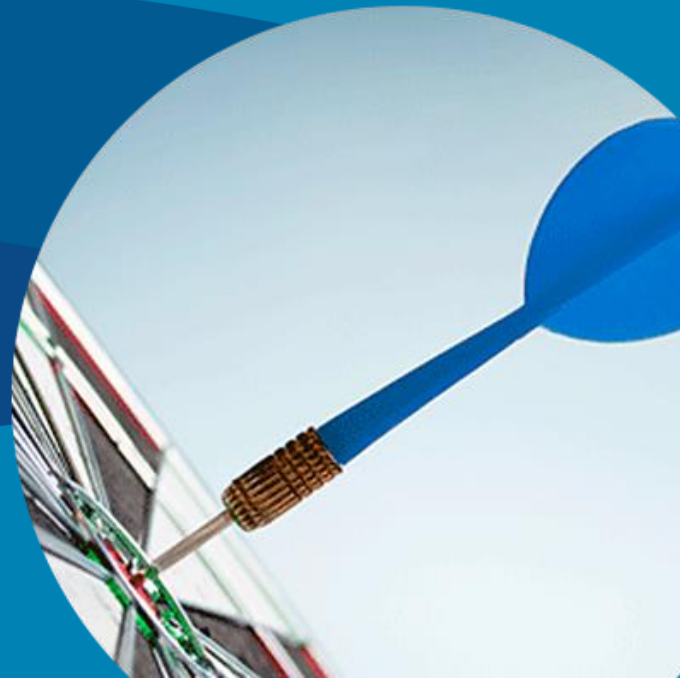


Michigan State Police Retirement System

Pension Actuarial Valuation Results
as of September 30, 2018



September 30, 2018 Valuation

- Purpose of the September 30, 2018 valuation is twofold:
 - Determine the employer contribution for fiscal year 2021
 - Measure the System's funding progress
- Reflects the Dedicated Gains Policy adopted by the Board of Trustees
 - The investment return assumption for the Non-Hybrid plan was reduced from 7.05% to 6.80% as a result of the policy
 - The investment return assumption for the Hybrid plan was reduced from 7.00% to 6.85% as a result of the Policy
- Reflects the adoption of new assumptions in conjunction with the Experience study covering the period October 1, 2012 through September 30, 2017

September 30, 2018 Valuation

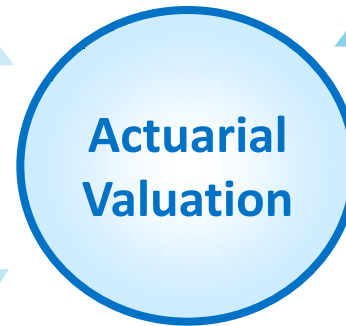
- Reflects the following provisions of Public Act 674 of 2018
 - Change in the amortization period used in the development of employer contributions (18 years)
 - Gradual transition from level percent of payroll amortization of unfunded actuarial accrued liability (UAAL) to level dollar amortization
- Employer contribution rates included in this presentation do not incorporate the “contribution floor” provisions of Public Act 674 of 2018

Actuarial Valuation Process

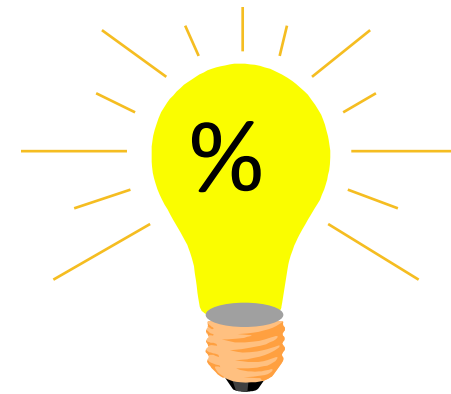
Member Data



Financial Data



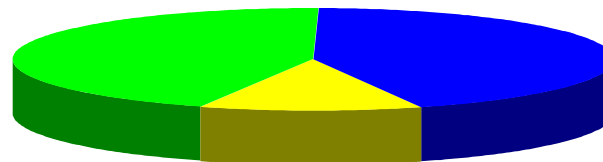
Actuarial Assumptions



Plan Provisions



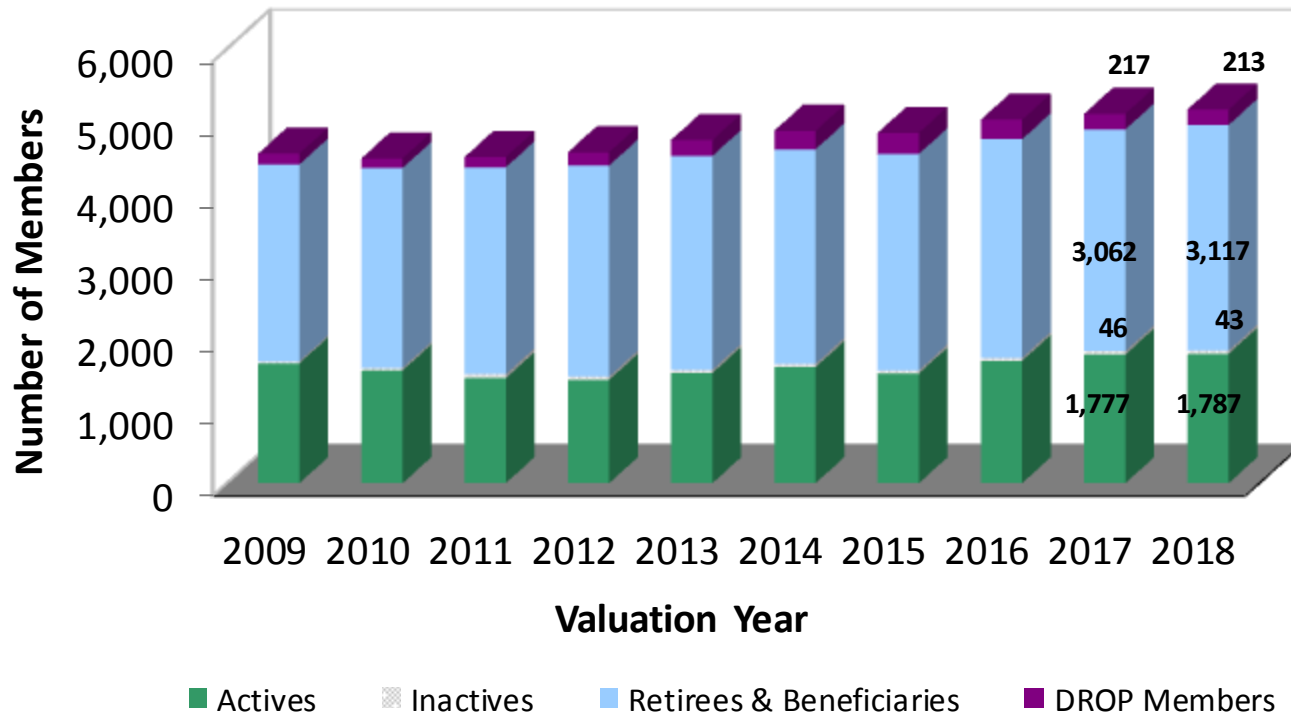
Actuarial Cost Method



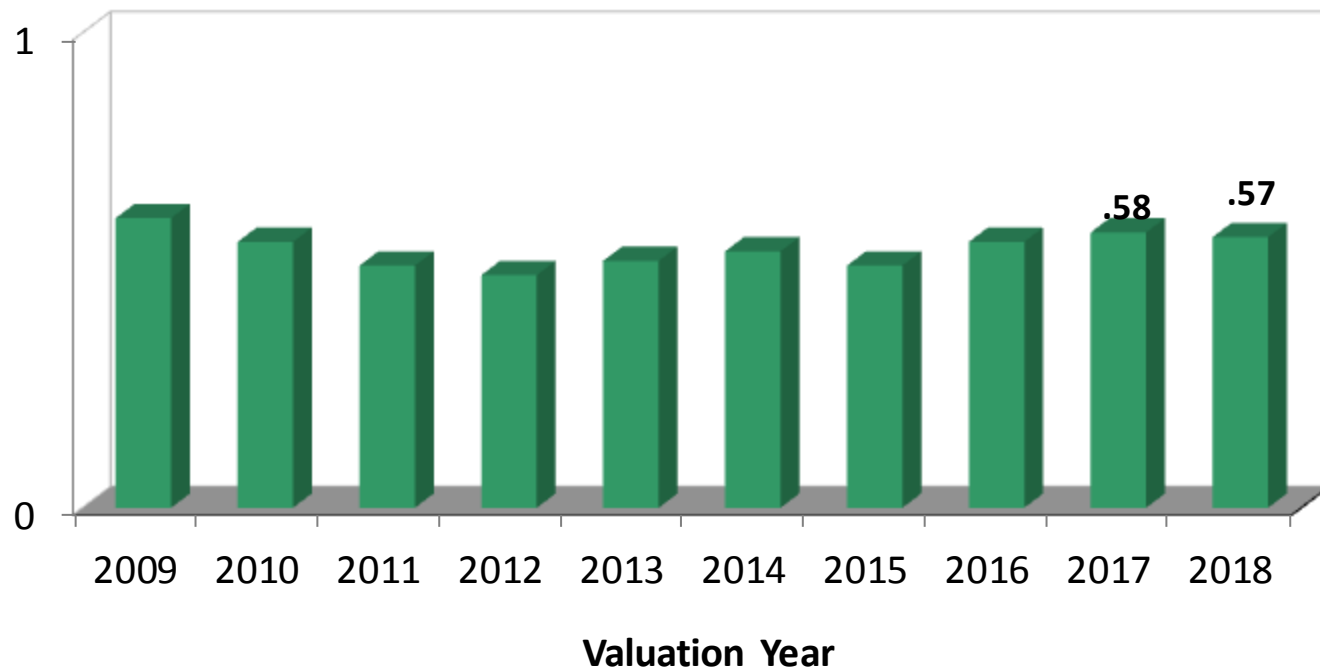
Dedicated Gains Policy

- Adopted in 2017
- The purpose of the policy is to reduce the investment return assumption for actuarial valuation purposes if the fiscal year's market value rate of return exceeds a certain amount
- The immediate recognition of the market value return is expected to offset the increase in the computed employer contribution from where it otherwise would have been
- SPRS specific provisions:
 - It was assumed that the reduction in the investment return assumption would be applicable to both the Non-Hybrid and Hybrid portions of the Retirement System

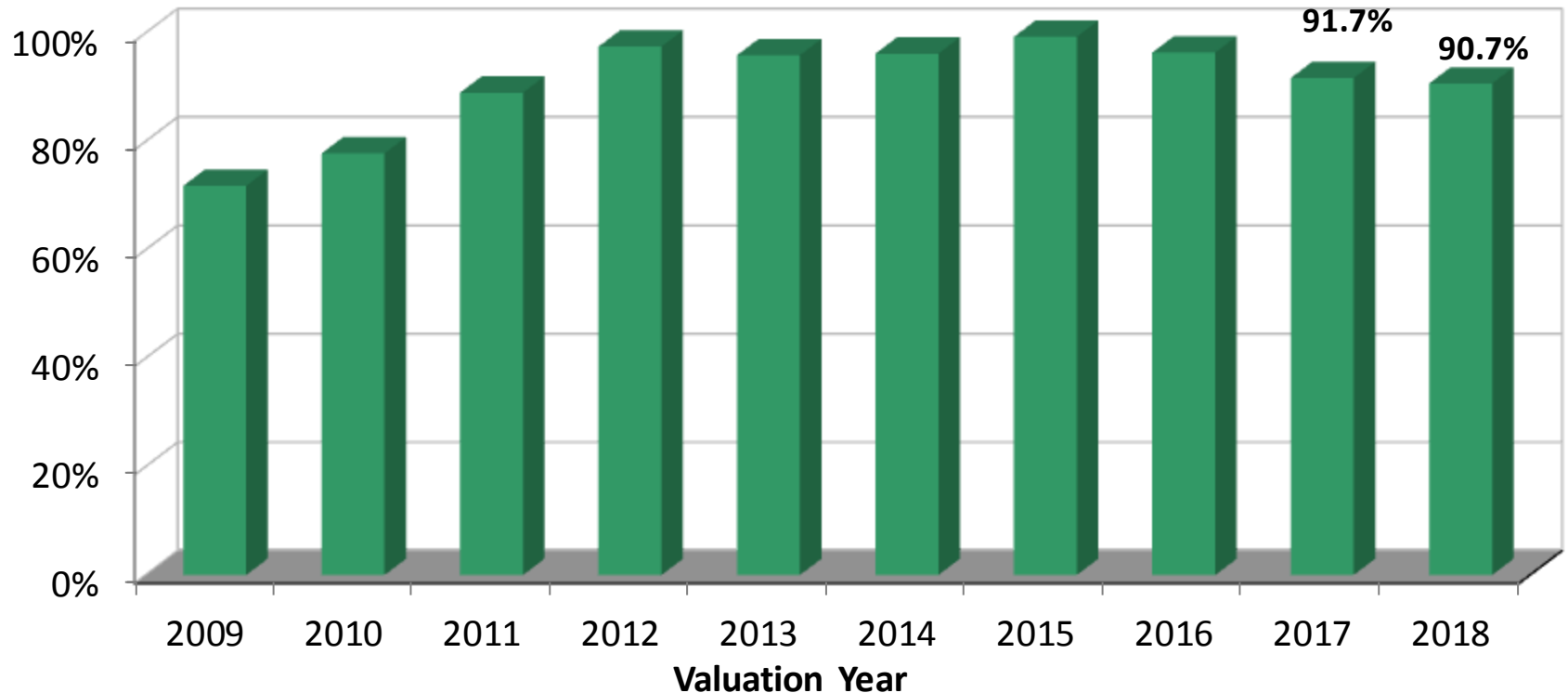
Membership Data



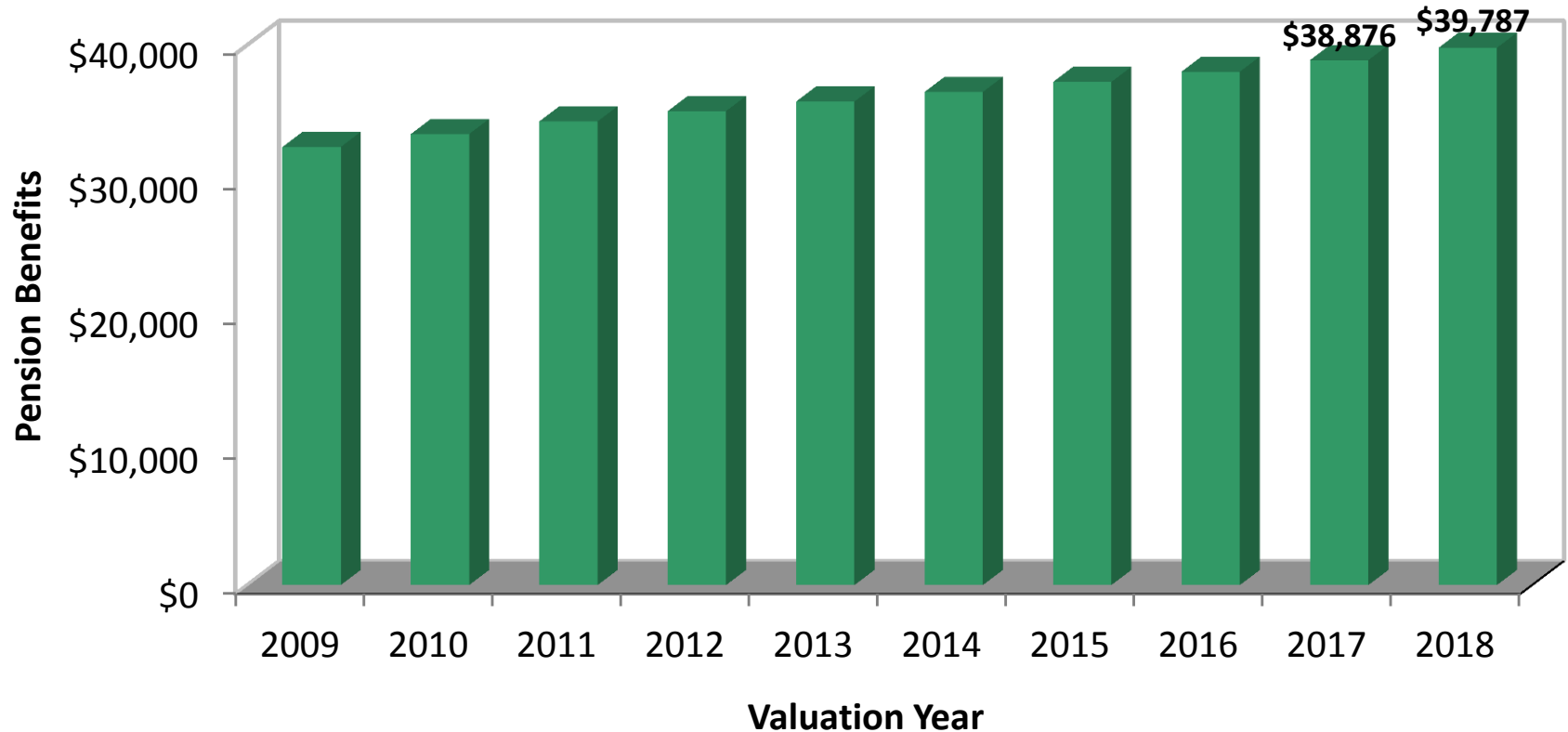
Ratio of Active Members to Pension Benefit Recipients



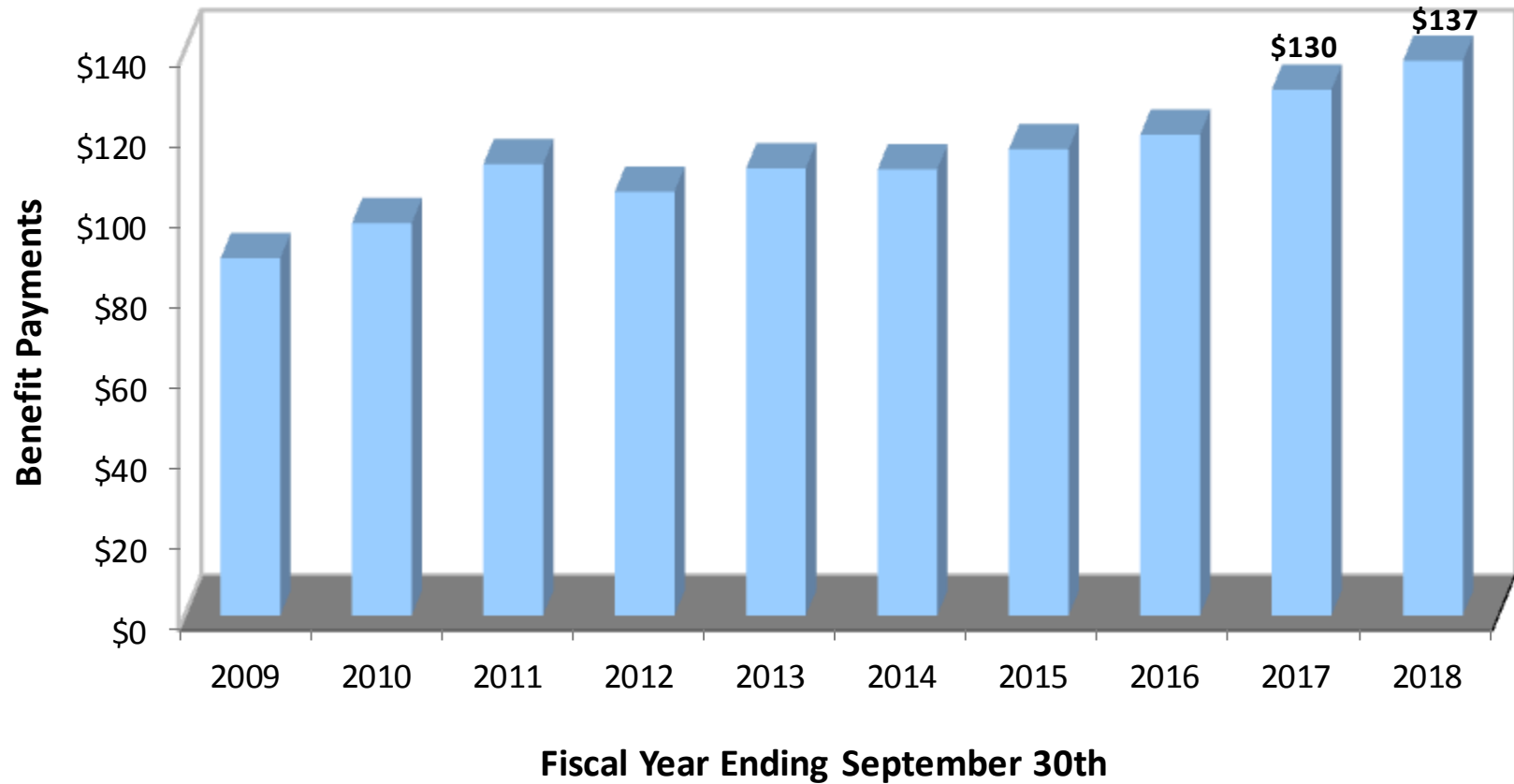
Pension Benefits Expressed as %'s of Active Member Pay



Average Annual Pensions

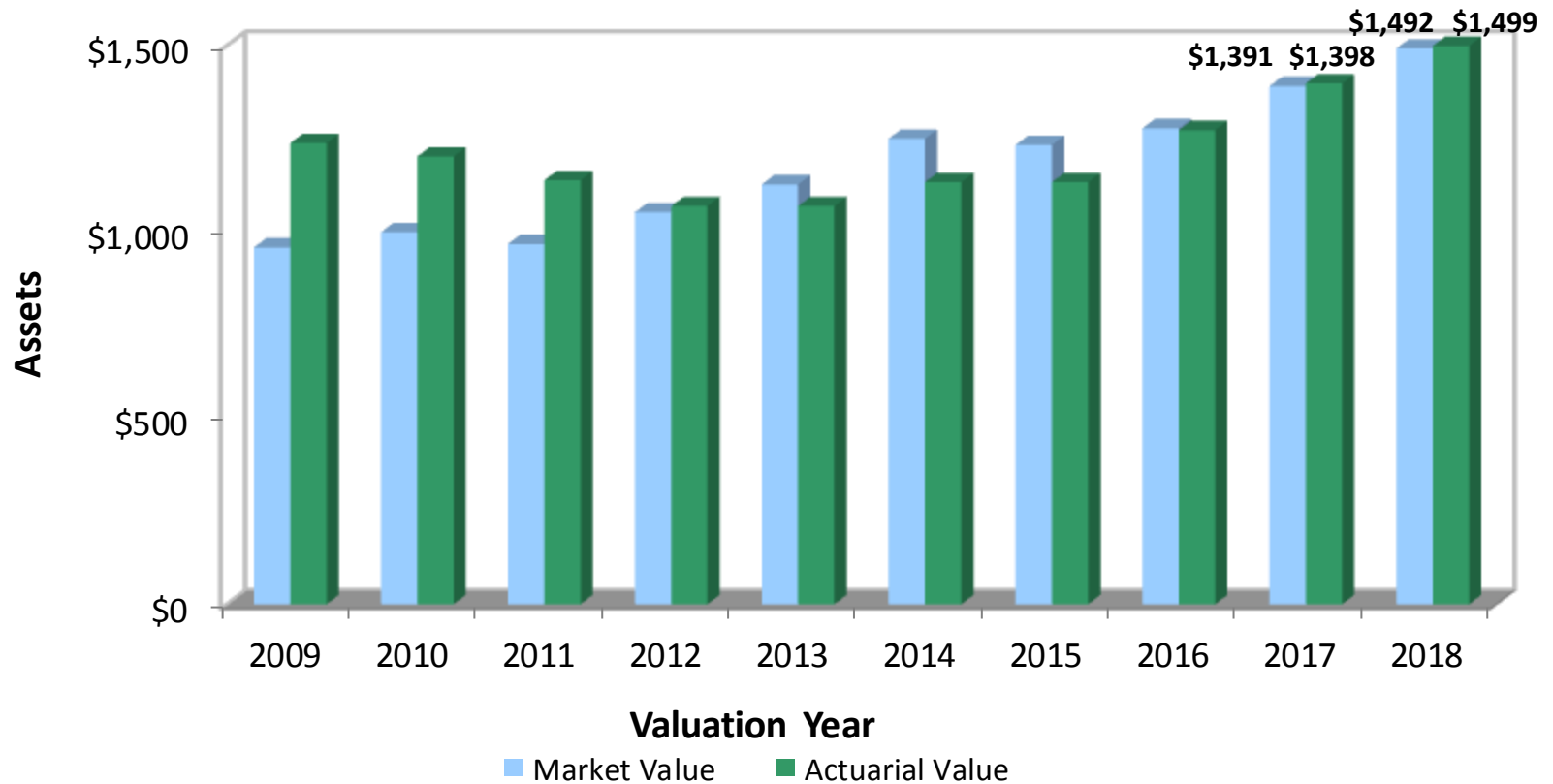


Actual Pension Benefit Payments by Fiscal Year (Amounts in Millions)

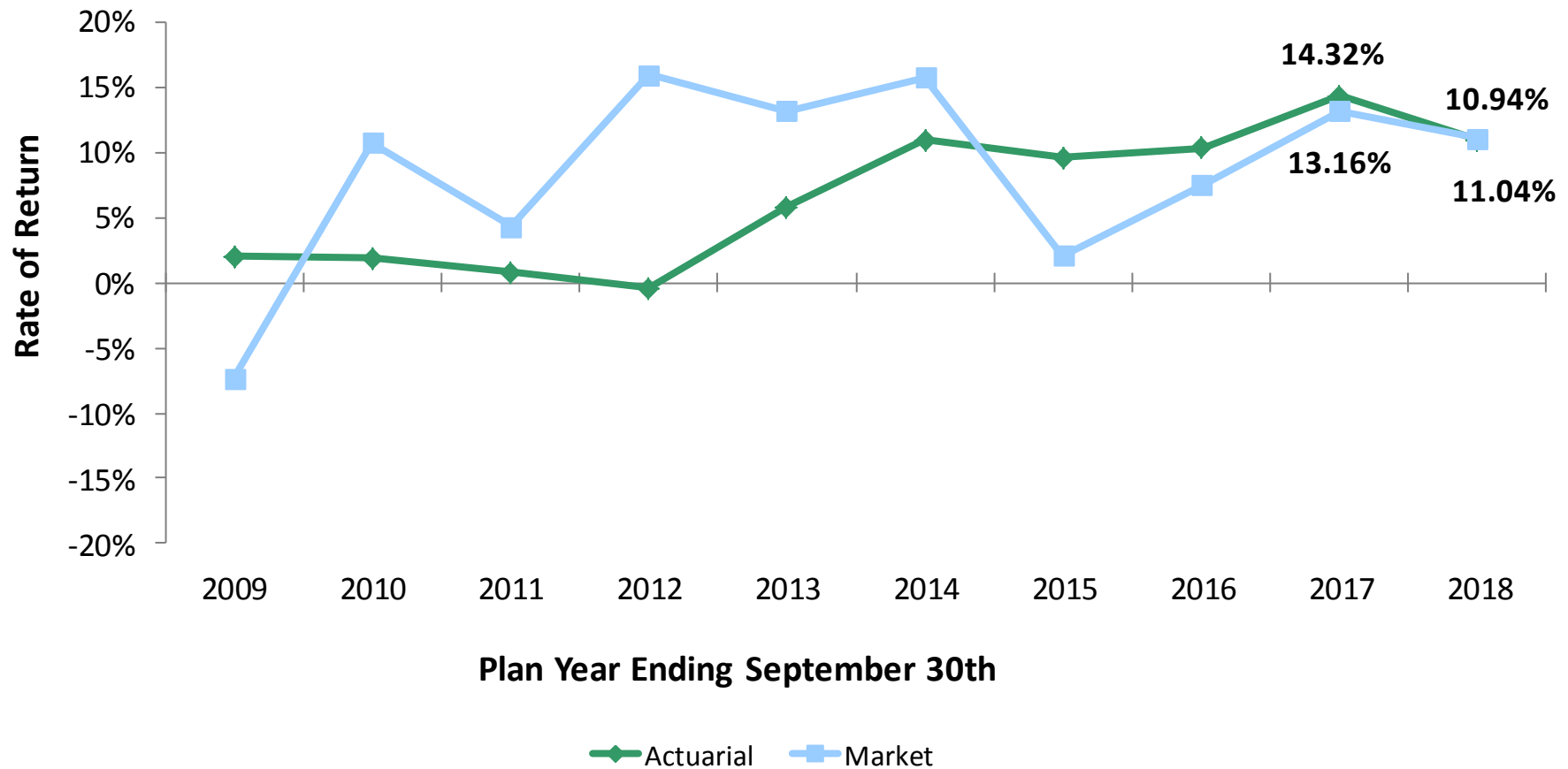


Pension Assets

(Amounts in Millions)



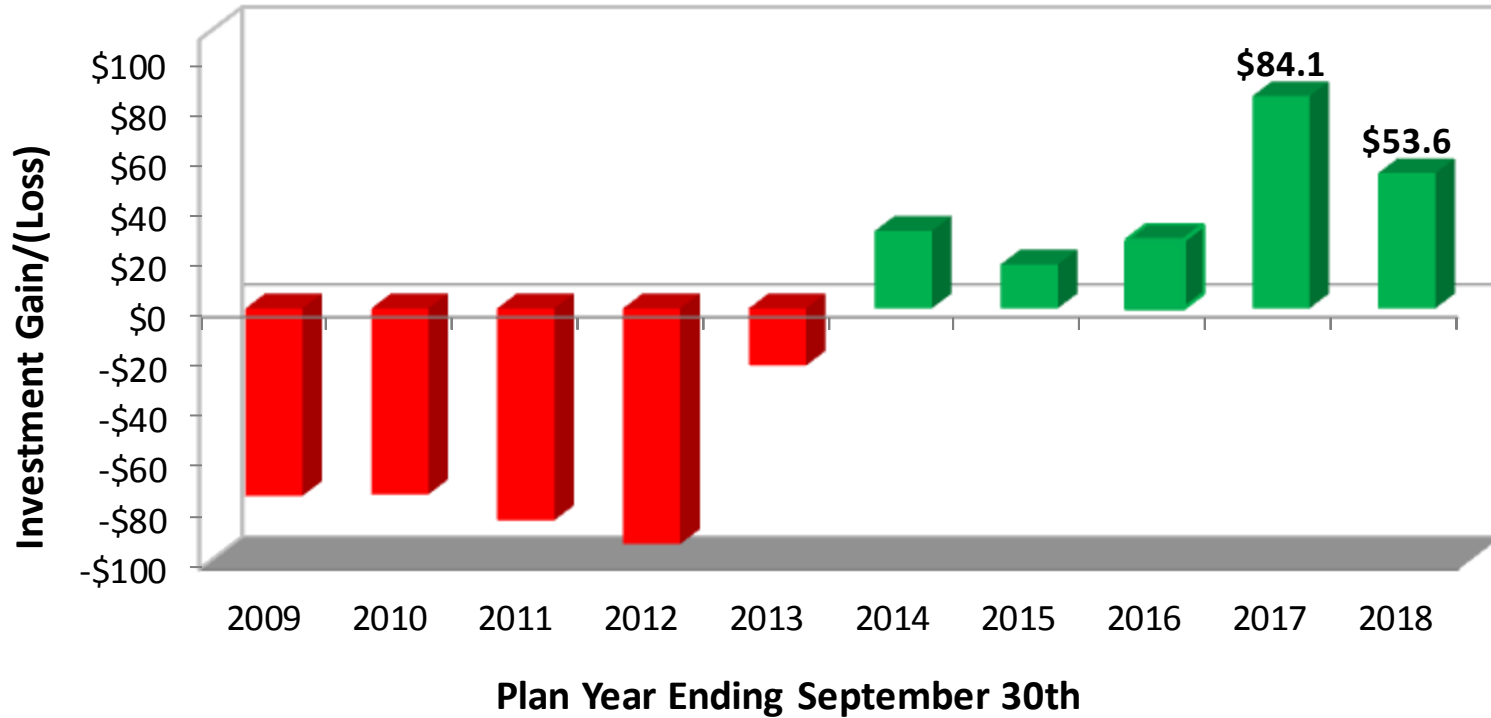
Actuarial & Market Net Rates of Return[#]



[#] Rates of return on Non-Hybrid actuarial assets.

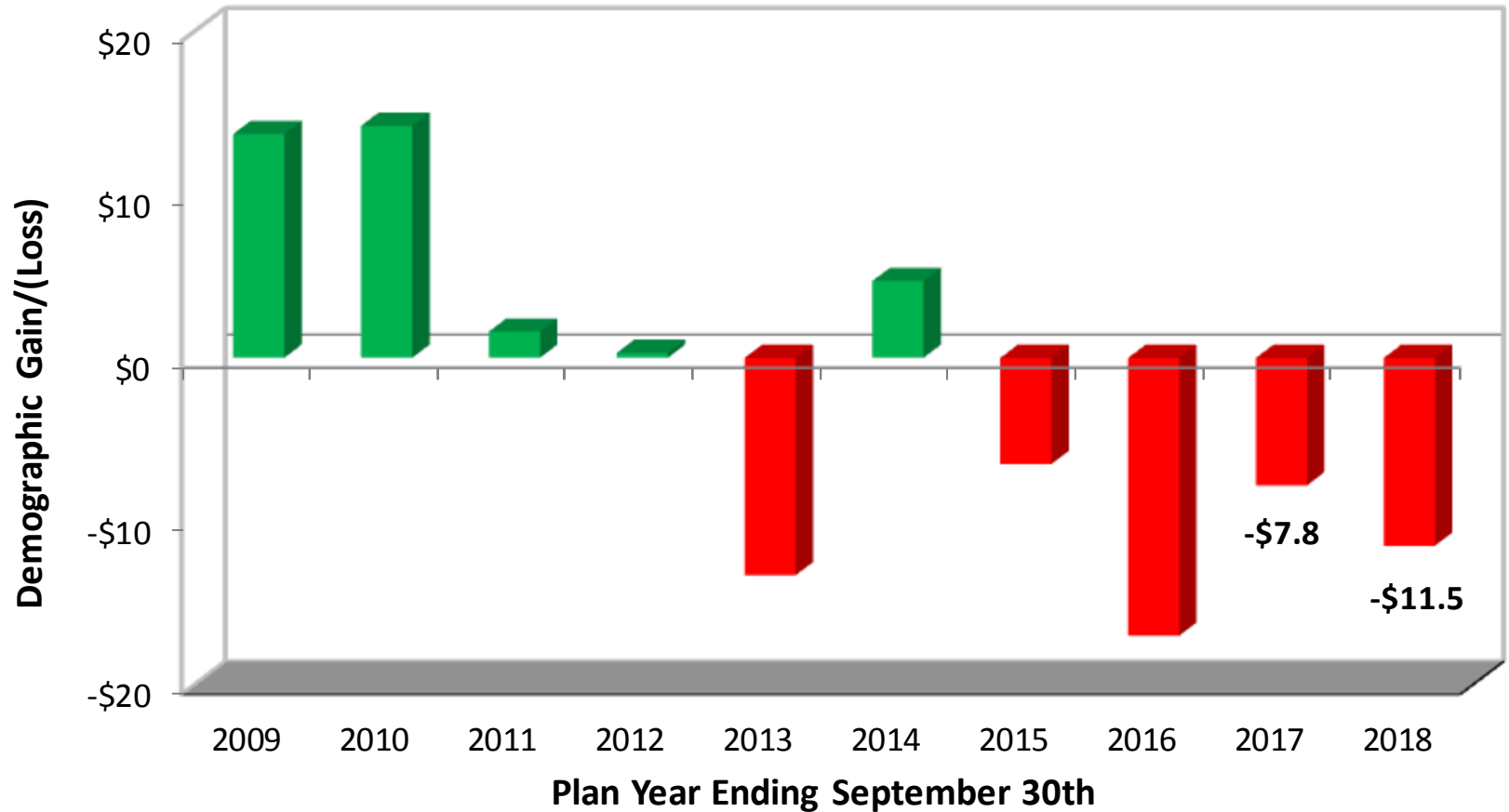
Investment Gain/(Loss)

(Amounts in Millions)



Demographic Gain/(Loss)

(Amounts in Millions)



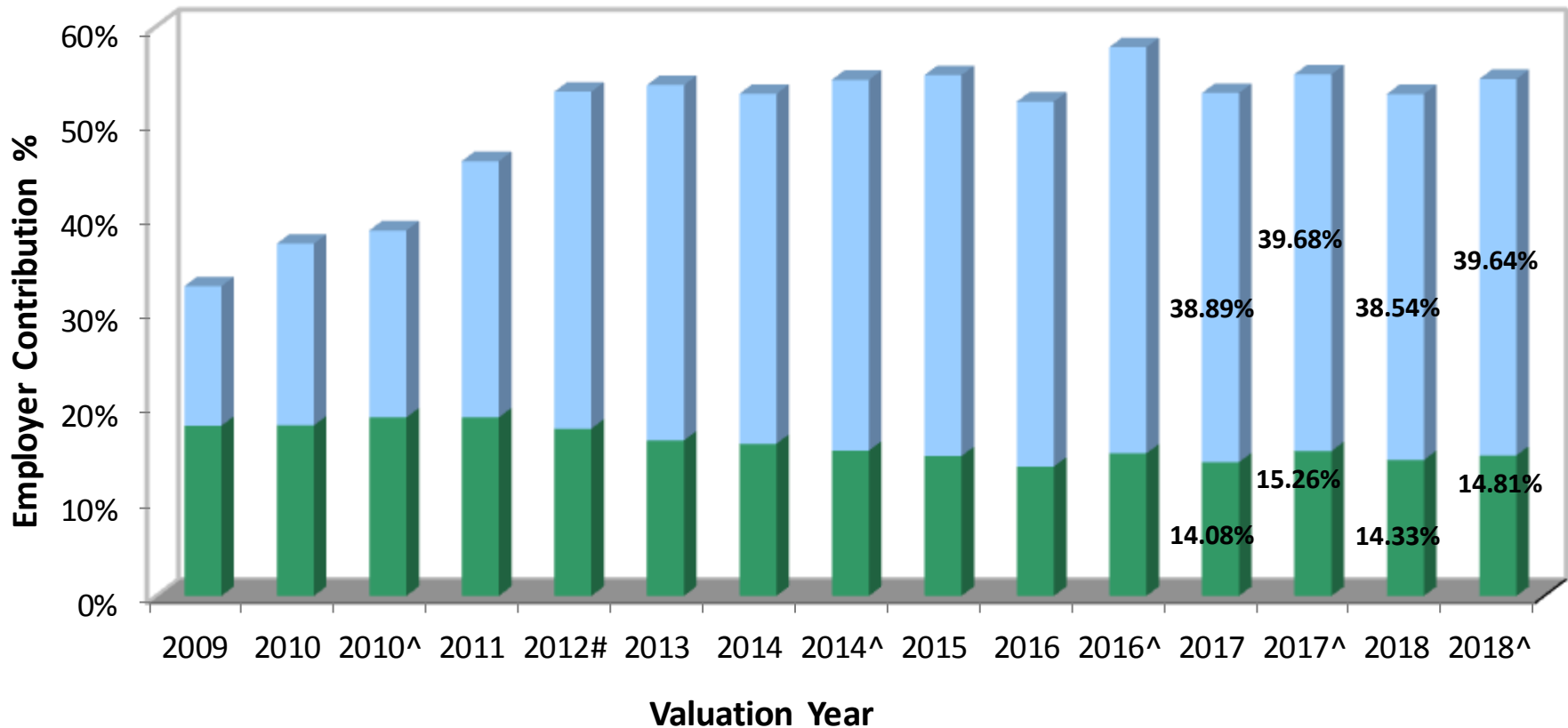
Gain/(Loss) by Type of Activity

(Amounts in Millions)

Plan Year Ending 9/30	2018	2017	2016	2015	2014	2013
New Entrants *	(0.45)	0.00	0.00	0.00	0.00	0.00
Retiree Deaths	(2.42)	(1.83)	(2.84)	(0.71)	(2.78)	(6.34)
Investments	53.59	84.14	27.08	17.43	30.70	(22.72)
Pay Increases	(2.92)	(4.37)	1.14	5.40	8.93	(1.34)
Withdrawal	(0.37)	0.43	(1.48)	(0.54)	0.42	0.36
Retirements	(0.11)	2.47	1.12	(3.03)	(0.75)	(1.80)
Other	(5.23)	(4.46)	(14.98)	(7.62)	(1.11)	(4.20)
Total	42.09	76.38	10.04	10.93	35.41	(36.04)

* New entrants with past service (rehires).

Historical Employer Contribution %'s Valuation as of September 30th



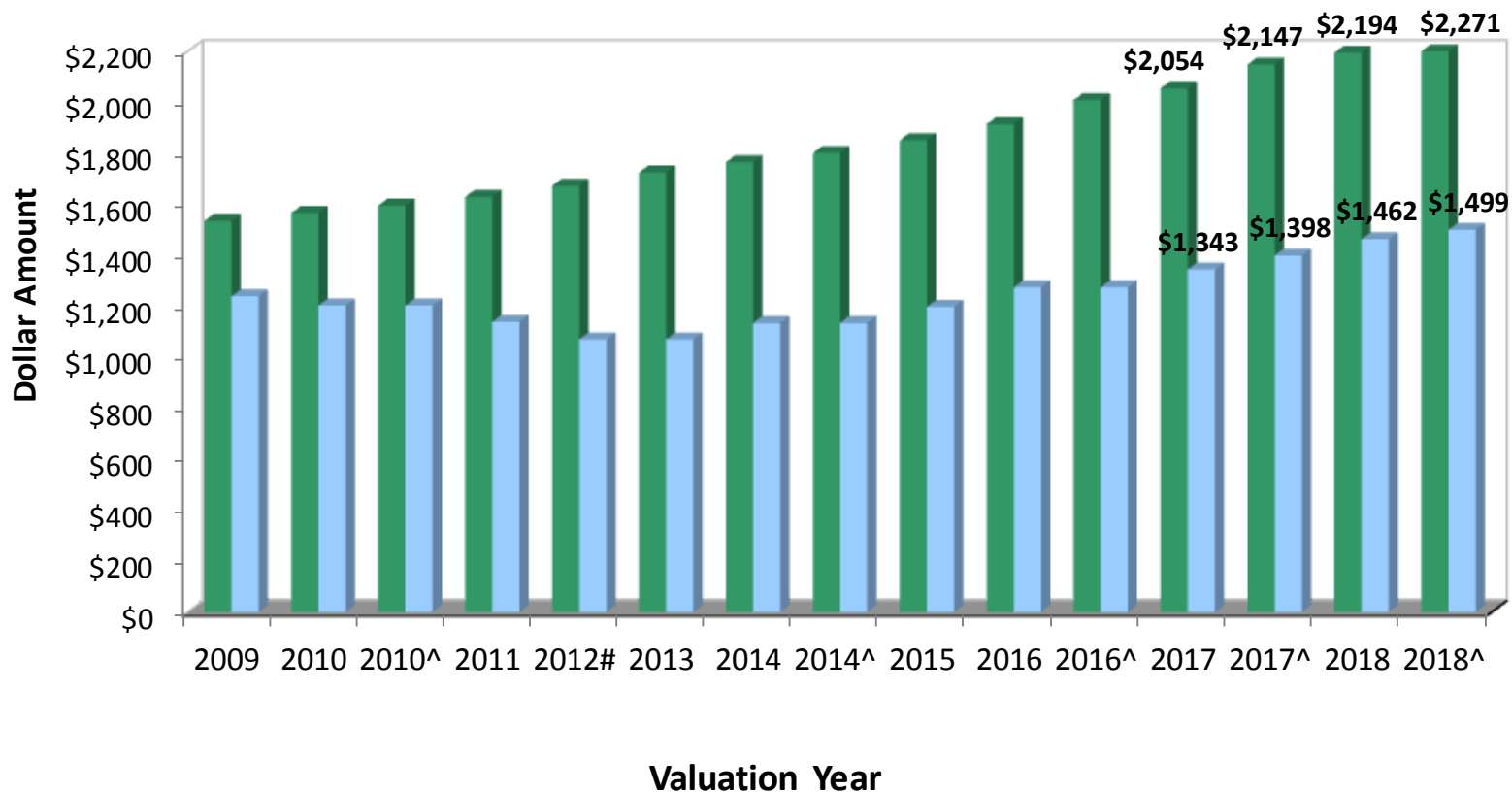
Revised benefit provisions.

^ Revised actuarial assumptions.

■ Normal Cost

■ Amortization Payment

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

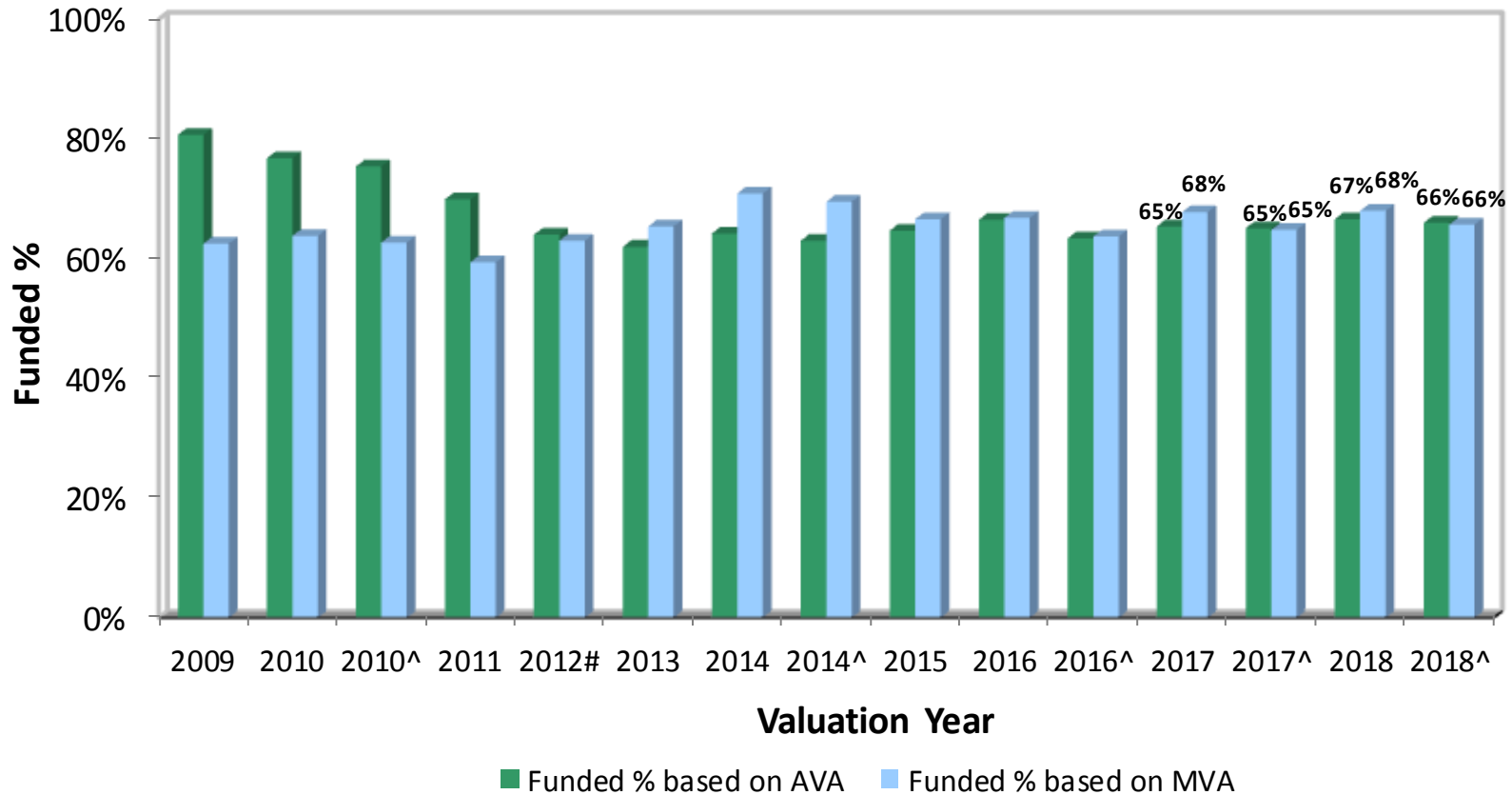


■ Actuarial Accrued Liability (AAL) ■ Actuarial Value of Assets (AVA)

[#] Revised benefit provisions.

[^] Revised actuarial assumptions.

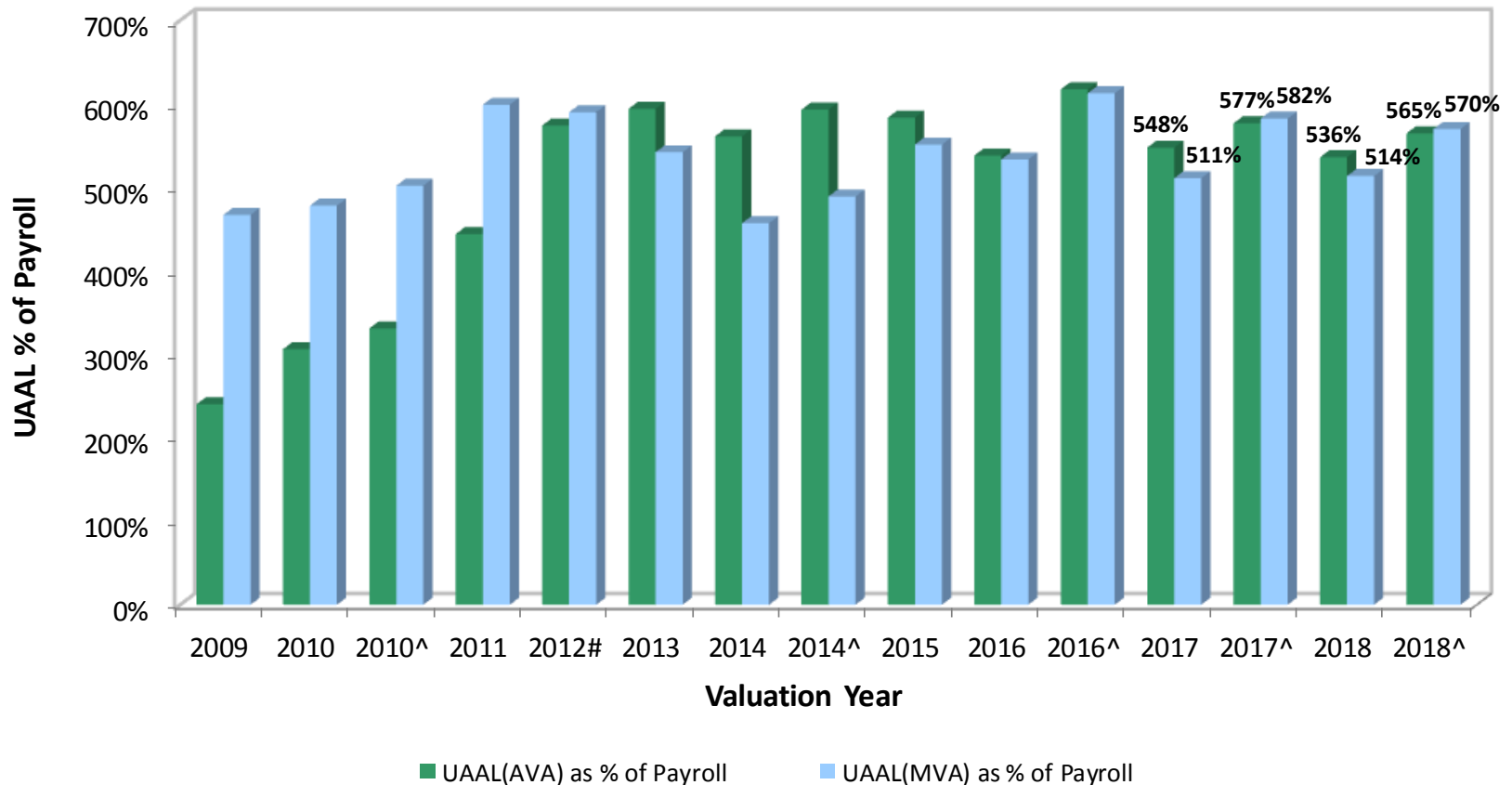
Retirement System Funded % Based on Actuarial Value and Market Value of Assets



Revised benefit provisions.

^ Revised actuarial assumptions.

Unfunded Actuarial Accrued Liability as a Percentage of Payroll



Revised benefit provisions.

^ Revised actuarial assumptions.

Disclaimers

- This presentation is intended to be used in conjunction with the September 30, 2018 pension actuarial valuation report issued on April 25, 2019. 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.