VALUATION OF THE MILITARY RETIREMENT SYSTEM

SEPTEMBER 30, 2021

DoD Office of the Actuary
February 2023

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SUPPLEMENTARY INFORMATION

ACTUARIAL CERTIFICATION

This report on the valuation of the Military Retirement System as of September 30, 2021, has been prepared in accordance with generally accepted actuarial principles, standards, and practices. In preparing this report, we have relied upon information maintained by other Department of Defense activities regarding plan provisions, finances, and participants. The purpose of the actuarial valuation documented in this report is to develop actuarial liabilities and funding amounts to support the Secretary of Defense and the DoD Board of Actuaries (Board) in meeting the requirements of Chapter 74, Title 10, United States Code. Use of these results for other purposes may not be appropriate. The census, rates, and parameters used to develop actuarial liabilities and funding amounts are provided in a separate report--"Technical Reference to the FY 2021 Military Retirement System Valuation Report - Data, Methods & Assumptions" (Technical Reference). To prepare the results in this report, actuarial assumptions are used to model a single scenario from a range of reasonable outcomes for the valuation basis. The results based on that single scenario are included in this report. Please contact the DoD Office of the Actuary for further information.

We have performed the valuation using methods and assumptions approved by the Board. In general, the decrement rates used in the valuation are based on Military Retirement System experience. The annual, long-term economic assumptions include a 2.50% rate of inflation, a 2.75% across-the-board salary increase, and a 4.00% interest rate. Unless otherwise stated, normal cost percentages shown in this report do not reflect budgetary reductions (sequestration).

The actuarial methods and assumptions used in the preparation of this report are reasonable, and the valuation results present a fair picture of the financial condition of the Military Retirement System for purposes of meeting the requirements of Chapter 74, Title 10, United States Code. A valuation report is a snapshot of a plan's estimated financial condition at a particular point in time; it does not predict a pension plan's future financial condition or its ability to pay benefits in the future. Future report results may differ significantly from those presented and documented in this report for reasons that include changes in military benefits, military force structure, and the broader economic environment. These amounts and other variables are unknowable at the valuation date.

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USE OF THIS REPORT

- **Intended Audience**: Those seeking actuarial information about the Military Retirement System (MRS) or financial information about the Military Retirement Fund (MRF or Fund).
- **Report Limitations**: Stated in *Actuarial Certification* section of this report.
- The future is uncertain, and the actual experience will differ from these assumptions; these differences may be significant or material. Economic, demographic, and political forces impact the actuarial projections and valuation results; they cannot necessarily be accurately predicted over long periods of time.
- For a high-level summary and bottom line results, refer to the *General Information and Key Results* section.
- The census, rates, and parameters used to develop actuarial liabilities and funding amounts are provided in the Technical Reference.
- In various places throughout this report, figures may not add exactly due to rounding.
- Many references to "active duty" personnel throughout the report also include full-time support reservists. Similarly, many references to "reservists" or "selected reservists" exclude full-time support reservists.

ABBREVIATIONS AND COMMON TERMS

Board	DoD Board of Actuaries
BRS	Blended Retirement System
COLA	Cost-of-Living Adjustment
CPI-U	Consumer Price Index for All Urban Consumers
CPI-W	Consumer Price Index for Urban Wage Earners and Clerical Workers
CSB/Redux	Career Status Bonus Retirement System combined with the Redux System
DFAS	Defense Finance and Accounting Service
DIC	Dependency and Indemnity Compensation
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
FY	Fiscal Year
GORGO	Actuarial Projection Model used by DoD OACT
MRF / MRS	Military Retirement Fund / Military Retirement System
NCP	Normal Cost Percentage
OACT	DoD Office of the Actuary
OMB	U.S. Office of Management and Budget
P.L.	Public Law
SBP	Survivor Benefit Plan
SOA	Society of Actuaries
UFL	Unfunded Liability
U.S.C.	United States Code
VA	U.S. Department of Veterans Affairs

GENERAL INFORMATION AND KEY RESULTS

Military Retirement System – For Fiscal Year ending September 30, 2021

1. **Name of Plan:**
   Military Retirement System

2. **Name and Address of Plan Sponsor:**
   Department of Defense
   1400 Defense Pentagon
   Washington, DC 20301-1400
   Website: https://www.defense.gov/

3. **Type of Plan:**
   Defined Benefit

4. **Establishment of Funding Arrangement:**
   Public Law 98-94 (currently Chapter 74 of Title 10, U.S.C.)

5. **Administrative Costs:**
   Not borne by the Plan

6. **Funding Arrangement:**
   Trust Fund

7. **Actuarial Cost Method:**
   Aggregate Entry-Age Normal

8. **Oversight:**
   DoD Board of Actuaries. The Board approves methods and assumptions used in the valuation. The current members of the Board (as of this valuation report date) are:

   Marcia A. Dush, Chairperson
   John H. Moore
   Michael E. Clark

9. **Plan Participant Information at *End of Plan Year*:**

	Members (in 000s)	Annualized Pay ($ in billions)
Active Duty and Full-time Reservists:	1,425	$67.78
Selected Drilling Reservists:	703	$8.40
Non-Selected Reservists – w/ 20 years:	183	-N/A-
Non-disabled Retirees:	1,866	$56.92
Disabled Retirees:	130	$1.96
Surviving Families:	318	$4.60

*** Only retirees and surviving families are paid from the Military Retirement Fund. The survivor annuities do not reflect the offset to pay due to VA's DIC***

GENERAL INFORMATION AND KEY RESULTS (Continued)

Military Retirement System – For Fiscal Year ending September 30, 2021

10. Valuation Input Data:

Extracts from files maintained by DMDC and files submitted by DFAS.

11. Retirement Criteria:

A. Nondisabled Retirement from Active Duty – Immediate, after 20 years of service

B. Disabled Retirement – Immediate, generally with no years of service requirement

C. Nondisabled Retirement from Reserve Duty - Deferred to age 60 (or earlier in some cases) after 20 years of creditable service

12. Actuarial Assumptions:

A. Economic:
(Annual Rates)

1) Inflation – 2.50%
2) Salary – 2.75% (excludes promotion and longevity increases)
3) Interest – 4.00%

B. Demographic:

1) Mortality and other assumptions: Based on MRF experience.
2) Mortality Improvement: Based on MRF experience using methods and assumptions utilized by the Society of Actuaries (SOA).
3) Percent of a Typical New Entrant Cohort Serving 20 Or More Years: Full-time (FT) personnel: 19% Part-time (PT) personnel: 18%

13. Accounting Results During Fiscal Year 2021:

($ in billions)

A. Benefits paid to participants:	$63.0
B. Contributions from Services:	$25.2
C. Contributions from Treasury:	$108.0
D. Investment Income	$56.9

14. Actuarial Results at End of Fiscal Year 2021:

($ in billions)

A. Present Value of Future Benefits:	$2,216.3
B. Actuarial Accrued Liability	$1,851.6
C. Actuarial Value of Assets:	$1,106.5
D. Unfunded Accrued Liability:	$745.1
E. Funded Ratio (C./B.):	60%

15. NCPs Applied to Fiscal Year 2023 Basic Pay:

	DoD	Treasury	Total
Full-time:	36.9%	16.2%	53.1%
Part-time:	24.5%	3.8%	28.3%

SUMMARY OF CHANGES

FOR THE SEPTEMBER 30, 2021, VALUATION

Changes in Actuarial Assumptions

At the July 2021 meeting, the DoD Board of Actuaries approved the following changes for the September 30, 2021, valuation. For access to the official transcript of the meeting, follow this link: https://actuary.defense.gov/External-Links/.

New Economic Assumptions

The Board approved long-term economic assumptions for the September 30, 2021, valuation. They include a 4.00% interest rate (0.25% decrease from prior year). There was no change to the across-the-board salary increase and COLA assumptions of 2.75% and 2.50%, respectively. This resulted in an increase of 2.8% to the FY 2023 full-time DoD NCP, and an increase of 2.2% to the part-time NCP. This change increased the September 30, 2021, accrued liability by $79.9 billion (or 4.3%). These assumptions are described in Appendixes D and F of the Technical Reference.

Mortality Improvement Scales

The Board approved the use of updated mortality improvement scales for retirees and survivors. The new scales use FYs 2000-2020 military data (from the previous FYs 2000-2019 data) using a modified version of SOA's "MP-2020" methodology. In addition, the mortality improvement scale for active duty and reserve military members was updated to the SOA's MP-2020 mortality improvement scale (adjusted to reflect an assumed 80%/20% male/female military population mix). This is a change from the prior improvement scale, which is based on SOA's MP-2016 using a 90%/10% male/female mix. The new scales resulted in decreases to the FY 2023 NCPs of 0.3% for full-time and 0.4% for part-time. This change decreased the September 30, 2021, accrued liability by $22.3 billion (or 1.2%). These assumptions are described in Appendix J of the Technical Reference.

Active Duty Decrement Rates

The Board approved the use of updated active duty decrement rates. The updated rates are based on an experience period from FYs 2015-2019, whereas the prior rates use a 20-year period of FYs 1982-1989, 1997-1999, and 2000-2008. This resulted in a decrease of 0.4% to the FY 2023 full-time DoD NCP and no change to the part-time NCP (to the 3rd decimal place). This change decreased the September 30, 2021, accrued liability by $29.5 billion (or 1.6%). These assumptions are described in Appendix G of the Technical Reference.

Reserve Decrement Rates

The Board approved the use of some updated reserve rates. The updated rates are based on an experience period from FYs 2017-2019, whereas the prior rates are based on FYs 2005-2009. This resulted in a decrease of 0.3% to the FY 2023 full-time DoD NCP and a decrease of 2.8% to the part-time NCP. This change increased the September 30, 2021, accrued liability by $2.5 billion (or 0.1%). These assumptions are described in Appendix H of the Technical Reference.

Coast Guard Experience

The Board approved the use of combined experience including DoD and Coast Guard in the development of the above active and reserve decrement rates. The National Defense Authorization Act for FY 2021 (NDAA 2021) requires Coast Guard be added to the MRF beginning in FY 2023, and that a single normal cost for full- and part-time be promulgated for the Armed Forces including Coast Guard. This resulted in an increase of 0.4% to the FY 2023 full-time NCP and no change to the part-time NCP (to the 3rd decimal place), and had no material effect on the September 30, 2021, accrued liability. The actual inclusion of the Coast Guard in the MRF will not take place until the September 30, 2022 valuation.

SUMMARY OF ANTICIPATED CHANGES
FOR THE SEPTEMBER 30, 2022, VALUATION

Changes in Actuarial Assumptions

At the June 2022 meeting, the DoD Board of Actuaries approved the following changes for the September 30, 2022, valuation. For access to the official transcript of the meeting, follow this link: https://actuary.defense.gov/External-Links/.

VA Offset Parameters

The Board approved updated VA offset parameters. These parameters offset retired pay of retirees due to receipt of VA disability pay. For nondisabled retirees from active duty, the update was from FYs 2008-2009 to a blend of FYs 2004, 2005, 2018, and 2019; whereas for nondisabled retirees from the reserves, the update was from FYs 2008-2009 to FYs 2018-2019. There was no change for disabled retirees other than to reflect Coast Guard experience. These changes result in decreases in the FY 2024 DoD NCPs of 4.1% for full-time and a 1.5% for part-time NCP, and lead to an estimated increase in the September 30, 2021, accrued liability of $55.7 billion (or 3.0%). These assumptions are described in Appendix F of the Technical Reference.

Retiree Death and Other Loss Rates

The Board approved the use of updated retiree decrement rates. The experience period for death and other loss rates was updated to FYs 2017-2020 from FYs 2010-2012 for nondisabled retirees, FYs 2014-2016 for permanent disabled retirees, and FY 2007-2010 for temporarily disabled retirees. Additionally, they approved combining nondisabled retiree from active duty and reserves experience in the determination of death rates. Finally, they approved the use of death and other loss rates for permanently disabled retirees to model temporarily disabled retirees. The net effect of these changes was a 2.8% decrease to the full-time DoD NCP, a 0.1% decrease to the part-time NCP, and an estimated increase in the September 30, 2021, accrued liability of $1.3 billion (or 0.1%). These assumptions are described in Appendix I of the Technical Reference.

Mortality Improvement Scales

The Board approved the use of updated mortality improvement scales for retirees and survivors. Improvement scales were combined for retirees from active, reserves, and permanent disability. The male/female adjustment factors were also simplified. The long-term rate of mortality improvement was updated to reflect historical military trends; previously, it was based on SOA's experience. The impact of COVID was reflected by applying a load to the mortality rates in FYs 2021-2023. These changes resulted in increases to the FY 2023 DoD NCPs of 0.3% for full-time, and 0.3% for part-time, and are estimated to increase the September 30, 2021, accrued liability by $7.1 billion (or 0.4%). These assumptions are described in Appendix J of the Technical Reference.

Plan Amendment

The NDAA 2021 requires the Coast Guard to be covered by the MRF no later than the beginning of FY 2023. The Coast Guard will be included in the September 30, 2022, MRF valuation, and is

estimated to increase the liability by about $60 billion (or 3%). The Coast Guard will begin making normal cost payments starting October 1, 2022, and the Board will determine an amortization schedule to pay off the initial unfunded liability in the 2023 Board meeting, with first payment starting October 1, 2023.

VALUATION OF THE MILITARY RETIREMENT SYSTEM

Introduction

The MRS provides benefits for retirement from active duty and from the reserves, disability retirement benefits, optional survivor coverage, and a special compensation program for certain disabled retirees. A detailed description of benefits can be found in Appendix A of the Technical Reference, and a history of the system is in Appendix B of the Technical Reference.

Public Law (P.L.) 98-94 (currently Chapter 74 of Title 10, U.S.C.) established an aggregate entry-age normal cost funding method for the MRS starting October 1, 1984. Under this law, DoD pays the normal cost of the MRS and the Department of Treasury (Treasury) makes payments from general revenues to amortize the unfunded liability, including any gains or losses that have arisen from assumption or benefit changes, or from actual experience differing from assumed experience. P.L. 108-136 modified this process such that DoD's normal cost contribution excludes the cost due to Concurrent Receipt benefits (refer to Appendix A of the Technical Reference for more information on Concurrent Receipt provisions). Treasury's total contribution includes an additional amount to fund the normal cost for Concurrent Receipt benefits.

P.L. 98-94 also established an independent three-member DoD Retirement Board of Actuaries who were appointed by the President. The Board is required to review valuations of the MRS; to determine the method of amortizing unfunded liabilities; to report annually to the Secretary of Defense; and to report to the President and the Congress on the status of the MRF at least every four years. DoD OACT provides all technical and administrative support to the Board. P.L. 110-181 eliminated the previously separate Retirement and Education Benefits Boards, and created a new single DoD Board appointed by the Secretary of Defense. Board duties with respect to the Retirement and Education Benefits Funds are similar, and the law expands the Board's responsibilities to include oversight of any other funds the Secretary of Defense deems necessary.

The terms of the Board members are fifteen years and a member can be removed only for misconduct or failure to perform the duties of the office. The current Board members, as of this valuation report date, are Marcia Dush (Chairperson), John Moore, and Mike Clark. The DoD Chief Actuary is the Executive Secretary for the Board.

Military retired pay is based on "basic pay." This is the principal element of military compensation that all members receive; however, it is not analogous to private or public sector salaries for comparative purposes. Reasonable comparisons can be made to Regular Military Compensation (RMC). RMC is the sum of (1) basic pay, (2) the housing allowance, which varies by grade, location, and dependency status, (3) the subsistence allowance, and (4) the tax advantages accruing to allowances because they are not subject to federal income tax. Consequently, comparisons of military retired pay to other pension systems should recognize the relationship to RMC rather than to basic pay only. Appendix A of the Technical Reference contains a more complete description of this topic.

Valuation Data and Procedure

The valuation input data were extracted from files maintained by DMDC. Data on individual retirees and survivors come from official files submitted by DFAS. Active duty data elements are obtained from the Active Duty Military Personnel Master File, and reserve data are obtained from the Reserve Component Common Personnel Data System Master File. OACT reviews the data for

reasonableness and consistency against figures provided by the DoD Comptroller, but does not audit the data and relies on the file suppliers for their accuracy and comprehensiveness.

Where applicable, dollar amounts include the subsequent January 1st increase in basic pay. These totals are summarized in Table 1.

TABLE 1

INITIAL ACCOUNTING FIGURES AS OF SEPTEMBER 30

($ in billions)

	2021	2020
Total Active Duty Personnel + Full-Time Reservists	1,425,020	1,419,813
Total Annualized Basic Pay	$67.78	$65.50
Non-BRS	*739,965*	*812,291*
Total Annualized Basic Pay	*$43.93*	*$45.11*
BRS	*685,055*	*607,522*
Total Annualized Basic Pay	*$23.85*	*$20.38*
Total Selected Drilling Reservists	702,629	708,004
Total Annualized Basic Pay	$8.40	$8.23
Non-BRS	*434,854*	*485,514*
Total Annualized Basic Pay	*$6.13*	*$6.36*
BRS	*267,775*	*222,490*
Total Annualized Basic Pay	*$2.27*	*$1.86*
Total Non-Selected Reservists (with 20 years)	182,944	189,644
Total Annualized Basic Pay	-N/A-	-N/A-
Total Number of Non-disabled Retirees	1,866,453	1,875,046
Total Annualized Retired Pay	$56.92	$56.13
Total Number of Disabled Retirees	130,024	128,921
Total Annualized Retired Pay	$1.96	$1.90
Total Number of Surviving Families	317,764	321,054
Total Annualized Survivor Annuities	$4.60	$4.55

Note: Survivor annuities do not include pay due to VA's DIC. Cost, liabilities, and outlays in this report reflect the offset phase-out.

Population and pay projections are generated by an actuarial projection model (GORGO[1]). GORGO is a deterministic model; use of a deterministic model assumes the average outcome will occur annually over a period of time.

The data on active duty personnel and drilling reservists are grouped into cells by age nearest birthday and number of years of service. Each cell contains the number and the average basic pay for personnel with that particular combination of age and length of service. Data on the retired population and surviving families are grouped into cells by age, and each cell contains the number and total net annualized retired pay or survivor annuity.

Separate data arrays are maintained in GORGO for each of the population categories listed in Table 2. These data arrays are displayed in Appendix C of the Technical Reference.

In GORGO, the starting populations are projected year by year into the future. Each year, personnel are moved from one population category to another (e.g., from active to retired, or dropped from the system altogether) by means of decrements such as withdrawal, nondisability retirement, temporary disability, permanent disability, transfer, death with and without survivors, etc. The basic pay scale is assumed to increase at the valuation across-the-board salary increase assumption. Basic pay is also increased by individual promotion and longevity increases. Generally, retired pay and survivor annuities are increased by the valuation COLA assumption each year for retirees and survivors who receive a full COLA. At the end of each year, the number of people and the amounts paid in basic pay and benefits are saved, and the population is aged. After 100 years, when a negligible amount of basic pay and benefit expenditures are projected, the present values of the series of future benefit payments and future basic pay outlays are determined, using the valuation interest rate. Because no new entrants come into the system, the projection is said to be "closed group."

There is also an option in GORGO for an "open group" projection in which new entrants are added each year to meet DoD projected endstrengths. Detailed results of an open group projection of the MRS appear in Appendix K of the Technical Reference.

An open group projection also appears in Table 9. This projection, which shows the past and projected flow of plan assets over approximately the next 25 years, includes the total basic payroll, the normal cost contributions, the payments to amortize the unfunded liability, investment income, fund disbursements, and the fund balance. All of these items are discussed in detail throughout the text of this report and the Technical Reference. An overview of the GORGO process is illustrated in Figure 1.

[1] GORGO was named after a monster featured in a 1961 British science fiction movie based on a variation of *Godzilla*.

TABLE 2

GORGO POPULATION CATEGORIES

1. Active duty populations and basic pay, and benefit tier (BRS/Non-BRS)

    a. Officer
    b. Enlisted

2. Selected reserve populations, basic pay, career points, and benefit tier (BRS/Non-BRS)

    a. Officer
    b. Enlisted

3. Non-selected reserve (those /who have completed 20 good years and have not reached paid retirement) populations, basic pay, accumulated retirement credit points, and benefit tier (BRS/Non-BRS)

    a. Officer
    b. Enlisted

4. Retiree populations, benefit tier (BRS/Non-BRS), retired pay, and survivor benefit coverage

    a. Nondisabled officer (non-CSB electors)
    b. Nondisabled enlisted (non-CSB electors)
    c. Nondisabled officer (CSB electors)
    d. Nondisabled enlisted (CSB electors)
    e. Reserve officer
    f. Reserve enlisted
    g. Disabled officer (Permanent and Temporary)
    h. Disabled enlisted (Permanent and Temporary)

5. Surviving families in a survivor benefit plan, total annuities, survivor benefit coverage, and benefit tier (BRS/Non-BRS)

    a. Survivor Benefit Plan (SBP)
    b. Reserve Component Survivor Benefit Plan (RCSBP)
    c. Retired Serviceman's Family Protection Plan (RSFPP)
    d. Death on active duty (DOAD)
    e. Minimum income (MinInc)

6. Typical new entrant cohort population and benefit tier (BRS/Non-BRS)

    a. Officer
    b. Enlisted

FIGURE 1

GORGO PROCESS OVERVIEW

Economic assumptions, i.e., the annual rate of inflation, the annual basic pay scale increases, and the annual valuation interest rate, were decided upon by the Board after extensive analysis of past trends, the current environment, and future expectations. A discussion of these assumptions is contained in Appendix D of the Technical Reference.

The decrement rates and other non-economic assumptions can be categorized as follows:

1. Active duty decrement rates
2. Retiree and survivor decrement rates
3. Drilling and non-drilling (with 20 good years) reserve decrement rates
4. Actuarial projection model parameters
5. Other rates (e.g., mortality improvement)

The decrement rates and GORGO parameters are generally based on military-specific experience. The rates and descriptions of how they were derived appear in Appendices G through J of the Technical Reference. The actuarial projection model parameters, dealing with such matters as the survivor benefit elections, premium deductions, and member/beneficiary age differences, appear in Appendix F of the Technical Reference.

Valuation results are sensitive to certain assumptions. In general, the valuation results are most sensitive to changes in the economic (e.g., long-term interest assumption) and retention assumptions, where retention refers to the active and reserve duty net loss rates. Valuation results are also sensitive to mortality rates and mortality improvement rates. Table 7 provides an analysis of sensitivity to the long-term interest rate and mortality rates assumptions.

Assets

The assets of the MRF are invested in special issue Treasury obligations bearing interest at rates determined by the Secretary of the Treasury, taking into consideration current market yields for outstanding marketable U.S. obligations of comparable maturities. Each security issued to the Fund mirrors a security that has been issued to the public, i.e., it has the same maturity date, coupon rate, and other security-specific characteristics. The special issue "mirrored" security may have been issued recently, or at any time in the past. Under current procedures adopted by Treasury, the investment manager (DFAS Trust Funds Accounting & Reporting Division) is permitted to redeem long-term special issue securities at any time before maturity for their fair market value, which is based on the public issue bid price with the same maturity date, coupon rate, and other security-specific characteristics. However, Treasury policy encourages a buy-and-hold approach giving consideration to the needs of the Fund in determining the maturities of securities purchased.

The investment manager must follow the asset investment strategy approved by the DFAS Investment Board at their semiannual meetings. The current investment strategy includes investing the assets so that the Fund generates sufficient cash to fund benefit payments and expenses as they come due. Many considerations are taken into account when making investment decisions, including balancing various risks, targeting an expected average maturity of future investments of 20 years (which is reasonably close to the duration of the liabilities), and current and expected economic conditions. A large majority of purchases are in Treasury Inflation-Protected Securities (TIPS). This strategy hedges almost all of the inflationary pressures while minimizing liquidity risks to the Fund. Timing issues and the inconsistency between the TIPS calculation of inflation (CPI-U) and the Fund's crediting of inflation (CPI-W) to retiree and survivor benefits leave some residual inflationary risks.

For purposes of determining the unfunded liability, the assets of the Fund are valued using the amortized cost method. Under this method, the yield to maturity of a security valued at any point in time is equal to the yield to maturity at the time of purchase. In the valuation of the MRS, the amortized cost value is referred to as the "actuarial value of assets." The actuarial value of assets is determined by amortizing premium and discount over the life of the securities. The total investment return includes the interest coupons received, the change in the amortized cost value during the year, and the inflation compensation accrued from the holdings of TIPS. The actuarial value of assets used in the determination of the unfunded liability includes the "accrued interest," which is the amount of the next interest coupon payment that has accrued since the date of the last coupon payment (generally semiannual). The amount of the "accrued interest" is determined by multiplying the coupon payment by the ratio of the time that has elapsed since the last coupon payment date to the total time between coupon payments. Table 3 presents a statement of the actuarial value of assets; Table 4 presents a statement of changes in the actuarial value of assets.

In an open group projection of a retirement system where the total number of employees is held constant, the number of retirees and survivors on the rolls at year end, as well as the number withdrawing, retiring, dying, etc., each year, eventually levels out. When this occurs, the population is said to be "stationary." In this report's open group projection, DoD-projected endstrengths are used through the end of FY 2027 (as depicted in Table 9). Subsequently, the force size is held constant each year. However, the assumption of future mortality improvement results in a small increase in the retired population each year, so that the retired population is nearly, but not completely, stationary.[2]

When a population becomes stationary, the fund disbursements increase each year at the same rate as total pay, which in this valuation is 2.75 percent per year. If the method of funding the system is theoretically sound, the value of the assets in the Fund will also increase at this same rate, and thus will become a level percentage of pay. Otherwise, the fund would either increase indefinitely as a percent of pay, or decrease until it was zero. Practical considerations in this report's open group projection, including mortality improvement, the difference between the short-term economic assumptions and the ultimate economic assumptions (see Table 9 Footnote), and the fact that payments on future gains and losses implied by the short-term assumptions are not projected, cause the fund disbursements to grow at an ultimate rate different from the assumed 2.75 percent per year.

[2] More precisely, the retired population would become nearly, but not completely, stationary if the open group projection were extended many years beyond what is shown in this report.

TABLE 3

DEPARTMENT OF DEFENSE
MILITARY RETIREMENT FUND
STATEMENT OF ACTUARIAL VALUE OF ASSETS
($ in millions)

	For the Plan Year Ended September 30:	
	2021	2020
Assets		
1) Investments, at book value:		
U.S. Government securities[1]	$1,100,371	$973,603
2) Accounts receivable:		
a) Accrued interest[2]	$5,893	$5,608
b) Due from military retirees or their survivors	$160	$147
c) Intragovernmental	$0	$0
3) Cash ('Fund Balance with Treasury')	$75	$75
Actuarial value of assets	1,106,499	$979,433

[1] Book value is determined by 1) amortizing premium and discount over the life of the securities using the effective interest method and 2) including additional inflation compensation from TIPS. Additional adjustment made as a result of FY 2011 National Defense Authorization Act (P.L. 111-383) regarding retired pay date as follows:

	2021	2020
Investments, at book value (actual)	$1,100,371	$973,603
October Expenditures paid in September	$0	$0
Investments, at book value (adjusted)	$1,100,371	$973,603

[2] Includes accrued interest receivable and interest purchased.

TABLE 4

DEPARTMENT OF DEFENSE
MILITARY RETIREMENT FUND
STATEMENT OF CHANGES IN ACTUARIAL VALUE OF ASSETS
($ in millions)

	For the Plan Year Ended September 30: 2021	2020
1) Actuarial value of assets at beginning of plan year:	$979,433	$896,989
2) Investment income:		
a) Interest/Inflation	$62,488	$27,144
b) Net appreciation (depreciation) in book value of investments[1]	($5,602)	($4,536)
3) Contributions:		
a) From Services	$25,200	$21,800
b) Appropriation to amortize the unfunded liability	$98,100	$91,873
c) Appropriation for Treasury Normal Cost Contribution	$9,900	$8,505
4) Total additions (2 + 3):	$190,086	$144,786
5) Change in Accounts Receivable	$13	$14
6) Benefits paid to participants:	$63,033	$62,356
Actuarial value of assets (1 + 4 + 5 - 6):	$1,106,499	$979,433

1. Investments bought, sold and held during the plan year ended September 30 appreciated (depreciated) in value as follows:

	2021	2020
Amortized discount	$897	$878
Amortized premium	($6,498)	($5,414)
Gain (loss) on sale *	$0	$0
	($5,602)	($4,536)

* Gain (loss) on sale is only shown for informational purposes and is not included in the net appreciation (depreciation).

Normal Cost

The aggregate entry-age NCP is 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 and survivor benefits of that group. It is determined using a new-entrant cohort as the starting population in a GORGO projection. Their basic pay and benefits are projected for 100 years, and then discounted back to the present (i.e., the valuation date). Mathematically, an NCP is calculated by dividing the present value of future benefits for the entire cohort by the present value of future basic pay, evaluated at the assumed interest rate.

There are four nondisability benefit formulas (for four distinct populations) within the MRS (see Appendix A of the Technical Reference).

- ***Final Pay***: Military personnel who first became members of a uniformed service before September 8, 1980, have retired pay equal to final basic pay times a multiplier. The multiplier is equal to 2.5 percent times years of service.
- ***High-3****:* If the retiree first became a member of a uniformed service on or after September 8, 1980, the average of the highest 36 months of basic pay is used instead of final basic pay.
- ***Career Status Bonus (CSB)/Redux****:* Members who first became a member of a uniformed service on or after August 1, 1986, provided they had 15 years of service before December 31, 2017, may have chosen between a High-3 and the Career Status Bonus (CSB), which provides a bonus in exchange for reduced (Redux) benefits.[3]
- ***Blended Retirement System (BRS)***: Military personnel who first become a member of a uniformed service after December 31, 2017, are under BRS, which was enacted in NDAA 2016 and took effect January 1, 2018. Members who first entered the military before January 1, 2018, and who had served for fewer than 12 years as of December 31, 2017 (or less than 4,320 points for reservists), have the option to "opt-in" to BRS via an irrevocable election during a one-year (calendar year 2018) open season or remain in the High-3 system. Members who had served 12 or more years as of December 31, 2017 (or more than 4,320 points for reservists) are not permitted to opt-in to BRS and will receive benefits based on their current plan.

P.L. 99-661, enacted in November 1986, mandated that two separate NCPs be used for the valuation of the MRS. One NCP is for active duty personnel and full-time reservists (full-time) and one is for part-time reservists (part-time). Full-time and part-time NCPs are calculated for each of the separate benefit formulas. Only full-time personnel are under the CSB/Redux benefit formula. The FY 2022 NCPs are summarized below (with DoD NCPs in parentheses):

Benefit Formula	Full-Time	Part-Time
Final Pay	-N/A-	31.4% (27.3%)
High-3	59.2% (42.0%)	30.2% (26.3%)
CSB/Redux [4]	58.4% (41.2%)	-N/A-
BRS	45.8% (31.0%)	24.7% (21.2%)

[3] The National Defense Authorization Act of FY 2016 (NDAA 2016, P.L. 114-92) sunsets the CSB/Redux benefit tier by not allowing any CSB elections after December 31, 2017.

[4] This NCP represents a blend of NCPs for CSB/Redux and High-3 benefit formulas based on the CSB/Redux Election Proportion (See Appendix F of the Technical Reference).

P.L. 108-136 required Treasury to pay into the Fund at the beginning of each year the normal cost arising from increased Concurrent Receipt benefits. The NCPs shown above include the respective Total ("DoD plus Treasury") and DoD percentages. The NCPs are disaggregated in Table 5. Table 6 also displays the DoD and Treasury NCPs separately.

The FY 2022 weighted NCPs in Table 5 are calculated using the NCP weighting factors (see Appendix E of the Technical Reference), along with BRS opt-in rates (see Appendix F of the Technical Reference). The sum of the DoD and Treasury components of the weighted aggregate full-time NCP is 53.7 percent, and the weighted aggregate part-time NCP is 28.5 percent. Due to federal budget deadlines, the two NCPs used to determine the actual contributions to the Fund must be established in advance of implementation and may vary from those actually derived in a valuation.

Table 5 summarizes the components of the FY 2022 NCPs.

TABLE 5

NORMAL COST AS A PERCENT OF BASIC PAY (NCPs)
(DoD Normal Cost Percentage in Parentheses)

FULL-TIME	FINAL PAY	HIGH-3	CSB/ REDUX	BRS	FY 2022 Weighted
Nondisability benefits	-N/A-	54.5 (39.4)	53.7 (38.6)	41.7 (28.8)	49.2 (34.9)
Disability benefits	-N/A-	1.8 (0.6)	1.8 (0.6)	1.8 (0.6)	1.8 (0.6)
Survivor benefits	-N/A-	2.9 (2.1)	2.9 (2.0)	2.3 (1.6)	2.7 (1.9)
Total	-N/A-	59.2 (42.0)	58.4 (41.2)	45.8 (31.0)	53.7 (37.4)
PART-TIME					
Nondisability benefits	26.3 (23.7)	25.4 (22.9)	-N/A-	20.4 (18.2)	23.9 (21.5)
Disability benefits	2.1 (1.0)	1.9 (0.9)	-N/A-	1.9 (0.9)	1.9 (0.9)
Survivor benefits	3.0 (2.6)	2.9 (2.5)	-N/A-	2.4 (2.1)	2.7 (2.4)
Total	31.4 (27.3)	30.2 (26.3)	-N/A-	24.7 (21.2)	28.5 (24.7)

- Note that columns may not add exactly due to rounding of the separate NCP components.
- Final Pay NCPs are no longer part of the weighted NCP calculation.
- Only full-time personnel are under the CSB/Redux benefit formula, thus an analogous part-time NCP is not applicable ("N/A").

As can be determined from this table, 92 percent of the full-time normal cost and 84 percent of the part-time normal cost stem from nondisability retirement. Based on current decrement rates, 19 percent of a typical group of new entrants attain 20 years of active duty service and become eligible for nondisability retirement from active duty. Specifically, 60 percent of new officers and 16 percent of new enlistees attain 20 years of active duty service.

It should be noted that some military personnel who begin their careers on active duty move to the reserves and retire from there. This is modeled through the allocation of a portion of the reserve benefit, in present value terms, to the full-time normal cost (see Appendix F of the Technical

Reference). Based on current reserve decrement rates, 18 percent of a typical group of members entering the reserves for the first time (including members with prior active or non-drilling reserve time) become eligible for a reserve nondisability retirement (63% for officers, and 16% for enlisted).

Table 10 lists the past and projected weighted aggregate full-time and part-time NCPs under current law in the normal cost columns. The columns are separated into the DoD and Treasury NCPs due to P.L. 108-136. In recent years both the full- and part-time sums of the DoD and Treasury component weighted aggregate percentages are generally at the level of the CSB/Redux NCPs (High-3 for part-time) since virtually all non-retired personnel entered the uniformed service on or after August 1, 1986. With the passage of the law on BRS, projected NCPs will eventually converge to the level of the BRS NCPs. As indicated in the Table 9 footnote, the Treasury Concurrent Receipt normal cost payments reflect amounts sequestered by fiscal year.

Amortization of Unfunded Liability

Under P.L. 98-94, normal cost contributions began to be made by DoD on behalf of all military personnel on October 1, 1984. Since normal cost contributions had not been made for service prior to this date, there was an initial unfunded accrued liability of $528.7 billion as of September 30, 1984. If this amount had been deposited in the retirement fund on September 30, 1984, then it, together with the future normal cost payments to be made on behalf of all active duty personnel and drilling reservists over the balance of their active careers, plus investment earnings at the assumed rate, would have been sufficient to provide all expected retirement and survivor benefits for those in the system on that date.

The Board originally determined that the initial unfunded accrued liability of the system should be amortized with payments equal to 33 percent of the second preceding fiscal year's basic payroll. It was originally projected that this method would amortize the initial unfunded liability over 60 years. However, economic assumption changes extended this amortization period well beyond 60 years. As a result, the Board revised the amortization method of the original unfunded liability such that the amortization would have been completed in FY 2044. In 1996, it was determined that the Fund was projected to have a negative balance for several years before becoming positive again. The Board decided to shorten the amortization period to 50 years. The Board again shortened the amortization period in 2007 to 42 years in order to ensure that the payments cover the interest on the unfunded liability each year. The initial unfunded liability is now expected to be fully amortized in calendar year 2025 (FY 2026).

Changes in the unfunded liability can also arise because of: 1) modifications to benefit provisions, 2) changes in actuarial assumptions, and 3) deviations in actual experience from expected experience (gains and losses). In the July 2021 meeting, the Board approved a method to amortize these changes over 20 years by payments that increase in absolute value at the same rate as the annual long-term basic pay scale assumption. A description of the methods and computations used to calculate the payment streams for changes in unfunded liability can be found in Appendix L of the Technical Reference.

Unfunded Accrued Liability as of September 30, 2021

Table 6 summarizes the calculation of the unfunded accrued liability as of September 30, 2021. The present value of future benefits is obtained by projecting future benefits for the total covered

population (closed group with no new entrants) as of September 30, 2021, and discounting these benefits back to the present (i.e. valuation date) at the assumed interest rate. The GORGO actuarial model projects benefits for the current active and retired populations over the duration of their lifetimes. Additional minor adjustments to the projection results are made outside of the GORGO model to capture the more complex law changes. The initial retirement benefits for military personnel are based on their total projected service at retirement, the applicable benefit formula, and assumed basic pay increases. Subsequent retirement benefits include assumed cost-of-living adjustments and the age 62 adjustment for those retiring under the CSB/Redux formula.

The present value of future normal cost contributions is obtained by (1) using GORGO to project future yearly full-time and part-time basic pay for the September 30, 2021, covered population, (2) multiplying the pay by the total projected (DoD and Treasury) full-time and part-time weighted aggregate entry-age NCPs, and (3) discounting the resulting normal costs back to September 30, 2021. For this closed group, the relative percentages of basic pay subject to the four separate benefit formulas will change over time as fewer members are covered under the CSB/Redux, High-3 and Final Pay formulas, and more are covered under BRS. The *weighted* full- and part-time NCPs that are multiplied against the future full- or part-time pay in each year reflect expected changing percentages of pay going to members covered by the multiple benefit formulas. This will change in future years as more personnel are covered under BRS. This weighted procedure is roughly equivalent in the aggregate to projecting separately the pay of each of the eight groups of active duty and selected reserve members and multiplying it by the individual group's NCP.

The sum of the DoD and Treasury components of the weighted aggregate entry-age NCPs for FY 2022 are 53.7 percent full-time and 28.5 percent part-time. Federal budget deadlines require the establishment of NCPs in advance of the valuation. Consequently, the percentages actually implemented in a fiscal year may vary from those derived in the valuation. These differences, which are small unless major actuarial assumptions or benefits are changed, are reflected in the unfunded liability by using the implemented normal cost in the first year of the projection.

Table 7 displays selected sensitivities in the estimated valuation cost figures due to changes in certain economic and non-economic assumptions. The figures require the use of actuarial assumptions regarding future economic and demographic experience, which are typically disclosed as a single value. In an attempt to assess system financial risks, certain underlying valuation assumptions were tested for their respective impacts. The absolute levels of change tested in Table 7 were selected to show directional magnitudes, not necessarily anticipated changes.

Deducting the present value of future normal costs and the actuarial asset value of the Fund from the present value of future benefits leaves an unfunded liability of $745.1 billion as of September 30, 2021. This was greater than the expected unfunded liability of $683.1 billion. The expected unfunded liability is what the unfunded liability would have been if all actuarial assumptions had been realized and all benefit formulas had remained unchanged. The fact that the actual unfunded liability is greater than expected means that there was a total FY 2021 loss of $62.1 billion ($745.1 billion minus $683.1 billion). The components of this loss are outlined in Table 8. The total experience gain/loss is divided into five segments: (1) the gain due to the difference between the actual interest rate (5.3%) earned by the Fund in FY 2021 and the assumed interest rate (4.25%), (2) the loss due to the actual January 1, 2022, COLA (5.9%) being different from that assumed (2.50%), (3) the gain due to the actual January 1, 2022, across-the-board salary increase (2.7%) being different from that assumed (2.75%), (4) the loss due to the difference between the

actual and assumed non-economic experience, and (5) the loss due to the sequestration-required nonpayment of the October 1, 2021, Treasury Concurrent Receipt normal cost contribution. See the Summary of Changes for the September 30, 2021, Valuation for a more detailed discussion of the actuarial assumptions outlined in Table 8.

These changes in unfunded liability were used to calculate the October 1, 2022, unfunded liability payment. The total payment was determined to be $120.438 billion. This total payment includes (1) a payment of $105.404 billion to amortize the original unfunded liability, plus (2) an amount of $17.162 billion to amortize changes in actuarial assumptions, plus (3) an amount of $7.676 billion to amortize benefit changes, less (4) an amount of $10.799 billion to amortize total combined experience gains and losses through FY 2021, plus (5) $0.995 billion to amortize over one year the loss due to sequestration of the October 1, 2021, Treasury Concurrent Receipt normal cost contribution. The detailed calculations of these payment components can be found in Appendix L of the Technical Reference. Tables 11 and 12 show the projection of the unfunded liability payments and unfunded liability balances. As stated earlier, Tables 9 and 10 display all projected transactions to the Fund.

Starting in FY 2005, the total payment to be made by Treasury includes the amount required by P.L. 108-136 to pay for the increased normal cost due to Concurrent Receipt benefits in addition to the unfunded liability amortization amount. The total actuarially determined Treasury payment on October 1, 2022, is $132.011 billion, equal to $120.438 billion for the unfunded liability amortization plus $11.573 billion for Concurrent Receipt benefits. Note that the difference in the actual contribution reflects a sequestration-mandated reduction from the $11.573 billion, to $10.612 billion. Detailed calculations of the total Treasury payment are also located in Appendix L of the Technical Reference.

TABLE 6

MILITARY RETIREMENT SYSTEM
ACTUARIAL STATUS INFORMATION
($ in billions)

		For the Plan Year Ended September 30: 2021	2020
1.	Present value of future benefits (PVFB)		
	a. Retirees and Survivors	$1,198.5	$1,107.4
	b. Reserves	$221.9	$215.1
	c. Active Duty	$795.8	$748.0
	TOTAL	$2,216.3	$2,070.5
2.	Present value of future normal cost contributions (PVFNC)[1]	$364.6	$337.8
3.	Actuarial accrued liability (1. – 2.)	$1,851.6	$1,732.7
4.	Actuarial value of assets[2]	$1,106.5	$979.4
5.	Unfunded accrued liability (3. – 4.)	$745.1	$753.3
6.	Funded Ratio (4. / 3.)	60%	57%
7.	DoD NCP to be applied to basic pay in fiscal year[3]	FY 2023	FY 2022
	a. Full-time	36.9%	35.1%
	b. Part-time	24.5%	25.7%
8.	Treasury NCP to be applied to basic pay in fiscal year[4]	FY 2023	FY 2022
	a. Full-time	16.2%	16.5%
	b. Part-time	3.8%	4.4%

Basic pay is only a portion of active duty military compensation. See The Military Retirement System: Benefits (Appendix A of the Technical Reference) for details.

[1] The September 30, 2021, PVFNC reflects a reduction of $956.658 million due to sequestration of the October 1, 2021, Treasury Concurrent Receipt normal cost contribution. The September 30, 2020, PVFNC reflects a reduction of $891.088 million due to sequestration of the October 1, 2020, Treasury Concurrent Receipt normal cost contribution.

[2] The actuarial value of assets is determined using the amortized cost method from Table 4.

[3] Due to the need to establish the NCPs in advance of implementation (federal budget deadlines), the percentages actually used in a fiscal year may vary from the ones derived in the valuation.

[4] P.L. 108-136 requires the Department of Treasury to pay the normal cost resulting from the increase in benefits due to Concurrent Receipt.

TABLE 7

MILITARY RETIREMENT SYSTEM
SENSITIVITY TESTS*
($ in billions)

Long-Term Real Interest Rate Assumption

[Baseline Real Interest = 1.50%, Appendix D of the Technical Reference]

		Baseline	0.25% Lower	0.25% Higher
1.	Present value of future benefits	$ 2,216.3	$ 2,336.7	$ 2,105.4
2.	Actuarial accrued liability	$ 1,851.6	$ 1,935.9	$ 1,779.9
3.	Unfunded accrued liability	$ 745.1	$ 829.4	$ 673.4
4.a.	FY 2023 FT NCP [DoD + Treasury]	53.1%	57.8%	47.8%
4.b.	FY 2023 PT NCP [DoD + Treasury]	28.3%	31.1%	25.0%

Retiree Mortality Rates

[Baseline = 'Retired Death Rates', Appendix I of the Technical Reference]

		Baseline	x 1.25	x 0.75
1.	Present value of future benefits	$ 2,216.3	$ 2,125.5	$ 2,336.2
2.	Actuarial accrued liability	$ 1,851.6	$ 1,782.4	$ 1,960.3
3.	Unfunded accrued liability	$ 745.1	$ 675.9	$ 853.8
4.a.	FY 2023 FT NCP [DoD + Treasury]	53.1%	50.9%	55.0%
4.b.	FY 2023 PT NCP [DoD + Treasury]	28.3%	18.2%	29.5%

* A sensitivity test measures the impact of a change in an actuarial assumption on an actuarial determination. As mentioned earlier in the Valuation Data and Procedures section of this report, valuation results are most sensitive to changes in the economic (e.g., long-term interest) and retention assumptions. Valuation results are also sensitive to retiree mortality rates. Baseline figures are generally from Table 6. The absolute levels of the changes intend to show potential directional magnitudes to assist report users assess potential future risks.

TABLE 8

MILITARY RETIREMENT SYSTEM
FY 2021 CHANGE IN UNFUNDED LIABILITY
($ in billions)

		For the Plan Year Ended September 30, 2021	
1.	Actual unfunded accrued liability (9/30/21)	745.1	
2.	Expected unfunded accrued liability (9/30/21)	683.1	
3.	Total (gain)/loss	62.1	3.4%
a.	Total experience (gain)/loss	30.5	1.6%
	Interest assumption	-11.6	0.6%
	COLA assumption	37.5	2.0%
	Salary assumption	-0.2	0.0%
	Non-economic experience	4.8	0.3%
b.	10/1/21 unpaid contribution	$1.0	0.1%
c.	Total benefit change (gain)/loss	$0.0	0.0%
d.	Total assumption change (gain)/loss	$30.6	1.7%
	Updated Mortality Improvement	-$22.3	1.2%
	Updated Active Duty Rates	-$29.5	1.6%
	Updated Reserve Rates	$2.5	0.1%
	New Economic Assumptions	$79.9	4.3%

In this table, negative values represent actuarial gains and positive values represent actuarial losses.

Percentages shown are ratios of absolute values of each gain or loss component to the accrued liability (Table 6, line 3).

The reasons for the total experience (gain)/loss:
- Interest = 4.25% long-term assumed vs. 5.3% FY21 dollar-weighted fund yield;
- COLA = 2.50% long-term assumed vs. 5.9% January 1, 2022 increase;
- Salary = 2.75% long-term assumed vs. 2.7% January 1, 2022 increase;

→October 1, 2021 (10/1/21) unpaid contribution loss is due to sequestration of the Treasury Concurrent Receipt normal cost contribution.

TABLE 9

MILITARY RETIREMENT SYSTEM
PAST AND PROJECTED FLOW OF PLAN ASSETS[1]
(In Billions of Dollars and as a Proportion of Payroll)

		Contributions Received											
		From DoD, for Normal		From Treasury, for		From Treasury, for Amortization of							
Fiscal Year	Basic Payroll[2]	Costs[3]		Normal Costs[3]		Unfunded Liability[4]		Investment Income		Fund Disbursements[5]		Fund Balance, End of Year[6]	
1985	$33.5	$17.0	(50.7%)	---	---	$9.5	(28.4%)	$1.1	(3.3%)	$15.8	(47.2%)	$11.8	(35.2%)
1986	35.4	17.4	(49.2)	---	---	10.5	(29.7)	2.5	(7.1)	17.6	(49.7)	24.6	(69.5)
1987	36.4	18.3	(50.3)	---	---	10.5	(28.8)	3.6	(9.9)	18.1	(49.7)	38.9	(106.9)
1988	37.3	18.4	(49.3)	---	---	10.3	(27.6)	5.0	(13.4)	17.5	(46.9)	53.4	(143.2)
1989	38.6	18.5	(47.9)	---	---	9.8	(25.4)	6.1	(15.8)	20.2	(52.3)	67.6	(175.1)
1990	39.8	16.3	(41.0)	---	---	10.6	(26.6)	7.3	(18.3)	21.5	(54.0)	80.4	(202.0)
1991	42.3	17.2	(40.7)	---	---	10.8	(25.5)	8.5	(20.1)	23.1	(54.6)	93.7	(221.5)
1992	41.1	16.3	(39.7)	---	---	11.2	(27.3)	9.4	(22.9)	24.5	(59.6)	106.1	(258.2)
1993	38.9	13.2	(33.9)	---	---	12.3	(31.6)	10.0	(25.7)	25.7	(66.1)	115.9	(297.9)
1994	38.3	12.8	(33.4)	---	---	11.9	(31.1)	10.3	(26.9)	26.7	(69.7)	124.2	(324.3)
1995	37.1	12.2	(32.9)	---	---	11.5	(31.0)	10.9	(29.4)	27.8	(74.9)	131.0	(353.1)
1996	36.7	11.2	(30.5)	---	---	10.7	(29.2)	11.3	(30.8)	28.8	(78.5)	135.3	(368.7)
1997	36.8	11.1	(30.2)	---	---	15.2	(41.3)	11.9	(32.3)	30.2	(82.1)	143.3	(389.4)
1998	37.1	10.4	(28.0)	---	---	15.1	(40.7)	12.2	(32.9)	31.1	(83.8)	149.9	(404.0)
1999	37.6	10.4	(27.7)	---	---	15.3	(40.7)	12.4	(33.0)	31.9	(84.8)	156.0	(414.9)
2000	39.0	11.4	(29.2)	---	---	15.3	(39.2)	12.7	(32.6)	32.8	(84.1)	162.7	(417.2)
2001	40.9	11.4	(27.9)	---	---	16.1	(39.4)	13.2	(32.3)	34.1	(83.4)	169.2	(413.7)
2002	44.7	12.9	(28.9)	---	---	17.0	(38.0)	12.4	(27.7)	35.1	(78.5)	176.5	(394.9)
2003	52.0	13.7	(26.3)	---	---	17.9	(34.4)	10.0	(19.2)	35.6	(68.5)	182.6	(351.2)
2004	53.6	14.1	(26.3)	---	---	18.2	(34.0)	10.1	(18.8)	37.0	(69.0)	188.0	(350.7)
2005	56.3	15.0	(26.6)	$1.5	(2.7%)	21.4	(38.0)	10.9	(19.4)	39.0	(69.3)	197.9	(351.5)
2006	54.0	13.9	(25.7)	2.3	(4.3)	23.2	(43.0)	12.3	(22.8)	41.1	(76.1)	208.4	(385.9)
2007	56.4	14.5	(25.7)	2.5	(4.4)	26.0	(46.1)	10.3	(18.3)	43.5	(77.1)	218.2	(386.9)
2008	59.2	16.1	(27.2)	2.8	(4.7)	46.2	(78.0)	15.6	(26.4)	45.8	(77.4)	253.1	(427.5)
2009	63.0	17.5	(27.8)	3.7	(5.9)	51.1	(81.1)	2.9	(4.6)	50.0	(79.4)	278.4	(441.9)
2010	64.4	20.4	(31.7)	4.5	(7.0)	58.6	(91.0)	10.4	(16.1)	50.6	(78.6)	321.7	(499.5)
2011	66.9	21.0	(31.4)	5.0	(7.5)	61.4	(91.8)	18.0	(26.9)	51.0	(76.2)	376.1	(562.2)
2012	66.5	21.9	(32.9)	5.4	(8.1)	64.8	(97.4)	12.5	(18.8)	52.6	(79.1)	428.0	(643.6)
2013	66.3	20.5	(30.9)	6.8	(10.3)	67.7	(102.1)	15.0	(22.6)	54.5	(82.2)	483.5	(729.3)
2014	65.4	20.5	(31.3)	6.3	(9.6)	72.9	(111.5)	17.1	(26.1)	55.4	(84.7)	545.0	(833.3)
2015	64.3	19.7	(30.6)	6.2	(9.6)	75.6	(117.6)	10.8	(16.8)	56.7	(88.2)	600.6	(934.1)
2016	64.6	19.5	(30.2)	6.9	(10.7)	79.3	(122.8)	15.3	(23.7)	57.2	(88.5)	664.4	(1,028.5)
2017	65.4	18.3	(28.0)	6.8	(10.4)	81.2	(124.1)	21.2	(32.4)	57.8	(88.4)	734.1	(1,122.5)
2018	66.7	18.4	(27.6)	6.8	(10.3)	82.9	(124.3)	30.5	(45.8)	58.9	(88.4)	813.9	(1,220.2)
2019	69.1	20.5	(29.7)	7.9	(11.4)	88.0	(127.4)	27.4	(39.7)	60.7	(87.8)	897.0	(1,298.1)
2020	72.2	21.8	(30.2)	8.5	(11.8)	91.9	(127.2)	22.6	(31.3)	62.4	(86.4)	979.4	(1,356.5)
2021	74.6	25.2	(32.9)	9.9	(12.9)	98.1	(127.9)	56.9	(74.2)	63.0	(82.1)	1,106.5	(1,442.6)
↑ ACTUAL ↑													
↓ PROJECTED ↓													
2022	$77.2	$26.2	(33.9%)	$10.6	(13.7%)	$114.5	(148.3%)	$48.5	(62.8%)	$66.5	(86.2%)	$1,239.6	(1,606.0%)
2023	80.8	28.3	(35.1)	10.6	(13.1)	120.4	(149.0)	54.0	(66.8)	70.1	(86.7)	1,382.9	(1,711.4)
2024	80.9	28.4	(35.2)	11.9	(14.7)	122.7	(151.8)	59.8	(74.0)	72.3	(89.4)	1,533.5	(1,896.2)
2025	82.7	29.2	(35.3)	12.2	(14.8)	126.1	(152.5)	66.0	(79.8)	74.3	(89.8)	1,692.7	(2,047.5)
2026	84.6	29.6	(34.9)	12.4	(14.7)	129.6	(153.2)	72.5	(85.7)	76.2	(90.1)	1,860.5	(2,199.7)
2027	86.5	29.9	(34.6)	12.6	(14.6)	15.6	(18.1)	74.6	(86.2)	78.2	(90.4)	1,915.1	(2,214.0)
2028	88.6	30.3	(34.2)	12.9	(14.5)	16.1	(18.1)	76.8	(86.6)	80.1	(90.4)	1,971.0	(2,224.5)
2029	91.0	30.8	(33.9)	13.1	(14.4)	16.5	(18.2)	79.0	(86.8)	82.1	(90.2)	2,028.3	(2,229.8)
2030	93.4	31.3	(33.6)	13.4	(14.4)	17.0	(18.2)	81.3	(87.1)	84.1	(90.0)	2,087.3	(2,235.1)
2031	95.9	31.9	(33.2)	13.7	(14.3)	17.4	(18.2)	83.7	(87.2)	86.1	(89.8)	2,147.8	(2,239.7)
2032	98.6	32.5	(32.9)	14.0	(14.2)	17.9	(18.2)	86.1	(87.3)	88.2	(89.4)	2,210.1	(2,240.5)
2033	101.4	33.1	(32.6)	14.4	(14.2)	18.4	(18.2)	88.6	(87.3)	90.3	(89.0)	2,274.3	(2,241.9)
2034	104.3	33.8	(32.4)	14.7	(14.1)	18.9	(18.1)	91.1	(87.4)	92.3	(88.5)	2,340.5	(2,243.7)
2035	107.3	34.4	(32.1)	15.1	(14.1)	19.4	(18.1)	93.8	(87.4)	94.4	(87.9)	2,408.9	(2,244.9)
2036	110.4	35.1	(31.8)	15.4	(14.0)	20.0	(18.1)	96.5	(87.5)	96.4	(87.3)	2,479.6	(2,246.8)
2037	113.5	35.8	(31.6)	15.8	(13.9)	20.5	(18.1)	99.4	(87.6)	98.5	(86.8)	2,552.7	(2,250.0)
2038	116.6	36.5	(31.3)	16.2	(13.9)	21.1	(18.1)	102.3	(87.8)	100.8	(86.4)	2,628.0	(2,254.4)
2039	119.8	37.2	(31.1)	16.6	(13.8)	21.7	(18.1)	105.3	(88.0)	103.1	(86.0)	2,705.8	(2,259.3)
2040	123.1	38.0	(30.9)	17.0	(13.8)	22.3	(18.1)	108.5	(88.1)	105.2	(85.5)	2,786.3	(2,264.2)
2041	126.5	38.8	(30.7)	17.4	(13.8)	22.9	(18.1)	111.7	(88.3)	107.3	(84.8)	2,869.8	(2,268.5)
2042	130.0	39.7	(30.5)	17.8	(13.7)	2.2	(1.7)	114.2	(87.9)	109.6	(84.3)	2,934.2	(2,257.4)
2043	133.6	40.6	(30.4)	18.3	(13.7)	0.0	(0.0)	116.7	(87.4)	111.7	(83.6)	2,998.0	(2,244.8)
2044	137.3	41.6	(30.3)	18.8	(13.7)	0.0	(0.0)	119.2	(86.8)	113.8	(82.9)	3,063.8	(2,231.1)
2045	141.2	42.6	(30.2)	19.2	(13.6)	0.0	(0.0)	121.9	(86.3)	115.9	(82.1)	3,131.5	(2,218.3)
2046	145.1	43.7	(30.1)	19.8	(13.6)	0.0	(0.0)	124.6	(85.8)	118.0	(81.3)	3,201.5	(2,206.1)
2047	149.2	44.8	(30.0)	20.3	(13.6)	0.0	(0.0)	127.4	(85.4)	120.0	(80.5)	3,273.9	(2,194.4)
2048	153.4	46.0	(30.0)	20.8	(13.6)	0.0	(0.0)	130.3	(84.9)	122.2	(79.7)	3,348.8	(2,183.3)
2049	157.7	47.2	(29.9)	21.4	(13.6)	0.0	(0.0)	133.3	(84.5)	124.3	(78.9)	3,426.3	(2,173.2)
2050	162.1	48.5	(29.9)	22.0	(13.6)	0.0	(0.0)	136.4	(84.2)	126.5	(78.1)	3,506.7	(2,163.8)
2051	166.6	49.9	(29.9)	22.6	(13.6)	0.0	(0.0)	139.6	(83.8)	128.7	(77.3)	3,590.0	(2,155.0)

Note: Treasury Normal Cost Contributions are net of actual and expected sequestered amounts by the following fiscal years:

- FY 2014: 9.8%
- FY 2015: 9.5%
- FY 2016: 9.3%
- FY 2017: 9.1%
- FY 2018: 8.9%
- FY 2019: 8.7%
- FY 2020: 8.6%
- FY 2021: 8.3%
- FY 2022: 8.3%
- FY 2023: 8.3%

TABLE 9 FOOTNOTES

NOTE REGARDING OPEN GROUP PROJECTIONS: The approximate 25-year open group projection in this report is based on benefit provisions, data, methods and assumptions as of the valuation date. The values are displayed in future-year dollars. They are intended to provide the user with a general directional magnitude, but uncertainty increases with the length of the projection period. Actual results are heavily dependent on the underlying assumptions being realized. Economic, demographic, and political forces cannot be precisely predicted over very long periods of time.

In addition, the fundamental purpose of OACT's valuation is to produce actuarial liability and normal cost amounts, both of which are done on a closed group basis. In performing the valuation calculations, many assumptions represent long-run average expectations. This is appropriate for such liability and normal cost determinations. The open group projection uses many of the same long-run average assumptions that are used in the actuarial liability and normal cost calculations, but incorporates some adjustments for short-term expectations (e.g., the use of short-term economic assumptions for basic pay and COLA increases).

The projection in this publication is intentionally limited to approximately 25 years. Additional projection years, as well as projections assuming different economic assumptions, may be available upon request.

[1] P.L. 98-94 established the Fund. Under the law, DoD is responsible for the normal cost payment and Treasury is responsible for the payments on the unfunded liability. P.L. 108-136 assigned Treasury the responsibility of funding the normal cost resulting from increased benefits due to Concurrent Receipt, starting in FY 2005. There are no employee contributions to the Fund.

[2] DoD-projected endstrengths are used through the end of FY 2027 and constant force strengths are used thereafter. Basic pay is only a portion of military compensation.

[3] Due to federal budget deadlines, NCPs are established in advance of implementation. The percentage actually used and displayed here may vary from the one derived in the valuation as of the end of the previous year. Starting in FY 1987, NCPs have been developed separately for the full-time and part-time basic payrolls. FYs 2014 through 2023 Treasury Normal Cost Payments reflect sequestered amounts.

TABLE 9 FOOTNOTES (Continued)

[4] Reflects amortization payments for FY 2023 and thereafter determined in the September 30, 2021, valuation.

[5] Disbursements are on a cash basis. Beginning in December 1984, entitlements obligated for a month have been paid at the beginning of the following month. Prior to this date, entitlements were paid at the end of the month of obligation. Consequently, FY 1985 disbursements include only 11 months of payments. The FY 2011 National Defense Authorization Act allowed for retired pay to be paid on the previous business day if the first of the month falls on a weekend or holiday. This is not accounted for in the projected Fund Disbursements or Balances.

[6] This fund balance (on a book value basis) reflects cash disbursements during the year. On September 30, 2021, assets in the Fund totaled $1,106.5 billion.

OTHER NOTES: Mortality rates that are applied in the valuation to active/reserve duty members, retirees, and survivors, are subject to annual rates of improvement. See Appendix J of the Technical Reference. People and pay underlying the projection can be found in Appendix K of the Technical Reference. The table does not reflect future gains or losses due to short-term economic experience being different than assumed. Consequently, only payments on the total unfunded liability as of September 30, 2021, are reflected.

ANNUAL ECONOMIC ASSUMPTIONS USED IN PROJECTIONS OF PLAN ASSETS

	Fiscal Year	Full COLA (%)	Basic Pay (%)	Interest (%)
[*Actual]*	2022	5.9%	2.7%	4.00%
	2023	4.3	4.6	4.00
	2024	2.3	2.6	4.00
	2025	2.3	2.6	4.00
	2026	2.3	2.6	4.00
	2027	2.3	2.6	4.00
	2028	2.3	2.6	4.00
	2029	2.3	2.6	4.00
	2030	2.3	2.6	4.00
	2031	2.5	2.6	4.00
[Long-Term]	2032	2.5	2.75	4.00

Full COLA is equal to full cost-of-living increases to retiree and survivor annuities. Basic Pay is the rate at which the entire military pay table increases (hence excludes longevity or promotion-and-merit increases). They are applied on an across-the-board basis and typically occur each January 1st. Interest assumptions pertain to annual, aggregate Fund yield on all cash flows. The above COLA and Basic Pay assumptions are from OMB; the interest (fund yield) is the Board's long-term interest assumption. Long-term annual economic assumptions (used throughout the projection in the normal cost and unfunded liability calculations) are 2.50% COLA, 2.75% basic pay, and 4.00% interest.

TABLE 10

MILITARY RETIREMENT SYSTEM
PAST AND PROJECTED PAYROLL AND NORMAL COST PAYMENTS
(In Billions of Dollars and as a Proportion of Payroll)

Fiscal	Payroll			DoD Normal Cost Payments				Treasury Normal Cost Payments				Normal Cost Payments	
Year	Full-Time	Part-Time	Total	Full-Time		Part-Time		Full-Time		Part-Time		Total	
1985	$30.6	$2.9	$33.5	$15.5	(50.7%)	$1.5	(50.7%)	$0.0	---	$0.0	---	$17.0	(50.7%)
1986	32.3	3.1	35.4	16.4	(50.7)	1.6	(50.7)	0.0	---	0.0	---	17.9	(50.7)
1987	33.4	3.0	36.4	17.4	(52.2)	0.8	(26.4)	0.0	---	0.0	---	18.2	(50.1)
1988	34.0	3.3	37.3	17.4	(51.2)	0.9	(26.1)	0.0	---	0.0	---	18.3	(49.0)
1989	35.0	3.6	38.6	17.6	(50.2)	0.9	(25.7)	0.0	---	0.0	---	18.5	(47.9)
1990	36.0	3.7	39.7	15.8	(43.9)	0.5	(13.4)	0.0	---	0.0	---	16.3	(41.1)
1991	38.6	3.7	42.3	16.7	(43.2)	0.5	(13.3)	0.0	---	0.0	---	17.2	(40.6)
1992	36.9	4.1	41.0	15.8	(42.7)	0.5	(13.3)	0.0	---	0.0	---	16.3	(39.8)
1993	35.1	3.8	38.9	12.8	(36.4)	0.4	(10.6)	0.0	---	0.0	---	13.2	(33.9)
1994	34.5	3.8	38.3	12.4	(36.0)	0.4	(10.6)	0.0	---	0.0	---	12.8	(33.5)
1995	33.4	3.8	37.2	11.9	(35.5)	0.4	(10.5)	0.0	---	0.0	---	12.3	(32.9)
1996	33.1	3.7	36.8	10.9	(32.9)	0.4	(9.6)	0.0	---	0.0	---	11.2	(30.6)
1997	33.2	3.7	36.9	10.8	(32.6)	0.4	(9.6)	0.0	---	0.0	---	11.2	(30.3)
1998	33.4	3.7	37.1	10.2	(30.5)	0.3	(8.8)	0.0	---	0.0	---	10.5	(28.3)
1999	33.7	3.9	37.6	10.2	(30.2)	0.3	(8.7)	0.0	---	0.0	---	10.5	(28.0)
2000	35.1	4.0	39.1	11.2	(31.8)	0.4	(9.8)	0.0	---	0.0	---	11.6	(29.5)
2001	36.7	4.2	40.9	10.9	(29.6)	0.6	(14.1)	0.0	---	0.0	---	11.5	(28.0)
2002	40.8	3.9	44.7	12.4	(30.3)	0.6	(14.4)	0.0	---	0.0	---	12.9	(28.9)
2003	47.8	4.2	52.0	13.1	(27.4)	0.6	(14.6)	0.0	---	0.0	---	13.7	(26.4)
2004	49.4	4.2	53.6	13.4	(27.1)	0.7	(16.0)	0.0	---	0.0	---	14.1	(26.2)
2005	52.0	4.3	56.3	14.3	(27.5)	0.7	(16.7)	1.7	(3.3%)	0.0	(0.8%)	16.8	(29.8)
2006	49.7	4.3	54.0	13.2	(26.5)	0.7	(16.7)	2.4	(4.9)	0.1	(1.4)	16.4	(30.3)
2007	51.2	5.2	56.4	13.6	(26.5)	0.9	(17.5)	2.5	(4.9)	0.1	(1.5)	17.1	(30.3)
2008	53.5	5.7	59.2	15.5	(29.0)	1.1	(19.1)	2.7	(5.0)	0.1	(1.5)	19.4	(32.7)
2009	57.1	5.9	63.0	16.8	(29.4)	1.2	(21.1)	4.0	(7.0)	0.1	(2.3)	22.2	(35.2)
2010	58.3	6.1	64.4	18.9	(32.4)	1.5	(24.5)	4.7	(8.0)	0.2	(2.8)	25.2	(39.2)
2011	56.6	10.3	66.9	18.5	(32.7)	2.5	(24.4)	4.6	(8.2)	0.3	(3.2)	26.0	(38.9)
2012	57.3	9.2	66.5	19.7	(34.3)	2.2	(24.3)	5.0	(8.8)	0.3	(3.6)	27.3	(41.0)
2013	57.1	9.2	66.3	18.3	(32.1)	2.2	(24.4)	6.4	(11.2)	0.3	(3.2)	27.3	(41.1)
2014	57.0	8.4	65.4	18.5	(32.4)	2.1	(24.5)	6.0	(11.7)	0.2	(2.9)	26.8	(40.9)
2015	56.0	8.3	64.3	18.0	(32.2)	1.9	(22.5)	6.0	(11.8)	0.2	(2.7)	26.1	(40.6)
2016	56.3	8.3	64.6	17.7	(31.4)	1.9	(23.0)	6.7	(13.1)	0.2	(2.9)	26.5	(41.0)
2017	56.4	9.0	65.4	16.3	(28.9)	2.0	(22.8)	6.6	(12.8)	0.3	(3.3)	25.2	(38.5)
2018	57.5	9.2	66.7	16.3	(28.4)	2.1	(22.6)	6.5	(12.5)	0.3	(3.3)	25.2	(37.8)
2019	60.1	9.0	69.1	18.3	(30.4)	2.2	(24.7)	7.6	(13.6)	0.3	(3.6)	28.4	(41.1)
2020	62.8	9.4	72.2	19.5	(31.1)	2.3	(24.1)	8.2	(14.2)	0.3	(3.8)	30.3	(42.0)
2021	64.0	10.6	74.6	22.3	(34.9)	2.9	(26.9)	9.5	(15.9)	0.4	(4.2)	36.7	(47.0)
						↑ ACTUAL ↑							
						↓ PROJECTED ↓							
2022	$67.2	$9.9	$77.2	$23.6	(35.1%)	$2.6	(25.7%)	$10.2	(16.5%)	$0.4	(4.4%)	$36.7	(47.6%)
2023	68.6	12.2	80.8	25.4	(36.9)	3.0	(24.5)	10.2	(16.2)	0.4	(3.8)	39.0	(48.2)
2024	71.8	9.1	80.9	26.2	(36.5)	2.2	(24.3)	11.6	(16.1)	0.3	(3.8)	40.4	(49.9)
2025	73.4	9.3	82.7	27.0	(36.7)	2.2	(24.1)	11.8	(16.1)	0.3	(3.8)	41.4	(50.1)
2026	75.1	9.5	84.6	27.3	(36.3)	2.3	(23.9)	12.1	(16.1)	0.4	(3.7)	42.0	(49.6)
2027	76.7	9.8	86.5	27.6	(35.9)	2.3	(23.8)	12.3	(16.0)	0.4	(3.7)	42.5	(49.2)
2028	78.6	10.1	88.6	27.9	(35.6)	2.4	(23.6)	12.5	(15.9)	0.4	(3.7)	43.2	(48.7)
2029	80.6	10.3	91.0	28.4	(35.2)	2.4	(23.4)	12.7	(15.8)	0.4	(3.7)	43.9	(48.3)
2030	82.8	10.6	93.4	28.9	(34.9)	2.5	(23.3)	13.0	(15.7)	0.4	(3.7)	44.7	(47.9)
2031	85.0	10.9	95.9	29.3	(34.5)	2.5	(23.1)	13.3	(15.7)	0.4	(3.7)	45.6	(47.5)
2032	87.4	11.2	98.6	29.9	(34.2)	2.6	(23.0)	13.6	(15.6)	0.4	(3.7)	46.5	(47.2)
2033	89.9	11.6	101.4	30.5	(33.9)	2.6	(22.9)	13.9	(15.5)	0.4	(3.7)	47.5	(46.8)
2034	92.4	11.9	104.3	31.1	(33.6)	2.7	(22.8)	14.3	(15.5)	0.4	(3.6)	48.5	(46.5)
2035	95.1	12.2	107.3	31.7	(33.3)	2.8	(22.6)	14.6	(15.4)	0.4	(3.6)	49.5	(46.2)
2036	97.8	12.6	110.4	32.3	(33.0)	2.8	(22.5)	15.0	(15.3)	0.5	(3.6)	50.6	(45.8)
2037	100.5	13.0	113.5	32.9	(32.8)	2.9	(22.3)	15.4	(15.3)	0.5	(3.6)	51.6	(45.5)
2038	103.2	13.4	116.6	33.5	(32.5)	3.0	(22.2)	15.7	(15.2)	0.5	(3.6)	52.7	(45.2)
2039	106.0	13.7	119.8	34.2	(32.3)	3.0	(22.1)	16.1	(15.2)	0.5	(3.6)	53.8	(44.9)
2040	108.9	14.1	123.1	34.9	(32.0)	3.1	(22.0)	16.5	(15.1)	0.5	(3.6)	55.0	(44.7)
2041	111.9	14.6	126.5	35.6	(31.8)	3.2	(21.9)	16.9	(15.1)	0.5	(3.6)	56.2	(44.4)
2042	115.0	15.0	130.0	36.4	(31.7)	3.3	(21.8)	17.3	(15.0)	0.5	(3.6)	57.5	(44.2)
2043	118.1	15.4	133.6	37.2	(31.5)	3.4	(21.8)	17.7	(15.0)	0.6	(3.6)	58.8	(44.1)
2044	121.4	15.9	137.3	38.1	(31.4)	3.5	(21.7)	18.2	(15.0)	0.6	(3.6)	60.3	(43.9)
2045	124.8	16.4	141.2	39.0	(31.3)	3.5	(21.7)	18.7	(15.0)	0.6	(3.6)	61.8	(43.8)
2046	128.2	16.9	145.1	40.0	(31.2)	3.6	(21.6)	19.2	(14.9)	0.6	(3.6)	63.4	(43.7)
2047	131.8	17.4	149.2	41.0	(31.1)	3.7	(21.6)	19.7	(14.9)	0.6	(3.6)	65.1	(43.6)
2048	135.5	17.9	153.4	42.1	(31.1)	3.9	(21.5)	20.2	(14.9)	0.6	(3.5)	66.8	(43.6)
2049	139.2	18.4	157.7	43.2	(31.0)	4.0	(21.5)	20.8	(14.9)	0.7	(3.5)	68.6	(43.5)
2050	143.1	19.0	162.1	44.4	(31.0)	4.1	(21.5)	21.3	(14.9)	0.7	(3.5)	70.5	(43.5)
2051	147.1	19.5	166.6	45.7	(31.0)	4.2	(21.5)	21.9	(14.9)	0.7	(3.5)	72.5	(43.5)

TABLE 11

MILITARY RETIREMENT SYSTEM
PAST AND PROJECTED UNFUNDED LIABILITY PAYMENTS ON OCTOBER 1
($ in billions)

Calendar Year	Original UFL	Assumption Changes	Benefit Changes	Actuarial Experience	Total
1984	$9.500	$0.000	$0.000	$0.000	$9.500
1985	10.500	0.000	0.000	0.000	10.500
1986	11.042	0.000	0.000	-0.518	10.524
1987	11.679	0.000	-0.113	-1.281	10.285
1988	12.003	0.135	-0.112	-2.244	9.782
1989	16.300	-2.116	-0.132	-3.456	10.596
1990	17.237	-2.237	-0.140	-4.078	10.782
1991	18.228	-2.366	-0.148	-4.508	11.206
1992	22.621	-4.625	-0.171	-5.552	12.273
1993	23.865	-4.880	-0.180	-6.897	11.908
1994	25.177	-5.148	-0.189	-8.370	11.470
1995	27.746	-6.619	-0.079	-10.349	10.699
1996	33.456	-6.917	-0.042	-11.346	15.151
1997	36.227	-8.529	0.048	-12.627	15.119
1998	37.676	-8.870	0.050	-13.606	15.250
1999	39.183	-9.201	0.052	-14.732	15.302
2000	42.098	-9.984	0.335	-16.360	16.089
2001	43.571	-9.862	0.472	-17.134	17.047
2002	45.096	-10.059	0.661	-17.770	17.928
2003	46.674	-10.741	0.977	-18.721	18.189
2004	46.857	-10.959	4.627	-19.167	21.358
2005	48.614	-11.337	6.081	-20.178	23.180
2006	50.437	-11.238	6.313	-19.464	26.048
2007	66.711	-7.642	6.430	-19.312	46.187
2008	69.213	-5.076	7.026	-20.038	51.125
2009	70.379	-1.241	7.100	-17.619	58.619
2010	73.018	-1.012	7.367	-17.969	61.404
2011	75.757	0.171	7.643	-18.820	64.751
2012	78.598	0.386	7.930	-19.181	67.733
2013	81.373	3.150	8.211	-19.849	72.885
2014	84.221	2.594	8.498	-19.751	75.562
2015	87.169	3.770	8.796	-20.446	79.289
2016	90.024	4.459	7.724	-21.015	81.192
2017	92.950	3.736	7.904	-21.713	82.877
2018	94.971	6.383	8.214	-21.572	87.996
2019	98.057	6.361	8.858	-21.403	91.873
2020	100.414	9.550	9.196	-21.054	98.106
2021	103.197	15.309	7.679	-11.722	114.463
		↑ ACTUAL ↑			
		↓ PROJECTED ↓			
2022	105.404	17.162	7.676	-9.804	120.438
2023	108.303	17.634	7.887	-11.096	122.728
2024	111.282	18.119	8.104	-11.401	126.104
2025	114.342	18.617	8.327	-11.714	129.572
2026	0.000	19.129	8.556	-12.036	15.649
2027	0.000	19.655	8.791	-12.367	16.079
2028	0.000	20.196	9.033	-12.708	16.521
2029	0.000	20.751	9.282	-13.057	16.976
2030	0.000	21.322	9.537	-13.416	17.443
2031	0.000	21.908	9.799	-13.785	17.922
2032	0.000	22.510	10.069	-14.164	18.415
2033	0.000	23.129	10.346	-14.554	18.921
2034	0.000	23.766	10.630	-14.954	19.442
2035	0.000	24.419	10.922	-15.365	19.976
2036	0.000	25.091	11.223	-15.787	20.527
2037	0.000	25.780	11.531	-16.222	21.089
2038	0.000	26.490	11.849	-16.667	21.672
2039	0.000	27.218	12.174	-17.126	22.266
2040	0.000	27.966	12.509	-17.597	22.878
2041	0.000	2.723	1.218	-1.713	2.227
2042	0.000	0.000	0.000	0.000	0.000
2043	0.000	0.000	0.000	0.000	0.000

Note: Actuarial Experience includes impact of sequestered Treasury Normal Cost payments.

TABLE 12

MILITARY RETIREMENT SYSTEM
PAST AND PROJECTED UNFUNDED LIABILITY BALANCE ON SEPTEMBER 30 (Before Payment)
($ in billions)

Calendar Year	Original UFL	Assumption Changes	Benefit Changes	Actuarial Experience	Total
1984	$528.700	$0.000	$0.000	$0.000	$528.700
1985	553.500	0.000	0.000	-13.800	539.700
1986	578.800	0.000	-3.000	-34.200	541.600
1987	605.200	3.600	-2.998	-59.500	546.302
1988	632.700	-50.062	-3.076	-81.180	498.382
1989	664.173	-53.711	-3.172	-94.562	512.728
1990	693.224	-55.207	-3.253	-102.283	532.481
1991	723.306	-97.578	-3.331	-111.879	510.518
1992	757.959	-102.353	-3.421	-139.327	512.858
1993	790.488	-105.057	-3.494	-167.942	513.995
1994	824.120	-130.691	-0.968	-201.052	491.409
1995	852.872	-134.017	-0.832	-217.255	500.768
1996	880.822	-159.859	0.897	-231.424	490.436
1997	902.444	-162.883	1.000	-244.673	495.888
1998	922.521	-164.057	1.014	-259.976	499.503
1999	942.360	-169.827	6.583	-277.940	501.176
2000	959.626	-164.942	9.414	-284.168	519.931
2001	974.873	-162.970	13.075	-285.393	539.585
2002	989.509	-170.593	19.216	-293.105	545.027
2003	1,003.439	-172.248	94.231	-297.115	628.308
2004	1,016.562	-171.288	125.272	-304.415	666.132
2005	1,030.312	-165.769	128.261	-290.020	702.784
2006	1,043.054	-126.439	131.332	-282.660	765.287
2007	1,052.174	-89.221	140.140	-279.068	824.025
2008	1,044.591	-27.990	142.047	-254.441	904.207
2009	1,031.462	-19.974	142.785	-245.726	908.548
2010	1,016.346	2.415	143.487	-258.786	903.461
2011	997.569	8.208	143.947	-252.478	897.246
2012	974.816	68.621	144.141	-254.041	933.537
2013	945.510	58.240	143.703	-262.357	885.095
2014	911.665	81.894	142.944	-268.738	867.765
2015	872.953	96.068	127.811	-280.383	816.450
2016	827.038	80.674	124.563	-289.710	742.564
2017	775.707	140.441	131.072	-279.349	767.871
2018	716.895	139.147	129.327	-265.801	719.567
2019	653.020	214.646	140.610	-252.606	755.671
2020	581.324	266.366	138.010	-232.396	753.304
2021	501.348	298.374	134.289	-188.876	745.135
		↑ ACTUAL ↑			
		↓ PROJECTED ↓			
2022	414.077	294.387	131.674	-184.240	655.899
2023	321.020	288.314	128.958	-181.413	556.880
2024	221.226	281.508	125.914	-177.130	451.518
2025	114.342	273.924	122.523	-172.358	338.430
2026	0.000	265.519	118.763	-167.070	217.213
2027	0.000	256.246	114.616	-161.235	209.627
2028	0.000	246.055	110.058	-154.823	201.289
2029	0.000	234.893	105.066	-147.799	192.159
2030	0.000	222.708	99.615	-140.132	182.190
2031	0.000	209.441	93.681	-131.785	171.337
2032	0.000	195.034	87.237	-122.720	159.552
2033	0.000	179.425	80.255	-112.898	146.782
2034	0.000	162.548	72.705	-102.278	132.976
2035	0.000	144.334	64.558	-90.817	118.075
2036	0.000	124.711	55.782	-78.470	102.023
2037	0.000	103.605	46.341	-65.190	84.756
2038	0.000	80.938	36.203	-50.927	66.214
2039	0.000	56.626	25.328	-35.630	46.323
2040	0.000	30.584	13.680	-19.244	25.020
2041	0.000	2.723	1.218	-1.713	2.227
2042	0.000	0.000	0.000	0.000	0.000
2043	0.000	0.000	0.000	0.000	0.000
2044	0.000	0.000	0.000	0.000	0.000
2045	0.000	0.000	0.000	0.000	0.000
2046	0.000	0.000	0.000	0.000	0.000

Note: Actuarial Experience includes impact of sequestered Treasury Normal Cost payments.

The Military Retirement Fund Transaction Process

The description of deficit, debt, and funding impact contained in this section are applicable under the current practices of the federal government regarding budget accounting and tax policy. These practices do not provide for increases in taxes to fund the MRS beyond what is required to pay benefits to retirees and survivors each year, but do result in increases in the national debt.

A nonrevolving trust fund was created inside the Unified Budget of the federal government for the monies of the MRS. This fund has three sources of income: (1) normal cost payments made by DoD, (2) unfunded liability and Concurrent Receipt normal cost payments made by Treasury, and (3) interest earnings on investments in government securities made by Treasury and the payments of the par values of these securities at maturity. All three of these items are intragovernmental transfers consisting of debits from one government account and credits to another.

The Fund has two types of payouts: (1) payments to retirees and survivors of retirees, and (2) purchases of U.S. Treasury securities. The purchase of a Treasury security is also an intragovernmental transfer, while a payment to a retiree or a survivor is not.

Figure 2 on the following page depicts this process. The only transactions in a particular year that directly affect the deficit of the Unified Budget are those that pass in or out of the government, such as tax collections ("in") and retiree or survivor payments ("out"). The intragovernmental transfers are debits and credits within the federal budget, with no direct effect on the deficit. The following examples illustrate the process:

- If DoD debits $25 billion in normal cost payments and the Fund credits the $25 billion, the net direct federal budget deficit effect is zero.

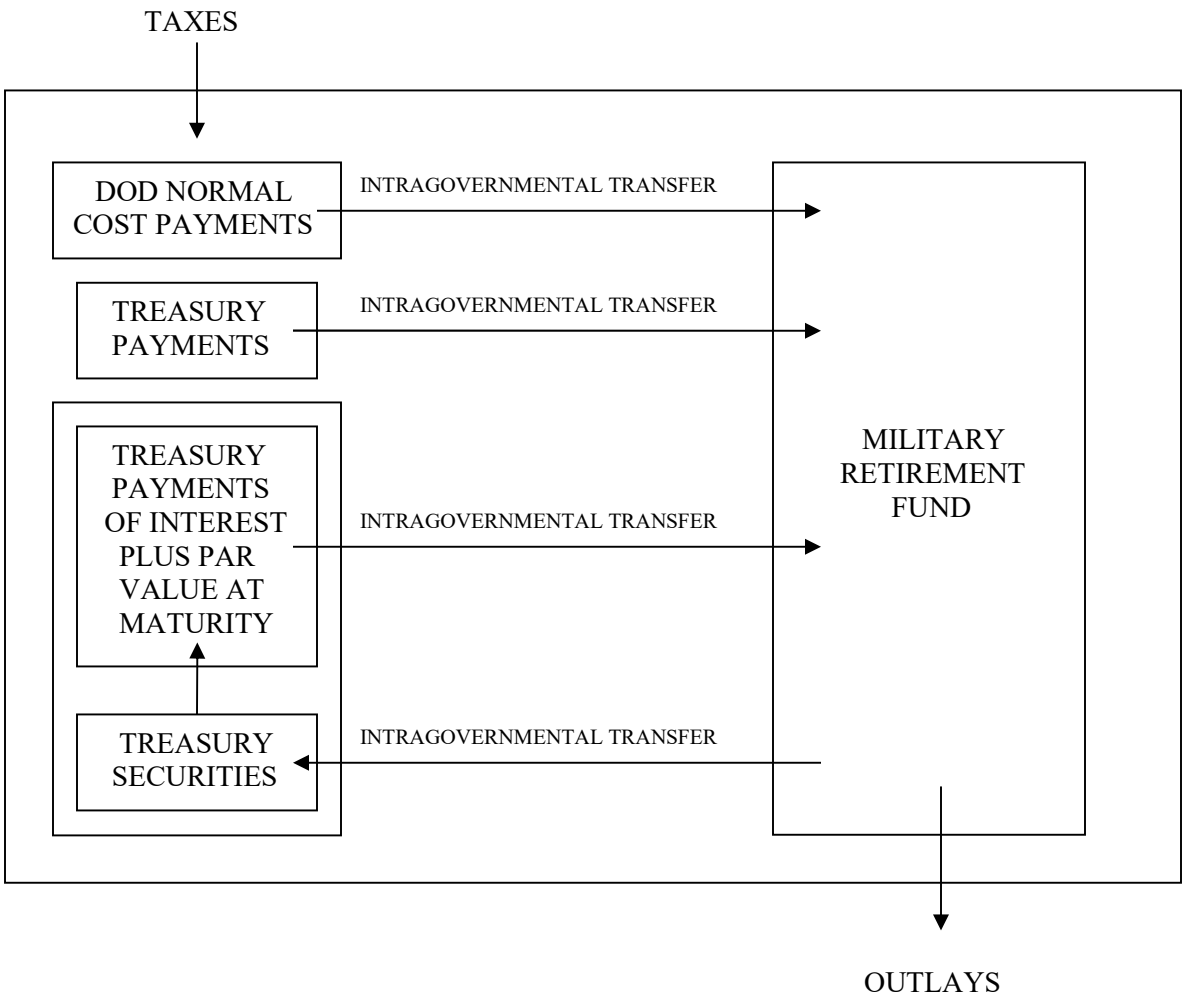
- If the Fund purchases $80 billion in securities (debit) and the Treasury sells $80 billion in securities (credit), the net direct federal budget deficit effect is zero.

- If the Treasury pays $30 billion interest (debit) and the Fund earns $30 billion interest (credit), the net direct federal budget deficit effect is zero.

- Disregarding all other government programs, if the government collects $55 billion in tax revenues (credit) and pays $60 billion to retirees (debit), the net direct federal budget deficit effect is $5 billion.

FIGURE 2

MILITARY RETIREMENT SYSTEM
UNIFIED BUDGET



All of the intragovernmental transfers in Figure 2 will always generate both a credit and an associated equal debit within the Unified Budget. Consequently, under current federal budget accounting practices, contributions to the Fund beyond what are required to pay benefits to retirees and survivors that year have no impact on the total federal deficit. Just as in the pay-as-you-go method, the only transactions that directly affect the deficit in the retirement system accounting process are payments to retirees and survivors (i.e. outlays).

On the other hand, the purchase of securities by the Fund does increase the national debt, specifically the portion of the debt held by the government. The portion held by the public will not change. However, the total debt will increase and this requires an increase in the statutory borrowing authority (debt ceiling).

Suppose that in the year 2021 the amount needed to pay retirees was $63 billion and the Fund had grown to $1,107 billion. The following transactions would take place:

- Fund redeems $63 billion in Treasury securities (credit).
- Treasury pays $63 billion to Fund (debit).
- Net federal surplus zero.

Since no budget surplus can be derived from using fund money, the government still has a need for $63 billion to pay retirees—the same need it would have under the pay-as-you-go system. Accordingly, the Fund cannot transfer liabilities from one tax year to another.

However, funding does have an effect on the DoD budget. With the normal cost payments (except for Concurrent Receipt) in the DoD budget, policymakers now consider the impact on future retirement costs when they make manpower decisions, and this could have a significant impact on future federal budgets. For example, if a decision were made today to double the size of the active duty and reserve forces, the DoD budget would automatically have an immediate increase in retirement funding obligations. Under the pay-as-you-go method, the retirement expenses would not necessarily be considered in the initial decision since they would not emerge for 20 years.

In their prior quadrennial reports to the President and Congress, the DoD Board has noted that the establishment of the Fund does not represent actual advance funding. Real advance funding could be achieved by investing the assets outside the Unified Budget, for example, in stocks or corporate bonds, or in bonds of state and local municipalities or quasi-federal government agencies (like Fannie Mae or Freddie Mac). Instead, the accrual accounting procedure now in place is essentially an internal cost accounting system. While the nation has not technically set aside money to pay the benefits of those who have served in uniform, the Fund can be viewed as earmarking future tax receipts for the benefit of military retirees. As such, the existence of the Fund promotes a measure of "psychological security" for military members.

Along these same lines, the DoD Board has frequently noted two common misconceptions about the Fund:

1) ***The Fund represents government tax receipts that have been accumulated in the past.*** Actually, the Fund represents future tax receipts that will be allocated to pay principal and interest on government bonds being held by the Fund.

2) ***The financial and actuarial status of the Fund can be measured by prospective short-term (or medium-term) cash flows.*** Rather, the entire present value of the liabilities must be compared to the sum of the Fund and prospective contributions. A year-by-year projection of cash flow is also needed to measure the Fund's ability to pay annual benefits. Comparing the past and projected dollars as a proportion of payroll (as shown in Table 9) is another key measure of sustainability.

The current financing procedure, although carried out by allocating no more tax dollars than needed to pay benefits to military retirees as they come due, has nonetheless contributed to a more accurate allocation of resources within the defense budget and to formal recognition--in the national debt--of the government's obligation to pay retirement benefits to military members and eligible

survivors/annuitants. This represents more responsible fiscal practice than would obtain under a pay-as-you-go system.

The fact that costs are fully recognized in advance provides greater benefit security over the long term. Also, when there is a Fund, the system is not as dependent on obtaining the necessary appropriation from Congress each year in order to pay benefits for that year. This can provide additional benefit security in the short run.

The actuarially based costs of the retirement system are reasonable given the plan provisions, and the system is considered sustainable assuming continuing willingness of the government to pay the required costs.

ENDNOTES

MISSION STATEMENT
DoD OFFICE OF THE ACTUARY

The Office of the Actuary (OACT) performs actuarial valuations and provides actuarial support and expertise for the following major benefit programs and funds: the Military Retirement System/Military Retirement Fund; Military Health System, including the portion funded through the Medicare-Eligible Retiree Health Care Fund; education benefits funded through the Education Benefits Fund; and separation benefits funded through the Voluntary Separation Incentive Fund. OACT fulfills the Secretary of Defense's statutory requirements for actuarial funding determinations for these programs, and provides requisite actuarial support to the independent Boards of Actuaries that oversee the determinations. OACT is also responsible for providing actuarial liabilities and associated input for the Department's and government-wide financial statements; providing quarterly Incurred-But-Not-Reported reserve estimates for DoD health care programs; informing policy analysis of military benefit provisions and proposals by providing actuarial and cost analysis; providing actuarial support and products for the execution of benefit programs including the Survivor Benefit Plan; providing actuarial support and expertise on matters related to investing the assets of funds that finance military benefit programs; and providing actuarial and statistical information about the Military Retirement System for key stakeholders.

This report presents the status of the Military Retirement System as of September 30, 2021. Technical information, including rates, parameters, census data, etc., is included in the Technical Reference.