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Quantity for the Quality: How the Selective Retention Bonus Impacts the Retention of Talent in the Marine Corps

March 2023

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

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ABSTRACT

In this thesis, we study how the Selective Retention Bonus (SRB) impacts the retention of talented First Term Alignment Plan (FTAP) Marines from 2015 to 2020. The Marine Corps needs data-driven analysis on how the SRB relates to talent management. We analyze how different bonus quantities affect the retention of quality Marines and how the SRB impacts the time it takes to fill military occupational specialty (MOS) boat spaces.

We use data from the Total Force Data Warehouse to study the population of FTAP Marines eligible for reenlistment and data from the Total Force Retention System to study the population of FTAP Marines that reenlisted.

We use regression analysis to study the impact of the SRB. We find for Marines who score in the top 10% of their primary military occupational specialty (PMOS) on the PFT and proficiency scores, every $10k that the Marine Corps offers them correlates to an 8.1 percentage point increase in the probability of reenlistment. We find that bonus eligible tier 1 Marines are associated with reenlisting 18 days earlier than bonus ineligible tier 1 Marines. Lastly, we find that the Marine Corps is 17.1 percentage points more likely to fill 95% of the boat spaces of a bonus eligible PMOS by December 31. We recommend that the Marine Corps store tier scores of Marines who do not reenlist and investigate adapting a menu of contracts approach to the SRB.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFQT	Armed Forces Qualification Test
BSR	Boat Space Report
CFT	Combat Fitness Test
CMC	Commandant of the Marine Corps
CON	Conduct Marks
CRM	Command Retention Mission
EAS	End Active Service
ECRB	Enlisted Career Retention Board
ECC	End Current Contract
EDIPI	Electronic Data Interchange Personnel Identifier (EDIPI)
FTAP	First Term Alignment Plan
FY	Fiscal Year
JEPES	Junior Enlisted Performance Evaluation System
LPM	Linear Probability Model
MARADMIN	Marine Administrative Message
MCMAP	Marine Corps Martial Arts Program
MCO	Marine Corps Order
MOS	Military Occupational Specialty
M&RA	Manpower and Reserve Affairs
PFT	Physical Fitness Test
PME	Professional Military Education
PMOS	Primary Military Occupational Specialty
PRO	Proficiency Marks
RELM	Reenlistment Extension Lateral Move
SRB	Selective Retention Bonus
STAP	Subsequent Term Alignment Plan
TFDW	Total Force Data Warehouse

TFRS	Total Force Retention System
USMC	United States Marine Corps

I. INTRODUCTION

In Fiscal Year (FY) 2019, the Marine Corps spent around $136 million in retention bonuses and incentives (Chagnon, 2018). The Selective Retention Bonus (SRB) is one of the Marine Corps' top resources for retaining individuals under the current retention model (United States Marine Corps, 2016). Every FY, the Marine Corps spends hundreds of millions on bonuses and incentives created to retain Marines. The Marine Corps is adopting a new retention mindset called "Talent Management" (Berger, 2021). The Commandant of the Marine Corps (CMC) said the current retention model "is no longer suited to our service needs or the expectations of the Americans who fill our ranks" (Berger, 2021, p. 1). This creates a problem because the Marine Corps needs to align the SRB with the new objectives in "Talent Management." To align the SRB, the Marine Corps must evaluate the effectiveness of the money it spends on the SRB. Under the current bonus structure, the Marine Corps cannot offer higher bonuses to Marines of exceptional quality. The Marine Corps assigns tier scores from one to four as quality metric for Marines who apply for reenlistment. A score of one is for the top 10 percentile and a score of four is for the bottom 10 percentile. Under the current SRB system, the Marine Corps must pay the tier 1 Marine the same amount as the tier 3 Marine if they meet the exact eligibility requirements. This is also a problem because the Marine Corps overpays average Marines, underpays exceptional Marines, and fails to tie the bonus incentive to the future performance of the Marines. The Marine Corps needs to understand how talented Marines respond to bonus incentives, so they can create a new bonus structure that achieves the objectives of Talent Management.

This thesis aims to advance the United States Marine Corps (USMC) understanding of how the Selective Retention Bonus affects the quality of Marines that submit for reenlistment. We use multiple linear regression analysis to analyze how the SRB impacts the retention of talented First Term Alignment Plan Marines (FTAP). We also explore how different bonus quantities impact retention, how bonuses impact fill rates for boat spaces, and how the spread of talent responds to different bonus quantities.

This thesis builds upon prior research on the SRB, Marine Corps retention process, and other bonus studies (Arkes, 2018; Cole, 2014; Crider, 2015; Enns, 1977; Polich et al., 1986; Wang et al., 2022). These studies provide insight into the retention process, the SRB, and the effectiveness of the tier score and offer new retention bonus structures. They also highlight the difficulties surrounding studying retention bonuses because of the inability to run a randomized experiment. This thesis advances an understanding of how Marines of varying talent respond to fluctuations in the SRB.

The data we use comes from the Total Force Data Warehouse (TFDW) and the Total Force Retention System (TFRS). The final dataset contains 149,337 observations from TFDW and 32,228 observations from TFRS, where one observation represents an FTAP Marine eligible for reenlistment in a specific FY. The data contains the FTAP population from 2015 to 2020. An FTAP Marine is enlisted and eligible for reenlistment for the first time.

The Marine Corps can use this thesis to inform new policies on retention and talent management and to create experiments that further investigate the impact of the SRB on Marines. We find that Marine Corps only captures the tier scores of those who submit for reenlistment and needs to start capturing the tier scores of the entire enlistment population. We find that every $10,000 that the Marine Corps offers eligible Marines correlates to an 8.1 percentage point increase in the probability of reenlistment for Marines in the top 10 percent of their MOS with their proficiency marks and PFT scores. We also find that when Marines receive an early reenlistment kicker in addition to the SRB, every $10,000 that the Marine Corps offers to eligible Marines correlates with tier 1 Marines reenlisting 18 days earlier than tier 1 Marines not eligible for a bonus.

The rest of this thesis proceeds as follows. The next chapter discusses the background surrounding the retention process, the SRB, and the Marine Corps push to "Talent Management." Then we discuss the prior literature on retention bonuses. Chapter III outlines how we clean the data and the equations we use in our regression analysis. Chapter IV discusses our analysis of our findings. Lastly, in Chapter V, we give conclusions, offer recommendations for future studies, and discuss how the Marine Corps can update its systems to facilitate future research.

II. BACKGROUND AND LITERATURE REVIEW

This chapter contains a background on the implementation of talent management, the Marine Corps retention process, the SRB, and how the Marine Corps categorizes talent. Then we provide a literature review covering prior research on civilian retention bonuses, the SRB, omitted variable bias, and bonus contracts.

A. BACKGROUND

1. Talent Management

The Marine Corps is transitioning from a model that focuses on manpower to one that focuses on managing talent (Berger, 2021). The Marine Corps uses a retention system from the industrial era and prioritizes maintaining a force of primarily first-term Marines. The Commandant of the Marine Corps recognizes that the current retention model does not meet his goals for the USMC. The Commandant outlines his goals to make the force smaller, faster, wiser, quieter, and more lethal in Force Design 2030 (Berger, 2020). General Berger states he expects a complete transition to a Talent Management model by 2025 (Berger, 2021). General Berger defines talent as "an individual's innate potential to do something well. A Marine turns their talents into strengths, aptitudes, and skills through dedicated study, repetition, and hard work – a process accelerated by their curiosity, passion, interests, and desire for excellence." Therefore, the Marine Corps is shifting its focus to finding talented and creating new incentives to retain talented Marines. General Berger concludes that a talent management system will make the Marine Corps more "intelligent, physically fit, cognitively mature, and experienced" (Berger, 2021).

The Marine Corps plans to adopt a talent management mindset by recruiting individuals with the right talents, matching those talents to organizational needs, and incentivizing those talented individuals to remain (Flanagan, 2022). A talent management system comes at a cost. A part of talent management is maturing the force, which emphasizes retaining first-term Marines (primarily corporals and sergeants). A talent management system seems more expensive because, in that system, the Marine Corps

spends more money on corporals and sergeants than it does to replace them with privates and lace corporals. The CMC disagrees and says, "A simple salary comparison is a poor way to evaluate the overall cost encumbrance of a new personnel model, as it fails to include a whole range of service savings associated with maintaining a more mature force (e.g., fewer recruiters, instructors, lower PCS and separations costs, lower mishap rates, etc.), not to mention improvements in training and discipline" (Berger, 2021). Therefore, the Marine Corps is willing to spend more money to incentivize and retain talented individuals. The Marine Corps must change.

2. Retention Process

The Marine Corps executes a well-structured retention process each year. The March before a Fiscal Year (FY) begins, Commanders begin having intentional retention discussions with eligible Marines (United States Marine Corps, 2010). An eligible Marine is a Marine with an End of Current Contract (ECC) that falls between October 1 FYXX to September 30 FYXX (United States Marine Corps, 2017). The Marine Corps splits eligible Marines into two retention categories, FTAP and Subsequent Term Alignment Plan (STAP). FTAP Marines are those who are eligible for reenlistment for the first time, and STAP Marines are those who have already reenlisted at least once before. The Marine Corps retains 4,000 to 6,500 FTAP Marines (20 to 25%) out of an eligible population of 20,000 to 30,000 Marines depending on the year (USMC, 2017, 2019). In contrast, the Marine Corps retains 5,000 to 6,500 STAP Marines (60%) out of an eligible population of 9,000 to 10,000. The Marine Corps uses zones to further break down the reenlistment population.

A zone depends on how many years of service a Marine has served. Zone A Marines fall between 17 months to six years of active service; Zone B falls between 6 years and one day to 10 years of active service; Zone C falls between 10 years and one day to exactly 14 years of active service; Zone D falls between 14 years and one day to exactly 18 years of total active service; Zone E falls between 18 years and one day to exactly 20 years of total active service (United States Marine Corps, 2017). Figure 1 shows how the USMC executes the retention timeline.

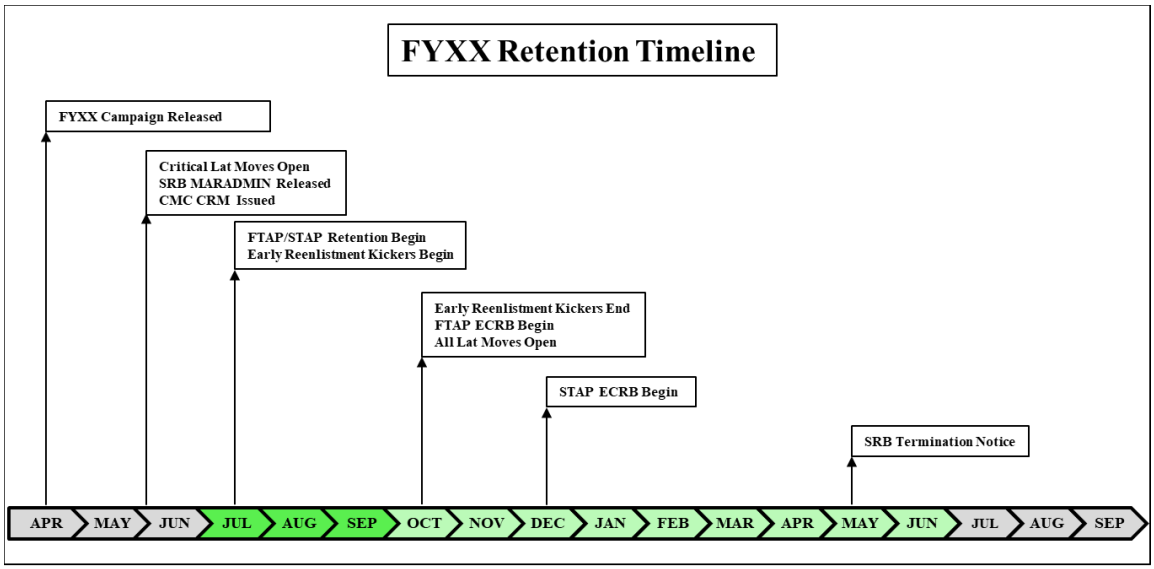

Figure 1. FY campaign retention timeline. Adapted from USMC (2022).

The Marine Corps releases its FY Campaign in April. This message details when the FY Campaign begins, the key milestone events with associated dates, and administrative information about the campaign (United States Marine Corps, 2020a). Associated with the message is a separate document that the USMC publishes in the Total Force Retention System (TFRS). This document gives specific retention goals for each MOS.

Then in May/June, the USMC cancels the previous SRB, opens lateral moves for critical MOSs, releases the new SRB message, and the CMC releases the Command Retention Mission (CRM). In May, the Marine Corps gives a 30 day notice before it cancels the previous SRB. Then in June, the Marine Corps publishes a new message outlining the SRB plan and any logistical details. Also, the CRM posts in June, which gives specific command retention goals that help the Marine Corps accomplish retention campaign objectives. So, the campaign releases in April with the end goals for the entire Marine Corps. Then the CRM takes those significant objectives and apportions smaller objectives between major commands to accomplish the high level objectives.

In July, Marines with eligible ECCs start reenlisting. The USMC gives early reenlistment bonuses from July to September for Marines with eligible PMOSs. Early

Reenlistment bonuses are called kickers. Beginning in October, early reenlistment bonuses are no longer available, and the FTAP Enlisted Career Retention Board (ECRB) begins. The USMC utilizes ECRBs for MOSs that receive more applications than they have spaces to fill. The FTAP ECRB starts in October, and the STAP ECRB starts in December. The retention campaign finishes the following September.

3. Selective Retention Bonus

Manpower and Reserve Affairs (M&RA) uses the Selective Retention Bonus to incentivize retention among high attrition military occupation specialties (MOS) (United States Marine Corps, 2017). The Department of Defense states the authority of retention bonuses and defines them as monetary incentives that services may offer to service members to retain "adequate numbers of qualified enlisted personnel in specific reenlistment categories" (Office of the Under Secretary of Defense for Personnel and Readiness, 2020). The instruction contains several constraints surrounding bonuses and eligibility. However, the bottom line is that a bonus is given in exchange for a specified service to meet retention goals in high attrition jobs. The Marine Corps further specifies that SRBs cannot exceed $25,000 for each year of obligated service, with a maximum total of one bonus of $100,000 (Headquarters, United States Marine Corps, 2016). If service members fall within the STAP category, they cannot exceed $200,000 in bonuses over their careers. The Marine Corps spends over $100 million yearly in retention bonuses and offers bonuses for 30 to 40 PMOSs.

The SRB is a tool for the Marine Corps reenlistment process. Each year the Marine Corps releases a message to the force called a MARADMIN that gives the details for the SRB campaign (Fiscal Year 2023 Selective Retention Bonus Program and FY23 Broken Service SRB Program, 2022). As seen in Figure 1, the USMC releases the SRB in June. Only Marines eligible for reenlistment based on their ECC and with a MOS identified in the SRB message are eligible for a bonus. Marines from the previous year's campaign are no longer eligible for the SRB once the next SRB MARADMIN is released. So, Marines who waited until the last three months of the fiscal year to reenlist are not eligible for any SRB.

The Marine Corps gives different bonuses based on zone, rank, and MOS but does not give different bonuses based on talent or performance. Table 1 depicts the ways the SRB varies.

Table 1. Sample of some Primary MOS (PMOS) bonuses listed in the FY 2018 SRB MARADMIN. Adapted from USMC (2017).

FY18 Zone A SRB			
MOS	**E3**	**E4**	**E5 Above**
0211LM	$ -	$ 55,000.00	$ 58,750.00
0231	$ 8,500.00	$ 9,750.00	$ 10,750.00
0241LM	$ 20,250.00	$ 24,500.00	$ 27,000.00
0261	$ 8,500.00	$ 9,750.00	$ 10,750.00
0311	$ 8,500.00	$ 9,750.00	$ 10,750.00
0313	$ 8,500.00	$ 9,750.00	$ 10,750.00
0321LM	$ 40,500.00	$ 48,750.00	$ 55,000.00
0331	$ 8,500.00	$ 9,750.00	$ 10,750.00
0341	$ 8,500.00	$ 9,750.00	$ 10,750.00
0351	$ 8,500.00	$ 9,750.00	$ 10,750.00
0352	$ 8,500.00	$ 9,750.00	$ 10,750.00
0365LM	$ -	$ 23,000.00	$ 25,000.00
0372LM	$ 40,500.00	$ 48,750.00	$ 55,000.00
0651LM	$ 25,500.00	$ 29,250.00	$ 32,000.00
0689LM	$ -	$ 48,750.00	$ 55,000.00
0842	$ 4,250.00	$ 4,750.00	$ 5,250.00
0844	$ 4,250.00	$ 4,750.00	$ 5,250.00
0847	$ 4,250.00	$ 4,750.00	$ 5,250.00
0861	$ 17,000.00	$ 19,500.00	$ 21,250.00
2147	$ 4,250.00	$ 4,750.00	$ 5,250.00
2336LM	$ 40,500.00	$ 48,750.00	$ 55,000.00

Table 1 depicts what Marines see when they view the SRB MARADMIN. FTAP Marines focus on PMOS bonuses listed under Zone A. If a Marine wants to laterally move to a different MOS, they look at bonuses abbreviated LM. Marines also look to see if there are additional incentives that go with the bonus, like kickers (United States Marine Corps, 2017). An example of a kicker is the early reenlist kicker. If Marines reenlist from July through September, and their MARADMIN states their PMOSs are

eligible for a bonus, they are also eligible for an early reenlistment kicker bonus. There are other kickers for special MOSs that vary each year.

The Marine Corps does not offer bonus quantities based on quality and performance. General Berger says in the 2022 annual update to Force Design 2030, "To change the 'recruit and replace' paradigm, we will implement measures to professionalize our career retention force and further incentivize retaining our most talented Marines. This will allow us 'retain and invest' in our most valued asset—Marines" (Berger, 2022). The Selective Retention Bonus does not offer higher bonuses for talented Marines. In fact, under the current model, the Marine Corps cannot pay Marines of equal Zone rank and MOS a different amount based on their quality because to do so would violate the U.S. Equal Pay Act (U.S. Equal Employment Opportunity Commission, 2008). The U.S. Equal Pay Act does not allow pay differences for members who perform the same skill that requires the same effort, responsibility, and working conditions. A recent paper offers all the services a bonus template to provide bonuses based on talent legally (Wang et al., 2022). Under a Menu of Contracts approach, Marines choose the bonus structure they want, eliminating any possibility of discrimination from the Marine Corps (Wang et al., 2022). The Marine Corps must adapt its model to retain talented individuals. This thesis studies how Marines of different talents respond to the bonus to take steps toward reforming the bonus structure.

4. Talent and Tiers

The Marine Corps has multiple ways to measure talent. For FTAP reenlistments, the Marine Corps assigns tier scores to Marines. Multiple components go into creating a tier score. Now the Marine Corps uses the Junior Enlisted Performance Evaluation System (JEPES) to compile tier components and calculate tiers (United States Marine Corps, 2020b). They transitioned to the JEPES system in 2021, but our data ends before this transition.

a. Tier Components

The following components make up the tier score: Physical Fitness Test (PFT), Combat Fitness Test (CFT), Rifle Score, Marine Corps Martial Arts Belt, Proficiency

marks, Conduct Marks, and if a Marine promotes meritoriously (United States Marine Corps, 2014). Crider, in his thesis, explains in detail each component of the tier score (Crider, 2015).

The PFT consists of three events that score up to 300 points given a particular age and sex. The three events are pull-ups, a core exercise (now a plank but used to be a crunch), and a three-mile run. Marines take the PFT from January 1 to June 30 every year.

The CFT also consists of three events that score up to 300 points given a particular age and sex. The three events are an 880-yard run, ammunition can lifts, and a 300-yard shuttle, including low crawling, sprinting, and buddy carries. Marines take the CFT from July 1 to December 31 every year.

Marines shoot at a rifle range once a fiscal year, and Marines who qualify on the range score from 250 to 350 points. Marines can improve their MCMAP belts by logging training and conditioning hours and demonstrating proficiency in specific techniques. A black belt equates to a belt level of 5.

Marines receive Proficiency Marks (PROs) from 0.0 to 5.0 from their command to evaluate how well they perform their jobs. Marines receive Conduct Marks (CONs) from 0.0 to 5.0 from their command to evaluate their conduct throughout the reporting period. Lastly, commands can nominate exceptional Marines for meritorious promotions. Meritorious promotions are a tool to promote Marines faster than their peers. A meritorious promotion only counts toward a tier score if the Marine promotes meritoriously to their current grade.

b. Calculating the Tier Score

Equation 1 calculates a raw score for Marines. The Marine Corps creates tier scores based on MOS percentiles from the raw score.

$$RawScore = PFT + CFT + Rifle + Proficiency * 100 + Conduct * 100 + MCMAPLevel * 10 \quad (1)$$

Also, Marines receive an extra 100 points toward their raw score if they promote meritoriously to their current rank. In July, Marines eligible for reenlistment are given raw scores from Equation 1. Then the Marine Corps uses the raw scores to rank Marines within each PMOS. The Marine Corps assigns tiers to Marines based on the percentile of their raw score within their PMOS. This score is called a computed tier score. Table 2 depicts the different tier scores and correlating percentiles.

Table 2. Tier percentiles. Adapted from Crider (2015).

Tier	Description	Percentile Range in MOS
1	Eminently Qualified	> 90 to 100
2	Highly Competitive	> 60 to < = 90
3	Competitive	> 10 to < = 60
4	Below Average	< = 10

Though Marines receive a tier score in July, they can increase or decrease their score throughout the retention campaign. If a Marine improves their raw score, their new tier is calculated based upon the cutoffs determined in July, not the current population. Theoretically, more than the original top 10 percent of Marines can reenlist with a computer tier 1 score. Marines can delay submitting for reenlistment to improve their tier score but risk not having a remaining boat space in their MOS. Marines also receive a tier score from their chain of command. The command tier score allows commanders to evaluate a Marine that may deviate from the computed tier score. The Marine Corps utilizes the computed and command tier scores to evaluate Marines for retention.

B. LITERATURE REVIEW

1. Bonuses

a. Private Sector

Corporations often use bonuses to increase the retention of skilled individuals. Joseph and Kalwani test whether bonuses help sales force retention (Joseph & Kalwani, 1992). They find that bonuses significantly increase employee retention when a firm pays

above the average compensation in the sales field. However, they also find that bonuses are not a significant way to increase employee retention when a firm pays below the average compensation. They explain the disparity between the two categories because higher paying firms attract specific individuals who like what a bonus communicates about their hard work. Though this conclusion supports the idea that the SRB helps retain talented individuals, Joseph and Kalwani did not support that conclusion with any evidence. Therefore, the reason for the disparity between the two types of firms is not conclusive.

Organizations can improve their retention with an optimal bonus incentive. Swain studies the SRB's impact in the Tennessee Education system context. The study observes how teachers respond to Tennessee's $5000 incentive bonus to retain talented teachers (teachers with a level five rating) to help priority schools (Swain et al., 2019). The bonus is like the Selective Retention Bonus in that it obligates the teachers to commit to extra years of teaching at their respective schools. Swain observes that Tennessee retains 68 percent of teachers offered the bonus. The study concludes that the bonus increases teacher retention by 20 percent and that "for every teacher retained as a result of the one-time bonus, students taught by that teacher experienced an increase in teacher effectiveness of 1.7 standard deviations" (Swain et al., 2019, p. 149). This study observes a positive impact on talent retention and the institution because of the SRB. However, achieving an optimal price for an SRB is complex. Also, the behavior and demographics of Marines are not synonymous with those of Tennessee teachers.

b. Omitted Variable Bias

Jeremy Arkes studies the significant biases that exist when studying the effects of the SRB (Arkes, 2018). The biases he discusses are excess supply, reverse causality, measurement error, and non-monetary factors. Excess supply is when more than the minimum amount of servicemembers reenlist. Reverse causality is when an organization gives higher bonuses to struggling occupations. Measurement error occurs when researchers fail to account for multiple bonuses that a single person rates (like a kicker

and a PMOS bonus). Non-monetary factors are all the other factors that go into making a reenlistment decision, like duty station priority, job preference, and family circumstances.

In another study on manpower retention models, Arkes discusses four significant biases: direct reverse causality, indirect reverse causality, measurement error, and excess supply (Arkes et al., 2019). Concerning the SRB, direct reverse causality is "the propensity of sailors to reenlist likely affects the SRB level" (Arkes et al., 2019, p. 17). This yields a negative bias for predicting the SRB. This thesis looks at the same MOSs over multiple years to observe variability in the bonus quantities to mitigate direct causality.

Indirect reverse causality is "researchers coding the SRB at the loss date or the time of reenlistment rather than using a fixed time" (Asch et al., 2021, p. 17). This yields a positive bias for predicting the SRB. This thesis uses demographics and bonuses on July 1 as a fixed date to mitigate indirect causality.

Measurement error is "the SRB coded may not reflect the SRB considered at the time of the decision." An example of this situation is a Marine that is eligible for a lateral but is also eligible for a PMOS bonus. This yields a negative bias when predicting the SRB. This thesis accounts for monetary incentives and the PMOS bonuses to mitigate the effect of measurement error.

Lastly, excess supply is when "researchers observe when the sailor reenlisted, not whether the sailor was willing to reenlist." Said another way, excess supply bias is when researchers only account for those who reenlist instead of all those who are eligible for a bonus. This thesis accounts for all reenlistment eligible FTAP Marines regardless of bonus eligibility to mitigate the effect of excess supply.

Arkes concludes that eliminating all the biases above is "almost certainly impossible" (Arkes, 2018). These biases make studying the causal effect of bonuses almost impossible. The inability to isolate causality in a bonus study leads researchers to come away with different conclusions on the effectiveness of retention bonuses.

c. Military Bonus

Researchers divide on their conclusions about the effectiveness of SRBs in a military context. Hosek and Peterson perform a study for Rand Corporation, where they observe the impacts of the SRB on retention (Hosek & Peterson, 1985). Their study looks at three potential outcomes: someone reenlists, someone does not reenlist, or someone extends their current reenlistment. Using the extension category allows them to see if the bonus impacts the willingness of a service member to reenlist for an extended period.

They conclude that the SRB is "an effective tool for counteracting lower unemployment in the civilian economy." They also conclude that bonuses effectively increase the reenlistment rate and that higher bonuses increase the number of years someone is willing to serve (because higher bonuses led to an increase in reenlistment and a decrease in extension). From their findings, they conclude that higher pay does help retention during periods of low unemployment. Bonuses are preferred in this scenario because they allow the "targetability" of skill versus a blanket increase across the force.

Enns studies the bonus effect on first-term reenlistments (Enns, 1977). He uses data from the early 1970s and finds that as the bonus increases, the reenlistment rate increases. Enns concludes that first-term reenlistment rates increase by two to three percentage points as the SRB multiple increases. However, Hosek, Peterson, and Enns have many of the biases in their study that Arkes identifies in his research.

In contrast to the Rand study, Conatser performs a study and concludes that "Surprisingly, SRB multiple offered for reenlistment was not a strong predictor in logistic regression" (Conatser, 2015). For several reasons, Conatser's conclusions do not mean the SRB is ineffective in the force today. Conatser uses data from FY04 to FY05, which means the period, the conflicts the USMC faces, the MOSs available, the demographics of the force, and the SRB multiples are very different in our study. We also perform a causal model in comparison to Conatser's predictive. This thesis performs a causal analysis that observes the SRB over multiple years and accounts for tiers of Marines applying for reenlistment.

No literature or model predicts an optimal bonus dollar amount that efficiently retains talented individuals across all MOSs. Ramsey studies enlistment bonuses and concludes, "This research determined that data from the TFDW cannot be used to effectively predict the optimal dollar amount for enlistment bonuses" (Ramsey, 2008). The reasons he cites for his conclusion are like the issues researchers encounter when studying retention bonuses: small scope of data, slight variation in data, and small budgets. The SRB has a considerable variation between years, a large budget, and over twenty years of data.

Rather than find a specific dollar amount for retention bonuses, Hattiangadi creates a military/civilian pay index along with other controls to gauge the effectiveness of the SRB on retention (Hattiangadi et al., 2004). The study compares the price increase in the civilian market and the price increases in the military, with the base year of 1990, to create the index. When the index exceeds one, the market favors the military over civilians. There are a few issues with their study. They compare price increases in the market, not net gains. Therefore, they fail to capture the attractiveness of a job that pays $80k to a Marine with a PMOS that only makes $50k a year. They also use data from 1980 to 2003, which may not generalize Marine Corps today.

d. Randomized Trial, The Gold Standard

Jeremy Arkes identifies the difficulty of studying a bonus effect because of omitted variable biases (Arkes, 2018). To remove omitted variable bias, run a randomized experiment with a test and control group (Arkes et al., 2019). Very few randomized control trials exist on the causal effect of SRBs. Polic, Dertouzos, and Press conduct "The Enlistment Bonus Experiment" to study three bonus effects: market expansion, skill channeling, and term of enlistment shifts (Polich et al., 1986). Market expansion is the change in the total number of people who enlist. Skill channeling is the change in enlistments towards hard-to-find skills. The term of enlistment is the change in the number of years in a reenlistment contract.

The study uses the Army's bonus structure in 1982 as a baseline. To qualify for a bonus in 1982, a person needs an AFQT score above 50 and a high school diploma. With

that baseline, there are two categories of enlistees, those who sign up for a skilled job (infantry, armor, or artillery) and those who sign up for any other job. The highest bonus is $5000 for those who sign up for a skilled job. A person can enlist for 4, 3, or 2 years, but only those who enlist for four years get a bonus. The experiment offers a new bonus structure depicted in Table 3. The experiment contains three bonus offers referred to as Bonus Cells in Table 3.

Table 3. Experiment contract options. Adapted from Polich et al. (1986).

Bonus Cell	% Offered	Bonus Amount	Obligated Service(Years)
A	70%	$ 5,000.00	4
B	15%	$ 8,000.00	4
C	15%	$ 8,000.00	4
		$ 4,000.00	3

Cell A represents the control group. During the study, enlistees can sign four, three, or two-year contracts, but only people who sign up for a highly skilled job and meet the high school diploma and AFQT criteria can receive a bonus.

The experiment concludes that compared to the control group, the number of quality enlistments (AFQT and high school criteria) increases by 4.1 percent in Cell B and 5 percent in Cell C. The amount of skilled, high-quality enlistments (skilled job, AFQT, high school) increases 31.7 percent in Cell B and 41.5 percent in Cell C. Lastly, the amount of four-year enlistments increase by 15.3 percent in Cell B but does change in Cell C. Three-year enlistments increase 87.4 percent in Cell C.

In conclusion, the new bonuses correlate with increases in term lengths, total recruits, and quality recruits. The general conclusions from this experiment still apply today. Though this experiment is a randomized trial, this experiment is still subject to excess supply bias (Arkes et al., 2019). This study cannot tell us the marginal amount of money required to enlist one more soldier. However, we use this experiment to justify our assumption that an increase in a bonus correlates with an increase in the total quantity and quality of Marine who reenlist.

2. Bonus Contracts

a. Contract Theory

A good contract should align its incentives to address hidden information and action issues (Bolton et al., 2005). When two entities enter a contract with each other, they often do so with the presence of asymmetric information. An optimal contract aligns its incentives to self-correct for this issue.

Hidden information is when the buyer or employee has information about themselves that the seller or employer does not know. The employee has perfect knowledge about his/her motivation, competence, and willingness to take risks. While the employer can understand some of these characteristics, the employee has a clearer picture.

Hidden action is when the employer cannot observe what the employee does. For example, an employer may watch the employee accomplish task 1, but the employer cannot see how much effort the employee took to complete task 1. Hidden information is called adverse selection, and hidden action is called moral Hazard.

Screening and signaling often address adverse selection (Bolton et al., 2005). Screening is when the employer tries to gain insight into the hidden information of the employee. The military does this when they screen recruits for medical problems. The military is investing money in every recruit that attends boot camp and therefore needs a base knowledge of medical history to know if someone is worth the investment. Signaling is when the employee proposes a contract to the employer, giving insight into hidden information. An example of signaling is a talented person proposing a high-risk, high-reward contract because they know they can achieve the threshold.

Adverse selection applies to the SRB because the Marine Corps offers bonuses to Marines with hidden information. The Marine Corps pays a talented Marine just as much as a non-talented Marine, holding rank, MOS, and zone constant. The Marine Corps offers a one size fits all package because it does not currently "screen" for talent or willingness to accept a riskier contract.

Moral Hazard is often addressed through incentives that mitigate the hidden action of the employee (Bolton et al., 2005). For example, when employees get insurance, they may act less carefully than before they had insurance. A Company can add an incentive that gives a bonus for going an extended period without an accident. Another option is to raise the rates for everyone to account for those who act less carefully than they would have uninsured. An organization addresses Moral Hazard when the employer disincentivizes the bad behavior through a penalty or rewards the desired behavior.

Moral Hazard is present in the SRB because the Marine Corps offers the same bonus to the tier 1 and 3 Marines. Therefore, the Marine Corps does not incentivize the tier 1 Marine to put in more effort than the tier 3 Marine with the SRB. A bonus contract should incentivize talented members to go above and beyond to earn a higher payoff.

The best way to address Moral Hazard and Adverse Selection is through "incentive compatible" contracts (Bolton et al., 2005). The "revelation principle" says, "to determine optimal contracts under asymmetric information, it suffices to consider only one contract for each type of information that the informed party might have, but to make sure that each type has the incentive to select only the contract that is destined to him/her" (Bolton et al., 2005, p. 16). A Menu of Contracts approach builds upon the conclusions of the revelation principle.

b. Menu of Contracts

To address the issues of Moral Hazard and Adverse Selection, the employer should offer a menu of contracts that deals with and incentivizes the hidden information and actions. The organization should structure the contracts so that it is evident to the employees which option yields the greatest return. If an organization offers two bonuses, one for talented Marines and the other for average Marines, the bonus should contain incentives toward the target Marines. A bonus should have incentives and conditions, so Marines self-select themselves into the optimal bonus. The organization should also target the bonus to determine the best performance from its targeted Marines.

Wang, Gates, and Simerman publish a report that argues for a new SRB structure incorporating a Menu of Contracts approach (Wang et al., 2022). In the context of Naval

Aviation, they propose a bonus structure that addresses Moral Hazard and Adverse Selection. They offer two tracks for their bonuses. They design the first option to attract pilots because it is a high-risk/reward contract. The second is a low-risk/low-reward designed to attract average pilots. Their bonus structure rewards pilots for earning Department Head (which they use to gauge talent). Their structure requires pilots to choose a bonus structure before the Navy releases the Department Head results. They require a decision before the results to deal with Moral Hazard and incentivize top Pilots to continue performing at a high level. Allowing the pilots to choose which contract they want deals with Adverse Selection because they self-select the group that yields the highest payout. The Menu of Contracts approach also discourages aviators from gaming the system because choosing the wrong bonus will cost aviators the optimal dollar amount they could have received.

Lastly, their Menu of Contracts approach prevents any form of government discrimination. The Equal Pay Act allows the government to offer bonuses that differ based on the skill performed, the amount of effort the job requires, the responsibility inherent to the job, and the working conditions (U.S. Equal Employment Opportunity Commission, 2008). The brilliance of a Menu of Contracts approach in the context of the SRB is that Aviators choose the bonuses they desire. The government cannot prevent or coerce them to choose one option. Therefore, this approach to bonuses avoids any credible accusation of discrimination.

Before the Marine Corps adopts a model like a Menu of Contracts, they need to know how Marines of different tiers respond to the bonus. This thesis studies how talented Marines respond to the SRB to equip the Marine Corps with the necessary information to pursue further research on transitioning the SRB to a Menu of Contracts.

III. DATA AND METHODOLOGY

In this chapter, we show where we clean the data and provide summary statistics of the final dataset. Then we talk about the limitations of calculating tier scores for all Marines. Finally, we talk about our regression analysis and provide the equations we use in our analysis.

A. DATA CLEANING

In this section, we discuss we get the data, how we clean the data, and the limitations we face with the data. The data came from three areas, TFRS, TFDW, and the SRB MARADMINS. We uniquely identify each Marine for all datasets containing Marine level observations using their Electronic Data Interchange Personnel Identifier (EDIPI). We convert all monetary amounts to FY 2020 dollars using the Consumer Price Index from the U.S. Bureau of Labor Statistics (U.S. Bureau of Labor Statistics, current).

1. Total Force Data Warehouse Enlistment Cohort Population

The data from TFDW represents each FTAP reenlistment cohort population from FY 2014 to FY 2022. The data contains pooled cross-sectional observations of Marines. Each observation is one FTAP Marine eligible for reenlistment in a particular FY. We use the Marine's ECC to determine eligibility for reenlistment and start our pull on July 1 (the beginning of the FY retention campaign). We end our data pull on the last day of the retention campaign, September 30, so that we can determine who reenlists and receives a bonus. We make the TFDW data the mast dataset for our merges because it contains the information of all FTAP Marines who are eligible for reenlistment within a particular campaign.

We use the following steps to clean the TFDW. The dataset starts with 231,062 observations. We create a fiscal year variable based on every Marine's ECC falling within the eligible window. We drop 3,729 observations that happen before FY 2014. We drop one more observation that is missing an EDIPI. Then we drop 378 duplicate observations that contain the same EDIPI FY age, reenlistment decision, ECC, and End

of Act Service (EAS). Next, we drop 29,366 observations duplicate observations with the same EDIPI and FY but have a smaller age value than their duplicate. We then drop two more observations that show a Marine does not reenlist but has a duplicate observation that does reenlist with the same EDIPI, FY, and age. The final dataset contains 197,587 observations. The key variables we use in the data for our analysis are EDIPI, rank, MOS, PFT score, CFT score, MCMAP belt, SRB, and kicker bonus.

2. Total Force Retention System

TFRS stores all the Reenlistment Extension Lateral Move (RELM) requests that Marines submit yearly. Three datasets come from TFRS.

a. FTAP Boat Space Reports (BSR)

The Marine Corps stores Boat Space Reports in TFRS. The BSR contains PMOS level information. Each observation represents a PMOS for a particular FY. For each observation, we see how many Marines the Marine Corps wants to reenlist and how many Marines they do reenlist. We pull the data exclusively for the FTAP population from FY 2014 to FY 2022. The data contains a total of 1,550 observations. We use the BSR reenlistment quantities to gauge the accuracy of our other datasets.

b. TFRS Approved Reenlistment Observations

The next TFRS dataset contains pooled cross-sectional information on all the Marine reenlistment RELMS from FY 2014 to FY 2021. One row in the dataset represents RELM from a Marine who submits a package for reenlistment in a particular FY. We identify each Marine using their EDIPI. This dataset is essential because it captures the FTAP population of Marines that the Marine Corps approves for reenlistment. We use the dataset to determine if a Marine is in the FTAP population when they submit for reenlistment. We also determine from the dataset if the Marine Corps approves reenlistment and the type of reenlistment they approve (lateral move or normal reenlistment).

We perform the following steps to clean the data. The data starts with 135,872 observations. First, we drop 74,766 observations that contain STAP Marines because we

only want the FTAP population. Then we drop 18,805 observations because they contain RELMS that the Marine Corps does not approve for reenlistment. Lastly, we drop 69 duplicate observations with the same EDIPI and multiple requests for lateral moves. The final dataset contains 42,232 observations.

c. TFRS Tier Score Observations

The final dataset from TFRS contains pooled cross-sectional data of the RELMs that Marines submit in a particular FY from 2013 to 2022. One observation represents a RELM from a Marine in a specific FY. This dataset is essential because it contains the computed tier scores of Marines who submit for reenlistment. We use the command recommend tier score for observations missing a computed tier score (1,108 observations of the final dataset).

We take the following steps to clean the data. The dataset starts with 347,475 observations. We drop all 223,828 STAP Marines that are labeled "Careerist." Then we drop 43,168 observations with RELMS that the Marine Corps does not accept for reenlistment. After that, we drop 27,073 observations because they are not reenlistment or lateral move RELMs. Next, we drop 12 RELMs that have a submit date before FY 2014 and 10,046 observations with a submit date after FY 2021. Lastly, we drop 3,831 duplicate observations with the same EDIPI; we keep the observations with the latest RELM approval date. The final dataset contains 41,753 observations.

3. Selective Retention Bonus Quantities

The TFDW data contains information on the bonuses Marines receive. However, we also need to know the bonuses that Marine Corps offers to Marines before they decide to reenlist or leave active service. We create a file that contains all the zone A selective retention bonuses between 2015 to 2020. We get this data from the SRB MARADMIN published each year. The file contains pooled cross-sectional information, with 1,635 observations in total. One observation represents the SRB that Marine Corps offers to a PMOS in a specific FY for a particular rank.

4. Data Merges

We perform the following steps to merge the multiple datasets. The TFRS reenlistment population data is the master dataset for the first merge. We merge the tier scores to the reenlistment population using EDIPI as the merge variable. 41,745 observations match, eight tier scores do not merge, and 487 reenlistment observations do not merge. We dropped the eight tier scores that do not merge.

We use the TFDW dataset as the master dataset for the rest of the merges. The following merges use PMOS and EDIPI as the merge variables. We merge the BSR data with the TFDW data and match 196,225 observations. 1,361 observations from TFDW do not match because they contain an incorrect PMOS code (for example, a PMOS code of 0300 verse 0311). 312 observations from the BSR do not merge, mainly because they are secondary MOSs. We drop all BSR observations that do not merge.

Next, we merge the TFRS data with the TFDW data. We use EDIPI as the merge variable. We match 41,698 observations. 155,888 observations from TFDW and 1,002 observations from TFRS do not match. We compare the number of Marines who reenlist from the BSR with those who reenlist according to the dataset. We show this comparison in Table 4.

Table 4. The difference in reenlistment totals: BSR data vs. final dataset

	BSR # Reenlisted	Dataset # Reenlisted	Difference (%)
2014	4,527	4,310	**5.03**
2015	4,944	4,876	1.39
2016	5,251	5,203	.923
2017	6,134	6,182	.776
2018	5,063	4,975	1.77
2019	5,465	5,378	1.62
2020	5,427	5,606	3.19
2021	5,570	5,168	**7.78**

We observe in Table 4 that the dataset observations in FY 2014 and FY 2021 exceed a five percent difference from the BSR dataset. Therefore, we limit the scope of this study from FY 2015 to FY 2020. We drop 1,002 observations that do not match TFRS, 23,247 from FY 2014, and 25,154 from FY 2021.

Lastly, we merge the SRB data with the dataset and match 49,457 observations. We match the observations using rank, PMOS, and FY. There are 168 observations from the SRB data that do not match because the dataset does not contain observations with Marines of all three ranks for every PMOS in a particular FY. We drop all the SRB observations that do not merge.

B. SUMMARY STATISTICS

The summary statistics help provide a complete picture of the final dataset composition. Table 5 shows the demographics of the final dataset. Table 6 shows the yearly summary statistics of total and tier 1 reenlistments. Figure 2 displays the fluctuations in total tier 1 reenlistments each year. Figure 3 shows us how many bonuses the Marine Corps gives each year. Lastly, Figure 4 depicts the yearly bonus money the Marine Corps gives FTAP Marines.

Table 5. FTAP demographic summary statistics

	Count	Mean	SD
Rank			
Pvt	655	0.004	0.066
Pfc	1,494	0.010	0.100
LCpl	22,196	0.149	0.356
Cpl	96,833	0.649	0.477
Sgt	28,001	0.188	0.390
Ethnicity			
Native American	1,713	0.011	0.107
Asian	4,391	0.029	0.169
Black	15,651	0.105	0.306
Pacific Islander	1,765	0.012	0.108
White	123,746	0.830	0.376
Sex			
Male	137,243	0.920	0.271
Female	11,936	0.080	0.271
Married	58,950	0.395	0.489
Single	87,521	0.587	0.492
N	149,179		

We depict the population demographics in Table 5 to validate the dataset. We see in Table 5 that most of the observations contain white and male Marines. We also see that the majority of reenlistment eligible Marines are corporals. These accurately represent the reenlist cohorts from 2015 to 2020.

Table 6. Summary statistics of FTAP reenlistments

	n	Sum	Mean	SD
Reenlistments				
2015	23,320	4,876	0.209	0.407
2016	24,334	5,203	0.214	0.410
2017	26,951	6,182	0.229	0.420
2018	23,482	4,975	0.212	0.409
2019	25,008	5,376	0.215	0.411
2020	26,084	5,606	0.215	0.411
Tier 1 Reenlistments				
2015	23,320	1,396	0.060	0.237
2016	24,334	1,296	0.053	0.225
2017	26,951	1,569	0.058	0.234
2018	23,482	1,233	0.053	0.223
2019	25,008	1,265	0.051	0.219
2020	26,084	1,311	0.050	0.218
N	149,179			

We use Table 6 to show how many Marines reenlist each year. According to the dataset, the Marine Corps reenlists around 20 percent of the eligible cohort yearly. Reenlistment numbers fluctuate each year but peak in 2017. The amount of FTAP tier 1 Marines who reenlist also fluctuates, but tier 1 Marines make up at least 20 percent of all FTAP reenlistments yearly. We use Figure 2 to depict that ratio.

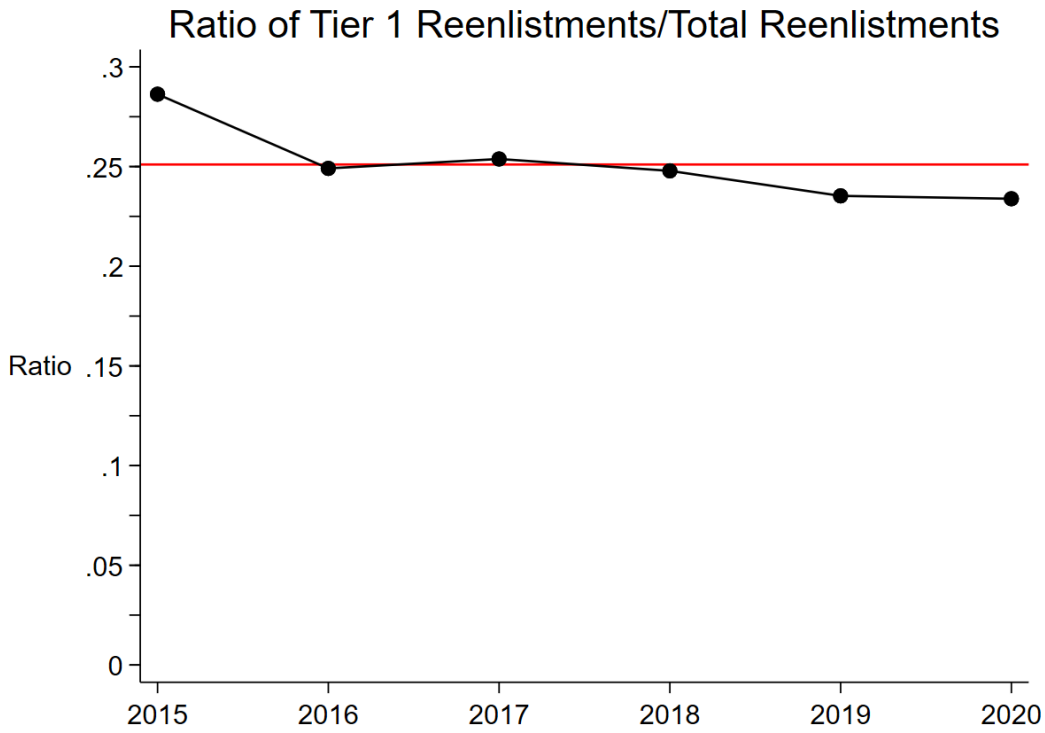

Figure 2. The ratio of FTAP tier 1 reenlistments out of all FTAP reenlistments

We use Figure 2 to depict the proportion of FTAP reenlistments out of all FTAP reenlistments. On average, tier 1 Marines make up around 25% of all FTAP reenlistments (depicted with the red line). We also see the ratios of tier 1 Marines trend downward in 2018. That trend is interesting because the trend continues through 2020, and the CMC released "Talent Management 2030" in 2021.

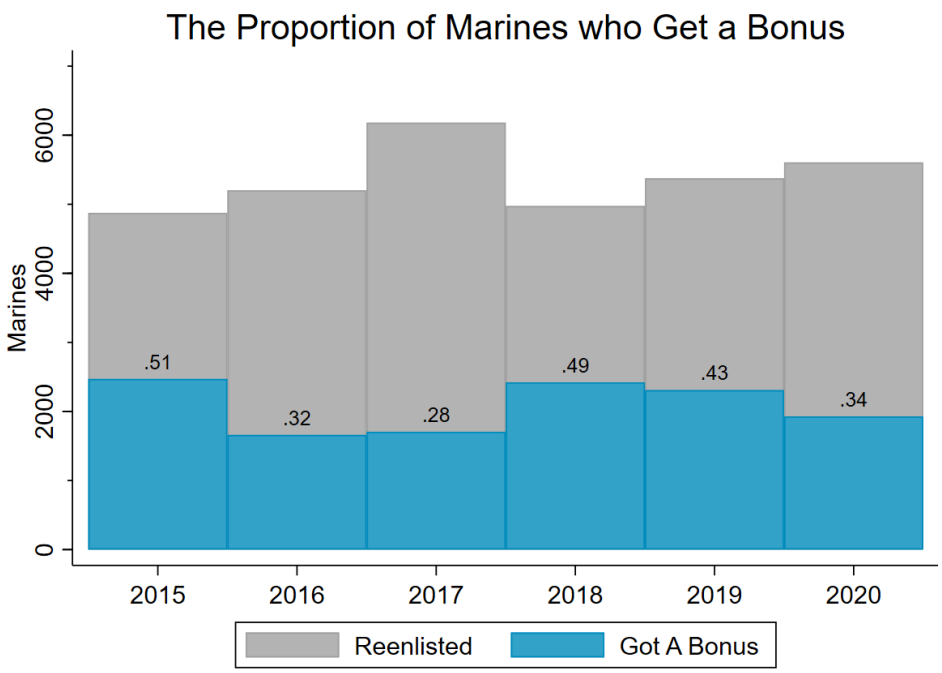

Figure 3. Comparison of the FTAP Marines who get a bonus to the FTAP reenlistment population

Figure 3 shows the ratio of Marines who get bonuses from all the FTAP Marines who reenlist. The Marine Corps gives the highest ratio of bonuses from 2015 to 2018. From Figure 3, we expect an increase in the SRB budget starting in 2018 to account for the increased ratio of Marines who receive bonuses. That is what we see and depict in Figure 4.

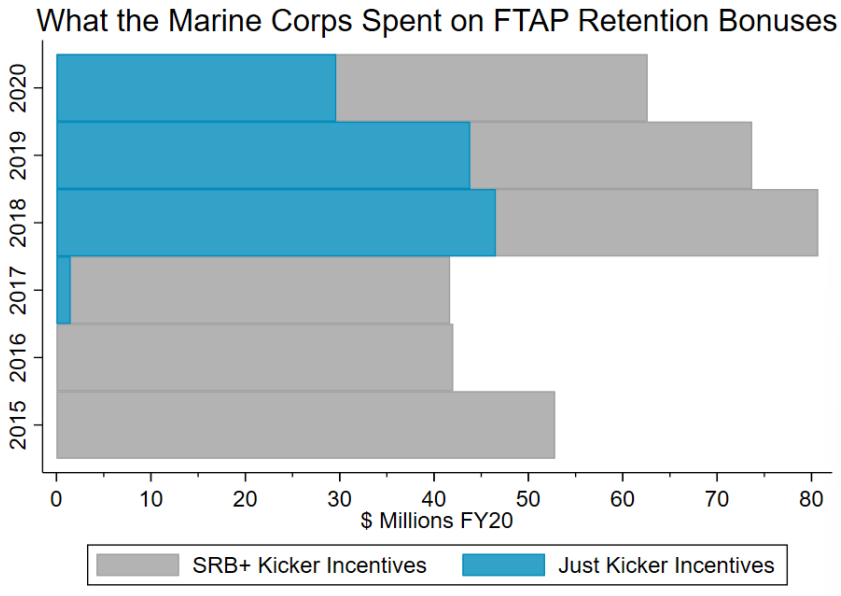

Figure 4. The money the Marine Corps gives to FTAP Marines by FY

Figure 4 shows that the majority of kicker bonuses start in 2018. That discovery matches what we see in the USMC SRB MARADMINS. From 2015 to 2017, the SRB budget ranges from $40M to $50M. From 2018 to 2019, the Marine Corps spends over $40M in just Kicker Incentives. One major kicker incentive is the early reenlistment kicker. In Chapter IV, we investigate the impact of the early reenlistment kicker against the time it takes a Marine to reenlist.

C. TIER SCORE LIMITATIONS

One of the main limitations of this study is that we only have computed tier scores for Marines who submit a RELM. So, we can use the tier score to talk about talent among Marines who submit for reenlistment, but we cannot say anything about Marines who do not submit for reenlistment. Chapter II mentions that all raw scores factor into setting tier thresholds at the beginning of July. However, the Marine Corps only stores tie scores from Marines who submit for reenlistment. Also, we need daily data to know a Marine's tier score for a given day because the tier scores can shift daily.

We cannot perfectly replicate the tier score with our data. Instead, we modify the tier score equation from Chapter II and use the current scores for every observation on

July 1 of each retention year. We modify the tier score equation because we do not have information on meritorious promotions, and our rifle score information is inaccurate. We use the same tier score equation but omit the meritorious promotions and rifle scores. We calculate the new tier score using the equation:

$$MyTierRaw = PFT + CTF + PRO*100 + CON*100 + MCMAPLevel*10 \quad (2)$$

After calculating the raw score, we create percentiles based on MOS and reenlistment year. We then use the guidelines in Chapter II to place Marines into a tiered category from one to four.

D. REGRESSION ANALYSIS

This thesis aims to identify how quality Marines respond to the SRB. We use STATA software to run Linear Probability Models (LPMs) on the dataset. We know we cannot interpret our results as causal because of all the issues Jeremy Arkes mentions (Arkes, 2018). However, we can use LPMs to study patterns and correlations with the regressions.

1. Marine Level Regressions

We run two main sets of regressions. The first regressions focus on individual Marine observations. Since the SRB changes for each year, MOS, and rank, we use fixed effects in our regressions for these three categories. Table 7 gives all the variables we use for the Marine level regressions.

Table 7. Variables used for Marine level regressions

Reenlist	Dummy, 1 if Marine reenlisted
Responsedays	The number of days after July 1 of a reenlistment year
Bonus1	Dummy, 1 if bonus offered was between $1 to $6400
Bonus2	Dummy, 1 if bonus offered was between $6400 to $9250
Bonus3	Dummy, 1 if bonus offered between $9250 to $13,500
Bonus4	Dummy, 1 if bonus offered between $13,500 to $19,750
Bonus5	Dummy, 1 if bonus offered greater than $19,750
Offered	SRB offered (in $10,000)
WasOffered	Dummy, 1 if bonus was offered to the Marine
MyTier	Our tier score we calculated for Marines, values between 1 to 4
Tier	A Marine's computed tier score from TFRS
Performance	
HighPFT	Dummy, 1 if Marine scored in the top 10% of mos and reenlistment year on PFT
HighCFT	Dummy, 1 if Marine scored in the top 10% of mos and reenlistment year on CFT
HighMCMAP	Dummy, 1 if Marine scored in the top 10% of mos and reenlistment year in MCMAP Level
HighPRO	Dummy, 1 if Marine scored in the top 10% of mos and reenlistment year in Proficiency Marks
HighCON	Dummy, 1 if Marine scored in the top 10% of mos and reenlistment year in Conduct Marks
Controls	
Asian	Dummy, 1 if Marine is Asian
Black	Dummy, 1 if Marine is Black
Islander	Dummy, 1 if Marine is Islander
NativeAmerican	Dummy, 1 if Marine is Native American
Male	Dummy, 1 if Marine is Male
Married	Dummy, 1 if Marine is Married
Age	Marine's age
Fixed Effects	
MOS	The Marines MOS
FY	The FY the Marines was eligible for reenlistment
Rank	The Marines rank, E1 to E5

Then with these variables, we use the following regressions:

$$Reenlist_{itjm} = \alpha + \beta_1 Bonus_{1,itjm} + \beta_2 Bonus_{2,itjm} + \beta_3 Bonus_{3,itjm} + \beta_4 Bonus_{4,itjm} + \beta_5 Bonus_{5,itjm} + \beta_6 MyTier_{itm} + X_{it}\theta + a_m + \delta_t + \gamma_j + \varepsilon_{itjm} \quad (3)$$

$$Reenlist_{itjm} = \alpha + \beta_1 Offered_{itjm} + \beta_2 MyTier_{itm} + X_{it}\theta + a_m + \delta_t + \gamma_j + \varepsilon_{itjm} \quad (4)$$

$$Reenlist_{itjm} = \alpha + \beta_1 WasOffered_{itjm} + \beta_2 MyTier_{itm} + X_{it}\theta + a_m + \delta_t + \gamma_j + \varepsilon_{itjm} \quad (5)$$

$$Reenlist_{itjm} = \alpha + \beta_1 Offered_{itjm} + \beta_2 HighPFT_{it} + \beta_3 HighCFT_{it} + \beta_4 HighMCMAP_{it} + \beta_5 HighPRO_{it} + \beta_6 HighCON_{it} + X_{it}\theta + a_m + \delta_t + \gamma_j + \varepsilon_{itjm} \quad (6)$$

$$Reenlist_{itjm} = \alpha + \beta_1 WasOffered_{itjm} + \beta_2 HighPFT_{it} + \beta_3 HighCFT_{it} + \beta_4 HighMCMAP_{it} + \beta_5 HighPRO_{it} + \beta_6 HighCON_{it} + X_{it}\theta + a_m + \delta_t + \gamma_j + \varepsilon_{itjm} \quad (7)$$

$$Responsedays_{itjm} = \alpha + \beta_1 Offered_{itjm} + \beta_2 Tier_{itm} + X_{it}\theta + a_m + \delta_t + \gamma_j + \varepsilon_{itjm} \quad (8)$$

The symbol X represents all of the demographic control variables in Table 7. The subscript *i* denotes the individual Marine, *t* denotes the FY, *j* denotes rank, and *m* denotes MOS. Equations 3 to 8 use MOS(a_m), FY(δ_t), and rank(γ_j) fixed effects. In equation 3, we examine how Marines respond to different bonus ranges. We create bonus ranges that have relatively even distributions of Marines. We depict the distributions of our groupings in Figure 5.

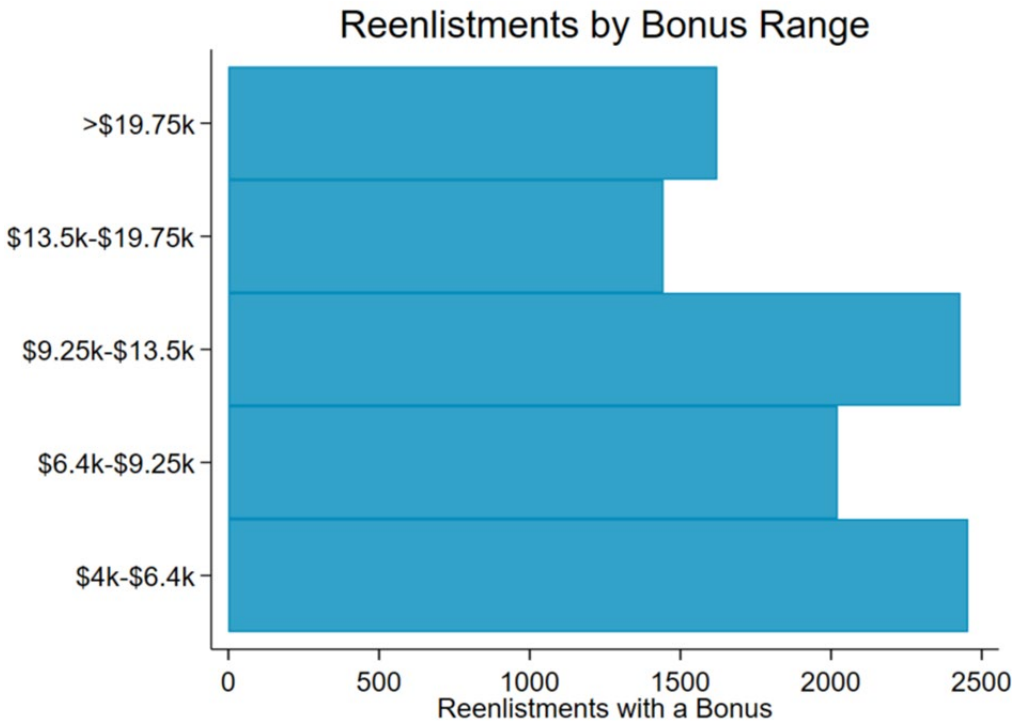

Figure 5. Marine reenlistment totals for each bonus category

In equations 4 and 6, we eliminate the categories and examine how Marines respond to the bonus. Equations 5 and 7 examine how Marines react to being offered a bonus regardless of the amount. Lastly, equation 8 examines how fast Marines submit RELMs for reenlistment based on the bonus amount that the Marine Corps offered to them. We use Figure 6 to see the distribution of response days throughout the dataset.

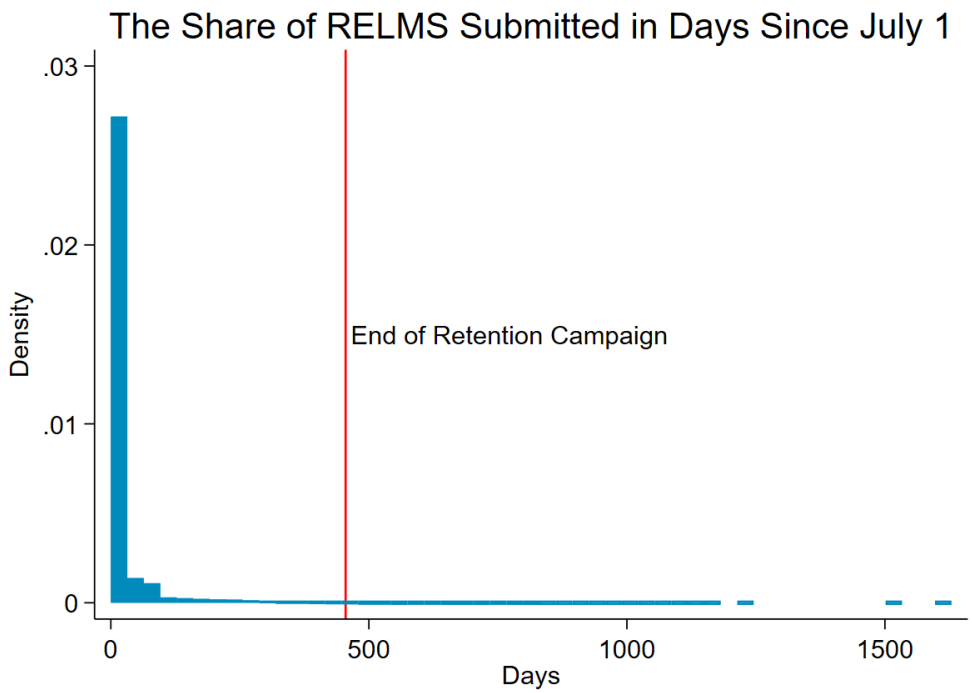

Figure 6. The distribution of when Marines submit their RELMS throughout the retention campaign

There are two main takeaways from Figure 6 that drive our analysis. A retention campaign should only take 455 days (15 months). Therefore, we should not see a Marine submit a RELM 1000 days after July 1. The second takeaway is that most Marines submit their RELMs on July 1. So, we remove observations that contain Marines who submit their RELM on July 1 or 400 days after July 1. We depict the new distribution of response days in Figure 7.

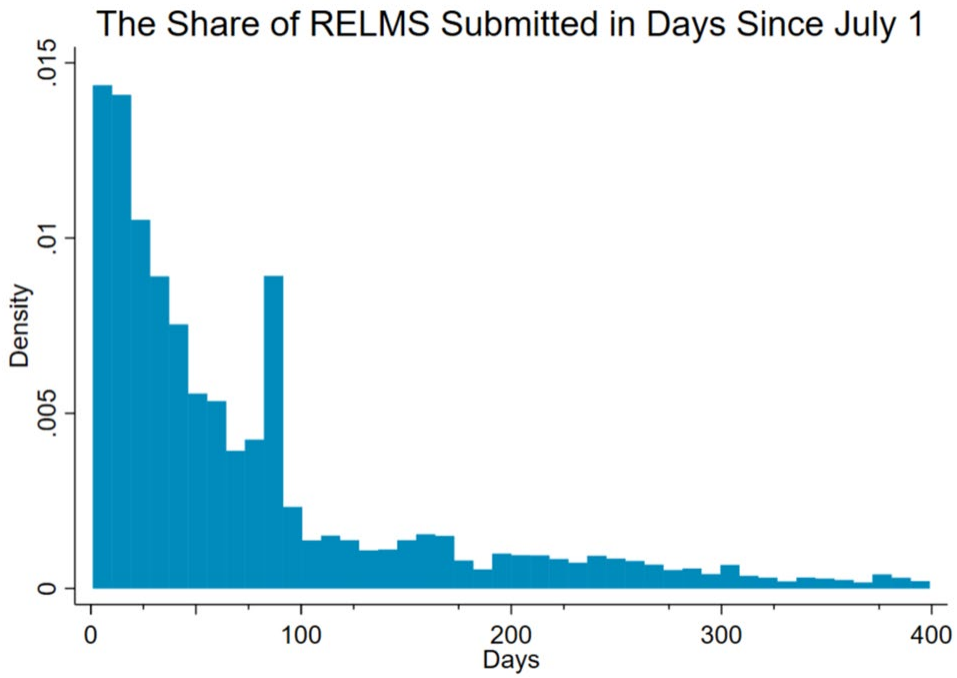

Figure 7. When Marines submit their RELMS throughout the retention campaign after removing RELMS with submit dates on July 1 or more than 400 days after July 1

2. MOS Level Regressions

The second set of regressions we run focuses on the MOS level observations. These regressions focus on how the SRB impacts the fill rates of the MOS boat spaces. Table 8 gives all the variables we use for the MOS level regressions.

Table 8. Variables used for MOS level regressions

Variables	Definition
Sep30Tier1	Tier 1 RELMs submitted/Total MOS Boat Spaces within the first 3 months
Sep30Tier2	Tier 2 RELMs submitted/Total MOS Boat Spaces within the first 3 months
Sep30Tier3	Tier 3 RELMs submitted/Total MOS Boat Spaces within the first 3 months
Sep30Tier4	Tier 4 RELMs submitted/Total MOS Boat Spaces within the first 3 months
Dec31Complete	Dummy, 1 if MOS boat spaces are 95% filled by Dec31
Dec31Tier1	Tier 1 RELMs submitted/Total MOS Boat Spaces by December 31
Dec31Tier2	Tier 2 RELMs submitted/Total MOS Boat Spaces by December 31
Dec31Tier3	Tier 3 RELMs submitted/Total MOS Boat Spaces by December 31
Dec31Tier4	Tier 4 RELMs submitted/Total MOS Boat Spaces by December 31
WasOffered	Dummy, 1 if bonus was offered to the Marine

September variables refer to September 1 in the retention campaign since the campaign starts in July and is 15 months.

Then with these variables, we run the following regression.

$$Sep30Complete95_{tm} = \alpha + \beta_1 WasOffered_{tm} + a_m + \delta_t + \varepsilon_{tm} \quad (9)$$

$$Sep30Tier_{ntm} = \alpha + \beta_1 WasOffered_{tm} + a_m + \delta_t + \varepsilon_{tm} \quad (10)$$

$$Dec31Complete95_{tm} = \alpha + \beta_1 WasOffered_{tm} + a_m + \delta_t + \varepsilon_{tm} \quad (11)$$

$$Dec31Tier_{ntm} = \alpha + \beta_1 WasOffered_{tm} + a_m + \delta_t + \varepsilon_{tm} \quad (12)$$

With the MOS level equations, the fixed effects are just for FY and MOS. The only new subscript is *n* which denotes the tier rankings one to four. The fixed effects use the same notion from equations 3 through 8. In equation 9, we study the relationship between if the Marine Corps fills 95 percent of a PMOS's boat spaces by September 30 and if the Marine Corps offers Marines in that PMOS a bonus. We look at September 30 because that is the final day a Marine can receive an early reenlistment kicker. We do the same for equation 12, except the date of interest is December 31. In equation 10, we study the relationship between the proportion of boat spaces that Marines of a specific tier fill in a PMOS by September 30 and if the Marine Corps offers Marines in that

PMOS a bonus. We do the same for equation 11, except the date of interest is December 31.

In summary, we run regressions using a Marine as the base unit to see how Marines respond to the SRB. We study how the SRB impacts reenlistment rates, how the SRB impacts talent retention, and if the SRB correlates with faster RELM submit dates. We then zoom out and use the MOS as the base unit to observe patterns in a larger context. We study how the SRB impacts the amount of time it takes the Marine Corps to fill the boat spaces of a PMOS and if there are more tier 1 reenlistments in PMOS that the Marine Corps offers bonuses.

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IV. ANALYSIS

This chapter discusses our findings and how they relate to our research questions. We use the Marine level regressions to study how different bonus quantities impact the retention of talented Marines. Then we look at how the SRB affects the time a Marine takes to reenlist. We use the MOS level regressions to observe how the SRB impacts the time it takes to fill boat spaces within a PMOS.

A. MARINE LEVEL REGRESSIONS

We split the Marine level regressions into three different talent metrics. We use the tier scores that we create from equation 2 and the performance metrics listed in Table 7 to study how Marines in different talent categories respond to the SRB. Then we use the computed tier scores from TFRS to examine the relationship between the SRB and the time it takes a Marine to reenlist.

1. Regressions Using Our Tier Scores

The first two regressions in Table 9 illustrate how Marines respond to different bonus ranges.

Table 9. The impact of different ranges of the SRB on the probability of reenlistment given tier scores we calculated

	MyTier1	MyTier2	MyTier1	MyTier2	MyTier1	MyTier2
Bonus Range						
>$19,751	0.0336 (0.410)	0.0268 (0.236)				
$13,501 to $19,750	0.0227 (0.329)	0.0030 (0.824)				
$9251 to $13,500	-0.0036 (0.866)	0.0288* (0.015)				
$6401 to $9250	-0.0058 (0.802)	0.0316* (0.013)				
<$6400	0.0257 (0.216)	0.0336** (0.004)				
Bonus Amount						
$10k			0.0145 (0.185)	0.0073 (0.247)		
Bonus Offered						
Yes					0.0118 (0.485)	0.0260** (0.006)
Outcome mean	0.448	0.323	0.448	0.323	0.448	0.323
Observations	15,644	44,482	15,644	44,482	15,644	44,482
R^2	0.090	0.057	0.090	0.057	0.090	0.057

p-values in parenthesis * $p<.05$, ** $p<.01$. The first two regressions pertain to equation 3. The next two regressions pertain to equation 4. The last two regressions pertain to equation 5.

The first two regressions show how Marines respond to the bonus when we split the bonus into different ranges. Most signs are positive, but only a few results are statistically significant. We interpret one of the values as offering a MyTier2 Marine a bonus of less than $6400 increases the probability of reenlistment by 3.36 percentage points. The base category is a Marine without a bonus.

The next two regressions show how the probability of reenlistment changes for every $10k that the Marine Corps offers to Marines. The way we interpret the coefficients is that for every $10k, the probability of reenlistment for a MyTier1 Marine increases by 1.45 percentage points. The results are not statistically significant.

The last two regressions show how the probability of reenlistment changes when the Marine Corps offers a Marine a bonus. We interpret one of these coefficients as offering a MyTier2 Marine a bonus increases the probability of reenlistment by 2.6 percentage points. Only one of these coefficients is statistically significant.

The general trend in Table 9 is that offering a Marine a bonus is associated with a higher probability of reenlistment. However, most coefficients are not statistically significant, and we cannot conclude causation from these regressions. We also know our tier scores are different from the computed tier scores.

2. Regressions Using Tier Components

Table 10. The impact of the SRB on the probability of reenlistment with Marines who score within the top 10% of a performance metric

	High PFT	High PRO	BOTH	High PFT	High PRO	BOTH
Bonus Amount						
$10k	0.0215 (0.063)	0.0342* (0.042)	0.0807* (0.022)			
Bonus Offered						
Yes				0.0392* (0.026)	0.0135 (0.873)	0.1080* (0.046)
Outcome mean	0.386	0.374	0.449	0.386	0.363	0.449
Observations	13,795	6,348	1,687	13,795	3,512	1,687
R^2	0.082	0.085	0.142	0.082	0.109	0.141

p-values in parenthesis * $p<.05$, ** $p<.01$, *** $p<.001$. The first three regressions pertain to equation 6. The last three regressions pertain to equation 7.

The first three regressions in Table 10 show how the probability of reenlistment changes for every $10k the Marine Corps offers to Marines, given that they perform in the top 10% on the PFT, proficiency marks, or both. We ignore bonus ranges for these regressions because they do not provide additional insights into the results Table 10. We run the regressions on all the performance metrics in Table 7, but we only report the noteworthy results in Table 10. The third regression tells us that for Marines who score in the top 10% on the PFT and their proficiency marks within their MOS, every $10k increases the probability of reenlistment by 8.07 percentage points.

From the last three regressions, we conclude that offering a Marine bonus who scores within the top 10% on their PFT and proficiency marks correlates with a 10.8 increase in the probability of reenlistment. We cannot conclude causation from these

regressions, but we see a general trend that offering high-caliber Marines a bonus correlates with a higher probability of reenlistment.

3. Regressions Using the Marine Corps Computed Tier Score

The following regressions show how the bonus impacts the time a Marine takes to submit a RELM. We run these regressions to see if the bonus correlates with reducing the time a Marine takes to submit for reenlistment. We show these results in Table 11.

Table 11. The impact of the SRB on the mean number of days it takes a Marine to submit for reenlistment

	Tier1	Tier2	All	Tier1	Tier2	All
Before Kicker Offered						
$10k	-2.543	-2.769	-3.431			
	(0.501)	(0.368)	(0.081)			
After Kicker Offered						
$10k				-17.623***	-2.964	-6.728**
				(0.000)	(0.447)	(0.009)
Outcome mean	70.625	76.669	79.194	68.414	69.333	74.414
Observations	3,877	6,133	15,227	3,703	6,470	15,507
R^2	0.185	0.163	0.140	0.159	0.114	0.107

p-values in parenthesis * $p<.05$, ** $p<.01$, *** $p<.001$. These regressions pertain to equation 8. The first three regressions control for the years between FY15 to FY17. The last three regressions control for the years between FY18 to FY20.

From Table 11, we see a correlation between the Marines that the Marine Corps offers bonuses and a reduction in the number of days it takes a Marine to submit for reenlistment. We split the dataset into before FY18 (the first three regressions) and after FY18 (the last three regressions). We split the data because the Marine Corps starts offering early reenlistment incentives in FY18. We depict this trend in Figure 4. The results show that Marines respond to the SRB differently starting in FY18 than in previous years.

Between FY18 to FY20 (the sixth regression), for every $10k the Marine Corps offers to Marines, Marines submit for reenlistment 6.7 days earlier. The base category contains Marines without bonuses. We also see that starting in FY18, tier 1 Marines, whom the Marine Corps offers bonuses, submit their RELMs 17.6 days earlier than tier 1 Marines without a bonus. While we cannot claim causality, we do see that, in general, an increase in the amount of money that the Marine Corps offers to Marines is associated with a decrease in the time it takes for a Marine to submit for reenlistment.

B. MOS LEVEL REGRESSIONS

We use the MOS level regressions to examine how the SRB impacts the time the Marine Corps takes to fill PMOS boat spaces. We also examine the talent composition of the boat spaces at a specific time in the retention cycle. We look at two dates, September 30 and December 31. At both cutoff dates, we want to know if there is a correlation between bonus eligible PMOSs and PMOSs that the Marine Corps fills 95% of the boat spaces. We use the Marine Corps computed tier score for all the MOS level regressions.

Table 12. The impact of the SRB on the probability of filling MOS boat spaces within the first three months

	Share of Tier1	Share of Tier2	Boat Space 95% Filled
Offered Bonus	0.07635*	0.04369	0.05520
	(0.025)	(0.175)	(0.283)
Observations	918	918	918
R^2	0.326	0.287	0.351

p-values in parenthesis * *p*<.05, ** *p*<.01, *** *p*<.001. These regressions pertain to equations 9 and 10. Share of tier x Marines = tier x reenlistments/ total reenlistments.

Table 12 shows how the SRB influences the number of boat spaces the Marine Corps fills in a PMOS by September 30. The status quo for these regressions is a PMOS

that the Marine Corps does not offer a bonus. We define the share of tier 1 Marines who reenlist as the tier 1 reenlistments divided by the total reenlistments. The first regression shows that a bonus eligible PMOS has a 7.6 percentage point increase in the share of tier 1 Marines who reenlist. Said another way, PMOSs eligible for the bonus have a greater proportion of tier 1 Marines who reenlist.

The third regression in Table 12 shows the probability of filling 95% of the PMOS boat spaces by September 30 if the Marine Corps offers Marines in that PMOS a bonus increases by 5.5 percentage points. This result is not statistically significant. Even though we cannot claim causality, the results in Table 12 are consistent with the observation we make using Table 11, which is that tier 1 Marines seem to reenlist earlier if the Marine Corps offers them a bonus.

Table 13. The impact of the SRB on the percentage point difference of MOS boat spaces filled by December 31

	Share of Tier1	Share of Tier2	Boat Space 95% Filled
Offered Bonus	0.07196*	0.02478	0.17085*
	(0.042)	(0.493)	(0.023)
Observations	898	898	440
R^2	0.322	0.293	0.440

p-values in parenthesis * *p*<.05, ** *p*<.01, *** *p*<.00. These regressions pertain to equations 11 and 12.

The difference between Table 13 and Table 12 is that the date of interest changes to December 31. The first regression shows that a bonus eligible PMOS has a 7.2 percentage point increase in the share of tier 1 Marines who reenlist.

In the third regression, we see that offering a PMOS bonus yields a 17.1 percentage point increase in the probability of filling 95% of the boat spaces by

December 31. Though we cannot say the bonus causes Marines to reenlist earlier, we can say that a bonus eligible PMOS is associated with filling boat spaces faster than the status quo. Like Table 12, Table 13 shows that the share of tier 1 Marines who reenlist increases for a PMOS that the Marine Corps offers a bonus. Also, there are more MOSs that fill 95% of their boat spaces if the MOS is eligible for a bonus.

In summary, we find that the SRB correlates with an increase in quality reenlistments. We observe that trend with two different quality metrics in Tables 9 and 10. Table 11 shows that the SRB correlates with quicker tier 1 reenlistments. Then in Tables 12 and 13, we find that the SRB is associated with drawing in a greater portion of tier 1 reenlistments. We cannot claim causation with these findings but see consistent trends throughout the multiple regressions.

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V. CONCLUSION

This chapter summarizes the results and offers recommendations to the Marine Corps for future research. This thesis studies how the Selective Retention Bonus affects the quality of Marines that submit for reenlistment, how different bonus quantities impact retention, and how bonuses impact the time it takes the Marine Corps to fill PMOS boat spaces. We find that SRB correlates with increasing the retention rate among higher-caliber Marines.

We make Marines ineligible for bonuses, the status quo in our Marine level regressions. With these regressions, we show that for every $10k the Marine Corps offers to Marines, Marines receive an 8.1 percentage point increase in the probability of reenlistment if they score in the top 10% of their MOS on their PFT and Proficiency marks. Next, we see that for every $10k the Marine Corps offers to Marines, tier 1 Marines submit for reenlistment 17 days earlier than the status quo. We cannot say the bonus causes tier 1 Marines to submit for reenlistment. However, we can say that using different quality metrics, we find that talented bonus eligible Marines are associated with higher reenlistment rates and faster time to reenlist than the status quo.

We make PMOSs ineligible for bonuses, the status quo in our MOS level regressions. With these regressions, we show that if the Marine Corps offers Marines in a PMOS a bonus, the boat spaces fill with 7.6 percentage points more tier 1 Marines. Lastly, we show that the Marine Corps is 17.1 percentage points more likely to fill 95% of the boat spaces of a bonus-eligible PMOS by December 31. In both tables, we see that, in general, the SRB correlates with reducing the amount of time it takes to fill boat spaces.

This thesis cannot remove the underlying biases present in SRB studies. However, we observe trends that show the SRB correlates with increasing the retention of tier 1 Marines and filling boat spaces faster. If the Marine Corps wants more clarity on how the SRB impacts the retention of talented Marines, they should consider the following recommendations.

The Marine Corps needs to store the tier scores for all Marines regardless of if they submit for reenlistment. Using the tier metric, we have information about the talent that the Marine Corps retains. However, we cannot use the tier score to compare the Mainres who reenlist with the Marines who do not reenlist because the Marine Corps only stores tier scores for Marines who submit for reenlistment. The tier score is also hard to replicate because it changes daily based on how a Marine's current information compares to thresholds established in July. The Marine Corps may want to create a separate tier metric that gives all Marines an unchanging tier score on July 1, regardless of if they reenlist. From a policy perspective, that type of tier score creates a concrete metric to evaluate talent in the Marine Corps at a set point in time. Defining a Marine with a fluid tier score requires a timestamp. Also, how valid is a score where a Marine can jump from tier 3 to tier 1 within a month? Another consideration is that some Marines have more opportunities to improve their score throughout the retention campaign than others. The Marine Corps should have a metric to evaluate all Marines at a set time to create an equal standard across the force. A score like that gives researchers a talent baseline to analyze the retention population.

Another way to examine the SRB is to run a randomized experiment. The Marine Corps should run an experiment where they randomly select different PMOSs and, within those MOSs, offer varying bonus amounts to Marines. The Marine Corps can take those results and draw better conclusions about how the SRB affects the retention rate.

Lastly, the Marine Corps should explore modifying the bonus structure to a Menu of Contracts. A Menu of Contracts gives more power to the Marines to choose the bonus structure they want and allows the Marine Corps to offer varying bonus amounts based on tier scores. A Menu of Contracts also incentivizes Marines to work harder to achieve the maximum benefits of their contract structure. A thesis that proposes a Menu of Contracts structure for the Marine Corps is in line with the Commandant's desire to implement new incentives to retain the very best among the Marine Corps.

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