability of a lateral move. Even though the effects are likely to be small, considering the small standard deviation, these estimates of Marine aviator lateral moves do indicate that squadron level command climate does have a significant effect. To understand these effects further, I substituted squadron type for aviator type to see if changing the bins for Marine aviator primary military occupational specialty reveal additional insights into command climate effects for this outcome.

Table 9. Models of Lateral Move by Aviator Type

	Dependent Variable		
		Lateral Move	
	Baseline	Squadron Score	Principal Components
	(1)	(2)	(3)
Squadron Score		-0.212***	
		(0.055)	
Principal Component 1			-0.118**
			(0.049)
Principal Component 2			0.085
			(0.082)
Commissioned FY2008	0.009	-0.029*	-0.029*
	(0.018)	(0.017)	(0.017)
Commissioned FY2009	0.0001	-0.023	-0.022
	(0.017)	(0.016)	(0.016)
Commissioned FY2010	-0.008	-0.028	-0.027
	(0.019)	(0.017)	(0.017)
Commissioned FY2011	-0.015	-0.027	-0.026
	(0.020)	(0.018)	(0.018)
Commissioned FY2012	-0.019	-0.019	-0.018
	(0.018)	(0.017)	(0.017)
Jet Aviator	0.052**	0.024	0.024
	(0.020)	(0.018)	(0.018)
Rotary Wing Aviator	0.055***	0.009	0.008
	(0.019)	(0.017)	(0.017)
Tilt rotor Aviator	0.029	-0.001	0.003
	(0.021)	(0.020)	(0.020)
Female	0.066**	0.045*	0.046**
	(0.026)	(0.023)	(0.023)
Minority	0.047***	0.042***	0.042***
	(0.015)	(0.013)	(0.013)
Marital Status (5yr)	-0.032**	-0.029**	-0.030**
	(0.015)	(0.013)	(0.013)
Number Of Dependents (5yr)	0.011	0.011*	0.011*
	(0.007)	(0.006)	(0.006)
Constant	0.019	0.682***	0.665***
	(0.022)	(0.166)	(0.204)
Observations	2,016	1,561	1,561
R^2	0.018	0.026	0.027
Adjusted R^2	0.012	0.018	0.018
Residual Std. Error	0.237 (df = 2003)	0.184 (df = 1547)	0.184 (df = 1546)
F Statistic	3.052*** (df = 12; 2003)	3.146*** (df = 13; 1547)	3.087*** (df = 14; 1546)
Notes:			*p<0.1;**p<0.05;***p<0.01

Linear Probability Model. The excluded variables in this table are Commissioned FY2007 and maritime aviator type. Personnel data from Defense Enrollment Eligibility Reporting System from FY2004 to 2022. Command Climate data from DEOCS 4.0 from 2014 to 2017.

In the models for lateral move with squadron type, the coefficients for the command climate variables change slightly, but retain the same sign and significance. The notable difference in this model is the coefficient for Marine Tactical Electronic Squadrons. The significant coefficient indicates that aviators in these squadrons are approximately 12 percentage points more likely to laterally move than similar aviators from the excluded Marine Heavy Helicopter Squadron group. Understanding this does benefit from additional context, however. As mentioned earlier, Marine Tactical Electronic Squadrons are no longer in the Marine Corps as a function of force design. This event increases the volume of these aviators likely to be eligible for lateral moves as a result. The lateral move indicator is for Marine aviators that end up with a non-aviator primary military occupational specialty. The fact that squadron command climate is statistically significant for aviators leaving aviation while on active duty, rather than laterally moving to another squadron type, amplifies the importance of this result. It suggests that when Marine aviators are driven to choose a different primary military occupational specialty, their experience with squadron command climate has a significant impact on whether they remain in aviation or laterally move to another Marine Corps warfighting community.

Table 10. Models of Lateral Move by Squadron Type

	Dependent Variable		
	Baseline (1)	Lateral Move Squadron Score (2)	Principal Components (3)
Squadron Score		-0.185***	
		(0.055)	
Principal Component 1			-0.085**
			(0.050)
Principal Component 2			0.123
			(0.082)
HMLA	0.018	-0.006	-0.007
	(0.016)	(0.014)	(0.014)
HMM	0.019		
	(0.073)		
VMA	-0.016	-0.008	0.009
	(0.026)	(0.022)	(0.022)
VMAQ	0.125**	0.123**	0.126***
	(0.031)	(0.028)	(0.028)
VMFA	-0.009	-0.003	-0.003
	(0.019)	(0.016)	(0.016)
VMGR	-0.043**	-0.012	-0.012
	(0.021)	(0.019)	(0.019)
VMM	-0.015	-0.013	-0.011
	(0.018)	(0.016)	(0.017)
Female	0.066**	0.042*	0.042*
	(0.026)	(0.023)	(0.013)
Minority	0.047***	0.041***	0.041***
	(0.015)	(0.013)	(0.013)
Marital Status (5yr)	-0.030**	-0.027**	-0.027**
	(0.015)	(0.013)	(0.013)
Number Of Dependents (5yr)	0.010	0.010	0.010
	(0.007)	(0.006)	(0.006)
Constant	0.062***	0.612***	0.701***
	(0.018)	(0.168)	(0.204)
Observations	2,016	1,561	1,561
R^2	0.028	0.039	0.041
Adjusted R^2	0.020	0.029	0.030
Residual Std. Error	0.236 (df = 1999)	0.183 (df = 1544)	0.183 (df = 1543)
F Statistic	3.619*** (df = 16; 1999)	3.913*** (df = 16; 1544)	3.884*** (df = 17; 1543)
Notes:			*p<0.1;**p<0.05;***p<0.01

Linear Probability Model. Fixed effects included for commissioning year FY2007 to 2012. The excluded variables in this table are Commissioned FY2007 and HMH squadron type. Personnel data from Defense Enrollment Eligibility Reporting System from FY2004 to 2022. The following designations apply to squadron type: HMH, Marine Heavy Helicopter Squadron; HMLA, Marine Light Attack Helicopter Squadron; HMM, Marine Medium Helicopter Squadron; VMA, Marine Attack Squadron, VMAQ, Marine Tactical Electronic Squadron; VMFA, Marine Fighter Attack Squadron; VMGR, Marine Transport Refueling Squadron; VMM, Marine Medium Tiltrotor Squadron.

VI. CONCLUSIONS

A. SUMMARY

This thesis takes a step toward understanding the quality of squadron command climate and estimations for its impact on Marine aviator separations. Using a squadron fixed-effects methodology and restricted-access DEOCS 4.0 data, I find that USMC squadron command climate does not significantly impact Marine aviator separation decisions following completion of their active duty service commitment for those commissioned between FY2007 and 2012. Incorporating fixed effects for commissioning year, and aviation communities by primary military occupational specialty, I find that estimates for separation are marginally significant across communities with different active duty service commitments, but there Furthermore, variations between Marine aviation communities have marginal effects on Marine aviator separation decisions at the end of their active duty service commitment. I conclude that Marine aviator separation decisions are affected by factors at the service level or beyond and are not significantly influenced by variations at the squadron or aviation community level.

In addition to studying separation from active-duty, I estimate Marine aviator lateral moves on active-duty to the impact of squadron command climate. I find that squadrons with high command climate have lower rates of lateral moves away from Marine aviation in the observed population. I estimate that a one-point increase in overall squadron command climate results in a 21.2 percentage point decrease in the likelihood of a Marine aviator laterally moving away from Marine aviation. More specifically, I estimate a one-point increase in organizational effectiveness results in an 11.8 percentage point decrease in the lateral move estimate. However, the standard deviation in the command climate data is 0.086, meaning a standard deviation change in command climate results in the probability of lateral move changing 1.82 percentage points or 1.0 percentage point, respectively. So, while the effect of squadron command climate is significant, the actual change to the estimated probability of lateral move for the observed Marine aviators is marginal for the majority of squadrons.

Overall, it is noteworthy that it appears USMC squadron command climate does not have a significant effect on Marine aviator separation while lateral moves from Marine aviation are influenced by squadron command climate. It demonstrates both the effectiveness of Marine Corps retention policies for qualified Marine aviators, and the potential impact command climate has on Marine aviators' career decisions in the observed population. Of course, I note that the consistent quality of command climate across the observed Marine squadrons and the relatively small Marine aviator community observed in this thesis, and therefore should be cautious to expand these estimates to other groups or time periods. This is a step toward quantitatively understanding the quality of career experiences on Marine aviator separations. More studies using alternative methods and additional data sources are necessary to fully understand these effects on separation to inform monetary and non-monetary retention policy at the Marine Corps service level.

B. LIMITATIONS

The scope of this study was limited by not having access to additional personnel variables from the United States Marine Corps' Total Force Data Warehouse and Marine Sierra Hotel Aviation Readiness Program. From a personnel perspective, I am unable to capture individual training milestones and accomplishments that are important for understanding potential mitigating factors for separation and for accurately measuring service contract lengths. Notably, I did not have a variable for winging date, so I was unable to accurately determine when individual active duty service commitments end. Furthermore, without a variable for individual contracts being either six years or eight years, using standard active duty service commitment lengths is potentially unreliable for those commissioned in 2010 and beyond because of changing active duty service commitment policies during that time. Next, not having secondary military occupational specialties codes or training qualifications is a significant limitation for studying Marine aviators. As seen in the literature review, weapons and tactics instructor and forward air controller are two aviator qualifications repeatedly studied for their effects on retention. These two qualifications come with a secondary military occupational specialty code that exists in multiple datasets. However, there are numerous other qualification codes since those studies were completed with the potential to serve as a proxy for individual performance and talent management. Additionally, the Marine Sierra Hotel Aviation Readiness Program contains even more granular data on training and performance.

The availability and usefulness of DEOCS data also limits the scope of the study. Personnel data exists for commissioning years from FY2004 to FY2013, but DEOCS results corresponding to years these aviators are in fleet squadrons could not be incorporated in this study. The desired length of data to use for the available population would extend from 2014 to 2022 and encompass Marine aviators' career assignments until the end of their active duty service commitment or to the date they separate from active duty, whichever is later. The main challenge to this at the time of the study is changes to DEOCS versions that created partitions in the data. Furthermore, because the DEOCS data is the aggregate of thousands of respondents, there is potential error in how it measures command climate. However, there may not be a more direct variable or collection of variables available to capture a squadron's command climate over multiple years.

Future research should address these limitations by including more years of DEOCS results or alternate command climate data, personal performance measures, and operational squadron performance measures. A study should also look at the effects B-Billet assignments have on Marine aviator separations.

C. RECOMMENDATIONS

Considering the null effect to observed Marine aviator separations, command climate at the squadron level does not have a significant impact on separation across the service. However, the significant correlation between squadron command climate and lateral moves indicates that command climate impacts Marine aviators' future career decisions and subsequently the availability of winged aviators to fulfill Marine aviation manpower requirements. I recommend that Marine Corps retention policy develop and implement solutions that apply across the service for all Marine aviators. Additionally, I recommend that Marine aviation continue to prioritize policies and resources for all squadrons to maintain high levels of command climate, specifically organizational effectiveness, in the areas of organizational cohesion, job satisfaction, and trust.

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APPENDIX. DEOCS 4.0 QUESTION BANK

This appendix contains the full list of questions available in the DEOCS 4.0 dataset used for this thesis. Source: Defense Equal Opportunity Management Institute (2013).

ORGANIZATIONAL EFFECTIVENESS	
Organizational Commitment	
1	I feel motivated to give my best efforts to the mission of my organization.
2	I feel a strong sense of belonging to this organization.
3	I am proud to tell others that I belong to this organization.
Trust in Leadership	
4	I trust that my organizations leadership will represent my best interests.
5	I trust that my organization’s leadership will support my career advancement.
6	I trust that my organization’s leadership will treat me fairly.
Organizational Performance	
7	My organizations performance, compared to similar organizations, is high.
8	When short suspense/tasks arise, people in my organization do an outstanding job in handling these situations.
9	My organization makes good use of available resources to accomplish its mission.
10	All members of my organization make valuable contributions to completing tasks.
Organizational Cohesion	
11	Members support each other to get the job done.
12	Members work well together as a team.
13	Members look out for each other’s welfare.
14	Members trust each other.
Leadership Cohesion	
15	Leaders in my organization work well together as a team.
16	Leaders in my organization communicate well with each other.
17	Leaders in my organization support each other to get the job done.
18	Leaders in my organization are consistent in enforcing policies.
Job Satisfaction	
19	I feel satisfied with my present job.
20	I find real enjoyment in my work.
21	I like my job.
22	Most days I am enthusiastic about my work.
Diversity Management	
23	Members are encouraged to perform to their fullest potential, regardless of their background.
24	Members have access to a mentoring program.
25	Members’ skills and other attributes are taken into account when assigning tasks.
26	Efforts are made to make everyone feel like part of the team.

Organizational Processes	
27	Discipline is administered fairly.
28	Relevant job information is shared among members.
29	Personnel are accountable for their behavior.
30	Programs are in place to address members' concerns.
31	Decisions are made after reviewing relevant information.
Help Seeking Behaviors	
32	Seeking help for depression, suicidal thoughts, or Post Traumatic Stress Disorder (PTSD) is a sign of strength.
33	Seeking help for depression, suicidal thoughts, or Post Traumatic Stress Disorder (PTSD) would negatively impact a member's career.
34	Members are well trained to recognize the signs of depression, suicidal thoughts, or Post Traumatic Stress Disorder (PTSD).
Exhaustion / Burnout	
35	I feel mentally worn out.
36	I feel emotionally worn out.
37	I feel physically worn out.
EO / EEO / FAIR TREATMENT	
Hazing	
38	Newcomers in this organization are pressured to engage in potentially harmful activities that are not related to the mission.
39	Newcomers are harassed and humiliated prior to being accepted into the organization.
40	To be accepted in this organization, members must participate in potentially dangerous activities that are not related to the mission.
Demeaning Behaviors	
41	Certain members are purposely excluded from social work group activities.
42	Certain members are frequently reminded of small errors or mistakes they have made, in an effort to belittle them.
Favoritism	
43	People in my work area do not practice favoritism.
Racial Discrimination	
44	Qualified personnel of all races/ethnicities can expect similar job assignments.
45	Qualified personnel of all races/ethnicities can expect the same training opportunities.
46	People of all races/ethnicities can expect to be treated with the same level of professionalism.
Sex Discrimination	
47	Qualified members of both genders can expect similar job assignments.
48	Qualified members of both genders can expect to be treated with the same level of professionalism.
49	Qualified personnel of both genders can expect the same training opportunities.
Religious Discrimination	
50	Leaders do not publicly endorse a particular religion.

51	Qualified personnel of all religions can expect the same training opportunities.
52	Qualified people of all religions can expect similar job assignments.
Sexual Harassment	
53	Leaders in my organization adequately respond to allegations of sexual harassment.
54	Sexual harassment does not occur in my work area.
55	Leaders play an active role in the prevention of sexual harassment.
Racist Behaviors	
56	Racial comments are not used in my work area.
57	Racial slurs are not used in my work area.
Sexist Behaviors	
58	Sexist slurs are not used in my work area.
59	Sexist jokes are not used in my work area.

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