



STATE OF ILLINOIS

OFFICE OF THE AUDITOR GENERAL

STATE ACTUARY'S REPORT

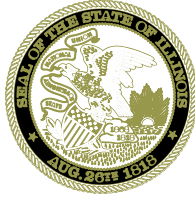
**THE ACTUARIAL ASSUMPTIONS AND
VALUATIONS OF THE FIVE STATE-FUNDED
RETIREMENT SYSTEMS**

DECEMBER 2015

WILLIAM G. HOLLAND

AUDITOR GENERAL

SPRINGFIELD OFFICE:
ILES PARK PLAZA
740 EAST ASH • 62703-3154
PHONE: 217/782-6046
FAX: 217/785-8222 • TTY: 888/261-2887
FRAUD HOTLINE: 1-855-217-1895



CHICAGO OFFICE:
MICHAEL A. BILANDIC BLDG. • SUITE S-900
160 NORTH LASALLE • 60601-3103
PHONE: 312/814-4000
FAX: 312/814-4006
FRAUD HOTLINE: 1-855-217-1895

OFFICE OF THE AUDITOR GENERAL
WILLIAM G. HOLLAND

*To the Speaker and Minority Leader of the House of
Representatives, the President and Minority Leader
of the Senate, the members of the General Assembly,
and the Governor:*

This is our 2015 report on the actuarial assumptions and valuations of the five State-funded retirement systems.

This report was conducted pursuant to Public Act 097-0694 which amended the Illinois State Auditing Act by adding a requirement for the Auditor General to annually review assumptions and valuations prepared by the actuaries of the five State-funded retirement systems. The report is based on reports prepared by Cheiron, the State Actuary, on each of the State-funded retirement systems.

The report is transmitted in conformance with Section 5/2-8.1(c) of the Illinois State Auditing Act.

A handwritten signature in blue ink, appearing to read "William G. Holland".

WILLIAM G. HOLLAND
Auditor General

Springfield, Illinois
December 30, 2015

TABLE OF CONTENTS

	Auditor General’s Transmittal Letter Table of Contents Glossary of Terms	
Chapter One AUDITOR GENERAL’S SUMMARY	Report Conclusions Introduction and Background Requirements of Public Act 097-0694 Contracting with the State Actuary Review of the Actuarial Assumptions Economic Assumptions Interest Rate Assumption Inflation Assumption Demographic Assumptions Proposed Certification of Required State Contribution Actuarial Methods Funding Method Asset Smoothing Method State Mandated Funding Method Responses to the Recommendations	1 2 2 3 3 5 5 7 8 9 10 10 10 11 12
Chapter Two PRELIMINARY REPORT ON THE TEACHERS’ RETIREMENT SYSTEM	Introduction Cheiron Transmittal Letter Section I – Report Scope Section II – Summary of Recommendations Section III – Supporting Analysis Proposed Certification of the Required State Contribution State Mandated Methods Recommended Additional Disclosures Assessment of Actuarial Assumptions Used in the 2015 Valuation A. Economic Assumptions B. Demographic Assumptions C. Actuarial Methods	13 15 17 18 20 20 20 22 23 23 30 40

	Status of Recommendations from the 2014 State Actuary's Report	42
Chapter Three PRELIMINARY REPORT ON THE STATE UNIVERSITIES RETIREMENT SYSTEM	Introduction	47
	Cheiron Transmittal Letter	49
	Section I – Report Scope	51
	Section II – Summary of Recommendations	52
	Section III – Supporting Analysis	54
	Proposed Certification of the Required State Contribution	54
	State Mandated Methods	54
	Assessment of Actuarial Assumptions Used in the 2015 Valuation	55
	A. Economic Assumptions	55
	B. Demographic Assumptions	63
	C. Actuarial Methods	72
Status of Recommendations from the 2014 State Actuary's Report	74	
Chapter Four PRELIMINARY REPORT ON THE STATE EMPLOYEES' RETIREMENT SYSTEM	Introduction	77
	Cheiron Transmittal Letter	79
	Section I – Report Scope	81
	Section II – Summary of Recommendations	82
	Section III – Supporting Analysis	84
	Proposed Certification of the Required State Contribution	84
	State Mandated Methods	84
	Assessment of Actuarial Assumptions Used in the 2015 Valuation	85
	A. Economic Assumptions	85
	B. Demographic Assumptions	91
	C. Actuarial Methods	102
Status of Recommendations from the 2014 State Actuary's Report	104	
Chapter Five PRELIMINARY REPORT ON THE	Introduction	109
	Cheiron Transmittal Letter	111

JUDGES’ RETIREMENT SYSTEM	Section I – Report Scope	113
	Section II – Summary of Recommendations	114
	Section III – Supporting Analysis	116
	Proposed Certification of the Required State Contribution	116
	State Mandated Methods	116
	Assessment of Actuarial Assumptions Used in the 2015 Valuation	118
	A. Economic Assumptions	118
	B. Demographic Assumptions	123
	C. Actuarial Methods	129
	Status of Recommendations from the 2014 State Actuary’s Report	131
Chapter Six PRELIMINARY REPORT ON THE GENERAL ASSEMBLY RETIREMENT SYSTEM	Introduction	137
	Cheiron Transmittal Letter	139
	Section I – Report Scope	141
	Section II – Summary of Recommendations	142
	Section III – Supporting Analysis	145
	Proposed Certification of the Required State Contribution	145
	State Mandated Methods	145
	Assessment of Actuarial Assumptions Used in the 2015 Valuation	147
	A. Economic Assumptions	147
	B. Demographic Assumptions	152
C. Actuarial Methods	158	
Status of Recommendations from the 2014 State Actuary’s Report	160	
APPENDICES	TITLE	PAGE
Appendix A	Illinois State Auditing Act (30 ILCS 5/2-8.1)	167
Appendix B	Materials Reviewed by Cheiron	171
Appendix C	Responses from the Retirement Systems	183

GLOSSARY OF TERMS

Actuarial Assumptions – Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, interest rate (also called the investment return or discount rate) and inflation. Demographic assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (interest rate and inflation) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Gain (Loss) – The difference between actual experience and actuarial assumed experience during the period between two actuarial valuation dates, as determined in accordance with a particular actuarial funding method.

Actuarial Liability – The Actuarial Liability is the present value of all benefits accrued as of the valuation date using the methods and assumptions of the valuation. It is also referred to by some actuaries as the “accrued liability” or “actuarial liability.”

Actuarial Present Value – The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest and by probabilities of payment.

Actuarial Value of Assets – The Actuarial Value of Assets equals the Market Value of Assets adjusted according to the smoothing method in accordance with Illinois Law. The smoothing method is intended to smooth out the short-term volatility of investment returns in order to stabilize contribution rates and the funded status.

Actuarial Cost Method – A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future plan benefits” between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”

Asset Smoothing Method – A method of asset valuation where the annual fluctuation in the market value of assets is averaged over a period of years. See Actuarial Value of Assets above.

Entry Age Normal (EAN) – A method under which the Present Value of Future Benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this Present Value of Future Benefits allocated to a valuation year is called the Normal Cost. The portion of this Present Value of Future Benefits not provided for at a valuation date by the Present Value of Future Normal Costs is called the Actuarial Liability.

GLOSSARY OF TERMS

Funded Status – The Actuarial Value of Assets divided by the Actuarial Liability. The Funded Status represents the percentage of assets in the Plan compared to the Actuarial Liability. The Funded Status can also be calculated using the Market Value of Assets.

Governmental Accounting Standards Board – The Governmental Accounting Standards Board (GASB) defines the accounting and financial reporting requirements for governmental entities. GASB Statement No. 67 defines the plan accounting and financial reporting for governmental pension plans, and GASB Statement No. 68 defines the employer accounting and financial reporting for participating in a governmental pension plan.

Market Value of Assets – The fair value of the Plan’s assets assuming that all holdings are liquidated on the measurement date.

Normal Cost – 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 accrued liability is not part of the normal cost.

Present Value of Future Benefits – The Actuarial Present Value of all benefits promised in the future to current members of the Plan assuming all Actuarial Assumptions are met.

Present Value of Future Normal Costs – The Actuarial Present Value of retirement system benefits allocated to future years of service.

Projected Unit Credit (PUC) – A method under which the benefits of each individual included in an actuarial valuation are allocated by a consistent formula to the years in which they are earned. The Actuarial Present Value of benefits allocated to a valuation year is called the Normal Cost. The Actuarial Present Value of benefits allocated to all periods prior to a valuation year is called the Actuarial Liability.

Unfunded Actuarial Liability (UAL) – The difference between the actuarial accrued liability and valuation of assets. Sometimes referred to as “unfunded accrued liability.”

Chapter One

AUDITOR GENERAL'S SUMMARY

REPORT CONCLUSIONS

On June 18, 2012, Public Act 097-0694 was signed into law which directed the Auditor General to contract with or hire an actuary to serve as the State Actuary. Cheiron was selected as the State Actuary. The Public Act directed the State Actuary to:

- Review assumptions and valuations prepared by actuaries retained by the boards of trustees of the State-funded retirement systems;
- Issue preliminary reports to the boards of trustees of the State-funded retirement systems concerning proposed certifications of required State contributions submitted to the State Actuary by those boards; and
- Identify recommended changes to actuarial assumptions that the boards must consider before finalizing their certifications of the required State contributions.

Cheiron reviewed the actuarial assumptions used in each of the five systems' actuarial valuations for the year ended June 30, 2015 and **concluded that they generally were reasonable. Cheiron did not recommend any changes to the assumptions used in the June 30, 2015 actuarial valuations.**

Cheiron made recommendations for additional disclosures for the 2015 valuations and recommended changes for future valuations. Recommendations included the following:

- The Boards should periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary.
- Cheiron continues to recommend the Boards annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly.
- For three of the systems (TRS, SURS, and SERS), Cheiron recommends the Boards consider lowering the interest rate assumption next year and develop the rate taking into account the negative cash flow of the systems.

Cheiron verified the arithmetic calculations made by the systems' actuaries to develop the required State contribution and reviewed the assumptions on which the calculations were based.

The Illinois Pension Code requires that the systems' actuaries calculate the required State contribution using a prescribed funding method that achieves 90 percent funding in the year

2045. Cheiron concluded that **this funding method does not meet** generally acceptable actuarial principles because the systems are never targeted to be funded to 100 percent and the funding of the systems is significantly deferred into the future. **Cheiron recommended that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of the systems.**

Based on the systems' 2015 actuarial valuation reports, the funded ratio of the systems ranged from 43.3 percent (SURS) to 16.0 percent (GARS), based on the actuarial value of assets as a ratio over the actuarial liability. Cheiron has concerns about the solvency of the systems if there is a significant market downturn. Cheiron recommended the systems include stress testing within the valuation reports. This would include a detailed explanation of the implications that volatile investment returns and other stressors (e.g., membership declines, lower salary growth) would have on the systems. This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested.

INTRODUCTION AND BACKGROUND

On June 18, 2012, Public Act 097-0694 was signed into law which directed the Auditor General to contract with or hire an actuary to serve as the State Actuary. The Public Act amended the Illinois State Auditing Act as well as sections of the Illinois Pension Code for each of the five State-funded retirement systems. The five State-funded retirement systems are:

- The Teachers' Retirement System (TRS);
- The State Universities Retirement System (SURS);
- The State Employees' Retirement System (SERS);
- The Judges' Retirement System (JRS); and
- The General Assembly Retirement System (GARS).

Requirements of Public Act 097-0694

Public Act 097-0694 requires the State Actuary to conduct an annual review of the valuations prepared by the actuaries of the State-funded retirement systems. Specifically the Act requires the State Actuary to:

- Review assumptions and valuations prepared by actuaries retained by the boards of trustees of the State-funded retirement systems;
- Issue preliminary reports to the boards of trustees of the State-funded retirement systems concerning proposed certifications of required State contributions submitted to the State Actuary by those boards; and
- Identify recommended changes to actuarial assumptions that the boards must consider before finalizing their certifications of the required State contributions.

On or before November 1 of each year, beginning November 1, 2012, the boards of each of the systems must submit to the State Actuary a proposed certification of the amount of the required State contribution to the system for the next fiscal year, along with all of the actuarial assumptions, calculations, and data upon which that proposed certification is based.

On or before January 1, 2013, and each January 1 thereafter, the Auditor General shall submit a written report to the General Assembly and Governor documenting the initial assumptions and valuations prepared by actuaries retained by the boards of trustees of the State-funded retirement systems, any changes recommended by the State Actuary in the actuarial assumptions, and the responses of each board to the State Actuary's recommendations.

On or before January 15, 2013, and every January 15 thereafter, each Board shall certify to the Governor and the General Assembly the amount of the required State contribution for the next fiscal year. The Board's certification must note any deviations from the State Actuary's recommended changes, the reason or reasons for not following the State Actuary's recommended changes, and the fiscal impact of not following the State Actuary's recommended changes on the required State contribution.

Contracting with the State Actuary

On July 12, 2012, the Office of the Auditor General issued a Request for Proposals for the services of a State Actuary. On August 24, 2012, the contract was awarded to Cheiron. Cheiron is a full-service actuarial and consulting firm with offices in nine locations throughout the United States. Cheiron has experience working with multiple public pension plans around the country.

REVIEW OF THE ACTUARIAL ASSUMPTIONS

Cheiron reviewed each of the actuarial assumptions used in each of the five systems' actuarial valuations for the year ended June 30, 2015 and **concluded that they generally were reasonable. Cheiron did not recommend any changes to the assumptions used in the June 30, 2015 actuarial valuations.**

Cheiron did recommend additional disclosures for the 2015 valuations and also recommended changes for future valuations. The systems' responses to Cheiron's preliminary reports can be found in Appendix C of this report.

Exhibit 1-1 summarizes the recommendations made to the retirement systems. At the end of each of the reports located in Chapters Two through Six is a chart summarizing the status of recommendations made by the State Actuary in the 2014 report.

Exhibit 1-1 RECOMMENDATIONS TO THE RETIREMENT SYSTEMS					
Recommendations	TRS	SURS	SERS	JRS	GARS
Recommended Changes to Actuarial Assumptions used in the 2015 Actuarial Valuations:					
Cheiron reviewed the actuarial assumptions and concluded that they were reasonable. Consequently, Cheiron did not have any recommended changes to assumptions this year.					
Recommended Additional Disclosures for the 2015 Actuarial Valuations:					
• Expand/include stress testing of the System within the valuation report	X		X	X	X
• Include the statutory State contribution development in the Executive Summary	X				
• Review the discount rate calculation regarding the treatment of future expenses	X				
Recommended Changes for Future Actuarial Valuations:					
• Annually review the economic assumptions (interest rate and inflation rate) and adjust assumptions accordingly	X	X	X	X	X
• Consider lowering the interest rate next year and develop the rate taking into account negative cash flow	X	X	X		
• Evaluate the implications of the one year delay in data used for the valuation to substantiate if it is immaterial	X				
• Include stress testing of the System within the valuation report		X			
• Regarding the wage inflation assumption, provide justification for the 1.0% productivity assumption		X			
• Request investment consultants provide longer term market expectations		X	X	X	X
• Consider the use of generational mortality improvement assumptions			X	X	X
• For the Boards of the three systems whose assets are commingled, consider whether different interest rate assumptions for these systems are appropriate			X	X	X
• Consider if additional revisions to demographic assumptions for Tier 2 members are appropriate			X		
• When the next experience study is performed, review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience				X	X
• Regarding mortality improvement, disclose which projection scale is being utilized				X	X
• Review appropriateness of the wage inflation assumption				X	X
• Breakout the classification of "Other" activity further so that the resulting impact can be understood and reviewed for reasonableness					X
• Include an additional disclosure on how the 10% load on inactive vested liabilities was developed					X

Exhibit 1-1 RECOMMENDATIONS TO THE RETIREMENT SYSTEMS					
Recommendations	TRS	SURS	SERS	JRS	GARS
Other Recommendations:					
• Periodically retain the services of an independent actuary to conduct a full scope actuarial audit in which the results of the valuation are fully replicated	X	X	X	X	X
• Change the funding method to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of the system	X	X	X	X	X
Source: OAG summary of Cheiron’s preliminary reports to the five State-funded retirement systems.					

The following sections discuss some of the key assumptions and recommendations. Further details on the assumptions and recommendations, including those not discussed in this summary chapter, are contained in the State Actuary’s preliminary reports for each of the five systems, found in Chapters Two through Six of this report.

Economic Assumptions

Cheiron reviewed the economic assumptions utilized in the actuarial valuations for each of the five State-funded retirement systems. The following sections discuss two of those assumptions – the interest rate assumption and the inflation assumption.

Interest Rate Assumption

The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the required State contribution amount. This assumption is used to value liabilities for funding purposes. The retirement systems use varying interest rate assumptions. Exhibit 1-2 shows the interest rate assumptions for each of the five State-funded retirement systems. As can be seen in the exhibit, the interest rate assumption for each system was unchanged for this year’s actuarial valuation. As it did in last year’s report, Cheiron again recommended that the Boards annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly.

Exhibit 1-2
INTEREST RATE ASSUMPTIONS
FOR THE FIVE STATE-FUNDED RETIREMENT SYSTEMS
 June 30, 2015 Valuation

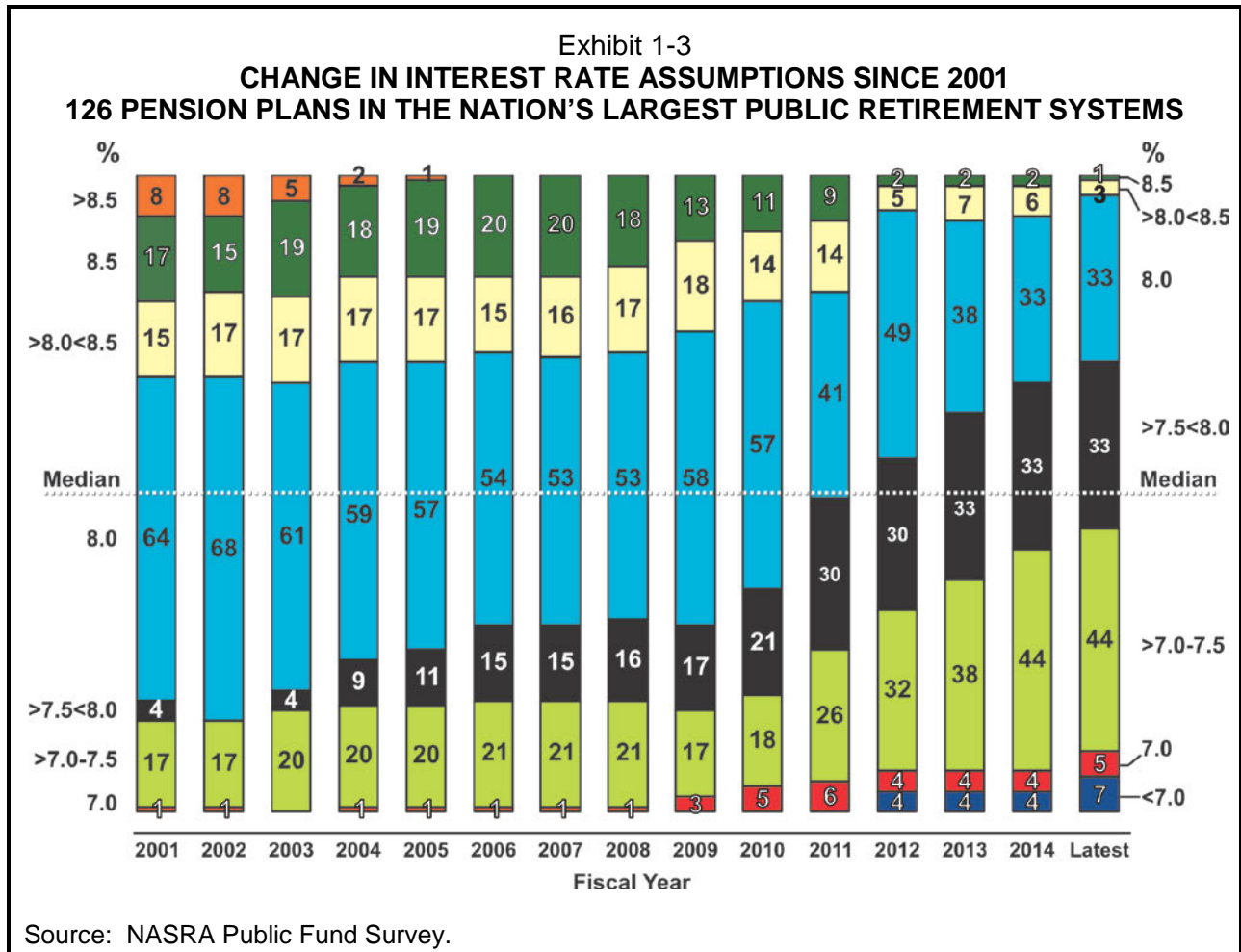
System	Interest Rate	Notes
Teachers' Retirement System	7.50%	Lowered from 8.00% for the June 30, 2014 actuarial valuation
State Universities Retirement System	7.25%	Lowered from 7.75% for the June 30, 2014 actuarial valuation
State Employees' Retirement System	7.25%	Lowered from 7.75% for the June 30, 2014 actuarial valuation
Judges' Retirement System	7.00%	Lowered from 8.00% for the June 30, 2010 actuarial valuation
General Assembly Retirement System	7.00%	Lowered from 8.00% for the June 30, 2011 actuarial valuation
Source: Retirement system actuarial reports and experience studies.		

After reviewing all of the materials that were made available, Cheiron concluded that the interest rate assumptions were reasonable. However, for three of the systems (TRS, SURS, and SERS), Cheiron recommended the Boards consider lowering the interest rate next year. Cheiron's recommendation was based on several factors, including some projected rates of return that were lower than the assumed rate of return.

Another factor was that the systems are, or will be, experiencing negative cash flows which may impact the interest rate returns that are realized. Negative cash flow is measured as contributions less benefits and expenses. TRS, SURS, and GARS are experiencing negative cash flows while SERS and JRS are projected to begin having negative cash flows in the near future. Negative cash flows result in actuarial returns (i.e., "dollar weighted" returns) being less than "time weighted" returns, which is what investment consultants base their reported and projected returns. As a result, even if an investment consultant's expected long term return is, for example, 7.40 percent, it is expressed as a time weighted return figure. For plans with negative cash flows, we would expect the dollar weighted returns to be less. Cheiron recommended that the rate be developed taking into account the negative cash flows of the systems and the anticipated future interest rate environment.

Cheiron noted that there has been emerging actuarial practice throughout the country to reduce the discount rates even below the level that the investment consultants believe is achievable. This is because of the very low interest rate environment we are currently experiencing. The lower the interest rate environment, the greater the investment risk that must be taken to achieve an assumed rate of return.

Cheiron also discussed the nationwide movement among pension plans to lower the interest rate assumption. The National Association of State Retirement Administrators (NASRA) conducts the Public Fund Survey which is an online compendium of key characteristics covering 126 public pension plans. Exhibit 1-3 shows the change in the interest rate assumptions, since the inception of the Public Fund Survey in 2001, for 126 public pension plans.



The exhibit shows the shift to lower interest rate assumptions. In 2001, 104 of the 126 plans (83%) used an interest rate assumption of 8.0 percent or higher. The most recent data shows that this number has dropped to only 37 of 126 plans (29%) that use an interest rate of 8.0 percent or higher. The median assumption has fallen below 8.0 percent. In addition, 12 plans have adopted a rate of 7.0 percent or lower.

Inflation Assumption

The inflation assumption primarily impacts the salary increase assumption. The five State-funded retirement systems use inflation assumptions ranging from 2.75 percent to 3.00 percent. Exhibit 1-4 shows the inflation assumptions for each of the five systems.

Exhibit 1-4 INFLATION ASSUMPTIONS FOR THE FIVE STATE-FUNDED RETIREMENT SYSTEMS June 30, 2015 Valuation		
System	Inflation Rate	Notes
Teachers' Retirement System	3.00%	Lowered from 3.25% for the June 30, 2014 actuarial valuation
State Universities Retirement System	2.75%	Lowered from 3.75% for the June 30, 2011 actuarial valuation
State Employees' Retirement System	3.00%	Lowered from 3.50% for the June 30, 2002 actuarial valuation
Judges' Retirement System	3.00%	Lowered from 4.00% for the June 30, 2011 actuarial valuation
General Assembly Retirement System	3.00%	Lowered from 4.00% for the June 30, 2011 actuarial valuation
Source: Retirement system actuarial reports and experience studies.		

Cheiron concluded that the inflation assumptions used by the five State-funded retirement systems were reasonable. Cheiron's rationale for concurring with the inflation assumptions included:

- The 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (next 75 years) inflation will average somewhere between 2.0% and 3.4%.
- Cheiron's comparison of other public sector retirement systems' inflation assumptions as shown by a study published by the National Conference on Public Employee Retirement Systems (NCPERS). The study shows that the 3.0% assumption used by four of the five State-funded systems is a prevalent assumption while the 2.75% assumption, which SURS uses, is on the lower end of inflation assumptions. The average rate amongst the 179 systems who responded to the study was 3.2%.

Demographic Assumptions

The retirement systems utilize a number of demographic assumptions such as mortality rates, disability rates, and termination rates. Cheiron reviewed the demographic assumptions and concluded that they were reasonable. Cheiron did, however, make recommendations for future valuations concerning various demographic assumptions.

Cheiron made recommendations involving the mortality assumptions for three of the systems. Cheiron recommended SERS, JRS, and GARS consider the use of generational mortality assumptions in future valuations. Also for JRS and GARS, when the next experience study is performed, the system actuaries should review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience.

As it did last year, Cheiron included additional analysis in its reports on each of the five systems. Cheiron collected data from past valuation reports dating back to 2009 and presented a historical review of past demographic and salary increase experience gains and losses. Results were presented in a chart which showed the pattern of annual gains and losses attributable to different sources. These charts can be found in Chapters Two through Six. Different measures were used for each system depending on the information available but sources used included:

- Active and retiree mortality;
- Disability;
- New entrants;
- Benefit recipients;
- Salary increases;
- Retirement; and
- Terminations.

An examination of these trends can be used to determine if adjustments need to be made to assumptions or if additional disclosures need to be made in the actuarial valuation reports. As shown previously, Exhibit 1-1 summarizes the recommendations made for the various retirement systems. Additional details on the demographic assumptions examined can be found in the chapters for each of the five State-funded retirement systems.

PROPOSED CERTIFICATION OF REQUIRED STATE CONTRIBUTION

As required by Public Act 097-0694, each of the five State-funded retirement systems submitted to the State Actuary a proposed certification of the amount of the required State contribution for that system. **Cheiron verified the arithmetic calculations made by the systems’ actuaries to develop the required State contribution and reviewed the assumptions on which the calculations were based.** Exhibit 1-5 shows the amounts of proposed State contributions submitted by the systems for Fiscal Year 2017.

Exhibit 1-5 AMOUNTS OF STATUTORILY REQUIRED STATE CONTRIBUTIONS	
System	State Contribution (for Fiscal Year 2017)
Teachers’ Retirement System	\$ 3,986,583,351
State Universities Retirement System	1,671,426,000
State Employees’ Retirement System	2,014,461,000
Judges’ Retirement System	131,334,000
General Assembly Retirement System	21,721,000
Total	\$7,825,525,351

Source: 2015 retirement system actuarial valuation reports.

Cheiron noted that, in accordance with 30 ILCS 5/2-8.1, its review does not include a replication of the actuarial valuation results. Given the size of the Plans (TRS, SURS, and SERS), the Plans’ low funded ratios, the recent changes in legal requirements, and guidance issued by the Government Finance Officers Association, **Cheiron recommended that the**

Boards periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the Plans' actuaries. A replication audit will uncover any potential problems in the processing and certification of valuation results.

ACTUARIAL METHODS

Actuarial methods consist of three components: (1) the funding method, which is the attribution of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e., asset smoothing); and (3) the amortization basis of the Unfunded Actuarial Liability (UAL). The amortization basis is discussed under the State Mandated Funding Method in the next section.

Funding Method

All of the five State-funded retirement systems use the Projected Unit Credit (PUC) cost method to assign costs to years of service. This method is required under the Illinois Pension Code. Cheiron had no objection to using the PUC cost method as it is an acceptable method that is used by other public sector pension funds. However, Cheiron would prefer the Entry Age Normal (EAN) funding method as it is more consistent with the Pension Code's requirement for level percent of pay funding.

Under the PUC method, the benefits of active participants are calculated based on their compensation projected with assumed annual increases to ages at which they are assumed to leave the active workforce by any of these causes: retirement, disability, turnover, or death. Only past service (through the valuation date but not beyond) is taken into account in calculating these benefits. The cost of providing benefits based on past service and future compensation is the actuarial accrued liability for a given active participant. Under the PUC cost method, the value of an active participant's benefits tends to increase more sharply over their later years of service than over their earlier ones.

As a result of this pattern of benefit values increasing, while the PUC method is not an unreasonable method, more plans use the EAN funding method to mitigate this effect. It should also be noted that the EAN method is the required method to calculate liability for the Governmental Accounting Standards Board Statements 67 and 68.

Asset Smoothing Method

The actuarial value of assets for the systems is a smoothed market value. Unanticipated changes in market value are recognized over five years in the actuarial value of assets. The primary purpose for smoothing out gains and losses over multiple years is that the fluctuations in the actuarial value of assets will be less volatile over time than fluctuations in the market value of assets. Cheiron concurred with the use of the asset smoothing method noting that smoothing the market gains and losses over a period of five years to determine the actuarial value of assets is a generally accepted approach in determining actuarial cost.

Another aspect of asset smoothing methods is whether or not to limit the maximum spread between the actuarial value of assets and the market value of assets. Many public sector pension plans limit the actuarial value of assets to be in any year no more than 120% of market value, or no less than 80% of market value. In fact, the Internal Revenue Service Code 26 U.S.C. §430(g)(3)(B)(iii) mandates this “corridor” for private sector pension plans (a 90%-110% corridor is mandated). Even though it is not mandated for public plans, Cheiron believes that the use of this type of corridor is a sounder actuarial practice, and according to ASOP No. 44 in Section 3.3 b. 1, the actuarial value of assets should “...fall within a reasonable range around the corresponding market values.”

In past reports, Cheiron recommended that the Boards consider moving to this approach in future valuations. However, since the Boards do not have the authority to create such a corridor, Cheiron did not repeat the recommendation in this year’s reports.

STATE MANDATED FUNDING METHOD

The Illinois Pension Code requires that the systems’ actuaries base the required contribution using a prescribed funding method that achieves 90 percent funding in the year 2045. In the actuarial valuation reports, the systems’ actuaries discuss their concerns with this funding method.

- TRS and its actuary have been critical of the statutory funding method. In TRS’ June 30, 2015 Actuarial Valuation Report, TRS’ actuary comments that the statutory funding method does not meet Actuarial Standards of Practice. With support of the TRS Board, TRS’ actuary reports on an alternative funding method that they consider representative of generally accepted actuarial methods and refers to this method as Actuarial Math 2.0. This method uses the Entry Age Normal method and amortizes the unfunded liability over 20 years. Cheiron concurred with TRS’ actuary’s recommendations and demonstration of an alternative funding approach and agreed that it conforms to a goal of full funding within a reasonable time period and is in accordance with generally accepted actuarial practices.
- In SURS’ June 30, 2015 Actuarial Valuation Report, SURS’ actuary comments that the Statutory funding policy defers funding for these benefits into the future and places a higher burden on future generations of taxpayers. They recommend a funding policy which would contribute the normal cost plus a closed 29 year amortization of the unfunded accrued liability as a level percentage of capped payroll.
- In the actuarial valuations for SERS, GARS, and JRS, the actuary advises “strengthening the current statutory funding policy” and provides the following examples:
 - Increasing the 90 percent funding target;
 - Reducing the projection period needed to reach 90 percent funding;

- Separating the financing of benefits for members hired before and after December 31, 2010; and
- Changing to an Actuarial Determined Contribution based funding approach with an appropriate amortization policy for each respective tiered benefit structure.

Cheiron concluded that the Pension Code funding method does not meet generally acceptable actuarial principles because the systems are not targeted to be funded to 100 percent and the funding of the System is significantly deferred into the future. Continuing the practice of underfunding future accruals increases the risk of the systems becoming unsustainable.

Based on the systems' 2015 actuarial valuation reports, the funded ratio of the systems ranged from 43.3 percent (SURS) to 16.0 percent (GARS) based on the actuarial value of assets as a ratio to the actuarial liability. Cheiron has concerns about the solvency of the systems if there is a significant market downturn.

Cheiron recommended stress testing be done or be expanded to demonstrate the likelihood there will be sufficient assets to pay benefits if there is a significant market downturn. The stress testing should be included within the valuation report and include a detailed explanation of the implications that volatile investment returns and other stressors (e.g., membership declines, lower salary growth) would have on the systems. This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested.

RESPONSES TO THE RECOMMENDATIONS

Each of the five State-funded retirement systems provided responses to Cheiron's recommendations contained in the preliminary reports. The systems generally agreed with Cheiron's recommendations. The complete responses are in Appendix C.

Chapter Two**PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT
SYSTEM**

In accordance with 30 ILCS 5/2-8.1, Cheiron, the State Actuary, submitted a preliminary report to the Board of Trustees of the Teachers' Retirement System (TRS) concerning proposed certifications of required State contributions submitted to Cheiron by the Board. The preliminary report was submitted to TRS on December 3, 2015. The preliminary report was based on Cheiron's review of actuarial assumptions included in TRS' 2015 Actuarial Valuation Report.

Following is Cheiron's final preliminary report on the Teachers' Retirement System. TRS' written response, provided on December 10, 2015, can be found in Appendix C.

December 21, 2015

Mr. William G. Holland
Auditor General
740 East Ash Street
Springfield, Illinois 62703

Board of Trustees
Teachers' Retirement System of the State of Illinois
2815 West Washington Street
Springfield, Illinois 62702

Dear Ladies and Gentlemen:

In accordance with the Illinois State Auditing Act (30 ILCS 5/2-8.1), Cheiron is submitting this preliminary report concerning the proposed certification prepared by Buck Consultants (Buck) of the required State contribution to the Teachers' Retirement System of the State of Illinois (TRS or System) for Fiscal Year 2017.

In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.

Section I of this report describes the review process undertaken by Cheiron. Section II summarizes our findings. Section III provides the supporting analysis for those findings and presents more details on our assessment of the actuarial assumptions and methods employed in Buck's actuarial certification, as well as our assessment of Buck's determination of the Required State Contribution for Fiscal Year 2017. Section III also includes comments on other issues impacting the funding of the Teachers' Retirement System, including the implications of Article 16 of the Illinois Pension Code, which establishes the statutory funding requirements for the System. **In our opinion, the statutory mandated minimum funding requirements call for inadequate funding and do not meet Actuarial Standards of Practice (ASOP), particularly ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.**

In preparing this report, we relied on information (some oral and some written) supplied by TRS and Buck. This information includes actuarial assumptions and methods adopted by the TRS Board, plan provisions, summarized census data, the draft June 30, 2015 Actuarial Valuation, minutes of the 2015 TRS Board of Trustee meetings, an experience study covering the period from July 1, 2011 through June 30, 2014 and various studies and memos prepared by the System's advisors, staff and Executive Director. A detailed description of all information provided for this review is contained in the body of our report as Appendix B.

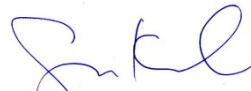
To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared exclusively for the Office of the Auditor General and the Teachers' Retirement System of the State of Illinois for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Sincerely,
Cheiron



Kenneth A. Kent, FSA, FCA, EA, MAAA
Principal Consulting Actuary



Gene Kalwarski, FSA, FCA, EA, MAAA
Principal Consulting Actuary

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION I - REPORT SCOPE

Illinois Public Act 097-0694 (the Act) amended the Illinois State Auditing Act (30 ILCS 5/2-8.1) and requires Cheiron, as the State Actuary, to review the actuarial assumptions and valuation of the Teachers' Retirement System of the State of Illinois (TRS or System) and to issue to the TRS Board this preliminary report on the proposed certification prepared by Buck Consultants (Buck) of the required State contribution for Fiscal Year (FY) 2017. The purpose of this review is to identify any recommended changes to the actuarial assumptions and methods for the TRS Board to consider before Buck, the TRS actuary, finalizes its certification of the required State contributions to TRS for FY 2017.

While the Act states that just the actuarial assumptions and valuation are to be reviewed, we have also reviewed the actuarial methodologies (funding and asset smoothing methods) employed in preparing the actuarial certification, along with any other information contained in the actuarial valuation report provided to the TRS Board, as these methods and disclosures can have a material effect on the amount of the State contribution being certified and the long-term impact of TRS on the States financial resources. Finally, we have offered our opinion on the implications of Article 16-158 of the Illinois Pension Code, which impacts the contribution amount certified by Buck.

In conducting this review, Cheiron reviewed the draft June 30, 2015 Actuarial Valuation prepared by Buck, minutes of the 2015 Board of Trustees meetings, the *Investigation of Demographic and Economic Experience* for the three year period from July 1, 2011 through June 30, 2014, and various studies and memos prepared by the System's advisors, staff, and Executive Director. The specific materials we reviewed are listed in Appendix B.

In addition to reviewing the actuarial certification of the required State contribution to TRS, the Act requires the State Actuary to conduct a review of the "actuarial practices" of the Board. While the term "actuarial practices" was not defined in the Act, we continue to interpret this language to mean that we reviewed: (1) the use of a qualified actuary (as defined in the Qualification Standards of the American Academy of Actuaries) to prepare the annual actuarial valuation for determining the required State contribution; and (2) the conduct of periodic formal experience studies to justify the assumptions used in the actuarial valuation. In addition, we have included comments on actuarial communication and compliance with Actuarial Standards of Practice (ASOP) reflected in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION II - SUMMARY OF RECOMMENDATIONS

This section summarizes recommendations from our review of the actuarial assumptions and methods employed in the draft June 30, 2015 Actuarial Valuation of TRS as well as the “actuarial practices” of the TRS Board. Section III of this report provides detailed analysis and rationale for these recommendations.

Proposed Certification of the Required State Contribution

Buck has determined that the FY 2017 required State contribution calculated under the current statutory funding plan is \$3,986,583,351. We have verified the arithmetic calculations made by Buck to develop this required State contribution and have reviewed the assumptions on which it was based. As such, we have accepted Buck’s annual projections of future payroll, total normal costs, employee contributions, combined benefit payments and expenses, and total contributions.

1. We recommend that the TRS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System’s actuary.

State Mandated Funding Method

2. We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of TRS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

30 ILCS 5/2-8.1 requires the State Actuary to identify recommended changes in actuarial assumptions that the TRS Board must consider before finalizing its certification of the required State contribution. We have reviewed the analysis as presented in the report and the assumption changes and believe the response to the experience is reasonably reflected in the assumption changes. Therefore we conclude that all the actuarial assumptions used in the draft June 30, 2015 Actuarial Valuation are reasonable in general, based on the evidence provided to us.

Recommended Additional Disclosures for the 2015 Valuation

3. We continue to recommend that Buck expand the stress testing of the System within the valuation report and include a detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g., membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period.
4. We recommend the inclusion of the statutory State contribution development in the Executive Summary to emphasize the makeup of the State’s funding obligation. We also

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION II - SUMMARY OF RECOMMENDATIONS

believe such an exhibit should include a numerical comparison of the statutory and alternative *Actuarial Math 2.0* funding results as defined in the valuation report.

5. In relation to the discount rate calculated in accordance with GASB 67, we recommend Buck review their calculation regarding the treatment of future expenses, because we believe the method applied is flawed, and the resulting discount rate may be slightly higher than shown in the results.

Recommended Changes for Future Valuations

6. We recommend that TRS consider lowering the interest rate next year and the rate be developed taking into account the negative cash flow of TRS and the anticipated future interest rate environment.
7. We recommend the TRS Board continue to annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly.
8. We continue to recommend evaluating the implications of the one year delay in data used for the valuation to substantiate if it is immaterial.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

In this section we provide detailed analysis and supporting rationale for the recommendations that were presented in Section II of this report.

Proposed Certification of the Required State Contribution

As stated in our summary of recommendations in Section II, we have verified the arithmetic calculations made by Buck to develop this State required contribution, have reviewed the assumptions on which it is based, and have accepted Buck's annual projections of future payroll, total normal costs, benefits, expenses, and total contributions. However, in accordance with 30 ILCS 5/2-8.1, our review does not include a replication of the actuarial valuation results.

Given the size of the TRS Plan, the Plan's low funded ratio, the recent changes in legal requirements, and guidance issued by the Government Finance Officers Association, we are recommending that the Board periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary. Results are compared in a detailed fashion to measure the liabilities for each benefit form and feature. A replication audit will uncover any potential problems in the processing and certification of valuation results.

We recommend that the TRS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary (Recommendation #1).

It is our understanding that TRS has issued a formal Request for Proposal for actuarial services. If Buck is replaced by another firm, we would anticipate that next year's valuation and the transition process will satisfy this recommendation. If the actuary is not changed, then a full replication audit should be performed.

State Mandated Methods

State Mandated Funding Method:

The Illinois Pension Code (40 ILCS 5/16-158) is limited in meeting the risks of the System. This law requires that the actuary base the required contribution using a prescribed funding method that achieves 90% funding in the year 2045. This does not meet generally acceptable actuarial principles because the System is never targeted to be funded to 100%, and the funding of the System is significantly deferred into the future. In addition, on-going benefits being earned in the future are also being funded only at 90%. The method defined in the Code does not conform to the guidelines in ASOP No. 4, Section 3.14 regarding the allocation procedures of costs to the expected benefit payments which provides:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of TRS (Recommendation #2). Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

In its draft June 30, 2015 Actuarial Valuation on pages 12-21, Buck comments that the statutory funding method does not meet Actuarial Standards of Practice. With support of the TRS Board, Buck reports on an alternative funding method that they consider representative of generally accepted actuarial methods and refers to this method as *Actuarial Math 2.0*. Using this methodology, the State's contribution amount would be \$6,070,973,314 for FY 2017. We concur with Buck's recommendations and demonstration of an alternative funding approach and agree that it conforms to a goal of full funding within a reasonable time period and is in accordance with generally accepted actuarial practices.

The method Buck calls as Actuarial Math 2.0 is described in this section of their report with a numerical demonstration and determination of the contribution amount on page 32. The method includes the following provisions:

- The use of the Entry Age Normal Method (EAN) instead of the Projected Unit Credit (PUC) method. The method uses the Entry Age Normal Cost Method (the same method called for in the new GASB 67 and 68 disclosures). Actuarial methods differ in how they allocate the cost of benefits over a participant's life time. PUC, which is called for in the statutory contribution determination, determines the cost of benefits at the participant's attained age. So as a participant gets older and the cost of the benefit is discounted over a decreasing period from expected retirement to attained age, their cost—the normal cost—will increase. With a large group and stable population, the actual normal costs don't necessarily increase because the average age of the population remains constant. Under the EAN, the normal cost is determined as a level percent of pay from age at entry into the system to normal retirement. This method typically provides a more stable cost as a percent of pay and is the same method adopted by GASB for the Statement 67 and 68 disclosures.
- The unfunded liability under Actuarial Math 2.0 is amortized over 20 years on an increasing basis, with the annual payments scheduled to increase by 2.0%. The rate of 2% is to reflect, according to TRS, the expected State revenue growth rate. Amortizing the unfunded liability on an increasing basis can be an issue because it can result in the initial payments not being sufficient to cover the interest cost. However, selection of the 20 years and use of 2.0% as a proxy for the annual increase rate expected for the State's general revenue will result in the first and all future payments covering the interest cost on the unfunded liability as well as a

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

portion of the principal. We have confirmed TRS's statement that, based on this method of amortization, the principal on the unfunded will begin to be paid down in the first year. We also confirm that the method proposed meets generally accepted actuarial methods.

- All future changes to the unfunded liability not attributable to the current amortization amounts such as experience, benefit changes, and changes in assumptions are to be amortized over the same 20 year amortization methodology.

Based on the draft June 30, 2015 Actuarial Valuation, the funded ratio, measured as the ratio of the actuarial value of assets to the actuarial liability, is currently at 42.0%. We have concerns about the solvency of the System if there is a significant market downturn. This is why we previously recommended stress testing be done to determine whether there will be sufficient assets under the State mandated funding method to pay benefits if there is a significant market downturn.

We continue to recommend that Buck expand the stress testing of the System within the valuation report and include a detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g., membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period (Recommendation #3). This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested. It is important to include this information in the report so that all readers will be aware of the various risks the System faces, which are not apparent in the deterministic projections. Cheiron has provided to TRS possible interest rate and inflation scenarios to consider for this purpose.

While the Buck report includes some sensitivity analysis to alternative investment returns occurring in one year and the implications on future funded ratios and State contributions (see page 22 of the AVR), this is insufficient in demonstrating the potential unsustainability of cost or insolvency of funds.

Recommended Additional Disclosures

Section 1.2 on page 28 of the valuation report presents a relatively concise summary of the elements that make up the total State contribution amounts under both the Statutory and Actuarial Math 2.0 methods. **We recommend the inclusion of the statutory State contribution development in the Executive Summary to emphasize the makeup of the State's funding obligation. We also believe such an exhibit should include a numerical comparison of the statutory and alternative *Actuarial Math 2.0* funding results as defined in the valuation report (Recommendation #4).**

With the expansion of the Executive Summary and the projection values provided in Section 4 of Buck's draft June 30, 2015 Actuarial Valuation, we find that all the appropriate details are included. This allows for the tracking of future payroll, normal costs by tier, and liabilities by

THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1

SECTION III – SUPPORTING ANALYSIS

participant categories. This additional information also allows insight into the growing risks of TRS under the statutory minimum funding as one can track the growth of liabilities, assets, and expected future contribution amounts to determine if the amounts expected from the State are reasonable and sustainable.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

A. Economic Assumptions

1. The Interest Rate:

The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the required State contribution amount. This assumption, which is used to value liabilities for funding purposes, was maintained at 7.50% for the draft June 30, 2015 Actuarial Valuation. As recommended in past reports, Buck, the investment consultants RVK, and the TRS staff have reviewed and provided reports on the long-term return rate, currently at 7.50% and demonstrated adequate support of continued use of this rate. Also in August of 2015, Buck conducted a three year *Investigation of Demographic and Economic Experience* covering the period from July 1, 2011 through June 30, 2014 in accordance with the Board's policy.

After reviewing all the materials (see Appendix B of the report) that were made available, Cheiron concludes that the use of 7.50% for this valuation is reasonable. However, the rationale for the current interest rate of 7.50% is based, as we understand it, from the expected returns of the current asset allocation policy. We do not believe the same results would occur if projections were performed accounting for the material negative cash flow. **We recommend that TRS consider lowering the interest rate next year and the rate be developed taking into account the negative cash flow of TRS and the anticipated future interest rate environment (Recommendation #6).**

While this assumptions and the rationale for maintaining it was supported by a review of historic returns according to general investment allocations of the Fund in the *Investigation of Demographic and Economic Experience* (see pages 9 – 11), what is missing in the analysis is the impact of the significant negative cash flow (contributions less benefits and expenses), which in 2015 represented 2.6% of assets.

The projected geometric returns determined at various periods and particularly over a 20 year period in support of the 7.50% assumption, provided by Buck in their review of this assumption in August 2015, appears to be based on time weighted returns, and not dollar weighted returns. Only dollar weighted returns equate the actuarial interest rate assumption. With negative cash flows (contribution income less benefit and expense payout), dollar weighted returns tend to lag behind time weighted returns. If this factor was considered, we believe the conclusions supporting the current 7.50% rate would be different and would support further lowering of the rate. This can be demonstrated by a projection of the current

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

assets with a zero cash flow against the current assets with the negative cash flow expected over time. What is anticipated is that in the years when the return is below the assumption, the pay out of assets in benefit payments in excess of contributions is not available for an equal return above the assumption.

We recommend the TRS Board continue to annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly (Recommendation #7).

Our rationale for this recommendation is as follows:

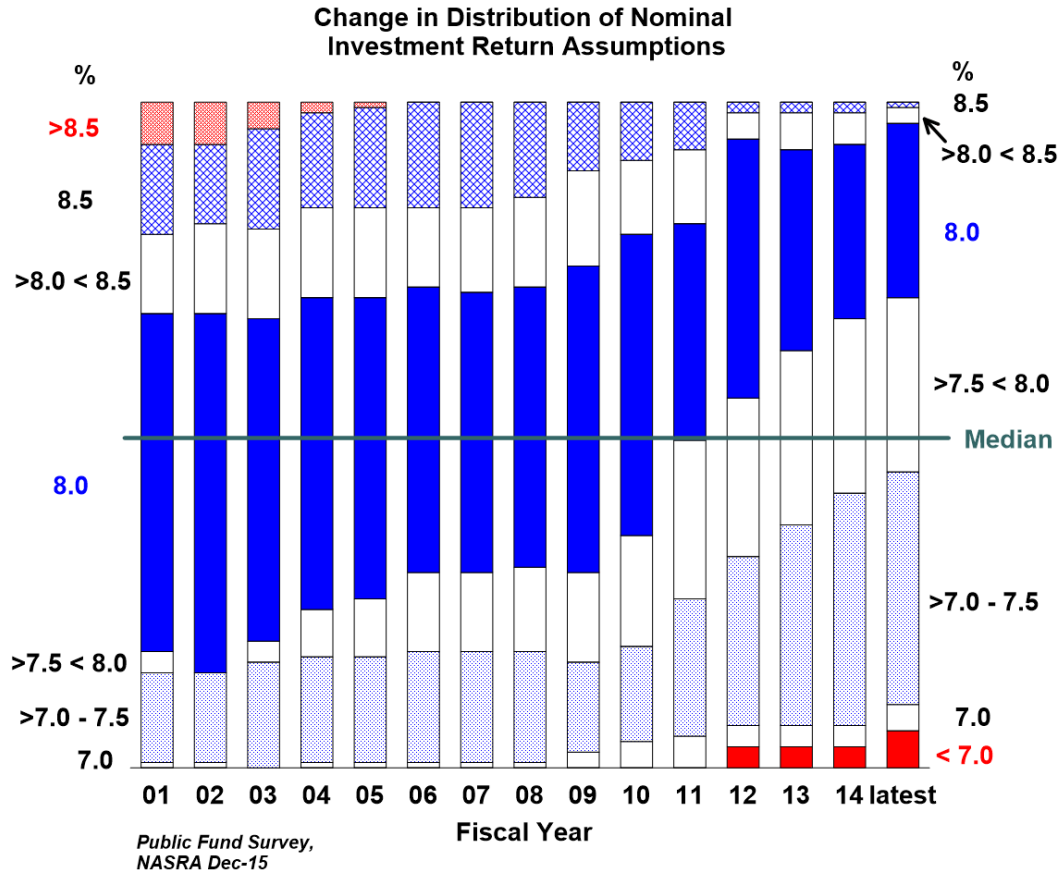
We reviewed the asset liability modeling and asset allocation reports of RV Kuhns dated March 2015. This presentation provides expectations from the investment consultant of a long-term return rate of 7.27% with the TRS expectation of 7.46%. These results support a long-term expectation of less than 7.50% and rationale for further considerations of a rate reduction in the future.

The balance of this section provides background and benchmarking information around the changes in the economic assumptions adopted by the Board.

- The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 126 large retirement plans. The following chart shows the distribution of investment return assumptions for the last 14 years of its survey. The latest data includes results collected through December 2015.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS



- Over the period shown in the latest survey, there continues to be a pattern of reducing investment return assumptions. Seventy of the 126 plans have reduced the interest rate assumption since Fiscal Year 2011. For these 70 plans, the average reduction is 0.38%. The survey is consistent with the experience of other Cheiron clients with which there has been a significant trend to reduce the investment return assumptions in the last several years.
- There has been emerging actuarial practice throughout the country to reducing the discount rates even below the level that the investment consultants believe is achievable. This is because of the very low interest rate environment we are currently in. The lower the interest rate environment, the greater the investment risk that must be taken to achieve an assumed rate of return. For example, in 1995 yields on ten year Treasury bonds (a proxy for a risk free investment) was 6.21%. In 2015 these yields are now 1.98%. This means, back in 1995 in order to achieve 7.50%, a system only had to earn 1.29% more than the ten year treasury yields (“risk free” rates), whereas today a system would have to earn 5.52% above this “risk free” rate. By reducing the investment return assumption, plans are more likely to meet their funding goals without requiring investment performance so much in excess of the risk free rate.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

- In addition to taking pressure off of the investment process, there is a growing concern that long term interest rates will eventually rise. A pattern of rising interest rates generally results in declining bond returns. This in turn will result in even greater investment risks on the equity side of the assets in order to compensate for both declining bond returns and the need to earn 5.52% above the risk free rates of return.
- As is the case with most maturing pension plans, TRS is experiencing negative cash flows measured as contributions less benefits and expenses. TRS's negative cash flow is 2.6% of assets and growing. This negative cash flow is expected to grow in the coming years. Negative cash flows result in actuarial returns (i.e. dollar weighted returns) being less than "time weighted" returns, which is what all investment consultants base their reported and projected returns on. So as a result, even if an investment consultant's expected long term return horizon is 7.4%, for example, that is expressed as a time weighted return figure, and for plans with negative cash flows, we would expect the dollar weighted returns to be less.
- New GASB 67 and 68 pronouncements require many public pension plans, such as TRS, to use a lower interest rate for accounting disclosures and pension expense determinations in Fiscal Years 2014 and 2015, respectively. It's important to note, however, that the new standards do not define funding requirements for a plan. We discuss this issue specific to the assumptions used by Buck in the TRS report below.
- The federal government, which promulgates minimum funding standards for corporate pension plans, already requires corporate pension plans to utilize interest assumptions that are based on short-term and mid-term bond rates, which are very low (Pension Protection Act of 2006 p. 14. IRC §430(h)(2)(B)).

GASB Discount Rate

In relation to the discount rate calculated in accordance with GASB 67, we recommend Buck review their calculation regarding the treatment of future expenses because we believe the method applied is flawed and the resulting discount rate may be slightly higher than shown in the results (Recommendation #5). In Section 3.5 on pages 50 and 53 of Buck's report, they performed the determination of the appropriate discount rate in accordance with GASB 67. They defined the blended rate of 7.47% to be used in the measure of the TRS liabilities. This rate is based on the projection of assets and benefit payments on a closed plan basis. The lower discount rate reflects, in accordance with the methods defined in paragraph 26 of GASB 67 the blending of the assumed return rate and an average municipal bond rate. Under this methodology a projection is performed on a closed group basis, assuming no new entrants. On this basis, if it is determined in any year in the future that the assets are projected to be insufficient to pay all benefits, such benefit payments must be discounted on an average municipal bond rate instead of the long-term expected asset return rate. Buck has included this projection in their report and the 7.47% assumption used to measure liabilities under GASB 67 and 68 reflects these results.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

However we believe there may be a logic error in the projection demonstrated in Buck's report on pages 50 through 53 which may support the use of 7.50%. Based on these projections, it would appear all future expenses will be charged against the closed group of participants, whereas during this projection period, it would be anticipated that some of the future expenses will be charged against new entrants. The expectation of expenses declining over time is particularly true as the expense assumption is designed to value expenses as a percent of current and future total payroll which for a closed group would decline to zero over the projection period required. So as payroll becomes a decreasing portion of the closed group covered under this projection, the expense should be declining. The most obvious illustration of this is that in the last year of the projection when the last current participant receives the last payment, the expenses are \$144 million.

2. *Inflation Assumption:*

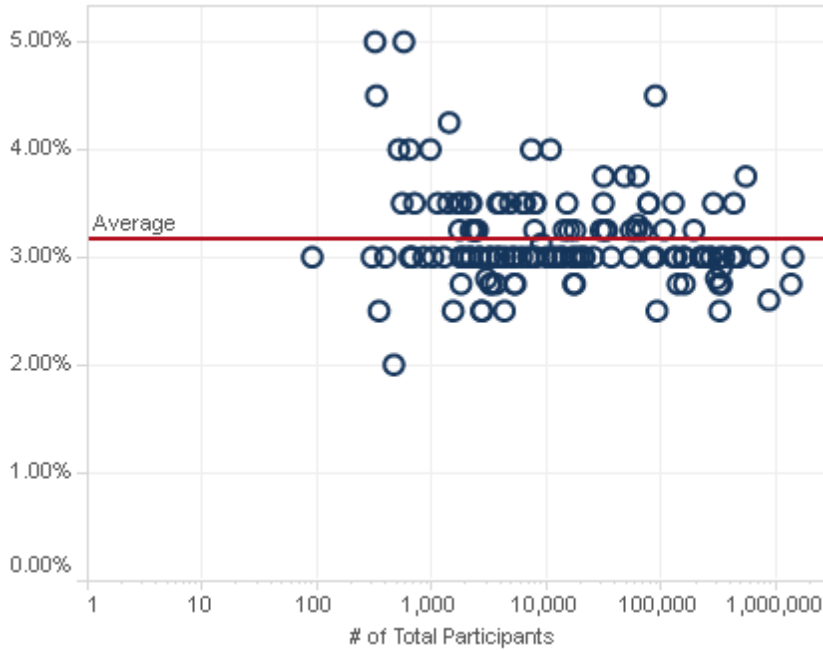
We find the inflation assumption of 3.00%, which primarily impacts the salary increase assumption used in the draft June 30, 2015 Actuarial Valuation by Buck in certifying the required State contribution, is reasonable.

Our rationale for concurring with the 3.00% assumption is as follows:

- The 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (next 75 years) inflation will average somewhere between 2.0% and 3.4% (<http://www.ssa.gov/oact/tr/2015/tr2015.pdf>).
- As shown on page 9 of Buck's August 13, 2015, report to the TRS Board, they rely on historic data and their forward looking model which includes a 30 year projection of 3.01% to support their assumption of 3.00%. Their model, however, produced lower rates than the previous experience analysis.
- The *National Conference on Public Employee Retirement Systems* (NCPERS) November 2015 study provides the following graphic of respondents' inflation assumptions:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS



This shows that the 3.0% assumption, which TRS uses, is a prevalent inflation assumption among the 179 systems who responded to this study, with 3.2% as the average.

3. Salary (Annual Compensation) Increase Assumption:

For the draft June 30, 2015 Actuarial Valuation, the total salary scale increase assumption was decreased by 1.0% as a response to the experience measured and reported in Buck’s August 2015 report. With maintenance of the 3.0% inflation assumption and real wage growth assumption of 0.75%, the aggregate payroll growth assumption is assumed to remain the same at 3.75%. The 1.0% overall reduction however is taken from the portion of salary increases attributable to merit and seniority. Buck has accomplished this by moving from a merit and seniority based on age to one based on service.

<u>Salary Component</u>	<u>Amount</u>
Inflation	3.00%
Real Wage Growth	0.75%
Total Salary Increase Assumption	3.75%

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

Buck includes the following listing of salary increases by service and included the requested merit or seniority components.

Service	Salary Increase
1	9.75%
2	7.75%
3	7.25%
4	6.95%
5	6.75%
10	5.75%
15	4.75%
20 and above	3.75%

We find that the overall 1.00% reduction, in accordance with overall experience in lower payroll growth rates in general, as reasonable.

Our rationale for concurring with Buck's recommended salary increase assumption:

- In our own experience with our public sector pension plans (about 60 large plans), we have witnessed a consistent recent trend of declining salary increases for public sector employees that was addressed when the assumption was changed effective for the June 30, 2015, valuation.
- The reduction in the rates is a reflection of the repeated material gains from salary growth over the past six years as shown in the graph in the next section, Demographic Assumptions, and demonstrated in the experience study.

4. Cost of Living for Tier 2 Assumption:

For Tier 2 participants, benefits are increased annually equal to 50% of the consumer price index urban rates with a maximum of 3.0%. With the reduction of the inflation assumption to 3.00% in 2014, the assumption for COLAs was decreased from 1.625% to 1.40%. This is not an unreasonable assumption based on the assumption that when inflation is below 3.00%, the COLA will be less than 1.50%.

We find the assumption and the basis for setting it as reasonable.

5. Tier 2 Capped Pay Assumption:

Benefits for members hired after January 1, 2011, are calculated using pay that is capped under 40 ILCS 5/1-160. The pay cap is shown on page 9 of the draft June 30, 2015 Actuarial Valuation to be \$111,572 for 2015.

We find the assumption and the basis for setting it as reasonable.

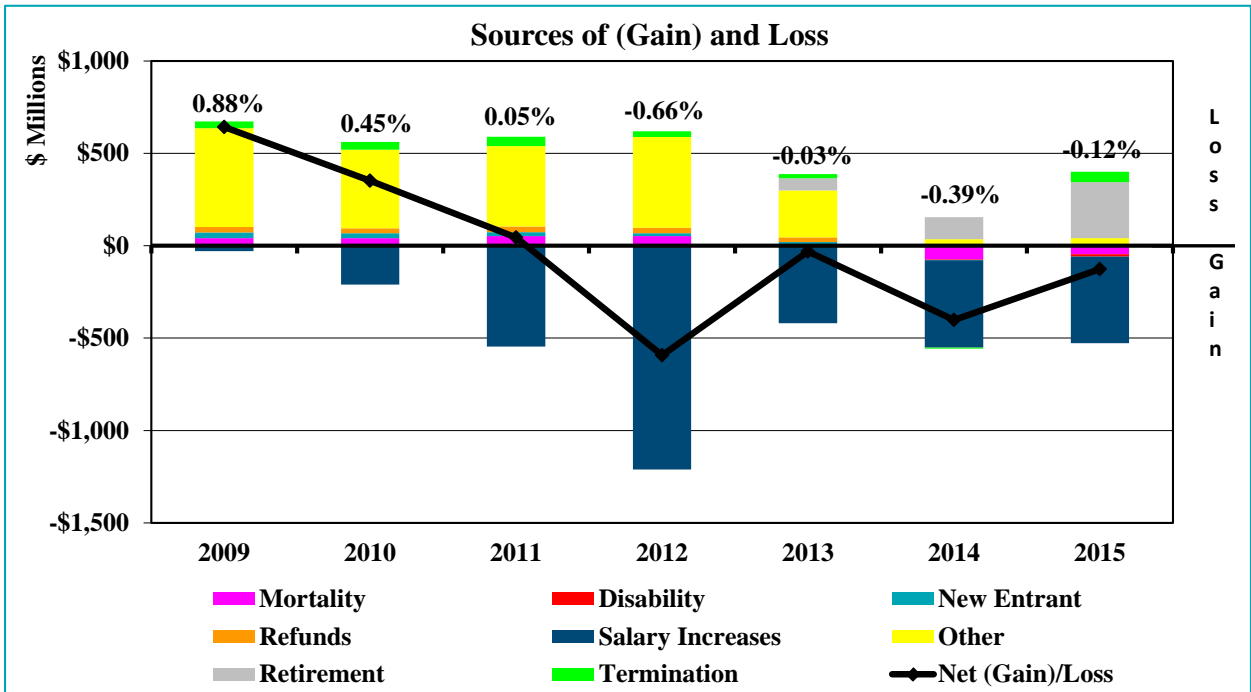
**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

B. Demographic Assumptions

This year Buck performed a 3-year experience analysis covering the period from July 1, 2011 through June 30, 2014. We have reviewed the report and find the recommendations, which the Board has adopted, reasonable.

In its annual actuarial valuation reports, TRS regularly reports sources of liability gains and losses. In the 2015 report, these are shown in Section 1.4 on page 34. In the chart below, we have collected similar data from TRS's past valuation reports dating back to 2009 and presented a historical review of past demographic and salary increase experience gains and losses.



The percentages shown above the bars refer to net (gain)/loss as a percentage of liability.

This chart shows the pattern of annual gains and losses attributable to eight different sources as shown in the legend above. When the colored bar slices appear above zero on the Y axis that represents an experience loss, and below zero represents an experience gain for that year.

Key observations from this chart are as follows:

1. As a result of the recent experience study and assumption changes implemented in the draft June 30, 2015 Actuarial Valuation, a number of the consistent trends over this time period have been addressed. The assumption changes can be referenced either in Buck's August report to TRS summarized as recommendations on page 3 and the financial

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

impact of the changes on page 23 of the same report. Those that have been reflected in the experience study include:

- a. The trend over the last year shows significant annual gains from salary increase less than expected. The consistent gains from the salary increase have been addressed by a decrease in the salary scale.
 - b. Four of the seven years demonstrated losses from mortality reflecting retirees living longer. This experience has been addressed through the changes made and reflected in the June 30, 2015 valuation.
 - c. There were also losses from terminations which have been addressed in the assumption changes.
2. The other material change that was made this year following previous year's recommendations was to address, reconcile, and report on the significant "Other" sources of losses. This had been partially addressed in last year's report and completely addressed this year.
 3. The net liability (gain)/loss is shown by the black line on the first graph above. This net (gain)/loss as a percent of liability is shown above the bars.

Data Reconciliation:

The draft June 30, 2015 Actuarial Valuation includes a breakdown of gains and losses including those attributable to demographic changes made in the assumptions resulting from the experience analysis. We found this helpful in reconciling the changes in the unfunded liability from 2014 to 2015.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

Below, we summarize all the demographic assumptions that we reviewed and we've concluded all are reasonable and meet the requirements of ASOP No. 35, Section 3.3.4.

1. Rates of Termination:

Rates of Termination were changed for the 2015 valuation.

Age	<u>Males</u>		<u>Females</u>	
	Non-vested	Vested*	Non-vested	Vested*
25	9.5%	6.0%	8.4%	6.5%
30	8.8%	2.8%	11.3%	5.0%
35	10.2%	2.1%	11.6%	3.5%
40	12.3%	1.7%	10.8%	2.2%
45	12.6%	1.5%	10.3%	1.9%
50	16.7%	1.9%	11.8%	1.7%
55	20.7%	5.0%	17.0%	3.8%
60	16.4%	4.6%	16.9%	4.0%
65	30.2%	4.6%	35.0%	4.0%

*5 or more years of service.

2. Rates of Mortality:

Rates of Mortality were changed for the 2015 valuation.

One of the areas we looked at closely this year was the mortality assumption. Recently changed Actuarial Standards of Practice (ASOP No. 35) now require that actuaries at least consider projections of mortality improvements, and if there is not such an assumption for improvement, the actuary must disclose the basis for not making the assumption. Based on the current assumptions, mortality improvements are both being projected and reflect application of generational mortality improvements that meet the ASOP requirements. For TRS, the assumed mortality rates are based on the Society of Actuaries RP-2014 mortality tables, with adjustments as appropriate for TRS experience. The rates are used on a fully generational basis using projection table MP-2014. Sample rates and a description of the tables follows. Note that the sample rates shown are as of the base year 2014.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

a. Death before Retirement at Selected Ages:

Age	Males	Females
25	0.0339%	0.0146%
30	0.0317%	0.0184%
35	0.0367%	0.2410%
40	0.0440%	0.0334%
45	0.0682%	0.0554%
50	0.1182%	0.0930%
55	0.1955%	0.1412%
60	0.3288%	0.2060%
65	0.5805%	0.3119%

Pre-Commencement Member: the RP-2014 White Collar table.

b. Death after Retirement at Selected Ages:

Age	Healthy Males	Healthy Females	Disabled Males	Disabled Females	Beneficiary Males	Beneficiary Females
50	0.2764%	0.1578%	2.0395%	1.1907%	0.4552%	0.3100%
55	0.3908%	0.2064%	2.3369%	1.4479%	0.6423%	0.4057%
60	0.5225%	0.2957%	2.6604%	1.6999%	0.8704%	0.5814%
65	0.7580%	0.4977%	3.1685%	2.0860%	1.2335%	0.9014%
70	1.2402%	0.8021%	4.0346%	2.8203%	1.8781%	1.4412%
75	2.1279%	1.3359%	5.4287%	4.1045%	3.0045%	2.3451%
80	4.2903%	3.2244%	7.6616%	6.1036%	5.0089%	3.9025%
85	7.8655%	5.7890%	11.3303%	9.0420%	8.6797%	6.7764%
90	14.5119%	10.6219%	17.3005%	13.2652%	15.2217%	11.9981%

Post-Commencement Healthy used for non-disability retirements: the RP-2014 White Collar table with female rates multiplied by 76% for ages 50-77, and 106% for ages 78 to 114, and male rates multiplied by 115% for ages 78 to 114.

Post-Commencement Disability: the RP-2014 Disabled table.

Post-Commencement Surviving Beneficiaries: the RP-2014 table with female and male rates multiplied by 112% for ages 50 to 114.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

3. Rates of Disability:

Rates of Disability were changed for the 2015 valuation.

Age	Males	Females
25	.029%	.030%
30	.023%	.061%
35	.030%	.069%
40	.051%	.112%
45	.068%	.140%
50	.117%	.192%
55	.138%	.240%
60	.179%	.227%
65	.536%	.410%

4. Rates of Retirement:

a. For Members Hired before January 1, 2011:

Rates of Retirement were changed, for members hired before January 1, 2011, for the 2015 valuation.

Age**	Service*				
	5 – 18	19 - 30	31	32-33	34+
54	-	6%	8%	38%	60%
55	-	10%	8%	38%	60%
56	-	7%	8%	38%	45%
57	-	7%	12%	40%	45%
58	-	7%	12%	40%	40%
59	-	25%	38%	60%	40%
60	14%	30%	48%	60%	40%
61	14%	27%	33%	45%	40%
62	14%	27%	50%	45%	40%
63	14%	27%	38%	50%	40%
64	24%	37%	50%	60%	40%
65-67	26%	37%	50%	50%	40%
68-69	26%	33%	50%	50%	40%
70	100%	100%	100%	100%	100%

* Active member service rounded to nearest year on June 30 prior to retirement.

** Age rounded to nearest year on June 30 prior to retirement.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

b. For Members Hired on or after January 1, 2011:

Age**	Service*				
	9 – 18	19 - 30	31	32-33	34+
≤ 61	0%	0%	0%	0%	0%
62	13%	15%	20%	25%	25%
63	8%	10%	15%	20%	20%
64	8%	10%	15%	20%	20%
65	8%	10%	15%	20%	20%
66	20%	10%	15%	20%	20%
67	20%	40%	70%	70%	70%
68	20%	40%	40%	40%	40%
69	20%	40%	40%	40%	40%
70	100%	100%	100%	100%	100%

* Active member service rounded to nearest year on June 30 prior to retirement.

** Age rounded to nearest year on June 30 prior to retirement.

c. Utilization of Early Retirement Option (ERO) among All Active Service Retirees:***

ERO utilization was changed for the 2015 valuation.

Age**	Service*			
	19 - 30	31	32	33
54	0%	0%	0%	0%
55	50%	65%	82%	10%
56	58%	66%	52%	11%
57	49%	44%	52%	12%
58	58%	50%	38%	6%
59	51%	64%	52%	8%

* Active member service rounded to nearest year on June 30 prior to retirement.

** Age rounded to nearest year on June 30 prior to retirement.

*** ERO Utilization Rates are applied only to members who have less than 35 years of total service at the assumed retirement date (including assumed sick leave and optional service purchased at retirement). Based on the sick leave and optional service assumptions, the majority of members with 33 years of service at the beginning of the year of retirement will not be assumed to retire on ERO because they will be assumed to have at least 35 years of service at retirement.

5. Marital Data: It is assumed that 85% of members are married and that the female spouse is three years younger than the male spouse. (Adopted effective June 30, 1993.)

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

- 6. Growth in Active Membership:** For purposes of the projection required by State funding law, it is assumed that the active membership of the System will remain constant in number with no change in the size of either the full-time/part-time group or the hourly/substitute group. (Adopted effective June 30, 1994.)
- 7. Severance Pay:** Changed for the 2015 valuation. The percent of retirees from active service assumed to receive severance payments, and the amount of such severance payments, should be based on the assumption that 20% of retirees will receive severance pay and the average severance payment will be 2.5% of other pensionable earnings in the last year of employment.
- 8. Optional Service Purchases:** Changed for the 2015 valuation. The liability for retirement benefits for active members who have not previously purchased optional service is increased to cover the employer cost of out-of-system service purchased in the last two years prior to retirement. The amount purchased varies by the amount of regular service at retirement. Representative amounts purchased at retirement, and other assumptions used, are as follows:

Regular Service at Retirement	Maximum Service Purchased
10 years	0.204 years
20 years	0.537 years
25 years	1.029 years
30 years	1.424 years
34 or more	None

- a. Actual optional service credit for each current member is provided by TRS; and
- b. No additional service purchases will be assumed for members who currently have optional service credit; and
- c. Members will not purchase service if it does not improve their pension benefit; and
- d. When optional service is purchased within the last two years prior to retirement, 25% of the cost is covered by member payments, and the remaining cost is the responsibility of the employer.

The liability covered by future member payments is not included in the liability on the valuation date, but is brought into projected liabilities as those payments are brought into the assets.

- 9. Sick Leave Service Credit:** Changed for the 2015 valuation. The assumed unused and uncompensated sick leave service credit at retirement varies by the amount of regular service at retirement. Representative assumed amounts of unused and uncompensated sick leave service are as follows:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

Regular Service at Retirement	Sick Leave Service Credit
20 years	0.938 years
25 years	1.115 years
30 years	1.276 years
34 years	1.450 years
35 or more	None

10. Administrative Expenses: The administrative staff of the System estimates the expected administrative expenses for the fiscal year following the valuation. Total payroll for the same year is projected based on valuation assumptions, and the expected administrative expenses are then expressed as a percent of total payroll. Administrative expenses in future years are then assumed to remain constant as a percent of total payroll. (Adopted effective June 30, 1994.)

11. 2.2 Upgrade Assumption: For those active members who have already made a payment to upgrade past service prior to June 30, 1998 their benefits are based on their upgrading at the valuation date. For all other active members, they are assumed to upgrade at retirement. (Adopted effective June 30, 1999.)

12. Liability Adjustment: The current actuarial valuation was based on the latest membership data available, which were submitted by the System for active, inactive, and retired members as of the prior valuation date. In projecting results to account for the one-year difference in the census date and the valuation date, Buck made use of the valuation assumptions. To the extent that changes have occurred in the census from the date the census information is determined and the valuation date, Buck will work with TRS staff to determine if additional adjustments need to be made. Otherwise, any change in liability due to changes in census between the collection date of the census information and the valuation date will be captured in the next actuarial valuation.

We continue to recommend evaluating the implications of the one year delay in data used for the valuation to substantiate if it is immaterial (Recommendation #8). The implications of the use of the prior year's data brought forward to represent the current year's data in the report should be numerically demonstrated to allow for the evaluation of the significance to the resulting liabilities and plan costs.

13. Future Payroll Assumption: Changed for the 2015 valuation. Future payroll is projected using the assumed decrements for the members in the system and the new entrant profile as described below:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

a. Distribution of New Entrants is as follows (based on 6/30/2014 new hire statistics):

Age Group	Full Time/ Part Time			Hourly/ Substitute		
	Males	Females	Total	Males	Females	Total
20 – 24	5.1%	26.2%	31.3%	6.6%	18.7%	25.3%
25 – 29	6.8	26.0	32.8	7.5	14.5	22.0
30 – 34	3.7	10.5	14.2	3.2	6.8	10.0
35 – 39	1.9	5.4	7.3	2.1	6.9	9.0
40 – 44	1.3	4.6	5.9	2.2	9.6	11.8
45 – 49	1.0	3.1	4.1	1.4	5.8	7.2
50 – 54	0.7	1.9	2.6	1.5	4.1	5.6
55 – 59	0.3	0.9	1.2	1.1	3.0	4.1
60 – 64	0.2	0.4	0.6	1.2	1.8	3.0
65 – 69	0.0	0.0	0.0	0.7	0.7	1.4
70	0.0	0.0	0.0	0.3	0.3	0.6
Total	21.0%	79.0%	100.0%	27.8%	72.2%	100.0%

b. Service Credit Earned in Each Future Year (based on 6/30/2014 new hire statistics):

Age Group	Full Time/ Part Time			Hourly/ Substitute		
	Males	Females	Total	Males	Females	Total
20 – 24	0.951	0.969	0.966	0.271	0.259	0.262
25 – 29	0.963	0.964	0.964	0.258	0.246	0.250
30 – 34	0.951	0.957	0.955	0.248	0.246	0.247
35 – 39	0.957	0.958	0.958	0.243	0.240	0.241
40 – 44	0.951	0.950	0.950	0.248	0.240	0.241
45 – 49	0.970	0.962	0.964	0.265	0.244	0.248
50 – 54	0.970	0.955	0.959	0.260	0.244	0.248
55 – 59	0.803	0.926	0.895	0.250	0.241	0.243
60 – 64	0.970	0.956	0.961	0.260	0.236	0.246
65 – 69	0.000	0.000	0.000	0.238	0.234	0.236
70	0.000	0.000	0.000	0.243	0.218	0.231
Average	0.955	0.963	0.961	0.258	0.247	0.250

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

c. Projected Annual Rate of Pay at 6/30/2014* (for one year of service credit):

Age Group	Full Time/ Part Time			Hourly/ Substitute		
	Males	Females	Total	Males	Females	Total
20 – 24	\$ 43,350	\$ 43,421	\$ 43,410	\$ 24,796	\$ 26,527	\$ 26,075
25 – 29	46,270	47,274	47,066	22,480	24,734	23,965
30 – 34	56,622	49,576	51,412	22,709	23,194	23,039
35 – 39	60,163	53,193	55,007	22,672	20,750	21,199
40 – 44	63,824	54,772	56,766	20,273	18,660	18,961
45 – 49	63,810	58,709	59,953	20,114	18,287	18,642
50 – 54	65,192	56,033	58,499	18,179	17,765	17,876
55 – 59	77,805	56,904	61,129	16,712	17,689	17,427
60 – 64	56,006	63,947	61,300	17,711	17,880	17,813
65 – 69	-	-	-	16,846	18,975	17,910
70	-	-	-	19,011	15,685	17,348
Total	\$ 51,738	\$ 47,997	\$ 48,782	\$ 21,931	\$ 22,394	\$ 22,266

* The rate of pay profile will increase by the inflation and real wage growth assumptions.

14. 415 and 401(a)(17) Limits: Benefits are limited by these Internal Revenue Code limits and are assumed to increase 3.00% annually.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

C. Actuarial Methods

Actuarial methods consist of three components: (1) the funding method, which is the attribution of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e., asset smoothing); and, (3) the amortization basis of the Unfunded Actuarial Liability (UAL). Since the amortization basis is governed by State law, we do not comment on it here.

1. Cost Method:

The System uses the projected unit credit cost method (PUC) to assign costs to years of service, as required under the Pension Code (40 ILCS 5/16). **We have no objections with respect to using the PUC method, although we, as Buck does, would prefer the Entry Age Normal (EAN) funding method as it is more consistent with the requirement in 40 ILCS 5/16 -158 for level percent of pay funding.**

Under the PUC method, which is used by some public sector pension funds, the benefits of active participants are calculated based on their compensation projected with assumed annual increases to ages at which they are assumed to leave the active workforce by any of these causes: retirement, disability, turnover, or death. Only past service (through the valuation date but not beyond) is taken into account in calculating these benefits. The cost of providing benefits based on past service and future compensation is the actuarial accrued liability for a given active participant. Under the PUC cost method, the value of an active participant's benefits tends to increase more sharply over his or her later years of service than over his or her earlier ones. As a result of this pattern of benefit value increasing, while the PUC method is not an unreasonable method, more plans use the EAN funding method to mitigate this effect. It should also be noted that the EAN method is the required method to calculate liability for GASB 67 & GASB 68.

2. Asset Smoothing Method:

The actuarial value of assets for the System is a smoothed market value. Unanticipated changes in market value are recognized over five years in the actuarial value of assets. The primary purpose for smoothing out gains and losses over multiple years is that the fluctuations in the actuarial value of assets will be less volatile over time than fluctuations in the market value of assets. **Smoothing the market gains and losses over a period of five years to determine the actuarial value of assets is a generally accepted approach in determining actuarial cost, and we concur with its use.**

Another aspect of asset smoothing methods is whether or not to limit the maximum spread between the actuarial value of assets and the market value of assets. Many public sector pension plans limit the actuarial value of assets to be in any year no more than 120% of market value, or no less than 80% of market value. In fact, the Internal Revenue Service

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

(IRS) IRC §430(g)(3)(B)(iii) mandates this “corridor” for private sector pension plans (a 90%-110% corridor is mandated). Even though it is not mandated for public plans, we believe that the use of this type of corridor is a sounder actuarial practice, and according to ASOP No. 44 in Section 3.3 b. 1, the actuarial value of assets should “...fall within a reasonable range around the corresponding market value.”

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Response to Recommendations in 2014

In the State Actuary's Preliminary Report on the Teachers' Retirement System of Illinois presented December 19, 2014, Cheiron made several recommendations. Below we summarize how these recommendations were reflected in either the System's comments last year or in this year's draft June 30, 2015 Actuarial Valuation.

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
1. We recommend that the TRS Board consider conducting an independent actuarial audit in which the results of the valuation are replicated by the audit actuary and any deviations are noted and reconciled.	Partially Implemented	- We understand that TRS has an RFP out for the valuation work. If a new actuary is selected their transition work will serve the same purpose performed by a replication audit. Recommendation repeated.
2. We have suggested and continue to suggest that the TRS Board always use the conservative end of any range of assumptions recommended by the actuary or other advisors due to the uncertainty and risks associated with the State mandated funding method.	Partially Implemented	Recommendation modified to reflect adoption of a funding policy that meets Actuarial Standards of Practice.
3. We recommend that Buck expand the stress testing of the System to demonstrate the long-term impact of a significant market downturn as well as a long-term decline in active payroll.	Partially Implemented	- While the TRS report shows some sensitivity testing of the implications and sensitivity of future funded status and funding requirements resulting from returns greater and less than the assumed return rate, this does not represent stress testing. Stress testing is a valuable tool by which risks of the plan, such as plan insolvency, can be identified. Until such stress tests are performed and the results can be analyzed, the State would have no ability to know whether or not there is a plan insolvency risk. Recommendation repeated.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
4. We recommend the inclusion of the statutory State contribution development in the Executive Summary to emphasize the makeup of the State's funding obligation.	Partially Implemented	- A development of the statutory State contribution and their proposed Actuarial Math 2.0 does not appear in the Executive Summary. Including the numeric value of the cost in the Executive Summary would help highlight this information. Recommendation repeated.
5. We recommend Buck revise the term <i>Generally Accepted Actuarial Standards</i> with reference to a particular funding method. There are no such standards, nor is there a single generally accepted actuarial method of funding. While the funding approach so described is included in the report to illustrate a more rational funding approach than the State mandated method, the title could mislead the public into thinking that such a method is codified within the Actuarial Standards of Practice (ASOPs).	Implemented	- The term, Generally Accepted Actuarial Standards is no longer being used as a focus of their discussion in the 2015 AVR.
6. In coordination with the lowering of the inflation assumption from 3.25% to 3.00%, the Tier 2 pay cap increase and COLA increase assumptions were changed. For these two inflation dependent benefit structures, the assumption was lowered from 1.625% to 1.50% and 1.40%, respectively. It is unclear why the assumptions would be different if both represent 50% of inflation. We recommend Buck explain in this year's report the	Implemented	- There was appropriate discussion of the COLA in the June 30, 2015 Actuarial Valuation report (page 9).

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
rationale for an assumption that is less than 50% of the inflation assumption for the COLA increase assumption.		
7. We recommend adding additional years and a narrative to the table in Section 1.4 of the valuation report, which for the first time provides a detailed description of experience gains and losses by source. This information is fundamental in assessing the effectiveness of the individual assumptions. A brief description of the reason for significant gains or losses and discussion of the impact of assumption changes will provide insight into potential risks in the system.	Implemented	- Three years of experience are provided on page 34. While there is no description of the trends there was an experience report presented to the Board covering these years.
8. Given the delay in the data used for the 2014 valuation, we continue to recommend that Buck provide discussion and quantification of the impact such a delay has on the measurement of liabilities and plan costs.	Partially Implemented	- Section 6 of the actuarial valuation report could benefit from a separate section discussing the data delay along with any other assumptions applied to the data like defaults for missing data fields. Recommendation repeated.
9. We recommend Buck provide a draft report for this review process and include changes subsequent to the State Actuary's review in the final report instead of a supplement, so that any future users of the report will have the benefit of the changes included within a single document.	Implemented	- This was implemented for the draft June 30, 2015 Actuarial Valuation report.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
10. We continue to recommend that the TRS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly as they did prior to this year's valuation.	Implemented	- It appears that the discount rate assumption is being reviewed annually and the other economic assumptions which were reviewed in a three year experience analysis will at least be reviewed every three years. Recommendation repeated.
11. We recommend again, as we did last year, that TRS consider in future valuations establishing a corridor around the market value of assets of 80% to 120% beyond which the actuarial value is limited, given the use of the actuarial value of assets in the projection methodology in accordance with 40 ILCS 5/16-158 (k). While this change would have no impact on the System for the June 30, 2014, valuation, we believe it would be better to establish this corridor before it is actually applicable.	Not Repeated	- The TRS Board does not have the authority to create such a corridor; as such we will no longer repeat this recommendation.
12. Since the development of assets without the General Obligation Bonds (GOB) directly impacts the required State contribution, it is important to verify that these assets have been historically developed accurately. We recommend that prior to the completion of the June 30, 2015, draft valuation report, that Buck provides a verification of the hypothetical assets without the GOB.	Not Repeated	- A full detailed historical development is not available; as such we will no longer repeat this recommendation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
13. We recommend that in the demonstration of alternative funding methods, Buck include projections of the contribution requirement and funded status of each method. The projections would show the effectiveness of these methods to meet the long-term goals of the system.	Implemented	- Buck has provided a clearly delineated alternative funding method in conformance with generally accepted actuarial practice. They have shown how each of the elements of the Actuarial Math 2.0 method are determined. In support of their efforts a graphic showing the funded status and future costs against the Statutory Minimum would be informative regarding the value of a more reasonable funding approach.
14. We recommend that Buck include sample mortality rates in a tabular format to comply with the ASOPs.	Implemented	- These can be found on pages 100 and 101 of the AVR.

Chapter Three**PRELIMINARY REPORT ON THE
STATE UNIVERSITIES
RETIREMENT SYSTEM**

In accordance with 30 ILCS 5/2-8.1, Cheiron, the State Actuary, submitted a preliminary report to the Board of Trustees of the State Universities Retirement System (SURS) concerning proposed certifications of required State contributions submitted to Cheiron by the Board. The preliminary report was submitted to SURS on December 4, 2015. The preliminary report was based on Cheiron's review of actuarial assumptions included in SURS' 2015 Actuarial Valuation Report.

Following is Cheiron's final preliminary report on the State Universities Retirement System. SURS' written response, provided on December 14, 2015, can be found in Appendix C.

December 21, 2015

Mr. William G. Holland
Auditor General
740 East Ash Street
Springfield, Illinois 62703

Board of Trustees
State Universities Retirement System of Illinois
1901 Fox Drive
P.O. Box 2710
Champaign, Illinois 61825-2710

Dear Ladies and Gentlemen:

In accordance with the Illinois State Auditing Act (30 ILCS 5/2-8.1), Cheiron is submitting this preliminary report concerning the proposed certification prepared by Gabriel, Roeder, Smith & Company (GRS), of the required State contribution to the State Universities Retirement System of Illinois (SURS or System) for Fiscal Year 2017.

In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, represent an improvement over the assumptions and methods used in the previous year, as a result of implementing new and somewhat stronger actuarial assumptions. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.

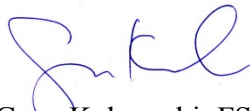
Section I of this report describes the review process undertaken by Cheiron. Section II summarizes our findings. Section III provides the supporting analysis for those findings, and presents more details on our assessment of the actuarial assumptions and methods employed in GRS's actuarial certification, as well as our assessment of GRS's determination of the Required State Contribution for Fiscal Year 2017. Section III also includes comments on other issues impacting the funding of the State Universities Retirement System, including the implications of Article 15 of the Illinois Pension Code, which establishes the statutory funding requirements for the System. **In our opinion, the statutory mandated minimum funding requirements call for inadequate funding and do not meet Actuarial Standards of Practice (ASOP), particularly ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.**

In preparing this report, we relied on information (some oral and some written) supplied by SURS and GRS. This information includes actuarial assumptions and methods adopted by the SURS Board, plan provisions, summarized census data, the draft June 30, 2015 Actuarial Valuation, the 2015 Experience Review Report, the Fiscal Year 2015 Investment Plan, 2015 minutes of the SURS Board of Trustee meetings, and various memos prepared by the System's advisors, staff, and Executive Director. A detailed description of all information provided for this review is contained in the body of our report as Appendix B.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared exclusively for the Office of the Auditor General and the State Universities Retirement System of Illinois for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Sincerely,
Cheiron



Gene Kalwarski, FSA, FCA, EA, MAAA
Principal Consulting Actuary



Michael J. Noble, FSA, FCA, EA, MAAA
Principal Consulting Actuary

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION I - REPORT SCOPE

Illinois Public Act 097-0694 (the Act) amended the Illinois State Auditing Act (30 ILCS 5/2-8.1) and requires Cheiron, as the State Actuary, to review the actuarial assumptions and valuation of the State Universities Retirement System of Illinois (SURS or System), and to issue to the SURS Board this preliminary report on the proposed certification prepared by Gabriel, Roeder, Smith & Company (GRS) of the required State contributions for Fiscal Year (FY) 2017. The purpose of this review is to identify any recommended changes to the actuarial assumptions for the SURS Board to consider before GRS, the SURS actuary, finalizes its certification of the required State contributions to SURS for FY 2017.

While the Act states that just the actuarial assumptions and valuation are to be reviewed, we have also reviewed the actuarial methodologies (funding and asset smoothing methods) employed in preparing the actuarial certification, as these methods can have a material effect on the amount of the State contribution being certified. Finally, we have offered our opinion on the implications of Article 15-155 of the Illinois Pension Code, which impacts the contribution amount certified by GRS.

In conducting this review, Cheiron reviewed the draft June 30, 2015 Actuarial Valuation prepared by GRS, the 2015 Experience Review Report, the Fiscal Year 2015 Investment Plan, 2015 minutes of the SURS Board of Trustee meetings, and various memos prepared by the System's advisors, staff, and Executive Director. The specific materials we reviewed are listed in Appendix B.

In addition to reviewing the actuarial certification of the required State contribution to SURS, the Act requires the State Actuary to conduct a review of the "actuarial practices" of the Board. While the term "actuarial practices" was not defined in the Act, we continue to interpret this language to mean that we review: (1) the use of a qualified actuary (as defined in the Qualification Standards of the American Academy of Actuaries) to prepare the annual actuarial valuation for determining the required State contribution; and (2) the conduct of periodic formal experience studies to justify the assumptions used in the actuarial valuation. In addition, we have included comments on actuarial communication and compliance with Actuarial Standards of Practice (ASOP) reflected in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

This section summarizes recommendations from our review of the actuarial assumptions and methods employed in the draft June 30, 2015 Actuarial Valuation of SURS as well as the “actuarial practices” of the SURS Board. Section III of this report provides detailed analysis and rationale for these recommendations.

Proposed Certification of the Required State Contribution

GRS has determined that the FY 2017 required State contribution calculated under the current statutory funding plan is \$1,671,426,000. We have verified the arithmetic calculations made by GRS to develop this required State contribution and have reviewed the assumptions on which it was based. As such, we have accepted GRS’s annual projections of future payroll, total normal costs, benefits, expenses, and total contributions.

1. We recommend that the SURS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System’s actuary.

State Mandated Funding Method

2. We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of SURS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

30 ILCS 5/2-8.1 requires the State Actuary to identify recommended changes in actuarial assumptions that the SURS Board must consider before finalizing its certification of the required State contribution. We have reviewed all the actuarial assumptions used in the State Universities Retirement System’s draft June 30, 2015 Actuarial Valuation and conclude that the assumptions are reasonable in general, based on the evidence provided to us.

Recommended Changes for Future Valuations

3. We continue to recommend that GRS include stress testing of the System within the valuation report and include an explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period. On December 2, 2015, GRS provided stress tests demonstrating three volatile return scenarios in a separate communication from the valuation report.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

4. We recommend that the SURS Board consider lowering the current 7.25% interest rate assumption to 7.00% or lower and that rate should be developed taking into account the negative cash flow of SURS and the anticipated future interest rate environment.
5. We recommend that the SURS Board continue to annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly.
6. The wage inflation assumption of 3.75% consists of a 2.75% price inflation and 1.0% productivity (standard of living) increase assumption. We recommend that GRS provide justification for the 1.0% productivity assumption given the fiscal challenges facing the State of Illinois.
7. We recommend that in future experience studies, GRS specifically request that the investment consultants referenced in developing market expectations provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the SURS.

GASB 67 and 68

The 2015 SURS GASB 67 and 68 information were provided in a separate report. We find that the assumptions and methods used to prepare the 2015 SURS GASB 67 and 68 schedules are reasonable based on the evidence provided to us.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

In this section we provide detailed analysis and supporting rationale for the recommendations that were presented in Section II of this report.

Proposed Certification of the Required State Contribution

As stated in our summary of recommendations in Section II, we have verified the arithmetic calculations made by GRS to develop this required State contribution, have reviewed the assumptions on which it is based, and have accepted GRS's annual projections of future payroll, total normal costs, benefits, expenses, and total contributions. However, in accordance with 30 ILCS 5/2-8.1, our review does not include a replication of the actuarial valuation results.

Given the size of the SURS Plan, the Plan's low funded ratio, the recent changes in legal requirements, and guidance issued by the Government Finance Officers Association, we are recommending again that the Board periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary. Results are compared in a detailed fashion to measure the liabilities for each benefit form and feature. A replication audit will uncover any potential problems in the processing and certification of valuation results.

We recommend that the SURS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary (Recommendation #1).

It is our understanding that SURS has issued a formal Request for Proposal for actuarial audit services. However, it appears the requested audit may be limited in scope and not require a full replication of results by the auditing actuary which we recommend. As a result this audit will not accomplish the goal of ensuring the accuracy of the valuation.

State Mandated Methods

State Mandated Funding Method:

The Illinois Pension Code (40 ILCS 5/15-155) is limited in meeting the risks of the System. This law requires that the actuary base the required contribution using a prescribed funding method that achieves 90% funding in the year 2045. This does not meet generally acceptable actuarial principles because the System is not targeted to be funded to 100% and the funding of the System is pushed too far into the future. In addition, on-going benefits being earned in the future are also being only funded at 90%. The method defined in the Code does not conform to the guidelines in ASOP No. 4, Section 3.14 regarding the allocation procedures of costs to the expected benefit payments which provides:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of SURS (Recommendation #2). Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

The GRS draft June 30, 2015 Actuarial Valuation includes a recommended funding policy which would contribute the normal cost plus a closed 29 year amortization of the unfunded accrued liability as a level percentage of capped payroll. According to this methodology the States' contribution amount would be \$1,999,305,000 for Fiscal 2017. We concur with the GRS's recommendations to increase the 90% funding target and to reduce the projection period, in accordance with generally accepted actuarial practices.

Based on the draft June 30, 2015 Actuarial Valuation, the funded ratio, measured as the ratio of the actuarial value of assets to the actuarial liability, is currently at 43.3%. We have concerns about the solvency of the System if there is a significant market downturn. This is why we previously recommended stress testing be done to determine whether there will be sufficient assets under the State mandated funding method to pay benefits if there is a significant market downturn.

We continue to recommend that GRS include stress testing of the System within the valuation report and include an explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period (Recommendation #3). This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested. On December 2, 2015 GRS provide a separate communication which demonstrated three volatile return scenarios suggested by the State Actuary and provided analysis of the results. It is important to include this information in the report so that all readers will be aware of the various risks the System faces, which are not apparent in the deterministic projections.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

A. Economic Assumptions

1. The Interest Rate:

The interest rate assumption (also called the investment return or discount rate), is the most impactful assumption affecting the required State contribution amount. This assumption,

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

which is used to value liabilities for funding purposes, was maintained at 7.25% for the draft June 30, 2015 Actuarial Valuation.

After reviewing all the materials (see Appendix B of the report) that were made available, Cheiron concludes that the use of 7.25% for this valuation is reasonable. However we do recommend that the Board consider lowering this assumption to 7.00% or lower in next year's valuation and that rate should be developed taking into account the negative cash flow of SURS and the anticipated future interest rate environment (Recommendation #4).

We further recommend that the SURS Board continue to annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly (Recommendation #5).

Our rationale for this recommendation is as follows:

- The February 5, 2015 NEPC 2015 Outlook report shows an expected geometric return on the System's revised asset portfolio to be 7.5% over a 30 year period based on the interim asset allocation target and 7.4% based on the current asset allocation target. This expected return has declined 19 basis points since NEPC's outlook in 2014.
- In GRS's 2015 Economic Assumption Review, GRS comments that in 2014 GRS recommended lowering the investment return assumption to either 7.25% or 7.0%. We have recommended in the past that whenever the actuary recommends a range for an assumption that the Board should always select the conservative end of the range because it will result in greater contributions. Since GRS and the Board have been critical for the inadequate funding called for by the State mandated funding law, whenever the Board has an opportunity to adopt a recommended assumption that will increase contributions it should always do so.
- Also in GRS's 2015 Economic Assumption Review (GRS Review), GRS presented the opinions of eight independent investment consultants on the future 20 year expected geometric earnings of the System and then adjusted the expected nominal return to the System's inflation assumption and net plan incurred expenses. The net adjusted expected nominal returns varied from 6.62% to 8.40% with a 7.51% arithmetic average of the eight expected nominal returns, adjusted for expenses (page 41 of GRS Review).
- The GRS Review also included a table showing the 20-year geometric average of net nominal return based on each of the eight investment consultant's expectations. The average of the 50th percentile expectations is 6.7%, and the probability of exceeding 7.25% investment return each year is 42.7% which can be seen in the bottom row of the GRS Chart below (page 9 of GRS Review). Therefore, it can be inferred there is a higher likelihood of investment loss than gain and the expected average return rate based on the current asset allocation is lower than 7.25%. While this is certainly greater than the

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

36.1% chance of meeting the prior assumption of 7.75%, this suggests the Board may want to consider in future years lowering the rate even further.

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.75% *	Probability of exceeding 7.50%	Probability of exceeding 7.25%	Probability of exceeding 7.00%	Probability of exceeding 6.75%
	25th	50th	75th					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	4.0%	5.9%	7.8%	25.1%	28.1%	31.2%	34.4%	37.8%
2	4.2%	6.0%	7.9%	26.9%	29.9%	33.1%	36.4%	39.9%
3	4.4%	6.3%	8.3%	30.8%	33.8%	37.0%	40.3%	43.7%
4	4.8%	6.6%	8.4%	32.8%	36.3%	39.8%	43.4%	47.1%
5	5.1%	7.1%	9.1%	41.0%	44.3%	47.6%	50.9%	54.2%
6	5.5%	7.3%	9.1%	43.6%	47.3%	51.0%	54.7%	58.3%
7	5.0%	7.1%	9.2%	41.6%	44.6%	47.8%	50.9%	54.1%
8	5.6%	7.5%	9.6%	47.3%	50.6%	54.0%	57.3%	60.6%
Average	4.8%	6.7%	8.7%	36.1%	39.4%	42.7%	46.0%	49.5%

- In our opinion, the use of 7.25% is justified for this 2015 valuation because we believe that the “long-term” outlook of the eight investment consultants that GRS surveyed most likely had a shorter time horizon than the time horizon applicable to the investment assumptions (30+ years). In our experience we find that investment consultants view 10 years as a long-time horizon. We would expect that had GRS requested these eight consultants to provide 30+ year outlooks that their longer term outlooks would be higher and thus more supportive of the 7.25% investment assumption. In any event **we recommend that in future experience studies GRS specifically request these eight investment consultants to provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the SURS (Recommendation #7).**
- There has been emerging actuarial practice throughout the country to reducing the discount rates even below the level that the investment consultants believe is achievable. This is because of the very low interest rate environment we are currently in. The lower the interest rate environment, the greater the investment risk that must be taken to achieve an assumed rate of return. For example, in 1995 yields on ten year Treasury bonds (a proxy for a risk free investment) was 6.21%. In 2015, these yields are now 1.98%. This means, back in 1995 in order to achieve 7.25%, a system only had to earn 1.04% more than the ten year treasury yields (“risk free” rates), whereas today a system would have to earn 5.27% above the risk free” rate. By reducing the investment return assumption, plans are more likely to meet their funding goals without requiring investment performance so much in excess of the risk free rate.

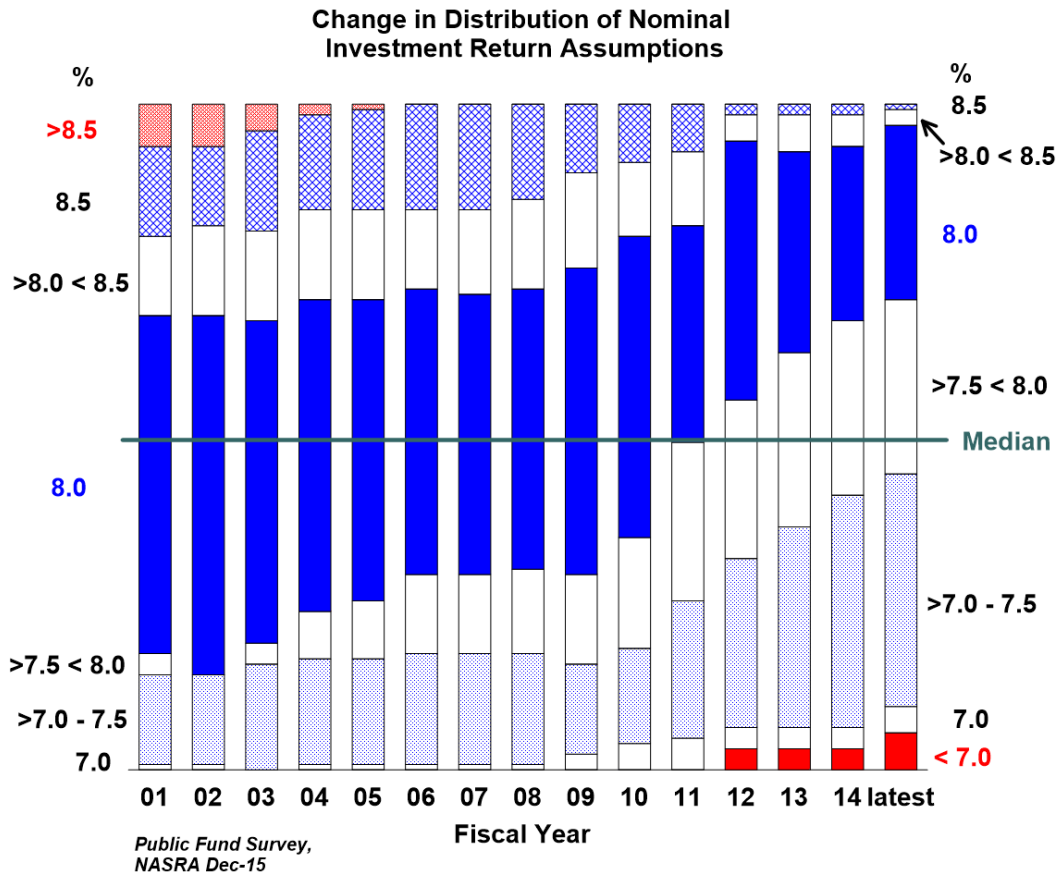
**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

- In addition to taking pressure off of the investment process, there is a growing concern that long term interest rates will eventually rise. A pattern of rising interest rates generally results in declining bond returns. This in turn will result in even greater investment risks on the equity side of the assets in order to compensate for both declining bond returns and the need to earn 5.27% above the risk free rates of return.
- As is the case with most maturing pension plans, SURS is experiencing negative cash flows measured as contributions less benefits and expenses. SURS' negative cash flow is 2% of assets and growing. This negative cash flow is expected to grow in the coming years. Negative cash flows result in actuarial returns (i.e. dollar weighted returns) being less than "time weighted" returns, which is what all investment consultants base their reported and projected returns on. So as a result, even if an investment consultant's expected long term return horizon to be at 7.4% for example, that is expressed as a time weighted return figure, and for plans with negative cash flows, we would expect the dollar weighted returns to be less.
- A review of the interest and inflation rates does not involve the collection of significant data and can be updated annually. In addition, it keeps the Board focused more closely on these very important assumptions.
- The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 126 large retirement plans. The following chart shows the distribution of investment return assumptions for the last 14 years of the survey. The latest data includes results collected through December 2015.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS



Over the period shown in the latest survey, there continues to be a pattern of reducing investment return assumptions. Seventy of the 126 plans have reduced the interest rate assumption since Fiscal Year 2011. For these 70 plans, the average reduction is 0.38%. The survey is consistent with the experience of other Cheiron clients, with which there has been a significant trend to reduce the investment return assumptions in the last several years.

- New GASB 67 and 68 pronouncements may subject many public pension plans, such as SURS, to effectively use a lower interest rate for accounting disclosures and pension expense determinations in fiscal years 2014 and 2015, respectively. It is important to note, however, that the new standards do not define funding requirements for a plan.
- The federal government, which promulgates minimum funding standards for corporate pension plans, already requires corporate pension plans to utilize interest assumptions that are based on short-term and mid-term bond rates, which are very low (Pension Protection Act of 2006 p. 14. IRC §430(h)(2)(B)).

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

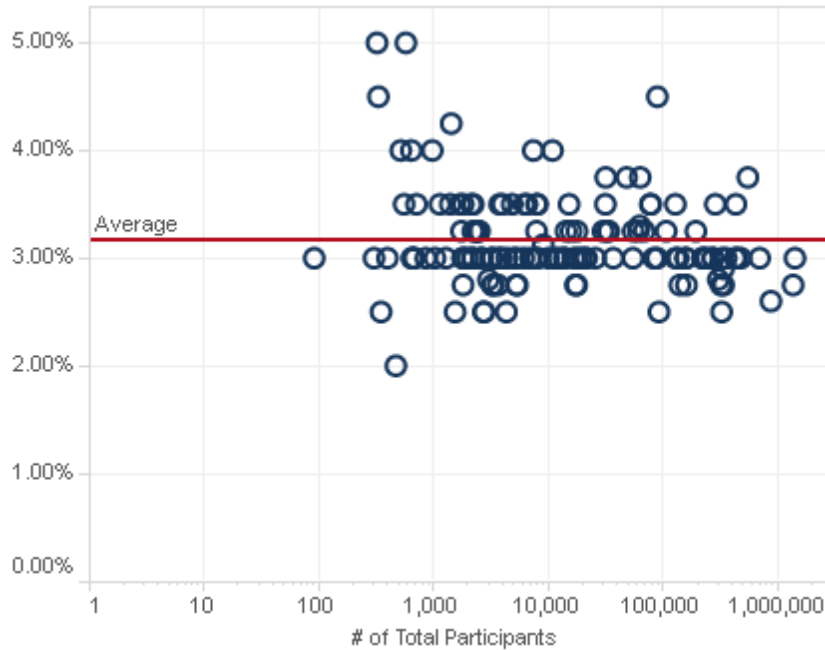
SECTION III - SUPPORTING ANALYSIS

2. *Inflation Assumption:*

The inflation assumption of 2.75%, which primarily impacts the salary increase assumption, used in the draft June 30, 2015 Actuarial Valuation by GRS is reasonable.

Our rationale for concurring with the 2.75% assumption:

- The July 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (next 75 years) inflation will average somewhere between 2.0% and 3.4% (<http://www.ssa.gov/oact/tr/2015/tr2015.pdf>).
- As shown on page 43 of the 2015 GRS Experience Review, there continues to be support for this assumption as a long-term rate even though the historic short-term averages are being lowered by the current historically low rates.
- The *National Conference on Public Employee Retirement Systems* (NCPERS) November 2015 study provides the following graphic of respondents' inflation assumptions:



This shows that the 2.75% assumption, which SURS uses, is on the lower end of the inflation assumptions used amongst the 179 systems who responded to this study, with 3.2% as the average.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

3. *Salary (Annual Compensation) Increase Assumption:*

Salary Increases were changed for the 2015 valuation and are shown below.

Illustrative rates of increase per individual employee per annum, compounded annually:

Service Year	Total Increase
0	15.00%
1	12.00%
2	9.00%
3	7.25%
4	6.50%
5	6.00%
6	5.75%
7	5.50%
8	5.25%
9	5.00%
10	4.75%
11	4.50%
12-13	4.25%
14-33	4.00%
34+	3.75%

These increases include a component for inflation of 2.75% per annum and 1.00% standard of living increase.

The assumed rate of total payroll growth is 3.75%.

We find the assumption and the basis for setting it as reasonable for the 2015 valuation but we recommend that GRS provide justification for the 1.0% standard of living increase assumption which is a component of the 3.75% wage inflation assumption, given the fiscal challenges facing the State of Illinois (Recommendation #6).

Our rationale for concurring with GRS's recommended salary increase assumption for the 2015 valuation:

- The July 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (between 2025 and 2088) real wage differential will average somewhere between 0.52% and 1.76%.
- This assumption is supported by credible data as shown on page 9 of the 2015 Experience Review performed by GRS.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

- During the year ending June 30, 2015, there was again a small experience gain from this assumption (i.e., salary increases were less than assumed) as shown on page 19 of the draft June 30, 2015 Actuarial Valuation. The table on page 19 shows that there have been gains due to salary increases for the last four years. However, this alone should not be a consideration for changing this assumption long term, and may be more indicative of the state of the current economy.

4. *Cost of Living Adjustment Assumption:*

Benefits are increased annually as described on page 40 of the draft June 30, 2015 Actuarial Valuation. Annual increases are 3% for those hired prior to January 1, 2011 and based upon ½ of the Consumer Price Index for those hired on or after January 1, 2011, which is 1.375% based on the inflation assumption of 2.75%.

We find the assumption and the basis for setting it as reasonable.

5. *Capped Pay Assumption:*

Benefits for members hired after January 1, 2011 are calculated using pay that is capped under 40 ILCS 5/1-160. The pay cap is shown on page 39 of the draft June 30, 2015, Actuarial Valuation to be \$111,572 for 2015.

We find the assumption and the basis for setting it as reasonable.

6. *Effective Rate of Interest:*

The Effective Rate of Interest is the interest rate that is applied to member contribution balances. For purposes other than determining the money purchase benefit, this rate is determined by the Board annually. Member accounts are assumed to be credited with an effective rate of interest of 7.00% for the June 30, 2015, valuation. **While we find this assumption and the basis for setting it as reasonable, we would like to point out that crediting member accounts with a 7% is generous given today's low interest rate environment, that it may impact participant behavior (retirement, plan choice).**

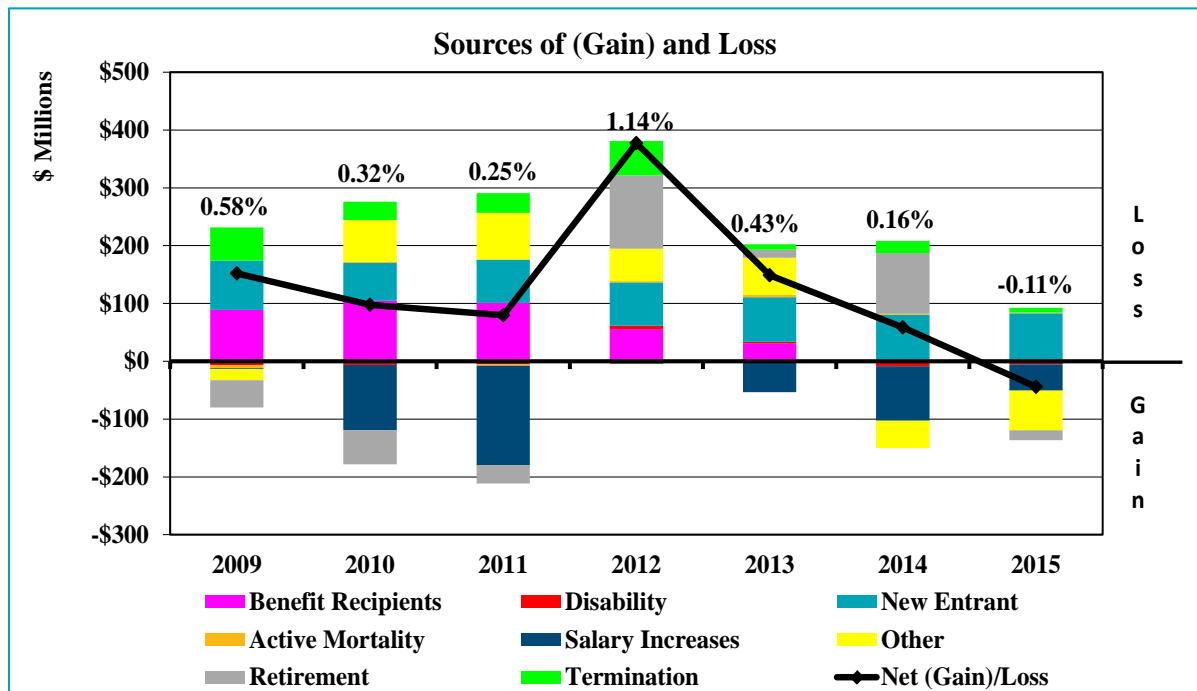
**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

B. Demographic Assumptions

For the draft June 30, 2015 Actuarial Valuation, GRS has recommended and the Board has adopted, several assumption changes from those used in the prior valuation. These changes resulted from the findings of the GRS 2015 Experience Review.

In its annual actuarial valuation reports, GRS regularly reports sources of liability gains and losses. In the draft June 30, 2015 Actuarial Valuation, these are shown on page 19. In the chart below we have collected similar data from GRS's past valuation reports dating back to 2009 and presented a historical review of past demographic and salary increase experience gains and losses.



The percentages shown above the bars refer to net (gain)/loss as a percentage of liability.

This chart shows the pattern of annual gains and losses attributable to eight different sources as shown in the legend above. When the colored bar slices appear above zero on the Y axis that represents an experience loss, and below zero represents an experience gain for that year.

Key observations from this chart are as follows:

1. In every year since 2009 there have been experience losses attributable to new entrants joining SURS. New entrant losses are expected because participants are hired and accrue service between valuations. There is also an offsetting gain to the assets due to contributions from these new entrants. This is not a reason for concern unless the new entrant loss is more than expected for participants hired in the last year.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

2. For 2009 through 2013, there were consistent losses attributable to SURS benefit recipients. GRS addressed this with staff and determined that much of this loss was due to unexpected changes in benefit amounts paid. This may occur when initial benefits are based on estimates which are later adjusted based on finalized information. Starting in 2013, GRS has received additional data from SURS to better measure expected benefits, and these losses have essentially disappeared the past two years (2014 and 2015).
3. A trend of salary gains has appeared in most years including the last three. However, as we discussed in the salary assumption section, this is likely to be a reflection of the general economic environment since 2009 rather than a problem with the long term assumption.
4. Since 2009 termination from employment experience has consistently shown losses, and diminishing in size in 2013. This assumption was reexamined in the recent GRS 2015 Experience Review, and was slightly modified to produce fewer expected number of terminations. This change is better reflective of the actuarial experience of the System.
5. Disability and active mortality experience are too small to be noticed on the chart, given their insignificant size relative to other experience items. Since there have been both gains and losses in each of these areas during the period shown, they are not an immediate area of concern.
6. The net liability (gain)/loss is shown by the black line on the graph above. This net (gain)/loss as a percent of liability is shown above the bars. While there is a pattern of consistent losses, the percent is generally quite small.

Out of the demographic assumptions, there is one assumption that should be more closely reviewed.

1. Mortality:

Mortality Rates were changed for the 2015 valuation and are shown below.

Recently changed Actuarial Standards of Practice (ASOP No. 35) now requires that actuaries at least consider projections of mortality improvements, and if there is not such an assumption for improvement, the actuary must disclose the basis for not making the assumption. **Based on the recently completed 2015 GRS Experience Review, the mortality assumption has been updated from the RP-2000 Mortality Table projected to 2017 to the RP-2014 Mortality Table with projected generational mortality improvement. In our opinion, this change meets the ASOP 35 requirements.** These new assumed mortality rates, while based on the Society of Actuaries RP-2014 mortality tables, also include adjustments made as appropriate for SURS experience. Sample rates and a description of the tables follows. Note that the sample rates shown are as of the base year 2014.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Base Table with 2014 Base Year	Male Set Forward	Female Set Forward	Male Multiplier	Female Multiplier
RP-2014 White Collar Employee, sex distinct (pre-retirement)	None	None	110% pre 60, 80% at ages 60+	90% pre 60, 90% at ages 60+
RP-2014 White Collar Healthy Annuitant, sex distinct (non-disabled post-retirement)	1 year	1 year	100%	100%
RP-2014 Disabled Annuitant, sex distinct (disabled post-retirement)	9 years	10 years	100%	100%

The provision for future mortality improvement is based on the generational application of the MP-2014 improvement scales.

Age	Future Life Expectancy (years) in 2015			
	Postretirement		Disabled - Retiree	
	Male	Female	Male	Female
35	51.89	53.99	29.47	34.27
40	46.66	48.77	26.05	30.21
45	41.51	43.62	22.88	26.43
50	36.47	38.54	19.84	22.78
55	31.59	33.54	16.87	19.15
60	26.82	28.63	13.96	15.63
65	22.21	23.90	11.18	12.41
70	17.81	19.40	8.64	9.62
75	13.74	15.21	6.42	7.28

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Below we summarize all remaining demographic assumptions that we reviewed, and we have concluded all are reasonable and meet the requirements of ASOP No. 35, Section 3.3.4.

1. Marriage Assumption:

Members are assumed to be married in the following proportions:

Age	Males	Females
20	25%	40%
30	70	75
40	80	80
50	85	80
60	85	70

2. Self-Managed Plan Election:

Thirty percent of total future hires will elect to participate in the Self-Managed Plan.

3. Termination Rates:

Termination Rates were changed for the 2015 valuation.

A table of termination rates based on experience in the 2010-2014 period. The assumption is a table of turnover rates by years of service.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

A sample of these rates follows:

Years of Service	All Members
0	20.00%
1	20.00
2	15.00
3	14.00
4	12.00
5	10.00
6	9.00
7	7.50
8	6.75
9	6.00
10	5.25
11	4.50
12	4.00
13	3.70
14	3.20
15	3.00
16	3.00
17	3.00
18	3.00
19	3.00
20	2.50
21	2.50
22	2.50
23	2.50
24	2.50
25	2.00
26	2.00
27	2.00
28	2.00
29	2.00

Part-time members with less than three years of service (all members classified as part-time for valuation purposes) are assumed to terminate at the valuation date.

Members that terminate with at least five years of service (10 years of service for Tier 2 members) are assumed to elect the most valuable option on a present value basis, either refund of contributions or a deferred benefit.

Termination rate for 29 years of service used for Tier 2 members until retirement eligibility is met.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

4. Retirement Rates:

Retirement Rates were changed for the 2015 valuation.

Upon eligibility, active members are assumed to retire as follows:

Age	<u>Members Hired before January 1, 2011 and Eligible for</u>		<u>Members Hired on or after January 1, 2011 and Eligible for</u>	
	Normal Retirement	Early Retirement	Normal Retirement	Early Retirement
Under 50	50.0%	-	-	-
50	45.0	-	-	-
51	45.0	-	-	-
52	45.0	-	-	-
53	40.0	-	-	-
54	40.0	-	-	-
55	38.0	7.5%	-	-
56	36.0	6.0	-	-
57	30.0	4.5	-	-
58	30.0	5.5	-	-
59	30.0	6.0	-	-
60	11.0	-	-	-
61	11.0	-	-	-
62	13.0	-	-	35.0%
63	13.0	-	-	15.0
64	13.0	-	-	15.0
65	17.0	-	-	15.0
66	17.0	-	-	15.0
67	15.0	-	50.0%	-
68	15.0	-	35.0	-
69	15.0	-	30.0	-
70-74	15.0	-	15.0	-
75-79	20.0	-	20.0	-
80+	100.0	-	100.0	-

Members that retire are assumed to elect the most valuable option on a present value basis, either refund of contributions (or portable lump sum retirement, if applicable) or a retirement annuity.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

5. Disability Rates:

Disability Rates were changed for the 2015 valuation. A table of disability incidence with sample rates follows:

Age	Males	Females	Age	Males	Females
20	0.042%	0.060%	50	0.206%	0.249%
21	0.043%	0.064%	51	0.219%	0.257%
22	0.044%	0.067%	52	0.231%	0.264%
23	0.045%	0.071%	53	0.244%	0.272%
24	0.046%	0.074%	54	0.256%	0.279%
25	0.047%	0.078%	55	0.264%	0.287%
26	0.048%	0.081%	56	0.271%	0.294%
27	0.049%	0.085%	57	0.279%	0.302%
28	0.050%	0.088%	58	0.286%	0.309%
29	0.051%	0.092%	59	0.294%	0.317%
30	0.054%	0.099%	60	0.301%	0.324%
31	0.056%	0.107%	61	0.309%	0.332%
32	0.059%	0.114%	62	0.316%	0.339%
33	0.061%	0.122%	63	0.324%	0.347%
34	0.064%	0.129%	64	0.331%	0.354%
35	0.067%	0.137%	65	0.339%	0.362%
36	0.071%	0.144%	66	0.346%	0.369%
37	0.074%	0.152%	67	0.354%	0.377%
38	0.078%	0.159%	68	0.361%	0.384%
39	0.081%	0.167%	69	0.369%	0.392%
40	0.091%	0.174%	70	0.369%	0.392%
41	0.101%	0.182%	71	0.369%	0.392%
42	0.111%	0.189%	72	0.369%	0.392%
43	0.121%	0.197%	73	0.369%	0.392%
44	0.131%	0.204%	74	0.369%	0.392%
45	0.144%	0.212%	75	0.369%	0.392%
46	0.156%	0.219%	76	0.369%	0.392%
47	0.169%	0.227%	77	0.369%	0.392%
48	0.181%	0.234%	78	0.369%	0.392%
49	0.194%	0.242%	79	0.369%	0.392%

Disability rates apply during the retirement eligibility period.

6. Operational Expenses

The amount of operational expenses for administration incurred in the latest fiscal year are supplied by SURS staff and incorporated in the Normal Cost.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

7. Spouse's Age

The female spouse is assumed to be three years younger than the male spouse.

8. Missing Data

Members with an unknown gender are assumed to be female. Active and inactive members with an unknown date of birth are assumed to be 37-years-old (was 30-years-old in 2014 Report) at the valuation. An assumed spouse date of birth is calculated for current service retirees in the traditional plan for purposes of calculating future survivor benefits. The female spouse is assumed to be 3 years younger than the male spouse. Seventy percent of current total male retirees and 80% of current total female retirees in the traditional plan that have not elected a survivor refund are assumed to have a spouse at the valuation date.

9. Benefit Commencement Age

Inactive members eligible for a deferred benefit are assumed to commence benefits at their earliest normal retirement age. For Tier 1 members this is age 62 with at least five years of service, age 60 with at least eight years of service, or immediately with at least 30 years of service. For Tier 2 members, this is age 67 with 10 or more years of service.

10. Load on Final Average Salary

No load is assumed to account for higher than assumed pay increases in final years of employment before retirement.

11. Load on Liabilities for Service Retirees with Non-finalized Benefits

A load of 10% on liabilities for service retirees whose benefits have not been finalized as of the valuation date is assumed to account for finalized benefits that on average are 10% higher than 100% of the preliminary estimated benefit. A load of 5% is used if a "best formula" benefit was provided in the data by Staff.

12. Valuation of Inactives

An annuity benefit is estimated based on information provided by staff for Tier 1 inactive members with five or more years of service and Tier 2 members with 10 or more years of service.

13. Reciprocal Service

Reciprocal service is included for current inactive members for purposes of determining vesting eligibility and eligibility age to commence benefits.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

The recently updated actuarial assumptions (including retirement and termination rates) were based on SURS service only. Therefore, reciprocal service was not included for current active members. Reciprocal service will be collected and analyzed in the future and will be considered in the next Experience Review.

14. Other Projection Assumptions

The number of total active members throughout the projection period will remain the same as the total number of active members in the defined benefit plans and the SMP in the current valuation.

New entrants have an average age of 37.2 and average capped pay of \$36,607 and average uncapped pay of \$37,954 (2015 dollars). These values are based on the average age and average pay of current members. The range profile is based on the age at hire and assumed pay at hire (using the actuarial assumptions, inflated to 2015 dollars) of current active members with service between one and four years.

Age	Number Males	Average Pay		Number Females	Average Pay		Total Number	Average Pay	
		Capped Male	Uncapped Male		Capped Female	Uncapped Female		Capped Total	Uncapped Total
<20	63	\$15,625	\$15,625	50	\$14,030	\$14,030	113	14,919	14,919
20 - 24	737	27,868	27,868	1,198	26,866	26,866	1,935	27,248	27,248
25 - 29	1,830	37,401	38,058	2,406	34,209	34,275	4,236	35,588	35,909
30 - 34	1,622	43,460	44,993	2,029	37,989	38,733	3,651	40,419	41,514
35 - 39	1,068	45,119	48,118	1,378	37,205	38,062	2,446	40,661	42,453
40 - 44	829	42,908	45,651	1,177	36,194	37,190	2,006	38,969	40,686
45 - 49	724	42,675	46,460	1,004	33,367	34,424	1,728	37,267	39,467
50 - 54	678	42,025	46,592	872	32,002	33,340	1,550	36,386	39,136
55 - 59	476	37,799	41,147	616	32,298	33,933	1,092	34,696	37,077
60 - 64	269	34,456	40,625	263	31,022	32,869	532	32,758	36,791
65 - 69	15	17,789	17,789	6	25,405	25,405	21	19,965	19,965
Total	8,311	39,843	42,039	10,999	34,163	34,867	19,310	36,607	37,954

15. Self-Managed Plan (SMP) Contribution Assumptions

The projected SMP contributions are equal to 7.6% of SMP payroll, plus estimated SMP expenses minus SMP employer forfeitures. Estimated SMP expenses for FY 2016 are \$488,530 and SMP employer forfeitures used to reduce the certified contributions for FY 2017 are \$4,235,356. Estimated SMP expenses for FY 2017 and after are assumed to increase by 2.75%. Estimated SMP employer forfeitures used to reduce the certified contributions for FY 2018 and after are assumed to be 7.5% of the gross SMP employer contribution.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

C. Actuarial Methods

Actuarial methods consist of three components: (1) the funding method, which is the attribution of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e. asset smoothing); and (3) the amortization basis of the Unfunded Actuarial Liability (UAL). Since the amortization basis is governed by State law, we do not comment on it here.

1. Cost Method:

The System uses the projected unit credit cost method (PUC) to assign costs to years of service, as required under the Pension Code (40 ILCS 5/15). **We have no objections with respect to using the PUC method, although we would prefer the Entry Age Normal (EAN) funding method as it is more consistent with the requirement in 40 ILCS 5/15 - 155 requirement for level percent of pay funding.**

Under the PUC method, which is used by some public sector pension funds, the benefits of active participants are calculated based on their compensation projected with assumed annual increases to ages at which they are assumed to leave the active workforce by any of these causes: retirement, disability, turnover, or death. Only past service (through the valuation date but not beyond) is taken into account in calculating these benefits. The cost of providing benefits based on past service and future compensation is the actuarial accrued liability for a given active participant. Under the PUC cost method, the value of an active participant's benefits tends to increase more sharply over his or her later years of service than over his or her earlier ones. As a result of this pattern of benefit values increasing, while the PUC method is not an unreasonable method, more plans use the EAN funding method to mitigate this effect. It should also be noted that the EAN method is the required method to calculate liability for GASB 67 & GASB 68.

2. Asset Smoothing Method:

The actuarial value of assets for the System is a smoothed market value. Unanticipated changes in market value are recognized over five years in the actuarial value of assets. The primary purpose for smoothing out gains and losses over multiple years is that the fluctuations in the actuarial value of assets will be less volatile over time than fluctuations in the market value of assets. **Smoothing the market gains and losses over a period of five years to determine the actuarial value of assets is a generally accepted approach in actuarial cost, and we concur with its use.**

Another aspect of asset smoothing methods is whether or not to limit the maximum spread between the actuarial value of assets and the market value of assets. Many public sector pension plans limit the actuarial value of assets to be in any year no more than 120% of market value, or no less than 80% of market value. In fact, the Internal Revenue Service (IRS) under IRC §430(g)(3)(B)(iii), mandates this "corridor" for private sector pension plans

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

(a 90%-110% corridor is mandated). Even though it is not mandated for public plans, we believe that the use of this type of corridor is a sounder actuarial practice, and according to ASOP No. 44 in Section 3.3 b 1, the actuarial value of assets should "...fall within a reasonable range around the corresponding market value."

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Response to Recommendations in 2014

In the State Actuary's Preliminary Report on the State Universities Retirement System of Illinois presented December 19, 2014, Cheiron made several recommendations. Below we summarize how these recommendations were reflected in either the System's comments last year or in this year's draft June 30, 2015 Actuarial Valuation.

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
1. We recommend that the SURS Board consider conducting in independent actuarial audit in which the results of the valuation are replicated by the audit actuary and any deviations are noted and reconciled.	Partially Implemented	- The SURS Board previously engaged The Segal Company in 2012 to perform a limited scope (level 2) actuarial audit that found all SURS assumptions to be reasonable. A copy of the audit results report has been provided to Cheiron for their review. Government Finance Officers Association (GFOA) best practices recommend an actuarial audit every 5 years. Recommendation repeated.
2. We concur with GRS's comments on the implication to the System of the State Mandated Funding method, and suggest the SURS Board always use the conservative end of any range of assumptions recommended by the actuary or other advisors due to the uncertainty and risks associated with this method.	Partially Implemented	- GRS and the System agree that the State Mandated Funding method inadequately funds the System but since the funding policy is established by the legislature, this is not under the control of the Board. Recommendation modified to reflect adoption of a funding policy that meets Actuarial Standards of Practice.
3. We recommend that GRS expand the stress testing of the System to involve a variety of stressors and the potential that a significant market downturn will have ripple effects in areas beyond asset returns.	Implemented	- The System provided stress testing analysis on December 2, 2015. Recommendation modified this year (Recommendation #3) to have the stress test analysis incorporated directly into the valuation report. Recommendation repeated.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
4. For the current valuation GRS should disclose whether or not the recommended mortality tables sufficiently cover anticipated increases through 2045.	Implemented	- Following completion of the experience study SURS has now implemented a fully generation mortality improvement table which addresses our prior concern.
5. We concur with GRS's recommendation, and recommend again, as we did last year, a corridor be established around the market value of assets of 80% to 120% beyond which the actuarial value is limited given the use of the actuarial value of assets in the projection methodology in accordance with 40 ILCS 5/15-155 (m). While this change would have no impact on the System for the June 30, 2014 valuation, we believe it would be better to establish this corridor before it is actually applicable.	Not Repeated	- The SURS Board does not have the authority to create such a corridor; as such we will no longer repeat this recommendation.
6. We continue to recommend the Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly as it did prior to this year's valuation.	Implemented	- We have been informed that the System will be reviewing the economic assumption annually. Recommendation repeated.
7. We recommend that GRS consider using a fully generational mortality table so that future mortality improvements will continue to impact new entrants throughout the projection period ending in 2045.	Implemented	- GRS updated their mortality assumptions to be based on the RP-2014 Table with future mortality improvement based on the generational application of the MP-2014 improvement tables.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE UNIVERSITIES RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
8. We recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the SURS.	Not Implemented	- This part of the experience study was not redone this year. Recommendation repeated.
9. We recommend that prior to the completion of the June 30, 2015 Actuarial Valuation, GRS provide a verification of the hypothetical assets developed without the GOB bonds.	Not Repeated	- A full detailed historical development is not available; as such we will no longer repeat this recommendation.

Chapter Four**PRELIMINARY REPORT ON THE
STATE EMPLOYEES'
RETIREMENT SYSTEM**

In accordance with 30 ILCS 5/2-8.1, Cheiron, the State Actuary, submitted a preliminary report to the Board of Trustees of the State Employees' Retirement System (SERS) concerning proposed certifications of required State contributions submitted to Cheiron by the Board. The preliminary report was submitted to SERS on December 4, 2015. The preliminary report was based on Cheiron's review of actuarial assumptions included in SERS' 2015 Actuarial Valuation Report.

Following is Cheiron's final preliminary report on the State Employees' Retirement System. SERS' written response, provided on December 15, 2015, can be found in Appendix C.



December 21, 2015

Mr. William G. Holland
Auditor General
740 East Ash Street
Springfield, Illinois 62703

Board of Trustees
State Employees' Retirement System of Illinois
2101 South Veterans Parkway
P.O. Box 19255
Springfield, Illinois 62794-9255

Dear Ladies and Gentlemen:

In accordance with the Illinois State Auditing Act (30 ILCS 5/2-8.1), Cheiron is submitting this preliminary report concerning the proposed certification prepared by Gabriel Roeder Smith & Company (GRS), of the required State contribution to the State Employees' Retirement System of Illinois (SERS or System) for Fiscal Year 2017.

In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.

Section I of this report describes the review process undertaken by Cheiron. Section II summarizes our findings. Section III provides the supporting analysis for those findings and presents more details on our assessment of the actuarial assumptions and methods employed in GRS's actuarial certification, as well as our assessment of GRS's determination of the required State contribution for Fiscal Year 2017. Section III also includes comments on other issues impacting the funding of the SERS, including the implications of Article 14 of the Illinois Pension Code, which establishes the statutory funding requirements for the System. **In our opinion, the statutory mandated minimum funding requirements call for inadequate funding, and do not meet Actuarial Standards of Practice (ASOP), particularly ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.**

In preparing this report, we relied on information (some oral and some written) supplied by SERS and GRS. This information includes actuarial assumptions and methods adopted by the SERS Board, System provisions, summarized census data, the draft June 30, 2015 Actuarial Valuation, the draft 2015 GASB 67/68 Report prepared by GRS, 2015 minutes of the SERS Board of Trustee meetings, and various studies and memos prepared by the System's advisors, staff, and Executive Director. A detailed description of all information provided for this review is contained in the body of our report as Appendix B.


To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared exclusively for the Office of the Auditor General and the State Employees' Retirement System of Illinois for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Sincerely,
Cheiron



Michael J. Noble, FSA, FCA, EA, MAAA
Principal Consulting Actuary



Gene Kalwarski, FSA, FCA, EA, MAAA
Principal Consulting Actuary

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION I - REPORT SCOPE

Illinois Public Act 097-0694 (the Act) amended the Illinois State Auditing Act (30 ILCS 5/2-8.1) and requires Cheiron, as the State Actuary, to review the actuarial assumptions and valuation of the State Employees Retirement System of Illinois (SERS or System) and to issue to the SERS Board this preliminary report on the proposed certification prepared by Gabriel, Roeder, Smith & Company (GRS) of the required State contributions for Fiscal Year (FY) 2017. The purpose of this review is to identify any recommended changes to the actuarial assumptions for the SERS Board to consider before GRS, the SERS actuary, finalizes its certification of the required State contributions to SERS for FY 2017.

While the Act states that just the actuarial assumptions and valuation are to be reviewed, we have also reviewed the actuarial methodologies (funding and asset smoothing methods) employed in preparing the actuarial certification, as these methods can have a material effect on the amount of the State contribution being certified. Finally, we have offered our opinion on the implications of Article 14-131 of the Illinois Pension Code, which impacts the contribution amount certified by GRS.

In conducting this review, Cheiron reviewed the draft June 30, 2015 Actuarial Valuation, the draft 2015 GASB 67/68 Report, minutes of the 2015 Board of Trustees meetings, and various studies and memos prepared by the System's advisors, staff, and Executive Director. The specific materials we reviewed are listed in Appendix B.

In addition to reviewing the actuarial certification of the required State contribution to SERS, the Act requires the State Actuary to conduct a review of the "actuarial practices" of the Board. While the term "actuarial practices" was not defined in the Act, we continue to interpret this language to mean that we review: (1) the use of a qualified actuary (as defined by the Qualifications Standards of the American Academy of Actuaries) to prepare the annual actuarial valuation for determining the required State contribution; and (2) the conduct of periodic formal experience studies to justify the assumptions used in the actuarial valuation. In addition, we have included comments on actuarial communication and compliance with Actuarial Standards of Practice (ASOP) reflected in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

This section summarizes recommendations from our review of the actuarial assumptions and methods employed in the draft June 30, 2015 Actuarial Valuation of SERS as well as the "actuarial practices" of the SERS Board. Section III of this report contains detailed analysis and rationale for these recommendations.

Proposed Certification of the Required State Contribution

GRS has determined that the FY 2017 required State contribution calculated under the current statutory funding plan is \$2,014,461,000. We have verified the arithmetic calculations made by GRS to develop this required State contribution and have reviewed the assumptions on which it was based. As such, we have accepted GRS's annual projections of future payroll, total normal costs, employee contributions, combined benefit payments and expenses, and total contributions.

1. We recommend that the SERS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary.

State Mandated Funding Method

2. We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of SERS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

30 ILCS 5/2-8.1 requires the State Actuary to identify recommended changes in actuarial assumptions that the SERS Board must consider before finalizing its certification of the required State contribution. We have reviewed all the actuarial assumptions used in the draft June 30, 2015 Actuarial Valuation and conclude that the assumptions are reasonable in general, based on the evidence provided to us.

Recommended Additional Disclosures for the 2015 Valuation

3. We continue to recommend that GRS include stress testing of the System within the valuation report and include detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period. On December 15, 2015, the System provided stress tests demonstrating a variety of scenarios in a separate communication from the valuation report.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

Recommended Changes for Future Valuations

4. We recommend that SERS consider lowering the interest rate next year and the rate be developed taking into account the anticipated future negative cash flow of SERS and the anticipated future interest rate environment.
5. We continue to recommend the SERS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work, and adjust assumptions accordingly.
6. We recommend that GRS consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045.
7. We recommend that GRS consider whether additional revisions to the demographic assumptions, specifically the termination assumption, for Tier 2 members are appropriate to their benefit structure and consistent with the revised retirement rates already implemented.
8. We recommend that in future experience studies, GRS specifically request that the investment consultants referenced in developing market expectations provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the SERS and the Illinois State Board of Investment (ISBI).
9. We further recommend that the Boards of the three systems whose assets are commingled, SERS, the Judges' Retirement System (JRS), and the General Assembly Retirement System (GARS), consider whether different interest rate assumptions for these systems are appropriate.

GASB 67 and 68

The 2015 SERS GASB 67 and 68 information were provided in a separate report. We find that the assumptions and methods used to prepare the 2015 SERS GASB 67 and 68 schedules are reasonable based on the evidence provided to us.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

In this section we provide detailed analysis and supporting rationale for the recommendations that were presented in Section II of this report.

Proposed Certification of the Required State Contribution

As stated in our summary of recommendations in Section II, we have verified the arithmetic calculations made by GRS to develop this State required contribution, have reviewed the assumptions on which it is based, and have accepted GRS's annual projections of future payroll, total normal costs, benefits, expenses, and total contributions. However, in accordance with 30 ILCS 5/2-8.1, our review does not include a replication of the actuarial valuation results.

Given the size of the SERS Plan, the Plan's low funded ratio, the recent changes in legal requirements, and guidance issued by the Government Finance Officers Association, we are recommending again that the Board periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary. Results are compared in a detailed fashion to measure the liabilities for each benefit form and feature. A replication audit will uncover any potential problems in the processing and certification of valuation results.

We recommend that the SERS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary (Recommendation #1).

State Mandated Methods

State Mandated Funding Method

The Illinois Pension Code (40 ILCS 5/14-131) is limited in meeting the risks of the System. This law requires that the actuary base the required contribution using a prescribed funding method that achieves 90% funding in the year 2045. This does not meet generally acceptable actuarial principles because the System is never targeted to be funded to 100% and the funding of the System is significantly deferred into the future. In addition, on-going benefits being earned in the future are also being only funded at 90%. The method defined in the Code does not conform to the guidelines in ASOP No. 4, Section 3.14 regarding the allocation procedures of costs to the expected benefit payments which provides:

When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of SERS (Recommendation #2). Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

Since GRS has concluded that the State mandated funding method does not conform to Actuarial Standards of Practice, the Board adopted a separate funding policy for GASB 67, the Actuarially Determined Contribution, which is based contributing the annual normal cost plus amortization of the unfunded actuarial liability over 25 years as a level percent of capped payroll. According to this methodology the States' contribution amount would be \$2,388,509,050 for Fiscal 2017. We concur with the GRS recommendations that the System should be funded in accordance with generally accepted actuarial practices.

Based on the draft June 30, 2015 Actuarial Valuation, the funded ratio, measured as the ratio of the actuarial value of assets to the actuarial liability, is currently at 36.2%. We have concerns about the solvency of the System if there is a significant market downturn. This is why we previously recommended stress testing be done to determine whether there will be sufficient assets under the State mandated funding method to pay benefits if there is a significant market downturn.

We continue to recommend that GRS include stress testing of the System within the valuation report and a include detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period (Recommendation #3). This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested. On December 15, 2015 the System provided a separate communication which demonstrated a wide variety of return scenarios and provided analysis of the results. It is important to include this information in the report so that all readers will be aware of the various risks the System faces, which are not apparent in the deterministic projections.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

A. Economic Assumptions

1. The Interest Rate

The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the required State contribution. This assumption, which is used to value liabilities for funding purposes, was maintained at 7.25% for the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

After reviewing all the materials (see Appendix B of the report) that were made available, Cheiron concludes that the use of 7.25% for this valuation is reasonable. However, we recommend that SERS consider lowering the interest rate next year and the rate be developed taking into account the anticipated future negative cash flow of SERS and the anticipated future interest rate environment (Recommendations #4).

We further continue to recommend that the SERS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly (Recommendation #5).

We further recommend that the Boards of the three systems whose assets are commingled, SERS, the Judges' Retirement System (JRS), and the General Assembly Retirement System (GARS), consider whether different interest rate assumptions for these systems are appropriate (Recommendation #9).

Our rationale for this recommendation is as follows:

- A review of the interest and inflation rates does not involve the collection of significant data and can be updated annually. In addition, it keeps the Board focused more closely on these critical assumptions.
- In GRS's April 2014 Experience Review, it presented the opinions of eight independent investment consultants on the future expected earnings of the System and concluded that, adjusting for GRS's assumed rate of inflation, the expected arithmetic mean of the SERS portfolio is 7.52%. (See pages 10 and 11 GRS April 2014 Experience Review Report.) GRS then converted this arithmetic mean to what it refers to as a geometric rate of return of 6.82% that can be seen in the bottom row of the GRS chart below in the 50th percentile column. These figures show that SERS has only a 42.3% chance of meeting the revised assumption of 7.25% (see the far right column, bottom row). This suggests the Board may want to consider in future years lowering the rate.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

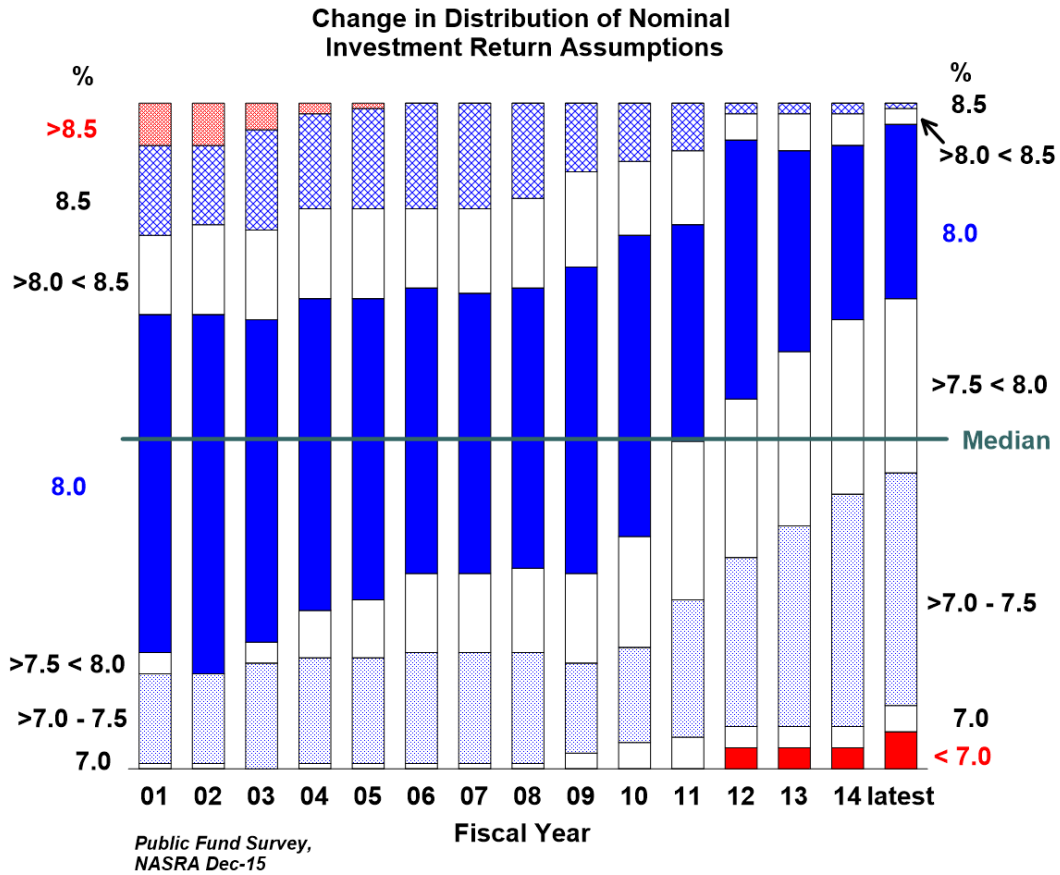
Investment Consultant	Distribution of 30-Year Average Geometric Net Nominal Return			Probability of exceeding	Probability of exceeding	Probability of exceeding
	25th	50th	75th	7.75%	7.50%	7.25%
(1)	(2)	(3)	(4)	(5)	(5)	(5)
1	4.53%	6.01%	7.51%	21.7%	25.2%	28.8%
2	4.60%	6.11%	7.64%	23.5%	27.0%	30.8%
3	4.80%	6.27%	7.77%	25.2%	28.9%	32.9%
4	5.63%	6.84%	8.07%	30.9%	35.9%	41.1%
5	5.46%	6.88%	8.33%	34.2%	38.6%	43.2%
6	5.38%	6.93%	8.50%	36.2%	40.3%	44.5%
7	6.14%	7.63%	9.14%	47.9%	52.3%	56.8%
8	6.27%	7.90%	9.55%	52.4%	56.5%	60.5%
Average	5.35%	6.82%	8.31%	34.0%	38.1%	42.3%

- There has been emerging actuarial practice throughout the country to reducing the discount rates even below the level that the investment consultants believe is achievable. This is because of the very low interest rate environment we are currently in. The lower the interest rate environment, the greater the investment risk that must be taken to achieve an assumed rate of return. For example, in 1995 yields on ten year Treasury bonds (a proxy for a risk free investment) was 6.21%. In 2015, these yields are now 1.98%. This means, back in 1995 in order to achieve 7.25%, a system only had to earn 1.04% more than the ten year treasury yields (“risk free” rates), whereas today a system would have to earn 5.27% above the risk free” rate. By reducing the investment return assumption, plans are more likely to meet their funding goals without requiring investment performance so much in excess of the risk free rate.
- In addition to taking pressure off of the investment process, there is a growing concern that long term interest rates will eventually rise. A pattern of rising interest rates generally results in declining bond returns. This in turn will result in even greater investment risks on the equity side of the assets in order to compensate for both declining bond returns and the need to earn 5.27% above the risk free rates of return.
- In our opinion, the use of 7.25% is justified for this 2015 valuation because we believe that the “long-term” outlook of the eight investment consultants that GRS surveyed most likely had a shorter time horizon than the time horizon applicable to the investment assumptions (30+ years). In our experience we find that investment consultants view 10 years as a long-time horizon. We would expect that had GRS requested these eight consultants to provide 30+ year outlooks that their longer term outlooks would be higher and thus more supportive of the 7.25% investment assumption. In any event **we recommend that in future valuations GRS specifically request these eight investment consultants to provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the SERS and the Illinois State Board of Investment (ISBI) (Recommendation #8).**

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

- SERS is projected to have a negative cash flow (contribution income less benefit and expense payout) in 2019 and the negative cash flow is expected to grow significantly to over a billion dollars per year by 2031 (3.3% of assets) as shown in the graph on page 13 and table 4a of the draft actuarial valuation report. Negative cash flows result in actuarial returns (i.e. dollar weighted returns) being less than “time weighted” returns, which is what all investment consultants base their reported and projected returns on. So as a result, even if an investment consultant’s expected long term return horizon to be at 7.4% for example, that is expressed as a time weighted return figure, and for plans with negative cash flows, we would expect the dollar weighted returns to be less.
- The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 126 large retirement plans. The following chart shows the distribution of investment return assumptions for the last 14 years of the survey. The latest data includes results collected through December 2015.



**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Over the period shown in the latest survey, there continues to be a pattern of reducing investment return assumptions. Seventy of the 126 plans have reduced the interest rate assumption since Fiscal Year 2011. For these 70 plans, the average reduction is 0.38%. The survey is consistent with experience of other Cheiron clients, with which there has been a significant trend to reduce the investment return assumptions in the last several years.

- New GASB 67 and 68 pronouncements subject many public pension plans to effectively use a lower interest rate for accounting disclosures and pension expense determinations in fiscal years 2014 and 2015. For example SERS uses 7.09% as of June 30, 2014 and 7.02% as of June 30, 2015 for accounting purposes. It is important to note, however, that the new standards do not define funding requirements for a plan.
- The federal government, which promulgates minimum funding standards for corporate pension plans, already requires corporate pension plans to utilize interest assumptions that are based on short-term and mid-term bond rates, which are very low (Pension Protection Act of 2006 p. 14. IRC §430(h)(2)(B)).

2. *Inflation Assumption*

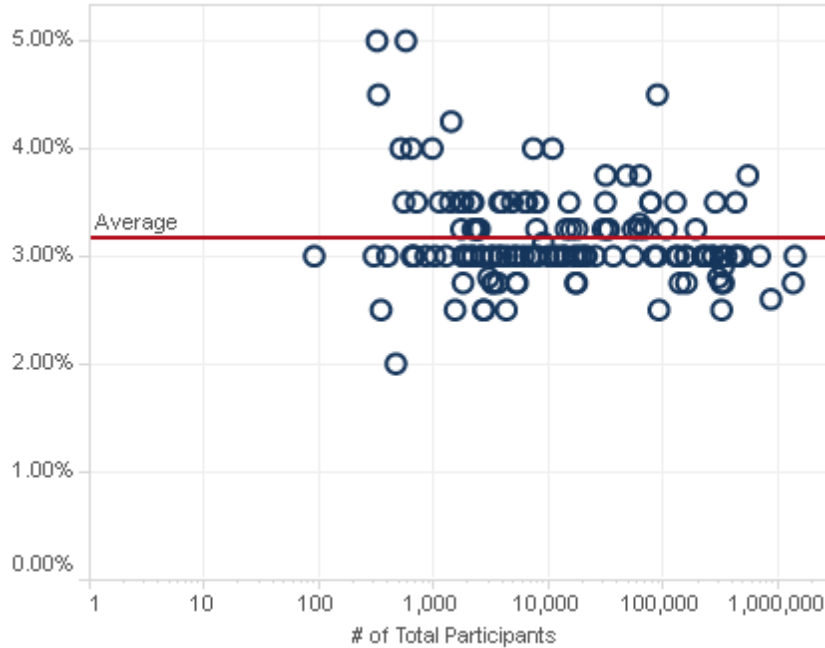
We find the inflation assumption of 3.00%, which primarily impacts the salary increase assumption, used in the draft June 30, 2015 Actuarial Valuation by GRS in certifying the required State contribution is reasonable.

Our rationale for concurring with the 3.00% assumption:

- The July 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (next 75 years) inflation will average somewhere between 2.0% and 3.4% (<http://www.ssa.gov/oact/tr/2015/tr2015.pdf>).
- As shown on pages 7 and 8 of the GRS April 2014 Experience Review Study, there continues to be support for this assumption as a long-term rate even though the historic short-term averages are being lowered by the current historically low rates.
- The *National Conference on Public Employee Retirement Systems* (NCPERS) November 2015 study, provides the following graphic of respondents' inflation assumptions:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS



This shows that the 3.0% assumption, which SERS uses, is a prevalent inflation assumption among the 179 systems who responded to this study, with 3.2% as the average.

3. *Salary (Annual Compensation) Increase Assumption*

The salary scale assumption is shown in the table below.

Illustrative rates of increase per individual employee per annum, compounded annually:

Age	Annual Increase
25	7.92%
30	6.45%
35	5.55%
40	5.22%
45	4.83%
50	4.51%
55	4.30%
60	4.10%
65	3.72%
70	3.50%

These increases include a component for inflation of 3.0% per annum and overall payroll growth (inflation plus productivity) is 3.5%.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

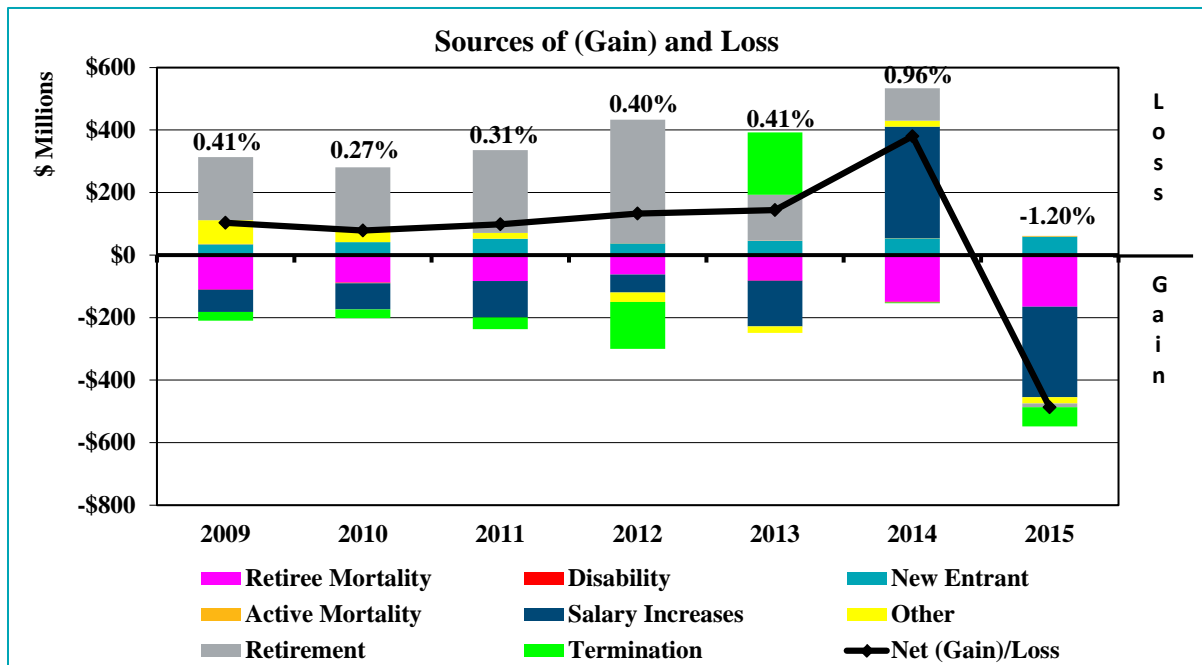
We find the assumption and the basis for setting it as reasonable.

Our rationale for concurring with GRS's recommended salary increase assumption:

- This assumption, which is employer specific, is supported by credible data as shown on pages 12-15 of the April 2014 Experience Review Study performed by GRS.
- In our own experience with our public sector pension plans (about 60 large plans), we have witnessed a consistent recent trend of declining salary increases for public sector employees.

B. Demographic Assumptions

In its annual actuarial valuation reports, GRS regularly reports sources of liability gains and losses. In the draft June 30, 2015 Actuarial Valuation, these are shown on page 18. In the chart below, we have collected similar data from GRS's past valuation reports dating back to 2009 and presented a historical review of past demographic and salary increase experience gains and losses.



The percentages shown above the bars refer to net (gain)/loss as a percentage of liability.

This chart shows the pattern of annual gains and losses attributable to eight different sources as shown in the legend above. When the colored bar slices appear above zero on the Y axis that represents an experience loss, and below zero represents an experience gain for that year.

Key observations from this chart are as follows:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

1. For the first year since 2009 there was a net gain in the draft 2015 valuation. This is primarily due to the significant salary gain. However, retirement, which had been a source of consistent losses, showed a very small gain in 2015. This is an indication that the increased retirement rates adopted in the 2014 valuation are more closely matching experience.
2. In every year since 2009 there have been experience losses attributable to new entrants joining SERS. The continuing source of losses due to new entrants commonly is expected for most pension plans. This is because members who are hired after the valuation date may earn a partial year service credit that does not show up until the following valuation, and at that point the extra liabilities are treated as a liability loss. These losses, however, are largely offset by asset gains attributable to contributions made on behalf of these new members that were also not anticipated.
3. Since 2009, there have been consistent mortality gains attributable to SERS retirees but there have been insignificant mortality gains or losses attributable to active members. This means that there have been more deaths than anticipated for retirees and deaths for actives were largely as anticipated. **Despite the greater than expected deaths for retirees found in this study, we maintain our recommendation (#6) to consider generational mortality tables because, by 2045, the funding target date the actuarial liability will consist almost entirely of today's current active members and a significant number of new hires and the 20% margin for future mortality improvement based on the most recent experience study may not be adequate to cover the anticipated improvements by that date.**
4. There has been a steady trend of salary gains up until 2014 when a significant loss occurred. For 2015 a significant gain occurred. GRS should confirm that this volatility can be accurately attributable to one-time events.
5. Termination from employment experience has been irregular. This is not surprising as termination from employment rates are commonly volatile as short-term changes in the economy, anticipated plan changes, employment opportunities elsewhere, etc., all impact this behavior.
6. Disability experience is too small to be noticed on the chart, given its insignificant size relative to other experience items.
7. The net liability (gain)/loss is shown by the black line on the graph above. This net (gain)/loss as a percent of liability is shown above the bars. While there is a pattern of consistent losses, the percent is generally quite small.

Out of the demographic assumptions, there are two assumptions that should be more closely reviewed.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

1. Mortality Assumption

Post-Retirement Mortality

105% of the RP2014 Healthy Annuitant mortality table, sex distinct, with rates projected to 2014. No adjustment is made for post-disabled mortality. While a fully generational mortality table was considered as part of the most recent experience study, the mortality table used is a static table and provides an estimated margin of 20% for future mortality improvement based on the experience study report of the State Employees' Retirement System for the period from July 1, 2009 to June 30, 2013.

Pre-Retirement Mortality, including terminated vested members prior to attaining age 50

Based on a percentage of 90% for males and 110% for females of the RP2014 Total Employee mortality table. Five percent of deaths among active employees are assumed to be in the performance of their duty.

Despite the fact that the SERS Board has adopted the latest mortality table recently published by the Society of Actuaries (SOA), referred to as the RP 2014 mortality table, GRS should consider for future valuations using generational mortality tables. Generational mortality tables, which assume that mortality rates at each age decline over time, are increasingly being implemented. Given the significant dependence of the statutory funding requirements on new hires over the next 30 years, generational mortality is of greater significance here than for a typical public pension plan that bases its contributions on just the current plan membership.

GRS stated in its April 2014 Experience Review Report that the reason it was comfortable not moving to a generational mortality improvement approach was because it "believes that the recommended mortality tables contain a sufficient level of conservatism to cover any increases in life expectancy in the near future".

Since the statutory funding requirement is significantly dependent on the actuarial liability projected 30 years from now, and GRS believes the newly adopted mortality tables are sufficient to cover life expectancy increases in the near future, **we recommend that GRS consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045 (Recommendation #6).**

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

2. Termination

The termination assumption for Tier 2 members is the same as for Tier 1. Given that GRS has revised retirement rates for Tier 2, we recommend that GRS consider whether additional revisions to the demographic assumptions, specifically the termination assumption, for Tier 2 members are appropriate to their benefit structure and consistent with the revised retirement rates already implemented (Recommendation #7).

Illustrative rates of withdrawal from the System are as follows:

Service (Beginning of Year)	Service Based Withdrawal			
	Regular Formula Employees		Alternative Formula Employees	
	Males	Females	Males	Females
0	0.2300	0.2300	0.0325	0.0600
1	0.1200	0.1200	0.0325	0.0450
2	0.0950	0.0850	0.0325	0.0450
3	0.0700	0.0650	0.0200	0.0400
4	0.0625	0.0500	0.0175	0.0300
5	0.0425	0.0475	0.0175	0.0300
6	0.0425	0.0350	0.0175	0.0300
7	0.0350	0.0350	0.0175	0.0200
8	0.0300	0.0300	0.0150	0.0200
9	0.0250	0.0250	0.0150	0.0200
10	0.0250	0.0250	0.0150	0.0200
11	0.0200	0.0200	0.0125	0.0175
12	0.0200	0.0200	0.0125	0.0175
13	0.0200	0.0200	0.0100	0.0150
14	0.0150	0.0150	0.0100	0.0150
15	0.0150	0.0150	0.0100	0.0150
16	0.0150	0.0150	0.0100	0.0150
17	0.0150	0.0150	0.0100	0.0150
18	0.0150	0.0150	0.0100	0.0150
19	0.0150	0.0150	0.0100	0.0150
20	0.0150	0.0100	0.0100	0.0150
21	0.0150	0.0100	0.0100	0.0150
22	0.0150	0.0100	0.0100	0.0150
23	0.0150	0.0100	0.0100	0.0150
24	0.0150	0.0100	0.0100	0.0150
25	0.0150	0.0100	0.0100	0.0150
26	0.0150	0.0100	0.0100	0.0150
27	0.0150	0.0100	0.0100	0.0150

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Service (Beginning of Year)	Service Based Withdrawal			
	Regular Formula Employees		Alternative Formula Employees	
	Males	Females	Males	Females
28	0.0150	0.0100	0.0100	0.0150
29	0.0150	0.0100	0.0100	0.0150
30+	0.0150	0.0100	0.0100	0.0150

It is assumed that terminated employees will not be rehired. The rates apply only to employees who have not fulfilled the service requirement necessary for retirement at any given age.

With the exception to the comments just made relating to termination and mortality improvement, we have concluded that all remaining demographic assumptions are reasonable and meet the requirements of ASOP No. 35, Section 3.3.4.

1. Marriage Assumption

85.0% of active male participants and 65.0% of active female participants are assumed to be married. Actual marital status at benefit commencement is used for retirees.

2. Social Security Offset for Survivor Benefits

There is no offset assumption for male surviving spouses because it is assumed their own primary insurance amount (PIA) is as great as their spouses' PIA. 60% of married male members are assumed to have a dual income household. For the dual income household, it is assumed the offset at age 60 is 45.0 percent of the original survivor benefit. It is assumed the offset at age 62 is 10.0% of the original survivor benefit. Furthermore, it is assumed that 50% of retirees on or after July 1, 2009, will elect to remove the offset provision. In exchange for the removal, the member's retirement annuity is reduced by 3.825% monthly as mandated by Statutes (40 ILCS 5/14-121).

3. Disability

Because members who receive disability benefits typically spend less than one year on disability, they are considered active members. Therefore, a load of 1.63% of pay on the normal cost is applied to reflect the near-term cash flow. This assumption is based on 110% of the most recent disability benefit payment information as a percent of payroll and will be updated at each valuation date as experience emerges.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

4. Retirement

Employees are assumed to retire in accordance with the rates shown below. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

Retirement Rates for Regular Formula Employees		
	Males	Females
50	15.00%	25.00%
51	15.00%	25.00%
52	25.00%	30.00%
53	25.00%	25.00%
54	20.00%	20.00%
55	17.50%	16.00%
56	17.50%	16.00%
57	15.00%	16.00%
58	15.00%	16.00%
59	15.00%	16.00%
60	10.00%	16.00%
61	10.00%	12.50%
62	20.00%	20.00%
63	17.50%	17.50%
64	15.00%	17.50%
65	20.00%	25.00%
66	25.00%	20.00%
67	20.00%	20.00%
68	20.00%	20.00%
69	17.50%	20.00%
70	17.50%	20.00%
71	17.50%	15.00%
72	15.00%	20.00%
73	17.50%	20.00%
74	20.00%	20.00%
75	100.00%	100.00%

Early Retirement Rates for Regular Formula Employees		
	Males	Females
55	4.50%	4.50%
56	6.00%	4.00%
57	5.00%	7.00%
58	7.50%	9.50%
59	9.50%	12.00%

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Retirement Rates for Alternative Formula Employees				
Age	Eligible for Alternate Formula Benefits Only		Eligible for Regular Formula Benefits Only	
	Males	Females	Males	Females
50	60.00%	40.00%	N/A	N/A
51	45.00%	40.00%	N/A	N/A
52	45.00%	35.00%	N/A	N/A
53	40.00%	30.00%	N/A	N/A
54	40.00%	25.00%	N/A	N/A
55	35.00%	30.00%	N/A	N/A
56	35.00%	25.00%	N/A	N/A
57	27.50%	20.00%	N/A	N/A
58	30.00%	20.00%	N/A	N/A
59	25.00%	25.00%	N/A	N/A
60	30.00%	30.00%	5.00%	8.00%
61	25.00%	20.00%	5.00%	8.00%
62	45.00%	45.00%	10.00%	8.00%
63	40.00%	35.00%	10.00%	12.50%
64	30.00%	40.00%	10.00%	12.50%
65	55.00%	40.00%	20.00%	17.50%
66	50.00%	60.00%	20.00%	15.00%
67	50.00%	50.00%	20.00%	40.00%
68	30.00%	15.00%	17.50%	30.00%
69	35.00%	35.00%	17.50%	20.00%
70	50.00%	60.00%	17.50%	25.00%
71	30.00%	50.00%	17.50%	30.00%
72	100.00%	100.00%	100.00%	100.00%

Members hired after December 31, 2010, eligible for the regular formula benefits will retire according to the following age-based retirement rates:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Retirement Rates for Regular Formula Employees				
Employees Eligible for Normal Retirement			Employees Eligible for Early Retirement	
Age			Age	
67	50.0%		62	30.0%
68	35.0		63	15.0
69	35.0		64	15.0
70	35.0		65	15.0
71	20.0		66	15.0
72	20.0			
73	20.0			
74	20.0			
75	100.0			

Members hired after December 31, 2010, eligible for the alternate formula benefits will retire according to the following age-based retirement rates:

Retirement Rates for Alternate Formula Employees			
Age	Males		Females
60	50.0%		50.0%
61	25.0		20.0
62	45.0		45.0
63	40.0		35.0
64	30.0		40.0
65	55.0		40.0
66	50.0		60.0
67	50.0		50.0
68	30.0		15.0
69	35.0		35.0
70	50.0		60.0
71	30.0		50.0
72	100.0		100.0

5. Assets

Assets available for benefits are used as described on page 46 of the draft June 30, 2015 Actuarial Valuation. The asset valuation method is prescribed by statute, and does not appear to allow a corridor, therefore, a corridor has not been established.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

6. Expenses

As estimated and advised by SERS staff, assumed plan expenses are based on current expenses and are expected to increase in relation to the projected capped payroll.

7. Spouse's Age

The female spouse is assumed to be three years younger than the male spouse.

8. Children

It is assumed that married members have 2.2 children, one year apart in age.

The age of the youngest child of a deceased employee at his or her date of death is assumed to be as follows:

Age at Death of Employee	Age of Youngest Child	Age at Death of Employee	Age of Youngest Child
20	2	40	6
25	3	45	8
30	4	50	10
35	5	55	12
		60	14

9. Overtime and Shift Differentials

Reported earnings include base pay alone. It is assumed that overtime and shift differentials will increase total payroll by 3.5% over reported earnings.

10. Load for Inactive Members Eligible for Deferred Vested Pension Benefits

Load of 15 percent to the liability attributable to inactive members eligible for deferred vested pension benefits for increase in final average salary due to participation in a reciprocal system after termination.

11. Missing Data

If year-to-date earnings are not available, then the monthly pay rate is used. If both year-to-date earnings and the monthly pay rate are not available, the annual rate of pay is assumed to be the rate of pay for the population as a whole on the valuation date. For members with less than a year of service, the annual rate of pay is based on the greater of year-to-date earnings or annualized pay rate. If a birth date was not available, the member was assumed to be age 35.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

12. Decrement Timing

All decrements are assumed to occur mid-year.

13. Decrement Relativity

Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

14. Decrement Operation

Disability and turnover decrements do not operate after member reaches retirement eligibility.

15. Eligibility Testing

Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

16. Population Projection

For purposes of determining annual appropriation as a percent of total covered payroll, the size of the active group is assumed to remain level at the number of actives as of the valuation date. New entrants are assumed to enter with an average age and an average pay as disclosed below. New entrants are assumed to have the same demographic profile as new entrants in the 15 years prior to the valuation date. The average increase in uncapped payroll for the projection period is 3.5% per annum.

Age Group	New Entrant Benefit Groups												Total	
	New Entrants Eligible for Regular Formula Benefits that are Covered by Social Security		New Entrants Eligible for Regular Formula Benefits that are not Covered by Social Security		New Entrants in Positions Formerly Eligible for Alternate Formula Benefits that are Covered by Social Security that are now Eligible for Regular Formula Benefits		New Entrants Eligible for Alternate Formula Benefits that are Covered by Social Security		New Entrants in Positions Formerly Eligible for Alternate Formula Benefits that are not Covered by Social Security that are now Eligible for Regular Formula Benefits		New Entrants Eligible for Alternate Formula Benefits that are not Covered by Social Security			
	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary
Under 20	80	2,358,446			14	690,023	17	780,785			1	36,934	112	3,866,188
20-24	2,182	85,476,855	8	289,273	587	29,624,728	843	42,684,464	218	13,929,071	73	4,422,404	3,911	176,426,795
25-29	3,788	171,209,790	28	1,507,166	814	42,939,907	1,016	55,143,162	355	23,295,236	129	8,107,343	6,130	302,202,604
30-34	3,359	166,218,047	27	1,519,642	571	32,634,270	766	44,917,258	169	11,839,114	60	4,055,243	4,952	261,183,574
35-39	2,912	152,253,060	8	409,630	454	26,583,379	563	34,534,786	73	5,046,495	17	1,209,947	4,027	220,037,297
40-44	2,856	154,770,274	15	827,662	431	25,834,477	417	26,931,594	29	2,125,886	2	125,244	3,750	210,615,137
45-49	2,350	129,772,966	12	726,104	317	19,072,924	285	19,364,613	14	906,632	3	214,488	2,981	170,057,727
50-54	1,962	108,959,941	7	433,206	231	14,816,904	155	10,787,405	11	798,398	1	50,964	2,367	135,846,818
55-59	1,234	67,843,687	10	644,644	137	8,846,704	53	3,537,563	8	593,711			1,442	81,466,309
60-64	432	22,392,766	3	223,522	44	2,863,177	15	1,148,446	3	234,394			497	26,862,305
65-69	38	2,264,329			4	261,762	1	77,852					43	2,603,943
70 & Over														
Total	21,193	\$1,063,520,161	118	\$6,580,849	3,604	\$204,168,255	4,131	\$239,907,928	880	\$58,768,937	286	\$18,222,567	30,212	\$1,591,168,697
Avg. Salary		\$50,183		\$55,770		\$56,650		\$58,075		66,783		63,715		52,667
Avg. Age		37.69		37.57		34.95		32.52		29.21		27.83		36.31
Percent Male		43%		73%		78%		75%		91%		84%		53%

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

C. Actuarial Methods

Actuarial methods consist of three components: (1) the funding method, which is the attribution of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e., asset smoothing); and (3) the amortization basis of the Unfunded Actuarial Liability (UAL). Since the amortization basis is governed by State law, we do not comment on it here.

1. Cost Method

The System uses the projected unit credit cost method (PUC) to assign costs to years of service, as required under the Pension Code (40 ILCS 5/14). **We have no objections with respect to using the PUC method, although we would prefer the Entry Age Normal (EAN) funding method as it is more consistent with the requirement in 40 ILCS 5/14-131 for level percent of pay funding.**

Under the PUC method, which is used by some public sector pension funds, the benefits of active participants are calculated based on their compensation projected with assumed annual increases to ages at which they are assumed to leave the active workforce by any of these causes: retirement, disability, turnover, or death. Only past service (through the valuation date but not beyond) is taken into account in calculating these benefits. The cost of providing benefits based on past service and future compensation is the actuarial accrued liability for a given active participant. Under the PUC cost method, the value of an active participant's benefits tends to increase more sharply over his or her later years of service than over his or her earlier ones. As a result of this pattern of benefit value increasing, while the PUC method is not an unreasonable method, more plans use the EAN funding method to mitigate this effect. It should also be noted that the EAN method is the required method to calculate liability for GASB 67 & GASB 68.

2. Asset Smoothing Method

The actuarial value of assets for the System is a smoothed market value. Unanticipated changes in market value are recognized over five years in the actuarial value of assets. The primary purpose for smoothing out gains and losses over multiple years is that fluctuations in the actuarial value of assets will be less volatile over time than fluctuations in the market value of assets. **Smoothing the market gains and losses over a period of five years to determine the actuarial value of assets is a generally accepted approach in actuarial cost, and we concur with its use.**

Another aspect of asset smoothing methods is whether or not to limit the maximum spread between the actuarial value of assets and the market value of assets. Many public sector pension plans limit the actuarial value of assets to be in any year no more than 120% of market value, or no less than 80% of market value. In fact the Internal Revenue Service (IRS) IRC §430(g)(3)(B)(iii), mandates this "corridor" for private sector pension plans (a 90%-

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

110% corridor is mandated). Even though it is not mandated for public plans, we believe that the use of this type of corridor is a sounder actuarial practice, and according to ASOP No. 44 in Section 3.3 b. 1, the actuarial value of assets should "...fall within a reasonable range around the corresponding market value."

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Response to Recommendations in 2014

In the State Actuary's Preliminary Report on the State Employees' Retirement System of Illinois presented December 19, 2014, Cheiron made several recommendations. Below we summarize how these recommendations were reflected in either the System's comments last year or in this year's draft June 30, 2015 Actuarial Valuation.

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
1. We recommend that the Board periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary.	Not Implemented	- The System actuary commented that type and timing of audits is a matter for the Board. We recommend a full scope replication audit be performed. Recommendation repeated.
2. We concur with the GRS recommendations to increase the 90% funding target and to reduce the projection period, in accordance with generally accepted actuarial practices and suggest the SERS Board always use the conservative end of any range of assumptions recommended by the actuary or other advisors due to the uncertainty and risks associated with this method.	Partially Implemented	- The System feels that the funding policy is established by the legislature and is not under the control of the Board and address this concern in their annual actuarial valuation. Recommendation modified to reflect adoption of a funding policy that meets Actuarial Standards of Practice.
3. We recommend future valuation reports include the stress testing provided this year in the supplementary report.	Not Implemented	- Not included in the draft June 30, 2015 Actuarial Valuation, but sent as a separate document. Recommendation repeated.
4. We recommend GRS indicate when and how they will stress test the 2014 valuation results	Implemented	- The System provided stress testing analysis on December 15, 2015.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
before the 2015 valuation efforts commence.		<p>Recommendation modified this year (Recommendation #3) to have the stress test analysis incorporated directly into the valuation report.</p> <p>Recommendation encompassed in stress testing recommendation.</p>
5. We recommend GRS analyze and disclose in general terms how there was a 2014 liability loss of \$356 million due to payroll increases in the past year, when in the previous five years there were only gains. Our concern is that this may be attributable to large pay increases in the year of retirement.	Implemented	- Analysis was included in supplemental information provided in 2014.
6. GRS also determined that the FY 2016 required State contribution rate calculated under the current statutory funding plan is 43.88%. However, they did not include the basis to which this rate applies. Therefore, we recommend that GRS clarify to what payroll this required rate is to apply.	Implemented	- Included in the draft June 30, 2015 Actuarial Valuation page 8.
7. We recommend again, as we did last year, that GRS consider in future valuations establishing a corridor around the market value of assets of 80% to 120% beyond which the actuarial value is limited, given the use of the actuarial value of assets in the projection methodology in accordance with 40 ILCS 5/14-	Not Repeated	- The SERS Board does not have the authority to create such a corridor; as such we will no longer repeat this recommendation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
131(h). While this change would have no impact on the System for the June 30, 2014, valuation, we believe it would be better to establish this corridor before it is actually applicable.		
8. We continue to recommend the Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work, and adjust assumptions accordingly.	Not Implemented	- No change for 2015. No concrete evidence that Board considered lowering rate for 2015. Recommendation repeated.
9. Since the statutory funding requirement is significantly dependent on the projected actuarial liability 31 years from now, we recommend that GRS consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045.	Not Implemented	- Draft June 30, 2015 Valuation Report did not include recommended disclosure. Recommendation repeated.
10. We continue to have the following two minor recommendations to future reports and GRS continues to not provide this information.		
a. Full disclosure of assumptions with respect to 415(b) limits and 401(a)(17)	Implemented	- A comment was included in the draft June 30, 2015 Actuarial Valuation that no explicit assumption is made with respect

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
limits.		to 415(b) limits and 401(a)(17) limits.
b. Consider whether additional revisions to the demographic assumptions, specifically the termination assumption, for Tier 2 members are appropriate to their benefit structure and consistent with the revised retirement rates already implemented.	Not Implemented	Recommendation repeated.
11. We recommend that in future experience studies, GRS specifically request that the investment consultants referenced in developing market expectations provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the SERS and the Illinois State Board of Investment (ISBI).	Not Implemented	- No experience study performed this year, so the opportunity to implement has not occurred. Recommendation repeated.
12. In our prior two reports, we also asked for a historic development of assets without the General Obligation Bonds (GOB) issued in 2004 but we have yet to obtain such information. Since the development of assets without the GOB directly impacts the required State contribution, it is important to verify that these assets have been historically developed accurately. We recommend that prior to the completion of the June 30, 2015 Actuarial Valuation, GRS provide a verification of the	Not Repeated	- The development of the assets with the GOB proceeds are provided in each respective historical valuation report. As such, we will no longer repeat this recommendation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
STATE EMPLOYEES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
hypothetical assets developed without the GOB bonds.		

Chapter Five

**PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM**

In accordance with 30 ILCS 5/2-8.1, Cheiron, the State Actuary, submitted a preliminary report to the Board of Trustees of the Judges' Retirement System (JRS) concerning proposed certifications of required State contributions submitted to Cheiron by the Board. The preliminary report was submitted to JRS on December 4, 2015. The preliminary report was based on Cheiron's review of actuarial assumptions included in JRS' 2015 Actuarial Valuation Report.

Following is Cheiron's final preliminary report on the Judges' Retirement System. JRS' written response, provided on December 18, 2015, can be found in Appendix C.

December 21, 2015

Mr. William G. Holland
Auditor General
740 East Ash Street
Springfield, Illinois 62703

Board of Trustees
Judges' Retirement System of Illinois
2101 South Veterans Parkway
P.O. Box 19255
Springfield, Illinois 62794-9255

Dear Ladies and Gentlemen:

In accordance with the Illinois State Auditing Act (30 ILCS 5/2-8.1), Cheiron is submitting this preliminary report concerning the proposed certification prepared by Gabriel Roeder Smith & Company (GRS), of the required State contribution to the Judges' Retirement System of Illinois (JRS or System) for Fiscal Year 2017.

In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.

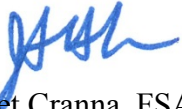
Section I of this report describes the review process undertaken by Cheiron. Section II summarizes our findings. Section III provides the supporting analysis for those findings and presents more details on our assessment of the actuarial assumptions and methods employed in GRS's actuarial certification, as well as our assessment of GRS's determination of the required State Contribution for Fiscal Year 2017. Section III also includes comments on other issues impacting the funding of JRS, including the implications of Article 18 of the Illinois Pension Code, which establishes the statutory funding requirements for the System. **In our opinion, the statutory mandated minimum funding requirements call for inadequate funding, and do not meet Actuarial Standards of Practice (ASOP), particularly ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*.**

In preparing this report, we relied on information, some oral and some written, supplied by JRS and GRS. This information includes actuarial assumptions and methods adopted by the JRS Board, System provisions, summarized census data, the draft June 30, 2015 Actuarial Valuation, the draft 2015 GASB 67/68 Report, 2015 minutes of the JRS Board of Trustee meetings, and various studies and memos prepared by the System's advisors, staff and Executive Director. A detailed description of all information provided for this review is contained in the body of our report as Appendix B.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared exclusively for the Office of the Auditor General and the Judges' Retirement System of Illinois for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Sincerely,
Cheiron



Janet Cranna, FSA, FCA, EA, MAAA
Principal Consulting Actuary



Michael J. Noble, FSA, FCA, EA, MAAA
Principal Consulting Actuary

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION I - REPORT SCOPE

Illinois Public Act 097-0694 (the Act) amended the Illinois State Auditing Act (30 ILCS 5/2-8.1) and requires Cheiron, as the State Actuary, to review the actuarial assumptions and valuation of the Judges' Retirement System of Illinois (JRS or System) and to issue to the JRS Board this preliminary report on the proposed certification prepared by Gabriel Roeder Smith & Company (GRS) of the required State contributions for Fiscal Year (FY) 2017. The purpose of this review is to identify any recommended changes to the actuarial assumptions for the JRS Board to consider before GRS, the JRS actuary, finalizes its certification of the required State contributions to the JRS Board for FY 2017.

While the Act states that just the actuarial assumptions and valuation are to be reviewed, we have also reviewed the actuarial methodologies (funding and asset smoothing methods) employed in preparing the actuarial certification, as these methods can have a material effect on the amount of the State contribution being certified. Finally, we have offered our opinion on the implications of Article 18-131 of the Illinois Pension Code, which impacts the contribution amount certified by GRS.

In conducting this review, Cheiron reviewed the draft June 30, 2015 Actuarial Valuation, the draft 2015 GASB 67/68 Report, minutes of the 2015 Board of Trustees meetings, and various studies and memos prepared by the System's advisors, staff, and Executive Director. The materials we reviewed are listed in Appendix B.

In addition to reviewing the actuarial certification of the required State contribution to JRS, the Act requires the State Actuary to conduct a review of the "actuarial practices" of the JRS Board. While the term "actuarial practices" was not defined in the Act, we continue to interpret this language to mean that we review: (1) the use of a qualified actuary (as defined in the Qualification Standards of the American Academy of Actuaries) to prepare the annual actuarial valuation for determining the required State contribution; and (2) the conduct of periodic formal experience studies to justify the assumptions used in the actuarial valuation. In addition, we have included comments on actuarial communication and compliance with Actuarial Standards of Practice (ASOP) reflected in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION II - SUMMARY OF RECOMMENDATIONS

This section summarizes recommendations from our review of the actuarial assumptions and methods employed in the draft June 30, 2015 Actuarial Valuation of JRS as well as the “actuarial practices” of the JRS Board. Section III of this report contains detailed analysis and rationale for these recommendations.

Proposed Certification of the Required State Contribution

GRS has determined that the FY 2017 required State contribution calculated under the current statutory funding plan is \$131,334,000. We have verified the arithmetic calculations made by GRS to develop this required State contribution and have reviewed the assumptions on which it was based. As such, we have accepted GRS's annual projections of future payroll, total normal costs, employee contributions, combined benefit payments and expenses, and total contributions.

1. We recommend that the JRS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary.

State Mandated Funding Method

2. We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of JRS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

30 ILCS 5/2-8.1 requires the State Actuary to identify recommended changes in actuarial assumptions that the JRS Board must consider before finalizing its certification of the required State contribution. We have reviewed all the actuarial assumptions used in the draft June 30, 2015 Actuarial Valuation and we conclude that the assumptions are reasonable in general, based on the evidence provided to us.

Recommended Additional Disclosures for the 2015 Valuation

3. We continue to recommend that GRS include stress testing of the System within the valuation report and include detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period. Since this recommendation was requested last year, we recommend that this 2015 valuation include such stress tests.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION II - SUMMARY OF RECOMMENDATIONS

Recommended Changes for Future Valuations

4. We continue to recommend the JRS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work, and adjust assumptions accordingly.
5. We further recommend that the Boards of the three systems whose assets are commingled, State Employees' Retirement System (SERS), JRS, and the General Assembly Retirement System (GARS), consider whether different interest rate assumptions for these systems are appropriate.
6. We recommend that when the next experience study is performed, as an alternative base mortality table, GRS review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience.
7. We recommend that GRS consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045.
8. We recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer-term market expectations (30+ years) and that GRS obtain the specific expectations of the investment consultant serving JRS and the Illinois State Board of Investment (ISBI).
9. Page 36 of the draft June 30, 2015 Actuarial Valuation discloses that mortality improvement is projected based upon a "static table". As there are multiple mortality improvement scales to be applied to base mortality rates, GRS should fully disclose which projection scale is being utilized in the June 30, 2015 Actuarial Valuation.
10. We recommend that GRS review appropriateness of the 3.75% wage inflation assumption if consistent gains continue in future years.

GASB 67 and 68

The 2015 JRS GASB 67 and 68 information were provided in a separate report. We find that the assumptions and methods used to prepare the 2015 JRS GASB 67 and 68 schedules are reasonable based on the evidence provided to us.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

In this section, we provide detailed analysis and supporting rationale for the recommendations that were presented in Section II of this report.

Proposed Certification of the Required State Contribution

As stated in our summary of recommendations in Section II, we have verified the arithmetic calculations made by GRS to develop this State required contribution, have reviewed the assumptions on which it is based, and have accepted GRS's annual projections of future payroll, total normal costs, benefits, expenses, and total contributions. However, in accordance with 30 ILCS 5/2-8.1, our review does not include a replication of the actuarial valuation results.

Given the size of the JRS Plan, the Plan's low funded ratio, the recent changes in legal requirements, and guidance issued by the Government Finance Officers Association, we are recommending that the Board periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary. Results are compared in a detailed fashion to measure the liabilities for each benefit form and feature. A replication audit will uncover any potential problems in the processing and certification of valuation results.

We recommend that the JRS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary (Recommendation #1).

State Mandated Methods

State Mandated Funding Method

The Illinois Pension Code (40 ILCS 5/18-131) is limited in meeting the risks of the System. This law requires that the actuary base the required contribution on a prescribed funding method that achieves 90% funding in the year 2045. This does not meet generally acceptable actuarial principles because the System is never targeted to be funded to 100% and the funding of the System is significantly deferred into the future. In addition, on-going benefits being earned in the future are also being only funded at 90%. The method defined in the Code does not conform to the guidelines in ASOP No. 4, Section 3.14 regarding the allocation procedures of costs to the expected benefit payments, which provides:

When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1

SECTION III – SUPPORTING ANALYSIS

We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of JRS (Recommendation #2). Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

In its draft June 30, 2015 Actuarial Valuation on pages 11-14, GRS offers commentary on the statutory funding method from an actuarial point of view. With support of the JRS Board, GRS reports on an alternative funding method that they consider representative of generally accepted actuarial methods. This alternative funding method is described on page 9 of the draft June 30, 2015 Actuarial Valuation with a numerical demonstration and determination of the contribution amount on page 10. The actuarially determined contribution (ADC) under this method consists of the normal cost determined under the projected unit credit funding method, plus a 25 year level percent of capped payroll closed period amortization of the unfunded accrued liability. Based on this method, the State's contribution amount is \$152,699,188. They contrast the ADC funding method with the current statutory method and note that the statutory policy produces a back-loaded contribution projection, where contributions are significantly deferred into the future.

Since GRS has concluded that the State mandated funding method does not conform to Actuarial Standards of Practice, the Board adopted a separate funding policy for GASB 67, the Actuarially Determined Contribution, which is based on contributing the annual normal cost plus amortization of the unfunded actuarial liability over 25 years as a level percent of capped payroll. We concur with GRS that the plan should be funded in accordance with generally accepted actuarial practices.

Based on the draft June 30, 2015 Actuarial Valuation, the funded ratio, measured as the ratio of the actuarial value of assets to the actuarial liability, is currently at 34.75%. We have concerns about the solvency of the System if there is a significant market downturn. This is why we previously recommended stress testing be done to determine whether there will be sufficient assets under the State mandated funding method to pay benefits if there is a significant market downturn.

We continue to recommend that GRS include stress testing of the System within the valuation report and include a detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period (Recommendation #3). This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested. It is important to include this information in the report so that all readers will be aware of the various risks the System faces, which are not apparent in the deterministic projections. Cheiron has provided to JRS possible interest rate and inflation scenarios to consider for this purpose.

SECTION III – SUPPORTING ANALYSIS

Assessment of Actuarial Assumptions Used in the 2015 Valuation

A. Economic Assumptions

1. *Interest Rate:*

The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the required State contribution amount. This assumption, which is used to value liabilities for funding purposes, was maintained at 7.00% for the draft June 30, 2015 Actuarial Valuation.

After reviewing all the materials (see Appendix B of this report) that were made available, Cheiron concludes that the use of 7.00% for this valuation is reasonable. We continue to recommend that the JRS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly (Recommendation #4). This is opposed to the current process of waiting for the completion of a formal Experience Review Study.

We further recommend that the Boards of the three systems whose assets are commingled, JRS, the General Assembly Retirement System (GARS), and the State Employees' Retirement System (SERS), consider whether different interest rate assumptions for these systems are appropriate (Recommendation #5).

Our rationale for this recommendation is as follows:

- Based on GRS's March 29, 2013, Experience Review, the average 50th percentile of the 30-year expected average geometric net nominal return for eight investment consultants surveyed by GRS is 7.09%.
- Due to the nature of the population of JRS, the duration of the cash-flow is shorter than other retirement systems, supporting a lower interest rate.
- GRS's survey also estimated that the middle 50% of the probable distribution of the System's returns is between 5.23% and 8.97%. This approach satisfies ASOP No. 27.
- GRS's survey also found the average expected nominal return net of expenses for a single year to be 7.83%.
- In addition to the March 29, 2013, Experience Review that GRS prepared for JRS, it also developed information on this assumption for SERS in April 2014. Since JRS' funds are commingled with SERS, along with GARS, considering this information is also reasonable. In this Experience Review, GRS presented the opinion of eight independent investment consultants on the future expected earnings of SERS and concluded that, adjusting for GRS's assumed rate of inflation, the expected arithmetic mean of the SERS

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

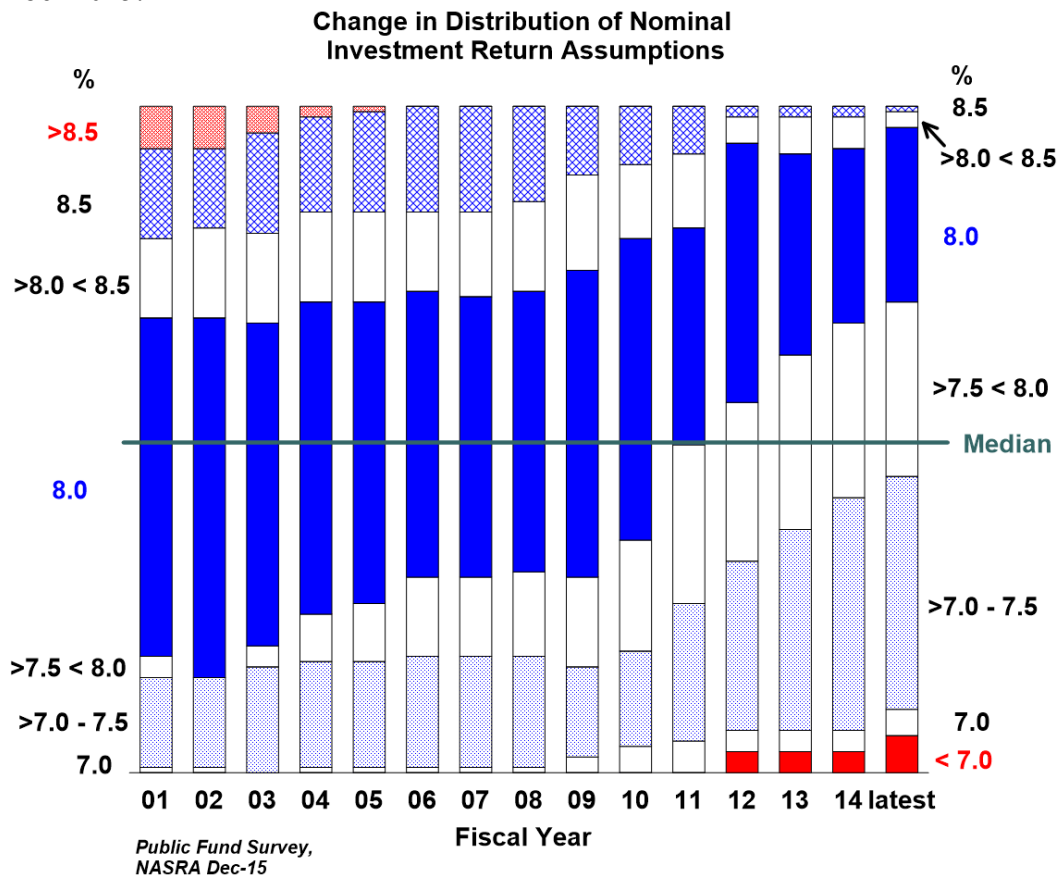
portfolio, that JRS is commingled with, is 7.52%. They then converted this arithmetic mean to a geometric rate of return of 6.82%. They did not provide probabilities of exceeding 7.00%, but did note that there is a 42.3% of exceeding 7.25%.

- There has been emerging actuarial practice throughout the country to reducing the discount rates even below the level that the investment consultants believe is achievable. This is because of the very low interest rate environment we are currently in. The lower the interest rate environment, the greater the investment risk that must be taken to achieve an assumed rate of return. For example, in 1995 yields on ten year Treasury bonds (a proxy for a risk free investment) was 6.21%. In 2015, these yields are now 1.98%. This means, back in 1995 in order to achieve 7.00%, a system only had to earn 0.79% more than the ten year treasury yields (“risk free” rates), whereas today a system would have to earn 5.02% above the “risk free” rate. By reducing the investment return assumption, plans are more likely to meet their funding goals without requiring investment performance so much in excess of the risk free rate.
- In addition to taking pressure off the investment process, there is a growing concern that long-term interest rates will eventually rise. A pattern of rising interest rates generally results in declining bond returns. This in turn will result in even greater investment risks on the equity side of the assets in order to compensate for both declining bond returns and the need to earn 5.02% above the risk free rates of return.
- Currently, total contributions coming into JRS exceeds benefits and expenses being paid out. However, the draft 2015 Actuarial Valuation shows that within a couple of years, JRS will experience negative cash flows, which is the case with most maturing pension plans. Negative cash flows result in actuarial returns (i.e. dollar weighted returns) being less than “time weighted” returns, which is what all investment consultants base their reported and projected returns on. So as a result, even if an investment consultant’s expected long-term time horizon is at 7.0% for example, that is expressed as a time weighted return figure, and for plans with negative cash flows, we would expect the dollar weighted returns to be less.
- In our opinion, the use of 7.00% is justified for this 2015 valuation because we believe that the “long-term” outlook of the eight investment consultants that GRS surveyed most likely had a shorter time horizon than the time horizon applicable to the investment assumptions (30+ years). In our experience, we find that investment consultants view 10 years as a long time horizon. We would expect that had GRS requested those eight consultants to provide 30+ year outlooks that their longer-term outlooks would be higher and thus more supportive of the 7.00% investment assumption. In any event, **we recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer-term market expectations (30+ years) and that GRS obtain the specific expectations of the investment consultant serving JRS and the Illinois State Board of Investment (ISBI) (Recommendation #8).**

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

- A review of the interest and inflation rates does not involve the collection of significant data, and can easily be updated annually. In addition, it keeps the Board focused more closely on these critical assumptions.
- The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 126 large retirement plans. The following chart shows the distribution of investment return assumptions for the last 14 years of its survey. The latest data includes results collected through December 2015.



Over the period shown in the latest survey, there continues to be a pattern of reducing investment return assumptions. Seventy of the 126 plans have reduced the interest rate assumption since Fiscal Year 2011. For these 70 plans, the average reduction is 0.38%. The survey is consistent with experience of other Cheiron clients, with which there has been a significant trend to reduce the investment return assumptions in the last several years.

- GASB 67 and 68 subject many public pension plans, such as JRS, to effectively use a lower interest rate for accounting disclosures and pension expense determinations. It is

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

important to note, however, that the new standards do not define funding requirements for a plan.

- The federal government, which promulgates minimum funding standards for corporate pension plans, already requires corporate pension plans to utilize interest rate assumptions based on short-term and mid-term bond rates, which are very low (Pension Protection Act of 2006 p. 14. IRC §430(h)(2)(B)).

2. *Inflation Assumption:*

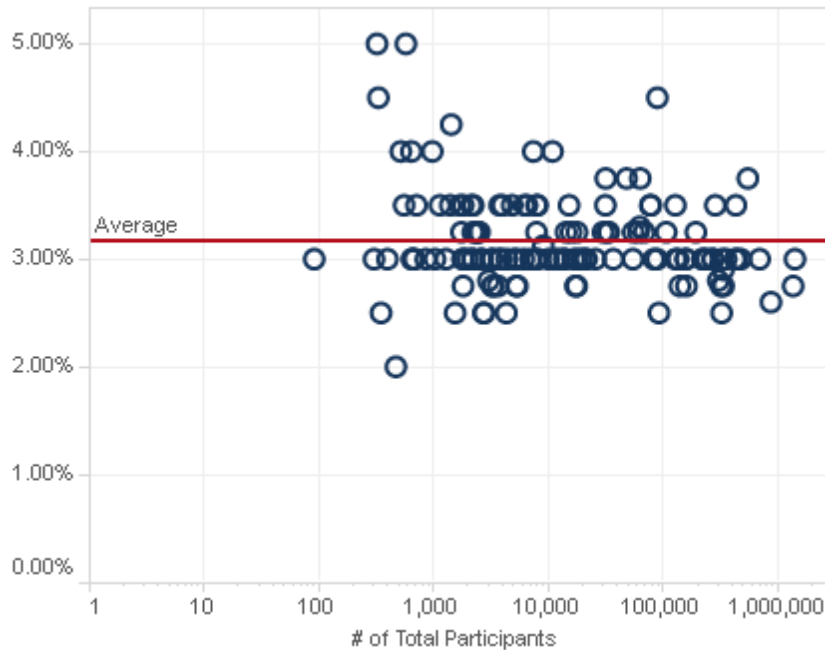
We find the inflation assumption of 3.00%, which primarily impacts the salary increase assumption, used in the draft June 30, 2015 Actuarial Valuation by GRS in certifying the required State contribution, is reasonable.

Our rationale for concurring with the 3.00% assumption:

- The July 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (next 75 years), inflation will average somewhere between 2.0% and 3.4% (<http://www.ssa.gov/oact/tr/2015/tr2015.pdf>).
- GRS's March 29, 2013, Experience Review presentation shows a range of 2.16% to 3.26% for expectations of future inflation from the eight investment consultants surveyed.
- While GRS did not provide an updated Experience Review for JRS, it provided support on pages 7 and 8 of its April 2014 Experience Review Study for SERS for this assumption as a long-term rate.
- The *National Conference on Public Employee Retirement Systems* (NCPERS) November 2015 study provides the following graphic of respondents' inflation assumptions:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS



This shows that the 3.0% assumption, which JRS uses, is a prevalent inflation assumption amongst the 179 systems that responded to this study, with 3.2% as the average.

3. *Salary (Annual Compensation) Increase Assumption:*

For the draft June 30, 2015 Actuarial Valuation, the salary scale assumption for uncapped payroll is 3.75% per year, compounded annually for all active members, regardless of age or service. It includes components of 3.0% per annum for inflation, 0.60% per annum for productivity, and 0.15% for merit/promotion increases.

We find the assumption and the basis for setting it as reasonable for the 2015 valuation however, we recommend that GRS review appropriateness of the 3.75% wage inflation assumption if consistent gains continue in future years (Recommendation #10).

Our rationale for concurring with GRS's salary increase assumption:

- GRS's review of the salary history and Consumer Price Index changes from 2000 to 2012 indicates that the data supports the assumption.
- In our own experience with our public sector pension plans (about 60 large plans), we have witnessed a consistent recent trend of declining salary increases for public sector employees.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

4. COLA:

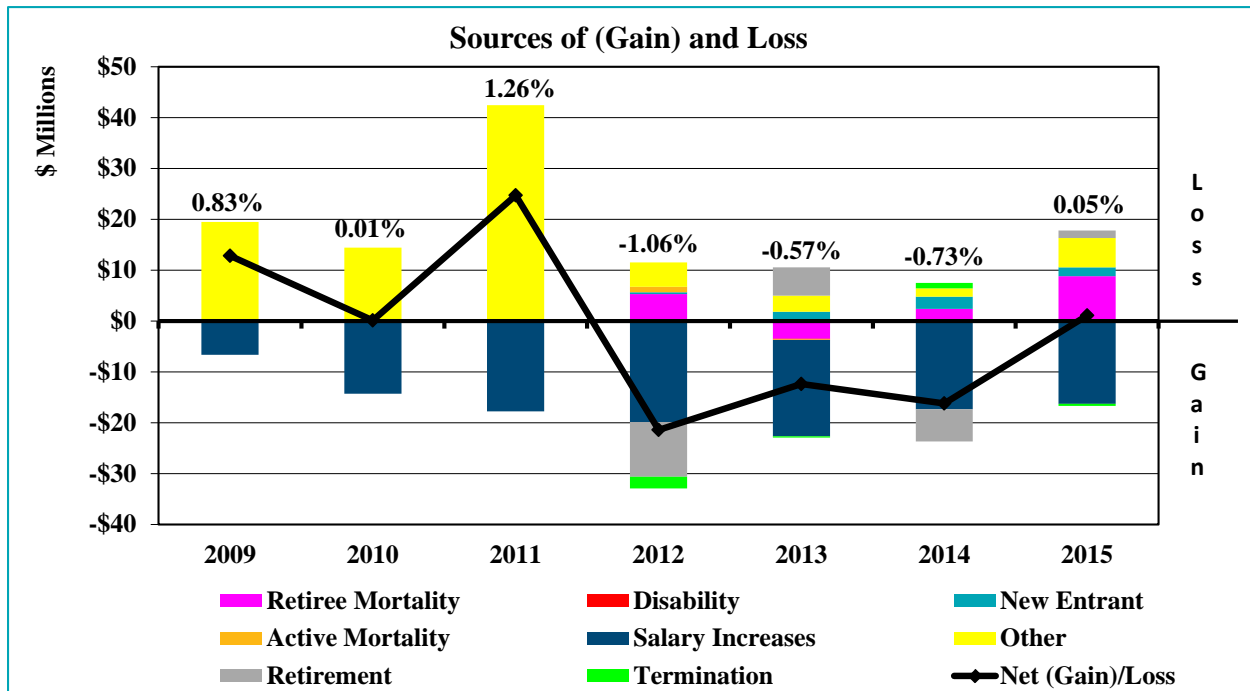
While Tier 1 members receive an annual automatic COLA, Tier 2 members receive an annual increase of the lesser of the 3% received by Tier 1 and the annual change in the Consumer Price Index for all Urban Consumers.

5. Capped Pay Assumption:

The Tier 2 capped payroll growth is 3% per year, compounded annually, which is the inflation assumption.

B. Demographic Assumptions:

In its annual actuarial valuation reports, GRS regularly reports sources of liability gains and losses. In the draft June 30, 2015 Actuarial Valuation, these are shown on page 18. In the chart below, we have collected similar data from past valuation reports dating back to 2009 and use these to present a historical review of past demographic and salary increase experience gains and losses. Note that GRS became the actuary effective with the 2012 report, and the results prior to 2012 were provided by the prior actuary, Goldstein and Associates.



The percentages shown above the bars refer to net (gain)/loss as a percentage of liability.

This chart shows the pattern of annual gains and losses attributable to eight different sources as shown in the legend above. When the colored bar slices appear above zero on the Y-axis that represents an experience loss, and below zero represents an experience gain for that year.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

Key observations from this chart is as follows:

1. Retirement experience, retiree mortality, and termination losses have all been volatile over the last four years where experience is provided and have not shown any particular trend.
2. There has been a gain due to salary for each of the last seven years. Total payroll grew over the first couple of years of the period, but since has stayed relatively stable. This is likely to be a reflection of the general economic environment since 2009 rather than a problem with the long-term assumption. However, **we recommend that GRS review appropriateness of the 3.75% wage inflation assumption if consistent gains continue in future years** (Recommendation #10).
3. The net liability (gain)/loss is shown by the black line on the first graph above. This net (gain)/loss as a percent of liability is shown above the bars.

Out of the demographic assumptions, there are three assumptions that are of particular interest.

1. Mortality:

For the current valuation, GRS maintained the post-retirement mortality table as the RP-2000 Combined Healthy Mortality Table, sex distinct, projected to 2015 (static table), setback three years for males and two years for females. It also maintained the pre-retirement mortality to be 85% of the new post-retirement mortality for males and 70% of the new post-retirement mortality for females.

Mortality experience has been volatile over the last several years. Base mortality utilized in the draft June 30, 2015 Actuarial Valuation is a function of the RP-2000 Combined Healthy Mortality Table. The “Combined” table means that actual mortality experience used to develop the base table was blended based upon mortality observations exhibited by both retirees and active members. While the current assumption adjusts the Combined table to estimate mortality rates for active members, the Annuitant / Non-Annuitant mortality tables were developed so that actuarial valuations can better reflect mortality for retirement eligible members who either (1) retire or (2) do not retire and continue working. The differentiation between annuitant and non-annuitant mortality rates are important as generally one of the reasons a member may continue working vs. retire is because their health can allow them to do so. As such, the non-annuitant tables would reflect a lower mortality rate at retirement ages when compared to the annuitant tables. **We recommend that when the next experience study is performed, as an alternative base mortality table, GRS review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience** (Recommendation #6).

Recently changed Actuarial Standards of Practice (ASOP No. 35) now require that actuaries at least consider projections of mortality improvements, and if there is not such an assumption for improvement, the actuary must disclose the basis for not making the assumption. As such, **GRS should consider for future valuations using generational**

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

mortality tables (Recommendation #7). Generational mortality tables, which assume that mortality rates at each age decline over time, are increasingly being implemented. Given the significant dependence of the statutory funding requirements on new hires over the next 30 years, generational mortality is of greater significance here than for a typical public pension plan that bases its contributions on just the current plan membership.

If GRS believes the mortality tables used in the draft June 30, 2015 Actuarial Valuation are sufficient to cover life expectancy increases in the future, **GRS should disclose whether or not the recommended tables sufficiently cover anticipated increases through 2045** (Recommendation #7).

2. *New Entrant Assumptions:*

The new entrant profile includes capped salary information. GRS assumes that for purposes of determining the annual appropriation as a level percent of total covered payroll, the size of the active group will remain level at the number of actives as of the valuation date. New entrants are assumed to enter with an average age (46.98), average uncapped pay (\$184,340), and average capped pay (\$115,481) based on the averages for all current active members. The average increase in uncapped payroll for the projection period is 3.75% per annum.

3. *Other Demographic assumptions:*

Page 36 of the draft June 30, 2015 Actuarial Valuation Report discloses that mortality improvement is projected based upon a “static table”. As there are multiple mortality improvement scales to be applied to base mortality rates, **GRS should fully disclose which projection scale is being utilized in the June 30, 2015 Actuarial Valuation** (Recommendation #9).

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

Below we summarize all remaining demographic assumptions, which we reviewed and concluded all are reasonable and meet the requirements of ASOP No. 35, Section 3.3.4.

1. Retirement

Employees are assumed to retire in accordance with the rates shown below. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

Tier 1 Rates:

Retirement Rates	
Age	Male & Female
60	22.0%
61-70	11.0%
71	12.0%
72	14.0%
73	16.0%
74	18.0%
75-79	20.0%
80	100.0%

Early Retirement Rates	
Age	Male & Female
55	8.0%
56	8.0%
57	8.0%
58	8.0%
59	8.0%

Tier 2 Rates:

Retirement Rates	
Age	Male & Female
62	30.0%
63	10.0%
64	13.0%
65	16.0%
66	20.0%
67	30.0%
68	11.0%
69-71	12.0%
72	14.0%
73	16.0%
74	18.0%
75-79	20.0%
80	100.0%

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

2. Termination:

GRS currently assumes all members have the same termination rates. Illustrative rates of this withdrawal from the System are as follows:

Age Based Withdrawal	
Age	Male & Female
30	0.0128
35	0.0110
40	0.0094
45	0.0076
50	0.0058
55	0.0042
60	0.0024
65	0.0007

It is assumed that terminated employees will not be rehired. The rates apply only to employees who have not fulfilled the service requirement necessary for retirement at any given age.

3. Disability

No assumption for disability.

4. Spouse's Age

The female spouse is assumed to be four years younger than the male spouse.

5. Decrement Timing

All decrements are assumed to occur beginning of year.

6. Decrement Relativity

Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

7. Decrement Operation

Turnover decrements do not operate after member reaches retirement eligibility.

8. Eligibility Testing

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

9. Marriage Assumption

75.0 percent of active and retired participants are assumed to be married.

10. Employee Contribution Election

For purposes of the valuation, it is assumed that all judges elect to contribute only on increases in salary when they become eligible for this provision.

ASSUMPTIONS AS A RESULT OF PUBLIC ACT 96-0889

Members hired after December 31, 2010, are assumed to contribute on salary up to the final average compensation cap in a given year until this plan provision or administrative procedure is clarified.

State contributions, expressed as a percentage of pay, are calculated based upon capped pay.

Retirement rates are also adjusted for Tier 2 members, as detailed previously.

THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1

SECTION III – SUPPORTING ANALYSIS

C. Actuarial Methods:

Actuarial methods consist of three components: (1) the funding method, which is the attribution of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e., asset smoothing); and (3) the amortization basis of the Unfunded Actuarial Liability (UAL). Since the amortization basis is governed by State law, we do not comment on it here.

1. Cost Method

The System uses the projected unit credit (PUC) cost method to assign costs to years of service, as required to under the Pension Code (40 ILCS 5/18). **We have no objections with respect to using the PUC method, although we would prefer the Entry Age Normal (EAN) funding method, as it is more consistent with the requirement in 40 ILCS 5/18-131 for level percent of pay funding.**

Under the PUC method, which is used by some public sector pension funds, the benefits of active participants are calculated based on their compensation projected with assumed annual increases to ages at which they are assumed to leave the active workforce by any of these causes: retirement, disability, turnover, or death. Only past service (through the valuation date but not beyond) is taken into account in calculating these benefits. The cost of providing benefits based on past service and future compensation is the actuarial accrued liability for a given active participant. Under the PUC cost method, the value of an active participant's benefits tends to increase more sharply over their later years of service than over their earlier ones. As a result of this pattern of benefit value increasing, while the PUC method is not an unreasonable method, more plans use the EAN funding method to mitigate this affect. It should also be noted that the EAN method is the required method to calculate liability for GASB 67 & GASB 68.

2. Asset Smoothing Method

The actuarial value of assets for the System is a smoothed market value. Unanticipated changes in market value are recognized over five years in the actuarial value of assets. The primary purpose for smoothing out gains and losses over multiple years is that fluctuations in the actuarial value of assets will be less volatile over time than fluctuations in the market value of assets. **Smoothing the market gains and losses over a period of five years to determine the actuarial value of assets is a generally accepted approach in determining actuarial cost, and we concur with its use.**

Another aspect of asset smoothing methods is whether or not to limit the maximum spread between the actuarial value of assets and the market value of assets. Many public sector pension plans limit the actuarial value of assets to be in any year no more than 120% of market value, or no less than 80% of market value. In fact, the Internal Revenue Service (IRS), IRC §430(g)(3)(B)(iii), mandates this "corridor" for private sector pension plans (a

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION III – SUPPORTING ANALYSIS

90%-110% corridor is mandated). Even though it is not mandated for public plans, we believe that the use of this type of corridor is a sounder actuarial practice, and according to ASOP No. 44 in Section 3.3 b. 1, the actuarial value of assets should "...fall within a reasonable range around the corresponding market value."

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Response to Recommendations in 2014

In the State Actuary's Preliminary Report on the Judges' Retirement System of Illinois presented December 19, 2014, Cheiron made several recommendations. Below we summarize how these recommendations were reflected in either the System's comments last year or in this year's draft June 30, 2015 Actuarial Valuation.

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
1. We recommend that the JRS Board consider conducting an independent actuarial audit in which the results of the valuation are replicated by the audit actuary and any deviations are noted and reconciled.	Not Implemented	- The System actuary commented that type and timing of audits is a matter for the Board. We recommend a full scope replication audit be performed. Recommendation repeated.
2. We have suggested and continue to suggest that the JRS Board always use the conservative end of any range of assumptions recommended by the actuary or other advisors due to the uncertainty and risks associated with the State mandated funding method.	Partially Implemented	- The System feels that the funding policy is established by the legislature and is not under the control of the Board and addressed this concern in their annual actuarial valuation. Recommendation modified to reflect adoption of a funding policy that meets Actuarial Standards of Practice.
3. We recommend future valuation reports include the stress testing provided this year in the supplementary report.	Not Implemented	- Not included in the draft June 30, 2015 Actuarial Valuation, but sent as a separate document. Recommendation repeated.
4. GRS determined that the FY 2016 required State contribution rate calculated under the current statutory funding plan is 80.072%. However, it did not include the basis to which this rate applies. Therefore, we recommend that GRS add clarity to this letter by making clear to what this required rate is to	Implemented	- Implemented in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
apply.		
5. We recommend again, as we did last year, that GRS consider in future valuations establishing a corridor around the market value of assets of 80% to 120% beyond which the actuarial value is limited, given the use of the actuarial value of assets in the projection methodology in accordance with 40 ILCS 5/18-131(d). While this change would have no impact on the System for the June 30, 2014, valuation, we believe it would be better to establish this corridor before it is actually applicable.	Not Repeated	- The JRS Board does not have the authority to create such a corridor; as such we will no longer repeat this recommendation.
6. We continue to recommend that the Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work, and adjust assumptions accordingly. We further recommend that the Boards of the three systems whose assets are commingled, JRS, the General Assembly Retirement System (GARS), and the State Employees' Retirement System (SERS), consider whether different economic assumptions for these systems need to be used.	Not Implemented	- No change for 2015. No concrete evidence that the Board reviewed the economic assumptions (interest rate and inflation) prior to commencing the valuation work. Recommendation repeated.
7. Since the statutory funding requirement is significantly dependent on the projected actuarial liability 31 years from now, we recommend that GRS	Not Implemented	- Draft June 30, 2015 Valuation Report did not include recommended disclosure. Recommendation repeated.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045.		
8. With respect to the assumptions used in the 2014 draft Actuarial Valuation Report, we noticed that there have been consistent gains due to salary increases each year from 2009 through 2014. GRS continues to develop the statutory funding contributions based on a constant population assumption and continued payroll growth, both in the short-term and long-term. GRS should provide evidence that these assumptions are reasonable.	Not Implemented	Recommendation regarding the salary increase assumption repeated.
9. In our prior two reports, we also asked for a historic development of assets without the General Obligation Bonds (GOB) issued in 2004, but we have yet to obtain such information. Since the development of assets without the GOB directly impacts the required State contribution, it is important to verify that these assets have been historically developed accurately. We recommend that	Not Repeated	- The development of the assets with the GOB proceeds are provided in each respective historical valuation report. As such, we will no longer repeat this recommendation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
prior to the completion of the June 30, 2015, draft valuation report, that GRS provide a verification of the hypothetical assets without the GOB.		
10. We continue to have several minor recommendations for future reports, and GRS continues to not provide this information.		
a. We recommend that GRS disclose the additional economic assumptions that it utilizes in its actuarial valuation, along with the growth rates for these. GRS added a disclosure for the assumption for the COLA for Tier 2 this year, but disclosures relating to the 415(b) and 401(a)(17) limits are still not made.	Implemented	- A comment was included in the draft June 30, 2015 Actuarial Valuation that no explicit assumption is made with respect to 415(b) limits and 401(a)(17) limits.
b. We recommend again, as we have the previous two years, that GRS consider using the actual data available rather than an assumption for determining if a member will choose the spousal continuance benefit option that provided a survivor annuity. We further continue to recommend that GRS provide details regarding the election of this provision by the current inactive members in the Participant Data section. If there are material	Implemented	- This data is not available and GRS provided some commentary on the basis of the assumption on page 34 of the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
JUDGES' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
limits in the data preventing this, GRS should note this.		
c. We recommend that GRS provide additional clarity on the payrolls used in its valuation throughout its report to allow for a more complete evaluation by another qualified actuary as required by Actuarial Standards of Practice.	Implemented	- This was provided in the draft June 30, 2015 Actuarial Valuation.
d. We recommend that GRS consider whether additional revisions to the demographic assumptions, specifically the termination and salary scale assumptions, for Tier 2 are appropriate to its benefit structure and consistent with the revised retirement rates already implemented.	Implemented	- GRS indicated that based on the available data, the assumptions are appropriate and will be monitored as experience emerges.
11. We recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the JRS and the Illinois State Board of Investment (ISBI).	Not Implemented	- No experience study performed this year, so the opportunity to implement has not occurred. Recommendation repeated.

Chapter Six

**PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY
RETIREMENT SYSTEM**

In accordance with 30 ILCS 5/2-8.1, Cheiron, the State Actuary, submitted a preliminary report to the Board of Trustees of the General Assembly Retirement System (GARS) concerning proposed certifications of required State contributions submitted to Cheiron by the Board. The preliminary report was submitted to GARS on December 4, 2015. The preliminary report was based on Cheiron's review of actuarial assumptions included in GARS' 2015 Actuarial Valuation Report.

Following is Cheiron's final preliminary report on the General Assembly Retirement System. GARS' written response, provided on December 18, 2015, can be found in Appendix C.

December 21, 2015

Mr. William G. Holland
Auditor General
740 East Ash Street
Springfield, Illinois 62703

Board of Trustees
General Assembly Retirement System of Illinois
2101 South Veterans Parkway
P.O. Box 19255
Springfield, Illinois 62794-9255

Dear Ladies and Gentlemen:

In accordance with the Illinois State Auditing Act (30 ILCS 5/2-8.1), Cheiron is submitting this preliminary report concerning the proposed certification prepared by Gabriel Roeder Smith & Company (GRS), of the required State contribution to the General Assembly Retirement System of Illinois (GARS or System) for Fiscal Year 2017.

In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.

Section I of this report describes the review process undertaken by Cheiron. Section II summarizes our findings. Section III provides the supporting analysis for those findings and presents more details on our assessment of the actuarial assumptions and methods employed in GRS's actuarial certification, as well as our assessment of the GRS's determination of the required State Contribution for Fiscal Year 2017. Section III also includes comments on other issues impacting the funding of GARS, including the implications of Article 2 of the Illinois Pension Code, which establishes the statutory funding requirements for the System. **In our opinion, the statutory mandated minimum funding requirements call for inadequate funding and do not meet Actuarial Standards of Practice (ASOP), particularly ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.**

In preparing this report, we relied on information, some oral and some written, supplied by GARS and GRS. This information includes actuarial assumptions and methods adopted by the GARS Board, System provisions, summarized census data, the draft June 30, 2015 Actuarial Valuation, the draft 2015 GASB 67/68 Report prepared by GRS, 2015 minutes of the GARS Board of Trustee meetings, and various studies and memos prepared by the System's advisors, staff and Executive Director. A detailed description of all information provided for this review is contained in the body of our report as Appendix B.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared exclusively for the Office of the Auditor General and the General Assembly Retirement System of Illinois for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

Sincerely,
Cheiron



Gregory A. Reardon, FSA, EA, MAAA
Consulting Actuary



Michael J. Noble, FSA, FCA, EA, MAAA
Principal Consulting Actuary

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8.1**

SECTION I - REPORT SCOPE

Illinois Public Act 097-0694 (the Act) amended the Illinois State Auditing Act (30 ILCS 5/2-8.1) and requires Cheiron, as the State Actuary, to review the actuarial assumptions and valuation of the General Assembly Retirement System of Illinois (GARS or System) and to issue to the GARS Board this preliminary report on the proposed certification prepared by Gabriel Roeder Smith & Company (GRS) of the required State contributions for Fiscal Year (FY) 2017. The purpose of this review is to identify any recommended changes to the actuarial assumptions for the GARS Board to consider before GRS, the GARS actuary, finalizes its certification of the required State contributions to the GARS Board for FY 2017.

While the Act states that just the actuarial assumptions and valuation are to be reviewed, we have also reviewed the actuarial methodologies (funding and asset smoothing methods) employed in preparing the actuarial certification, as these methods can have a material effect on the amount of the State contribution being certified. Finally, we have offered our opinion on the implications of Article 2-124 of the Illinois Pension Code, which impacts the contribution amount certified by GRS.

In conducting this review, Cheiron reviewed the draft June 30, 2015 Actuarial Valuation, the draft 2015 GASB 67/68 Report, minutes of the 2015 Board of Trustees meetings, and various studies and memos prepared by the System's advisors, staff, and Executive Director. The materials we reviewed are listed in Appendix B.

In addition to reviewing the actuarial certification of the required State contribution to GARS, the Act requires the State Actuary to conduct a review of the "actuarial practices" of the Board. While the term "actuarial practices" was not defined in the Act, we continue to interpret this language to mean that we review: (1) the use of a qualified actuary (as defined in the Qualification Standards of the American Academy of Actuaries) to prepare the annual actuarial valuation for determining the required State contribution; and (2) the conduct of periodic formal experience studies to justify the assumptions used in the actuarial valuation. In addition, we have included comments on actuarial communication and compliance with Actuarial Standards of Practice (ASOP) reflected in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

This section summarizes recommendations from our review of the actuarial assumptions and methods employed in the draft June 30, 2015 Actuarial Valuation of GARS, as well as the “actuarial practices” of the GARS Board. Section III of this report contains detailed analysis and rationale for these recommendations.

Proposed Certification of the Required State Contribution

GRS has determined that the FY 2017 required State contribution calculated under the current statutory funding plan is \$21,721,000. We have verified the arithmetic calculations made by GRS to develop this required State contribution and have reviewed the assumptions on which it was based. As such, we have accepted GRS’s annual projections of future payroll, total normal costs, employee contributions, combined benefit payments and expenses, and total contributions.

1. We recommend that the GARS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System’s actuary.

State Mandated Methods

2. We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of GARS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

30 ILCS 5/2-8.1 requires the State Actuary to identify recommended changes in actuarial assumptions that the GARS Board must consider before finalizing its certification of the required State contribution. We have reviewed all the actuarial assumptions used in the draft June 30, 2015 Actuarial Valuation and we conclude that the assumptions are reasonable in general, based on the evidence provided to us.

Recommended Additional Disclosures for the 2015 Valuation

3. We continue to recommend that GRS include stress testing of the System within the valuation report and include a detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period. Since this recommendation was requested last year, we recommend that this 2015 valuation include such stress tests.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

Recommended Changes for Future Valuations

4. We continue to recommend the GARS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work, and adjust assumptions accordingly.
5. We further recommend that the Boards of the three systems whose assets are commingled, State Employees' Retirement System (SERS), the Judges' Retirement System (JRS), and GARS, consider whether different interest rate assumptions for these systems are appropriate.
6. We recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving GARS and the Illinois State Board of Investment (ISBI).
7. The draft June 30, 2015 Actuarial Valuation contains an exhibit on page 18 which reconciles Gain / Loss activity by source, one of which is due to "Other" activity. We recommend that the classification of "Other" activity be broken-out further so that the resulting impact can be understood and reviewed for reasonableness.
8. We recommend that when the next experience study is performed, as an alternative base mortality table, GRS review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience.
9. We recommend that GRS consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045.
10. Page 36 of the draft June 30, 2015 Actuarial Valuation discloses that mortality improvement is projected based upon a "static table". As there are multiple mortality improvement scales that can be applied to base mortality rates, GRS should fully disclose which projection scale is being utilized in the June 30, 2015 Actuarial Valuation.
11. The draft June 30, 2015 Actuarial Valuation reflects a 10% load on inactive vested liabilities to reflect increases in inactive members' pay due to current participation in a reciprocal retirement system. We recommend that GRS include an additional disclosure as to how this assumption was developed.
12. We recommend that GRS review appropriateness of the salary increase assumption and total payroll assumption in future valuations.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION II - SUMMARY OF RECOMMENDATIONS

GASB 67 and 68

The 2015 GARS GASB 67 and 68 information were provided in a separate report. We find that the assumptions and methods used to prepare the 2015 GARS GASB 67 and 68 schedules are reasonable based on the evidence provided to us.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

In this section we provide detailed analysis and supporting rationale for the recommendations that were presented in Section II of this report.

Proposed Certification of the Required State Contribution

As stated in our summary of recommendations in Section II, we have verified the arithmetic calculations made by GRS to develop this State required contribution, have reviewed the assumptions on which it is based, and have accepted GRS's annual projections of future payroll, total normal costs, benefits, expenses, and total contributions. However, in accordance with 30 ILCS 5/2-8.1, our review does not include a replication of the actuarial valuation results.

Given the size of the GARS Plan, the Plan's low funded ratio, the recent changes in legal requirements, and guidance issued by the Government Finance Officers Association, we are recommending that the Board periodically undertake a full scope actuarial audit, utilizing the services of a reviewing actuary. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary. Results are compared in a detailed fashion to measure the liabilities for each benefit form and feature. A replication audit will uncover any potential problems in the processing and certification of valuation results.

We recommend that the GARS Board periodically retain the services of an independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary (Recommendation #1).

State Mandated Methods

State Mandated Funding Method:

The Illinois Pension Code (40 ILCS 5/2-124) is limited in meeting the risks of the System. This law requires that the actuary base the required contribution using a prescribed funding method that achieves 90% funding in the year 2045. This does not meet generally acceptable actuarial principles because the System is never targeted to be funded to 100% and the funding of the System is significantly deferred into the future. In addition, on-going benefits being earned in the future are also being only funded at 90%. The method defined in the Code does not conform to the guidelines in ASOP No. 4, Section 3.14.1 regarding the allocation procedures of costs to the expected benefit payments, which provides:

When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary's professional judgment, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

We recommend that the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of GARS (Recommendation #2). Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.

In its draft June 30, 2015 Actuarial Valuation on pages 11-14, GRS offers commentary on the statutory funding method from an actuarial point of view. With support of the GARS Board, GRS reports on an alternative funding method that they consider representative of generally accepted actuarial methods. This alternative funding method is described on page 9 of the draft June 30, 2015 Actuarial Valuation with a numerical demonstration and determination of the contribution amount on page 10. The actuarially determined contribution (ADC) under this method consists of the normal cost determined under the projected unit credit funding method, plus a 20-year level percent of capped payroll closed-period amortization of the unfunded accrued liability. GRS contrasts the ADC funding method with the current statutory method and notes that the statutory policy produces a back-loaded contribution projection, where contributions are significantly deferred into the future. GRS also provides a chart on page 12 that “illustrates how significantly the current funding policy defers contributions into the future.” This chart shows that the projected funded ratio does not begin to markedly improve until after 2034, or 19 years into the projection period.

Since GRS has concluded that the State mandated funding method does not conform to Actuarial Standards of Practice, the Board adopted a separate funding policy for GASB 67, the Actuarially Determined Contribution, which is based upon contributing the annual normal cost plus amortization of the unfunded actuarial liability over 20 years as a level percent of capped payroll. We concur with GRS that the plan should be funded in accordance with generally accepted actuarial practices.

Based on the draft June 30, 2015 Actuarial Valuation, the funded ratio, measured as the ratio of the actuarial value of assets to the actuarial accrued liability, is currently at 16.01%. We have concerns about the solvency of the System if there is a significant market downturn. This is why we previously recommended stress testing be done to determine whether there will be sufficient assets under the State mandated funding method to pay benefits if there is a significant market downturn.

We continue to recommend that GRS include stress testing of the System within the valuation report and include a detailed explanation of the implications that volatile investment returns and a variety of other stressors (e.g. membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period (Recommendation #3). This should include an analysis and discussion of the impact on the annual contribution requirement of the alternative scenarios tested. It is important to include this information in the report so that all readers will be aware of the various risks the System faces, which are not apparent in the deterministic projections. Cheiron has provided to GARS possible interest rate and inflation scenarios to consider for this purpose.

THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8

SECTION III - SUPPORTING ANALYSIS

Assessment of Actuarial Assumptions Used in the 2015 Valuation

A. Economic Assumptions

1. Interest Rate:

The interest rate assumption (also called the investment return or discount rate) is the most impactful assumption affecting the required State contribution amount. This assumption, which is used to value liabilities for funding purposes, was maintained at 7.00% for the draft June 30, 2015 Actuarial Valuation.

After reviewing all the materials (see Appendix B of this report) that were made available, Cheiron concludes that the use of 7.00% for this valuation is reasonable. We continue to recommend that the GARS Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly (Recommendation #4). This is opposed to the current process of waiting for the completion of a formal Experience Review Study.

We further recommend that the Boards of the three systems whose assets are commingled, GARS, the Judges' Retirement System (JRS), and the State Employees' Retirement System (SERS), consider whether different interest rate assumptions for these systems are appropriate (Recommendation #5).

Our rationale for this recommendation is as follows:

- Based on GRS's March 29, 2013 Experience Review, the average 50th percentile of the 30-year expected average geometric net nominal return for eight investment consultants surveyed by GRS is 7.09%.
- GRS's survey also estimated that the middle 50% of the probable distribution of the System's returns is between 5.23% and 8.97%. This approach satisfies ASOP No. 27.
- GRS's survey also found the average expected nominal return net of expenses for a single year to be 7.83%.
- In addition to the March 29, 2013 Experience Review that GRS prepared for GARS, they also developed information on this assumption for SERS in April 2014. Since GARS' funds are commingled with SERS, along with JRS, considering this information is also reasonable. In this Experience Review, GRS presented the opinion of eight independent investment consultants on the future expected earnings of SERS and concluded that, adjusting for GRS's assumed rate of inflation, the expected arithmetic mean of the SERS portfolio, that GARS is commingled with, is 7.52%. They then converted this arithmetic

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

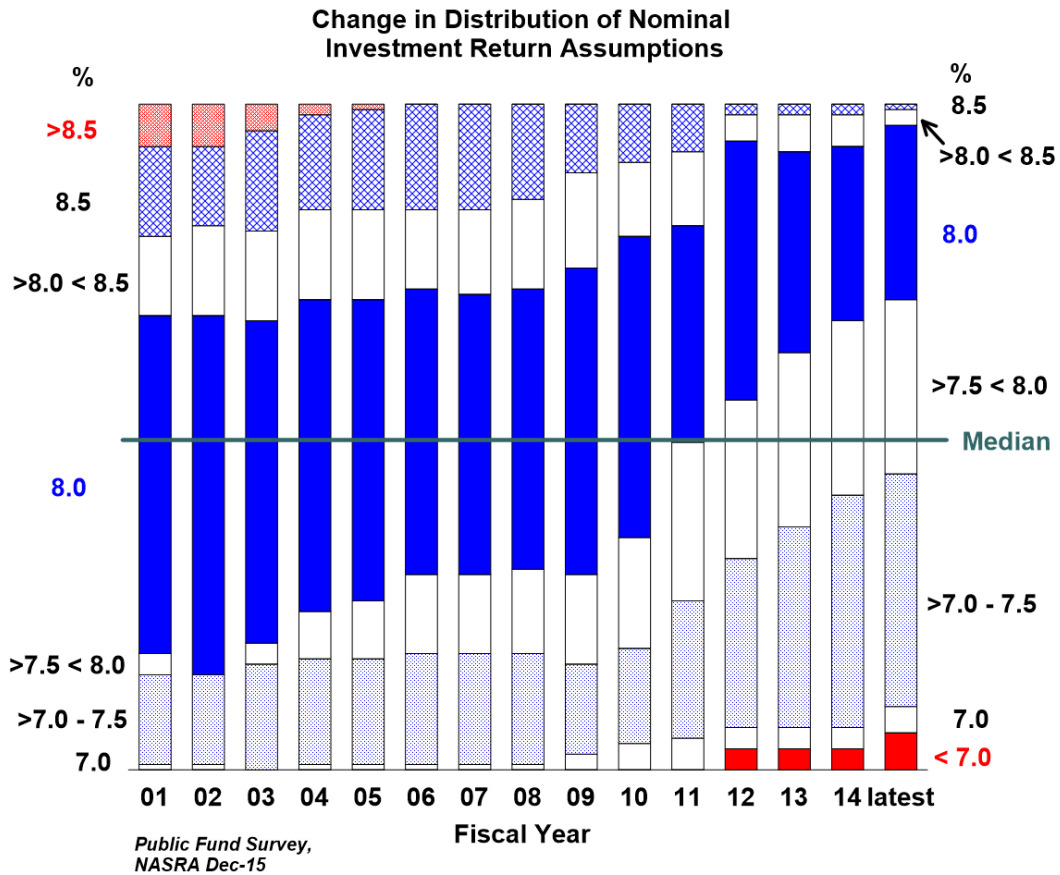
mean to a geometric rate of return of 6.82%. They did not provide probabilities of exceeding 7.00%, but did note that there is a 42.3% of exceeding 7.25%.

- There has been emerging actuarial practice throughout the country to reducing the discount rates even below the level that the investment consultants believe is achievable. This is because of the very low interest rate environment we are currently in. The lower the interest rate environment, the greater the investment risk that must be taken to achieve an assumed rate of return. For example, in 1995 yields on ten year Treasury bonds (a proxy for a risk free investment) was 6.21%. In 2015, these yields are now 1.98%. This means, back in 1995 in order to achieve 7.00%, a system only had to earn .79% more than the ten year treasury yields (“risk free” rates), whereas today a system would have to earn 5.02% above the “risk free” rate. By reducing the investment return assumption, plans are more likely to meet their funding goals without requiring investment performance so much in excess of the risk free rate.
- In addition to taking pressure off the investment process, there is a growing concern that long-term interest rates will eventually rise. A pattern of rising interest rates generally results in declining bond returns. This in turn will result in even greater investment risks on the equity side of the assets in order to compensate for both declining bond returns and the need to earn 5.02% above the risk free rates of return.
- As is the case with most maturing pension plans, GARS is experiencing negative cash flows measured as contributions less benefits and expenses. GARS’ negative cash flow is 8% of assets and growing. This negative cash flow is expected to grow in the coming years. Negative cash flows result in actuarial returns (i.e. dollar weighted returns) being less than “time weighted” returns, which is what all investment consultants base their reported and projected returns on. So as a result, even if an investment consultant’s expected long-term time horizon to be at 7.4% for example, that is expressed as a time weighted return figure, and for plans with negative cash flows, we would expect the dollar weighted returns to be less.
- In our opinion, the use of 7.00% is justified for this 2015 valuation because we believe that the “long-term” outlook of the eight investment consultants that GRS surveyed most likely had a shorter time horizon than the time horizon applicable to the investment assumptions (30+ years). In our experience, we find that investment consultants view 10 years as a long-term horizon. We would expect that had GRS requested those eight consultants to provide 30+ year outlooks that their longer-term outlooks would be higher and thus more supportive of the 7.00% investment assumption. In any event, **we recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving GARS and the Illinois State Board of Investment (ISBI) (Recommendation #6).**

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

- A review of the interest and inflation rates does not involve the collection of significant data, and can easily be updated annually. In addition, it keeps the Board focused more closely on these critical assumptions.
- The National Association of State Retirement Administrators (NASRA) conducts an annual survey of public funds. The latest Public Fund Survey covers 126 large retirement plans. The following chart shows the distribution of investment return assumptions for the last 14 years of the survey. The latest data includes results collected through December 2015.



Over the period shown in the latest survey, there continues to be a pattern of reducing investment return assumptions. Seventy of the 126 plans have reduced the interest rate assumption since Fiscal Year 2011. For these 70 plans, the average reduction is 0.38%. The survey is consistent with experience of other Cheiron clients, with which there has been a significant trend to reduce the investment return assumptions in the last several years.

- GASB 67 and 68 subject many public pension plans, such as GARS, to effectively use a lower interest rate for accounting disclosures and pension expense determinations. It is

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

important to note, however, that the new standards do not define funding requirements for a plan.

- The federal government, which promulgates minimum funding standards for corporate pension plans, already requires corporate pension plans to utilize interest rate assumptions that are based on short-term and mid-term high quality corporate bond rates, which are currently very low (Pension Protection Act of 2006 p. 14. IRC §430(h)(2)(B)).

2. *Inflation Assumption:*

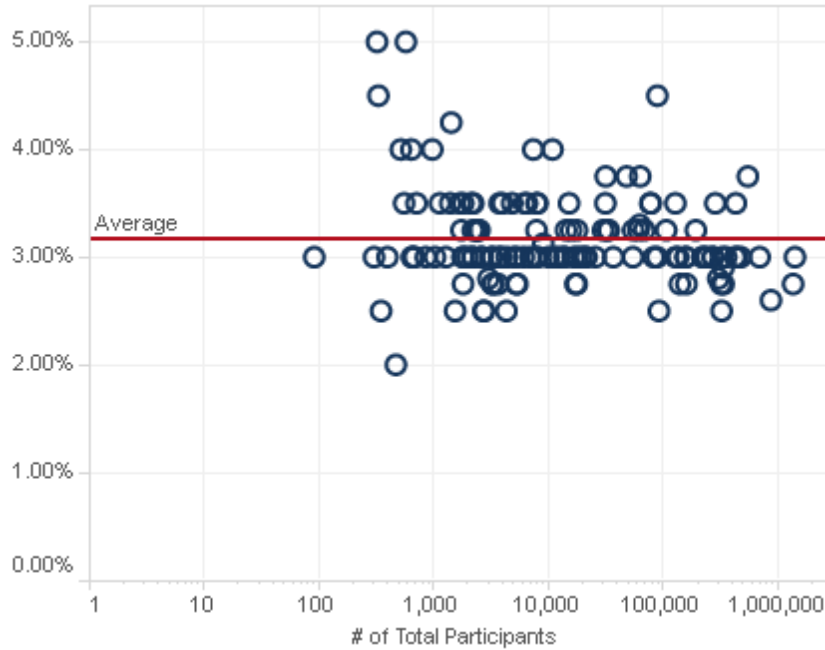
We find the inflation assumption of 3.00%, which primarily impacts the salary increase assumption, used in the draft June 30, 2015 Actuarial Valuation by GRS in certifying the required State contribution, is reasonable.

Our rationale for concurring with the 3.00% assumption:

- The July 2015 Old-Age, Survivors, and Disability Insurance Trustees Report projects that over the long-term (next 75 years), inflation will average somewhere between 2.0% and 3.4% (<http://www.ssa.gov/oact/tr/2015/tr2015.pdf>).
- GRS's March 29, 2013, Experience Review presentation shows a range of 2.16% to 3.26% for expectations of future inflation from the eight investment consultants surveyed.
- While GRS did not provide an updated Experience Review for GARS, it provided support on pages 7 and 8 of its April 2014 Experience Review Study for SERS for this assumption as a long-term rate.
- The *National Conference on Public Employee Retirement Systems* (NCPERS) November 2015 study provides the following graphic of respondents' inflation assumption:

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS



This shows that the 3.0% assumption, which GARS uses, is a prevalent inflation assumption amongst the 179 systems who responded to this study, with 3.2% as the average.

3. *Salary (Annual Compensation) Increase Assumption:*

For the draft June 30, 2015 Actuarial Valuation, the salary scale assumption for uncapped payroll is 3.50% per year, compounded annually for all active members, regardless of age or service. It includes components of 3.00% per annum for inflation, 0.40% per annum for productivity, and 0.10% for merit/promotion increases. In addition, salaries are assumed to remain at their current levels for fiscal year 2016.

We find the assumption and the basis for setting the assumption reasonable.

Our rationale for concurring with GRS's salary increase assumption:

- GRS's review of the report issued by the Legislative Research Unit regarding the history of Illinois Legislator's compensation where the average salary increase from 1991 to 2012 averaged 2.90% per year which supports the salary increase assumption.

4. *COLA:*

While Tier 1 members receive an annual automatic COLA, Tier 2 members receive an annual increase of the lesser of the 3% received by Tier 1 and the annual change in the Consumer Price Index for all Urban Consumers.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

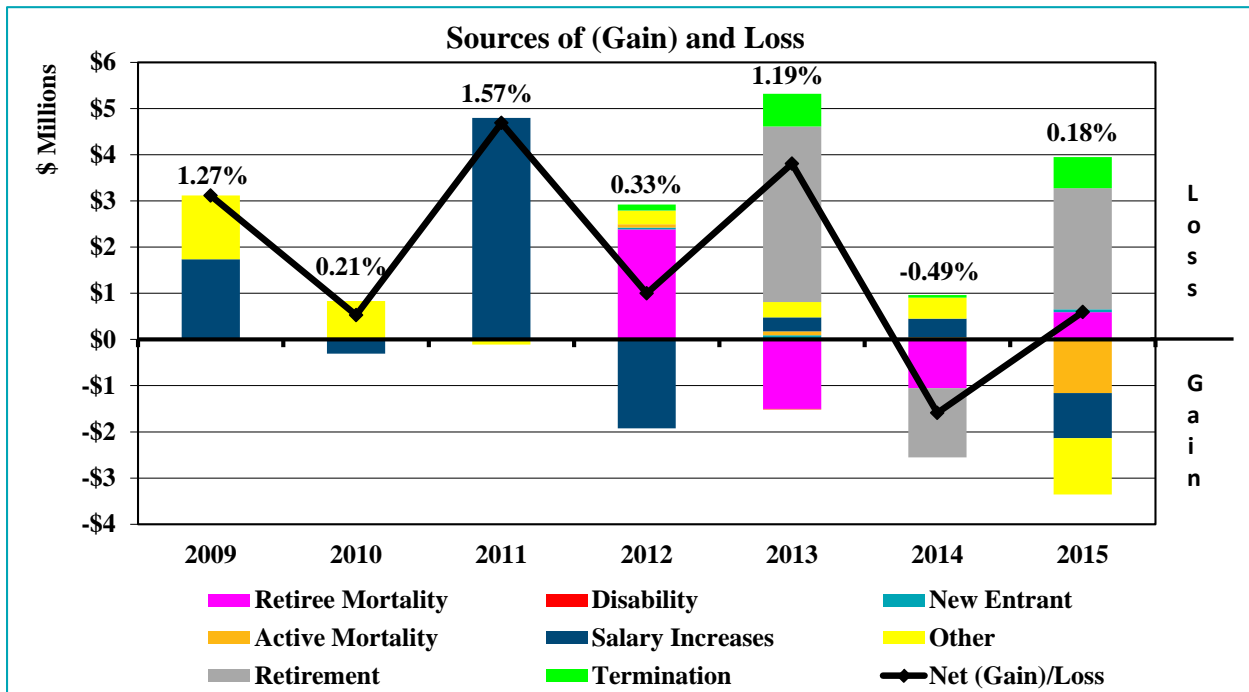
SECTION III - SUPPORTING ANALYSIS

5. Capped Pay Assumption:

The Tier 2 capped payroll growth is 3% per year, compounded annually, which is the inflation assumption.

B. Demographic Assumptions

In its annual actuarial valuation reports, GRS regularly reports sources of liability gains and losses. In the draft June 30, 2015 Actuarial Valuation, these are shown on page 18. In the chart below, we have collected similar data from past valuation reports dating back to 2009 and use these to present a historical review of past demographic and salary increase experience gains and losses. Note that GRS became the actuary effective with the 2012 valuation, and the results prior to 2012 were provided by the prior actuary, Goldstein and Associates.



The percentages shown above the bars refer to net (gain)/loss as a percentage of liability.

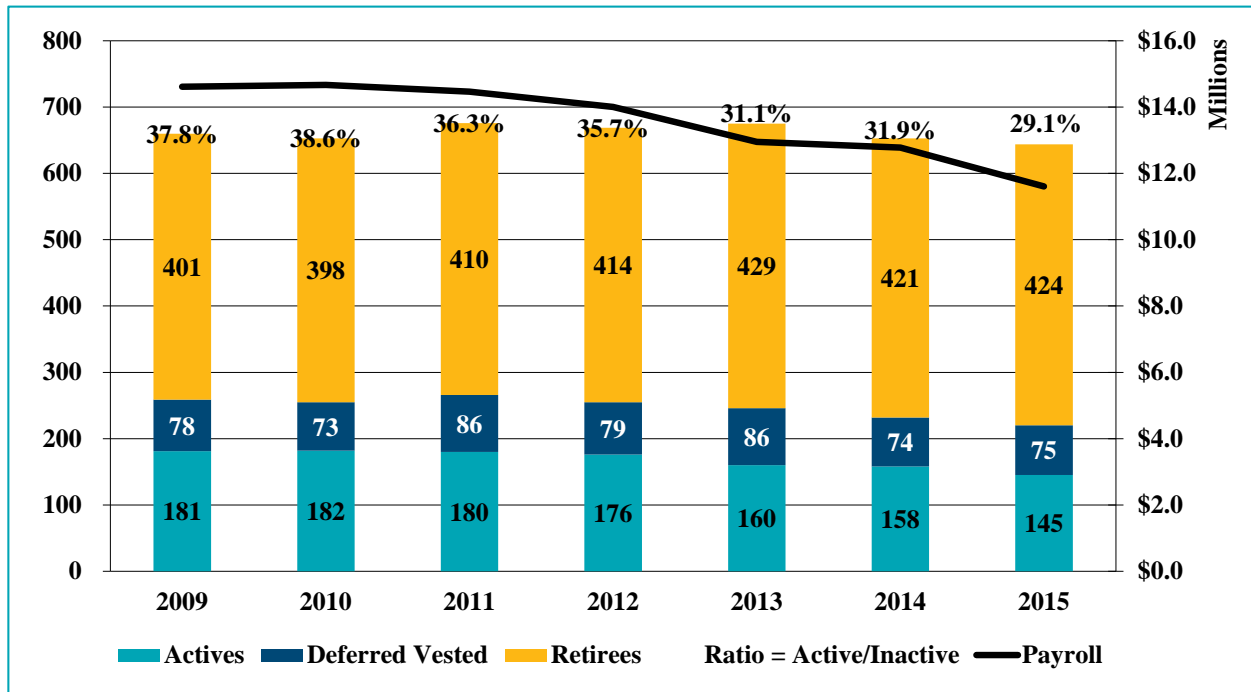
This chart shows the pattern of annual gains and losses attributable to different sources as shown in the legend above. When the colored bar slices appear above zero on the Y axis that represents an experience loss, and below zero represents an experience gain for that year.

Since the prior actuary did not examine many of these experience sources, observations prior to 2012 are limited.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

GRS also reports the membership by category and payroll included in the valuation. Below we present a historical review of membership and payroll.



Key observations from these charts are as follows:

1. Only the last four valuations provided a detailed analysis of gains and losses. Prior to the 2012 valuation, only salary experience was provided.
2. Retirement experience has been volatile over the last several years and has not shown any particular trend.
3. Mortality experience has also been volatile over the last several years. There was a loss over the last year due to retiree mortality. This means fewer deaths were observed than anticipated for retirees. Another way to express this is retirees are living longer than the current mortality assumption predicts. In contrast, there was a gain over the last year due to active mortality indicating there are more active deaths than anticipated.
4. There have been termination losses in each of the last four years.
5. The active population has been declining over the last five years. Effective with the draft June 30, 2015 Actuarial Valuation, GRS now assumes a declining active population over the projection period, which is consistent with recent trends.
6. While there have been both salary gains and losses over the last seven years, total payroll has decreased significantly over the period and the average pay has been relatively stable. **We recommend that GRS review appropriateness of the salary increase assumption and total payroll assumption in future valuations** (Recommendation #12).

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

7. Certain types of experience, such as disability experience and new entrant experience, are too small to be noticed on the chart, given their insignificant size relative to other experience items.
8. The draft June 30, 2015 Actuarial Valuation contains an exhibit on page 18 which reconciles Gain / Loss activity by source. Item (1i) of this exhibit reports a gain of \$1.2 million (or .38% of actuarial accrued liability) attributable to "Other" activity. In addition, the three years prior reflect consistent losses due to "Other" activity. **We recommend that the classification of "Other" activity be broken-out further so that the resulting impact can be understood and reviewed for reasonableness** (Recommendation #7). The additional detail would also confirm whether or not there exists any large "Other" offsetting Gain / Loss sources.
9. The net liability (gain)/loss is shown by the black line on the first graph above. This net (gain)/loss as a percent of liability is shown above the bars.

The draft June 30, 2015 Actuarial Valuation was based on the 2013 Experience Review and the opt-out analysis for future members of the System which GRS presented during the April 15, 2015 Board meeting. Based on the opt-out review, the new entrance assumption was modified beginning with the draft June 30, 2015 Actuarial Valuation to reflect the expectation that 50% of future members eligible for membership in the System opt-out. There were no other changes in assumptions in the draft June 30, 2015 Actuarial Valuation when compared to the June 30, 2014 Actuarial Valuation.

1. Mortality:

For the current valuation, GRS maintained the post-retirement mortality table as the RP-2000 Combined Healthy Mortality Table, sex distinct, projected to 2015 (static table), setback three years for males and two years for females. It also maintained the pre-retirement mortality to be 85% of the new post-retirement mortality for males and 70% of the new post-retirement mortality for females.

Mortality experience has been volatile over the last several years. Base mortality utilized in the draft June 30, 2015 Actuarial Valuation is a function of the RP-2000 Combined Healthy Mortality Table. The "Combined" table means that actual mortality experience used to develop the base table was blended based upon mortality observations exhibited by both retirees and active members. While the current assumption adjusts the Combined table to estimate mortality rates for active members, the Annuitant / Non-Annuitant mortality tables were developed so that actuarial valuations can better reflect mortality for retirement eligible members who either (1) retire or (2) do not retire and continue working. The differentiation between annuitant and non-annuitant mortality rates are important as generally one of the reasons a member may continue working vs. retire is because their health can allow them to do so. As such, the non-annuitant tables would reflect a lower mortality rate at retirement ages when compared to the annuitant tables. **We recommend that when the next experience study is performed, as an alternative base mortality table, GRS review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables**

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

result in a better fit and thus more reasonably project anticipated future plan experience (Recommendation #8).

Recently changed Actuarial Standards of Practice (ASOP No. 35) now require that actuaries at least consider projections of mortality improvements, and if there is not such an assumption for improvement, the actuary must disclose the basis for not making the assumption. As such, **GRS should consider for future valuations using generational mortality tables** (Recommendation #9). Generational mortality improvement projections, which assume that mortality rates at each age decline over time, are becoming increasingly implemented. Given the significant dependence of the statutory funding requirements on new hires over the next 30 years, generational mortality is of greater significance here than for a typical public pension plan that bases its contributions on just the current plan membership.

If GRS believes the mortality rates used in the draft June 30, 2015 Actuarial Valuation are sufficient to cover life expectancy increases in the future, **GRS should disclose whether or not the recommended tables sufficiently cover anticipated increases through 2045** (Recommendation #9).

2. New Entrant Assumptions:

The new entrant profile includes capped salary information. New entrants are assumed to enter with an average age (41.81), average uncapped pay (\$80,798), and average capped pay (\$80,046). Based on the assumption that 50 percent of future members elect to opt out of the pension system, the population is projected to decrease from 145 members as of the valuation date, to 75 members in 2045 and ultimately reach 73 members in 2051. The average increase in uncapped payroll for the projection period is 3.50% per annum.

3. Other Demographic assumptions:

- Page 36 of the draft June 30, 2015 Actuarial Valuation Report discloses that mortality improvement is projected based upon a “static table”. As there are multiple mortality improvement scales that can be applied to base mortality rates, **GRS should fully disclose which projection scale is being utilized in the June 30, 2015 Actuarial Valuation** (Recommendation #10).
- The draft June 30, 2015 Actuarial Valuation reflects a 10% load on inactive vested liabilities to reflect increases in inactive members’ pay due to current participation in a reciprocal retirement system. **We recommend that GRS include an additional disclosure as to how this assumption was developed** (Recommendation #11).

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Below we summarize all remaining demographic assumptions, which we reviewed and concluded all are reasonable and meet the requirements of ASOP No. 35, Section 3.3.4.

1. Marriage Assumption

75.0% of active and retired participants are assumed to be married.

2. Termination

Rates of withdrawal are assumed to be equal to 4.0% for all ages 20 through 65.

It is assumed that terminated employees will not be rehired. The rates apply only to employees who have not fulfilled the service requirement necessary for retirement at any given age.

3. Disability

No assumption for disability.

4. Retirement

Employees are assumed to retire in accordance with the rates shown below. The rates apply only to employees who have fulfilled the service requirement necessary for retirement at any given age.

Retirement Rates	
Age	Male and Female
55	10.00%
56-79	8.50%
80	100.00%

5. Spouse's Age

The female spouse is assumed to be four-years younger than the male spouse.

6. Decrement Timing

All decrements are assumed to occur at the beginning of the year.

7. Decrement Relativity

Decrement rates are used directly from the experience study without adjustment for multiple decrement table effects.

8. Decrement Operation

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

Turnover decrements do not operate after member reaches retirement eligibility.

9. Eligibility Testing

Eligibility for benefits is determined based upon the age nearest birthday and service on the date the decrement is assumed to occur.

ASSUMPTIONS AS A RESULT OF PUBLIC ACT 96-0889

Members hired after December 31, 2010 are assumed to make contributions on salary up to the final average compensation cap in a given year until this plan provision or administrative procedure is clarified.

State contributions, expressed as a percentage of pay, are calculated based upon capped pay.

Retirement rates for Tier 2 members to account for the change in retirement age, as follows:

Retirement Rates	
Age	Male & Female
62	40.00%
63	15.00%
64	20.00%
65	25.00%
66	30.00%
67	40.00%
68-79	5.00%
80	100.00%

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

C. Actuarial Methods

Actuarial methods consist of three components: (1) the funding method, which is the attribution of total costs to past, current, and future years; (2) the method of calculating the actuarial value of assets (i.e. asset smoothing); and (3) the amortization basis of the Unfunded Actuarial Liability (UAL). Since the amortization basis is governed by State law, we do not comment on it here.

1. Cost Method:

The System uses the projected unit credit (PUC) cost method to assign costs to years of service, as required under the Pension Code (40 ILCS 5/2). **We have no objections with respect to using the PUC method, although we would prefer the Entry Age Normal (EAN) funding method, as it is more consistent with the requirement in 40 ILCS 5/2-124 for level percent of pay funding.**

Under the PUC method, which is used by some public sector pension funds, the benefits of active participants are calculated based on their compensation projected with assumed annual increases to ages at which they are assumed to leave the active workforce by any of these causes: retirement, disability, turnover, or death. Only past service (through the valuation date but not beyond) is taken into account in calculating these benefits. The cost of providing benefits based on past service and future compensation is the actuarial accrued liability for a given active participant. Under the PUC cost method, the value of an active participant's benefits tends to increase more sharply over their later years of service than over their earlier ones. As a result of this pattern of benefit value increasing, while the PUC method is not an unreasonable method, more plans use the EAN funding method to mitigate this affect. It should also be noted that the EAN method is the required method to calculate liability for GASB 67 and GASB 68.

2. Asset Smoothing Method:

The actuarial value of assets for the System is a smoothed market value. Unanticipated changes in market value are recognized over five years in the actuarial value of assets. The primary purpose for smoothing out gains and losses over multiple years is that the fluctuations in the actuarial value of assets will be less volatile over time than fluctuations in the market value of assets. **Smoothing the market gains and losses over a period of five years to determine the actuarial value of assets is a generally accepted approach in determining actuarial cost, and we concur with its use.**

Another aspect of asset smoothing methods is whether or not to limit the maximum spread between the actuarial value of assets and the market value of assets. Many public sector pension plans limit the actuarial value of assets to be in any year no more than 120% of market value, or no less than 80% of market value. In fact, the Internal Revenue Service (IRS), IRC §430(g)(3)(B)(iii), mandates this "corridor" for private sector pension plans (a

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

SECTION III - SUPPORTING ANALYSIS

90%-110% corridor is mandated). Even though it is not mandated for public plans, we believe that the use of this type of corridor is a sounder actuarial practice, and according to ASOP No. 44 in Section 3.3 b.1, the actuarial value of assets should "...fall within a reasonable range around the corresponding market value."

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Response to Recommendations in 2014

In the State Actuary's Preliminary Report on the General Assembly Retirement System of Illinois presented December 19, 2014, Cheiron made several recommendations. Below we summarize how these recommendations were reflected in either the System's comments last year or in this year's draft June 30, 2015 Actuarial Valuation.

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
1. We recommend that the GARS Board consider conducting an independent actuarial audit in which the results of the valuation are replicated by the audit actuary and any deviations are noted and reconciled.	Not Implemented	- The System actuary commented that type and timing of audits is a matter for the Board. We recommend a full scope replication audit be performed. Recommendation repeated.
2. We have suggested and continue to suggest that the GARS Board always use the conservative end of any range of assumptions recommended by the actuary or other advisors due to the uncertainty and risks associated with the State mandated funding method.	Partially Implemented	- The System feels that the funding policy is established by the legislature and is not under the control of the Board and addressed this concern in their annual actuarial valuation. Recommendation modified to reflect adoption of a funding policy that meets Actuarial Standards of Practice.
3. We recommend future valuation reports include the stress testing provided this year in the supplementary report.	Not Implemented	- Not included in the draft June 30, 2015 Actuarial Valuation, but sent as a separate document. Recommendation repeated.
4. GRS determined that the FY 2016 required State contribution rate calculated under the current statutory funding plan is 126.700%. However, it did not include the basis to which this rate applies. Therefore, we recommend that GRS add clarity to this letter by making clear to what this required rate is to	Implemented	- GRS added additional commentary on page 3 of their draft June 30, 2015 Actuarial Valuation regarding which payroll is applied to the contribution rate when determining statutory funding levels.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
apply.		
5. We recommend again, as we did last year, that GRS consider in future valuations establishing a corridor around the market value of assets of 80% to 120% beyond which the actuarial value is limited, given the use of the actuarial value of assets in the projection methodology in accordance with 40 ILCS 5/18-131(d). While this change would have no impact on the System for the June 30, 2014 valuation, we believe it would be better to establish this corridor before it is actually applicable.	Not Repeated	- The GARS Board does not have the authority to create such a corridor; as such we will no longer repeat this recommendation.
6. We continue to recommend the Board annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work, and adjust assumptions accordingly. We further recommend that the Boards of the three systems whose assets are commingled, GARS, the Judges' Retirement System (JRS), and the State Employees' Retirement System (SERS), consider whether different economic assumptions for these systems need to be used.	Not Implemented	- No change for 2015. No concrete evidence that the Board reviewed the economic assumptions (interest rate and inflation) prior to commencing the valuation work. Recommendation repeated.
7. Since the statutory funding requirement is significantly dependent on the projected actuarial liability 31 years from now, we recommend that GRS	Not Implemented	- Draft June 30, 2015 Valuation Report did not include recommended disclosure. Recommendation repeated.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
consider the use of generational mortality improvement assumptions in future valuations. In the event that GRS does not choose to use such assumptions, then we recommend it disclose its rationale and whether or not the recommended mortality tables sufficiently cover anticipated life expectancy increases through 2045.		
8. GRS projects the State contribution as a percentage of payroll. Total payroll used in the projection appears to be increasing between 3.5% and 3.7% per year. However, both the active population and total payroll have decreased over the last four actuarial valuations and average annual payroll has remained flat over the last four years. We recommend GRS analyze and disclose whether the constant population assumption and payroll assumption used is reasonable.	Implemented	- GRS analyzed the opt-out percentage assumption for future members of the System, reviewing data back to 2011. Based on their opt-out study, they recommended an assumption that 50% of future members eligible for membership in the System opt-out. The Board approved this assumption at the April 15, 2015 Board meeting and the new assumption was first effective with the 2015 GARS Actuarial Valuation.
9. In our prior two reports, we also asked for a historic development of assets without the General Obligation Bonds (GOB) issued in 2004, but we have yet to obtain such information. Since the development of assets without the GOB directly impacts the required State contribution, it is important to verify that these assets have been historically developed	Not Repeated	- The development of the assets with the GOB proceeds are provided in each respective historical valuation report. As such, we will no longer repeat this recommendation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
accurately. We recommend that prior to the completion of the June 30, 2015 draft valuation report, that GRS provide a verification of the hypothetical assets without the GOB.		
10. We continue to have several minor recommendations for future reports, and GRS continues to not provide this information.		
a. We recommend full disclosure of assumptions with respect to 415(b) limits, 401(a)(17) limits, and the COLA for Tier 2, along with the growth rates for these.	Implemented	- A comment was included in the draft June 30, 2015 Actuarial Valuation that no explicit assumption is made with respect to 415(b) limits and 401(a)(17) limits.
b. We recommend again, as we have the previous two years, that GRS consider using the actual data available rather than an assumption for determining if a member will choose the spousal continuance benefit option that provided a survivor annuity. We further continue to recommend that GRS provide details regarding the election of this provision by the current inactive members in the Participant Data section. If there are material limits in the data preventing this, GRS should note this.	Implemented	- This data is not available and GRS provided some commentary on the basis of the assumption on page 35 of the draft June 30, 2015 Actuarial Valuation.
c. We recommend that GRS provide additional clarity on	Implemented	- This was provided in the draft June 30, 2015 Actuarial Valuation.

**THE STATE ACTUARY'S PRELIMINARY REPORT ON THE
GENERAL ASSEMBLY RETIREMENT SYSTEM OF ILLINOIS
PURSUANT TO 30 ILCS 5/2-8**

STATUS OF RECOMMENDATIONS FROM THE 2014 STATE ACTUARY'S REPORT

Recommendations to Retirement System from 2014 State Actuary Report	Status	Comments
the payrolls used in its valuation throughout its report to allow for a more complete evaluation by another qualified actuary as required by Actuarial Standards of Practice.		
d. We recommend that GRS consider whether additional revisions to the demographic assumptions, specifically the termination and salary scale assumptions, for Tier 2 are appropriate to its benefit structure and consistent with the revised retirement rates already implemented.	Implemented	- GRS indicated that based on the available data, the assumptions are appropriate and will be monitored as experience emerges.
11. We recommend that in future experience studies, GRS specifically request the investment consultants referenced in developing market expectations to provide longer-term market expectations (30+ years) and that GRS also obtain the specific expectations of the investment consultant serving the GARS and the Illinois State Board of Investment (ISBI).	Not Implemented	- No experience study performed this year, so the opportunity to implement has not occurred. Recommendation repeated.

APPENDICES

APPENDIX A

**Illinois State Auditing Act
(30 ILCS 5/2-8.1)**

(30 ILCS 5/2-8.1)

Sec. 2-8.1. Actuarial Responsibilities.

- (a) The Auditor General shall contract with or hire an actuary to serve as the State Actuary. The State Actuary shall be retained by, serve at the pleasure of, and be under the supervision of the Auditor General and shall be paid from appropriations to the office of the Auditor General. The State Actuary may be selected by the Auditor General without engaging in a competitive procurement process.
- (b) The State Actuary shall:
 - (1) review assumptions and valuations prepared by actuaries retained by the boards of trustees of the State-funded retirement systems;
 - (2) issue preliminary reports to the boards of trustees of the State-funded retirement systems concerning proposed certifications of required State contributions submitted to the State Actuary by those boards;
 - (3) cooperate with the boards of trustees of the State-funded retirement systems to identify recommended changes in actuarial assumptions that the boards must consider before finalizing their certifications of the required State contributions;
 - (4) conduct reviews of the actuarial practices of the boards of trustees of the State-funded retirement systems;
 - (5) make additional reports as directed by joint resolution of the General Assembly; and
 - (6) perform any other duties assigned by the Auditor General, including, but not limited to, reviews of the actuarial practices of other entities.
- (c) On or before January 1, 2013 and each January 1 thereafter, the Auditor General shall submit a written report to the General Assembly and Governor documenting the initial assumptions and valuations prepared by actuaries retained by the boards of trustees of the State-funded retirement systems, any changes recommended by the State Actuary in the actuarial assumptions, and the responses of each board to the State Actuary's recommendations.
- (d) For the purposes of this Section, "State-funded retirement system" means a retirement system established pursuant to Article 2, 14, 15, 16, or 18 of the Illinois Pension Code.

(Source: P.A. 97-694, eff. 6-18-12.)

APPENDIX B
Materials Reviewed by Cheiron

MATERIALS REVIEWED BY CHEIRON

Following is a listing of information reviewed by Cheiron for each of the five State funded retirement systems. This is the information Cheiron relied upon in preparing the preliminary reports of the retirement systems.

Teachers' Retirement System:

- Illinois Law:
 - Illinois Pension Code (40 ILCS 5/) Article 16: Teachers' Retirement System of the State of Illinois
 - Public Act 088-0593
 - Public Act 093-0002
 - Public Act 093-0839
 - Public Act 094-0004
 - Public Act 096-0043
 - Public Act 096-0889
 - Public Act 097-0694

- Files received from the Teachers' Retirement System:

Prior to June 30, 2014, State Actuary Report:

- 09.21.12 Rate of Return Decision Memo
- AA Presentation RVK Apr 2011 Board FINAL
- Buck – IL TRS Exp Analysis Report 2007 revised
- Buck August 2012 Board Meeting Presentation Experience Analysis
- Buck IL TRS 2007 Valuation Report
- Buck IL TRS 2008 Valuation Report
- Buck IL TRS 2009 Valuation Report
- Buck IL TRS 2010 Valuation Report
- Buck IL TRS 2011 Valuation Report
- Buck IL TRS Exp Analysis Report 2012 FINAL
- Buck May 2011 Board Meeting Investment Return Assumption
- Buck October 2011 Board Meeting Presentation Valuation Results
- Illinois TRS Investment Assumption History 1939-2012
- Segal IL TRS Actuarial Audit Report – FINAL
- TRS total fund net returns FY 1983-2011
- Morgan Stanley October Memo – Municipal Bond Monthly
- Illinois TRS – 2013 EROA Analysis Summary

- 2013 09 06 Buck TRS Data Lag Approval
- 2013-10 Presentation – RV Kuhns Investment Performance Review Slides
- Preliminary 9-9-13 TRS Financials
- Buck IL TRS 2013 Draft Valuation Report
- Buck October 2013 Board Meeting Presentation
- Buck 2013 Valuation Results Memo to Board Members
- GASB Implementation email
- Projected Liabilities by Tier
- GAAP Information
- 2013-10-31 TRS Preliminary FY 2015 Certification
- 10-30-14 Buck TRS Preliminary Valuation Report as of June 30, 2014
- 10-31-14 TRS Preliminary FY 2016 Certification Exhibit A
- Board Meeting Minutes from 2013 and 2014
- Buck IL TRS spreadsheet with additional details on Section 4 of 2014 AVR
- TRS IL spreadsheet with additional details on Funding Projections
- Buck October 2014 Board Presentation – Final
- 2014-04 TRS Retreat Presentation – Final
- 2014-04 TRS AL Executive Summary
- 2014-04 TRS AL Study
- 2014-05 Presentation RVK Asset Allocation
- Buck Letter – Economic Assumptions Recommendation
- Assumed-Rate-Return-Discussion-Final
- Materiality Limit Memo
- Buck IL TRS 2014 Data
- Preliminary TRS Allocation for GASB 67/68

Since the June 30, 2014, State Actuary Report:

- Board Minutes from 2015
 - Buck TRS 2015 Certification Draft
 - Buck TRS 2015 DRAFT Valuation Report
 - Asset Allocation Changes from Stan Rupnik
 - Asset Allocation Discussion – RVK Presentation March 2015
 - TRS Economic Impact Study of Benefits – May 2015
 - Buck TRS Investigation of Demographic and Economic Experience Presentation – August 13, 2015
 - Buck TRS Investigation of Demographic and Economic Experience Report – August 2015
 - Buck IL TRS spreadsheet with additional details on Section 4 of 2015 AVR
 - TRS Memo on the GASB 68 Allocation – June 30, 2015
 - TRS response to proportionate share questions – May 8, 2015
 - TRS Stress Testing Scenarios – November 19, 2015
 - TRS Stress Testing Summary email – November 24, 2015
- Files received from the Illinois Office of the Auditor General:
 - VERSIGHT Memo dated 12/9/2011 from Karl K. Oman

- Other:
 - November 2015 *National Conference on Public Employee Retirement Systems* (NCPERS) Public Retirement Systems Study
 - December 2015 Survey published by the National Association of State Retirement Agencies (NASRA)
 - July 2015 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

State Universities Retirement System

- Illinois Law:
 - Illinois Pension Code (40 ILCS 5/) Article 15 : State Universities Retirement System of Illinois
 - Public Act 088-0593
 - Public Act 093-0002
 - Public Act 093-0839
 - Public Act 094-0004
 - Public Act 096-0043
 - Public Act 096-0889
 - Public Act 097-0694

- Files received from the State Universities Retirement System:

Prior to June 30, 2014 State Actuary Report:

- SURS 2010 Experience Study
- SURS June 2012 Investment Update
- SURS June 2011 Asset Allocation and Liability Study
- SURS May 2011 Status Update of the Asset/ Liability Study
- GRS IL SURS 2008 Valuation Report
- GRS IL SURS 2009 Valuation Report
- GRS IL SURS 2010 Valuation Report
- GRS IL SURS 2011 Valuation Report
- GRS IL SURS 2012 Valuation Report
- GRS IL SURS 2012 Certification of FY 2014 Required State Contribution
- GRS IL SURS 2012 Data
- GRS spreadsheet with additional details on Tables 13 and 14
- IL Department of Insurance Bulletin – Annual Salary Maximum for Pension and Annuity Purposes, and Annual Cost of Living Allowance (COLA) for New Hires on or after January 1, 2011
- SURS 2nd Quarter 2013 Board Report
- SURS 2013 Callan Periodic Table
- SURS 2013 Capital Markets Illinois
- SURS Compiled FY 2014 Investment Plan
- SURS June 2013 Investment Update

- GRS IL SURS 2013 DRAFT Valuation Report
- GRS IL SURS Proposed 2013 Certification of FY 2015 Required State Contribution
- GRS IL SURS 2013 Data
- Board Meeting Minutes from 2013 and 2014
- Segal IL SURS Limited Scope Audit of the June 30, 2011 Actuarial Valuation
- SURS Asset Liability Study Memo
- NEPC IL SURS 2014 Asset Liability Study
- SURS Economic Assumption Review Recommendation Memo
- GRS IL SURS 2014 Investment Return Presentation
- NEPC IL SURS 2014 Asset Allocation Discussion Presentation
- NASRA Investment Return Assumptions Update April 2014
- NCPERS Page 11 from 2013 Public Fund Study
- SURS Recommendation of Experience Study Memo
- GRS IL SURS Public Act 98-0599/Senate Bill 1 Actuarial Impact Analysis
- SURS Response to State Actuary May 21, 2014 Email Request Memo
- GRS IL SURS Economic Assumption Study Report
- GRS IL SURS Senate Bill 1 Study Summary
- GRS IL SURS Proposed 2014 Certification of FY 2016 Required State Contribution
- GRS IL SURS 2014 Draft Valuation Report
- GRS IL SURS 2014 Updated Draft Valuation Report
- GRS IL SURS GASB 67 Plan Reporting and Accounting Schedules
- GRS IL SURS spreadsheet with additional details for 2014 Stress Testing
- SURS IL spreadsheet with additional details on Funding Projections
- GRS IL SURS 2014 Data
- GRS IL SURS spreadsheet with additional details on Tables 13-16, 18-21 from 2014 AVR

Since the June 30, 2014 State Actuary Report:

- Board Minutes from 2015
 - GRS SURS 2015 Certification Draft
 - GRS SURS 2015 DRAFT Valuation Report
 - GRS SURS Economic Assumptions Review Presentation – September 10, 2015
 - GRS SURS Economic Assumptions Review Report – August 28, 2015
 - GRS SURS Experience Review Report – January 16, 2015
 - NEPC SURS Capital Markets Assumptions and Actions for Clients Presentation – February 5, 2015
 - NEPC SURS Second Quarter IPA Board Report – September 2015
 - SURS Investment Plan FY 2015 – September 2014
 - SURS Investment Plan FY 2016 – September 2015
 - McGladrey SURS GASB 68 Implementation letter – May 11, 2015
 - GRS IL SURS spreadsheet with additional details on Tables 13-16, 18-21 from 2015 AVR
 - GRS IL SURS Final Stress Testing Scenarios letter – December 2, 2015
- Other:

- November 2015 *National Conference on Public Employee Retirement Systems* (NCPERS) Public Retirement Systems Study
- December 2015 Survey published by the National Association of State Retirement Agencies (NASRA)
- July 2015 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

State Employees' Retirement System

- Illinois Law:
 - Illinois Pension Code (40 ILCS 5/) Article 14: State Employees' Retirement System of Illinois
 - Public Act 088-0593
 - Public Act 093-0002
 - Public Act 093-0839
 - Public Act 094-0004
 - Public Act 096-0043
 - Public Act 096-0889
 - Public Act 097-0694
- Files received from the State Employees' Retirement System:

Prior to June 30, 2014 State Actuary Report:

- SERS Five-Year Experience Analysis for the Period 2006-2010 (GRS – 7/12/2011)
- SERS Funding Policy Review from GRS on 10/19/2010
- SERS Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2011
- GRS IL SERS 2007 Valuation Report
- GRS IL SERS 2008 Valuation Report
- GRS IL SERS 2009 Valuation Report
- GRS IL SERS 2010 Valuation Report
- GRS IL SERS 2011 Valuation Report
- GRS IL SERS 2012 Valuation Report
- GRS IL SERS 2012 Certification
- GRS IL SERS 2012 Data
- SERS Valuation Discount Rate Change Study (GRS – 2/5/2013)
- GRS IL SERS 2013 Valuation Report
- GRS IL SERS 2013 Proposed Certification
- GRS IL SERS 2013 Data
- SERS Experience Review for the Years July 1, 2009 to June 30, 2013
- GRS IL SERS 2014 Draft Certification
- GRS IL SERS 2014 Draft Valuation Report
- GRS IL SERS GASB 67 Plan Reporting and Accounting Schedules
- Board Meeting Minutes from 2013 and 2014
- GRS IL SERS spreadsheet with additional details on Tables 4 and 7-10 from 2014 AVR

- SERS IL spreadsheet with additional details on Funding Projections

Since the June 30, 2014 State Actuary Report:

- Board Minutes from 2015
- GRS SERS Recommended GASB 67 and 68 Actuarially Determined Contribution letter – March 27, 2015
- GRS SERS 2015 Certification Draft
- GRS SERS 2015 DRAFT Valuation Report
- GRS SERS 2015 DRAFT GASB 67 and 68 Report
- GRS IL SERS spreadsheet with additional details on Tables 4 and 7-10 from 2015 DRAFT Valuation Report
- GRS IL SURS Final Stress Testing Scenarios letter – December 4, 2015

- Other:

- November 2015 *National Conference on Public Employee Retirement Systems* (NCPERS) Public Retirement Systems Study
- December 2015 Survey published by the National Association of State Retirement Agencies (NASRA)
- July 2015 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

Judges' Retirement System

- Illinois Law:

- Illinois Pension Code (40 ILCS 5/) Article 18: Judges' Retirement System of Illinois
- Public Act 088-0593
- Public Act 093-0002
- Public Act 093-0839
- Public Act 094-0004
- Public Act 096-0043
- Public Act 096-0889
- Public Act 097-0694

- Files received from the Judges' Retirement System:

Prior to June 30, 2014, State Actuary Report:

- JRS Experience Study: Five-Year Experience Analysis for the Period 2006-2010 (Goldstein & Associates – 7/18/2011)
- JRS Investment Return Assumption letter (Goldstein & Associates – 10/6/2010)
- JRS Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2011
- Goldstein & Associates JRS 2006 Valuation Report
- Goldstein & Associates JRS 2007 Valuation Report
- Goldstein & Associates JRS 2008 Valuation Report
- Goldstein & Associates JRS 2009 Valuation Report

- Goldstein & Associates JRS 2010 Valuation Report
- Goldstein & Associates JRS 2011 Valuation Report
- GRS IL JRS 2012 Final Valuation Report
- GRS IL JRS 2012 Certification
- GRS IL JRS 2012 Data
- GRS IL JRS March 29, 2013 Experience Review
- GRS IL JRS 2013 DRAFT Valuation Report
- GRS IL JRS 2013 Data
- Board Meeting Minutes from 2013 and 2014
- GRS JRS Experience Review – March 29, 2013
- GRS IL JRS 2014 Certification Draft
- GRS IL JRS 2014 DRAFT Valuation Report
- GRS IL SERS April 2014 Experience Review
- GRS IL JRS 2013 Final Valuation Report
- GRS IL JRS 2014 GASB 67 Plan Reporting and Accounting Schedules
- GRS IL JRS spreadsheet with additional details on Tables 4 and 7-10 from 2014 AVR
- GRS JRS 2014 Stress Testing Scenarios letter – November 14, 2014
- GRS JRS 2014 Final Valuation Report

Since the June 30, 2014, State Actuary Report:

- Board Minutes from 2015
- GRS JRS Recommended GASB 67 and 68 Actuarially Determined Contribution letter – March 20, 2015
- GRS JRS 2015 Certification Draft
- GRS JRS 2015 DRAFT Valuation Report
- GRS JRS 2015 DRAFT GASB 67 and 68 Report
- GRS IL JRS spreadsheet with additional details on Tables 4 and 7-10 from 2015 DRAFT Valuation Report
- Other:
 - November 2015 *National Conference on Public Employee Retirement Systems* (NCPERS) Public Retirement Systems Study
 - December 2015 Survey published by the National Association of State Retirement Agencies (NASRA)
 - July 2015 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

General Assembly Retirement System

- Illinois Law:
 - Illinois Pension Code (40 ILCS 5/) Article 2: General Assembly Retirement System of Illinois
 - Public Act 088-0593
 - Public Act 093-0002
 - Public Act 093-0839

- Public Act 094-0004
 - Public Act 096-0043
 - Public Act 096-0889
 - Public Act 097-0694
- Files received from the General Assembly Retirement System:

Prior to June 30, 2014, State Actuary Report:

- GARS Experience Study: Five-Year Experience Analysis for the Period 2006-2010 (Goldstein & Associates – 8/11/2011)
- GARS Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2011
- Goldstein & Associates GARS 2006 Valuation Report
- Goldstein & Associates GARS 2007 Valuation Report
- Goldstein & Associates GARS 2008 Valuation Report
- Goldstein & Associates GARS 2009 Valuation Report
- Goldstein & Associates GARS 2010 Valuation Report
- Goldstein & Associates GARS 2011 Valuation Report
- GRS IL GARS 2012 DRAFT Valuation Report
- GRS IL GARS 2012 Certification
- GRS IL GARS 2012 Data
- GARS IL Experience Review (GRS - April 17, 2013)
- GRS IL GARS 2013 DRAFT Valuation Report
- GRS IL GARS 2013 Data
- Board Meeting Minutes from 2013, 2014 and 2015
- GRS IL GARS 2014 Certification Draft
- GRS IL GARS 2014 DRAFT Valuation Report
- GRS IL SERS April 2014 Experience Review
- GRS IL GARS 2013 Final Valuation Report
- GRS IL GARS 2014 GASB 67 Plan Reporting and Accounting Schedules
- GRS IL GARS spreadsheet with additional details on Tables 4 and 7-10 from 2014 AVR
- GRS GARS 2014 Stress Testing Scenarios letter – November 18, 2014
- GRS GARS Recommended GASB 67 and 68 Actuarially Determined Contribution letter – March 27, 2015
- GRS GARS 2014 Final Valuation Report
- GRS GARS Recommended Opt Out Percentage for Future Members letter – April 9, 2015

Since the June 30, 2014, State Actuary Report:

- Board Minutes from 2015
- GRS GARS Recommended GASB 67 and 68 Actuarially Determined Contribution letter – March 27, 2015
- GRS GARS 2015 Certification Draft
- GRS GARS 2015 DRAFT Valuation Report

- GRS GARS 2015 DRAFT GASB 67 and 68 Report
- GRS IL GARS spreadsheet with additional details on Tables 4 and 7-10 from 2015 DRAFT Valuation Report

- Other:
 - November 2015 *National Conference on Public Employee Retirement Systems* (NCPERS) Public Retirement Systems Study
 - December 2015 Survey published by the National Association of State Retirement Agencies (NASRA)
 - July 2015 *Old-Age, Survivors and Disability Insurance Trustees Report* (OASDI)

APPENDIX C

Responses from the Retirement Systems



TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS

Richard W. Ingram, Executive Director
2815 West Washington Street, P.O. Box 19253
Springfield, Illinois 62794-9253

December 10, 2015

VIA ELECTRONIC MAIL (jbutcher@auditor.illinois.gov)

Mr. Joe Butcher
Office of the Auditor General
740 East Ash Street, First Floor
Springfield, IL 62703

Dear Mr. Butcher:

We have reviewed the preliminary report prepared by Cheiron, the state actuary, on our 2015 preliminary actuarial valuation. We understand that Cheiron did not recommend any changes in the assumptions used to calculate the FY 2017 state funding requirement.

Listed below are our responses to Cheiron's eight recommendations. These responses include those of the TRS actuary, Buck Consultants.

Proposed Certification of the Required State Contribution

- 1) Cheiron again recommends that the TRS board periodically retain the services of independent actuary to conduct a full scope actuarial audit. Such an audit should fully replicate the original actuarial valuation, based on the same census data, assumptions, and actuarial methods used by the System's actuary.**

If TRS changes actuarial firms in 2016, a replication audit would be part of the transition from Buck. If we do not change actuarial firms, we question the need for such a review since it would seem somewhat redundant. Partial reviews are already conducted each year by outside entities, and we have had limited scope audits performed by outside actuaries in the past. We are still not convinced that a full scope audit is warranted, considering the time and expense that would be required.

State Mandated Funding Method

- 2) Cheiron recommends that the funding method be changed to at least fully fund future benefit accruals to avoid continued systematic underfunding. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable.**

The state funding methodology is set by the General Assembly and the governor. The retirement system boards and the actuaries do not have the authority to change the funding method.

The TRS board, Buck, and Cheiron all agree that the current funding methodology does not follow Actuarial Standards of Practice. TRS has demonstrated its concern over inadequate funding by certifying alternative state funding requirements that are consistent with standard actuarial practice, beginning with the 2012 actuarial valuation.

It would be helpful if the Executive Summary could acknowledge TRS leadership over the last several years in pointing out the state's funding failures. For example, the following sentence from page 5 of the Cheiron report gives evidence of the state actuary's agreement that funding reform is needed in Illinois:

"We concur with Buck's recommendations and demonstration of an alternative funding approach and agree that it conforms to a goal of full funding within a reasonable time period and is in accordance with generally accepted actuarial practices."

Assessment of Actuarial Assumptions used in the 2015 Valuation

No changes are recommended. Cheiron concludes that the recommendations are reasonable based on the evidence TRS provided.

Recommended Additional Disclosures for the 2015 Valuation

- 3) Cheiron continues to recommend that Buck expand the stress testing of the System within the valuation report and include a detailed explanation of the implications that volatile investment returns and a variety of stressors (e.g., membership declines, lower salary growth) will have on the potential unsustainable cost impact that could occur during the statutory funding period.**

The 2015 valuation expands the stress testing that was contained in the 2014 actuarial valuation. Additionally, on November 24, 2015, TRS submitted three sets of 30-year scenarios that Buck prepared at Cheiron's request. These additional scenarios are not mentioned in the report but could be on Appendix page 1. In 2014, we submitted the detailed stress testing prepared by our investment consultant, R.V. Kuhns.

While extended down markets certainly pose risks to the systems, yearly contribution volatility is a bigger threat to receiving adequate funds from the state.

- 4) Cheiron recommends the inclusion of the statutory state contribution development in the Executive Summary to emphasize the makeup of the state's funding obligation. We also believe such an exhibit should include a numerical comparison of the statutory and alternative *Actuarial Math 2.0* funding results as defined in the valuation.**

We will discuss this with Buck and it may be appropriate to include some presentation of this information in the Executive Summary. It is clear that all of the issues and concepts are discussed in great detail in the body of the report and one factor to keep in mind is the desire to not have the Executive Summary become so lengthy that it is somewhat repetitious of the information presented elsewhere.

- 5) **Cheiron recommends that Buck review its calculation regarding the treatment of future expenses under GASB Statement No. 67. Cheiron believes Buck's method is flawed and that the resulting discount rate should be slightly higher than shown in the results.**

We have discussed this with Buck and we all recognize that the GASB guidance on these issues lacks some clarity. Since some portion of the contributions made on behalf of new entrants is included in the cash flow projections because new entrant contributions exceed the cost of their benefits, it seemed reasonable to maintain the determination of projected administrative expenses in total rather than adjusting them to reflect the fact that the benefit payments were actually expected to decline to zero for the closed group. While this approach may not be a flaw, it may be that a subtle modification in the administrative expense determination may be utilized in future years. In any event, it was determined that any change would not have had a material impact on the resulting discount rate determined and the approach taken could not be viewed by an auditor as being less than truly conservative.

Recommended Changes for Future Valuations

- 6) **Cheiron recommends that TRS consider lowering the interest rate next year and the rate be developed taking into account the negative cash flow of TRS instead of just the long term returns achievable under the asset allocation.**

TRS will continue to review all of the economic assumptions each year as the valuation process unfolds. Any changes will be decided upon in the normal course of business. We believe the rate of return should be based upon the portfolio structure as contemplated over subsequent years and the rate-of-return expected based upon that portfolio structure. While the comments about the negative cash flow in recent years merit consideration, it is not a certainty that such a condition mandates a different approach in assessing the future return expectations. Ignoring even possible changes affecting contributions and benefit payments, favorable investment results may generate a stable or growing level in the total assets such that no change is required in the basic portfolio structure, which implies that the expected returns based upon the portfolio structure need not be revised.

- 7) **Cheiron recommends that the TRS board continue to review annually economic assumptions (interest and inflation) prior to commencing the valuation work and adjust assumptions accordingly.**

Buck has pointed out to the board that the investment return is the most critical of the actuarial assumptions and should not be adjusted annually. Doing so would make state contribution requirements more volatile. However, Buck has been reviewing the investment return and its components (inflation and real return) annually with the board since Cheiron made this suggestion.

The current assumptions have been selected so that changes in the expectations of the markets will not require annual changing of the assumption. Absent changes in the investment portfolio, the current assumption review every three years is sufficient. The economic assumptions are reviewed each year during the analysis of gains and losses.

- 8) Cheiron continues to recommend that Buck provide discussion and quantification of the impact of the one-year data lag for participant information. (Member information as of June 30, 2014 was used for the June 30, 2015 valuation.) Discussion could include assumptions like defaults applied to missing data fields.**

We will discuss with Buck the possible inclusion of such an analysis. Because of the stable nature of the population and the self-correcting nature of the valuation process itself, it is possible that the results would not be materially different if alternative approaches were considered.

We would be happy to discuss any of these points with you. We appreciate your efforts.

Sincerely,



Richard W. Ingram
Executive Director



December 14, 2015

Mr. William G. Holland
Auditor General
740 East Ash Street
Springfield, IL 62703

Re: Response to the State Actuary Report of 2015

Dear Mr. Holland:

This is the official response from the State Universities Retirement System of Illinois (SURS) regarding the December 2015 preliminary report issued by Cheiron – The State Actuary’s Preliminary Report on the State Universities Retirement System of Illinois under Public Act 097-694.

What follows is a summary response which also includes a detailed response for each of the recommendations from our actuary, Gabriel Roeder Smith & Company (GRS).

Recommendations

1. Proposed Certification of the Required State Contribution

The State Actuary accepts the proposed certification of \$1,671,426,000 for the Fiscal Year 2017 SURS required state contribution. In this section, the State Actuary recommends that the Board have an independent full replication actuarial audit be performed.

Response: The SURS Board previously engaged the Segal Company in 2012 to perform a limited scope (level 2) actuarial audit that found all SURS assumptions to be reasonable. At the June 12, 2015 board meeting, the SURS board approved a search for an actuarial audit provider. A Request for Proposal was disseminated on November 2, 2015. The board approved a firm at the December 10, 2015 meeting. A full actuarial audit is expected to be completed June 2016.

2. State Mandated Funding Method

The State Actuary recommends that the funding method be changed to at least fully fund future plan benefit accruals to avoid systematic underfunding of SURS.

Response: The funding policy is established by the legislature and is not under the control of the Board. Please note that prior annual valuation reports and the certification letters sent to the State have addressed this concern and we will do so again in this year’s communication.

Assessment of Actuarial Assumptions Used in the 2015 Valuation

The December 2015 report issued by the State Actuary, Cheiron, indicates that they believe that the assumptions used in the June 30, 2015, Actuarial Valuation, are reasonable.

Recommended Changes for Future Valuations

3. The State Actuary also recommends additional stress testing within the valuation report.

They further recommend that GRS include stress testing of the System within the valuation report and include an explanation of the implications that volatile investment returns and a variety of other stressors will have on the potential unsustainable cost impact that could occur during the statutory funding period.

Response: We agree that stress testing can be a good way to assess risk and to develop strategies for the long term management of the risk. SURS submitted three scenario stress tests to the state actuary. The results of the stress test will be forwarded with our certification letter. Since the Board does not set the funding policy or the benefit provisions, and the State bears the contribution risk from the stressors, we recommend that additional stress testing be conducted at the request of and reviewed by the State.

4. Recommend lowering the current interest assumption for the future valuation

Cheiron recommends the SURS board consider lowering the current 7.25% interest rate assumption to 7.0% or lower and that rate should be developed taking into account the negative cash flow of SURS and the anticipated future interest rate environment.

Response: We believe that the current assumption continue to be conservative and reasonable. An economic study was completed by GRS and presented to the SURS Board September 2015. The board approved to maintain the current assumptions at the December 2015 meeting.

5. Cheiron recommends the Board annually review the economic assumptions (interest rate and inflation) each year prior to commencing the valuation work and adjust assumptions accordingly.

Response: As mentioned in the response above, the Board reviewed the economic study which included an analysis of the investment return assumption and the price and wage inflation assumption. The Board approved maintaining the current investment assumption of 7.25%. The Board reviews the economic assumptions annually and will continue to do so.

6. Recommend GRS provide justification for the productivity assumption for the future valuation

The wage inflation assumption of 3.75% consists of 2.75% price inflation and 1.0% productivity (standard of living) increase assumption. Cheiron recommends that GRS provide justification for the 1.0% productivity assumption given the fiscal challenges facing the State of Illinois.

Response: We believe the 1.0% productivity assumption is reasonable.

7. Recommend longer-term market expectations from investment consultants

In future experience studies, GRS should request that the investment consultants references in developing market expectations provide longer-term market expectations (30+years) and that GRS also obtain the specific expectations of the investment consultant serving SURS.

Response: Market expectations from SURS' current investment consultant (NEPC) were included in the GRS analysis. We will request, to the extent available, use of the longer-term market expectations in future experience.

Mr. Holland, please call me if you have any questions concerning these responses.

Sincerely yours,



W. Bryan Lewis
Executive Director

Encl: Actuarial Valuation Report
SURS 2015 Economic Assumption Review
Gabriel Roeder Smith & Company Response to State Actuary Report of 2015

cc: Michael J. Noble, Cheiron
Joseph Butcher, Office of the Auditor General
Jim Schlouch, Office of the Auditor General
Joseph J. Evans, McGladrey LLP

December 7, 2015

Board of Trustees
State Universities Retirement System of Illinois
1901 Fox Drive
Champaign, Illinois 61820

Re: Response to State Actuary Report of 2015

Dear Members of the Board:

At your request we have reviewed the report issued by Cheiron – The State Actuary’s Preliminary Report on the State Universities Retirement System of Illinois (“SURS”) Pursuant to 30 ILCS 5/2-8. This report was a review of the June 30, 2015, actuarial valuation.

Assessment of Actuarial Assumptions and Methods Used in the 2015 Valuation

This report issued by the State Actuary, Cheiron, indicates that **“In summary, we believe that the assumptions and methods used in the draft June 30, 2015, Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, represent an improvement over the assumptions and methods used in the previous two year, as a result of using new and somewhat stronger actuarial assumptions. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.”**

During the course of the year the Board adopted a new set of assumptions based on an experience study conducted for the period June 30, 2010, through June 30, 2014, and adopted a generational mortality assumption.

Proposed Certification of the Required State Contribution

In this section, the State Actuary recommends that the Board have an independent full replication actuarial audit performed (**Recommendation #1**).

The type and timing of actuarial audits is a matter of Board policy, and we will leave the response to the Board. For reference, the Government Finance Officers Association (GFOA) updated their Best Practice on Actuarial Audits in May 2014 (<http://www.gfoa.org/actuarial-audits>). However, we are aware that the Board is currently in the process of selecting an actuarial firm to conduct an actuarial audit.

State Mandated Funding Method

In this section the State Actuary opines on their concern that the Statutory funding method does not meet Actuarial Standards of Practice (**Recommendation #2**), and in particular, ASOP 4, Section 3.14 which states:

“When selecting a contribution allocation procedure, the actuary should select a contribution allocation procedure that, in the actuary’s professional judgement, is consistent with the plan accumulating adequate assets to make benefit payments when due, assuming that all actuarial assumptions will be realized and that the plan sponsor or other contributing entity will make actuarially determined contributions when due.”

It is very important to understand that the ASOPs provide guidance to actuaries when performing actuarial services. The ASOPs have neither jurisdiction nor authority over governments or system Boards. The funding policy used in the June 30, 2015 actuarial valuation is prescribed in accordance with Article 15 of the Illinois Pension Code and is not under the actuary or the Board's control; therefore, no action is required. We note that the annual actuarial valuation reports and the Board have communicated similar concerns to the State consistently over the years. In addition, Cheiron notes that "...the certified contributions.... were properly calculated in accordance with State Law." Cheiron also states that "We concur with GRS' recommendation to increase the 90% funding target and to reduce the projection period, in accordance with generally accepted actuarial practices." Therefore, we recommend that Cheiron address this issue directly with the State and recommend a statutory change.

Assuming that SURS continues to remain open (enroll new entrants into the System) and statutory contributions are made, SURS is expected to be able to make benefit payments when due under the current funding policy.

Recommended Changes for Future Valuations

Recommendation #3 is to include stress testing within the actuarial valuation report and include an explanation of the implications that volatile investment returns and a variety of stressors may have on the sustainability of the level of statutory contributions during the statutory funding period.

As Cheiron noted, GRS did provide three specific stress testing scenarios as requested by Cheiron in a separate letter from the actuarial valuation report.

Stress testing, if done completely and presented properly, can provide useful information on the level of statutory contributions and funded position of the System under adverse economic conditions. Therefore, at the Board's request and with their concurrence, we can definitely include additional stress testing analysis as an additional section in the actuarial valuation report to the extent that the Board's timing requirements for finalizing the report permit.

Recommendation #4 is that the Board considering lowering the current 7.25% interest rate assumption to 7.00% or lower and that rate should be developed taking into account the negative cash flow of SURS and the anticipated future rate environment.

The Board will be considering economic assumptions to be used in the actuarial valuations as of June 30, 2016, at its December meeting, based on input from GRS and the SURS investment consultant. Based on analysis by GRS and the SURS investment consultant, there is expected to be higher than a 50% probability of meeting the long-term current assumption of 7.25% over the next 20 to 30 years. We believe that the asset allocation and capital market assumptions reflect SURS' negative cash flow situation and long-term expectations. Therefore, GRS thinks the current assumption of 7.25% is reasonable based on the most recent analysis.

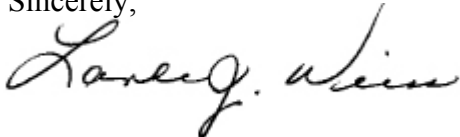
Recommendation #5 is that the Board continue to annually review the economic assumptions (interest rate and inflation) prior to commencing the valuation work and adjust assumptions accordingly. GRS and the Board will continue to annually review the economic assumptions prior to commencing the actuarial valuation work.

Recommendation #6 is that GRS provide justification for the 1.0% productivity assumption portion of the total wage inflation assumption of 2.75% given the fiscal challenges facing the State of Illinois. The rationale for the salary increase and wage inflation assumptions can be found in the experience study report covering the period June 30, 2010, through June 30, 2014. GRS is not

qualified to quantify potential changes in productivity increases given the fiscal challenges facing the State of Illinois. We believe that maintaining the current assumption of 1.0% is a more conservative approach since it would result in higher actuarial accrued liabilities.

Recommendation #7 is that GRS specifically request longer-term market expectations from investment consultants (30+ years) and obtain specific expectations of the investment consultant serving the SURS. Market expectations from SURS' current investment consultant (NEPC) were included in the GRS analysis. We will request, and to the extent available, use the longer-term market expectations in future experience studies.

Sincerely,



Lance Weiss, EA, MAAA
Senior Consultant



Amy Williams, ASA, MAAA
Consultant

AW:kb

cc: David Kausch, Gabriel, Roeder, Smith & Company
Kristen Brundirks, Gabriel, Roeder, Smith & Company

December 15, 2015

Board of Trustees
State Employees' Retirement System of Illinois
2101 South Veterans Parkway
P.O. Box 19255
Springfield, IL 62794-9255

Re: Response to State Actuary Report of 2015 – SERS – Revised

Dear Members of the Board:

At your request we have reviewed the report issued by Cheiron – The State Actuary’s Preliminary Report on the State Employees’ Retirement System of Illinois (“SERS”) Pursuant to 30 ILCS 5/2-8. This report was a review of the June 30, 2015, actuarial valuation for SERS.

Assessment of Actuarial Assumptions and Methods Used in the 2015 Valuation

This report issued by the State Actuary, Cheiron, indicates that **“In summary, we believe that the assumptions and methods used in the draft June 30, 2015, Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.”**

Page 1 of the transmittal letter of the GRS Valuation report states:

The System’s current contribution rate determined under the statutory funding policy may not conform to the Actuarial Standards of Practice. Therefore, the Board adopted an actuarial funding policy to be used to calculate the Actuarial Determined Contribution (“ADC”) under GASB Statements Nos. 67 and 68 for financial reporting purposes.

Although the statutory contribution requirements were met, the statutory funding method generates a contribution requirement that is less than a reasonable actuarially determined contribution. Meeting the statutory requirement does not mean that the undersigned agree that adequate actuarial funding has been achieved. We recommend the adherence to a funding policy, such as the Board policy used to calculate the ADC under GASB Statements Nos. 67 and 68, that funds the normal cost of the plan as well as an amortization payment that seeks to pay off any unfunded accrued liability over a closed period of 25 years.

Proposed Certification of the Required State Contribution

In **item 1**, the State Actuary recommends that the Board have an independent full replication actuarial audit performed.

The type and timing of actuarial audits is a matter of Board policy, and we will leave the response to the Board. For reference, the Government Finance Officers Association (GFOA) recently updated their Best Practice on Actuarial Audits (<http://www.gfoa.org/actuarial-audits>).

State Mandated Funding Method

In **item 2**, the State Actuary recommends that: “the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of SERS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable”

We agree with the State Actuary's comment on strengthening SERS funding policy. As stated above a funding policy that finances the normal cost plus the unfunded actuarial liability over a 25-year closed period would in our opinion strengthen the funded status of SERS. However, a change in the funding method and funding policy would require a statutory change.

Recommended Additional Disclosures for the 2015 Valuation

In **item 3**, the State Actuary recommends that actuarial valuation report include a section with stress testing information. A stress test was performed for SERS, based on Cheiron's suggested scenarios, and delivered on December 4, 2015. The stress test included three random investment trials suggested by Cheiron. Stress testing, if done completely and properly, can provide useful information on the level of statutory contributions and funded position of the System under adverse economic conditions. For example, stochastic modeling could be used to project the funded status and statutory contributions, over 5,000 random investment trials, in order to evaluate the likelihood that the funded ratio or contributions will exceed certain limits.

At the Board's request and with their concurrence, we can include stress testing information in the actuarial valuation report to the extent that the Board's timing requirements for finalizing the report permits.

Recommended Changes for Future Valuations

In **item 4**, the State Actuary recommends that SERS consider lowering the interest rate, for the next valuation, by taking into account both the anticipated future negative cash flow and long-term returns achievable under the asset allocation.

We will continue to provide the SERS Board, on an annual basis, information necessary to evaluate the long-term investment return assumption taking into account both the anticipated future negative cash flow and long-term returns achievable under the asset allocation, prior to commencing the valuation process.

In **item 5**, the State Actuary recommends that SERS annually review the economic assumptions prior to commencing the valuation work, and adjust assumptions accordingly.

We agree with the State Actuary's recommendation and will continue to provide the SERS Board, on an annual basis, with information necessary to evaluate all economic assumptions, prior to commencing the valuation process.

In **item 6**, the State Actuary recommends that GRS consider using a fully generational mortality in future valuations. The State Actuary also recommends the GRS disclose whether or not the mortality adequately covers mortality improvements through 2045.

As stated on page 37 of our valuation report, a fully generational mortality table was considered as part of the most recent experience study. The mortality table used in the valuation is a static table and provides an estimated margin of 20 percent for future mortality improvement based on the experience study report of the State Employees' Retirement System for the period from July 1, 2009, to June 30, 2013. This static table has a larger margin for future mortality improvement than the previously used table. Moreover, for many ages, the static projection assumes more improvement than the fully generational projection under the same scale. We will review the mortality assumption as part of the next scheduled experience review which will occur after the SERS valuation as of June 30, 2016. The review will include the impact of adopting a generational mortality table.

In **item 7**, the State Actuary recommends that GRS considering revisions to the demographic assumptions, specifically termination rates applicable to Tier 2 members.

We agree with the State Actuary's recommendation and will review and, if appropriate, update the termination rates for Tier 2 members as part of the next scheduled experience review.

In **item 8**, the State Actuary recommends that future experience studies include investment return analysis using capital market assumptions appropriate for a 30-year investment horizon period, and that the analysis include capital market assumptions provided by the investment consultant serving the Illinois State Board of Investments (ISBI).

We agree with the State Actuary's recommendation and will request the additional investment data, and to the extent it is available will include it in our analysis.

In **item 9**, the State Actuary recommends that SERS, JRS, and GARS whose assets are commingled with ISBI consider the appropriateness of using different interest rate assumptions.

On annual basis, we will continue to review the liquidity requirements, projected funded status, and contribution requirements in order to evaluate the appropriateness of using different interest rate assumptions for each respective plan.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



Alex Rivera, FSA, EA, MAAA
Senior Consultant



David Kausch, FSA, EA, MAAA
Senior Consultant

December 18, 2015

Board of Trustees
Judges' Retirement System of Illinois
2101 South Veterans Parkway
P.O. Box 19255
Springfield, IL 62794-9255

Re: Response to State Actuary Report of 2015 - JRS

Dear Members of the Board:

At your request we have reviewed the report issued by Cheiron – The State Actuary's Preliminary Report on the Judges' Retirement System of Illinois ("JRS") Pursuant to 30 ILCS 5/2-8. This report was a review of the June 30, 2015, actuarial valuation for JRS.

Assessment of Actuarial Assumptions and Methods Used in the 2015 Valuation

This report issued by the State Actuary, Cheiron, indicates that **"In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation Report, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law."**

Page 1 of the transmittal letter of the GRS Valuation report states:

The System's current contribution rate determined under the statutory funding policy may not conform to the Actuarial Standards of Practice. Therefore, the Board adopted a policy to be used to calculate the Actuarial Determined Contribution ("ADC") under GASB Statements Nos. 67 and 68 for financial reporting purposes.

Although the statutory contribution requirements were met, the statutory funding method generates a contribution requirement that is less than a reasonable actuarially determined contribution. Meeting the statutory requirement does not mean that the undersigned agree that adequate actuarial funding has been achieved. We recommend the adherence to a funding policy, such as the Board policy used to calculate the ADC under GASB Statements Nos. 67 and 68, that finances the normal cost of the plan as well as an amortization payment that seeks to pay off any unfunded accrued liability over a closed period of 25 years.

Proposed Certification of the Required State Contribution

In **item 1**, the State Actuary recommends that the Board have an independent full replication actuarial audit performed.

The type and timing of actuarial audits is a matter of Board policy, and we will leave the response to the Board. For reference, the Government Finance Officers Association (GFOA) recently updated their Best Practice on Actuarial Audits (<http://www.gfoa.org/actuarial-audits>).

State Mandated Funding Method

In **item 2**, the State Actuary recommends that: “the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of JRS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable”

We agree with the State Actuary's comment on strengthening JRS funding policy. As stated above a funding policy that finances the normal cost plus the unfunded actuarial liability over a 25-year closed period would in our opinion strengthen the funded status of JRS. However, a change in the funding method and funding policy would require a statutory change.

Recommended Additional Disclosures for the 2015 Valuation

In **item 3**, the State Actuary recommends that actuarial valuation report include a section with stress testing information. A stress test is being performed for JRS, based on Cheiron's suggested scenarios, and will be delivered in December. The stress test will include three random investment trials suggested by Cheiron. Stress testing, if done completely and properly, can provide useful information on the level of statutory contributions and funded position of the System under adverse economic conditions. For example, stochastic modeling could be used to project the funded status and statutory contributions, over 5,000 random investment trials, in order to evaluate the likelihood that the funded ratio or contributions will exceed certain limits.

At the Board's request and with their concurrence, we can include stress testing information in the actuarial valuation report to the extent that the Board's timing requirements for finalizing the report permits.

Recommended Changes for Future Valuations

In **item 4**, the State Actuary recommends that JRS annually review the economic assumptions prior to commencing the valuation work, and adjust assumptions accordingly.

We agree with the State Actuary's recommendation and will continue to provide the JRS Board, on an annual basis, with information necessary to evaluate all economic assumptions, prior to commencing the valuation process.

In **item 5**, the State Actuary recommends that SERS, JRS, and GARS whose assets are commingled with ISBI consider the appropriateness of using different interest rate assumptions.

On annual basis, we will continue to review the liquidity requirements, projected funded status, and contribution requirements in order to evaluate the appropriateness of using different interest rate assumptions for each respective plan.

In **item 6**, the State Actuary recommends that during the next experience study, GRS review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience.

We agree with the State Actuary's recommendation, and we will review the mortality assumption as part of the next scheduled experience review which will occur prior to June 30, 2016, actuarial valuation.

In **item 7**, the State Actuary recommends that GRS consider using a fully generational mortality in future valuations. The State Actuary also recommends the GRS disclose whether or not the mortality adequately covers mortality improvements through 2045.

We will review the mortality assumption as part of the next scheduled experience review which will occur prior to the June 30, 2016, actuarial valuation. The review will include the impact of adopting a generational mortality table.

In **item 8**, the State Actuary recommends that future experience studies include investment return analysis using capital market assumptions appropriate for a 30-year investment horizon period, and that the analysis include capital market assumptions provided by the investment consultant serving the Illinois State Board of Investments (ISBI).

We agree with the State Actuary's recommendation and will request the additional investment data, and to the extent it is available will include it in our analysis.

In **item 9**, the State Actuary recommends that GRS fully disclose which projection scale is being utilized in the June 30, 2015, actuarial valuation.

We agree with the State Actuary's recommendation and we will fully disclose the projection scale being used in the June 30, 2015, actuarial valuation.

In **item 10**, the State Actuary recommends that GRS consider the appropriateness of the 3.75% wage inflation assumption if consistent gains continue in future years.

We agree with the State Actuary's recommendation and we will review the wage inflation assumption during the next scheduled experience review which will occur prior to the June 30, 2016, actuarial valuation.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



Alex Rivera, FSA, EA, MAAA
Senior Consultant



David Kausch, FSA, EA, MAAA
Senior Consultant

December 18, 2015

Board of Trustees
General Assembly Retirement System of Illinois
2101 South Veterans Parkway
P.O. Box 19255
Springfield, IL 62794-9255

Re: Response to State Actuary Report of 2015 - GARS

Dear Members of the Board:

At your request we have reviewed the report issued by Cheiron – The State Actuary’s Preliminary Report on the General Assembly Retirement System of Illinois (“GARS”) Pursuant to 30 ILCS 5/2-8. This report was a review of the June 30, 2015, actuarial valuation for GARS.

Assessment of Actuarial Assumptions and Methods Used in the 2015 Valuation

This report issued by the State Actuary, Cheiron, indicates that **“In summary, we believe that the assumptions and methods used in the draft June 30, 2015 Actuarial Valuation, which are used to determine the required Fiscal Year 2017 State contribution, are reasonable. We also find that the certified contributions, notwithstanding the State funding requirements that do not conform to Actuarial Standards of Practice, were properly calculated in accordance with State law.”**

Page 1 of the transmittal letter of the GRS Valuation report states:

The System’s current contribution rate determined under the statutory funding policy may not conform to the Actuarial Standards of Practice. Therefore, the Board adopted a policy to be used to calculate the Actuarial Determined Contribution (“ADC”) under GASB Statements Nos. 67 and 68 for financial reporting purposes.

Although the statutory contribution requirements were met, the statutory funding method generates a contribution requirement that is less than a reasonable actuarially determined contribution. Meeting the statutory requirement does not mean that the undersigned agree that adequate actuarial funding has been achieved. We recommend the adherence to a funding policy, such as the Board policy used to calculate the ADC under GASB Statements Nos. 67 and 68, that finances the normal cost of the plan as well as an amortization payment that seeks to pay off any unfunded accrued liability over a closed period of 20 years.

Proposed Certification of the Required State Contribution

In **item 1**, the State Actuary recommends that the Board have an independent full replication actuarial audit performed.

The type and timing of actuarial audits is a matter of Board policy, and we will leave the response to the Board. For reference, the Government Finance Officers Association (GFOA) recently updated their Best Practice on Actuarial Audits (<http://www.gfoa.org/actuarial-audits>).

State Mandated Funding Method

In **item 2**, the State Actuary recommends that: “the funding method be changed to at least fully fund future plan benefit accruals to avoid continued systematic underfunding of GARS. Continuing the practice of underfunding future accruals increases the risk of the System becoming unsustainable”

We agree with the State Actuary’s comment on strengthening GARS funding policy. As stated above a funding policy that finances the normal cost plus the unfunded actuarial liability over a 20-year closed period would in our opinion strengthen the funded status of GARS. However, a change in the funding method and funding policy would require a statutory change.

Recommended Additional Disclosures for the 2015 Valuation

In **item 3**, the State Actuary recommends that actuarial valuation report include a section with stress testing information. A stress test is being performed for GARS, based on Cheiron’s suggested scenarios, and will be delivered in December. The stress test will include three random investment trials suggested by Cheiron. Stress testing, if done completely and properly, can provide useful information on the level of statutory contributions and funded position of the System under adverse economic conditions. For example, stochastic modeling could be used to project the funded status and statutory contributions, over 5,000 random investment trials, in order to evaluate the likelihood that the funded ratio or contributions will exceed certain limits.

At the Board’s request and with their concurrence, we can include stress testing information in the actuarial valuation report to the extent that the Board’s timing requirements for finalizing the report permits.

Recommended Changes for Future Valuations

In **item 4**, the State Actuary recommends that GARS annually review the economic assumptions prior to commencing the valuation work, and adjust assumptions accordingly.

We agree with the State Actuary’s recommendation and will continue to provide the GARS Board, on an annual basis, with information necessary to evaluate all economic assumptions, prior to commencing the valuation process.

In **item 5**, the State Actuary recommends that SERS, JRS, and GARS whose assets are commingled with ISBI consider the appropriateness of using different interest rate assumptions.

On annual basis, we will continue to review the liquidity requirements, projected funded status, and contribution requirements in order to evaluate the appropriateness of using different interest rate assumptions for each respective plan.

In **item 6**, the State Actuary recommends that future experience studies include investment return analysis using capital market assumptions appropriate for a 30-year investment horizon period, and that the analysis include capital market assumptions provided by the investment consultant serving the Illinois State Board of Investments (ISBI).

We agree with the State Actuary's recommendation and will request the additional investment data, and to the extent it is available will include it in our analysis.

In **item 7**, the State Actuary recommends that the category "Other" in the Analysis of Financial Gains and Losses of Unfunded Accrued Actuarial Liability Table, Table 3 in the June 30, 2015, valuation, be further broken out in future valuations so that the resulting impact can be understood and reviewed for reasonableness.

We agree with the State Actuary's recommendation, and will further break out the "Other" category contained in the Gain/Loss exhibit, in the June 30, 2015, valuation.

In **item 8**, the State Actuary recommends that during the next experience study, GRS review the RP-2000 Annuitant and Non-Annuitant mortality tables to determine if such tables result in a better fit and thus more reasonably project anticipated future plan experience.

We agree with the State Actuary's recommendation, and we will review the mortality assumption as part of the next scheduled experience review which will occur prior to June 30, 2016, actuarial valuation.

In **item 9**, the State Actuary recommends that GRS consider using a fully generational mortality in future valuations. The State Actuary also recommends the GRS disclose whether or not the mortality adequately covers mortality improvements through 2045.

We will review the mortality assumption as part of the next scheduled experience review which will occur prior to the June 30, 2016, actuarial valuation. The review will include the impact of adopting a generational mortality table.

In **item 10**, the State Actuary recommends that GRS fully disclose which projection scale is being utilized in the June 30, 2015, actuarial valuation.

We agree with the State Actuary's recommendation and we will fully disclose the projection scale being used in the June 30, 2015, actuarial valuation.

In **item 11**, the State Actuary recommends that GRS include additional disclosure on how the 10% load on inactive vested liabilities to reflect increases in inactive members' pay due to current participation in a reciprocal system was developed.

We agree with the State Actuary's recommendation and we will include additional disclosure on how the load for inactive member pay increases was developed.

In **item 12**, the State Actuary recommends that GRS consider the appropriateness of the salary increase assumption and total payroll assumption in future valuations.

We agree with the State Actuary's recommendation and we will review the salary increase assumption wage inflation assumption during the next scheduled experience review which will occur prior to the June 30, 2016, actuarial valuation.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



Alex Rivera, FSA, EA, MAAA
Senior Consultant



David Kausch, FSA, EA, MAAA
Senior Consultant