Technical Report 818

Estimating the Costs of the Army College Fund

Edward J. Schmitz, Charles Dale, and Alan F. Drisko

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Abraham Nelson

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→ This paper estimates the projected costs of the Army College Fund (ACF) program implemented on 1 July 1985. Estimates are based on analysis of program participants to date and on historical usage under the FY 1981-82 ACF program and the Vietnam-era GI Bill. The estimates indicate that future program costs are likely to be considerably below the present actuarial rates.

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Technical Report 818

Estimating the Costs of the Army College Fund

Edward J. Schmitz, Charles Dales, and Alan F. Drisko

Manpower and Personnel Policy Research Group
Curtis L. Gilroy, Chief

Manpower and Personnel Research Laboratory
Newell K. Eaton, Director

The Manpower and Personnel Policy Research Group (MPPRG) of the U.S. Army Research Institute (ARI) performs research in the economics of manpower, personnel, and training issues of significance to the U.S. Army. Questions about the costs of Army educational benefits have generated continuing interest.

This report was prepared as part of the Program Task in Recruiting and Retention of the Manpower and Personnel Research Laboratory as a result of a 27 April 1987 meeting with a representative of the Chief Actuary of the Department of Defense. In June 1987, the results of the report were briefed to the Chief Actuary of the Department of Defense, who agreed to present the results to the Department of Defense Board of Actuaries. Incorporation of the results of this report into the current actuarial model could considerably increase program savings to the Army.

EDGAR M. JOHNSON
Technical Director

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ESTIMATING THE COSTS OF THE ARMY COLLEGE FUND

EXECUTIVE SUMMARY

Requirement:

The U.S. Army Research Institute conducts research on manpower, personnel, and training issues of significance and interest to the U.S. Army. One of the major incentives to Army Recruiting has been the educational benefit package available under the new Army College Fund (ACF) program. Determining accurate projected costs of the ACF program is very important for Army policymakers.

Procedure:

The authors developed a cost model for educational benefits of the Army College Fund (ACF) program based on refinements of the present actuarial model. The new model was estimated using data on historical usage under the FY 1981-82 ACF program and the Vietnam Era GI Bill and previously unavailable data on participants in the program to date.

Findings:

Overall usage of supplemental educational benefits, also called "kickers," will be considerably lower than what is presently assumed in the actuarial calculations. In addition, kicker usage will vary considerably with enlistment term, with usage declining as enlistment term increases.

Utilization of Findings:

The results of this report may be used by the Chief Actuary of the Department of Defense to make refinements to the educational benefits actuarial model. Incorporation of the results of this report would considerably lower the costs of Army educational benefits.

ESTIMATING THE COSTS OF THE ARMY COLLEGE FUND

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ESTIMATING THE COSTS OF THE ARMY COLLEGE FUND

INTRODUCTION

The Army College Fund has been a principal enlistment tool for acquiring high quality recruits, who are defined as high school graduates scoring 50 or above on the Armed Forces Qualification Test (AFQT). While there have been numerous analyses of the effect of educational benefits on enlistments, there have been no analytical estimates of the cost of these benefits.

This paper estimates the projected costs of the current Army College Fund (ACF) program that was implemented on 1 July 1985. First, a model is developed for projecting program costs based upon a refinement of the present actuarial model. Then estimates of the model's parameters are made based upon analysis of program participants to date, historical usage under the FY 1981-82 ACF program, and Vietnam era GI Bill experience. Based upon these estimates, projections are made of the costs of the present ACF program. These estimates indicate that eventual program costs are likely to be considerably below the present actuarial rates.

BACKGROUND

Educational benefits have long been a part of the military's compensation system. The GI Bill provided all military personnel with substantial educational benefits to compensate for the interruption of careers and provide an adjustment mechanism to aid the return to the civilian labor market. In 1977 the GI Bill was replaced by the Veteran's Educational Assistance Program (VEAP). VEAP differed from the GI Bill in that benefits were substantially reduced and soldiers were required to contribute to participate. The soldier's contribution was matched two for one, up to a maximum contribution of $2,700.

The development of educational benefits as an enlistment program began in 1979 with the test of the first supplemental educational benefits, also called "kickers." The kickers differed from all previous educational benefits in that they were only offered to high quality recruits enlisting in specific critical military occupational specialities (MOS). Those kickers became known as Super VEAP and included additional benefits of from $2,000 to $6,000.

In fiscal year 1981 an experiment was conducted by the Department of Defense on educational benefits. This experiment, The Educational Assistance Test Program of 1981, was successful in showing that the Army could increase its enlistments of high quality soldiers without resulting in lower enlistments by the Air Force or Navy. One of the test programs, Ultra VEAP, was implemented in FY82 as the Army College Fund (ACF).

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Several changes have occurred since the implementation of the ACF. In 1985 the VEAP program was replaced by the New GI Bill, which had higher benefit levels and lower contribution requirements than VEAP. The kicker for the four year enlistment was also increased to $14,400, and four year enlistments lost the opportunity to receive both ACF and enlistment bonuses. However, the new ACF program operates largely the same as the program that has been in place since 1982. Individuals receive benefits only if they meet the quality requirements, enlist in an eligible MOS, contribute a portion of their pay, and perform acceptable service in the Army.

The Department of Defense Actuary has made estimates of the projected utilization of educational benefits for the purpose of assessing the present day cost to the Army of the program. The Actuary estimates four key parameters:

- The interest rate to be earned by the Fund

- The time between enlistment and the midpoint of benefit usage

- The percentage of accessions who will use benefits

- The proportion of total benefits spent by each accession

The interest rate is largely determined by market forces, and the time between accession and benefit usage is generally determined by enlistment term. Thus, the key parameters that need to be estimated are the percent of accessions who will ultimately use benefits and the percent of benefits each will use.

DEVELOPMENT OF A COST MODEL

In order to estimate the accrual costs of the Army College Fund it is necessary to develop a model of how much will be spent and when the funds will be spent. Our research maintains the basic framework and assumptions behind the present DoD Actuary model, but enhances the model with additional detail and quantitative estimates of various parameters that are based upon data that have become available from the Defense Manpower Data Center, U.S. Army Finance and Accounting Center, and the Veterans' Administration.

First, we assume that benefit use will occur among people who have separated from the service. This agrees with the present assumption of the DoD and the observed usage of the ACF by accessions from FY81-82. Less than 0.5 percent of these users were in the service.

To determine the cost of the Army College Fund, it is necessary to estimate:

1. The usage of benefits.

2. The timing of benefit usage.

The usage of benefits requires knowledge of both the numbers of individuals who can be expected to become users and the amount of benefits used by each user. This is exactly the procedure used in the present actuarial model. However, it is possible to break down the various parameters into considerable more detail than has been done previously.

The first task in projecting ACF costs is to project the number of users of the program. Two populations of users are considered for forecasting:

- Those individuals who serve one term, then separate.

- Those who reenlist, stay until a later date, and then become users.

The model of factors affecting usage is provided in Figure 1. An individual must proceed conditionally from the enlistment point through the next four steps to become a benefit user. If any step is not performed the individual will not become an ACF benefit user.

For example, the group of immediate users is of great interest for projecting program costs, since the great majority of users can be expected to come from this category. To become a benefit user from this category, an individual must perform five steps:

1. enlist

2. contribute

3. perform military service

4. separate

5. attend school

The recruit must sign an enlistment contract that entitles him or her to ACF benefits. The recruit must be a nonprior service accession, a high school diploma graduate, score 50 or above on the Armed Forces Qualification Test, and serve in an appropriate military occupational specialty (MOS).

Once a recruit has signed an enlistment contract, he or she must contribute to the New GI Bill to maintain eligibility for the additional ACF entitlement. If the recruit fails to contribute to the GI Bill then eligibility for both ACF and GI Bill is lost.

The third step required to obtain eligibility for the ACF is the performance of acceptable military service. The recruit who contributes must serve honorably at least 20 months for a two year enlistment, and 30 months for a three or four year ACF contract.

The fourth step required to become a benefit user is to leave the Army. While soldiers can theoretically use benefits while still in the Army, virtually all users of the program (99.5%) have done so after separating from the Army.
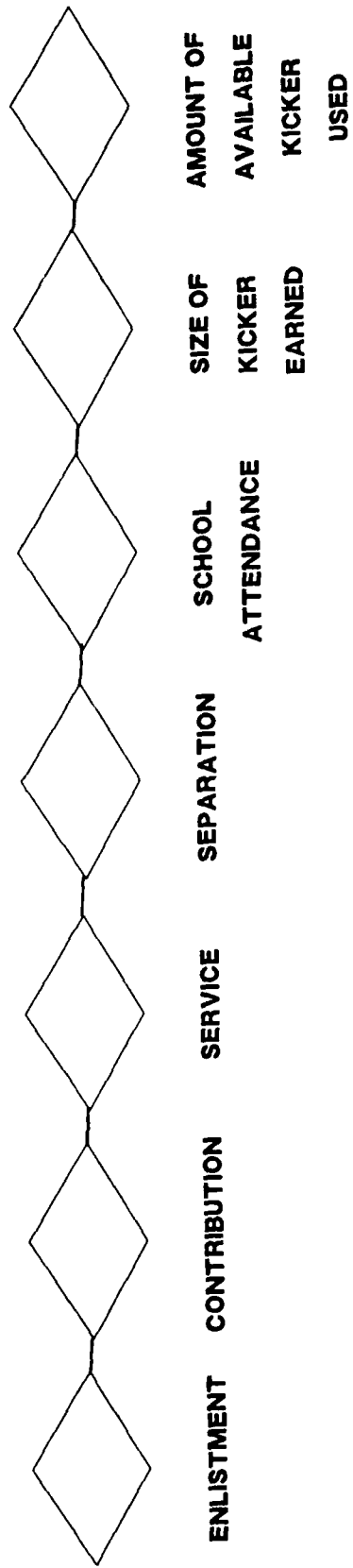
ENLISTMENT — CONTRIBUTION — SERVICE — SEPARATION — SCHOOL ATTENDANCE — SIZE OF KICKER EARNED — AMOUNT OF AVAILABLE KICKER USED

Figure 1. Decision points affecting Army College Fund usage.

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The final step in becoming a benefit user is to attend school and apply for benefits through the Veterans' Adminstration.

Once an individual has become a user of ACF benefits one must estimate his or her utilization of benefits, or the proportion of the nominal kicker that will be used. This can be affected by two factors:

(1) The percentage of the maximum kicker earned.

(2) The percentage of the available kicker used.

Kickers are earned in proportion to months served. In addition to requiring at least 20 or 30 months of honorable service, the full kicker is earned only if the soldier serves the full enlistment term. If the recruit serves only 36 months of a 48 month enlistment, only 36/48 or 75 percent of the kicker would be earned.

The second factor influencing utilization is the proportion of the benefits available to an individual that is used. The full benefit would not be used if the individual attends school less than 36 months or does not attend full time.

Individuals who reenlist could also be expected to experience benefit usage. However, their probability of becoming a user and their utilization rates will occur much later and likely be different from those people who attend school immediately.

The final category of parameters required to project benefit usage is the time between accession and completion of benefit usage. This can be broken down into three periods:

(1) The time between accession and separation

(2) The time between separation and the start of benefit usage.

(3) The time between the start of benefit usage and the midpoint of benefit usage.

Once the usage of benefits and the time between accession and the midpoint of benefit usage has been estimated, these factors can be combined according to the actuarial formula to estimate the amount of money that would need to be set aside for each ACF accession so that sufficient funds would be available to pay for their future use of the program. In the next section we make estimates of each of these factors for the present ACF population so that such calculations can be made.

RESULTS

It is now possible to estimate the cost of the Army College Fund much more accurately than was po··ible when the program was implemented in July 1985. First of all, actual behavior of those recruits who have enlisted under the New ACF program can be measured for the first steps in the process.

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Second, the ACF program that was tested in FY81 and implemented in FY82 provides historical data on the probability of occurrence of many other steps.

We have merged data from the Defense Manpower Data Center, U.S. Army Finance and Accounting Center, and Veterans' Administration (see Appendix A). This data file gives us a complete picture of what has happened to Army College Fund enlistments from the first test of the program in FY81 through any benefit usage that has occurred with the Veteran's Administration through July 1986. Thus, the behavior of ACF recruits with respect to attrition, separation, and benefit usage for up to nearly four years beyond separation can be analyzed.

Adjusting these historical rates based upon changes in the program that occurred with the introduction of the New GI Bill and making projections from this data enables one to make reasonable estimates of the eventual use of the Army College Fund. These projections can be compared to selected data from Vietnam era GI Bill usage available from the Veteran's Administration.

Estimating the Number of ACF Users

Estimates of the ACF program costs are made for two populations:

- Individuals who serve one enlistment

- Individuals who reenlist

The greatest usage of the program would be expected to occur from those who serve only one enlistment term, and the most accurate data is available for this population. The first factor to examine is the proportion of ACF recruits who make contributions to the new GI Bill. The U. S. Army Recruiting Command has recently matched enlistment records with accounting and finance records to identify those individuals who enlisted for the new ACF and make contributions, a prerequisite to receiving benefits. Not all recruits eligible for the program choose to make contributions. They may decide they probably will not attend college, or they may separate prior to having an account established for them with the Accounting and Finance Center.

USAREC estimated the percentage of accessions by enlistment term who made contributions to be:

    2 year   91.6 percent

    3 year   88.5 percent

    4 year   82.4 percent

The next factor in the ACF benefit usage equation is the probability of performing honorable service for 20 months or more for two year enlistments, or 30 months or more for three and four year recruits. We examined the probability of this occurring for the FY82 ACF population. The characteristics of this population are described in Appendix B and compared

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to the FY86 ACF accession population. In general, the populations are very similar in terms of such characteristics as age and test scores.

Enlistment cohort records from DMDC for those individuals who entered the Army in that year who were eligible for the ACF were merged with accounting and finance records of participation under the VEAP. The service records of only those recruits who were ACF eligible and made one or more contributions were examined as to their probability of completing 20 or 30 months of service honorably. The rates by enlistment term were:

2 year   88.4 percent

3 year   74.7 percent

4 year   67.0 percent

For the individual to use the benefits, he or she almost always separates from the Army. The FY82 population that had contributed to VEAP and performed the required service was analyzed to determine their probability of separating from the Army. The separation rates by enlistment term were:

2 year   83.1 percent

3 year   70.1 percent

4 year   69.5 percent

The next critical task is estimating the probability that an individual who has separated from the Army will draw upon his or her military educational benefits. Historically, the user rates for those individuals who have contributed, served, and separated were:

2 year   64.0   percent

3 year   46.9   percent

4 year   14.0   percent

These individuals have several more years within which to begin benefit usage. However, previous research on college attendance (Manski and Wise 1983) and the historical experience of the Veterans' Administration would lead one to expect that most individuals who plan to use the benefits will begin to do so within a few years of separating from the service. Figure 2 provides the cumulative percent of eventual benefit users who have appeared by various points in time after separation from the military. Nearly one half of all eventual users have appeared within one year of separation, and almost three fourths have appeared within three years.

To project the eventual numbers of benefit users that would be likely to eventually appear, the percentage of time between separation from the Army and the start of benefit use was examined. Exponential smoothing was used to a project the eventual number of users.
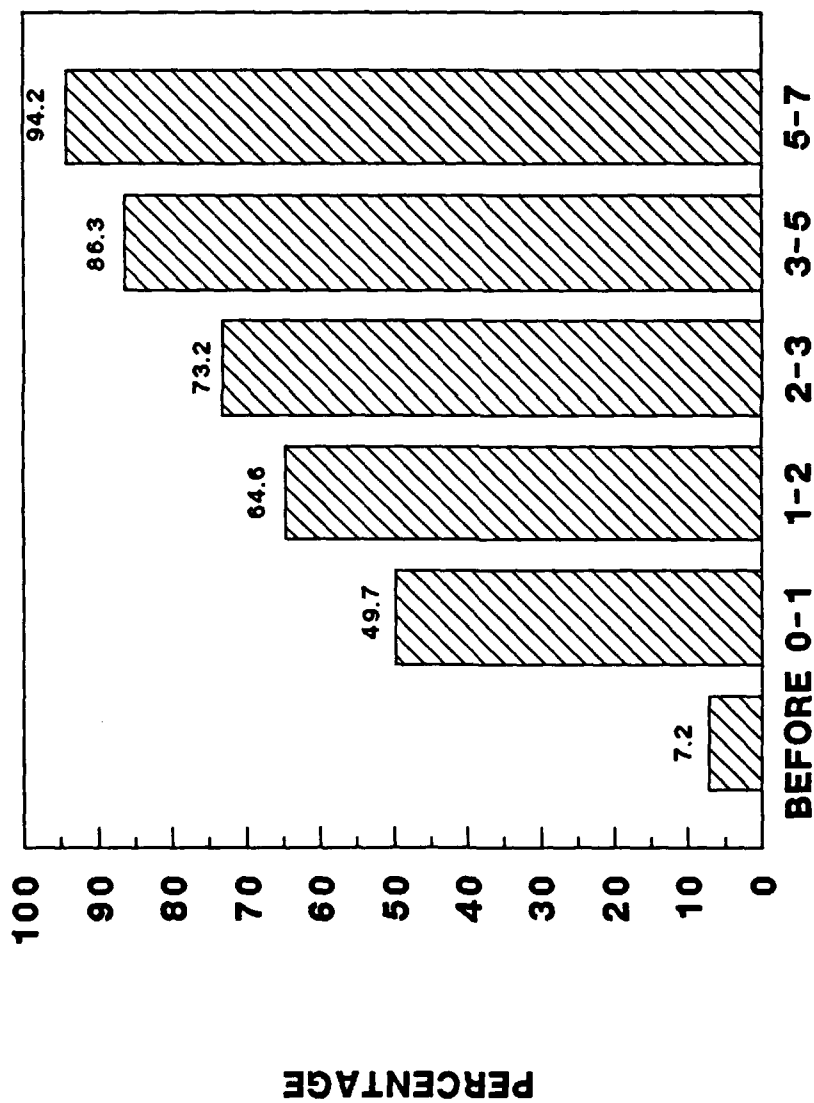
YEARS SINCE RELEASE FROM ACTIVE DUTY

Figure 2. Percentage of ACF users by time since release from active duty.

Figure 3 illustrates the percent of eligible users who had enlisted for two year terms and who had begun using benefits since their date of separation. The data file was sorted in ascending order of time from separation to first use. The longest time from separation date to first usage was 2.8 years. A sharp dropoff in new users was observed about one year after separation.

Exponential smoothing was used to project the cumulative number of users that can be expected. (See Nelson 1973, Little and Sall 1984.) This technique was appropriate here because there was enough data past the inflection point near one year to project this trend. Similar extrapolations were performed for three and four year enlistees. The projected total num... of users by enlistment term is:

2 year   73.8 percent

3 year   64.5 percent

4 year   44.8 percent

One difference between the present ACF program and the ACF program in place in FY 82 is the nature of program refunds. These individuals had the option of receiving a refund of their contributions to VEAP. Individuals participating under the New GI Bill do not have the option of receiving a refund.

To examine whether the nonrefundability of benefits would be likely to increase benefit users, we examined the usage of the noncontributory VEAP test cell of the FY 81 Educational Assistance Test Program. This experimental program provided the same benefit level for education as the existing Army program, known as Super VEAP. However, the soldier made no contributions of his own under the Noncontributory VEAP program. Hence, he or she could receive no refunds if it was determined that college attendance was unlikely. A statistical analysis of the number of benefit users under Noncontributory VEAP found no increase in usage over the Super VEAP program (See Appendix C).

Estimating Utilization Rates

The final factors in the benefit usage equation are the utilization factors, or the proportions of the kickers that are used. The first of these is the proportion of the maximum kicker earned. Those soldiers who begin contributions, serve the required time, and separate had served enough time on active duty to earn the following percentage of the maximum kickers:

2 year   97.9 percent

3 year   98.6 percent
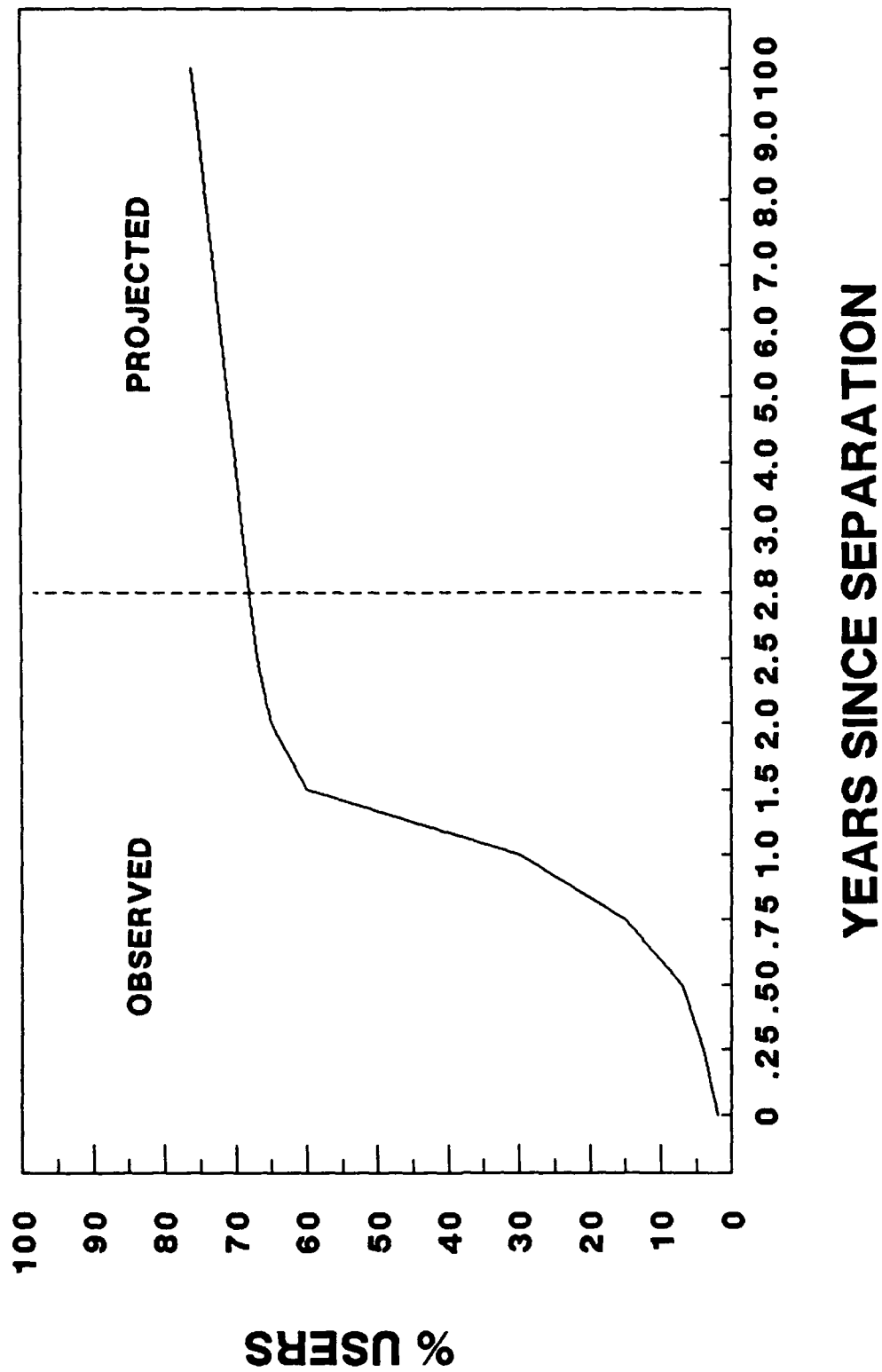
4 year   93.7 percent

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Figure 3. Users of ACF benefits: 2-year enlistees, FY82 cohort.

The final utilization factor is the percent of available kicker that would be spent by each user (see Appendix D). Through July 1986 the FY 82 ACF users had spent the following proportions by enlistment term:

2 year 56.7 percent

3 year 39.0 percent

4 year 14.1 percent

Using the same exponential smoothing technique used to project the number of users, the following estimates of available kicker utilization were made:

2 year 90.3 percent

3 year 56.4 percent

4 year 56.4 percent

The same projected rate was used for both three and four year enlistments because four year enlistments had not had sufficient time from their separation date to exhibit more than minimal benefit usage. Thus, the 56.4 percent utilization of kickers is likely to be conservative, since the four year recruits will be older and are more likely to be married, two factors which have been associated with lower benefit usage.

This utilization factor is also likely to be high for two year enlistments. Under the VEAP, Army College Fund benefits were paid out in relation to the number of months contributed. A two year enlistment in FY 82 had benefits paid out over 24 months, or less than three years of college attendance. Under the New Army College Fund benefits are paid out to all recruits over 36 months. Only those individuals who attend college full time at least four years would receive full benefits. All two year recruits attending college for less than four years would receive lower kickers under the present formula.

Also, since the proportion of benefits used were derived separately from utilization trends of existing users, it is likely to be biased above actual usage. This approach implicitly assumes that individuals beginning to use their benefits after we have observed them will use the same proportion of benefits as those who we have already observed. Table 1 shows Vietnam era GI Bill benefit utilization. Users who began using their benefits later tended to use a lower proportion of their benefits.

Benefit Usage of Reenlistees

Individuals who reenlist may eventually become benefit users at a later date. However, most reenlistees can be expected to stay until retirement. Veterans' Administration (1981) data on the proportion of users who separate at age 31 or older indicates 50.5 percent of such individuals use any benefits. As a conservative assumption, we estimate that these individuals utilize 100 percent of their benefits.

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Timing of Benefit Use

For immediate separations we assume each recruit serves exactly the enlistment term and that the midpoint of benefit utilization is 1.5 years after the start of benefit usage. The average time between separation and the start of benefit usage appears to be similar for all groups. A factor of 1.5 years is used in each case. Thus, the time between accession and the midpoint of usage by enlistment term is:

2 year	5 years
3 year	6 years
4 year	7 years

For reenlistees, all are expected to serve 20 years, retire, and start school immediately. Thus, the average time between accession and usage for all reenlistments is 21.5 years.

Projecting Usage and Costs

Once the different rates have been estimated they can be combined to project the benefit usage of each population. Table 1 shows the percentage of benefits used by single term soldiers. The greatest proportion of benefits would be used by the two year term soldiers, while three and four year term soldiers would use a considerably smaller share of their benefits. All factors are associated with higher benefit usage for the two year enlistments. They contribute at the highest percentage, are most likely to complete the required service, separate at the highest rate, are most likely to use benefits, and use the greatest share of their benefits.

Table 2 projects the share of benefits used by reenlistees. Three year term soldiers would be projected to have the highest reenlistment usage.

Once usage and time to usage have been estimated projections of the cost of each type of kicker can be made according to the actuarial formula. Table 3 combines the usage rates with the time factors, interest rate (8.5 percent), and kicker amounts to project the expected costs of kickers by one term soldiers and reenlistees. As expected, most of the costs would be generated by single term soldiers. The total costs of each of the four types of kickers are:

	NOMINAL KICKER	ACTUARY	ARI
2 year	$ 8,000	$2,772	$2,652
2 + 2 year	12,000	4,158	3,979
3 year	12,000	3,528	1,618
4 year	14,400	3,600	1,152

The 2 + 2 year amount refers to a special program for two-year enlistees who already had 60 semester hours (2 academic years) of college.

Table 1

College Fund Usage Factors For Single Term Soldiers

	2 YEAR RATE	3 YEAR RATE	4 YEAR RATE	AVERAGE RATE
SERVED 20/30 MONTHS	88.4%	74.7%	67.0%	76.7%
SEPARATED	83.1%	70.1%	69.5%	74.2%
CUMULATIVE PERCENT	73.5%	52.4%	46.6%	57.5%
USED BENEFITS	73.8%	64.5%	44.8%	61.0%
CUMLATIVE PERCENT	54.2%	33.8%	20.9%	36.3%
PERCENT OF MAXIMUM KICKER EARNED	97.9%	98.6%	93.7%	96.7%
CUMULATIVE PERCENT	53.1%	33.3%	19.6%	35.3%
PERCENT KNICKER USED	90.3%	56.4%	56.4%	67.7%
CUMULATIVE PERCENT	47.9%	18.8%	11.0%	25.9%
TOTAL USAGE	47.9%	18.8%	11.0%	25.9%

Table 2

College Fund Usage Factors For Reenlistees

	2 YEAR RATE	3 YEAR RATE	4 YEAR RATE	AVERAGE RATE
SERVED 20/30 MONTHS	88.4%	74.7%	67.0%	76.7%
REENLISTED	16.9%	29.9%	30.5%	25.8%
CUMULATIVE PERCENT	14.9%	22.3%	20.4%	19.2%
USED BENEFITS	50.5%	50.5%	50.5%	50.5%
CUMULATIVE PERCENT	7.5%	11.3%	10.3%	9.7%
PERCENT OF MAXIMUM KICKER EARNED	100.0%	100.0%	100.0%	100.0%
CUMULATIVE PERCENT	7.5%	11.3%	10.3%	9.7%
PERCENT KICKER USED	100.0%	100.0%	100.0%	100.0%
CUMULATIVE PERCENT	7.5%	11.3%	10.3%	9.7%
TOTAL USAGE	7.5%	11.3%	10.3%	9.7%

Table 3

Actuarial Costs of Kickers

KICKER TYPE	NOMINAL KICKER	USAGE	TIME IN SERVICE (YEARS)	TIME FR ETS TO SCHOOL (YEARS)	TIME IN SCHOOL (YEARS)	TOTAL ELAPSED TIME (YEARS)	PRESENT VALUE
				SINGLE TERM SOLDIERS			
2 YEAR	$ 8,000	47.9%	2	1.5	1.5	5	$2,548
2+2 YEAR	$12,000	47.9%	2	1.5	1.5	5	$3,823
3 YEAR	$12,000	18.8%	3	1.5	1.5	6	$1,383
4 YEAR	$14,400	11.0%	4	1.5	1.5	7	$ 895
				REENLISTEES			
2 YEAR	$ 8,000	7.5%	20	0	1.5	21.5	$ 104
2+2 YEAR	$12,000	7.5%	20	0	1.5	21.5	$ 156
3 YEAR	$12,000	11.3%	20	0	1.5	21.5	$ 235
4 YEAR	$14,400	10.3%	20	0	1.5	21.5	$ 257
				TOTAL COSTS			
2 YEAR	$ 8,000						$2,652
2+2 YEAR	$12,000						$3,979
3 YEAR	$12,000						$1,618
4 YEAR	$14,400						$1,152

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DISCUSSION

Our results provide two important findings:

1. Overall kicker usage will be considerably below what is presently assumed in the actuarial calculations.

2. Kicker usage will vary considerably by enlistment term, with usage declining as enlistment term increases.

The fact that the usage would be likely to be much lower than previously assumed by the Department of Defense actuary could not be known until enough relevant history of usage from a similar program had been gathered. However, once the usage rate is decomposed into a number of different factors it becomes apparent that usage will be under 50 percent of the kickers, and our result of an average usage rate of 25.9% (Table 1) is closer to the approximately 30% usage estimates calculated by the Veterans' Administration (1981) and the Congressional Budget Office (1985). Contribution, attrition, and reenlistment eliminate well over half the population from immediate use, even though the attrition and reenlistment rates of the ACF population are considerably below the historical rates of soldiers with similar characteristics. Even if usage is considerably above that of the Vietnam era GI Bill population, which we predict it will be, the usage per accession will be considerably lower than the present actuarial estimates.

We also estimate usage and costs will vary considerably by enlistment term. The present rates indicate that the proportional costs would be lower for longer term soldiers due to higher reenlistment rates. We estimate the usage to be much lower for three and four year enlistments due to a number of factors. Three and four year soldiers will be much less likely to qualify for benefits, based upon historical contribution and attrition results. They also appear to be less likely to attend school and use a smaller portion of their kickers, even when we control for the shorter time they have had to use benefits. This can be explained by the fact they are much older when they leave the service, and much more likely to be married, two factors which have been shown to be associated with reduced college attendance. Also, those most motivated to attend college appear to be attracted to the two year program.

The estimates of ACF program cost can be improved substantially in the future as a longer history of participation and usage is observed. Also, we believe the model presented here can serve as the basis for adjusting future cost projections. Given our analysis of the factors that could affect ACF costs and our analysis of historical data, we believe that our projections are reasonable and conservative estimates of eventual ACF costs.

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APPENDIX A
DATA SOURCES

Social Security Numbers were used to merge data from the following files:

DEFENSE MANPOWER DATA CENTER COHORT TAPES:

Social Security Number

Birth Date

Date Entered Active Duty (EAD)

Highest Year of Education at EAD

Marital Status and Number of Dependents at EAD

Sex

Race

Prior Service Indicator

Enlistment Term

Entry Pay Grade

Military Entrance Processing Station (MEPS)

Training/Enlistment MOS

Highest Year of Education at Seperation

Separation Pay Grade

Marital Status and Number of Dependents at Seperation

Separation Program Designator

Interservice Separation Code

Separation Date

Current Basic Active Service Date (BASD)

Current Expiration Term of Service (ETS)

Current Character of Service

Current Reenlistment Eligibility

Current Pay Entry Basic Date (PEBD)

Last Transaction BASD

Last Transaction ETS

Last Transaction Character of Service

Last Transaction Reenlistment Eligibility

Last Transaction Pay Entry Basic Date

DEPIN Date (year and month)

Time in DEP

Time in Service

1944 AFQT Score

Contract Date

VETERANS' ADMINISTRATION DATA:

Social Security Number

Total Refund

Original Participant Contribution

Total Amount of Kicker Available for Use

Amount of Benefits Used

Benefit Use Flag

Date Benefit Usage Began

U.S. ARMY FINANCE AND ACCOUNTING CENTER DATA:

Social Security Number

Total Refund

Gross Contribution

Net Contribution

APPENDIX B
ENLISTMENT CHARACTERISTICS OF ACF ACCESSIONS

Table B-1

Comparison Of FY82 And FY86 Acf Accession Characteristics By Enlistment Term

| | TWO YEAR | | THREE YEAR | | FOUR YEAR | |
	FY82	FY86	FY82	FY86	FY82	FY86
NUMBER	5,318	11,611	8,358	10,368	11,088	13,655
MEAN AGE	19.9	19.7	20.1	19.8	20.5	19.8
MEAN AFQT	72.0	72.1	69.8	72.1	72.0	71.7
PERCENT FEMALE	4.1	12.8	27.9	15.9	9.2	8.1
PERCENT BLACK	10.5	13.2	14.8	13.2	11.1	11.5
PERCENT MARRIED	5.3	8.5	11.7	8.5	17.7	12.1
PERCENT COMBAT	38.8	26.9	15.9	31.8	71.5	48.9

Table B-1 compares the FY82 Army College Fund test cell participants with FY86 cohort for selected characteristics that have been statistically related to benefit usage. In the FY82 cohort, age and being married were shown to be negatively correlated to the probability of contributing and using ACF, while AFQT has been positively correlated to these two factors occurring. Women were shown to have higher attrition, and thus lower benefit usage. Blacks were found to have higher reenlistment rates and thus lower immediate benefit usage. Individuals entering combat MOS exhibited higher contribution and separation rates, hence higher benefit usage.

Among the FY86 group the 2 year enlistees only showed slightly higher average AFQT score (72.10 versus 72.01) and the slightly lower average age (19.73 years versus 19.87 years) would tend to lead to higher eventual benefit utilization. The larger proportions of females, blacks, soldiers in combat MOS's and married soldiers, all would tend to lead to lower the estimates of usage from those we obtained in our analysis of the FY82 cohorts.

For 3 year enlistees, only the lower number of females in FY86 would lead to lower usage rates. The effects of race, age, marital status, combat MOS and average AFQT scores would lead to higher benefits usage rates.

The net effect is mixed for 4 year enlistees. Race, combat MOS, and average AFQT factors in FY86 would tend to lead to lower usage than our estimates for the FY82 cohort, while sex, age, and marital status would tend to lead to lower usage rates.

Overall, the differences between the FY82 and FY86 cohorts are not great. Thus, our estimates of ultimate benefit usage rates are unlikely to be greatly affected by those differences.

APPENDIX C
THE EFFECT OF NONREFUNDABLE BENEFITS ON THE NUMBER OF ARMY COLLEGE FUND USERS

In FY81 an experiment was performed to test the effect of different educational benefit programs on high quality enlistments (nonprior service test category I-IIIA graduates). This experiment and the characteristics of the four different benefit programs is described in Fernandez (1982).

Super VEAP and Noncontributory VEAP program test cells both provided the same educational benefits, except Super VEAP participants could obtain a refund of their contributions should they decide not to attend school. In FY1982 both program test cells entered the Army College Fund program.

In FY82 the Noncontributory VEAP program had 5.6 percent greater proportion of users over the Super VEAP test cell. However, this increase was maintained in FY82 when both cells were under the ACF. Thus, the higher percent of users observed in the Noncontributory test cell appears to be related to test cell characteristics and not the educational benefit program.

Table C-1

User Rates By Year And Test Cell

	Super VEAP	Noncontributory VEAP	Percent Difference
FY 1981			
Eligible Separations	3628	1377	
User Percent	31.4	33.3	+5.6
FY 1982			
Eligible Separations	5259	1961	
User Percent	35.2	37.3	+6.0

APPENDIX D
THE EXPONENTIAL SMOOTHING METHOD

The expected cumulative number of users, and the estimated amount of available kicker utilization, were estimated using the method of exponential smoothing (see Nelson 1973, and Little and Sall 1984, for examples).

At time period $\underline{t}$, the basic one period ahead forecast for variable $\underline{Z}$ is given by

$$Z_{t+1} = (1-w) \; Z_t + (1-w) \; wZ_{t-1}$$

$$+ \; (1-w) \; w^2 \; Z_{t-2} \; +\cdots \hspace{3cm} (D-1)$$

The forecast is weighted by varying the values of $\underline{w}$. If $\underline{w}$ is relatively small, there will be larger weights on recent data, and rapidly declining weights on older data. Conversely, a relatively large value of w puts relatively little weight on the most recent data, and has slowly declining weights over time. The sum of all the weights is equal to unity, regardless of the relative size of $\underline{w}$, so the forecast of $\underline{Z}$ is a true average of past values of $\underline{Z}$.

Forecasts for several periods ahead are obtained by repeatedly applying Equation (D-1) to the data. Table D-1 shows the $\underline{w}$ coefficients used in this report. When the data appear to have a linear trend, the smoothed series obtained from Equation (D-1) is itself smoothed. When a quadratic trend appears to be present, as is the case in this report, the series is smoothed again.

The application of exponential smoothing in this report was largely based on the historical experience of educational benefit usage. In the past most users began using their educational benefits within a few years after their date of separation. New users would constantly start using their benefit after longer periods of separation, but at ever decreasing rates. Similarly, the rate of benefit usage would lessen the longer a user was from his date of separation.

Figure 3 (page 10) illustrates the use of this method. It shows the cumulative percent of eligible users who started using benefits, among 2-year enlistees in FY82 cohort. The data were initially sorted in ascending order based on the time between first payment of educational benefits and the date of seperation. A quadratic trend was used to incorporate the curvilinear shape of the usage line. The end of the large surge at the one year period is seen on the graph as a flattening of the curve. Exponential smoothing could safely be used here because sufficient data were available after the leveling off of the curve to enable a stable monthly projection to be made. Low w weights were used in Equation (D-1) to give a relatively higher weight

D-1

to the most recent data, i.e., the part of the curve over 2 years from the date of separation. This was done to maintain agreement with historical experience, which typically showed a leveling off after the initial surge and not a second surge. About 64% of eligible users had begun using benefits when our data base ended in July 1986. this was projected to ultimately be 73.8% user participation.

Similar projection methods were used for both percentages of eligible users who would begin using benefits, and for the maximum amount of allowable kicker benefits that would be used.

The results are shown in Tables D-2 and D-3. For example, 3-year enlistees in the FY82 cohort who began using benefits had used 39% of their total allowed kicker benefits by July 1986. this was projected eventually to reach 56.4%.

The only exception to the use of the exponential smoothing technique was 4-year enlistees from the FY82 cohort. By July 1986 they had only had enough time to spend about 11% of their allowable data (a few sample projection runs produced the ultimate kicker usage of just over 30%, as shown in Table D-3, but the results were very unstable and sensitive to changes in the w value), we instead chose to make the very conservative estimate that kicker usage of 4-year enlistees would be the same as the kicker usage of 3-year enlistees, and we used a value of 56.4% for both groups.

Table D-1

Weighting Factors for Exponential Smoothing Equations Small Values of w Put the Greatest Weight on the Most Recent Data

	w IN USERS EQUATIONS	w IN KICKERS EQUATIONS
2-YEAR:		
FY81	.0013	.006
FY82	.001	.0025
3-YEAR:		
FY81	.0019	.005
FY82	.0015	.005
4-YEAR:		
FY81	.002	.002
FY82	.005	.004

Users Equations = Conditional upon leaving the Army and being eligible to use kicker benefits, equations project probability of being a user (Table D-2).

Kickers Equations = For actual users, equations project percentage of maximum kicker benefits they will use (Table D-3).

Table D-2

Projections from Users Equations

	NUMBER	LONGEST TIME SINCE SEPARATION (YEARS)	OBSERVED USER RATE	PROJECTED USER RATE
2-YEAR:				
FY81	523	3.6	.608	.675
FY82	839	2.7	.640	.738
3-YEAR:				
FY81	358	2.5	.483	.611
FY82	804	1.6	.469	.645
4-YEAR:				
FY81	479	1.5	.357	.448
FY82	847	0.6	.140	.435

Users Equations = Conditional upon leaving the Army and being eligible to use kicker benefits, equations project probability of being a user.

Table D-3

Projections From Kickers Equations

PROJECTED	NUMBER	LONGEST TIME SINCE SEPARATION (YEARS)	OBSERVED USER RATE	USER RATE
2-YEAR:				
FY81	318	3.6	.702	.903
FY82	537	2.7	.567	.891
3-YEAR:				
FY81	173	2.5	.390	.564
FY82	377	1.6	.249	.352
4-YEAR:				
FY81	171	1.5	.243	.338
FY82	119	0.6	.141	.314

Kickers Equations = For actual users, equations project percentage of maximum kicker benefits they will use.