



STATE OF WISCONSIN
Department of Employee Trust Funds
A. John Voelker
 SECRETARY

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Correspondence Memorandum

Date: March 3, 2022
To: Employee Trust Funds Board
From: Cindy Klimke-Armatoski
 Chief Trust Financial Officer
Subject: December 31, 2021 Actuarial Valuation of Retired Lives

The Department of Employee Trust Funds (ETF) requests the Employee Trust Funds Board (Board) approve the report, 39th Annual Actuarial Valuation of Retired Lives as of December 31, 2021.

Gabriel Roeder Smith & Company (GRS) has completed the actuarial valuation of the Wisconsin Retirement System retired lives as of December 31, 2021. This valuation determines the amounts to be transferred from member and employer accounts to fund 2021 new annuities and the amount available to provide increases for existing Core and Variable annuities. Increases will first be included on May 1, 2022, annuity payments.

GRS is recommending Core annuities be increased by 7.4%. This is based on the 12.9% effective rate interest credited to the Core annuity reserve and mortality experienced during the last year. The increase will be applied to all Core annuities except those originating in 2021, which will receive a prorated increase.

GRS is recommending Variable annuities be increased by 15.0%. This is based on the 20.0% effective rate interest credited to the Variable annuity reserve and mortality experienced during the last year. The Variable annuity increase will be applied equally to all Variable annuities, regardless of the effective date.

Pursuant to provisions of the Wisconsin Administrative Code, Secretary Voelker and the Board Chair, Wayne Koessler, reviewed and approved the recommended rates which were announced to the public. Actuaries from GRS will be at the Board meeting to present the report and answer questions.

Attachment: 39th Annual Actuarial Valuation of Retired Lives

Reviewed and approved by John Voelker, Secretary
 Electronically Signed 3/8/22

Board	Mtg Date	Item #
ETF	03.24.22	5A

Wisconsin Retirement System

39th Annual Actuarial Valuation of Retired Lives

December 31, 2021



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March 2, 2022

Employee Trust Funds Board
Madison, Wisconsin

Ladies and Gentlemen:

The results of the **39th annual actuarial valuation of core and variable annuities** being paid from the Wisconsin Retirement System are presented in this report. The purpose of this report is to establish the ratio of assets to liabilities in the Core and Variable Funds and to make recommendations for related benefit adjustments in accordance with statutory provisions and administrative code. This report should not be relied on for any other purpose.

The date of this valuation was December 31, 2021. Actuarial assumptions used in the valuation are summarized in the Appendix. The assumptions and methods were updated to reflect mortality adjustments from an experience study performed since the prior valuation.

The results of the valuation may be briefly summarized as follows (\$ millions):

	Core	Variable
Number of Annuitants	228,161	42,251
Annual Amount of Annuities Paid	\$ 5,842.6	\$ 502.6
Fund Balance	69,910.7	5,618.0
Actuarial Reserve	65,085.4	4,866.0
Ratio	1.074	1.155

Based upon these results, core annuities will be increased 7.4% and variable annuities will be increased by 15.0%.

This report was prepared at the request of the Wisconsin Retirement System and those designated or approved by the Wisconsin Retirement System. This report may be provided to parties other than the Wisconsin Retirement System only in its entirety and only with the permission of the Wisconsin Retirement System. GRS is not responsible for unauthorized use of this report. The valuation was based upon data furnished by the Wisconsin Retirement System's staff, concerning Fund assets and individual annuitants and beneficiaries. Data was checked for internal consistency, but was not audited. We are not responsible for the accuracy or completeness of the information provided by the Wisconsin Retirement System.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law.

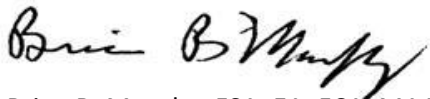
This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report does not include an assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. However, an additional assessment of risk for the Wisconsin Retirement System was conducted in the fall of 2021 in conjunction with the State of Wisconsin Investment Board and the fall of 2020 by the Department of Employee Trust Funds. Additional discussion of various risk factors is also included in the active lives valuation report issued in June.

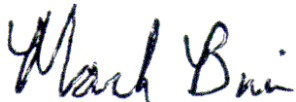
To the best of our knowledge this report is complete and accurate. All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Brian B. Murphy, Mark Buis and James D. Anderson are all Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor.

The cooperation of the Secretary and his staff in gathering materials for this valuation is acknowledged with appreciation.

Respectfully submitted,
Gabriel, Roeder, Smith & Company



Brian B. Murphy, FSA, EA, FCA, MAAA, PhD



Mark Buis, FSA, EA, FCA, MAAA



James D. Anderson, FSA, EA, FCA, MAAA

BBM/MB/JDA:dj



SECTION A

EXECUTIVE SUMMARY

Executive Summary

1. Retiree Dividend in Core Annuities

The net of fee investment return of 16.89% in the core annuity fund was higher than the assumed investment return of 7.0% on a market value basis. However, under the asset valuation method, investment gains and losses are spread over a 5-year period. Partial recognition of this year's gain was combined with the continued phase-in of investment gains and losses from prior years resulting in a published effective earnings rate of 12.9%. The 12.9% published effective earnings rate exceeds the 5.0% investment return threshold that triggers an annuity adjustment. This valuation determined the amount of available surplus/deficit. The surplus in the core fund is \$4,825.3 million as of December 31, 2021. After adjusting for expected improvements in longevity and various other items (described in detail on page 6), **the result is a 7.4% increase in the core annuity benefit.**

2. Change in Variable Annuities

The variable fund effective earnings rate was 20.0% resulting in a surplus of \$752.0 million. The surplus of \$752.0 million will **result in a 15.0% increase in all variable annuities in force.**

3. General Comments

Due to the asset smoothing method used in the core annuity fund, there are approximately \$17.7 billion in unrecognized asset gains as of December 31, 2021 which will be recognized over the next four years. Although only approximately half of this applies to the annuitant reserve, this may still increase the probability of positive annuity adjustments in the future.

The present value of previously granted Core dividends is approximately \$9.4 billion prior to dividend adjustments and \$14.2 billion after the dividend adjustment. It is important that the value of dividend payments continue to build up in order to avoid the possibility of leveraged negative adjustments in the future. This buildup will happen naturally as long as investments in the core fund achieve results in excess of 5%.

An Experience Study was conducted in the Fall of 2021. The change in the discount rate from 7.0% to 6.8% does not impact retiree liabilities or dividends because the 5% discount rate is set by State statute and dividends are based upon actual core fund investment results (after smoothing). The update in the mortality table had very minor impact on liabilities.

4. Conclusion

In accordance with the Administrative Code, ETF 20.25, Section 40.27(2) and Section 40.28(2) of the Wisconsin Statutes:

- Core annuities will be increased by 7.4%, and
- Variable annuities will be increased by 15.0%.

SECTION B

OPERATION OF THE RETIREMENT SYSTEM

Operation of the Retirement System

Each year, as of December 31, an actuarial valuation of the liability for retired persons receiving benefits from the Wisconsin Retirement System is conducted. The purpose of the valuation is to determine the actuarial present value of future benefit payments on behalf of current retired lives. This present value is the “actuarial reserve.” Theoretically, if an amount of money equal to the actuarial present value were invested at a yield equal to the valuation interest rate, the initial amount plus the continuing investment income would provide exactly the right amount of money to pay the annuities of all current retired persons and their beneficiaries for the rest of their lives. The fund would decrease each year, and would become zero many decades in the future when the last annuitant dies.

The above is a “closed group” description of the operation of the annuity reserve fund. But the fund is really an “open group.” The size of the fund does not actually decrease because each year more benefits are added to the rolls than are removed and fresh money is transferred into the annuity reserve fund to finance the benefits of the new annuitants. (The actuary calculates the reserve transfers for new annuitants each year as a by-product of the actuarial valuation.)

According to theory, the fund will eventually reach a state when the number of people entering (retiring) each year is approximately equal to the number of people exiting (dying) each year. When this mature state is reached, the amount of money in the fund will remain approximately level in constant dollars from year to year. Each year, the reserve transfers for the new annuitants plus real investment earnings on the whole fund (total money in) will be approximately equal to the benefit payments (total money out). The only source of growth in assets would be the result of the effects of inflation. The dollars in the fund would increase, but the “real” value of the fund would not change.

There are at least two factors that cause the actual operation to be different from the theoretical operation described above. The first is that annuitants may have longer or shorter lifetimes than expected. In recognition of this, the actuary monitors mortality experience of the retirement system and recommends a new mortality table when appropriate. The second factor is that actual investment earnings are rarely equal to the assumed rate. When either mortality or investment earnings differ from expectations, the difference, positive or negative, is recorded in a supplemental reserve. The operation of the supplemental reserve is described on the next page.

Operation of the Retirement System

The Wisconsin Retirement System (WRS) maintains separate reserves for core and variable annuities.

The basic objective of the Core Fund is to earn an optimum long-term return while taking acceptable risk. The Core Fund has a significant amount of stocks, but also invests in other assets such as bonds, real estate and private equity. It is considered a fully diversified, balanced fund invested for the long-term needs of the Retirement System. The Variable Fund is an “all-stocks” fund. Participants in this fund are exposed to a higher degree of risk (because of possible losses from unfavorable stock market performance), in exchange for the possibility of greater returns over the life of the investment in the fund. Investment return in the Core Fund is smoothed via operation of the Market Recognition Account. Variable Fund returns are not smoothed.

Annuity adjustments for both Core and Variable annuities depend on whether or not returns credited to those funds exceed or fall short of 5%. If there are negative Core and/or Variable annuity adjustment rates based on investment losses, the Core portion of a participant’s annuity can never be decreased below the finalized initial amount. However, there is no limit to how much the Variable portion of a participant’s annuity can be reduced.

WRS practice with respect to annuity adjustments is described below.

Core Annuity Division: If the supplemental reserve is positive and is at least 0.5% of core annuity liabilities, core annuity increases (dividends) may be granted. If the supplemental reserve is negative and is equal to or greater than 0.5% of core annuity liabilities in absolute value, prior core annuity dividends are reduced by an aggregate amount equal to the shortfall. Increases or decreases become effective in April following the December 31 valuation.

Variable Annuity Division: If the supplemental reserve is at least 2% of variable annuity liabilities, substantially all of the reserve (dropping fractions of a percent) is used to increase or decrease variable annuities for the ensuing year. Increases or decreases become effective in April following the December 31 valuation.

In calculating both the dividend for the Core annuities and the adjustment for Variable annuities, a 5.0% assumed investment return is used to develop liabilities. Returns in excess of 5.0% can produce an increase in a member’s annuity. Returns below 5% may result in a decrease. Please see page 29 for a full description of the statutory provisions.



SECTION C

CORE ANNUITIES

Core Annuity Division Development of Assets and Liabilities

	\$ Millions		Ratio
	Assets	Liabilities	
Ending Balance December 31, 2020	\$63,805.8	\$60,691.1	1.051
Closing Adjustments	2.3	0.0	
Variable Terminations	65.7	65.7	
2021 Core Annuity Average Adjustment: 5.1%	0.0	2,946.3	
Beginning Balance January 1, 2021	63,873.8	63,703.1	1.003
Increases			
Reserve Transfers	4,028.3	4,028.3	
Regular Interest (5%)	3,142.4	3,142.4	
Additional Earnings	4,617.6	0.0	
Addition for Experience Study	0.0	14.5	
Other	0.0	0.0	
Total Increases	11,788.3	7,185.2	
Decreases			
Annuities & Lump Sums	5,750.8	5,750.8	
Credit Re-establishments	0.6	0.6	
Subtraction for Experience Study	0.0	0.0	
Other	0.0	51.5	
Total Decreases	5,751.4	5,802.9	
Ending Balance December 31, 2021	\$69,910.7	\$65,085.4	1.074

The ending liability balance includes a data reserve of \$65 million and a liability for previously granted dividends of \$9,437 million (prior to any 2022 adjustments calculated in this December 31, 2021 valuation).

Core Fund Reserve Transfer Recommendation

Amounts to be transferred from the Employer Reserve and the Employee Reserve to the Annuity Reserve to cover liabilities for new annuities are computed as the first step in the annual actuarial valuation. The actuarial present value at time of retirement of core annuities reported as new since the last actuarial valuation is \$3,993,808,135. Adjustments to prior transfers, related to estimated annuities for which final computations have now been made, totaled \$34,504,102. Reserve transfers are distributed as follows:

Group	Regular Transfer	Adjustment to Prior Transfer	Total Transfer
General	\$3,302,471,194	\$29,463,911	\$3,331,935,105
Protective with Social Security	522,946,753	3,758,504	526,705,257
Protective without Social Security	118,916,025	976,081	119,892,106
Executive & Elected	49,474,163	305,606	49,779,769
Totals	\$3,993,808,135	\$34,504,102	\$4,028,312,237

Accordingly, we recommend that \$4,028,312,237 be transferred to the Core Annuity Reserve. The results in this report assume that this transfer has been made.

Discussion of Dividend

The Core Annuity Fund balance, \$69,910.7 million, was higher than the actuarial present value of core annuities and reserves, \$65,085.4 million, by \$4,825.3 million, which resulted in an annuity adjustment of 7.4%. The primary sources of the 7.4% adjustment are:

	% of APV
1. SWIB net of fee investment return	16.89%
2. MRA adjustment	(3.99)%
3. Published effective earnings rate	12.90%
4. Adjustment to relate earnings to average core annuity fund balance	(0.59)%
5. Earnings rate based on average balance	12.31%
6. Expected dividend before adjustments: $1.1231/1.05-1$	6.96%
7. Adjustment to relate average asset to ending liability	0.13%
8. Carryover from last year due to timing of dividend, accounting adjustments and rounding	0.26%
9. Experience study adjustment	(0.02)%
10. Experience and other effects	0.08%
11. Statutory adjustment to round to nearest one-tenth percent	(0.01)%
12. Computed average dividend rate: (6)+(7)+(8)+(9)+(10)+(11)	7.4%
13. Adjustment for members at or near the statutory floor	0.0%
14. Final computed dividend rate: (12)+(13), if greater than 0.5% (or less than -0.5%) of core annuities, otherwise 0%	7.4%

See pages 30 and 31 for a description of items on this page.

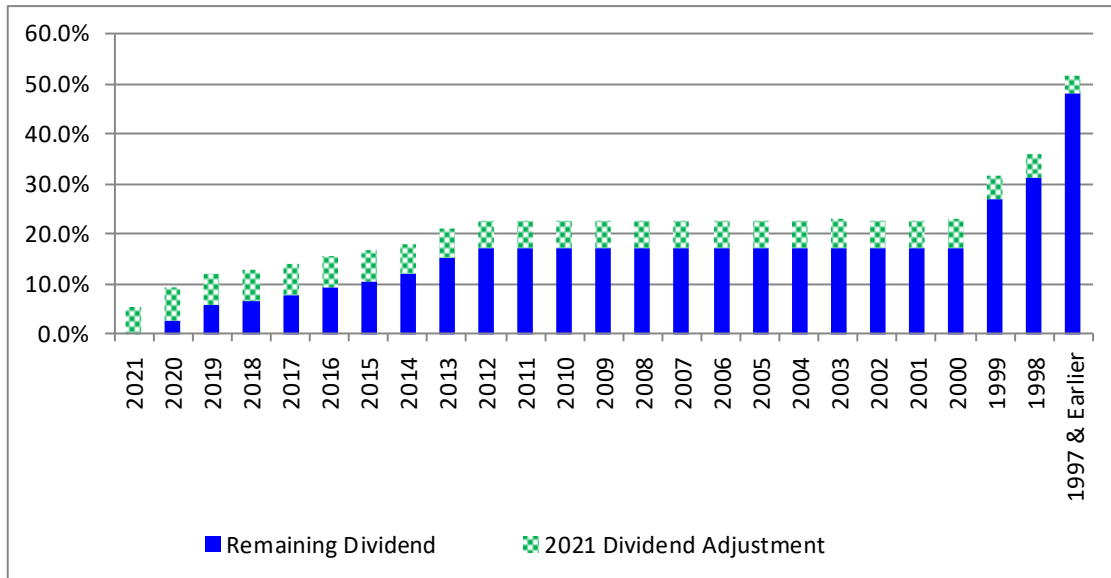
In accordance with the Administrative Code, ETF 20.25 and Section 40.27(2) Wisconsin Statutes (shown on page 29 of this report), the dividend adjustment is 7.4% effective April 1, 2022.



Discussion of Dividend

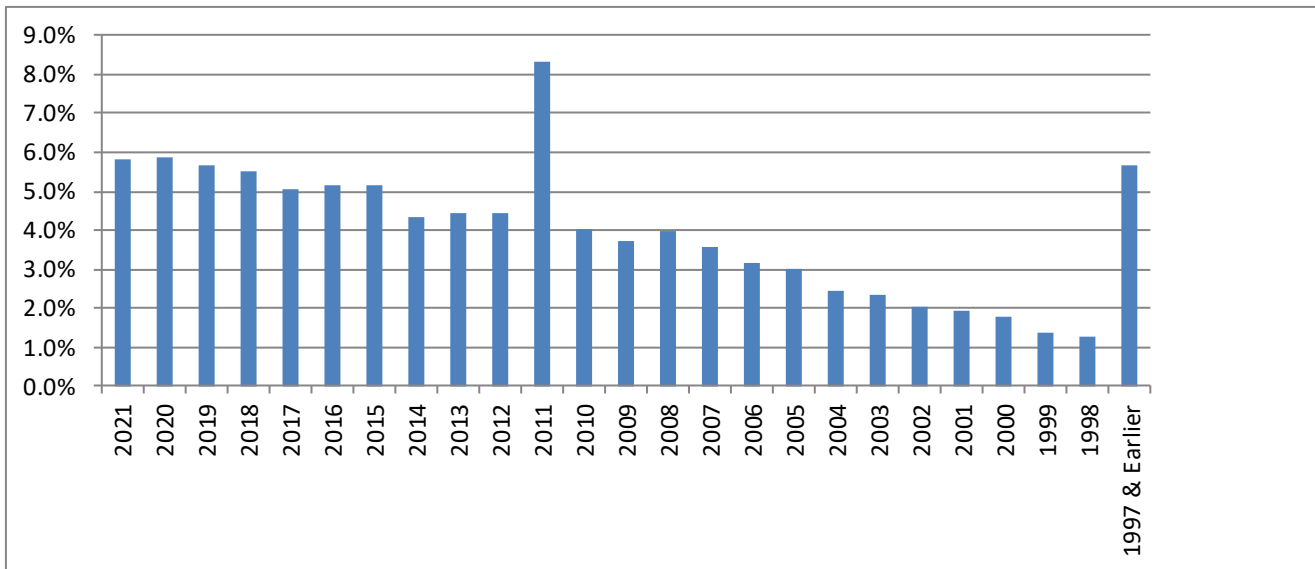
As shown on the prior page, the adjustment for core fund members is 7.4%.

Dividend Remaining (as a Percentage of Total Benefit) by Year of Retirement



After the 2022 dividend adjustment, members retired prior to 2000 continue to have the highest dividend remaining as a percentage of total benefit and also represent a shrinking portion of the liabilities. The chart below shows liabilities by year of retirement.

Liabilities (as a Percentage of Total) by Year of Retirement



Between 2008 and 2012, the liability for dividends decreased from about \$9.2 billion to \$3.0 billion. The value of previously granted dividends is approximately \$9.4 billion as of December 31, 2021 prior to the 2022 dividend adjustment and \$14.2 billion after the adjustment. In addition, there are currently about \$17.7 billion in unrecognized asset gains in the Market Recognition Account that will be recognized over the next four years, about half of which will be applied to the core annuitant reserve.

Transfers to Annuity Reserve to Finance Core Annuities Approved in 2021 Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
REGULAR RETIREMENT				
SL	Straight Life	1,683	\$ 35,864,299	\$ 498,929,600
SL	Straight Life (accelerated)	0	4,600,804	16,820,723
A60	Life Annuity with 60 payments guaranteed	799	17,030,635	237,241,695
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	2,458,617	8,130,528
A180	Life Annuity with 180 payments guaranteed	2,032	42,591,532	626,078,501
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	8,504,337	34,226,358
A180F	Life Annuity with 180 payments guaranteed (forced)	5	55,145	672,768
JOINT	Joint and 75% Survivor	888	24,065,797	370,587,867
JOINT	Joint and 75% Survivor (accelerated)	0	3,394,997	13,465,281
R25	Reduced 25% on First Death	413	12,122,706	179,775,433
R25	Reduced 25% on First Death (accelerated)	0	1,497,699	6,062,082
C100	100% Continued to Named Survivor	1,164	26,740,226	408,111,383
C100	100% Continued to Named Survivor (accelerated)	0	3,490,723	13,358,018
C180	100% Continued to Named Survivor with 180 payments guaranteed	3,353	88,113,045	1,403,846,115
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	15,752,017	69,003,929
LOL	Life with Optional Length Guaranteed	1	10,066	89,434
AC24	Annuity Certain with 24 Payments	2	116,665	291,116
AC60	Annuity Certain with 60 Payments	4	173,263	814,163
AC120	Annuity Certain with 120 Payments	0	57,830	470,814
AC180	Annuity Certain between 24 and 180 Payments	0	111,189	916,231
SLNSD	Straight Life - Named Survivor Deceased	2	31,367	378,454
	Total Regular	10,346	\$ 286,782,959	\$ 3,889,270,493
	Average Age at Retirement	61.2 Years		
DISABILITY RETIREMENT				
SL	Straight Life	53	\$ 1,420,108	\$ 18,048,550
A60	Life Annuity with 60 payments guaranteed	13	307,172	4,095,693
A180	Life Annuity with 180 payments guaranteed	46	1,061,882	14,724,030
JOINT	Joint and 75% Survivor	14	499,721	7,398,939
R25	Reduced 25% on First Death	3	72,622	1,249,377
C100	100% Continued to Named Survivor	23	591,190	9,801,955
C180	100% Continued to Named Survivor with 180 payments guaranteed	79	2,119,692	34,965,984
AC24	Annuity Certain with 24 Payments	0	9,409	25,421
	Total Disability	231	\$ 6,081,796	\$ 90,309,949
	Average Age at Retirement	54.3 Years		
DEATH-IN-SERVICE BENEFITS				
SL	Straight Life	11	\$ 184,284	\$ 2,561,369
A60	Life Annuity with 60 payments guaranteed	7	53,531	819,891
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	14,508	46,954
A180	Life Annuity with 180 payments guaranteed	37	677,617	10,328,971
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	73,464	434,663
AC24	Annuity Certain with 24 Payments	0	13,221	35,845
	Total Death-in-Service	55	\$ 1,016,625	\$ 14,227,693
	Average Age at Retirement	57.8 Years		
GRAND TOTAL		10,632	\$ 293,881,380	\$ 3,993,808,135

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.



Core Annuities Being Paid Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
REGULAR RETIREMENT				
SL	Straight Life	30,602	\$ 682,495,639	\$ 7,275,909,422
SL	Straight Life (accelerated)	0	17,347,789	45,723,589
A60	Life Annuity with 60 payments guaranteed	21,242	480,829,839	4,861,024,355
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	10,962,393	25,577,885
A120	Life Annuity with 120 payments guaranteed	13	147,284	313,014
A180	Life Annuity with 180 payments guaranteed	43,682	942,984,296	10,097,702,575
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	35,683,472	97,765,159
A180F	Life Annuity with 180 payments guaranteed (forced)	363	3,443,907	30,098,593
JOINT	Joint and 75% Survivor	24,165	688,948,007	7,801,523,938
JOINT	Joint and 75% Survivor (accelerated)	0	15,206,997	39,533,967
R25	Reduced 25% on First Death	13,865	429,351,426	4,255,301,307
R25	Reduced 25% on First Death (accelerated)	0	6,322,805	17,960,640
C100	100% Continued to Named Survivor	21,705	524,434,030	6,321,536,000
C100	100% Continued to Named Survivor (accelerated)	0	14,491,602	40,445,527
C180	100% Continued to Named Survivor with 180 payments guaranteed	62,248	1,680,262,957	21,562,930,572
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	70,930,574	206,243,447
LOL	Life with Optional Length Guaranteed	30	795,211	5,365,408
LOLF	Life with Optional Length Guaranteed (Forced)	3	48,455	165,021
AC24	Annuity Certain with 24 Payments	4	234,254	348,746
AC60	Annuity Certain with 60 Payments	11	675,254	1,977,005
AC120	Annuity Certain with 120 Payments	9	1,027,046	4,854,189
AC180	Annuity Certain between 24 and 180 Payments	5	1,984,921	9,187,237
C50	50% Continued to One Beneficiary	14	109,405	425,661
C50W180	50% Continued to One Beneficiary with 180 Months guaranteed	1	3,924	9,908
C75WSS	75% Continued to One Beneficiary and Social Security Integrated	23	532,185	1,882,894
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	9	30,312	61,727
A180WSS	Life with 180 Months Guaranteed and Social Security Integrated	14	287,559	692,714
PF6213	Police and Firemen s.62.13 *	12	368,149	1,284,461
SLNSD	Straight Life - Named Survivor Deceased	826	24,165,568	230,516,490
	Total Regular	218,846	\$5,634,105,260	\$62,936,361,451

(concluded on next page)

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.



Core Annuities Being Paid Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
DISABILITY RETIREMENT				
SL	Straight Life ⁽¹⁾	2,419	\$ 54,864,011	\$ 402,172,109
A60	Life Annuity with 60 payments guaranteed	352	9,832,737	90,075,140
A180	Life Annuity with 180 payments guaranteed	1,042	27,809,782	283,755,469
JOINT	Joint and 75% Survivor	483	11,977,075	132,511,624
R25	Reduced 25% on First Death	185	4,506,806	47,708,384
C100	100% Continued to Named Survivor	1,117	22,242,808	244,214,295
C180	100% Continued to Named Survivor with 180 payments guaranteed	2,252	52,693,000	673,067,319
AC24	Annuity Certain with 24 Payments	0	9,409	17,526
DWSMC	Disability with Spouse or Minor/Dependent Child	1	18,887	113,838
PF6213	Police and Firemen s.62.13 *	4	74,471	408,753
SLNSD	Straight Life - Named Survivor Deceased	6	192,851	2,017,574
	Total Disability	7,861	\$ 184,221,837	\$ 1,876,062,031
DEATH-IN-SERVICE BENEFITS				
SL	Straight Life	253	\$ 3,663,679	\$ 40,628,930
SL	Straight Life (accelerated)	0	133,806	386,829
A60	Life Annuity with 60 payments guaranteed	135	2,636,967	28,593,923
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	64,624	157,394
A180	Life Annuity with 180 payments guaranteed	1,049	16,860,953	198,909,394
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	666,527	3,215,193
C180	100% Continued to Named Survivor with 180 payments guaranteed	2	11,806	163,631
LOL	Life with Optional Length Guaranteed	4	165,292	727,610
AC24	Annuity Certain with 24 Payments	0	13,221	29,037
AC60	Annuity Certain with 60 Payments	0	3,864	10,773
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	10	8,390	32,459
PF6213	Police and Firemen s.62.13 *	1	29,247	80,530
	Total Death-in-Service	1,454	\$ 24,258,376	\$ 272,935,703
GRAND TOTAL		228,161	\$ 5,842,585,473	\$ 65,085,359,184

⁽¹⁾ Includes 1,620 members formerly covered under the LTDI program.

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.

*Additional Information for Police and Firemen 62.13 Annuities

	<u>Regular Retirement</u>			<u>Disability Retirement</u>			<u>Death-in-Service Retirement</u>		
	Original	Dividends	Total	Original	Dividends	Total	Original	Dividends	Total
Benefit Amount	\$ 86,406	\$ 281,743	\$ 368,149	\$ 15,394	\$ 59,077	\$ 74,471	\$ 6,193	\$ 23,054	\$ 29,247
Present Value	296,183	988,278	1,284,461	84,491	324,262	408,753	17,052	63,478	80,530



Core Annuities Being Paid Tabulated by Attained Ages

Attained Ages	Regular		Disability		Death-in-Service		Totals	
	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount
Under 20	0	\$ 0	0	\$ 0	7	\$ 49,634	7	\$ 49,634
20-24	0	0	5	68,187	12	131,237	17	199,424
25-29	0	0	8	120,585	17	126,764	25	247,349
30-34	0	0	17	260,035	28	191,737	45	451,772
35-39	1	4,838	59	1,387,709	32	233,564	92	1,626,111
40-44	4	35,053	154	3,519,069	43	441,306	201	3,995,428
45-49	41	509,261	257	5,986,791	41	368,359	339	6,864,411
50-54	1,570	52,736,000	562	13,954,887	75	1,009,346	2,207	67,700,233
55-59	12,391	380,757,644	1,057	27,053,734	124	2,051,478	13,572	409,862,856
60-64	28,999	775,033,992	1,590	37,279,702	204	3,155,239	30,793	815,468,933
65-69	46,701	1,180,586,642	1,189	29,400,479	235	4,787,112	48,125	1,214,774,233
70-74	51,388	1,353,044,695	1,117	26,925,845	242	4,996,900	52,747	1,384,967,440
75-79	34,850	875,389,687	803	18,123,062	145	2,821,722	35,798	896,334,471
80-84	21,278	505,508,137	557	11,343,077	96	1,706,659	21,931	518,557,873
85-89	12,741	305,615,950	328	6,160,442	65	771,324	13,134	312,547,716
90-94	5,944	142,561,157	128	2,244,646	33	504,045	6,105	145,309,848
95 & Up	1,708	36,256,289	30	384,178	19	331,437	1,757	36,971,904
Certain Only*	1,230	26,065,915	0	9,409	36	580,513	1,266	26,655,837
Totals	218,846	\$5,634,105,260	7,861	\$184,221,837	1,454	\$24,258,376	228,161	\$5,842,585,473

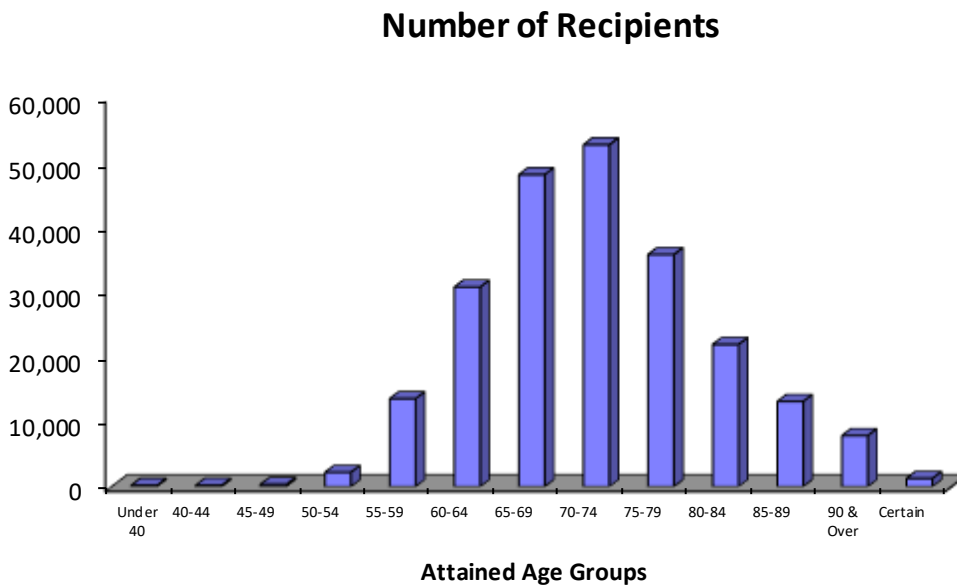
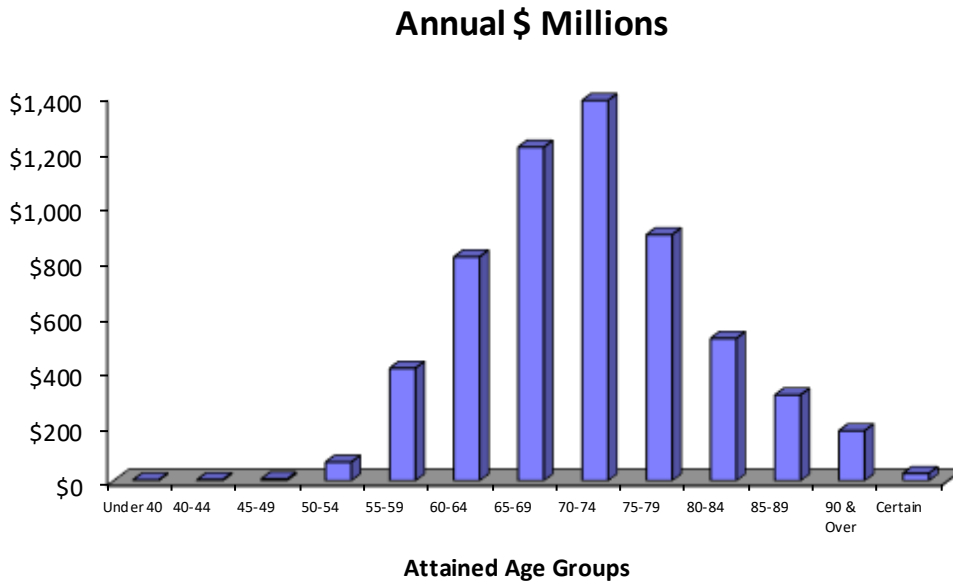
Averages in Years

Age at retirement	59.9	50.8	51.8	59.6
Attained age	71.5	64.8	67.0	71.3

* Certain Only category consists of continuations of 5, 10 and 15-year certain and life annuities to beneficiaries of deceased annuitants.

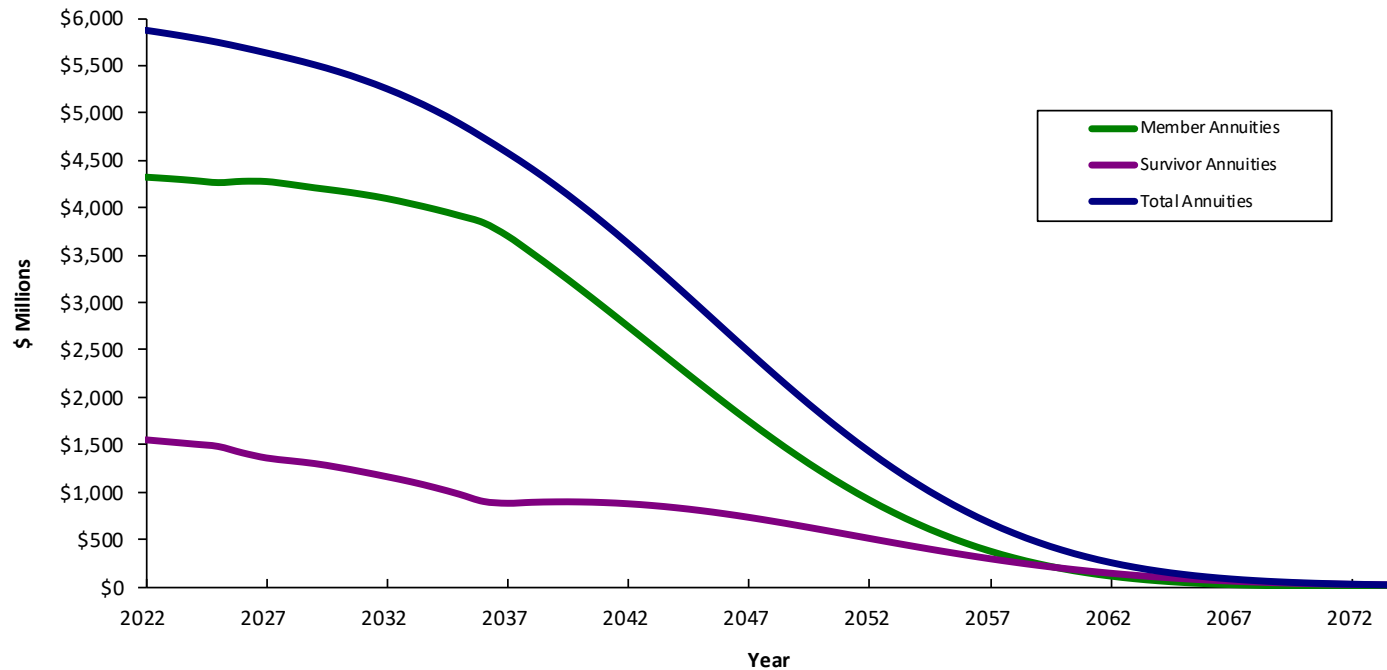


Core Annuities Being Paid by Attained Age*



* Includes regular and disability retirees and survivor beneficiaries. The “certain” category includes annuities paid for a fixed period which is not dependent upon the age of the recipient.

Projected Future Core Annuity Payments on Behalf of Present Retired Lives Including Present and Future Expected Dividends



	\$ Billions	
	<u>With Expected Dividends</u>	<u>Without Expected Dividends</u>
Total Future Benefit Payments	\$137.7	\$109.3
Present Assets	69.9	69.9
Future Investment Return Needed	67.8	39.4

Based upon the assumptions used in the valuation, future dividends are expected to be approximately 1.7% per year. Of course actual dividends will be based upon actual future investment return and the operation of the Market Recognition Account.

SECTION D

VARIABLE ANNUITIES

Variable Annuity Division Development of Assets and Liabilities

	\$ Millions		Ratio
	Assets	Liabilities	
Ending Balance December 31, 2020	\$4,954.0	\$4,383.0	1.130
Closing Adjustments	(1.8)	0.0	
Variable Terminations	(65.7)	(65.7)	
2021 Adjustment: 13%	0.0	556.5	
Beginning Balance January 1, 2021	4,886.5	4,873.8	1.003
Increases			
Reserve Transfers	285.6	285.6	
Regular Interest (5%)	238.6	238.6	
Additional Earnings	697.9	0.0	
Addition for Experience Study	0.0	0.0	
Other	0.0	0.0	
Total Increases	1,222.1	524.2	
Decreases			
Annuities & Lump Sums	490.6	490.6	
Credit Re-establishments	0.0	0.0	
Subtraction for Experience Study	0.0	14.5	
Other	0.0	26.9	
Total Decreases	490.6	532.0	
Ending Balance December 31, 2021	\$5,618.0	\$4,866.0	1.155

Variable Fund Reserve Transfer Recommendation

Amounts to be transferred from the Employer Reserve and the Employee Reserve to the Annuity Reserve to cover liabilities for new annuities are computed as the first step in the annual actuarial valuation. The actuarial present value at time of retirement of variable annuities reported as new since the last actuarial valuation is \$273,421,835. Adjustments to prior transfers, relating to estimated annuities for which final computations have now been made, totaled \$12,207,556. Reserve transfers were distributed as follows:

Group	Regular Transfer	Adjustment to Prior Transfer	Total Transfer
General	\$238,390,551	\$10,614,910	\$249,005,461
Protective with Social Security	27,343,632	1,248,080	28,591,712
Protective without Social Security	5,010,887	(34,430)	4,976,457
Executive & Elected	2,676,765	378,996	3,055,761
Totals	\$273,421,835	\$12,207,556	\$285,629,391

Accordingly, we recommend that \$285,629,391 be transferred to the Variable Annuity Reserve. The results in this report assume that this transfer has been made.

Discussion of Variable Annuity Change

Variable Annuity Reserves, \$5,618.0 million, were more than the actuarial present value of variable annuities, \$4,866.0 million, by \$752.0 million as of December 31, 2021 or 15.5% of the Actuarial Present Value (APV) of variable annuity payments. In accordance with Section 40.28(2) of the Wisconsin Statutes (see page 29 of this report), variable annuities will be increased by 15.0% effective April 1, 2022. The primary sources of the 15.0% are as follows:

	% of APV
1. SWIB net of fee investment return	20.0%
2. Adjustment to published effective rate	0.0%
3. Published effective earnings rate	20.0%
4. Adjustment to relate earnings to average variable annuity fund balance	(0.4)%
5. Earnings rate based on average balance	19.6%
6. Expected change before adjustments: $(1.196)/1.05-1$	13.9%
7. Adjustment to relate average asset to ending liability	0.4%
8. Carryover from last year due to timing of distribution, accounting adjustments and truncation	0.3%
9. Experience study adjustment	0.3%
10. Experience and other effects	0.6%
11. Statutory adjustment: (truncate to whole percent)	(0.5)%
12. Variable annuity change: (6)+(7)+(8)+(9)+(10)+(11)	15.0%

Please see pages 30 and 31 for a description of the items on this page.

In accordance with the Administrative Code, ETF 20.25 and Section 40.28(2) Wisconsin Statutes (shown on page 29 of this report), variable annuities will be increased by 15.0% effective April 1, 2022.



Transfers to Annuity Reserve to Finance Variable Annuities Approved in 2021 Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
REGULAR RETIREMENT				
SL	Straight Life	279	\$ 2,142,136	\$ 30,719,034
SL	Straight Life (accelerated)	0	334,372	1,169,752
A60	Life Annuity with 60 payments guaranteed	124	1,062,949	14,982,225
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	189,558	635,595
A180	Life Annuity with 180 payments guaranteed	386	3,134,749	46,796,105
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	667,082	2,952,203
A180F	Life Annuity with 180 payments guaranteed (forced)	1	25,960	313,406
JOINT	Joint and 75% Survivor	169	1,709,340	26,514,221
JOINT	Joint and 75% Survivor (accelerated)	0	373,665	1,404,458
R25	Reduced 25% on First Death	89	1,090,440	15,973,292
R25	Reduced 25% on First Death (accelerated)	0	181,566	779,433
C100	100% Continued to Named Survivor	202	1,744,107	27,538,138
C100	100% Continued to Named Survivor (accelerated)	0	291,969	1,225,117
C180	100% Continued to Named Survivor with 180 payments guaranteed	595	5,601,723	89,260,074
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	1,308,673	5,706,976
AC24	Annuity Certain with 24 Payments	0	3,429	9,297
AC60	Annuity Certain with 60 Payments	2	22,136	103,186
AC120	Annuity Certain with 120 Payments	1	8,257	64,740
AC180	Annuity Certain between 24 and 180 Payments	0	5,502	29,119
	Total Regular	1,848	\$ 19,897,613	\$ 266,176,371
	Average Age at Retirement	59.8 Years		
DISABILITY RETIREMENT				
SL	Straight Life	10	\$ 67,494	\$ 809,113
A60	Life Annuity with 60 payments guaranteed	4	21,384	284,010
A180	Life Annuity with 180 payments guaranteed	10	92,107	1,243,417
JOINT	Joint and 75% Survivor	5	71,947	1,002,138
C100	100% Continued to Named Survivor	4	12,987	195,235
C180	100% Continued to Named Survivor with 180 payments guaranteed	16	120,815	2,052,328
	Total Disability	49	\$ 386,734	\$ 5,586,241
	Average Age at Retirement	53.6 Years		
DEATH-IN-SERVICE BENEFITS				
SL	Straight Life	1	\$ 18,107	\$ 224,122
A60	Life Annuity with 60 payments guaranteed	3	15,978	250,468
A180	Life Annuity with 180 payments guaranteed	9	76,524	1,184,633
	Total Death-in-Service	13	\$ 110,609	\$ 1,659,223
	Average Age at Retirement	60.1 Years		
GRAND TOTAL		1,910	\$ 20,394,956	\$ 273,421,835

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.



Variable Annuities Being Paid Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
REGULAR RETIREMENT				
SL	Straight Life	5,198	\$ 55,046,025	\$ 514,502,008
SL	Straight Life (accelerated)	0	995,322	2,638,281
A60	Life Annuity with 60 payments guaranteed	3,533	38,760,292	341,923,809
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	609,969	1,452,496
A120	Life Annuity with 120 payments guaranteed	3	24,536	50,360
A180	Life Annuity with 180 payments guaranteed	8,123	81,034,607	773,056,443
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	2,240,810	6,749,632
A180F	Life Annuity with 180 payments guaranteed (forced)	34	232,876	1,846,845
JOINT	Joint and 75% Survivor	4,909	67,905,857	664,713,937
JOINT	Joint and 75% Survivor (accelerated)	0	987,487	2,638,875
R25	Reduced 25% on First Death	3,174	58,023,774	464,137,299
R25	Reduced 25% on First Death (accelerated)	0	432,830	1,384,412
C100	100% Continued to Named Survivor	3,978	48,185,450	490,976,277
C100	100% Continued to Named Survivor (accelerated)	0	917,963	2,808,826
C180	100% Continued to Named Survivor with 180 payments guaranteed	11,494	129,351,461	1,453,215,089
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	3,783,582	11,363,929
LOL	Life with Optional Length Guaranteed	3	58,511	135,548
AC24	Annuity Certain with 24 Payments	0	3,429	6,772
AC60	Annuity Certain with 60 Payments	2	38,532	131,814
AC120	Annuity Certain with 120 Payments	2	120,104	583,020
AC180	Annuity Certain between 24 and 180 Payments	1	357,595	1,258,894
C50	50% Continued to One Beneficiary	5	66,855	222,750
C50W180	50% Continued to One Beneficiary with 180 Months guaranteed	1	15,499	35,662
C75WSS	75% Continued to One Beneficiary and Social Security Integrated	12	125,320	476,119
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	3	13,086	28,637
A180WSS	Life with 180 Months Guaranteed and Social Security Integrated	2	17,223	43,882
SLNSD	Straight Life - Named Survivor Deceased	147	1,797,825	15,505,848
	Total Regular	40,624	\$491,146,820	\$4,751,887,464

(concluded on next page)

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.



Variable Annuities Being Paid Tabulated by Type of Annuity and Option

Numeric Code	Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
DISABILITY RETIREMENT					
1	SL	Straight Life	136	\$ 888,262	\$ 8,366,911
3	A60	Life Annuity with 60 payments guaranteed	67	550,573	4,543,362
7	A180	Life Annuity with 180 payments guaranteed	249	1,419,033	14,399,312
10	JOINT	Joint and 75% Survivor	102	989,466	9,599,003
12	R25	Reduced 25% on First Death	39	302,744	2,692,567
14	C100	100% Continued to Named Survivor	209	1,511,457	13,522,684
16	C180	100% Continued to Named Survivor with 180 payments guaranteed	461	3,069,418	34,307,127
Total Disability			1,263	\$ 8,730,953	\$ 87,430,966
DEATH-IN-SERVICE BENEFITS					
1	SL	Straight Life	66	\$ 580,014	\$ 5,666,564
2	SL	Straight Life (accelerated)	0	18,592	36,193
3	A60	Life Annuity with 60 payments guaranteed	31	287,850	2,131,007
4	A60	Life Annuity with 60 payments guaranteed (accelerated)	0	4,404	1,154
7	A180	Life Annuity with 180 payments guaranteed	263	1,735,679	18,417,650
8	A180	Life Annuity with 180 payments guaranteed (accelerated)	0	90,257	411,213
28	A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	4	3,355	11,044
Total Death-in-Service			364	\$ 2,720,151	\$ 26,674,825
GRAND TOTAL			42,251	\$ 502,597,924	\$ 4,865,993,255

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.



Variable Annuities Being Paid Tabulated by Attained Ages

Attained Ages	Regular		Disability		Death-in-Service		Totals	
	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount
Under 20	0	\$ 0	0	\$ 0	0	\$ 0	0	\$ 0
20-24	0	0	1	1,458	3	4,297	4	5,755
25-29	0	0	5	12,205	3	3,961	8	16,166
30-34	0	0	6	11,900	5	4,629	11	16,529
35-39	0	0	10	26,476	3	2,539	13	29,015
40-44	1	369	24	105,731	11	31,698	36	137,798
45-49	16	111,741	31	167,411	14	59,969	61	339,121
50-54	352	2,881,885	59	361,479	22	128,312	433	3,371,676
55-59	2,598	23,844,846	153	778,716	30	185,604	2,781	24,809,166
60-64	5,047	36,769,389	197	937,337	56	357,950	5,300	38,064,676
65-69	7,963	55,388,886	234	974,574	50	308,851	8,247	56,672,311
70-74	9,508	95,406,549	190	1,418,275	62	346,792	9,760	97,171,616
75-79	6,752	104,191,658	152	1,694,490	36	464,654	6,940	106,350,802
80-84	3,812	79,293,081	98	1,230,308	23	311,435	3,933	80,834,824
85-89	2,529	55,454,169	73	708,271	19	253,073	2,621	56,415,513
90-94	1,352	27,612,539	26	266,678	13	134,572	1,391	28,013,789
95 & Up	457	8,535,068	4	35,644	9	111,727	470	8,682,439
Certain Only*	237	1,656,640	0	0	5	10,088	242	1,666,728
Totals	40,624	\$491,146,820	1,263	\$8,730,953	364	\$2,720,151	42,251	\$502,597,924

Averages in Years

Age at retirement	59.2	52.6	52.2	59.0
Attained age	71.5	66.5	67.9	71.3

* Certain only category consists of continuations of 5, 10 and 15-year certain and life annuities to beneficiaries of deceased annuitants.



SECTION E

COMPARATIVE STATEMENTS

Core Annuities Comparative Statement 1987 Through 2021

Valuation Date	Number	\$ Millions				Change in		
		Annual	Fund	Actuarial	Ratio	Annuities		CPI*
		Annuities	Balance	Reserve		Average	Maximum	
1987	67,688	\$ 366.9	\$ 3,833.7	\$ 3,594.6	1.067	6.7 %		4.4 %
1988	70,017	420.6	4,319.6	4,150.9	1.041	4.1 %		4.4 %
1989	73,232	488.7	5,487.4	4,928.1	1.113	11.3 %		4.6 %
1990	77,666	611.3	6,443.8	6,219.1	1.036	3.6 %		6.2 %
1991	79,465	660.4	7,137.8	6,711.3	1.063	6.3 %		3.0 %
1992	81,508	732.3	7,782.4	7,456.6	1.044	4.4 %		3.0 %
1993	83,836	801.7	8,608.2	8,205.3	1.049	4.9 %		2.7 %
1994	86,214	882.2	9,286.2	9,029.6	1.028	2.8 %		2.7 %
1995	88,998	955.8	10,351.7	9,804.1	1.056	5.6 %		2.6 %
1996	92,198	1,065.8	11,699.8	10,977.1	1.066	6.6 %		3.3 %
1997	95,128	1,188.4	13,185.1	12,240.4	1.077	7.7 %		1.7 %
1998	99,112	1,349.5	14,951.8	13,943.0	1.072	7.2 %		1.6 %
1999	102,817	1,513.8	16,857.8	15,687.2	1.075	17.1 % **		2.7 %
2000	107,425	1,867.0	20,517.8	19,405.3	1.057	5.7 %		3.4 %
2001	112,142	2,048.6	21,979.7	21,283.6	1.033	3.3 %		1.6 %
2002	116,289	2,226.6	23,142.4	23,202.9	0.997	0.0 %		2.4 %
2003	121,582	2,364.7	25,071.9	24,724.0	1.014	1.4 %		1.9 %
2004	126,211	2,500.3	26,920.0	26,232.2	1.026	2.6 %		3.3 %
2005	131,674	2,691.4	28,575.3	28,359.7	1.008	0.8 %		3.4 %
2006	137,117	2,843.6	31,180.5	30,273.9	1.030	3.0 %		2.6 %
2007	142,906	3,075.3	35,050.1	32,877.5	1.066	6.6 %		4.1 %
2008	144,033	3,399.3	35,798.1	36,551.5	0.979	(2.1)%	(2.1)%	0.1 %
2009	150,671	3,449.3	36,655.8	37,072.7	0.989	(1.1)%	(1.3)%	2.7 %
2010	155,775	3,532.4	37,798.4	38,148.5	0.991	(0.9)%	(1.2)%	1.5 %
2011	167,453	3,842.0	40,411.5	42,078.3	0.960	(4.0)%	(7.0)%	3.0 %
2012	173,655	3,806.3	40,591.6	41,852.4	0.970	(3.0)%	(9.6)%	1.7 %
2013	180,056	3,800.7	44,273.2	42,300.5	1.047	4.7 %		1.5 %
2014	185,605	4,102.3	47,135.7	45,790.7	1.029	2.9 %		0.8 %
2015	191,795	4,364.9	49,147.0	48,897.5	1.005	0.5 %		0.7 %
2016	197,647	4,523.1	51,972.0	50,941.4	1.020	2.0 %		2.1 %
2017	203,202	4,747.0	54,900.0	53,590.0	1.024	2.4 %		2.1 %
2018	211,126	5,040.9	56,493.8	56,629.3	0.998	0.0 %		1.9 %
2019	216,944	5,183.7	59,138.4	58,157.0	1.017	1.7 %		2.3 %
2020	222,723	5,423.2	63,805.8	60,691.1	1.051	5.1 %		1.4 %
2021	228,161	5,842.6	69,910.7	65,085.4	1.074	7.4 %		7.0 %
35-Year Average						3.6 %		2.7 %
20-Year Average						1.5 %		2.3 %
10-Year Average						2.3 %		2.1 %
5-Year Average						3.3 %		2.9 %

* CPI percentage increase determined by ratio of current year CPI-U67 December index over prior year December index.

** Including 10.6% Act 11 transfer.

In cases where there is a negative dividend, a maximum decrease is calculated to account for annuitants that are already at the floor and whose dividend cannot be reduced.



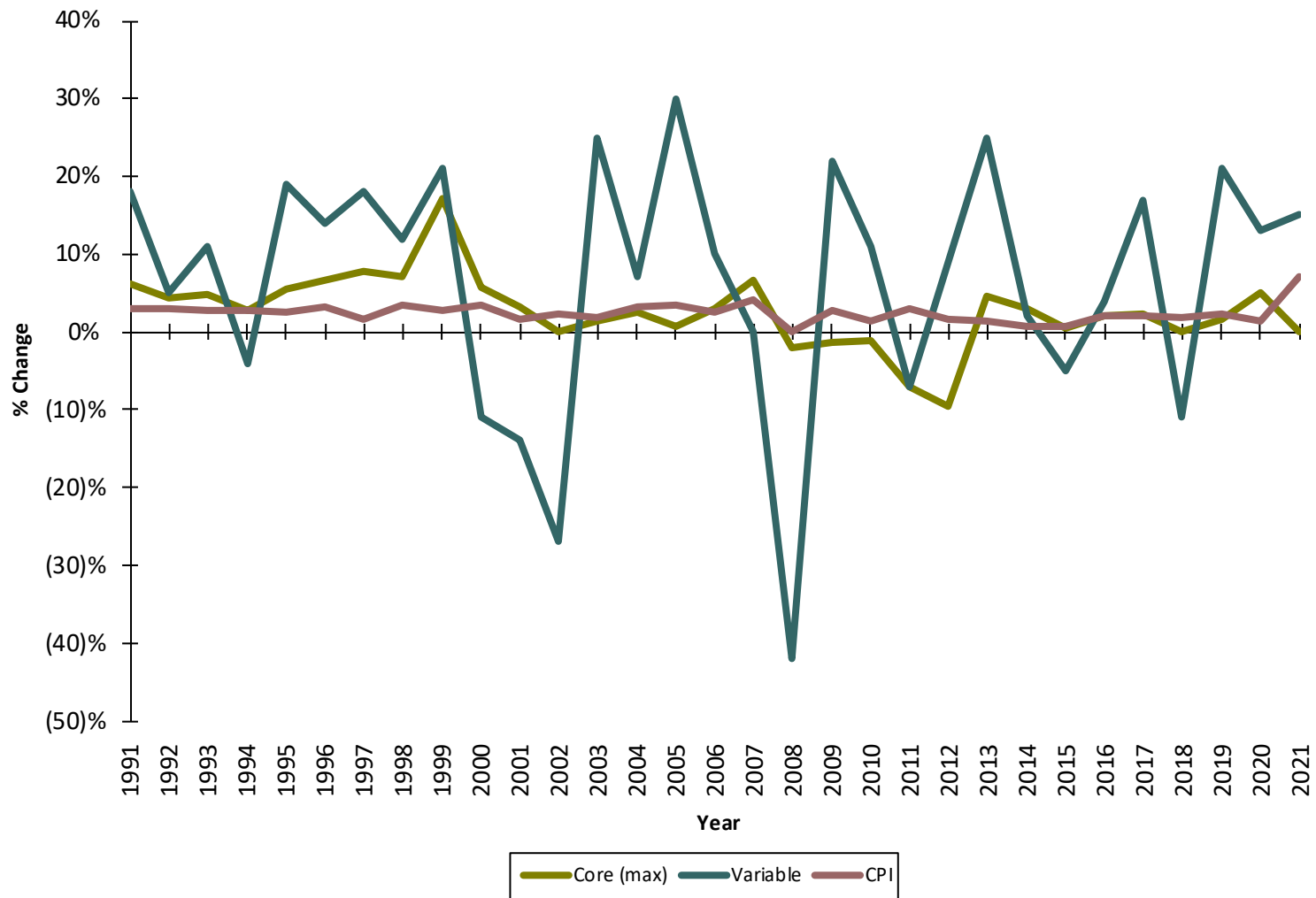
Variable Annuities Comparative Statement 1987 Through 2021

Valuation Date	Number	\$ Millions				Change in	
		Annual Annuities	Fund Balance	Actuarial Reserve	Ratio	Annuities	CPI*
1987	17,084	\$ 60.4	\$ 548.8	\$ 584.2	0.939	(6.0)%	4.4 %
1988	17,779	61.4	682.6	594.0	1.149	14.0 %	4.4 %
1989	18,502	75.9	878.1	756.5	1.161	16.0 %	4.6 %
1990	19,922	101.0	868.6	1,013.4	0.857	(14.0)%	6.2 %
1991	20,538	91.5	1,101.3	929.7	1.184	18.0 %	3.0 %
1992	20,968	112.6	1,208.6	1,147.4	1.053	5.0 %	3.0 %
1993	21,623	123.7	1,407.9	1,268.6	1.110	11.0 %	2.7 %
1994	22,248	144.6	1,418.0	1,487.0	0.954	(4.0)%	2.7 %
1995	22,978	150.2	1,854.2	1,556.0	1.192	19.0 %	2.6 %
1996	23,725	189.8	2,264.9	1,976.7	1.146	14.0 %	3.3 %
1997	24,462	228.2	2,800.0	2,371.5	1.181	18.0 %	1.7 %
1998	25,424	289.5	3,400.5	3,035.5	1.120	12.0 %	1.6 %
1999	26,257	345.8	4,432.9	3,659.1	1.212	21.0 %	2.7 %
2000	27,321	445.3	4,211.4	4,749.3	0.887	(11.0)%	3.4 %
2001	28,314	424.4	3,901.8	4,547.4	0.858	(14.0)%	1.6 %
2002	28,662	374.0	2,899.3	3,999.1	0.726	(27.0)%	2.4 %
2003	29,496	273.3	3,635.9	2,892.2	1.257	25.0 %	1.9 %
2004	30,270	346.0	3,909.9	3,654.5	1.070	7.0 %	3.3 %
2005	31,499	376.5	4,092.7	3,970.7	1.031	3.0 %	3.4 %
2006	32,683	391.8	4,594.2	4,145.2	1.108	10.0 %	2.6 %
2007	33,880	432.6	4,625.0	4,563.7	1.013	0.0 %	4.1 %
2008	34,927	427.0	2,574.5	4,491.0	0.573	(42.0)%	0.1 %
2009	34,836	240.3	3,078.4	2,512.7	1.225	22.0 %	2.7 %
2010	35,866	288.4	3,340.6	3,005.4	1.111	11.0 %	1.5 %
2011	38,949	330.3	3,197.9	3,462.9	0.924	(7.0)%	3.0 %
2012	39,873	304.6	3,463.9	3,169.6	1.093	9.0 %	1.7 %
2013	40,317	324.5	4,187.3	3,347.0	1.251	25.0 %	1.5 %
2014	39,420	386.5	3,995.4	3,917.1	1.020	2.0 %	0.8 %
2015	40,152	387.8	3,704.8	3,910.1	0.947	(5.0)%	0.7 %
2016	40,647	363.6	3,792.0	3,645.1	1.040	4.0 %	2.1 %
2017	40,877	369.9	4,324.9	3,682.1	1.175	17.0 %	2.1 %
2018	41,187	425.8	3,738.6	4,207.6	0.891	(10.0)%	1.9 %
2019	41,777	379.7	4,519.4	3,728.6	1.212	21.0 %	2.3 %
2020	41,753	449.7	4,954.0	4,383.0	1.130	13.0 %	1.4 %
2021	42,251	502.6	5,618.0	4,866.0	1.155	15.0 %	7.0 %
35-Year Average						4.3 %	2.7 %
20-Year Average						3.1 %	2.3 %
10-Year Average						8.6 %	2.1 %
5-Year Average						10.6 %	2.9 %

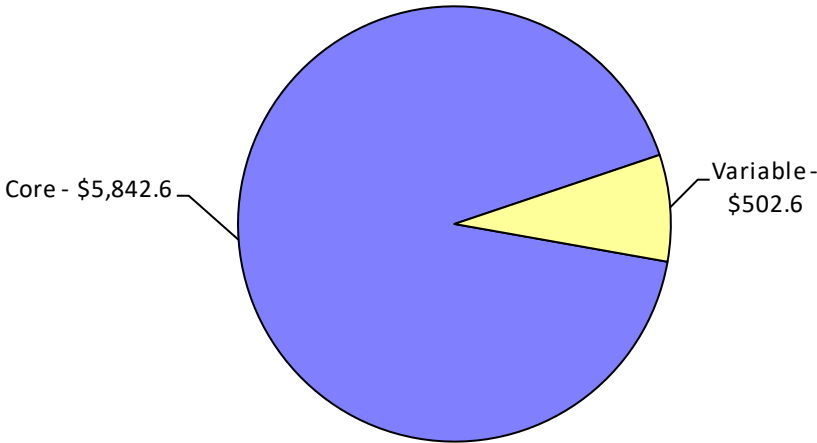
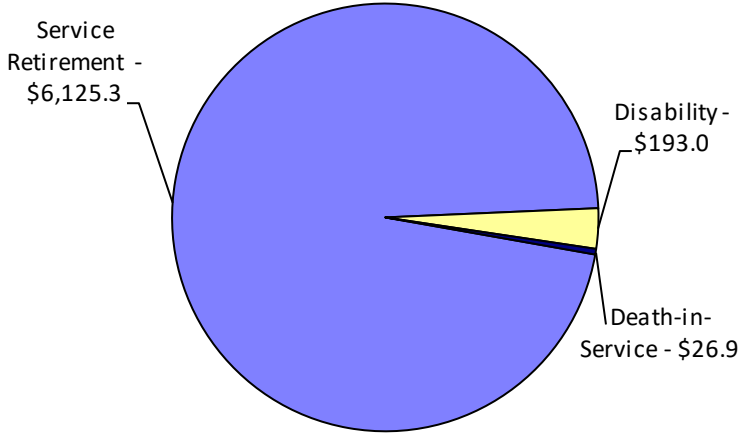
* CPI percentage increase determined by ratio of current year CPI-U67 December index over prior year December index.



History of % Changes in Annuities and CPI



Annual Annuities Being Paid by Type \$ Millions



Annuities Being Paid Tabulated by Year of Retirement⁽¹⁾ (\$1,000s annually)

Year Ret'd ⁽²⁾	Core Annuities				Variable Annuities				Avg. Total Annuity
	No.	Initial	Increases	Total	No.	Initial	Increases	Total	
2021	10,119	\$ 280,743	\$ 0	\$ 280,743	1,831	\$ 19,167	\$ 0	\$ 19,167	\$33,232
2020	10,747	279,773	7,666	287,439	1,568	14,472	1,878	16,350	31,002
2019	10,323	260,581	15,811	276,392	1,557	10,586	3,888	14,474	30,779
2018	10,126	256,963	17,663	274,626	1,494	11,698	2,696	14,394	30,934
2017	9,743	235,634	19,353	254,987	1,460	8,321	3,660	11,981	29,996
2016	10,033	237,727	24,872	262,599	1,521	8,458	4,207	12,665	29,965
2015	10,127	235,378	27,713	263,091	1,627	8,885	3,754	12,639	30,033
2014	9,182	195,492	26,770	222,262	1,657	8,665	3,908	12,573	28,492
2013	9,498	196,156	35,115	231,271	1,632	6,687	5,441	12,128	27,996
2012	9,376	195,842	40,011	235,853	1,664	5,783	5,648	11,431	28,976
2011	14,933	371,254	76,476	447,730	3,008	13,820	11,588	25,408	35,144
2010	8,179	185,460	38,014	223,474	1,558	5,328	5,545	10,873	31,410
2009	7,639	175,096	36,043	211,139	1,365	3,858	5,748	9,606	31,707
2008	8,253	192,228	39,521	231,749	1,591	9,360	4,166	13,526	30,371
2007	8,041	175,377	36,031	211,408	1,751	10,619	4,723	15,342	28,440
2006	7,581	157,191	32,388	189,579	1,604	10,490	6,173	16,663	27,281
2005	7,501	153,030	31,526	184,556	1,584	10,918	6,947	17,865	27,083
2004	6,659	128,587	26,546	155,133	1,485	10,535	7,909	18,444	26,153
2003	6,572	127,471	26,336	153,807	1,351	8,577	10,192	18,769	26,339
2002	6,097	114,815	23,685	138,500	1,191	11,427	6,838	18,265	25,818
2001	6,111	114,656	23,604	138,260	1,234	17,874	6,682	24,556	26,783
2000	5,962	110,940	22,961	133,901	1,026	20,286	4,519	24,805	26,799
1999	4,904	79,138	28,988	108,126	850	13,368	6,408	19,776	26,193
1998	4,640	70,968	32,300	103,268	845	11,675	7,670	19,345	26,614
1997	3,721	55,465	31,017	86,482	688	8,084	7,718	15,802	27,749
1996	3,514	51,587	34,483	86,070	717	7,402	9,072	16,474	29,382
1995	3,018	42,156	32,040	74,196	606	4,970	8,223	13,193	29,344
1994	2,586	34,652	28,878	63,530	576	4,708	7,284	11,992	29,675
1993	2,230	28,463	25,333	53,796	486	3,342	6,092	9,434	28,728
1992	1,784	20,991	20,806	41,797	406	2,623	5,161	7,784	28,203
1991	1,458	16,844	18,478	35,322	351	1,910	4,778	6,688	29,501
1990	2,293	27,830	33,015	60,845	586	3,475	6,992	10,467	31,765
1989	1,520	18,190	24,359	42,549	359	1,905	4,747	6,652	32,911
1988	910	8,113	12,569	20,682	242	974	2,905	3,879	27,504
1987	690	5,479	9,117	14,596	179	583	1,603	2,186	25,159
1986	570	4,696	9,158	13,854	170	575	1,750	2,325	29,310
1985	482	3,825	8,245	12,070	122	299	1,222	1,521	28,855
1984	308	2,051	4,838	6,889	97	258	1,058	1,316	27,811
1983	197	976	2,460	3,436	69	133	656	789	21,666
1982	128	552	1,530	2,082	32	42	248	290	18,526
Prior	406	1,054	3,442	4,496	111	91	670	761	7,563
Total	228,161	\$4,853,424	\$989,161	\$5,842,585	42,251	\$302,231	\$200,367	\$502,598	\$27,810

⁽¹⁾ Includes 1,620 members formerly covered under the LTDI program based on year of termination.

⁽²⁾ The number of retirements during 2021 may not match the number of new retirees on Page 8 of this report due to Reporting Lag.

As of December 31, 2021, the median annual Core benefit is approximately \$21,500, the median annual Variable benefit is approximately \$7,000 and the median combined benefit is \$23,800.



Liabilities as of December 31, 2021 Tabulated by Year of Retirement⁽¹⁾ (\$1,000s)

Year Ret'd ⁽²⁾	Core Liabilities				Variable Liabilities				Total Liabilities
	No.	Initial	Increases	Total	No.	Initial	Increases	Total	
2021	10,119	\$ 3,784,897	\$ 0	\$ 3,784,897	1,831	\$ 258,576	\$ 0	\$ 258,576	\$ 4,043,473
2020	10,747	3,734,280	102,329	3,836,609	1,568	186,316	24,188	210,504	4,047,113
2019	10,323	3,469,844	210,456	3,680,300	1,557	137,450	50,481	187,931	3,868,231
2018	10,126	3,364,283	231,281	3,595,564	1,494	145,485	33,522	179,007	3,774,571
2017	9,743	3,046,272	251,675	3,297,947	1,460	106,440	46,809	153,249	3,451,196
2016	10,033	3,041,578	320,805	3,362,384	1,521	104,832	52,141	156,973	3,519,357
2015	10,127	2,995,848	355,583	3,351,431	1,627	110,941	46,874	157,815	3,509,245
2014	9,182	2,479,298	342,738	2,822,036	1,657	107,291	48,382	155,673	2,977,709
2013	9,498	2,448,913	443,012	2,891,926	1,632	82,101	66,811	148,913	3,040,838
2012	9,376	2,404,980	496,399	2,901,379	1,664	70,313	68,676	138,989	3,040,368
2011	14,933	4,493,430	928,967	5,422,397	3,008	160,317	134,419	294,736	5,717,133
2010	8,179	2,165,375	446,632	2,612,007	1,558	60,597	63,059	123,656	2,735,663
2009	7,639	2,002,710	414,477	2,417,187	1,365	42,195	62,876	105,071	2,522,258
2008	8,253	2,138,833	441,408	2,580,241	1,591	100,652	44,743	145,395	2,725,637
2007	8,041	1,927,385	397,042	2,324,427	1,751	112,961	50,233	163,194	2,487,620
2006	7,581	1,702,848	351,795	2,054,642	1,604	110,861	65,236	176,097	2,230,739
2005	7,501	1,608,992	332,021	1,941,014	1,584	111,521	70,966	182,487	2,123,501
2004	6,659	1,304,423	269,545	1,573,968	1,485	105,633	79,297	184,930	1,758,898
2003	6,572	1,256,138	259,710	1,515,848	1,351	84,640	100,576	185,216	1,701,064
2002	6,097	1,093,883	225,782	1,319,665	1,191	110,684	66,247	176,931	1,496,596
2001	6,111	1,038,734	213,943	1,252,677	1,234	159,163	59,496	218,660	1,471,336
2000	5,962	959,792	198,590	1,158,381	1,026	174,934	38,971	213,905	1,372,286
1999	4,904	654,451	238,632	893,083	850	108,133	51,831	159,964	1,053,047
1998	4,640	557,288	253,316	810,605	845	88,612	58,217	146,829	957,433
1997	3,721	410,698	228,944	639,642	688	58,873	56,206	115,079	754,720
1996	3,514	361,171	240,780	601,951	717	49,350	60,485	109,835	711,786
1995	3,018	279,551	212,185	491,736	606	31,955	52,869	84,824	576,559
1994	2,586	214,973	179,027	394,001	576	28,564	44,193	72,757	466,757
1993	2,230	168,062	149,911	317,973	486	18,897	34,419	53,315	371,288
1992	1,784	115,712	115,093	230,805	406	13,673	26,892	40,565	271,370
1991	1,458	88,114	96,764	184,877	351	9,475	23,705	33,180	218,058
1990	2,293	142,003	168,671	310,674	586	17,252	34,721	51,973	362,647
1989	1,520	84,732	113,885	198,617	359	8,482	21,137	29,619	228,236
1988	910	36,502	56,724	93,226	242	4,115	12,265	16,379	109,606
1987	690	22,721	37,911	60,632	179	2,322	6,385	8,707	69,339
1986	570	18,198	35,562	53,760	170	2,232	6,788	9,020	62,780
1985	482	14,387	31,161	45,549	122	1,117	4,575	5,692	51,241
1984	308	7,158	17,067	24,225	97	848	3,473	4,321	28,546
1983	197	3,378	8,560	11,938	69	433	2,112	2,545	14,482
1982	128	2,161	5,921	8,082	32	146	867	1,013	9,095
Prior	406	3,965	13,094	17,059	111	299	2,171	2,470	19,529
Total	228,161	\$55,647,962	\$9,437,398	\$65,085,359	42,251	\$3,088,680	\$1,777,313	\$4,865,993	\$69,951,353

⁽¹⁾ Includes 1,620 members formerly covered under the LTDI program based on year of termination.

⁽²⁾ The number of retirements during 2021 may not match the number of new retirees on Page 8 of this report due to Reporting Lag.



Comparison of Actual to Expected Deaths Among Retired Lives (Normal Retirement Only) During 2021

Age	Male Deaths			Female Deaths			Total Deaths		
	Actual	Expected	Exposure	Actual	Expected	Exposure	Actual	Expected	Exposure
30-34									
35-39						1			1
40-44						5			5
45-49			20			51			71
50-54	2	2	1,098	1		586	3	2	1,684
55-59	15	16	5,343	19	19	6,903	34	35	12,246
60-64	69	57	10,997	85	74	17,911	154	131	28,908
65-69	196	157	18,008	183	193	29,501	379	350	47,509
70-74	362	333	20,664	336	364	31,074	698	697	51,738
75-79	462	423	14,077	423	426	19,170	885	849	33,247
80-84	478	489	8,711	504	540	12,638	982	1,029	21,349
85-89	562	535	5,159	590	644	8,011	1,152	1,179	13,170
90-94	437	394	2,174	634	617	4,220	1,071	1,011	6,394
95-99	181	138	489	342	313	1,287	523	451	1,776
100 & Up	24	20	52	91	83	227	115	103	279
Totals	2,788	2,564	86,792	3,208	3,273	131,585	5,996	5,837	218,377
Prior Year									
Totals	2,697	2,437	85,080	3,091	2,947	127,236	5,788	5,384	212,316
Average									
Ages	81.9	81.9	71.9	83.8	83.6	72.2	82.9	82.8	72.1



SECTION F

APPENDIX



Actuarial Assumptions Used in the Retired Life Actuarial Valuation

The interest rate used in the valuation was 5.0% per year, compounded yearly, as provided in Section 40.02 of the Wisconsin Statutes. The liability for current dividends was calculated assuming those dividends would always be paid. However, continued payment of those dividends is not guaranteed. Unfavorable investment performance or other factors could cause all or a portion of those dividends to be rolled back. liabilities would be lower than reported in this valuation. The mortality table used in the valuation was the 2020 WRS Experience Table, as adopted by the Board in connection with the 2018-2020 Experience Study. This table includes margin for future improvements in mortality by incorporating 100% of the MP-2021 fully generational mortality projection scale. The impact of the new mortality tables is minor, so the new tables were fully recognized in the 2021 valuation.

Single Life Retirement Values 2020 WRS Experience Table – with 5% Interest

Sample Attained Ages in 2021	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)		Probability of Death Next Year	
	Males	Females	Males	Females	Males	Females
40	\$216.52	\$218.27	47.0	49.1	0.062%	0.042%
45	208.53	210.76	41.8	43.9	0.081%	0.054%
50	198.37	201.29	36.6	38.7	0.122%	0.088%
55	185.83	189.80	31.5	33.5	0.245%	0.227%
60	170.94	176.38	26.6	28.6	0.422%	0.351%
65	153.52	160.18	21.9	23.9	0.682%	0.499%
70	133.38	140.83	17.5	19.2	1.134%	0.797%
75	110.84	118.74	13.3	14.9	2.076%	1.524%
80	87.27	95.30	9.7	11.0	3.970%	3.050%
85	64.78	72.37	6.7	7.7	7.635%	5.982%

The values shown above are for non-disabled participants. Sample values for disabled participants are as follows:

Sample Attained Ages in 2021	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)		Probability of Death Next Year	
	Males	Females	Males	Females	Males	Females
40	\$175.27	\$178.91	32.1	34.8	0.957%	0.855%
45	164.66	168.46	28.1	30.8	1.212%	1.114%
50	152.97	158.24	24.4	27.0	1.719%	1.602%
55	141.07	148.78	21.1	23.6	2.325%	2.048%
60	129.40	138.80	18.1	20.5	2.956%	2.395%
65	117.53	126.57	15.4	17.5	3.508%	2.525%
70	104.23	111.27	12.7	14.3	4.134%	2.962%
75	88.61	93.78	10.1	11.2	5.306%	4.177%
80	71.78	75.86	7.7	8.4	7.585%	6.502%
85	55.79	59.55	5.7	6.2	11.412%	10.364%

Statutory Provisions – Post-Retirement Adjustments

Core Annuities – 40.27(2)

“CORE ANNUITY RESERVE SURPLUS DISTRIBUTIONS. Surpluses in the core annuity reserve established under s. 40.04 (6) and (7) shall be distributed by the board if the distribution will result in at least a 0.5% increase in the amount of annuities in force, except as otherwise provided by the department by rule, on recommendation of the actuary, as follows:

(a) The distributions shall be expressed as percentage increases in the amount of the monthly annuity in force, including prior distributions of surpluses but not including any amount paid from funds other than the core annuity reserve fund, preceding the effective date of the distribution. For purposes of this subsection, annuities in force include any disability annuity suspended because the earnings limitation had been exceeded by that annuitant in that year.

(b) Prorated percentages based on the annuity effective date may be applied to annuities with effective dates during the calendar year preceding the effective date of the distribution, as provided by rule, but no other distinction may be made among the various types of annuities payable from the core annuity reserve.

(c) The distributions shall not be offset against any other benefit being received but shall be paid in full, nor shall any other benefit being received be reduced by the distributions. The annuity reserve surplus distributions authorized under this subsection may be revoked by the board in part or in total as to future payments upon recommendation of the actuary if a deficit occurs in the core annuity reserves and such deficit would result in a 0.5 percent or greater decrease in the amount of annuities in force, except as otherwise provided by the department by rule.

(d) Notwithstanding s 40.03 (2) (i), (7) (d), and (8) (d), the department may promulgate rules under this subsection without the approval of the teachers retirement board and the Wisconsin retirement board.”

Variable Annuities – 40.28(2)

“Whenever the balance in the variable annuity reserve, as of December 31 of any year, exceeds or is less than the then present value of all variable annuities in force, determined in accordance with the rate of interest and approved actuarial tables then in effect, by at least 2% of the present value of all variable annuities in force, the amount of each variable annuity payment shall be proportionately increased or decreased, disregarding fractional percentages, and effective on a date determined by rule, so as to reduce the variance between the balance of the variable annuity reserve and the present value of variable annuities to less than one percent.”

Narrative Regarding the Development of Core and Variable Annuity Adjustments Shown on Pages 6 and 16

- 1. SWIB Net of Fee Investment Return**
State of Wisconsin Investment Board net earnings rate on the Core/Variable Fund.
- 2. MRA Adjustment (Core)/Adjustment to Published Effective Rate (Variable)**
Item 3 below minus Item 1 above. For core annuities, this is the MRA adjustment which takes into account five-year smoothing of gains and losses.
- 3. Published Effective Earnings Rate**
The earnings rate published by DETF is funds' earnings credits expressed as a percentage of the beginning year balance adjusted for benefit payments and reserve transfers.
- 4. Adjustment to Relate Earnings to Average Core/Variable Annuity Balance**
Item 5 below minus Item 3 above.
- 5. Earnings Rate Based on Average Balance**
This is similar to the published earnings rate except that the rate is determined as a percentage of the average balance during the year instead of the adjusted beginning of year balance.
- 6. Expected Core/Variable Adjustment before Adjustments**
The relative difference in fund growth based on actual versus the 5% assumed earnings rates.
- 7. Adjustment to Relate Average Asset to Ending Liability**
The final core/variable adjustment is calculated based on the end of year assets divided by the end of year liabilities. Since the calculations in Items 5 and 6 are based on average (approximately mid-year) balances, this adjustment is needed so that the final adjustment will be based on the end of year liabilities.
- 8. Carryover from Last Year Due to Timing of Distribution and Accounting Adjustments (and Truncation for Variable Annuity)**
The core or variable annuity adjustments are made effective April 1 of each year. This adjustment takes into account the fact that the prior year core/variable adjustment was in effect for less than a full year as well as any accounting adjustments made to the asset value at the beginning of the year. This adjustment also carries over any truncated or rounded amounts from the prior year.

Narrative Regarding the Development of Core and Variable Annuity Adjustments Shown on Pages 6 and 16

9. Experience Study Adjustment

A study is conducted for WRS every three years to analyze the assumptions that are made in the valuation versus the experience that actually occurred. If the results of the study show material changes in experience, WRS generally adopts a new set of assumptions. When assumptions are changed, this item displays the effect of the change on the core/variable adjustment. Although the mortality table now includes a projection for expected future improvements in mortality, each valuation may phase into the full table incrementally over the three year experience study cycle, depending on the size of the adjustment. By increasing reserves gradually each year, instead of all at once every three years, the effect on core and variable annuity adjustments will also be more gradual.

10. Experience and Other Effects

After making all other known adjustments, this is the remainder of all other experience. Changes here are primarily attributable to mortality experience and, generally to a lesser extent, on any data adjustments.

11. Statutory Adjustment to Round/Truncate

By statute, the core annuity adjustment is calculated to the nearest one-tenth of a percent. For the variable annuity adjustment, the adjustment is truncated to a whole percent. This is the adjustment made from the calculated core/variable annuity adjustment without rounding/truncation to the statutory rate.

12. Computed Average Core/Variable Annuity Adjustment

This is the end of year asset value divided by the end of year liability. It is reconciled to the published earnings rate (Item 3) by making the adjustments in Items 6 through 11.

13. Adjustment for Members Not Eligible for Negative Dividend

This is an adjustment that is sometimes made for Core Fund recipients to reflect that some members may not have any remaining dividends and hence are not subject to a further negative adjustment.

14. Final Maximum Computed Core Annuity Adjustment

When there is a negative core annuity adjustment for the Core Fund, this will affect people differently based upon year of retirement. In years when there is a negative core annuity adjustment, this will be the largest negative core annuity adjustment that will occur in the Core Fund. If greater in absolute value than 0.5% of core annuities, Item 12 plus Item 13, otherwise 0%.

Dividend Risk Measure

In accordance with the Funding Policy, a Dividend Risk Measure (DRM) is calculated annually. The Dividend Risk Measure is defined as the dividend liability divided by the total retiree core assets in the MRA. For 2021, dividend liability (after the dividend adjustment in April) is approximately \$14.2 billion. As of December 31, 2021, the total retiree assets are approximately \$69.9 billion, resulting in a DRM of 20.3%. This means that the retiree assets would need to decrease by 20.3% to deplete the existing dividend liability. The higher the DRM ratio, the less likely it is for the dividend liability to be depleted. Shown below is the historical DRM measure based on the Market Recognition account as well as the DRM measure on a market value basis.

