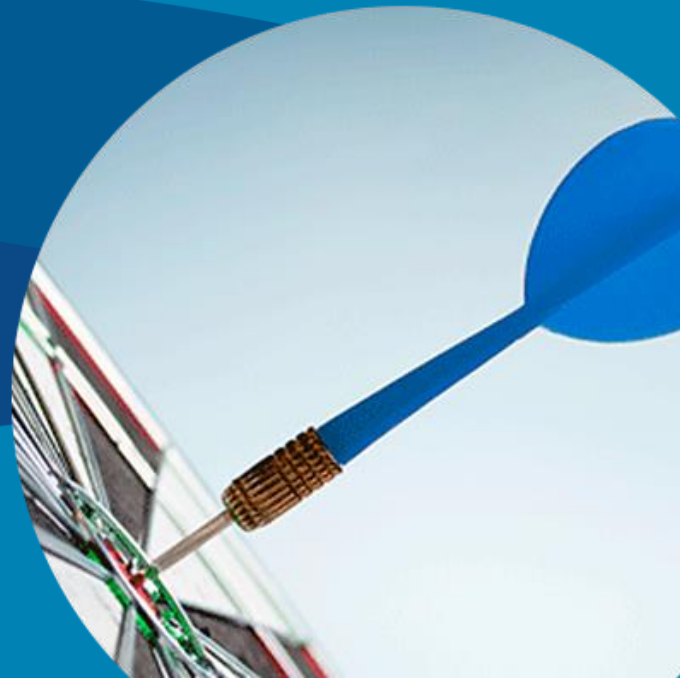




Michigan Public School Employees' Retirement System

Pension Actuarial Valuation Results
as of September 30, 2022



September 30, 2022 Valuation

- Purpose of the September 30, 2022 valuation is twofold:
 - Determine the employer contribution rate for fiscal year 2025
 - Measure the System's funding progress
- Reflects the Dedicated Gains Policy adopted by the Board of Trustees
 - Starting with the September 30, 2021 funding valuation, in accordance with modifications to the Dedicated Gains Policy, the Policy cannot lower the investment return assumption below 6.00%
 - Investment return assumption remained at 6.00% for Non-Hybrid portion and for Pension Plus Plan (PPP) portion as a result of the Policy
- Investment return assumption for Pension Plus 2 Plan (PPP2) is 6.00% in conjunction with Public Act 92 of 2017

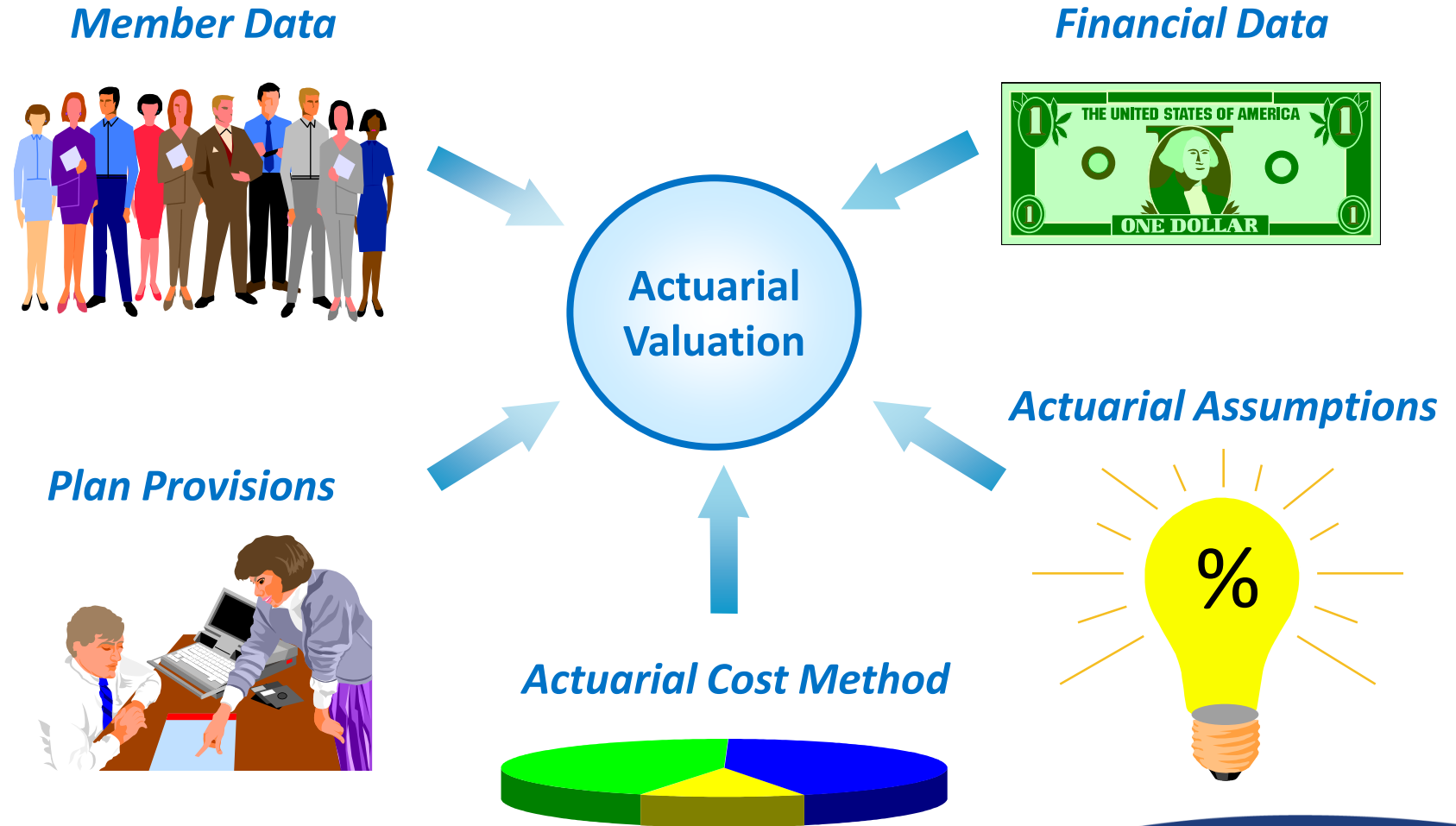
September 30, 2022 Valuation

- Reflects the provisions of Public Act 220 of 2022
 - Revised pattern of transition from level percent of payroll amortization of Unfunded Actuarial Accrued Liability (UAAL) to level dollar amortization
 - 0.75% payroll growth assumption for the September 30, 2022 valuation for amortization purposes only
 - Only applies to the Non-Hybrid and PPP portions
- Reflects select provisions of Public Act 144 of 2022
 - The September 30, 2022 valuation accounts for additional appropriations included in this Public Act intended to reduce UAAL in the development of the FY 2025 employer contribution requirements
 - An additional employer contribution of \$1 billion in FY 2023
 - Additional employer contributions of \$140.4 million in FY 2023 and \$125.0 million in FY 2024 associated with adopting the revised amortization payroll growth assumption schedule as part of Public Act 220 of 2022

September 30, 2022 Valuation

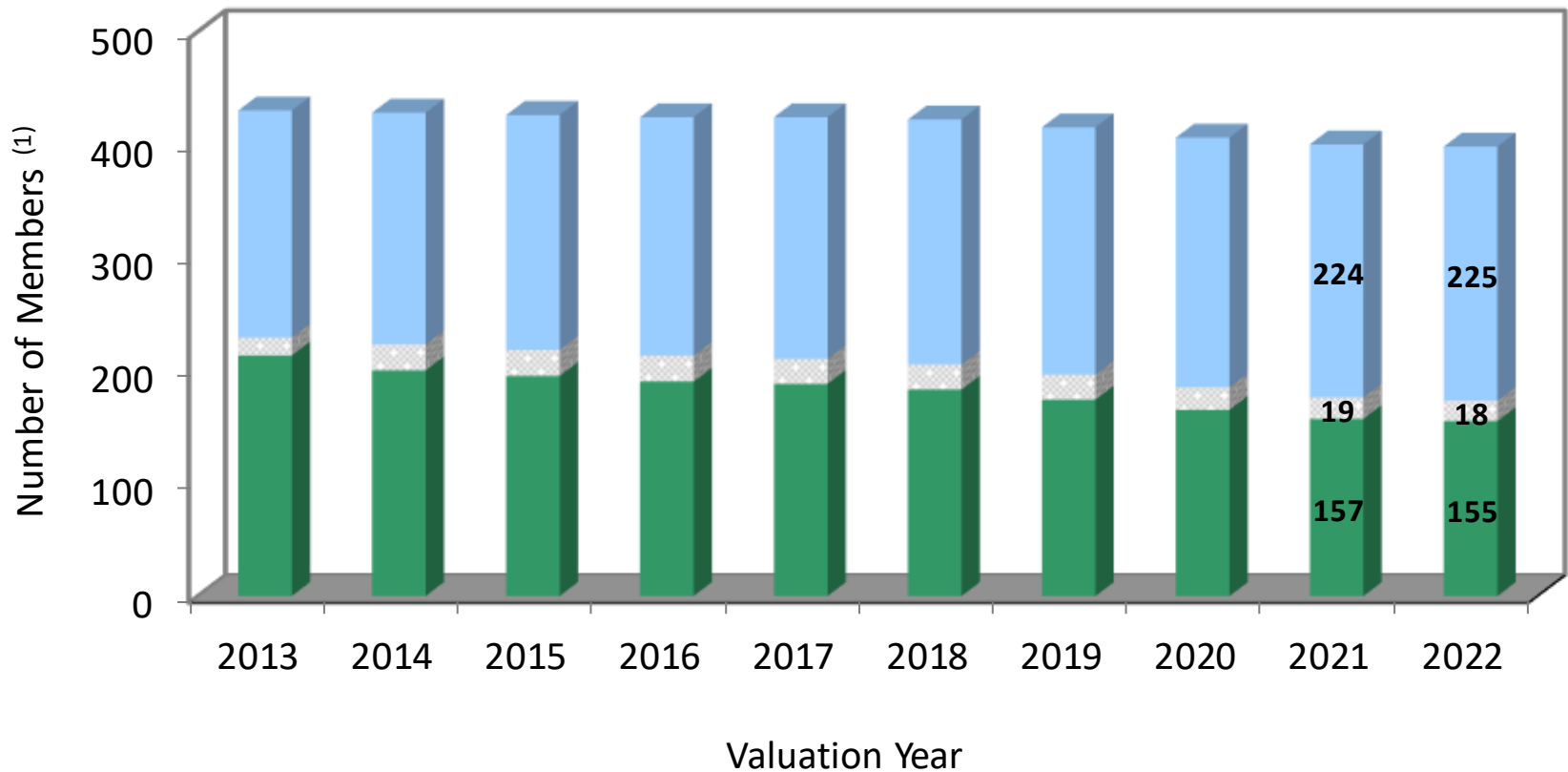
- Employer contribution rates included in this presentation do not incorporate the “contribution floor” provisions of Public Act 181 of 2018 or Public Act 92 of 2017
- Employer contribution rates included in this presentation are in addition to any reconciliation payments as required by subsection 41(9) of MPERS statute

Actuarial Valuation Process



Defined Benefit Plan Membership Data

(Counts in Thousands)

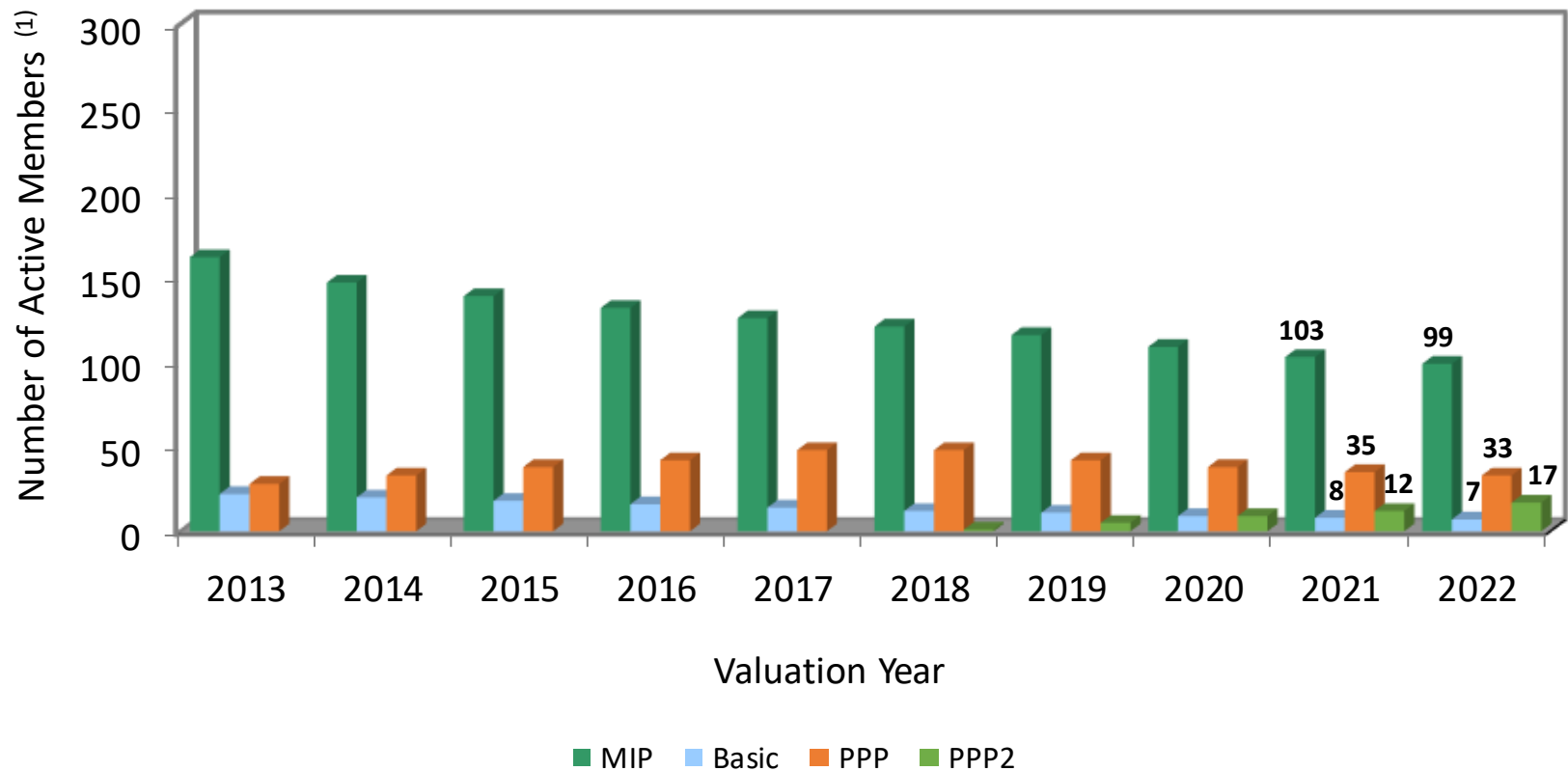


■ Actives ▨ Vested Inactives ■ Retirees & Beneficiaries

(1) Excludes active members covered exclusively by the pure defined contribution plan. Starting in 2014, active members who elected not to continue in the defined benefit plan as a result of PA 300 are classified as inactive members.

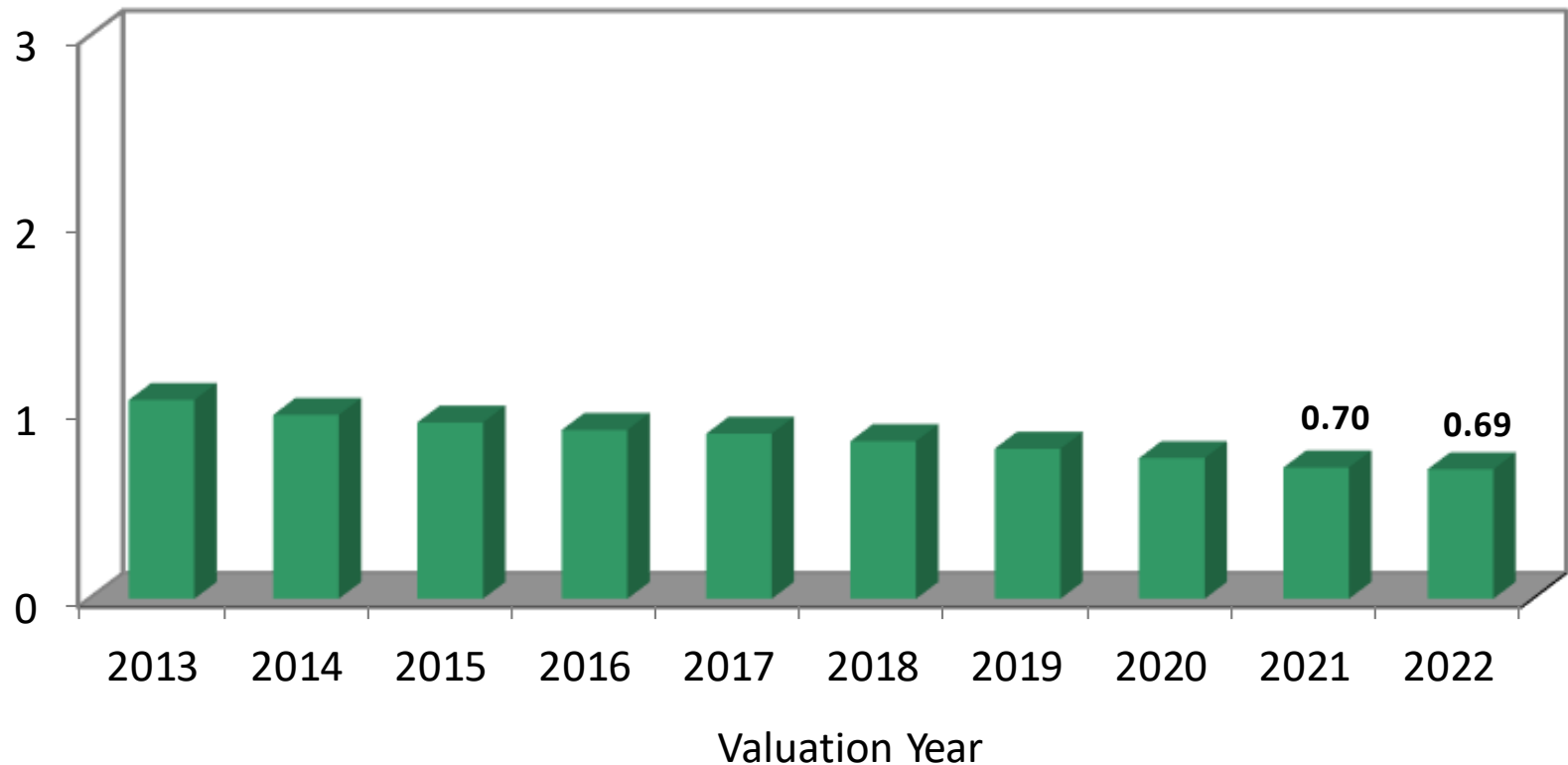
Defined Benefit Plan Active Members by Group

(Counts in Thousands)



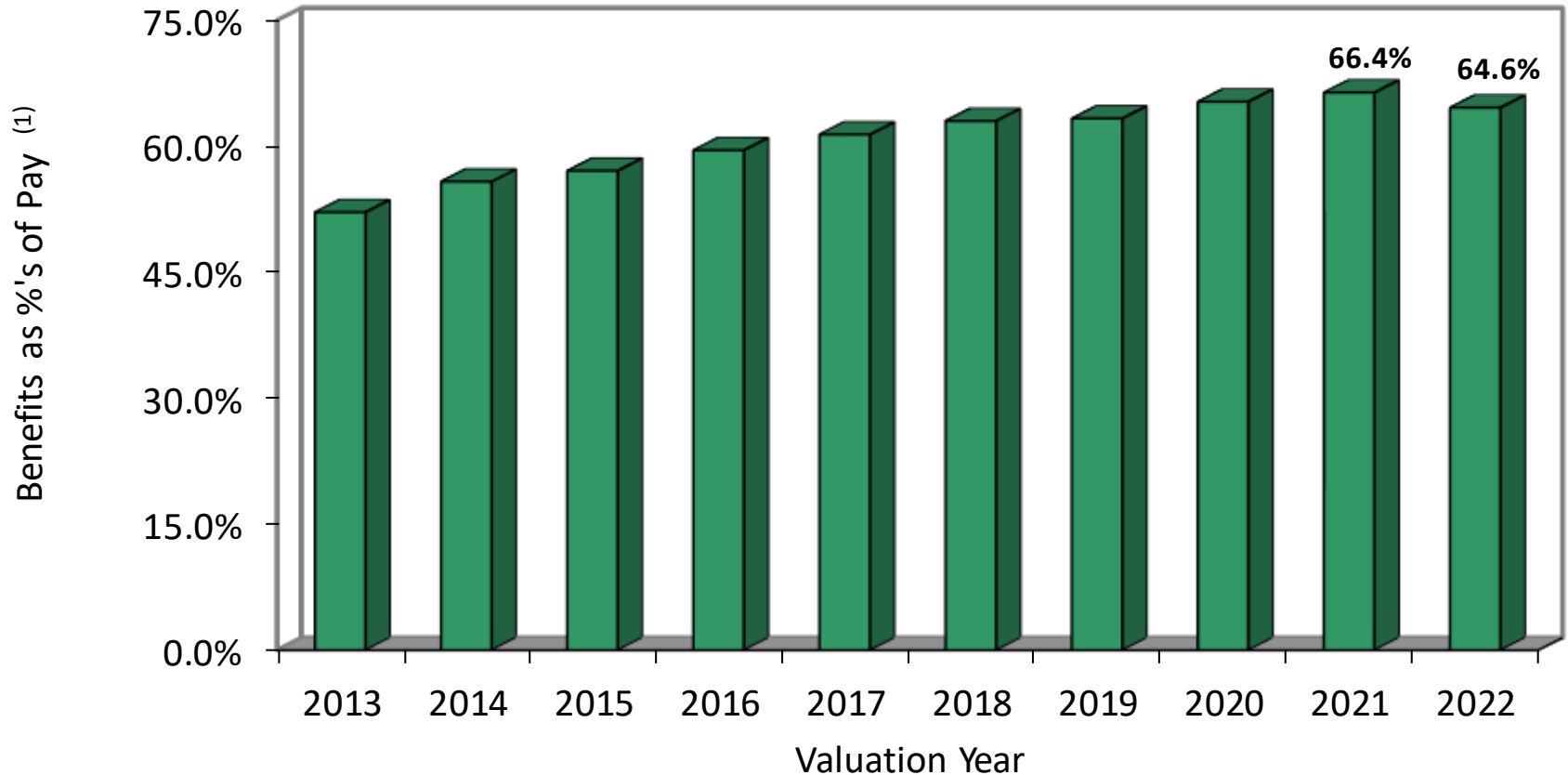
(1) Excludes active members covered exclusively by the pure defined contribution plan. Starting in 2014, active members who elected not to continue in the defined benefit plan as a result of PA 300 are classified as inactive members.

Ratio of Active Members⁽¹⁾ to Pension Benefit Recipients



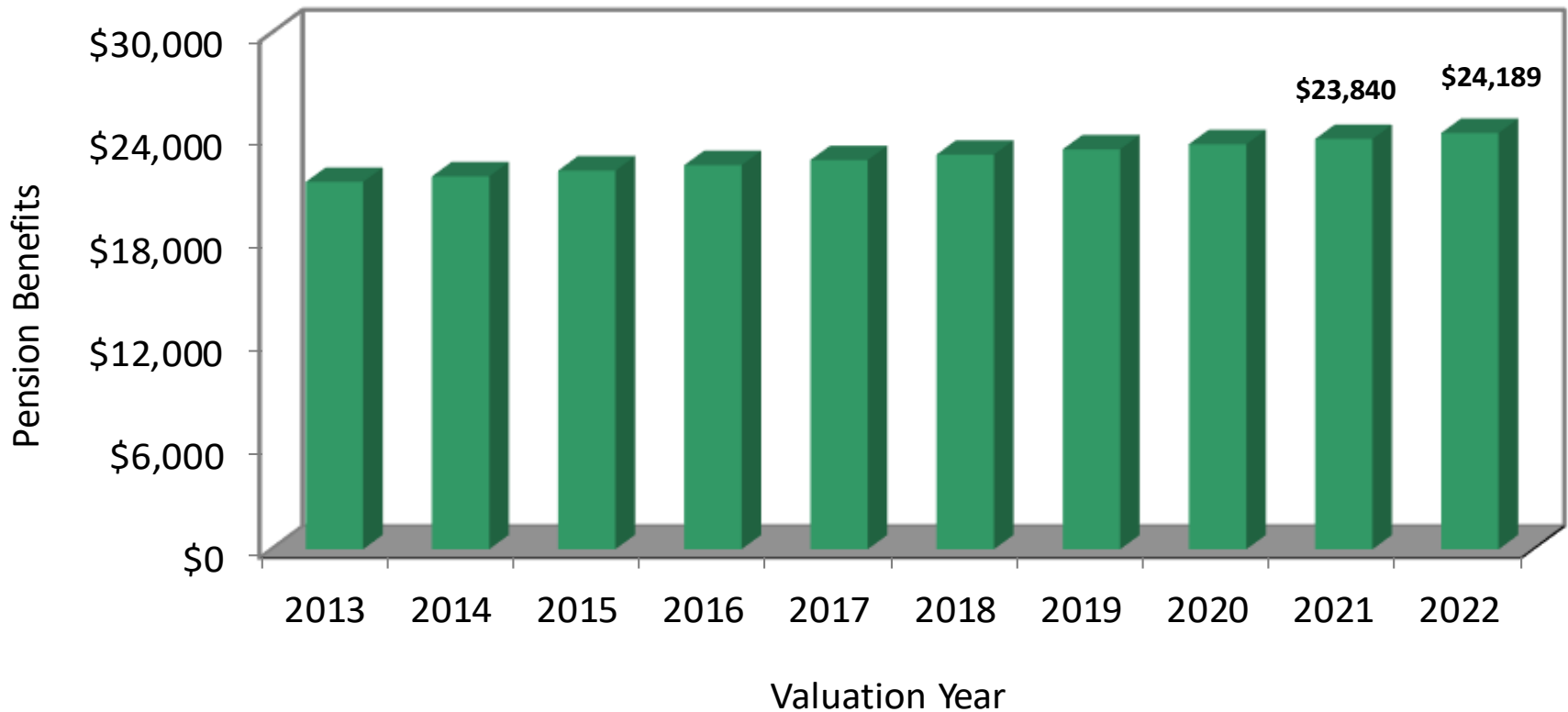
(1) Excludes active members covered exclusively by the pure defined contribution plan. Starting in 2014, active members who elected not to continue in the defined benefit plan as a result of PA 300 are classified as inactive members.

Pension Benefits Expressed as %'s of Active Member Pay



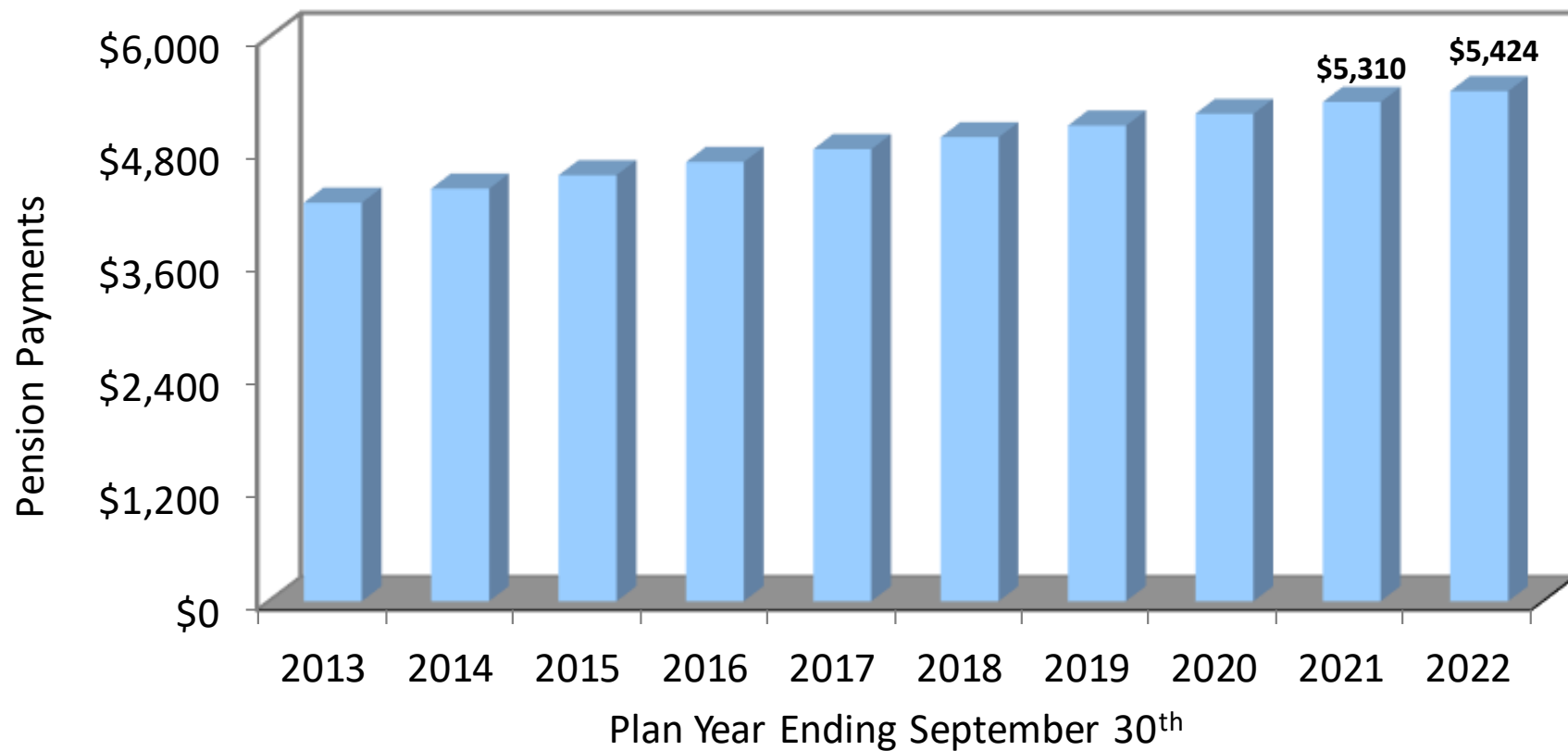
(1) Percentage of defined benefit MPSERS payroll (excludes payroll of those covered exclusively by the pure defined contribution plan and of those who elected not to continue in the defined benefit plan as a result of PA 300).

Average Annual Pensions

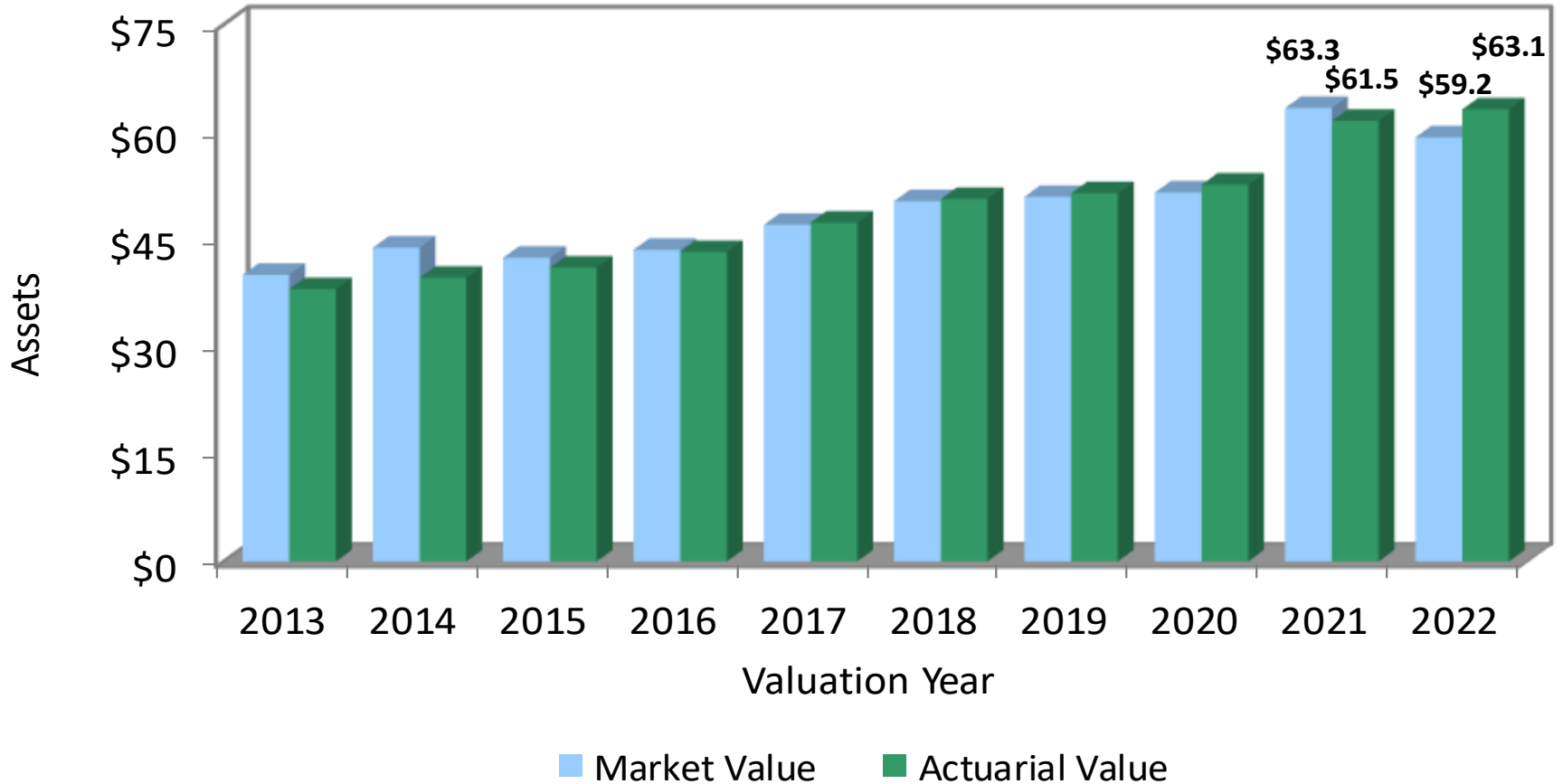


Reported Pension Payments by Plan Year

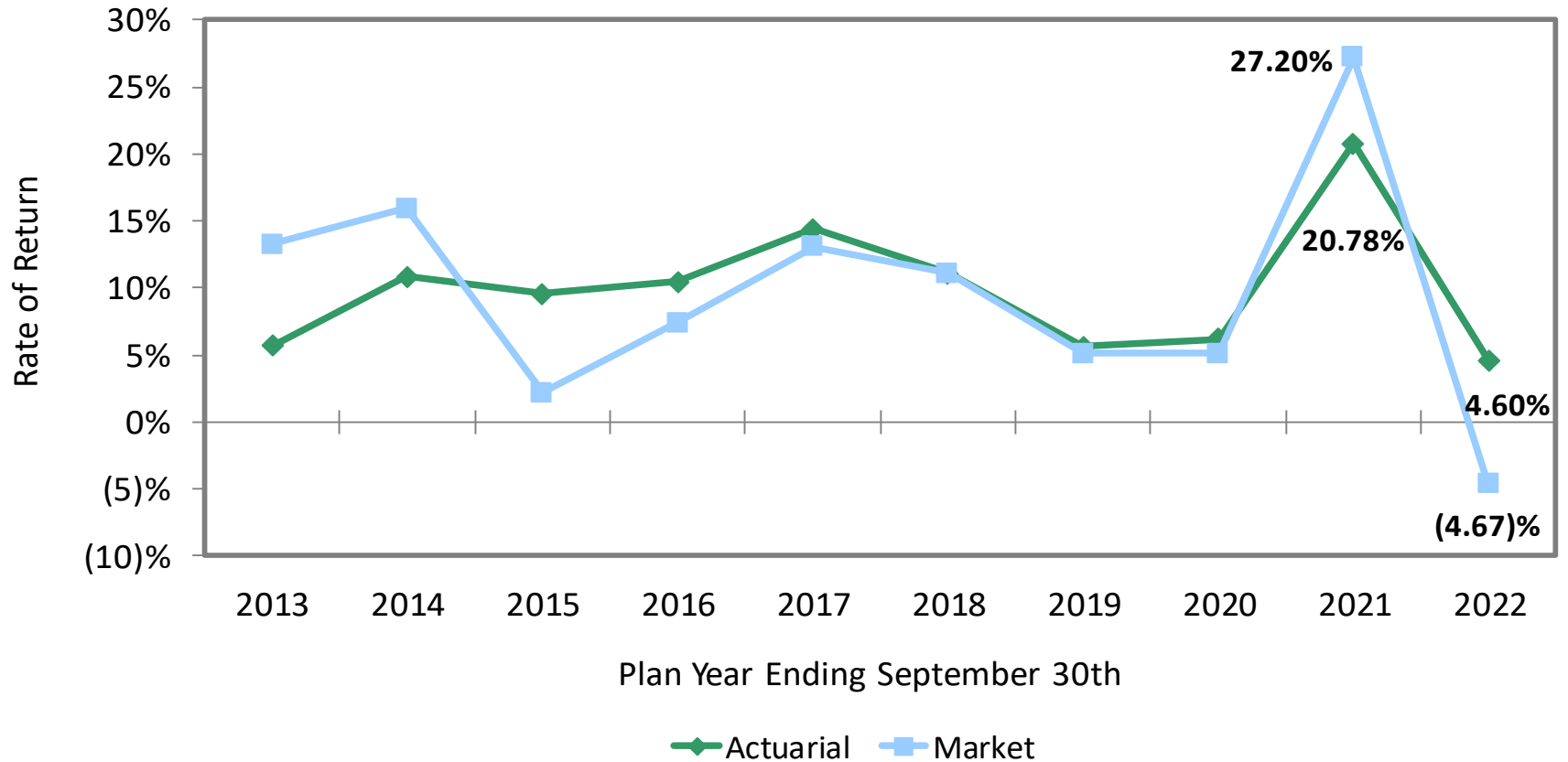
(Amounts in Millions)



Growth of Pension Assets (\$ in Billions)



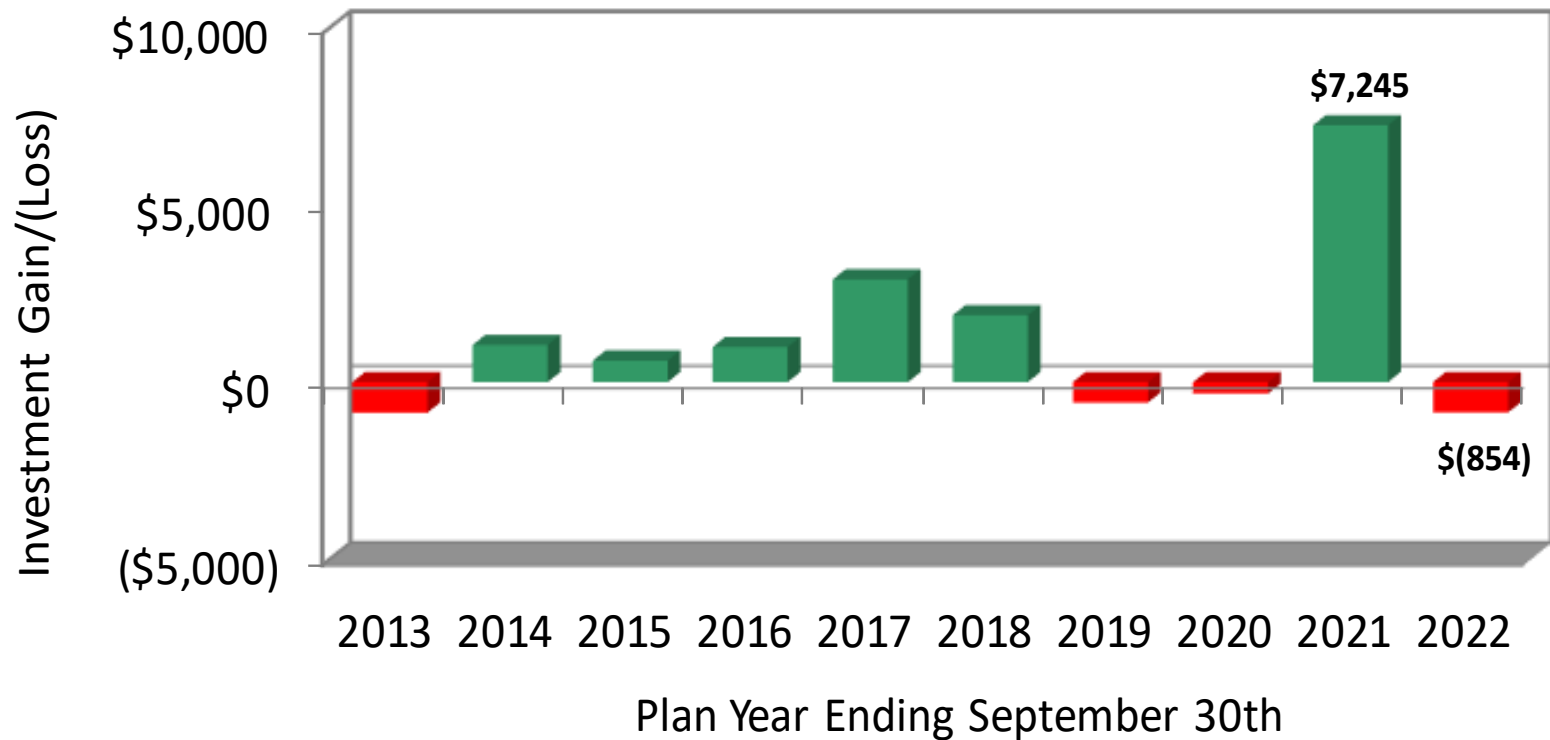
Actuarial & Market Net Rates of Return



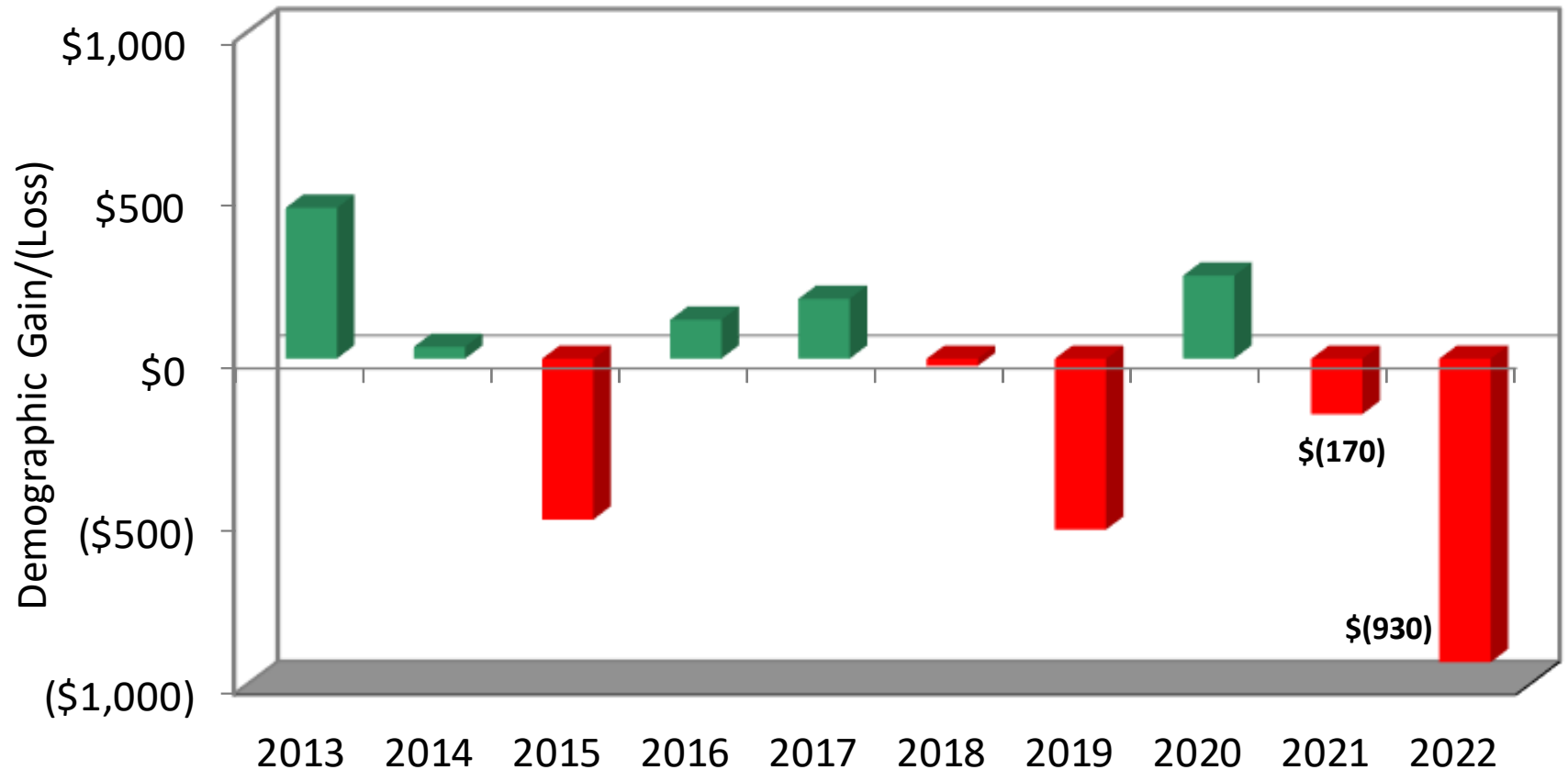
Rates of return shown above are for Non-Hybrid assets.



Investment Gain/(Loss) (\$ in Millions)



Demographic Gain/(Loss) (\$ in Millions)



Plan Year Ending September 30th

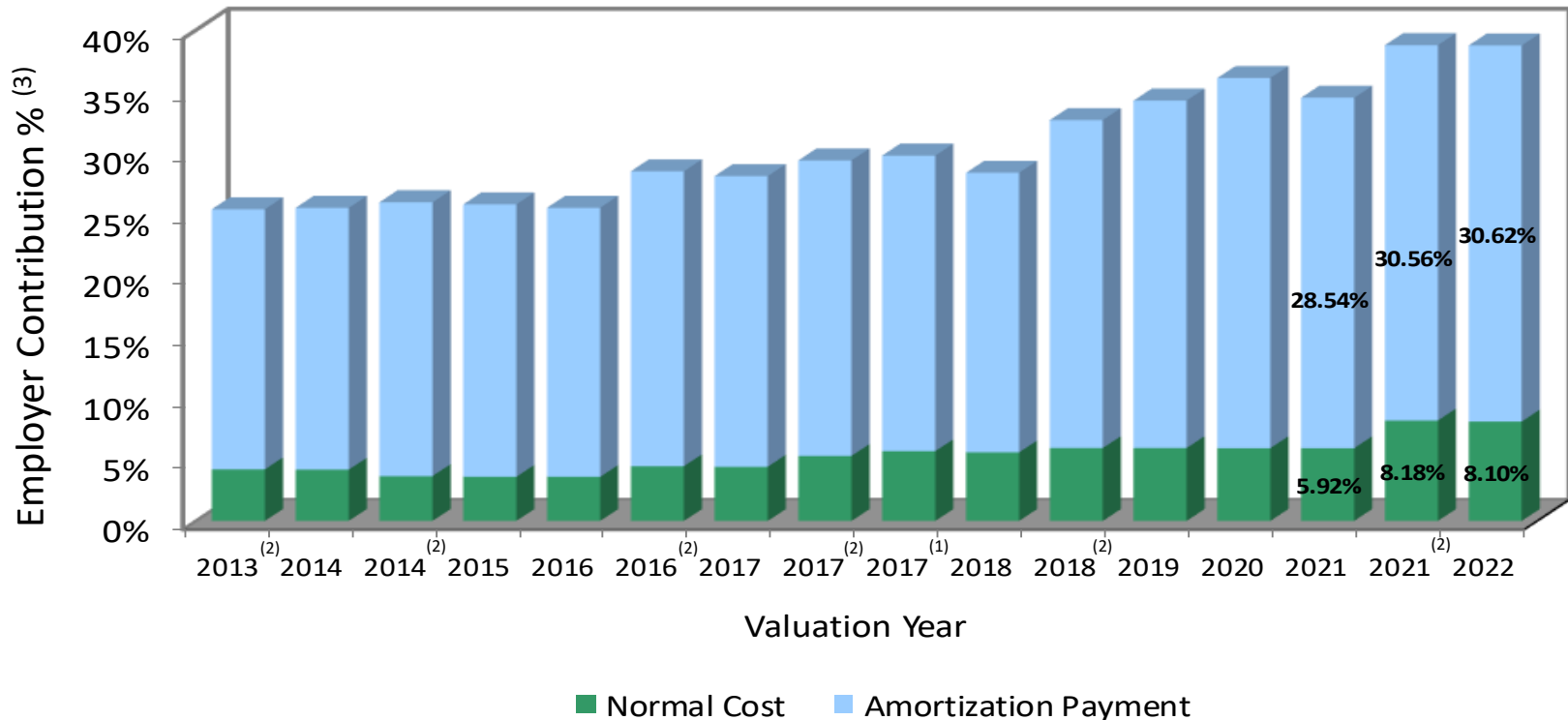
Gain/(Loss) by Type of Activity

(Amounts in Millions)

Plan Year Ending 9/30	2018	2019	2020	2021	2022
Rehires	\$ 7.2	\$ 9.6	\$ (1.8)	\$ 9.2	\$ 1.7
Retiree Deaths	(80.9)	20.8	109.1	156.7	120.2
Investments	1,884.7	(577.3)	(321.4)	7,245.2	(853.9)
Pay Increases	241.6	(477.7)	72.3	(234.8)	(1,029.1)
Withdrawal	(73.0)	(55.8)	(26.1)	(60.9)	(47.1)
Retirements	24.8	27.6	18.6	5.6	24.3
Other	(141.4)	(48.6)	82.4	(45.5)	0.1
Total	1,863.0	(1,101.3)	(66.9)	7,075.5	(1,783.7)



Historical Employer Contribution %'s Valuation as of September 30

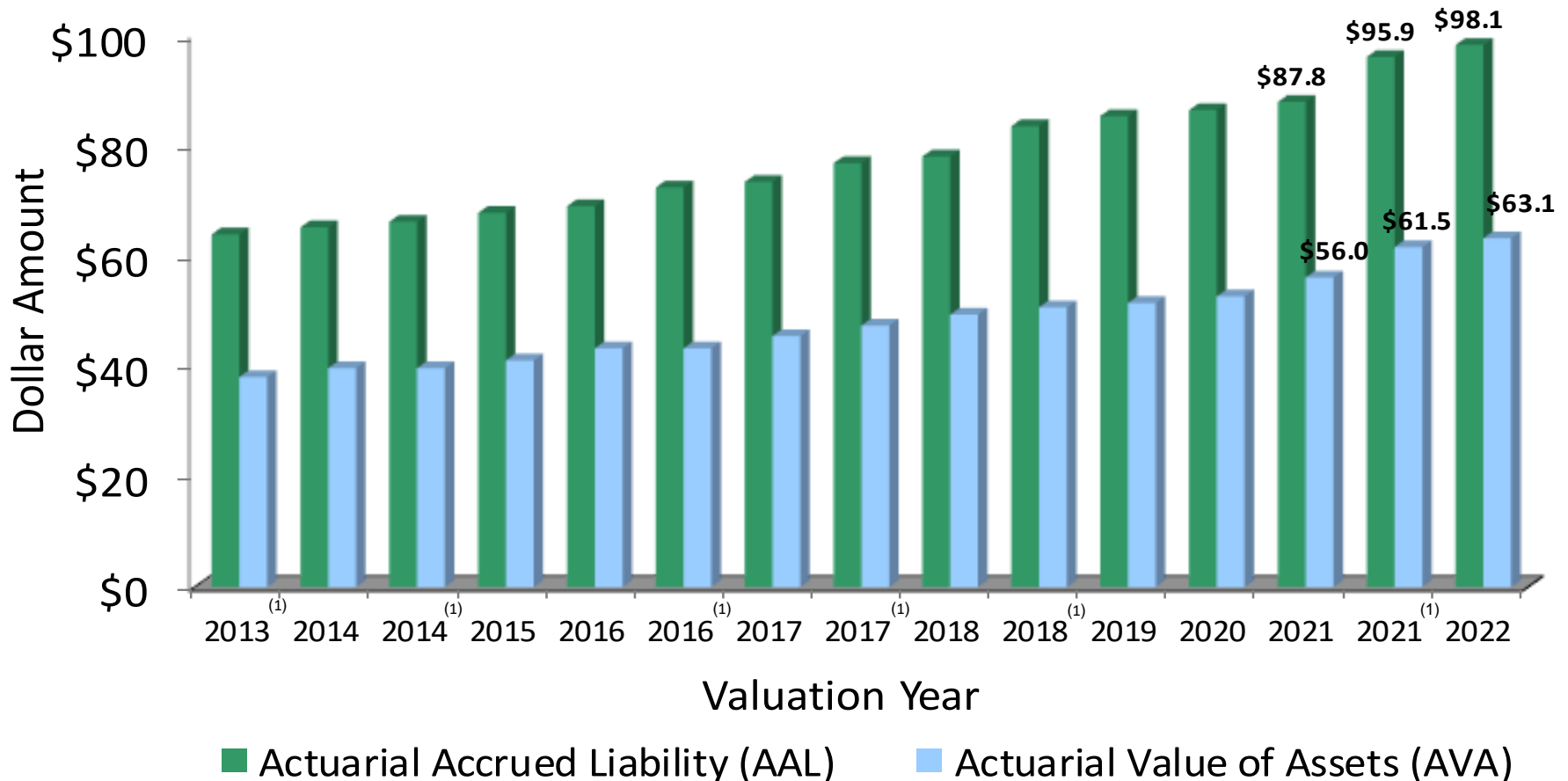


(1) Revised benefit provisions.

(2) Change in assumptions and/or methods shown for years where assumptions other than the amortization payroll growth assumption have changed.

(3) The normal cost is expressed as a percentage of defined benefit participating active member payroll, while the Amortization Payment is expressed as a percentage of total MPSERS active member payroll (including that of defined benefit and defined contribution active members).

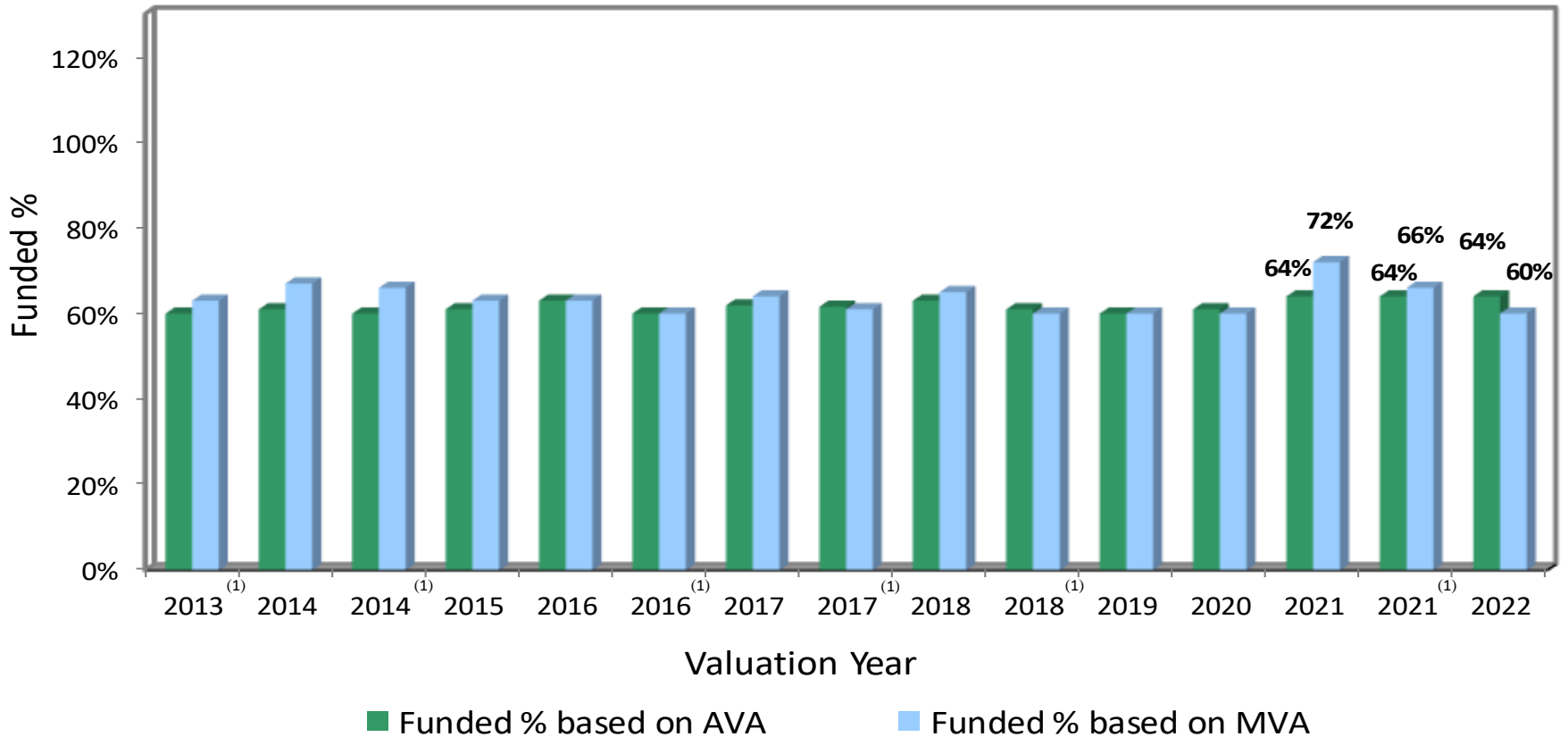
Actuarial Accrued Liability Compared to Actuarial Value of Assets (\$ in Billions)



(1) Reflects actuarial assumptions and/or methods changes.

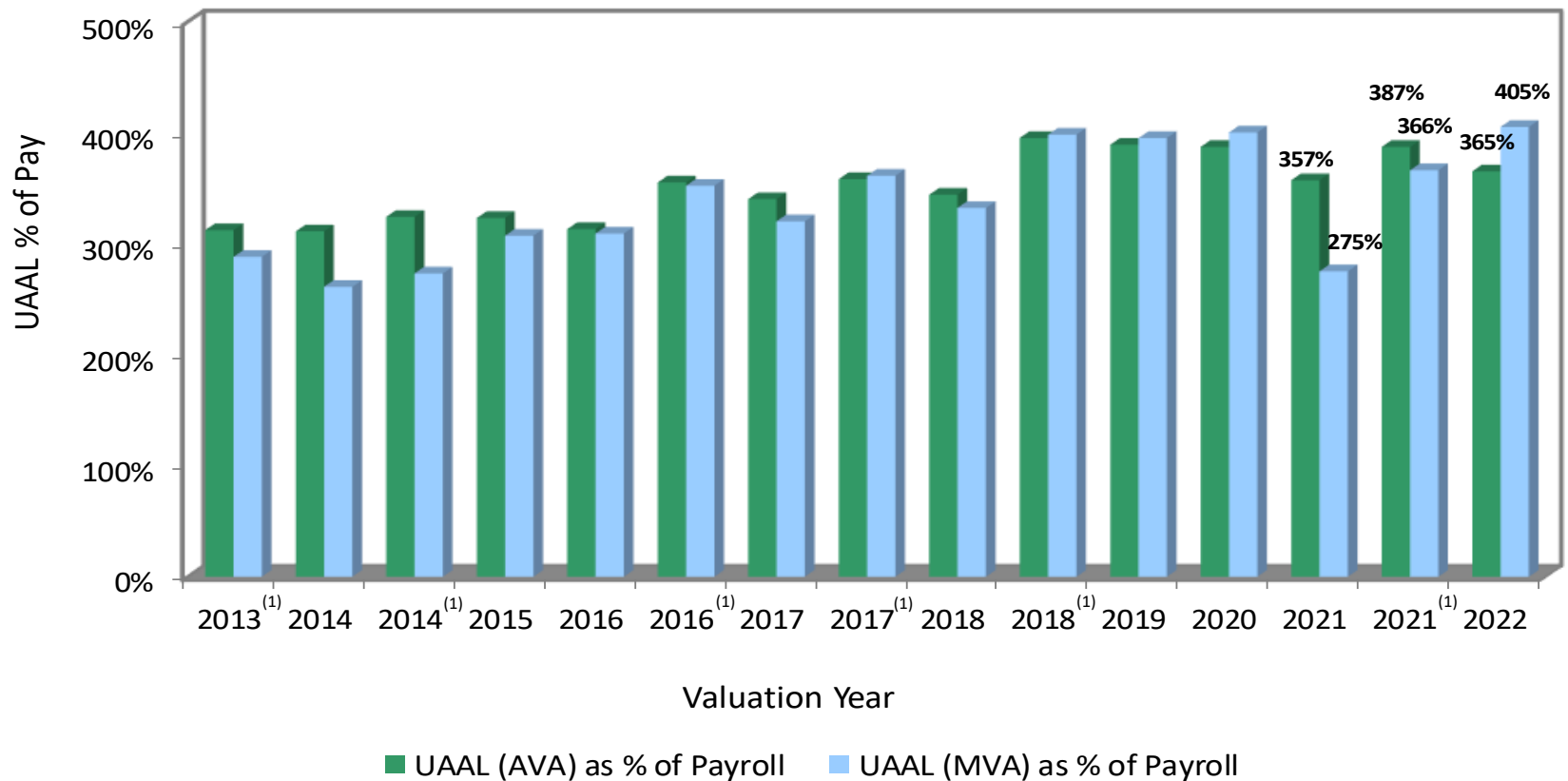


Retirement System Funded % Based on Actuarial Value and Market Value of Assets



(1) Reflects actuarial assumptions and/or methods changes.

Unfunded Actuarial Accrued Liability as a Percentage of Payroll⁽²⁾



(1) Reflects actuarial assumptions and/or methods changes.

(2) Percentage of total MPSERS payroll (including both DB and DC active member payroll).

Risk Metrics

- The determination of the actuarial accrued liability and the total computed employer contribution requires the use of assumptions regarding future economic and demographic experience
- Risk measures are intended to aid in the understanding of the effects of future experience differing from the assumptions
- Risk measures may also help with illustrating the potential volatility in the actuarial accrued liability and the total computed employer contribution

Risk Metrics

1. **Funded Ratio (Funding Value of Assets basis)**
 - This is the most widely known measure of a plan's financial strength. The trend in the funded ratio and the actual funded ratio are both important metrics. A trend approaching 100% is desirable.
2. **Funded Ratio (Market Value of Assets basis)**
 - This is similar to the above metric, except that the asset value is the market value.
3. **Unfunded Actuarial Accrued Liability (UAAL) Amortization Period**
 - Periods above about 17 to 23 years generally indicate that the UAAL payment is less than the interest on the UAAL. This situation is referred to as "negative amortization." Negative amortization is increasingly viewed as undesirable.
4. **Total UAAL / Total Payroll**
 - The ratio of UAAL to payroll gives an indication of the plan sponsor's ability to pay off the UAAL. A declining ratio is desirable. A ratio above approximately 3.0 to 4.0 may indicate difficulty in discharging the unfunded liability in some circumstances.

Risk Metrics

5. Total Funding Value of Assets / Total Payroll

- The ratio of assets to payroll gives an indication of both maturity and volatility. Many systems have ratios between 5.0 and 7.0. Social Security Replacement Plans may fall above that range. A high ratio can indicate volatility of contribution rates.

6. Total Actuarial Accrued Liability (AAL) / Total Payroll

- This is similar to the above metric. It illustrates the expected ratio of assets to payroll when the plan is fully funded.

7. Standard Deviation of Investment Return / Total Payroll

- The portfolio standard deviation measures the volatility of investment returns. When divided by payroll, it gives the effect of a one standard deviation asset gain or loss as a percent of payroll. This theoretically may happen once every 6 years.

Risk Metrics

Valuation Date September 30,	Funded Ratio		UAAL Amortization Period ³	Total UAAL / Total Payroll ²	Total Funding Value of Assets / Total Payroll ²	Total AAL / Total Payroll ²	Standard Deviation of Investment Return / Total Payroll ²
	Based on AVA	Based on MVA					
2013 ¹	60 %	63 %	23	3.1	4.6	7.7	n/a
2014 ¹	60	66	22	3.2	4.9	8.1	n/a
2015	61	63	21	3.2	5.0	8.2	n/a
2016 ¹	60	60	20	3.5	5.3	8.8	n/a
2017 ¹	62	61	19	3.6	5.7	9.3	n/a
2018 ¹	61	60	18	3.9	6.1	10.0	80 %
2019	60	60	17	3.9	5.9	9.8	77
2020	61	60	16	3.9	6.0	9.9	78
2021 ¹	64	66	15	3.9	6.9	10.8	94
2022	64	60	14	3.7	6.6	10.2	81

¹ After changes in actuarial assumptions.

² Payroll for UAAL purposes (Total MPSERS Payroll).

³ Non-Hybrid and PPP UAAL amortization period.

Disclaimers

- This presentation is intended to be used in conjunction with the September 30, 2022 pension actuarial valuation report. This presentation should not be relied upon for any purpose other than the purpose described in the valuation report.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.
- The actuaries submitting this presentation (Mita Drazilov and Louise Gates) are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.