# I Want You! (But Not You): Selection in Military Retention

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**Abstract**

Government workers provide essential goods and services, but less is known about the determinants of their quality. We complement the existing literature, which has focused on compensation levels, by studying how the structure of common retention incentives affects employee quality in the U.S. military. We combine administrative data with quasi-random variation to find that low-ability soldiers are relatively more responsive to both lump-sum bonuses and early retirement benefits, and both effects are large enough to lower the organization's average ability level. We provide suggestive evidence that neither access to credit nor differences in personal discount rates explain these selection patterns.

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# 1 Introduction

The public sector is a large and important part of the economy. Approximately 15% of U.S. workers are employed by the federal, state, or local governments and the public sector also produces public goods that are key to economic growth. Existing studies document the impact of public sector worker quality on a variety of important public sector outputs including education (Chetty et al., 2014), nursing (Aiken et al., 2003), law enforcement (Rydberg and Terrill, 2010), and political leadership (Besley et al., 2011). However, the public sector is unusual in the constraints it imposes on the compensation and management of personnel and in its relative insulation from direct competition. As a result, the determinants of selection into the public sector has been a longstanding question in economics, spanning fields from labor and public finance (Katz and Krueger (1991); Borjas (2002)) to development and political economy (Dal Bo et al. (2013); Deserranno (2019)) and national security (Friedman (1967); Simon and Warner (2007); Korb and Segal (2011)). Existing research has focused primarily on understanding how differences in the levels of compensation across the public and private sectors affect who decides to enter government service (see, e.g., Dal Bo et al. (2013); Finan (2017); Nickell and Quintini (2002); Bacolod (2007)).[1]

In this paper, we bring new evidence to this literature and provide well-identified estimates of the effects of commonly used public sector compensation policies on the quality of public sector employees. We also expand the scope of this line of research by studying these effects in the context of retention policies, as opposed to the better-studied effect of wages on the entry margin. Because public sector personnel managers typically lack the same tools as private sector managers to individually adjust compensation, they instead frequently rely on a limited menu of retention policies and incentives, including retention bonuses and retirement incentives. These policies, almost all of which feature lump-sum cash payouts, are known to be effective at increasing the quantity of retained workers.[2] In this paper, however, we show that they also meaningfully affect the types of workers who elect to remain in the public sector. In particular, we study how key retention incentives affect worker sorting in the U.S. military. In contrast to much of the literature showing that higher levels of

[1] There is a modest related literature on military recruitment and retention, almost all of which has analyzed (Brown (1985); Warner et al. (2003); and Gelber (2007)) or modeled (Gotz and McCall (1984) and Daula and Moffitt (1995)) enlistment and retention quantities, with little attention to worker quality. Among the papers studying military personnel, our work is most closely related to Warner and Pleeter (2001) and Simon et al. (2015), who estimate personal discount rates using military drawdown policies—including those studied here. However, our paper is the first to establish the causal effects of these different types of compensation on the quality of retained workers and the implications this has for the aggregate workforce quality.

[2] See, e.g., Asch et al. (2010).

compensation induce higher quality workers to enter the public sector, we find that more generous lump-sum retention incentives actually induce lower ability workers to remain. Our findings highlight that the structure, rather than just the level, of compensation matters in determining the quality of retained public servants. We show that these effects are large enough to affect the average ability level of the organization's overall workforce, a finding that should draw increased attention to how commonly used retention policies are designed and deployed.

Our results are somewhat striking in light of both the existing empirical literature and predictions made by the simplest models of selection. In a simple model in which returns to individual ability are higher in the private sector than in the public sector,[3] and where workers differ only in their ability, one would expect any increases in public sector compensation—even those that are not specifically targeted towards higher ability workers—to increase the average ability of those who select into the public sector. Indeed, this prediction that higher wages attract higher quality workers is consistent with the selection patterns documented by Dal Bo et al. (2013) and throughout much of the literature on the personnel of the state (Finan, 2017). However, our results on the retention margin are inconsistent with this simple model of selection. Instead, we find that, because low-ability workers are more responsive than their higher ability peers to a lump-sum retention bonus, generous retention incentives can actually reduce average ability levels. These results support a richer model with additional dimensions of worker heterogeneity, and they demonstrate that the design of retention policies can be crucial for retaining high-ability workers.

Our setting is the U.S. Army, where we combine rich micro-data with a policy environment that generates plausibly exogenous variation in the relative returns to continued employment in the military. Specifically, we study how soldiers of different ability levels respond to two common types of retention policies: 1) lump-sum retention bonuses and 2) offers of early retirement benefits. The U.S. military provides a useful setting in which to study questions relating to the public sector more broadly, as key features of military compensation are relatively common across the public sector but comparatively rare in the private sector. First, the military sets wages according to a highly standardized pay scale with minimal variation based on individual abilities. Second, the military offers a generous but cliff-vested (at 20 years of service) defined benefit pension, which substantially shifts compensation to the future and creates unique retention incentives.[4] Third, the military

[3] See Borjas (2002); Katz and Krueger (1991).

[4] In 2018 the military replaced its defined benefit system with a "blended" defined benefit and defined contribution system. Our data are confined to the 1992-2016 time period, when the military relied on a pure defined benefit system.

often uses large recruitment and retention bonuses as relatively blunt tools for either growing or shrinking the overall size of the force. These three features are prevalent across other public sector organizations at the federal and state levels. For example, defined benefit pensions remain more common today in the public than private sectors (Poterba et al., 2007), and the retention bonuses and early retirement incentives we study are frequently relied upon by other public sector organizations seeking to affect retention (e.g., the U.S. Postal Service, Social Security Administration, and the U.S. Border Patrol).[5] The military is especially intriguing because military retirement often occurs in middle age (Kamarck, 2018). In contrast to the existing retirement literature, which has been primarily concerned with workers at the very end of their careers, studies of the military may enhance our understanding of how retirement incentives affect the transitions of skilled workers in the mid-to-late parts of their careers.[6]

Not only does the military mirror many of the dynamics affecting public sector organizations at large, but given its size and economic importance,[7] the military is also worth studying in its own right. Recently, policymakers have expressed concern that the U.S. military in particular is failing to retain its best and brightest members, particularly among commissioned and non-commissioned officers, who comprise the middle and upper-level "management" of the military.[8] In fact, our own data validates their concerns and shows that the enlisted soldiers who stay in the Army the longest tend to be the ones with the lowest average scores on pre-enlistment aptitude tests (see Figure 1). Compared to soldiers who exit the Army after a single enlistment, soldiers who serve 20 years or more have an average Armed Forces Qualification Test (AFQT) score that is almost half of a standard deviation lower. Military analysts have suggested that the military's retention policies should be designed to optimize not only quantity retained, but also the quality of those retained, as they argue that retaining a more talented workforce increases productivity, boosts morale, and ultimately saves costs (Wardynski et al. (2010), Wallace et al. (2015)). However, there is little concrete empirical evidence on the

[5]As of January 2018, the U.S. Postal Service, Social Security Administration, Small Business Administration, and Environmental Protection Agency all offered early retirement policies to thousands of employees. See http://www.fedweek.com/fedweek/usps-offering-round-early-retirements; https://www.govexec.com/management/2017/10/agency-jobs-watch-how-will-your-agency-cut-its-workforce/137905/. Additionally, members of Congress have recently proposed greater use of recruitment and retention bonuses in the United States Border Patrol, which is said to be experiencing a "brain drain". See https://www.foxnews.com/us/border-patrol-brain-drain-agency-losing-more-agents-than-it-can-hire.

[6]Specifically, our paper contributes to a larger literature quantifying the effects of retirement programs on labor supply, which has focused primarily on the relationship between retirement decisions and pensions (e.g., Brown (2013)). We add to this literature by studying mid-career workers and by studying the heterogenous response of workers of different ability levels.

[7]Including civilian employees, the Department of Defense is the world's single largest employer. See https://www.forbes.com/sites/niallmccarthy/2015/06/23/the-worlds-biggest-employers-infographic/#78410ba5686b.

[8]See, e.g., Wardynski et al. (2010). See, also, Kane (2012).

nature of selection in military retention. In Appendix A, we show that the key parameter to inform policy makers of how retention policies will affect the average quality of retained soldiers is precisely the object we estimate—the differential sensitivity of soldiers of varying abilities to potential reenlistment incentives.

Our empirical strategy leverages two sources of quasi-random variation in the financial returns to reenlisting in the military. First we study Selective Reenlistment Bonuses (SRBs), which offer a lump-sum payment to soldiers who choose to reenlist. SRB offers fluctuate frequently in response to changes in the Army's demand for soldiers of different ranks and skill sets, but importantly for our purposes, they are offered to all soldiers of a given rank and specialty regardless of individual ability. Second, we study early retirement incentives, which offer soldiers immediate (but reduced) retirement benefits in exchange for early exit from the military. Like the reenlistment bonuses, they were applied without regard to individual ability.

Our analysis shows that low-ability soldiers are more responsive to both types of near-term reenlistment incentives. Specifically, a 10 point decrease in a soldier's AFQT score (approximately equivalent to one-half of a standard deviation) is associated with a nearly one percentage point increase in the effect of a $10,000 SRB offer on a soldier's probability of reenlistment. Even more striking, soldiers with upper quintile AFQT scores are totally unresponsive to bonus offers. We find similar results using a soldier's speed of promotion as an alternative measure of ability. We also find that lower ability soldiers are more responsive to early retirement programs, and that of the soldiers who leave the military in direct response to early retirement programs, almost two-thirds have below-median AFQT scores.

We show that the increased sensitivity of low-ability soldiers to lump-sum bonuses is not consistent with a simple model in which the return to ability is lower in the military than in the civilian sector. Rather, we show that this excess sensitivity could be due to differences in unobservable taste for the military. We also show that the observed selection patterns persist even after controlling for variables proxying for soldiers' access to credit and discount factors. This finding suggests that differences in liquidity constraints and personal discount rates are not the primary explanations for the excess sensitivity of low-ability soldiers to lump-sum cash incentives.

The rest of the paper proceeds as follows. Section 2 describes our institutional setting and Section 3 describes our data. We present our empirical strategies and results in Section 4. Section 5 explores explanations for our primary finding, and Section 6 concludes

## 2 Institutional Setting

We analyze the reenlistment decisions of enlisted members of the all-volunteer U.S. Army between 1992 and 2016. Reenlistment is uniquely important in the military given its restricted lateral entry. Unlike private firms, which are free to hire at all levels, the military cannot simply hire more Sergeants or more Generals; instead, it must promote from within. Enlisted soldiers serve for fixed terms, and the typical first term of service lasts four years. At the end of each term, soldiers deemed eligible to reenlist (based on their previous performance) meet with a counselor to discuss their options which normally include opportunities to reenlist for an additional term of between two and six years. The counselors will also discuss the monetary and other potential benefits of remaining in the Army as well as potential opportunities in the civilian labor market. While reenlistment policies have changed some over time, eligible soldiers can typically reenlist between 12 months and 90 days prior to the end of their term.[9] Just after basic training, soldiers receive their Military Occupational Specialty (MOS), which corresponds to the job they will perform in the Army. A soldier's MOS is one of the most salient and important features of her individual experience in the Army, and while mid-career changes are possible, they are the not common.

We utilize two measures of individual ability—the AFQT score and the soldier's speed of promotion in their first term. A substantial body of previous research has established that a soldier's cognitive ability affects her on-the-job performance.[10] Wigdor and Green (1991) undertook an ambitious study of U.S. military performance and found that a soldier's AFQT is highly correlated with both hands-on performance and written knowledge of her job. Observed correlations range from 0.10 to almost 0.70, and the highest correlations tend to be in combat occupations. (See Appendix Table B1.) Other studies have documented that AFQT scores explain individual and group performance in technical fields such as communications (Winkler et al. 1992; Fernandez 1992), air defense systems (Orvis et al., 1992), and automotive and helicopter maintenance (Mayberry and Carey, 1997). AFQT scores also predict early service attrition (Flyer and Elster 1983; Teachout and Pellum 1991; Horowitz and Sherman 1980). Finally, while most of the existing studies have focused on enlisted personnel, recent military research highlights the importance of cognitive ability for military officers as well (Condly et al., 2017).

[9] Figure B2 in the appendix shows the distribution of the gap between the beginning of the eligibility window and the expected end of service. For the large majority of soldiers, this is either 12, 15, or 24 months. See Appendix Section B.1 for more details.

[10] For a review of the literature on human capital and military performance, see Kavanagh (2005).

Like many public sector compensation schemes, the military pay system has some unique features that distinguish it from the private sector. Military basic pay is a function of only rank,[11] years of service, and dependents status. The military also offers generous additional benefits, such as enlistment bonuses, periodic retention bonuses, education benefits, housing allowances, and a generous retirement program. The military's pension system is especially distinctive. Prior to 2018 (and throughout our sample), the U.S. military offered only a defined benefit plan to servicemembers. Active duty service members were eligible for a retirement pension only after 20 years of service, and soldiers who separated prior to 20 years received no retirement pay whatsoever. A soldier who separated with 20 years of service received an annual pension valued at approximately 50 percent of her final annual salary, and soldiers who retired after more than 40 years received up to 100 percent of their final salary. Notably, a retired soldier begins receiving her annual pension immediately upon retirement from the military, regardless of the soldier's age or employment status. Since many soldiers enlist at just 18 to 20 years of age, a soldier as young as 38 can be "retired" and receiving a military pension.[12]

### 2.1 Variation in Military Retention Policies

We leverage two particular military retention policies that generate quasi-random variation in the relative return to continued military service. Our first policy is the Army's Selective Reenlistment Bonus (SRB) program. SRBs are cash bonuses offered to certain reenlistment-eliglble soldiers nearing the end of an enlistment term in order to encourage reenlistment. SRB offers vary by the soldier's current rank, the MOS that the soldier chooses to fill upon reenlistment, the soldier's total years of service, certain specialty skills the soldier might possess (for example, "airborne" qualification), the number of years for which the soldier reenlists, and the location in which the soldier is willing to be stationed. Depending upon her characteristics, a soldier may be eligible for a menu of several different SRB offers, and it is up to the soldier which SRB offer (if any) she accepts. SRB offers generally range from $0 to as high as $20,000. In our sample, the average SRB bonus received was $1,891, but among the 11% of soldiers who received a non-zero bonus, the average was $9,150. Compared to a soldier's base pay (e.g., in 2015, an E-4 with four years of service earned just over $28,000 annually), SRBs

[11] Throughout this paper we refer to ranks by their corresponding pay grades. A pay grade consists of a letter—"E" for enlisted personnel, and "O" for commissioned officers—followed by a number, denoting the relative position of the rank. For example, an E-5 (Sergeant) is superior by two ranks to an E-3 (Private First Class).

[12] Although the purely defined benefit system was replaced with a "blended" defined benefit and defined contribution system in 2018, the defined benefit portion still cliff vests at 20 years, and it will likely still account for the majority of most servicemembers' retirement savings.

frequently represent a sizeable share of overall compensation.

The second set of policies we consider comprises the military's early retirement programs. In the early 1990s, after the Cold War ended, the Department of Defense implemented two programs—Voluntary Separation Incentives and Special Separation Benefits (VSI/SSB), and the Temporary Early Retirement Authority (TERA) program—as part of a larger "drawdown" strategy. Both programs were offered in two waves over the course of the early 1990s. In addition to reducing its overall size, the Army sought to reshape its force for the post-Cold War era by directing separation and retirement incentives at certain MOS and rank combinations.

We specifically study the second wave of the TERA program (August 1994 through July 1995), which offered early retirement to soldiers with at least 18 but less than 20 years of service who also met specific service requirements within their occupation and rank. The program was small overall, with only 1,731 eligible soldiers, which reflects 0.6 percent of all soldiers serving at that time and 6.8 percent of soldiers with at least 15 years of experience (see Appendix Table B5). The benefits bestowed by TERA were generous. While soldiers are generally ineligible for retirement benefits prior to 20 years of service, TERA entitled recipients to an immediate military pension, albeit at a slightly reduced rate. Specifically, a soldier retiring under TERA had her military pension reduced by approximately 5% for each year less than 20.[13]

We also exploit variation from the VSI/SSB program, which offered inducements to mid-career soldiers who were willing to voluntarily separate from the Army pre-retirement. We focus our VSI/SSB analysis on the second wave of the program (August 1993 through June 1995). The VSI/SSB program was offered to soldiers who had 1) completed their first full term of service and 2) had accrued more than 6 but less than 20 years of service as of December 5, 1991.[14] Among that set of soldiers, eligibility was further restricted to certain occupation and rank combinations. The VSI/SSB programs were significantly larger than the TERA program—7,326 soldiers were eligible, covering 3.8 percent of all soldiers serving at that time and 11.7 percent of soldiers with at least 6 years of experience.

The VSI and SSB programs shared identical eligiblity rules, but the benefits provided by the two programs differed significantly, with VSI offering an annuity payment and SSB offering a single lump-sum payment upon separation. Soldiers had the option of choosing between the two programs. A soldier electing the VSI program received an annual payment equal to 2.5% of the soldier's final base annual pay multiplied by her

[13] More specifically, the retirement pay formula for TERA is $0.025 *$ years of service $*$ final base pay $*$ reduction factor, where the reduction factor is $\frac{m}{240}$ and where $m$ is the number of full months served as of the retirement date.

[14] Both programs also requires that the soldier enter the reserves for several years.

total years of service, paid out once a year for twice the number of years of service. A soldier electing the SSB program received a single payment valued at 15% of her final base annual pay multiplied by her total years of service (i.e., a soldier with 7 years of service had a SSB payment just larger than her annual salary). For mid-career and senior soldiers, VSI/SSB and TERA eligibility had a major effect on the relative returns to continued military service.[15]

## 3 Data

We use the U.S. Army's Total Army Personnel Database (TAPDB) to construct a panel of enlistment spells from 1992 to 2016. Each observation (or "spell") corresponds to a single enlistment term for a soldier (e.g., a soldier who has served a single enlistment of four years will have just one observation, while a soldier in her tenth year of service will have multiple observations). We exclude all current enlistment spells (approximately 6%) since we do not observe their conclusion. We provide summary statistics for our sample in Table 1. The sample is primarily male with an average age of 28 and an average service duration of 6.33 years. For all analyses, we restrict our attention to those soldiers eligible to reenlist at the end of the term (Column 2), who look observably similar to the overall sample. The last two columns show the average characteristics of individual spells that end in the soldier choosing to leave the Army (Column 3) or with the soldier reenlisting (Column 4). Around 50 percent of soldiers serve for only a single enlistment, and the average number of enlistments per soldier is 2.8.[16] On average, soldiers deciding to reenlist are more likely to be married and slightly younger than those who do not.

Our primary measure of ability is a soldier's AFQT score, which reflects the soldier's vocabulary, reading comprehension, and mathematical skills. The military uses the AFQT for initial selection (i.e., eligibility to enlist) and classification (i.e., eligibility for certain occupations), and labor economists have used these scores widely as a measure of individual cognitive ability (e.g., Grilliches and Mason 1972). AFQT scores range from

[15]Before being granted the benefits of either TERA or VSI/SSB, eligible soldiers who decided to take up the program had to be approved by their commander. Eligible soldiers were able to apply to these programs at any time, regardless of whether they were in their reenlistment window or not. One may be concerned that although all soldiers within a rank, occupation and year of service bin were eligible, the approving commander may take the soldier's performance and aptitude into account when granting approval. While this is possible, evidence from Army archives suggest this was not the case. In fact, according to the Army's Fiscal Year 1992 "Historical Summary," 100% of on-time VSI/SSB applications were approved that year (see `http://www.history.army.mil/books/DAHSUM/1992/ch07.htm`).

[16]See Appendix Figure B1 for the full distribution of the number of enlistments per soldier.

0-99, corresponding to the percentile of the applicant's raw test score.[17] Table 1 shows that soldiers eligible to reenlist have higher scores than those who are ineligible (Column 1 vs. 2), and that those who choose to reenlist have lower scores than those who leave (Column 3 vs. 4). Indeed, Appendix Figure B4 shows that at every year of service, lower AFQT soldiers are more likely to reenlist.

While evidence suggests that AFQT scores are good predictors of military performance, cognitive measures may not capture all dimensions of ability relevant to the military. For that reason, we complement AFQT scores with a variable related to the speed of a soldier's promotions, which is commonly used to measure military aptitude. In particular, we observe the number of months in a soldier's first term that she spent below the rank of Sergeant, with larger numbers reflecting slower advancement. As expected, Appendix Figure B3 shows that AFQT and speed of promotion are positively correlated both overall and within a range of occupations.[18]

In addition to personnel data, we collect monthly SRB offers and eligibility criteria for the VSI/SSB and TERA programs from publicly available policy announcements ("U.S. Army Military Personnel Messages").[19] We record the amount of the offer and the eligibility requirements (i.e., MOS, rank, years of service, and any special conditions) for each SRB. We construct the SRB offer data to isolate the exogenous aspects of the program (i.e., the variation in SRB offers that is uncorrelated with soldiers' choices). Specifically, we define the soldier's SRB offer as the bonus that is available for a 4-year reenlistment with the soldier's current occupation, rank, skill level, and tenure. This assignment process abstracts from the variation in SRBs that results from soldiers switching occupations in order to take advantage of a high SRB offer in a different occupation.[20] We exclude SRB offers that require moving to a particular location or unit, as they might reflect endogenous location preferences.[21] Finally, since monthly bonus offers may vary throughout the reenlistment window, we expect that soldiers may delay reenlistment if they anticipate that a higher bonus offer is imminent, and

[17] Note that percentiles are determined with respect to the full population of test-takers. Because the military restricts enlistments to those above a minimum score—typically in the vicinity of 30—the median and mean AFQTs within the military exceed 50.

[18] We have also explored several alternative specifications of soldier promotion speed and find very similar results across alternative parameterizations. We chose the time the soldier took to get to rank E-5 (Sergeant) as a baseline because it is highly predictive of future promotion speeds and has a reasonable amount of variation among first term soldiers (See Table B2).

[19] We are grateful to the authors of Greenstone et al. (2018), who shared with us the bonus offer data for the period 1997-2010. We have extended the dataset through 2016. Eligibility criteria for the VSI/SSB and TERA programs were announced in two separate Military Personnel Messages, both published in 1993. Unfortunately, these memoranda were not stored electronically, and copies of the final messages were destroyed in the Pentagon during the 9/11 attack. We therefore constructed the eligibility criteria from a pair of draft messages, which the Army had preserved. While we are are confident that the final rules were similar to the draft messages, we cannot be certain that they were identical.

[20] In fact, 23 percent of soldiers in our sample switch occupations upon reenlistment, and the average reenlistment term in the sample is 4.18 years. Appendix Table B3 shows that SRB offers are highly correlated across the length of reenlistment terms.

[21] Appendix Table B4 shows that general bonus offers and simultaneously offered location-specific bonus offers are highly correlated.

this sort of behavior may be more common among high-ability soldiers. To eliminate this strategic timing of reenlistment, we assign each soldier the SRB offer that was available in the first month of their reenlistment window.[22] Despite these abstractions, our assigned SRB offers are highly predictive of the actual received bonus amount for those who take up SRB offers.[23]

# 4 Empirical Strategy & Results

The following section provides evidence on the selection on ability induced by two of the Army's lump-sum retention policies—Selective Reenlistment Bonuses, which provide cash bonuses to soldiers who stay, and early-retirement programs, which provide cash bonuses to soldiers who leave. In Appendix Section A, we show that the differential response of soldiers to lump-sum bonuses is the key statistic for understanding how the average ability of the military is affected by these reenlistment programs.

## 4.1 Evidence from Selective Reenlistment Bonuses (SRBs)

We begin by comparing the reenlistment decisions of soldiers according to the bonus amounts they are offered. In particular, we estimate the following equation:

$$\text{Stay}_{it} = \beta_0 + \beta_1 \text{SRB}_{it} + \beta_2 \text{SRB}_{it} * \text{AFQT}_i + \beta_3 \text{AFQT}_i + \gamma_{MOS,rank,yos} + \mu_t + \delta \mathbf{X}_{it} + \epsilon_{it}, \tag{1}$$

where $\text{Stay}_{it}$ is an indicator for whether soldier $i$ chooses to reenlist at time $t$; $\text{SRB}_{it}$ represents a soldier's SRB offer as described above, and $AFQT_i$ is the soldier's raw AFQT score percentile. We expect $\beta_1$, which estimates the average effect of SRB offers on reenlistment, to be positive, since SRBs are designed to increase soldier retention. Our coefficient of interest is $\beta_2$, which reflects the differential responsiveness of high- and low-ability soldiers to reenlistment bonus offers.

The identification assumption underlying the estimation of $\beta_2$ is that SRBs are conditionally randomly assigned, and thus unrelated to both individual ability and non-monetary factors affecting the reenlistment decision. Since SRB offers vary by occupation, rank, year of service, and date, all of our specifications include offer-date fixed effects and MOS×rank×years-of-service fixed effects. We also include controls ($\mathbf{X}_{it}$) for mar-

[22] We show, however, that our results are not sensitive to the timing assumption for the SRBs. See Appendix Tables C5 and C6.

[23] The coefficient of a regression of actual bonuses on SRB offers is 0.236 and is highly statistically significant ($p < 0.01$).

ital status, gender, race, age, and special military skills designations. While the demographic controls are not necessary for identification, they nonetheless improve the precision of our estimates. Although we are unable to test whether SRBs are correlated with unobservable soldier characteristics, such as their taste for military service, in Columns (1) and (4) of Appendix Table D1 we document that, conditional on occupation, tenure, and rank, SRBs are not offered to cohorts of soldiers that are higher ability. This test on observables strongly supports the identifying assumption, since the finding that SRBs are uncorrelated with our rich set of observables makes it unlikely that they are nonetheless correlated with potential unobservable characteristics (Altonji et al., 2005).

Given these controls, $\beta_2$ will be identified off of relatively high-frequency variation in SRB offers that vary across MOS, rank, and years of service within a date. While it is difficult to know precisely what drives this time-series variation, anecdotal and observational evidence suggests that variation in SRBs arises from a combination of "inside" factors—namely, the military's operational and strategic requirements—and "outside factors"—namely, labor market conditions and other economic trends affecting civilian labor market opportunities. For example, SRB offers for Patriot missile operators (MOS 14T) appear to have been largely driven by operational requirements (i.e., air defense requirements during the first Gulf War) and large-scale changes to the Army's overall force structure (i.e., growth of the total air defense capability). In contrast, SRB offers for infantrymen (MOS 11B)—the largest MOS in the military—appear to vary more closely with secular trends (e.g., macroeconomic conditions, post-9/11 surges in enlistments, and increased demand to support the wars in Afghanistan and Iraq). Insofar as outside economic conditions affect SRB offers, they will only threaten our identification if they vary at a high frequency and in a manner that is specific to soldiers of a particular MOS, rank, and tenure. Appendix Section B.2 provides case studies for the time series variation driving other specific occupations.

In Figure 2 we provide descriptive evidence for the effect of SRBs on selection. Both the left and right panels depict the residualized AFQT distributions for soldiers who reenlist compared to those who stay. We residualize the AFQT scores by the soldier's occupation, rank, years of service, and the date of the reenlistment decisions—the very same variables that are used to determine a soldier's eligibility for the military's various incentive programs. This residualization removes, for example, any differences stemming from the fact that soldiers of higher ranks tend to have higher AFQT scores, are more likely to reenlist, and may also be eligible for different reenlistment incentives. Figure 2a plots the AFQT distributions for soldiers who were offered *no*

SRB at the time of reenlistment, while Figure 2b plots the distributions for soldiers who were offered an SRB of at least $8,000. In both panels the stayer distribution (drawn in dashed lines) is shifted left relative to the leaver distribution (drawn in solid lines), meaning that the average ability of the soldiers who choose to reenlist is lower than those who chose to leave the military.[24] This comports with Table 1, which indicated that soldiers who reenlist tend to have lower AFQT scores than those who leave, but the residualized distributions plotted in Figure 2 show that, even within detailed occupation, rank, and tenure bins, soldiers at the higher end of the AFQT distribution are less likely to stay in the military. What is key from Figures 2a and 2b, however, is that the disparity between stayers and leavers is even greater for soldiers who receive a large SRB offer than it is for soldiers who receive no SRB offer. This suggests that when the SRB is higher, either lower ability soldiers are even more likely to stay, or higher ability soldiers are even more likely to leave.[25]

In Table 2 we formalize this descriptive result with a regression analysis. Column 1 first shows a benchmark specification relating bonus offers to average reenlistment without including the interaction between a soldier's AFQT score and their bonus offer. The coefficient on a soldier's AFQT score in Column 1 reiterates that soldiers with higher AFQT scores are less likely to reenlist—for each additional percentile point in the raw AFQT score, soldiers are 0.1141 percentage points less likely to reenlist. The Column 1 results also show that SRBs work as intended: on average, a $10,000 bonus increases soldier retention by 1.5 percentage points (2.3 percent).[26]

However, as depicted in Figure 2, soldiers across the ability distribution are not uniformly responsive to SRBs. Column 2 of Table 2 corresponds to our baseline specification in Equation 1, and it shows that a soldier's responsiveness to the bonus offer is decreasing in her AFQT score. The point estimate on the interaction of the SRB offer and the soldier's AFQT score is negative and statistically significant – a soldier who has an AFQT score that is 10 percentiles higher is more than 0.7 percentage points less responsive to a $10,000 SRB bonus offer. Indeed, as we show in additional results below, soldiers with AFQT scores above the 80th percentile are not at all responsive to the SRB offer.

In Columns 3 and 4 of Table 2 we estimate the same model with additional fixed effects that control for potential confounders. Column 3 includes nonparametric time trends for each soldier's commuting zone of

[24] Appendix Figure C2 shows the raw distribution of AFQT scores by reenlistment status.

[25] Appendix Figure C1 shows a similar pattern using a soldier's speed of promotion in their first term as their measure of quality.

[26] Note that the average non-zero SRB offer is $9,151 in 2015 dollars. About 75% of soldiers face no SRB offer in their current MOS at the beginning of their reenlistment window. This baseline estimate of the effect of SRB offers on reenlistment probabilities is similar to those reported in Greenstone et al. (2018).

record (i.e., place of residence immediately prior to initial enlistment) to control for any reenlistment differences that are correlated with the soldier's local area. The point estimates are smaller, but, as we show in Appendix Table C1, this difference is entirely driven by changes in the sample induced by the additional fixed effects. Even so, the main pattern of lower responsiveness by higher-ability soldiers remains sizable and statistically significant. Column 4 includes nonparametric time trends for each occupation. This model identifies SRB effects from the differential time variation across ranks and tenures within an occupation and thus sweeps out anything that varies at the occupation level (e.g., changes in mortality risk, changes in outside employment opportunities for a given occupation). Once again, we find that soldiers with higher AFQT scores are less responsive to SRB offers. In Column 5 we measure a soldier's ability not by her AFQT score but by the number of months that the soldier spent below sergeant in her first term. Higher numbers imply slower promotion speeds and therefore lower military performance. Our results show that that soldiers who are promoted less quickly are more responsive to SRB offers, consistent with the AFQT findings in Columns 2-4. In Appendix Tables C1 and C2 we document that the Table 2 results are robust to various alternative specifications and sample restrictions, including using the log rather than the level of the SRB offer, restricting to the 10 largest occupations, and dropping the Iraq War "surge" years (2007-2009).

Equation 1 imposes a linear relationship between a soldier's ability and her responsiveness to bonus offers. We relax this assumption in Figure 3 and depict the effects of an SRB offer throughout the ability distribution. The left panel presents results using the AFQT scores, where we interact the SRB offer with dummies for each AFQT score decile. We use equally sized decile bins to reflect the soldier's relative position among those eligible to reenlist. The figure reveals that that the relationship is close to linear and decreasing throughout the distribution. Soldiers in the bottom decile are almost 5 percentage points more likely to reenlist when offered a $10,000 SRB versus no SRB, while soldiers in the middle of the distribution are only about 1 percentage point more likely to reenlist when facing the same incentive. Beginning at the 80th percentile of this AFQT distribution, we can no longer reject the hypothesis that SRBs have no effect on reenlistment rates. We find similar results in the right panel of Figure 3, which uses our speed-of-promotion-based ability measure. The effect of SRBs on reenlistment is almost entirely driven by soldiers in the highest three deciles (i.e., those with the slowest promotions).

#### 4.1.1 Effect Magnitudes

So far we have compared how bonuses affect the reenlistment decisions of individual soldiers at different ability levels, but an alternative method for assessing the magnitude of the selection induced by SRBs is to ask how the "marginal" reenlisters differ from the average reenlisters, and how these two groups vary with bonus offers. This approach mirrors that of Gruber et al. (1999), who analyzed the effects of legalized abortion on children's average living standards.

Figure 2 shows that, on average, the soldiers who choose to leave the military are of higher ability than those who choose to reenlist. Therefore, if the effect of SRBs on reenlistment were constant across the ability distribution, offering higher SRBs would *increase* the average quality of soldiers in the military. However, as we explore at length in Appendix D, the pattern of self-selection that we document in Table 2 is large enough that increasing SRB offers actually *decreases* the average quality of retained soldiers. Specifically, the estimates in Figure 3 imply that if the Army offered an average cohort a $10,000 SRB, it would retain an additional 195 soldiers. However, of those retained soldiers, about 150 (77 percent) would come from below the 50th percentile of the AFQT distribution, and the average AFQT percentile of those marginally retained soldiers would be 46, a full 10 points lower than the average AFQT score of the average reenlisting cohort in our data (where most soldiers receive no SRB, and the average SRB offer is just $1,891).

### 4.2 Evidence from early retirement incentives

While SRBs offer cash to those who choose to stay in the military, early retirement programs offer lump-sum payouts to those who choose to leave the military. Our analysis of the Army's early retirement programs is conceptually similar to our preceding SRB analysis, but the program details and structure of the data require a slightly modified approach. Rather than evaluating whether a soldier reenlists at the end of her spell, we evaluate whether or not she remained in the Army throughout the duration of the drawdown program eligibility window. This modification pools together soldiers who actively decide to reenlist with those who were not up for reenlistment during the program window but who nonetheless declined to take-up the early retirement program and leave the Army. We restrict our sample to spells that are active 6 months before the introduction of the early retirement program, thus counting each individual soldier only once. We make a few additional sample restrictions (described below) to isolate soldiers who are most similar to the eligible soldiers.

We first document that the program accomplished its objective of encouraging eligible soldiers to exit the military by estimating Equation (2):

$$\text{Stay}_{i,t_T} = \beta_0^T + \beta_1^T \text{ELIG}_i + \beta_2^T YOS_{i,t_0} + \gamma_{MOS,rank}^T + \delta^T \mathbf{X}_i + \epsilon_i^T, \tag{2}$$

where $\text{ELIG}_i$ is an indicator for soldier $i$'s eligibility for either VSI/SSB or TERA, $YOS_{i,t_0}$ is the soldier's years of service as of the program eligibility date $t_0$, and $\text{Stay}_{i,t_T}$ is an indicator for the solider remaining in the Army $T$ months after the early retirement program went into effect ($t_T$). For example, the estimate for $\beta_1^{T=3}$ shows the relative probability of being in the military, by program eligibility, 3 months after the program went into effect. We re-estimate Equation (2) for a range of $T$ values in order to analyze the effects of the early retirement program prior to and while it is in active effect. We include occupation$\times$rank fixed effects to capture any average differences in retention probabilities, and we control for the soldier's tenure since reenlistment probabilities generally decrease with tenure. We identify the effect of program eligibility by comparing soldiers of different service tenures within an occupation-by-rank bin and by comparing soldiers with the same years of service across different occupation-by-rank bins. The basic identifying assumption is that, after controlling for these observable determinants of program eligibility, eligibility for an early retirement program is correlated with neither an individual's ability level nor with the various unobservable determinants of her reenlistment decision. This assumption implies that, absent program implementation, reenlistment rates for eligible and ineligible groups would have followed parallel trends.

We present our regression results in Figure 4. In Panel A, we first document the effects of the retirement programs on average retention. The left graph depicts the results for the VSI/SSB programs, which offered separation incentives to mid-career soldiers. Note that the small and statistically insignificant coefficient left of the zero-month threshold shows that, prior to the official implementation of the VSI/SSB program, soldiers who were eventually eligible for the program had the same probability of staying in the military as those who would never be eligible, validating the primary parallel trends assumption underlying this specification. However, once the program comes into effect, eligible soldiers are more likely to leave the military, and by the time the VSI/SSB program expires, eligible soldiers were almost 15 percentage points less likely to remain in the military compared to ineligible soldiers. The right graph in Panel A depicts a similar analysis for TERA (which

affected late-career soldiers). While the results are noisier because the program was significantly smaller, the overall pattern is similar—retention rates for eligible and ineligible soldiers moved in parallel prior to the program, but after implementation, TERA induced eligible soldiers to retire at higher rates.

In Panel B of Figure 4 we present the retirement program effects by ability levels (specifically, upper and lower AFQT score terciles).[27] The left panel depicts the results for the VSI/SSB program. As before, there are no pre-program differences in reenlistment probabilities for each ability group, and both groups are more likely to leave the Army when offered early retirement. However, higher ability soldiers responded less to the early retirement offer than lower ability soldiers, as demonstrated by the coefficients for the bottom-tercile soldiers lying below the coefficients for top-tercile soldiers at all times after program implementation. The right panel documents similar results for the TERA program. Soldiers with lower AFQT scores are more responsive to the program than soldiers with comparatively higher scores..[28] In Appendix Figure C3, we show that patterns are similar when we split not by AFQT score but instead by soldiers' speed of promotion in their first term. Appendix Tables C7 and C8 provides regression estimates from a version of Equation (2) where VSI/SSB or TERA program eligibility is interacted with a soldier's ability, further documenting that high ability soldiers are less responsive to these programs.

The Figure 4 estimates imply that a VSI offer to 1,000 soldiers would induce an additional 90 soldiers to retire. Almost two-thirds of those soldiers would be below the median AFQT score. Thus, in contrast to the SRB result, the self-selection induced by this policy is large enough to *increase* the average quality of retained soldiers, since the lowest ability soldiers disproportionately take up the cash offer to leave the military. See Appendix D for a more formal analysis of the effect of both retirement programs on average soldier ability levels.

[27] The estimates from these two groups were jointly estimated in a single regression, with soldiers belonging to the middle AFQT tercile as the omitted category.

[28] There are several reasons why the results would be stronger for the VSI/SSB program than the TERA program. As shown in Table B5, the VSI/SSB program affected more soldiers. Additionally, the VSI/SSB program ran for longer than the TERA program, perhaps giving soldiers more time to react. However, the programs also differed in the type of benefit—soldiers eligible for the VSI/SSB program had the option to get a large lump-sum payment while soldiers in TERA were only entitled to the retirement annuity. Indeed, most soldiers who took up the VSI/SSB program chose the lump-sum payment rather than the annuity.

## 5 Explanatory Mechanisms

The previous sections document that the sensitivity of reenlistment decisions to near-term cash incentives is decreasing in individual soldier ability. These results are perhaps surprising. First, this selection pattern would seem to work against the positive effect of base wages on quality of civil service recruits documented throughout much of the literature (e.g., Dal Bo et al. 2013). Furthermore, in Appendix A, we demonstrate that this pattern of selection is not consistent with a simple workhorse model of selection in which soldiers differ only along one dimension—their ability—and in which the wage profile in the military is less sensitive to ability than in the private sector.

In this section, we empirically explore the degree to which the selection patterns we document are driven by the specific lump-sum structure of the retention payments, which, unlike changes in base wages, alter both the level and timing of compensation. First, we assess whether low-ability soldiers are more credit constrained and thus value the liquidity provided by the lump-sum payments more than their higher-ability peers. Second, we explore whether higher ability soldiers are more patient (as measured by lower personal discount rates) and consequently less responsive to promises of immediate lump-sum transfers. Our results suggest that, while both access to credit and discount factors are associated with reenlistment, neither is likely to be driving the differential responsiveness of high- and low-ability soldiers to cash incentives. Rather, we hypothesize that the selection patterns we document could be driven by features of the programs other than the timing of their payments. We show formally in Appendix A that this selection on ability may result from an idiosyncratic "taste for service" that is distributed such that high-ability soldiers tend to be inframarginal relative to their low-ability peers. It could also be that low-ability soldiers have lower expected permanent incomes, and thus any fixed nominal payment represents a larger relative income shock for them. Finally, since individuals may utilize hyperbolic (or quasi-hyperbolic) discounting (Laibson (1997)), and since those with lower cognitive abilities may be more likely to do so (Benjamin et al. (2013), Shamosh and Gray (2008), Parker and Fischhoff (2005)), our differential responsiveness to near term incentives by ability may reflect these alternative time preferences. Our data are unfortunately not well suited to formally test either of these possibilities, so in the next sections, we focus on empirical evidence exploring whether differences in either credit constraints or personal discount factors are able to explain the main result.

### 5.1 Credit Constraints

Low-ability soldiers may exhibit differential sensitivity to cash incentives because they are more credit constrained than their high-ability peers. Given that family resources account for a large share of the variation in AFQT scores (Neal and Johnson, 1996) and that AFQT scores are themselves strongly correlated with future labor market outcomes (Heckman et al., 2006), access to credit—which is a function of both current assets and future income—is likely to be correlated with cognitive ability. These differences in liquidity by ability may cause lower ability soldiers to respond to near term incentives for several reasons. First, they may place a higher value on cash for precautionary savings or to finance a larger household expenditure. In the case of the early retirement programs, more credit-constrained households may also value the liquidity as it enables them to prolong and optimize their job search in the civilian labor market.[29]

We explore the degree to which differences in liquidity across the ability distribution explain our main results by adding additional controls to our baseline SRB regressions from Section 4.1. If differences in access to credit are driving soldiers' differential responsiveness to SRBs by ability level, then we anticipate that directly controlling for measures of credit constraints in our baseline regressions will correct for omitted variable bias and consequently eliminate the interaction between SRBs and our measures of ability. In order to control for access to credit, we match soldiers to their individual credit scores and balances, which were obtained from one of the major credit reporting agencies for soldiers who were eligible for reenlistment at any point between April 2007 and March 2015.[30] In our data, we confirm that there is a positive correlation between ability and credit scores.[31]

The first three columns of Table 3 present regression coefficients from equation (1) after controlling for soldiers' credit scores. Column 1 replicates our main SRB result in the subsample of soldiers with non-missing credit scores. Column 2 shows both that the coefficient on the SRB $*$ AFQT interaction is robust to simply controlling for credit scores and that soldiers with higher credit scores are less likely to reenlist on average. However, the estimates in Column 3 show that soldiers with more credit are less responsive to SRBs, as theory would predict, but that the coefficient on SRB $*$ AFQT remains unchanged, suggesting that credit constraints

[29] A few recent papers have addressed the important role that worker liquidity constraints can play in labor markets. For example, Giannetti (2011) find that liquidity constraints can also affect occupational choice; individuals with a higher probability of facing liquidity constraints are less likely to be self-employed, and they are more likely to be employed in the public vs. private sector (see, also, Bianchi and Bobba 2013).

[30] Our match rate is high (nearly 90%) for our main sample of reenlistment-eligible soldiers.

[31] The correlation coefficients between credit score and AFQT and months spent below sergeant are 0.21 and -0.14, respectively.

are not driving our main finding. In Appendix Table C10 we show that these patterns are robust to alternative proxies for credit constraints, including an indicator for whether a soldier has a credit score of at least 680 (which most lenders consider to be "prime" credit).

### 5.2 Personal Discount Factors

An alternative explanation for our patterns is that high- and low-ability soldiers' differential sensitivity to cash incentives may reflect behavioral differences in decision making between high- and low-ability individuals. Previous research has demonstrated that cognitive ability is strongly correlated with a variety of decision-making characteristics, such as greater patience and higher risk tolerance (see, e.g., Frederick (2005) and Benjamin et al. (2013)). Importantly, similar relationships have been documented previously for the military. Warner and Pleeter (2001) estimate servicemembers' personal discount rates (PDRs) using take-up of early 1990s military drawdown programs (namely, VSI and SSB, discussed above). Their estimates suggest average discount rates as high as 17%, and they document higher rates for enlisted members, less educated members, and those with lower AFQT scores. Simon et al. (2015) estimate PDRs using more recent military retirement programs and find smaller PDRs of around 7% for enlisted soldiers and 2-4% for officers. Both studies document a negative correlation between AFQT scores and PDRs. We do not attempt to replicate these analyses, but we do confirm similar patterns in our sample, which is restricted to the Army enlisted force given our desire to exploit variation in SRBs (which were not offered to officers) and early retirement incentives. In Appendix Table C9 we provide OLS estimates from regressions of VSI/SSB take-up on soldier ability and show that for each 10 additional points of AFQT score a soldier is approximately 2% less likely to select the SSB lump-sum payment over the VSI annuity, which has a higher net present value for standard discount rates. The relationship is robust, albeit smaller, after including various demographic controls and MOS and rank fixed effects.

As with credit constraints, we explore the role that differences in personal discount rates play in driving the heterogeneous responses to SRB offers by adding additional proxies for discount factors to our baseline SRB regressions. We proxy for soldiers' discount factors with two additional variables, both of which are directly observable within the Army's personnel data. First, we generate an indicator variable for whether, at the time of initial enlistment, soldiers made an upfront investment (known as the GI Bill "buy-up")in order to enlarge

their future GI Bill educational benefits.[32] Second, we construct a variable measuring soldiers' participation in the Thrift Savings Plan (TSP), which is an optional 401(k)-style retirement savings plan offered to members of the military since 2001.[33] We proxy for a soldier's relative patience with her TSP contributions as a % share of her total base pay over the course of an enlistment spell. Both of these proxies capture the degree to which soldiers choose to transfer resources from the present to the future.

Columns 4-6 and 7-9 of Table 3 present regression coefficients from equation (1) after controlling for participation in the GI Bill "buy-up," and TSP contributions, respectively. As with credit scores, soldier ability is indeed positively correlated with our proxies for soldiers' relative patience.[34] However, Table 3 suggests that the correlation between discount factors and soldier ability cannot fully explain our main result. Columns 4 and 7 replicate our main SRB result in the subsamples of soldiers with non-missing GI Bill and TSP data, respectively. Columns 5 and 8 show that the coefficient on the SRB $*$ AFQT interaction is robust to controlling for each of these variables individually, and columns 6 and 9 show that the coefficient on SRB $*$ AFQT is also robust to including the interaction between SRBs and either of our two discount factor proxies. Specifically, we find that soldiers who are more patient (as reflected by our proxy measures) are indeed less responsive to SRBs. However, the coefficient on SRB $*$ AFQT remains unchanged across the columns, suggesting that differences in discount factors across ability levels are also unlikely to be driving our main finding. In Appendix Table C10 we show that these patterns are largely robust to alternative specifications, including when we proxy for discount factors not with participation in the MGIB buy-up option but with enrollment in the baseline MGIB,[35] and when we proxy not with the share of a soldier's salary that she contributes to the TSP but with whether she makes any TSP contribution whatsoever.

[32]The "GI Bill" is a general term used to describe a series of federal government programs that have funded civilian higher education for returning military veterans since 1944. We focus on the "Montgomery GI Bill" (MGIB), which was passed into law in 1984 and remains in place today. Although most present-day veterans now use the "Post-9/11 GI Bill", the MGIB remained the dominant source of veterans' education benefits until at least 2008. We focus in particular on the MGIB's $600 "buy-up" option, which promises soldiers a larger future GI Bill benefit in exchange for a $600 deduction from their first year's salary. Under 2016 rates, veterans using the MGIB are eligible to receive a baseline monthly tuition benefit of $1,857. Soldiers who elected to participate in the buy-up are eligible to receive an additional $150 per month.

[33]Additional details on both the MGIB buy-up and the TSP are provided in Appendix Section B.1.2.

[34]The correlations between buy-up participation and AFQT/months-below-sergeant are 0.07 and -0.04, respectively; and, the correlations between TSP contributions and AFQT/months-below-sergeant are 0.09 and -0.03, respectively.

[35]Because even the baseline MGIB benefits require an initial contribution of $1,200 at the time of enlistment, enrollment in the MGIB is itself a reasonable proxy for a soldier's relative patience. However, enrollment in standard MGIB is far more common than participation in the buy-up, and it may be the default for most soldiers. Whereas more than 93% of all eligible soldiers elect to enroll in the standard MGIB, just 3% of those soldiers make the additional $600 contribution necessary to participate in the buy-up.

## 6 Conclusion

This paper explores the nature of selection in public sector employee retention with evidence from the U.S. Army. Our paper extends the literature on worker sorting between the public and private sectors. Relative to the existing research, which has tended to emphasize differences in the levels of compensation at the initial entry margin, our paper brings new attention to the retention margin, and in particular to the structure of commonly used retention incentives. Using variation in reenlistment bonuses and early retirement programs, we have shown that low-ability soldiers are more sensitive to immediate lump-sum transfers than their higher-ability peers. On the margin, lump-sum bonus offers induce lower-ability soldiers to reenlist, while early retirement programs induce lower-ability soldiers to leave the Army. We provide suggestive evidence that these patterns do not arise from differences in either credit constraints or discount factors across the ability distribution. We nonetheless estimate that these effects are large enough to affect the average ability level of the military. Insights from this project are relevant not only to the U.S. military but also to the many other public sector organizations that lack the private sector's ability to target incentives to high-performing workers but are nonetheless tasked with recruiting and retaining a high-quality workforce.

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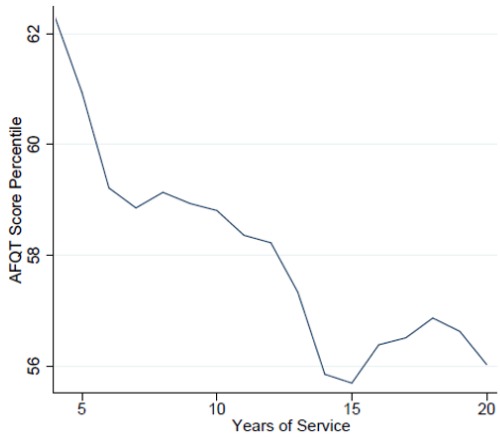
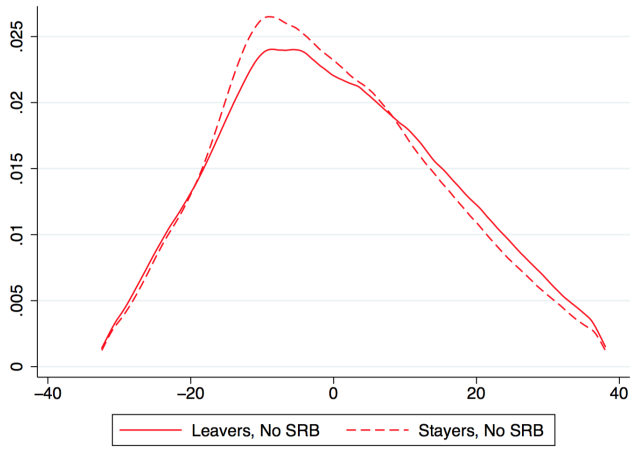
Figure 1: Average AFQT Score Percentile by Tenure with the Army

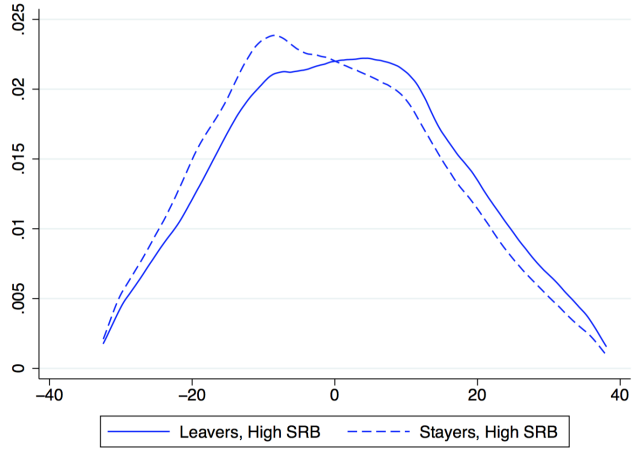



Notes: The figure plots the average AFQT Score Percentile of enlisted soldiers in the Army from 1992-2016, excluding soldiers who are currently serving. Years of service is defined as a soldier's total tenure with any branch of the military. Years of service is measured at the time of separation, or, for soldiers still serving, in the current period.

Figure 2: The Distribution of AFQT Scores for Soldiers, Split by Reenlistment Decisions and SRB Offers



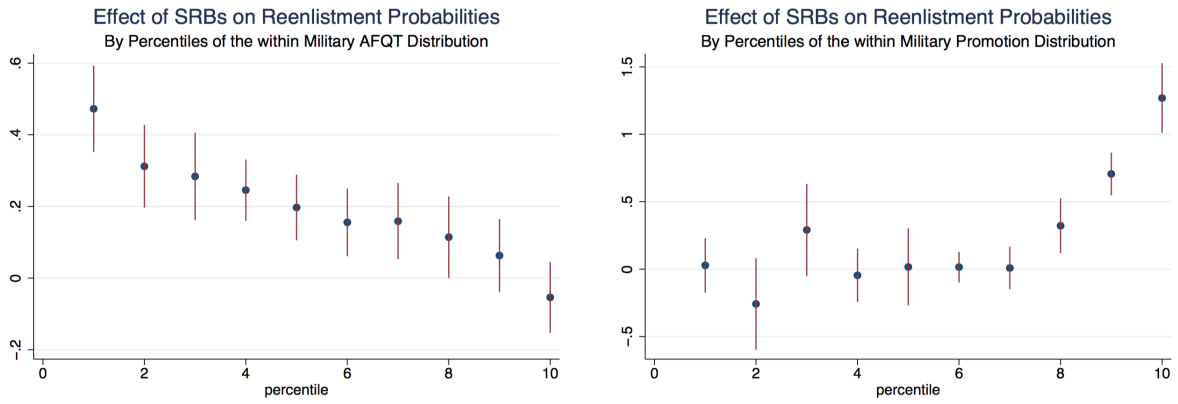

(a) Soldiers without an SRB offer




(b) Soldiers offered an SRB of at least $8,000

Notes: Figures 2a and 2b plot the residuals of a regression of AFQT score on MOS*rank*YOS dummies as well as date dummies. The sample includes only those soldiers who have a choice to reenlist. The left panel plots the distributions for the set of soldiers who do not have a SRB available at the start of their reenlistment window. The right panel shows the distributions for the set of soldiers who have an offered SRB of at least $8,000. The left figure includes 1.7 million observations ( 75% of the sample) while the right panel includes 300,000 observations ( 13% of the sample). Each distribution is truncated at the top and bottom 1%.

Figure 3: The Effect of Selective Reenlistment Bonuses on Soldier Retention by Soldier Quality: Nonlinear Specifications

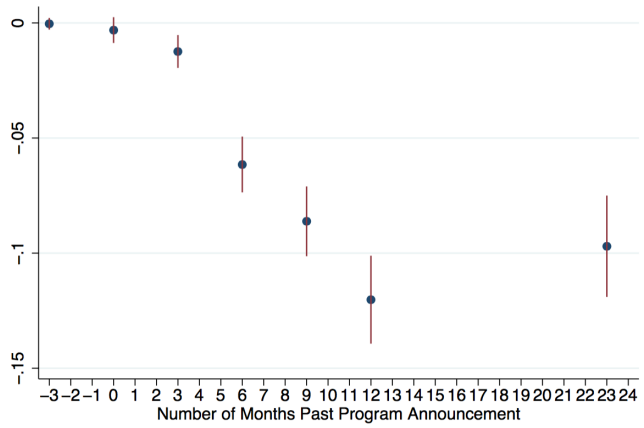



Notes: The left panel of this figure plots the coefficient estimates on the interaction of SRB offers and a dummy for each percentile of the AFQT score distribution. These are 10 equallly sized percentile bins, and correspond to the distribution of those soldiers who are eligible to reenlist, not the overall distribtuion of AFQT percentiles. The right panel plots similar regressions using the distribution of soldier's promotion speeds instead of AFQT scores. The promotion speed is measured by the number of months the soldier spend at a rank below a sergeant. In both panels, the red bars show 95 percent confidence intervals, clustering the standard erros at the MOS*rank*yos level. Reenlistment probabilities (the y-axis) are scaled by 100 and SRB values are in terms of thousands of U.S. dollars.

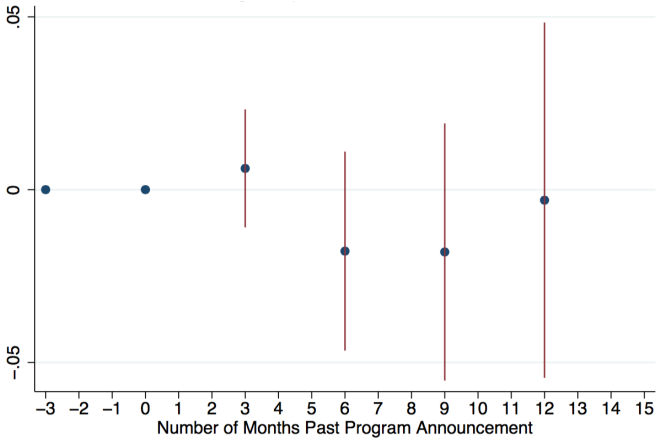
Figure 4: The Effect of Early Retirement Programs on Soldier Selection

*Panel A: The Effect of Early Retirement Programs on Soldier Retention*

(a) VSI/SSB

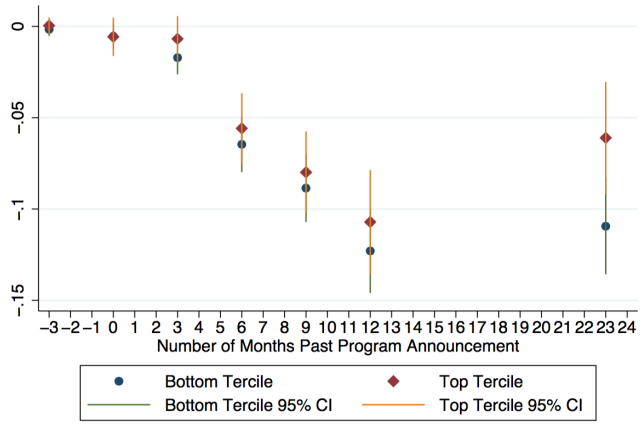



(b) TERA

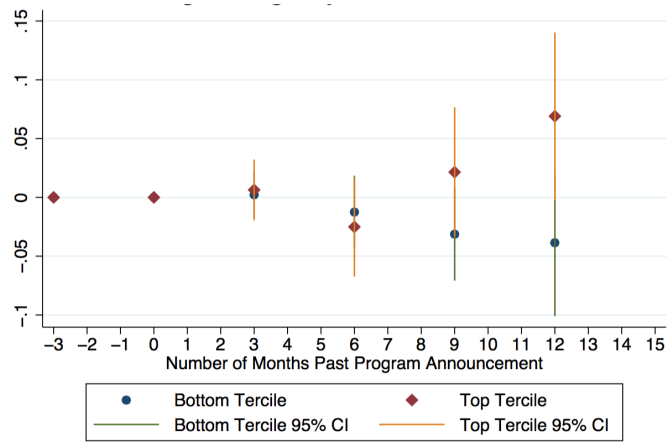



*Panel B: The Effect of Early Retirement Programs on Retention by AFQT Scores*

(c) VSI/SSB




(d) TERA




Notes: The left graph of each panel (VSI/SSB) shows the probability of remaining in the Army for each month relative to August 1, 1993, the start of the VSI/SSB program and includes soldiers with at least 6 years of experience. In Panel A, blue dots show the coefficient estimate on program eligibility from separate regressions on the probability of remaining in the military in period $t$. In Panel B, we split soldiers into terciles of the AFQT score distribution. In each time period, we run a regression of program eligibility interacted with the soldier's AFQT tercile on the probability of remaining in the military in period $t$. The right figures shows similar specifications, but defines the sample and the time period relative to August 31, 1994, the day the TERA program was introduced and includes only soldiers in the affected ranks and occupations, who have tenures that put them within 1 year of being eligible. In panel B, blue circles plot the coefficient on program eligibility interacted with the bottom tercile, and red diamonds plot the coefficient on program eligibility interacted with the top tercile. The middle tercile was also included in the regression but is not plotted here. Across all figures, regressions also includes occupation and rank fixed effects, a control for the soldier's tenure as of the program start date, dummies for the soldier's AFQT score tercile, and demographic controls (age, marital status, gender and race). Lines show the 95% confidence intervals, with standard errors clustered at the occupation*rank*year of service bin.

Table 1: Summary Statistics

| | (1) Full Sample | (2) Soldiers with Reenlistment Choice | (3) Spells ending in exit | (4) Spells ending in Reenlistment |
|---|---|---|---|---|
| Fraction Male | 0.85 | 0.85 | 0.85 | 0.86 |
| Age | 28.37 | 29.02 | 29.71 | 28.66 |
| Years of Service | 6.33 | 6.98 | 7.96 | 6.46 |
| Fraction Married | 0.57 | 0.60 | 0.52 | 0.64 |
| AFQT Percentile | 57.94 | 58.25 | 59.68 | 57.48 |
| Months as Sergeant in First Term | 2.51 | 2.99 | 1.95 | 3.55 |
| Number of Soldiers | 1,626,298 | 1,180,179 | 726,930 | 715,153 |
| Number of Spells | 2,765,755 | 2,102,206 | 734,972 | 1,367,234 |

Notes: Sample in Column 1 includes the enlistment spells for all enlisted soldiers from 1992-2016. Column 2 restricts to the enlistment spells at the end of which soliders have the option to reenlist. Column 3 includes the set of spells at the end of which the soldier decides to exit the military. Column 4 includes the set of spells that are followed by another term in the Army. Years of service are defined as of the end of the spell, and AFQT scores are measured at the time of entrance into the Army.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 2: The Effect of SRBs on Soldier Retention, by Soldier Ability

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| *Ability Measure:* | AFQT Score | | | | Months Below Sergeant in First Term |
| SRB | 0.158*** | 0.615*** | 0.327*** | 0.359*** | -0.607*** |
| | (0.042) | (0.078) | (0.066) | (0.085) | (0.108) |
| SRB * AFQT | | -0.710*** | -0.281*** | -0.745*** | 0.015*** |
| | | (0.116) | (0.102) | (0.117) | (0.002) |
| AFQT | -11.411*** | -9.347*** | -14.312*** | -9.127*** | 0.309*** |
| | (0.873) | (0.868) | (0.648) | (0.914) | (0.024) |
| $R^2$ | 0.157 | 0.157 | 0.189 | 0.195 | 0.171 |
| Year * Month FE | Y | Y | N | N | Y |
| Year * Month * CZ FE | N | N | Y | N | N |
| Year * Month * MOS FE | N | N | N | Y | N |
| MOS * Rank * YOS FE | Y | Y | Y | Y | Y |
| Demographic Controls | Y | Y | Y | Y | Y |
| Avg. Reenlistment Rate | 65.10 | 65.10 | 66.72 | 65.13 | 66.30 |
| Avg. SRB | 2.89 | 2.89 | 3.26 | 2.9 | 3.02 |
| Observations | 1,761,615 | 1,761,615 | 1,422,783 | 1,757,584 | 1,708,425 |

Standard errors are reported in parentheses. They are two-way clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. SRBs are in $1000s of 2015 dollars. Demographic controls include gender, age, marital status, race, and special skill dummies. "Ability" is defined as AFQT score for columns (1)-(4) and months below Sergeant for column (5). AFQT is on a scale from 0-1. See Table C1, Column 1 for evidence that the average SRB in a given period is conditionally uncorrelated with the average ability of the eligible soldiers.

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 3: The Effect of SRBs on Soldier Retention, by AFQT
Including Credit Score, Montgomery GI Bill, and Thrift Saving Program Interactions

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | Credit Score | | | GI Bill "Buy-up" | | | TSP Contribution % | | |
| SRB | 0.477*** | 0.472*** | 1.488*** | 0.198* | 0.169 | 0.163 | 0.365*** | 0.363*** | 0.367*** |
| | (0.145) | (0.145) | (0.221) | (0.114) | (0.116) | (0.116) | (0.093) | (0.094) | (0.093) |
| SRB * AFQT | -0.847*** | -0.839*** | -0.707*** | -0.483*** | -0.427*** | -0.368*** | -0.708*** | -0.706*** | -0.692*** |
| | (0.188) | (0.186) | (0.179) | (0.122) | (0.123) | (0.123) | (0.132) | (0.133) | (0.133) |
| AFQT | -9.652*** | -8.511*** | -3.126 | -17.491*** | -16.735*** | -16.876*** | -10.171*** | -10.806*** | -10.212*** |
| | (0.955) | (0.884) | (3.585) | (0.813) | (0.814) | (0.815) | (0.907) | (0.905) | (0.924) |
| Mechanism Var. | | -0.248*** | -0.161*** | | -12.662*** | -9.727*** | | 29.542*** | 56.600*** |
| | | (0.020) | (0.041) | | (0.797) | (1.388) | | (1.303) | (3.769) |
| SRB * Mechanism Var. | | | -0.017*** | | | -0.584*** | | | -0.656*** |
| | | | (0.002) | | | (0.107) | | | (0.167) |
| AFQT * Mechanism Var. | | | -0.088 | | | -0.608 | | | -36.592*** |
| | | | (0.056) | | | (1.787) | | | (4.937) |
| $R^2$ | 0.207 | 0.209 | 0.209 | 0.221 | 0.223 | 0.223 | 0.232 | 0.232 | 0.232 |
| Year * Month FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| MOS * Rank * YOS FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year * Month * MOS FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Demographic Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Avg. Reenlistment Rate | 68.28 | 68.42 | 68.42 | 52.05 | 52.05 | 52.05 | 64.62 | 64.62 | 64.62 |
| Avg. SRB | 2.06 | 2.06 | 2.06 | 3.33 | 3.33 | 3.33 | 2.70 | 2.70 | 2.70 |
| Observations | 606,350 | 600,688 | 600,688 | 1,000,035 | 1,000,035 | 1,000,035 | 1,168,621 | 1,168,621 | 1,168,621 |

Standard errors are reported in parentheses. They are two-way clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. Samples for columns (1)-(3) are further restricted to soldiers with non-missing credit scores. Samples for columns (4)-(6) are restricted to soldiers with non-missing GI Bill participation data. Samples for columns (7)-(9) are restricted to soldiers with non-missing TSP contribution data. SRBs are in $1000s of 2015 dollars. Demographic controls include gender, age, marital status, race, and special skill dummies. AFQT and TSP contribution % are on scales from 0-1.

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

APPENDIX NOT FOR PUBLICATION

# A Theoretical Framework for Public Sector Retention

The goal of this section is twofold. First, we demonstrate the importance of the parameter that we estimate, the differential sensitivity of soldiers to lump-sum bonuses by ability, for capturing how the quality of the military will change with various retention policies. Second, we show that in the simplest model of public sector retention, this key parameter is unambiguously positive – retention policies that increase the financial return should attract higher ability soldiers and increase the average quality of soldiers in the military. However, we show that away from that simple case, the theoretical predictions are ambiguous and depend on the underlying distribution of preferences across the population.

First, we relate the parameter that we estimate in Section 4 to the effect of retention policies on the average quality of the military $\overline{A}$, a parameter that analysis in the military is key for designing retention policies. Mechanically, the total quality of retained soldiers is

$$\overline{A} = \sum_{u} p_i(R) * a_i$$

where $p_i(R)$ is the probability that individual $i$ reenlists and $a_i$ is the ability of soldier $i$. The response of this average to a reenlistment bonus $K$ is

$$\frac{d\overline{A}}{dK} = \sum_{i} \frac{dp_i(R)}{dK} * a_i = \sum_{i} \gamma_i a_i$$

where $\gamma_i = \frac{dp_i(R)}{dK}$. Using expectations, you can rewrite this as:

$$\frac{d\overline{A}}{dK} = \overline{\gamma}\,\overline{a} + cov(\gamma_i, a_i) = \overline{\gamma}\,\overline{a} + \beta Var(a_i)$$

where $\overline{\gamma}$ is the average response of soldiers to the bonus and $\overline{a}$ is average ability in the military. The key parameter that needs to be estimated to inform the effect of retention policies on average soldier quality is $\beta$, which is precisely the parameter we focus on estimating in Section 4.

Having established the importance of this parameter for the design of retention policies, we now explore

a simple model of selection that underpins this parameter. Consider a soldier choosing whether to reenlist in the military for a fixed term. As discussed above, personnel management is notoriously rigid in the military. Although individual ability can indirectly influence compensation – for example, higher ability individuals might be promoted more quickly, entitling them to a steeper wage profile – at least in the short term, military compensation is largely independent of individual ability. Alternatively, in a competitive civilian labor market, higher ability individuals earn their full marginal product. Therefore, in our simplified model, military compensation is independent of individual ability, whereas civilian wages are increasing in ability.

We will write the individual's military payoff as:

$$U_i(military) = W^m(\mathbf{X}_i), \tag{A1}$$

where $W^m$ is the military wage function and $\mathbf{X}$ is a vector of individual characteristics affecting compensation (for example, rank, years of service, and military occupational specialty). Should she choose not to reenlist, the same individual earns a payoff of:

$$U_i(civilian) = W^c(\mathbf{X}_i, a_i), \tag{A2}$$

where $W^c$ is the civilian wage function, and $a$ reflects individual ability, and $\frac{\partial W^c}{\partial a} \geq 0$.

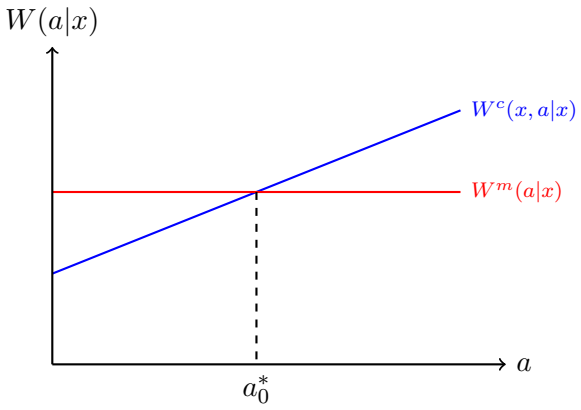
Figures A1a and A1b depict the military and civilian wage functions and the distribution of ability types, respectively. In this setting, there exists a threshold ability type $a_0^*$, such that soldiers of ability $a_i < a_0^*$ will always choose to reenlist, and soldiers of ability $a_i > a_0^*$ will always choose to separate from the military.

Now suppose that the military wants to attract more workers and therefore offers a lump-sum reenlistment bonus of $K$. The new military payoff is:

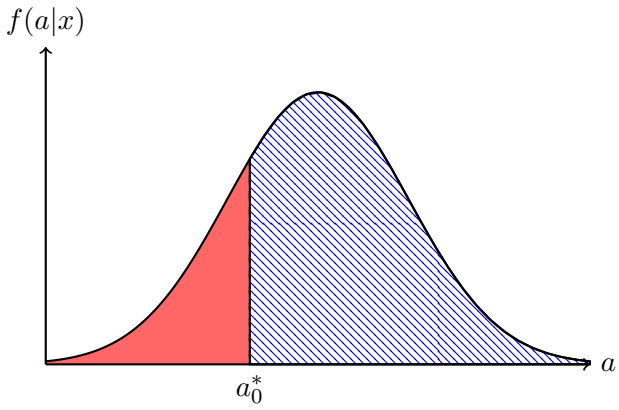
$$U_i(military) = W^m(\mathbf{X}_i) + K \tag{A3}$$

Figure A2a depicts the military and civilian wage functions subsequent to the level shift in military wage. As illustrated by the figure, a level shift in the military wage generates a corresponding increase in the threshold ability type, $a_1^*$. Intuitively, as military wages increase, the military will tend to retain more service mem-

Figure A1: Simple Case



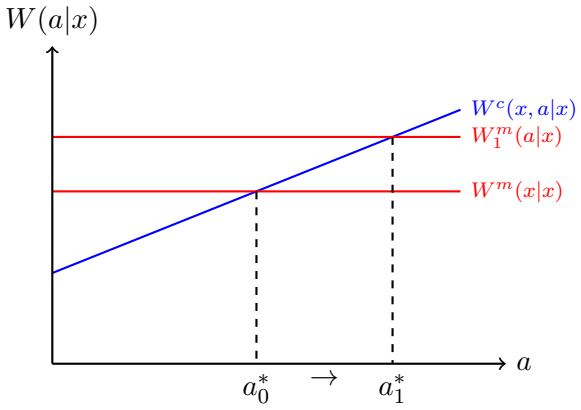

(a) Military and Civilian Wage Functions



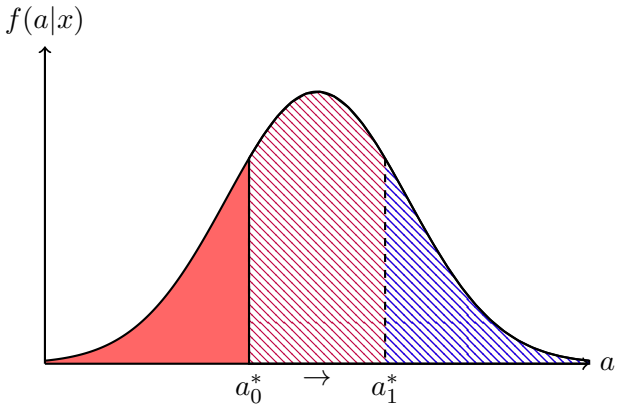

(b) PDF of Soldier Ability

bers. Only the most productive soldiers will be able to command a comparable wage in the civilian labor market. Figure A2b depicts the new cutoff rule. In this simple case, an increase to the relative military payoff generates an increase in the marginal ability type $a^*$, and implies that higher ability soldiers are more responsive to reenlistment bonuses than their lower-ability peers. It is only the higher-ability workers who are on the margin and thus affected by lump-sum bonuses. It also increases the average ability of the soldiers who the military retains, which is likely a key statistic that the policy-maker cares about.

Figure A2: Exogenous Shift in Relative Military Compensation




(a) Military and Civilian Wage Functions




(b) PDF of Soldier Ability

While this simple model generates an unambiguous counterfactual prediction, a setting with richer soldier heterogeneity will produce theoretically ambiguous responses. Suppose that soldiers have heterogeneous

"taste" for military service $c_i$ drawn from a continuous distribution $F(\cdot)$. In particular, rewrite the military payoff function as

$$U_i(military) = W^m(\mathbf{X}_i) + c_i, \tag{A4}$$

Given heterogenous taste for service, a soldier $i$ reenlists if her military payoff exceeds her civilian payoff, or $W^m(\mathbf{X}_i)+c_i > W^c(\mathbf{X}_i, a)$. This yields a cutoff rule for the soldier's reenlistment decision with respect to ability type $a_i$. Namely, conditional on individual characteristics $\mathbf{X}$, a soldier reenlists if

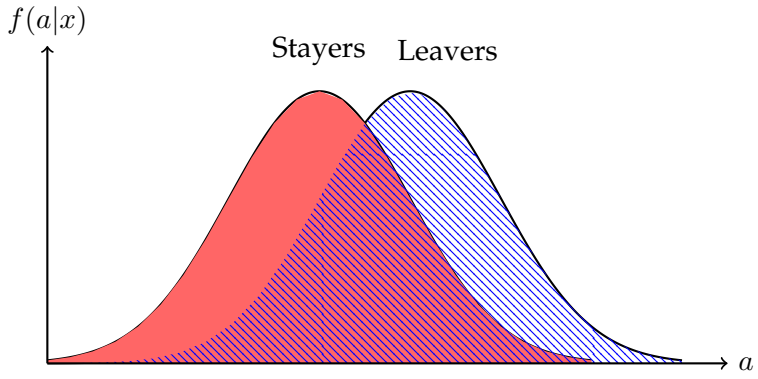
$$a_i < g(c_i), \tag{A5}$$

where $g(c_i) = W^{c^{-1}}\left(W^m(X_i) + c_i\right)$ and $g'(c_i) > 0$.

Figure A3 depicts stylized baseline ability distributions of stayers and leavers in this continuous-type setting. As Equation (A5) demonstrates, conditional on a soldier's taste for the military ($c_i$), the sorting of stayers and leavers looks identical to our simple case in Figure A1b. However, in the continuous-type setting, we have to aggregate across values of taste-for-service types $c_i$ in order to obtain the full distribution of ability types among either stayers or leavers. In other words, we obtain the "stayer" distribution in Figure A3 by adding up the areas left of the cutoff value $g(c_i)$ for each taste-for-service type $c_i$. Consistent with the preliminary prediction that those who reenlist are of lower average ability than those who do not reenlist, we draw the PDFs so that the stayer ability distribution peaks to the left of the leaver ability distribution. In this more general case, there are many ability types for which soldiers will either reenlist *or* separate, depending upon their individual taste for service. Stayers on the far right-hand tail of their ability distribution – that is, those who reenlist despite highly marketable private-sector job skills – have a very high taste for military service. Conversely, leavers on the far left-hand tail of their ability distribution – that is, those who separate from the military despite relatively low private-sector job skills – have a very low taste for military service.

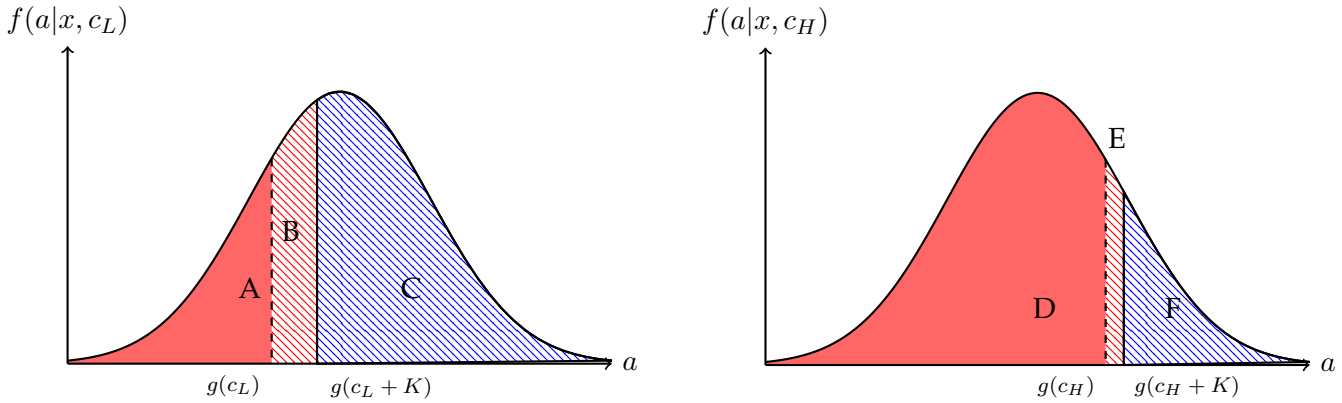
Now consider the introduction of lump-sum bonuses $K$, again in the form of a positive level shift in the military wage, so that the military payoff is $W^m(\mathbf{X}_i) + c_i + K$. Under the new cutoff rule, a soldier reenlists if $a_i < g(c_i + K)$. Conditional on taste for service, the stark predictions depicted in Figure A2 from the simple case still hold. That is, for each value of $c_i$, an increase to the relative military payoff generates an increase in

Figure A3: Stayer and Leaver Ability Distributions,
Continuous Taste Types ($c_i$)




the marginal ability type $a^*$ and increases in the average abilities of those who chose to reenlist. However, in aggregating the changes across soldier types, the predictions for how soldiers of different abilities respond to the bonus become ambiguous. What the differential elasticity to bonuses by ability will be will depend upon at least three factors: 1) the shape of the function $g(\cdot)$ (which incorporates both how individuals trade off taste for military service with other types of compensation and how civilian employers reward ability), 2) the density of the ability distribution around cutoff values and 3) the correlation between ability $a$ and taste for service $c$.[36]

Figure A4: Change in Relative Return to Military Service, Two-Type Case




(a) Low Taste for Military Service ($c_L$)

(b) High Taste for Military Service ($c_H$)

[36] In the dynamic version of this static problem where soldiers consider the expected future stream of compensation, this would also depend on the correlation between discount factors and ability $a$.

To fix intuitions, suppose there are just two types of taste for military service, $c_i \in \{c_L, c_H\}$, denoting either a low or high taste for military service. Figure A4a shows the new cutoff rule after the bonus $K$ for individuals with a low taste for service $c_L$, and Figure A4b shows the new cutoff rule for individuals with a high taste for service $c_H$. Soldiers in areas $A$ and $D$ were always going to reenlist in the military, and soldiers in areas $C$ and $F$ were never going to reenlist. Areas $B$ and $E$, on the other hand, correspond to soldiers who were induced to stay in the military due to the change in the compensation policy. The estimated differential response to the bonuses by ability will depends on the size and placement of these two areas. Specifically, the size of area $B$ and $E$ is going to depend on the distance between $g(c_L)$ and $g(c_L + K)$ or between $g(c_H)$ and $g(c_H + K)$. This is determined by the shape of the $g$ function. The size of area $B$ and $E$ is also going to depend on the density of soldiers around these cutoffs (i.e the height of the distribution). Affecting parts of the ability distribution where there are more soldiers will have a bigger effect on the average quality of the group. Even in this simple two-type case, without further assumptions, there is no clear prediction for whether higher or lower skill soldiers will be more responsive to reenlistment bonuses. In this simple model, our empirical finding that lower ability soldiers are more responsive to these lump-sum bonuses corresponds to the case where $B$ is larger than $E$.

# B Data Appendix

## B.1 Data Details

### B.1.1 Reenlistment Data

The data for this analysis comes from the U.S. Army's Total Army Personnel Database (TAPDB), from which we have constructed a panel of enlistment spells between 1992 and 2016. We exclude from the analysis all current spells. For our analysis, the date of entry into the military is identified for each soldier according to the first month in which they received payments. This captures military service that the soldier may have preformed in the past either in nonconsecutive spells or in other branches of the military. We drop all observations where we observe only 1 spell for the soldier that is less than 3 months. These spells are likely soldiers who did not complete basic training. We also drop spells that are are the end of the soldier's tenure, are less than 3 months, and result in the soldier entering officer training. We code that soldier as reenlisting in our analysis.

In addition to making the choice of whether to reenlist at the end of their spell, some soldiers have the

option of extending their contract by up to a year. We identify spells as extension if the entry date of the spell is the same as the extension date of the previous spell. Since we are interested in major reenlistment decisions, we absorb all extensions into the previous spell. For example, if a soldier served for 3 years and extended their spell for 1 year, but then left the military, we code the soldier as having 1 four year spell and then choose not to reenlist. The left panel of Figure B1 shows the distribution of spell length in the resulting sample, and the right panel of Figure B1 shows the distribution of enlistment terms in our sample.

In addition to knowing the date at which the soldier decided to reenlist and the date at which the term of service was due to end, we need to identify the date at which the soldier entered the reenlistment window. We use this date to assign the unemployment rate and SRB offer that the soldier faces. When in the reenlistment window the soldier decided to reenlist is the soldier's choice, and we want to abstract from variation in the relative military wage that are the result of strategic timing of the market. For each fiscal year, the Army announces in MILPER messages the date at which the soldier is eligible to enter their reenlistment window. Before fiscal year 2007, soldiers entered their reenlistment window 12 months before the end of their contracted service. However, for 2007, 2008 and 2009, the army extended this to 24 months. In the following years, all soldiers with terms expiring in the following year became eligible for reenlistment window on a given date. Figure B2 plots the distribution of the number of months in advance the end of service (ETS) date that the soldier enters their reenlistment window. Most soldiers enter 12 months in advance, with additional masses at 15 and 24 months. Most soldiers also reenlist at some point in that window.

We use two main measures of soldier quality throughout our analysis: the soldier's AFQT score at entry and the number of months in their first term that the soldier spends below Sergeant (E-5). Table B1 shows estimates from Wigdor and Green (1991) showing that AFQT score are highly correlated with within-military hands on performance metrics. Figure B3 also shows that AFQT scores are highly predictive of being promoted quickly within the military. We chose the number of months below sergeant as our measure of military performance because it is highly correlated with future performance in the military. Table B2 shows the pairwise correlations for the number of months that it takes soldiers to get to each rank. The speed of promotion to E-3 or E-4 is not highly correlated with strong performance later in the soldier's career, as those promotions are more defaulted, so we use the speed of promotion to E-5.

### B.1.2 Credit, GI Bill, and Thrift Savings Plan (TSP) Data

Credit data were obtained from a major credit reporting agency, which we then matched with the TAPDB enlistment database. Credit data consists of a panel of twice-annual observations for soldiers with service between April 2007 and March 2015. Among soldiers who were eligible for at least one reenlistment during that time period, we are able to match nearly 90% to credit reporting data. For each soldier facing a reenlistment choice, we match the soldier to her credit report that is closest in time to the beginning of her reenlistment window. In addition to individual credit scores, we observe open lines of credit, balances, and delinquencies, grouped by major lending categories. For simplicity, we focus our analysis on credit scores, but we have confirmed that our results are largely robust to proxying for credit constraints with past delinquencies.

GI Bill data are directly observable within the TAPDB enlistment database. Immediately upon enlistment, soldiers who meet minimum eligibility requirements are offered the opportunity to enroll in the Montgomery GI Bill (MGIB) benefits package. In order to enroll, a soldier must consent to having $1,200 deducted from her military pay, usually in equal $100 deductions from her first twelve monthly pay checks. Under 2016 rates, soldiers who enrolled in the basic MGIB package were eligible to receive up to $66,852 in total educational benefits (up to $1,857 per month for 36 total months of higher education). Soldiers who enroll in the MGIB are given the further opportunity to participate in the MGIB "buy-up" by consenting to an additional deduction of between $20 and $600. Soldiers who participate in the full $600 buy-up become eligible to receive up to $5,400 in total MGIB educational benefits ($150 per month for 36 months). In our data we observe whether a soldier is eligible to enroll in the standard MGIB benefits package and whether she actually enrolls, as well as the amount of her total accrued MGIB contributions. We code soldiers as having participated in the buy-up when they have contributed a total of $1,800 towards the MGIB (the basic $1,200 contribution plus the full $600 buy-up contribution). Among our soldiers in our baseline sample, more than 93.3% enrolled in the basic MGIB, and among those, 3.3% participated in the full $600 buy-up.

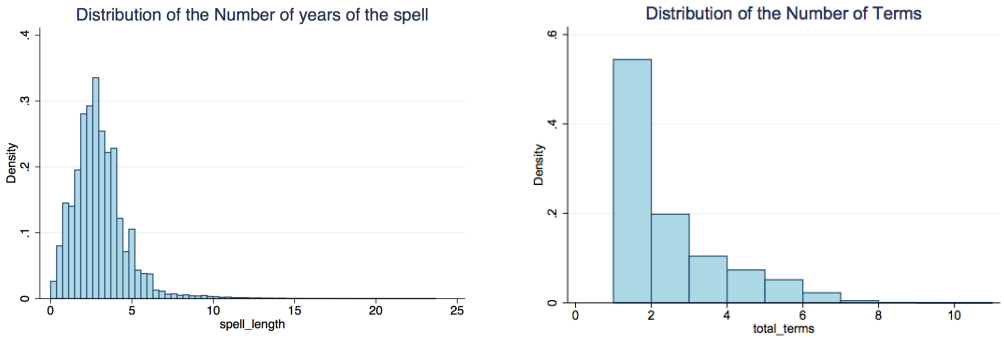
Thrift Savings Plan (TSP) contribution data are also directly observable within the TAPDB enlistment database. The TSP is a 401(k)-like retirement savings plan available to many federal workers. First established for civilian workers in 1986, members of the military became eligible for the TSP in 2001. For each spell, we observe the soldier's total contribution to her TSP account. We also observe her total base military pay over the course of her spell, which we use to calculate her TSP contribution as a share of her total basepay. We

also create an indicator variable for whether a soldier has made any contribution greater than zero to her TSP account over the course of her spell. Among enlistment spells since 2001, approximately 32% of soldiers make some positive contribution to the TSP, and the average contribution (as a share of total spell base military pay) is approximately 2.2%.

Appendix Table B6 shows pairwise correlations between credit score, basic MGIB enrollment, participation in the MGIB buy-up, participation in the TSP (i.e., any contribution), and total TSP contributions as a share of the servicemember's military pay. Credit scores are positively correlated with ability measures, as are participation in the MGIB buy-up and participation in the TSP. Enrollment in the basic MGIB is slightly negatively correlated with both of our ability measures.

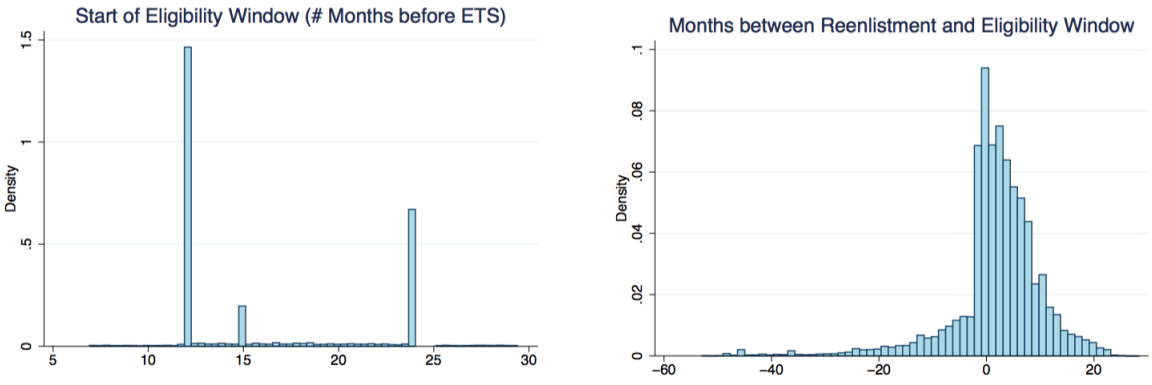
### B.1.3 Data Appendix Tables and Figures

Figure B1: Distribution of the Number of Terms amoung Enlisted Soldiers (1992-2017)




Notes: Sample includes all enlisted soldiers from 1992-2016 and excludes soldiers currently serving in the Army.

Figure B2: The Timing of Reenlistment Decisions and the Eligibility Window




Notes: Sample includes all enlisted soldiers from 1992-2016 and excludes soldiers currently serving in the Army. The left panel plots the distribution of the time between the beginning of the reenlistment window and the end of the soldier's term The right panel plots the distribution of the difference between the start of the reenlistment window and the date that the soldier actually reenlists.

Figure B3: The Correlation of AFQT scores and speed of promotion

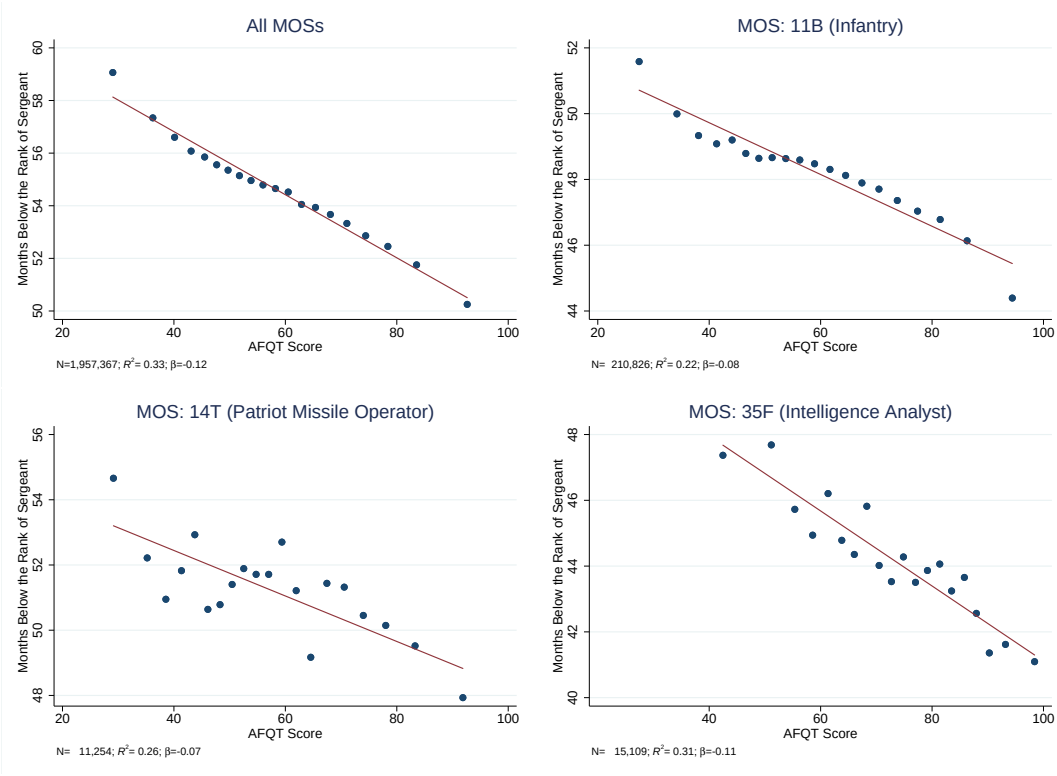



Figure B4: Continuation Profiles by AFQT Score

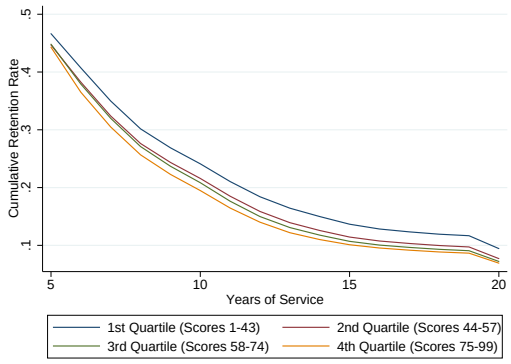


Table B1: Correlations of Armed Forces Qualifications Test (AFQT) and Job-Specific Hands-On Performance Measure

| Specialty | AFQT w/ Performance |
|---|---|
| Administrative specialist | 0.35 |
| Air traffic control operator | 0.10 |
| Rifleman | 0.40 |
| Machinegunner | 0.49 |
| Mortarman | 0.33 |
| Motor transport operator | 0.24 |
| Radio operator | 0.22 |
| Median Correlation | 0.26 |

Source: Wigdor and Green (1991), Table 8-10.

Table B2: Correlation of Promotion Speeds Across Ranks

| | (1) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Time to E-2 | Time to E-3 | Time to E-4 | Time to E-5 | Time to E-6 | Time to E-7 | Time to E-8 |
| Time to E-2 | 1 | | | | | | |
| Time to E-3 | 0.758*** | 1 | | | | | |
| Time to E-4 | 0.598*** | 0.686*** | 1 | | | | |
| Time to E-5 | 0.0764*** | 0.128*** | 0.298*** | 1 | | | |
| Time to E-6 | 0.0526*** | 0.0876*** | 0.213*** | 0.620*** | 1 | | |
| Time to E-7 | 0.0812*** | 0.112*** | 0.241*** | 0.565*** | 0.803*** | 1 | |
| Time to E-8 | 0.112*** | 0.144*** | 0.256*** | 0.505*** | 0.653*** | 0.774*** | 1 |

Notes: Sample includes all enlisted soldiers from 1992-2016. Correlations are pairwise.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B3: Correlation of SRB offers Across Chosen Reenlistment Term

| | (1) |
|---|---|
| | 4 Year Term |
| 2 Year Term | 0.593*** |
| 3 Year Term | 0.986*** |
| 5 Year Term | 0.988*** |
| 6 Year Term | 0.964*** |

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

Notes: Sample includes all SRB offers from 1997-2016. Correlations are pairwise.

Table B4: Correlations of Unconditional and Conditional (Location-Specific) SRB Offers (4-year terms)

| | (1) |
|---|---|
| | Regular Offer |
| Continental US 1 | 0.372*** |
| Continental US 2 | 0.510*** |
| Continental US 3 | 0.585*** |
| Continental US 4 | 0.698*** |
| Continental US 5 | 0.722*** |
| Continental US 6 | 0.846*** |
| Continental US 7 | 0.831*** |
| Non-continental 1 | 0.586*** |
| Non-continental 2 | 0.608*** |

Notes: Sample includes all SRB offers from 1997-2016. Correlations are pairwise. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B5: Eligibility for Early Retirement Programs

| | **Panel A: TERA Program** | | |
|---|---|---|---|
| | All | 15+ Years | Within 1 year |
| | Soldiers | of Service | of cutoff |
| Total Soldiers | 259,998.00 | 25,441.00 | 3,114.00 |
| Eligible Soldiers | 1,731.00 | 1,731.00 | 1,731.00 |
| Fraction Eligible for TERA | 0.67 | 6.80 | 55.59 |
| | **Panel B: VSI/SSB Program** | | |
| | All Soldiers | 6+ YOS | – |
| Total Soldiers | 194,017.00 | 62,420.00 | – |
| Eligible Soldiers | 7,326.00 | 7,326.00 | |
| Fraction Eligible for VSI | 3.78 | 11.74 | |

Notes: In Panel A, Column 1 includes sample is all enlisted solders serving in the military on August 31, 1994, the start date for the TERA program. In Panel A Column 2, the sample is restricted to those with at least 15 years of service. In Column 3, the sample is restricted to those in eligible occupations and ranks with service that puts them within 1 year of eligibility. In Panel B, Column 1 includes all enlisted soldiers serving in August 1, 1993, the start date of the VSI program. Column 2 further restricts the sample to those soldiers with at least 6 years of service.

Table B6: Pairwise Correlations Between Ability Measures (AFQT and Months Below Sergeant) and Credit Score, MGIB Participation, and TSP Participation

| Specialty | AFQT | Months Below Sergeant |
|---|---|---|
| Credit Score | 0.21 | -0.14 |
| MGIB Enrollment | -0.06 | 0.01 |
| MGIB Buy-up | 0.07 | -0.04 |
| Any TSP Contribution | 0.09 | -0.03 |
| % TSP Contribution | 0.12 | -0.04 |

## B.2 Case Studies: Time Series Variation in SRBs

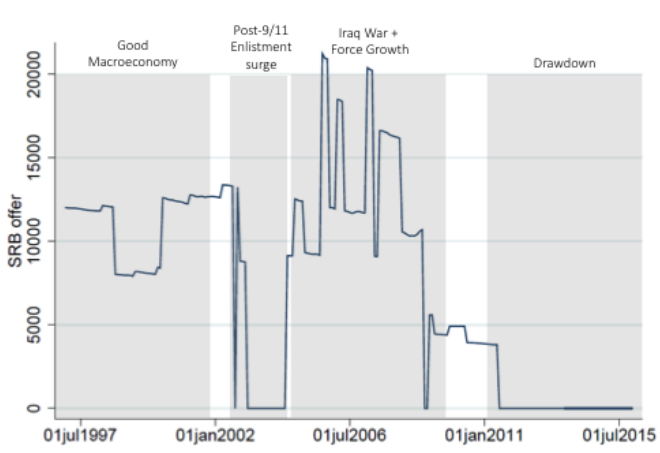
While it is difficult to know precisely what drives the high-frequency variation in SRB offers, anecdotal and observational evidence suggests that variation in SRBs is driven largely by a combination of "inside" factors – namely, the military's operational and strategic requirements – and "outside factors" – namely, labor market conditions and other economic trends affecting civilian labor market opportunities.[37] We study how these factors may have driven time-series variation in SRB offers across two separate MOSs in Figure B5. The left-most panel plots the time series of SRB offers for infantrymen. This MOS is the largest in the Army (11% of our sample) and is the most representative of the Army as a whole. Infantry SRBs remained moderately high throughout the period preceding the September 11, 2001 attacks. Although operational requirements were relatively minimal during this period, pre-war SRBs might reflect positive macroeconomic conditions, which forced the military to compete with civilian employers for qualified workers. Infantry SRBs dipped dramatically in early 2002 and remained low throughout much of the 2002-2004 period. This was a period of surging enlistment, which many attribute to heightened patriotism in the aftermath of the 9/11 attacks. However, SRBs increased again in 2004, and despite considerable volatility, they remained high through approximately 2008, reflecting the military's growing operational requirements in Iraq and Afghanistan. Though we might be concerned that this period also had higher casualties than other periods (a negative job amenity), we control for month fixed effects in all regressions and occupation by month fixed effects in others. Infantry SRBs have remained low since approximately 2011, likely reflecting the military's gradual exit from Iraq and its overall drawdown of personnel.

In contrast to infantry SRBs, SRB offers for Patriot missile operators, plotted in the right panel of Figure B5, appear to be largely driven by operational requirements and large-scale changes to the Army's overall force structure. SRB offers to Patriot missile operators were highest between 1997 and 2002 – precisely the period during which the Army was expanding its number of Patriot missile battalions from 13 to 15. The Army's focus on Patriot missiles was likely influenced by a period of perceived threat by Iraqi Scud missiles, against which Patriot missiles were intended to defend. The Patriot missile operator SRBs illustrate how exogenous changes in Army force structure – due to the standing-up of a new unit or perhaps the introduction of new

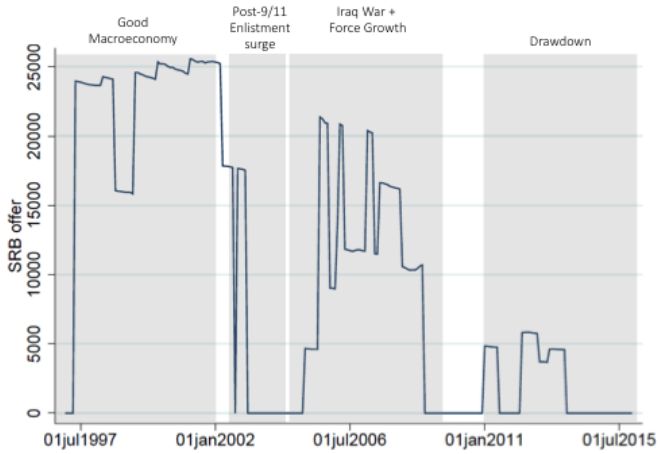
[37] While the Army process does not directly measure civilian economic opportunities, they do track the personnel inventories and adjust SRBs accordingly. So current labor market conditions may affect individual choices regarding reenlistment, which then affect the *future* SRBs offered to service members to maintain desired personnel inventories.

military technology – can be an important driver of variation in SRBs over time.

Figure B5: Selective Reenlistment Bonus (SRB) Case Studies
SRB offers by MOS (E-4), 1997-2015



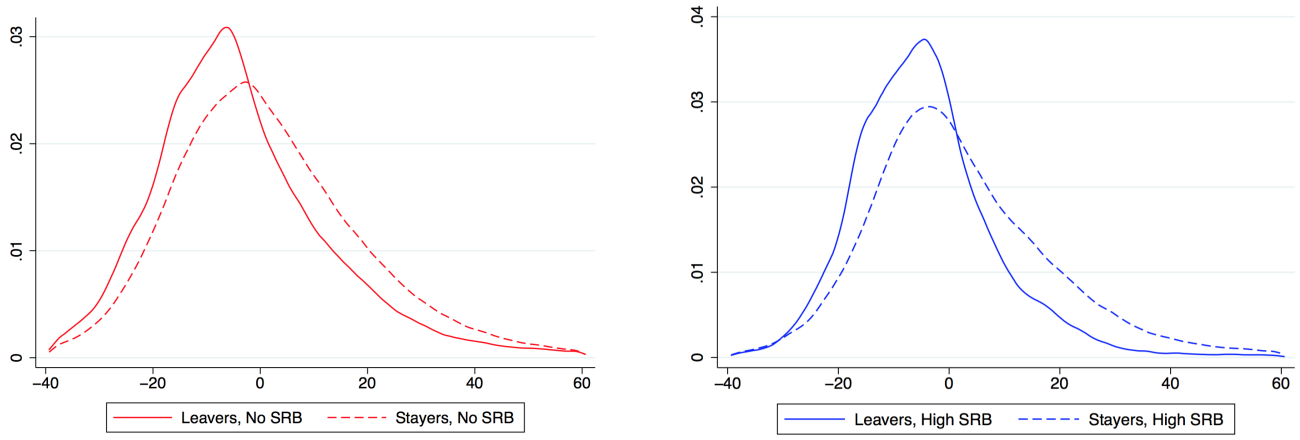

(a) MOS: 11B (Infantry)




(b) MOS: 14T (Patriot Missile Operator)

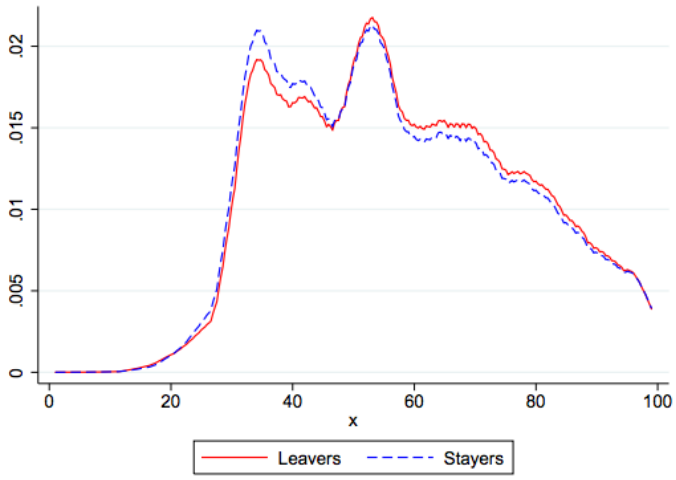
# C Robustnes of Empirical Results

Figure C1: The distribution of first term promotion speeds, split by reenlistment decisions.




Notes: The figure plots the residuals of a regression of the number of months the soldier spent below sergent (rank E4 of below) on MOS*rank*YOS dummies as well as date dummies. The sample includes those soldiers who have a choice to reenlist. The left panel plots the distributions for the set of soldiers who do not have a SRB available at the start of their reenlistment window. The right panel shows the distributions for the set of soldiers who have an offered SRB of at least $8,000. The left figure includes 1.7 million observations ( 75% of the sample) while the right panel includes 300,000 observations ( 13% of the sample). Each distribution is truncated at the top and bottom 1%.

Figure C2: The raw distribution of AFQT scores for soldiers, split by reenlistment decisions.




Notes: The figure plots the raw AFQT score distribution for soldiers by their reenlistment decision. The sample includes those soldiers who have a choice to reenlist.

Table C1: Soldier's Reenlistment Probabilities by AFQT Score and Offered Bonuses (SRBs): Alternate Specifications

| *Dependent Variable: Indicator for Reenlisting*100* | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | | *Subsamples* | | | |
| | Baseline | SRB in logs | Main MOS only | High-Corr. MOS only | No Surge Years | Positive SRB Offer |
| SRB | 0.615*** | | 0.465** | 0.600*** | 0.527*** | 0.216** |
| | (0.078) | | (0.207) | (0.221) | (0.076) | (0.109) |
| SRB*AFQT | -0.710*** | | -0.646* | -0.574 | -0.648*** | -0.224* |
| | (0.116) | | (0.335) | (0.366) | (0.113) | (0.117) |
| AFQT | -9.347*** | | -11.889*** | -10.195*** | -9.201*** | -17.428*** |
| | (0.868) | | (1.950) | (2.765) | (0.938) | (1.669) |
| log(SRB) | | 0.752*** | | | | |
| | | (0.098) | | | | |
| log(SRB)*AFQT | | -0.850*** | | | | |
| | | (0.184) | | | | |
| R-squared | 0.157 | 0.157 | 0.127 | 0.142 | 0.155 | 0.114 |
| Observations | 1761615 | 1761615 | 627775 | 382301 | 1457868 | 516754 |
| Year * Month FE | x | x | x | x | x | x |
| MOS*Rank*YOS FE | x | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x | x |
| Average Dep. Var | 65.1 | 65.1 | 63.92 | 63.25 | 63.92 | 66.35 |
| Average SRB | 2.89 | 2.66 | 2.72 | 3.5 | 2.72 | 9.86 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015.Demographic controls include gender, age, marital status, race, and special skill dummies. SRBs are in $1000s of 2015 dollars and AFQT is on a scale from 0-1. The ``main MOS only'' column restricts to the 10 largest occupations in our sample. The ``high corr. mos'' column restricts to MOSs identified by Wigdor and Green (1991) as exhibiting a high correlation between AFQT score and hands-on job performance. The ``no surge years'' specification excludes soldiers entering their reenlistment window during the Iraq qurve years (2007-2009). The ``positive SRB offer'' column incldues only soldiers who were offered a positive SRB.

Table C2: Soldier's Reenlistment Probabilities by Months E-4 or Below and Offered Bonuses (SRBs): Alternate Specifications

| *Dependent Variable: Indicator for Reenlisting*100* | (1) | (2) | | (3) | (4) |
|---|---|---|---|---|---|
| | | *Subsamples* | | | |
| | Baseline | Main MOS only | High-Corr. MOS only | No Surge Years | Positive SRB Offer |
| SRB | -0.607*** | -0.877*** | -0.952*** | -0.672*** | 0.461*** |
| | (0.108) | (0.295) | (0.326) | (0.116) | (0.111) |
| SRB*Months E4 or Below | 0.015*** | 0.019*** | 0.024*** | 0.016*** | -0.009*** |
| | (0.002) | (0.005) | (0.005) | (0.002) | (0.002) |
| Months E4 or Below | 0.309*** | 0.334*** | 0.273*** | 0.288*** | 0.599*** |
| | (0.024) | (0.054) | (0.067) | (0.024) | (0.030) |
| log(SRB) | | | | | |
| log(SRB)*AFQT | | | | | |
| R-squared | 0.171 | 0.150 | 0.155 | 0.167 | 0.150 |
| Observations | 1708425 | 619066 | 376659 | 1403790 | 522354 |
| Year * Month FE | x | x | x | x | x |
| MOS*Rank*YOS FE | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x |
| Average Dep. Var | 66.3 | 65.24 | 63.92 | 65.24 | 66.4 |
| Average SRB | 3.02 | 2.86 | 3.59 | 2.86 | 9.86 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. Demographic controls include gender, age, marital status, race, and special skill dummies. SRBs are in $1000s of 2015 dollars. ``Months E4 or Below'' is defined as the number of months spent in a rank below Sergeant during the soldier's first enlistment. The ``main MOS only'' column restricts to the 10 largest occupations in our sample. The ``high corr. mos'' column restricts to MOSs identified by Wigdor and Green (1991) as exhibiting a high correlation between AFQT score and hands-on job performance. The ``no surge years'' specification excludes soldiers entering their reenlistment window during the Iraq qurve years (2007-2009). The ``positive SRB offer'' column incldues only soldiers who were offered a positive SRB.

Table C3: Selective Reenlistment Bonuses (SRBs) and Average AFQT: Alternate Specifications

| *Dependent Variable: AFQT Score Percentile* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | | (6) | (7) | (8) |
| | | | | | Subsamples | | | | IV Spec |
| | Baseline | CZ Trends | MOS Trends | SRB in Logs | Main MOS only | High-Corr. MOS only | No Surge Years | Positive SRB Offers | Actual SRBs |
| SRB*Stay | -0.048*** | -0.056*** | -0.018 | | -0.166*** | -0.059 | -0.042** | -0.020 | -0.038 |
| | (0.015) | (0.016) | (0.012) | | (0.035) | (0.056) | (0.019) | (0.020) | (0.065) |
| SRB*Leave | 0.066*** | -0.000 | 0.108*** | | -0.047 | 0.074 | 0.061** | 0.024 | |
| | (0.022) | (0.023) | (0.016) | | (0.063) | (0.071) | (0.024) | (0.020) | |
| log(SRB)*Stay | | | | -0.064*** | | | | | |
| | | | | (0.016) | | | | | |
| log(SRB)*Leave | | | | 0.087*** | | | | | |
| | | | | (0.028) | | | | | |
| Stay | -1.216*** | -1.817*** | -1.183*** | -1.132*** | -1.544*** | -1.250*** | -1.173*** | -2.195*** | |
| | (0.118) | (0.089) | (0.121) | (0.124) | (0.248) | (0.381) | (0.126) | (0.279) | |
| R-squared | 0.304 | 0.351 | 0.326 | 0.304 | 0.251 | 0.226 | 0.302 | 0.313 | 0.290 |
| Observations | 1761615 | 1422783 | 1757584 | 1761615 | 627775 | 382301 | 1457868 | 516754 | 913070 |
| Year * Month FE | x | | | x | x | x | x | x | x |
| Year * Month * CZ FE | | x | | | | | | | |
| Year * Month * MOS FE | | | x | | | | | | x |
| MOSxRankxYOS FE | x | x | x | x | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x | x | x | x | x |
| Mean Dep. Var | 58.26 | 59.08 | 58.25 | 58.26 | 54.83 | 59.83 | 58.17 | 61.17 | 56.61 |
| Mean SRB | 2.89 | 3.26 | 2.9 | 2.66 | 2.96 | 3.5 | 2.72 | 9.86 | 3.36 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. SRBs are in $1000 of 2015 dollars. Demographic controls include gender, age, marital status, race, and special skill dummies. The dependent variable is a soldier's AFQT score. AFQT is on a scale from 0-100. The ``main MOS only'' column restricts to the 10 largest occupations. The ``high corr. mos'' column restricts to MOSs identified by Wigdor and Green (1991) as exhibiting a high correlation between AFQT score and hands-on job performance. The ``no surge years'' specification excludes soldiers entering their reenlistment window during the Iraq qurve years (2007-2009). The ``positive SRB offer'' column incldues only soldiers who were offered a positive SRB. The ``IV Specification'' restricts to only those who chose to reenlist and uses the offered SRB as an instrument for the actual SRB offer that the soldier receives. The first stage F-statistic for the IV regression is 460.

Table C4: Selective Reenlistment Bonuses (SRBs) and Average Months Below Sergeant: Alternate Specifications

| *Dependent Variable: Months E4 or Below* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) |
| | | | | Subsamples | | | | IV Spec |
| | | CZ | MOS | Main MOS | High-Corr. | No Surge | Positive SRB | Actual |
| | Baseline | Trends | Trends | only | MOS only | Years | Offers | SRBs |
| SRB*Stay | 0.022 | -0.007 | 0.051* | 0.073 | 0.054 | 0.021 | 0.013 | 0.076 |
| | (0.030) | (0.031) | (0.030) | (0.091) | (0.106) | (0.032) | (0.029) | (0.082) |
| SRB*Leave | -0.076*** | 0.037 | -0.055 | -0.079 | -0.134 | -0.116*** | 0.428*** | |
| | (0.027) | (0.023) | (0.043) | (0.061) | (0.086) | (0.028) | (0.052) | |
| log(SRB)*Stay | | | | | | | | |
| log(SRB)*Leave | | | | | | | | |
| Stay | 6.693*** | 8.416*** | 6.652*** | 7.115*** | 5.396*** | 5.974*** | 13.041*** | |
| | (0.505) | (0.451) | (0.529) | (1.074) | (1.132) | (0.492) | (0.962) | |
| R-squared | 0.342 | 0.391 | 0.361 | 0.305 | 0.316 | 0.336 | 0.327 | 0.343 |
| Observations | 1708425 | 1433249 | 1704497 | 619066 | 376659 | 1403790 | 522354 | 897384 |
| Year * Month FE | x | | | x | x | x | x | x |
| Year * Month * CZ FE | | x | | | | | | |
| Year * Month * MOS FE | | | x | | | | | x |
| MOSxRankxYOS FE | x | x | x | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x | x | x | x |
| Mean Dep. Var | 54.4 | 53.1 | 54.4 | 53.57 | 52.16 | 54.41 | 51.93 | 58.77 |
| Mean SRB | 3.02 | 3.27 | 3.02 | 3.04 | 3.59 | 2.86 | 9.86 | 3.46 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. SRBs are in $1000 of 2015 dollars. Demographic controls include gender, age, marital status, race, and special skill dummies. The dependent variable ``Months E4 or Below'' is defined as the number of months spent in a rank below Sergeant during the soldier's first enlistment. The ``main MOS only'' column restricts to the 10 largest occupations. The ``high corr. mos'' column restricts to MOSs identified by Wigdor and Green (1991) as exhibiting a high correlation between AFQT score and hands-on job performance. The ``no surge years'' specification excludes soldiers entering their reenlistment window during the Iraq qurve years (2007-2009). The ``positive SRB offer'' column incldues only soldiers who were offered a positive SRB. The ``IV Specification'' restricts to only those who chose to reenlist and uses the offered SRB as an instrument for the actual SRB offer that the soldier receives. The first stage F-statistic for the IV regression is 460.

Table C5: Selective Reenlistment Bonuses (SRBs) and Average AFQT: Alternative SRB Offer Windows

| *Dependent Variable: AFQT Score Percentile* | | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | | (5) |
| | | *Alternative SRB Offer Windows* | | | | |
| | Baseline | 6-mo. Avg. SRB | 12-mo. Avg. SRB | 6-mo. Max. SRB | 12-mo. Max. SRB | Final SRB Offer |
| SRB*Stay | -0.048*** | -0.061*** | -0.072*** | -0.055*** | -0.059*** | -0.063*** |
| | (0.015) | (0.017) | (0.018) | (0.014) | (0.014) | (0.011) |
| SRB*Leave | 0.066*** | 0.055** | 0.044* | 0.055*** | 0.050** | -0.001 |
| | (0.022) | (0.024) | (0.025) | (0.021) | (0.021) | (0.015) |
| Stay | -1.216*** | -1.227*** | -1.247*** | -1.189*** | -1.163*** | -1.530*** |
| | (0.118) | (0.118) | (0.118) | (0.119) | (0.119) | (0.117) |
| R-squared | 0.304 | 0.304 | 0.304 | 0.304 | 0.304 | 0.304 |
| Observations | 1761615 | 1761615 | 1761615 | 1761615 | 1761615 | 1761615 |
| Year * Month FE | x | x | x | x | x | x |
| MOS*Rank*YOS FE | x | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x | x |
| Average Dep. Var | 58.26 | 58.26 | 58.26 | 58.26 | 58.26 | 58.26 |
| Average SRB | 2.89 | 2.71 | 2.53 | 3.21 | 3.45 | .4 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015.Demographic controls include gender, age, marital status, race, and special skill dummies. SRBs are in $1000s of 2015 dollars and AFQT is on a scale from 0-100. The ``Baseline'' column uses soldiers' highest SRB offer on the first day of their reenlistment eligibility window. The ``6-mo. Avg.'' column uses the average of the high SRB offer on the first day of the first six months of a soldier's reenlistment eligibility window. The ``12-mo. Avg.'' column averages the high SRB offers across the first 12 months of the soldier's reenlistment eligibility window. The ``6-mo. Max.'' column uses the highest SRB offer from the first six months of the reenlistment eligibility window. The ``12-mo. Max.'' column uses the highest SRB offer from the first 12 months of the reenlistment eligibility window. The ``Final SRB Offer'' uses the highest SRB offer available on the last day of a soldier's reenlistment eligibility window, which is generally 90 days prior to the end of the soldier's current enlistment.

Table C6: Selective Reenlistment Bonuses (SRBs) and Average Months Below Sergeant: Alternative SRB Offer Windows

| *Dependent Variable: AFQT Score Percentile* | | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | | (5) |
| | | *Alternative SRB Offer Windows* | | | | |
| | Baseline | 6-mo. Avg. SRB | 12-mo. Avg. SRB | 6-mo. Max. SRB | 12-mo. Max. SRB | Final SRB Offer |
| SRB*Stay | 0.022 | 0.012 | 0.003 | 0.019 | 0.017 | 0.010 |
| | (0.030) | (0.031) | (0.031) | (0.028) | (0.026) | (0.016) |
| SRB*Leave | -0.076*** | -0.083*** | -0.089*** | -0.077*** | -0.080*** | -0.016 |
| | (0.027) | (0.030) | (0.033) | (0.027) | (0.027) | (0.022) |
| Stay | 6.693*** | 6.718*** | 6.742*** | 6.668*** | 6.637*** | 6.987*** |
| | (0.505) | (0.506) | (0.507) | (0.508) | (0.512) | (0.475) |
| R-squared | 0.342 | 0.342 | 0.342 | 0.342 | 0.342 | 0.342 |
| Observations | 1708425 | 1708425 | 1708425 | 1708425 | 1708425 | 1708425 |
| Year * Month FE | x | x | x | x | x | x |
| MOS*Rank*YOS FE | x | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x | x |
| Average Dep. Var | 54.4 | 54.4 | 54.4 | 54.4 | 54.4 | 54.4 |
| Average SRB | 3.02 | 2.83 | 2.64 | 3.35 | 3.6 | .42 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015.Demographic controls include gender, age, marital status, race, and special skill dummies. SRBs are in $1000s of 2015 dollars, and the dependent variable ``Months E4 or Below'' is defined as the number of months spent in a rank below Sergeant during the soldier's first enlistment. The ``Baseline'' column uses soldiers' highest SRB offer on the first day of their reenlistment eligibility window. The ``6-mo. Avg.'' column uses the average of the high SRB offer on the first day of the first six months of a soldier's reenlistment eligibility window. The ``12-mo. Avg.'' column averages the high SRB offers across the first 12 months of the soldier's reenlistment eligibility window. The ``6-mo. Max.'' column uses the highest SRB offer from the first six months of the reenlistment eligibility window. The ``12-mo. Max.'' column uses the highest SRB offer from the first 12 months of the reenlistment eligibility window. The ``Final SRB Offer'' uses the highest SRB offer available on the last day of a soldier's reenlistment eligibility window, which is generally 90 days prior to the end of the soldier's current enlistment.

Table C7: Soldier's Survival Probabilities by Soldier Quality and VSI Program Eligibility

| *Dependent Variable: Indicator for Remaining in Military through VSI Period* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *Quality Measure:* | AFQT Score Percentile | | | | Months below Sergent in first term | | | |
| | All Soldiers | | 6+ Years of Service | | All Soldiers | | 6+ Years of Service | |
| VSI/SSB Eligibility | -0.099*** | -0.196*** | -0.097*** | -0.151*** | -0.198*** | 0.411*** | -0.174*** | 0.047* |
| | (0.014) | (0.032) | (0.016) | (0.032) | (0.014) | (0.031) | (0.012) | (0.026) |
| VSI/SSB*Quality | | 0.193*** | | 0.106*** | | -0.006*** | | -0.002*** |
| | | (0.030) | | (0.029) | | (0.000) | | (0.000) |
| Quality | -0.099*** | -0.107*** | -0.022*** | -0.034*** | 0.005*** | 0.005*** | -0.001*** | -0.000 |
| | (0.011) | (0.011) | (0.008) | (0.008) | (0.000) | (0.000) | (0.000) | (0.000) |
| R-squared | 0.154 | 0.155 | 0.168 | 0.168 | 0.230 | 0.240 | 0.176 | 0.182 |
| Observations | 189243 | 189243 | 60678 | 60678 | 161364 | 161364 | 32356 | 32356 |
| Average Dep. Var | 0.83 | 0.83 | 0.84 | 0.84 | .84 | .84 | .85 | .85 |
| Fraction Eligible | .04 | .04 | .12 | .12 | .03 | .03 | .17 | .17 |

Note: Standard errors are reported in parentheses. They are clustered at the MOS*Rank*YOS. Sample in column 1, 2, 5 and 6 is restricted to all soldiers serving on August 31, 1994 (the start of the sample period). Sample in Column 3, 4,79 and 8 is further restricted to those soldiers with between 6 an 20 years of service as of August 31, 1994. All regressions include occupation and rank fixed effects, a control for the years of service as of August 31, 1994, as well as controls for gender, age, marital status, and race. ``Ability'' is defined as AFQT score for columns (1)-(4) and months below Sergeant for columns (5)-(8). AFQT is on a scale from 0-1.

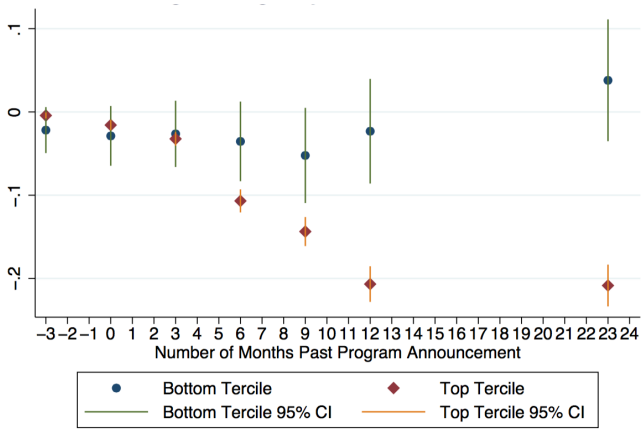
Table C8: Soldier's Survival Probabilities by Soldier Quality and TERA Program Eligibility

| *Dependent Variable: Indicator for Remaining in Military through TERA Period* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *Quality Measure:* | AFQT Score Percentile | | | | | | Months below Sergent in first term | |
| | All Soldiers | | 15+ Years of Service | | Around Cutoff | | All Soldiers | |
| TERA Eligibility | -0.046*** | -0.088*** | -0.021 | -0.053 | -0.024 | -0.089** | -0.145*** | 0.264* |
| | (0.014) | (0.032) | (0.016) | (0.032) | (0.021) | (0.040) | (0.032) | (0.152) |
| TERA*Ability | | 0.078 | | 0.061 | | 0.122* | | -0.003*** |
| | | (0.056) | | (0.057) | | (0.067) | | (0.001) |
| Ability | -0.060*** | -0.060*** | -0.022* | -0.026** | -0.023 | -0.066* | 0.003*** | 0.003*** |
| | (0.008) | (0.008) | (0.012) | (0.012) | (0.035) | (0.037) | (0.000) | (0.000) |
| R-squared | 0.107 | 0.107 | 0.115 | 0.115 | 0.078 | 0.079 | 0.148 | 0.148 |
| Observations | 254274 | 254274 | 24589 | 24589 | 4387 | 4387 | 219156 | 219156 |
| Average Dep. Var | .91 | .91 | .87 | .87 | .84 | .84 | .92 | .92 |
| Fraction Eligible | .01 | .01 | .07 | .07 | .33 | .33 | <.01 | <.01 |

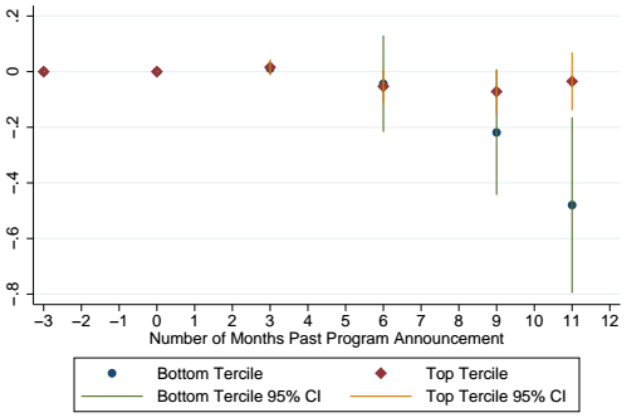
Note: Standard errors are reported in parentheses. They are clustered at the MOS*Rank*YOS. Sample in column 1, 2, 7 and 8 is restricted to all soldiers serving on August 31, 1994 (the start of the sample period). Sample in Column 3 and 4 is further restricted to those soldiers with between 15 an 20 years of service as of August 31, 1994. Columns 5 and 6 restrict the sample to those soldiers in an eligible occupation/rank but within 2 years (above or below) the mininmum years of service for program eligibility. All regressions include occupation and rank fixed effects, a control for the years of service as of August 31, 1994, as well as controls for gender, age, marital status, and race. ``Ability'' is defined as AFQT score for columns (1)-(6) and months below Sergeant for columns (7) and (8). AFQT is on a scale from 0-1.

Figure C3: The Effect of Early Retirement Programs on Retention by Soldier Promotion Speeds

(a) The probability of surviving by VSI/SSB Eligibility




(b) The probability of surviving by TERA Eligibility




Notes: The left panel shows the probability of remaining in the Army for each month relative to August 1, 1993, the start of the VSI/SSB program, split by the soldier's promotion speed in his first term. We split soldiers into terciles of the months spent below sergeant in their first term. In each time period, we run a regression of program eligibility interacted with the soldier's promotion tercile on the probability of remaining in the military in period $t$. Each regression also includes occupation and rank fixed effects, a control for the soldier's tenure as of the program start date, dummies for the soldier's promotion speed tercile, and demographic controls (age, marital status, gender and race). Blue circle plot the coefficient on program eligibility interacted with the top tercile, and red triangles plot plot the coefficient on program eligibility interacted with the bottom tercile. The middle tercile was also included in the regression but is not plotted here. Lines show the 95% confidence intervals, with standard errors clustered at the occupation*rank*year of service bin. The sample includes the set of soldiers in the military on February 1, 1993, 6 months prior to the VSI program. The right panel shows similar specifications, but defines the sample and the time period relative to August 31, 1994, the day the TERA program was introduced. The right panel further restricts the sample to include only soldiers in the affected ranks and occupations, who are within 1 year of being eligible.

Table C9: Relationship Between Soldier Ability and Take-Up of SSB vs. VSI

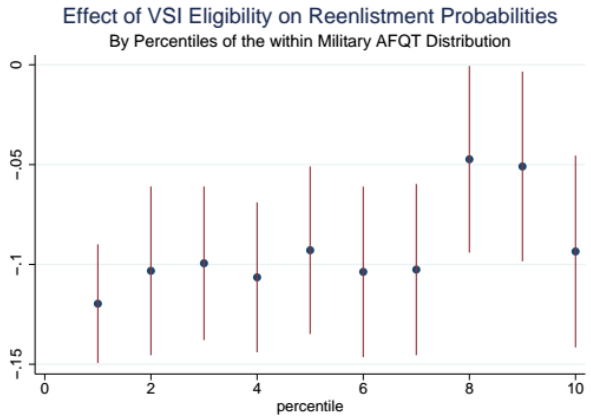
| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Ind. Var.: AFQT | | | Ind. Var.: Months E-4 or Below | | |
| AFQT | -0.154*** | -0.094*** | -0.065** | | | |
| | (0.021) | (0.023) | (0.026) | | | |
| Months E-4 or below | | | | 0.082*** | 0.028 | 0.042** |
| | | | | (0.016) | (0.017) | (0.019) |
| $R^2$ | 0.012 | 0.085 | 0.096 | 0.006 | 0.087 | 0.101 |
| MOS FE | N | Y | Y | N | Y | Y |
| Rank FE | N | Y | Y | N | Y | Y |
| Demographic Controls | N | N | Y | N | N | Y |
| Dep. mean | .91 | .91 | .91 | .92 | .92 | .92 |
| Ind. Mean | 53.81 | 53.78 | 53.94 | 88.23 | 88.35 | 87.57 |
| Observations | 5,620 | 5,573 | 5,323 | 4,970 | 4,928 | 4,753 |

Standard errors are reported in parentheses. Sample is restricted to the soldiers who were eligible for the second wave of the VSI/SSB programs and who chose to separate under one of the two programs. Demographic controls include gender, age, marital status, race, and special skill dummies. AFQT is on a scale from 0-1.

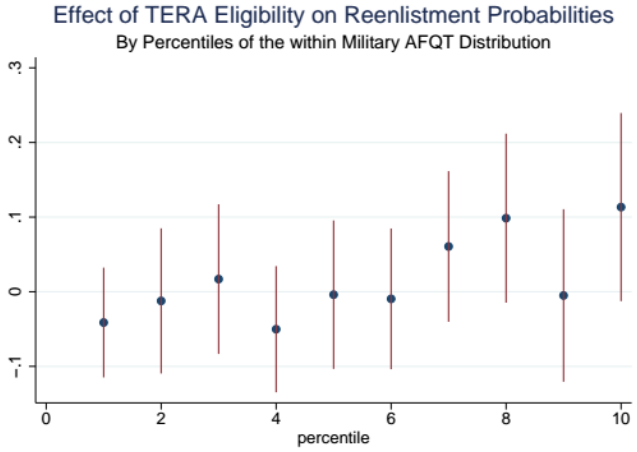
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure C4: The Effect of Early Retirement Programs on Soldier Retention by Soldier Quality: Nonlinear Specifications

(a) The probability of remaining in the military by VSI/SSB Eligibility




(b) The probability of remaining in the military by TERA Eligibility




Notes: Each blue dot shows the estimate of program eligibility interacted with the soldier's AFQT score percentile from a regression where the dependent variable is an indicator for the solider still being in the military at the end of the program period. The regression also includes occupation and rank fixed effects, a control for the year of service, dummies for the soldier's AFQT score percentile, and demographic controls (age, marital status, gender and race). Standard errors are clustered at the occupation*rank*year of service bin. The left panel includes the sample of soldiers who were serving on August 1, 1993, the start of the VSI/SSB period, and the right panel includes the set of soldiers who were serving on August 31, 1994, the start of the TERA program. Additioally, the left panel also restricts the sample to those soldiers with at least 6 years of experience. The right panel restricts the sample to include only soldiers in the affected ranks and occupations, who have tenures that put them within 1 year of being eligible.

Table C10: The Effect of SRBs on Soldier Retention, by AFQT
Robustness Specifications Including Credit Score, Montgomery GI Bill, and Thrift Saving Program Interactions

.8

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | Prime Credit Score | | | GI Bill Enrollment | | | Any TSP Contribution | | |
| SRB | 0.477*** | 0.481*** | 0.631*** | 0.282** | 0.292** | 0.562*** | 0.365*** | 0.360*** | 0.346*** |
| | (0.145) | (0.145) | (0.152) | (0.115) | (0.115) | (0.112) | (0.093) | (0.094) | (0.094) |
| SRB * AFQT | -0.847*** | -0.851*** | -0.756*** | -0.567*** | -0.573*** | -0.608*** | -0.708*** | -0.695*** | -0.699*** |
| | (0.188) | (0.187) | (0.181) | (0.126) | (0.126) | (0.125) | (0.132) | (0.132) | (0.135) |
| AFQT | -9.652*** | -8.903*** | -7.309*** | -17.463*** | -17.598*** | -24.432*** | -10.171*** | -10.999*** | -11.306*** |
| | (0.955) | (0.912) | (1.050) | (0.849) | (0.847) | (1.678) | (0.907) | (0.906) | (0.903) |
| Mechanism Var. | | -3.443*** | -1.401** | | -3.628*** | -7.483*** | | 4.870*** | 3.943*** |
| | | (0.290) | (0.624) | | (0.456) | (1.066) | | (0.181) | (0.369) |
| SRB * Mechanism Var. | | | -0.291*** | | | -0.267*** | | | 0.080** |
| | | | (0.039) | | | (0.057) | | | (0.040) |
| AFQT * Mechanism Var. | | | -2.610*** | | | 7.558*** | | | 1.231** |
| | | | (0.882) | | | (1.414) | | | (0.564) |
| $R^2$ | 0.207 | 0.209 | 0.209 | 0.222 | 0.222 | 0.223 | 0.232 | 0.233 | 0.233 |
| Year * Month FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| MOS * Rank * YOS FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year * Month * MOS FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Demographic Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Avg. Reenlistment Rate | 68.28 | 68.42 | 68.42 | 52.38 | 52.38 | 52.38 | 64.62 | 64.62 | 64.62 |
| Avg. SRB | 2.06 | 2.06 | 2.06 | 3.29 | 3.29 | 3.29 | 2.70 | 2.70 | 2.70 |
| Observations | 606,350 | 600,688 | 600,688 | 1,078,808 | 1,078,808 | 1,078,808 | 1,168,621 | 1,168,621 | 1,168,621 |

Standard errors are reported in parentheses. They are two-way clustered at the MOS*Rank*YOS and individual level. Sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. Samples for columns (1)-(3) are further restricted to soldiers with non-missing credit scores. Samples for columns (4)-(6) are restricted to soldiers with non-missing GI Bill participation data. Samples for columns (7)-(9) are restricted to soldiers with non-missing TSP contribution data. Prime credit score is a dummy variable for whether the soldier has a credit score of 680 or greater. GI Bill Enrollment is defined as a dummy variable for whether the soldier enrolls in the GI Bill at all. SRBs are in $1000s of 2015 dollars. Demographic controls include gender, age, marital status, race, and special skill dummies. AFQT is on a scale from 0-1.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

# D Selection and Average Ability Levels

In this section, we present empirical specifications and results demonstrating how the offer of either reenlistment bonuses or early retirement benefits affects the average quality of soldiers who are retained. The results in Section 4 showed that soldiers of higher ability are both less likely to reenlist in the military on average and are less responsive to both SRB offers and a pair of early early-retirement programs. Appendix Section A further demonstrates that the effect this has on the average quality of retained soldiers is ambiguous and depends on the magnitude of the selection on ability. In this section, we show that our individual-level effects are large enough to generate changes in average soldiers ability-levels. This second analysis also enables us to characterize the quality of the marginal soldiers, i.e. the soldiers who were induced to reenlist when offered higher compensation.

Starting with the Army's SRBs, we estimate the change in the *average* quality of the "stayers" and the "leavers" using the following specification:

$$\text{AFQT}_i = \alpha_0 + \alpha_1 \text{SRB}_{it} * \text{Stay}_{it} + \alpha_2 \text{SRB}_{it} * \text{Leave}_{it} + \alpha_3 \text{Stay}_{it} + \gamma_{MOS,rank,yos} + \mu_t + \delta \mathbf{X}_{it} + \epsilon_{it}, \qquad \text{(D1)}$$

The coefficients of interest are $\alpha_1$ and $\alpha_2$, which estimate the effect of higher reenlistment bonus offers on the average ability of stayers or leavers, respectively. A positive value on $\alpha_1$ would indicate that higher bonus offers tend to retain soldiers of higher average ability. As discussed in Section A, our basic conceptual framework offers ambiguous predictions regarding the effect of a change in relative military compensation on the average ability of either stayers or leavers. As in Equation 1, we include MOS×rank×years-of-service fixed effects.

Table D1 shows estimates from Equation D1, showing how the average ability of soldiers who chose to stay varies with the offered bonus. The identifying assumption underlying this analysis is that SRB offers are not systematically offered to cohorts of soldiers that are of higher quality. If this were the case, then we would observe that higher SRB offers are associated with higher quality reenlisted soldiers, but it would not reflect soldier selection.[38] The first column shows that this assumption is indeed satisfied – once we control for

[38]Note that on average, in the raw data, soldiers of higher ability are offered higher bonus offers. This reflects the fact that soldiers of higher ability tend to be in higher skill occupations with more outside options. However, once we control for the soldiers occupation,

the set of fixed effects that determine the SRB offer, there is no correlation between the average ability of the soldiers eligible for reenlistment and their SRB offer. Columns 2 and Column 3 then split the sample by the soldier's reenlistment decision. Column 2 shows that when the SRB offer is $10,000 dollars, the average ability of those soldiers who endogenously chose to stay in the military is $0.2$ percentage points lower, although the estimate is noisy. As with the results in Table 2 and Figure 3, this shows that lower ability soldiers are more responsive to SRB offers, and enough so that they bring down average soldier quality. Column 3 shows, conversely, that when the SRB is higher, the average ability of those who leave the military is higher, although the estimate is also noisy. Column 4 pools the two samples and jointly estimates how the quality of the two groups endogenously changes as the bonus offer changes. The only difference between this specification and the split-sample specification in columns 2 and 3 is that the fixed effects are restricted to be the same, which gives us more power. When we do this, the results are qualitatively similar but even stronger – when an SRB of $10,000 i is offered, the average AFQT score of the soldiers who reenlist is 0.48 percentage points lower and the average AFQT score of those who exit the military is 0.66 percentage points higher.

While at first glance these magnitudes look small, these are in fact quantitatively large effects. The average difference in quality between the stayers and the leavers is $1.2$ percentage points. A $10,000 SRB bonus increases the difference between the two groups by an additional $1.1$ percentage points, a 92 percent increase over the average difference between the two groups. Additionally, this reflects a difference in the *average* quality of the two groups. We can also examine the effect of SRBs on the quality of the *marginal* soldier – the soldier who would not have reenlisted but for the bonus offer. We can benchmark this with a simple back of the envelope calculation.[39] Column 1 of Table 2 shows that an SRB offer of $10,000 makes soldiers 1.5 percentage points more likely to reenlist. On average, 22,000 soldiers are eligible to reenlist each period, meaning that this SRB retained 330 additional soldiers. These marginally retained soldiers compose $2$ percent of the reenlisted soldiers. Thus, in order for them to bring down the average of the reenlisted soldiers by 0.48 percentage points, the average AFQT score of the marginal soldiers must have been around the 32nd percentile. This would put the marginal soldier around the enlistment cutoff for AFQT scores, the lowest scores at which a person is eligible to join the Army.

The last two columns of Table D1 repeat the analysis using our within-military measures of soldier quality.

tenure and rank, this positive correlation goes away.

[39] We also plan to characterize this more formally following Gruber, Levine and Staiger (1999).

We see results here that are largely consistent with the AFQT results – when the SRB if higher, the average quality of the leavers is higher, in that they spent on average 4 more days as Sergeant in their first term when the SRB offered is $10,000 higher. While the selection along this dimension goes in the same direction as the selection across AFQT scores, the magnitude of the difference is smaller. For this measure of soldier quality, there is only an increase in the difference between the stayers and the leavers of 1.5 percent. Appendix Tables C3 and C4 show that these patterns are largely robust to alternative specifications and sample restrictions, including when we instrument for *actual* reenlistment bonuses with SRB offers.[40]

Table D1: Selective Reenlistment Bonuses (SRBs) and Average Soldier Ability

| | *(1)* | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *Dependent Variable:* | AFQT Score Percentile | | | | Months below Sergent in first term | |
| | *Full Sample* | *Stayers Only* | *Leavers Only* | *Full Sample* | | |
| SRB | -0.015 | | | | 0.004 | |
| | (0.015) | | | | (0.020) | |
| SRB*Stay | | -0.021 | | -0.048*** | | 0.022 |
| | | (0.015) | | (0.015) | | (0.030) |
| SRB*Leave | | | 0.014 | 0.066*** | | -0.076*** |
| | | | (0.019) | (0.022) | | (0.027) |
| Stay | | | | -1.216*** | | 6.693*** |
| | | | | (0.118) | | (0.505) |
| R-squared | 0.302 | 0.313 | 0.293 | 0.304 | 0.326 | 0.342 |
| Observations | 1761615 | 1146584 | 614559 | 1761615 | 1708425 | 1708425 |
| Year * Month FE | x | x | x | x | x | x |
| MOSxRankxYOS FE | x | x | x | x | x | x |
| Demographic Controls | x | x | x | x | x | x |
| Mean Dep. Var | 58.26 | 57.5 | 59.67 | 58.26 | 54.4 | 54.4 |
| Mean SRB | 2.89 | 2.98 | 2.73 | 2.89 | 3.02 | 3.02 |

Note: Standard errors are reported in parentheses. They are twoway clustered at the MOS*Rank*YOS and individual level. The full sample is restricted to the soldiers who are eligible to reenlist in spells ending between 1997-2015. Column 2 restricts to the spells in which the soldier decides to renlist in the Army Column 3 restricts to the enlistment spells where the soldier decides to leave the Army. SRBs are in $1000 of 2015 dollars. Demographic controls include gender, age, marital status, race, and special skill dummies. The dependent variable is defined as AFQT score for columns (1)-(4) and months below Sergeant for columns (5)-(6).AFQT is on a scale from 0-100.

As before, we also examine the effect of these programs on average quality of retained soldiers by running

[40]Because the actual SRB offer is only observed for the set of people who reenlist, we restrict the sample to the stayers only. The actual SRB and the offered SRB can vary for several reasons—for example, the soldier may decide to reenlist for a term that is longer or shorter than 4 years, she may wait to reenlist until later in her enlistment window when the initial SRB offer is no longer available, or she may choose to switch occupations, thereby becoming eligible for an alternative SRB offer. Even so, the SRB offer available at the beginning of a soldier's reenlistment window is highly predictive of the actual SRB offer received. The IV estimates are noisier but similar in magnitude to the OLS regressions.

the regression described in Equation D1.

$$\text{AFQT}_i = \alpha_0 + \alpha_1 \text{ELIG}_i * stay_{i,t_T} + \alpha_2 * \text{ELIG}_i * leave_{i,t_T} + \alpha_3 stay_{i,t_T} + \gamma_{MOS,rank} + \delta \mathbf{X}_i + \epsilon_i, \qquad \text{(D2)}$$

The coefficients of interest from Equation D2 are $\alpha_1$ and $\alpha_2$, which estimate the effect of drawdown program eligibility on the average ability among either stayers or leavers, respectively. Stayers are those who remain in the military at the end of the program eligibility window ($t_T$), and leavers are those who separate from the military at any point during the program eligibility window.

Table D2 presents estimates from Equation D2, showing how the average ability of those who chose to stay in the Army at the end of the program and those who chose to leave the Army varies with eligibility for the program. The first column shows that even after controlling for soldier rank, occupation, tenure and demographics, the average AFQT score of VSI/SSB-eligible soldiers is lower than that of ineligible soldiers. This is not a problem for identification, but it means that the coefficients in Column 2, which show the relative ability of the stayers and the leavers by the end of the VSI sample period, must be interpreted in relation to the coefficient on VSI/SSB eligibility in Column 1, rather than relative to 0 as in the earlier analysis.

Column 2 shows that by the end of the VSI period, the average AFQT score of the eligible stayers is about 1.2 percentage points higher and the average AFQT score of the eligible leavers is 1.6 percentage points lower than the average for the eligible population, shown in Column 1. Columns 3 and 4 show similar results on a more restricted sample of soldiers (namely, those with enough tenure to be among the general group of soldiers targeted by the early retirement program). Finally, Columns 5 through 8 show that the patterns are similar when considering the soldier's speed of promotion – by the end of the VSI period, the average ability of the soldiers still in the Army increased with program eligibility and the average ability of those outside the Army decreased with eligibility. Stayers spent 14.4 fewer months below the rank of sergeant than leavers – a large difference, equivalent to 18.7 percent of the average in the population. Appendix Table D3 shows comparable results for the TERA program, which are qualitatively similar but statistically weaker.

Table D2: Average Soldier Ability and VSI/SSB Eligibility

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| *Dependent Variable:* | AFQT Score Percentile | | | | Months below Sergent in first term | | | |
| | All Soldiers | | 6+ Years of Service | | All Soldiers | | 6+ Years of Service | |
| VSI/SSB Eligibility | -1.705*** | | -1.760*** | | 4.390*** | | -3.903*** | |
| | (0.343) | | (0.365) | | (0.816) | | (0.528) | |
| VSI/SSB Eligibility*Stay | | -0.529 | | -0.616 | | -9.812*** | | -10.653*** |
| | | (0.444) | | (0.438) | | (0.833) | | (0.730) |
| VSI/SSB Eligibility*Leave | | -3.346*** | | -3.134*** | | 23.914*** | | 3.768*** |
| | | (0.445) | | (0.462) | | (0.927) | | (0.628) |
| Stay | | -2.433*** | | -0.901*** | | 20.752*** | | 0.854** |
| | | (0.248) | | (0.224) | | (0.584) | | (0.361) |
| R-squared | 0.281 | 0.283 | 0.320 | 0.321 | 0.370 | 0.439 | 0.641 | 0.650 |
| Observations | 189243 | 189243 | 60678 | 60678 | 161364 | 161364 | 32356 | 32356 |
| Mean Dep. Var | 58.57 | 58.57 | 54.74 | 54.74 | 59.24 | 59.24 | 81.06 | 81.06 |
| Fraction Eligible | .04 | .04 | .12 | .12 | .03 | .03 | .17 | .17 |

Notes: Sample in Column 1, 2, 5 and 6 is restricted to all soldiers serving on August 31, 1994 (the start of the sample period). Sample in Column 3, 4, 7 and 8 is further restricted to those soldiers with between 6 and 20 years of service as of August 31, 1994. All regressions include occupation and rank fixed effects, a control for the years of service as of August 31, 1994, as well as controls for gender, age, marital status, and race. Stay is defined as being in the Army at the end of the VSI/SSB period. The dependent variable is defined as AFQT score for columns (1)-(4) and months below Sergeant for columns (5)-(8). AFQT is on a scale from 0-100.

Table D3: Average Soldier Quality and TERA Eligibility

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| *Dependent Variable:* | AFQT Score Percentile | | | | | | Months below Sergent in first term | |
| | All Soldiers | | 15+ Years of Service | | Around Cutoff | | All Soldiers | |
| TERA Eligibility | 1.450*** | | -0.211 | | 0.529 | | 31.700*** | |
| | (0.528) | | (0.559) | | (1.127) | | (1.945) | |
| TERA Eligibility*Stay | | 2.518*** | | 1.436 | | 0.153 | | 14.569*** |
| | | (0.885) | | (0.879) | | (1.441) | | (3.802) |
| TERA Eligibility*Leave | | 0.834 | | -0.922 | | 0.310 | | 44.929*** |
| | | (0.611) | | (0.622) | | (1.110) | | (1.645) |
| Stay | | -2.296*** | | -0.681** | | 0.440 | | 18.480*** |
| | | (0.271) | | (0.334) | | (0.816) | | (0.639) |
| R-squared | 0.277 | 0.278 | 0.347 | 0.347 | 0.336 | 0.361 | 0.334 | 0.367 |
| Observations | 254274 | 254274 | 24589 | 24589 | 4387 | 4377 | 219156 | 219156 |
| Mean Dep. Var | 58.62 | 58.62 | 53.75 | 53.75 | 52.15 | 52.13 | 59.15 | 59.15 |
| Fraction Eligible | .01 | .01 | .07 | .07 | .33 | .33 | <.01 | <.01 |

Notes: Sample in Column 1, 2, 7 and 8 is restricted to all soldiers serving on August 31, 1994 (the start of the sample period). Sample in Column 3 and 4 is further restricted to those soldiers with between 15 an 20 years of service as of August 31, 1994. Columns 5 and 6 restrict the sample to those soldiers in an eligible occupation/rank but within 2 years (above or below) the mininmum years of service for program eligibility. All regressions include occupation and rank fixed effects, a control for the years of service as of August 31, 1994, as well as controls for gender, age, marital status, and race. Stay is defined as being in the Army at the end of the VSI/SSB period. The dependent variable is defined as AFQT score for columns (1)-(6) and months below Sergeant for columns (7) and (8). AFQT is on a scale from 0-100.