



Vermont Pension Investment Committee

# Economic Assumption Review

July 1, 2014 through June 30, 2019

October 2020 / Matt Strom / Kathy Riley

# Actuarial Certification

This experience study of the Vermont Retirement Systems for the five year period ending June 30, 2019 was prepared in accordance with generally accepted actuarial principles and practices. This study was completed at the request of the Board to review and update, as necessary, the assumptions used in the actuarial valuation. This document should not be shared, copied or quoted, in whole or in part, without the consent of Segal, except to the extent otherwise required by law.

The census information on which this experience study was based was prepared by the Office of the State Treasurer for use in the annual valuations.

The actuarial calculations were directed under the supervision of Kathleen Riley, FSA, MAAA, EA, and Matthew Strom, FSA, MAAA, EA. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this experience study is complete and accurate. Further, in our opinion, the recommended assumptions are reasonably related to the experience of and the expectations for the System.

# Agenda

Overview

Summary of Recommended Assumptions

Cost Impact

Analysis

# Overview: Purpose of an Experience Study

**An experience study provides the basis for developing recommended assumptions to be used in the annual actuarial valuation**

- Performed on a periodic basis, typically every five years
- Last review of certain economic assumptions (investment return, inflation, and COLA) prepared in 2017

**Actuarial Standards of Practice No. 27 and 35 provide guidance on best practices for performing assumption-setting analysis**

- Each assumption should be “reasonable”

**Segal’s role is to make appropriate recommendations to the Board for each assumption**

- The assumptions are the Board’s assumptions and the Board can adopt all, none, or some of the recommendations of the actuary

# Overview: Actuarial Assumptions

## Economic

- Inflation
- Investment return
- Salary increase
- Payroll growth
- COLA

## Demographic

- Death after retirement
- Death in active service
- Retirement
- Termination
- Disability

Actuaries make assumptions as to when and why a member will leave active service and estimate the amount, duration and present value of the pension benefits paid.

# Summary of Economic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Inflation	2.50%	2.30%	N/A
Investment Return	7.50%	7.15% <sup>1</sup>	Increase
Salary Scale	Merit/seniority rates (including productivity) based on age plus inflation	Minor increases to the merit and seniority (and productivity) portion of individual salary increases based on years from hire plus the revised inflation assumption	Slight Increase
Payroll Growth	3.50%	No change	N/A
COLA	2.55% for Groups A/C/D and Group F members who retired before July 1, 2008; 1.40% for Group F members who retired after July 1, 2008	2.40% for Groups A/C/D and Group F members who retired before July 1, 2008; 1.35% for Group F members who retired after July 1, 2008	Slight Decrease

<sup>1</sup> A range of reasonable investment return assumptions was first identified (7.00% to 7.25%). Within the reasonable range, 7.15% was proposed because it results in a similar confidence level as the current assumption when last studied. However, we believe that choosing the lowest end of the reasonable range, and, therefore, increasing the associated confidence level, is preferable. During the discussions regarding this and related presentations, it was also noted that the target asset allocation on which our analysis was based had not yet been reached and would not be reached for several years. As a result, all Boards, including VPIC, approved an investment return assumption of 7.00%.

# VSEERS Cost Impact

(Based on the June 30, 2019 Actuarial Valuation)

Description	Current Assumptions	All Proposed Demographic Assumptions	All Proposed Demographic and Economic Assumptions Including 7.00%
Actuarial Accrued Liability	\$2,780.0M	\$2,846.1M	\$2,996.8M
<i>Change from prior column</i>		<i>+66.1M</i>	<i>+150.7M</i>
<i>Cumulative change</i>		<i>+66.1M</i>	<i>+216.8M</i>
Actuarial Value of Assets	\$1,964.5M	\$1,964.5M	\$1,964.5M
Unfunded Actuarial Accrued Liability	\$815.5M	\$881.6M	\$1,032.3M
Funded Percentage	70.7%	69.0%	65.6%
<i>Change from prior column</i>		<i>-1.7%</i>	<i>-3.4%</i>
<i>Cumulative change</i>		<i>-1.7%</i>	<i>-5.1%</i>
Normal Cost	\$53.2M	\$59.3M	\$67.7M
<i>Change from prior column</i>		<i>+6.1M</i>	<i>+8.4M</i>
<i>Cumulative change</i>		<i>+6.1M</i>	<i>+14.5M</i>
Actuarially Determined Contribution for FY 2021	\$83.9M	\$95.8M	\$113.6M
<i>Change from prior column</i>		<i>+11.9M</i>	<i>+17.8M</i>
<i>Cumulative change</i>		<i>+11.9M</i>	<i>+29.7M</i>

# VSTRS Cost Impact

(Based on the June 30, 2019 Actuarial Valuation)

Description	Current Assumptions	All Proposed Demographic Assumptions	All Proposed Demographic and Economic Assumptions Including 7.00%
Actuarial Accrued Liability	\$3,505.3M	\$3,641.6M	\$3,831.5M
<i>Change from prior column</i>		+136.3M	+189.9M
<i>Cumulative change</i>		+136.3M	+326.2M
Actuarial Value of Assets	\$1,950.9M	\$1,950.9M	\$1,950.9M
Unfunded Actuarial Accrued Liability	\$1,554.5M	\$1,690.7M	\$1,880.6M
Funded Percentage	55.7%	53.6%	50.9%
<i>Change from prior column</i>		-2.1%	-2.7%
<i>Cumulative change</i>		-2.1%	-4.8%
Normal Cost	\$40.8M	\$60.9M	\$69.2M
<i>Change from prior column</i>		+20.1M	+8.3M
<i>Cumulative change</i>		+20.1M	+28.4M
Actuarially Determined Contribution for FY 2021	\$135.6M	\$168.1M	\$186.4M
<i>Change from prior column</i>		+32.5M	+18.3M
<i>Cumulative change</i>		+32.5M	+50.8M



# VMERS Cost Impact

## (Based on the June 30, 2019 Actuarial Valuation)

Description	Current Assumptions	All Proposed Demographic Assumptions	All Proposed Demographic and Economic Assumptions Including 7.00%
Actuarial Accrued Liability	\$896.3M	\$901.4M	\$937.3M
<i>Change from prior column</i>		+5.1M	+35.9M
<i>Cumulative change</i>		+5.1M	+41.0M
Actuarial Value of Assets	\$718.3M	\$718.3M	\$718.3M
Unfunded Actuarial Accrued Liability	\$178.0M	\$183.1M	\$218.9M
Funded Percentage	80.1%	79.7%	76.6%
<i>Change from prior column</i>		-0.4%	-3.1%
<i>Cumulative change</i>		-0.4%	-3.5%
Normal Cost	\$32.8M	\$32.6M	\$34.7M
<i>Change from prior column</i>		-0.2M	+2.1M
<i>Cumulative change</i>		-0.2M	+1.9M
Actuarially Determined Contribution for FY 2021	\$22.6M	\$23.0M	\$27.0M
<i>Change from prior column</i>		+0.4M	+4.0M
<i>Cumulative change</i>		+0.4M	+4.4M

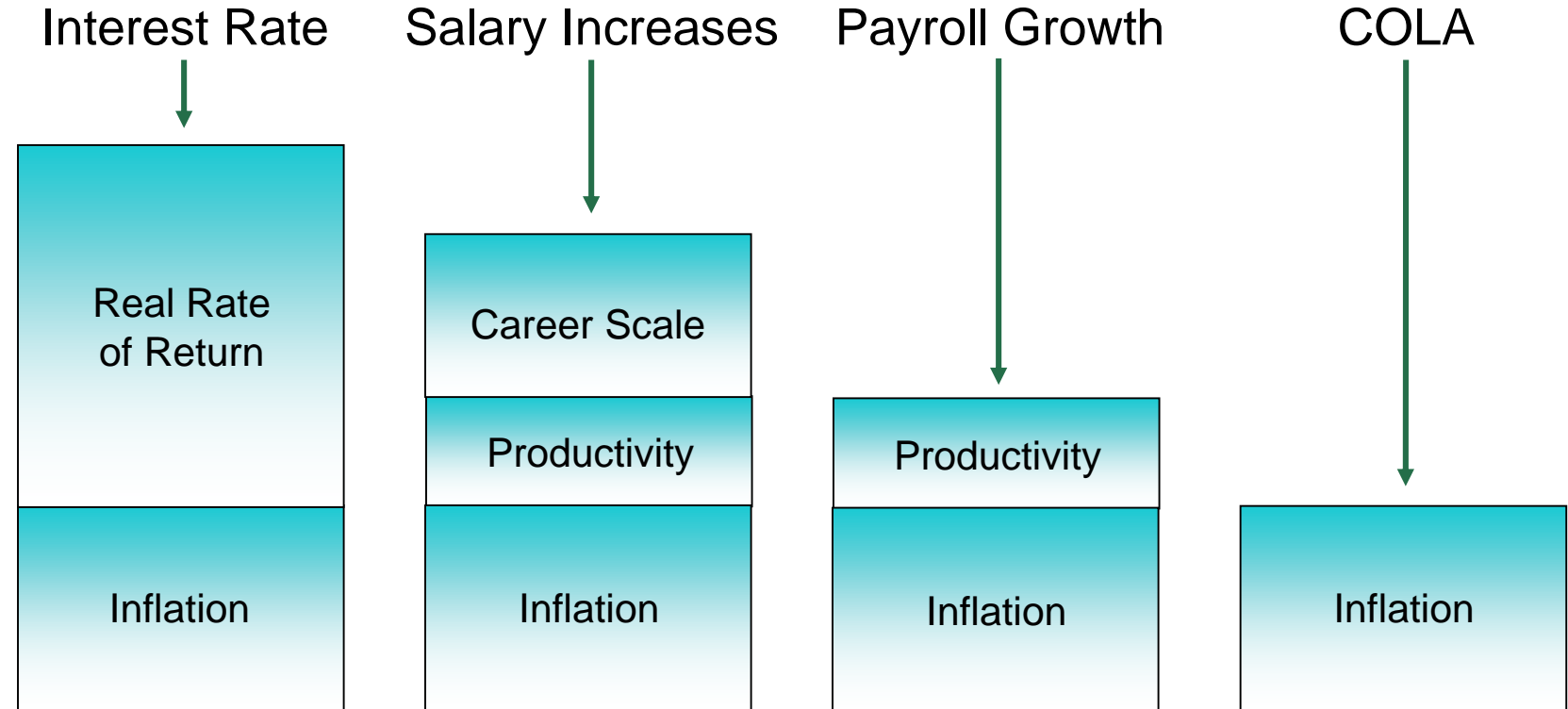
# VMERS Cost Impact

## (Based on the June 30, 2019 Actuarial Valuation)

Description	Current Assumptions	All Proposed Demographic Assumptions	All Proposed Demographic and Economic Assumptions Including 7.00%
<b>Total</b> – Actuarially Determined Contribution Rate for FY 2021	7.039%	7.143%	8.407%
<i>Change from prior column</i>		+0.104%	+1.264%
<i>Cumulative change</i>		+0.104%	+1.368%
<b>Group A</b> – Actuarially Determined Contribution Rate for FY 2021	3.898%	4.309%	5.375%
<i>Change from prior column</i>		+0.411%	+1.066%
<i>Cumulative change</i>		+0.411%	+1.477%
<b>Group B</b> – Actuarially Determined Contribution Rate for FY 2021	7.083%	7.135%	8.280%
<i>Change from prior column</i>		+0.052%	+1.145%
<i>Cumulative change</i>		+0.052%	+1.197%
<b>Group C</b> – Actuarially Determined Contribution Rate for FY 2021	9.807%	9.440%	11.125%
<i>Change from prior column</i>		-0.367%	+1.685%
<i>Cumulative change</i>		-0.367%	+1.318%
<b>Group D</b> – Actuarially Determined Contribution Rate for FY 2021	12.554%	13.346%	15.381%
<i>Change from prior column</i>		+0.792%	+2.035%
<i>Cumulative change</i>		+0.792%	+2.827%

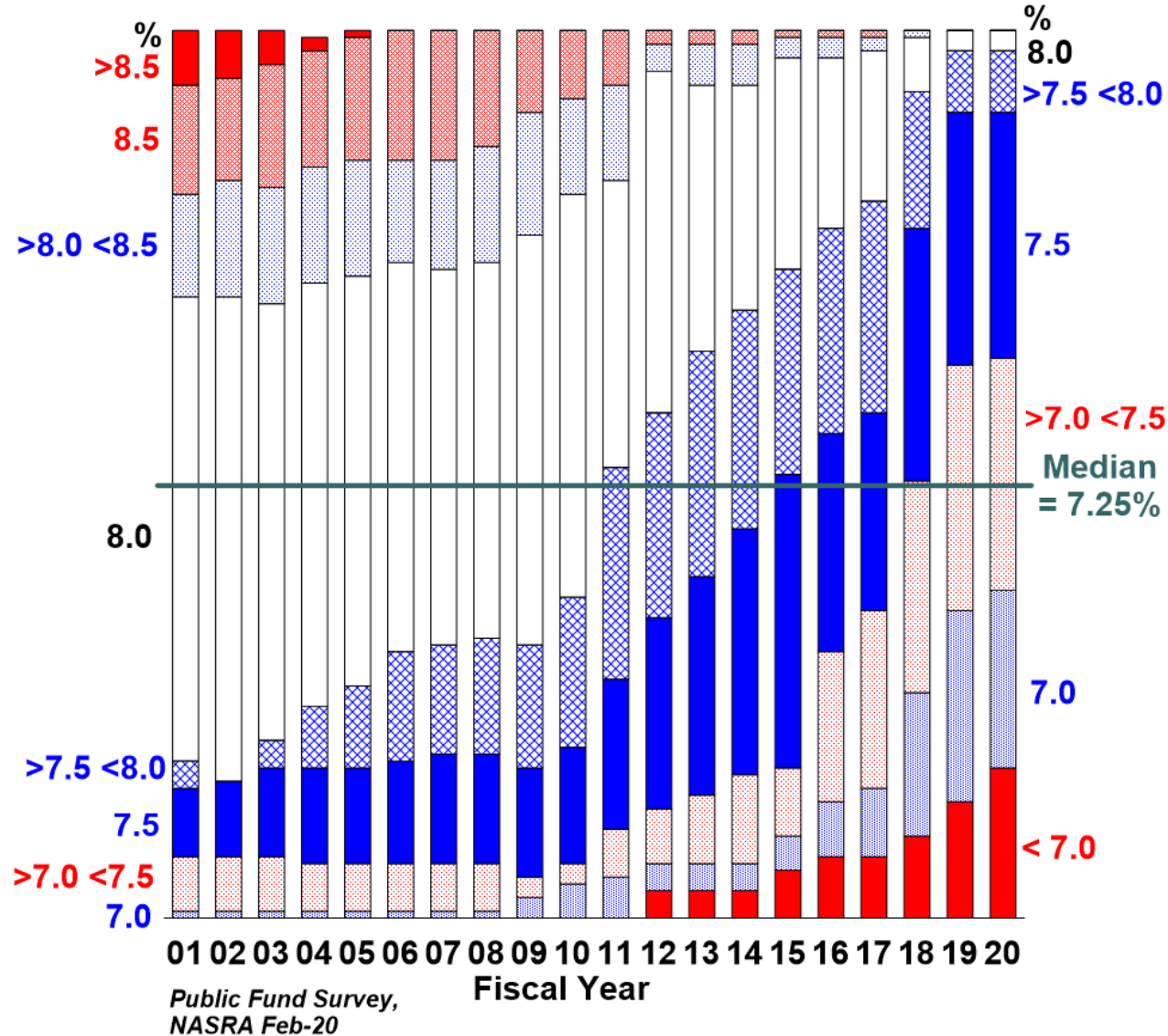
# Basis for Setting Economic Assumptions

**Each economic assumption has 2 or 3 components**



Each component should be consistent across all economic assumptions, but may include a provision for adverse deviation.

# Distribution of Historical Return Assumptions



Since 2001, the median investment return assumption has been moving downward and this trend is expected to continue as more systems complete experience review cycles.

# Assumed Rate of Inflation

**Inflation represents the annual increase in the cost of living**

**The current inflation assumption is 2.50%**

- Inflation is a component of the following economic assumptions:
  - Investment return
  - Individual salary increases and payroll growth
  - Cost-of-living-adjustments

**Segal's recommendation is to lower the assumption from 2.50% to 2.30%, based on:**

- The average 20-year inflation assumption from the 2019 Horizon Survey of Capital Market Expectations is 2.29%;
- The market's expectation of inflation is similar over 20-year and 30-year time horizons; and
- The Philadelphia Federal Reserve Bank Survey of Professional Forecasters 10-year outlook (2.20%) is consistent with the 10-year average from the Horizon Survey (2.21%).

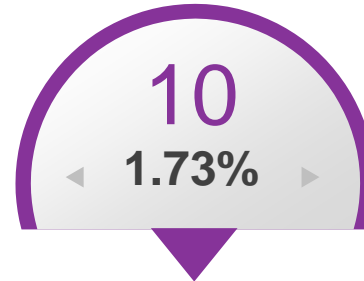
# Assumed Rate of Inflation (*continued*)

**As of June 30, 2019, the historical national inflation (CPI-U) averages are:**



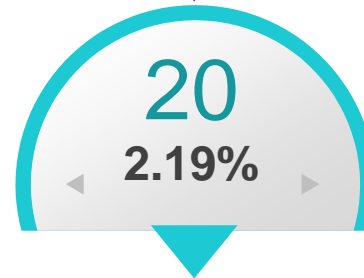
**5-year Average**

The most recent 5-year average increase in CPI-U is 1.45%



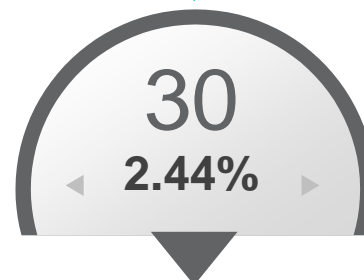
**10-year Average**

The most recent 10-year average increase in CPI-U is 1.73%



**20-year Average**

The most recent 20-year average increase in CPI-U is 2.19%



**30-year Average**

The most recent 30-year average increase in CPI-U is 2.44%

# Assumed Rate of Inflation (*continued*)

**In addition to historical inflation, other metrics to consider are current market expectations and estimates from professional forecasters and economists**

**By observing the difference between the yields on US Treasury bonds with and without inflation indexing, we can calculate the rate of inflation that investors expect. As of June 2019, the yields on 10-year, 20-year, and 30-year Treasury bonds were as follows:**

	<b>10-Year</b>	<b>20-Year</b>	<b>30-Year</b>
Non-inflation indexed:	2.07%	2.36%	2.57%
Inflation indexed:	0.37%	0.59%	0.79%
Delta:	1.70%	1.77%	1.78%

- The differences ranging between 1.70% to 1.78% represent the financial market's current expectations of inflation over the next 10 to 30 years

# Assumed Rate of Inflation (*continued*)

Source	10-Year	20-Year
Federal Reserve Bank of Philadelphia Fourth Quarter 2019 Survey of Professional Forecasters	2.20%	
2019 Horizon Survey of Capital Market Expectations	2.21%	2.29%
NEPC	2.25%*	
Segal Marco Advisors	2.00%	2.00%

\*2.25% is the 2019 NEPC 5-7 year inflation assumption

We recommend that the Board lower the inflation assumption from 2.50% to 2.30%



# Assumed Rate of Investment Return

**The investment return is a principal assumption used in any actuarial valuation and is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plan**

**The current investment return assumption of 7.50% consists of three components:**

- Inflation\*: 2.50%
- Real rate of return: 5.05%
- Adjustment for conservatism: (0.05%)

**Our approach is to analyze inflation and real return separately**

\*The proposed inflation assumption is 2.30%

# Basis for Expected Real Rate of Return

## **We have based our analysis of the expected real rate of return on the Horizon Survey of Capital Market Assumptions (2019 Edition)**

- This survey compiles and averages the capital market assumptions of 34 investment consultants (including NEPC and Segal Marco Advisors)
  - 16 respondents provided assumptions for “long term”, or 20 years
- Expected arithmetic returns are used to determine the expected returns by asset class
- The 20-year expected geometric portfolio real rate of return was generated from the 50<sup>th</sup> percentile of 5,000 simulated portfolio return trials

# Geometric Real Rate of Return

	Asset Class	20-Year Horizon Annual Arithmetic Real Return	Target Allocation <sup>1</sup>	Weighted Real Return
Equity	US Large Cap	6.05%	11.63%	0.70%
	US Small Cap	7.23%	10.63%	0.77%
	International Developed	7.01%	14.59%	1.02%
	Emerging Markets	9.38%	6.15%	0.58%
	Private Equity	10.53%	10.00%	1.05%
Fixed/Alternative	US Core	2.17%	20.00%	0.43%
	International Debt Emerging	4.47%	4.00%	0.18%
	TIPS	1.40%	3.00%	0.04%
	Real Estate	5.65%	8.00%	0.45%
	Hedge Funds	4.32%	10.00%	0.43%
	Infrastructure	6.17%	2.00%	0.12%
	<b>Total</b>		<b>100%</b>	<b>5.79%</b>
	Adjustment to Geometric			(0.54%)
	<b>Geometric Real Rate of Return<sup>2</sup></b>			<b>5.25%</b>

<sup>1</sup> Several equity classes include a portion of the target allocation to Global Equity.

<sup>2</sup> Geometric Real Rate of Return is the compounded 50<sup>th</sup> percentile return over 20 years. Arithmetic returns represent the expected return for a single year. Geometric returns take into account year-over-year compounding over the 20 year period.

# Adjustment for Current Market Outlook

**From 2019 to 2020, the investment market outlook changed and many investment consultants lowered their expectations**

- Capital market assumptions from the Horizon Survey are aggregated based on investment consultant expectations from Q1 2019
- As an example, using VPIC's target allocation, the change in 50th percentile return based on Segal Marco Advisors capital market assumptions between January 2019 and January 2020 is a decrease of 0.32%
- We recommend an additional downward adjustment to the expected real rate of return to reflect the change in market outlook since early 2019

Geometric real rate of return	5.25%
Less adjustment for update in market outlook from January 2019 to January 2020	<u>(0.30%)</u>
Modified real rate of return	4.95%

# Assumed Rate of Return Alternatives

**Over a 20-year period, the Fund is expected to earn an annual real rate of return of at least 4.95% half of the time**

- Lowering the expected real rate of return to 4.85% will increase the likelihood of meeting the expectation over a 20-year period to 51.3%

Component	Current	50/50: 7.25%	7.15%	7.00%
Inflation	2.50%	2.30%	2.30%	2.30%
Real Rate of Return	5.05%	4.95%	4.95%	4.95%
Adjustment for Adverse Deviation	(0.05%)	(0.00%)	(0.10%)	(0.25%)
Total	7.50%	7.25%	7.15%	7.00%
Confidence Level*	51%	50.0%	51.3%	53.1%

\* The Confidence Level indicates the likelihood that expectations will be met over a 20-year period. An increase in the confidence level indicates that the plan is more likely to meet the expected rate of return.

We recommend that the Board lower the return assumption from 7.50% to 7.15%<sup>1</sup> to maintain a confidence level consistent with how the current assumption was set. A lower assumption such as 7.00% would increase that confidence level to 53.1%.

<sup>1</sup> A range of reasonable investment return assumptions was first identified (7.00% to 7.25%). Within the reasonable range, 7.15% was proposed because it results in a similar confidence level as the current assumption when last studied. However, we believe that choosing the lowest end of the reasonable range, and, therefore, increasing the associated confidence level, is preferable. During the discussions regarding this and related presentations, it was also noted that the target asset allocation on which our analysis was based had not yet been reached and would not be reached for several years. As a result, all Boards, including VPIC, approved an investment return assumption of 7.00%.

