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Cash Incentives and Military Enlistment, Attrition, and Reenlistment

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Summary

Until recently, the wars in Afghanistan and Iraq placed great stress on military recruiting and retention. Recruit quality fell between FY 2003 and FY 2008 while the services, particularly the Army, struggled to meet its overall recruiting goal. Recruit quality refers to recruits who are high school graduates and who score in the top half of the Armed Forces Qualification Test (AFQT). Between FY 2004 and FY 2008, the percentage of active duty, non-prior service, high school graduate recruits fell from 95 percent to 92 percent, for all of DoD, and the percentage with AFQT scores above 50 fell from 73 percent to 68 percent (Department of Defense, 2009). In FY 2005, the Army failed to meet its overall recruiting goal. As for retention, first- and second-term reenlistment rates remained fairly stable over the period FY 1996 to FY 2007 (Hosek and Martorell, 2009). But, as the burden of deployment on individual soldiers increased under long and multiple deployments, the effect of deployments on reenlistment, which had been positive, became negative in FY 2006 and FY 2007. Also, the Army imposed stop-loss on a significant fraction of its enlisted force beginning in FY 2003.[1] The recent recession has since helped recruiting and retention; for example, in FY 2009, the percentage of recruits with a high school diploma increased to 96 percent, and the percentage with AFQT scores above 50 increased to 72 percent.

To address the recruiting and retention challenges, budgets for enlistment and reenlistment bonuses increased dramatically beginning in FY 2004. In FY 2008 dollars, the selective reenlistment bonus (SRB) budget for active duty personnel increased across DoD from $625 million in FY 2003 to $1.4 billion in FY 2008. The bulk of the increase was due to increases in the Army and Marine Corps budgets. In FY 2003, these budgets were 21 percent of the DoD SRB budget. By FY 2008, these budgets were 66 percent of the DoD SRB budget. The large ramp-up in enlistment bonuses began in FY 2006. In FY 2005, the DoD enlistment bonus (EB) budget increased from $296 million (in FY 2008 dollars) to $475 million in FY 2006, ultimately reaching $611 million in FY 2008. These increases helped the services reach their recruiting and retention goals during operations in Iraq and Afghanistan and at a time when the Army and Marine Corps were increasing their end strength.

Rising bonuses in recent years have raised questions about the size, scope, and efficacy of these expenditures. Congress directed DoD to provide information on the number and average amounts of bonuses, by occupational area, and on metrics of performance. The Office of Accession Policy and the Office of Officer and Enlisted Personnel Management, within the Office of the Under Secretary of Defense for Personnel and Readiness, requested that RAND provide input to enable these offices to respond to the Congressional mandate. This report summarizes the findings of the RAND study.

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[1] Stop-loss policies were designed to prevent soldiers whose contracts were expiring from separating from the Army.

Approach

To provide input on the size and scope of bonuses, we used data provided by the Defense Manpower Data Center (DMDC) and enlistment data provided by the Navy and the Army to compute the number of enlistment and selective reenlistment bonuses paid and their average amount, by occupation. To assess the effectiveness of bonuses, we drew from the 7th, 9th, and 10th Quadrennial Reviews of Military Compensation, together with the report of the Defense Advisory Committee on Military Compensation, to identify the criteria for assessing military compensation and, specifically, bonuses. These criteria are that bonuses (1) support DoD's force management goals, particularly recruiting and retention goals, (2) are flexibly used and can adjust quickly as circumstances change and address specific recruiting or retention problem areas, and (3) are efficient in achieving force management goals at the least cost.

We then estimated enlistment and reenlistment models to assess the extent to which bonuses contributed to recruiting and retention success (criterion 1). In the case of enlistment, we use data provided by the Army and Navy from FY 1998 to FY 2008 on enlistments and recruiting resources, including enlistment bonuses and recruiters. We also used Current Population Survey data on the civilian unemployment rate, civilian earnings, and civilian demographic characteristics. We aggregated the data by state and quarter to estimate models of the relationship between high-quality enlistments and enlistment bonuses, recruiters, military pay, variables representing civilian opportunities (such as the civilian unemployment rate), variables representing the Iraq war (e.g., casualties), and demographic characteristics of each state over time that may reflect individuals' taste for military service. Models are estimated for the Army and the Navy.

We estimate the market-expansion effects of bonuses and the effects of enlistment bonuses on first-term attrition in the Army using Army data from FY 1998 to FY 2008. This analysis provides insight into whether enlistment bonuses increase or decrease the number of person-years provided by an Army recruit during the first term.

We took advantage of two research efforts that deal with reenlistment—studies that began before the start of this project. One effort focuses on the Army and the other focuses on all four services. Each had taken steps toward developing its own database, and the Army analysis in each effort provided an opportunity to compare results to see if they were consistent and, in that sense, robust to the different methods used in the two efforts. Both efforts estimate two aspects of the effect of bonuses on reenlistment: the effect on the probability of reenlistment and the effect on the length of reenlistment (given reenlistment).

The Army-only analysis provides a detailed history of the Army reenlistment bonus program and estimates models for Zone A reenlistment (at two to six years of service) and Zone B reenlistment (seven to ten years of service).[2] The data were provided by the Defense Manpower Data Center and cover non-prior service personnel who entered the Army between FY 1988 and FY 2002 and faced a reenlistment decision between FY 2002 and FY 2006 in one of 24 Army military occupational specialties (MOSs). These 24 MOSs account for nearly half of all personnel who entered the Army between FY 1988 and FY 2002. The models control for other key variables such as length of deployment and stop-loss. The models estimated are a probit model of reenlistment defined over the period of 12 months before the expiration of term of service (ETS) up to the ETS, an annual model of reenlistment, and a Tobit model of the length of reenlistment.

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[2] Zones A and B refer to the first and second reenlistment decision points.

The second effort is an analysis of first- and second-term reenlistment in each military service across all of their occupations. This analysis builds on data provided by DMDC and used for an analysis of the effect of deployment on reenlistment during the global war on terrorism presented in Hosek and Martorell (2009). We extend that study by refining the SRB measure used. The models estimated are a linear probability model of reenlistment and a Tobit model of the length of reenlistment. Both the Army-only effort and the effort that builds on Hosek and Martorell use two alternative definitions of the bonus variable. We describe this in detail in the report. A key point is that we expect the bonus effect estimates obtained for the Army from the analysis that builds on Hosek and Martorell to bracket those obtained in the Army-only analysis—and they do.

To assess the extent to which bonuses are used flexibly (criterion 2), we compare average enlistment and reenlistment bonus amounts by occupation, length of enlistment (or reenlistment), and over time. An additional way to assess flexibility is to estimate the skill-channeling effects of enlistment bonuses, or the extent to which they induce recruits to select hard-to-fill occupations. We do not estimate the skill-channeling effects of enlistment bonuses in this study. However, comparisons of bonus amounts provide information on the extent to which the services varied the incentives for enlistment and reenlistment.

To assess efficiency (criterion 3), we compare the cost of recruiting or retaining additional personnel using bonuses to the cost of using pay and other resources. It is important to note that we use a relative metric, not an absolute metric, of cost-effectiveness. Thus, our analysis does not answer the question of whether bonuses were set at the right levels. Instead, we answer the question of whether the services increased enlistments and reenlistments at a lower cost by using bonuses rather than by using other resources such as pay. More specifically, we estimate the cost per additional high-quality Army and Navy recruit and the cost per additional year of reenlistment for each service using bonuses.

Caveats

This study provides estimates of the cost-effectiveness of bonuses relative to other resources that could be used to increase enlistments and reenlistments, notably pay. The study does not estimate the absolute cost of bonuses, nor does it determine whether bonus levels were optimal and could have achieved the same effects at even lower cost. Nonetheless, the estimates presented here provide policymakers with information on whether a given expenditure will produce a larger effect if spent on bonuses or other resources. As discussed under the topic of future research, determining the optimal mix and levels of bonuses would require additional analysis, beyond the scope of the current study, of whether different levels and mixes of bonuses across occupations and terms of enlistment or reenlistment would results in more enlistments and reenlistments for the same cost than what was actually observed. Experimental data would be particularly well suited for performing such an analysis because the mix of bonuses could be varied randomly.

Rather than using experimental data, our analysis uses administrative data on enlistment and reenlistment bonuses paid to military applicants and reenlistees. Our approach may produce estimates of the effects of bonuses on enlistments and reenlistments that are potentially subject to both upward and downward biases. As is well known in statistics, a biased estimator is one where the expected value of the estimator does not equal the true value of the parameter being estimated. In the context of this study, our estimated effect of enlistment or reenlistment bonuses may possibly deviate from the true effect of these bonus programs. If the estimated effect overstates the true effect of bonuses, then the bias is upward and, conversely, if the estimated effect understates the true effect, the bias is downward. On the other hand, as discussed below, using administrative data also has advantages, and the alternative approach—conducting a randomized experiment—also has advantages and disadvantages.

There are several possible sources of bias in our analysis of administrative data. The first results from the possibility of reverse causality, a term commonly used in the econometrics literature. Reverse causality in the context of bonus effectiveness refers to the phonemenon whereby not only do bonuses affect enlistments and reenlistments but enlistments and reenlistments may, in reverse, also affect bonuses. Bonuses influence the willingness to enlist or reenlist, and our models seek to estimate the size of this positive effect. But because enlistments and reenlistments may affect bonuses, and in the opposite direction, reverse causality may impart a negative, downward bias. Why might enlistments and reenlistments have a negative effect on bonuses? Enlistment and reenlistment outcomes may influence the amount of bonuses set by policymakers. For example, the Army increased SRB multipliers dramatically in FY 2005–2006 over concern that retention would suffer during operations in Iraq and Afghanistan. Thus, policymakers increase bonuses when enlistments or reenlistments are down, imparting a downward bias on estimates of the incentive effect of bonuses on the willingness to enlist or reenlist.

We address the problem of reverse causality by using data across many occupations, and we estimate the models with "fixed effects" for occupation and time in the reenlistment models and for state and time in the enlistment models, to capture state, occupation, or time-specific differences in enlistment or reenlistment. Nonetheless, we recognize that the bias caused by reverse causality may still be present to the extent that it explains variations in enlistment within states over time, or variations in reenlistment within occupations over time.

Another source of potential bias is that additional factors that are not observed in our data and that are correlated with bonuses may increase enlistments in some states and in some occupations. These factors include recruiter or career counselor effort, the use of bonuses in occupations that are expanding as a service is growing (and the nonuse of bonuses in occupations that are contracting when a service is shrinking), local attitudes toward enlistment in the military, or incentives to choose specific occupations or locations. Omitting these other factors can impart an upward bias to the estimated bonus effects, offsetting to some extent the potential downward bias associated with reverse causality.

Yet another potential source of bias is related to whether the construction of the variable representing the SRB multiplier depends on deployment status and on the effects on reenlistments of stop-loss and the time of reenlistment decisions. Personnel facing a reenlistment decision may time that decision to occur while they are deployed to take advantage of higher bonuses given to those who reenlist while deployed. Further, because of stop-loss policies, individuals facing a reenlistment decision while deployed must stay in service and are not allowed to leave; however, they may reenlist. Consequently, higher bonuses may be associated with a greater chance of reenlistment, because bonuses are higher for deployed personnel and deployed personnel may be constrained only to reenlist. Because of the mechanistic relationship between reenlistment and deployment (as a result of stop-loss policies), the estimated effect of bonuses is biased upward to the extent that bonuses vary with deployment.

We address this source of bias by estimating models where SRB multipliers are defined to vary with deployment status and models where they are invariant to deployment status. Although the latter models avoid this source of bias because they do not depend on bonuses, this approach introduces measurement error into the definition of the bonus variable. Measurement error imparts a downward bias on the estimated bonus effect. On the other hand, the former approach introduces an upward bias. We therefore present estimates from both models, to show the range of estimated effects.

Because of these potential biases, the estimates presented in this report must be interpreted as associations between bonuses and enlistment or reenlistment. In other words, although we use the term "effect," the relationships we estimate are not causal but are correlations. On the other hand, we take steps to mitigate the potential biases, such as presenting a range of estimates, and use econometric methods that attempt to reduce the effects of these biases. Furthermore, using administrative data to estimate the effects of bonuses has several advantages. Administrative data are easier to collect and can be analyzed in a more timely manner. Also, they permit analysis of the effects of other variables of interest, such as deployment in the case of reenlistment and other recruiting resources in the case of enlistment. Finally, as detailed below, our estimates are quite robust to the alternative definitions we use, and they are consistent with estimates in previous literature on enlistment and reenlistment.

An alternative approach is to conduct a randomized national experiment to estimate the effects of bonuses. One advantage of this alternative approach is its ability to address the issue of reverse causality. On the other hand, this approach has drawbacks, as discussed by Moffitt (2004) and Heckman and Smith (1995), experimental results can also be subject to biases, and there are limitations to what can be learned from experiments. Ideally, both experimental and nonexperimental approaches should be used to study the effects of bonuses. This study contributes to the literature and policy debate by providing estimates based on nonexperimental approaches.

Results

Effectiveness

We find that enlistment bonuses were an important contributor to the Army's success in meeting its recruiting and retention objectives in recent years. Using our estimated Army enlistment model for simulation, we estimate that in the absence of the increase in enlistment bonuses that occurred between FY 2004 and FY 2008, the Army would have enlisted 26,700, or 20 percent, fewer high-quality enlistments, implying about 1,670 fewer enlistments per quarter over this period.

In the case of reenlistment, we use our estimated models to simulate the effects on the probability of reenlistment of eliminating the SRB program in FY 2007, a year when approximately 80 percent of Army reenlistees received bonuses. For the Army, we estimate that eliminating this program in FY 2007 would have reduced the probability of reenlistment in Zone A (at the first reenlistment point) from 39 percent to 35.3 percent, a sizable drop. Alternative models that we estimate produce even larger estimates of the effects of the SRB program for the Army. Nonetheless, the results are consistent in suggesting that bonuses were a critical tool for the Army in meeting its retention objectives in FY 2007.

We also simulate the effects for the other services as well. Eliminating the SRB program in the Marine Corps in FY 2007 would have reduced the probability of reenlistment in Zone A from 37 percent to 27 percent, also a sizable drop. The simulated effects for the Navy and Air Force are smaller, however, because the average reenlistment bonus multiplier was smaller than for the Marine Corps and Army, and their first-term reenlistment rates were higher. The Marine Corps and Army were the branches with the heaviest combat duties in Operaton Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). The reenlistment results for these services suggest that bonuses helped compensate for the heavy deployments associated with these operations.

We also find that the estimated effect of the SRB multiplier on Army reenlistment varies depending on how the SRB multiplier variable is constructed with respect to deployment. Both the Army-only model and the model building on Hosek and Martorell use two variants of the bonus variable, one that conditions the SRB multiplier on deployment status and one that does not. The models differ in how deployment status is defined, reflecting differences in the modeling approaches. The Army-only model defines deployment status by whether a member is deployed in the fiscal year he or she is facing the reenlistment decision. Thus, the bonus variable depends on whether deployment occurred during the fiscal year but the service member need not be deployed at the time of the reenlistment decision. By comparison, the four-service analysis defines deployment as of the same month as the reenlistment decision. Both analyses for the Army, regardless of how deployment status is defined, find a lower bonus effect when the SRB multiple variable is not conditioned on deployment and a higher estimate when it is conditioned on deployment. The difference in these effects is probably a result of the Army's use of stop-loss, as mentioned. However, because of the difference in how deployment status is defined, the results from the analysis based on Hosek and Martorell bracket the SRB reenlistment estimates found in the 24-MOS analysis that uses a wider window for deployment.

Estimates of the effect of the SRB multiplier on reenlistment for the other services show little difference, depending on whether the SRB multiplier is conditioned on deployment. The lack of difference probably arises from little if any use of stop-loss in these services. Thus, only the Army estimate is sensitive to how the SRB multiplier is defined.

Our study also estimated the effects of SRB multipliers on length of reenlistment (LOR). Both the Army-only analysis and the four-service analysis building on Hosek and Martorell allowed the effect of the multiplier to vary depending on its level and found positive effects of Army SRB multipliers on LOR at lower SRB multiplier levels. In the Army-only analysis, we found that the positive effects of the SRB multiplier diminish at higher multiplier levels at both the first term (Zone A) and the second term (Zone B). The four-service analysis found a positive effect of SRB multipliers on LOR at the first term for each service but a diminishing effect at higher multiplier levels at the second term for all four services. The estimated effects of the multiplier on LOR are smallest for the Air Force, especially at the end of the second term. The estimated effects for the Marine Corps are also less than they are for the Army, although larger than for the Air Force. Despite these service differences, the general result is that reenlistees are estimated to choose shorter terms at higher multiplier levels than at middle levels at the second term.

We suggest two hypotheses for the cause of the decreasing effect on LOR of higher-level SRB multipliers. First, the services place caps on bonus amounts so that at some point, choosing a longer term does not result in a higher bonus. Consequently, members have no incentive to choose longer terms and may choose shorter terms that result in the same bonus amount.

As bonuses increase, the caps are more likely to be binding. We investigated this hypothesis by estimating the SRBM effect on LOR using Army data before FY 2005 when bonus caps were higher. We find that the diminishing effects of the SRB multiplier on LOR occur at even higher multipliers when we use pre-FY 2005 data, suggesting that bonus caps did play a role for the Army.

Second, bonuses may have a diminishing effect on LOR as the multiplier increases because of an "income effect," whereby reenlistees faced with a higher multiplier choose shorter term lengths that give them the flexibility to leave earlier to take advantage of civilian opportunities. A third hypothesis may also be important. Reenlistees may have limited flexibility to choose term length, especially in some occupational areas. For example, a service might expect or constrain the service member to choose a four- or six-year reenlistment, and increases in the bonus multiplier might have little effect on the length chosen. This may be the case for the Air Force especially, which experienced the smallest bonus effect on length of reenlistment. Consequently, reenlistees may not be at liberty to increase term length when the multiplier increases.

The first two explanations suggest the possibility of improving the effectiveness of SRB multipliers. Bonus caps could be more actively managed so that increases in multipliers do not provide incentives to choose shorter term lengths. Put differently, if bonus caps are not increased when multipliers are increased, this may create a perverse incentive to choose a shorter LOR. In addition, the services may need to give members more flexibility to increase term length as the multiplier increases. However, we have not verified that service policies have limited the flexibility in choosing the length of reenlistment. The third explanation, however, is a supply side response: Service members may prefer a shorter LOR when the SRB multiplier is increased because they can still receive the same size bonus but with a shorter commitment to the service, i.e., they have more opportunity to leave sooner if they chose to do so. To summarize, an efficient bonus program should target bonuses to critical skills where the retention need is greatest and should not impede the full effect using bonus caps or limited flexibility in choosing the length of reenlistment. These are general points and there may be cases where exceptions should apply, yet the argument for exception should be explicit and well understood.

Flexibility

Comparisons of the percentage of individuals receiving bonuses and the average bonus amounts over time, across occupation, and across service length indicate that at certain times, the majority of Army recruits received an enlistment bonus and the majority of Army reenlistees received an SRB. The share of Army enlistments receiving bonuses rose from about 40 percent in September 2004 to about 70 percent in September 2008 and 80 percent of reenlistees in FY 2007 received an SRB. Thus, the Army increasingly used enlistment bonuses to expand the market and used selective reenlistment bonuses as an across-the-board pay differential.

However, we note that most elements of compensation are common to the four military services. But the Army has been the most affected by the operations in Iraq and Afghanistan, resulting in negative shocks to recruiting and retention. The enlistment and reenlistment bonus programs provide the Army with an adjustment mechanism that obviated the need for compensation adjustments that were not service-specific. That a high percentage of enlistees and reenlistees received a bonus need not be viewed as an unnecessary use of bonuses if, in fact, their high use is in response to an overall, service-level shortfall of enlistments and reenlistments.

Furthermore, our comparisons indicate that even when the majority of Army enlistees and reenlistees received a bonus, there was substantial variation in bonus amounts and prevalence across occupations and lengths of enlistment (or reenlistment). This variation provides evidence that bonuses were used flexibly by the Army both to channel recruits into different occupations and service lengths and to expand the market and meet retention goals.

Specifically, in the case of enlistment, Army occupational specialties, such as infantry, field artillery, and air defense, consistently received substantially larger enlistment bonuses than other occupational areas. For example, in FY 2008, fire support specialists (13F) received an average bonus of $18,700 whereas armament repairers received a bonus of $2,800 on average. We also find variation across term of enlistment. Specifically, the premium for a six-year enlistment (relative to a five-year enlistment) was about $4,200, and for a five-year enlistment (relative to a four-year enlistment) it was about $2,300. In the case of reenlistment, the Army used complex rules to fine-tune the targeting of the dollar amount of SRBs at specific groups. The amounts of the SRBs depended on the occupation, rank, length of reenlistment of reenlistees, as well as on their skill (within an occupation), location, unit assignment, and deployment status.

Finally, the Army adjusted bonuses over time as conditions changed. As evidenced by the number of SRB program changes the Army announced each year in the FY 2001–2008 period, it seemed to manage its SRB program proactively. Furthermore, as shown by SRB reductions in the FY 2002–2003 time frame, and the substantial reductions it announced in March 2008, the Army is not reticent to reduce SRBs when retention is above target.

As with the Army, Marine Corps bonuses increased in terms of both the percentage of reenlistees receiving a bonus, from over 20 percent to about 80 percent for those at the first reenlistment point between FY 1996 and FY 2007, and the average SRB multiplier at the first term for those receiving a bonus, from over 2 to nearly 4. In the Navy, the percentage of reenlistees at the first term receiving an SRB varied over this period, increasing from around 60 percent in FY 1996 to 80 percent in FY 2000, but then declining to around 60 percent in FY 2007. On the other hand, average SRB multipliers among those receiving an SRB declined in the Navy between FY 2000 and FY 2007, from about 3.25 to 2. The Air Force experienced even larger swings. The percentage receiving an SRB at the first term increased from 20 percent to 80 percent between FY 1996 and FY 2002, falling back to less than 20 percent by FY 2007. Unlike the Navy, the average SRB multiplier in the Air Force for those receiving one increased from about 1.5 in FY 1996 to about 3.5 in FY 2007. Thus, in the Air Force, relatively few received a bonus in FY 2007 but those who received one had a substantially higher bonus than those in early years.

The large variations in bonuses over time in each service indicate that this compensation tool, unlike basic pay and the various allowances paid by the services, can be turned on and off relatively easily and quickly. Bonuses are used flexibly to respond to recruiting and retention changes. Furthermore, variations across occupations, and even across locations, skill subsets, units, and deployment status in the case of reenlistment bonuses, suggest that the services, notably the Army, used bonuses to target resources, even when the most personnel were receiving some sort of bonus.

Cost-Effectiveness (Efficiency)

We assess whether the bonus programs are too large or too small by comparing the cost of expanding these programs (and also the person-years of experienced personnel) using EBs and

SRBs with the cost of doing so using other compensation or personnel policy tools, notably pay. As discussed under the “Caveats” subsection, we do not assess whether the absolute levels of bonuses were optimal.

We estimate that enlistment bonuses are more cost-effective than pay but less cost-effective than recruiters as a way to expand the market for the Army. The marginal cost of enlistment bonuses (i.e., the cost per additional high-quality recruit) is estimated to be $44,900, compared to $57,600 for pay. We estimate a lower marginal cost for Army recruiters, $33,200. It is likely that we overstate the total marginal cost of bonuses. First, we account only for the market expansion effect and not the skill-channeling effects of bonuses. Second, our study finds that enlistment bonuses have a small but statistically significant effect on reducing attrition, thereby increasing the number of person-years provided by a given recruit, and this improvement in person-years is not included in our marginal cost estimate. Third, bonuses may induce enlistees to choose longer enlistment terms, producing more person-years. Again, we do not account for this effect in our estimate of cost-effectiveness. It is also important to note that although our cost-effectiveness estimate for recruiters is lower than it is for bonuses, the estimate does not account for any benefits associated with services’ flexibility to target recruiters to specific regions of the country, or the costs associated with the time lag involved in expanding the recruiter force because of training time. These considerations regarding our cost-effectiveness measures indicate that although cost-effectiveness is one criterion for comparing recruiting resources, other considerations may also be important.

In the case of reenlistment, we provide a range of estimates of the marginal cost of SRBs using alternative assumptions and using different SRB estimates, depending on whether the SRB multiplier is conditional on deployment and whether we use estimates from the Army-only analysis or the four-service analysis. The estimates account for both the effects of SRB multipliers on reenlistment and the length of reenlistment. Our estimates for the Army indicate that the marginal cost of a change in the SRB multiplier at the first reenlistment point is in the range of $8,300 to $24,900 per person-year. For the second term, the estimate is in the range of $10,400 to $23,900 per person-year.

Our estimated marginal cost of first-term reenlistment bonuses for the Marine Corps is about the same as for the Army, a little higher for the Navy (in the range of $24,700 to $28,000), and substantially higher for the Air Force (in the range of $67,400 to $70,200). The marginal cost of reenlistment bonuses are usually higher for all services at the second term than at the first, varying from about $38,000 for the Navy to as high as $75,000 for the Marine Corps and $112,000 for the Air Force.

We note that our cost estimates of reenlistment bonuses incorporate the estimated effects of bonuses on length of reenlistment term. To the extent that the effects are positive but decreasing at higher multiplier levels and reflect the effects of bonus ceilings or the limited flexibility to choose term lengths, the cost-effectiveness of bonuses could be increased. The services could manage bonus ceilings more actively and, if necessary, increase the flexibility available to members to choose term lengths. Both of these steps would increase the cost-effectiveness of bonuses at the end of the second term.

For several reasons, bonuses are always likely to be more cost-effective than across-the-board increases in military pay: They can be targeted at occupations and zones, can be applied to a given interval of service (the reenlistment period), and can vary in amount. An across-the-board pay increase applies to all occupations, not just those with an impending shortage; creates a higher pay floor, which might mean higher pay costs in all future years; and gives the same pay increase to everyone. Military pay must be kept competitive overall, and pay increases provide the foundation for competitiveness. Bonuses allow for selective increases to differentiate pay by occupation and experience level and can be easily increased or decreased depending on current conditions. The estimated bonus costs at the end of the first term are likely to be substantially less than the marginal cost of raising military pay to achieve reenlistment goals, especially for the Army, Navy, and Marine Corps. Similarly, these costs are likely to be substantially less at the end of the second term for the Army and Navy relative to the marginal cost of raising pay. Since pay must be raised for everyone, not just reenlistees in critical occupations, the rents[3] associated with changes in pay are large and substantially more than the rents associated with reenlistment bonuses. That said, whether bonuses were optimally managed or set too high for too long is an open question.

We note that the marginal cost estimates for the Air Force are quite high, in contrast to the other services, as they are for the Marine Corps at the end of the second term. The high marginal costs come from the small bonus effects discussed above. A full understanding of why these bonus effects are small will require further research. Taken literally, they suggest that bonuses are a costly way to obtain additional person-years for these services at these reenlistment points. However, we urge caution in drawing this conclusion. First, our bonus effects may be biased downward and may be affected by bonus caps and limited flexibility in choosing LOR, as discussed above, and estimated effects that are too small lead to marginal cost estimates that are too high. Second, cost-effectiveness must be measured relative to an alternative approach to achieving reenlistments and, as noted in the previous paragraph, bonuses are more cost-effective than an across-the-board pay raise.

Other Results

Although these topics are not the focus of our analysis, we also report estimates of the effects of enlistment bonuses on Navy high-quality enlistments, the effects of EBs on Army first-term attrition, the effects of the Iraq War on Army high-quality enlistments, and the effects of deployment and stop-loss on the probability of Army reenlistment.

We find that enlistment bonuses have a smaller effect on Navy than on Army high-quality enlistments. Unlike the Army, the Navy did not expand its enlistment bonus program in recent years, and the percentage of Navy recruits receiving a bonus declined. On the other hand, average Navy enlistment bonuses differed substantially across occupational areas, suggesting that EB played more of a skill-channeling than a market expansion role for the Navy in recent years.

As noted above, we estimate that enlistment bonuses have a small but positive effect on the probability that an Army recruit completes his or her first enlistment term. A priori, we are not able to predict whether bonuses should increase or decrease attrition. On the one hand, larger bonuses are paid in installments, so recruits have a strong incentive to remain in service to ensure collecting the full amount of their bonus. On the other hand, bonuses attract recruits who have less taste for military service and who, in the absence of bonuses, would not have enlisted. Consequently, we might expect an increase in bonuses to be associated with a lower probability of completing the first term. Our analysis indicates that, on net, the positive incentive effect of bonuses outweighs the negative effect of lower average taste for service on the probability of completing the first term for Army recruits.

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[3] Rent is a term from the economics literature. In the case of bonuses and enlistment and reenlistment bonuses, it refers to situations where bonus payments must be increased to expand enlistments or reenlistments over and above current enlistment and reenlistment levels. Consequently, individuals who would have enlisted or reenlisted in the absence of the increase earn a higher bonus than the one needed to induce them to enlist or reenlist. For example, suppose, hypothetically, that 100 high-quality recruits would have enlisted at a bonus of $5,000, but the Army needs to raise enlistment bonuses to $7,500 to increase enlistments to 108, then 100 high-quality recruits receive a rent of at least $2,500 because they received a bonus of $7,500 although 100 individuals would have enlisted for $5,000. Stated differently, these 100 individuals each receive a payment of at least $2,500 above their opportunity cost of joining.

We also find that operations in Iraq and Afghanistan have a negative effect on Army high-quality enlistments, but the size of the effect depends on our mathematical specification of the effects of these operations. When we represent these effects in terms of casualties, we estimate the effect of the Iraq War to reduce high-quality enlistments by an average of 6 percent. However, when we measure the effects of the Iraq War as the change in high-quality Army enlistments after the first quarter of FY 2003 that is unexplained by our model, we estimate a much larger effect. Using this method, we estimate that by FY 2006, the war accounted for a 50 to 60 percent decline in high-quality enlistments. The differences in these estimates (6 percent versus 50 to 60 percent) indicate the inherent difficultly of measuring the effects of national policy changes in a model estimated with aggregate data, as we use in this study. Nonetheless, the different approaches are consistent in indicating that the war had a sizable negative effect on high-quality Army enlistments, although the magnitude remains somewhat uncertain.

Some of the key results of our analysis of Army reenlistment relate to deployment and stop-loss. The Army imposed stop-loss on a significant fraction of its enlisted force, and we find that those subject to stop-loss were less likely to reenlist. However, we also find that the reenlistment rate at Zone A of those subject to stop-loss was only about two-thirds the rate of those who were not subject to stop-loss. In other words, only a third of the soldiers under the stop-loss policy would have exited from the Army if they had been permitted to do so. The remaining two-thirds of soldiers were willing to reenlist, even though they were under the stop-loss policy.

As with past studies, we find that deployed soldiers reenlist at a higher rate than nondeployed soldiers. On the other hand, more cumulative deployment time reduces the probability of reenlistment. Specifically, we find that a soldier with between one and two years of deployment is about 17 percentage points less likely to reenlist as a soldier with no deployment time.

Concluding Thoughts and Directions for Future Research

The main conclusion of this study is that enlistment and reenlistment bonus programs were important in helping the Army meet its recruiting and retention objectives and that the Army managed these programs flexibly by targeting bonuses to specific groups and adjusting them in a timely manner. At a time of war when some in Congress have called for the reinstatement of the military draft (Waller, 2003), bonuses were an important tool. They enabled the Army to respond to the adverse shocks to enlistment and reenlistment that resulted from declining civilian youth attitudes toward the military, frequent and long deployments, and rising end strengths. We also find evidence that the other services used bonuses flexibly by changing bonus amounts as retention shifted, and that reenlistment bonuses proved cost-effective relative to pay generally for the other services as well.

A remaining question is whether bonus levels were set correctly and, more broadly, whether the services could improve the management of these programs. Ideally, information is needed on the effects of enlistment and reenlistment bonuses on the supply of personnel to different occupations and an analysis of whether a different mix and different levels of bonuses than those actually observed would have resulted in more enlistments and reenlistments for the same cost. Such an analysis was beyond the scope of the current study but should be pursued in future research. Our analysis does provide some information on where management of bonuses might be improved. Specifically, we find that higher bonus multipliers reduce the length of reenlistment in some cases. That is, reenlistees choose shorter term lengths. We do not have the data to test alternative explanations for these results, but we suggest that the services might better manage bonus caps and provide members with the flexibility to choose longer terms to give them an incentive, and the ability, to choose longer reenlistment terms.

We recommend several areas for future research. In the case of enlistment, an empirical assessment is needed of how enlistment bonuses affect recruits' decisions to choose one occupation over another. With estimates of the skill-channeling effects of enlistment bonuses, one could then simulate how changing bonus differentials across occupations would affect enlistment rates into different occupations. In the case of both enlistment and reenlistment, we strongly recommend that Congress and DoD conduct an experimental test of the effectiveness of bonuses. Such a test would complement the results presented here by providing estimates without the confounding effects of reverse causality bias and would also permit estimates of the skill-channeling effects of bonuses on enlistment.