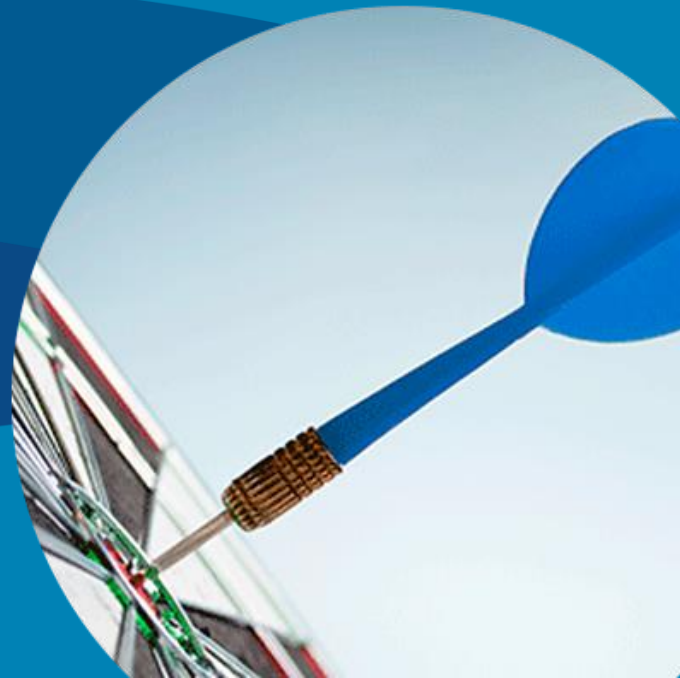




# Michigan State Police Retirement System

Pension Actuarial Valuation Results  
as of September 30, 2021



# September 30, 2021 Valuation

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- Purpose of the September 30, 2021 valuation is twofold:
  - Determine the employer contribution for fiscal year 2024
  - 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 was reduced from 6.80% to 6.15% for the Non-Hybrid Plan and from 6.85% to 6.15% for the Pension Plus Plan (PPP) as a result of the Policy

# September 30, 2021 Valuation

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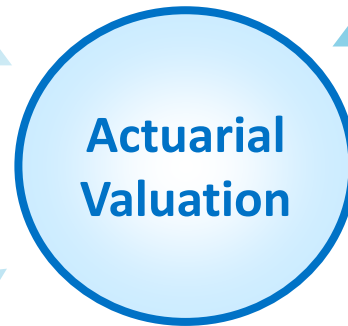
- Reflects these provisions of Public Act 674 of 2018
  - Gradual transition from level percent of payroll amortization of Unfunded Actuarial Accrued Liabilities (UAAL) to level dollar amortization
  - 1.25% payroll growth assumption for the September 30, 2021 valuation for amortization purposes only
- Employer contribution rates included in this presentation do not incorporate the “contribution floor” provisions of Public Act 674 of 2018

# Actuarial Valuation Process

*Member Data*



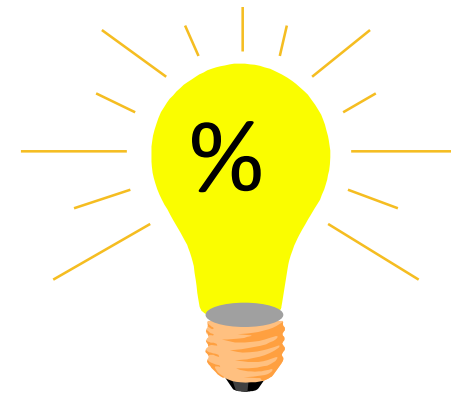
*Financial Data*



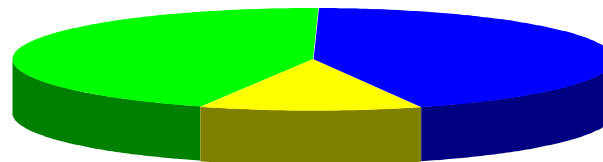
*Plan Provisions*



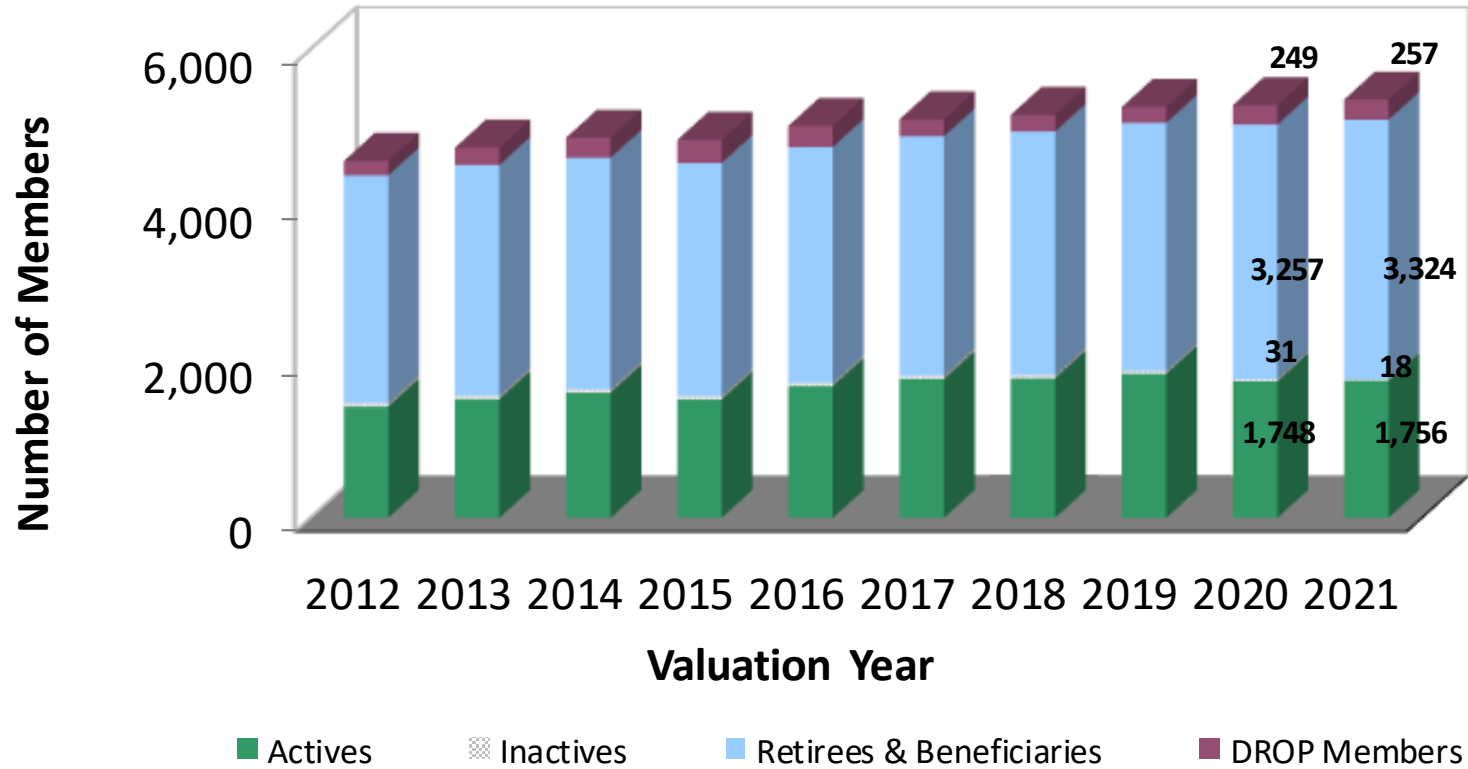
*Actuarial Assumptions*



*Actuarial Cost Method*

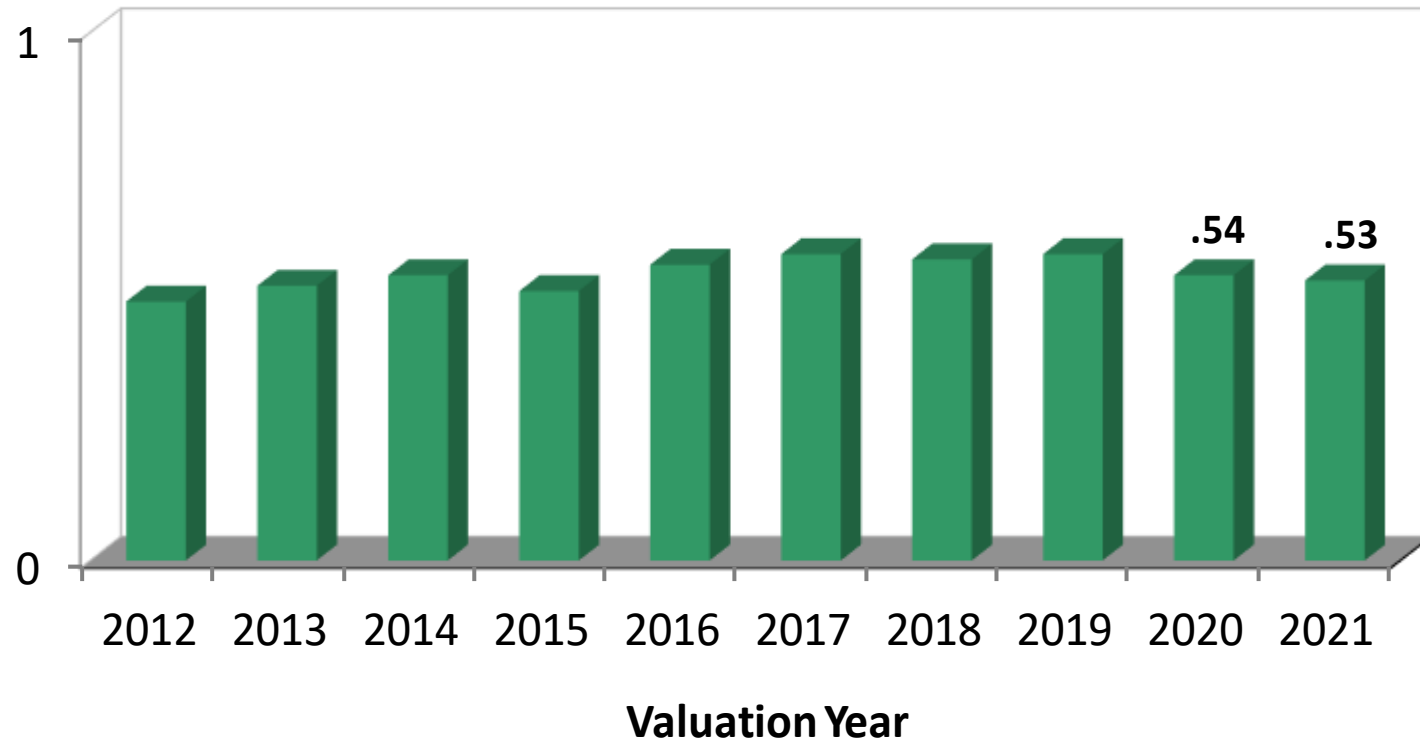


# Membership Data



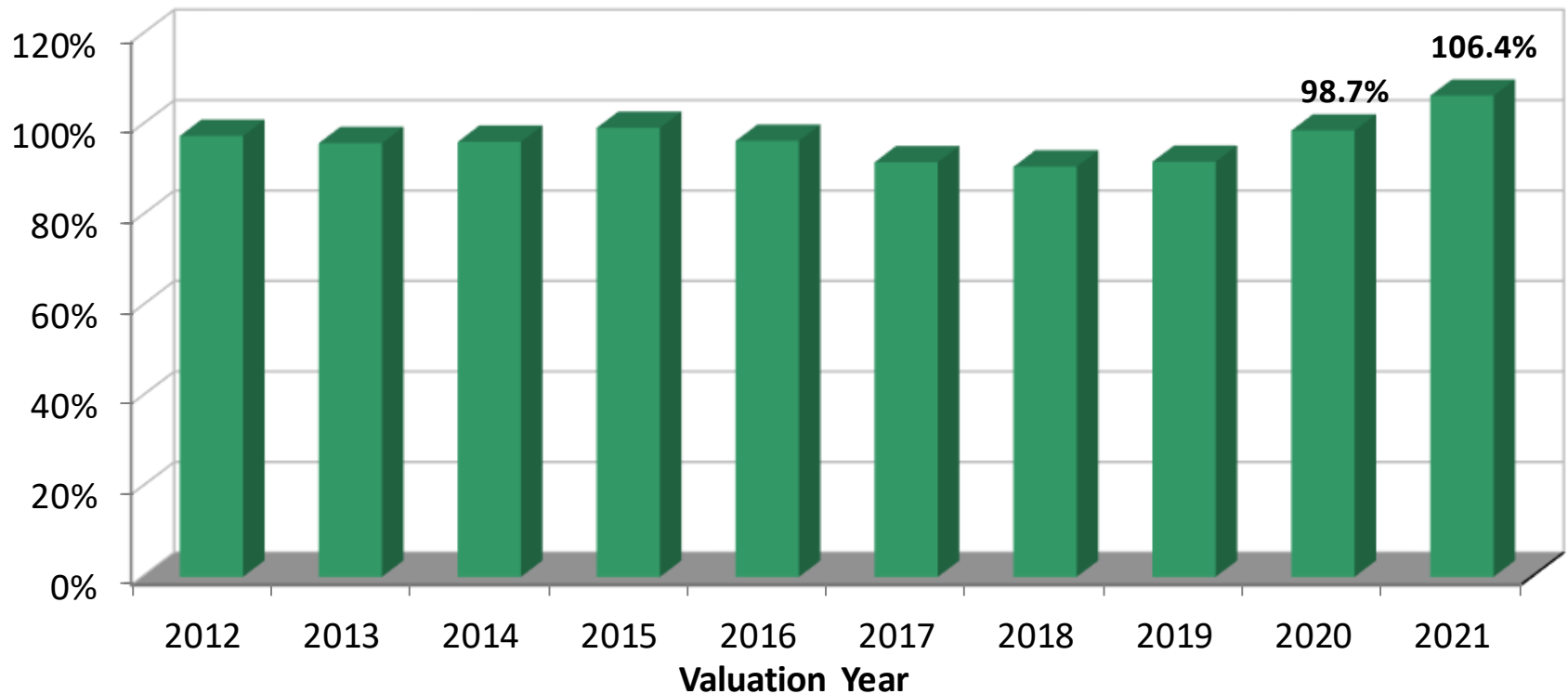
# Ratio of Active Members to Pension Benefit Recipients

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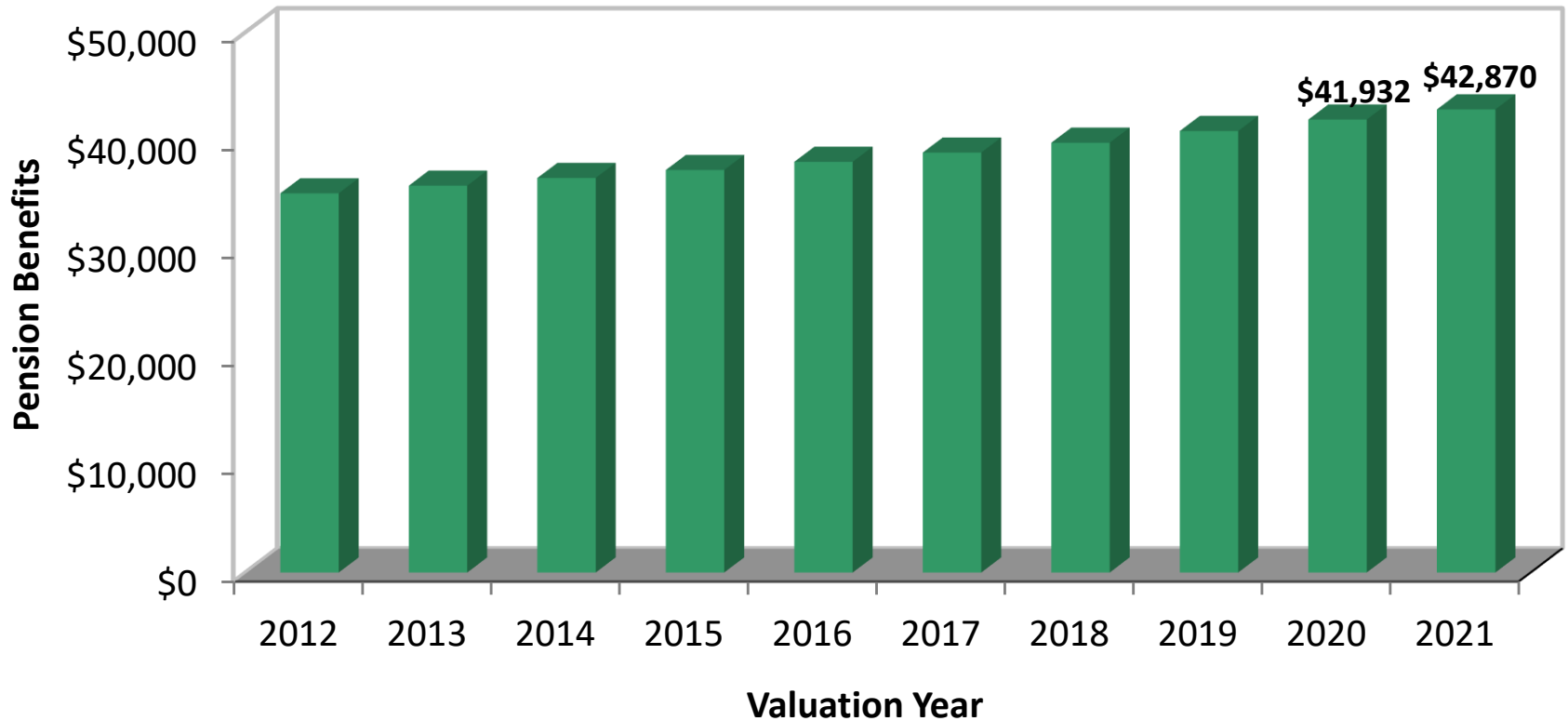
# Pension Benefits Expressed as %'s of Active Member Pay

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# Average Annual Pensions

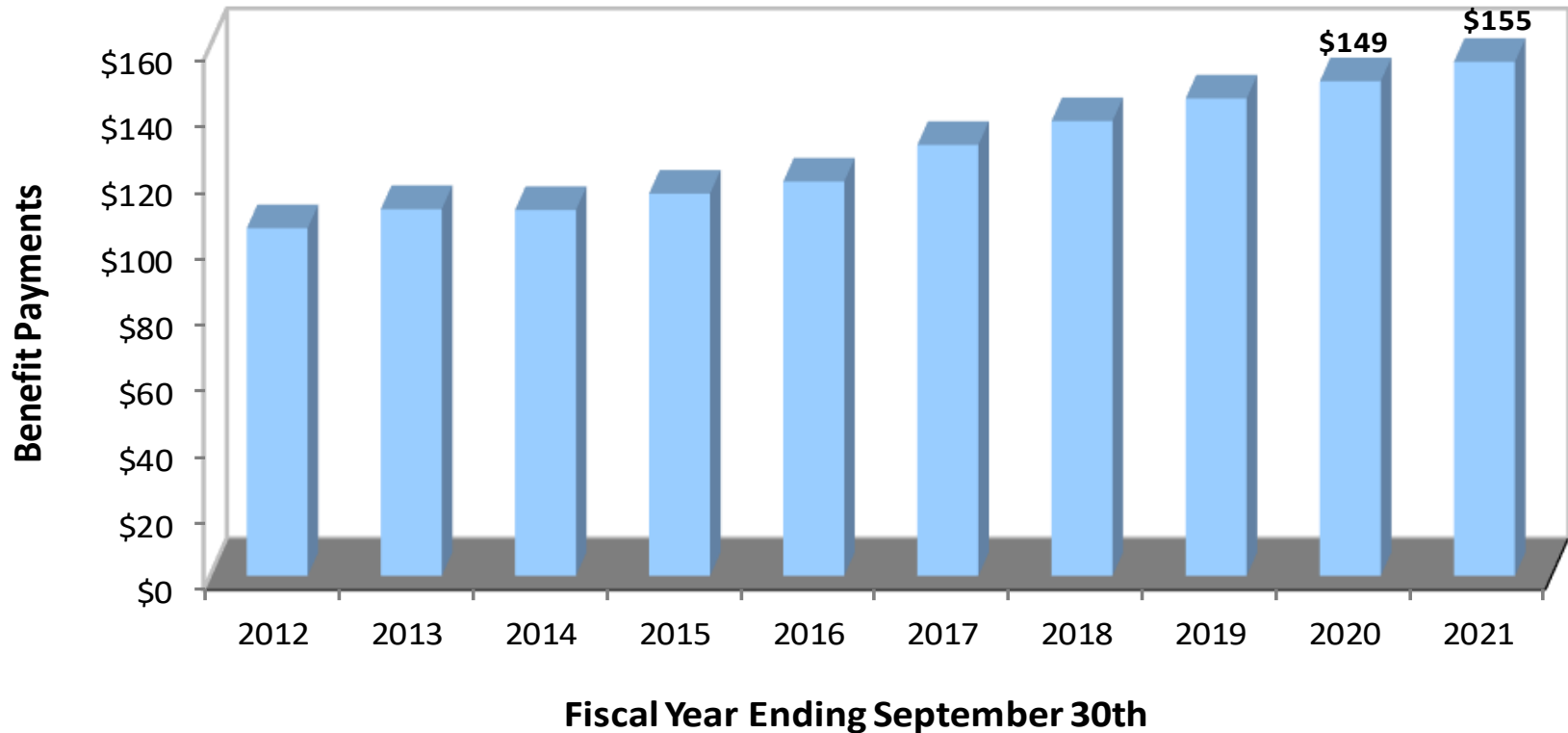
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# Actual Pension Benefit Payments by Fiscal Year \*

(Amounts in Millions)

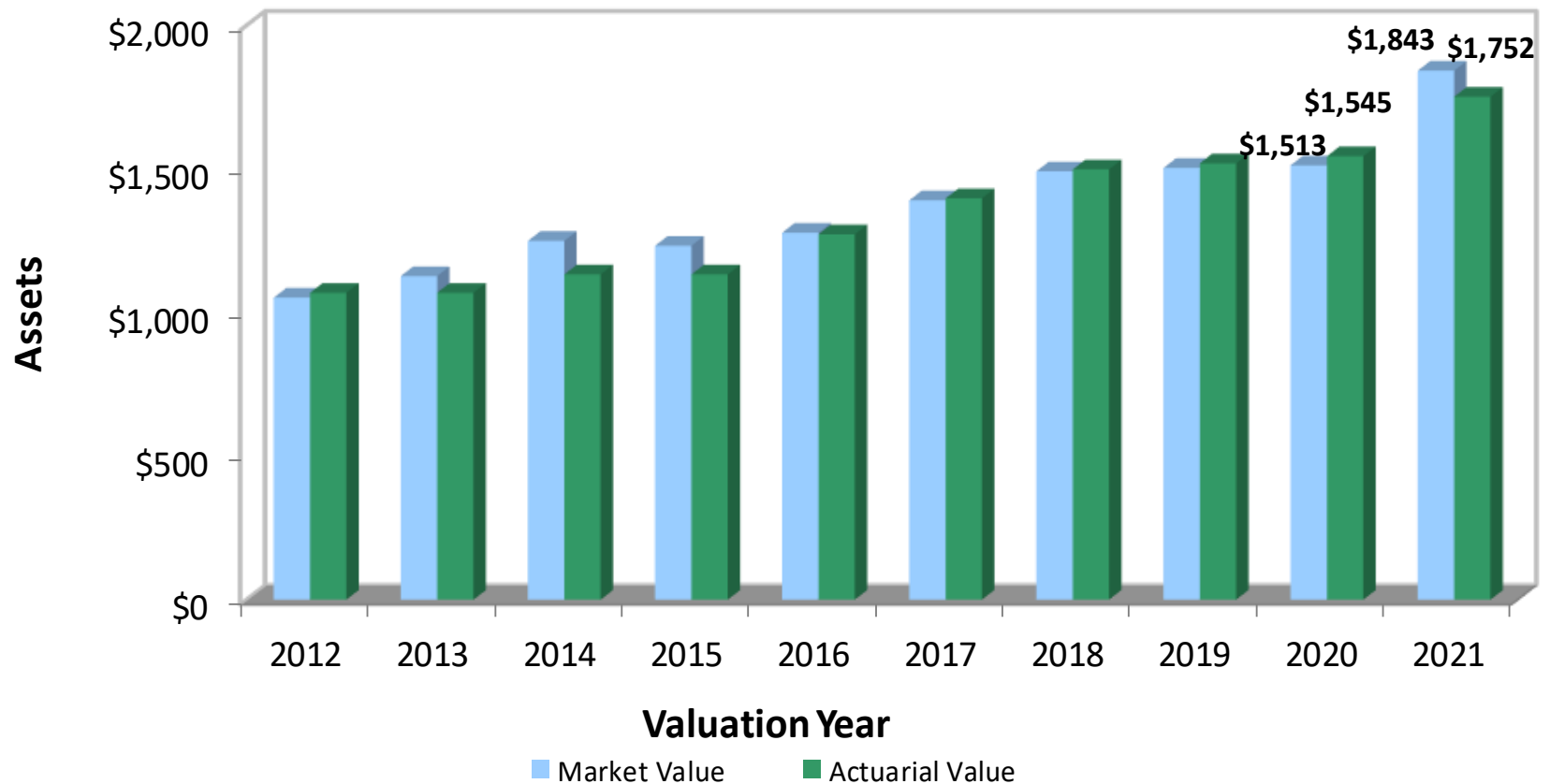


\* Includes the payment of DROP account balances.

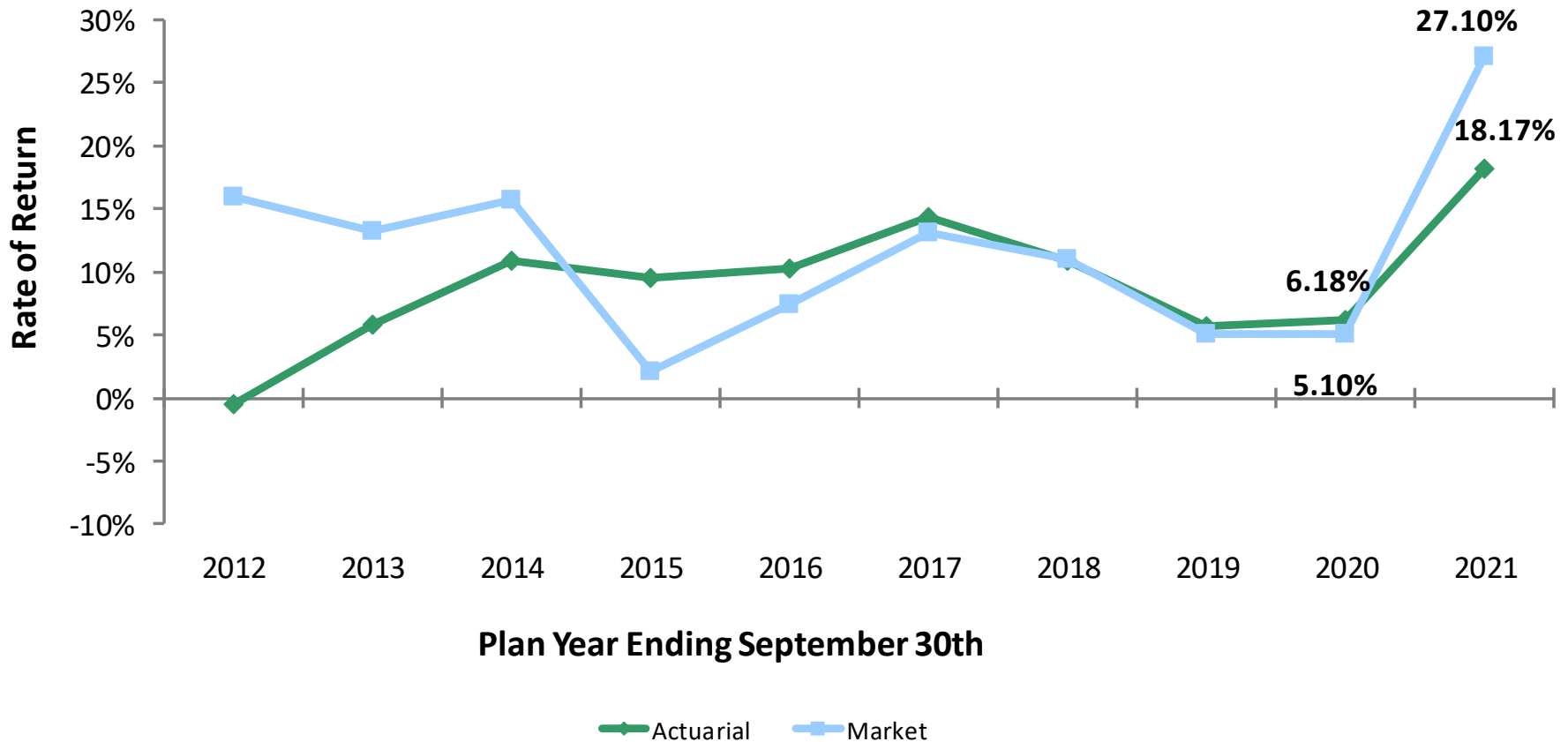


# Pension Assets

(Amounts in Millions)



# Actuarial & Market Net Rates of Return

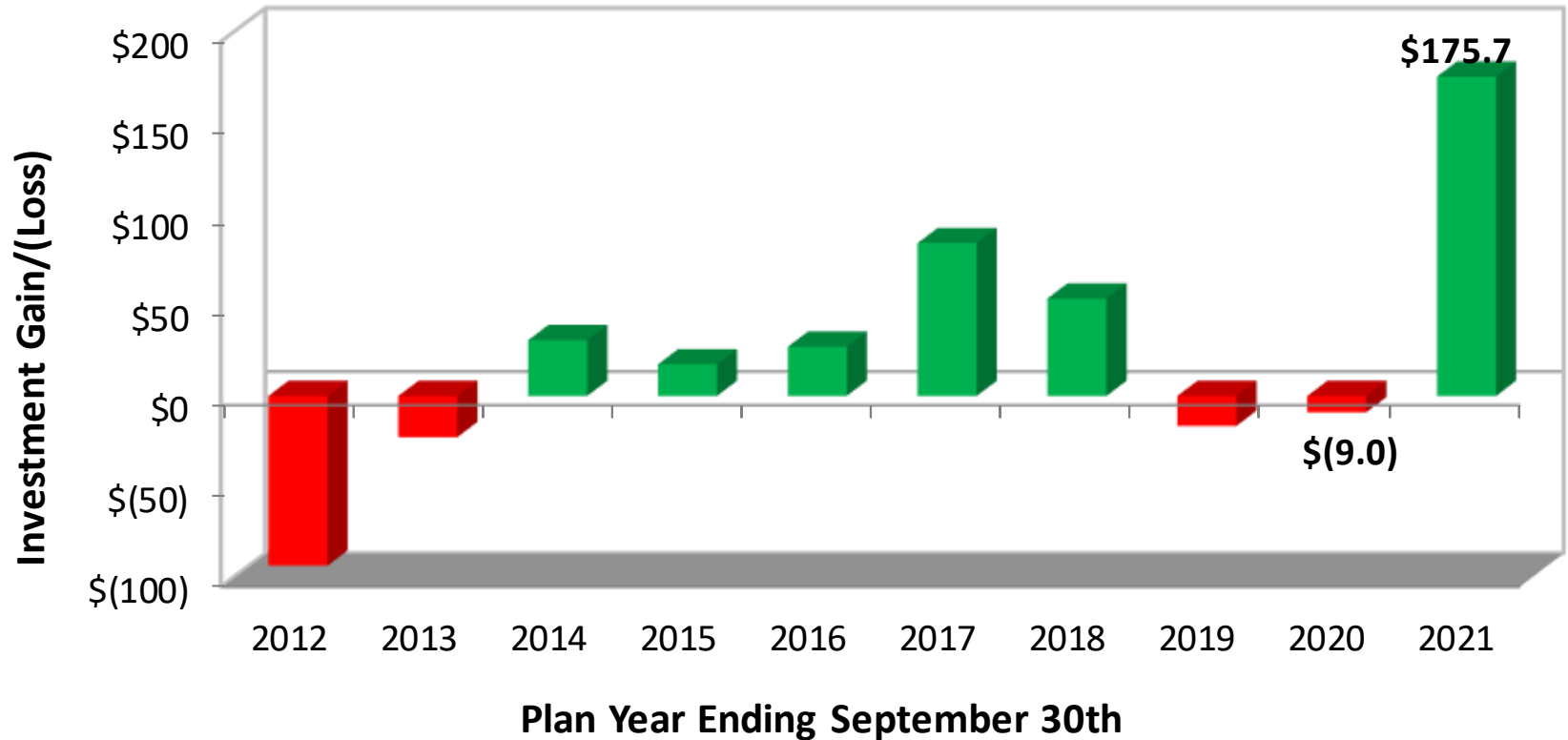


Rates of return shown above are for Non-Hybrid assets.



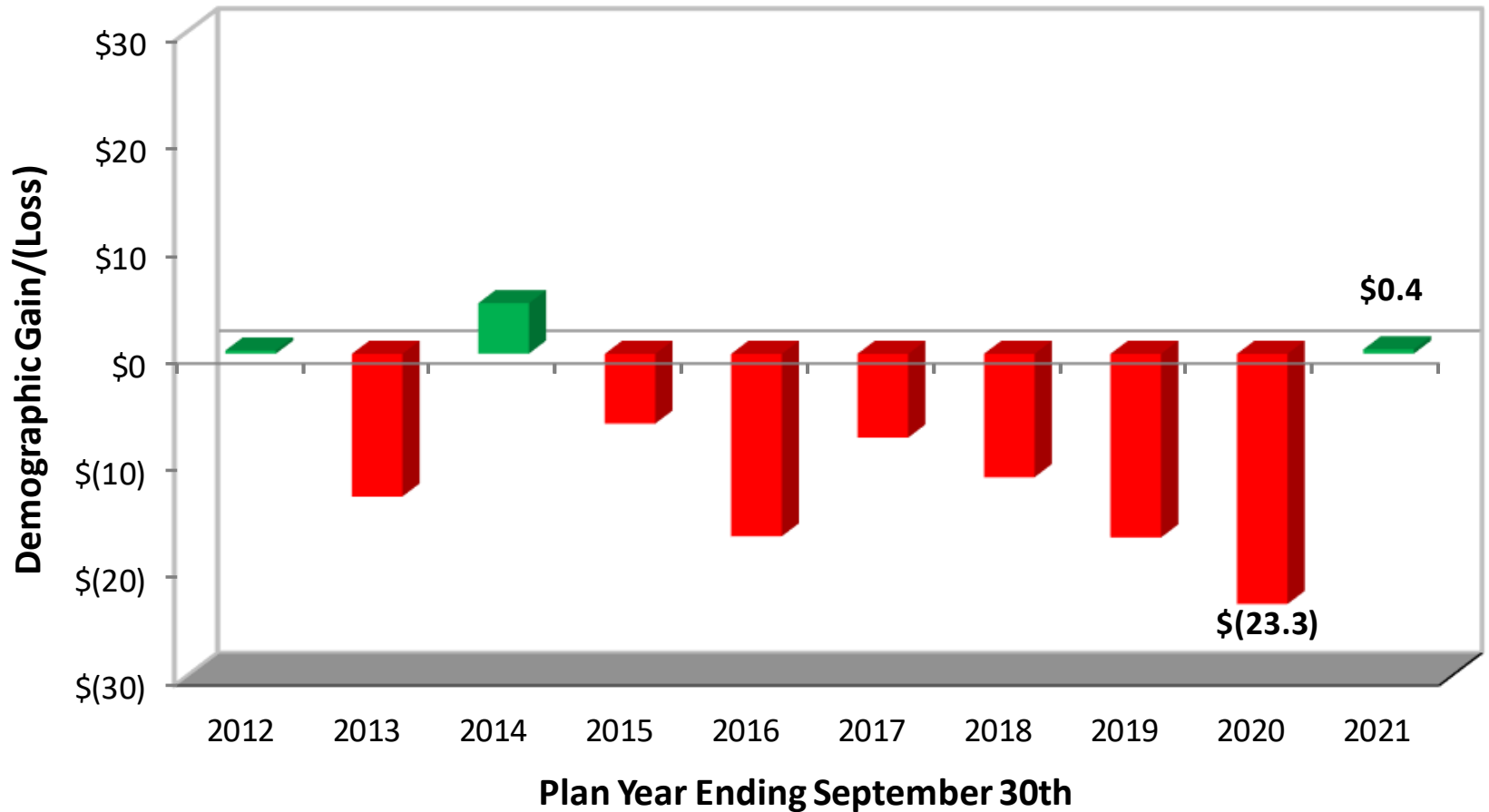
# Investment Gain/(Loss)

(Amounts in Millions)



# Demographic Gain/(Loss)

(Amounts in Millions)



# Gain/(Loss) by Type of Activity

(Amounts in Millions)

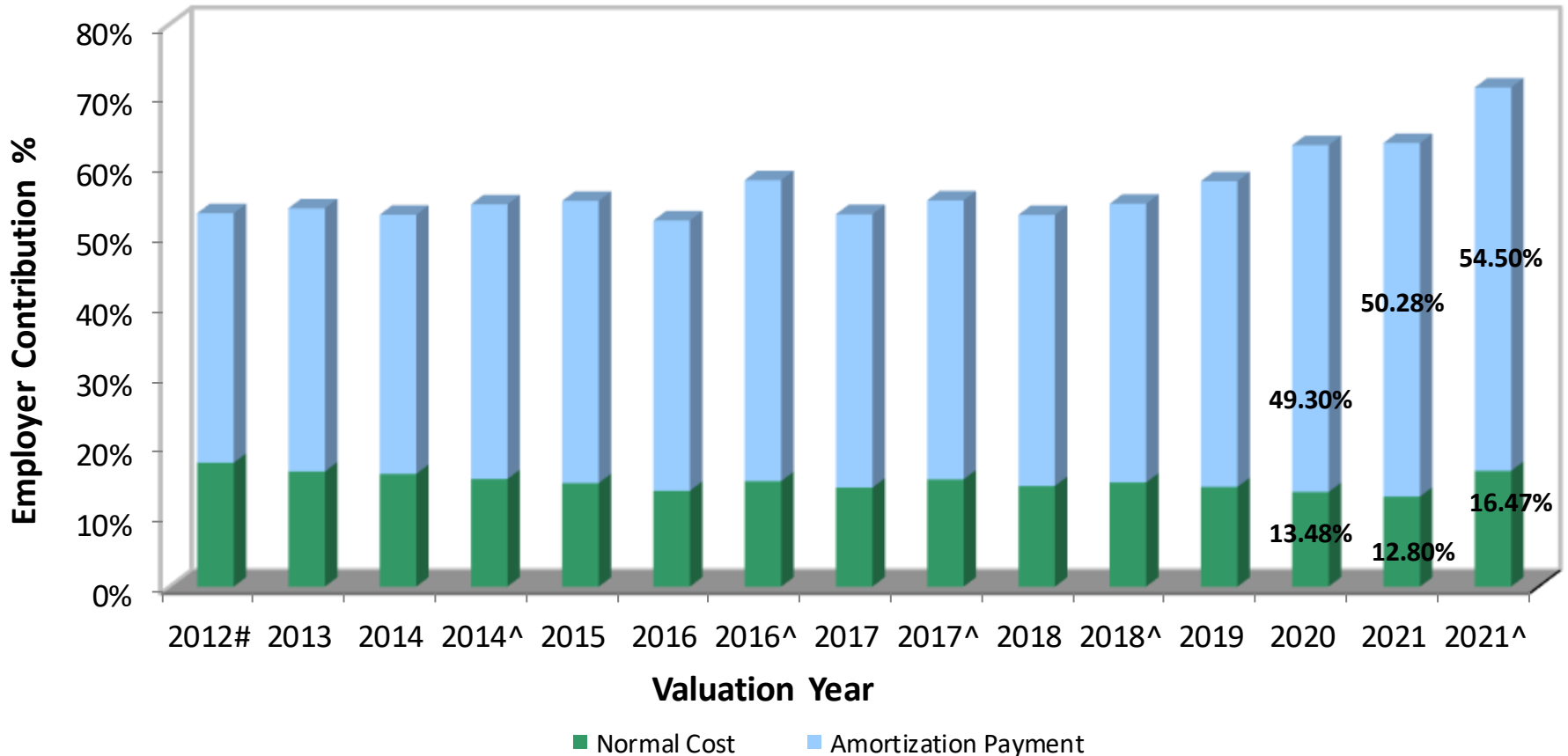
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Plan Year Ending 9/30	2021	2020	2019	2018	2017	2016
New Entrants *	(0.02)	0.00	(0.84)	(0.45)	0.00	0.00
Retiree Deaths	(5.33)	(5.27)	(5.30)	(2.42)	(1.83)	(2.84)
Investments	175.75	(9.03)	(16.46)	53.59	84.14	27.08
Pay Increases	(1.04)	(11.61)	(8.21)	(2.92)	(4.37)	1.14
Withdrawal	0.55	0.14	1.69	(0.37)	0.43	(1.48)
Retirements	(5.41)	(6.34)	(0.42)	(0.11)	2.47	1.12
Other	11.69	(0.21)	(4.02)	(5.23)	(4.46)	(14.98)
<b>Total</b>	<b>176.19</b>	<b>(32.32)</b>	<b>(33.56)</b>	<b>42.09</b>	<b>76.38</b>	<b>10.04</b>

\* New entrants with past service (rehires).



# Historical Employer Contribution %'s Valuation as of September 30<sup>th</sup>

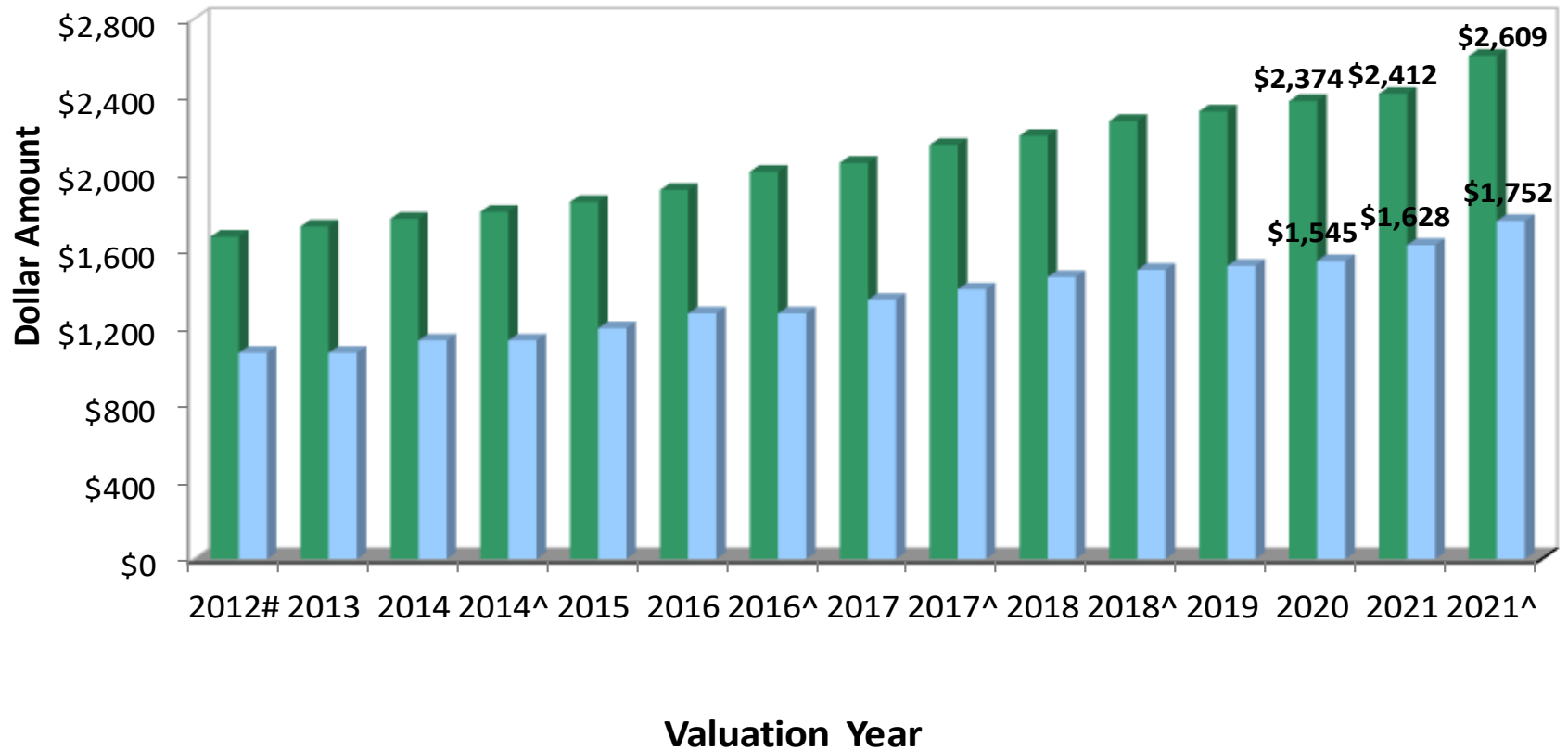


# Revised benefit provisions.

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



# Actuarial Accrued Liability Compared to Actuarial Value of Assets (Amounts in Millions)



■ Actuarial Accrued Liability (AAL)
 ■ Actuarial Value of Assets (AVA)

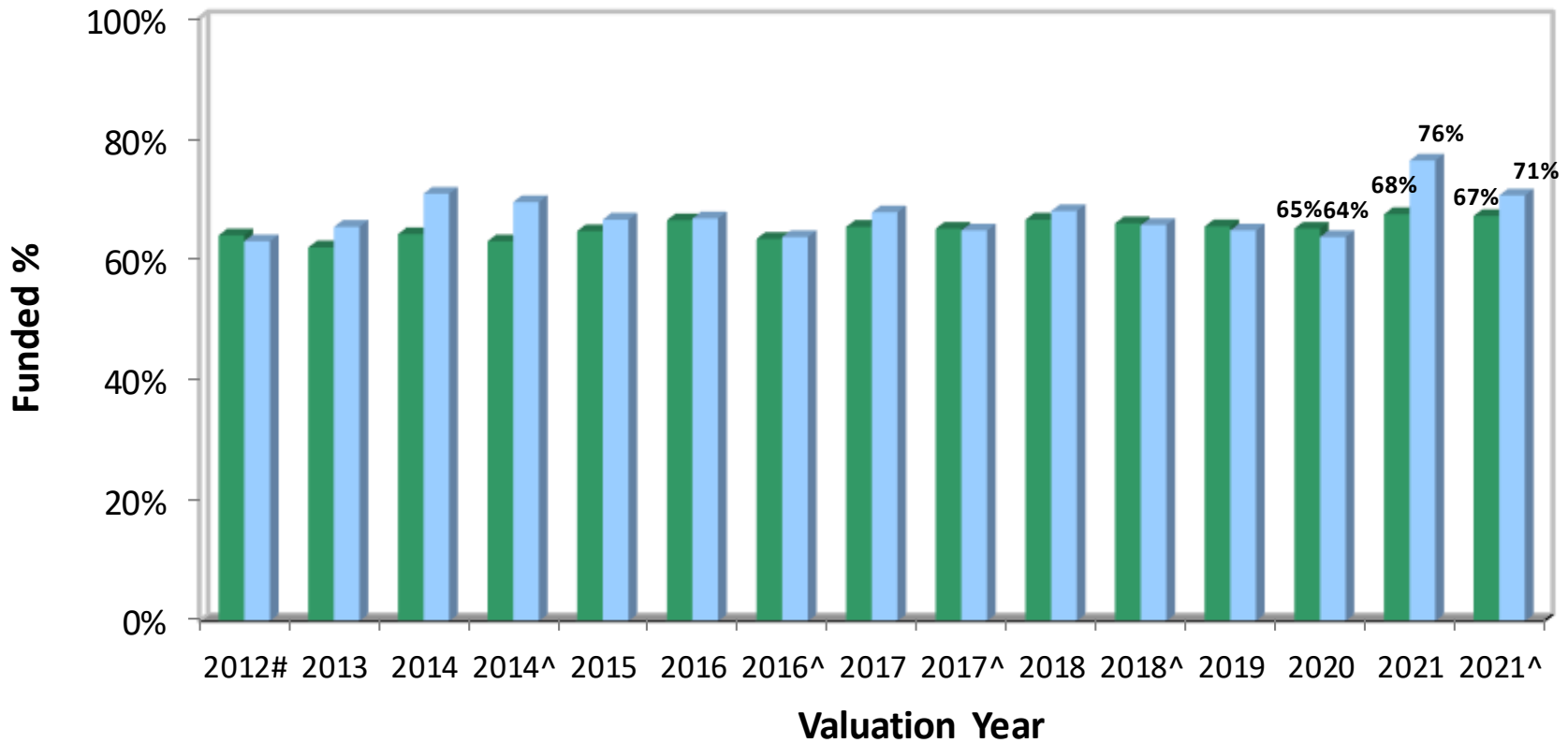
# Revised benefit provisions.

^ Revised actuarial assumptions.





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



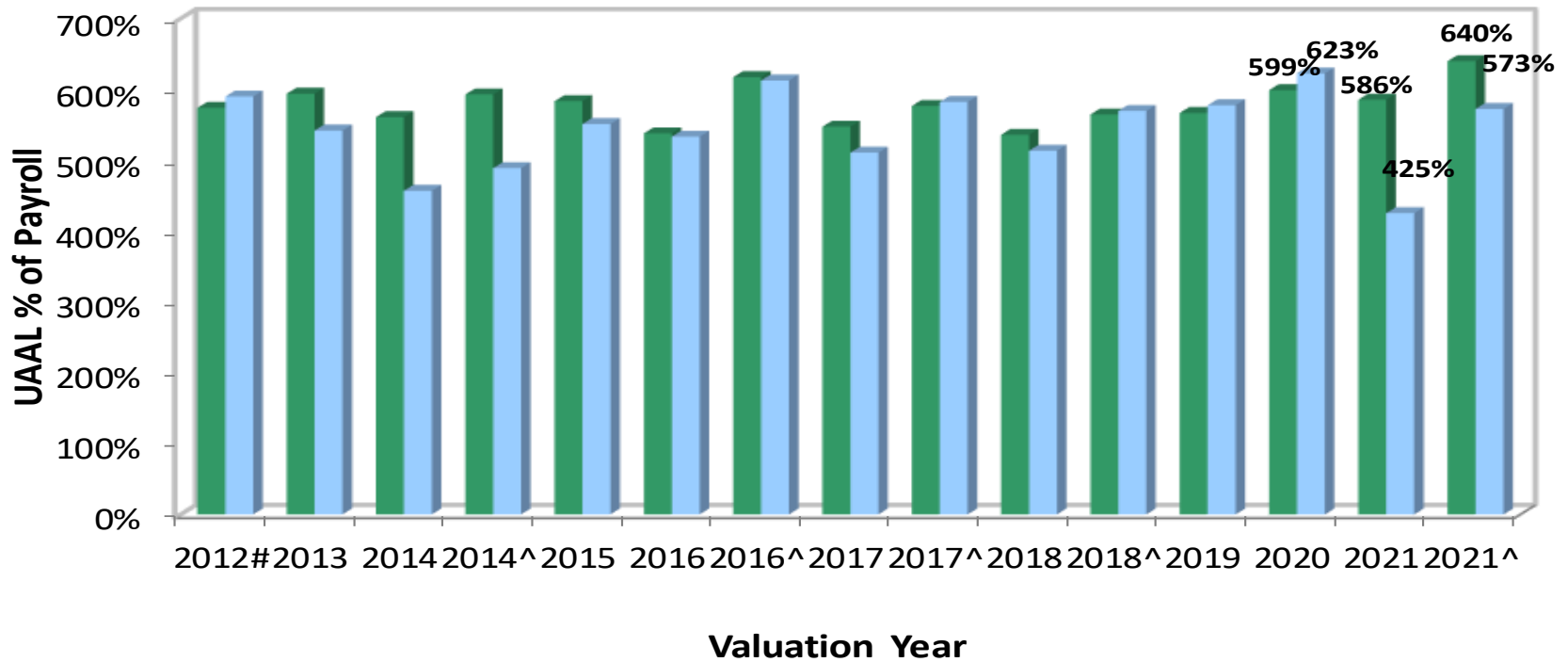
■ Funded % based on AVA      ■ Funded % based on MVA

# Revised benefit provisions.

^ Revised actuarial assumptions.



# Unfunded Actuarial Accrued Liability as a Percentage of Payroll



# Revised benefit provisions.

^ Revised actuarial assumptions.



# Risk Metrics

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- 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

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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

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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 one standard deviation asset gain or loss as a percent of payroll. This theoretically may happen once every 6 years.

# Summary of Risk Metrics

Valuation Date September 30,	Funded Ratio		UAAL	Total UAAL / Total Payroll	Total Funding Value	Total AAL / Total Payroll	Standard Deviation of
	Based on AVA	Based on MVA	Amortization Period		of Assets / Total Payroll		Investment Return / Total Payroll
2013	62 %	65 %	23	5.9	9.7	15.6	**
2014 <sup>1</sup>	63	69	22	5.9	10.1	16.0	**
2015	65	67	21	5.8	10.7	16.5	**
2016 <sup>1</sup>	63	64	18	6.2	10.7	16.9	**
2017 <sup>1</sup>	65	65	17	5.8	10.8	16.5	**
2018 <sup>1</sup>	66	66	18	5.6	11.0	16.6	144 %
2019	65	65	17	5.7	10.8	16.4	140
2020	65	64	16	6.0	11.2	17.2	144
2021 <sup>1</sup>	67	71	15	6.4	13.1	19.5	181

<sup>1</sup> After changes in actuarial assumptions.

# Disclaimers

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- This presentation is intended to be used in conjunction with the September 30, 2021 pension actuarial valuation report. This presentation should not be relied on 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.