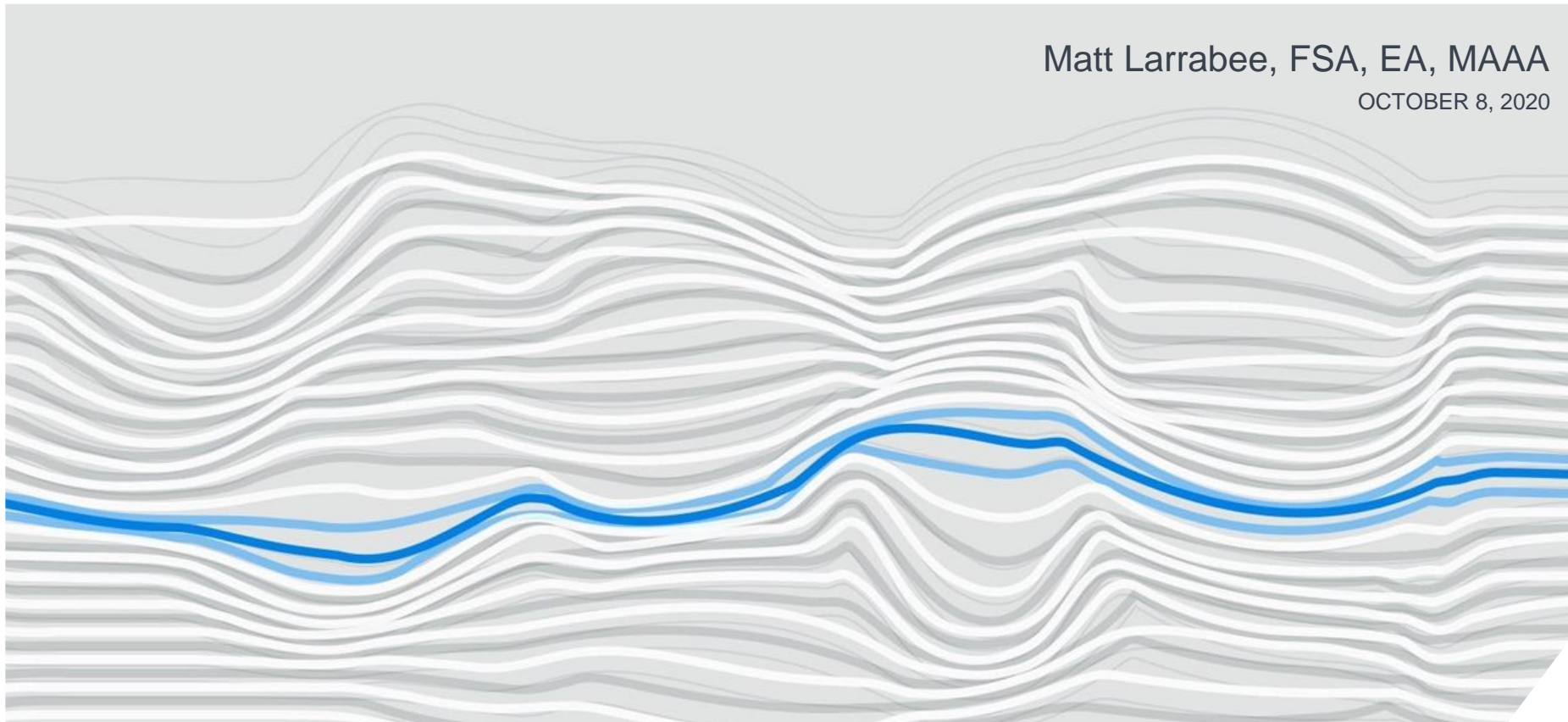


Florida Retirement System

2020 FRS Actuarial Assumption Estimating Conference
Including Preliminary July 1, 2020 Actuarial Funding Valuation Results

Matt Larrabee, FSA, EA, MAAA

OCTOBER 8, 2020



Executive Summary

- Preliminary 2020 valuation results at a 7.2% investment return assumption are similar to final 2019 valuation results
 - Funded status decreased by 0.5% to 83.7% in part due to a +6.8% return on the smoothed asset measure and individual member salary increases above assumption
 - The blended Pension Plan/Investment Plan composite employer contribution rate increased by 0.17% of payroll to 11.54%, and projected 2021-2022 employer contributions increased by \$220 million to \$4.28 billion
- The 2021-2022 contribution cost increase for a potential 0.20% decrease in the investment return assumption is similar to last year: 1.01% of payroll / \$380 million
 - Aon's median investment return outlook decreased 0.13% to 6.46%, and Aon's median outlook for real return also decreased by 0.13% to 4.27%
 - The current 2.60% inflation assumption is above both Social Security's intermediate long-term outlook (2.40%) and other inflation forecasts
 - If the inflation assumption is simultaneously decreased by 0.20%, that assumption change would mitigate between \$70 million and \$120 million of the increase noted above

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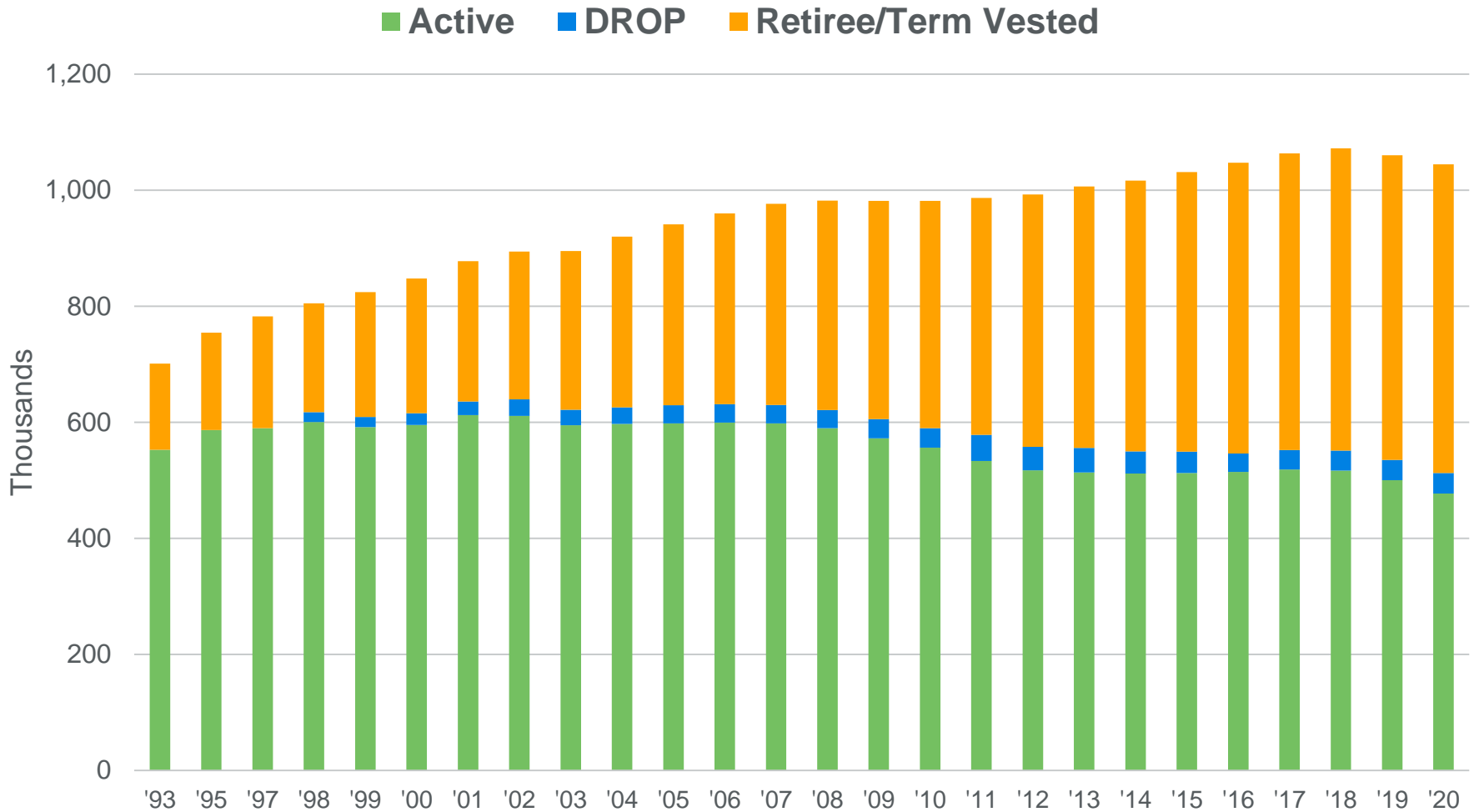
Agenda

- Preliminary 2020 actuarial funding valuation results
- Investment return assumption for system funding
- Inflation-related assumptions
- Unfunded actuarial liability (UAL) amortization policy
- Needed guidance for FRS Pension Plan funding valuation
- Discount rate and other assumptions for Florida Health Insurance Subsidy (HIS) and Florida National Guard GASB valuations
- Needed guidance for HIS and National Guard

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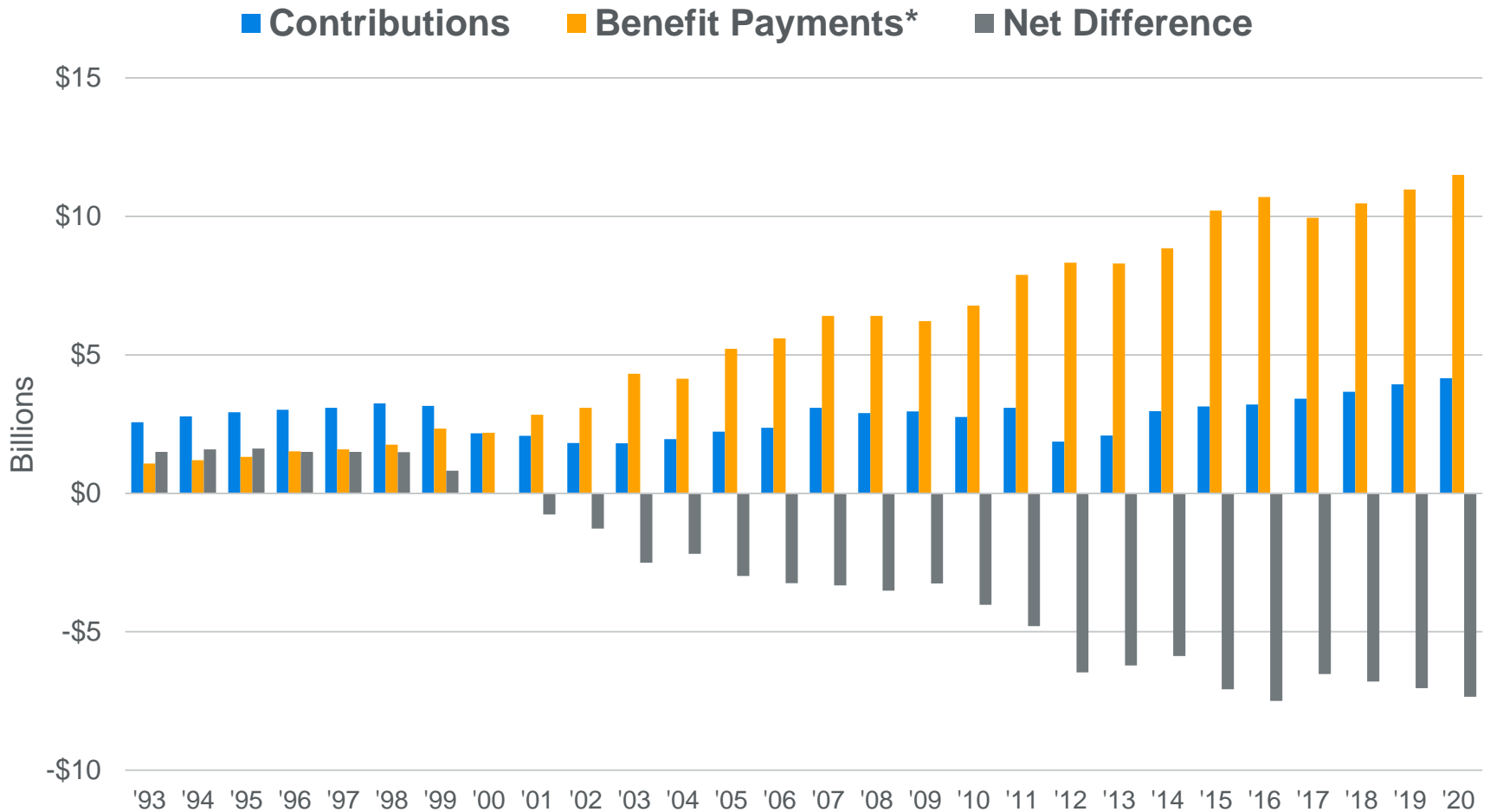
FRS Pension Plan Assets, Member Demographics

FRS Pension Plan Membership



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Contributions and Benefit Payments

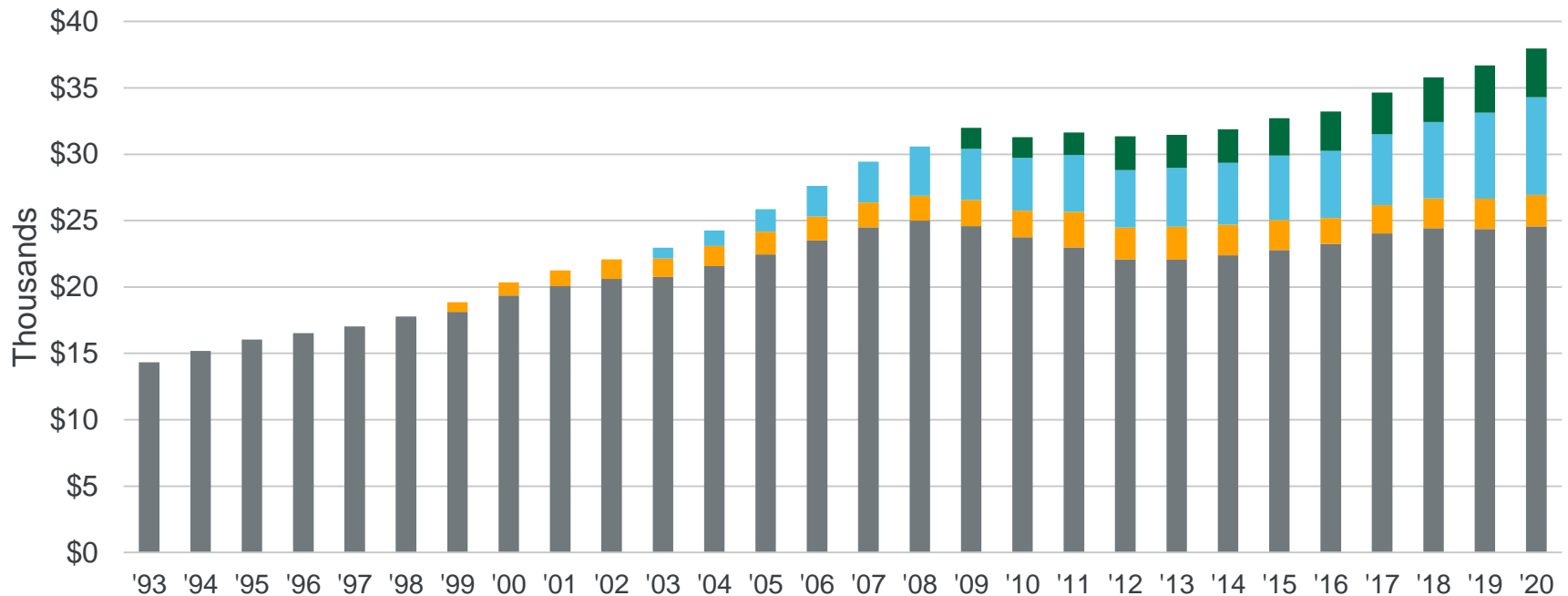


* Includes transfers to Investment Plan in 2013 and subsequent years.

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Payroll: FRS + Non-FRS UAL Contributory

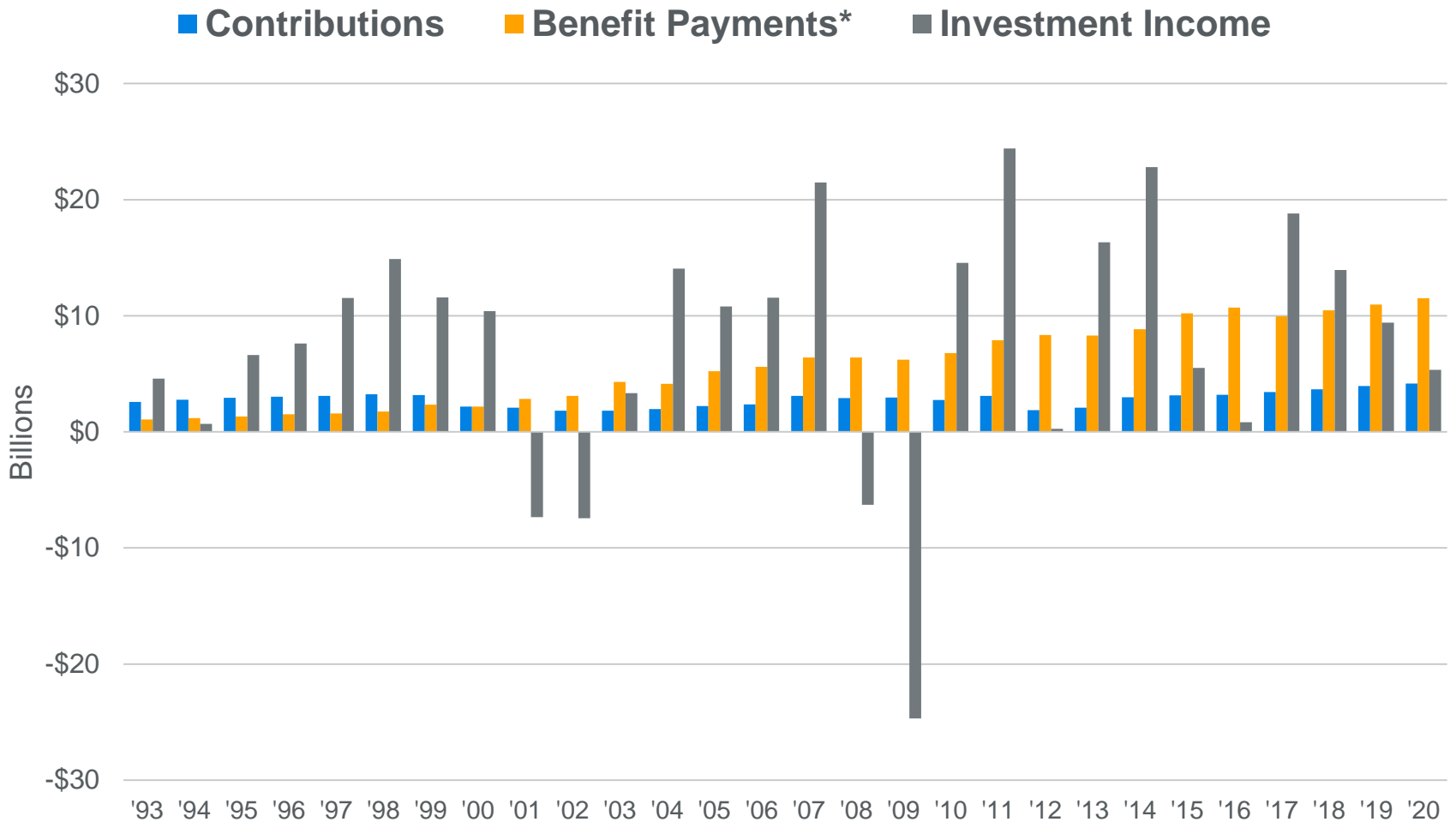
- Additional Payroll Subject to UAL Contributions*
- Investment Plan Payroll
- DROP Member Payroll
- Non-DROP Pension Plan Payroll



**Includes payroll for participants in certain non-FRS defined contribution plans upon which UAL Rate contributions to the FRS Pension Plan are made. This payroll component is projected to be \$3.8B in the 2020-21 plan year.*

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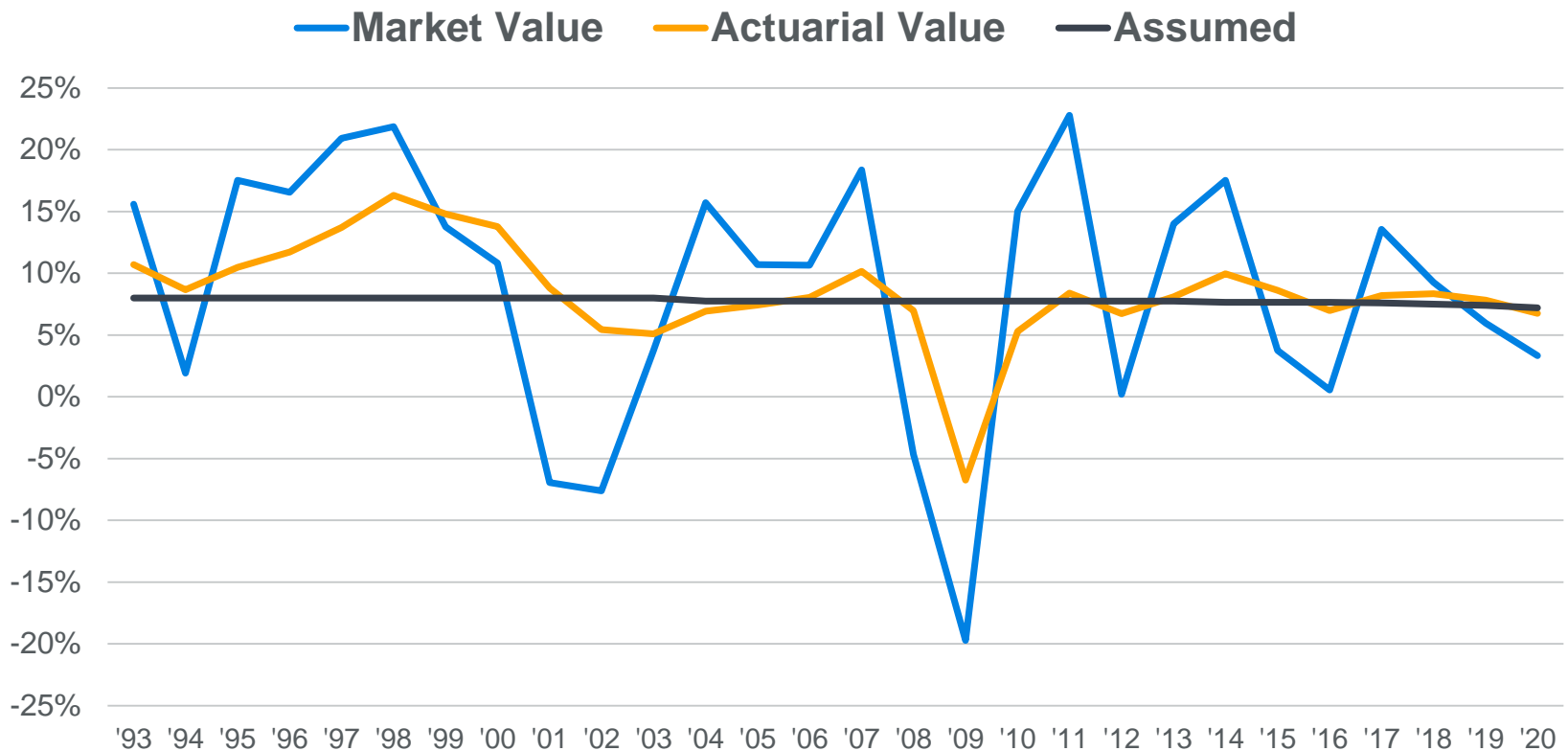
Pension Plan Cash Flows



* Includes transfers to Investment Plan

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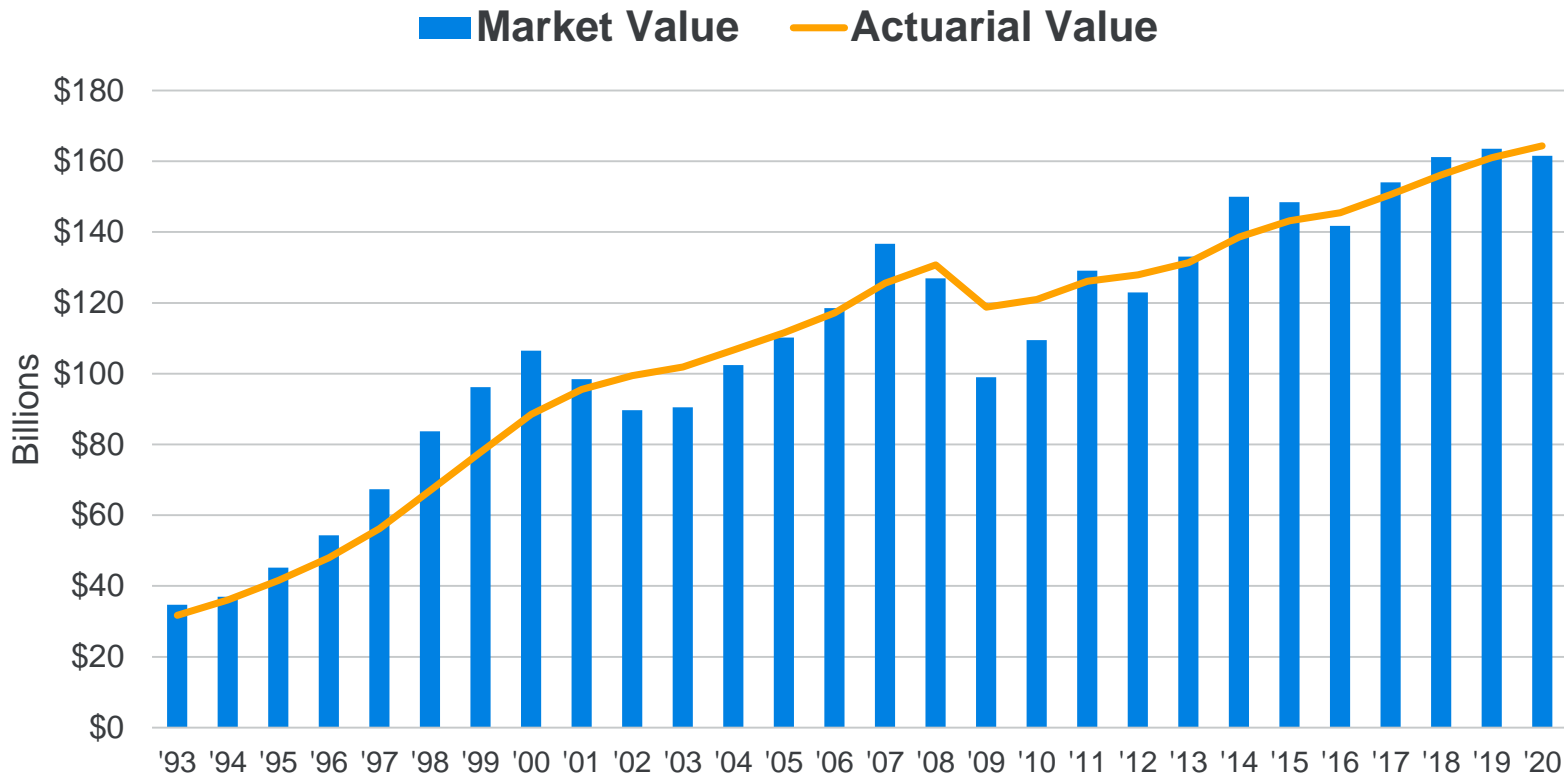
Historic Asset Returns



- The 2019-20 return was +3.3% on a market value of assets (MVA) basis and +6.8% on a smoothed actuarial value of assets (AVA) basis
 - AVA return is determined by market value returns over the prior five years

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Market & Actuarial Value of Assets



- Market value of assets (MVA) is \$2.7 billion **below** Actuarial Value of Assets (AVA) at July 2020. That **deferred investment loss** will be recognized in lower AVA returns (and associated **contribution rate increases**) in subsequent valuations if future market investment performance fails to exceed assumption

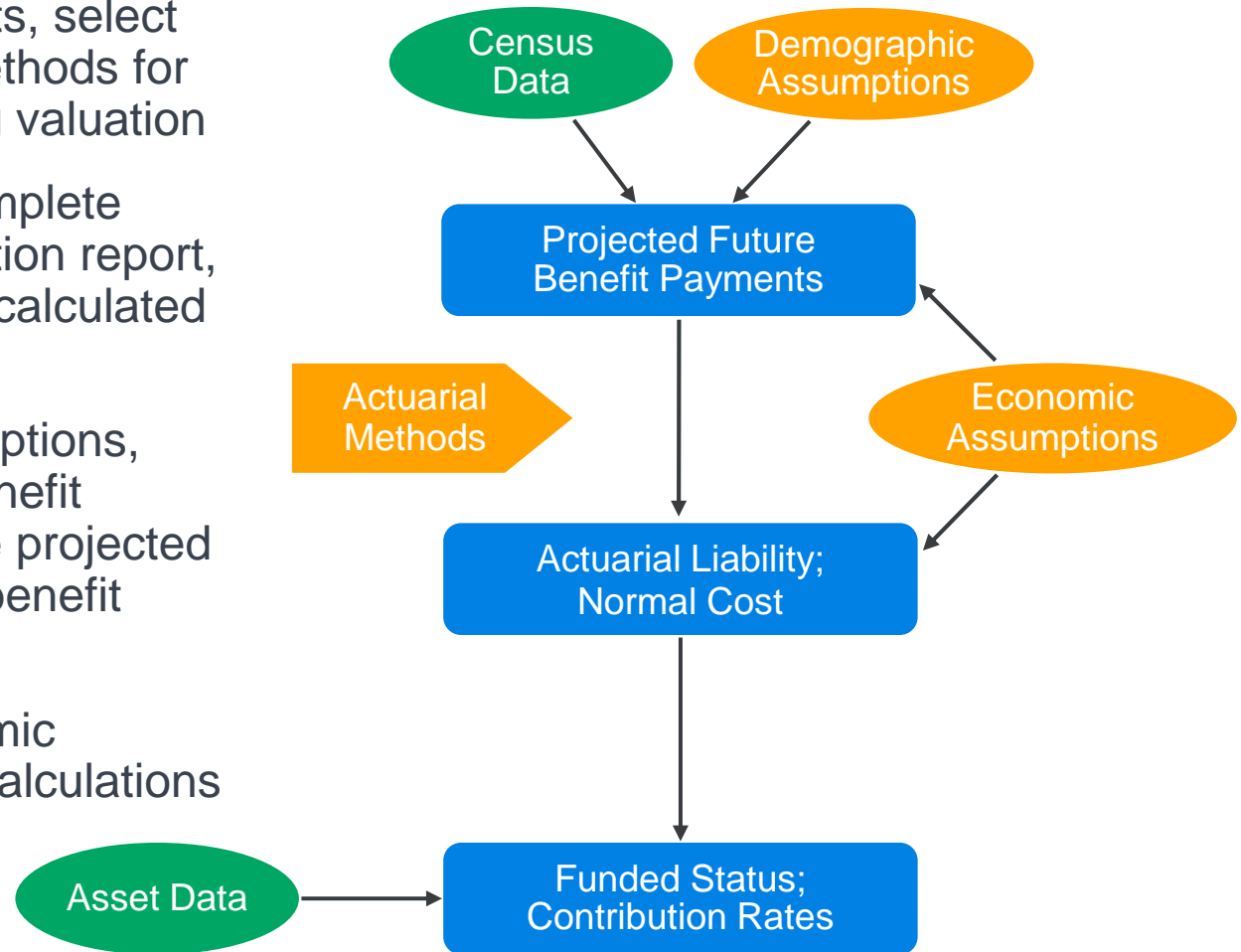
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Valuation Process and Projected Benefit Payments

Actuarial Valuation Process

- Today: Discuss preliminary 2020 valuation results, select assumptions and methods for 2020 system funding valuation
- By December 1: Complete 2020 actuarial valuation report, including actuarially calculated contribution rates
- Demographic assumptions, census data, and benefit provisions determine projected future year-by-year benefit payments
- Methods and economic assumptions affect calculations of funded status and contribution rates

Legend
Provided by FRS
Adopted by Conference
Calculated by actuary



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Overview of an Actuarial Valuation

Two Pension Plan valuations are conducted annually in parallel to:

- Calculate funded status (funding valuation)
- Develop actuarially calculated contribution rates (funding valuation)
- Satisfy financial reporting requirements (separate GASB valuation)

Data

Assumptions

Methods

Provisions



**Projected
Benefit
Payments**



Funded Status

**Actuarially Calculated
Contribution Rates**

GASB Reporting

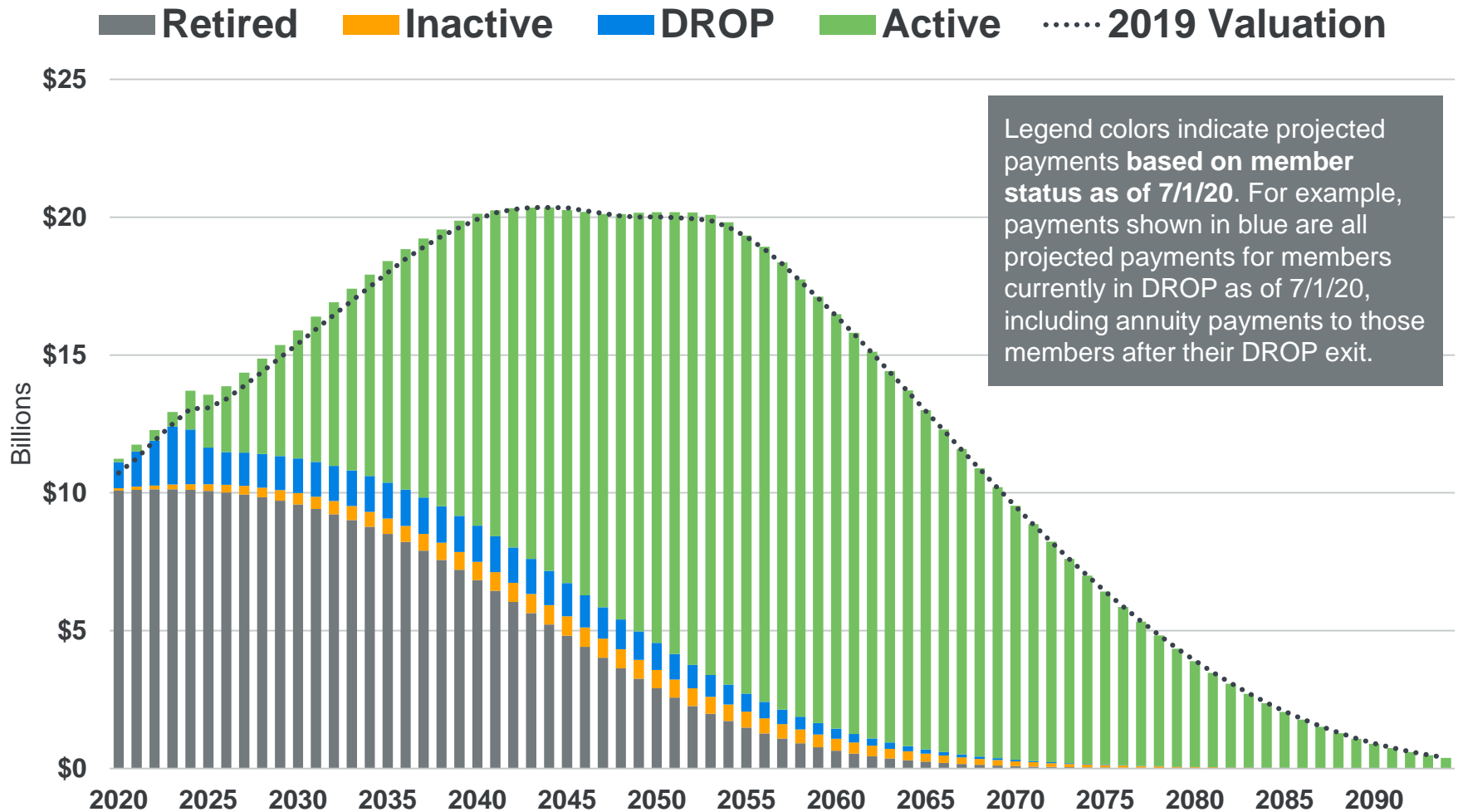
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Projected Benefit Payments

- Projected benefit payments are developed using:
 - Census data provided by the Division of Retirement
 - Demographic assumptions
 - Life expectancy (i.e., mortality)
 - Likelihood and timing of immediate unreduced retirement or DROP entry
 - Likelihood of termination of employment prior to unreduced retirement eligibility
 - Annual salary increase assumption for individual members
 - Incidence of disability
- Membership demographic data is provided annually by DMS
- Assumptions listed above are typically formally reviewed in detail every five years as part of an actuarial experience study

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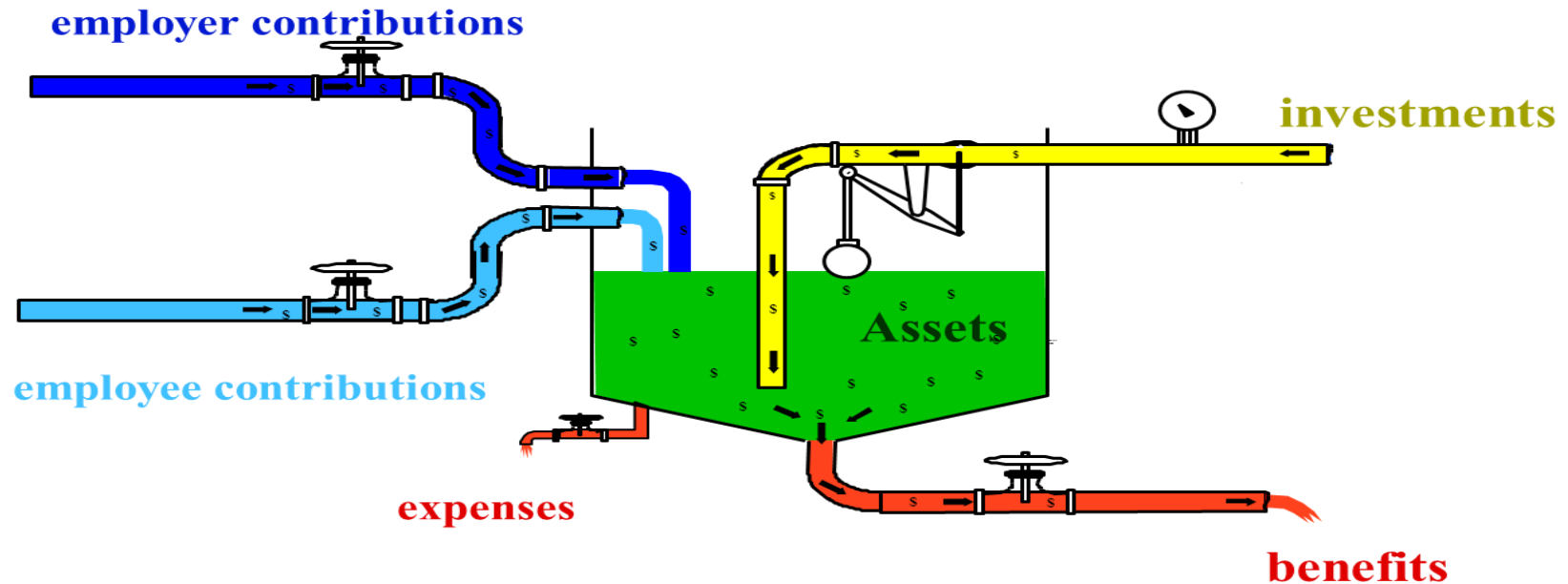
Projected Benefit Payments – 2020 Valuation



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Actuarial Methods and Assumptions for System Funding Calculations

The Fundamental Cost Equation



- Methods & assumptions do not determine ultimate long-term System cost, only the budgetary **timing** of cost incurrence

Ultimately, the “Fundamental Cost Equation” always governs:

$$\text{Contributions} + \text{Investments} = \text{Benefits} + \text{Expenses}$$

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Actuarial Methods for Funding Valuation

- Key actuarial methods previously adopted by the Conference in 2019:
 - Individual Entry Age Normal (Individual EAN) cost allocation method
 - This method sets the normal cost rate as a level percent of payroll contribution needed during a member's full career to fund that member's projected cost of total benefits if experience follows assumptions. Accordingly, Tier I members will have higher normal cost rates than similarly situated Tier II members.
 - 30-year amortization over a closed period, as a level percent of projected payroll, of previously unanticipated changes in UAL that arise since the prior actuarial valuation
 - This approach has an extended period of net negative amortization for each amortization tranche in the UAL contribution rate structure:
 - The unamortized balance increases for the first 11 to 13 years
 - The balance decreases after that, with the original unamortized balance effectively being paid off in the last 10-12 years of the 30-year amortization period

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Preliminary 2020 Actuarial Funding Valuation Results

Calculation of Valuation Results

- Projected year-by-year benefit payments are converted to a present value projected cost of total benefits using the return assumption
 - The present value is allocated between past (Actuarial Liability) and projected future service (Normal Costs) via the cost allocation method
- This establishes “2020 Preliminary” funding valuation results using:
 - Actual 2019-20 investment returns
 - Member demographic census data as of July 2020
 - Methods and assumptions as adopted by the 2019 FRS Actuarial Assumption Conference, based on the 2019 Experience Study

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Pension Plan UAL and Funded Status

	2019 Final (2019 data; 2019 assumptions)	2020 Preliminary (2020 data; 2019 assumptions)
Actuarial Liability (AL)	\$ 191.3	\$ 196.4
Actuarial Value of Assets (AVA)	<u>161.0</u>	<u>164.3</u>
Unfunded Actuarial Liability (UAL)	\$ 30.3	\$ 32.1
Funded Status	84.2%	83.7%

(Amounts in \$ billions)

- Market Value of Assets (MVA) is \$2.7 billion **below** AVA at July 2020. That **deferred investment loss** will be recognized in lower future AVA returns (and associated **future UAL contribution rate increases**) if future market value investment performance fails to meet or exceed 7.20%.
- Results shown above use a 7.20% investment return assumption and the individual entry age cost allocation method

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Blended Proposed Statutory Rates at 7.20%

Weighted Average of Rates Across All Membership Classes	Final 2020-21 Rates (7.20% Assumption)			Preliminary 2021-22 Rates (7.20% Assumption)		
	NC	UAL	Total	NC	UAL	Total
PP composite employer rate	7.03%	5.80%	12.83%	6.97%	6.28%	13.25%
IP composite employer rate	4.83%	0.00%	4.83%	4.70%	0.00%	4.70%
Blended PP / IP employer rate	6.60%	4.77%	11.37%	6.48%	5.06%	11.54%
Employee contribution rate			3.00%			3.00%
Composite blended employer plus employee rate			14.37%			14.54%

- Pension Plan (PP) contribution rates are blended with Investment Plan (IP) contribution rates to create blended PP/IP proposed statutory employer rates
- Statutory IP rates by membership class are unchanged, but the 2021-22 IP payroll is more heavily weighted to Regular Class, which decreases the IP composite employer rate

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Projected Contributions in Dollars at 7.20%

Total For All Membership Classes	Normal Cost Rate	Applicable Normal Cost Payroll	UAL Rate	Applicable UAL Payroll	Blended PP/IP Rate	Employer Contribution
Final 2020-21	6.60%	\$34.2 billion	4.77%	\$37.9 billion	11.37%	\$4.06 billion
Preliminary 2021-22	6.48%	\$35.4 billion	5.06%	\$39.2 billion	11.54%	\$4.28 billion
Change	-0.12%		+0.29%		+0.17%	\$0.22 billion

- $(\text{Normal cost rate} \times \text{Normal cost payroll}) + (\text{UAL rate} \times \text{UAL payroll}) = \text{Contribution}$
- Pension Plan (PP) contribution rates are blended with Investment Plan (IP) contribution rates to create blended PP/IP proposed statutory employer rates
- Preliminary 2021-22 rates above reflect actual 2019-20 investment performance and July 1, 2020 FRS member census, along with all actuarial methods and assumptions used in the July 1, 2019 valuation

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Results Under Current Methods, 7.20% Return

Valuation Results at 7.2% Assumption	Blended PP/IP Employer Rate	UAL (AVA)	Funded Status
Final 2020-21	11.37%	\$30.3 B	84.2%
Preliminary 2021-22:			
- 7.20% return assumption, 30-year level % of projected pay amortization of newly established UAL amortization bases	11.54%	\$32.1 B	83.7%

- Based on projected 2021-22 PP/IP payroll of \$39.2 billion (including payroll subject to only UAL contributions), estimated combined 2021-22 PP/IP employer contribution of:
 - \$4.28 billion** reflecting actual 2019-20 investment performance and July 1, 2020 FRS member census, but before any potential modification to the return assumption, inflation-related assumptions or amortization policy

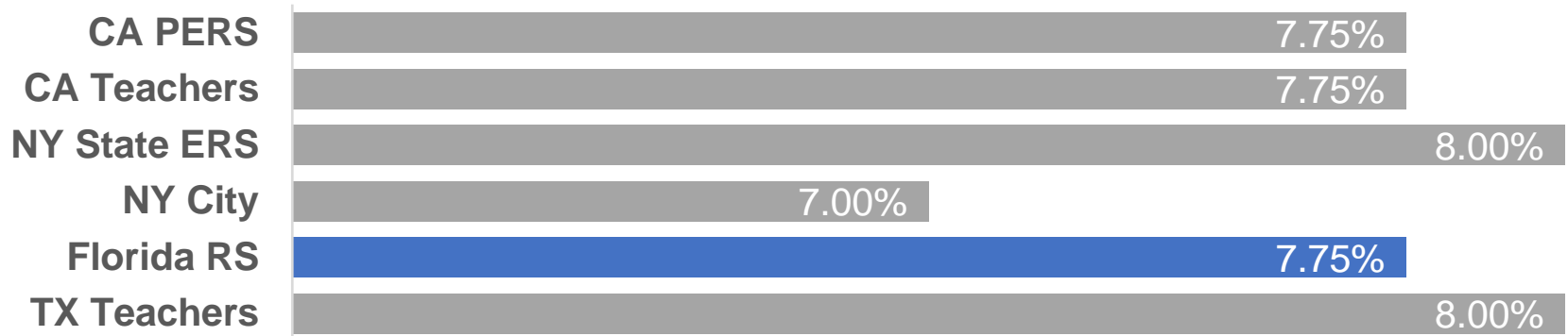
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Investment Return Assumption for System Funding

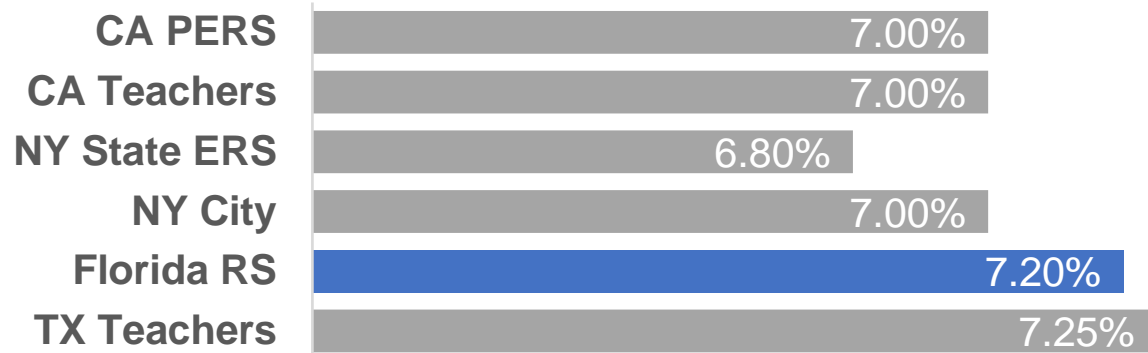
Note: Today's Milliman speaker is not a
credentialed investment advisor

What Are FRS's Jumbo Peer Systems Doing?

Assumptions in 2010



Assumptions in 2020



Source: NASRA Public Fund Survey (Sep. '20)

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Last Year's Return Models and Assumption

- Median (50th percentile) average annual long-term future investment returns from two real return investment models presented at the 2019 Conference are summarized below:
 - “SBA Approach” model developed in Q3 of 2019 by Aon using average global equity risk premiums from several large investment consultancies: **6.59%** median return
 - Used Aon’s outlook for inflation at that time of 2.1%
 - Inferred: Aon median real (in excess of inflation) return outlook of **4.40%**
 - Milliman model: **6.7%** median return
 - Used Conference’s adopted inflation assumption of **2.6%**
 - Inferred: Milliman median real (in excess of inflation) return outlook of 4.00%
 - The default inflation assumption in Milliman’s model at that time was 2.2%
- The Conference lowered the return assumption from **7.4%** to **7.2%** for the 2019 actuarial valuation for funding purposes

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Updates to Return Models for This Year

- Aon’s “SBA Approach” model from its Q3 2020 asset-liability study that blends the global equity risk premiums of four large investment consultancies: **6.46%** median return
 - Reflects Aon’s current outlook for inflation of 2.1%
 - Inferred: Aon median real (in excess of inflation) return outlook of **4.27%**
- Milliman model: **6.56%** median return
 - Uses the Conference’s most recently adopted inflation assumption of **2.6%**
 - Inferred: Milliman median real (in excess of inflation) return outlook of 3.86%
 - The current default inflation assumption in Milliman’s outlook model is 2.2%

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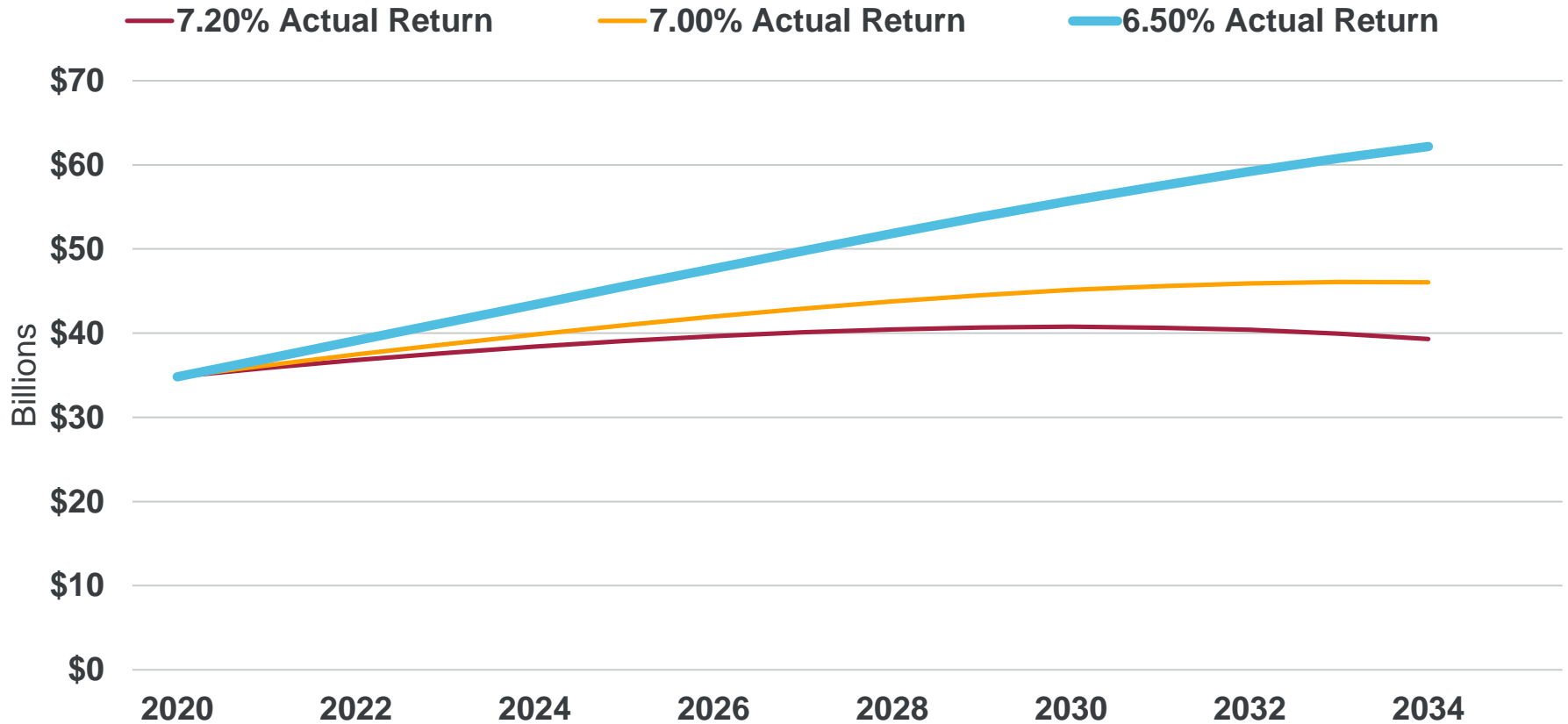
Milliman Investment Return Model

Percentile	30-Year Average
65 th	7.41%
60 th	7.12%
55 th	6.83%
50th	6.56%
45 th	6.28%
40 th	6.00%
35 th	5.71%

- Based on the current target asset allocation, model results are geometric annual average net returns based on:
 - A series of average annual real returns by asset class, plus asset class correlations
 - The 2.6% inflation assumption most recently adopted by the Conference
 - In this table, the 60th percentile means that in the Milliman model 60% of possible 30-year average annualized returns are at or below 7.12%
 - Details on the model inputs in the appendix

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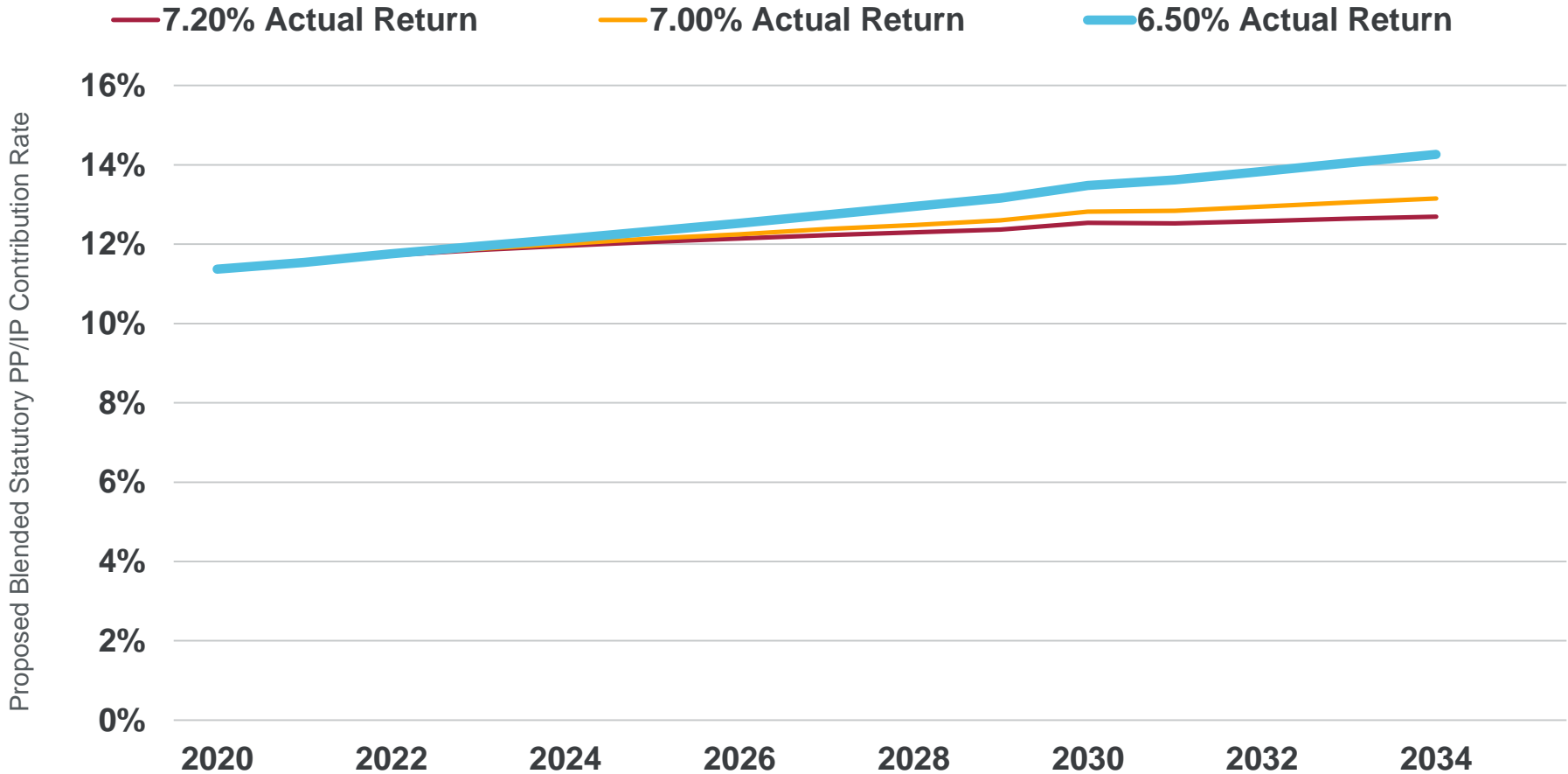
Unfunded Liability under Varying Actual Returns



Using a 7.20% adopted assumption for the actuarial valuation's assumed return, this chart projects unfunded liability on a **market value of assets basis** under three scenarios for actual annual investment return on a market value of assets basis

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Contribution Rate under Varying Actual Returns



Using a 7.20% adopted assumption for the actuarial valuation's assumed return, this chart projects the proposed blended statutory composite Pension Plan/Investment Plan employer contribution rate under three scenarios for actual annual investment return on a fair market value of assets basis

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Setting the Assumption for System Funding

- Per statute, the Conference selects the assumption for the valuation report that determines actuarially calculated contribution rates
- To comply with Actuarial Standards of Practice (ASOPs), the actuary assesses the reasonableness of the selected assumption
 - Per the ASOPs, if, in the actuary's professional judgment, the selected assumption “**significantly conflicts** with what...would be **reasonable** for the purpose of the measurement”, the actuary must disclose that conflict in his or her written report

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What Makes an Assumption “Reasonable”?

- Per the relevant Actuarial Standard of Practice (ASOP), an assumption is **reasonable** for the purpose of the measurement if it:
 - Takes into account current economic data, and
 - Reflects the actuary’s estimate of future experience, and
 - It has no “**significant bias** (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation...are included and disclosed”
- The actuary can incorporate experts’ views (such as those of credentialed investment professionals) in assessing reasonableness

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What is “Significant Bias” in an Assumption?

- The governing Actuarial Standard of Practice acknowledges that the meaning of “significant” varies by situation
- For return assumption selection, the relevant meaning is that “a result may be **significant** because it is of consequence”

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Effect of Various Return Assumptions

System Average Valuation Results	Blended PP/IP Employer Rate	UAL (AVA)	Funded Status
Final 2020-21 at 7.20% assumption	11.37%	\$30.3 B	84.2%
Preliminary 2021-22:			
- At 7.20% assumption ¹	11.54%	\$32.1 B	83.7%
- At 7.10% assumption ²	12.04%	\$34.3 B	82.7%
- At 7.00% assumption ³	12.55%	\$36.6 B	81.8%
- At 6.95% assumption ⁴	12.79%	\$37.8 B	81.3%
- At 6.50% assumption	15.10%	\$48.5 B	77.2%

- Based on projected 2021-22 PP/IP payroll of \$39.2 billion (including payroll subject to only UAL contributions), estimated combined 2021-22 PP/IP contribution of:

¹ **\$4.28 billion** at 7.20% return assumption

² **\$4.47 billion** at 7.10% return assumption [**\$190 million** increase from 7.20% return assumption]

³ **\$4.66 billion** at 7.00% return assumption [**\$380 million** increase from 7.20% return assumption]

⁴ **\$4.75 billion** at 6.95% return assumption [**\$470 million** increase from 7.20% return assumption]

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Inflation-Related Assumptions

Inflation-Related Assumptions

- If the Conference adopts a lower return assumption, a decision between two implementation options is needed:
 - Decrease the assumed real (in excess of inflation) investment return, and/or
 - Decrease the inflation assumption
- If the inflation assumption is decreased, then implementation decisions on two other inflation-related assumptions are also needed:
 - Decrease the individual salary increase assumptions for members?
 - Decrease the assumption for future growth in statutory UAL Cost payroll?

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Components of Current Return Assumption

Investment Return 7.20%

Inflation 2.60%

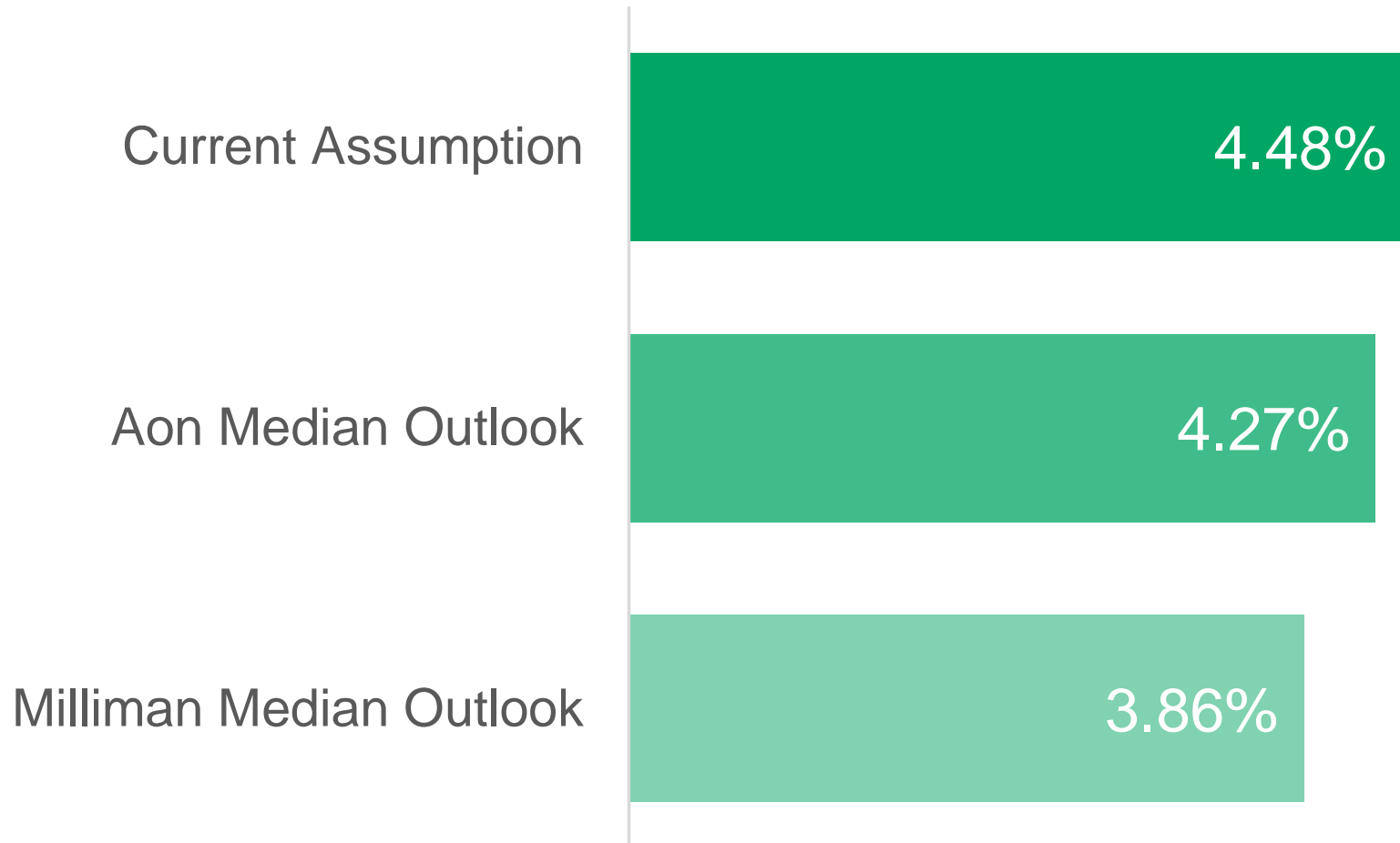
Real Return 4.48%

- The governing formula is:

$$(1 + \textit{Investment Return}) = (1 + \textit{Inflation}) \times (1 + \textit{Real Return})$$

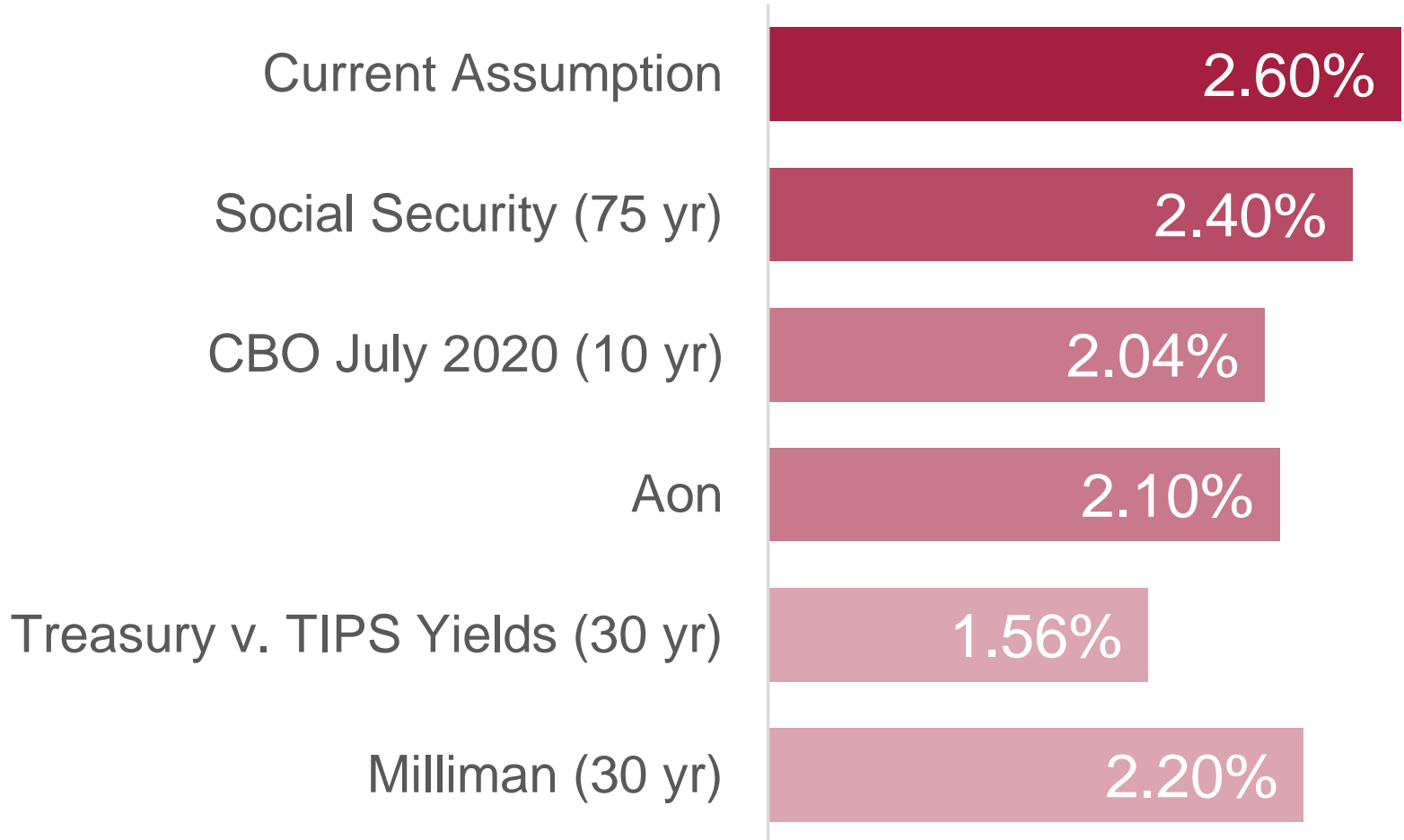
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Guidance on Real Return Assumption



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Guidance on Inflation Assumption



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Inflation-Related Assumptions

- Say the Conference adopts a lower return assumption and implements it via a decrease in the inflation assumption
 - As an illustrative example, say both assumptions are decreased by 0.20%
 - Investment return decreases from 7.20% to 7.00%
 - Inflation decreases from 2.60% to 2.40%
- In this example's case, then the Conference should also decide:
 - If the assumptions for annual salary increases for individual members should decrease by 0.20% or remain unchanged
 - Salary increase assumptions vary by membership class, age, and length of service
 - If the assumption for the annual future increase in statutory UAL Cost payroll should decrease by 0.20% or remain unchanged
 - The current assumption is 3.25%, consisting of 2.60% inflation and 0.65% real wage growth assumptions
 - Actual payroll growth since the prior valuation was 3.5%, and annualized growth over the prior five and ten years has been 3.0% and 2.0%, respectively

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Inflation-Related Assumptions at 7.0% Return

Preliminary 2021-2022 Results at 7.0% Assumption	Blended PP/IP Employer Rate	Combined PP/IP Employer Contribution
Real return assumption is lowered by 0.20%; Inflation assumption remains at 2.60%; All inflation-related assumptions left unchanged	12.55%	\$4.66 billion
Inflation, individual member salary increase, and system UAL Cost payroll growth assumptions all lowered by 0.20%; Real return assumption is left unchanged	12.37%	\$4.59 billion
Inflation and individual member salary assumptions lowered by 0.20%; System UAL Cost payroll growth assumption left unchanged at 3.25%; Real return assumption is left unchanged	12.24%	\$4.54 billion

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Amortization Policy

Effect of Amortization at 7.20% Return

Preliminary 2021-22 Valuation ¹ at 7.20%:	Blended PP/IP Employer Rate	Employer Contribution
30 yr level % amortization on new bases	11.54%	\$4.28 B
25 yr level % amortization on new bases	11.57%	\$4.29 B
25 yr level % amortization on all bases	11.66%	\$4.32 B
20 yr level % amortization on new bases	11.62%	\$4.31 B
20 yr level % amortization on all bases	12.01%	\$4.46 B

¹ Reflecting current demographic assumptions and individual entry age normal cost method, and based on projected 2021-22 PP/IP payroll of \$39.2 billion (including payroll subject only to UAL contributions)

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Effect of Amortization at 7.10% Return

Preliminary 2021-22 Valuation ¹ at 7.10% ² :	Blended PP/IP Employer Rate	Employer Contribution
30 yr level % amortization on new bases	12.04%	\$4.47 B
25 yr level % amortization on new bases	12.11%	\$4.49 B
25 yr level % amortization on all bases	12.20%	\$4.53 B
20 yr level % amortization on new bases	12.21%	\$4.53 B
20 yr level % amortization on all bases	12.61%	\$4.69 B

¹ Reflecting current demographic assumptions and individual entry age normal cost method, and based on projected 2021-22 PP/IP payroll of \$39.2 billion (including payroll subject only to UAL contributions)

² Reflecting a decrease in the real return assumption, with inflation and other inflation-related assumptions left unchanged

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Effect of Amortization at 7.00% Return

Preliminary 2021-22 Valuation ¹ at 7.00% ² :	Blended PP/IP Employer Rate	Employer Contribution
30 yr level % amortization on new bases	12.55%	\$4.66 B
25 yr level % amortization on new bases	12.65%	\$4.70 B
25 yr level % amortization on all bases	12.74%	\$4.73 B
20 yr level % amortization on new bases	12.81%	\$4.76 B
20 yr level % amortization on all bases	13.21%	\$4.92 B

¹ Reflecting current demographic assumptions and individual entry age normal cost method, and based on projected 2021-22 PP/IP payroll of \$39.2 billion (including payroll subject only to UAL contributions)

² Reflecting a decrease in the real return assumption, with inflation and other inflation-related assumptions left unchanged

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Effect of Amortization at 6.95% Return

Preliminary 2021-22 Valuation ¹ at 6.95% ² :	Blended PP/IP Employer Rate	Employer Contribution
30 yr level % amortization on new bases	12.79%	\$4.75 B
25 yr level % amortization on new bases	12.92%	\$4.80 B
25 yr level % amortization on all bases	13.01%	\$4.83 B
20 yr level % amortization on new bases	13.11%	\$4.87 B
20 yr level % amortization on all bases	13.51%	\$5.03 B

¹ Reflecting current demographic assumptions and individual entry age normal cost method, and based on projected 2021-22 PP/IP payroll of \$39.2 billion (including payroll subject only to UAL contributions)

² Reflecting a decrease in the real return assumption, with inflation and other inflation-related assumptions left unchanged

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Needed Guidance for FRS Pension Plan

Needed Guidance for FRS Pension Plan

- From Conference Principals for system funding calculations, identification of **methods** and **assumptions** to use in the 2020 FRS Pension Plan valuation calculations for system funding purposes to calculate blended proposed 2021-22 statutory contribution rates:
 - Investment return assumption (currently 7.20%)
 - Inflation assumption (currently 2.60%)
 - If inflation assumption is changed:
 - Individual member salary increase assumption
 - System statutory UAL Cost payroll (includes both Pension Plan and Investment Plan) growth assumption (currently 3.25%) consisting of inflation plus real wage growth
 - Amortization policy - currently 30-year amortization as a level percent of projected future payroll for newly arising UAL bases

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Discount Rate Assumption for HIS and National Guard GASB Valuations

GASB Discount Rate Assumption

- Currently, the Florida Health Insurance Subsidy (HIS) and Florida National Guard benefits are effectively funded on a pay-as-you-go basis
- Accounting standards first effective several years ago (GASB 67 & 68) give direction on the discount rate assumption to be used for financial reporting of programs funded on a pay-as-you-go basis
 - The assumption should reflect an **index of 20-year, tax exempt, high quality (AA/Aa or higher) general obligation municipal bonds**
 - The assumption selected should be based on **market conditions as of the measurement date** of the financial reporting in question
- After consideration of these requirements at the time of initial implementation of the accounting standards, the Conference adopted the **Bond Buyer General Obligation 20-Bond Municipal Bond Index** for use in HIS and National Guard GASB calculations
 - That index has been used for pay-as-you-go GASB financial reporting valuations by all public systems with which I am familiar

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Historical Values of the Bond Index

- The table below shows the value of the Bond Buyer General Obligation 20-Bond Municipal Bond Index as of the last five fiscal year-end measurement dates

June 30	Index
2020	2.21%
2019	3.50%
2018	3.87%
2017	3.58%
2016	2.85%

- The **higher** the index, the **lower** the calculated liability, with an index decrease from 3.50% to 2.21% estimated to **increase** HIS liability and National Guard liability by approximately \$2.05 billion and \$260 million, respectively

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Other Assumptions for HIS and National Guard GASB Valuations

HIS GASB Valuation Assumptions

- In addition to the discount rate assumption, other assumptions about member behavior (e.g., timing and nature of cessation of employment) and life expectancy are used in the HIS valuation
- The assumptions used in the last full valuation, conducted in 2018, mirrored those used in the 2018 valuation of the FRS Pension Plan and were established by the most recent Experience Study at that time (conducted in 2014)
- For this valuation, we recommend updates to mirror those used in the 2019 and 2020 FRS Pension Plan valuations, reflecting the Experience Study conducted in 2019

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HIS GASB Valuation Assumptions (Cont.)

- Specific to the HIS valuation, we use additional assumptions relating to member elections at time of retirement
 - Percentage of eligible members who elect HIS coverage at retirement
 - Prior valuation assumed **95%**
 - We recommend new assumption of **90%**, based on observed experience
 - Percentage of eligible members who elect a spousal protection form of benefit:
 - Prior valuation assumed **30%**, applicable to both Pension Plan (PP) and Investment Plan (IP) retirees
 - We recommend bifurcating the assumption:
 - **30%** of retiring PP members elect a spousal protection form of benefit (since HIS spousal continuance is tied to Option election of PP benefit)
 - **80%** of retiring IP members elect a spousal protection form of benefit (since HIS spousal continuance is not tied to IP retiree election)

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National Guard Valuation Assumptions

- The initial valuation for the National Guard program was conducted in 2014 to comply with the new GASB financial reporting standards
- Assumptions used in valuations prior to this year incorporate FRS Pension Plan assumptions along with estimates of future military experience as National Guard benefits are tied to federal pay levels and retirement benefits
- Only changes recommended are to update mortality / life expectancy assumptions to mirror those developed with the Experience Study conducted in 2019

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Needed Guidance for HIS and National Guard

Needed Guidance

- From Conference Principals for GASB financial reporting calculations of HIS and National Guard:
 - Re-confirmation of the continued use of the Bond Buyer General Obligation 20-Bond Municipal Bond Index as the discount rate for the GASB valuations of the two programs
 - Adoption of updates to demographic assumptions to reflect assumptions used in the 2019 and 2020 FRS Pension Plan valuations, as developed by the 2019 Experience Study
 - Adoption of updates to HIS-specific assumptions on percentage of members electing a) coverage at retirement and b) a spousal protection form of benefit payment
 - Adoption of updates to the mortality assumption to reflect assumptions used in the 2019 and 2020 FRS Pension Plan valuations, as developed by the 2019 Experience Study, along with re-confirmation of the previously used assumptions other than discount rate and mortality for the National Guard program

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Appendix

Milliman Capital Market Outlook Assumptions

For assessing the expected portfolio return under Milliman's capital market assumptions, we considered FRS investments to be allocated among the model's asset classes as shown below. This allocation is based on our understanding of the current target allocation policy, as provided to us by Aon Hewitt Investment Consulting via email on September 17, 2020.

	Policy Allocation	Annual Arithmetic Mean	Annualized Geometric Mean	Annual Standard Deviation	
US Cash	1.0%	2.40%	2.39%	1.20%	*2.6% is the inflation assumption most recently adopted by the FRS Actuarial Assumption Conference. That 2.6% assumption is then applied to real return assumptions in Milliman's capital market outlook model to calculate a median (50 th) percentile return. Real return assumptions in the Milliman model are set semi-annually by a committee of credentialed investment professionals. The default inflation assumption in the Milliman model is currently 2.2%.
US Interm Bonds	18.0%	3.20%	3.15%	3.40%	
US Gvt Bonds	1.0%	3.14%	3.03%	4.80%	
US Bank / Leveraged Loans	1.1%	5.40%	5.16%	7.40%	
Global Equity	54.2%	8.18%	6.92%	17.05%	
US REITs	1.0%	7.93%	6.31%	19.30%	
Private Real Estate Property	9.3%	6.45%	5.81%	12.00%	
Timber	0.4%	6.66%	5.91%	13.00%	
Infrastructure	1.4%	6.66%	5.91%	13.00%	
Private Equity	9.0%	12.08%	8.42%	30.00%	
Commodities	0.4%	5.50%	3.91%	18.85%	
Hedge Funds - MultiStrategy	1.4%	5.93%	5.61%	8.45%	
Hedge Funds - Event-Driven	0.1%	6.09%	5.76%	8.70%	
Hedge Funds - Equity Hedge	0.2%	6.50%	5.96%	11.05%	
Strategic Investments	1.1%	5.54%	5.26%	7.90%	
Hedge Funds - Distressed	0.4%	5.88%	5.51%	9.15%	
US Inflation (CPI-U)*			2.60%	1.65%	
Total Fund	100%	7.2%	6.56%	12.2%	

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Regular - Various Return Assumptions

Regular Membership Class	Blended PP/IP Employer Rate	Estimated PP/IP Contribution
Final 2020-21 at 7.20% assumption	8.28%	\$2.26 B
Preliminary 2021-22:		
- At 7.20% assumption	8.44%	\$2.39 B
- At 7.10% assumption	8.85%	\$2.51 B
- At 7.00% assumption	9.27%	\$2.63 B
- At 6.95% assumption	9.48%	\$2.69 B
- At 6.50% assumption	11.42%	\$3.25 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$30.4 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Special Risk - Various Return Assumptions

Special Risk Membership Class	Blended PP/IP Employer Rate	Estimated PP/IP Contribution
Final 2020-21 at 7.20% assumption	22.73%	\$1.16 B
Preliminary 2021-22:		
- At 7.20% assumption	22.89%	\$1.21 B
- At 7.10% assumption	23.76%	\$1.25 B
- At 7.00% assumption	24.61%	\$1.30 B
- At 6.95% assumption	25.06%	\$1.32 B
- At 6.50% assumption	29.09%	\$1.53 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$5.30 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Regular – Amortization at 7.20%

Regular Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	4.84%	3.44%	\$2.26 B
Preliminary 2021-22 at 7.20%:			
- 30 yr level % amortization on new bases	4.75%	3.69%	\$2.39 B
- 25 yr level % amortization on new bases	4.75%	3.71%	\$2.40 B
- 25 yr level % amortization on all bases	4.75%	3.80%	\$2.43 B
- 20 yr level % amortization on new bases	4.75%	3.75%	\$2.41 B
- 20 yr level % amortization on all bases	4.75%	4.11%	\$2.52 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$30.4 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Special Risk – Amortization at 7.20%

Special Risk Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	15.13%	7.60%	\$1.16 B
Preliminary 2021-22 at 7.20%:			
- 30 yr level % amortization on new bases	14.88%	8.01%	\$1.21 B
- 25 yr level % amortization on new bases	14.88%	8.04%	\$1.21 B
- 25 yr level % amortization on all bases	14.88%	8.16%	\$1.22 B
- 20 yr level % amortization on new bases	14.88%	8.09%	\$1.21 B
- 20 yr level % amortization on all bases	14.88%	8.67%	\$1.24 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$5.30 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Regular – Amortization at 7.10%

Regular Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	4.84%	3.44%	\$2.26 B
Preliminary 2021-22 at 7.10%:			
- 30 yr level % amortization on new bases	4.91%	3.94%	\$2.51 B
- 25 yr level % amortization on new bases	4.91%	4.00%	\$2.53 B
- 25 yr level % amortization on all bases	4.91%	4.08%	\$2.55 B
- 20 yr level % amortization on new bases	4.91%	4.09%	\$2.56 B
- 20 yr level % amortization on all bases	4.91%	4.45%	\$2.67 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$30.4 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Special Risk – Amortization at 7.10%

Special Risk Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	15.13%	7.60%	\$1.16 B
Preliminary 2021-22 at 7.10%:			
- 30 yr level % amortization on new bases	15.29%	8.47%	\$1.25 B
- 25 yr level % amortization on new bases	15.29%	8.56%	\$1.26 B
- 25 yr level % amortization on all bases	15.29%	8.68%	\$1.26 B
- 20 yr level % amortization on new bases	15.29%	8.70%	\$1.27 B
- 20 yr level % amortization on all bases	15.29%	9.29%	\$1.30 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$5.30 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Regular – Amortization at 7.00%

Regular Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	4.84%	3.44%	\$2.26 B
Preliminary 2021-22 at 7.00%:			
- 30 yr level % amortization on new bases	5.08%	4.19%	\$2.63 B
- 25 yr level % amortization on new bases	5.08%	4.28%	\$2.66 B
- 25 yr level % amortization on all bases	5.08%	4.36%	\$2.68 B
- 20 yr level % amortization on new bases	5.08%	4.42%	\$2.70 B
- 20 yr level % amortization on all bases	5.08%	4.78%	\$2.81 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$30.4 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Special Risk – Amortization at 7.00%

Special Risk Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	15.13%	7.60%	\$1.16 B
Preliminary 2021-22 at 7.00%:			
- 30 yr level % amortization on new bases	15.69%	8.92%	\$1.30 B
- 25 yr level % amortization on new bases	15.69%	9.07%	\$1.31 B
- 25 yr level % amortization on all bases	15.69%	9.19%	\$1.31 B
- 20 yr level % amortization on new bases	15.69%	9.31%	\$1.32 B
- 20 yr level % amortization on all bases	15.69%	9.89%	\$1.35 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$5.30 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Regular – Amortization at 6.95%

Regular Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	4.84%	3.44%	\$2.26 B
Preliminary 2021-22 at 6.95%:			
- 30 yr level % amortization on new bases	5.17%	4.31%	\$2.69 B
- 25 yr level % amortization on new bases	5.17%	4.42%	\$2.73 B
- 25 yr level % amortization on all bases	5.17%	4.51%	\$2.75 B
- 20 yr level % amortization on new bases	5.17%	4.58%	\$2.78 B
- 20 yr level % amortization on all bases	5.17%	4.95%	\$2.89 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$30.4 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Special Risk – Amortization at 6.95%

Special Risk Membership Class	Blended PP/IP Employer Rate		Estimated PP/IP Contribution
	NC	UAL	
Final 2020-21 at 7.20% assumption	15.13%	7.60%	\$1.16 B
Preliminary 2021-22 at 6.95%:			
- 30 yr level % amortization on new bases	15.92%	9.14%	\$1.32 B
- 25 yr level % amortization on new bases	15.92%	9.33%	\$1.33 B
- 25 yr level % amortization on all bases	15.92%	9.45%	\$1.34 B
- 20 yr level % amortization on new bases	15.92%	9.62%	\$1.35 B
- 20 yr level % amortization on all bases	15.92%	10.2%	\$1.38 B

- Based on projected 2021-22 PP/IP payroll subject to UAL contributions of \$5.30 billion
 - Does not include projected contributions on DROP payroll (estimated for 2020-21 to be \$0.362 billion in contributions on \$2.36 billion of applicable payroll)

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Setting the Investment Return Assumption

Actual future investment returns are not knowable in advance, so how should the assumption be set?

- Prudently select a best estimate
- Review return models from credentialed investment professionals
- Remain cognizant that hoping for a result does not make it happen; the assumption selected does not affect actual investment returns
- Avoid myopia – the objective is to make a prudent long-term estimate, not to get a single individual year right
- Neither ignore historical results nor be beholden to them
- Since actual results will vary from assumption, review a return model's probability range and consider a margin for variance

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Contribution Rate Calculations

- Pension Plan-specific contribution rates have two components:
 - Normal cost rate
 - Cost assigned to current year benefits by the allocation method
 - UAL rate
 - Rate calculated to eliminate UAL in a systematic manner over a specified time period if future experience follows assumptions
- To calculate the UAL rate, an additional assumption and an additional method are needed
 - For amortizations as a level percentage of projected payroll, the system's **general wage increase** assumption affects the rate
 - In addition, the length of the **amortization period** affects the rate

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Asset Measurement Method

- Contribution rates established annually based on the reported unfunded actuarial liability (UAL)
 - UAL compares Actuarial Liability against a system asset measure
- The Actuarial Value of Assets (AVA) measure used by FRS to calculate UAL is specified by statute, and employs an “asset smoothing” technique
 - The mandated method annually recognizes 20% of investment return deviations from assumption
- The statutory calculation approach includes a “corridor” to ensure smoothed assets vary no more than 20% from fair market value

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Asset Smoothing

- The objective of asset smoothing is to keep long-term contribution levels appropriately linked to actual investment performance, and to have year-to-year contribution rate changes be less volatile and more predictable
- Five-year smoothing method recognizes heavy losses gradually following times of unfavorable asset performance
- The smoothing is symmetrical, so that any large investment gains are also not “felt” all at once, but instead serve as a cushion against potential future unfavorable asset performance

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Disclaimer

At your request, we have provided these draft results prior to completion of the July 1, 2020 Actuarial Valuation Report. Because these are draft results, Milliman does not make any representation or warranty regarding the contents of the presentation. Milliman advises any reader not to take any action in reliance on anything contained in this presentation. All results from this presentation are subject to revision or correction prior to the release of the final July 1, 2020 Actuarial Valuation Report, and such changes or corrections may be material.

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Certification

This presentation summarizes key preliminary results of an actuarial valuation of the Florida Retirement System (“FRS” or “the System”) as of July 1, 2020. The valuation, when finalized, will develop actuarially calculated contribution rates for the Plan Year ending June 30, 2022. The results in this presentation are preliminary in nature and may not be relied upon to, for example, prepare the System’s Consolidated Annual Financial Report (CAFR). The reliance document will be the formal July 1, 2020 Actuarial Valuation Report.

In preparing this presentation, we relied, without audit, on information (some oral and some in writing) supplied by Division of Retirement (“Division”) staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

Preliminary results have been determined on the basis of actuarial assumptions and methods as most recently adopted by the 2019 FRS Actuarial Assumption Conference. At the time of their review and adoption, those assumptions, with the exception of the investment return assumption as disclosed in the July 1, 2019 Actuarial Valuation Report, were individually reasonable (taking into account the experience of the System and reasonable expectations); and offered a reasonable estimate of anticipated future experience affecting the System.

Future actuarial measurements may differ significantly from the current measurements presented in this presentation due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. The FRS Actuarial Assumption Conference has the final decision regarding the selection of assumptions for System funding calculations.

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Certification

Computations presented in this presentation are for purposes of preliminarily estimating the actuarially calculated contribution rates for funding the System. Computations prepared for other purposes may differ. The calculations in the presentation have been made on a basis consistent with our understanding of the System's funding requirements and goals. The calculations in this presentation have been made on a basis consistent with our understanding of the plan provisions described in the appendix of our formal actuarial valuation report as of July 1, 2019. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this presentation. Accordingly, additional determinations may be needed for other purposes.

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The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel. The presenting actuaries are independent of the plan sponsors. I am not aware of any relationship that would impair the objectivity of Milliman's work.

On the basis of the foregoing, I hereby certify that, to the best of my knowledge and belief, this presentation has been prepared in accordance with generally recognized and accepted actuarial principles and practices. I am a member of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

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Actuarial Basis

Data

We have based our calculations on demographic member census data as of July 1, 2020 as supplied by the Division of Retirement (“Division”). That data will be summarized in our formal actuarial valuation report for funding purposes as of July 1, 2020, which will be published in the 4th quarter of this year. Assets as of June 30, 2020, were based on values provided by the Division.

Methods / Policies

Actuarial Cost Method: Individual Entry Age Normal, using the interpretation of that method as most recently endorsed by the 2019 FRS Actuarial Assumption Conference.

UAL Amortization: Newly arising UAL each plan year is amortized as a level percentage of projected payroll over a closed 30-year period, except where explicitly modeled as a policy alternative in the body of the presentation.

Actuarial Value of Assets: A smoothed asset value specified by Florida Statutes that annually recognizes 20% of deviations in investment performance from the long-term assumption systematically over time. The statutory calculation approach includes a “corridor” to ensure smoothed assets vary no more than 20% from fair market value.

Assumptions

Assumptions for preliminary 2020 valuation calculations use assumptions as detailed July 1, 2019 Actuarial Valuation Report for funding purposes.

Provisions

Provisions valued are as summarized in the July 1, 2019 Actuarial Valuation Report for system funding purposes as subsequently modified by Senate Bill 426, which was enacted into law during the 2020 legislative session.

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