



STATE OF WISCONSIN
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 Robert J. Conlin
 SECRETARY

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Correspondence Memorandum

Date: March 8, 2021
To: Employee Trust Funds Board
From: Cindy Klimke-Armatoski
 Chief Trust Financial Officer
Subject: December 31, 2020 Actuarial Valuation of Retired Lives

The Department of Employee Trust Funds (ETF) requests the Employee Trust Funds Board (Board) approve the report, 38th Annual Actuarial Valuation of Retired Lives as of December 31, 2020.

Gabriel Roeder Smith & Company (GRS) has completed the actuarial valuation of the Wisconsin Retirement System retired lives as of December 31, 2020. This valuation determines the amounts to be transferred from member and employer accounts to fund 2020 new annuities and the amount available to provide increases for existing Core and Variable annuities.

GRS is recommending Core annuities be increased by 5.1%. This is based on the 10.9% 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 2020, which will receive a prorated increase.

GRS is recommending Variable annuities be increased by 13.0%. This is based on the 18.0% 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 and will first be included on May 1, 2021, annuity payments.

Pursuant to provisions of the Wisconsin Administrative Code, Secretary Conlin 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: 38th Annual Actuarial Valuation of Retired Lives

Reviewed and approved by Robert J. Conlin, Secretary

Electronically Signed 3/10/21

Board	Mtg Date	Item #
ETF	3.25.21	5A

Wisconsin Retirement System

38th Annual Actuarial Valuation of Retired Lives

December 31, 2020



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March 4, 2021

Employee Trust Funds Board
Madison, Wisconsin

Ladies and Gentlemen:

The results of the **38th 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, 2020. Actuarial assumptions used in the valuation are summarized in the Appendix. The assumptions and methods were unchanged from those used in the prior valuation.

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

	Core	Variable
Number of Annuitants	222,723	41,753
Annual Amount of Annuities Paid	\$ 5,423.2	\$ 449.7
Fund Balance	63,805.8	4,954.0
Actuarial Reserve	60,691.1	4,383.0
Ratio	1.051	1.130

Based upon these results, core annuities will be increased 5.1% and variable annuities will be increased by 13.0%.

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 WRS 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 2019 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.

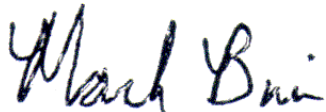
To the best of our knowledge this report is complete and accurate. All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Brian B. Murphy, Mark Buis and James D. Anderson 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,



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



Mark Buis, FSA, EA, FCA, MAAA



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

BBM/MB/JDA:sc



SECTION A

EXECUTIVE SUMMARY

Executive Summary

1. Retiree Dividend in Core Annuities

The net of fee investment return of 15.21% 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 10.9%. The 10.9% 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 \$3,114.7 million as of December 31, 2020. After adjusting for expected improvements in longevity and various other items (described in detail on page 6), **the result is a 5.1% increase in the core annuity benefit.**

2. Change in Variable Annuities

The variable fund effective earnings rate was 18.0% resulting in a surplus of \$571.0 million. The surplus of \$571.0 million will **result in a 13.0% 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 \$11.1 billion in unrecognized asset gains as of December 31, 2020 which will be recognized over the next four years. Although approximately half of this applies to the annuitant reserve, this may increase the probability of positive annuity adjustments in the future.

The present value of previously granted Core dividends is approximately \$7.0 billion prior to dividend adjustments and \$10.1 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 attain the long-term investment assumption of 7.0% adopted with the most recent experience study.

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 5.1%, and
- Variable annuities will be increased by 13.0%.

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 fund the original benefit. 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, 2019	\$59,138.4	\$58,157.0	1.017
Closing Adjustments	2.4	0.0	
Variable Terminations	118.9	118.9	
2020 Core Annuity Average Adjustment: 1.7%	0.0	941.1	
Beginning Balance January 1, 2020	59,259.7	59,217.0	1.001
Increases			
Reserve Transfers	3,842.7	3,842.7	
Regular Interest (5%)	2,922.8	2,922.8	
Additional Earnings	3,160.5	0.0	
Addition for Experience Study/Mortality Reserve	0.0	121.4	
Other	0.0	0.0	
Total Increases	9,926.0	6,886.9	
Decreases			
Annuities & Lump Sums	5,378.2	5,378.2	
Credit Re-establishments	1.7	1.7	
Subtraction for Experience Study/Mortality Reserve	0.0	0.0	
Other	0.0	32.9	
Total Decreases	5,379.9	5,412.8	
Ending Balance December 31, 2020	\$63,805.8	\$60,691.1	1.051

The ending liability balance includes a data reserve of \$60.6 million and a liability for previously granted dividends of \$7,020 million (prior to any 2021 adjustments calculated in this December 31, 2020 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 \$3,823,539,294. Adjustments to prior transfers, related to estimated annuities for which final computations have now been made, totaled \$19,142,431. Reserve transfers are distributed as follows:

Group	Regular Transfer	Adjustment to Prior Transfer	Total Transfer
General	\$3,250,781,861	\$16,657,803	\$3,267,439,664
Protective with Social Security	429,977,881	1,658,556	431,636,437
Protective without Social Security	108,995,780	642,764	109,638,544
Executive & Elected	33,783,772	183,308	33,967,080
Totals	\$3,823,539,294	\$19,142,431	\$3,842,681,725

Accordingly, we recommend that \$3,842,681,725 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, \$63,805.8 million, was higher than the actuarial present value of core annuities and reserves, \$60,691.1 million, by \$3,114.7 million, which resulted in an annuity adjustment of 5.1%. The primary sources of the 5.1% adjustment are:

	% of APV
1. SWIB net of fee investment return	15.21%
2. MRA adjustment	(4.31)%
3. Published effective earnings rate	10.90%
4. Adjustment to relate earnings to average core annuity fund balance	(0.50)%
5. Earnings rate based on average balance	10.40%
6. Expected dividend before adjustments: 1.104/1.05-1	5.14%
7. Adjustment to relate average asset to ending liability	0.07%
8. Carryover from last year due to timing of dividend accounting adjustments and rounding	0.07%
9. Experience study/mortality reserve adjustment	(0.20)%
10. Experience and other effects	0.05%
11. Statutory adjustment to round to nearest one-tenth percent	(0.03)%
12. Computed average dividend rate: (6)+(7)+(8)+(9)+(10)+(11)	5.1%
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%	5.1%

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

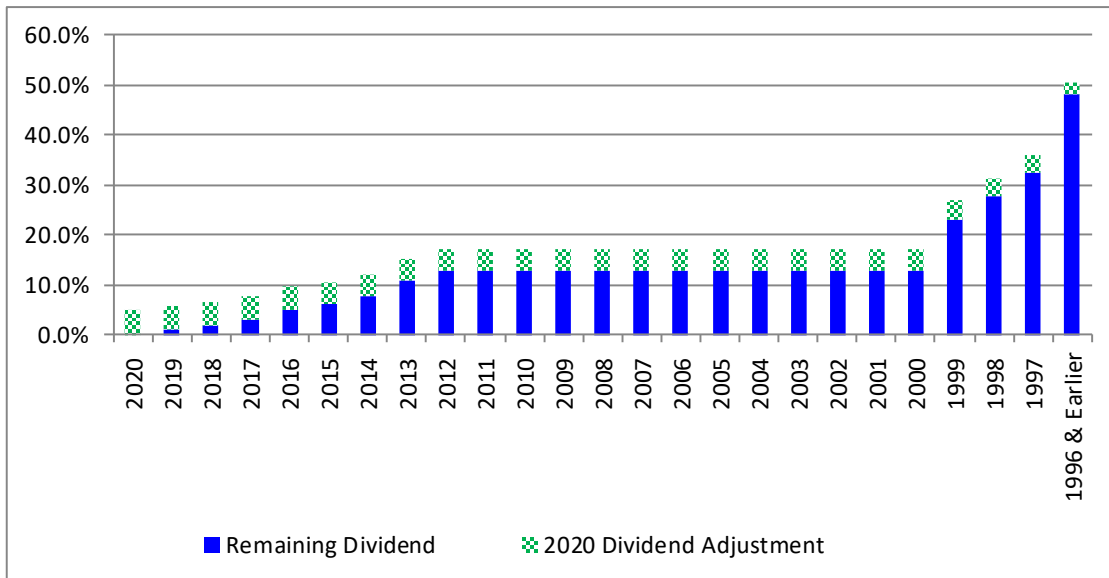
In accordance with the Administrative Code, ETF 20.25 and Section 40.27(2) Wisconsin Statutes (shown on page 29 of this report), the dividend adjustment is 5.1% effective April 1, 2021.



Discussion of Dividend

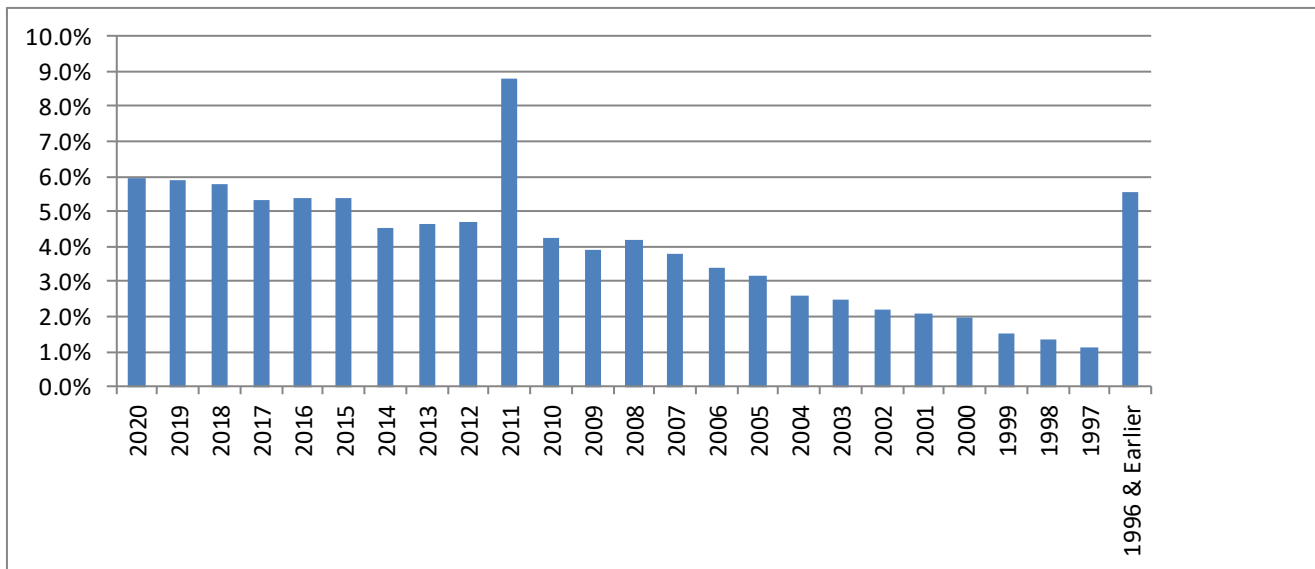
As shown on the prior page, the adjustment for core fund members is 5.1%.

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



After the 2021 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 \$7.0 billion as of December 31, 2020 prior to the 2021 dividend adjustment and \$10.1 billion after the adjustment. In addition, there are currently about \$11.1 billion in unrecognized asset gains that will be recognized over the next four years, about half of which will be applied to the annuitant reserve.

Transfers to Annuity Reserve to Finance Core Annuities Approved in 2020 Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
REGULAR RETIREMENT				
SL	Straight Life	1,693	\$ 33,095,211	\$ 451,496,162
SL	Straight Life (accelerated)	0	4,084,496	13,752,533
A60	Life Annuity with 60 payments guaranteed	901	18,552,838	255,204,121
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	2,505,651	8,577,721
A180	Life Annuity with 180 payments guaranteed	2,234	43,842,728	636,484,316
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	8,063,054	30,662,645
A180F	Life Annuity with 180 payments guaranteed (forced)	6	39,458	473,662
JOINT	Joint and 75% Survivor	832	21,401,782	326,459,761
JOINT	Joint and 75% Survivor (accelerated)	0	3,189,357	11,809,339
R25	Reduced 25% on First Death	381	10,517,208	151,138,086
R25	Reduced 25% on First Death (accelerated)	0	1,269,918	4,857,132
C100	100% Continued to Named Survivor	1,163	25,842,476	395,179,537
C100	100% Continued to Named Survivor (accelerated)	0	2,988,991	12,156,748
C180	100% Continued to Named Survivor with 180 payments guaranteed	3,311	83,094,156	1,318,220,885
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	15,611,744	63,386,036
LOLF	Life with Optional Length Guaranteed (Forced)	1	10,443	82,471
AC24	Annuity Certain with 24 Payments	2	126,593	290,839
AC60	Annuity Certain with 60 Payments	2	140,908	651,097
AC120	Annuity Certain with 120 Payments	0	120,902	976,653
AC180	Annuity Certain between 24 and 180 Payments	2	333,121	2,639,578
SLNSD	Straight Life - Named Survivor Deceased	1	25,389	322,401
	Total Regular	10,529	\$ 274,856,424	\$ 3,684,821,723
	Average Age at Retirement	61.4 Years		
DISABILITY RETIREMENT				
SL	Straight Life	41	\$ 1,251,227	\$ 18,483,788
A60	Life Annuity with 60 payments guaranteed	24	549,467	7,834,638
A180	Life Annuity with 180 payments guaranteed	49	1,300,811	18,804,567
JOINT	Joint and 75% Survivor	13	238,496	3,767,063
R25	Reduced 25% on First Death	2	84,017	1,170,345
C100	100% Continued to Named Survivor	21	625,155	10,464,040
C180	100% Continued to Named Survivor with 180 payments guaranteed	124	3,617,045	59,710,362
	Total Disability	274	\$ 7,666,218	\$ 120,234,803
	Average Age at Retirement	53.9 Years		
DEATH-IN-SERVICE BENEFITS				
SL	Straight Life	16	\$ 251,586	\$ 3,534,165
SL	Straight Life (accelerated)	0	39,304	167,164
A60	Life Annuity with 60 payments guaranteed	5	117,380	1,344,722
A180	Life Annuity with 180 payments guaranteed	52	827,892	12,482,508
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	122,677	938,190
AC60	Annuity Certain with 60 Payments	0	3,676	16,019
	Total Death-in-Service	73	\$ 1,362,515	\$ 18,482,768
	Average Age at Retirement	53.0 Years		
GRAND TOTAL		10,876	\$ 283,885,157	\$ 3,823,539,294

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	29,715	\$ 630,574,269	\$ 6,742,497,601
SL	Straight Life (accelerated)	0	16,277,745	41,936,180
A60	Life Annuity with 60 payments guaranteed	21,193	455,856,375	4,639,848,870
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	11,098,005	26,363,389
A120	Life Annuity with 120 payments guaranteed	16	179,632	461,556
A180	Life Annuity with 180 payments guaranteed	42,735	877,157,568	9,422,988,510
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	33,772,233	90,024,416
A180F	Life Annuity with 180 payments guaranteed (forced)	381	3,384,534	30,690,185
JOINT	Joint and 75% Survivor	23,827	645,016,962	7,370,569,796
JOINT	Joint and 75% Survivor (accelerated)	0	15,046,179	38,020,169
R25	Reduced 25% on First Death	13,918	409,806,960	4,089,933,383
R25	Reduced 25% on First Death (accelerated)	0	6,203,206	16,630,797
C100	100% Continued to Named Survivor	20,947	481,599,572	5,850,417,130
C100	100% Continued to Named Survivor (accelerated)	0	13,938,823	37,907,992
C180	100% Continued to Named Survivor with 180 payments guaranteed	59,562	1,525,464,158	19,768,454,025
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	67,329,423	189,753,686
LOL	Life with Optional Length Guaranteed	31	1,099,969	8,325,237
LOLF	Life with Optional Length Guaranteed (Forced)	3	49,298	181,688
AC24	Annuity Certain with 24 Payments	4	289,108	395,135
AC60	Annuity Certain with 60 Payments	8	591,896	1,746,756
AC120	Annuity Certain with 120 Payments	11	1,038,358	5,014,966
AC180	Annuity Certain between 24 and 180 Payments	4	1,992,471	9,215,958
C50	50% Continued to One Beneficiary	19	207,514	694,641
C50W180	50% Continued to One Beneficiary with 180 Months guaranteed	1	3,734	10,783
C75WSS	75% Continued to One Beneficiary and Social Security Integrated	30	717,170	2,725,926
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	16	57,471	156,325
A180WSS	Life with 180 Months Guaranteed and Social Security Integrated	23	454,410	1,180,677
PF6213	Police and Firemen s.62.13 *	17	521,904	1,801,035
SLNSD	Straight Life - Named Survivor Deceased	807	22,782,135	218,612,472
Total Regular		213,268	\$5,222,511,082	\$58,606,559,284

(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⁾	2,555	\$ 54,731,407	\$ 424,644,311
A60	Life Annuity with 60 payments guaranteed	368	9,823,607	91,307,863
A180	Life Annuity with 180 payments guaranteed	1,047	26,609,168	275,148,039
JOINT	Joint and 75% Survivor	485	11,410,103	125,188,990
R25	Reduced 25% on First Death	189	4,367,328	46,107,937
C100	100% Continued to Named Survivor	1,137	21,356,947	233,545,752
C180	100% Continued to Named Survivor with 180 payments guaranteed	2,212	49,213,902	627,122,283
AC24	Annuity Certain with 24 Payments	1	3,720	2,114
AC180	Annuity Certain between 24 and 180 Payments	0	2,500	2,030
DWSMC	Disability with Spouse or Minor/Dependent Child	2	34,345	270,213
PF6213	Police and Firemen s.62.13 *	5	90,567	415,611
SLNSD	Straight Life - Named Survivor Deceased	6	183,493	2,084,640
Total Disability		8,007	\$ 177,827,087	\$ 1,825,839,783
DEATH-IN-SERVICE BENEFITS				
SL	Straight Life	253	\$ 3,490,099	\$ 38,390,917
SL	Straight Life (accelerated)	0	136,903	476,294
A60	Life Annuity with 60 payments guaranteed	135	2,544,395	27,670,500
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	47,684	150,718
A180	Life Annuity with 180 payments guaranteed	1,039	15,841,924	187,765,653
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	618,784	3,116,901
C180	100% Continued to Named Survivor with 180 payments guaranteed	2	11,233	157,952
LOL	Life with Optional Length Guaranteed	4	157,271	820,177
AC60	Annuity Certain with 60 Payments	0	3,676	13,347
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	14	10,335	41,581
PF6213	Police and Firemen s.62.13 *	1	27,828	86,575
Total Death-in-Service		1,448	\$ 22,890,132	\$ 258,690,615
GRAND TOTAL		222,723	\$ 5,423,228,301	\$ 60,691,089,682

⁽¹⁾ Includes 1,770 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

Benefit Amount	Regular Retirement			Disability Retirement			Death-in-Service Retirement		
	Original	Dividends	Total	Original	Dividends	Total	Original	Dividends	Total
Benefit Amount	\$ 125,413	\$ 396,491	\$ 521,904	\$ 19,675	\$ 70,892	\$ 90,567	\$ 6,193	\$ 21,635	\$ 27,828
Present Value	430,559	1,370,476	1,801,035	90,291	325,320	415,611	19,267	67,308	86,575



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	1	\$ 11,582	7	\$ 47,293	8	\$ 58,875
20-24	0	0	5	60,155	14	140,005	19	200,160
25-29	0	0	7	107,876	19	135,073	26	242,949
30-34	0	0	20	292,864	28	190,350	48	483,214
35-39	2	12,769	68	1,354,895	33	236,182	103	1,603,846
40-44	5	30,495	149	3,153,888	40	375,105	194	3,559,488
45-49	49	520,773	295	6,460,421	48	466,730	392	7,447,924
50-54	1,464	46,327,763	573	13,584,397	73	961,058	2,110	60,873,218
55-59	12,144	352,765,099	1,148	27,781,453	121	1,781,794	13,413	382,328,346
60-64	29,152	757,080,604	1,612	35,969,953	211	3,522,220	30,975	796,572,777
65-69	47,947	1,170,267,402	1,224	28,874,772	245	4,707,177	49,416	1,203,849,351
70-74	49,625	1,230,215,752	1,093	24,863,370	219	4,199,138	50,937	1,259,278,260
75-79	31,779	746,307,590	773	16,331,870	139	2,598,583	32,691	765,238,043
80-84	20,155	451,256,769	548	10,730,623	95	1,358,587	20,798	463,345,979
85-89	12,226	277,221,615	327	5,537,217	64	771,871	12,617	283,530,703
90-94	5,772	129,728,605	128	2,295,028	36	559,690	5,936	132,583,323
95 & Up	1,709	35,761,807	35	413,003	25	331,791	1,769	36,506,601
Certain Only*	1,239	25,014,039	1	3,720	31	507,485	1,271	25,525,244
Totals	213,268	\$5,222,511,082	8,007	\$177,827,087	1,448	\$22,890,132	222,723	\$5,423,228,301

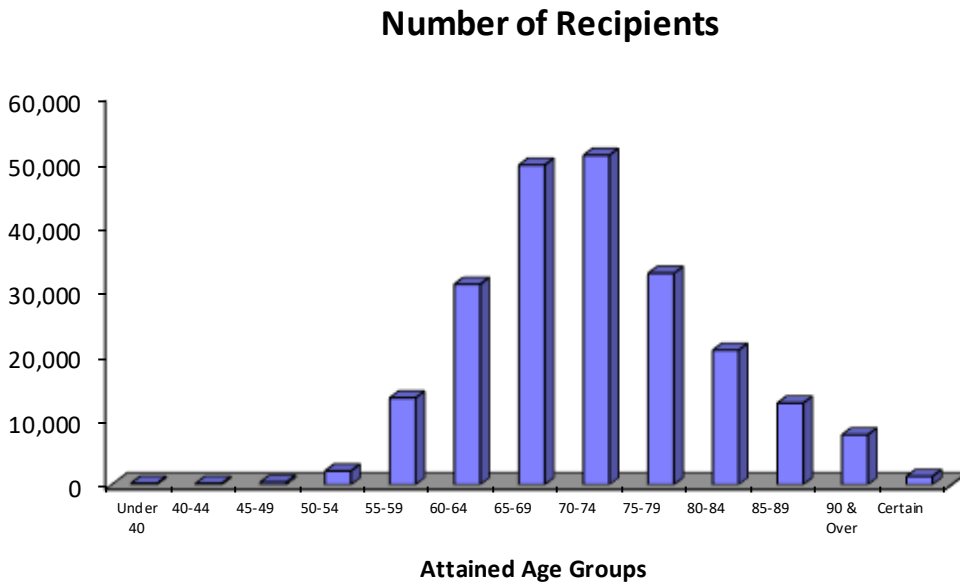
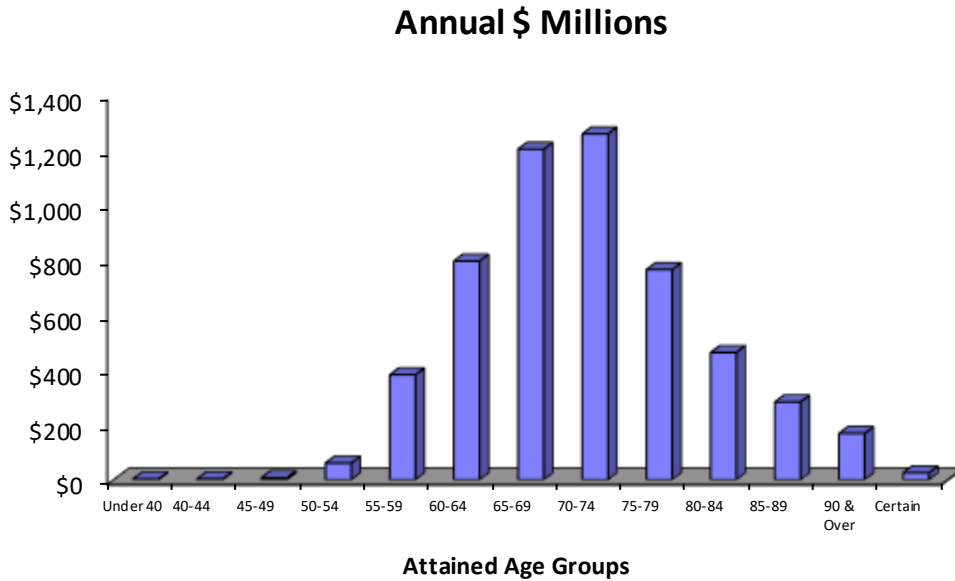
Averages in Years

Age at retirement	59.9	50.8	51.8	59.5
Attained age	71.3	64.5	66.9	71.0

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

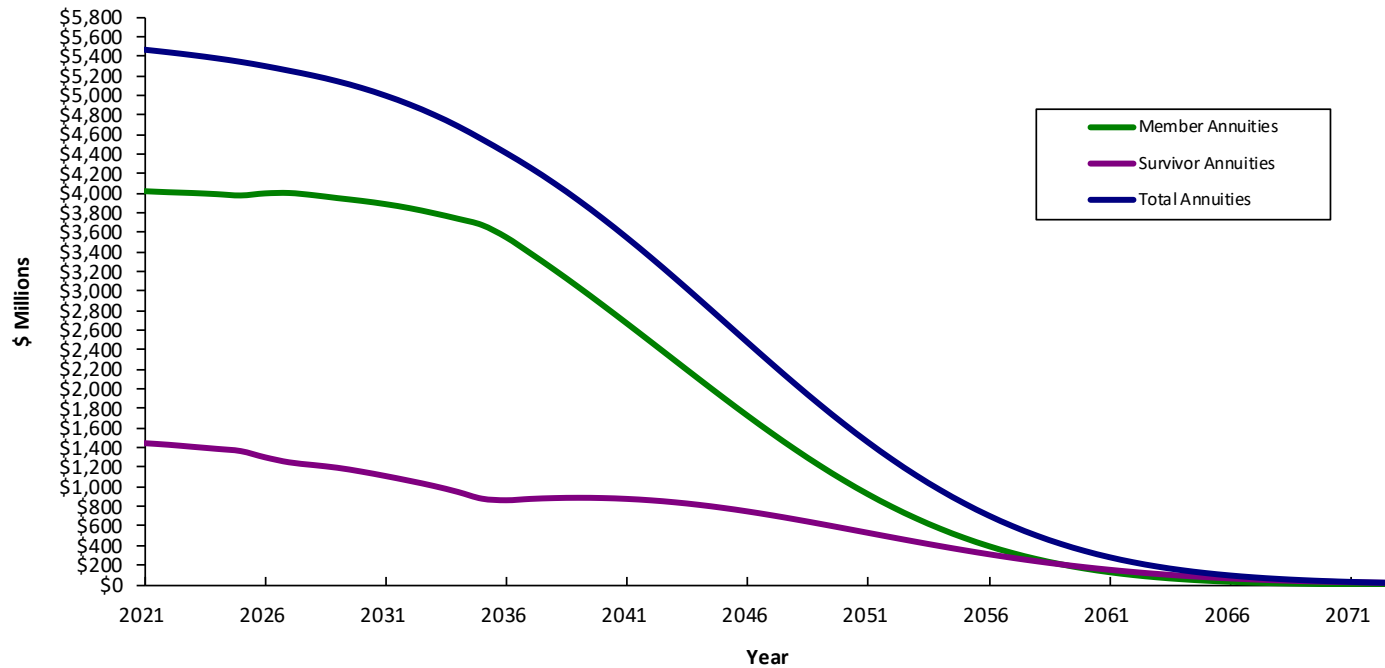


Core Annuities Being Paid by Attained Age*



* 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	\$132.9	\$102.3
Present Assets	63.8	63.8
Future Investment Return Needed	69.1	38.5

Based upon the assumptions used in the valuation, future dividends are expected to be approximately 1.9% 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, 2019	\$4,519.4	\$3,728.6	1.212
Closing Adjustments	(2.0)	0.0	
Variable Terminations	(118.9)	(118.9)	
2020 Adjustment: 21%	0.0	764.8	
Beginning Balance January 1, 2020	4,398.5	4,374.5	1.005
Increases			
Reserve Transfers	230.9	230.9	
Regular Interest (5%)	213.8	213.8	
Additional Earnings	541.9	0.0	
Addition for Experience Study/Mortality Reserve	0.0	7.5	
Other	0.0	0.0	
Total Increases	986.6	452.2	
Decreases			
Annuities & Lump Sums	431.1	431.1	
Credit Re-establishments	0.0	0.0	
Subtraction for Experience Study/Mortality Reserve	0.0	0.0	
Other	0.0	12.6	
Total Decreases	431.1	443.7	
Ending Balance December 31, 2020	\$4,954.0	\$4,383.0	1.130



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 \$221,469,391. Adjustments to prior transfers, relating to estimated annuities for which final computations have now been made, totaled \$9,462,482. Reserve transfers were distributed as follows:

Group	Regular Transfer	Adjustment to Prior Transfer	Total Transfer
General	\$197,707,194	\$8,022,706	\$205,729,900
Protective with Social Security	18,638,390	1,360,845	19,999,235
Protective without Social Security	3,152,966	73,203	3,226,169
Executive & Elected	1,970,841	5,728	1,976,569
Totals	\$221,469,391	\$9,462,482	\$230,931,873

Accordingly, we recommend that \$230,931,873 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, \$4,954.0 million, were more than the actuarial present value of variable annuities, \$4,383.0 million, by \$571.0 million as of December 31, 2020 or 13.0% 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 13.0% effective April 1, 2021. The primary sources of the 13.0% are as follows:

	% of APV
1. SWIB net of fee investment return	17.5%
2. Adjustment to published effective rate	0.5%
3. Published effective earnings rate	18.0%
4. Adjustment to relate earnings to average variable annuity fund balance	(0.4)%
5. Earnings rate based on average balance	17.6%
6. Expected change before adjustments: $(1.176)/1.05-1$	12.0%
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	0.5%
9. Experience study/mortality reserve adjustment	(0.2)%
10. Experience and other effects	0.3%
11. Statutory adjustment: (truncate to whole percent)	0.0%
12. Variable annuity change: (6)+(7)+(8)+(9)+(10)+(11)	13.0%

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 13.0% effective April 1, 2021.



Transfers to Annuity Reserve to Finance Variable Annuities Approved in 2020 Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
REGULAR RETIREMENT				
SL	Straight Life	266	\$ 2,094,558	\$ 27,647,842
SL	Straight Life (accelerated)	0	287,474	1,006,255
A60	Life Annuity with 60 payments guaranteed	128	1,102,460	14,744,007
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	150,246	507,786
A180	Life Annuity with 180 payments guaranteed	413	2,884,851	41,816,092
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	517,492	2,098,669
A180F	Life Annuity with 180 payments guaranteed (forced)	2	6,110	72,733
JOINT	Joint and 75% Survivor	144	1,330,517	19,385,001
JOINT	Joint and 75% Survivor (accelerated)	0	230,739	888,510
R25	Reduced 25% on First Death	70	899,747	11,561,306
R25	Reduced 25% on First Death (accelerated)	0	96,068	433,155
C100	100% Continued to Named Survivor	190	1,814,089	24,037,037
C100	100% Continued to Named Survivor (accelerated)	0	255,498	988,785
C180	100% Continued to Named Survivor with 180 payments guaranteed	527	4,010,647	64,226,334
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	1,049,761	4,276,141
AC24	Annuity Certain with 24 Payments	0	10,264	18,713
AC60	Annuity Certain with 60 Payments	0	3,642	15,882
AC120	Annuity Certain with 120 Payments	0	23,585	186,608
AC180	Annuity Certain between 24 and 180 Payments	0	38,280	386,101
	Total Regular	1,740	\$ 16,806,028	\$ 214,296,957
	Average Age at Retirement	60.3 Years		
DISABILITY RETIREMENT				
SL	Straight Life	8	\$ 52,858	\$ 775,445
A60	Life Annuity with 60 payments guaranteed	3	20,316	277,841
A180	Life Annuity with 180 payments guaranteed	15	93,852	1,404,150
JOINT	Joint and 75% Survivor	1	6,120	94,031
R25	Reduced 25% on First Death	1	483	7,341
C100	100% Continued to Named Survivor	3	16,393	276,506
C180	100% Continued to Named Survivor with 180 payments guaranteed	25	195,101	3,140,502
	Total Disability	56	\$ 385,123	\$ 5,975,816
	Average Age at Retirement	53.9 Years		
DEATH-IN-SERVICE BENEFITS				
SL	Straight Life	4	\$ 24,895	\$ 381,376
SL	Straight Life (accelerated)	0	22,340	49,989
A60	Life Annuity with 60 payments guaranteed	1	2,428	35,976
A180	Life Annuity with 180 payments guaranteed	8	41,471	628,029
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	12,935	101,248
	Total Death-in-Service	13	\$ 104,069	\$ 1,196,618
	Average Age at Retirement	56.9 Years		
GRAND TOTAL		1,809	\$ 17,295,220	\$ 221,469,391

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	5,114	\$ 49,595,685	\$ 462,240,642
SL	Straight Life (accelerated)	0	785,274	2,187,695
A60	Life Annuity with 60 payments guaranteed	3,561	35,079,029	312,031,716
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	547,084	1,373,420
A120	Life Annuity with 120 payments guaranteed	4	37,894	86,557
A180	Life Annuity with 180 payments guaranteed	8,022	73,053,834	696,199,307
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	1,924,967	5,504,030
A180F	Life Annuity with 180 payments guaranteed (forced)	37	205,345	1,628,863
JOINT	Joint and 75% Survivor	4,889	61,170,793	606,934,407
JOINT	Joint and 75% Survivor (accelerated)	0	820,702	2,051,745
R25	Reduced 25% on First Death	3,243	53,405,678	436,247,269
R25	Reduced 25% on First Death (accelerated)	0	330,803	936,742
C100	100% Continued to Named Survivor	3,891	42,875,028	438,882,017
C100	100% Continued to Named Survivor (accelerated)	0	727,751	2,245,447
C180	100% Continued to Named Survivor with 180 payments guaranteed	11,181	112,696,462	1,282,782,313
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	3,142,916	9,183,808
LOL	Life with Optional Length Guaranteed	4	244,458	2,085,010
AC24	Annuity Certain with 24 Payments	0	13,260	10,728
AC60	Annuity Certain with 60 Payments	0	16,767	46,603
AC120	Annuity Certain with 120 Payments	2	107,903	521,875
AC180	Annuity Certain between 24 and 180 Payments	0	489,765	1,750,924
C50	50% Continued to One Beneficiary	9	127,075	384,572
C50W180	50% Continued to One Beneficiary with 180 Months guaranteed	1	13,716	37,551
C75WSS	75% Continued to One Beneficiary and Social Security Integrated	16	159,004	608,127
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	6	36,158	103,781
A180WSS	Life with 180 Months Guaranteed and Social Security Integrated	3	23,822	64,485
SLNSD	Straight Life - Named Survivor Deceased	148	1,715,293	15,048,053
Total Regular		40,131	\$439,346,466	\$4,281,177,687

(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	130	\$ 763,896	\$ 7,216,841
3	A60	Life Annuity with 60 payments guaranteed	69	552,777	4,399,098
7	A180	Life Annuity with 180 payments guaranteed	249	1,296,297	12,856,476
10	JOINT	Joint and 75% Survivor	99	877,611	8,110,576
12	R25	Reduced 25% on First Death	40	275,465	2,469,171
14	C100	100% Continued to Named Survivor	217	1,411,844	12,805,210
16	C180	100% Continued to Named Survivor with 180 payments guaranteed	456	2,717,487	30,127,427
30	DWSMC	Disability with Spouse or Minor/Dependent Child	1	670	6,961
Total Disability			1,261	\$ 7,896,047	\$ 77,991,760
DEATH-IN-SERVICE BENEFITS					
1	SL	Straight Life	67	\$ 525,709	\$ 5,266,615
2	SL	Straight Life (accelerated)	0	16,452	46,424
3	A60	Life Annuity with 60 payments guaranteed	29	263,889	2,009,382
4	A60	Life Annuity with 60 payments guaranteed (accelerated)	0	3,897	4,758
7	A180	Life Annuity with 180 payments guaranteed	260	1,559,589	16,131,005
8	A180	Life Annuity with 180 payments guaranteed (accelerated)	0	90,727	383,449
28	A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	5	3,766	13,611
Total Death-in-Service			361	\$ 2,464,029	\$ 23,855,244
GRAND TOTAL			41,753	\$ 449,706,542	\$ 4,383,024,691

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	1	\$ 1,290	0	\$ 0	1	\$ 1,290
20-24	0	0	1	918	3	3,802	4	4,720
25-29	0	0	4	9,883	3	3,505	7	13,388
30-34	0	0	8	13,913	6	4,266	14	18,179
35-39	0	0	11	29,864	5	4,949	16	34,813
40-44	2	995	17	59,317	9	27,880	28	88,192
45-49	19	117,171	23	100,801	18	69,524	60	287,496
50-54	346	2,330,910	71	358,777	17	86,848	434	2,776,535
55-59	2,479	18,743,836	146	638,827	35	202,591	2,660	19,585,254
60-64	5,128	31,687,929	203	783,160	50	267,784	5,381	32,738,873
65-69	8,413	54,039,175	250	1,048,690	56	287,110	8,719	55,374,975
70-74	9,504	93,981,893	181	1,266,693	56	319,766	9,741	95,568,352
75-79	6,068	89,118,991	141	1,565,905	35	452,153	6,244	91,137,049
80-84	3,596	67,806,119	103	1,170,321	22	256,876	3,721	69,233,316
85-89	2,507	47,711,542	68	578,829	18	213,105	2,593	48,503,476
90-94	1,370	24,627,200	29	245,258	13	120,417	1,412	24,992,875
95 & Up	452	7,317,536	4	23,601	12	106,585	468	7,447,722
Certain Only*	247	1,863,169	0	0	3	36,868	250	1,900,037
Totals	40,131	\$439,346,466	1,261	\$7,896,047	361	\$2,464,029	41,753	\$449,706,542

Averages in Years

Age at retirement	59.2	52.6	51.9	59.0
Attained age	71.3	66.5	67.7	71.2

* 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 1986 Through 2020

Valuation Date	Number	\$ Millions				Change in		
		Annual	Fund	Actuarial	Ratio	Annuities		CPI*
		Annuities	Balance	Reserve		Average	Maximum	
1986	65,425	\$ 303.5	\$ 3,256.9	\$ 3,021.2	1.078	7.6 %		1.1 %
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 %	4.7 %	1.5 %
2014	185,605	4,102.3	47,135.7	45,790.7	1.029	2.9 %	2.9 %	0.8 %
2015	191,795	4,364.9	49,147.0	48,897.5	1.005	0.5 %	0.5 %	0.7 %
2016	197,647	4,523.1	51,972.0	50,941.4	1.020	2.0 %	2.0 %	2.1 %
2017	203,202	4,747.0	54,900.0	53,590.0	1.024	2.4 %	2.4 %	2.1 %
2018	211,126	5,040.9	56,493.8	56,629.3	0.998	0.0 %	0.0 %	1.9 %
2019	216,944	5,183.7	59,138.4	58,157.0	1.017	1.7 %	1.7 %	2.3 %
2020	222,723	5,423.2	63,805.8	60,691.1	1.051	5.1 %	5.1 %	1.4 %
35-Year Average						3.6 %		2.5 %
20-Year Average						1.3 %		2.0 %
10-Year Average						1.2 %		1.7 %
5-Year Average						2.2 %		2.0 %

* 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.



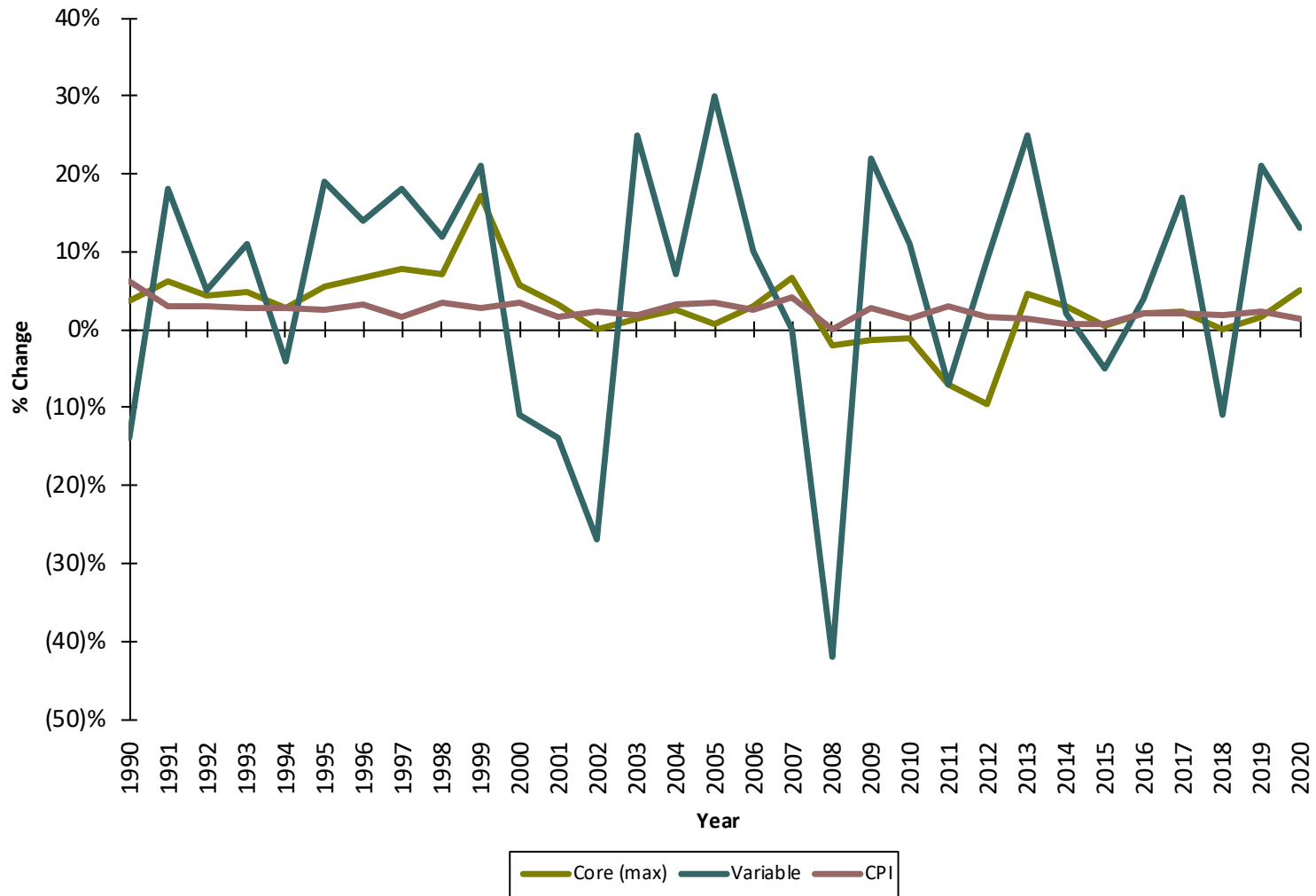
Variable Annuities Comparative Statement 1986 Through 2020

Valuation		\$ Millions				Change in	
		Annual	Fund	Actuarial	Ratio		
Date	Number	Annuities	Balance	Reserve			
1986	16,276	\$ 51.8	\$ 538.7	\$ 498.6	1.080	8.0 %	1.1 %
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 %
35-Year Average						4.1 %	2.5 %
20-Year Average						1.6 %	2.0 %
10-Year Average						6.3 %	1.7 %
5-Year Average						8.4 %	2.0 %

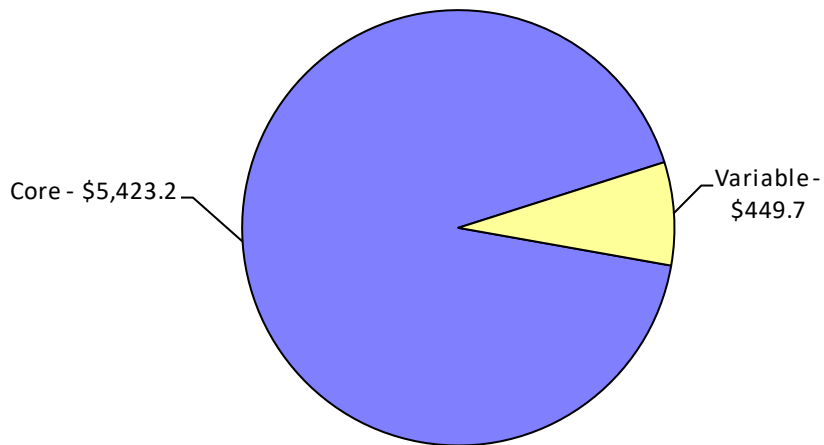
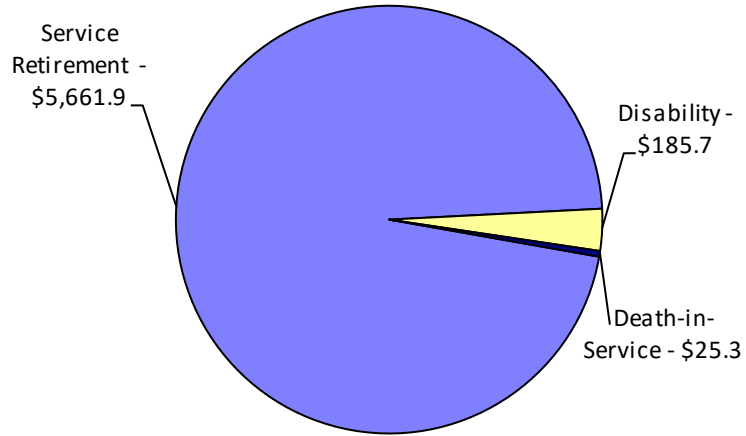
* CPI percentage increase determined by ratio of current year CPI-U67 December index over prior year December index.



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	
2020	10,238	\$ 269,986	\$ 0	\$ 269,986	1,694	\$ 16,224	\$ 0	\$ 16,224	\$31,090
2019	10,362	266,604	2,459	269,063	1,582	11,075	2,323	13,398	30,088
2018	10,166	262,055	4,442	266,497	1,519	12,048	1,072	13,120	29,918
2017	9,794	240,548	7,264	247,812	1,479	8,624	2,364	10,988	28,945
2016	10,097	243,540	12,628	256,168	1,533	8,722	2,836	11,558	29,000
2015	10,180	240,770	15,458	256,228	1,641	9,121	2,361	11,482	29,102
2014	9,240	201,438	16,640	218,078	1,671	8,959	2,545	11,504	27,571
2013	9,551	197,419	24,252	221,671	1,647	6,804	4,117	10,921	27,284
2012	9,458	197,897	29,026	226,923	1,677	5,877	4,404	10,281	27,518
2011	15,068	374,086	55,297	429,383	3,045	14,034	8,798	22,832	33,396
2010	8,251	186,936	27,502	214,438	1,570	5,407	4,357	9,764	29,890
2009	7,730	176,749	26,127	202,876	1,382	3,956	4,762	8,718	30,077
2008	8,341	193,985	28,594	222,579	1,609	9,473	2,642	12,115	28,758
2007	8,157	177,714	26,210	203,924	1,779	10,939	3,047	13,986	26,879
2006	7,865	160,935	23,807	184,742	1,656	10,964	4,448	15,412	25,592
2005	7,619	154,947	22,956	177,903	1,621	11,321	5,073	16,394	25,589
2004	6,791	130,289	19,328	149,617	1,511	10,710	5,883	16,593	24,558
2003	6,733	130,042	19,298	149,340	1,380	8,830	8,270	17,100	24,794
2002	6,225	117,072	17,309	134,381	1,214	11,695	4,848	16,543	24,346
2001	6,285	117,342	17,372	134,714	1,279	18,589	4,011	22,600	25,178
2000	6,140	113,572	16,901	130,473	1,058	20,957	1,720	22,677	25,107
1999	5,079	81,245	24,457	105,702	888	13,982	4,323	18,305	24,498
1998	4,837	73,285	28,238	101,523	892	12,459	5,810	18,269	24,920
1997	3,912	57,632	27,925	85,557	735	8,573	6,255	14,828	25,872
1996	3,727	53,905	31,730	85,635	759	7,773	7,537	15,310	27,319
1995	3,241	45,043	30,462	75,505	649	5,395	7,270	12,665	27,502
1994	2,784	37,001	27,501	64,502	617	5,075	6,364	11,439	27,665
1993	2,421	30,427	24,443	54,870	537	3,727	5,583	9,310	26,831
1992	1,954	22,897	20,498	43,395	441	2,873	4,672	7,545	26,380
1991	1,626	18,573	18,526	37,099	385	2,111	4,431	6,542	27,344
1990	2,555	30,858	33,343	64,201	648	3,887	6,475	10,362	29,801
1989	1,740	20,603	25,381	45,984	409	2,157	4,510	6,667	30,736
1988	1,077	9,663	13,797	23,460	281	1,130	2,852	3,982	25,937
1987	848	6,860	10,540	17,400	219	749	1,736	2,485	24,162
1986	682	5,657	10,150	15,807	195	685	1,765	2,450	27,454
1985	598	4,758	9,514	14,272	150	382	1,339	1,721	27,528
1984	378	2,608	5,721	8,329	114	297	1,041	1,338	26,555
1983	273	1,450	3,378	4,828	92	177	754	931	21,650
1982	170	740	1,928	2,668	44	62	322	384	18,063
1981	149	473	1,374	1,847	46	51	254	305	14,837
Prior	381	922	2,926	3,848	105	81	578	659	6,737
Total	222,723	\$4,658,526	\$764,702	\$5,423,228	41,753	\$295,955	\$153,752	\$449,707	\$26,369

⁽¹⁾ Includes 1,770 members formerly covered under the LTDI program based on year of termination.

⁽²⁾ The number of retirements during 2020 may not match the number of new retirees on Page 8 of this report due to Reporting Lag.

As of December 31, 2020, the median annual Core benefit is approximately \$20,500, the median annual Variable benefit is approximately \$6,200 and the median combined benefit is \$22,700.



Liabilities as of December 31, 2020 Tabulated by Year of Retirement⁽¹⁾ (\$1,000s annually)

Year Ret'd ⁽²⁾	Core Liabilities				Variable Liabilities				Total Liabilities
	No.	Initial	Increases	Total	No.	Initial	Increases	Total	
2020	10,238	\$ 3,614,252	\$ 0	\$ 3,614,252	1,694	\$ 208,933	\$ 0	\$ 208,933	\$3,823,185
2019	10,362	3,553,398	32,735	3,586,133	1,582	144,410	30,298	174,708	3,760,842
2018	10,166	3,445,580	58,419	3,503,999	1,519	151,383	13,467	164,850	3,668,849
2017	9,794	3,122,898	94,760	3,217,658	1,479	110,560	30,308	140,869	3,358,527
2016	10,097	3,117,784	162,838	3,280,622	1,533	107,869	35,069	142,938	3,423,559
2015	10,180	3,075,474	198,907	3,274,381	1,641	114,758	29,706	144,464	3,418,845
2014	9,240	2,544,972	212,277	2,757,249	1,671	110,695	31,441	142,136	2,899,385
2013	9,551	2,513,444	311,680	2,825,124	1,647	85,475	51,721	137,196	2,962,320
2012	9,458	2,478,498	366,990	2,845,488	1,677	72,963	54,672	127,635	2,973,124
2011	15,068	4,635,480	687,537	5,323,017	3,045	167,360	104,917	272,276	5,595,293
2010	8,251	2,240,794	331,562	2,572,357	1,570	63,189	50,922	114,111	2,686,468
2009	7,730	2,077,726	308,769	2,386,494	1,382	44,452	53,504	97,956	2,484,450
2008	8,341	2,225,634	329,330	2,554,964	1,609	105,169	29,278	134,448	2,689,412
2007	8,157	2,011,620	297,343	2,308,963	1,779	119,975	33,410	153,386	2,462,349
2006	7,865	1,780,220	264,010	2,044,230	1,656	117,706	47,754	165,460	2,209,690
2005	7,619	1,680,919	249,415	1,930,334	1,621	119,457	53,528	172,985	2,103,319
2004	6,791	1,367,505	203,082	1,570,587	1,511	111,674	61,339	173,013	1,743,600
2003	6,733	1,328,234	197,263	1,525,497	1,380	89,920	84,213	174,134	1,699,630
2002	6,225	1,158,567	171,462	1,330,029	1,214	117,108	48,550	165,657	1,495,686
2001	6,285	1,109,612	164,313	1,273,925	1,279	173,309	37,393	210,702	1,484,627
2000	6,140	1,029,167	153,140	1,182,307	1,058	189,378	15,548	204,925	1,387,232
1999	5,079	705,036	211,140	916,176	888	118,518	36,639	155,157	1,071,333
1998	4,837	604,161	232,675	836,836	892	99,479	46,393	145,873	982,709
1997	3,912	450,257	217,528	667,784	735	65,697	47,934	113,632	781,416
1996	3,727	399,361	234,387	633,748	759	55,003	53,336	108,339	742,086
1995	3,241	315,619	213,009	528,628	649	36,346	48,986	85,332	613,961
1994	2,784	243,935	181,257	425,192	617	32,901	41,259	74,160	499,352
1993	2,421	191,429	153,795	345,224	537	22,326	33,428	55,754	400,979
1992	1,954	133,967	120,274	254,241	441	15,977	25,973	41,950	296,191
1991	1,626	103,870	103,675	207,545	385	11,277	23,670	34,947	242,493
1990	2,555	168,282	182,028	350,310	648	20,608	34,336	54,944	405,255
1989	1,740	102,940	127,086	230,026	409	10,372	21,682	32,054	262,080
1988	1,077	45,673	65,279	110,952	281	5,089	12,839	17,928	128,881
1987	848	29,702	45,740	75,442	219	3,155	7,310	10,465	85,907
1986	682	22,986	41,440	64,426	195	2,820	7,266	10,087	74,512
1985	598	18,950	37,948	56,897	150	1,516	5,319	6,835	63,733
1984	378	9,744	21,437	31,181	114	1,062	3,728	4,791	35,972
1983	273	5,198	12,181	17,380	92	646	2,734	3,380	20,760
1982	170	2,872	7,404	10,277	44	220	1,138	1,357	11,634
1981	149	1,785	5,169	6,954	46	183	913	1,096	8,050
Prior	381	3,397	10,863	14,260	105	265	1,893	2,158	16,418
Total	222,723	\$53,670,942	\$7,020,148	\$60,691,090	41,753	\$3,029,206	\$1,353,819	\$4,383,025	\$65,074,115

⁽¹⁾ Includes 1,770 members formerly covered under the LTDI program based on year of termination.

⁽²⁾ The number of retirements during 2020 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 2020

Age	Male Deaths			Female Deaths			Total Deaths		
	Actual	Expected	Exposure	Actual	Expected	Exposure	Actual	Expected	Exposure
30-34									
35-39						2			2
40-44						5			5
45-49			17			61			78
50-54	3	2	1,017			543	3	2	1,560
55-59	17	25	5,287	21	20	6,891	38	45	12,178
60-64	88	71	11,099	70	75	17,763	158	146	28,862
65-69	181	191	18,425	192	195	29,943	373	386	48,368
70-74	331	328	19,740	277	319	28,715	608	647	48,455
75-79	420	388	13,478	393	367	18,039	813	755	31,517
80-84	482	452	8,353	457	469	11,947	939	921	20,300
85-89	584	491	5,012	641	602	7,730	1,225	1,093	12,742
90-94	417	341	2,115	642	547	4,122	1,059	888	6,237
95-99	158	135	499	326	291	1,265	484	426	1,764
100 & Up	16	13	38	72	62	210	88	75	248
Totals	2,697	2,437	85,080	3,091	2,947	127,236	5,788	5,384	212,316
Prior Year									
Totals	2,353	2,337	83,236	2,794	2,810	122,757	5,147	5,147	205,993
Average									
Ages	81.7	81.2	71.8	84.1	83.4	72.0	83.0	82.4	71.9



SECTION F

APPENDIX

Actuarial Assumptions Used in the Retired Life Actuarial Valuation

The interest rate used in the valuation was 5.0% a year, compounded yearly, as provided in Section 40.02 of the Wisconsin Statutes. To the extent that unfavorable investment performance reduces current dividends, liabilities would be lower than reported in this valuation. The mortality table used in the valuation was the Wisconsin 2018 Mortality Table, as adopted by the Board in connection with the 2015-2017 Experience Study. This table includes margin for future improvements in mortality by incorporating 60% of the MP-2018 fully generational scale. The impact of the new mortality tables is recognized equally over a three-year period.

Single Life Retirement Values Wisconsin Projected Experience Table - 2018 with 5% Interest

Sample Attained Ages in 2020	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)		Probability of Death Next Year	
	Males	Females	Males	Females	Males	Females
40	\$213.04	\$217.69	45.4	48.3	0.100%	0.062%
45	204.74	210.36	40.3	43.2	0.124%	0.092%
50	194.30	201.24	35.3	38.2	0.161%	0.134%
55	181.69	190.09	30.4	33.2	0.375%	0.241%
60	167.45	176.84	25.8	28.4	0.543%	0.352%
65	150.47	160.89	21.4	23.7	0.832%	0.526%
70	131.26	141.93	17.1	19.2	1.347%	0.870%
75	109.81	120.31	13.2	15.0	2.257%	1.573%
80	87.08	96.94	9.7	11.1	4.138%	2.962%
85	65.62	73.71	6.8	7.9	7.741%	5.961%

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

Sample Attained Ages in 2020	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)		Probability of Death Next Year	
	Males	Females	Males	Females	Males	Females
40	\$199.65	\$207.91	37.8	41.8	0.144%	0.103%
45	188.03	198.23	32.8	36.8	0.236%	0.154%
50	174.63	186.48	28.1	31.9	0.464%	0.270%
55	158.90	172.41	23.5	27.1	0.626%	0.397%
60	140.43	155.56	19.1	22.4	1.093%	0.614%
65	120.05	135.91	15.0	18.0	1.778%	1.051%
70	98.05	113.95	11.4	13.9	3.063%	1.893%
75	75.91	90.50	8.2	10.2	5.791%	3.568%
80	56.28	67.87	5.7	7.1	10.654%	7.302%
85	40.23	49.64	3.9	4.9	17.198%	12.618%

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/Mortality Reserve 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 phases into the full table incrementally over the three year experience study cycle. 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%.