VPIC: Expected Returns

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Capital market assumptions project the portfolio's expected return over the long run:

Capital market assumptions are long term forecasts of investment return and risk (standard deviation) for each asset class, as well as forecasts of correlation with between asset classes. These factors drive the Monte Carlo modeling described above. Many investment managers and consultants release their capital market assumptions on an annual basis, with interim updates when market volatility warrants. Such assumptions are specific to each firm's market outlook and, when applied to a portfolio's asset allocation targets, will show with a level of confidence the expected range of returns that will result if the capital market assumptions come to fruition.

VPIC's current target portfolio, using its current consultant's (RVK) capital market assumptions, is expected to generate a long-term (10-year) return of 6.5%, again, if all of the capital market assumptions in the model come to fruition. VPIC's prior consultant's (NEPC) capital market assumptions led to a bifurcated expected return of 6.7% in the intermediate term (10-year) and a long-term (30 year) of 7.2%. The pension Plans' actuary (Segal) reviewed a representative sample of capital market assumptions throughout the industry and recommended a range of 7%-7.25%.

While there is some dispersion among the different sources of capital market assumptions, there has been a consistent downward trend lower over the past 20 years.

--1/31/21 CIO Report to VPIC

RVK Capital Market Assumptions

- The table below outlines RVK's year-over-year CMA changes for each of the asset classes utilized in our Asset Allocation Study.

	2020 Q1		2021		Change (2020 Q1 - 2021)	
Asset Class	Nominal Return (Arith.)	Risk (St. Dev.)	Nominal Return (Arith.)	Risk (St. Dev.)	Nominal Return (Arith.)	Risk (St. Dev.)
Large/Mid Cap US Equity	7.25%	16.00%	6.00%	16.00%	-1.25%	0.00%
Small Cap US Equity	8.50%	19.00%	6.50%	19.00%	-2.00%	0.00%
Dev'd Large/Mid Cap Int'l Equity	9.00%	17.00%	7.50%	17.00%	-1.50%	0.00%
Dev'd Small Cap Int'l Equity	10.00%	20.00%	8.00%	20.00%	-2.00%	0.00%
Global Equity	8.35%	16.35%	7.05%	16.60%	-1.30%	0.25%
US Aggregate Fixed Income	2.50%	5.00%	2.00%	5.00%	-0.50%	0.00%
Emerging Markets Debt Hard Currency	7.00%	10.00%	5.00%	10.00%	-2.00%	0.00%
TIPS	2.50%	5.50%	1.50%	5.50%	-1.00%	0.00%
Core Real Estate	5.75%	12.50%	5.75%	12.50%	0.00%	0.00%
Non-Core Real Estate	7.75%	22.50%	7.75%	22.50%	0.00%	0.00%
Listed Infrastructure	7.75%	19.00%	6.50%	19.00%	-1.25%	0.00%
Agriculture/Farmland	6.25%	12.00%	6.25%	12.00%	0.00%	0.00%
Private Credit	9.00%	13.00%	6.75%	13.00%	-2.25%	0.00%
Private Equity	10.00%	22.00%	8.75%	22.00%	-1.25%	0.00%
US Inflation	2.00%	1.50%	2.00%	1.50%	0.00%	0.00%
Cash Equivalents	1.50%	2.00%	1.50%	2.00%	0.00%	0.00%

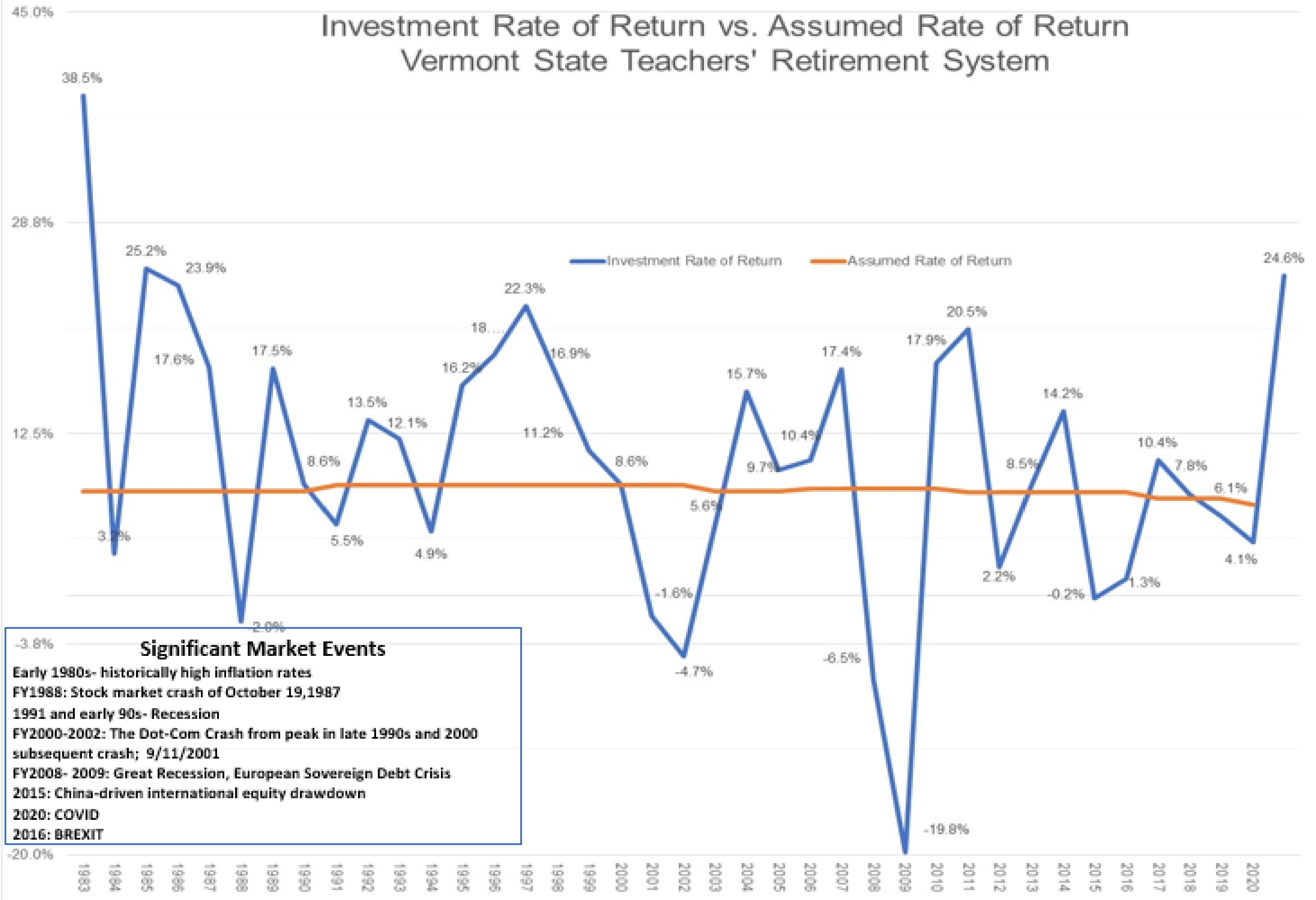
Represents an increase year-over-year.

Represents a decrease year-over-year.

RVK

Asset Class	Target
Growth Assets	
Passive Global Equities	24%
Active Global Equities	5%
Large Cap US Equities	4%
Small/Mid Cap US Equities	3%
Non-US Developed Market Equities	7%
Private Equity	10%
Emerging Market Debt	4%
Private and alternative Credit	10%
Non-Core Real Estate	4%
Total Growth Assets	**71%**
Downturn Hedging Assets	
Core Fixed Income	19%
Total Downturn Hedging	**19%**
Inflation Hedging Assets	
Core Real Estate	4%
US TIPS	3%
Infrastructure/Farmland	3%
Total Inflation Hedging	**10%**
Total	**100%**

Expected Long Term Return	**5.36%**
Risk (Standard Dev)	**10.89%**
Sharpe Ratio	**0.54**



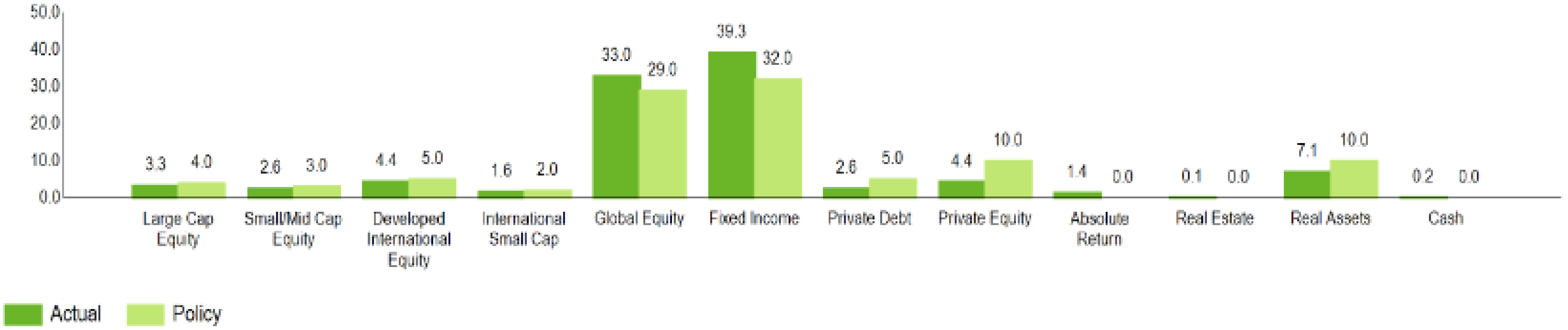
Source: VPIC, historical valuation reports

VPIC Composite

TOTAL FUND PERFORMANCE SUMMARY

	Market Value	3 Mo	Rank	Fiscal YTD	Rank	1 Yr	Rank	3 Yrs	Rank	5 Yrs	Rank	7 Yrs	Rank	10 Yrs	Rank
Total Fund Composite	$4,146,431,059	-10.9%	9	-5.9%	9	-3.2%	13	3.4%	25	3.8%	26	4.2%	89	5.7%	69
Allocation Index		*-12.4%*	*22*	*-7.6%*	*32*	*-4.9%*	*39*	*2.5%*	*61*	*3.2%*	*53*	*4.0%*	*92*	*5.1%*	*92*
Policy Index		*-10.2%*	*5*	*-5.2%*	*6*	*-2.2%*	*7*	*3.4%*	*22*	*3.8%*	*25*	*4.4%*	*81*	*5.4%*	*87*
InvMetrics Public DB < $5 Billion Net Median		*-13.8%*		*-8.4%*		*-5.4%*		*2.7%*		*3.3%*		*5.1%*		*6.1%*	

Actual vs Target Allocation (%)



Goals & Objectives

- The Fund's total return target is 7.5%, compounded annually over the long-term of 30 years based on a 2.5% inflation rate
- Long term policy targets are 43% equity, 32% fixed income, 10% real estate, and 15% private assets

Total Fund Performance

- For the quarter, the Fund returned -10.9%, outperforming the allocation index (+150 bps) and underperforming the policy index (-70 bps)
- For the trailing 1 Year, the Fund returned -3.2%, outperforming the Allocation Index (+170 bps) and underperforming the Policy Index (-100 bps)

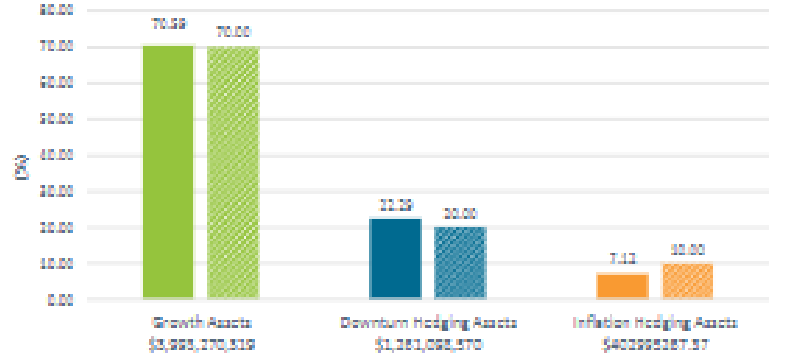
Recent Decisions & Ongoing Activities

- **March 2020:** Approved a new Investment Policy, which includes adding an Active Core Fixed Income manager and eliminating the Short-Term High Quality Fixed Income
- **September 2019:** Approved commitment of $100M to Nuveen Global Agriculture Fund and $25M commitment Pontifax AgTech Fund
- **July 2019:** Approved commitment of $35M to BlueVista V
- **June 2019:** Approved commitment of $75M to BSOPF II
- **April 2019:** Approved commitment of $100M to Dover X and $50M to Siguler Guff SBOF IV
- **March 2019:** Approved a new Investment Policy, adding two new asset classes: Short-Term High Quality Fixed Income and Infrastructure/Farmland

Vermont Pension Investment Committee
Total Fund Dashboard Summary

As of June 30, 2021

Total Fund Asset Allocation (Solid Bar) vs Target (Shaded Bar)



Asset Allocation vs. Target Allocation Differences

Schedule of Investable Assets

Period Ending	Beginning Market Value	+	Net Cash Flow	+	Gain/Loss	=	Ending Market Value	% Return
Quarter	5,374,453,690		-56,484,369		339,394,835		5,657,364,156	6.33

Total Fund Performance

	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	15 Years	2020	Since Incep.	Incep. Date
Total Fund	6.33	8.35	24.62	11.15	10.37	7.57	6.47	13.16	6.70	7/1/2005
Target Allocation Index	4.11	7.12	22.95	10.67	9.78	7.17	6.44	12.51	6.66	
Difference	2.22	1.23	1.67	0.48	0.59	0.40	0.03	0.65	0.04	

Performance by Allocation Bucket

	QTD	CYTD	1 Year	3 Years	5 Years	10 Years	15 Years	2020	Since Incep.	Incep. Date
Growth Assets	8.23	12.71	-	-	-	-	-	-	26.51	9/1/2020
MSCI ACW IM Index (USD) (Net)	7.18	12.68	40.94	14.24	14.55	9.90	7.74	16.25	26.33	
Difference	1.05	0.03	-	-	-	-	-	-	0.18	
Downturn Hedging Assets	1.90	-1.59	-	-	-	-	-	-	-0.83	9/1/2020
Bloomberg US Agg Bond Index	1.83	-1.61	-0.34	5.34	3.03	3.39	4.43	7.51	-1.00	
Difference	0.07	0.02	-	-	-	-	-	-	0.17	
Inflation Hedging Assets	2.14	0.48	-	-	-	-	-	-	0.79	9/1/2020
Consumer Price Index+2.5%	3.21	5.60	8.03	5.11	4.99	4.42	4.51	3.90	6.70	
Difference	-1.07	-5.12	-	-	-	-	-	-	-5.91	

Vermont Pension Investment Committee
Asset Allocation & Performance - Net of Fees

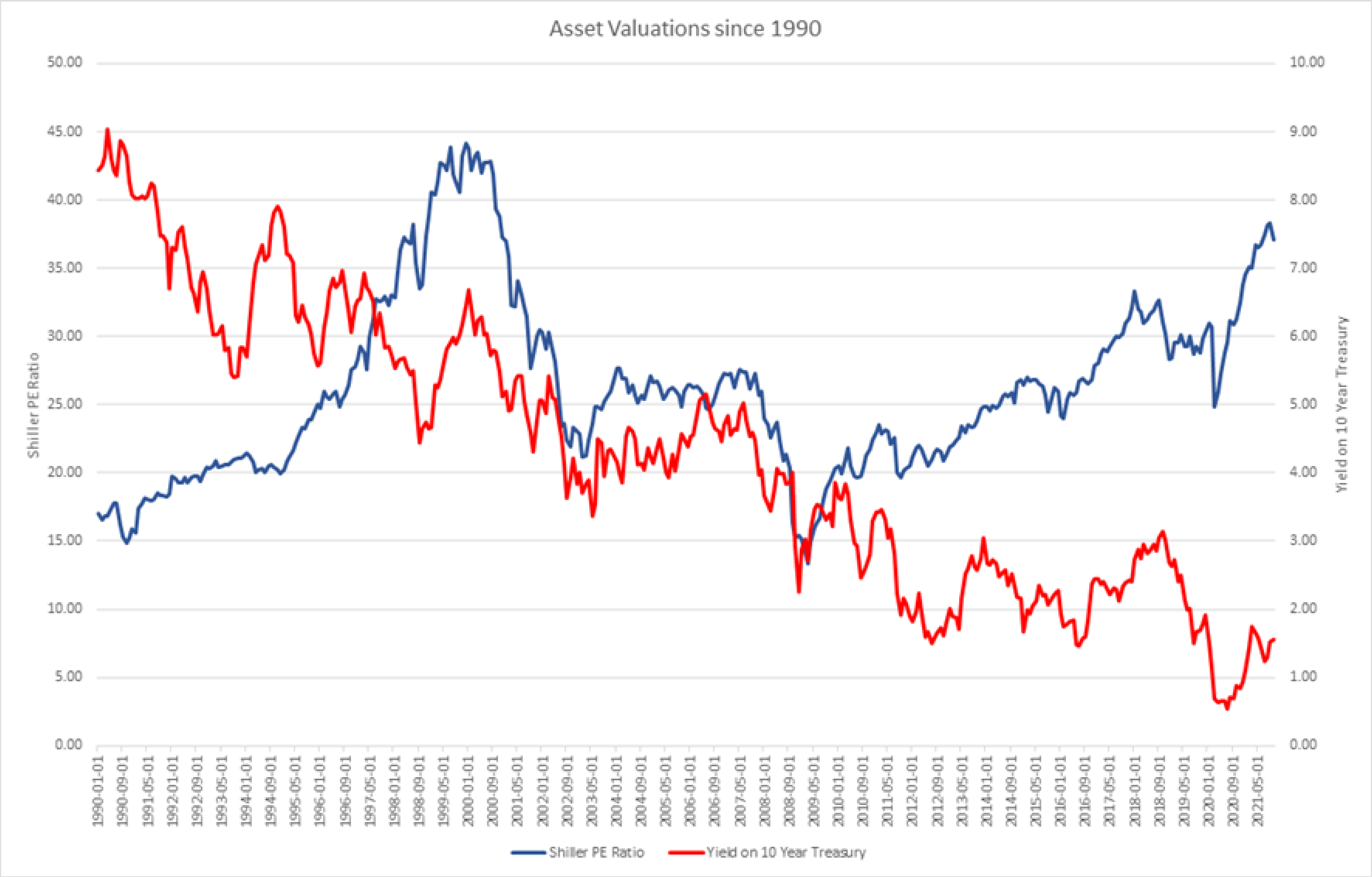
As of September 30, 2021

	Allocation		Performance (%)										
	Market Value ($)	Actual (%)	MTD	QTD	FYTD	1 Year	3 Years	5 Years	10 Years	15 Years	2020	Since Incep.	Inception Date
Total Fund (Combined Plans)	**5,853,282,832**	**100.00**	**-1.58**	**0.95**	**0.95**	**19.75**	**10.56**	**9.86**	**8.50**	**6.25**	**13.16**	**6.66**	**07/01/2005**
Target Allocation Index			-1.35	0.34	0.34	18.91	10.40	9.44	8.20	6.30	12.51	6.68	
Difference			-0.23	0.61	0.61	0.84	0.16	0.42	0.30	-0.05	0.65	-0.02	
Actual Allocation Index			-2.00	-0.11	-0.11	19.20	9.46	9.01	7.98	6.18	11.20	6.54	
Difference			0.42	1.06	1.06	0.55	1.10	0.85	0.52	0.07	1.96	0.12	
Total Fund (VMERS)	**907,977,102**	**15.51**	**-1.68**	**0.87**	**0.87**	**19.41**	**10.37**	**9.78**	**8.47**	**6.31**	**12.95**	**6.76**	**07/01/2005**
Target Allocation Index			-1.35	0.34	0.34	18.91	10.40	9.44	8.20	6.30	12.51	6.68	
Difference			-0.33	0.53	0.53	0.50	-0.03	0.34	0.27	0.01	0.44	0.08	
Actual Allocation Index			-2.03	-0.11	-0.11	18.73	9.43	9.00	7.94	6.16	11.38	6.51	
Difference			0.35	0.98	0.98	0.68	0.94	0.78	0.53	0.15	1.57	0.25	
Total Fund (VSERS)	**2,401,119,946**	**41.02**	**-1.56**	**0.98**	**0.98**	**19.76**	**10.53**	**9.84**	**8.50**	**6.30**	**13.07**	**6.70**	**07/01/2005**
Target Allocation Index			-1.35	0.34	0.34	18.91	10.40	9.44	8.20	6.30	12.51	6.68	
Difference			-0.21	0.64	0.64	0.85	0.13	0.40	0.30	0.00	0.56	0.02	
Actual Allocation Index			-1.98	-0.09	-0.09	19.14	9.58	9.06	7.94	6.09	11.59	6.47	
Difference			0.42	1.07	1.07	0.62	0.95	0.78	0.56	0.21	1.48	0.23	
Total Fund (VSTRS)	**2,544,185,522**	**43.47**	**-1.60**	**0.93**	**0.93**	**19.89**	**10.66**	**9.91**	**8.52**	**6.23**	**13.28**	**6.62**	**07/01/2005**
Target Allocation Index			-1.35	0.34	0.34	18.91	10.40	9.44	8.20	6.30	12.51	6.68	
Difference			-0.25	0.59	0.59	0.98	0.26	0.47	0.32	-0.07	0.77	-0.06	
Actual Allocation Index			-2.01	-0.12	-0.12	19.31	9.72	9.11	7.96	5.97	11.88	6.37	
Difference			0.41	1.05	1.05	0.58	0.94	0.80	0.56	0.26	1.40	0.25	

Returns have been volatile in recent years

During the fiscal year ended June 30, 2021, the VPIC portfolio generated a preliminary investment return of 24.62%, well in excess of our expectations and the 7% actuarial assumed rate of return (AROR). These results stand in stark contrast to last year's 4% return. While 4% fell short of both expectations and the AROR, it was a strong result given the COVID-driven downturn and ranked well above median among our peers. Our strong performance in both FY 2020 and 2021 is testament to the work we have done streamlining and optimizing the portfolio to maximize long-term returns within acceptable levels of risk and liquidity. As important, it also highlights the difficulty in accurately forecasting investment returns. Last year's capital market assumptions, for example, implied an investment return of just over 7%, yet we generated an actual return of 4%. This year's expected return was just under 6%, yet we generated a return of nearly 25%. As we have discussed, our capital market assumptions are not effective forecasters of returns from year to year.

--7/21/21 CIO Report to VPIC



Asset Valuations since 1990
Shiller PE Ratio
Yield on 10 Year Treasury

Four points are relevant as we think about portfolio design and our expectations for future returns.

1.Our capital market assumptions do not represent a budget or forecast for investment returns. Rather, they are the best tools we have, when combined with mean-variance optimization and *Monte Carlo* simulations, for gaining an understanding of how model investment portfolios should perform under a variety of economic scenarios. In contrast, the AROR is simply a discount rate that actuaries use to determine the actuarially determined employer contribution (ADEC). While the two are linked, they are used for entirely different purposes.

2.While investment returns can be volatile from year-to-year, we do not expect the AROR to be so. Making large changes to the AROR based on one year's performance would be imprudent and likely introduce unmanageable volatility into the payment of the ADEC.

3.Capital market assumptions are one input into the establishment of the AROR. The AROR is also informed by recent performance, inflation expectations, and other relevant factors. To the extent that the AROR proves to be either too optimistic or too pessimistic, annual actuarial valuations and periodic actuarial experience studies are designed to calibrate the ADEC along the way to prevent intergenerational inequities in pension funding.

4.Asset valuations are high across most asset classes as measured by most metrics. This implies lower returns going forward. Like forecasting returns, forecasting the timing of a reversion to more normal valuation levels is very difficult. International equities currently have lower valuations than do US equities; however, that may be the case for a very long time. Core bond valuations are high relative to history (and interest rates low); however, that also may be the case for a very long time.

--7/21/21 CIO Report to VPIC