

Illinois Municipal Retirement Fund

Annual Actuarial Valuation Report

December 31, 2017



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March 22, 2018

Board of Trustees
Illinois Municipal Retirement Fund
Oak Brook, Illinois 60521

**Re: Illinois Municipal Retirement Fund Actuarial Valuation as of December 31, 2017
Actuarial Disclosures**

Ladies and Gentlemen:

The results of the **December 31, 2017 annual actuarial valuations** of members covered by the Illinois Municipal Retirement Fund (IMRF) are presented in this report.

The purpose of the valuations, as provided by Article 7 of the Illinois Pension Code, is to measure IMRF's funding progress and to establish contribution rates for the 2019 calendar year. This report should not be relied upon for any other purpose. This report may be distributed to parties other than the Fund only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

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 (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

This valuation assumes the continuing ability of the participating employers to make the contributions necessary to fund this plan. A determination regarding whether or not the participating employers are actually able to do so is outside our scope of expertise. Consequently, we did not perform such an analysis.

The valuation was based upon information, furnished by IMRF staff, concerning Retirement Fund benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by IMRF Staff.

The valuations are based upon current plan provisions related to Regular Members, Sheriff's Law Enforcement Personnel (SLEP), and Elected County Officials (ECO) employment.

In addition, this report was prepared using certain assumptions approved by the Board as described in the section of this report entitled Actuarial Cost Methods and Assumptions.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge, the information contained in this report is accurate and fairly presents the actuarial position of IMRF as of the valuation date. 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.

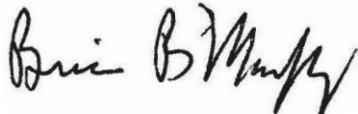
Brian B. Murphy, Mark Buis, and Francois Pieterse are Members of the American Academy of Actuaries (MAAA). These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein.

The signing actuaries are independent of the plan sponsor.

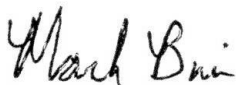
Gabriel, Roeder, Smith & Company will be pleased to review this valuation and report with the Board of Trustees and to answer any questions pertaining to the valuation.

Respectfully submitted,

GABRIEL, ROEDER, SMITH & COMPANY



Brian B. Murphy, FSA EA, FCA, MAAA



Mark Buis, FSA, EA, FCA, MAAA



Francois Pieterse, ASA, FCA, MAAA

BBM/MB/FP:sc



Introduction

IMRF is established under statutes adopted by the Illinois General Assembly. It is an agent multiple employer defined benefit pension plan that, as of December 31, 2017, encompasses 3,329 active plans and serves 439,021 active and inactive members and retired persons. Since IMRF reports information to us by plan, there are cases in which a person with coverage in more than one plan is counted multiple times for census counts. This produces an overstatement in the census when compared with true counts of people. This issue may affect inactive members to a greater extent than it affects others. Liabilities are, however, correctly calculated and apportioned among employers. IMRF is funded by both member and employer contributions. Members contribute at fixed rates determined by statute. Regular members contribute 4.5% of pay; SLEP members contribute 7.5%; ECO members contribute 7.5%. Participating employers make all additional contributions needed to provide benefits. Each employer contributes to a separate account within IMRF which, when combined with member contributions and investment income, will be sufficient to provide future benefits for its own employees. Employer contributions for each plan are computed each year in the actuarial valuation and consist of:

- **Normal Cost Contributions** for normal and early retirement benefits, separation benefits, permanent disability benefits, and annuity type death benefits. These contributions are the same as a percentage of payroll for most employers (larger employers have the option of being individually rated).
- **Contributions for lump sum death-in-service benefits**, which are separately determined for each employer.
- **Contributions for temporary disability benefits**, which are 0.08% of payroll for each employer.
- **Contributions for 13th Payments**, which are 0.62% of covered payroll for each employer.
- **Contributions for Early Retirement Incentive (ERI) unfunded liabilities** which are separately determined for each employer.
- **Contributions for other unfunded liabilities**, which are separately determined for each employer. For employers with taxing authority, unfunded liabilities are being funded over a 24-year closed period. For non-taxing employers the unfunded liabilities are being funded over a 10-year rolling period. Unfunded liabilities associated with benefit changes for SLEP members (Public Act 94-712) are amortized over 19 years for most employers. The amortization policy is described on page D-15.

Employer contributions computed in this valuation compared with those computed in the prior valuation are shown below.

	Average Employer Contribution Rates Expressed as %'s of Active Member Pays			
	Regular	SLEP	ECO	Average/Total
This Valuation	9.06%	20.50%	66.43%	9.62%
Prior Valuation	11.24%	21.49%	82.72%	11.78%

This year's valuation results were affected by:

- Changes in Actuarial Assumptions due to the Triennial Experience Study done in the fourth quarter of 2017.
- Favorable investment performance.
- Liability gains primarily due to lower than assumed salary increases.
- Continued recognition of Tier 2 benefits for new hires.
- ERI liabilities.
- Three employers are individually rated (DuPage County; Union School District 46 and Peoria County). Although these employers will receive separate valuation reports, member counts, assets, and liabilities for these employers are also included in the totals in this valuation report.

A full reconciliation of changes in contribution rates can be found in the Gain/Loss Analysis report. Based upon this year's valuation results, IMRF is 92.9% funded and the average/total employer rate is 9.62% of payroll.

Section A of this report describes this year's valuation results in depth.

Looking Ahead: There are forces acting to decrease rates in the future, and, potentially, forces acting to increase rates.

Among the forces acting to decrease rates are:

- The percentage of the population covered by Tier 2 will grow for many years.
- The market value of assets is currently higher than the value recognized in the valuation. If all assumptions are met in the future, the gradual recognition of that gap will lead to downward pressure on rates.

Among the forces acting to increase rates are:

- In recent years, actual payroll growth has lagged the assumed rate of growth. If this continues, and other assumptions are met exactly, the percentage of payroll required to fund the unfunded liability will increase.
- According to the most recent Triennial Experience study, the probability of meeting or exceeding the 7.5% assumed rate of return over the next 20 years is 37%. According to Callan's March 1, 2018 Asset Allocation Review (page 56), the Target Mix is expected to return 6.3% over a ten year horizon. If the interest rate assumption is consistently not met, contribution rates will increase, and the assumption itself may need to be changed.

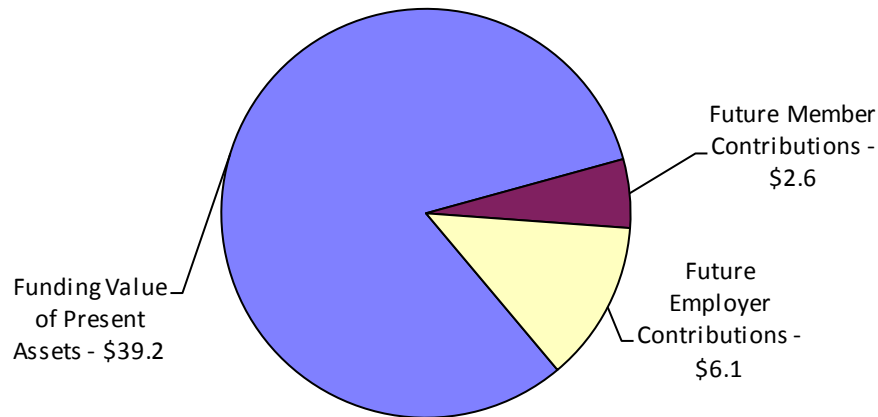
How these forces will interact with each other, and what other forces will emerge, remains to be seen.

SECTION A

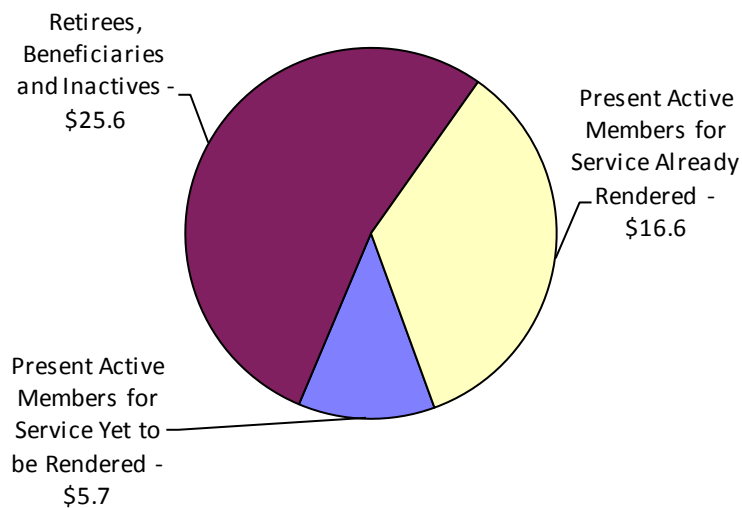
VALUATION RESULTS

Financing \$47.9 Billion Worth of Benefit Promises to Present Members, Retirees and Beneficiaries December 31, 2017 (Amounts in \$Billions)

Sources of Funds



IMRF Obligations



Actuarial Balance Sheet

December 31, 2017

	Funding Sources			
	Regular	SLEP	ECO	Total
Present Valuation Assets				
Member Contributions	\$ 6,325,619,257	\$ 401,090,604	\$ 23,862,531	\$ 6,750,572,392
VA Member Contributions	154,272,420	8,948,974	126,230	163,347,624
Employer Assets	11,773,937,848	660,858,536	3,945,071	12,438,741,455
Retired Life Assets	20,092,314,923	1,634,411,371	281,195,571	22,007,921,865
Market Value Adjustment	(2,045,640,345)	(144,525,252)	(16,543,950)	(2,206,709,547)
Death and Disability Reserves				33,928,523
Total Present Assets	\$36,300,504,103	\$2,560,784,233	\$292,585,453	\$39,187,802,312
Future Assets				
Member Contributions	\$ 2,357,298,140	\$ 188,345,437	\$ 3,368,673	\$ 2,549,012,250
Employer Contributions				
Normal Costs	2,876,796,454	265,385,861	5,933,350	3,148,115,665
Unfunded Liability	2,549,223,739	372,395,160	70,061,445	2,991,680,344
Total Employer	\$ 5,426,020,193	\$ 637,781,021	\$ 75,994,795	\$ 6,139,796,009
Total Future Assets	\$7,783,318,333	\$826,126,458	\$79,363,468	\$8,688,808,259
Total Funding Sources	\$44,083,822,436	\$3,386,910,691	\$371,948,921	\$47,876,610,571

	Funding Uses			
	Regular	SLEP	ECO	Total
Funds Needed for				
Active Members	\$20,375,921,993	\$1,656,665,186	\$ 58,784,799	\$22,091,371,978
Inactive Members	3,461,313,100	86,885,160	31,842,321	3,580,040,581
VA Members	154,272,420	8,948,974	126,230	163,347,624
Retirees and Beneficiaries	20,092,314,923	1,634,411,371	281,195,571	22,007,921,865
Death and Disability Benefits				33,928,523
Total Actuarial Present Value	\$44,083,822,436	\$3,386,910,691	\$371,948,921	\$47,876,610,571

Development of Average Contribution Rates Applicable to Calendar Year 2019 (Results as of December 31, 2017)

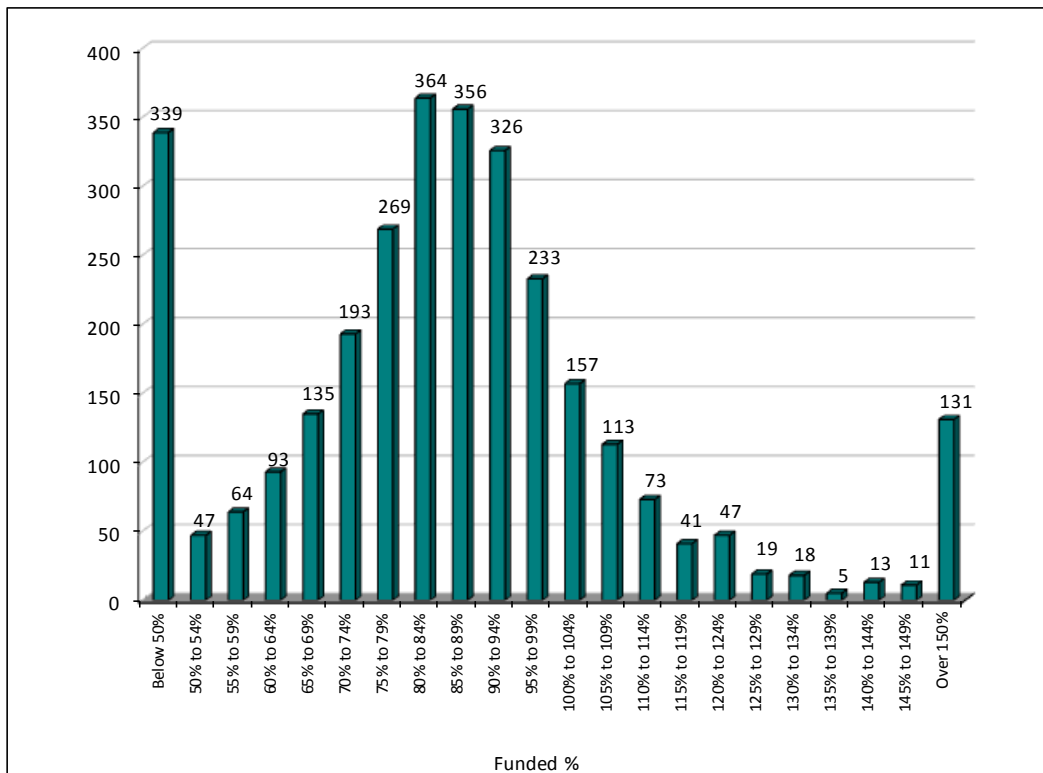
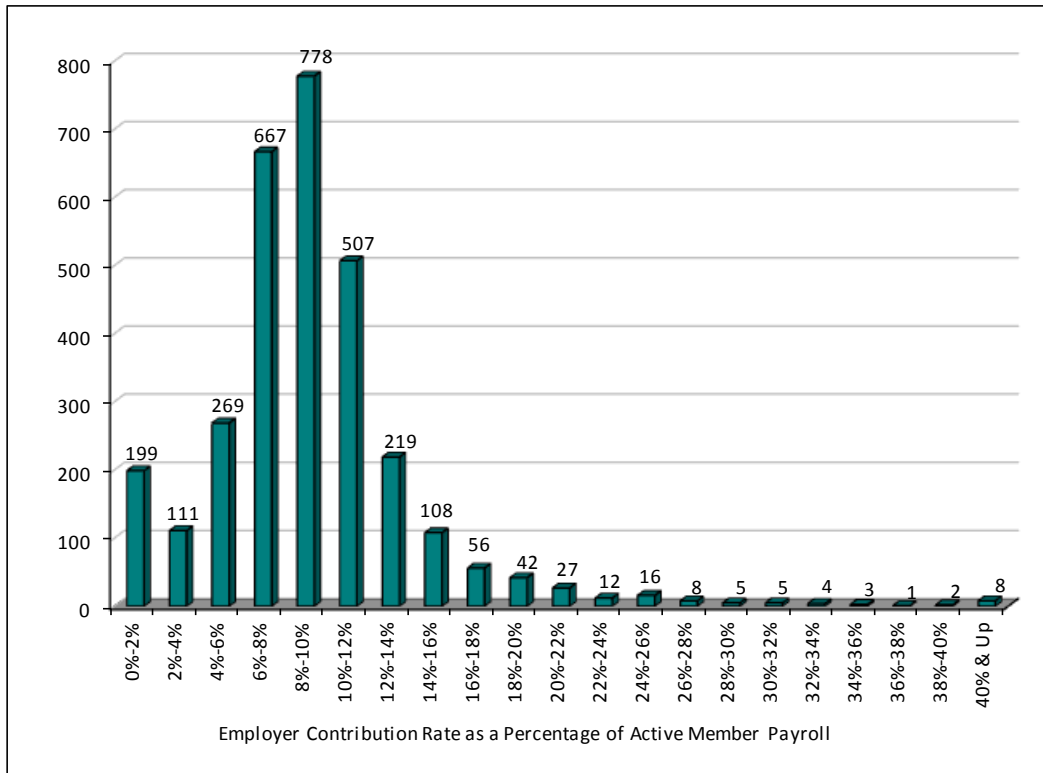
	% of Active Member Pays		
	Regular	SLEP	ECO
Tier 1 Employer Normal Cost	6.34 %	11.99 %	13.21 %
Tier 2 Employer Normal Cost	3.71 %	7.74 %	13.21 %
Average Employer Contributions for Normal Cost*			
Retirement	5.54 %	10.86 %	12.91 %
\$3,000 Lump Sum Death Benefit	0.03 %	0.02 %	0.04 %
Total & Permanent Disability Benefit	0.04 %	0.10 %	0.26 %
Total Normal Cost	5.61 %	10.98 %	13.21 %
Lump Sum Death-in-Service Benefits	0.09 %	0.09 %	0.11 %
Temporary Disability	0.08 %	0.08 %	0.08 %
13th Payments	0.62 %	0.62 %	0.62 %
Unfunded (Overfunded) Liabilities (24/10 years)	2.47 %	6.55 %	52.41 %
Early Retirement Incentive Liabilities	0.19 %	0.11 %	0.00 %
SLEP Supplemental Liabilities	0.00 %	2.07 %	0.00 %
Total Average Employer Rate	9.06 %	20.50 %	66.43 %
Prior Year Averages	11.24 %	21.49 %	82.72 %

* Average of Tier 1 and Tier 2 Normal Cost weighted on expected payroll.

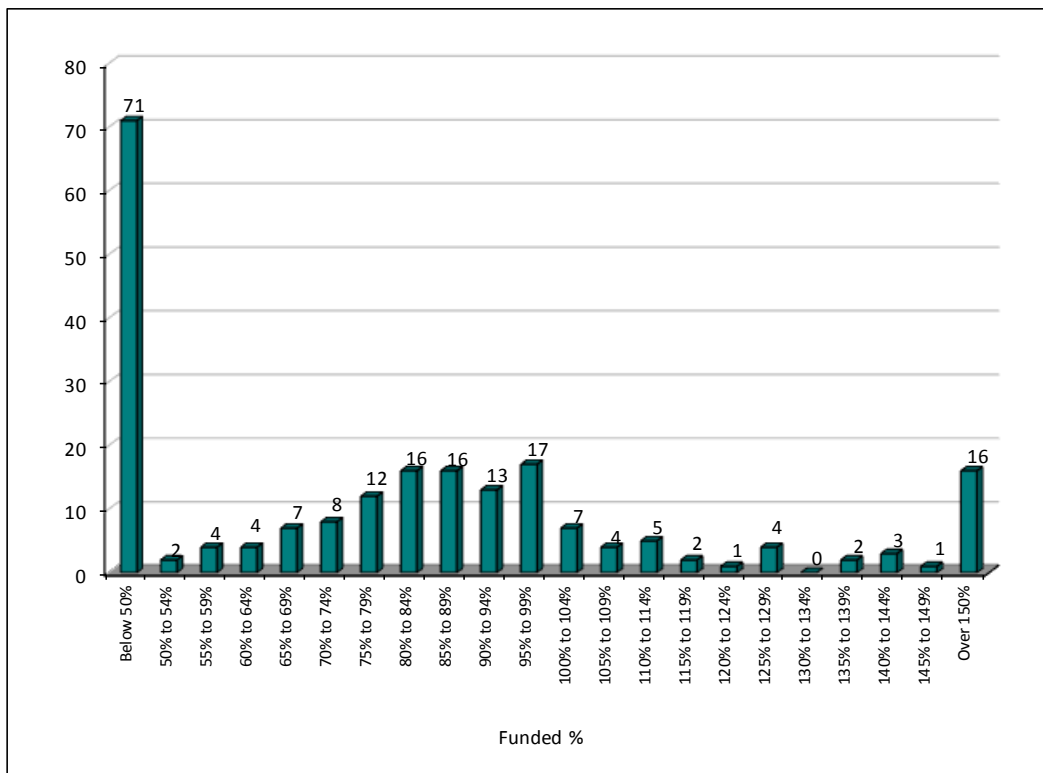
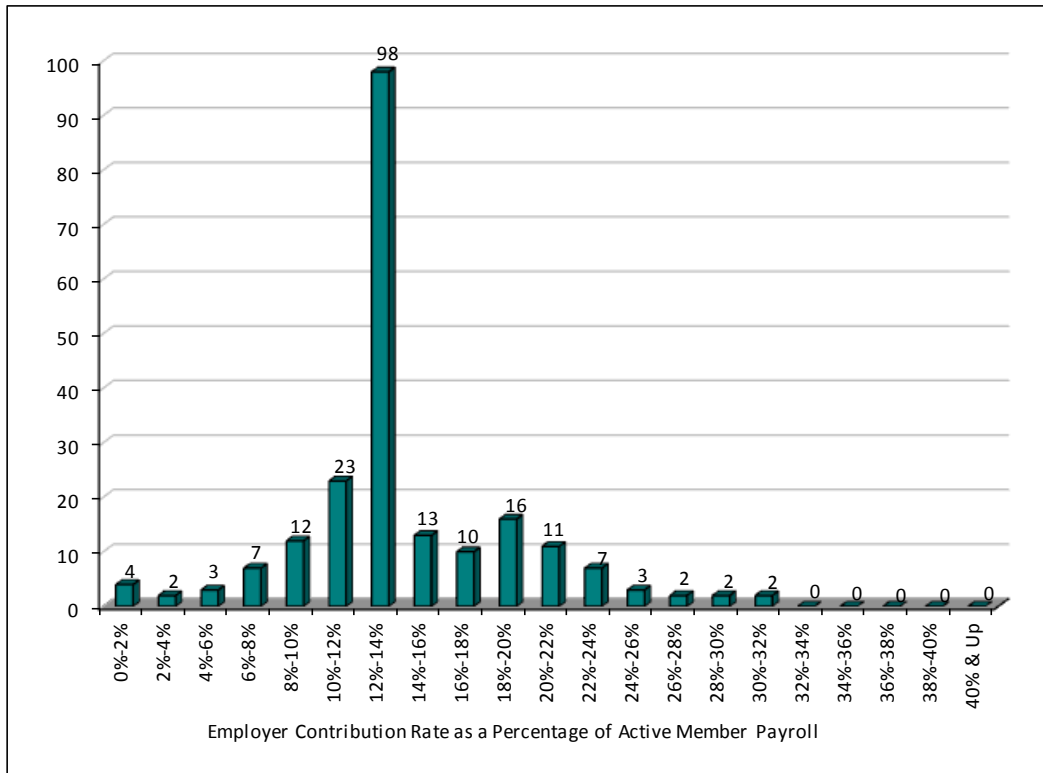
Each employer pays its normal cost in accordance with its mix of tier 1 and tier 2 employees and the percentages above (some larger employers have the option of paying an individual normal cost rate) and the same rate for temporary disability benefits and 13th Payments. Rates for lump sum death-in-service benefits, unfunded (overfunded) liabilities, and early retirement incentive liabilities are separately determined for each employer, and can vary widely. Because of this, the average contribution rates tell only part of the story. Pages A-4 through A-7 show the distribution of computed employer contribution rates, funding percents, and rate changes based on the annual required contribution from the prior year among the 3,047 Regular plans, 215 SLEP plans and 67 ECO plans. IMRF staff reviews all of the computed rates and, in some cases, may make adjustments to those rates that are not reflected in this report.

Employer contributions made during calendar year 2017 amounted to \$902 million. This compares with \$933 million in the previous year.

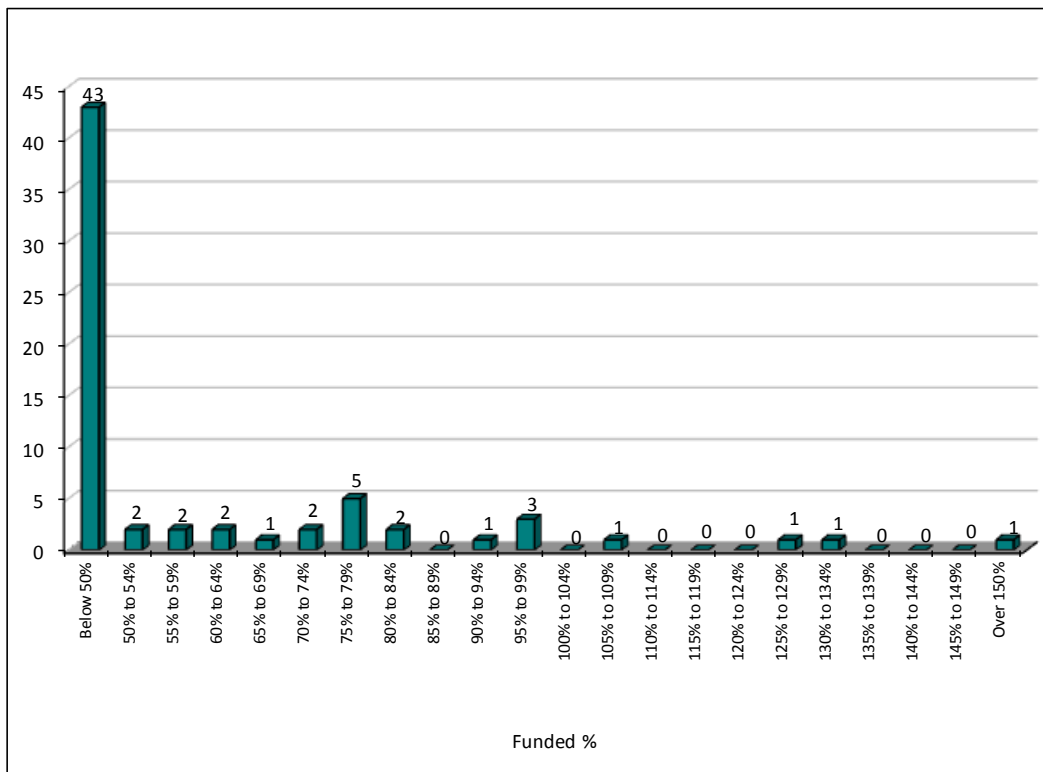
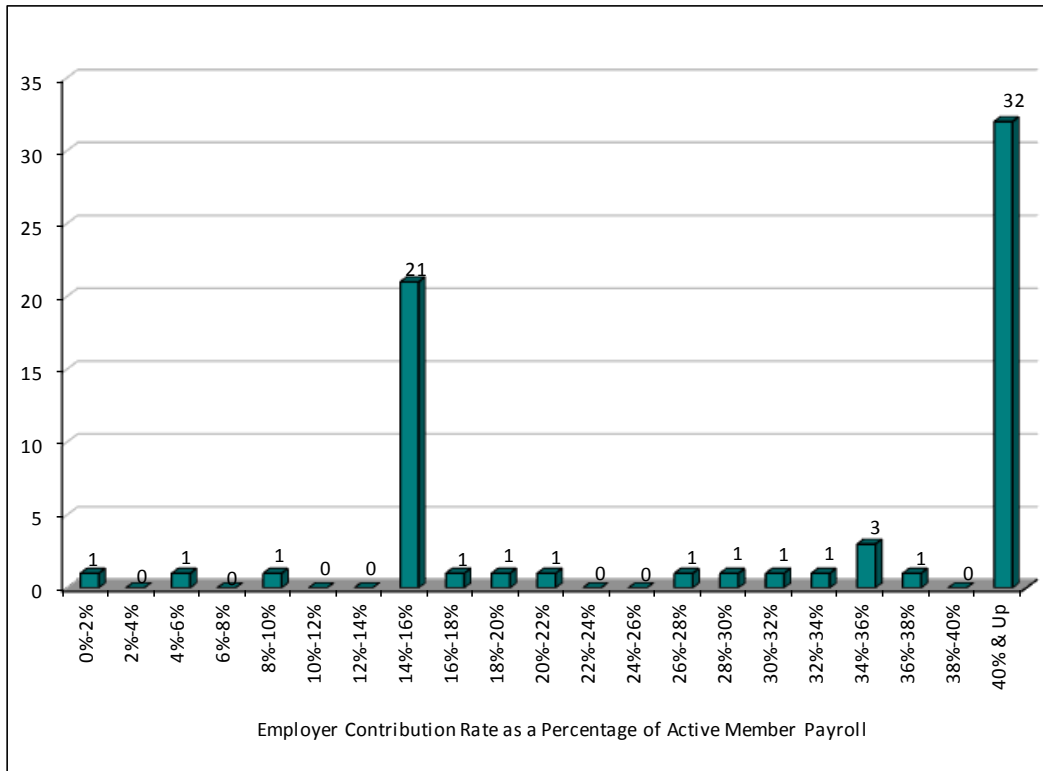
Employer Contribution Rates and Funded Percents 3,047 Regular Employers at December 31, 2017



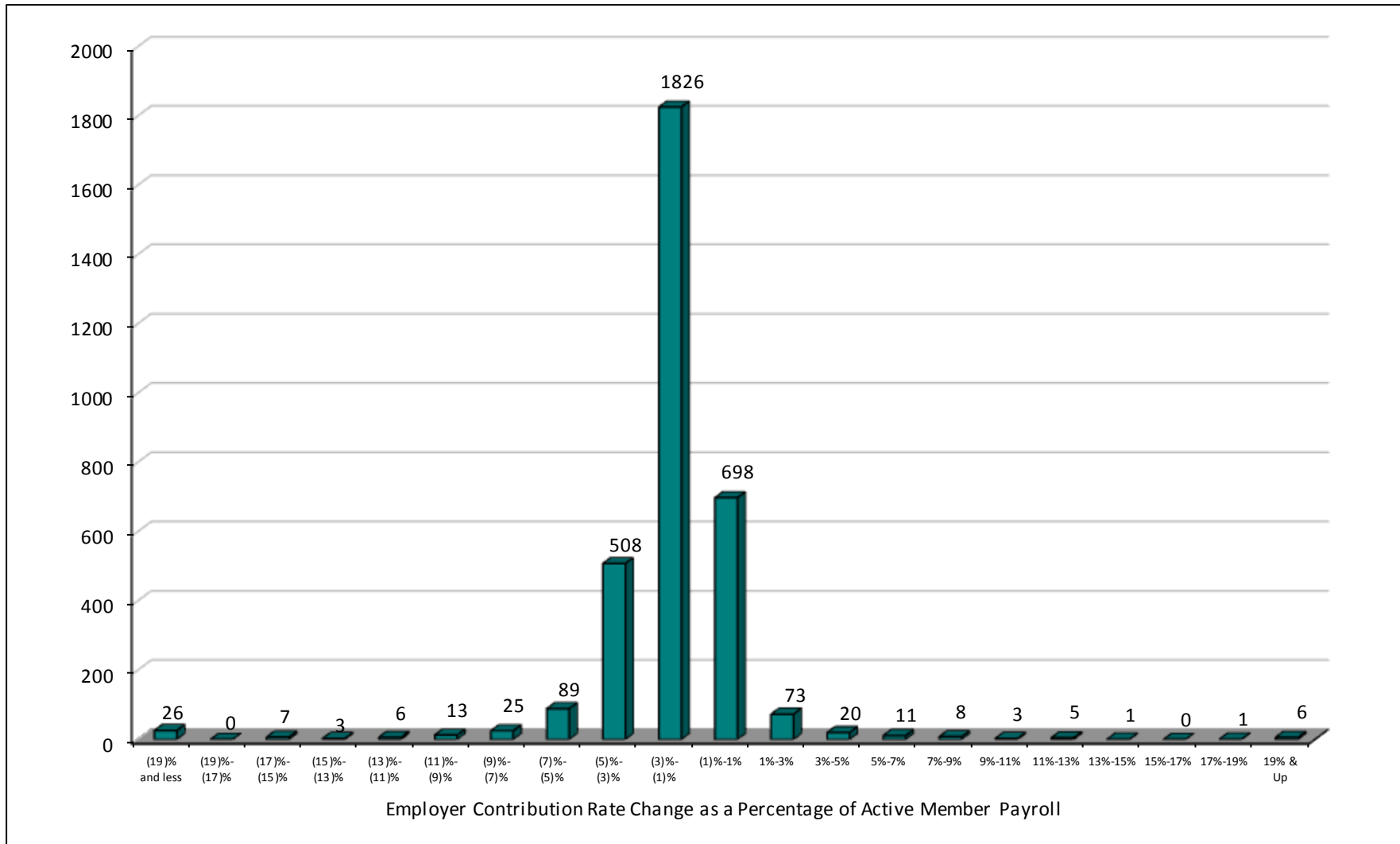
Employer Contribution Rates and Funded Percents 215 SLEP Employers at December 31, 2017



Employer Contribution Rates and Funded Percents 67 ECO Employers at December 31, 2017



Employer Contribution Rate Changes - 2017 Actuarial Valuations 3,329 Employers



Historical Summary of Employer Rates

Rate Applies to Calendar Year	Rate Computed as of December 31	Employer Contribution Rate Expressed as % of Active Member Payroll					
		Regular Members		SLEP Members		ECO Members	
		Normal Cost	Average Total Rate	Normal Cost	Average Total Rate	Normal Cost	Average Total Rate
1995	1993 ¹	7.22%	10.19%	9.50%	12.00%		
1996	1994	7.22%	9.98%	9.51%	11.97%		
1997	1995	7.27%	9.61%	9.32%	11.43%		
1998	1996 ¹	7.21%	9.64%	10.22%	13.94%		
1999	1997 ³	7.23%	9.03%	10.62%	14.65%	21.48%	36.14%
2000	1998	7.17%	8.16%	10.42%	14.28%	23.39%	41.38%
2001	1999 ¹	7.41%	6.64%	12.02%	14.86%	23.85%	42.58%
2002	2000	7.62%	5.87%	11.94%	14.13%	18.05%	38.46%
2003	2001	7.66%	6.22%	11.96%	14.04%	17.95%	40.37%
2004	2002 ¹	7.60%	7.82%	12.47%	16.29%	18.18%	44.90%
2005	2003	7.61%	9.25%	12.48%	17.15%	18.07%	42.66%
2006	2004	7.64%	10.04%	12.56%	18.25%	18.01%	44.90%
2007	2005 ^{1, 2}	7.43%	9.72%	11.66%	18.42%	17.52%	41.30%
2008	2006	7.42%	9.47%	11.63%	19.33%	16.96%	41.80%
2009	2007	7.42%	9.27%	11.63%	18.65%	17.08%	42.77%
2010	2008 ^{1, 4}	7.58%	11.89%	11.97%	21.63%	17.24%	43.57%
2011	2009 ⁴	7.58%	12.14%	11.97%	21.76%	17.20%	42.72%
2012	2010 ⁴	7.58%	12.42%	12.01%	22.48%	17.22%	47.15%
2013	2011 ^{1, 2, 4}	7.77%	12.85%	12.74%	23.40%	17.63%	46.85%
2014	2012 ⁴	7.64%	12.58%	12.61%	23.20%	17.59%	74.52%
2015	2013 ⁴	7.51%	11.69%	12.42%	22.33%	17.73%	70.37%
2016	2014 ^{1, 4}	6.84%	11.73%	11.95%	22.71%	16.49%	86.07%
2017	2015 ⁴	6.71%	11.34%	11.77%	22.39%	16.83%	73.50%
2018	2016 ⁴	6.61%	11.24%	11.63%	21.49%	16.85%	82.72%
2019	2017¹	5.61%	9.06%	10.98%	20.50%	13.21%	66.43%

1 Assumption change.

2 Benefit change.

3 Changed to payroll weighted average method.

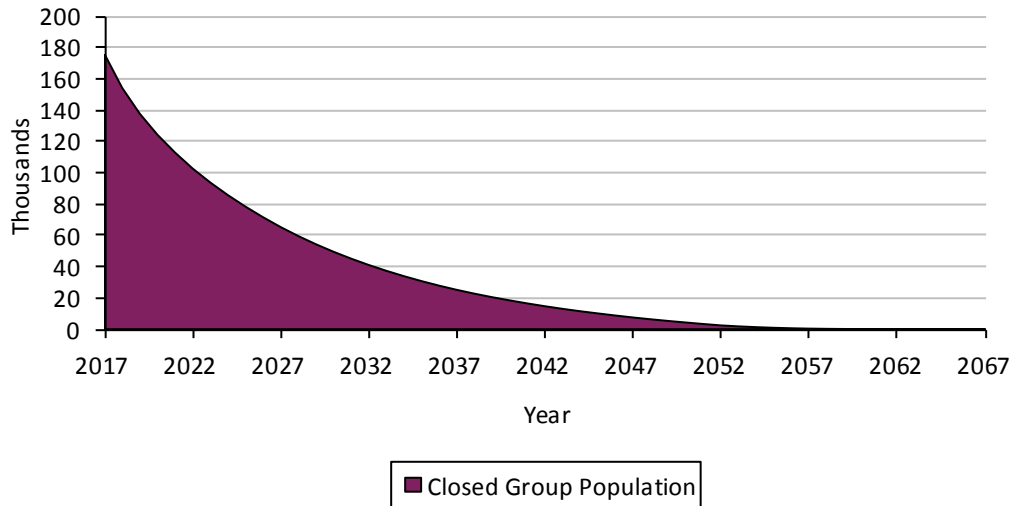
4 Before optional phase-in plan.

As shown above, the average employer contribution rates decreased this year for regular, SLEP and ECO employers. The decrease was primarily due to the assumption changes that the Board adopted in December of 2017. Generally, small fluctuations from year to year should be expected for the average rate and for any large employer's rate. Small and very small employers will experience larger variations.

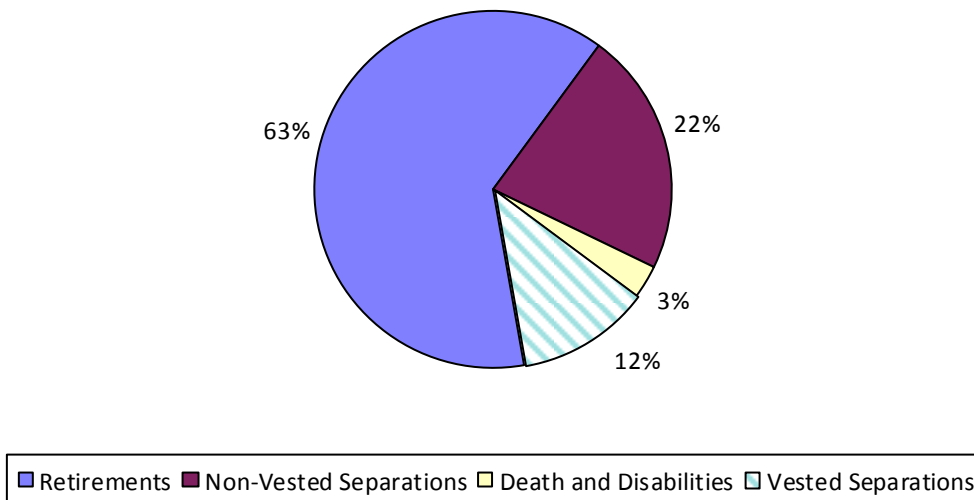
Most of the larger changes were for small employers (often employers covering just a few employees), since the removal or addition of one employee can significantly impact the contribution rate. The actuary and IMRF staff review all of the large rate changes individually in order to determine the reasonableness of the change. In some cases, rates may be adjusted following that review. Such adjustments are not reflected in this report.

Expected Development of Present Population December 31, 2017

Closed Group Population Projection



Expected Terminations from Active Employment for Current Active Members



The charts above show the expected future development of the present population in simplified terms. The retirement system presently covers 175,566 active members. Eventually, 22% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for a monthly benefit. About 75% of the present population is expected to receive monthly retirement benefits either by retiring directly from active service, or by retiring from vested deferred status. Three percent of the present population is expected to become eligible for death-in-service or disability benefits. **Within seven years, over half of the covered membership is expected to consist of new hires.**

Unfunded Actuarial Accrued Liabilities

In a retirement system such as IMRF, where unfunded liabilities are being amortized as a level percent of active member payroll, unfunded liabilities are expected to rise in dollar amount for an extended period before finally beginning to decrease. This has to do with inflation and the related fact that the dollar is a yardstick whose length changes every year. The schedule below illustrates the development of the unfunded liability, based upon actuarial value of assets, during the year.

	Unfunded Liability Development During	
	2017	2016
Unfunded (Overfunded) Liability January 1	\$4,585,312,875	\$4,573,446,421
Assumed Net (Payments) Credits	(302,834,136)	(295,381,436)
Assumed Interest	332,679,056	332,065,180
Expected Unfunded Liability December 31	4,615,157,795	4,610,130,165
Increase/(Decrease) Due to Experience Study	(1,094,614,950)	0
Increase/(Decrease) Due to Benefit Changes	0	0
Increase/(Decrease) Due to Data Changes	0	0
Loss/(Gain) Due to Investment Experience	(475,485,083)	109,908,168
Loss/(Gain) Due to Other Sources	(53,377,418)	(134,725,458)
Actual Unfunded Liability December 31	\$2,991,680,344	\$4,585,312,875

Unfunded Actuarial Accrued Liabilities Comparative Statement (Amounts in \$Millions)

Valuation Date	(1) Actuarial Accrued Liabilities (AAL)	(2) Valuation Assets	(3) Unfunded AAL	(4) Valuation Payroll	(5) Funded Ratio (2)/(1)	(6) Liability/ Payroll (1)/(4)	(7) Assets/ Payroll (2)/(4)	(8) Unfunded/ Payroll (3)/(4)
1992	\$ 6,954.5	\$ 5,615.6	\$ 1,338.9	\$2,634.4	80.7%	264.0%	213.2%	50.8%
1993*	7,509.8	6,396.3	1,113.4	2,709.3	85.2%	277.2%	236.1%	41.1%
1994	8,126.6	7,078.9	1,047.8	2,946.5	87.1%	275.8%	240.2%	35.6%
1995	8,823.7	8,034.0	789.7	3,095.9	91.1%	285.0%	259.5%	25.5%
1996*	9,778.6	9,076.3	702.3	3,084.1	92.8%	317.1%	294.3%	22.8%
1997	10,808.0	10,273.1	534.9	3,454.6	95.1%	312.9%	297.4%	15.5%
1998	11,860.9	11,636.5	224.4	3,696.0	98.1%	320.9%	314.8%	6.1%
1999*	13,005.0	13,520.2	(515.2)	3,952.1	104.0%	329.1%	342.1%	-
2000	14,153.1	15,169.4	(1,016.3)	4,184.7	107.2%	338.2%	362.5%	-
2001	15,318.5	16,305.0	(986.5)	4,503.1	106.4%	340.2%	362.1%	-
2002*	16,559.9	16,800.2	(240.3)	4,755.1	101.5%	348.3%	353.3%	-
2003	17,966.1	17,529.9	436.2	4,944.8	97.6%	363.3%	354.5%	8.8%
2004	19,424.7	18,316.0	1,108.7	5,161.1	94.3%	376.4%	354.9%	21.5%
2005 *#	20,815.1	19,698.4	1,116.7	5,374.6	94.6%	387.3%	366.5%	20.8%
2006	22,488.2	21,427.1	1,061.0	5,630.7	95.3%	399.4%	380.5%	18.8%
2007	24,221.5	23,274.4	947.2	5,931.4	96.1%	408.4%	392.4%	16.0%
2008 *	25,611.2	21,601.1	4,010.1	6,259.3	84.3%	409.2%	345.1%	64.1%
2009	27,345.1	22,754.8	4,590.3	6,461.7	83.2%	423.2%	352.1%	71.0%
2010	29,129.2	24,251.1	4,878.1	6,391.2	83.3%	455.8%	379.4%	76.3%
2011 *#	30,962.8	25,711.3	5,251.5	6,431.3	83.0%	481.4%	399.8%	81.7%
2012	32,603.2	27,491.8	5,111.4	6,496.1	84.3%	501.9%	423.2%	78.7%
2013	34,356.6	30,083.0	4,273.6	6,602.5	87.6%	520.4%	455.6%	64.7%
2014 *	37,465.1	32,700.2	4,764.9	6,732.5	87.3%	556.5%	485.7%	70.8%
2015	39,486.6	34,913.1	4,573.5	6,919.3	88.4%	570.7%	504.6%	66.1%
2016	41,358.7	36,773.4	4,585.3	7,006.7	88.9%	590.3%	524.8%	65.4%
2017 *	42,179.5	39,187.8	2,991.7	7,127.5	92.9%	591.8%	549.8%	42.0%

* Assumption change.

Benefit change.

While no one or two numeric indices can fully describe the financial condition of a retirement system, trends in both the Funded Ratio (column 5) and the Unfunded/Payroll Ratio (column 8) provide useful information. Unfunded accrued liabilities represent plan debt, while active member payroll represents the plan's capacity to service the debt. In a retirement system that is following the discipline of level percent of payroll financing, the Funded Ratio should gradually move toward 100% and the Unfunded/Payroll ratio should gradually move toward 0%.

Unfunded Actuarial Accrued Liabilities

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.50% on the actuarial value of assets), it is expected that:

1. The employer normal cost as a percentage of pay will decrease to the level of the Tier 2 normal cost as time passes as the majority of the active population will consist of Tier 2 members,
2. The unfunded actuarial accrued liability will increase in dollar amount for several years before it begins to decrease, and
3. The funded status of the plan will increase gradually towards a 100% funded ratio without ever actually reaching it.

When selecting a contribution allocation procedure, the following three items should be considered, including the balance amongst the three items: (1) benefit security, (2) intergenerational equity, and (3) contribution stability and predictability. Generally, given the nature of public employee retirement systems (e.g., level contribution financing objective and perceived ongoing nature of the plan or plan sponsor), intergenerational equity and contribution stability and predictability have received more consideration than benefit security when contribution allocation procedures are selected. However, given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

1. The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations, in other words, for transferring the obligations to an unrelated third party (e.g., insurance company) in a market value type transaction. In addition, the measurement is inappropriate for assessing benefit security for the membership.
2. The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. The amounts of future contributions will most certainly differ from those assumed in this report due to future actual experience differing from assumed experience based upon the actuarial assumptions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).

The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Risk Measures

\$ Millions									
Valuation Date	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Unfunded AAL	(4) Valuation Payroll	(5) Change in Valuation Payroll	(6) Funded Ratio (2)/(1)	(7) Annuitant Liabilities (AnnLiab)	(8) AnnLiab/AAL (7)/(1)	(9) Liability/Payroll (1)/(4)
2003	\$17,966.1	\$16,349.0	\$1,617.1	\$4,944.8	4.0%	91.0%	\$ 6,674.5	37.2%	363.3%
2004	19,424.7	18,316.0	1,108.7	5,161.1	4.4%	94.3%	7,332.5	37.7%	376.4%
2005 *#	20,815.1	19,793.5	1,021.6	5,374.6	4.1%	95.1%	7,966.1	38.3%	387.3%
2006	22,488.2	22,452.2	36.0	5,630.7	4.8%	99.8%	8,652.3	38.5%	399.4%
2007	24,221.5	24,211.5	10.0	5,931.4	5.3%	100.0%	9,400.8	38.8%	408.4%
2008 *	25,611.2	18,000.9	7,610.3	6,259.3	5.5%	70.3%	10,025.6	39.1%	409.2%
2009	27,345.1	22,282.2	5,062.9	6,461.7	3.2%	81.5%	10,903.3	39.9%	423.2%
2010	29,129.2	25,132.4	3,996.8	6,391.2	-1.1%	86.3%	12,122.0	41.6%	455.8%
2011 *#	30,962.8	24,833.7	6,129.1	6,431.3	0.6%	80.2%	13,388.0	43.2%	481.4%
2012	32,603.2	27,995.3	4,607.9	6,496.1	1.0%	85.9%	14,482.6	44.4%	501.9%
2013	34,356.6	33,203.0	1,153.6	6,602.5	1.6%	96.6%	15,753.1	45.9%	520.4%
2014 *	37,465.1	34,833.1	2,632.0	6,732.5	2.0%	93.0%	17,885.0	47.7%	556.5%
2015	39,486.6	34,461.1	5,025.5	6,919.3	2.8%	87.3%	19,471.6	49.3%	570.7%
2016	41,358.7	36,446.8	4,911.9	7,006.7	1.3%	88.1%	21,085.5	51.0%	590.3%
2017*	42,179.5	41,312.7	866.8	7,127.5	1.7%	97.9%	22,007.9	52.2%	591.8%

These Risk Measures were based on 7.5% future investment return and Market Value of Assets.

Notes:

(*). IMRF had experience studies in these years leading to a change or "true up" in actuarial assumptions. A pattern of periodic studies is a sign of a well run system and suggests the extent to which the liability measures the actuary provides are likely to be realistic.

(#). IMRF had benefit changes in these years. Benefit increases cause liabilities to rise; benefit decreases cause liabilities to fall. In either case, benefit changes affect the year by year comparability of the measures on this page.

(5). When payroll grows at or faster than the assumed rate, funding of unfunded accrued liabilities is likely to proceed at least at the scheduled rate. Payroll growing slower than the assumed rate can lead to underfunding of the plan because expected contributions for unfunded liability may not be received.

(6). The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(7) and (8). The ratio of Annuitant liabilities to total accrued liabilities gives an indication of the maturity of the system. As the ratio increases, cash flow needs increase, and the investment policy may need to change. A ratio on the order of 50% indicates a maturing system. A ratio significantly higher than 100% may indicate a closed system or another special situation.

(9). The ratio of liabilities to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

Risk Measures (Continued)

\$ Millions								
Valuation Date	(10) Assets/ Payroll (2)/(4)	(11) Portfolio StdDev	(12) Std Dev % of Pay (10)x(11)	(13) Unfunded/ Payroll (3)/(4)	(14) Net External Cash Flow (NECF)	(15) NECF/ Assets (14)/(2)	(16) Portfolio Rate of Return	(17) 10-Year Trailing Average
2003	330.6%			32.7%	\$(121.2)	-0.7%	22.1%	
2004	354.9%			21.5%	(48.3)	-0.3%	12.3%	
2005 *#	368.3%			19.0%	(14.5)	-0.1%	8.1%	
2006	398.7%			0.6%	(10.5)	0.0%	13.5%	
2007	408.2%			0.2%	(63.2)	-0.3%	8.1%	
2008 *	287.6%			121.6%	(84.2)	-0.5%	-25.3%	
2009	344.8%			78.4%	(118.7)	-0.5%	24.5%	
2010	393.2%			62.5%	(115.5)	-0.5%	13.3%	5.0%
2011 *#	386.1%			95.3%	(187.3)	-0.8%	-0.4%	5.7%
2012	431.0%			70.9%	(210.9)	-0.8%	13.6%	8.1%
2013	502.9%			17.5%	(271.9)	-0.8%	19.7%	7.8%
2014 *	517.4%	13.1%	67.8%	39.1%	(391.9)	-1.1%	6.1%	7.2%
2015	498.0%	13.9%	69.2%	72.6%	(532.8)	-1.5%	0.5%	6.4%
2016	520.2%	12.0%	62.3%	70.1%	(624.9)	-1.7%	7.6%	5.9%
2017*	579.6%	13.4%	77.8%	12.2%	(789.5)	-1.9%	15.7%	6.6%

These Risk Measures were based on 7.5% future investment return and Market Value of Assets.

Notes:

(10). The ratios of assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 500% and 700%. Ratios significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(11) and(12). The portfolio standard deviation measures the volatility of investment return. When multiplied by the ratio of assets to payroll it gives the effect of a one standard deviation asset move as a percent of payroll. This figure helps users understand the difficulty of dealing with investment volatility and the challenges volatility brings to sustainability.

(13). The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A ratio above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

(14) and (15). The ratio of Net External Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

(16) and (17). Investment return is probably the largest single risk that most systems face. The year by year return and the 10-year geometric average give an indicator of the historical performance of the portfolio versus the system's assumed return. The averages are of course distorted by the extraordinary events of 2008.

Short Condition Test

If the contributions to IMRF are level in concept and soundly executed, the Fund will **pay all promised benefits when due -- the ultimate test of financial soundness**. Testing for level contribution rates is the **long-term test**.

A short condition test is one means of checking a system's progress under its funding program. In a short condition test, the plan's present assets (cash and investments) are compared with:

- 1) Member contributions on deposit;
- 2) The liabilities for future benefits to present retired lives; and
- 3) The liabilities for service already rendered by active and inactive members.

In a system that has been following the discipline of level percent of payroll financing, the liabilities for member contributions on deposit (liability 1) and the liabilities for future benefits to present retired lives (liability 2) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by active and inactive members (liability 3) will be partially covered by the remainder of present assets. The larger the funded portion of liability 3, the stronger the condition of the system.

Short Condition Test (Regular, SLEP, ECO combined)

Calendar Year	Aggregate Actuarial Liabilities For			Actuarial Assets	Portion of Actuarial Liabilities Covered by Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
	Non-Retired Contributions	Annuitants	Non-Retired Members (Employer Financed Portion)				
2000	\$2,473,646,891	\$ 5,284,275,174	\$ 6,395,133,709	\$ 15,169,369,271	100%	100%	115.9%
2001	2,708,833,984	5,613,708,283	6,995,975,308	16,305,022,254	100%	100%	114.1%
2002*	2,950,041,671	6,050,882,416	7,558,983,215	16,800,195,504	100%	100%	103.2%
2003	3,186,234,066	6,674,490,186	8,105,379,199	17,529,890,818	100%	100%	94.6%
2004	3,423,785,725	7,332,542,340	8,668,338,951	18,315,987,910	100%	100%	87.2%
2005*#	3,688,148,208	7,966,135,229	9,160,777,405	19,698,401,285	100%	100%	87.8%
2006	3,960,880,175	8,652,328,762	9,874,976,094	21,427,139,356	100%	100%	89.3%
2007	4,248,399,825	9,400,832,984	10,572,310,907	23,274,361,198	100%	100%	91.0%
2008*	4,573,736,116	10,025,599,295	11,011,863,938	21,601,053,512	100%	100%	63.6%
2009	4,893,022,745	10,903,323,478	11,548,766,993	22,754,803,784	100%	100%	60.3%
2010	5,153,902,881	12,121,959,266	11,853,366,092	24,251,136,889	100%	100%	58.8%
2011 *#	5,417,822,062	13,388,018,799	12,156,974,567	25,711,287,584	100%	100%	56.8%
2012	5,705,336,025	14,482,560,758	12,415,347,316	27,491,809,785	100%	100%	58.8%
2013	5,957,217,332	15,753,071,341	12,646,286,800	30,083,042,548	100%	100%	66.2%
2014 *	6,262,110,058	17,885,026,667	13,318,010,887	32,700,208,537	100%	100%	64.2%
2015	6,488,892,894	19,506,345,352	13,491,335,644	34,913,127,469	100%	100%	66.1%
2016	6,714,120,028	21,085,519,077	13,559,071,297	36,773,397,527	100%	100%	66.2%
2017 *	6,924,946,616	22,007,921,865	13,246,614,175	39,187,802,312	100%	100%	77.4%

* Assumption change.

Benefit change.

Short Condition Test

Regular Members

Calendar Year	Aggregate Actuarial Liabilities For			Actuarial Assets	Portion of Actuarial Liabilities Covered by Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
	Non-Retired Contributions	Annuitants	Non-Retired Members (Employer Financed Portion)				
2008*	\$4,297,097,330	\$ 9,168,217,695	\$ 10,187,007,579	\$20,191,630,667	100%	100%	66.0%
2009	4,594,830,636	9,971,780,724	10,698,214,439	21,250,929,876	100%	100%	62.5%
2010	4,841,653,264	11,047,821,308	11,007,557,254	22,628,324,412	100%	100%	61.2%
2011 *#	5,087,758,544	12,189,531,092	11,298,603,677	23,948,247,636	100%	100%	59.0%
2012	5,350,457,218	13,212,926,495	11,531,067,293	25,599,029,673	100%	100%	61.0%
2013	5,578,881,769	14,369,082,490	11,726,152,647	27,972,103,567	100%	100%	68.4%
2014 *	5,864,657,124	16,328,679,943	12,393,664,527	30,402,948,477	100%	100%	66.2%
2015	6,078,358,544	17,811,924,086	12,534,397,434	32,424,981,363	100%	100%	68.1%
2016	6,291,877,038	19,261,898,572	12,633,562,550	34,123,098,220	100%	100%	67.8%
2017 *	6,490,226,071	20,092,314,923	12,298,162,175	36,331,479,430	100%	100%	79.3%

* Assumption change.

Benefit change.

SLEP Members

Calendar Year	Aggregate Actuarial Liabilities For			Actuarial Assets	Portion of Actuarial Liabilities Covered by Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
	Non-Retired Contributions	Annuitants	Non-Retired Members (Employer Financed Portion)				
2008*	\$251,078,170	\$ 691,076,541	\$711,187,062	\$1,225,043,022	100%	100%	39.8%
2009	270,526,254	756,769,279	735,206,914	1,307,566,622	100%	100%	38.1%
2010	284,935,047	868,199,000	739,639,201	1,410,557,658	100%	100%	34.8%
2011 *#	301,264,894	976,023,299	754,994,446	1,533,422,771	100%	100%	33.9%
2012	326,676,260	1,025,411,748	792,652,347	1,644,518,055	100%	100%	36.9%
2013	350,386,522	1,151,948,743	836,915,042	1,870,636,530	100%	100%	44.0%
2014 *	370,537,841	1,294,788,995	850,193,605	2,035,365,794	100%	100%	43.5%
2015	383,662,153	1,420,665,538	888,665,484	2,203,555,749	100%	100%	44.9%
2016	397,369,461	1,541,181,527	864,975,181	2,366,215,732	100%	100%	49.4%
2017 *	410,693,526	1,634,411,371	890,594,187	2,563,303,924	100%	100%	58.2%

* Assumption change.

Benefit change.

Short Condition Test

ECO Members

Calendar Year	Aggregate Actuarial Liabilities For			Actuarial Assets	Portion of Actuarial Liabilities Covered by Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
	Non-Retired Contributions	Annuitants	Non-Retired Members (Employer Financed Portion)				
2008 *	\$25,560,616	\$ 166,305,059	\$113,669,297	\$184,379,823	100%	95%	0.0%
2009	27,665,855	174,773,475	115,345,640	196,307,286	100%	96%	0.0%
2010	27,314,570	205,938,958	106,169,637	212,254,819	100%	90%	0.0%
2011 *#	28,798,624	222,464,408	103,376,444	229,617,177	100%	90%	0.0%
2012	28,202,547	244,222,515	91,627,676	248,262,057	100%	90%	0.0%
2013	27,949,041	232,040,108	83,219,111	240,302,451	100%	92%	0.0%
2014 *	26,915,093	261,557,729	74,152,755	261,894,266	100%	90%	0.0%
2015	26,872,197	273,755,728	68,272,726	284,590,357	100%	94%	0.0%
2016	24,873,529	282,438,978	60,533,566	284,083,575	100%	92%	0.0%
2017 *	24,027,019	281,195,571	57,857,813	293,018,958	100%	96%	0.0%

* Assumption change.

Benefit change.

SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA

Summary of Benefits and Conditions Evaluated

December 31, 2017

This is a brief plan description of IMRF benefits. Additional conditions and restrictions may apply. A complete description is found in Article 7 of the Illinois Pension Code. Only the description found in Article 7 can be relied upon.

Participating Employers

All counties and school districts, plus cities and villages and incorporated towns with a population of 5,000 or more (except certain governmental entities specifically excluded by the Pension Code) are required to participate. Other local government units may elect to participate.

Membership

All appointed employees of a participating employer who are employed in a position normally requiring 600 hours (1,000 hours for certain employees hired after 1981) or more of work in a year are required to participate. Elected officials and hospital employees who satisfy requirements may also participate.

Service Credit

Service credit is the total time under IMRF, stated in years and fractions. Service is credited monthly while the member is working, receiving IMRF disability benefits or on IMRF's Benefit Protection Leave. For revised ECO members, the ECO benefit formula is limited to service in an elected office.

Members may qualify for a maximum of one year of additional service credit for unused, unpaid sick leave accumulated with the last employer. Members who retire from a school district may utilize unused sick leave from all school district employers. This additional service credit applies only for members leaving employment for retirement. The service credit is earned at the rate of one month for every 20 days of unused, unpaid sick leave or fraction thereof.

IMRF is a participating plan under the Reciprocal Act, as are all other Illinois public pension systems, except local police and fire pension plans. Under the Reciprocal Act, service credit of at least one year may be considered together at the date of retirement or death for the purpose of determining eligibility for and amount of benefits. However, for teacher aides who meet certain criteria, service credit of less than one year may be considered in determining benefits under the Reciprocal Act.

Final Rate of Earnings (FRE)

Retirement and Survivor Annuities

Tier 1 Members: The final rate of earnings for Regular and SLEP members is the highest total earnings during any 48 consecutive months within the last 10 years of IMRF service divided by 48 or the total lifetime earnings divided by the total lifetime number of months of service. The final rate of earnings for ECO members is the annual salary of the ECO member on the day he or she retires. For revised ECO members who join the plan after January 25, 2000, the final rate of earnings is the highest total earnings during any 48 consecutive months within the last 10 years of IMRF service divided by 48 for each office held.

Tier 2 Members: The final rate of earnings for Regular and SLEP members is the highest total earnings during any 96 consecutive months within the last 10 years of IMRF service divided by 96 or the total lifetime earnings divided by the total lifetime number of months of service. For revised ECO members who join the plan after January 25, 2000, the final rate of earnings is the highest total earnings during any 96 consecutive months within the last 10 years of IMRF service divided by 96 for each office held. Pensionable earnings are initially capped at \$106,800 which will increase annually beginning in 2012 by three percent or one-half of the increase of the Consumer Price Index, whichever is less. For SLEP members, overtime compensation is excluded from pensionable earnings.

Death Benefits: The greater of the above amount or the average of earnings over the last 12 months of service.

Disability Benefits: The average of earnings over the last 12 months of service (for ECO members, annualized salary on last day of ECO participation).

Summary of Benefits and Conditions Evaluated December 31, 2017

Normal Retirement Pension Eligibility

Tier 1 Members:

Normal retirement for an unreduced pension is:

- Age 60 with eight or more years of service or 35 or more years of service at age 55,
- Age 50 with 20 or more years of SLEP service for members with SLEP service,
- Age 55 with eight or more years of service for members with ECO service, or
- Age 55 with eight or more years of service in the same elected county office for members with Revised ECO service.

Tier 2 Members:

Normal retirement for an unreduced pension is:

- Age 67 with ten or more years of service or 35 or more years of service at age 62,
- Age 55 with ten or more years of SLEP service for members with SLEP service, or
- Age 67 with eight or more years of service in the same elected county office for members with Revised ECO service.

Normal Retirement Pension Amount

A Regular IMRF pension is:

- 1-2/3 percent of the final rate of earnings for each of the first 15 years of service credit, plus
- 2 percent for each year of service credit in excess of 15 years.

The maximum pension at retirement cannot exceed 75 percent of the final rate of earnings.

A SLEP pension is:

- 2-1/2 percent of the final rate of earnings for each year of service.

The maximum pension at retirement cannot exceed 80 percent (75 percent for Tier 2) of the final rate of earnings.

An ECO pension is:

- 3 percent of the final rate of earnings for each of the first eight years of service, plus
- 4 percent for each year of service between eight and 12 years of service, plus
- 5 percent for years of service credit over 12.

The maximum pension at retirement cannot exceed 80 percent of the final rate of earnings.

A money purchase minimum pension is provided if it exceeds the normal formula amount. The money purchase minimum is the amount that may be purchased by 2.4 times the member's applicable accumulated contributions, including interest at 7.5%.

A reversionary pension option is provided to members at retirement. This option permits the member to revert a portion of their pension to one other person upon their death. This election is irrevocable. This payment option is often selected by members whose spouses are not eligible for a surviving spouse pension or who have children or other family members with special needs.

Factors for determining reversionary pension options are based on 120% of the current mortality rates (50% unisex) and 7.5% interest.

An IMRF pension is paid for life.

Early Retirement (not applicable to SLEP Tier 1 optional benefits or to ECO service)

Tier 1 Members: Regular members may retire as early as age 55 with a reduced pension. The reduction is the lesser of:

- one-fourth percent for each month the member is under age 60, or
- one-fourth percent for each month of service less than 35 years.

Summary of Benefits and Conditions Evaluated

December 31, 2017

Tier 2 Members: Regular members may retire as early as age 62 with a reduced pension. The reduction is the lesser of:

- one-half percent for each month the member is under age 67, or
- one-half percent for each month of service less than 35 years.

SLEP members may retire as early as age 50 with a reduced pension. The reduction is one-half percent for each month the member is under age 55.

Early Retirement Incentive Program (ERI)

Eligibility and Amount: IMRF employers may offer an early retirement incentive (ERI) program to their employees who are over 50 (57 for Tier 2 regular and ECO members) years of age and who have at least 20 years of service credit. Eligible members may purchase up to five years of service credit and age. Employers must pay off the additional ERI liability within 10 years. Subsequent ERI programs may be offered once every five years by an employer after the liability for the previous ERI program is paid.

Member Cost: For each year of service credit purchased, members pay the current member contribution rate multiplied by the highest 12 consecutive months of salary (within ERI period).

Vesting

Tier 1 Members: Members are vested for pension benefits when they have at least eight years of qualifying service credit. SLEP members are vested for a SLEP pension when they have at least 20 years of SLEP service credit. SLEP members with more than eight years of service but less than 20 years of SLEP service will receive a Regular pension. Revised ECO members (those who joined the ECO plan after January 25, 2000) are vested with eight or more years of ECO service credit in the same elected county position. Revised ECO members with eight years of service but less than eight years in the same elected county office will receive a Regular pension. Members can start drawing a benefit when either Normal or Early Retirement Pension Eligibility conditions are met.

Tier 2 Members: Members are vested for pension benefits when they have at least 10 years of qualifying service credit. SLEP members are vested for a SLEP pension when they have at least 10 years of SLEP service credit. Revised ECO members (those who join the ECO plan after January 25, 2000) are vested with ten or more years of ECO service credit in the same elected county position. Revised ECO members with at least 10 years of total service but less than 10 years of service in the same elected county office will receive a Regular pension. Members can start drawing a benefit when either Normal or Early Retirement Pension Eligibility conditions are met.

Surviving Spouse Pension

For Regular and SLEP members: A surviving spouse's monthly pension is one-half (66-2/3 percent for Tier 2) of the member's pension.

For ECO members: A surviving spouse's monthly pension is 66-2/3 percent of the member's pension. This pension is payable once the surviving spouse becomes 50 years old. If the spouse is caring for the member's minor, unmarried children, the spouse will receive (age 50 requirement does not apply):

- A monthly pension equal to 30 percent of the ECO member's salary at time of death, plus
- 10 percent of the ECO member's salary at time of death for each minor, unmarried child. The maximum total monthly benefit payable to spouse and children cannot exceed 50 percent of the ECO member's salary at time of death, or
- A monthly pension equal to 66-2/3 percent of the pension the member had earned.

Surviving spouse pensions under all plans are increased each January 1. The increase is based on the original amount of the pension. The increase for the first year is prorated for the number of months the surviving spouse or the member received a pension. For Tier 1, the annual increase is three percent. For Tier 2, the annual increase is three percent or one-half the increase in the Consumer Price Index, whichever is less.

Summary of Benefits and Conditions Evaluated December 31, 2017

Lump Sum Death-In-Service Benefit

Less than 1 year of service: Member contribution.

More than 1 year of service (or death in the line of duty): The sum of one times FRE (limited to pensionable earnings cap for Tier 2 members) and member contributions with interest.

These benefits are payable only if no surviving spouse pension is payable.

Lump Sum Death After Retirement Benefit

\$3,000. If there is no surviving spouse, any remainder of the deceased member's contributions and interest not paid out as a pension is also payable.

Children's Benefits

Regular and SLEP

Eligibility: Death of a member eligible to retire who has no surviving spouse, or death of a surviving spouse's beneficiary.

Amount: Equal to spouse's pension, divided equally among surviving children and payable to age 18.

ECO

Eligibility: Death of a member with minor children and no eligible spouse.

Amount: 20% of salary to each child, to a maximum of 50% of salary, payable to age 18.

If death occurs after termination of service, the total payment to the surviving spouse and children is limited to 75% of the member's pension.

Temporary Disability

Eligibility: Temporary disability for at least 30 days after one year of service and prior to age 70. Pre-existing conditions are excluded if service is under 5 years.

Amount: 50% of FRE less amounts payable from Social Security or Worker's Compensation.

Duration: Period equal to 1/2 credited service, not to exceed 30 months.

Total and Permanent Disability

Regular and SLEP

Eligibility: Payable after temporary disability period to members who are totally and permanently disabled and unable to engage in any gainful occupation.

Amount: 50% of FRE less amounts payable by Social Security.

Duration: To the later of (i) Social Security age, or (ii) age at disability plus 5 years.

ECO

Eligibility: Payable to members who are totally and permanently disabled from performing the duties of their office while in service as an elected county officer.

Amount: The greater of 50% of FRE or the alternate formula pension amount earned to date.

Duration: To the later of (i) Social Security age, or (ii) age at disability plus 5 years.

IMRF service is credited during the disability period, except that under the revised ECO plan, the service that will be credited will be Regular or SLEP as appropriate, but not ECO.

Summary of Benefits and Conditions Evaluated December 31, 2017

Post-Retirement Increases

Tier 1 Members: Members in all plans receive an annual 3% increase based upon the original amount of the annuity. The increase for the first year is pro-rated for the number of months the member was retired.

Tier 2 Members: Members in all plans receive an annual increase based upon the original amount of the annuity of 3% or one-half of the increase in the Consumer Price Index whichever is less. For regular and ECO members the annual increases do not begin until the retiree reaches the age of 67 or after 12 months of retirement, whichever is later. For SLEP members the increases begin at age 60 or after 12 months of retirement, whichever is later.

13th Payment

A lump sum payment is made to eligible retirees and surviving spouses on July 1st. The amount depends on funds available from a designated employer contribution of 0.62% of payroll. No specific 13th payment amount is promised to any individual.

Member Contributions

Regular Members: 4 1/2% of earnings (3-3/4% base plus 3/4% for survivor benefits).

SLEP Members: 7 1/2% of earnings (6-3/4% base plus 3/4% for survivor benefits).

ECO Members: 7 1/2% of earnings (6-3/4% base plus 3/4% for survivor benefits).

Converting past service credit: ECO members can convert past regular service by contributing 3% of earnings plus interest for each month of Regular service credit converted. ECO members can convert past SLEP service by contributing 0% to 3% (depending on the original SLEP contribution) of earnings plus interest for each month of SLEP service credit converted. SLEP members can convert past regular service by contributing 3% of earnings plus interest for each month of Regular service credit converted.

Voluntary Additional: Up to 10% of earnings.

Refunds: Non-vested members who stop working for an IMRF employer can receive a lump sum refund of their IMRF member contributions without interest. Vested members can receive a lump sum refund of their IMRF member contributions if they stop working for an IMRF employer prior to age 55 (62 for Tier 2 regular members, 50 for Tier 2 SLEP members). Vested members age 55 or older (62 for Tier 2 regular members, 50 for Tier 2 SLEP members) may receive separation refunds if the member rolls over the refund into another defined benefit retirement plan for the purpose of purchasing service credit.

Members who retire without an eligible spouse (married to or in a civil union with the member at least one year before the member terminates IMRF participation) may receive a refund of their surviving spouse contributions with interest or an annuity.

If, upon death of all persons eligible for benefits upon the member's record, all of the member contributions with interest (7.5% per year) were not paid as a refund or pension to either the member or his or her spouse or other beneficiary, any residual balance will be paid out.

Caps on Reportable Wages

Under Tier 2, a member's wages are capped. No contributions are payable on wages above the cap. The wage cap is also applied when IMRF calculates benefits. The cap increases each year by the lesser of 3% or one-half of the increase in the Consumer Price Index (urban) for the preceding September. If the CPI is zero or negative, the wage cap is not increased. A wage cap of \$113,645 was used in the December 31, 2017 valuation.

Summary of Covered Population Data December 31, 2017

Data on persons covered by IMRF were reported to the Actuary as follows:

Member Status	No.	Valuation Payroll/Benefits	Average		
			Pay/ Benefits	Age	Service
Active Members					
Regular Tier 1	107,477	\$4,885,604,092	\$45,457	52.4	14.9
Regular Tier 2	63,834	1,933,996,078	30,297	40.3	2.6
SLEP Tier 1	2,841	228,959,686	80,591	45.2	16.7
SLEP Tier 2	1,279	69,407,723	54,267	33.7	3.7
ECO / ECO SLEP Tier 1	135	9,525,042	70,556	56.2	16.6
Total Active	175,566	\$7,127,492,621	\$40,597	47.8	10.4
Inactive Members					
Regular Tier 1	134,954			48.5	6.1
Regular Tier 2	37,546			35.0	1.6
SLEP Tier 1	888			47.1	11.4
SLEP Tier 2	260			33.1	2.8
ECO / ECO SLEP Tier 1 (Inactive and Active)	162 (37,425)			56.8	13.5
Total Inactive	136,385			45.6	5.2
Retirees & Beneficiaries (Retired in multiple employers)	184,000 (56,930)				
Total Retired	127,070	\$2,024,041,464	\$15,929	72.0	
Total Population	439,021				
Prior Year Total	429,134				

There are a number of situations where members may be counted more than once. In particular, there are some members who are inactive with at least one employer and active with another employer. In order to avoid counting such individuals more than once, the inactive count is reduced by the number of such people as shown above. Other situations involving people who are inactive or retired with more than one employer can also lead to people being counted more than once in the totals above.

Additional population statistics are presented on the following pages.

Active Members by Employer Type

December 31, 2017

Regular, SLEP, ECO Combined

Type of Employer	Rate Groups	Members			Payroll
		Number	% of Total	Cumulative Percent	
School Districts	850	86,476	49.3%	49.3%	\$ 2,567,291,988
Counties (Regular, SLEP,ECO)	269	29,254	16.7%	66.0%	1,461,677,896
Cities	308	18,161	10.3%	76.3%	1,041,996,432
Villages	480	14,188	8.1%	84.4%	878,748,288
Park Districts	202	7,796	4.4%	88.8%	330,535,430
Townships	494	3,338	1.9%	90.7%	140,438,624
Special Ed Districts	49	4,695	2.7%	93.4%	137,609,401
Library Districts	226	3,221	1.8%	95.2%	120,144,941
Sanitary Districts	38	919	0.5%	95.7%	64,263,602
Intergovernmental Coop	54	753	0.4%	96.1%	52,414,725
Forest Preserve Districts	13	824	0.5%	96.6%	46,116,515
Towns	5	750	0.4%	97.0%	34,920,190
County Hospital Districts	3	716	0.4%	97.4%	34,752,915
Mass Transit District (Taxing Authority)	4	635	0.4%	97.8%	33,441,925
Mass Transit Instrumentality	5	566	0.3%	98.1%	20,584,896
Misc. Taxing Authority	8	275	0.2%	98.3%	19,553,466
Airport Authorities	12	277	0.2%	98.5%	16,498,443
Consolidated Education Service Region	24	471	0.3%	98.8%	15,358,593
Joint Spec Rec Assns	18	291	0.2%	99.0%	13,549,356
Fire Protection Districts	63	207	0.1%	99.1%	12,863,675
Miscellaneous Instrumentality	18	162	0.1%	99.2%	10,177,493
Health Districts	4	195	0.1%	99.3%	8,961,013
Regional Planning Commission	1	94	0.1%	99.4%	7,022,820
Multi Co/Cons Health Dept.	3	185	0.1%	99.5%	6,500,130
County Conservation Districts	5	120	0.1%	99.6%	6,355,092
Public Library System	2	139	0.1%	99.7%	6,311,600
Vocational System	39	157	0.1%	99.8%	5,819,256
Public Housing Authority	11	139	0.1%	99.9%	5,764,839
Educ Serv Centers	4	112	0.1%	100.0%	5,390,963
Special Ed Coop/Districts	12	57	0.0%	100.0%	4,339,328
Conservancy Districts	4	75	0.0%	100.0%	4,029,922
Water District	12	61	0.0%	100.0%	3,348,633
Mosquito Abatement District	7	30	0.0%	100.0%	2,088,168
Public Housing Commission	6	43	0.0%	100.0%	1,933,862
County Road District	33	54	0.0%	100.0%	1,787,265
Water Supply/Sewr Comission	6	30	0.0%	100.0%	1,641,626
ROE Office	2	37	0.0%	100.0%	1,459,038
Joint Education Projects	5	31	0.0%	100.0%	903,871
Drainage District	2	7	0.0%	100.0%	329,337
Multi Twp Assessment Districts	15	13	0.0%	100.0%	294,492
Township Cemetary	12	12	0.0%	100.0%	272,572
Tuberculosis Sanitarium Districts	1	0	0.0%	100.0%	-
Employers with no Active Members or no Asset Information*	452	0	0.0%	100.0%	-
Totals	3,781	175,566	100.0%	100.0%	\$7,127,492,621

* This number represents employers with no active members and no asset information. This number also represents employers listed earlier with employees participating in the voluntary additional contribution program.

Active Regular Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals	
	0-7	8-9	10-14	15-19	20-24	25-29	30 & Up	No.	Valuation Payroll
15 - 19	312							312	\$ 4,346,815
20 - 24	5,413							5,413	125,983,738
25 - 29	11,840	243	56					12,139	381,431,161
30 - 34	10,459	1,280	1,423	49				13,211	504,219,399
35 - 39	9,571	1,370	3,378	1,330	40			15,689	646,826,772
40 - 44	9,338	1,233	2,981	2,747	795	48	4	17,146	715,048,701
45 - 49	9,842	1,688	3,679	2,943	2,019	851	64	21,086	882,383,665
50	1,855	373	886	663	453	340	79	4,649	195,799,875
51	1,798	397	944	744	426	376	117	4,802	209,076,360
52	1,851	390	957	824	426	370	203	5,021	208,035,623
53	1,799	422	1,063	900	506	413	265	5,368	230,565,677
54	1,747	397	1,144	972	522	410	342	5,534	235,961,731
55	1,744	376	1,153	1,055	661	426	419	5,834	252,503,355
56	1,666	398	1,084	1,131	583	376	453	5,691	242,696,513
57	1,631	358	1,094	1,134	678	397	428	5,720	244,122,958
58	1,496	339	1,016	1,099	703	402	437	5,492	234,601,503
59	1,485	315	1,024	1,068	651	382	429	5,354	221,997,769
60	1,342	303	898	1,092	686	425	420	5,166	217,216,148
61	1,295	316	846	1,020	672	393	380	4,922	201,821,493
62	1,121	261	702	822	613	364	336	4,219	174,191,157
63	1,024	215	590	648	502	337	290	3,606	146,267,070
64	814	201	523	597	447	277	231	3,090	124,087,477
65	713	205	466	479	380	227	216	2,686	108,537,509
66	561	125	348	331	233	171	144	1,913	74,928,370
67	486	110	241	206	166	100	106	1,415	52,514,154
68	354	99	210	173	110	81	107	1,134	42,149,455
69	349	78	148	133	83	84	69	944	32,198,022
70	304	52	140	100	77	42	39	754	24,197,919
Over 70	1,067	280	567	441	257	168	221	3,001	85,889,781
Totals	83,277	11,824	27,561	22,701	12,689	7,460	5,799	171,311	\$6,819,600,170

Active SLEP Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals	
	0-7	8-9	10-14	15-19	20-24	25-29	30 & Up	No.	Valuation Payroll
20 - 24	81							81	\$ 3,434,630
25 - 29	402	3	1					406	20,895,955
30 - 34	366	115	122					603	38,356,282
35 - 39	192	80	324	93		1		690	48,272,298
40 - 44	114	43	162	264	92	3		678	51,436,153
45 - 49	64	35	148	200	279	89	1	816	66,877,345
50	14	6	13	29	31	39	2	134	11,600,506
51	8	5	11	23	30	32	2	111	9,423,160
52	8	2	10	16	19	12	2	69	5,598,617
53	10	3	13	18	14	9	7	74	5,788,128
54	4	1	11	12	20	10	4	62	4,998,513
55	7	2	8	13	12	9	5	56	4,685,432
56	2	1	6	16	7	10	4	46	3,706,907
57	10	1	8	13	8	3	5	48	3,944,219
58	7		12	8	7	5	6	45	3,477,468
59	4	1	8	7	6	5	5	36	2,768,406
60	8	1	6	4	2	4		25	2,074,511
61	6		5	4	2	4	3	24	2,048,368
62	3	3	6	8	7	5	3	35	2,505,356
63	2	1	5	5	3		2	18	1,323,568
64	4	2	2	4	2	1	1	16	1,285,271
65	3	2	4	6	1	1	2	19	1,590,979
66	1		2		2		1	6	544,621
67			2	2				4	302,560
68	2			1	1	1		5	380,029
69		1		2	1			4	392,104
70		2						2	127,463
Over 70	1		3	1			2	7	528,560
Totals	1,323	310	892	749	546	243	57	4,120	\$298,367,409

Active ECO Regular Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals	
	0-7	8-9	10-14	15-19	20-24	25-29	30 & Up	No.	Valuation Payroll
30-34	1							1	\$ 66,500
35-39		2						2	257,917
40-44	2	2	2	3				9	745,307
45-49	2	3	2	3	1	1		12	852,721
50		1	1	2				4	340,358
51			1	2	1	1		5	175,389
52		2		1	1			4	425,820
53		1	2	1				4	226,901
54	2		1			1	2	6	465,887
55	1	3	1	3		1	1	10	848,839
56	1	1	2	2	1	1	1	9	507,840
57	2							2	136,300
58	1		1	1		1		4	325,572
59	1	2	1					4	277,672
60				5	1		2	8	394,265
61	1	1	1	3	1	2		9	586,336
62			1	1		1	1	4	388,832
63	2		4	1			1	8	423,867
64			1		2			3	121,171
65		2			1	2		5	345,510
66			1					1	84,340
67			1	2		1		4	301,705
68	2			1				3	152,797
70			1					1	99,616
Over 70				1			1	2	96,571
Totals	18	20	24	32	9	12	9	124	\$8,648,033

Active ECO SLEP Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals	
	0-7	8-9	10-14	15-19	20-24	25-29	30 & Up	No.	Valuation Payroll
20-24									
25-29									
30-34									
35-39									
40-44									
45-49									
50	1			1				2	\$ 156,265
51			1					1	96,206
52									
53					1			1	68,339
54									
55									
56				1				1	75,706
57									
58									
59									
60									
61	1			2				3	212,187
62									
63									
64									
65									
66									
67							3	3	268,306
Totals	2		1	4	1		3	11	\$ 877,009

All Active Members by Years of Service and Gender December 31, 2017

Service Years	Active Member Count			Active Member Pays	
	Males	Females	Total	Total	Average
0-1	6,095	12,242	18,337	\$ 444,351,138	\$ 24,232
1-2	5,273	9,787	15,060	424,434,888	28,183
2-3	4,620	8,149	12,769	392,376,440	30,729
3-4	3,987	6,807	10,794	352,575,722	32,664
4-5	3,280	5,430	8,710	301,290,100	34,591
5-6	2,799	4,573	7,372	266,272,368	36,119
6-7	2,423	3,788	6,211	232,976,037	37,510
7-8	2,044	3,324	5,368	205,392,929	38,262
Sub-Total	30,521	54,100	84,621	2,619,669,622	30,958
8-9	2,016	3,389	5,405	206,232,827	38,156
9-10	2,522	4,227	6,749	277,794,875	41,161
10-11	2,363	4,537	6,900	286,248,831	41,485
11-12	2,154	4,195	6,349	272,140,245	42,863
12-13	2,077	3,720	5,797	260,404,705	44,921
13-14	1,726	3,200	4,926	225,627,035	45,803
14-15	1,699	2,810	4,509	210,041,172	46,583
15 & Up	20,015	30,295	50,310	2,769,333,309	55,045
Totals	65,093	110,473	175,566	\$7,127,492,621	\$40,597

Inactive Regular Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	No.
15-19	130							130
20-24	3,120	3						3,123
25-29	11,932	139	4					12,075
30-34	16,386	998	97					17,481
35-39	16,070	1,435	434	40		1	4	17,984
40-44	13,698	1,480	620	182	24	3	11	16,018
45-49	15,344	1,994	941	344	118	29	19	18,789
50	2,666	425	217	94	29	8	8	3,447
51	2,577	521	237	104	37	20	8	3,504
52	2,558	511	311	108	59	21	14	3,582
53	2,589	555	326	146	65	26	19	3,726
54	2,870	606	393	187	77	48	25	4,206
55	2,643	570	338	134	60	16	30	3,791
56	2,465	435	181	63	25	8	21	3,198
57	2,353	416	149	54	23	10	11	3,016
58	2,181	367	160	46	19	10	11	2,794
59	1,940	330	105	55	19	5	13	2,467
60	1,885	297	95	29	17	8	12	2,343
61	1,909	242	70	34	10	6	20	2,291
62	1,435	207	61	12	12	9	18	1,754
63	1,418	182	39	20	17	2	14	1,692
64	1,330	148	43	20	7	5	9	1,562
65	991	129	29	15	10	2	9	1,185
66	1,075	119	19	8	6	4	9	1,240
67	756	96	13	14	4	3	6	892
68	712	87	11	5	2	1	3	821
69	509	60	4	4	1	1	4	583
70	536	47	9	3	1		1	597
Over 70	1,044	121	35	10	6	1	14	1,231
Totals	115,122	12,520	4,941	1,731	648	247	313	135,522

Inactive SLEP Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals No.
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	
15-19								
20-24	10							10
25-29	73							73
30-34	83	22	6					111
35-39	67	29	14					110
40-44	43	35	12	5	3			98
45-49	69	24	20	10	15	5	4	147
50	11	5	3	2	3	2		26
51	8	4	4	2				18
52	4	5	4	3				16
53	6	5	8	6		1	1	27
54	5	2	5				1	13
55	7	4	5	1	1	1		19
56	3	2	3		1		1	10
57	3	1				1		5
58	6	1	3	1			1	12
59	8	1		1				10
60	4	1		1				6
61	2	2						4
62	3						1	4
63	4							4
64	5	2			1		1	9
65	5	1						6
66	3							3
67	4						1	5
68	1							1
69	2							2
70								
Over 70	4							4
Totals	443	146	87	32	24	10	11	753

Inactive ECO Members by Attained Age and Years of Service December 31, 2017

Attained Ages	Years of Service to Valuation Date							Totals No.
	0-4	5-9	10-14	15-19	20-24	25-29	30 & Up	
15-19								
20-24								
25-29								
30-34								
35-39		2						2
40-44	1	4	1					6
45-49	3	12	4	1				20
50	1	3	1		1			6
51	1	3		1		2		7
52		1						1
53		1	1					2
54	2	2	2	1	1			8
55	1	4	1	1	1			8
56		4	1					5
57	1	5						6
58	1	3	1					5
59		3		1				4
60	2			1				3
61	1	1		1				3
62	1	3	1					5
63	1	1						2
64			1		1			2
65	2							2
66		1						1
67							1	1
68	2	1			1			4
69		3		1				4
70	1							1
Over 70	1				1			2
Totals	22	57	14	8	6	2	1	110

Retirees and Beneficiaries December 31, 2017

Type of Retirement	Annual Amounts by Form of Payment					
	Regular		Level Payment Option		Total	
	No.*	Amount	No.*	Amount	No.*	Amount
Normal or Early						
Joint and 50% Survivor	97,025	\$ 1,111,148,796	21,795	\$ 297,504,408	118,820	\$ 1,408,653,204
Joint and 66% Survivor	672	16,621,116	169	4,966,440	841	21,587,556
Straight Life	32,451	370,661,712	6,873	102,098,112	39,324	472,759,824
Total	130,148	1,498,431,624	28,837	404,568,960	158,985	1,903,000,584
Disability	314	2,931,948	-	0	314	2,931,948
Surviving Beneficiaries	16,254	102,985,680	864	8,570,376	17,118	111,556,056
Annuitization of Surviving Spouse and SLEP benefits	6,713	4,843,500	-	0	6,713	4,843,500
Voluntary Contributions	870	1,709,376	-	0	870	1,709,376
Grand Total	154,299	\$1,610,902,128	29,701	\$413,139,336	184,000	\$2,024,041,464

* Number of records. There are 127,070 unique retirees.

Of the 6,713 records listed as receiving “Annuitization of Surviving Spouse and SLEP benefits”, 6,702 records are also in receipt of a separate retirement benefit.

Of the 870 records listed as receiving “Voluntary Contributions”, 862 records are also in receipt of a separate retirement benefit.

Thirteenth check payment amounts are not included in the above figures.

In the above chart, “Regular” refers to all forms of payment other than the level payment option. It does not connote “Regular” as opposed to SLEP and ECO.

Retirees and Beneficiaries by Attained Age December 31, 2017

Attained Ages	Number*			Annual Benefits
	Males	Females	Total	
Under 20	1	4	5	\$ 14,172
20 - 24	3	8	11	26,460
25 - 29	13	12	25	43,692
30 - 34	16	29	45	162,072
35 - 39	22	19	41	217,704
40 - 44	17	34	51	303,696
45 - 49	38	83	121	750,864
50 - 54	460	329	789	22,428,852
55 - 59	4,720	7,724	12,444	172,030,776
60 - 64	10,524	19,169	29,693	396,601,284
65 - 69	13,454	28,176	41,630	495,256,992
70 - 74	10,637	24,739	35,376	384,655,716
75 - 79	7,700	18,246	25,946	250,436,556
80 - 84	5,280	12,943	18,223	159,692,196
85 - 89	3,316	8,363	11,679	90,451,068
90 - 94	1,592	4,278	5,870	40,126,476
95 & Up	476	1,575	2,051	10,842,888
Totals	58,269	125,731	184,000	\$2,024,041,464

* Number of records. There are 127,070 unique retirees.

Retirees and Beneficiaries by Year of Retirement December 31, 2017

Year of Retirement	Number*			Annual Benefits
	Males	Females	Total	
2017	4,343	8,397	12,740	\$ 157,351,092
2016	4,213	9,147	13,360	155,342,088
2015	4,436	8,830	13,266	158,327,016
2014	3,983	8,463	12,446	148,308,600
2013	3,865	7,758	11,623	135,911,652
2012	3,440	6,861	10,301	119,984,316
2011	3,316	6,348	9,664	123,112,752
2010	3,292	6,336	9,628	118,617,648
2009	2,793	4,934	7,727	94,480,176
2008	2,439	4,490	6,929	82,381,956
2007	2,376	5,032	7,408	81,047,904
2006	2,092	4,203	6,295	71,953,716
2005	2,021	4,294	6,315	67,034,688
2004	2,000	4,081	6,081	66,846,012
2003	2,029	3,808	5,837	62,112,000
2002	1,526	3,287	4,813	49,892,364
2001	1,225	3,328	4,553	39,365,124
2000	1,039	2,610	3,649	34,989,768
1995 - 1999	5,113	13,075	18,188	168,086,268
1990 - 1994	1,857	6,182	8,039	61,065,696
1985 - 1989	664	2,970	3,634	22,753,116
1980 - 1984	177	1,018	1,195	4,500,108
1975 - 1979	25	228	253	500,712
1970 - 1974	4	50	54	76,128
Before 1970	1	1	2	564
Total	58,269	125,731	184,000	\$2,024,041,464

* Number of records. There are 127,070 unique retirees.

Data Reported for Actuarial Valuations Comparative Summary

Date December 31	Total Count	Active Members					Number		Ratio: Act/Ret.
		Number	Average			Inactive	Retired [#]		
			Age	Serv.	Annual Pay			Pay Increase	
1993	245,409	122,361	44.2	8.2	\$22,142	6.4 %	66,735	56,313	2.20
1994	265,456	133,803	43.8	7.8	22,021	(0.5)%	73,972	57,681	2.30
1995	262,232	136,617	43.8	8.2	22,661	2.9 %	65,914	59,701	2.29
1996	249,291	139,525	44.0	8.3	22,104	3.5 %*	48,274	61,492	2.27
1997	290,804	143,999	44.1	8.2	23,991	8.5 %	81,919	64,886	2.22
1998	303,869	148,610	44.3	8.2	24,871	3.7 %	88,173	67,086	2.22
1999	317,616	153,910	44.4	8.6	25,678	3.2 %	94,576	69,130	2.23
2000	330,313	157,836	44.6	8.2	26,514	3.4 %	102,082	70,395 ⁺	2.24
2001	343,842	163,886	44.9	8.3	27,477	3.9 %	108,338	71,618	2.29
2002	353,897	166,365	45.3	8.5	28,582	4.0 %	113,524	74,008	2.25
2003	361,010	166,439	45.7	8.8	29,709	3.9 %	118,093	76,478	2.18
2004	367,590	167,030	46.0	9.0	30,899	4.0 %	121,543	79,017	2.11
2005	377,251	169,867	46.3	9.1	31,640	2.4 %	125,761	81,623	2.08
2006	387,665	173,068	46.5	9.4	32,535	2.8 %	130,239	84,358	2.05
2007	398,659	176,495	46.7	9.5	33,607	3.3 %	134,687	87,477	2.02
2008	420,632	180,615	46.8	9.6	34,655	3.1 %	149,885	90,132	2.00
2009	412,435	180,643	47.1	9.8	35,771	3.2 %	138,530	93,262	1.94
2010	405,195	176,179	47.5	10.3	36,277	1.4 %	131,462	97,554	1.81
2011	409,415	175,233	47.7	10.4	36,701	1.2 %	132,282	101,900	1.72
2012	415,079	174,381	47.8	10.6	37,252	1.5 %	134,293	106,405	1.64
2013	417,227	173,481	47.9	10.7	38,059	2.2 %	136,749	106,997	1.62
2014	423,509	173,579	47.9	10.6	38,786	1.9 %	137,941	111,989	1.55
2015	432,096	173,832	47.9	10.6	39,805	2.6 %	141,236	117,028	1.49
2016	429,134	174,835	47.8	10.5	40,076	0.7 %	132,213	122,086	1.43
2017	439,021	175,566	47.8	10.4	40,597	1.3 %	136,385	127,070	1.38

* Changed method of recording earnings for 1996 valuation.

+ Restated subsequent to release of 2000 valuation.

Number of unique retirees. There are 184,000 retiree records.

SECTION C

FINANCIAL DATA

Development of Funding Value of Retirement System Assets

Year Ended December 31	2016	2017	2018	2019	2020	2021
A. Funding Value Beginning of Year	\$34,913,127,469	\$36,773,397,527				
B. Market Value End of Year	36,446,780,265	41,312,666,221				
C. Market Value Beginning of Year	34,461,065,824	36,446,780,265				
D. Non-Investment/Administrative Net Cash Flow	(624,873,575)	(789,479,627)				
E. Investment Return						
E1. Market Total: B-C-D	2,610,588,016	5,655,365,583				
E2. Assumed Rate of Return	7.50%	7.50%				
E3. Assumed Amount of Return	2,595,051,801	2,728,399,329	-----Scheduled-----			
E4. Return Subject to Phase-In: E1-E3	15,536,215	2,926,966,254				
F. Phased-In Recognition of Investment Return						
F1. Current Year: 0.20 x E4	3,107,243	585,393,251	Unknown	Unknown	Unknown	Unknown
F2. First Prior Year	(113,015,411)	3,107,243	\$531,215,977	Unknown	Unknown	Unknown
F3. Second Prior Year	-	(113,015,411)	-	\$531,215,977	Unknown	Unknown
F4. Third Prior Year	-	-	-	-	\$531,215,977	Unknown
F5. Fourth Prior Year	-	-	-	-	-	\$531,215,978
F6. Funding Corridor Adjustment	-	-				
F7. Total Scheduled Phase-in of gain/(loss)	(109,908,168)	475,485,083	531,215,977	531,215,977	531,215,977	531,215,978
G. Acceptable Phase-in of Investment Return						
G1. Projected Funding Value without Phase-in: A+D+E3	36,883,305,695	38,712,317,229				
G2. Limit on Phase-in: B-G1	(436,525,430)	2,600,348,992				
G3. Acceptable Phase-in Amount	(109,908,168)	475,485,083				
H. Funding Value End of Year: A+D+E3+G3	\$36,773,397,527	\$39,187,802,312				
I. Difference Between Market and Funding Value	(326,617,262)	2,124,863,909	1,593,647,932	1,062,431,955	531,215,978	-
J. Recognized Rate of Return	7.2%	8.8%				
K. Market Rate of Return	7.6%	15.7%				
L. Ratio of Funding Value to Market Value	100.9%	94.9%				

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased-in over a closed 5-year period subject to a 20% corridor. The acceptable phase-in amount (Item G3) is the minimum of Items F7 and G2, if G2 is positive. If G2 is negative, the acceptable phase-in amount is the greater of Items F7 and G2.

Development of Market Value Adjustment

In a single employer plan, the Market Value Adjustment would normally be the difference between the funding value of assets and the market value of assets. In IMRF, because of the need to allocate the Market Value Adjustment in an equitable manner among participating employers, certain extra steps are taken as shown below.

	Year Ended December 31	
	2017	2016
1. Funding Value of End of Year	\$ 39,187,802,312	\$ 36,773,397,527
2. Amounts not used in rate calculations		
a. Suspended Annuity Reserve	43,410,378	40,237,440
b. Disability Benefit Reserve	13,305,013	13,031,149
c. Death Benefit Reserve	20,623,510	19,573,265
d. Supplemental Benefit Reserve	1,235,653	744,509
e. Cases removed from rate calculations*	185,326,819	139,023,401
f. Estimated pending reserve transfers	-	-
g. Total	263,901,373	212,609,764
3. Remaining amount to allocate: (1)-(2g)	38,923,900,939	36,560,787,763
4. Total reported negative reserves	(70,139)	(58,848)
5. Amount available to positive reserves: (3)-(4)	38,923,971,078	36,560,846,611
6. Total Market Value of reported positive reserves	41,130,680,625	36,232,868,420
7. Market Value Adjustment: (5)-(6)	\$ (2,206,709,547)	\$ 327,978,191

* Employers that are not included on the asset file submitted to the actuary. In general, these employers have no active members and no employer assets, but may have retired lives and/or inactive members. This amount also includes Voluntary Additional contribution balances.

The Market Value Adjustment is allocated among all employers that have a positive reserve balance (member plus employer plus retired life reserves), in proportion to each employer's reserve balance.

Even in years when the Funding Value of Assets equals the Market Value of Assets, a market value adjustment can be made due to the following reasons:

- Differences between the earnings and experience reserve and the investment loss reserve from the financial statements.
- Differences between employee contribution amounts in the financial statements versus data tapes.
- Differences between employer contribution amounts in the financial statements versus data tapes.

Reported Market Values

	Market Value		Percentage of Total	
	2017	2016	2017	2016
Investment Portfolio				
Fixed income	\$ 10,795,058,802	\$ 10,002,021,597	26.3%	27.6%
Short term	75,520,121	104,466,706	0.2%	0.3%
Foreign exchange contracts	(1,077,345)	2,842,742	0.0%	0.0%
Stocks	17,092,349,046	14,456,879,247	41.6%	39.9%
Bond funds	-	-	0.0%	0.0%
Stock funds and index funds	8,803,067,909	7,772,080,398	21.4%	21.4%
Options	-	-	0.0%	0.0%
Real estate	2,251,708,528	1,937,666,935	5.5%	5.3%
Alternative investments	1,534,479,564	1,482,606,704	3.7%	4.1%
Master trust reserve fund	593,127,394	600,006,685	1.4%	1.7%
Cash	-	-	0.0%	0.0%
Due from brokers	-	-	0.0%	0.0%
Due (to) brokers	(111,441,532)	(189,808,540)	(0.3)%	(0.5)%
Accrued investment income	71,038,419	72,496,750	0.2%	0.2%
Total Invested Assets	\$41,103,830,906	\$36,241,259,224	100.0%	100.0%
Receivables	244,758,003	233,160,823		
Cash	(4,025,414)	(4,150,458)		
Fixed Assets	15,006,104	22,760,009		
Total Market Value	\$41,359,569,599	\$36,493,029,598		
Liabilities				
Benefits & vouchers payable	46,903,378	46,249,333		
Securities lending payable	-	-		
Total Liabilities	46,903,378	46,249,333		
Nets Assets Available for				
Benefits	\$41,312,666,221	\$36,446,780,265		

Amounts on this page are preliminary year-end numbers and may not agree with final audited numbers reported by IMRF, but are shown for completeness.

Change in Plan Assets

	Activity During Year	
	2017	2016
Additions:		
Contributions:		
Employer Contributions	\$ 902,355,627	\$ 932,706,442
Employee Contributions	393,504,075	380,379,655
Total Contributions	1,295,859,702	1,313,086,097
Investment Income:		
Net Appreciation (Depreciation) in Fair Value of Investments	5,125,049,797	2,105,606,988
Interest	236,017,438	239,415,915
Dividends	314,884,678	285,350,900
Securities Lending Income	10,487,794	10,922,862
Other	(205,723)	134,144
Net Investment Income	5,686,233,984	2,641,430,809
Other Revenues	564,556	46,220
Total Additions	6,982,658,242	3,954,563,126
Deductions:		
Benefits and Refunds:		
Retirement, Disability, and Beneficiary	1,979,925,090	1,838,876,539
Separation Benefits	60,990,938	54,183,036
Transfers to other Systems	91,361	156,038
Supplemental Benefits	44,331,939	44,744,059
Total Benefits and Refunds	2,085,339,328	1,937,959,672
Administrative Expenses	31,408,440	30,889,012
Other Expenses	24,518	0
Total Deductions	2,116,772,286	1,968,848,684
Net Increase (Decrease)	4,865,885,956	1,985,714,442
Net Assets Held in Trust:		
Beginning of Year	\$36,446,780,265	\$34,461,065,823
End of Year	\$41,312,666,221	\$36,446,780,265

SECTION D

ACTUARIAL METHODS AND ASSUMPTIONS

Summary of Actuarial Methods and Assumptions Used for IMRF Actuarial Valuations Assumptions Adopted by Retirement Board After Consulting with Actuary

Rationale: The rationale for all assumptions is provided in the study of experience during the 2014-2016 period, and dated November 8, 2017.

Economic Assumptions

The economic assumptions are based upon experience during the 2014-2016 period (please see report dated November 8, 2017), and were first used in the December 31, 2017 valuation.

The investment return rate assumed in the valuations was 7.5% per year, compounded annually (net after administrative expenses).

Price Inflation is assumed to be 2.5%.

Payroll Growth: Each employer's payroll was assumed to grow in total at a rate of 2.5% year.

The assumed **real rate of return** was 5.0% -- the difference between the assumed rate of investment return, and the assumed price inflation rate.

The **Active Member Population** is assumed to remain constant.

Pay increase assumptions for individual active members are shown for sample ages on pages D-8 and D-9. Part of the assumption for each age is for merit and/or seniority increase, and the other 3.25% recognizes price inflation, productivity increases, and other macroeconomic forces.

Non-Economic Assumptions

Non-economic (decrement) assumptions include rates of mortality before and after retirement, rates of disability, rates of retirement, rates of other separation from employment and probabilities of an active member being married. The non-economic assumptions are based upon experience during the 2014-2016 period (please see report dated November 8, 2017), and were first used in the December 31, 2017 valuation. Decrement assumptions are shown for sample ages beginning on page D-3.

Summary of Actuarial Methods and Assumptions Used for IMRF Actuarial Valuations Assumptions Adopted by Retirement Board After Consulting with Actuary

Actuarial Valuation Method

An aggregate entry age actuarial cost method of valuation was used in determining most liabilities and normal cost. This means that an individual entry-age employer normal cost was determined for each benefit group (Regular Tier 1, Regular Tier 2, SLEP Tier 1, SLEP Tier 2, ECO Tier 1, ECO Tier 2) as a percent of payroll. The normal cost for each employer was calculated based on the aggregate Tier 1 and Tier 2 normal cost, weighted on the expected payroll of Tier 1 and Tier 2 members for the given employer. Larger employers have the option of an individual normal cost rate. For each Tier the aggregate normal cost rate is multiplied by the present value of future salary of that Tier and then aggregated to determine the present value of future normal cost for each employer. The actuarial accrued liability is then calculated by subtracting the present value of future normal cost and present value of future employee contributions from the present value of future benefits.

Differences in the past between assumed experience and actual experience (“actuarial gains and losses”) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments (principal & interest) which are level percent of payroll contributions.

Liabilities for lump sum death benefits and temporary disability benefits were determined using a term cost approach. The actual cost of benefits as a percentage of payroll for the year ending on the valuation date is assumed to continue. Under this approach, the funding objective is to receive contributions each year that approximately equal the benefits being paid.

Employer contributions were assumed to be **paid in equal installments** throughout the year.

Present assets (cash & investments) at funding value are shown on page C-1.

Asset Valuation Method

The Funding Value of Assets (developed on page C-1) recognizes assumed investment return fully each year. Differences between actual and assumed investment income are phased-in over a closed 5-year period subject to a 20% corridor. The method also limits the adjustment to the expected actuarial return to the maximum amount of unrecognized gains or losses not yet reflected in the actuarial value of assets. In any year in which the actuarial value minus the market value of assets switches from a positive value to a negative value, or vice-versa, any prior gain/loss bases are eliminated and the smoothing mechanism restarts.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA).

Actuarial Assumptions December 31, 2017 Probabilities of Age & Service Retirement

Tier 1

Age at Retirement	Regular		Regular		SLEP		ECO-Regular		ECO-SLEP
	Reduced Early		Normal		Normal		Normal		Normal
	Males	Females	Males	Females	Service less than 32 years	Service 32 years or more	Males	Females	Males & Females
50					27%	35%			27%
51					27%	35%			27%
52					23%	35%			23%
53					14%	35%			14%
54					26%	35%			26%
55	7.10%	6.00%	37%	26%	24%	35%	25%	35%	24%
56	7.10%	6.00%	28%	20%	20%	35%	25%	35%	20%
57	7.10%	6.00%	21%	17%	23%	35%	15%	20%	23%
58	7.10%	6.00%	21%	17%	30%	35%	15%	20%	30%
59	7.10%	6.00%	23%	19%	24%	35%	15%	20%	24%
60			13%	11%	20%	35%	15%	20%	20%
61			13%	10%	17%	35%	15%	20%	17%
62			21%	18%	23%	35%	15%	20%	23%
63			19%	18%	20%	35%	15%	20%	20%
64			18%	17%	20%	35%	15%	20%	20%
65			25%	26%	30%	35%	15%	20%	30%
66			31%	28%	24%	35%	15%	20%	24%
67			26%	26%	24%	35%	15%	20%	24%
68			24%	22%	24%	35%	15%	20%	24%
69			22%	23%	24%	35%	15%	20%	24%
70			22%	23%	100%	100%	15%	20%	100%
71			22%	21%	100%	100%	15%	20%	100%
72			19%	21%	100%	100%	15%	20%	100%
73			20%	23%	100%	100%	15%	20%	100%
74			21%	21%	100%	100%	15%	20%	100%
75			21%	22%	100%	100%	17%	20%	100%
76			21%	22%	100%	100%	17%	20%	100%
77			21%	22%	100%	100%	17%	20%	100%
78			21%	22%	100%	100%	17%	20%	100%
79			21%	22%	100%	100%	17%	20%	100%
80 & Over			100%	100%	100%	100%	100%	100%	100%

For terminated vested members, members were assumed to retire as follows:

- Regular Tier 1 members were assumed to retire at age 60 or attained age if later;
- Regular Tier 2 members were assumed to retire at age 67 or attained age if later;
- SLEP Tier 1 members with less than 20 years of service were assumed to retire at age 60;
- SLEP Tier 1 members with 20 or more years of service were assumed to retire at age 50;
- SLEP Tier 2 members with less than 10 years of service were assumed to retire at age 67;
- SLEP Tier 2 members with 10 or more years of service were assumed to retire at age 55;
- ECO Tier 1 members were assumed to retire at age 55 or attained age if later; and
- ECO Tier 2 members were assumed to retire at age 62 or attained age if later.

Actuarial Assumptions December 31, 2017 Probabilities of Age & Service Retirement

Tier 2

Age	Regular								SLEP					
	Male				Female				Male			Female		
	Normal			Early	Normal			Early	Normal		Early	Normal		Early
	Service Less than 30 Years	Service Between 30 and 35 Years	Service 35 Years or More		Service Less than 30 Years	Service Between 30 and 35 Years	Service 35 Years or more		Service Less than 30 Years	Service 30 Years or More		Service Less than 30 Years	Service 30 Years or More	
50										12%			12%	
51										9%			9%	
52										7%			7%	
53										4%			4%	
54										12%			12%	
55								60%	80%		60%	80%		
56								18%	55%		18%	55%		
57								23%	55%		23%	55%		
58								33%	55%		33%	55%		
59								13%	55%		13%	55%		
60								8%	55%		8%	55%		
61								8%	55%		8%	55%		
62			75%	15%			75%	13%	23%	55%	23%	55%		
63			75%	15%			75%	13%	18%	55%	18%	55%		
64			75%	15%			75%	13%	18%	55%	18%	55%		
65			75%	15%			75%	13%	23%	55%	23%	55%		
66			75%	15%			75%	13%	23%	55%	23%	55%		
67	30%	50%	75%		25%	50%	75%		23%	55%	23%	55%		
68	30%	50%	75%		25%	50%	75%		23%	55%	23%	55%		
69	25%	50%	75%		20%	50%	75%		23%	55%	23%	55%		
70	20%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
71	20%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
72	20%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
73	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
74	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
75	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
76	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
77	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
78	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
79	18%	50%	75%		18%	50%	75%		100%	100%	100%	100%		
80+	100%	100%	100%		100%	100%	100%		100%	100%	100%	100%		

**Actuarial Assumptions
December 31, 2017
Probabilities of Separation from Active Member Status**

Tier 1 and Tier 2

Service	% Separating Next Year					
	Regular		ECO		SLEP	ECO-SLEP
	Males	Females	Males	Females		
0	24.5%	28.5%	40.0%	40.0%	17.0%	17.0%
1	19.5%	22.2%	20.0%	20.0%	10.0%	10.0%
2	15.0%	17.8%	15.0%	15.0%	6.5%	6.5%
3	13.0%	14.5%	14.0%	14.0%	6.2%	6.2%
4	10.3%	11.8%	13.0%	13.0%	5.5%	5.5%
5	8.8%	10.3%	12.0%	12.0%	4.6%	4.6%
6	7.3%	8.5%	11.0%	11.0%	3.6%	3.6%
7	7.0%	8.0%	10.0%	10.0%	N/A	N/A
Age	8 or More Years of Service		8 or More Years of Service		7 or More Years of Service	7 or More Years of Service
30	4.4%	7.3%	9.5%	6.8%	2.4%	2.4%
35	3.5%	5.8%	9.5%	6.8%	1.8%	1.8%
40	2.8%	4.4%	9.5%	6.8%	1.3%	1.3%
45	2.3%	3.6%	9.5%	6.8%	1.2%	1.2%
50	2.0%	3.0%	9.5%	6.8%	1.2%	1.2%

Actuarial Assumptions December 31, 2017

Active Member Probabilities of Death and Disability

Tier 1 and Tier 2

Sample Ages in 2017	% Dying			
	Regular & ECO		SLEP & ECO-SLEP	
	Male	Female	Male	Female
20	0.06%	0.02%	0.06%	0.02%
25	0.07%	0.02%	0.07%	0.02%
30	0.06%	0.02%	0.06%	0.02%
35	0.07%	0.03%	0.07%	0.03%
40	0.10%	0.05%	0.10%	0.05%
45	0.15%	0.08%	0.15%	0.08%
50	0.25%	0.13%	0.25%	0.13%
55	0.38%	0.19%	0.38%	0.19%
60	0.64%	0.31%	0.64%	0.31%
65	1.23%	0.49%	1.23%	0.49%
70	2.07%	0.82%	2.07%	0.82%
75	3.38%	1.36%	3.38%	1.36%
80	5.43%	2.29%	5.43%	2.29%

For active members, the mortality rates are based on the RP-2014 Employee Mortality Table for both males and females with 2-dimensional, fully generational improvements using the MP-2017 Mortality Improvement Scale. For males, 100% of the rates were used; for females, 99% of the rates were used.

Sample Ages	% Disabled							
	Regular		ECO		SLEP		ECO-SLEP	
	Male	Female	Male	Female	Male	Female	Male	Female
20	0.00%	0.00%	0.01%	0.01%	0.00%	0.01%	0.01%	0.01%
25	0.00%	0.00%	0.01%	0.01%	0.01%	0.02%	0.01%	0.01%
30	0.00%	0.00%	0.01%	0.01%	0.01%	0.03%	0.01%	0.01%
35	0.01%	0.00%	0.03%	0.02%	0.02%	0.05%	0.03%	0.02%
40	0.02%	0.01%	0.04%	0.03%	0.02%	0.07%	0.04%	0.03%
45	0.03%	0.01%	0.06%	0.04%	0.03%	0.10%	0.06%	0.04%
50	0.04%	0.02%	0.09%	0.06%	0.05%	0.15%	0.09%	0.06%
55	0.07%	0.03%	0.15%	0.10%	0.07%	0.21%	0.15%	0.10%
60	0.08%	0.05%	0.19%	0.17%	0.06%	0.19%	0.19%	0.17%
65	0.09%	0.06%	0.20%	0.20%	0.04%	0.13%	0.20%	0.20%
70	0.08%	0.05%	0.17%	0.17%	0.03%	0.07%	0.17%	0.17%
75	0.05%	0.04%	0.12%	0.12%	0.01%	0.02%	0.12%	0.12%
80	0.05%	0.03%	0.10%	0.10%	0.00%	0.00%	0.10%	0.10%

Actuarial Assumptions December 31, 2017 Retiree, Beneficiary, Terminated Vested and Disabled Life Mortality

Tier 1 and Tier 2

Sample Ages in 2017	% Dying Next Year			
	Non-Disabled Lives		Disabled Lives	
	Males	Females	Males	Females
40	0.2307%	0.1225%	1.5425%	0.6750%
45	0.3389%	0.1882%	2.0563%	0.9200%
50	0.4653%	0.2810%	2.3349%	1.1857%
55	0.6307%	0.4083%	2.4571%	1.4685%
60	0.8973%	0.5858%	2.8229%	1.7364%
65	1.4509%	0.8755%	3.6443%	2.0932%
70	2.3545%	1.3819%	4.8252%	2.7907%
75	3.8156%	2.2755%	6.5743%	4.0660%
80	6.2628%	3.8004%	9.2525%	6.0781%

Sample Ages in 2017	Life Expectancy Years for 2017			
	Non-Disabled Retired Lives		Disabled Lives	
	Males	Females	Males	Females
40	41.9	47.0	29.1	37.5
45	36.9	41.8	26.0	33.3
50	32.0	36.8	23.0	29.3
55	27.3	31.9	20.1	25.5
60	22.8	27.1	17.0	22.0
65	18.5	22.6	14.1	18.5
70	14.7	18.3	11.5	15.1
75	11.3	14.4	9.1	11.9
80	8.3	10.9	6.9	9.2

For non-disabled lives, the mortality rates are IMRF specific mortality rates with 2-dimensional, fully generational improvements using the MP-2017 Mortality Improvement Scale (projected from 2015). These rates were developed from the RP-2014 Blue Collar Mortality Table with adjustments to match current IMRF experience. For disabled lives, the mortality rates are IMRF specific mortality rates with 2-dimensional, fully generational improvements using the MP-2017 Mortality Improvement Scale. These rates were developed using the RP-2014 Disabled Mortality Table applying the same adjustments that were applied for non-disabled lives.

Actuarial Assumptions December 31, 2017 Pay Increases for Regular and ECO Active Members

Tier 1 and Tier 2

% Increase in Pay Next Year							
5 or More Years Service				Increase For Those With Less Than 5 Years of Service			
Age	Merit & Longevity	Economic	Total	Service	Merit & Longevity	Economic	Total
25	2.50%	3.25%	5.75%	0	7.10%	3.25%	10.35%
30	2.02%	3.25%	5.27%	1	6.40%	3.25%	9.65%
35	1.34%	3.25%	4.59%	2	3.60%	3.25%	6.85%
40	0.98%	3.25%	4.23%	3	2.70%	3.25%	5.95%
45	0.72%	3.25%	3.97%	4	2.20%	3.25%	5.45%
50	0.48%	3.25%	3.73%				
55	0.28%	3.25%	3.53%				
60	0.14%	3.25%	3.39%				

For a person with 5 or more years of service, the assumed pay increase during the coming year is found in the 5 or more years of service total column. For a person with less than 5 years of service, the assumed pay increase during the coming year is found in the less than 5 years of service total column.

Actuarial Assumptions
December 31, 2017
Pay Increases for SLEP and ECO-SLEP Active Members

Tier 1 and Tier 2

% Increase in Pay Next Year Years of Service			
Service	Economic	Merit & Longevity	% Total Increase
1	3.25%	11.00%	14.25%
2	3.25%	8.50%	11.75%
3	3.25%	4.00%	7.25%
4	3.25%	3.50%	6.75%
5	3.25%	3.00%	6.25%
6	3.25%	2.50%	5.75%
7	3.25%	2.00%	5.25%
8	3.25%	1.50%	4.75%
9	3.25%	1.25%	4.50%
10	3.25%	1.00%	4.25%
11	3.25%	0.75%	4.00%
12	3.25%	0.75%	4.00%
13	3.25%	0.50%	3.75%
14	3.25%	0.50%	3.75%
15	3.25%	0.50%	3.75%
16	3.25%	0.50%	3.75%
17	3.25%	0.50%	3.75%
18	3.25%	0.50%	3.75%
19	3.25%	0.50%	3.75%
20	3.25%	0.50%	3.75%
21	3.25%	0.50%	3.75%
22	3.25%	0.50%	3.75%
23	3.25%	0.50%	3.75%
24	3.25%	0.50%	3.75%
25	3.25%	0.50%	3.75%
26	3.25%	0.50%	3.75%
27	3.25%	0.50%	3.75%
28	3.25%	0.50%	3.75%
29	3.25%	0.50%	3.75%
30	3.25%	0.50%	3.75%

Miscellaneous and Technical Assumptions

Expenses:	Assumed investment return is net of administrative and investment expenses.
Marriage Assumption:	75% of male and 70% of female participants are assumed to be married for purposes of death-in-service and death after retirement benefits. Male spouses are assumed to be three years older than female spouses for active member valuation purposes.
Pay Increase Timing:	Beginning of (Calendar) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service on the decrement date is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
Normal Form of Benefit:	The assumed normal form of benefit is a 50% joint and survivor benefit for Regular and SLEP Tier 1 members and 66 2/3% for Regular and SLEP Tier 2 members and ECO members. Factors for determining optional forms of payment are based on 120% of the current mortality rates (50% unisex) and 7.5% interest.
Surviving Spouse Refunds:	For those individuals who are not assumed to be married at retirement, the surviving spouse contributions are assumed to be refunded.
SLEP Refunds:	SLEP participants who are assumed to retire with insufficient service to qualify for SLEP benefits are assumed to receive a refund of their SLEP contributions.
SLEP Conversions:	It was assumed that all active participants in the SLEP program will convert all eligible service (up to 10 years). Additionally, it was assumed that these members would contribute the difference in both member and employer rates for each year converted.
ECO Conversions:	It is assumed that active participants in the ECO program will convert all eligible service up to the point the maximum ECO benefit would be achieved.

Miscellaneous and Technical Assumptions

Final Rate of Earnings (FRE):	The FRE is determined by projecting the current salary to retirement and averaging the salary over the appropriate number of years. The current FRE is used if this produces a higher value. For Tier 2 members, FRE is capped at \$113,645 and increases by the lesser of 3% and one-half of CPI.
Refunds for Terminated Vested Members:	Members are assumed to elect annuities.
Other:	Disability decrements operate during retirement eligibility.
Post-Retirement Increases:	For Tier 2, pensions increase by the lesser of 3% or one-half of the increase in the Consumer Price Index (urban) for the preceding September. If the CPI is zero, pension benefits are not increased. In the December 31, 2017 valuation annual pension increases were assumed to grow at an annual rate of 1.35%. Tier 1 increases are not related to CPI.
Wage Cap Growth:	Under Tier 2, a member's wages are capped. The wage cap increases each year by the lesser of 3% or one-half of the increase in the Consumer Price Index (urban) for the preceding September. If the CPI is zero, the wage cap is not increased. A wage cap of \$113,645 was used for Tier 2 members in the December 31, 2017 valuation. In the December 31, 2017 valuation, the wage cap was assumed to grow at an annual rate of 1.35%.
Sick Leave Load:	Normal cost and active liabilities for all decrements were increased by 1.25% to account for the inclusion of unused sick leave.

Actuarial Funding Policy

A. Introduction

The purpose of this Actuarial Funding Policy is to record the funding objective and policy set by the Board of Trustees (Board) of the Illinois Municipal Retirement Fund (IMRF). The Board establishes this funding policy to help ensure the systematic accumulation of assets needed to pay future benefits for members of IMRF.

This funding policy shall be reviewed by the Board of Trustees every three years in conjunction with the triennial experience study conducted by IMRF's actuaries.

The actuary shall prepare annual actuarial valuations and calculate future employer contribution rates based upon calendar-year data. As required by statute, it shall conduct a triennial experience study to review actuarial assumptions and to recommend appropriate changes.

Summary of Key Actuarial Assumptions:

- Entry-Age Normal Actuarial Cost Method
- Utilize a 5-year Smoothing Period, subject to a 20% Market v. Actual Corridor
- Amortize over/under funding over a rolling period. Working to a rolling 15-year period as of 2029.
- Funding Target of 100%
- Economic Assumptions:

Price Inflation:	2.5%
Wage Inflation:	3.25%
Investment Return:	7.50%
- Mortality Assumption: RP-2014 projected to current year and MP-2017 projected to current year with administrative factors to be implemented by the actuary when appropriate.

Actuarial Funding Policy

B. Funding Objectives

1. Maintain adequate assets so that current plan assets plus future contributions and investment earnings will be sufficient to fund all benefits expected to be paid to members and beneficiaries when due.
2. Make consistent progress towards 100% funding and maintain 100% funding once it is obtained. In particular, continue progress of systematic reduction of the Unfunded Actuarial Accrued Liabilities (UAAL) through use of the Actuarial Determined Employer Contribution Rate (ADEC).
3. Maintain stability of employer contribution rates, consistent with other funding objectives, and avoid sharp increases or decreases due to specific events.
4. Maintain public policy goals of accountability and transparency, meaning that each policy element is to be clear in intent and effect, and each should allow an assessment of whether, how and when the funding requirements of the plan will be met.
5. Monitor material risks to assist in any risk management strategies the Board deems appropriate.
6. Promote intergenerational equity. Each generation of members and employers should incur the cost of benefits for the employees who provide services to them, rather than deferring those costs to future members and employers.
7. Provide a reasonable margin for adverse experience to help offset risks.
8. Review investment return assumption in conjunction with the periodic asset liability study and in consideration of the Board's risk profile.

Actuarial Funding Policy

C. Elements

1. Actuarial Cost Method (i.e. Contribution Budgeting)

An aggregate entry age actuarial cost method of valuation will be used in determining most liabilities and normal cost. An individual entry-age employer normal cost will be determined for each benefit group (Regular Tier 1, Regular Tier 2, SLEP Tier 1, SLEP Tier 2, ECO Tier 1, ECO Tier 2) as a percent of payroll. The normal cost for each employer will be calculated based on the aggregate Tier 1 and Tier 2 normal cost, weighted on the expected payroll of Tier 1 and Tier 2 members for the given employer. The aggregate normal cost rate is then multiplied by the present value of future salary to determine the present value of future normal cost for each employer. The actuarial accrued liability is then calculated by subtracting the present value of future normal cost and present value of future employee contributions from the present value of future benefits.

Differences in the past between assumed experience and actual experience (“actuarial gains and losses”) will become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are to be amortized to produce payments (principal & interest) which are level percent of payroll contributions.

Liabilities for lump sum death benefits and temporary disability benefits will be determined using a term cost approach. Under this approach, the funding objective is to receive contributions each year that approximately equal the benefits being paid.

2. Asset Smoothing Method

The Funding Value of Assets will recognize assumed investment return fully each year. Differences between actual and assumed investment income are to be phased-in over a closed 5-year period subject to a 20% corridor (intended to prevent excess divergence between actuarial and market values). The method also limits the adjustment to the expected actuarial return to the maximum amount of unrecognized gains or losses not yet reflected in the actuarial value of assets. In any year in which the actuarial value minus the market value of assets switches from a positive value to a negative value, or vice-versa, any prior gain/loss bases are to be eliminated and the smoothing mechanism restarts.

Actuarial Funding Policy

C. Elements (Continued)

3. Amortization Method

a. General

Financing Liabilities and Overfunding

The following procedures will be applied to financing liabilities.

- i. Instrumentalities: 10-year rolling period.
- ii. Early Retirement Incentive (ERI) Plan liabilities: a period up to 10 years selected by the Employer upon adoption of ERI.
- iii. For taxing bodies (Regular, SLEP and ECO rate Groups): 30-year closed period until the remaining period reaches 15 years. After that point, a single rolling 15-year period shall be used for all unfunded liabilities that develop after that point and the schedule for the pre-existing liabilities shall continue until those liabilities are fully extinguished. In the event that a single rolling 15-year period results in negative amortization, the Board shall select a lesser period such that negative amortization does not occur.

The following procedures will be applied to financing overfunding.

- i. Instrumentalities: 10-year rolling period.
- ii. For taxing bodies (Regular, SLEP and ECO rate Groups): 30-year closed period until the remaining period reaches 15 years. After that point, a single rolling 15-year period shall be used for all assets exceeding liabilities.
- iii. Assets exceeding liabilities can be used to satisfy Early Retirement Incentive (ERI) costs so long as the reserve balance (on an actuarial basis) does not drop below 100%. Those assets shall be applied to the extent they are available only at the employer's request. If those assets are insufficient to satisfy the ERI costs, then the remaining balance will be amortized for a period up to 10 years as selected by the employer.

b. SLEP Supplemental Liabilities (Public Act 94-712)

Amortize supplemental liabilities over a closed 30-year period, with an employer option of selecting a period of either 35 or 40 years.

4. Assumed Investment Return

The assumed rate of return is 7.5%, net of all administrative and investment expenses.

Actuarial Funding Policy

C. Elements (Continued)

5. Funding Target

The targeted aggregate funded ration shall be 100%.

6. Computation of Employer Contribution Rates

The Board shall determine the employer contribution rate annually in consultation with the actuary, based upon the actuarial valuation for the most recent completed calendar year. The rate shall be calculated and communicated to the employer as soon as practical in the following year (known as Preliminary Rate Notice) and finalized by year-end (known as Final Rate Notice). Each rate shall remain in effect for one calendar year.

Annual employer contributions will be calculated utilizing the Actuarially Determined Employer Contribution rate (ADEC). It will be expressed as a percentage of payroll to be calculated so as to include a factor for normal cost for current service for each eligible plan and tier (based upon the benefit provisions in the Illinois Pension Code) and a factor to collect or refund any under or over funded amount.

In situations where the annual contributions based upon the ADEC times employer payroll are deemed insufficient to extinguish an unfunded liability over the course of an amortization period, a minimum contribution will be calculated which will pay down the unfunded liability over a 20 year period.

Economic Assumptions:

- Price Inflation: 2.5%
- Payroll growth: 2.5%
- Investment Return: 7.50%

Non-Economic Assumptions will be based upon the latest applicable triennial experience study and include:

- Rates of separation from active member status
- Rates of disability among actives
- Patterns of merit and longevity increases among actives
- Rates of retirement

Mortality Assumption:

- The RP-2014 mortality tables with adjustments for IMRF experience and the MP-2017 projection scale with administrative factors to be implemented by the actuary when appropriate.

Actuarial Funding Policy

C. Elements (Continued)

7. Risk Management

a. Assumption Changes

- i. The actuarial assumptions used shall be those last adopted by the Board based on the most recent experience study and upon the advice and recommendation of the actuary. In accordance with 40 ILCS 5/7-213, the actuary shall conduct an experience study at least every three years. The results of the study shall be the basis for the actuarial assumption changes recommended to the Board.
- ii. The actuarial assumptions can be updated during the three-year period if significant plan design changes or other significant events occur, as advised by the actuary.

b. Amortization Method

The amortization method, Level Percent Closed, will ensure full payment of the UAAL over a finite, systematically decreasing period not to exceed 30 years. Not shorter than a rolling 15-year period.

c. Risk Measures

The following risk measures will be annually determined to provide quantifiable measurements of risk and their movement over time.

- i. Classic measures currently determined
 - A. Funded Ratio (assets/liability)
 - B. UAAL Amortization Period (years required to pay down the UAAL based on current funding rates)
- ii. Dollar Standard Deviation of Investment Return/Total Payroll
 - Measures the risk associated with negative asset returns relative impact on the funded status of the plan. A decrease in this measure indicates a decrease in investment risk.
- iii. Total UAL/Total Payroll
 - Measures the risk associated with contribution decreases relative impact on the ability to fund the UAAL. A decrease in this measure indicates a decrease in contribution risk.
- iv. Total Assets/Total Payroll
 - Measures the risk associated with the ability to respond to asset experience through adjustments in contributions. A decrease in this measure indicates a decrease in asset risk.
- v. Total AAL/Total Payroll
 - Measures the risk associated with the ability to respond to liability experience through adjustments in contributions. A decrease in this measure indicates a decrease in experience risk. This also provides a long-term measure of the asset risk in situations where the System has a funded ratio below 100%.

Actuarial Funding Policy

C. Elements (Concluded)

d. Peer Review (Actuarial Audit)

Conduct a peer review of the Actuary's work every five years.

e. Asset Liability Study

Conduct an asset liability study at least once every five years or as needed due to economic/financial conditions.

Actuarial Funding Policy

D. Glossary

- 1. Actuarial Accrued Liability (AAL):** The difference between (i) the actual present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as “accrued liability” or “past service liability”.
- 2. Actuarial Assumptions:** Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
- 3. Actuarial Cost Method:** A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future plan benefit” between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the “actuarial funding method”.
- 4. Actuarial Gain (Loss):** A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. For example, if during a given year the assets earn more than the investment return assumption, the amount of earnings above the assumption will cause an unexpected reduction in UAAL, or “actuarial gain” as the next valuation. These include contribution gains and losses that result from actual contributions made being greater or less than the level determined under policy.
- 5. Actuary:** A person who is trained in the applications of probability and compound interest to problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries (MAAA). The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and designation ASA and ultimately to Fellowship with the designation FSA.
- 6. Amortization:** Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.
- 7. Asset Liability Study:** A comprehensive strategic asset allocation review designed to assess the continuing appropriateness of the Investment Objectives and Asset Allocation Policy. It includes a study of future benefit payments, liabilities, required funding, the appropriateness of the actuarial interest rate assumption and the prospective funded status of liabilities. It may also include a study of portfolio design for optimal diversification and comparisons with peer practices.
- 8. Corridor:** A range described as a percentage beyond which the market value and actuarial value of assets should not exceed without significant changes to the employer contribution rate.

Actuarial Funding Policy

D. Glossary (Concluded)

- 9. Entry Age Normal Actuarial Cost Method:** A funding method that calculates the Normal Cost as a level percentage of pay over the working lifetime of the plan's members.
- 10. Experience Study:** An actuarial investigation of demographic and economic experiences of the system during the period studied. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities.
- 11. Funding Value of Assets:** The value of current plan assets recognized for valuation purposes. Generally based on a phased-in recognition of all or a portion of market related investment return. Sometimes referred to as Actuarial Value of Assets.
- 12. Market Value of Assets:** The fair value of plan assets as reported in the plan's audited financial statements.
- 13. Normal Cost (NC):** The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost". Any payment toward the unfunded actuarial liability is not part of the normal cost.
- 14. Rolling Period:** An amortization method in which the amortization period is reset each following year for the same period of time.
- 15. Unfunded Actuarial Accrued Liability (UAAL):** The positive difference, if any, between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability".

E. Appendix

Attached are reference materials which shall be updated from time to time, but which are not part of this Policy. Changes/revisions to the reference materials need not be adopted by the Board of Trustees. Substantive changes to this Policy require Board of Trustee approval.

Financing Unfunded Accrued Liabilities and Full Funding Credits December 31, 2017 Valuations

The following procedures were applied to financing liabilities in the valuation.

Financing Periods if employer is less than 120% funded on a market basis.

1. Instrumentalities: 10-year rolling period.
2. Early Retirement Incentive Plan liabilities: a period up to 10 years selected by the Employer upon adoption of ERI.
3. For taxing bodies (Regular, SLEP, and ECO rate Groups): 24-year closed period until remaining period reaches 15 years (then 15-year rolling period).

Financing Period if employer is over 120% funded on a market basis.

4. Irrespective of the size of the employer or the funding level, grant the employer an option to amortize overfunding over 120% over a 5-year period.
5. For employers with 50 or more employees, grant the employer an option to adopt a minimum contribution rate until the overfunding is reduced to 120%.
6. Irrespective of the size of the employer, surplus in a plan can be used to satisfy early retirement incentive costs so long as the reserve balance does not drop below 120%.

SLEP supplemental liabilities attributable to Public Act 94-712 were financed over 19 years for most employers (three employers were financed over 28 years and four employers were financed over 29 years). The mass production valuation applies rules 1 through 3. For rules 4 through 6, the period provided on the IMRF rate tape is used for valuation purposes and IMRF staff reviews each case individually to see if changes are needed to comply with Board policy.

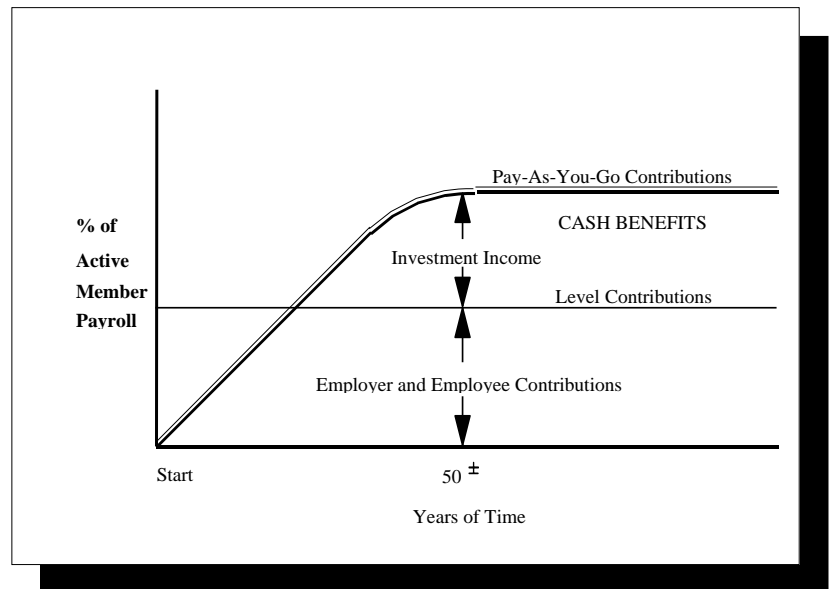
Selection of Assumptions Used in Actuarial Valuations

Economic Assumptions

Investment return
Pay increases to individual employees:
the portion for economic changes
Active member group size and
total payroll growth

Demographic Assumptions

Actual ages at service retirement
Pay increases to individual members:
the portion for merit & seniority
Disability while actively employed
Separations before retirement
Mortality after retirement
Mortality before retirement



Relationship Between the Board and the Actuary

The actuary should have the primary responsibility for choosing the **demographic** assumptions used in the actuarial valuation, making use of specialized training and experience.

The actuary and other professionals can provide guidance concerning the choice of suitable economic assumptions, but the basis of the economic assumptions is expected market returns for various asset classes and the assumed rate of inflation (a quantity which defies accurate prediction). Given an assumed rate of future inflation, it is very important that this rate be applied in a consistent manner in deriving the assumed rate of investment return, the economic portion of the assumption on pay increases to individual employees, and the assumed rate of growth of active member payroll. Consistent application of assumptions is an area in which the actuary has specialized training.

A sound procedure is that the actuary suggests reasonable alternatives for economic assumptions, followed by discussion involving the actuary, the Board of Trustees, and other professionals, and the Board then makes a final choice from the various reasonable alternatives.

SECTION E

FINANCIAL PRINCIPLES

Financial Principles and Operational Techniques of IMRF

Promises Made, and To Be Paid For: As each year is completed, IMRF in effect hands an “IOU” to each member then acquiring a year of service credit. The “IOU” says: “The Illinois Municipal Retirement Fund owes you one year’s worth of retirement benefits, payments in cash commencing when you retire.”

The related **key financial questions** are:

Which generation of taxpayers contributes the money to cover the IOU?

The present taxpayers, who receive the benefit of the member’s present year of service? **Or the future taxpayers**, who happen to be in Illinois at the time the IOU becomes a cash demand, years and often decades later?

The law governing IMRF financing intends that this year’s taxpayers contribute the money to cover the IOUs being handed out this year. With this financial objective, **the employer contribution rate is expected to remain approximately level from generation to generation of taxpayers.**

There are systems which have a design for deferring contributions to future taxpayers. Lured by a lower contribution rate now, they put aside the consequence that the contribution rate must then relentlessly grow to a level much higher than would be required if a level contribution pattern were followed.

An inevitable by-product of the level-cost design is the accumulation of reserve assets, for decades, and the income produced when the assets are invested. **Investment income** ultimately becomes **the 3rd and largest contributor** for benefits to members, and is interlocked with the contribution amounts required from members and employers.

Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

Normal Cost (the cost of members’ service being rendered this year)

... plus ...

Interest at the assumed real rate of return on Unfunded Actuarial Accrued Liabilities (unfunded actuarial accrued liabilities are the difference between: accrued liabilities for service already rendered; and the accrued assets of IMRF).

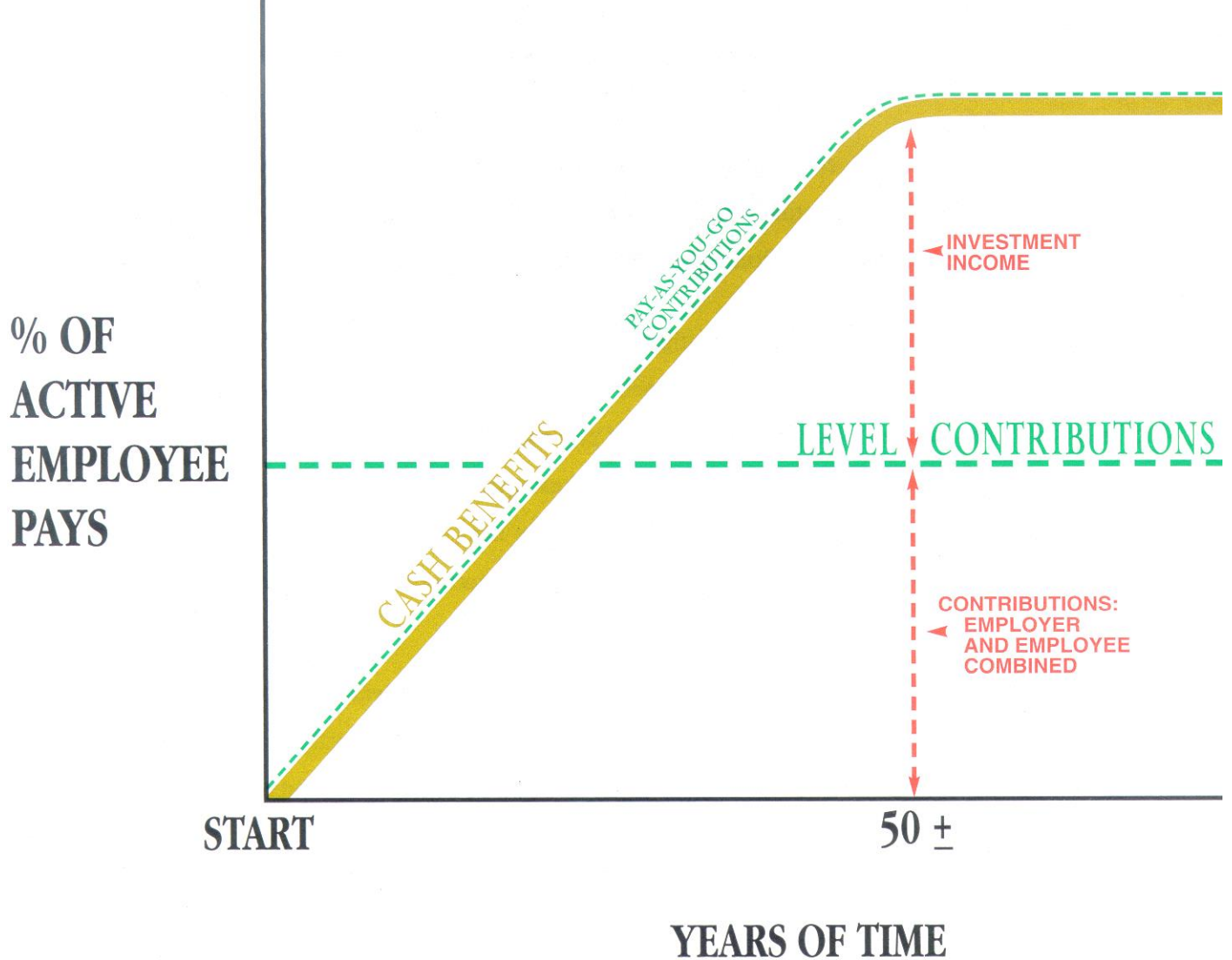
However, that statement is theoretically only. Contributions made at only that level would provide very little in the way of benefit security.

Computing Contributions to Support Fund Benefits: From a given schedule of benefits and from member and asset data, the actuary calculates the contribution rates to support the benefits by means of ***an actuarial valuation and a funding method.***

An actuarial valuation has a number of ingredients such as: the rate of investment return which plan assets will earn; the rates of withdrawal of active members who leave covered employment; the rates of mortality; the rates of disability; the rates of pay increases; and the assumed age or ages at actual retirement. These rates cannot be known today. Consequently, in an actuarial valuation, assumptions must be made as to what the above rates will be for the next year and for decades in the future. The assumptions are established by the Board of Trustees after receiving the advice of the actuary.

Reconciling Differences Between Assumed Experience and Actual Experience: Once actual experience has occurred and has been observed, it will not coincide exactly with assumed experience, regardless of the skill of the actuary and the many calculations made. The future cannot be predicted.

IMRF copes with these continually changing differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is ***continuing adjustments in financial position.*** Once every three years, an Experience Study is conducted to fully review differences between actual and assumed experience and recommend changes to our assumed experience, where appropriate.



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

- Economic Risk Areas
 - Rates of investment return
 - Rates of pay increase
 - Changes in active member group size
- Non-Economic Risk Areas
 - Ages at actual retirement
 - Rates of mortality
 - Rates of withdrawal of active members (turnover)
 - Rates of disability

The Actuarial Valuation Process

The financing diagram on the previous page shows the relationship between **the two fundamentally different philosophies of paying** for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program) which is thus an **increasing contribution method**; and, the **level contribution method** which attempts to equalize contributions between the generations.

The actuarial valuation is the mathematical process by which the level contribution rate is determined. The activity constituting the valuation may be summarized as follows:

A. **Census Data**, including:

- Retired lives now receiving benefits
- Former members with vested benefits not yet payable
- Active members

B. + **Asset data** (cash & investments)

C. + **Benefit provisions** that establish eligibility and amounts of payments to members

D. + **Assumptions concerning future experience** in various risk areas

E. + **The funding method** for employer contributions (the long-term, planned pattern for employer contributions)

F. + **Mathematically combining the assumptions, the funding method, and the data**

G. = Determination of:

- Plan Financial position and/or
- New Employer Contribution Rates

Glossary

Accrued Service - The service credited under the plan which was rendered before the date of the actuarial valuation.

Accumulated Benefit Obligation - The actuarial present value of vested and non-vested benefits based on service to date and past and current salary levels.

Actuarial Equivalent - A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.

Actuarial Present Value - The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Actuarial Present Value of Credited Projected Benefits or Pension Benefit Obligation - The present value of future benefits based on service to date and the effect of projected salary increases.

ERI - Early Retirement Incentive Plan.

Funded Percent - A measure of the ratio of the funding value of assets to the actuarial accrued liability.

Plan Termination Liability - The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for future service and salary. The termination liability will generally be less than the liabilities computed on a "going concern" basis and is not normally determined in a routine actuarial valuation.

Reserve Account - An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.



March 22, 2018

Mr. Mark Nannini
Chief Financial Officer
Illinois Municipal Retirement Fund
2211 York Road - Suite 500
Oak Brook, Illinois 60523-2374

Re: December 31, 2017 Actuarial Valuation

Dear Mark:

Enclosed are five copies of the report. We have also included an unbound master copy in case you need to make additional copies.

We look forward to reviewing the results of this year's valuations at the Board meeting.

Sincerely,

A handwritten signature in black ink that reads "Mark Buis". The signature is written in a cursive, slightly slanted style.

Mark Buis, FSA, EA, FCA, MAAA

MB:sc
Enclosures