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# Reenlistment Bonuses and Retention Behavior

## Executive Summary

James R. Hosek, Christine E. Peterson

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This report, an executive summary of Rand Report B-3199-MIL, presents a nontechnical discussion of the most policy-relevant findings of research on the effects of bonuses on retention behavior. The findings suggest that, overall, the reenlistment bonus program should be continued and perhaps expanded. It enables the services to respond quickly to changes both in labor supply, such as those created by economic and demographic cycles, and in labor demand, such as those created by changes in weapons systems or force deployment. Bonuses are effective in increasing retention rates and promoting longer terms of service. Since they are not part of base pay, they do not directly increase the potential retirement outlays as an increase in base pay would. Their power and flexibility make them a valuable aid in managing the size and shape of the career force.

*Very interesting -  
1/11/68*

## PREFACE

This is an executive summary of Rand Report R-3199-MIL, *Reenlistment Bonuses and Retention Behavior*, by James R. Hosek and Christine E. Peterson. It presents a nontechnical discussion of the most policy-relevant findings of research on the effects of bonuses on retention behavior. The findings and their implications should interest defense manpower policymakers concerned with the allocation of bonuses and the maintenance and evolution of enlisted force strength. Readers interested in a more comprehensive and technical discussion should consult the complete report.

The study reported here was conducted by Rand's Defense Manpower Research Center. The Center, established in 1976 under contract with the Office of the Secretary of Defense, conducts interdisciplinary research into the manpower problems facing the armed services. The Center's primary sponsors are the Office of the Assistant Secretary of Defense for Manpower, Installations, and Logistics, and the Office of the Assistant Secretary of Defense for Reserve Affairs. This research was conducted under Contract MDA903-83-C-0047

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# I. INTRODUCTION

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Retention is a perennial concern of military manpower planners. Manpower supply has been high recently, but retention rates could fall as the national economy improves or the ratio of military to civilian wages declines. However, reenlistment bonuses, one of the chief tools for managing retention, can help prevent personnel shortages in occupations critical to the capability of the services. Thirty to forty percent of all occupational specialties are covered by bonuses, even though only one percent (about 500 million dollars in FY81) of the total compensation budget is allotted to the Selective Reenlistment Bonus (SRB) program.

This study addresses a number of policy issues concerning the continued use of reenlistment bonuses:

1. How successful is the SRB program? That is, to what extent do reenlistment bonuses actually increase retention rates in the occupations in which they are offered?
2. Which of the two bonus payment methods, installments or lump sum, is more cost-effective?
3. Can reenlistment bonuses be used to mitigate the effects on retention of cyclical changes in the economy? How do they compare in this regard to higher military wages?
4. What role can reenlistment bonuses play in force shaping and planned growth?
5. What were the driving factors behind recent historical changes in retention rates?

To address these policy issues we analyzed continuation rate data from the Defense Manpower Data Center for the period mid-FY76 through FY81. We chose this period to take advantage of a natural experiment that permitted us to compare the effectiveness of two methods of bonus payment: in April 1979 the method changed from payment in installments to payment in a lump sum.

Our findings led us to the following conclusions:

1. Reenlistment bonuses are a powerful tool for controlling retention in targeted occupations. Higher reenlistment bonuses increase not only the rate of retention but also the expected personyears of active duty service in an occupation. (A personyear of service represents the work of one service

member over one year.) We believe the number of expected personyears to be a more informative measure of retention than the simple retention rate because it takes into account the contractual length of the new terms of service.

2. Lump sum bonuses are more cost-effective than installment bonuses, at least at the first-term retention point. Their advantage comes primarily from shifting personnel within an occupation from shorter to longer contractual obligations and secondarily from increasing the proportion of personnel who choose to stay in the occupation. In other words, the advantage of lump sum payment is especially evident in terms of increased expected personyears of service.
3. Reenlistment bonuses are effective countercyclical tools; that is, higher bonuses have the potential to counteract the effects of lower unemployment rates on the retention rate and on the expected personyears of service. Variations in the overall bonus budget, and hence in bonus coverage and amount, can be geared to the depth and duration of the business cycle, although this is not necessarily the current practice. Moreover, bonuses offer an advantage over higher military wages as a countercyclical tool. Higher wages can also offset lower unemployment, but, unlike bonuses, increase the proportion of personnel selecting short terms of service.
4. Reenlistment bonuses can play an important role in force shaping. Bonuses permit retention rates and expected personyears to be increased selectively by occupational specialty and for a particular term of service, whereas pay increases create higher retention across-the-board. This capability is especially important because the service branches face the same basic pay structure but different planned growth over the remainder of the decade.
5. Our model of retention behavior allows us to understand how key explanatory variables contributed to recent changes in retention rates. By calculating the specific contribution of each explanatory variable, we can determine the most important factors bearing on retention in a given period. For the period from 1979 through 1981, our model's predicted changes are quite close to the actual changes in historical rates. Retention rates during this period appear to have increased primarily because of increases in relative military/civilian pay and worsening civilian employment conditions. The former factor was especially important for the first-term rate and the latter for second-term retention. Changes in bonus coverage

and amount also contributed to higher retention, although secondarily.

Overall, our findings suggest that the reenlistment bonus program should be continued and perhaps expanded. The bonus program enables the services to respond quickly to changes both in labor supply, such as those created by economic and demographic cycles, and in labor demand, such as those created by changes in weapons systems or force deployment. Bonuses are effective in increasing retention rates and promoting longer terms of service. They can be targeted on specific occupations and quickly turned on or off. Since they are not part of base pay, they do not directly increase the potential retirement outlays as an increase in base pay would. Their power and flexibility make them a valuable aid in managing the size and shape of the career force.

Section II of this executive summary briefly explains our methodological approach. Section III uses our findings to address in detail the five policy questions outlined above. Section IV outlines future research.

## II. APPROACH

This section provides a brief overview of our model and methodology. The section has two major parts. The first explains how we developed our database. The second characterizes our econometric framework and estimation procedure in fairly nontechnical terms and indicates how we controlled for a major potential source of error.

Readers interested in a more technical discussion should consult the full report, R-3199-MIL.

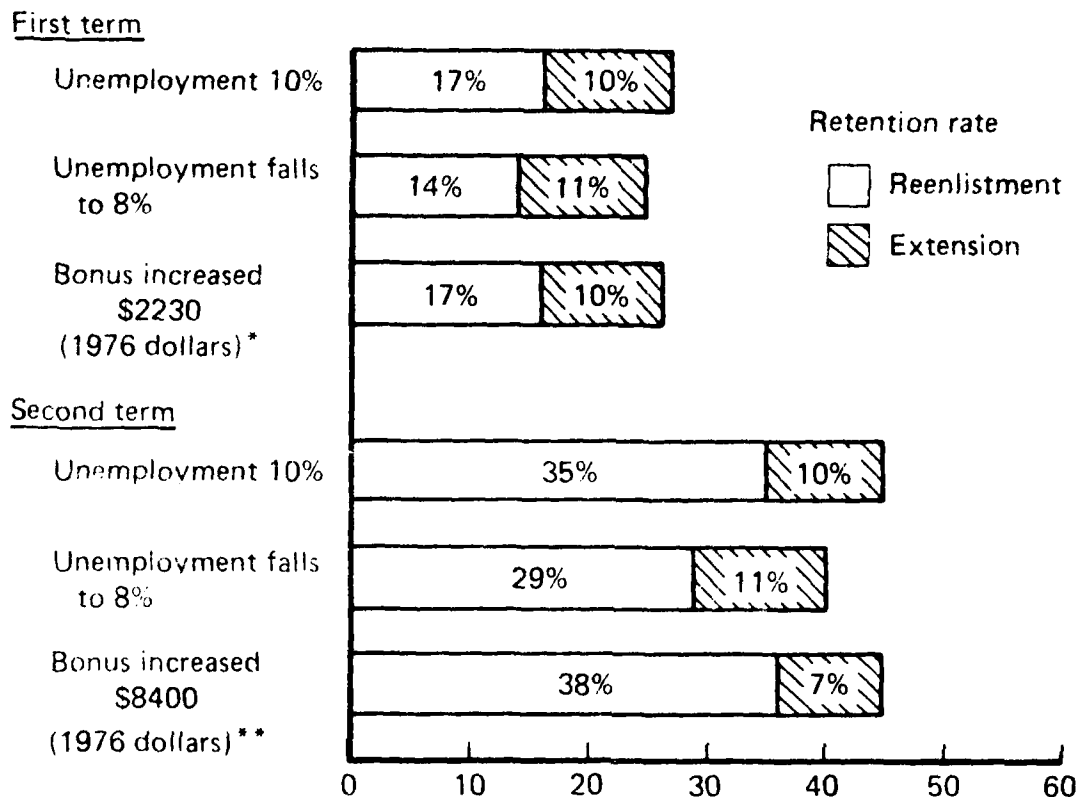
### CREATING THE DATABASE

Table 1 displays the variables used in the study and indicates their sources.

From the Defense Manpower Data Center (DMDC) we obtained retention rate data for each military occupation during the period FY76 to FY81. This period provided us with a natural experiment for comparing the effects of two payment methods: in April 1979 the payment of reenlistment bonuses changed from an installment to a lump sum method. We supplemented the DMDC data with specially-constructed variables on the bonus amount, the military/civilian wage index, and the unemployment rate.

Individual military occupations were the basic unit of analysis. We observed the retention behavior of male personnel in all enlisted military occupational specialties at both first- and second-term retention decision points. From the over 1300 occupations, we obtained a sample of almost 600 that provided data at each observation point. These occupations include the vast majority of military personnel at retention decision points. Table 2 shows how these occupations were distributed by service.

**Reenlistment, Extension, and Retention Rates.** We organized the retention data in a distinctive way by distinguishing two forms of retention: reenlistments and extensions. As eligible personnel approach a retention decision point, those who wish to stay in the service may either sign a new contract (*reenlist*) or increase the length of their current contract (*extend*). We distinguish between a decision to extend and a decision to reenlist because they affect expected person-years differently. Reenlistment contracts specify new terms of service obligation which are typically three or four years, though they may range from two to six. Contract extensions, by contrast, frequently last less than a year and rarely exceed 24 months. Extensions are less well

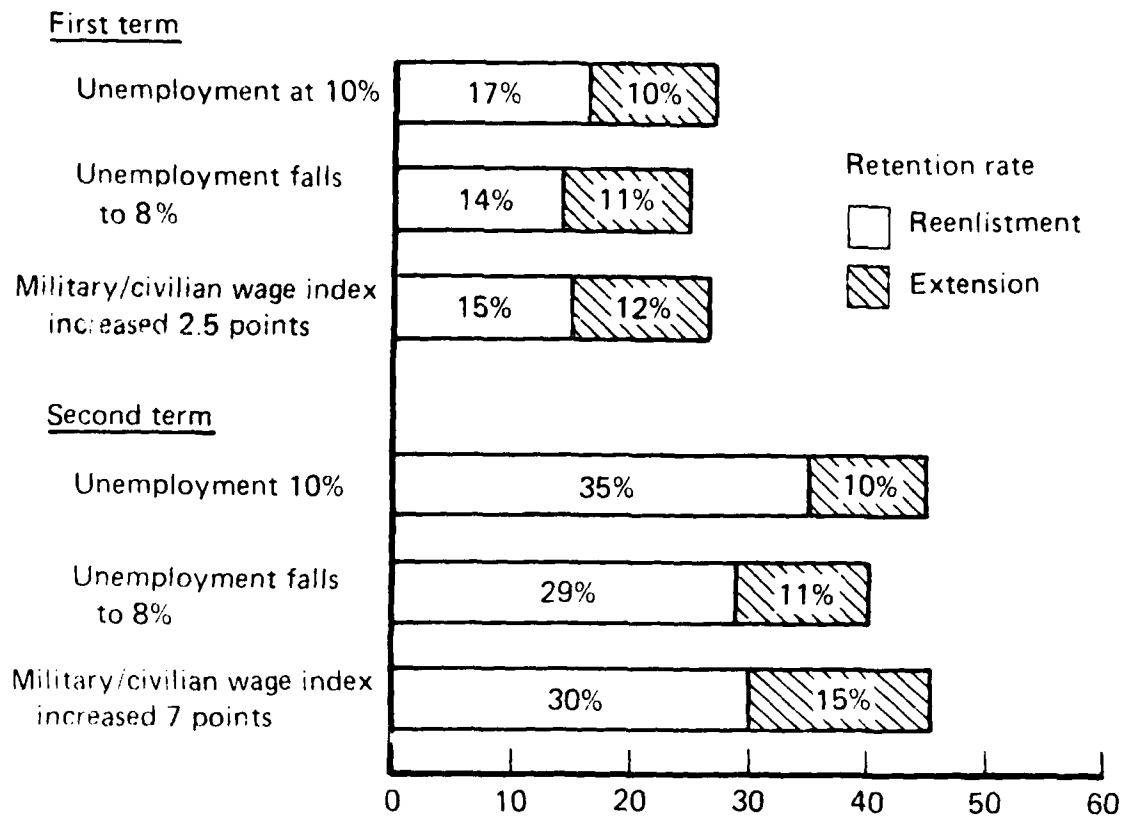


\* About \$4125 1984 dollars.

\*\* About \$15540 1984 dollars.

Fig. 5—Adjusting bonuses to offset decline in unemployment

points in the military/civilian wage index to restore retention, the percentage of personnel who choose to extend rises one fifth, from 10 to 12 percent. For the second term, which requires a 7 point rise in the pay index, the percentage of extenders rises one half, from 10 to 15 percent. The increase is even more dramatic considered as a percentage of all *retained* personnel: from this viewpoint extensions increase from 37 to 44 percent of all first-term retentions and from 22 to 33 percent of all second-term retentions. As a result of the higher proportion of retained personnel selecting short terms of service, expected personyears decrease.



† Military wage is increased 2.5% faster than civilian wage

Fig. 4—Adjusting pay to offset decline in unemployment

proportion is important because it bears on the number of person-years associated with a given rate of retention.

Higher bonuses and higher wages affect the proportion of reenlistments to extensions differently. As Fig. 1 showed, higher bonuses increase the reenlistment and retention rates but decrease extensions. By contrast, as Fig. 6 shows, a higher military/civilian wage index increases the rates for extensions as well as reenlistments and overall retention. Thus, although higher pay can offset a lower unemployment rate, the average length of commitment—and therefore expected person-years—of those choosing to remain in the service may decline.

According to Fig. 4, when a pay increase is used to restore the retention rate to its original level, the proportion of reenlistments is lower and the proportion of extensions higher than before the decline in unemployment. For the first term, which requires an increase of 2.5

Both higher military wages and bonuses increase retention and appear to be likely policy tools to offset the detrimental effects of lower unemployment rates. Our results suggest that, for skills offering a bonus, increases in bonus amount may be preferable to increases in pay as a means of increasing retention during periods of low unemployment. When higher wages and bonuses are used separately to raise retention to a given level, bonuses produce more expected person-years within the skill. This difference arises because wage increases and bonuses affect the composition of retention differently: bonuses cause a higher proportion of retained personnel to select longer terms of service.

To demonstrate, we next calculate the size of the increases in military pay and in bonus amount necessary to offset lower unemployment. Although a pay increase affects retention in all skills, we limit the discussion to bonus skills. For comparison purposes, we assume that bonus coverage and amounts are not affected by the pay increase.<sup>5</sup> Moreover, although we examine the effectiveness of the two means of improving retention rates, we do not consider their relative *cost-effectiveness*. That issue is a much more complex one than we have evidence to address.

To evaluate the impact of bonus versus pay increases on offsetting the effects of lower unemployment, we defined the following scenario: initially retention rates are 27 percent for first term (17 percent reenlistment, 10 percent extension) and 45 percent for second term (35 percent reenlistment, 10 percent extension). Suppose the unemployment rate falls by 2 percentage points from 10 to 8 percent. Our model predicts that first- and second-term retention rates consequently drop to 25 percent and 40 percent. Now we want to restore the retention rates to their original levels before the decline in unemployment. Under one plan, we adjust relative pay alone to compensate, and under the other we adjust only the bonus level.

Figures 4 and 5 show the size of pay and bonus increases necessary to offset the hypothetical decline in unemployment.<sup>6</sup> In both figures each bar represents the overall retention rate under a specified stage in our scenario. In addition, each bar is divided into its reenlistment and extension components to make evident how the proportion of reenlistments to extensions changes as the scenario changes. Again, this

<sup>5</sup>An increase in military pay actually increases the amount of a skill's bonus since bonus amount is the product of the bonus step and monthly base pay. We ignore this secondary effect.

<sup>6</sup>The results shown in Fig. 5 rely on a bonus effect adjusted to reflect the current hybrid payment system. Under that system, half of the reenlistment bonus is paid in a lump sum and the other half is paid in two installments.

### 3. HOW EFFECTIVE ARE BONUSES COMPARED WITH WAGES AS A COUNTERCYCLICAL TOOL?

Figure 3 shows the effects on the reenlistment, extension, and retention rates of changes in the unemployment rate. Our estimates indicate that higher unemployment rates produce the same pattern of effects as higher bonus amounts. That is, higher unemployment increases the reenlistment and retention rates and decreases the extension rate. The effect on reenlistment is several times larger than that on extension. Indeed, the overall effect on retention of a change in the unemployment rate is quite large, especially for second termers, who in our sample period are about three times as responsive to changes in the unemployment rate as are first termers.<sup>4</sup>

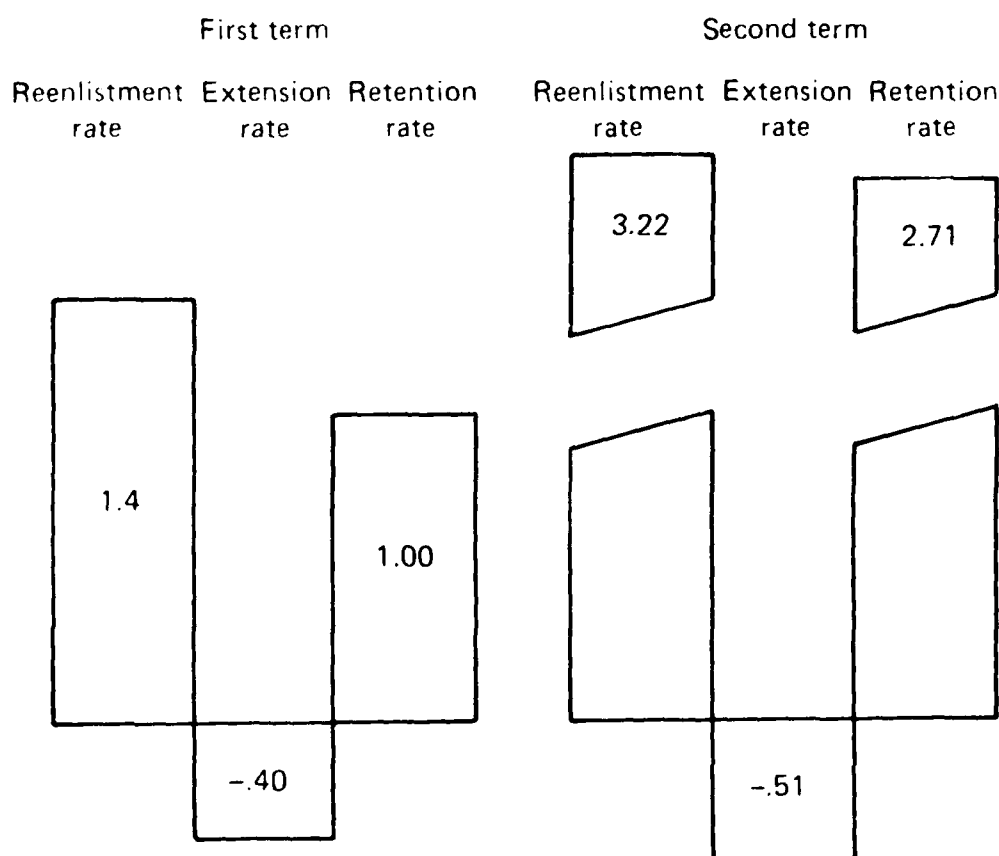


Fig. 3—Effects of unemployment rate  
(Percentage point change in rate per 1 percentage  
point change in unemployment rate)

<sup>4</sup>The unexpectedly high unemployment effect for second termers may be associated with our use of a six-month interval rather than a 12-month interval in defining the rates. Further investigation (with the sample period expanded to include the most recent years) seems necessary.

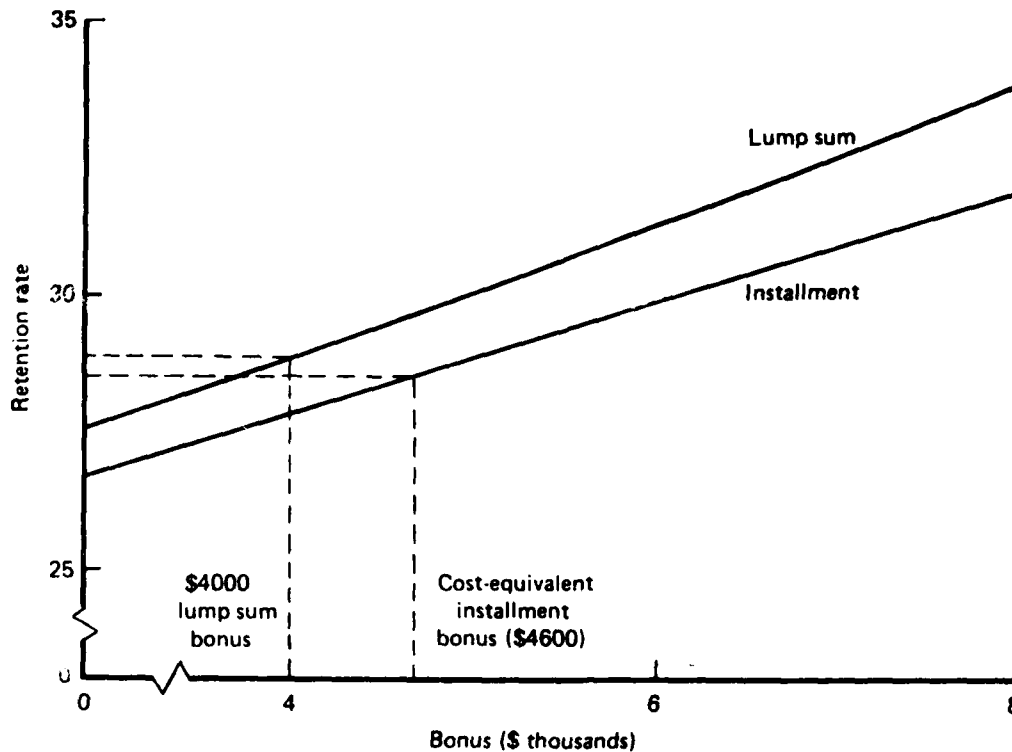


Fig. 2--continued

chosen. If we assume a \$4600 installment bonus (the mid value in the range) to be cost-equivalent to a \$4000 lump sum bonus and map the rates attainable with each (the dashed lines in the figure), we find that the lump sum bonus produces higher reenlistment and retention rates and lower extension rates.

Thus, as this example indicates, lump sum bonuses are more cost effective than installment bonuses, at least at the first term. (The cost-effectiveness is greater the lower the interest rate, i.e., the closer the cost-equivalent installment bonus to the lump sum bonus.) For cost-equivalent increases, the lump sum bonus results in a higher reenlistment rate and a lower extension rate than the installment bonus and has an approximately equal effect on the overall retention rate. In other words, a cost-equivalent lump sum bonus, though it may not cause many more personnel to stay in the military, encourages more of those who do stay to choose longer terms, thus increasing the total expected personyears of service. In addition, as Fig. 2 shows, the advantage of lump sum bonuses increases with increasing bonus amounts.

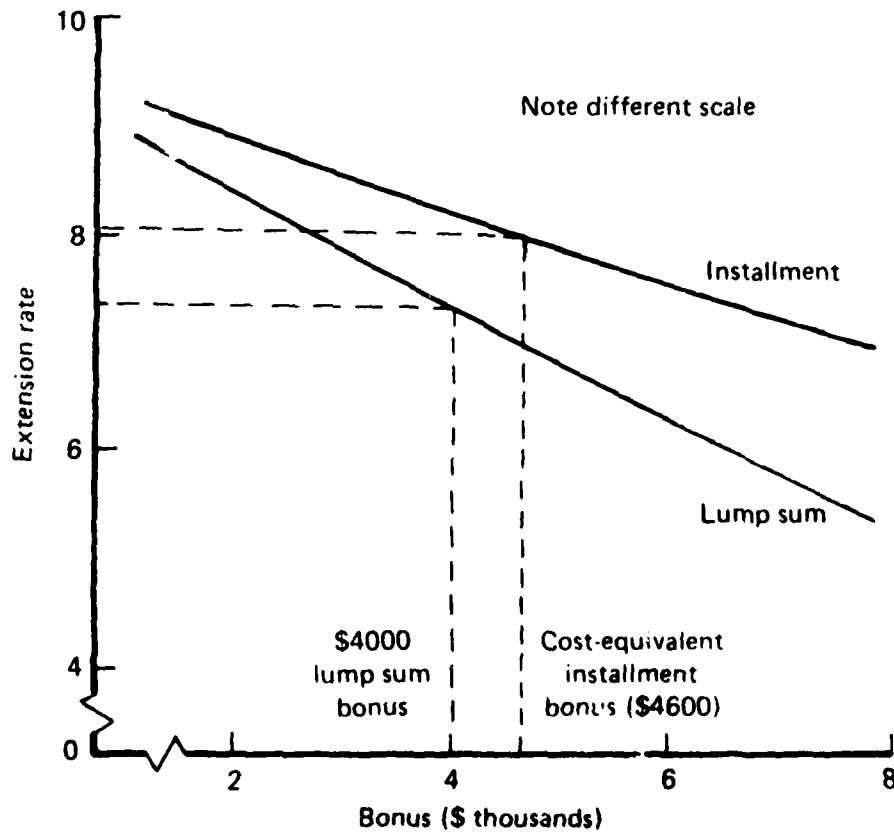
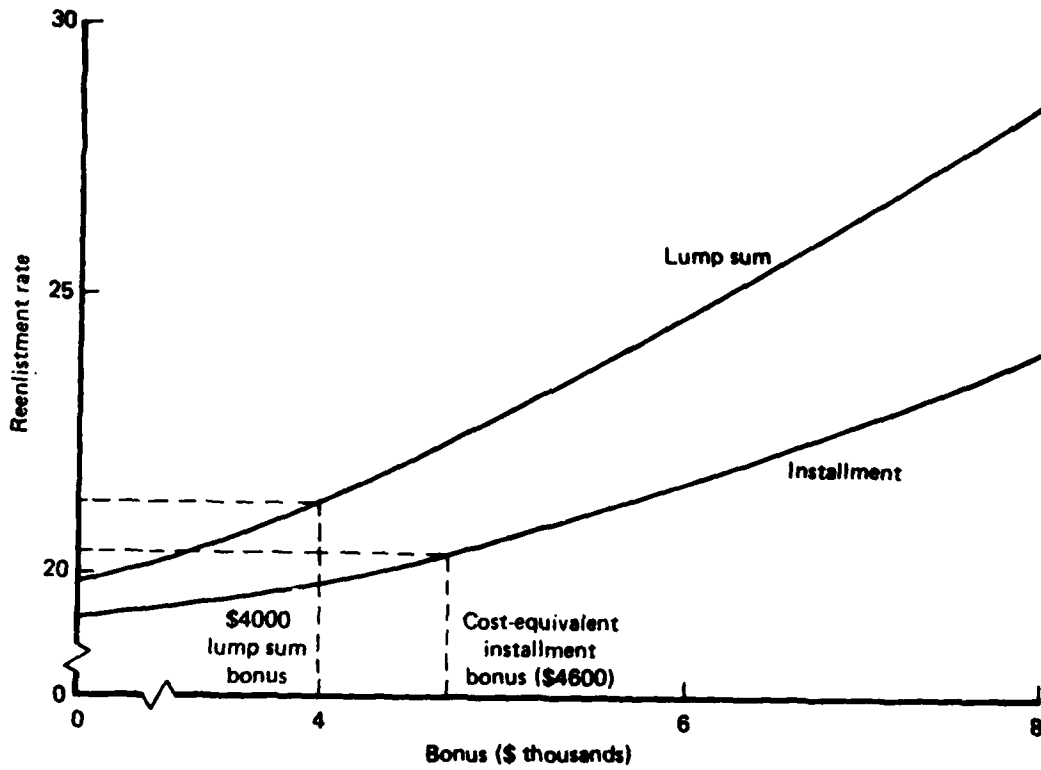


Fig. 2—Predicted first-term reenlistment, extension, and retention rates for lump sum and installment bonuses (Bonuses in 1976 dollars)

assume that bonus coverage is held constant and consider the case of higher installment bonuses.

Table 4 shows the size of a four-year installment bonus that the government could provide for the cost of a \$1 lump sum bonus. The values in the table vary from about \$1.10 to \$1.20, depending on the assumed values of the government interest rate and of the year-to-year continuation rate. The usefulness of Table 4 lies in converting lump sum bonuses into installment bonuses of equal cost to the government. For example, for the cost of a lump sum bonus of \$3700 (the average first-term reenlistment bonus in our data in 1976 dollars), the government could offer an installment bonus of \$4440 ( $1.20 \times \$3700$ ), given an interest rate of .08 and a continuation rate of .95.

Drawing on Table 4, we can use Fig. 2 to compare the reenlistment, extension, and retention rates attainable with cost-equivalent lump sum and installment bonuses. The three panels of the figure display the predicted values of first-term reenlistment, extension, and retention rates for lump sum and installment bonuses based on the estimated effects for each bonus type. (Other explanatory variables have been held at their means and the predictions correspond to the average rates rather than the rates in any particular occupation during our period of analysis.)

Suppose, for instance, we want to compare the rates attainable with a \$4000 lump sum bonus to those attainable with its cost-equivalent installment counterpart. From Table 4 we determine that a \$4000 lump sum bonus would be cost-equivalent to an installment bonus of \$4400-\$4800, depending on the interest rate and continuation rate

Table 4

COST EQUIVALENT INSTALLMENT BONUS  
PER \$1 LUMP SUM BONUS  
(Assumes a 4-year term of service)

Interest Rate	Continuation Rate	
	.95	.97
.04	\$1.14	1.11
.06	1.17	1.14
.08	1.20	1.17
.10	1.23	1.20

multiple in our data) raises the first-term reenlistment rate by only 1.25 percentage points. But this rise represents a 9 percent increase in the average reenlistment rate of our sample (13.9 percent).

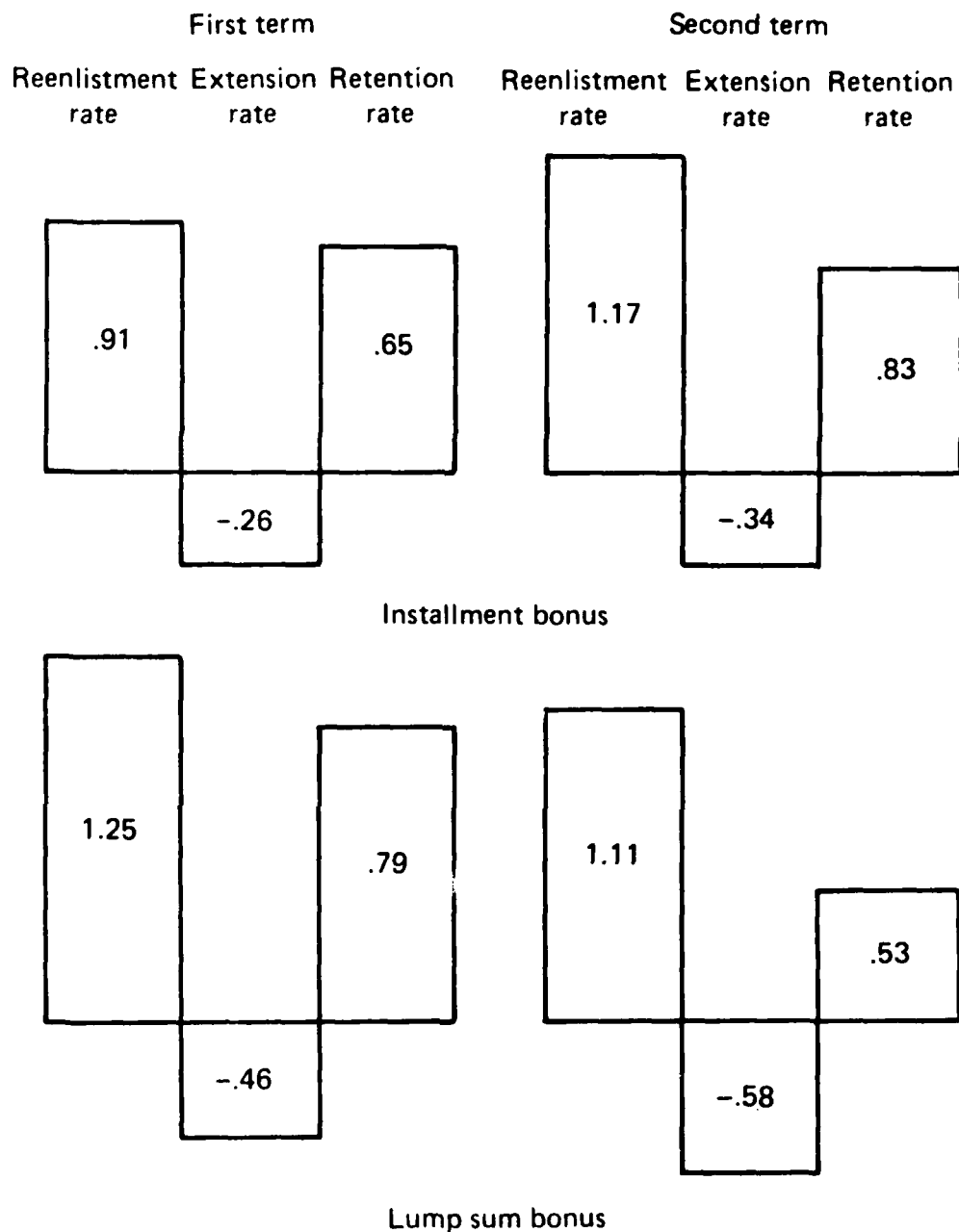
How do these changes in rates affect expected personyears? Since our data do not directly measure personyears of service subsequent to reenlistment or extension, we cannot answer this question precisely. But we can infer how personyears within an occupation will change based on our evidence about how bonuses affect reenlistment, extension, and retention rates. Higher bonuses increase the reenlistment and overall retention rates but decrease the extension rate. In addition, figures from DMDC indicate that an extender, on average, will generate fewer personyears than a reenlistee. If we hold the overall retention rate constant, therefore, a shift from extensions to reenlistments must result in more expected personyears. And personyears grow still more when the occupation's retention rate is allowed to increase.

## 2. ARE LUMP SUM OR INSTALLMENT BONUSES MORE COST-EFFECTIVE?

Our analysis shows that, at least for the first-term retention point, lump sum bonuses are more cost-effective than installment bonuses. Moreover, the lump sum payment method also produces more expected personyears.<sup>3</sup>

To arrive at this assessment of the cost-effectiveness of the two payment methods, we could not simply compare the effectiveness of lump sum and installment bonuses of the same face value. We had to compare them on a cost-equivalent basis. This was necessary because a \$4000 bonus costs the government less when paid in installments than when paid as a lump sum. Because the government must pay out only a part of an installment bonus each year, it can (in effect) invest the unpaid portion and apply the interest earned toward future installment payments. In addition, the government may not have to pay all the installments since not all reenlistees will complete their term of service. Consequently, a given bonus budget, if expended in the form of installment rather than lump sum bonuses, can fund greater bonus coverage across occupations, higher bonuses, or both. For simplicity we

<sup>3</sup>Our discussion focuses on the first-term retention decision point because we lack confidence in our second-term results on method of payment. The rapid expansion in second-term bonus usage from mid-FY79 through FY81 apparently signals a structural shift in the bonus allocation procedure.



**Fig. 1—Effects of higher bonuses**  
 (Percentage point change in rate per \$1000 increase in bonus)  
 (Bonuses in 1976 dollars)

### III. FINDINGS AND IMPLICATIONS

We next use our findings to address the five central policy issues which we identified in the Introduction:

1. The impact of reenlistment bonuses
2. The cost-effectiveness of the two payment methods
3. Bonuses vs. military wage as a countercyclical tool
4. The role of bonuses in force shaping
5. Understanding recent retention behavior

One subsection addresses each of these issues.

#### 1. TO WHAT EXTENT DO REENLISTMENT BONUSES AFFECT THE RETENTION RATE?

As Fig. 1 shows, higher bonus amounts increase the reenlistment rate, decrease the extension rate, and increase the retention rate.<sup>1</sup> The figure indicates how many percentage points each rate will rise or fall with each bonus increment of \$1000 (in 1976 dollars, our base year).<sup>2</sup> For instance, a \$1000 increase in installment bonuses will raise the first-term reenlistment rate almost a full percentage point, so that if the rate stands at 15 percent, it will go to almost 16. The same pattern of effects holds for both the first- and second-term reenlistment decision points and for both lump sum and installment methods of payment. Moreover, our findings also imply that higher bonuses increase expected personyears of service in an occupation, which is a more accurate gauge than the raw retention rate of the effect of the bonus program on force strength. The increase in the occupation's expected personyears results from a shift of personnel from extension to reenlistment and from an increase in overall retention.

The magnitude of the rate changes shown in the figure—most of which are less than one percentage point—is not as small as it may seem. For example, the figure shows that a \$1000 increase in a lump sum bonus (approximately equal to a half step increase in the bonus

<sup>1</sup>The size of the values displayed depends on the point of evaluation: for Figs. 1, 3, and 6 we have chosen to evaluate the effects at the mean rates observed over the period mid-FY76 through FY81. Evaluation at other points would yield substantially the same results.

<sup>2</sup> The Consumer Price Index increased nearly 85 percent from 1976 to 1984, so \$1000 1976 dollars approximately equals \$1850 1984 dollars.

This functional form permitted us to capture the effect of a given variable on one choice—say, reenlistment—while accounting for its collateral impact on the remaining choices (separation and extension).

We also controlled for a key potential source of error: simultaneity bias. Just as higher bonuses are expected to improve retention outcomes, a decline in retention outcomes can trigger greater bonus utilization; i.e., skills with lower retention rates are more likely to have bonuses authorized. The simultaneity of this relationship can seriously bias the bonus coefficients as well as those of other variables. If uncorrected, these biases would make both lump sum and installment bonuses appear less effective than they really are and possibly underestimate the difference between the two bonus effects. In that case, the cost-effectiveness of lump sum bonuses would be underestimated as well.

Going beyond previous work, we developed an explicit econometric framework to control for two sources of simultaneity bias. One source arises from persistent yet unobserved factors affecting an occupation's reenlistment and extension rates, and the other from autocorrelation in retention rates from one period to the next.

Table 3  
BONUS INCIDENCE

Period	Percent of Occupations	
	First Term	Second Term
FY76 II	30	8
FY77 I	27	11
II	29	14
FY78 I	34	16
II	34	16
FY79 I	36	21
II	36	22
FY80 I	36	28
II	36	28
FY81 I	40	42
II	40	43

estimating the effects of lump sum and installment bonuses for the second term.

**Military/Civilian Wage Index.** Apart from bonuses, we do not have occupation-level data on military and civilian earnings and instead rely on an index of the ratio of military to civilian wage growth. To represent civilian wages we used quarterly figures for the average hourly manufacturing wages. An increase in the index implies that it is more lucrative to remain in military service, but since the gain in expected military earnings will be approximately equal across military occupations, one military occupation will not necessarily gain relative to another.

**Unemployment Rate.** As our measure of unemployment we used the rate for the total civilian labor force prevailing prior to the start of each six-month period.

**Demographic Variables.** To control for composition, we defined two demographic variables—the percentage of males without a high school diploma or its equivalent, and the percentage of blacks.

### ECONOMETRIC MODEL AND ESTIMATION PROCEDURE

We estimated our model of retention behavior with Berkson's normal approximation applied to the polytomous logit functional form.

Table 2

## NUMBER OF OCCUPATIONS IN ANALYSIS FILE

Service	First Term	Second Term
Army	213	210
Navy	84	87
Marines	152	109
Air Force	121	136
DoD	570	542

known than reenlistments, but they are not negligible. In our sample, extenders constitute about one-third of the stayers at the first-term retention decision point and one-fifth at the second-term point.

We calculated the reenlistment and extension rates and the overall retention rate, the sum of the two, at the beginning of each six-month interval.<sup>1</sup> Because the DMDC data do not explicitly distinguish extensions from reenlistments, we define extensions as new obligations of 24 months or less and reenlistments as new obligations of 25 to 72 months.

**Bonus Variables.** We defined two bonus variables, for presence and for amount. Table 3 indicates the proportion of occupations in each period that offered a reenlistment bonus (the proportion of personnel covered was about the same). An individual's bonus equals his monthly pay times the number of years he reenlists times the current bonus multiple (or "step") for his occupation. We computed the amount of a typical bonus for each bonus skill by multiplying its bonus multiple by measures of monthly base pay typical of the group, thus giving the same base pay to all occupations in a given period. The monthly base pay was adjusted for inflation and in effect provides an index of the real value of a bonus multiple over our periods of observation.

To estimate the differential effect of lump sum over installment payment, we created two additional bonus variables by interacting the lump sum payment period indicator with bonus presence and amount. Because second-term bonus coverage rose rapidly after FY79, at the same time as the method of payment shifted, we expected some confounding of bonus effects and doubted the possibility of accurately

<sup>1</sup>The estimates in this summary come from our reenlistment and extension rate regressions. The full report presents separate estimates for the retention rate equation as well.

Table 1  
VARIABLES AND THEIR SOURCES

<b>Dependent Variables</b>	
Retention rate	Defense Manpower Data Center (DMDC)
Reenlistment rate	Constructed from DMDC data: new obligations of 25 to 72 months
Extension rate	Constructed from DMDC data: new obligations of 24 months or less
<b>Bonus Variables</b>	
Bonus presence	Indicates bonus offered in a skill based on skill bonus histories supplied by Office of Officer and Enlisted Personnel Management OASD(MI&L)
Bonus amount	Computed for each bonus skill using its bonus multiple along with the monthly base pay and length of obligation typical of the term
Lump sum period	Indicates period when bonuses were paid by lump sum; interacted with bonus presence and amount to estimate differential effect of lump sum over installment bonus
<b>Economic Variables</b>	
Military/civilian wage index	Constructed from data on military pay and the average hourly wage in manufacturing from Bureau of Labor statistics
Unemployment rate	Rate for the total civilian labor force from Bureau of Labor statistics
<b>Demographic Variables</b>	
Percentage without HS diploma	DMDC
Percentage black	DMDC

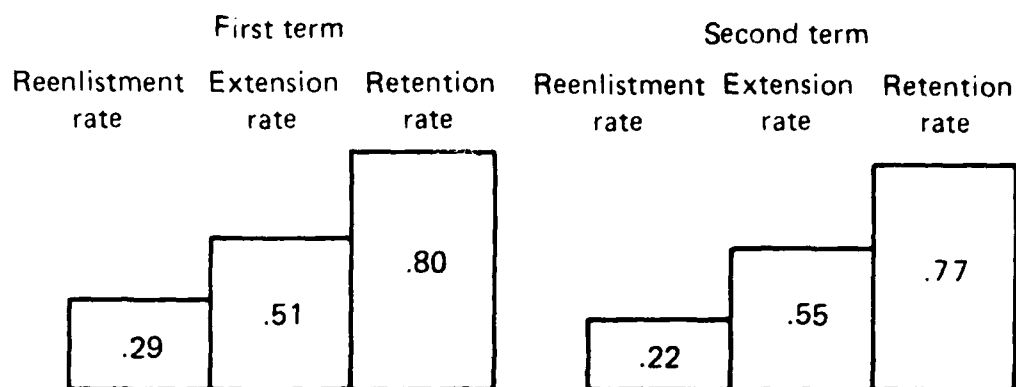


Fig. 6—Effects of military/civilian wage index  
(Percentage point change in rate per 1 point change  
in military/civilian wage index)

By contrast, when the bonus amount is increased to offset the decline in unemployment, expected personyears do not decrease. Figure 5 shows that when a bonus increase is used to restore the retention rate to its initial level, the first-term reenlistment and extension rates also return to their original levels. The expected personyears actually increase among second-term occupations. The reenlistment rate is higher and the extension rate lower—more personnel are selecting longer terms of service.

#### 4. WHAT ROLE CAN BONUSES PLAY IN FORCE SHAPING?

Force shaping means pursuing policies to ensure that the personnel force structure evolves in conformity with manpower requirements. Bonuses can aid in force shaping because they are effective in increasing retention selectively by occupation and for specific terms of service. Also, although not part of our study, available evidence suggests that personnel induced to stay by a bonus are more likely to leave the service upon completion of their terms.<sup>7</sup> Thus, greater use of bonuses at the first- and second-term retention points, relative to basic military pay, would likely result in a smaller proportion of personnel entering the 10+ years of service category. At the present time, the number of personnel in years of service 5 through 9 is especially large. In a few

<sup>7</sup>Glenn A. Gotz and John J. McCall, *A Dynamic Retention Model for Air Force Officers*, The Rand Corporation, R-3028-AF, December 1984.

years, this could produce an oversupply of personnel in the 10+ years of service group and an eventual surge in military retirees.<sup>8</sup> To some extent, bonuses could help alleviate this trend.

Furthermore, in occupations that are especially overstrength, it is conceivable to create a separation bonus. Receipt of the bonus could be made conditional on enlistment into the Selected Reserves, depending on the reserves' demand for personnel in the occupation.

### 5. CAN A MODEL OF RETENTION BEHAVIOR EXPLAIN RECENT RETENTION TRENDS?

Our model allows us to examine how much changes in each of our explanatory variables contributed to past changes in the retention rate. "Predicting" historical changes in this way also helps us judge the accuracy of the model.

For the period from 1979 through 1981, Table 5 shows that our model's predicted changes in retention rates are quite close to the actual changes. Between 1979 and 1981, the first-term retention rate rose from 18.5 to 27.7 percent (a rise of 9.2 percentage points) while the second-term retention rate increased from 39.6 to 51.3 percent (11.7 percentage points).

The predictions are based on our estimates of how changes in our explanatory variables over this period would affect retention. During this period, the relative wage index rose by 7 percentage points—military pay increased 7 percent more rapidly than our measure of civilian pay—and the unemployment rate increased from 6.3 to 8.0 percent. Bonus coverage and average amount also changed. While the proportion of first-term personnel covered by a bonus fell from .44

Table 5

#### CHANGE IN RETENTION RATE, 1979-1981

	Actual	Predicted
First term	9.2	9.2
Second term	11.7	12.8

<sup>8</sup>See James R. Hosek, Richard L. Fernandez, and David W. Grissmer, *Active Enlisted Supply: Prospects and Policy Options*, The Rand Corporation, P-6967, March 1984, for a fuller discussion.

to .36, their average bonus amount rose by 44 percent in real terms. Second-term bonus coverage rose markedly, from .23 to .46, with the average bonus amount changing only slightly. The demographic composition of the force also changed somewhat, with small percentage point changes in ethnic mix and in non-high school graduates.

Our model also allows us to decompose the change in retention rate by calculating the specific contribution of the changes in each explanatory variable. As Fig. 7 indicates, retention rates appear to have increased from 1979 through 1981 primarily because of increases in relative pay and worsening employment conditions. Changes in bonus amount and coverage had a smaller impact. In the first term, the increase in average bonus amount over the period accounted for 12.4 percent of the increase in retention. Although second-term bonus coverage increased markedly between 1979 and 1981, the impact on retention was overwhelmed by the large pay and unemployment effects and thus accounted for only 7.5 percent of the second-term retention rate increase.

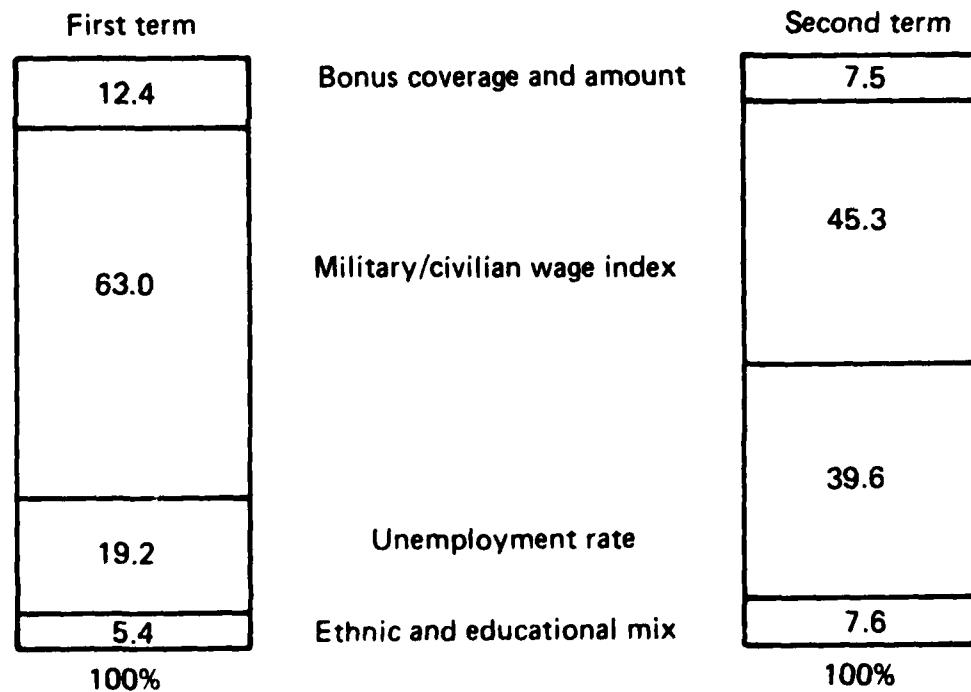


Fig. 7—Contributions to increase in retention, 1979-1981

#### IV. FUTURE RESEARCH

Our analysis can be used to forecast reenlistment, extension, and retention rates for first- and second-term personnel. The forecasts can be accomplished under scenarios defined in terms of changes in military/civilian pay and the unemployment rate. With some additional work, the consequences of changes in bonus coverage, bonus amount, and bonus allocation between first- and second-term reenlistment can also be forecast at an aggregate level.

Such forecasts can be integrated with research on trends in the personnel structure of the enlisted force. Forecasts of career force growth depend partly on assumptions about continuation rates for the large proportion of personnel who have reenlisted or extended in recent years. Personnel induced to reenlist by higher bonuses or poor economic conditions might reenlist at lower than expected rates at second and subsequent retention points. Further, by integrating research on retention and enlisted force trends, we can simulate the effects of various pay, bonus, or other force-shaping policies.

The research can be extended in several ways that would strengthen its usefulness in policy analysis. Although the present report concerns retention behavior at the DoD level, further work could provide estimates by service and occupational group. The dataset should be enhanced to permit analysis of reenlistment eligibility, promotion opportunity, and prior bonus payment, as well as to improve the demographic controls. Such enhancements would contribute to the knowledge of bonus effects, e.g., whether bonuses encourage the retention of high performance personnel; how much bonus effects differ by occupational group; to what extent bonuses encourage retraining into critical skills; and to what extent bonuses can be employed to limit the use of extensions in certain occupations.



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