Office of the Vermont State Treasurer

Review of 2021 Valuation Reports

Presentation to the
Pension Benefits, Design, and Funding Task Force

November 3, 2021

Purpose of the Annual Valuation

- To set or assess the adequacy of the retirement system to pay current and future retirement benefits.

- To assure intergenerational equity in the allocation of costs.

- Outputs:
  - Calculate the actuarially accrued liabilities
  - Calculate the actuarial value of assets
  - Calculate the funding status
  - Determine the Actuarially Determined Employer Contribution (ADEC)
  - Identify Gains and Losses: Review annual experience and compare against current actuarial assumptions
  - Review within the context of the statutorily established funding policy (amortization period)
  - Assess risks to the pension system

- Closed System
  - Estimate of a plan's financial position as of the valuation date
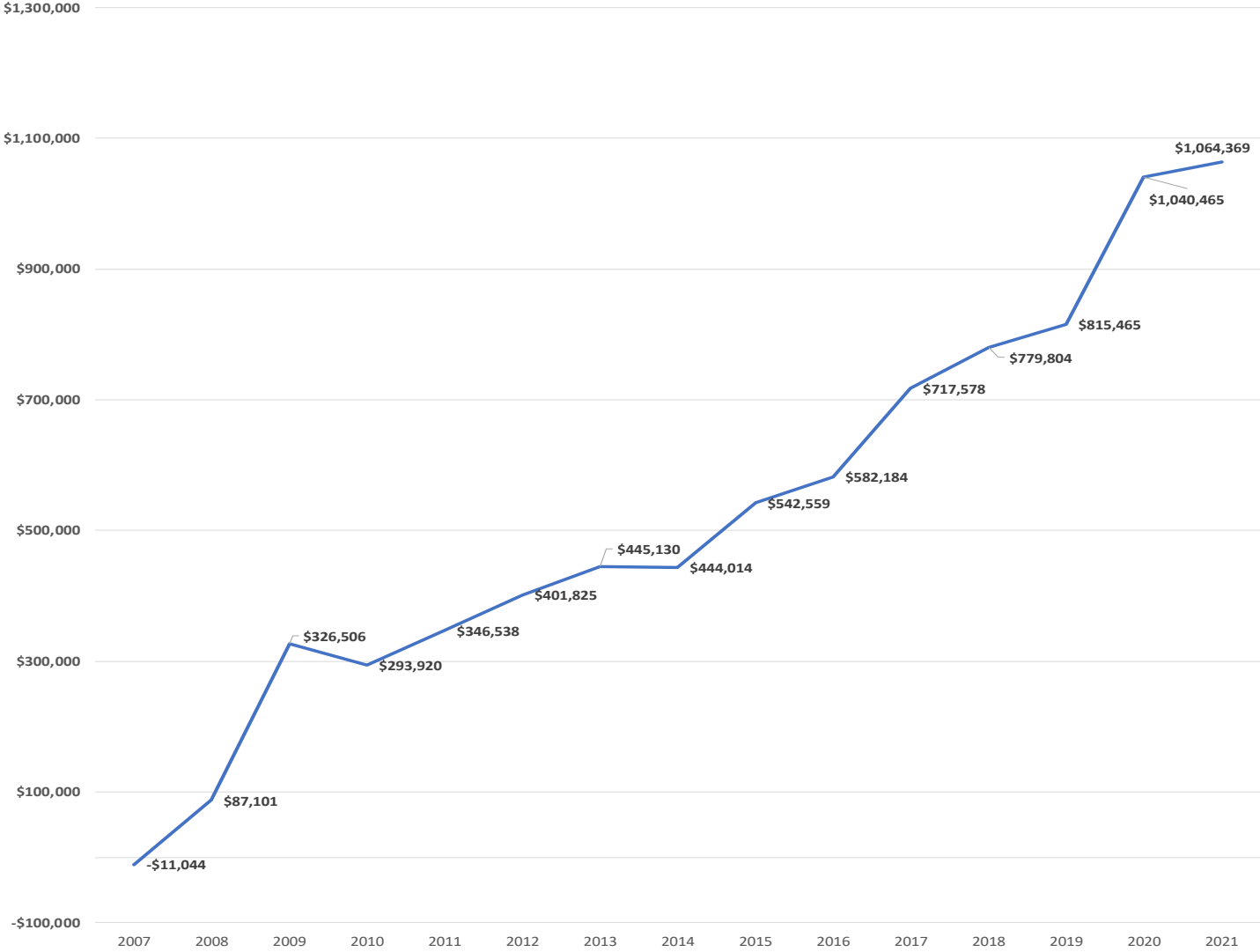 - Snapshot

Experience Studies

- "<u>Assumptions are used to estimate a plan's future benefit payments and their present value and do not determine outcomes.</u>"

    - Segal Group

- Outcomes are determined by actual member behavior, benefit provisions, actual contributions, and investment income.

- Actuarial assumptions do, however, provide a way to project future liabilities and assets for decision-making purposes.

- The reliability of an actuarial valuation depends on the use of reasonable methods and assumptions.

- Experience studies are used to "true up" these assumptions to keep them reasonable in a changing environment.

- Best practices recommend that experience studies be conducted no less frequently than every five years.

- Vermont statute now requires experience studies to be completed every three years.

Funding Progress of the VSERS Retirement System - (Amounts in Thousands)

Year ending June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a) (in thousands)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b-a)/c)
2021	$ 2,216,499	$ 3,280,868	1,064,369	**67.6%**	$ 552,317	192.7%
2020	2,054,826	3,095,291	1,040,465	66.4%	551,981	188.5%
2019	1,964,501	2,779,966	815,465	70.7%	527,571	154.6%
2018	1,881,805	2,661,609	779,804	70.7%	521,671	149.5%
2017	1,793,795	2,511,373	717,578	71.4%	504,553	142.2%
2016	1,707,268	2,289,452	582,184	74.6%	471,268	123.5%
2015	1,636,268	2,178,827	542,559	75.1%	462,057	117.4%
2014	1,566,076	2,010,090	444,014	77.9%	437,676	101.4%
2013	1,469,170	1,914,300	445,130	76.8%	416,766	106.8%
2012	1,400,779	1,802,604	401,825	77.7%	385,526	104.2%
2011	1,348,763	1,695,301	346,538	79.6%	398,264	87.0%
2010	1,265,404	1,559,324	293,920	81.2%	393,829	74.6%
2009	1,217,638	1,544,144	326,506	78.9%	404,516	80.7%
2008	1,377,101	1,464,202	87,101	94.1%	404,593	21.5%
2007	1,318,687	1,307,643	(11,044)	100.8%	386,917	-2.9%
2006	1,223,323	1,232,367	9,044	99.3%	369,310	2.4%
2005	1,148,908	1,174,796	25,888	97.8%	349,258	7.4%
2004	1,081,359	1,107,634	26,275	97.6%	336,615	7.8%
2003	1,025,469	1,052,004	26,535	97.5%	319,855	8.3%
2002	990,450	1,017,129	26,679	97.4%	300,994	8.9%
2001	954,821	1,026,993	72,172	93.0%	278,507	25.9%
2000	895,151	967,064	71,913	92.6%	266,519	27.0%
1999	804,970	876,412	71,442	91.8%	238,281	30.0%
1998	733,716	804,501	70,785	91.2%	235,956	30.0%
1997	639,128	753,883	114,755	84.8%	227,000	50.6%

VSERS ENDING FY UNFUNDED LIABILITY by YEAR

(1000s)

Year	Value
2007	-$11,044
2008	$87,101
2009	$326,506
2010	$293,920
2011	$346,538
2012	$401,825
2013	$445,130
2014	$444,014
2015	$542,559
2016	$582,184
2017	$717,578
2018	$779,804
2019	$815,465
2020	$1,040,465
2021	$1,064,369

VSERS - Scope of the Challenge (Dollars in Millions)

	2019 Valuation* 2021 budget	Estimated Results based on Experience Study	2020 Valuation ** 2022 budget	Add 2021 Valuation*** 2023 budget
Unfunded Liability	$815.5	$1,032.3	$1,040.5	$1,064.4
change		$216.8	$225.0	$248.9
ADEC	$83.9	$113.6	$119.9	$125.9
change		$29.7	$36.0	$42.0

* Used to develop FY2021 budget

** Impacts the FY2022 budget

***Impacts the FY2023 budget

Variances due to rounding

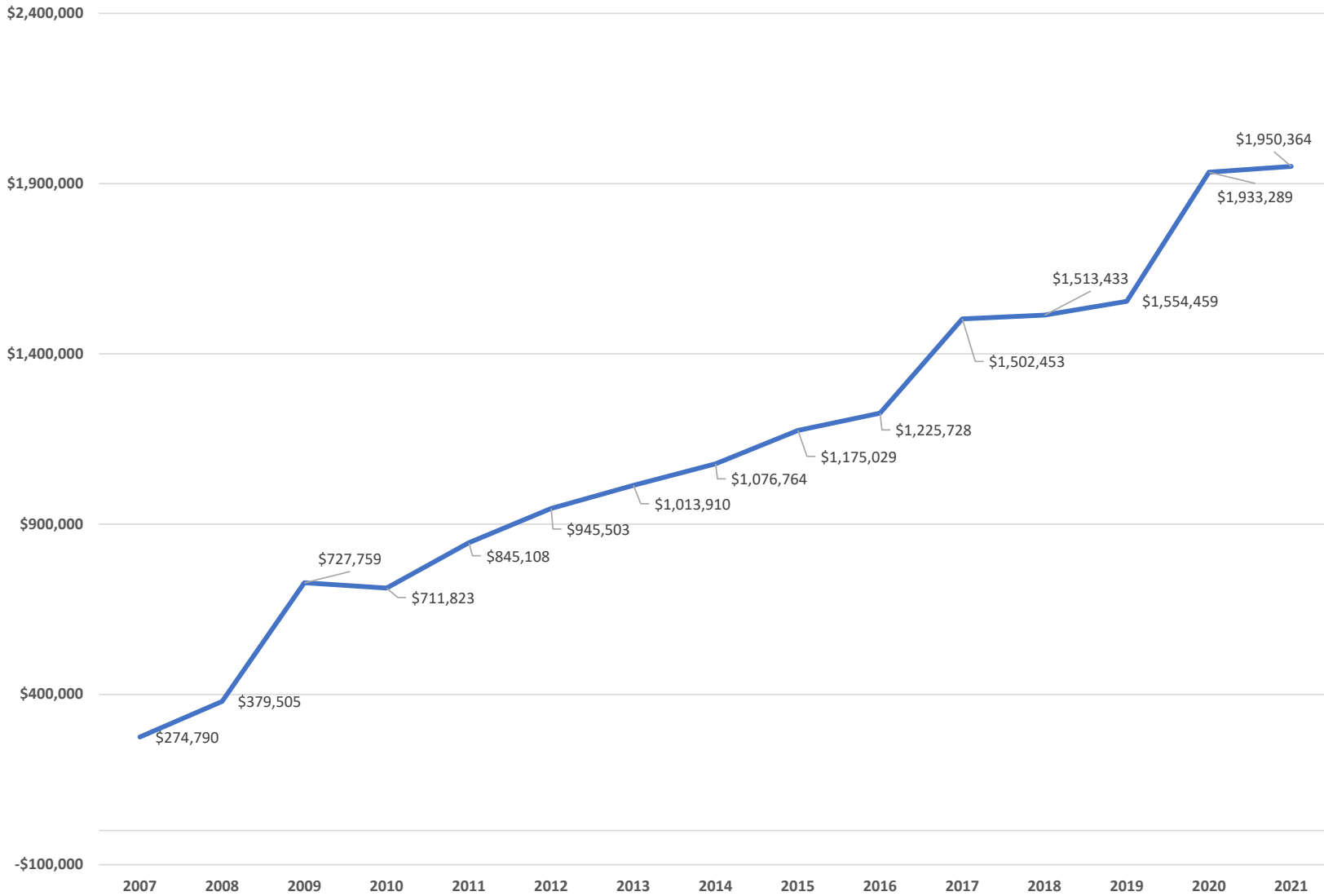## Funding Progress of the VSTRS Retirement System - (Amounts in Thousands)

Year ending June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a) (in thousands)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b-a)/c)
2021	$ 2,191,651	$ 4,142,015	$ 1,950,364	52.9%	$ 657,935	296.4%
2020	2,035,714	3,969,003	1,933,289	51.3%	645,903.0	299.3%
2019	1,950,860	3,505,319	1,554,459	55.7%	624,908.0	248.8%
2018	1,866,121	3,379,554	1,513,433	55.2%	612,899	246.9%
2017	1,779,592	3,282,045	1,502,453	54.2%	607,355	247.4%
2016	1,716,296	2,942,024	1,225,728	58.3%	586,397	209.0%
2015	1,662,346	2,837,375	1,175,029	58.6%	557,708	210.7%
2014	1,610,286	2,687,049	1,076,764	59.9%	567,074	189.9%
2013	1,552,924	2,566,834	1,013,910	60.5%	563,623	179.9%
2012	1,517,410	2,462,913	945,503	61.6%	561,179	168.5%
2011	1,486,698	2,331,806	845,108	63.8%	547,748	154.3%
2010	1,410,368	2,122,191	711,823	66.5%	562,150	126.6%
2009	1,374,079	2,101,838	727,759	65.4%	561,588	129.6%
2008	1,605,462	1,984,967	379,505	80.9%	535,807	70.8%
2007	1,541,860	1,816,650	274,790	84.9%	515,573	53.3%
2006	1,427,393	1,686,502	259,109	84.6%	499,044	51.9%
2005	1,354,006	1,492,150	138,144	90.7%	468,858	29.5%
2004	1,284,833	1,424,661	139,828	90.2%	453,517	30.8%
2003	1,218,001	1,358,822	140,821	89.6%	437,239	32.2%
2002	1,169,294	1,307,202	137,908	89.5%	418,904	32.9%
2001	1,116,846	1,254,341	137,495	89.0%	403,258	34.1%
2000	1,037,466	1,174,087	136,621	88.4%	387,999	35.2%
1999	931,056	1,065,754	134,698	87.4%	372,299	36.2%
1998	821,977	955,694	133,717	86.0%	357,899	37.4%

Reflects different actuarial method that overstated funded ratio

VSTRS ENDING FY UNFUNDED LIABILITY by YEAR

(1000s)

Year	Value
2007	$274,790
2008	$379,505
2009	$727,759
2010	$711,823
2011	$845,108
2012	$945,503
2013	$1,013,910
2014	$1,076,764
2015	$1,175,029
2016	$1,225,728
2017	$1,502,453
2018	$1,513,433
2019	$1,554,459
2020	$1,933,289
2021	$1,950,364

VSTRS - Scope of the Challenge (Dollars in Millions)

	2019	Estimated	2020	Add 2021
Unfunded Liability	$1,554.0	$1,880.0	$1,933.3	$1,950.4
change		$326.0	$379.3	$396.4
ADEC	$135.6	$186.4	$196.2	$205.2
change		$50.8	$60.6	$69.6

* Used to develop FY2021 budget

** Impacts the FY2022 budget

***Impacts the FY2023 budget

Variances due to rounding

Actuarial Gains and Losses
Key Points

- A pension plan has actuarial gains or losses each year.
  - Actual events during the year ("experience") do not exactly match the long-term assumptions previously made.

- Economic gains/losses:
  - The actual investment returns, cost of living, or inflation were higher or lower than anticipated.

- Experience and demographic gains or losses:
  - Mortality, Salary Increases, Termination, Staff Turnover, Retirement.

- An Experience Study is completed to reset assumptions.

- Patterns of gains/losses exist in both VSERS and VSTRS (see next slides).

- While gains and losses are measured against assumptions, it is actual performance (economic and demographic) that drives the liabilities.

- Per Segal: "Assumptions are used to estimate a plan's future benefit payments and their present value and do not determine outcomes."

Components of Change in the Unfunded Actuarial Liability - VSERS			
Category	Cumulative 2011-2020	Valuation 2021	Cumulative 2011-2021
Beginning FY Unfunded liability	$293,920,094		$293,920,094
Changes in Actuarial Assumptions	489,354,525	-	489,354,525
Changes in System Provisions	22,252	-	22,252
Incorporation of Temp Salary Decreases	-	-	-
Change in employee contribution rate	(2,610,261)	-	(2,610,261)
Expected adj. not incl. assumption/benefit changes	(79,843,570)	12,683,164	(67,160,406)
Other expense (gain)/loss	9,482,240	-	9,482,240
Salary experience (gain)/loss	95,627,506	4,448,937	100,076,443
COLA experience (gain)/loss	(110,469,758)	35,588,639	(74,881,119)
Net Turnover (new members, terminations)	61,630,140	(3,446,914)	58,183,226
Investment (gain)/Loss	56,205,931	(52,180,733)	4,025,198
Mortality (gain)/loss	40,657,045	4,440,365	45,097,410
Retirements (gain)/loss	97,520,027	19,015,951	116,535,978
Disability experience (gain)/loss	2,357,312	158,342	2,515,654
Other (gain)/loss	86,611,636	3,195,329	89,806,965
Ending FY Unfunded Liability	$1,040,465,119		$1,064,368,199

Components of Change in the Unfunded Actuarial Liability - VSTRS			
Category	Cumulative 2011-2020	Valuation 2021	Cumulative 2011-2020
Beginning FY Unfunded liability	$711,823,061		711,823,061
Changes in Actuarial Assumptions	783,238,313	-	783,238,313
Changes in System Provisions	-	-	-
Incorporation of Temp Salary Decreases	-	-	-
Change in employee contribution rate	-	-	-
Expected adj. not incl. assumption/benefit changes	(5,786,660)	29,161,309	23,374,649
Other expense (gain)/loss	(663,448)	6,407,934	5,744,486
Salary experience (gain)/loss	(125,779,835)	(9,493,027)	(135,272,862)
COLA experience (gain)/loss	(88,185,397)	22,593,555	(65,591,842)
Net Turnover (new members, terminations)	319,901,420	10,518,767	330,420,187
Investment (gain)/Loss	52,038,767	(57,785,688)	(5,746,921)
Mortality (gain)/loss	20,000,804	(1,761,346)	18,239,458
Retirements (gain)/loss	162,532,393	16,872,089	179,404,482
Disability experience (gain)/loss	2,670,773	560,942	3,231,715
Other (gain)/loss			-
Contribution Shortfall incl. Health Care Appropriation	101,499,179	-	101,499,179
Ending FY Unfunded Liability	$1,933,289,370		$1,950,363,905

Note: From 2011 through 2021, investments, combined for both VSERS and VSTRS, are a net gain, slightly exceeding the assumed rate of return.

Investments

Managed by The Vermont Pension Investment Commission (VPIC)
Key Points

- Investments are a significant contribution to the pension fund.
    - Roughly 60-62% of each dollar paid to retirees is from investment income.

- Investments are volatile and subject to market conditions.
    - Long-Term View

- Investment performance has met the assumed rate of return.
    - FY2021 return: 24.62% (highest return percentage since the 1980s).
    - Combined interest earnings (state, teachers, and municipal plan) of over $1.14 billion.

- Good news, but….
    - **Investments alone cannot solve the unfunded liability!**

- Investment results are "smoothed," theoretically so as to avoid peaks and valleys in appropriations (ADEC). Stabilizes contribution levels.

- VPIC's assumed rate of return is in line with other public pension funds.

- VPIC sets the smoothing period - 5 years. Is in line with other states.

Note: VPIC Chair and Chief Investment Officer can provide additional information

Investment Rate of Return vs. Assumed Rate of Return
Vermont State Teachers' Retirement System

Legend: Investment Rate of Return — Assumed Rate of Return
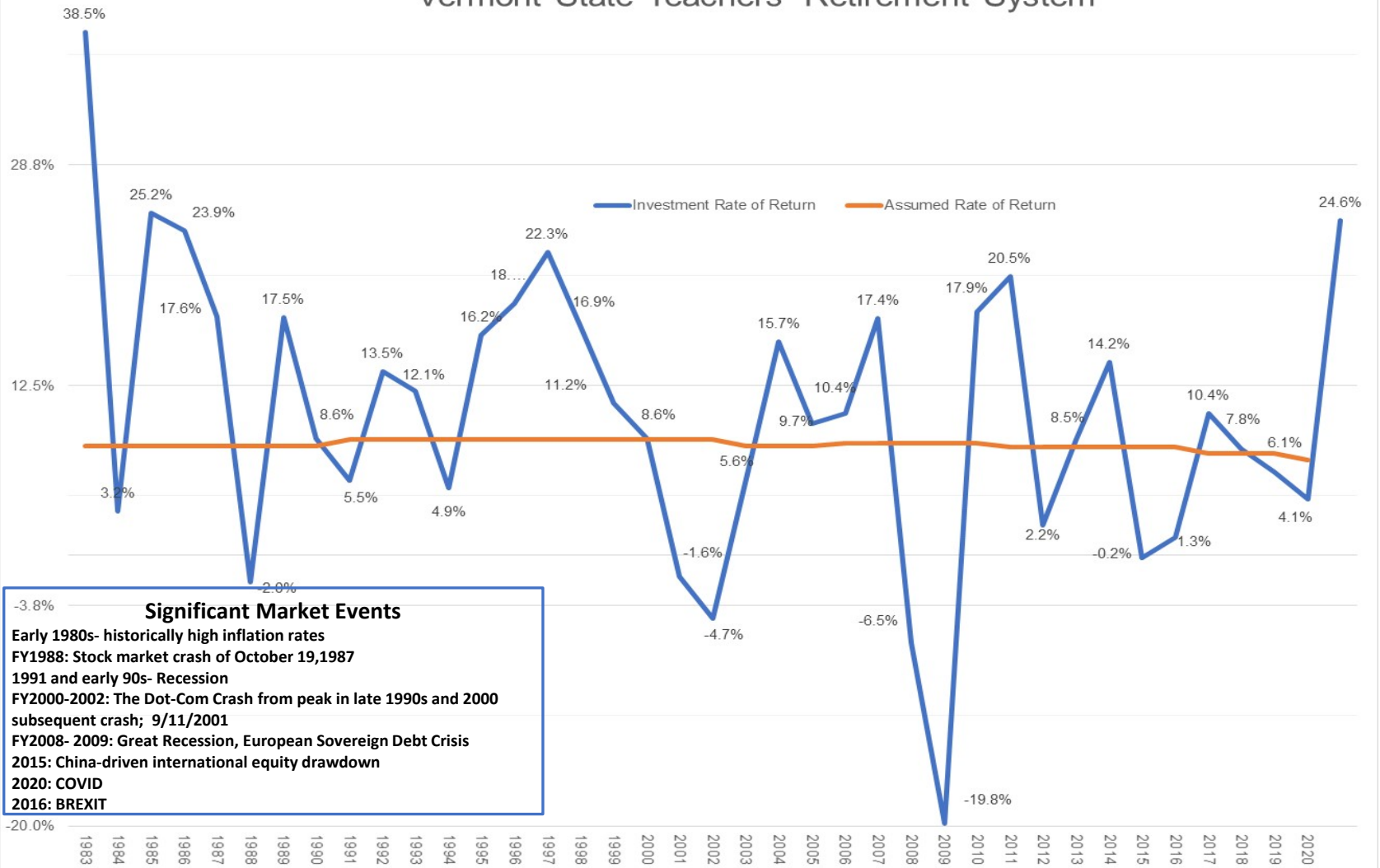
Significant Market Events

Early 1980s- historically high inflation rates
FY1988: Stock market crash of October 19,1987
1991 and early 90s- Recession
FY2000-2002: The Dot-Com Crash from peak in late 1990s and 2000
subsequent crash; 9/11/2001
FY2008- 2009: Great Recession, European Sovereign Debt Crisis
2015: China-driven international equity drawdown
2020: COVID
2016: BREXIT

Data labels (Investment Rate of Return): 38.5%, 25.2%, 23.9%, 17.6%, 3.2%, 17.5%, -2.0%, 8.6%, 5.5%, 13.5%, 12.1%, 4.9%, 16.2%, 18...., 22.3%, 11.2%, 16.9%, 8.6%, -1.6%, -4.7%, 15.7%, 9.7%, 10.4%, 17.4%, -6.5%, -19.8%, 17.9%, 20.5%, 2.2%, 8.5%, 14.2%, -0.2%, 1.3%, 10.4%, 7.8%, 6.1%, 4.1%, 24.6%, 5.6%

X-axis years: 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020

Y-axis: 45.0%, 38.5%, 28.8%, 12.5%, -3.8%, -20.0%

Source: VPIC, historical valuation reports

Markets are Volatile

Market Performance (%)	MTD	QTD	CYTD	1 Yr	3 Yr	5 Yr	7 Yr	10 Yr
S&P 500 (Cap Wtd)	-4.65	0.58	15.92	30.00	15.99	16.90	14.01	16.63
Russell 2000	-2.95	-4.36	12.41	47.68	10.54	13.45	11.90	14.63
MSCI EAFE (Net)	-2.90	-0.45	8.35	25.73	7.62	8.81	5.80	8.10
MSCI EAFE SC (Net)	-3.57	0.90	10.02	29.02	9.05	10.38	9.15	10.73
MSCI EM (Net)	-3.97	-8.09	-1.25	18.20	8.58	9.23	5.62	6.09
Bloomberg US Agg Bond	-0.87	0.05	-1.56	-0.90	5.35	2.94	3.26	3.01
ICE BofAML 3 Mo US T-Bill	0.01	0.02	0.04	0.07	1.18	1.16	0.87	0.63
NCREIF ODCE (Gross)	6.59	6.59	13.11	14.59	7.05	7.50	8.90	9.92
FTSE NAREIT Eq REITs Index (TR)	-5.40	0.98	23.15	37.39	10.01	6.83	9.04	11.27
HFRI FOF Comp Index	0.23	0.83	5.83	14.41	6.53	5.82	4.17	4.47
Bloomberg Cmdty Index (TR)	4.98	6.59	29.13	42.29	6.86	4.54	-1.49	-2.66

Source: RVK

Vermont's Return Assumption In Line With National Average

Rate of Return as Reported to NASRA May 2021
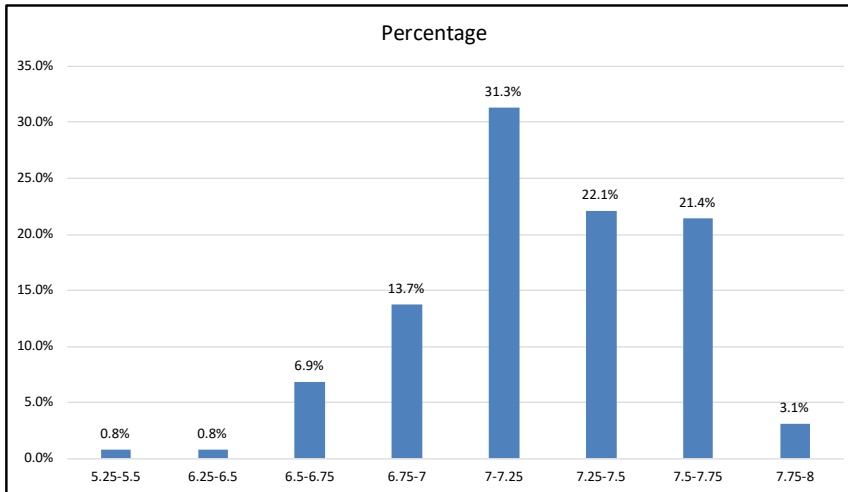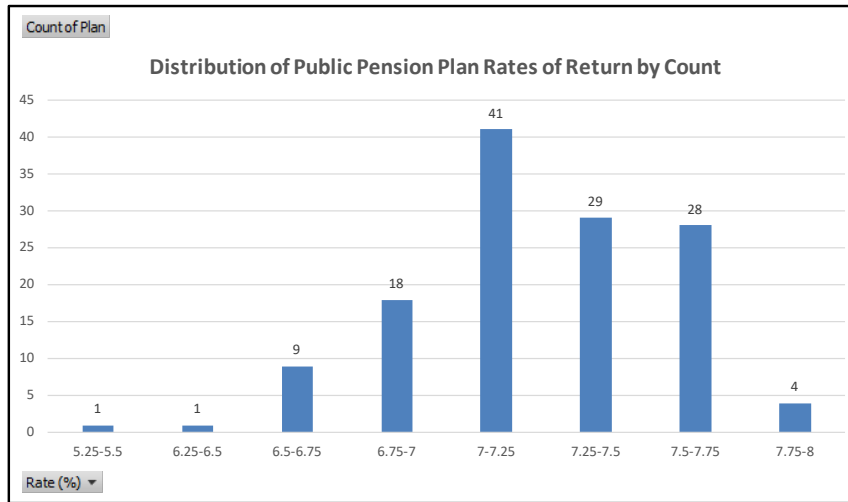
Rate (%)	Percentage	Count
5.25-5.5	0.8%	1
6.25-6.5	0.8%	1
6.5-6.75	6.9%	9
6.75-7	13.7%	18
7-7.25	31.3%	41
7.25-7.5	22.1%	29
7.5-7.75	21.4%	28
7.75-8	3.1%	4
Total	100.0%	131
Average	7.13	
Median	7.00	

Source: NASRA May Data

Determination of Actuarial Value of Assets for Year Ended June 30, 2021 — VSERS

1	Actuarial value of assets, June 30, 2020		$2,054,825,853
2	Net new money*, including expected investment income (7.00%)		109,492,892
3	Preliminary asset value: **1 + 2**		2,164,318,745
4	Smoothing adjustment		
	a) Market value, June 30, 2021	$2,425,222,408	
	b) Preliminary asset value	2,164,318,745	
	c) Unrecognized appreciation	260,903,663	
	d) Adjustment	X 20%	52,180,733
5	Actuarial value of assets, June 30, 2021: **3 + 4d**		$2,216,499,478
6	Actuarial value of assets as a percentage of market value: **1 / 5**		91.39%

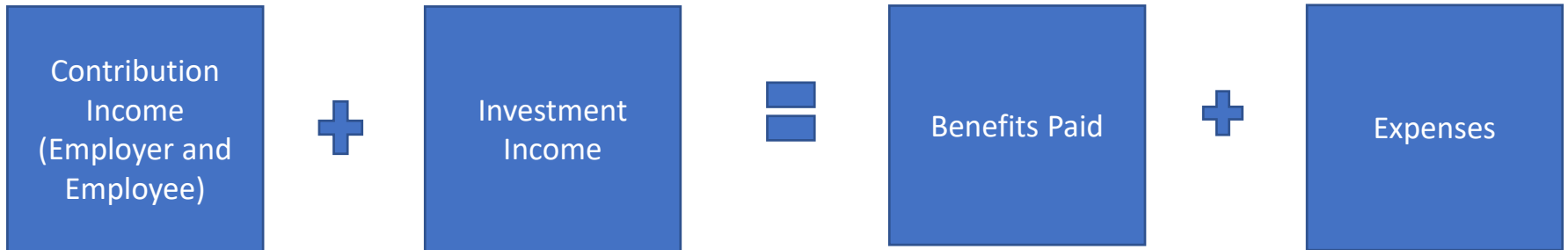* Net new money is comprised of contributions, interest, and dividends, less benefit payments and expenses.

Determination of Actuarial Value of Assets for Year Ended June 30, 2021 — VSTRS

1	Actuarial value of assets, June 30, 2020		$2,035,713,611
2	Net new money*, including expected investment income (7.00%)		98,151,456
3	Preliminary asset value: **1 + 2**		2,133,865,067
4	Smoothing adjustment		
	(a) Market value, June 30, 2021	$2,422,793,508	
	(b) Preliminary asset value	2,133,865,067	
	(c) Unrecognized appreciation	288,928,441	
	(d) Adjustment	X 20%	57,785,688
5	Actuarial value of assets, June 30, 2021: **3 + 4d**		$2,191,650,755
6	Actuarial value of assets as a percentage of market value: **5 / 4(a)**		90.46%

* Net new money is comprised of contributions, interest, and dividends, less benefit payments and expenses.

Source: Segal

Balancing Act of Pension Systems

Retirement Equation

| Contribution Income (Employer and Employee) | **+** | Investment Income | **=** | Benefits Paid | **+** | Expenses |

$$C + I = B + E$$

- Crossover or Depletion: Plan assets and expected future contributions are no longer sufficient to pay expected future benefit payments.

- The critical tipping point is not when assets run out or even decline, but when Governors and Legislatures no longer believe the required contributions are realistic and give up trying to fund the actuarially required contributions.

- Treasurer's Office 2005 Teacher Funding Report