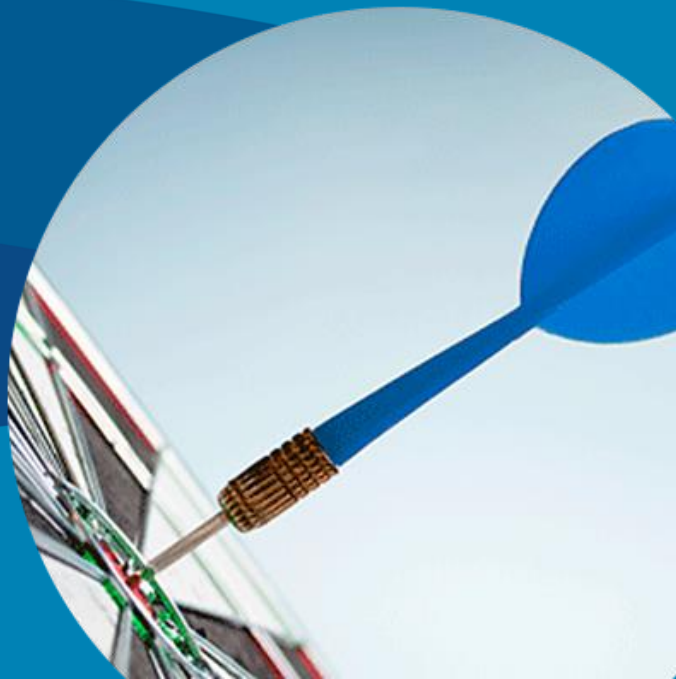
Illinois Municipal Retirement Fund

Brian Murphy, FSA, EA, FCA, MAAA
Mark Buis, FSA, EA, FCA, MAAA
Francois Pieterse, ASA, FCA, MAAA

November 16, 2018



Background

- Historically, GRS prepares a full Experience Study (Assumption review) every 3 years
- Last Experience Study was presented in November of 2017
- GRS recommended reducing the investment return assumption to 7.25%, but the Board elected to remain at 7.5%
- Due to GASB requirements and Actuarial Standards, actuaries need to ensure the reasonableness of the Investment Return Assumption (actually all assumptions) annually

GRS Retirement Consulting

Background

- We are not investment experts, we consider the following items:
  - Historical Patterns
  - Forward Expectations of Investment Consultants
  - Investment Policy
  - Funding Levels
  - Comparison to Other Systems
  - Actuarial Standards of Practice
- Typically, a Board's decision with input from Investment Experts and Actuary

GRS Retirement Consulting

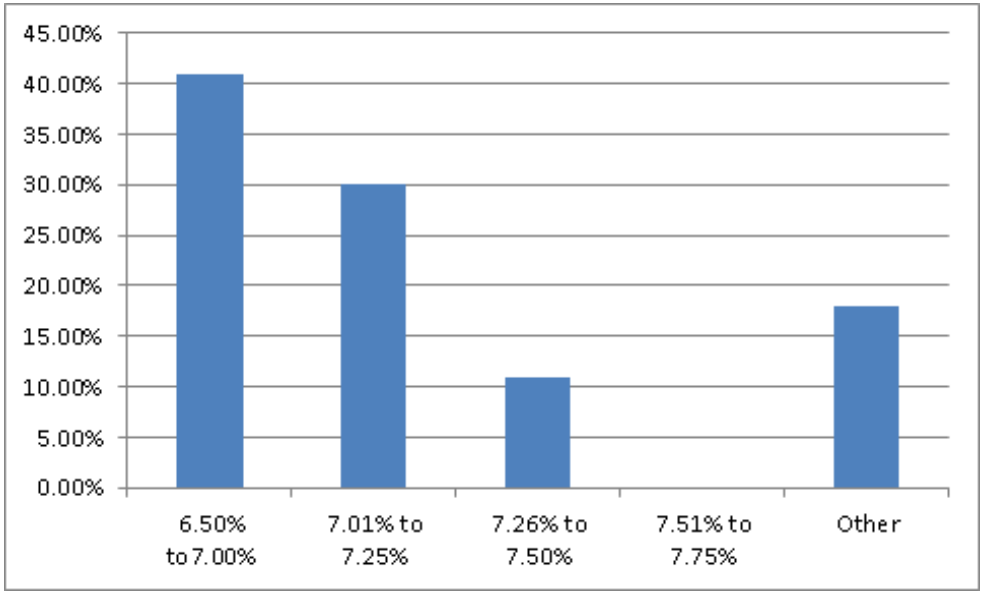
Background

- Current assumption of 7.5% has been in effect for 25 years
- While 7.5% assumed rate of return was historically conservative compared to other Systems, it is now considered aggressive
- The median return according to NASRA is now below 7.5% and falling
- Conservative assumptions have contributed to IMRF's strong funding position

GRS Retirement Consulting

What Are Other Actuaries Recommending?

- Recent Survey of Assumed Investment Return recommended by Public Sector Actuaries



- NASRA surveys will tend to lag actuarial recommendations by 1 to 2 years

GRS Retirement Consulting

What Are Other Systems Doing?

- Recent changes by other Systems
  - CALPERS – 7.5% to 7.0% over 3 years
  - CALSTRS – 7.5% to 7.0% over 2 years
  - State of Michigan – 7.5% to 7.05%
  - Ohio PERS – 7.5% to 7.2%
  - Texas Teachers 8.0% to 7.25%
  - Minnesota (PERA & SRS) – 8.0% to 7.5%
  - Minnesota Teachers – 8.5% to 7.5%
  - Kentucky – 6.75% to 5.25%
  - Illinois SURS – 7.25% to 6.75%
  - Illinois SERS – 8.5% to 7.0% (since 2010)
  - Chicago Public Schools – 7.25% to 7.0%
- 75% of the 129 plans that NASRA surveys have lowered their assumption since 2010.

GRS Retirement Consulting

Assumptions Within Illinois

Retirement System/Fund	Investment Return Assumption
State Universities Retirement System of Illinois	6.75%
State Employees' Retirement System of Illinois	7.00%
Teachers' Retirement System of Illinois	7.00%
Judges' Retirement System of Illinois	6.75%
General Assembly Retirement System of Illinois	6.75%
County Employees' and Officers' Annuity and Benefit Fund of Cook County	7.25%
Forest Preserve District Employees' Annuity and Benefit Fund of Cook County	7.25%
Laborer's and Retirement Board Employees' Annuity and Benefit Fund of Chicago	7.25%
Policemen's Annuity and Benefit Fund of Chicago	7.25%
Firemen's Annuity and Benefit Fund of Chicago*	7.50%
Illinois Municipal Retirement Fund	7.50%
Municipal Employees' Annuity and Benefit Fund of Chicago	7.00%
Park Employees' Annuity and Benefit Fund of Chicago	7.50%
Metropolitan Water and Reclamation District Retirement Fund	7.50%

GRS Retirement Consulting

Why Are so Many Systems Lowering Their Assumed Return?

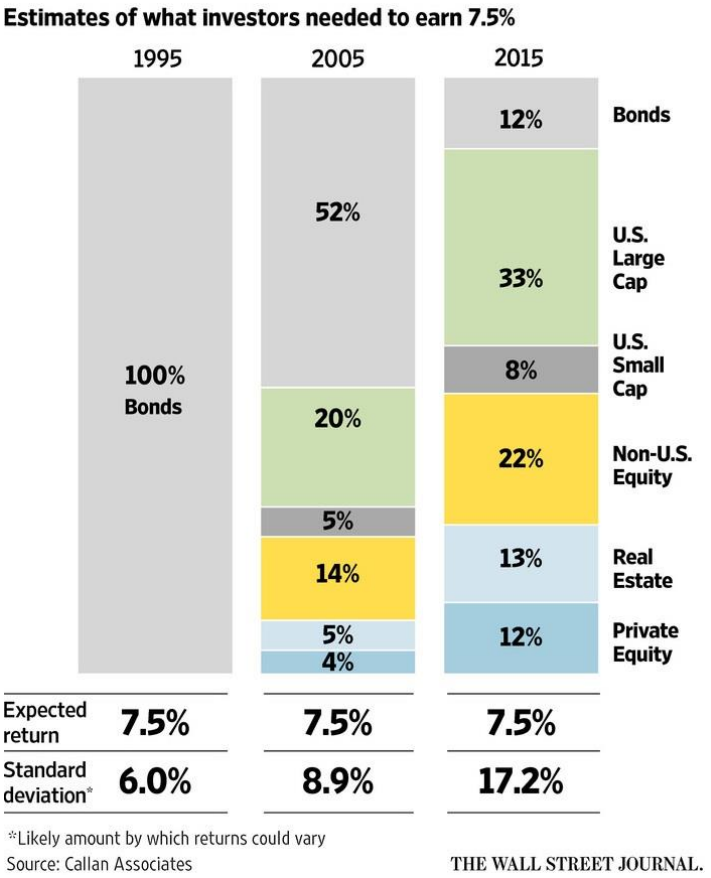
- Expected real returns are consistent or slightly higher than historical real returns, but historical total returns of 8% or more were largely driven by high inflation that is not expected to be repeated

	Historical Return (over last 50 years)	Forward Looking Returns
Inflation	4.0%	2.5%
Real Return	4.0%	4.5%
Total Return	8.0%	7.0%

- Higher Volatility (volatility drag) is also reducing the median return by about 50 basis points over historical averages

GRS Retirement Consulting

Increasing Risk for a Given Return



- IMRF has been assuming 7.5% since mid 1990's
- It takes much more risk today to produce a portfolio earning 7.5% than it did years ago
- While IMRF's current Standard Deviation is below the figure in this generic study, it is much higher than it would have been in 1995

GRS Retirement Consulting

IMRF Asset Allocation

As of June 30, 2018			
	Market Value		
Asset Class	(in Millions)	% Target	% Actual
Domestic Equity	$18,084.70	37.00%	43.80%
International Equity	$8,147.60	18.00%	19.70%
Fixed Income	$10,883.40	28.00%	26.40%
Real Estate	$2,376.30	9.00%	5.80%
Alternative Investments	$1,624.60	7.00%	3.90%
Cash Equivalents	$169.90	1.00%	0.40%
Total	$41,286.50	100.00%	100.00%

From IMRF Website

GRS Retirement Consulting

Capital Market Assumption Modeling

- GRS does not provide investment advice
- GRS maintains capital market assumptions from 12 different investment consulting firms over differing time horizons
  - 11 consultants provide 10-year assumptions; one provides 5-7 year assumptions. These tend to be quantitatively based. Using these assumptions, we produce “10-year expectations”
  - One consultant also provides 20-year assumptions. Two provide 30-year assumptions. The longer term assumptions are less quantitative than the 10-year assumptions. Using these assumptions, we develop rough “30-year expectations”
  - The 30-year expectations assume very favorable returns after the first 10 years
- GRS maps the IMRF asset allocation into the capital market assumptions of the 12 investment consultants to develop an approximation of what they would expect from the portfolio

GRS Retirement Consulting

Arithmetic Average Expectation over 10 Years (IMRF Target Allocation)

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)		Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)
1	5.88%	2.20%	3.68%	2.50%	6.18%	0.08%	6.10%		12.73%
2	6.54%	2.50%	4.04%	2.50%	6.54%	0.08%	6.46%		12.65%
3	6.26%	2.21%	4.05%	2.50%	6.55%	0.08%	6.47%		13.14%
4	6.34%	2.26%	4.08%	2.50%	6.58%	0.08%	6.50%		10.90%
5	6.45%	2.25%	4.20%	2.50%	6.70%	0.08%	6.62%		12.36%
6	6.70%	2.50%	4.20%	2.50%	6.70%	0.08%	6.62%		12.72%
7	6.37%	2.00%	4.37%	2.50%	6.87%	0.08%	6.79%		11.74%
8	6.43%	2.00%	4.43%	2.50%	6.93%	0.08%	6.85%		10.90%
9	6.79%	2.31%	4.49%	2.50%	6.99%	0.08%	6.91%		12.37%
10	7.12%	2.26%	4.86%	2.50%	7.36%	0.08%	7.28%		14.40%
11	6.85%	1.95%	4.90%	2.50%	7.40%	0.08%	7.32%		12.57%
12	7.66%	2.00%	5.66%	2.50%	8.16%	0.08%	8.08%		11.16%
Average	**6.62%**	**2.20%**	**4.41%**	**2.50%**	**6.91%**	**0.08%**	**6.83%**		**12.30%**

Only one of 12 consultants expects arithmetic return to exceed 7.5%, and that consultant appears to be an outlier.

GRS Retirement Consulting

Geometric Average Return (Based on 10-Year Assumptions) (IMRF Target Allocation)

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return 40th	50th	60th	Probability of exceeding 7.50%	Probability of exceeding 7.25%	Probability of exceeding 7.00%	Probability of exceeding 6.75%
(1)	(2)	(3)	(4)	(5)	(6)	(6)	(6)
1	4.65%	5.36%	6.07%	22.51%	25.21%	28.09%	31.11%
2	4.88%	5.61%	6.35%	25.94%	28.76%	31.72%	34.81%
3	4.98%	5.68%	6.39%	25.90%	28.83%	31.93%	35.16%
4	5.31%	5.92%	6.53%	25.79%	29.20%	32.81%	36.60%
5	5.11%	5.82%	6.54%	27.68%	30.69%	33.85%	37.13%
6	5.20%	5.89%	6.58%	27.91%	31.02%	34.28%	37.67%
7	5.47%	6.13%	6.79%	29.95%	33.33%	36.87%	40.52%
8	5.67%	6.28%	6.90%	30.83%	34.53%	38.38%	42.37%
9	5.48%	6.18%	6.87%	31.53%	34.80%	38.20%	41.71%
10	5.52%	6.32%	7.12%	35.51%	38.46%	41.48%	44.57%
11	5.88%	6.58%	7.29%	37.11%	40.53%	44.04%	47.60%
12	6.87%	7.49%	8.11%	49.81%	53.85%	57.86%	61.80%
Average	**5.42%**	**6.10%**	**6.80%**	**30.87%**	**34.10%**	**37.46%**	**40.92%**

Only one consultant would think there is a 50% chance of achieving 7.5%, and that one seems to be an outlier.

GRS Retirement Consulting

Summary

		Actuarial Investment Return Assumption		
		Preferred	**Also Acceptable**	**Probability of Earning 7.5%**
10 year	12 Consultants	6.1%	6.8%	31.19%
30 year	3 Consultants	6.8%	Something above 6.8%	39.6%

Based upon this analysis, there is approximately a 2/3rds chance that contribution rates calculated based upon a 7.5% assumption will not be met resulting in higher contribution rates. We would view continuation of this assumption as aggressive and not in the best interest of IMRF.

GRS Retirement Consulting

Comments

- The State's auditing actuary challenged the use of a 7.5% assumption as being "overly aggressive" almost a year ago
- The auditing actuary also indicated a need for support for focusing only on the longer term expectation of certain investment consultants in the same audit. (in other words, reliance on the 30-year expectations would require specific justification)

GRS Retirement Consulting

Conclusions

- Current 7.5% assumption is aggressive based on 10-year capital market expectations.
- Preferred actuarial assumption for IMRF is now 6.1% with anything up to 6.8% being routinely acceptable.
- The 6.8% upper bound can be stretched a little by giving extra weight to the 30-year expectations.
- But in our view, any assumption greater than 6.1% probably has less than a 50% chance of being achieved.
- Recommend decreasing assumed rate of return by at least 25 basis points (i.e., to 7.25% as previously recommended), and preferably by 50 basis points or more.
- Continued annual review of this assumption will be necessary.

GRS Retirement Consulting

Conclusions

- A reduction in assumed return will cause 2020 contribution rates to increase from 2019 levels, but recall that 2019 rates will be lower than current (2018) rates
  - 2018 average contribution rate – 11.24%
  - 2019 average contribution rate – 9.06%
  - 2020 estimated rate (using 7.25% return) – 10.15% to 10.65%
- Impact will vary by employer based on demographics
- Continued progression of active members into Tier 2 cost structure will decrease the contribution rate by about 0.10% of payroll per year on average
- 2020 rates will also be affected by 2018 investment return and carryover gains from 2017

GRS Retirement Consulting

IMRF Assumed Investment Return
Final Comments

- Lowering the actuarial assumed rate of return should not impact the asset allocation strategy or actual investment return to the plan
- Using more realistic assumed rate of return will be in the best interest of IMRF

GRS Retirement Consulting

APPENDIX

List of Investment Consulting Firms Surveyed

- Callan
- Wilshire
- NEPC
- PCA
- Bank of New York Mellon
- JP Morgan
- RV Kuhn
- Mercer
- Marquette
- Summit
- Aon
- Voya

GRS Retirement Consulting

Geometric vs. Arithmetic Return

- **Arithmetic return** is the arithmetic average of annual returns expected on a given portfolio over a given time horizon. For example maybe it is 7%.
- Standard deviation is a measure of the variability of return. For most portfolios today it is on the order of 10-15%.
- Variability drags down return.
- **Geometric return** is the compounded return expected on a given portfolio over a given time horizon. It will be lower than arithmetic due to variability.

GRS Retirement Consulting

Geometric vs. Arithmetic Return

- Suppose standard deviation is 10%. Then “most of the time” annual returns would be between 7%+10% and 7%-10% in our example.
- Compounded (Geometric) return would be about 50 basis points lower than arithmetic in that case.
- (1.17x0.97)1/2 = 1.0653 or about 6.5% compounded return.
- Variability drags down return!

GRS Retirement Consulting

Geometric vs. Arithmetic Return

- The **expected geometric rate of return** is the **preferred actuarial** assumption because over a long enough time horizon it has a 50% probability of being achieved.
- **Expected arithmetic return is also reasonable** because in any given year it has no expected gain or loss.
  - *But it is important to remember that arithmetic return has less than a 50% chance of being achieved over a time horizon if standard deviation is not 0%.*

GRS Retirement Consulting

What Is an Appropriate Time Horizon?

- Present Value of Future IMRF Benefits is $48 Billion. 40+% is paid out in the next ten years and well over half in the first 15 years as shown below.

% of PVB Paid By year	
Years	**% Paid**
1-10	40.58%
11-15	16.50%
16-30	30.62%
31-100	12.30%
All	100.00%

GRS Retirement Consulting

What Is an Appropriate Time Horizon?

- In terms of time horizon, the first 10 to 15 years are very important.
- While the years after that do matter, there is not much of an empirical basis for developing assumptions that far into the future.

GRS Retirement Consulting

Summary

Actuarial Investment Return Assumption		
Preferred		**Also Acceptable**
Median (Geometric)		Mean (Arithmetic)
50%	↔Probability of Achieving↔	Less than 50%

GRS Retirement Consulting

Disclaimers

- This presentation shall not be construed to provide tax advice, legal advice or investment advice.
- This presentation expresses the views of the author and does not necessarily express the views of Gabriel, Roeder, Smith & Company.

GRS Retirement Consulting