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Effects of Bonuses on Active Component Reenlistment Versus Prior Service Enlistment in the Selected Reserve

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Summary

The reserve components should be fully manned and ready, but at times during 2004 to 2009 the Army National Guard, the Army Reserve, and the Marine Corps Reserve experienced manning shortfalls. The shortfalls occurred despite constant manpower authorizations and can be attributed to an insufficient supply of personnel. Supply in general depends on recruiting and retention, and retention was stable in the Army National Guard and the Marine Corps Reserve, though it did decrease in the Army Reserve. Thus, in the Army National Guard, the Marine Corps Reserve, and to some extent the Army Reserve the manning shortfall came from an inadequate inflow of recruits.

The present study began with a focus on the effectiveness of RC enlistment and affiliation bonuses in increasing the enlistment of service members leaving the AC. In our analysis, we assume that AC service members at a reenlistment point consider remaining in the AC, joining the RC, or leaving the military entirely, and that both AC and RC bonuses influence this decision. Framing the analysis in this way broadened the focus of the study from just the effectiveness of RC bonuses to include how AC and RC bonuses interact to affect both AC reenlistment and prior service enlistment in the RC.

We focus on several research questions:

- Are RC bonuses effective in attracting AC enlisted members?
- How do the effects of AC and RC bonuses interact? That is, to what extent do RC enlistment bonuses draw service members away from the AC, and to what extent do AC reenlistment bonuses reduce prior service enlistment in the RC?
- What are the total and incremental costs of RC bonuses as bonus levels change?

In approaching these questions, we first discuss trends in reserve strength and RC and AC bonus programs to provide policy context for the study. We describe our data and present a theoretical model of the AC/RC/civilian choice, and we then discuss the empirical estimates of bonus effects, deployment effects, and time effects. Next, we develop models of bonus-setting behavior and present estimates of bonus total and

incremental cost based on the empirical estimates. In the final chapter, we present our conclusions.

Trends in Reserve and Active Component Bonus Programs

The year 2004 marked a low point in the use of AC and RC bonuses. Saddam Hussein's army was defeated in spring 2003, and retention in the U.S. military was high. But in subsequent months, insurgent groups became active and conditions worsened. The United States responded with a high ongoing pace of deployments, and many service members had two or even three deployments during this period. By 2005, the Army and the Marine Corps experienced downward pressure from deployment on retention (Hosek and Martorell, 2009), and the Army National Guard and Army Reserve coped with shortfalls in their personnel strength relative to authorized levels. The AC Army and Marine Corps greatly expanded the number of specialties eligible for a reenlistment bonus and increased average bonus amounts in 2005. These services also set plans in motion to grow, as Congress mandated. Bonus usage decreased in the AC Navy and Air Force as these services downsized, though bonus amounts increased among those receiving bonuses.

RC bonus usage and amounts were quite small up to 2006. In 1999, 11 percent of Army personnel who transitioned from the AC to the RC received a bonus, and that number was lower for the other services. Moreover, bonuses were small and averaged less than \$2,000 for all services. RC bonus eligibility criteria were broadened and bonus ceilings were raised in 2006, paving the way to an expansion of the RC bonus program. Much of the expansion occurred through increasing average bonus amounts. The average RC bonus increased from about \$1,500 to more than \$10,000 from 2006 to 2009, though the number of RC bonuses awarded changed little.

The large changes in AC and RC bonus usage and amounts during these years provide variation helpful in identifying the impact of bonuses on AC reenlistment and RC prior service enlistment.

Data and Model

Our analysis comprises the universe of all reenlistment decision points reached by active-duty military personnel with three or more years of service between 1999 and 2008. The analysis file is built from Defense Manpower Data Center administrative files on personnel. Data on bonus offers are not available, so we impute AC and RC bonuses to each service member. The imputations are made by cells defined by three-digit AC occupational specialty, zone (year of service group), month, and AC component. The imputed AC bonus is based on bonus payments received by those service

members in the cell who chose to reenlist. The imputed RC bonus is based on those service members in the cell who chose to join the RC within two years after leaving AC and who received a bonus.¹

Our model assumes that a service member at a reenlistment decision point chooses among three alternatives—AC reenlistment, RC enlistment, and becoming a civilian—and selects the alternative with the highest utility. The utility of AC reenlistment depends on the AC bonus, the utility of RC enlistment depends on the RC bonus, and the utility of each alternative also depends on other variables, such as demographics, and an error term. We assume the error follows a generalized extreme value distribution, which leads to the conditional logit model of choice probabilities. The model provides a framework for estimating the effects of the AC and RC bonuses.

The estimation of bonus effects presents issues of possible biases stemming from reverse causation,² omitted variables, bonus caps, the assumption of a static decisionmaker,³ and the unavailability of vacancies in particular units. We control for these issues to some extent by including variables for occupational specialty and year and by employing a quadratic specification of the bonus. Variables in the model also include Armed Forces Qualification Test (AFQT) category, education, gender, race, and an indicator for being promoted faster than average.

Bonus Effects

We estimate the model for service members in each AC component at first-term and second-term-or-higher reenlistment decision points. We find positive, statistically significant AC and RC bonus impacts. We use the estimated bonus coefficients to project AC reenlistment rates and RC enlistment rates for various combinations of AC and RC bonuses. The projections indicate that increasing the AC bonus increases AC reenlistment and decreases RC enlistment, while increasing the RC bonus increases RC enlistment and decreases AC reenlistment. That is, the own-effect of bonuses is positive and the cross-effect of bonuses is negative. The magnitude of these effects varies by term and service. The bonus specification is quadratic, and incremental bonus impacts decrease as bonus amounts reach higher levels. The change in incremental impact by bonus amount is small for the AC but more noticeable for the RC.

The general pattern of positive own-effects and smaller, negative cross-effects of bonuses on first-term reenlistment decisions is the same across services, but the mag-

¹ Nearly all AC service members who join the RC do so within two years of leaving the AC.

² Low RC enlistment can cause the RC bonus to be increased, whereas we are interested in the effect of a higher RC bonus on RC enlistment.

³ Congress sets a maximum bonus under each of the bonus programs. We discuss reasons why the existence of these bonus caps may bias our estimates.

nitudes differ. We find somewhat larger own-effects of RC bonuses for the Navy and Marine Corps. The cross-effect of AC bonuses on RC enlistment rates is roughly constant across services, but the cross-effect of RC bonuses on AC reenlistment rates is somewhat stronger for the Air Force and somewhat weaker for the Marine Corps.

The patterns for AC members at the second term and higher are similar to those for first-term members. An exception is that we find no evidence that RC bonuses affect second-term-and-higher reenlistment decisions for the Marine Corps. We also checked whether bonus effects vary by whether the service member's occupational specialty was classified as combat arms and by the amount and type of deployment while on active duty, but we found little evidence of interaction effects.

Bonus-Setting Behavior

The empirical finding of negative bonus cross-effects has implications for bonus setting and bonus costs that we delineate through models of AC and RC bonus setting. In the models, each side has an objective, e.g., meeting a reenlistment or enlistment target, and reacts to the bonus action taken by the other as needed to meet the target.

We present models for two bonus-setting objectives: (1) reaching specified targets for AC reenlistments and RC enlistments and (2) maximizing the value of additional AC reenlistments and RC enlistments relative to their bonus cost. The targets in the first case are given, and the model raises the question of how the targets are determined. In the second case, we assume that bonus setting is determined by an assessment of the perceived value of an additional AC reenlistment or RC enlistment versus the additional cost.

In the first case, bonus setters set bonuses at the minimum value necessary to achieve their target, conditional on the other component's bonus. This produces interactive behavior as bonuses are changed and leads to an equilibrium in which AC and RC bonuses depend only on the AC and RC targets. In the second case, optimal bonuses again depend on the interactive behavior and are such that the incremental value of an additional AC reenlistment equals the incremental cost, and similarly for an additional RC enlistment.

Under either objective, a bonus increase creates a negative externality for the other component. This is a consequence of supply-side behavior and is not a result of some inefficiency in bonus setting; a service member's willingness to reenlist in the AC depends positively on the AC bonus and negatively on the RC bonus, and the willingness to join the RC depends positively on the RC bonus and negatively on the AC bonus. Because of the negative externality, the other component must increase its bonus, which causes the cost of its bonus program to increase. Coordination between AC and RC bonus setters may help to avoid surprises but will not eliminate the cross-effects, because they derive from supply behavior. To reiterate, the need to adjust the

RC bonus when the AC bonus is changed, and vice versa, is a rational response required by the supply-side behavior and does not represent waste or inefficiency. Nevertheless, coordination between the AC and RC can help to make the process of setting bonuses and budgeting for bonus programs as smooth as possible.

Bonus Cost

Combining insights from the bonus-setting models with the empirical estimates of bonus impacts, we derive estimates for the cost of AC and RC bonuses from two different perspectives. The first shows AC and RC bonus costs for different combinations of AC and RC bonus amounts. While intuitive, this calculation ignores the externality that occurs when a bonus increase in one component decreases the supply of service members to the other component. The second perspective overcomes this limitation by showing the AC and RC bonus amounts required to sustain different combinations of AC reenlistment and RC enlistment rates, and the corresponding bonus costs. Using this approach, the bonus cost has two components: (1) the cost of a component's higher bonus and (2) the cost of the other component's higher bonus needed to hold its rate constant.

At an AC bonus of \$8,000 and an RC bonus of \$2,000, the first perspective indicates an average cost per RC enlistment ranging from \$28,000 for the Marine Corps to \$40,000 for the Army, and an average cost per AC reenlistment of \$22,000 for the Marine Corps to \$54,000 for the Army and \$132,000 for the Air Force. The Air Force estimate is high because of low responsiveness to reenlistment bonuses among Air Force personnel, a finding consistent with past research (Hosek and Martorell 2009; Asch et al., 2010).

As an example of the second perspective, a one-point increase in the Navy RC enlistment rate from 0.155 to 0.165 at an AC reenlistment rate of 0.40 requires an increase in the RC bonus from \$1,429 to \$3,755 and an increase in the AC bonus from \$10,656 to \$11,265. The RC bonus cost per 100 AC members at reenlistment increases from \$22,000 to \$62,000, or by \$40,000, and the AC bonus cost increases from \$426,000 to \$451,000, or by \$25,000. Again, these cross-effect costs are rational responses required because of supply-side behavior. They do not represent wastage and are part of the full cost of a bonus increase.