

A Policymaker's  
Guide to  
Accrual Funding  
of Military  
Retirement

RAND

William M. Hix  
William W. Taylor

19970318 014

DISTRIBUTION STATEMENT A

Approved for public release;  
Distribution Unlimited

*Arroyo Center*

The research described in this report was sponsored by the United States Army under Contract No. DASW0196-C-0004.

**Library of Congress Cataloging in Publication Data**

Hix, William M. (William Michael), 1940-  
A policymaker's guide to accrual funding of military retirement /  
William M. Hix, William W. Taylor.  
p. cm  
"Prepared for the United States Army."  
"MR-760-A."  
Includes bibliographical references.  
ISBN 0-8330-2464-7 (alk. paper)  
1. Military pensions—United States—Finance. I. Taylor,  
William W., 1938- . II. United States. Army. III. Title.  
UB373.H58 1997  
331.25'291355'00973—dc21 96-48479  
CIP

RAND is a nonprofit institution that helps improve public policy through research and analysis. RAND's publications do not necessarily reflect the opinions or policies of its research sponsors.

© Copyright 1997 RAND

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from RAND.

Published 1997 by RAND

1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138

1333 H St., N.W., Washington, D.C. 20005-4792

RAND URL: <http://www.rand.org/>

To order RAND documents or to obtain additional information,  
contact Distribution Services: Telephone: (310) 451-7002;

Fax: (310) 451-6915; Internet: [order@rand.org](mailto:order@rand.org)

---

**A Policymaker's  
Guide to  
Accrual Funding  
of Military  
Retirement**

---

William M. Hix  
William W. Taylor

DOCS CONTROL

*Prepared for the United States Army*

*Arroyo Center*

**RAND**

Approved for public release; distribution unlimited

---

## PREFACE

---

For more than a decade now, the policies under which accrual funding of military retirement has been implemented have hindered the realization of the full benefits envisioned when the legislation was enacted. Earlier research for the Office of the Secretary of Defense, forthcoming from RAND's National Defense Research Institute, describes five such policy issues. This report develops two of them further and recommends initiatives to better align policies with objectives.

This research was conducted as a quick-response activity for the Vice Chief of Staff of the U.S. Army. It was followed closely and assisted by the following Army offices: Deputy Chief of Staff for Personnel, Director of Program Analysis and Evaluation, and Assistant Secretary of the Army (Financial Management). The research was carried out within the Arroyo Center's Manpower and Training Program. The Arroyo Center is a federally funded research and development center sponsored by the United States Army. The study should be of interest to those in the executive and legislative branches who deal with defense budgetary issues.

This document is intended for two levels of audience: one at the policy level and one at the working level. To address the needs of each, the document is divided into two parts. It begins with an extended executive-level summary that provides the background, describes the issues, and provides enough of the underpinning detail to explain the rationale of the recommendations. Those interested in a relatively brief discussion of these issues should read only the summary.

The main body of the report addresses the same issues, but it contains much more detail, including more robust explanation and illustration of the quantitative aspects of the issues involved. Those interested in the detailed explanation may skip the summary and begin reading at Chapter One.

---

## CONTENTS

---

Preface .....	iii
Figures .....	vii
Tables .....	ix
Summary .....	xi
Acknowledgments .....	xxiii
Chapter One	
INTRODUCTION .....	1
History of Military Retirement Funding .....	2
The Basis of the Funding: DoD and the Treasury .....	3
How the Fund Works .....	5
The Benefits of Accrual Funding .....	6
Three Advantages of Accrual Funding .....	6
Historical Precedents .....	9
How the Rest of the Report Is Organized .....	10
Chapter Two	
ACTUARIAL GAINS AND LOSSES .....	11
Assumption Changes .....	12
Benefit Changes .....	13
Experience .....	14
Fund Valuations .....	14
Gain Equations .....	15
Historical Gains and Losses .....	16

Chapter Three	
SHARING GAINS BETWEEN THE DEPARTMENTS OF DEFENSE AND TREASURY . . . . .	21
Concept and Philosophy . . . . .	21
Recent Actions . . . . .	24
Effects of Sharing on the Federal Budget Deficit . . . . .	24
Methods of Allocating Gains and Losses . . . . .	26
Assumption Gains and Losses . . . . .	26
Benefit Gains and Losses . . . . .	32
Experience Gains and Losses . . . . .	34
Amortization Issues . . . . .	40
Examples . . . . .	42
A DoD Example . . . . .	42
The Case Against Longer Amortization Schedules . . . . .	47
An Army Example . . . . .	48
Chapter Four	
SERVICE-SPECIFIC ACCRUALS . . . . .	51
Continuation, or Withdrawal, Rates of the Services . . . . .	52
Accrual Costs Under Service-Specific Rates . . . . .	56
Chapter Five	
CONCLUSIONS . . . . .	59
Appendix	
AN EXPLANATION OF NORMAL COST PERCENTAGE CALCULATIONS . . . . .	61
Bibliography . . . . .	67

---

## FIGURES

---

S.1. Operation of DoD Retirement Fund . . . . .	xiii
S.2. Expected and Actual Retirement Funding FY94 . . . . .	xvi
1.1. DoD Funds Service Since Creation of the Fund in FY85 . . . . .	4
1.2. How Retirement Funds Flow . . . . .	6
2.1. Actuarial Gains: September 30, 1994 Valuation . . . . .	17
3.1. Accumulation of DoD Gain Credit: Experience Gains Only . . . . .	44
3.2. Accumulation of DoD Gain Credit: Assumption Gains Only . . . . .	46
3.3. Accumulation of DoD Gain Credit: Assumption and Experience Gains . . . . .	47
3.4. Accumulation of DoD Gain Credit: Assumption and Experience Gains with 30-Year Amortization Schedule . . . . .	48
3.5. Accumulation of Army Gain Credit . . . . .	49
4.1. Estimated Percent of Entrants Who Retire . . . . .	54
4.2. Percent of Force with More Than Ten Years of Service . . . . .	55

---

---

**TABLES**

---

S.1. Actuarial Gains to Military Retirement Fund . . . . .	xvii
S.2. Estimated Percentage of Entrants Who Retire . . . . .	xviii
1.1. Estimated Percentage of Entrants Who Retire . . . . .	5
2.1. Actuarial Gains FY85–FY94 . . . . .	18
2.2. Historical Differences Between Assumed and Actual Economic Assumptions . . . . .	19
3.1. Component of Assumption Gains Allocable to Defense and Treasury . . . . .	31
3.2. Component of Experience Gains Allocable to Defense and Treasury . . . . .	37
3.3. Present Value of DoD and Treasury Contributions . . .	39
3.4. 1994 Gain Distributions to DoD and Treasury . . . . .	39
3.5. Five- and Ten-Year Amortization Schedules for DoD Share of Assumed Gains . . . . .	43
4.1. Two Estimates of Service-Specific Nondisability Accruals . . . . .	57

---

## SUMMARY

---

### BACKGROUND

For many years, the Defense Department (DoD) funded military retirement on a “pay-as-you-go” basis. That is, each year the defense budget reflected the amount of money needed to pay those already retired. This approach worked well as far as paying retirees went, but it allowed policymakers to make decisions that affected the size of the future retirement bill—e.g., increasing the size of one of the services or changing the seniority of the force—without facing any immediate fiscal consequences for the increased future retirement burden. It could be years or even decades before the effect was felt in the form of additional funds needed to pay retirees.

In an attempt to promote better management, in 1984 Congress directed DoD to switch to an accrual system of funding retirement. Under this procedure, each year the individual services transfer from their budgets into a fund the amount necessary to fund the eventual retirement benefits earned by active duty and selected reserve personnel in the budget year. Thus, if today a service changes policies that affect the value of future retirement benefits for its current force, that service now sees the immediate budgetary consequences of that decision in an increase in the amount transferred to the retirement fund.

Retirement pay responsibility for military service rendered before October 1, 1984, shifted to the Department of the Treasury. At that time, the unfunded liability of this group was estimated at \$529 billion. That is, a civilian retirement plan faced with the same retirement liabilities would have needed \$529 billion in assets to be con-

sidered fully funded. The Treasury would make annual payments to fund this amount amortized over 60 years.

## **DoD RETIREMENT FUND**

To accommodate these fund transfers from both departments, a DoD retirement fund was established and a Department of Defense Retirement Board of Actuaries designated to monitor its actuarial status. Here's how the fund works.

Annually the services transfer by means of monthly payments an amount equal to a percentage of their basic pay accounts for active and reserve components. The percentage differs for active and reserves, but within those categories it is identical for all services. In FY95, fund transfers equaled 35.5 percent of the active duty basic pay and 10.5 percent of reserve pay. The Treasury Department annually transfers an amount equal to one year's amortized payment for the pre-1984 liability, adjusted for changes in assumptions and experience. The money in the fund is invested in nonnegotiable government securities, and it draws interest.

Transfers into the fund and its investment transactions qualify as intragovernmental transfers (even though they represent an outlay to DoD) and thus have no effect on the deficit. Only payments to retirees from the fund represent outlays from the federal government. Figure S.1 depicts the process.

## **WHAT'S THE ISSUE?**

There are two issues of immediate interest about the fund's operation:

- If the fund experiences an actuarial gain<sup>1</sup>—that is, if the actual liability turns out to be less than the expected liability—only the Treasury Department benefits. In the past decade, the fund has experienced gains of about \$288 billion, all of which went to re-

---

<sup>1</sup>Throughout this report, we refer to "actuarial gains and losses." These refer to changes in the expected liability of the fund and not to gains and losses in the normal sense of debits and credits to cash accounts. Thus, when the fund sustains a gain, it means that the expected liability of the fund has decreased.

duce Treasury's liability. Arguably, DoD's outlay could have been reduced by a significant fraction of this amount.

- Under current procedures, because the Air Force retires a greater proportion of its personnel, the Army, Navy, and Marines are in effect subsidizing Air Force retirements. This cross-service subsidy amounts to hundreds of millions of dollars annually.

## HOW DOES THE TREASURY DEPARTMENT BENEFIT?

### Gains and Losses

Three things can happen that will cause the fund to sustain a gain or loss:

- Funding assumptions can change.
- Benefits can change.
- Experience can differ from the assumptions.

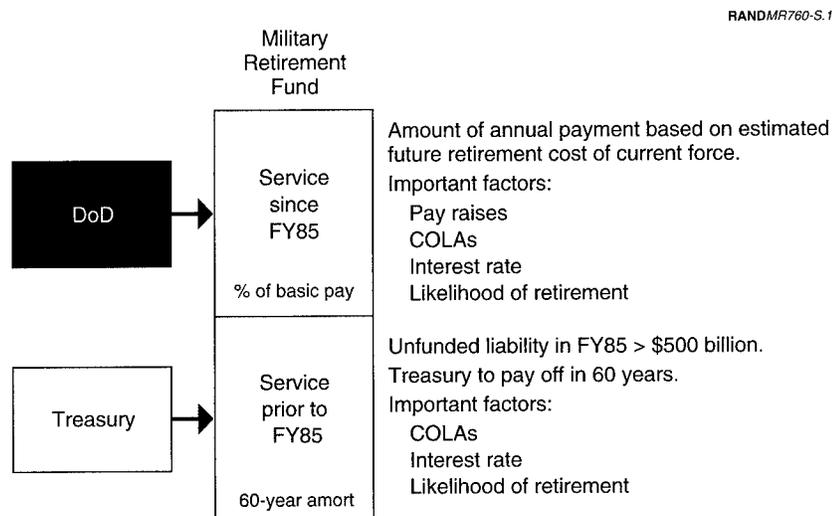


Figure S.1—Operation of DoD Retirement Fund

**Funding assumptions.** To determine how much money DoD has to transfer to the fund, the actuaries make some assumptions about economic and noneconomic factors. Economic factors include assumptions about pay raises, cost of living allowance (COLA) increases, and interest rates. An increase in the assumption about what pay raises will occur means that the future liability of the fund will increase because retirees will draw more money. Therefore, the amount transferred into the fund has to increase to account for this future liability. An assumed increase in the COLA will have a similar effect. But an assumption that the interest rate will increase has the opposite effect. The fund will earn more interest, and thus the amount transferred can be less.

The so-called noneconomic assumptions include such things as the rates of retirement and the longevity of retirees. If, for example, higher retirement rates or lower death rates are assumed, funding requirements increase. Over the life of the fund, noneconomic assumptions have had a small effect relative to the economic assumptions.

**Benefits.** Any benefit change will affect the size of the funding contribution. A recent example is the congressional decision to delay the rise in COLA payments. Until 1994, retirees received cost-of-living increases on January 1 of each year. The Congress delayed 1994 and 1995 increases for nondisabled retirees until April 1 and 1996–1998 increases until October 1.<sup>2</sup> These delays reduce the actuarial value of retirement benefits and, hence, the funding required. The effect of the change is assessed in the next valuation following the legislative change.

**Experience.** As mentioned, the actuaries make certain assumptions at the beginning of the year. Frequently, these differ from what actually happens during the year. For example, if the pay raises or COLAs approved differ from the assumptions, the fund earns more interest than expected, or fewer people retire than expected, the funding requirements change.

---

<sup>2</sup>Subsequent legislation changed the 1996 increase to April 1 and returned the 1997 and 1998 increases to January 1.

## An Example

An example will illustrate the manner and scope of these various changes on the fund's liability. For example, the fund valuation dated September 30, 1994, provided the basis for the Treasury's payment due on October 1, 1995. The fund valuation estimates the payments required to amortize the original unfunded liability of \$529 billion and changes in the total unfunded liability resulting from (1) changes in long-term future assumptions deemed appropriate since the last valuation, (2) changes in benefits legislated since the last valuation, and (3) differences between assumed and actual assumption values during the last year. These changes, which are amortized over 30 years, are computed simply by estimating the fund assets and accrued liability under the old assumptions, then under the new. The difference between the two estimates is defined as the actuarial gain or loss for the current valuation. Each component of the gain or loss is computed independently and can therefore be attributed to its specific cause: assumption changes, benefit changes, and experience.

In this case, changes occurred in all three areas. The fund valuation of September 30, 1994, shows that under the assumptions in effect at the last valuation, the expected unfunded liability as of September 30, 1994, would have been \$539.7 billion. However, during the year, the Board of Actuaries decided to reduce assumptions concerning future increases in basic pay and COLAs from 5.5 and 5.0 percent to 4.5 and 4.0 percent respectively. Further, the fund earned more interest than had been expected (8.6 vice 7.5 percent). Finally, a three-month delay in COLA increases reduced the value of retiree benefits, lowering the accrued liability. The net actuarial gain equaled \$48.3 billion. In other words, changes in assumptions and differences between expected and actual experience reduced the unfunded liability by \$48.3 billion. The Board of Actuaries then computed 30-year amortization schedules that reduced the Treasury's payments accordingly.

All of these changes lowered the assumed liability of the fund, resulting in an actuarial gain. Figure S.2 shows their cumulative effect. The cumulative effect of the assumption changes reduced liability by \$23 billion, the benefit change by \$2.3 billion, and the experience

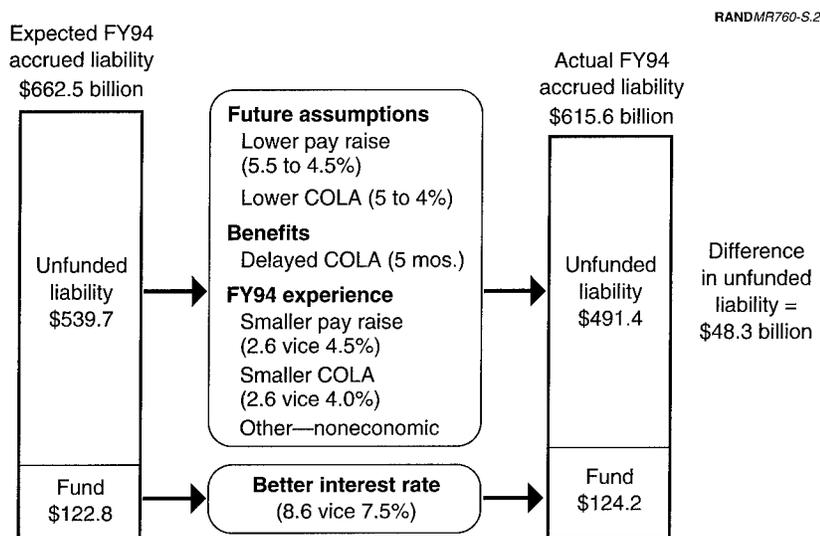


Figure S.2—Expected and Actual Retirement Funding FY94

changes by \$23.1 billion. The better-than-expected interest rate yielded \$1.4 billion. The net effect was to reduce the unfunded liability of the fund, which is the figure of interest, at the end of FY94 by \$48 billion.

### What Happens to the \$48 Billion?

The short answer is that the reduction is applied against the Treasury Department's liability. Although Treasury gets a credit for the entire amount, it does not get to take it in a single year. Rather, it must amortize the credit over 30 years. (Recall that its initial unfunded liability is being amortized over 60 years.)<sup>3</sup> Thus, every year for the next 30 years, Treasury's liability is reduced. The annual payments are not level, as in a normal mortgage amortization, but are increased annually by the assumed pay raise percentage so as to cause the payments to represent a constant fraction of payroll.

<sup>3</sup>This amortization period was reduced to 50 years by recent Board action.

## HOW OFTEN DOES THE FUND GAIN OR LOSE?

An annual gain of \$48 billion is not unusual. For the first 10 years of the fund's existence, actuarial gains totaled \$288 billion. Since its inception, the fund has never sustained a net actuarial loss. Table S.1 charts the history of the fund's first decade. It shows the gains that occurred in the various categories.

## HOW DO THE ARMY, NAVY, AND MARINES SUBSIDIZE AIR FORCE RETIREMENTS?

Turning to the second area, we mentioned above that the services transfer annually to the retirement fund an amount equal to a percentage of basic pay for active duty and selected reserve service members. The intention is that this transfer fund the future retirement liability of the individuals represented in those accounts. This policy treats all services as a group without differentiation by service or officer content and is consistent with the assumption that all services retire service members at an identical rate and that all services have the same officer and enlisted mix.

But the services retire people at very different rates. Table S.2 shows estimates of the percentage of entrants who remain on active duty until retirement. These estimates are based upon continuation rates observed from FY87 to FY89, the latest rates prior to the drawdown. Both for the officer and the enlisted forces, the Air Force retires the highest percentage, the Marine Corps the lowest. The Army and the Navy fall in between. The Navy retires a greater proportion of its enlisted force than the Army. The Army retires a slightly greater

**Table S.1**  
**Actuarial Gains to Military Retirement Fund**

Category	Change (\$ billion)	Percent of Total
Experience	+166	58
Assumption changes	+117	40
Benefit changes	+5	2
Average annual change	+29	

**Table S.2**  
**Estimated Percentage of Entrants Who Retire**  
**(Based upon FY87–89 rates)**

	Officer	Enlisted
Air Force	38.4	26.5
Army	30.0	9.9
Navy	28.4	14.3
Marine Corps	27.9	8.5

percentage of its officer force than the Navy. Accrual percentages computed with service-specific personnel policies would differ significantly by service. Current policies cause the budgets of the Army, Navy, and Marine Corps to carry several hundred millions of dollars a year of the cost of Air Force personnel policies. Hence, in its budget the Air Force appears several hundred million dollars a year cheaper than its actual cost; the other services appear more expensive. Chapter Four of this report develops this issue in more detail and includes estimates of the magnitude of the cross-service subsidies.

### WHAT SHOULD HAPPEN?

We suggest that the gains and losses that accrue to the retirement fund be shared between the Departments of Defense and Treasury. The division should reflect the relative contributions of the populations for which the departments have responsibility. This change would require new legislation. Further, we recommend that each service contribute to the retirement fund an amount that reflects its retirement liability. This change may not require legislation.

### Sharing Gains (and Losses)

Present law calls for Treasury to reap the benefit of any gains and to shoulder the burden of any loss. To date, no net losses have occurred, and Treasury has been the sole beneficiary of the gains. As a result, Treasury's annual payments have been cut roughly in half. Without the \$288 billion in gains over the past decade, Treasury's

annual payment would be \$25.2 billion. That payment has been trimmed to \$11.5 billion.

Two facets of the legislation that created the retirement fund seem to provide powerful arguments for sharing the gains. First, the clear intent of Congress for establishing the fund was to promote better management. The law says that the monthly accrual payments are intended "to permit the military services to recognize the full cost of manpower decisions made in the current year." By making the consequences of decisions affecting retired pay immediately apparent in service budgets, the Congress provided strong incentives for better management. Services that use manpower more efficiently can see an immediate effect in the annual outlay to the retirement fund. But not being able to share in the actuarial gains tends to dissipate the effect of the incentive. This interpretation of the law is clearly consistent with the notion that the services would view the money in their accrual budgets as fungible within each service. If that accrual money is not fungible within a fixed aggregate service budget, management incentives are severely weakened.

Second, Congress clearly divided the responsibility for funding service, relieving DoD of any responsibility for military service rendered before 1984 but holding it liable for all who serve after that date.

Given a desire to promote good management and a clear division of responsibility for the retired benefits, it would seem reasonable that any actuarial gains or losses ought to be divided between the two departments on the same basis. After all, a gain or loss simply represents a recomputation of the amount needed to fund a benefit earned. Thus, the agency responsible for the liability ought to get part of the credit for or bear the cost of any recomputation. Current law does not allow this, but the Board of Actuaries has recommended the change.

Assuming the law could be changed, determining how the gains and losses would be apportioned would involve some complexities. Such a division has been proposed in the past by the Board of Actuaries, and Chapter Three of this report provides a detailed proposal for the division.

The dollar amount of the change would be substantial. Under reasonable amortization schedules, the steady-state DoD credit for

gains could grow from about \$1 billion the first year to a steady state of between \$14 billion and \$18 billion a year. The Army share of that credit would be slightly less than one-third, growing to a figure between \$5 billion and \$6 billion a year—about 8 percent of the current Army budget.

### **Paying for Retirement by Service**

As mentioned above, Congress intended that the retirement fund would allow the services to recognize the full cost of their manpower decisions each year. The committee report accompanying the legislation went on to say that “the individual services manage their forces in different ways and different tradeoffs would occur among the services.”

One of the different ways the services manage their forces is by experience mix. The Marine Corps has the most junior force, reflecting its mission, organization, and philosophy. The Air Force has the most experienced force. The experience mix directly affects retirement rates and, in turn, the relative costs of funding these retirements.

If the legislative intent were to be followed, the Air Force would set aside the largest fraction of its base pay to fund retirements, and the Marine Corps the smallest. Yet, as described above, each service sets aside an identical percentage of its basic pay. This policy in effect causes the Army, Navy, and Marines to reflect part of the cost of higher Air Force rates of retirement. If service-specific accrual rates were to be implemented, it is not clear whether the aggregate service budgets would be adjusted accordingly or not. In either case, the services would benefit from the change in that their budgets would more accurately reflect the actual cost of their manpower decisions.

### **A FINAL CAVEAT**

As mentioned, most of the transactions associated with the fund are intragovernmental transfers and thus have no implications for the budget deficit. However, if the recommendations concerning sharing of actuarial gains made here were accepted and the Defense Department aggregate budget were allowed to remain unchanged, the

increased governmental outlays of the department and the services would increase the deficit. A deficit increase would occur even though the topline of a service budget did not change. If, on the other hand, the DoD budget were to be reduced by the amount of the actuarial gains, no deficit increase would occur.

The implementation of our service-specific accrual rates would have no effect on the deficit. The Army and all other services except the Air Force have an incentive to support our recommendations for service-specific accrual rates and to allow the three service beneficiaries to spend the accrual savings on other priorities. If the service aggregate budgets are adjusted to account for the shifts in accrual costs, the Army, Navy, and Air Force still have an incentive to support the change in that it will cause their budgets to more accurately reflect the real cost of their own policies. For example, it would strengthen any future Army argument concerning reductions in or inappropriateness of its "service share" of the DoD budget.

---

## ACKNOWLEDGMENTS

---

The authors are grateful for the confidence the Army leadership, in particular the Vice Chief of Staff, showed in the Arroyo Center by asking us to conduct this quick-response effort. We are indebted to many members of the Army staff, but in particular we would like to acknowledge LTG Ted Stroup, COL Jim Murray, COL Roland Carter, LTC Cornell McKenzie, and LTC Mike Streff for their assistance. In the Army Secretariat, MG Bob Howard, Mr. Steve Coakley, Ms. Sharon Weinhold, and Mr. Dale Lynn were generous with their time, advice, and information. In the Office of the Secretary of Defense, Mr. Jim Laughlin was especially helpful in providing background and data. Our continuing dialog with Mr. Chris Doyle from the DoD Office of the Actuary was essential to our understanding and presenting the complex issues associated with retirement accrual. In addition, Mr. Doyle, together with his colleagues, Mr. Ben Gottlieb and Mr. Lee Giesecke, reviewed an earlier draft and provided thoughtful and essential suggestions.

We are deeply indebted to RAND colleagues Dick Eisenman, David Grissmer, and Jim Hosek, whose earlier research provided the essential underpinnings of this report. Jim Hosek's suggestions on an earlier draft were most useful. Jerry Sollinger contributed immensely to the structure and clarity of the report, in particular the extensive summary.

---

**INTRODUCTION**

---

For the last decade, military retirement has been funded on an accrual basis. The annual budgets of the Military Departments now set aside funds to pay the eventual retirement benefits being earned by the active force in the current year.<sup>1</sup> Accrual funding was begun with the explicit objective of causing budgets to reflect the full cost of armed services manpower, thereby providing enhanced incentives for sound manpower decisions.

Two policies bias the accrual costs the services face and therefore hinder achievement of the goal of accrual funding. Today, each service budget reflects, in part, (1) costs that arguably should be borne by the Department of the Treasury and (2) the cost of the personnel policies of the other three services. These issues are important because they determine the allocation of many hundreds of millions of dollars each year.

The two issues have been under discussion in the Army recently as budgetary pressures have become increasingly binding. These two issues, as well as three others of less current importance to the Army, are described in a forthcoming document by RAND's National Defense Research Institute for the Office of the Secretary of Defense.<sup>2</sup>

---

<sup>1</sup>Here we use the term "active force" to mean current service members, both active duty and reserve, as distinguished from the retired force. Where necessary, we distinguish the active and reserve components by the terms "active duty" and "reserve component" forces.

<sup>2</sup>Richard Eisenman et al., *The Accrual System for Funding Military Retirement: Assessment and Recommended Changes*, MR-811-OSD, RAND (forthcoming)

## HISTORY OF MILITARY RETIREMENT FUNDING

Until the military retirement fund was created in 1984, military retirement was funded and budgeted on what is commonly called a “pay-as-you-go” basis under which the defense budget contained estimates each year of the amount needed to pay those already retired; no funds were budgeted to fund the accruing liability for future retirees. The budgets of the individual services were completely free of retirement obligations.

Laws governing private-sector retirement plans require firms to set aside money each year to fund the accruing retirement liability of their current work force so that when employees actually retire, sufficient funds reside in a fund to make the obligated payments over the retirees' years of retirement. Unlike these private-sector retirement plans, before 1984 the military plan was never funded prospectively.

Pay-as-you-go funding had a significant drawback, which led to the creation of the military retirement fund. Under pay-as-you-go funding, decisions to increase or decrease the size of the force or to change the retention patterns of personnel carried no immediate change in retirement budgets. Such policy changes affected retirement budgets only in later years, when either the number or grade structure of actual retirees later changed. And since the retired pay account was held at the Department of Defense level, the service budgets were never directly affected by policies that changed retirement obligations, current or future.

Since 1984, under accrual funding, a decision to reduce the seniority of the Army (and therefore the likelihood of retirement) this year reduces the amount of money required in this year's Army budget to fund future military retirement. Similarly, a decision to increase the experience of the Army increases the amount the Army must pay into the retirement fund this year. Marginal changes in future retirement obligations are immediately recognized rather than delayed, providing stronger incentives for the services to make economically sound policy choices. But, as described later in this report, certain aspects of current funding policies mute the strength of these incentives and can be improved.

## THE BASIS OF THE FUNDING: DoD AND THE TREASURY

When the fund was created, the DoD Retirement Board of Actuaries determined that at that time there was an unfunded liability of \$529 billion. In other words, a fully funded plan (assuming future interest and inflation rates, pay raises, and certain other assumptions) would have had assets equal to \$529 billion to pay then and future retirees *for the service they had rendered before the creation of the fund*. The law creating the fund assigned this original unfunded liability to the Treasury Department, which was given 60 years by the Board of Actuaries to amortize the \$529 billion.<sup>3</sup> Hence, the obligation to pay benefits already earned moved from Defense to Treasury.

The law assigned the Department of Defense (and, hence, the Military Departments) the requirement to fund only *service rendered after the creation of the fund*. To fulfill this obligation each Military Department annually budgets an amount, computed as a percentage of its basic-pay account, to fund prospectively the proportion of future retired pay attributable to service rendered in the budget year. These accrual amounts are computed as a normal cost—a level percentage of basic pay based upon the ratio of the present value of future benefits to the present value of future basic pay for the active force.<sup>4</sup> These accrual amounts are transferred from Defense to the military retirement fund at Treasury at the end of each month during the execution year. They count as outlays to Defense but as intragovernmental transfers to the federal government as a whole.

---

<sup>3</sup>The Department of Defense has chosen an amortization scheme in which Treasury payments are not level but instead increase with assumed pay raises over the 60-year period, causing the increased payments to reflect a constant proportion of the assumed future wage bill. This amortization schedule allows the unfunded liability to grow in nominal terms to over \$1.6 trillion in 2025, according to latest estimates, then fall rapidly to liquidation at the end of 2044, 60 years after the creation of the fund. The amortization period was recently reduced to 50 years.

<sup>4</sup>Title 10, Chapter 74, requires the Department of Defense to use an actuarial method called aggregate entry age normal (AEAN) as the means of computing the normal cost. This method, like most actuarial methods, does not deal very effectively with the large swings in retirement cost that could accompany severe management actions such as the recent post-Cold War drawdown. While this issue is not further developed here, a cohort-based rather than entry-age-based methodology can be argued as more appropriate. In the long run, the two methods yield similar results, but the AEAN methodology yields lower near-term savings in a drawdown (as well as lower near-term costs during a build-up). This methodology issue is one of the five accrual issues treated in Eisenman et al., *op. cit.*

Figure 1.1 illustrates the funding basis between DoD and Treasury.

In determining the percentage of basic pay each service pays into the fund each year, differences in service personnel policies are ignored. All services contribute the same percentage. In FY95 the services transferred amounts equal to 35.5 percent of their active duty basic pay and 10.7 percent of their selected-reserve pay. This practice was originally established for convenience only, and it fails to recognize interservice differences in the budget process, since it allows the service budgets to carry average rather than specific costs.

Table 1.1 shows the percentages of each service's entrants who remain on active duty until retirement, based on continuation rates for the years FY87–89. While these historical rates may seem irrelevant to today's force, the DoD Retirement Board of Actuaries uses an actuarial method of estimating retention behavior that relies on long-term estimates of continuation rates. This method dismisses more recent drawdown and postdrawdown rates as anomalies, relying instead on the predrawdown era as the best estimate of future rates after the effects of the drawdown have subsided. The interservice seniority differences continue in the postdrawdown years.

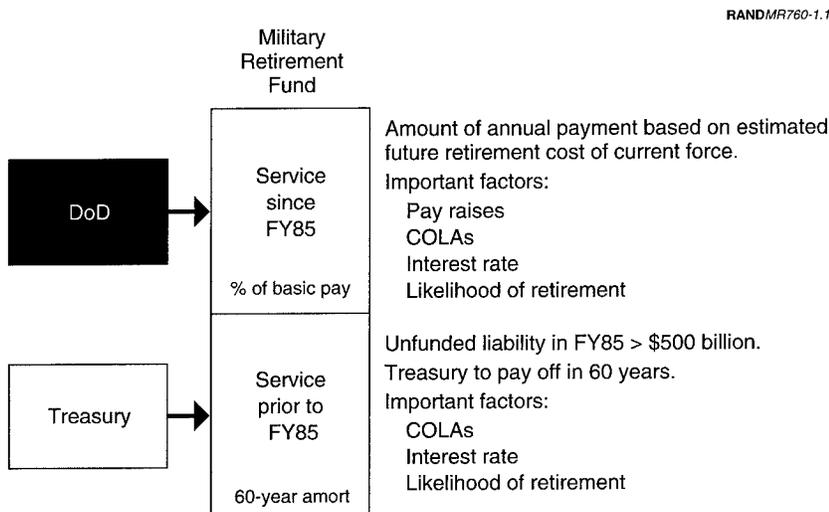


Figure 1.1—DoD Funds Service Since Creation of the Fund in FY85

**Table 1.1**  
**Estimated Percentage of Entrants Who Retire**  
**(Based upon FY87-89 rates)**

	Officer	Enlisted
Air Force	38.4	26.5
Army	30.0	9.9
Navy	28.4	14.3
Marine Corps	27.9	8.5

For both the officer and the enlisted forces, the Air Force maintains the most experience, the Marine Corps the least. Army and Navy experience falls between that of the other two services. The Navy retires a greater proportion of its enlisted force than the Army. The Army retires a slightly greater percentage of its officer force than the Navy. Accrual percentages computed with service-specific personnel policies would differ significantly. Current policies cause the budgets of the Army, Navy, and Marine Corps to carry several hundred millions of dollars a year of the cost of Air Force personnel policies. Hence, in its budget the Air Force appears several hundred million dollars a year cheaper than its actual cost; the other services appear more expensive. This issue is developed in Chapter Four with quantitative estimates of the magnitude of these cross-service subsidies.

## HOW THE FUND WORKS

As Figure 1.2 shows, both DoD and Treasury make annual payments into the military retirement fund. The fund invests these payments in nonmarketable Treasury securities, which yield interest and return a par value to the fund at maturity. Further, the checks for current retirees are written on the fund.

The payments of both Departments into the fund as well as the fund's investment transactions are considered intragovernmental transfers and therefore have no effect on the federal budget deficit. Only the payments made to retirees constitute outlays to the federal government and therefore add to any deficit or reduce any surplus.

RANDMR760-1.2

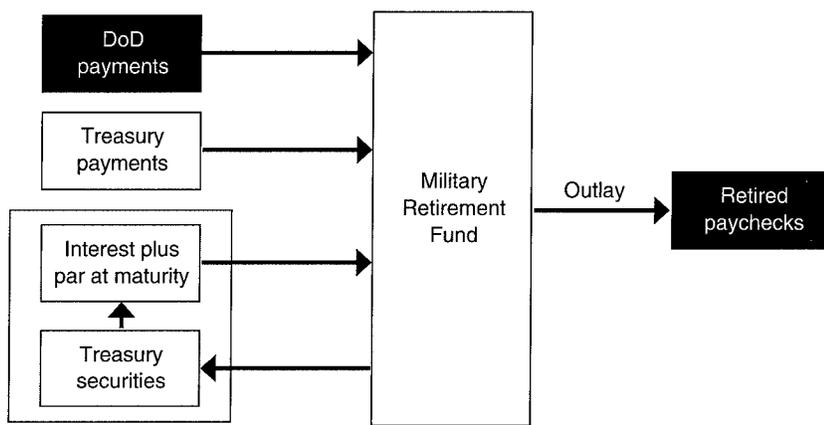


Figure 1.2—How Retirement Funds Flow

## THE BENEFITS OF ACCRUAL FUNDING

### Three Advantages of Accrual Funding

Accrual funding generates three classes of advantages: (1) by setting aside money in a fund,<sup>5</sup> it assures that adequate funds will be available for future retirees; (2) by recognizing liabilities for future retirement costs as they accrue, it provides incentives for decisionmakers to make economically sound tradeoffs; and (3) it makes visible the true costs of maintaining a work force. Military retirees are protected because the fund earmarks future tax revenues to be used to pay them.

<sup>5</sup>The financing mechanism established by Congress is more accurately called an accrual cost accounting system with no advance funding. The DoD and Treasury “contributions” are essentially costs to their respective departments but are offset by income to the military retirement “fund.” The net effect on the government is to require no new taxes, nor does this mechanism affect the budget deficit or government debt to the public. For additional information, see Eisenman et al., *op. cit.*, p. 7, from which this note is taken.

First, and least important to government retirement programs, accrual funding prevents employers from deferring the funding of their accruing obligations until pensions are actually drawn, placing retirees at risk should the employer be financially unable to make pension payments when they are due. This concern motivated the passage of the Employee Retirement Income Security Act (ERISA) in 1974. ERISA required private employers to vest employees early in their careers and to fund their retirement plans according to strict rules. The military retirement system is exempt from ERISA rules, there being little concern for the federal government's future ability to pay military retirees.

Instead, it was the other two classes of benefits that led to the law requiring accrual funding of military retirement in 1984. Economic incentives for decisionmakers to include the eventual cost of retirement in their decisions represent the most powerful and important benefit. Indeed, it is the benefit mentioned most prominently in the legislative record surrounding the act. As they decide their budgets and programs, the Military Departments have an incentive to make different decisions if they include the accruing retirement liability associated with their decisions than if that liability is ignored, as was the case under pay-as-you-go funding. For example, if the Army were examining options to free up funds for modernization or increases in operations tempo, reductions in personnel end strength might be addressed. An analysis that included savings from reduced retirement accruals might be more useful than if those savings were ignored.

But for the incentive to have its full effect, the Army must actually be permitted to apply the funds saved from its leaner manpower program to its modernization or readiness accounts. Herein lies the uncertainty. Because the programming and budgeting process is inherently political in nature, the Army's aggregate budget, or "topline" in the jargon, is not necessarily set and fixed in advance of the Army's internal tradeoffs and decisions, such as the manpower tradeoff suggested above. Indeed, it is entirely plausible that in the budgeting process, when informed of an Army plan to trade manpower seniority for other priorities, the Secretary of Defense might simply reduce the Army's topline by the amount of the manpower savings, including the retirement accrual amount. Hence, if during its budget deliberations the Army perceives that the Secretary of Defense might

actually reduce the Army budget rather than allow it to reapply the manpower savings, the Army has little incentive to propose the option in its budget. Hence, the power of the incentive envisioned for accrual funding is dependent entirely upon the perceived fungibility of the money at issue. The Army has powerful incentives to consider and decide tradeoffs when it views the money as its own; it has a lesser incentive if it views the money as threatened by the proposal of a tradeoff.

Another way to frame this question is to ask whether the aggregate level of the Army budget is decided top-down and in advance as a share of an already agreed-to defense budget or bottom-up and later by summing the manifold Army and defense budget decisions. In the inherently political environment of defense budgeting, the answer, of course, is that the budget is decided both ways. Further, the answer depends upon the general economic and political environment in the nation and upon whether options generate savings or require additional funding. In times of tight budgets, the Secretary of Defense is likely to respond to Army proposals that require additional funds by telling the Army to find the money within its own resources. But proposals that offer savings could result in a reduction of the Army's topline either to fund other service priorities or to reduce the aggregate defense budget.

In flusher times, such as during the early Reagan years, the politics were such that the services found it relatively easy to fund initiatives that added to their aggregate funding requirements. Similarly, options that offered savings were more likely than today to result in the services actually being able to spend the saved money on their other priorities. During that period, the aggregate defense budget was growing. Its aggregate level probably was decided largely in advance and was fairly independent of budget and program options generated in the services.

While there is no clear and definitive answer to the fungibility question, the term "service share" has some currency in the Pentagon. Service arguments that their share of the defense budget has fallen or is too low may not carry the day but can at least add weight to other arguments for funds. This argument relates to the third benefit of accrual funding, the argument for visibility of costs. Even if the Army is not allowed to keep the savings associated with a policy initiative,

the removal of the cost of that initiative from the Army budget will show the Army to be less costly, all other things being equal, than when its budget contained that cost. This visibility to the Secretary of Defense, the President, and the Congress permits them to make better decisions about the funding and use of the various services. To the extent that the Army, for example, is shown to be less costly than other services, and to the extent that more than one service can be employed for certain missions, the accuracy in reflecting the true relative costs of each one permits the Secretary of Defense, the administration, and the Congress to make better decisions about the size and funding of each service.

Hence, the second benefit pertains to the incentives internal to the Army itself to make economically sound decisions. The third benefit, the visibility argument, pertains both to internal Army incentives and to incentives of agencies external to the Army. Both benefits are important to the two accrual issues raised here.

### Historical Precedents

While the outcomes of inherently political budget processes are unpredictable, there is historical precedent to indicate that accrual savings can actually be turned into spending authorizations for DoD when there are *compelling demands* for the money to fund essential programs. At the other extreme, in the FY94 budget process, the Congress actually took funds from defense on the basis of an accrual proposal that was never implemented.<sup>6</sup>

Two events in the last ten years illustrate how retirement changes play in the political process. In FY86 the Congress changed the retirement formula for newly entering service members, substantially lowering the actuarial value of retirement for those personnel under what became known as the REDUX version of military retirement. The following year, the Congress legislated a transition to a separate

---

<sup>6</sup>Indeed, the Senate Appropriations Committee in the FY94 Appropriation Conference (two years ago) took away the entire savings *projected* by the actuary's *proposed* DoD share, even though legislation authorizing DoD to share in these gains was never approved. Of the nearly \$600 million total originally taken, over \$300 million was never recovered for the DoD budget. See *Senate Report of the Committee on Appropriations, 102nd Congress, July 1993*.

normal cost percentage for part-time reservists. In both cases, retirement accrual payments were actually reduced<sup>7</sup> from those originally projected in the DoD budget. And in both cases DoD had long lists of high-priority budget items that still lacked funding. In both cases, DoD was permitted to apply the resulting savings directly to fund these items. Interestingly, the priority of the remaining budget items determined the funding order without regard to the service from which the savings had come.

Another example where DoD was able to spend the money occurred in the FY92 budget during the drawdown of military personnel. Projected savings in future retirement obligations were used to directly offset the costs of funding the Voluntary Separation Incentive (VSI) program designed to encourage voluntary separations during the drawdown. Here the program that was funded by the savings (the VSI program) was directly related to the source of the savings (reduced numbers of future retirees).<sup>8</sup>

A central theme in these examples is that although the spending decision is a separate procedure that depends on priorities that evolve naturally in the budget process and not on the source of the savings, unfunded programs with high priorities can get funded with projected savings.<sup>9</sup>

## HOW THE REST OF THE REPORT IS ORGANIZED

The next chapter discusses how the fund sustains actuarial losses. It is this process that, over the years, has benefited the Department of the Treasury, to some extent at the cost of the DoD. Chapter Three describes how gains and losses might be shared between the two departments, and Chapter Four describes a process by which each service would pay for its own retirement costs. The final chapter presents our conclusions.

---

<sup>7</sup>The first generated a total savings with a present value of \$500 million, and the second reduced accrual payments by a total whose present value was \$3.8 billion; see DoD Office of the Actuary, "Past Valuation Results," August 2, 1995.

<sup>8</sup>Discussions with members of the DoD Comptroller's office, March 1996.

<sup>9</sup>Indeed, even in the first example, the Senate Appropriations Committee took the \$600 million to fund a program deemed critical by its staff members.

---

**ACTUARIAL GAINS AND LOSSES**

---

At the end of each fiscal year, the Department of Defense performs a valuation of the military retirement system using methods and assumptions approved by the Board of Actuaries. In conducting the valuation, DoD determines the system's unfunded liability and compares it against the unfunded liability that would have obtained had all actuarial assumptions in the prior year's valuation been met. The total actuarial gain for the year is the expected unfunded liability minus the actual. This gain is further subdivided into gains arising from three major sources: (1) changes, if any, in the COLA, wage growth, interest, and decrement *assumptions* for the future, (2) changes, if any, in future *benefits*, and (3) the extent to which *experience* during the past fiscal year varied from that assumed. Changes in these factors can affect both the Defense Department's normal cost payments and the Treasury Department's payments to retire the original unfunded liability.

To understand the genesis of gains and losses, it is useful to begin with fundamental definitions and relationships. The accrued liability (AL) of the system is defined as the difference between the present value of future benefits (PVFB) for everyone now in the system (retired and active) and the present value of future normal cost payments (PVFNC) that will be made into the fund (F):

$$AL = PVFB - PVFNC.$$

This accrued liability can in turn be divided into funded and unfunded portions,

$$AL = F + UFL,$$

where  $F$  denotes the assets in the actual fund and  $UFL$  represents the unfunded portion of the accrued liability. This terminology is often abbreviated, and  $UFL$  is referred to as the unfunded liability. It quantifies the extent to which fund assets ( $F$ ) fall short of theoretical requirements ( $AL$ ).<sup>1</sup>

We can solve for the unfunded liability and incorporate the accrued liability definition to obtain the  $UFL$  working equation:

$$UFL = PVFB - PVFNC - F.$$

Gains and losses are recorded as the changes in the unfunded liability that result from a decision to employ new assumptions, to reflect changes in benefit levels, or to reconcile actual experience with that expected. A gain results when these factors yield a lower unfunded liability. Similarly, a loss occurs when new assumptions yield a higher unfunded liability.

Since gains or losses are common, a policy issue for the federal government is how to share them between Defense and Treasury. To illuminate that issue it is necessary to pursue a more detailed discussion of the three sources of actuarial gains and losses: assumption changes, benefit changes, and experience.

## ASSUMPTION CHANGES

The actuarial funding process relies importantly on the following assumptions about the future:

- The **interest rate** assumption. This not only determines the expected growth rate of the fund, but also provides an essential component for the present-value calculations of future streams

---

<sup>1</sup>While most of the notation, terminology, and basic notions in this and following sections are adopted from publications and memorandums prepared by the DoD Office of the Actuary (several of which will be referenced later), a useful general publication that develops the same concepts and tracks many of the variations in actuarial terminology is C. L. Trowbridge and C. E. Farr, *The Theory and Practice of Pension Funding*, Homewood, IL: Richard D. Irwin, Inc., 1976.

of benefits and normal cost payments. The higher the assumed future interest rate, the lower the funding requirement. Hence, a decision to raise the assumed interest rate yields a gain.

- The **wage, or basic-pay, growth rate** assumption. This affects both the present value of future benefits and the present value of future normal cost payments. The higher the assumed future growth in basic pay, the greater the funding requirement. Hence, a decision to raise the assumed wage-growth rate, through a complex relationship,<sup>2</sup> increases the unfunded liability, yielding a loss.
- The **cost-of-living allowance (COLA)** assumption. Based upon estimates of future inflation, this determines the growth rate of future benefits for retirees. As with wage growth, the higher the assumed COLA growth, the greater the funding requirements and corresponding loss when assumed rates are raised.
- **Noneconomic assumptions.** Several factors, including active duty decrement rates, mortality rates, and transfer rates, determine retirement rates and retiree longevity; these exert a significant influence on the funding required.

When the Board of Actuaries changes these assumptions, it changes the amount of money required to make the fund actuarially sound and, therefore, the annual payments required of the Treasury to retire the original unfunded liability and of the Defense Department to fund the accruing liability.

## BENEFIT CHANGES

When a decision is made to change the value of the retirement benefit by changing the computational procedure or COLA timing, for example, funding requirements also change. The most recent example was a congressionally mandated delay of COLA increases for retirees. Until 1994, retirees received cost-of-living increases on January 1 of each year. The Congress delayed 1994 and 1995 increases

<sup>2</sup>A decision to raise the assumed wage-growth rate increases both the PVFB and PVFNC for service rendered after the decision, and increases only the PVFB for service rendered before the decision. The increase in PVFNC offsets the increase in PVFB for future service, causing the largest share of any loss to come from predecision service.

until April 1 and 1996–1998 increases until October 1 for nondisabled retirees.<sup>3</sup> These delays reduce the actuarial value of the retirement benefit and, hence, the funding required. The gain is assessed in the next valuation following the legislative change.

## EXPERIENCE

Changes in funding needs also occur when actual experience in a year differs from that expected. When actual increases in basic pay or COLAs differ from those estimated, when the fund earns more or less interest than expected, or when retirement or other decrement rates differ from those expected, funding requirements change accordingly. These experience gains and losses are generated by the need to reconcile recent actual experience with what was expected, whereas assumption gains and losses, described above, result from policy decisions to change long-term assumptions about the future.

## FUND VALUATIONS

Each year, as of the end of a fiscal year, the DoD Office of the Actuary conducts a fund valuation that provides the basis for normal cost and unfunded liability payments for the following budget years. For example, the fund valuation dated September 30, 1994, provided the basis for the Treasury's payment due on October 1, 1995. The fund valuation provides estimates of payments required to amortize the total accrued liability, including the unfunded portion (the original unfunded liability was \$529 billion). Under current policy, gains and losses are credited to Treasury, and each is amortized over 30 years, using a payment schedule that increases at the same rate as the assumed wage increase. Although negative gains, or losses, can also occur, in practice no overall net loss has occurred since the fund's inception.

---

<sup>3</sup>Subsequent legislation changed the 1996 increase to April 1 and returned the 1997 and 1998 increases to January 1.

## GAIN EQUATIONS

In the following sections, for simplicity, we use the term “gain” generally to mean either a gain or a loss, the only difference being the sign of the value.

**Assumption gains** result from funding requirement changes induced by revised assumptions about future interest rates, wage growth, cost of living, and noneconomic factors. Assumption gains are computed simply by calculating the unfunded liability (the amount by which fund assets fail to cover accrued liability) under the old assumptions, and then again under the new. The difference between the two results is defined as the actuarial gain or loss for the current valuation. This yields the following assumption gain equation:

$$\text{AssmptGain} = \text{UFL}(\text{oldAssmpt}) - \text{UFL}(\text{newAssmpt}).$$

**Benefit gains** result from funding requirement changes induced by changing the authorized level of benefits. Their computation is similar to the computation of assumption gains: simply take the difference between the unfunded liability under the old benefit provision and that under the new benefits. We then get the benefit gain equation:

$$\text{BenGain} = \text{UFL}(\text{oldBen}) - \text{UFL}(\text{newBen}).$$

**Experience gains** occur when actual experience with interest rates, wage growth, COLA, or other assumptions in any given year fails to match that expected. It is calculated by first estimating this year’s expected value of the unfunded liability (denoted by  $E[\text{UFL}]$ ). This is the value of the unfunded liability that results if every factor behaves exactly as assumed at the beginning of the year—in other words, if fund assets accrue at the assumed interest rate, benefit payments out of the fund are exactly as expected, and normal cost and the payments into the fund by DoD and Treasury are exactly as expected. To get the total experience gain, we subtract the actual unfunded liabil-

ity from the expected value. This yields the following experience gain equation:<sup>4</sup>

$$\text{ExperGain} = E[\text{UFL}] - \text{UFL}.$$

Figure 2.1 illustrates the effect of these changes. The fund valuation of September 30, 1994, shows that under the assumptions in effect at the last previous valuation the expected unfunded liability as of the end of September 1994 would have been \$539.7 billion, but during the year the Board of Actuaries decided to reduce assumptions concerning future increases in basic pay and COLAs from 5.5 to 5.0 percent and from 4.5 to 4.0 percent respectively. Further, a three-month delay in COLA increases reduced the value of retiree benefits, lowering the accrued liability. Finally, the fund earned more interest than had been expected (8.6 vice 7.5 percent). The net actuarial gain equaled \$48.3 billion. In other words, changes in assumptions and differences between expected and actual experience reduced the unfunded liability by \$48.3 billion. The Board of Actuaries then computed 30-year amortization schedules that reduced the Treasury's payments accordingly.

## HISTORICAL GAINS AND LOSSES

The FY94 gain total of \$48 billion, though a substantial dollar amount, is not atypical of the fund's gain history. During the first ten years of the fund's existence, ending in FY94, actuarial gains totaled \$288 billion. Indeed, gains have occurred in every year;<sup>5</sup> a net actuarial loss has never occurred. As Table 2.1 shows, \$166 billion (58 percent) of the first ten years' gains arose from *experience* gains, and \$119 billion of those resulted from lower-than-planned pay raise and COLA increases. Changes in future *assumptions* accounted for an-

<sup>4</sup>Although seldom referenced, there is an implied order in the calculation of these gains that has no effect on the total. To analyze the impact of the individual gain components, it is better to calculate the experience gain with the most recent set of assumptions and the most recent benefit program. Thus the assumption gain and benefit gain calculations typically precede the calculations for experience gains.

<sup>5</sup>A funding arrangement or set of assumptions that will advance the timing of contributions and thereby increase the assets in the pension fund, making gains predominate over losses, is considered "conservative" in actuarial terms. See Trowbridge and Farr, *op. cit.*, p. 27.

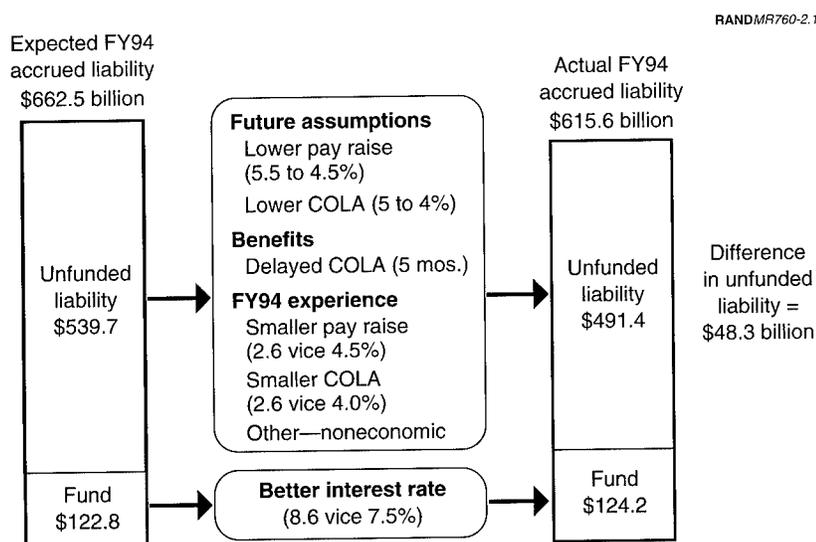


Figure 2.1—Actuarial Gains: September 30, 1994 Valuation

other \$117 billion (40 percent). *Benefit* changes have contributed little to aggregate gains, accounting for only \$5 billion (the remaining 2 percent). Actuarial gains have averaged about \$29 billion a year and, as the rightmost column in Table 2.1 demonstrates, show no signs of diminishing.

Experience gains continue primarily because recent pay and COLA increases have been smaller than forecast and the fund has yielded a higher-than-planned rate. Table 2.2 highlights the differences between assumed and actual COLAs, basic pay increases, and interest earnings. “Assumed” columns show the long-term rates that were assumed in the valuation just prior to the year in which the actual increases occurred. For example, in the bottom row of Table 2.2, the last fund valuation prior to FY95 (conducted as of September 30, 1994) assumed an FY95 pay increase of 4.5 percent. The actual FY95 pay increase (effective January 1, 1995) turned out to be only 2.6 percent.<sup>6</sup>

<sup>6</sup>We should point out that this difference for a single year is not particularly relevant in actuarial terms, where the stress is on capturing long-term behavior.

**Table 2.1**  
**Actuarial Gains FY85–FY94**  
**(\$ billions)**

Valuation Date 9/30	Experience Gains			Benefit Gains	Assumpt Gains	Total	
	Interest	COLA/Pay	Nonecon Subtotal				
85	0.5	11.3	2.0	13.8	0.0	0.0	13.8
86	1.0	23.7	-5.2	19.5	3.0	0.0	22.5
87	1.4	23.0	-0.8	23.6	-0.2	-3.6	19.8
88	1.6	6.1	9.0	16.7	0.0	56.3	73.0
89	1.8	7.8	0.5	10.1	0.0	0.0	10.1
90	2.1	4.5	-1.8	4.8	0.0	0.0	4.8
91	2.4	1.6	2.8	6.8	0.0	40.9	47.7
92	1.8	9.1	13.0	23.9	0.0	0.0	23.9
93	1.7	15.5	6.9	24.1	0.0	0.0	24.1
94	1.4	16.0	5.7	23.1	2.3	23.0	48.3
Totals	15.7	118.6	32.1	166.4	5.1	116.6	288.0

NOTE: Data reflect fund valuations done by the DoD Office of the Actuary on September 30, the end of each fiscal year. Negative numbers indicate actuarial loss rather than gain. Source: DoD Office of the Actuary, "Past Valuation Results," August 2, 1995.

In every year, actual basic pay increases have fallen short of the long-term assumptions. In every year except that following the September 30, 1990 valuation, actual COLAs have fallen short of those assumed as well. Moreover, in every year the fund has earned more interest than planned. Together, these unrealized assumptions have generated the \$166 billion in actuarial gains shown in Table 2.1.

The Board of Actuaries has revised its long-term assumptions about every third year. Assumed pay raises have dropped from 6.2 percent when the fund was created to 4.5 percent for the September 30, 1994, fund valuation. But even the new 4.5 percent rate substantially exceeds the recent experience shown in the "Actual" column. COLA assumptions have been changed only once, a drop of one percentage point to 4, but again still higher than recent experience. Interest rates, which were raised twice, have been lowered to 6.75 percent. Actual interest rates, while falling every valuation year, still exceed even the highest assumed rate of 7.5 percent.

**Table 2.2**  
**Historical Differences Between Assumed and Actual Economic Assumptions**  
**(All figures in percent)**

Valuation Date	Basic Pay Increase		COLA Increase		Interest	
	Assumed	Actual	Assumed	Actual	Assumed	Actual
9/30						
85	6.2	3.0	5.0	0.0	6.6	10.6
86	6.2	3.0	5.0	1.3	6.6	10.3
87	6.2	2.0	5.0	4.2	6.6	10.1
88	5.75	4.1	5.0	4.0	7.0	9.8
89	5.75	3.6	5.0	4.7	7.0	9.7
90	5.75	4.1	5.0	5.4	7.0	9.4
91	5.5	4.2	5.0	3.7	7.5	9.3
92	5.5	3.7	5.0	3.0	7.5	8.9
93	5.5	2.2	5.0	2.6	7.5	8.6
94	4.5	2.6	4.0	2.8	6.75	8.6

NOTE: "Assumed" columns reflect the long-term rates used in the valuation just prior to actual increases. The actual salary increase following the September 30, 1985 valuation date occurred on October 1, 1985; all others on January 1 of the year following the valuation date. All COLA increases occurred on January 1 of the year following the valuation date except those since the September 30, 1993 valuation, which have been delayed until April 1 each year.

SOURCES: "Assumed" columns come from "Valuations of the Military Retirement System" for relevant years; "Actual" columns come from DoD Office of the Actuary, "Past Valuation Results," August 2, 1995.

At issue with long-term economic assumptions is the relevance of recent trends for long-term projections. For example, recent low rates of wage growth may result not from short-term phenomena but from long-term structural changes in wage patterns, perhaps as a result of greater international competition in the labor market. While this economic issue is worthy of further consideration, it lies beyond the scope of this report.

---

**SHARING GAINS BETWEEN THE DEPARTMENTS OF  
DEFENSE AND TREASURY**

---

Current policies award all gains to Treasury. Each year's gain is amortized over 30 years. The cumulative effect of the \$288 billion in gains since the fund was created has been to cut Treasury's annual payments roughly in half. Without these gains, Treasury's 1994 payment would have been \$25.2 billion instead of its actual \$11.5 billion. In this chapter we present a rationale for Defense to share in future gains (as well as any future losses) and to eventually assume complete responsibility for all gains.

**CONCEPT AND PHILOSOPHY**

The military retirement accrual accounting system was established principally to reflect in current military budgets the costs of current manpower decisions by DoD and the services, thereby improving incentives to make economically sound policy choices<sup>1</sup> (interestingly enough, resolving this so-called "budget problem" is regarded as a primary purpose for funding private pensions as well).<sup>2</sup> Under the old pay-as-you-go military retirement policy, the DoD budget contained only the funds necessary to write the current checks for those already retired. Hence, service decisions to change personnel strengths, retention, or grade structure resulted in no current-year budgetary changes in retirement. Such changes affected retirement

---

<sup>1</sup>U.S. House of Representatives, *Department of Defense Authorization Act, 1984, Report of the Committee on Armed Services on H.R. 2969*, May 11, 1983.

<sup>2</sup>The second primary purpose for funding pensions is security of employee expectations. See Trowbridge and Farr, *op. cit.*, p. 4.

budgets only after soldiers in the force at the time of the decision actually retired—for junior soldiers, many years after the policy change. Under accrual funding, the retirement cost implications of this year's decisions are immediately reflected in this year's budget through each service's accrual payment. A decision to reduce strengths or grade structure, for example, should be reflected immediately in a lower accrual payment, giving the military services stronger incentives to use manpower efficiently.

In creating the fund, Congress decided to relieve Defense of the responsibility to pay for retirement benefits earned before the fund was created and to assign that \$529 billion responsibility to Treasury. The military services have been and continue to be required to fund only the cost of benefits earned since the fund's inception on October 1, 1984. Thus, under accrual funding the services are meant to face the full cost of their manpower decisions since the fund was created, but not the cost of earlier decisions. Payments for service rendered before 1984 represent the cost of earlier, not current, manpower decisions and are the responsibility of Treasury to pay.

This fundamental funding concept—*splitting responsibility* for military retirement between Treasury and Defense *according to when retirement benefits are earned*—is set forth in Chapter 74 of Title 10. The law makes it clear that the Treasury Department is to liquidate the original unfunded liability, which Chapter 74 defines as “the present value (as of October 1, 1984) of future benefits payable from the fund that are attributable to service in the armed forces before October 1, 1984.”<sup>3</sup> Chapter 74 requires Defense to fund benefits earned by service rendered on or after that date.

The concept establishing the temporal split of responsibility between the two departments would certainly seem to apply equally as well to any subsequent adjustment or reestimation of funding requirements for benefits earned during those two periods. This means that actuarial gains and losses should also be parsed to Treasury and Defense. A gain or loss simply reflects a recomputation of the amount required to fund benefits earned. Hence, the agency making the origi-

---

<sup>3</sup>Title 10, Chapter 74, Section 1465(a).

nal payment for the benefits earned ought to receive credit or be charged for any later recomputation of the agency's obligation.

Under current policy, however, such is not the case. The existing law,<sup>4</sup> despite its clear articulation of the fundamental funding concept, appears to assign all gains and losses to Treasury, although it can be argued that the law is ambiguous on the sharing of experience gains.<sup>5</sup> The committee report pertinent to the legislation offers no rationale for this disparity, yet it is clearly inconsistent with the underlying funding philosophy. Nor does either the committee report or the legislation address how to deal with gains and losses after Treasury has paid off the original unfunded liability (now projected to occur in 2043) and DoD assumes all funding responsibilities (including the risk for all gains and losses).<sup>6</sup> This omission will require the legislation to be changed eventually, so a timely change could clarify the fundamental funding responsibilities as well.

While the allocation of all gains and losses to Treasury precludes Defense from benefiting from gains, it also protects Defense from the additional liabilities of any future actuarial losses. The apparent inconsistency in allocating responsibility for funding between the two Departments but assigning gains and losses only to Treasury may have been to protect Defense from these unanticipated liabilities. The legislative history is not rewarding on this question. Despite the ambiguity over the legislative intent, both the DoD Retirement Board of Actuaries and a member of the House Armed Services Committee

---

<sup>4</sup>Ibid.

<sup>5</sup>The Defense Department's Office of the Actuary has pointed out that Chapter 74 of Title 10 mentions two of the three classes of gains and losses, i.e., those arising from benefit and assumption changes, but it is silent on experience changes. (See DoD, Office of the Actuary, *Allocation of Actuarial Gains and Losses Under the Military Retirement System to DoD and Treasury*, Staff Paper, May 1, 1992.) It is not clear whether this omission was intentional or accidental on the part of the drafters of the legislation. The committee report accompanying the legislation offers no help. Hence, since the fund's inception, the Executive has always treated experience gains like the other two, assigning them to Treasury. Logically, there is no obvious reason the law would treat experience gains differently in this respect. See U.S. House of Representatives, *Department of Defense Authorization Act, 1984, Report of the Committee on Armed Services on H.R. 2969*, May 11, 1983.

<sup>6</sup>Additionally, we should note that when all retirees with pre-1984 service die, the distinction between DoD and Treasury is no longer meaningful. At that time, DoD will have all the responsibility.

have recently supported changing the law, proposing to allow Defense and Treasury to share the responsibility for gains and losses. Neither effort has yet come to fruition.

## RECENT ACTIONS

The latest (1992) quadrennial report of the DoD Retirement Board of Actuaries to the President and Congress recommends that the law be changed to:

1. define the Treasury's responsibility to be only the liability for benefits attributable to service before October 1, 1984 (i.e., "the pre-October 1984 accrued liability"), including subsequent adjustments for experience, assumption changes, and benefit changes, and
2. define DoD's responsibility to be the liability for benefits attributable to service since October 1, 1984, including subsequent adjustments.<sup>7</sup>

Neither the Bush administration, near its end when the report was rendered, nor the Congress acted on the actuarial board recommendations to share gains and losses between the two departments.

On January 19, 1995, Representative John P. Murtha (D-PA) introduced a bill, H.R. 568, that would likewise require gains and losses to be shared between Treasury and Defense based on the proportion of the gain or loss attributable to service before (Treasury) and after (Defense) October 1, 1984. The bill was never reported out of the Committee on National Security.

## EFFECTS OF SHARING ON THE FEDERAL BUDGET DEFICIT

As described earlier, Treasury payments into the fund do not count as outlays to the federal government and therefore do not affect the budget deficit. Hence, actuarial gains that reduce Treasury's pay-

---

<sup>7</sup>Department of Defense, Retirement Board of Actuaries, *Report to the President and Congress on the Status of the Department of Defense Military Retirement Fund*, December 31, 1992, p. 9.

ments into the fund have no effect on the deficit. On the other hand, if Defense were to share in future gains and reduce its payment into the fund within a fixed topline, spending the difference on other priorities such as modernization, manpower, or readiness, the deficit would rise even though the DoD topline and DoD outlays would not change. Actuarial losses would, of course, have the opposite effect, reducing funds available to the department for nonaccrual purposes within a fixed topline. Any proposal to allow DoD to share in gains without concomitant reduction in DoD's topline will, therefore, likely meet with resistance by those in the administration and in the Congress concerned about the deficit.

The assumptions used by the Board of Actuaries have made gains more frequent than losses. In fact, gains have occurred in every year and will probably predominate in the future. As a result, tens of billions of dollars have been transferred from Defense to Treasury. This, however, is not the same as saying that Defense has given up tens of billions of dollars it might have otherwise spent on tanks, aircraft, manpower, or other goods and services. For that to be the case, one would have to assume that Defense would have been able to keep the money. It is not at all clear whether the Executive Branch or the Congress would have allowed Defense to keep the money or would have reduced the budget accordingly, in which case DoD and the services have lost nothing due to the gains.

The independence of the Board precludes Defense from determining assumptions. Nevertheless, during the drawdown DoD argued that the drawdown would reduce future retirement rates and the savings should be reflected in the accrual budget. Because the Board takes a long-term view of behavior (as well as of economic assumptions), it did not agree to use lower retirement rates. It did, however, change the economic assumptions to reduce DoD funding and, for the first time, recommend that DoD begin sharing in gains. Funding differences that result from short-term inaccuracies in behavior or economic assumptions are returned to the Treasury as gains. DoD does not now share in them, and certainly should.

In sum, the intent of the funding of military retirement is to provide Defense decisionmakers, particularly those in the Military Departments, better economic incentives to employ manpower judiciously. The current policy mutes those incentives in that the Military De-

partments have historically paid more (and perhaps been funded more) than the economic cost of their manpower. If the DoD Retirement Board of Actuaries continues to employ conservative assumptions that generate actuarial gains, the department will continue to transfer more than it otherwise would. It is less clear what effect the reduced defense transfers would have on the defense topline.

## METHODS OF ALLOCATING GAINS AND LOSSES

While sharing gains and losses on the basis of when benefits were earned is clear and simple in principle, its implementation is more complex. This section suggests techniques for doing so according to the proportion of years served before or after October 1, 1984. These techniques (as well as our notation and terminology) rely in part on previous work recorded in staff papers of the DoD Office of the Actuary.<sup>8</sup>

### Assumption Gains and Losses<sup>9</sup>

When long-term assumptions are revised, substantial gains or losses can occur; assumptions about future wage and COLA increases and interest rates exert a powerful influence over the fund's unfunded liability. For example, the last three assumption gains, in 1988, 1991, and 1994, ranged between \$23 billion and \$56 billion.

Assumption gains for a given fund year ( $t$ ) are simply defined as the difference between the unfunded liability under the old assumptions and that under the new, as follows:

$$\text{AssmptGain}_t = \text{UFL}_t(\text{oldAssmpt}) - \text{UFL}_t(\text{newAssmpt}).$$

<sup>8</sup>DoD Office of the Actuary, *Allocation of Actuarial Gains and Losses Under the Military Retirement System to DoD and Treasury*, May 1992, and DoD Office of the Actuary, *Valuation Gain/Loss Formulas*, January 1995.

<sup>9</sup>In this section and for the balance of the report, we shift from use of the term "active force," used to encompass both the active duty and reserve forces, to the term "active duty," meaning we exclude the Reserve Components. While the principles apply equally well to both, the numerical examples that follow pertain to only the active duty force and exclude both reservists and disability retirees.

And, for either the old or new assumptions, the unfunded liability at the end of year  $t$  (as in the previous chapter) can be written as the present value of the future stream of benefits (PVFB) for those now in the system, both retired and active, minus the present value of the stream of future normal cost payments (PVFNC) for the current active force,<sup>10</sup> minus the fund assets ( $F$ ), all at the end of year  $t$  as shown below:

$$UFL_t = PVFB_t - PVFNC_t - F_t .$$

When we substitute the unfunded liability ( $UFL_t$ ) equation into the assumption gain equation and collect terms, we can write<sup>11</sup>

$$\begin{aligned} \text{AssmptGain}_t &= PVFB_t (\text{old}) - PVFB_t (\text{new}) \\ &\quad - (PVFNC_t (\text{old}) - PVFNC_t (\text{new})) \\ &\quad - (F_t (\text{old}) - F_t (\text{new})). \end{aligned}$$

Working from the bottom up in this equation, first observe that any change in assumptions *does not affect* the value of the fund itself. This value was determined by previous payments made by DoD and Treasury plus actual interest earned, and does not change with assumption changes. This means that

$$F_t (\text{old}) = F_t (\text{new}),$$

and the last line drops out of the equation. The next line in the equation addresses the present value of future normal cost payments for year  $t$ . Since no normal cost payments were made before 1984, all gains resulting from changes in normal cost are entirely the responsibility of Defense, and their effect in the assumption gain equation should be assigned entirely to DoD.

Since the first line in the assumption gain equation deals with the present value of future benefits, to apply the fundamental concept

<sup>10</sup>Future normal cost payments are made only for the currently active, not the currently retired, force.

<sup>11</sup>We have simplified the notation for our functional arguments slightly here. Future references to the assumption gain equation will use this notation.

we would like to disaggregate these benefits by whether they were earned before or after October 1, 1984. For any year  $t$  we would like to write

$$PVFB_t = \text{Pre84}PVFB_t + \text{Post84}PVFB_t,$$

where the notation should be clear.

To allocate gains based on when the benefits were earned, consider the following three groups:

1. Those who were *retired* before October 1, 1984 (denoted by RET-84);
2. Those who *entered active duty* on or after October 1, 1984 (denoted by ENT-84);
3. Those who *entered active duty* before October 1, 1984 and *remained on active duty* after that date (denoted by ACT-84).

The RET-84 group clearly receives only benefits earned before October 1, 1984. The ENT-84 group either now receives or will receive only benefits earned after October 1, 1984. Hence, any gains (or losses) attributable to the RET-84 group should be fully credited to Treasury, and any attributable to the ENT-84 group should be fully credited to Defense. Only the ACT-84 group, who were already on active duty before October 1, 1984, and who continued to serve after that date, have earned benefits that should under this rubric be split.

Benefits earned by the RET-84 group contribute only to the first term of the PVFB equation above. Similarly, benefits earned by the ENT-84 group contribute only to the second term. Since PVFB computations deal only with current and potential beneficiaries who are currently "in the system" in the sense that they are presently on either the annuitant or active roles, the only remaining group that contributes to our PVFB calculation comprises those who were on active duty on October 1, 1984. Thus our PVFB partition will be complete if we can deal effectively with the ACT-84 group.

Assuming that retirement benefits are earned uniformly over time while on active duty,<sup>12</sup> a method to distribute the benefits for the ACT-84 group into the desired pre-October 1, 1984, and post-October 1, 1984, segments (pre84 and post84, respectively) would simply compute the benefits based on years of service before and after fiscal year 1984. The pre84 years of service are known for each member, and the total years of service can be readily estimated using known decrement rates so that  $\text{pre84PVFB}$  for any member is simply his total PVFB multiplied by the ratio of his pre84 years of service divided by his total expected years of service. The post84 ratio can be obtained in a similar manner (taking expected post84 years of service divided by total expected years of service), or it can be found by subtracting the pre84 ratio from one. The post84 ratio is then used to calculate  $\text{post84PVFB}$ .<sup>13</sup> Indeed, the same method can be applied to the RET-84 group, which has a pre84 ratio of one, and the ENT-84 group, which has a pre84 ratio of zero. These groups were introduced to illustrate the underlying concept in order to simplify the presentation, and they are not essential for the calculations.

The expected values required to compute the ratios for the ACT-84 population can be refined each year during the annual valuation process. This process requires that the PVFB for the retired population (in year  $t$ ) be calculated separately from the PVFB of the year- $t$  active population. Clearly both the post84 years and total years of service are known explicitly for anyone in the ACT-84 group who has

---

<sup>12</sup>There are actuarial methods that precisely measure how benefits accrue over time; however, the Aggregate Entry-Age Normal method imposed by law on the military retirement system is not of that type. See Trowbridge and Farr, *op. cit.*, for general information on contrasting actuarial methods, or Gerald Lee Giesecke, "The Projected Unit Credit Method with Benefits Apportioned by Interest-Adjusted Salary," *Transactions of the Society of Actuaries*, Vol. 46, 1994, pp. 193-226, for more explicit information with examples from the military retirement system. The critical issue for our discussion is that we know benefits are earned according to years of service, and an academic discussion over *how much* of the total benefit is earned in *which* year will lead us too far afield. Thus our assumption that benefits accrue uniformly is a reasonable proxy for our examples, and provides an essential first step for using any other method.

<sup>13</sup>This arithmetic can be aggregated. It is also interesting to note that we can show mathematically that for a *stationary* active duty population (i.e., one that is behaving in accordance with the assumed active duty decrement rates and has reached its steady-state year of service distribution; the term "mature population" is also used to describe this circumstance), the inflow and outflow are equal, and for any time  $t$  the pre- $t$  and post- $t$  ratios are both equal to one-half (50 percent).

retired by year  $t$ , and the expected total years of service will be conditioned on more information for anyone from the ACT-84 group who is still on active duty in year  $t$ .

We have shown that we can partition the PVFB equation according to our fundamental concept as desired. Thus we can write

$$PVFB_t = \text{Pre84}PVFB_t + \text{Post84}PVFB_t .$$

If we substitute this result, the assumption gain equation becomes

$$\begin{aligned} \text{AssmptGain}_t &= \text{Pre84}PVFB_t (\text{old}) - \text{Pre84}PVFB_t (\text{new}) && \text{Treasury} \\ &+ \text{Post84}PVFB_t (\text{old}) - \text{Post84}PVFB_t (\text{new}) && \text{DoD} \\ &- (\text{PVFNC}_t (\text{old}) - \text{PVFNC}_t (\text{new})) && \text{DoD} \\ &- (F_t (\text{old}) - F_t (\text{new})) && \text{Zero value.} \end{aligned}$$

In this form the assumption gain equation tells us exactly how much of the total assumption gain should be distributed to each agency. When we apply the fundamental concept to the first line of the equation, we see that the result should go to Treasury, since it deals only with benefits earned before October 1, 1984. The second line total should clearly go to DoD, since it deals only with benefits earned since October 1, 1984. The total in the third line goes to DoD, since it deals with normal cost payments that will be made by DoD to fund benefits earned after year  $t$ , which clearly follows October 1, 1984. The fourth line has a value of zero, so assigning it is immaterial. Since it clarifies exactly how the distribution to each agency should occur, we will call this the distribution form of the assumption gain equation. The results are summarized in Table 3.1.

To illustrate how the 1994 assumption gain of \$23 billion (from Table 2.1 of Chapter Two) would have been split between Defense and Treasury, we substitute the appropriate values<sup>14</sup> into the distribution form of the assumption gain equation above, obtaining

<sup>14</sup>All figures are adapted from results obtained during the 1994 annual valuation by the DoD Office of the Actuary. That office made separate runs of its GORGO model to determine the pre84 and post84 portions of the actual (i.e., new) PVFB shown here, and we assumed that its old PVFB values shared the same pre84/post84 proportion.

AssmptGain <sub>t</sub> = 517.5 – 496.7	Treasury
+ 225.8 – 216.7	DoD
– (104.7 – 97.8)	DoD
– (124.2 – 124.2)	Zero value

in billions of dollars for t = 1994. Thus

AssmptGain <sub>t</sub> = 20.8	Treasury
+ 9.1	DoD
– 6.9	DoD
– 0	Zero value,

so \$20.8 billion (90.5 percent) of the \$23.0 billion assumption gain shown in Table 2.1 should be credited to Treasury, and the DoD distribution should be the remaining \$2.2 billion (9.5 percent).

Recall from the earlier discussion that the actual split in a given year depends upon the extent to which each component—wage, COLA, and interest changes—contributes to the gain. Hence, the 90.5/9.5 percent split in FY94 was a function of the specific contributions of each component in that year and cannot be expected to hold from year to year.

Gains from **wage** assumption changes accrue primarily to Defense because they apply only to the currently active population, most of

**Table 3.1**

**Component of Assumption Gains Allocable to Defense and Treasury**

Component Affected	Economic Assumption Changed			Allocable to	
	Wage	COLA	Interest	Defense	Treasury
Pre84pVFB	X	X	X		X
Post84pVFB	X	X	X	X	
PVFNC	X	X	X	X	
Fund					NA

whose benefits are and will be earned post-1984. Further, the proportion of post-1984 service in this population increases each year. Changes in assumptions about future wages do not affect the benefits of already-retired force.

Gains from COLA assumption changes affect the present value of the benefits of both the currently active and currently retired forces. Since future normal cost payments are adjusted for the currently active population, COLA changes accrue primarily to Treasury. Again, though, the aging of both populations, which increases the proportion of post-1984 service each year, reduces Treasury's share of gains each year.

Gains from interest assumption changes, like those arising from COLA assumption changes (and for the same reasons) go principally to Treasury.

Noneconomic assumptions were not addressed here because their impact has been slight compared to other assumption changes, and the minor decrement rate adjustments that have been made typically were regarded in the category of experience gains by the actuaries. Since we will deal in some detail later with gains arising from experience deviations from the noneconomic assumptions, there is no requirement to address them here as well.

### Benefit Gains and Losses

The benefit gain equation for a given year ( $t$ ) is similar to the assumption gain equation:

$$\text{BenGain}_t = \text{UFL}_t(\text{oldBen}) - \text{UFL}_t(\text{newBen}).$$

This breaks down as before into the same three lines:

$$\begin{aligned} \text{BenGain}_t &= \text{PVFB}_t(\text{old}) - \text{PVFB}_t(\text{new}) \\ &\quad - (\text{PVFNC}_t(\text{old}) - \text{PVFNC}_t(\text{new})) \\ &\quad - (F_t(\text{old}) - F_t(\text{new})). \end{aligned}$$

Since the last line in this equation again has a value of zero and the second line again deals only with funding benefits earned after Octo-

ber 1, 1984, we can apply the fundamental concept and the preceding argument directly to obtain, *mutatis mutandis*, the distribution form of the benefit gain equation:

$$\begin{aligned}
 \text{BenGain}_t &= \text{Pre84PVFB}_t (\text{old}) - \text{Pre84PVFB}_t (\text{new}) && \text{Treasury} \\
 &+ \text{Post84PVFB}_t (\text{old}) - \text{Post84PVFB}_t (\text{new}) && \text{DoD} \\
 &- (\text{PVFNC}_t (\text{old}) - \text{PVFNC}_t (\text{new})) && \text{DoD} \\
 &- (F_t (\text{old}) - F_t (\text{new})) && \text{Zero value.}
 \end{aligned}$$

We are now able to distribute benefit gains accurately between Treasury and DoD, using the distribution form of the benefit gain equation and substituting actual values<sup>15</sup> as with the assumption gain computations above:

$$\begin{aligned}
 \text{BenGain}_t &= 498.3 - 496.7 && \text{Treasury} \\
 &+ 217.4 - 216.7 && \text{DoD} \\
 &- (97.8 - 97.8) && \text{DoD} \\
 &- (124.2 - 124.2) && \text{Zero value,}
 \end{aligned}$$

or

$$\begin{aligned}
 \text{BenGain}_t &= 1.6 && \text{Treasury} \\
 &+ 0.7 && \text{DoD} \\
 &- 0 && \text{DoD} \\
 &- 0 && \text{Zero value.}
 \end{aligned}$$

Thus, under this policy in this particular year, Treasury would receive \$1.6 billion (69.6 percent) and DoD \$0.7 billion (30.4 percent) of the total \$2.3 billion benefit gain.

<sup>15</sup>Again, all numbers are adapted from data provided by the DoD Office of the Actuary. As before, we used actual pre84 and post84 portions to split the PVFB(old) total into the same proportion.

In practice, the split of benefit-related gains cannot be predicted without first knowing the nature of the benefit change. When a benefit entitlement changes, as happened recently when a five-month delay in COLA increases was legislated, the present value of future benefits for current and future retirees is changed. But if a benefit change also involves such policies as retirement formulae, as occurred when the so-called High-Three and REDUX formulae were introduced, the present value of future normal cost is also affected. Hence, no general formula for allocating benefit gains can be specified. The formula depends upon the nature of the benefit change. Nevertheless, the principle—proportion of benefits earned before and after October 1, 1984—can still be straightforwardly applied.

### Experience Gains and Losses

Experience gains result from the annual reconciliation of actual historical experience with what was estimated for the past year. Although experience gains pertain to the same factors as assumption gains—interest rates, COLA and wage increases and noneconomic factors—assumption changes look forward to ask, “What valuation effects will result from factors changing in the future?” In contrast, experience gains look backward to answer the question, “What valuation effects resulted from the difference in what was expected to occur last year relative to what actually occurred?”

As with assumption gains, experience gains result from changes in the unfunded liability (UFL) in the valuation year ( $t$ ). The changes in this case, however, are based on the expected  $UFL_t$  ( $E[UFL_t]$ ), which brings the preceding year's calculated UFL ( $UFL_{t-1}$ ) forward to the current year under the premise that all assumptions, behavior, and payments for the year occurred precisely as expected. From this expected value we subtract the actual  $UFL_t$ , calculated at the end of year  $t$ , to obtain the experience gain. The experience gain equation is given by

$$\text{ExperGain}_t = E[UFL_t] - UFL_t.$$

From the UFL working equation and the linear property of the expected value operator,  $E[\cdot]$ , we can write

$$\begin{aligned} E[UFL_t] &= E[PVFB_t - PVFNC_t - F_t] \\ &= E[PVFB_t] - E[PVFNC_t] - E[F_t]. \end{aligned}$$

Substituting into the experience gain equation and collecting terms yields

$$\begin{aligned} \text{ExperGain}_t &= E[PVFB_t] - PVFB_t \\ &\quad - (E[PVFNC_t] - PVFNC_t) \\ &\quad - (E[F_t] - F_t). \end{aligned}$$

As with assumption gains, we will work from the bottom up, but the last line in the experience gain equation need not vanish. The fund value  $F_t$  is known, and it differs from last year's fund value  $F_{t-1}$  by an amount (based on accrued interest, payments incoming, and disbursements outgoing) that can readily be calculated. The payments into the fund by DoD and Treasury are based on the year  $t-1$  valuation and are known exactly. The disbursements needed to fund benefits in year  $t$  can be estimated quite accurately from the known retired and active populations at end-year  $t-1$ . Thus the primary reason for a nonzero value in the last line is that interest accrues in year  $t$  at a different rate from the assumed value. For this reason, the last line in the experience gain equation is used as a definition for the interest gain. Thus we define "interest gain" to be the difference between the actual fund value and its expected value (note that we have eliminated a minus sign from the last line), that is,

$$\text{IntGain}_t = F_t - E[F_t].$$

Can we apply the fundamental concept to the interest gain and parse its distribution based on benefits earned pre-1984 and post-1984? Although the fund has been paying beneficiaries since its inception, these payments do not relate directly to the interest gain. Of greater importance in the interest gain calculation is the origin of the funds that are drawing the interest. Since both Treasury and DoD have been contributing to the fund since its inception, the DoD Office of the Actuary has recommended allocating the interest gain "in proportion to the accumulated value of past fund contributions made by

Treasury and DoD, respectively,"<sup>16</sup> and we concur. This seems to be a most reasonable means to allocate the interest gain.

The second line of the experience gain equation does give us the opportunity to return to the fundamental concept. Since the future normal cost payments referenced there are designed to fund benefits earned after year  $t$ , they deal only with benefits earned after October 1, 1984, and any gain (or loss) realized because they differ from their expected value should (by the fundamental concept) be attributed totally to DoD.

Moreover, when we examine the first line of the experience gain equation, it is clear that the present value of future benefits can be split, exactly as before, into a portion that specifies the benefits earned for service prior to October 1, 1984 (pre84), as well as a portion that specifies benefits earned for subsequent service (post84). Thus we get for experience gains the following analog to the distribution forms of the assumption and benefit gain equations:

$$\begin{array}{ll}
 \text{ExperGain}_t = \text{Pre84}E[\text{PVFB}_t] - \text{Pre84}\text{PVFB}_t & \text{Treasury} \\
 + \text{Post84}E[\text{PVFB}_t] - \text{Post84}\text{PVFB}_t & \text{DoD} \\
 - (E[\text{PVFNC}_t] - \text{PVFNC}_t) & \text{DoD} \\
 - (E[F_t] - F_t) & \text{Apportioned by past} \\
 & \text{fund contributions.}
 \end{array}$$

It is often useful in practice to analyze the experience gains by further breaking them down into components that reflect where actual experience differs from assumed values. If we make this reduction of experience gains into more useful components, we can tabulate the distribution results as shown in Table 3.2.

<sup>16</sup>DoD Office of the Actuary, *Allocation of Actuarial Gains and Losses*, op. cit., p. 12. A potential issue at some point is whether the respective accumulated values should be calculated using actual or assumed interest rates, but this issue is not significant here.

**Table 3.2**  
**Component of Experience Gains Allocable to Defense and Treasury**

Component Affected	Actual Experience Fails to Match the Assumed Value of			Allocable to	
	Wage	COLA	Interest	Defense	Treasury
Pre84PVFB	X	X	X		X
Post84PVFB	X	X	X	X	
PVENC	X		X	X	
Fund			X	Apportioned by past fund contributions	

Again, as is the case with assumption changes, the actual split of experience gains depends upon the relative contributions of wage, COLA, and interest components. These will, of course, vary from year to year. But for 1994, again substituting actual values<sup>17</sup> into the distribution form of the experience gain equation, we have

$\text{ExperGain}_t = 512.8 - 496.7$	Treasury
+ 225.0 - 216.7	DoD
- (100.5 - 97.8)	DoD
- (122.8 - 124.2)	Apportioned by past fund contributions.

Thus

<sup>17</sup>Again the numbers are courtesy of the DoD Office of the Actuary. Here the pre84/post84 proportioning of  $E[PVFB_t]$  was based on the corresponding actual PVFB and the known years of service for (unexpected) drawdown losses from active duty. A clear explanation for calculating  $E[F_t]$  is contained in DoD Office of the Actuary, *Valuation Gain/Loss Formulas*, op. cit., p. 2.

ExperGain <sub>t</sub> = 16.1	Treasury
+ 8.3	DoD
- 2.7	DoD
+ 1.4	Apportioned by past fund contributions.

In order to apportion the \$1.4 billion interest gain calculated on the last line, it is necessary to determine the accumulated value of past fund contributions made by Treasury and DoD, respectively (see Table 3.3). The prior payments of each agency are then brought forward to their present value based upon the actual interest the fund has earned.<sup>18</sup> This method distributes 61.5 percent of the \$1.4 billion interest gain (or \$.9 billion) to DoD and the other \$0.5 billion to Treasury. For the entire experience gain, the proposed methods would allocate \$16.6 billion (72.1 percent) of the gain to Treasury and \$6.4 billion (27.9 percent) to DoD.

We have now developed distribution equations for allocating any type of gain between the Treasury and Defense departments. The 1994 distributions for all three types of gains are summarized in Table 3.4.

Though the proportion (19.3 percent) of the total annual gain that would be allocated to DoD is relatively small in percentage terms, the dollar amount (over \$9 billion) is far from insignificant. The high percentage allocable to Treasury reflects the large population of retired and active personnel who earned significant portions of their retirement benefits prior to October 1, 1984. Since these numbers will continually decrease (all benefits are now earned in post84 service), we can expect the DoD proportion to continually increase in

<sup>18</sup>The DoD Office of the Actuary has made similar computations but based the present values on assumed rather than actual interest earned. Although we prefer to use the actual rates, in practice the two methods yield about the same split. The assumed rates yield a DoD fraction about one percentage point below the 61.5 percent computed under our method.

**Table 3.3**  
**Present Value of DoD and Treasury Contributions**  
 (\$ Billions)

Fiscal Year	Contributions		Present Values (1995)	
	DoD	Treasury	DoD	Treasury
1985	17.0	9.5	40.1	22.4
1986	17.4	10.5	39.0	23.5
1987	18.3	10.5	37.2	21.3
1988	18.4	10.3	33.9	19.0
1989	18.5	9.8	31.1	16.5
1990	16.3	10.6	25.0	16.2
1991	17.2	10.8	24.1	15.1
1992	16.3	11.2	20.9	14.3
1993	13.2	12.3	15.5	14.5
1994	12.8	11.9	13.9	12.9
	Totals		280.6	175.8
	Grand Total			456.4
	Percent of Total		61.5%	38.5%

**Table 3.4**  
**1994 Gain Distributions to DoD and Treasury**  
 (\$ Billions)

Type of Gain	Total (\$B)	Treasury Share (\$B)	DoD Share (\$B)	Treasury Share (%)	DoD Share (%)
Experience	23.0	16.6	6.4	72.1	27.9
Benefit	2.3	1.6	0.7	69.6	30.4
Assumption	23.0	20.8	2.2	90.5	9.5
Total	48.3	39.0	9.3	80.7	19.3

the future. Accordingly, Treasury will pay off the unfunded portion of the accrued liability in a finite number of years.<sup>19</sup>

<sup>19</sup>This period will apparently be changed from a total of 60 years to 50 years in the near future. Originally, it floated with the Treasury payments fixed at 33 percent of the second preceding year's payroll, with an estimated amortization period of 60 years. Subsequent economic assumptions, however, extended this initial period well beyond

## AMORTIZATION ISSUES

Under accepted actuarial practices, the 1994 gains of \$9.3 billion and \$39 billion in Table 3.4 would not accrue to Defense and Treasury in a single year. Instead, gains or losses are spread, or amortized, over several years to smooth out their impact. Under current policy, gains (which accrue entirely to Treasury) are amortized over 30 years. At issue is whether 30 years is also the optimal period for amortization of any future gains and losses allocated to Defense.<sup>20</sup>

There are conflicting arguments and precedents for selecting the time period to amortize actuarial gains and losses. Longer periods generate better smoothing, while shorter periods provide quicker feedback and, therefore, more powerful incentives to manpower and personnel planners. These two conflicting goals set up a tension that confronts policymakers in determining the length of amortization schedules for Defense but not for Treasury. Quicker feedback to Defense decisionmakers could improve incentives to make economically sound policy decisions and better support the original congressional intent for establishing the military retirement accrual system. On the other hand, better smoothing enhances stability by reducing the volatility of future payments, and provides more conservative funding if gains prevail over losses.

Before the enactment of ERISA there was little federal policy on upper bounds for amortization periods. The IRS had imposed only

---

60 years and the Board of Actuaries revised the Treasury payment schedule so that the original UFL would be fully amortized in the year 2043. See DoD Office of the Actuary, *Valuation of the Military Retirement System*, op. cit., p. 14. The change to 50 years would presumably move the completion date for Treasury payments to 2033.

<sup>20</sup>A second issue of importance to setting amortization schedules, which we dispense with here, is how much of the credit (or loss) should be taken each year. Current law does not allow for level payments such as in a consumer loan or mortgage. Instead, payments grow in nominal terms over time to maintain a constant percentage of payroll. A stationary population requires fund disbursements that grow each year at exactly the same rate as the total payroll. Since the aggregate entry-age normal cost represents a level percentage of basic pay, there may be valid actuarial reasons to amortize gain adjustments so that they also grow as a level percentage of payroll. Because it is the method now required by law, we use it for our example. There are certainly other valid methods, including some that would be clearly advantageous to DoD by increasing near-year amounts, but assessing them would take us too far afield. See DoD Office of the Actuary, *Valuation of the Military Retirement System*, September 30, 1994, p. 8.

lower bounds to ensure that losses would be spread over a reasonable period. Longer amortization periods, though, obscured the effect of unrealistic economic assumptions, and ERISA and the Internal Revenue Code (I.R.C.) were modified to impose upper limits on all private pension programs having new or changed unfunded liabilities with amortization periods beginning after January 1, 1988. The limits are five years for experience gains and losses and ten years for economic assumption changes. Longer periods are allowed only for older plans that initiated their amortization schedules prior to the cutoff date.<sup>21</sup>

The DoD Office of the Actuary currently uses a 30-year period to amortize system gains and losses via adjustments in Treasury's unfunded liability payments. That office has suggested the same 30-year period if DoD begins to share in gains. Since presumably there will be gains in every year, though, this could become quite cumbersome. It would eventually require 30 individual adjustments, one for each of the gains that occurred in each of the most recent 30 years. Unlike the Treasury payments, these will never terminate. More importantly, a 30-year amortization plan would not complement the current DoD Planning, Programming, and Budgeting System (PPBS), since the economic impact of a single year's decision would be spread far beyond the 6-year horizon of the Future-Year Defense Program (FYDP).<sup>22</sup> Further, a 30-year amortization period would provide little feedback from decisions in any given year.

The limits imposed by ERISA and the I.R.C. appear to provide an effective compromise option to resolve these conflicts. The smoothing effect remains powerfully robust, while the feedback to decision-makers occurs soon enough to influence the PPBS decision process within its critical time horizon. In the context of the PPBS constraints and competing budgetary pressures, we think there are co-

---

<sup>21</sup>Dan M. McGill and Donald S. Grubbs, Jr., *Fundamentals of Private Pensions*, Homewood, IL: Richard D. Irwin, Inc., 1989, p. 381. These periods are for pension plans that are not subject to collective bargaining, and the reference cites ERISA 302(b)(2), (3) and I.R.C. 412(b)(2),(3), both of which apply to private pension plans only and not to the military retirement system. See also Trowbridge and Farr, *op. cit.*, p. 85.

<sup>22</sup>It may be worth noting that the 30-year amortization schedule was implemented prior to the ERISA and I.R.C. cutoff date.

gent arguments for shorter amortization periods than the ERISA standards, but larger spreads or longer periods defeat the intent of the original accrual legislation. Thus for illustrative purposes in our examples, we will amortize the DoD share of all nonassumption gains over five years, and we will use ten years for assumption gains.

## EXAMPLES

### A DoD Example

The total gain of \$48.3 billion shown in Table 3.4, while not atypical, is the second-largest annual gain tabulated in Table 2.1 (of Chapter Two), so it might be prudent to look for a better estimate of average gain behavior over time. Further examination of Table 2.1 reveals that the largest gains have occurred precisely when the economic assumptions were changed by the Board of Actuaries. The economic assumptions were changed for the valuations dated in 1988, 1991, and 1994, about every three years. Table 2.1 also reveals that benefit gains have remained fairly small over time (averaging \$0.5 billion), while experience gains have averaged about \$16.6 billion.

To build our illustration, we incorporate these averages and assume that we have a mature system (i.e., one exhibiting a stationary population or steady-state behavior that matches the assumed decrement rates) with annual experience and benefit gains totaling \$17.1 billion and assumption gains of \$40 billion occurring every three years. To simplify implementing our gain distribution methodology, we use the percentages in Table 3.4 to determine that the DoD share of each \$17.1 billion annual gain is \$4.8 billion, and its share of each \$40 billion assumption gain is \$3.8 billion.<sup>23</sup> Using the ERISA and I.R.C. recommended maximum periods, we amortize the average \$4.8 billion DoD share of the annual gain over five years, and use a ten-year amortization period for the average \$3.8 billion DoD share of the assumption gain that occurs every three years.

---

<sup>23</sup>The \$4.8 billion is calculated by taking 16.9 percent of \$16.6 billion plus 30.4 percent of \$0.5 billion. The \$3.8 billion is simply 9.5 percent of \$40 billion. This assumes that the DoD share remains fixed at the 1994 proportions rather than increasing over time, which of course it must. This assumption is adequate for our illustration, however.

We can readily present the amortization schedules for a single year's gains. Recall that these schedules are based on the assumed interest rate (6.75 percent) and ensure that the payments grow at the assumed pay growth rate (4.5 percent) throughout the amortization period.<sup>24</sup> The schedules are shown in Table 3.5.

Since we are assuming that these average gains continue indefinitely at the assumed periodic rates, it becomes important to show more than one year's worth of gain distributions. We need to look far enough out to see the cumulative effect over time.

The **five-year amortization** of experience gains accumulates relatively simply, since the gains occur each year. Thus the first payment for year one<sup>25</sup> is \$1.1 billion, but two payments occur in year two—

Table 3.5

**Five- and Ten-Year Amortization Schedules for DoD Share of Assumed Gains (\$ billions)**

Payment	Five-Year Payment Schedule for \$4.8 Billion in Experience Gains	Ten-Year Payment Schedule for \$3.8 Billion in Assumption Gains
1st	1.1	0.4
2nd	1.3	0.5
3rd	1.8	0.5
4th	2.6	0.6
5th	5.2	0.7
6th		0.8
7th		1.0
8th		1.4
9th		2.1
10th		4.1

<sup>24</sup>The actual formula for calculating these payments is illustrated in Appendix O of the 1994 valuation (DoD Office of the Actuary, *Valuation*, op. cit., p. O-4).

<sup>25</sup>For ease of reference we will use cardinal numbers (one, two, three, etc.) to refer to years and ordinal numbers (first, second, third, etc.) to refer to payments within an amortization schedule. This may seem unnecessary now, but it will help describe the accumulation of payments from the ten-year amortizations occurring every three years.

the \$1.3 billion second payment for the gain in year one and another \$1.1 billion first payment to begin amortizing the new gain that just occurred this year (i.e., year two). The year-two credit is the sum, or \$2.4 billion. The annual amount continues to grow by adding another payment each year through year five, when the annual credit is about \$12 billion, the sum of the first through fifth payments. After year five the year-one gain is fully amortized, and the corresponding payments end. Since another year’s gain amortization begins at that point, though, there will continue to be exactly five gain amortization payments in every successive year. Since each represents a different amortization year, DoD’s annual credit remains the sum of the five payments, or about \$12 billion, in the steady state. The effect of this accumulation is shown in Figure 3.1.

The ten-year amortization of assumption gains accumulates in a more complex manner, since new amortization schedules only start every three years when the gains occur. Thus the DoD credit in year one simply reflects the first amortization payment shown in the ten-year column in Table 3.5, or \$0.4 billion. Similarly, year-two credit is simply the second amortization payment of \$0.5 billion, and the

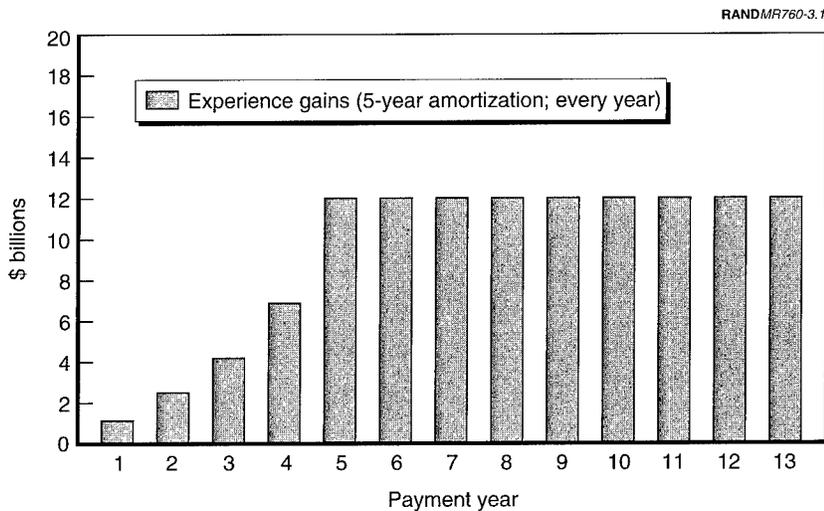
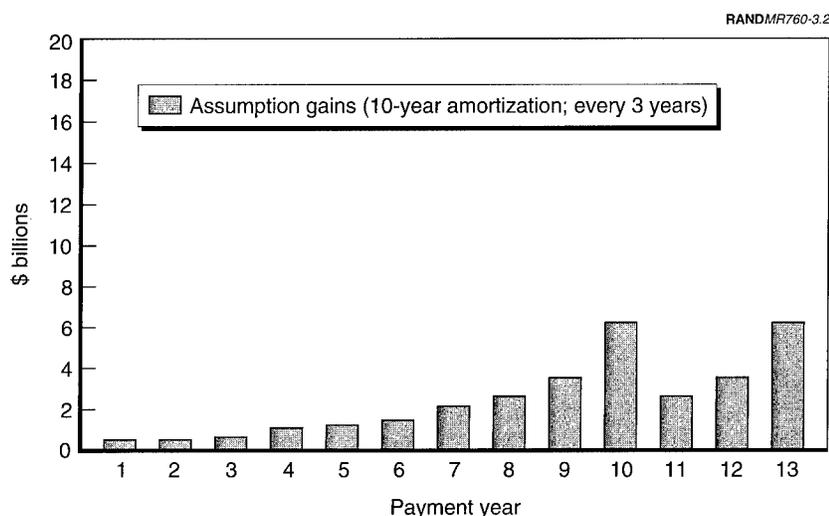


Figure 3.1—Accumulation of DoD Gain Credit: Experience Gains Only (Five-year amortization; gains every year)

credit for year three is the third payment, which is also \$0.5 billion. Note that no new assumption gain occurs in year three, since three years from year one is year four. Thus we expect assumption gains to occur only in years one, four, seven, ten, thirteen, etc. When a new gain does occur in year four, another payment is added. DoD credit in year four consists of the fourth payment from the year-one gain and the first payment from the year-four gain, a total of \$1 billion (i.e., \$0.6 plus \$0.4 billion). No gain occurs in years five and six, so DoD credit consists of the sums of the appropriate next payments in the same amortization schedules (i.e., the fifth payment plus the second and the sixth plus the third, respectively). When the next gain occurs in year seven, another first payment is added for DoD to amortize the gain, so year-seven credit is the sum of a seventh payment, a fourth payment, and a first payment. A glance at Table 3.5 reveals that this sum is (in billions)  $1.0 + 0.6 + 0.4$ , or about \$2 billion.

In years eight and nine the credit again is simply the sum of the appropriate next payments (the eighth, fifth, and second, which sum to \$2.6 billion, for year eight, and the ninth, sixth, and third, which sum to \$3.4 billion, for year nine). This growth shows clearly in Figure 3.2. Another assumption gain occurs in year ten, and the DoD credit is the sum of four payments, the tenth, seventh, fourth, and first, which simply adds a \$4.1 billion tenth payment to our previous year-seven sum to yield (in billions)  $4.1 + 1.0 + 0.6 + 0.4$ , or about \$6.1 billion. Since this tenth payment fully amortizes the original year-one assumption gain, though, with no new gain occurring, our year-eleven credit reverts to the sum of three payments, which are the eighth, fifth, and second, and these are exactly the same payments that we had for the DoD credit in year eight. Indeed, we have now reached the steady state, and credits for future years will simply cycle among the values that we already calculated for years eight, nine, and ten, respectively. This is also revealed graphically in Figure 3.2.

Although we have developed independently the cumulative behavior for amortization payments for the five-year schedule with yearly gains and the ten-year schedule with gains every three years, it is important to realize that for our illustrative example these amortizations are occurring simultaneously. We should therefore combine these results if we are to appreciate fully the cumulative impact for DoD to share fairly in the system gains. To do this, we will assume we are looking at the cumulative effect of a system that has experi-



**Figure 3.2—Accumulation of DoD Gain Credit: Assumption Gains Only**  
(Ten-year amortization; gains every three years)

ence gains right from the start in year one, but it does not encounter assumption gains until year three.<sup>26</sup>

The cumulative effect of DoD credit for this illustration is shown in Figure 3.3.

Since the experience gains become constant in the steady state and since we started the assumption gains two years later than in our independent discussion, the ten-, eleven-, and twelve-year values now cycle over and over in the steady state.

Assumption gains, while historically larger than experience gains, have a smaller effect on annual budgets because they typically occur only once every three years.

<sup>26</sup>Year three enjoys three advantages as a starting point for assumption gain amortizations: (1) it avoids the leveraging that assumption gains induce were they to start at the beginning; (2) it represents a reasonable expected value for the initial encounter of gains that are spaced uniformly every three years, and (3) it enables us to know over the long term exactly when the assumption gains occur, i.e., years three, six, nine, etc., precisely those numbers that are multiples of three.

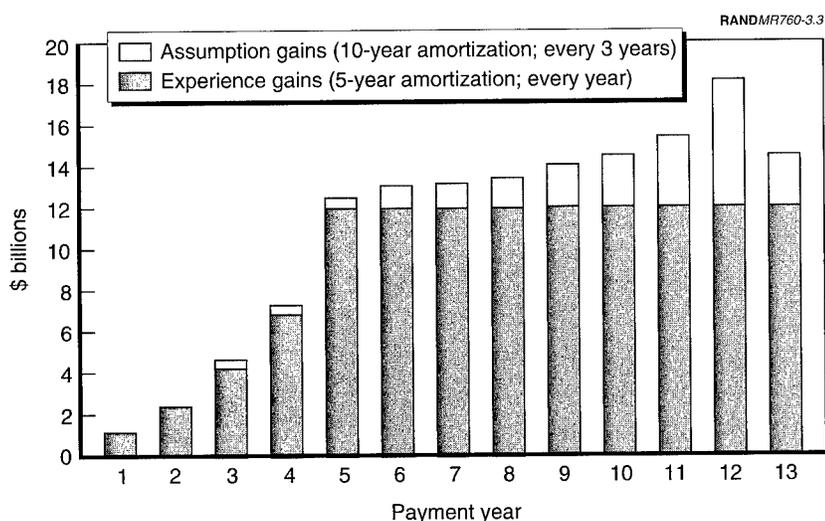


Figure 3.3—Accumulation of DoD Gain Credit: Assumption and Experience Gains

### The Case Against Longer Amortization Schedules

To amortize gains over a longer period, say the 30 years now the policy for Treasury, would reduce the power of the incentives for the services to make economically sound decisions. For example, under a 30-year amortization the cumulative gain in payment year six would drop from the \$13 billion shown in Figure 3.3 to about \$1.6 billion shown in Figure 3.4.

While a 30-year amortization schedule would cause gain accumulations to grow for more than 30 years to over \$25 billion, we have compared its first 13 years with our recommended schedule. The accumulations would clearly extend far beyond the department's fiscal horizon—the six years of the FYDP—and would, therefore, provide little incentive to decisionmakers.

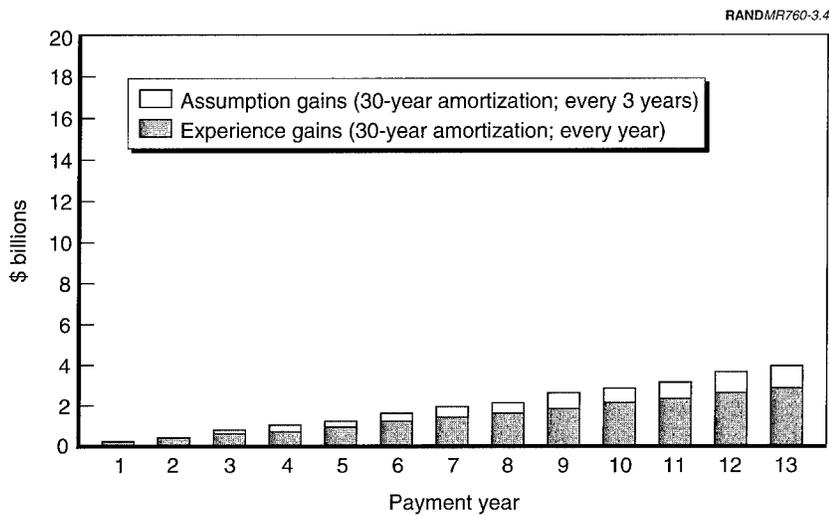


Figure 3.4—Accumulation of DoD Gain Credit: Assumption and Experience Gains with 30-Year Amortization Schedule

### An Army Example

Although we will not deal in detail with service-specific accrual procedures until the next chapter, it will still be useful at this time to look at the Army's portion of the illustrative amortization schedule for DoD's share of the gains. Service-specific distributions of the DoD gains are straightforwardly estimated as a proportion of total basic pay.<sup>27</sup> Since normal cost payments are passed on to the services as a level percentage of basic pay, any gains credited to DoD would be distributed to the individual services according to the proportion of total basic pay represented by that service. For a mature population these proportions would remain constant. For our example we used end-FY94 pay data provided on-line by the Defense Manpower Data Center to determine the Army's portion of the DoD gain amortization. The result, which differs from the DoD chart only by a simple scaling factor (of approximately one-third), is shown in

<sup>27</sup>This method, using the proportion of total basic pay for each service to determine its proportion of the gain, seems to work well for these examples. There may be other circumstances in which alternative methods would be preferable.

Figure 3.5. Although not shown here, the Air Force would receive about one-third of the gains, and the Navy and Marine Corps together would receive the other one-third.

Though the Army credit starts slowly, it reaches \$1.5 billion in year three and almost \$4 billion by year five. Its steady-state behavior cycles around \$5 billion. The steady-state figures represent an equilibrium point for an underlying mathematical representation assuming similar population behavior and gain experience based on the average historical patterns. As long as these factors remain reasonably consistent, future behavior may be expected to approximate the equilibrium results. Since we have deliberately adjusted our assumptions in this illustrative example to underestimate the DoD savings from accumulated gains, we feel that the example results should provide a lower bound for future behavior, given that the total gains continue to exhibit their historical pattern. Authorization to allow DoD to share in the actuarial gains could therefore mean considerable savings for the Army, for its share could exceed \$5 billion per year, or 8 percent of the Army budget.

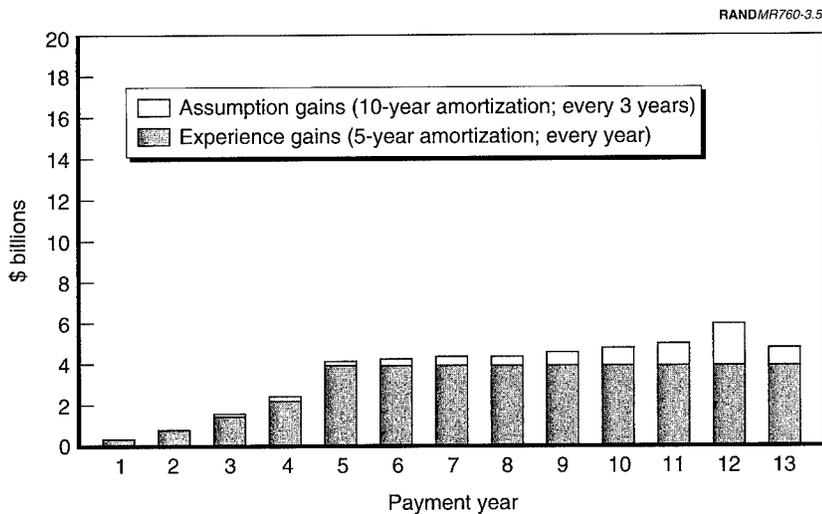


Figure 3.5—Accumulation of Army Gain Credit  
(Combination of all gains)

---

**SERVICE-SPECIFIC ACCRUALS**

---

Chapter 74 of Title 10 requires the Department of Defense to transfer to the Treasury monthly accrual payments intended “to permit the military services to recognize the full cost of manpower decisions made in the current year.”<sup>1</sup> The committee report accompanying the legislation goes on to say, “the individual services manage their forces in different ways and different tradeoffs would occur among the services.”

The principal way the services manage their forces differently lies in the relative experience—and therefore the relative likelihood of retirement—of those serving in each service. The Air Force maintains the most experienced force, the Marine Corps the least. Hence, the Air Force requires the highest percentage of its basic pay to be set aside in accrual funding, the Marine Corps the smallest. Yet the Department of Defense has implemented accrual funding by requiring all services, regardless of their individual personnel policies, to set aside exactly the same accrual percentages, resulting in substantial misstatements of each service’s “full cost of manpower decisions.”

In effect, this policy causes the Army, Navy, and Marine Corps budgets to carry several hundred million dollars each year of the cost of Air Force personnel decisions, a policy inconsistent with the legislative intent. Army, Navy, and Marine Corps personnel budgets and programs appear more expensive than their policies imply; the Air Force personnel budget appears less costly.

---

<sup>1</sup>U.S. House of Representatives, *Department of Defense Authorization Act, 1984, Report of the Committee on Armed Services on H.R. 2969*, May 11, 1983.

Further, the Office of the DoD Actuary may be using retention rates that yield higher overall retirement probabilities than one would get by aggregating the historical rates for all the services that we used.

This chapter describes the effects of these current policies and estimates the magnitude of the budgetary changes that would result from the application of service-specific accrual rates.

## CONTINUATION, OR WITHDRAWAL, RATES OF THE SERVICES

Included in the noneconomic assumptions essential for annual actuarial valuations and normal cost percentage (NCP) calculations are the various decrement rates documented in Appendix E of the annual valuation report.<sup>2</sup> These are required to project the behavior of the active duty, reserve, and retired populations, respectively, in order to calculate the present value of future benefits (PVFB) and (for those still receiving basic pay) the present value of future normal cost payments (PVFNC). Most critical for the calculations, perhaps, are the withdrawal from active duty rates (i.e., losses from the noneligible active population) that determine when retirement eligibility occurs and the nondisability retirement rates, which couple with pay data to fix the *amount* of the annuity for eligible retirees. These rates are complementary to the familiar continuation rates that govern the behavior of the overall active population.

NCP calculations, required by statute, are extremely sensitive to these rate assumptions because they assume that the rates hold in a static, or steady-state, condition and the same continuation rates will therefore apply for the entire future.<sup>3</sup> Also of note, active duty normal costs dominate those of the reserve components. Hence, active duty continuation rates represent a crucial parameter. The current methodology used by the actuaries partitions the active force into officer and enlisted populations and uses historical data from 1977 through 1987 as a basis for the assumed rates. No account is taken of

---

<sup>2</sup>DoD Office of the Actuary, *Valuation of the Military Retirement System*, op. cit., pp. E-1-E-9.

<sup>3</sup>See the discussion in the appendix plus the references contained therein for a more complete explanation of NCP calculations.

the post-Cold War drawdown, the Board of Actuaries viewing the occurrence as a one-time anomaly. Continuation rates since that time are considered unworthy for use as the long-term baseline NCP computations because these more recent rates involve remaining cohorts whose behavior remains distorted by forced and incentivized losses during the drawdown.

Force partitions are further subdivided into regular and nonregular components, and separate calculations apply to nondisability, disability, and survivors' benefits.<sup>4</sup> The partitions are important because the different groups have historically demonstrated remarkably distinct continuation behavior patterns, and the probability of achieving retirement eligibility in different groups differs dramatically.

The historical data upon which the steady-state continuation rates are currently based are lumped together for all four services, and no recognition is awarded to different behavior between services. The services themselves, however, represent populations with retirement probabilities that can also differ significantly. This difference is confirmed in Figure 4.1, where we show estimates of the percentage of entrants who remain on active duty until retirement. These estimates are based upon continuation rates observed from fiscal years 1987 through 1989, the latest Cold War data, more recent than the 1977-1987 data used by the Board of Actuaries for its most recent valuation.<sup>5</sup>

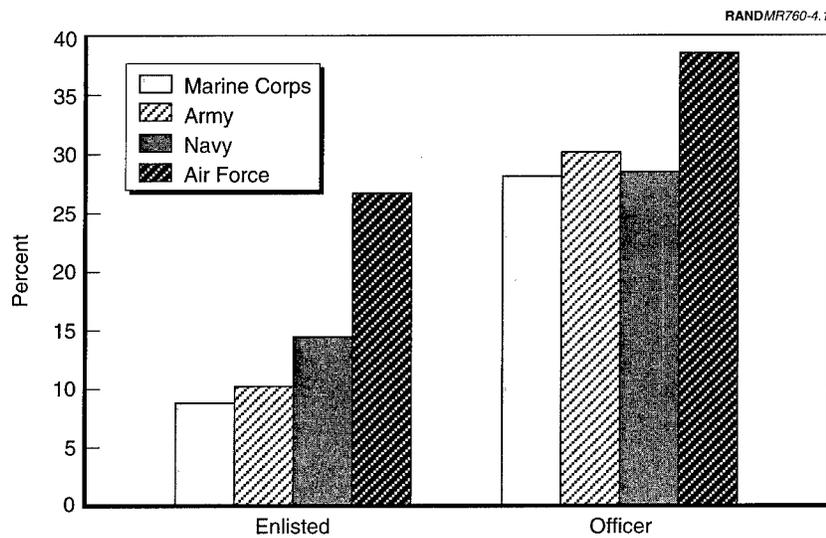
Although we would not argue that these data necessarily represent future steady-state behavior,<sup>6</sup> they clearly indicate the potential for

---

<sup>4</sup>DoD Office of the Actuary, *Valuation of the Military Retirement System*, op. cit., Table E-2, p. E-4. Note that data for some years are excluded from the basis. Officer retirement rates, for example, are based on data from 1977 through 1979, while officer other loss rates (withdrawal) are based on 1984 through 1987 data.

<sup>5</sup>Service-specific data are adapted from Defense Management Data Center historical data. Actuary data are taken from the 1994 valuation closed group population, adjusted for the transfer and reentry rates documented in the valuation report. Starting with the 1996 valuation, the actuaries will use continuation rates based on data from FY84 through FY90.

<sup>6</sup>Active duty retention data throughout the 1990s has been contaminated, first by Operation Desert Shield/Storm and then by the drawdown of military personnel. See the appendix for a more complete discussion of this problem.



**Figure 4.1—Estimated Percentage of Entrants Who Retire  
(Based on FY87–89 Data)**

significantly different behavior among active duty populations for the different services. Postdrawdown behavior confirms the continuation of interservice differentials as measured by the proportion of each service's force that has completed at least ten years of service.<sup>7</sup> Service differences in retention behavior seem likely in the future to continue to reflect the same relative differences exhibited in pre-drawdown continuation rate data. The Marine Corps continues to maintain the least experience, the Air Force the most. The differences are most pronounced among the enlisted forces, where more of the retirement money is lodged.

Indeed, these service differences could create accrual cost differences as great as those created by differential officer and enlisted re-

<sup>7</sup>FY87–89 retention data indicate that both officers and enlisted personnel who complete ten years of active service have, on average, over a 70 percent probability of reaching retirement. This means that officers who complete ten years are about 2.4 times more likely to retire than new accessions, and enlisted personnel are 5.6 times more likely to reach retirement eligibility once they complete ten years of active service.

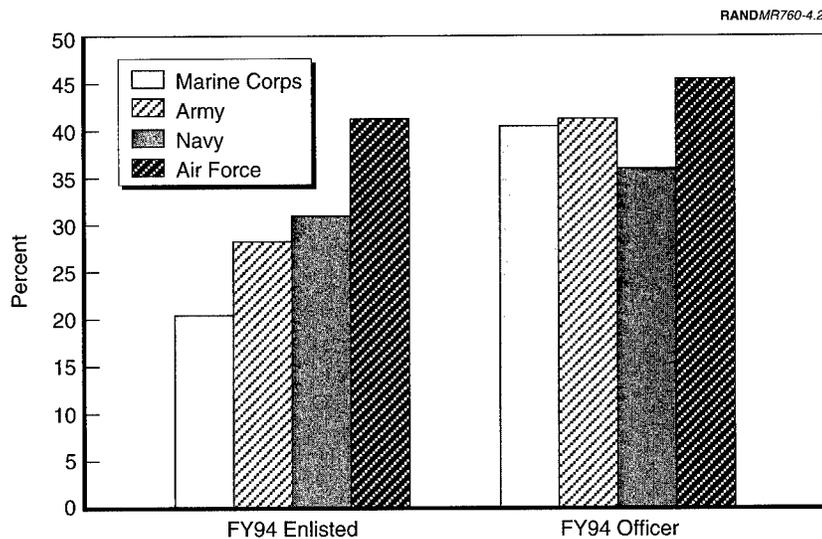


Figure 4.2—Percent of Force with More Than Ten Years of Service

tention (or active duty and selected reserve) behavior. This can be addressed by creating additional partitions in the population to deal with the differing behavior. This would require implementing service-specific NCP calculations. The need to examine further the potential implications and budgetary impact of this policy option was precisely the motivation that prompted us to develop a simplified model (NCPCalc) to replicate NCP calculations and capture the differences in retention behavior among the services. This model is described in more detail in the appendix, and its purpose is to estimate the NCP that should be used to determine the annual retirement accrual payments that should be made to fund future non-disability retirement benefits for active duty, full-time personnel.<sup>8</sup>

<sup>8</sup>We have looked only at service differences that pertain to active duty, full-time personnel retiring under nondisability conditions. It would require additional analysis to determine whether significant differences occur among the services regarding part-time personnel or temporary or permanent disabilities.

## ACCRUAL COSTS UNDER SERVICE-SPECIFIC RATES

In this section we provide two estimates of service-specific accrual rates and the changes in service budgets that would result from their use. Table 4.1 summarizes our estimates. The first two lines in Table 4.1, labeled “DoD-wide rates—budgeted (FY96),” exhibit for the four services and for DoD the FY96 basic-pay payroll and the actuaries’ nondisability accrual payment calculated by taking the currently budgeted 31.5 percent of that payroll for active duty nondisability retirement.<sup>9</sup> The next three lines, labeled “Service-specific estimate 1,” exhibit the results from NCPCalc, RAND’s service-specific NCP calculation model, using late Cold War retention rates. The service-specific NCPs based upon those rates are followed by the corresponding accrual payments and the reductions in each service accrual budget that would result. The final three lines, labeled “Service-specific estimate 2,” simply scale the service-specific results in estimate 1 to bring the total accrual payments from the services equal to the budgeted aggregate DoD payment of \$9.795 billion derived from the actuaries’ estimates.

Note that under estimate 1 the aggregate DoD accrual payment of \$8.739 billion is slightly more than a billion lower than the budget amount of \$9.795 billion. Because our less sophisticated model cannot replicate the actuaries’ more detailed computations precisely, it is difficult to tell exactly why the aggregate difference occurs. Nevertheless, most of this difference clearly lies in our relatively lower estimates of service retention and retirement rates. Even small changes in continuation rates yield large changes in accrual costs.

---

<sup>9</sup>The current full-time weighted actuary NCP values are tabulated in DoD Office of the Actuary, *Valuation of the Military Retirement System*, op. cit., Table 6, p. 11, and the specific numbers are 33.3 percent for the active duty total and 31.5 percent for the nondisability portion of the total. If we apply these values, for example, to the Army’s FY96 basic pay payroll of \$10.364 billion, we find a total accrual payment of \$3.454 billion and a nondisability accrual payment of \$3.27 billion. Though the arithmetic is simple, a word of warning is in order for anyone who is trying to follow it in official budget documents, which were our budget data sources. The numbers there reflect a “Retired Pay Accrual Reimbursement” to compensate the services for active duty personnel assigned to non-DoD agencies. This reimbursement has been omitted here to simplify the presentation. The FY96 Retired Pay Accrual Reimbursement to the Army is \$44 million, so the Retired Pay Accrual value listed in the document is \$3.41 billion, or \$3.454 billion – \$0.044 billion. The latter number is the one of interest here.

**Table 4.1**  
**Two Estimates of Service-Specific Nondisability Accruals**

	Army	Navy	Marine Corps	Air Force	Total
DoD-wide rates—budgeted (FY96)					
Basic pay (\$b)	10.364	8.641	3.133	8.909	31.047
Accrual payments (@ 31.5%)	3.270	2.737	0.977	2.810	9.795
Service-specific estimate 1					
RAND NCPs (%)	24.3	26.7	21.9	36.2	28.1
RAND Accrual payments (\$b)	2.518	2.309	0.686	3.226	8.739
Savings (\$b)	0.752	0.428	0.291	-0.416	1.055
Service-specific estimate 2					
Scaled NCPs (%)	27.2	30.0	24.5	40.6	31.5
Scaled accrual payments (\$b)	2.822	2.588	0.769	3.616	9.795
Scaled savings (\$b)	0.448	0.149	0.209	-0.806	0.000

SOURCE: *Summary of Entitlements Report for the FY 1997 OSD/OMB Budget*, dated October 12, 1995; FY96 budget numbers are used.

This set of assumptions yields an Army NCP of 24.3 percent instead of the budgeted 31.5 percent, or a reduction in the Army's accrual budget of \$752 million (\$3.270 minus \$2.518 billion). Only the Air Force requires more money—\$416 million.

In estimate 2 the service-specific NCPs are scaled upward to yield the budgeted aggregate DoD accrual rate and cost (31.5 percent and \$9.795 billion). Under this set of assumptions the Army accrual budget is reduced by only \$448 million instead of the \$752 in estimate 1. The Navy and Marine Corps budget reductions are similarly smaller, and the Air Force accrual budget increases by \$806 million.

It is important to note that we have no intention of challenging the actuaries' aggregate NCP numbers. We do feel, though, that service-specific differences need to be addressed to provide accurate incentives and contribute to critical decisions required in the budget process. It is also important to understand that, since the numbers can be influenced so significantly by the choice of steady-state continuation rates and other model input factors, it will be essential for all affected agencies to coordinate (under the leadership of the DoD

Board of Actuaries) on developing the methods needed to move to any service-specific calculation method.<sup>10</sup>

---

<sup>10</sup>See the appendix for a more complete discussion.

---

**CONCLUSIONS**

---

The current practice of allocating all actuarial gains and losses to the Department of the Treasury prevents the Military Departments and the Department of Defense from paying the true economic cost of their manpower decisions. Because conservative actuarial assumptions have historically created annual gains rather than losses, the Military Departments and the Department of Defense have borne costs that substantially exceed the true economic cost of their current manpower decisions. When these assumptions are revised or reconciled with recent history, the Department of the Treasury, not the Department of Defense, has enjoyed the benefit of the DoD overpayment through substantially lowered payments into the fund. If DoD and Treasury were to begin sharing actuarial gains and losses on the basis of when the benefits associated with the gains and losses were earned, the budgets of the two departments would more closely reflect the legislative intent that the military services budgets "recognize the full cost of manpower decisions made in the current year." Due to the consistent historical gains, service budgets have reflected more than the full cost. Further, when annual fund valuations correct for the overpayment, service budgets fail to be made whole. In the long term, such policies can lead to an overall underutilization of manpower relative to other DoD inputs.

If DoD is permitted to begin sharing in gains, it obviously stands to benefit the most if its aggregate budget level does not decline correspondingly and it is instead allowed to spend the difference on other priorities. But even if its budget is adjusted with gains, the department will benefit from the sharing in that its budget will more accurately reflect the true cost of its functions. Political pressure to keep

the deficit in hand will play a large role in determining the outcome of this debate but should not cause DoD to drop the issue; the department stands to benefit under either outcome.

The current practice of using DoD-wide rather than service-specific accrual rates for funding of the military retirement fund causes the budgets of the Army, Navy, and Marine Corps to reflect part of the cost of Air Force manpower decisions. Because the Air Force maintains a more experienced force than its sister services, it retires a greater proportion of its military force and therefore raises the DoD average accrual percentage, which the other services then share. The clear legislative intent is for accrual funding to reflect the fact that “the individual services manage their forces in different ways and different tradeoffs” occur among the services. Service-specific accrual rates would allow each service’s budget to more accurately reflect the cost of its own policy choices rather than the aggregate cost of the choices made by the other three.

As with the sharing of gains and losses, the three services whose accrual budgets now reflect in part the cost of Air Force personnel policies stand to gain regardless of whether their aggregate budgets are adjusted or not.

---

AN EXPLANATION OF NORMAL COST  
PERCENTAGE CALCULATIONS

---

## INTRODUCTION

The normal cost percentage (NCP) used to determine the annual payment to fund the military retirement system for each service is calculated using the aggregate entry-age normal cost funding method, as required by Public Law 98-94 (currently Chapter 74 of Title 10, U.S.C.).<sup>1</sup> It represents the

*level percentage of basic pay that must be contributed over the entire active career of a typical group of new entrants to pay for all the future retirement benefits for that group. . . . Their basic pay and benefits are projected over the next 100 years, and then discounted back to the present to find the normal cost percentage. Mathematically, a normal cost percentage is developed by dividing the present value of future benefits for the entire cohort by the present value of future basic pay.*<sup>2</sup>

The actual NCP calculations done by the DoD actuaries use an accepted actuarial projection model called GORGO. GORGO must track populations and their pay or benefit amount by age and year of

---

<sup>1</sup>See DoD Office of the Actuary, *Valuation of the Military Retirement System*, September 30, 1994, p. 1. The terms are defined in standard actuarial references, such as Dan M. McGill and Donald S. Grubbs, Jr., *Fundamentals of Private Pensions*, Pension Research Council, Wharton School of the University of Pennsylvania, 6th ed., 1989, or C. L. Trowbridge and C. E. Farr, *The Theory and Practice of Pension Funding*, Richard D. Irwin, Inc., Homewood, IL, 1976.

<sup>2</sup>DoD Office of the Actuary, *Valuation of the Military Retirement System*, op. cit., p. 8 (emphasis added).

service (where applicable) in some 21 distinct categories ranging from active personnel to surviving families.<sup>3</sup> It must also track transitions among these categories as well as other decrement rates. To provide a quick method to screen alternative policy options regarding military retirement funding, we set out to develop a simple spreadsheet model that would replicate GORGO's results in major interest areas, yet provide essential flexibility to examine alternatives such as service-specific calculations and to conduct sensitivity analyses for input parameters.

#### **THE NCP CALCULATION MODEL (NCPCalc)**

Since the policy options of interest involve retirement credit for active duty, full-time, nondisabled personnel only, there was ample opportunity to make simplifying assumptions for our spreadsheet model. The principal one was to use the high correlation of age to year of service in both the officer and the enlisted populations, to eliminate the requirement to track them by age. Expected values were used when needed for explicit calculations, and death rates (based on service-entry dates) were inferred from GORGO output.<sup>4</sup>

As is the case for any present value computation, values had to be assigned to specific key input parameters. Among these were decrement rates, which determine the probabilities that benefits will be paid to given groups or individuals, and economic assumptions such as inflation, interest rates, and pay growth, which determine the discount factors to use for the computation. We wanted to be able to examine the impact of recent experience for the former, while using actuarial assumptions (except for sensitivity excursions) for the latter. Like GORGO, for a single run NCPCalc can handle only one of the three existing retirement programs (called FINAL PAY, HI-3, and REDUX) for personnel currently on active duty. These individual results can then be combined based on a weighted average using the total basic pay for personnel in each of the three groups, which are defined by date of entry to active duty. Also like GORGO, it uses a steady-state, or stationary, population projection for NCP calcula-

---

<sup>3</sup>Ibid., Table 2, pp. 4–5.

<sup>4</sup>The DoD Office of the Actuary was extremely cooperative in supporting our effort.

tions,<sup>5</sup> which means that disbursements grow at the same rate as payroll each year.

We validated the NCPCalc model by comparing its results with those of GORGO in calculating the FINAL PAY NCP for a combined officer and enlisted population. This provided the most direct calculation in that it required fewer assumptions to resolve modeling ambiguities. The resulting values were identical to two significant figures, and differed by only one digit in the third figure. Actual values (to six significant figures) for the FINAL PAY combined NCP were 37.1369 percent for GORGO and 37.0430 percent for NCPCalc. We regarded this accuracy as adequate for our policy screening purposes.

### INPUT PARAMETERS TO NCPCalc

We are concerned that recent active duty decrement (and thus continuation) rates for all of the services have been contaminated by external factors that leave us a long way from our desired stationary equilibrium condition. First we experienced stop loss actions in 1990 and 1991 to support Desert Shield and Desert Storm operations. Then 1992 witnessed the start of incentivized losses to support drawdown initiatives. These losses were accelerated in 1993 and 1994 as Base Force end strengths were replaced by those of the Bottom-Up Review. During 1995 we saw that borrowed losses may have occurred in conjunction with these incentives, and personnel who remained on active duty during the drawdown may have a higher propensity to stay till retirement than previous historical data would suggest.

Our service-specific continuation rates are therefore based on actual service data taken from fiscal years 1987 through 1989, which represent the most recent "uncontaminated" data available. This departs slightly from the corresponding GORGO input, which uses officer data from 1984 through 1987 and enlisted data from 1977 through 1986.<sup>6</sup> Legitimate reservations can be raised for virtually any choice

---

<sup>5</sup>This is called a "closed group valuation" in actuarial terminology (see, e.g., McGill and Grubbs, *op. cit.*, p. 241).

<sup>6</sup>DoD Office of the Actuary, *Valuation of the Military Retirement System*, *op. cit.*, Table E-2, p. E-4.

of data to represent “steady-state” behavior for the foreseeable future, however, and we would be happy to work with the services to develop acceptable continuation rates for the calculations, should this seem advantageous.

The remaining NCPCalc input requirements included end strength by year of service and average pay per individual by year of service. In an effort to remain consistent with GORGO input, we used end-FY94 data to develop these inputs, except that (again to mimic GORGO) we included the January 1995 pay increase in the data. These data inputs were separated by officer and enlisted personnel for four distinct services.<sup>7</sup> Since they depend directly on year of service distributions (which vary among services), we also calculated service-specific weighting factors to combine the FINAL PAY, HI-3, and REDUX populations. It is interesting to note, however, that the weighting factors calculated for the Army replicated GORGO results to three significant figures. Finally, as mentioned earlier, we used the same economic assumptions<sup>8</sup> that were used in GORGO, and we calculated postretirement death rates in NCPCalc using steady-state decrement rates, new retiree data, and cumulative retiree data from GORGO.

## CONCLUSION

It should be emphasized that NCPCalc was designed to replicate GORGO on a macro level so that alternative policy options could be readily examined. It was not intended to challenge (or even provide) the accuracy of existing models, for a number of simplifying assumptions were required to develop it. While we feel comfortable with its accuracy for this policy screening purpose, we would not ad-

---

<sup>7</sup>The services, of course, are Army, Navy, Marine Corps, and Air Force. It should be noted that Warrant Officers were not specifically addressed in any service. This is because the required Warrant Officer data was not readily available when the model was developed. GORGO apparently does not deal explicitly with Warrant Officers either.

<sup>8</sup>These economic assumptions were adopted by the DoD Retirement Board of Actuaries in July 1994 for use in the September 30, 1994 valuation. They are: inflation = 4.0 percent, basic pay growth = 4.5 percent, and interest = 6.75 percent (DoD Office of the Actuary, *Valuation of the Military Retirement System*, op. cit., p. D-2 and p. 21). These were not changed except to conduct sensitivity analyses.

vocate its use to actually implement changes in military retirement funding. If OSD and the services were to decide, for example, to implement service-specific NCP calculations to fund military retirement, we believe that they should all be involved in developing a mutually agreeable database and actuarial model to use for this purpose.

---

## BIBLIOGRAPHY

---

Eisenman, Richard, David Grissmer, James Hosek, and William Taylor, *The Accrual System for Funding Military Retirement: Assessment and Recommended Changes*, Santa Monica, CA: RAND, MR-811-OSD, (forthcoming).

Giesecke, Gerald Lee, "The Projected Unit Credit Method with Benefits Apportioned by Interest-Adjusted Salary," *Transactions of the Society of Actuaries*, Vol. 46, 1994, pp. 193-226.

McGill, Dan M., and Donald S. Grubbs, Jr., *Fundamentals of Private Pensions*, Homewood, IL: Pension Research Council, Wharton School of the University of Pennsylvania, 6th ed., 1989.

*Summary of Entitlements Report for the FY 1997 OSD/OMB Budget*, October 12, 1995.

Trowbridge, C. L., and C. E. Farr, *The Theory and Practice of Pension Funding*, Homewood, IL: Richard D. Irwin, Inc., 1976.

U.S. Department of Defense, Office of the Actuary, *Allocation of Actuarial Gains and Losses Under the Military Retirement System to DoD and Treasury*, May 1, 1992.

U.S. Department of Defense, Office of the Actuary, *Valuation of the Military Retirement System*, September 30, 1994.

U.S. House of Representatives, *Department of Defense Authorization Act, 1984, Report of the Committee on Armed Services on H.R. 2969*, May 11, 1983.