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# Liability Driven Investing

December 2025

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Sage Advisory Services  
5900 Southwest Parkway  
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Austin, Texas 78735

**SAGE** | INVEST WITH WISDOM™

## Who We Are

- Founded in 1996
- 100% employee operated
- 17-member investment team has an average industry experience of 18 years
- Deliver fixed income SMAs across the yield curve

## Why Sage

### Agility

Our size and independence as an employee-controlled firm enable us to take a nimble approach.

### Alignment

We customize the investment experience to align with each client's unique objectives and needs.

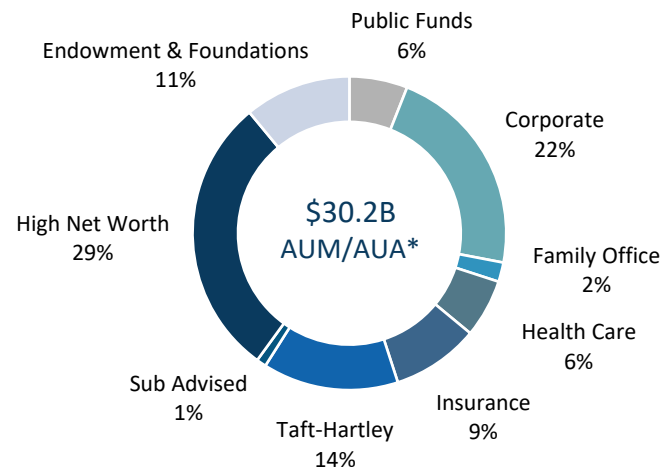
### Consistency

We have a tenured investment team and proven process that enable us to deliver expected results.

### Culture

We are committed to cultivating a culture of service and trust among our clients, our employees, and our community.

## Who We Serve



## Fixed Income Strategies

### Strategies Across the Yield Curve\*

Short Term	Intermediate	Core	Long/LDI	Credit	Municipal
Enhanced Cash	Moderate Term	Core Aggregate	LDI	Intermediate Corp	Muni Total Return
Short Term	Intermediate Term	Core Plus	Long Term	High Yield	Muni Ladder

### Customization Options

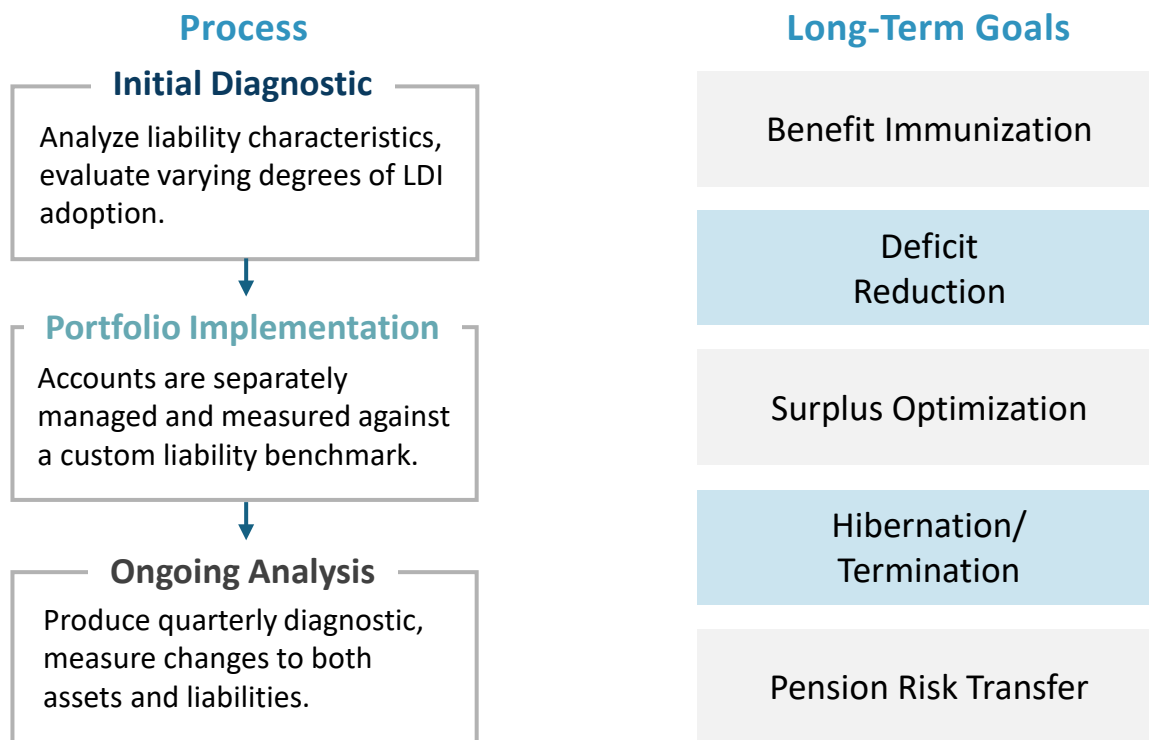
<b>Client Application</b>  Customize to the unique purpose of asset pool  <b>Example</b> Pension plan de-risking, insurance co. reserves, hospital operating pools	<b>Maturity/Duration</b>  Target a max maturity, duration or ladder  <b>Example</b> Maximum maturity of 5 years or duration of less than 1 year	<b>Credit Quality</b>  Restrict, limit, expand ratings categories  <b>Example</b> Allow allocation to below-IG bonds to enhance yield	<b>Cash Flow Targeting</b>  Align portfolio with known liquidity needs  <b>Example</b> Manage maturities and cash to fund quarterly distributions	<b>Responsible Investing</b>  Limit or exclude certain industries or securities  <b>Example</b> Apply faith-based screens to a corporate bond allocation
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\*Not a complete list of strategies

## Custom LDI Solutions

### Our Approach

*We start with the end in mind. The relationship between assets and liabilities is a key consideration of the planning process because ultimately, our liability-driven approach is about managing risk. Each account is customized and measured against a custom liability benchmark.*



## Sample Pension Plan Diagnostic: Asset/Liability Characteristics

*The Sage team will produce an initial diagnostic to evaluate the relationship between plan assets and liabilities to understand important risk characteristics, such as the interest rate hedge ratio.*

	Future Value	Discount Rate	Present Value	Surplus/ (Deficit)	Funded Status	Duration (Years)	Dollar Duration	IR Hedge Ratio
<b>Assets</b>								
Fixed Income Assets			84,908			6.2	5,264	
<u>Return Seeking Assets</u>			<u>127,362</u>			<u>N/A</u>	<u>N/A</u>	
<b>Total Assets</b>			<b>212,270</b>			<b>2.5</b>	<b>5,264</b>	
<b>Liabilities</b>								
PBO, IRS Corp Curve	424,875	4.9%	212,270	0	100%	11.5	24,441	22%

## Sample Pension Plan Diagnostic: Interest Rate Sensitivities and Hedge Ratios

*The analysis evaluates the potential funded status volatility of the current allocation while comparing the same risk metrics for portfolios that introduce varying allocations to LDI.*

	<b>Current Portfolio:</b> 40% FI / 60% Return-Seeking	<b>Portfolio 2:</b> 75% LDI / 25% Return-Seeking
<b>Liability Profile</b>		
Present Value	212,270	212,270
Duration (Total)	11.5	11.5
<b>Asset Profile</b>		
Total Assets	212,270	212,270
Fixed Income Allocation	40%	75%
Return-Seeking Allocation	60%	25%
Fixed Income Duration	6.2	11.5
<b>Risk Profile</b>		
Funded Status	100%	100%
Surplus/(Deficit)	0	0
Portfolio IR Hedge Ratio	22%	75%
% Funded Status Vol	10.0%	4.4%
\$ Funded Status Vol	21,823	9,506

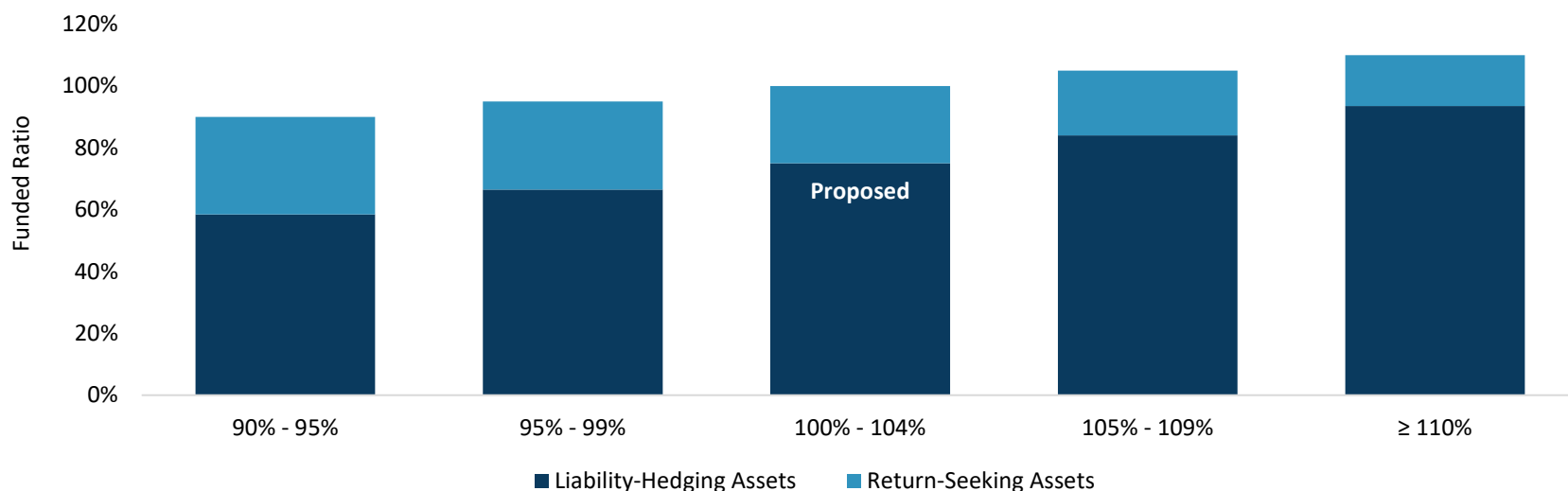
## Sample Pension Plan Diagnostic: Capital Market Scenario Analysis

*In addition to utilizing stochastic modeling to understand statistical risk, we model the potential impact of an instantaneous shift in interest rates and return-seeking assets.*

Current Allocation						75% LDI / 25% Return-Seeking							
Plan Funded Status Resulting From Market Movements						Plan Funded Status Resulting From Market Movements							
		Interest Rate Shift							Interest Rate Shift				
		-2.0%	-1.0%	0.0%	+1.0%	+2.0%			-2.0%	-1.0%	0.0%	+1.0%	+2.0%
Return-Seeking Change	-20%	73.4%	80.5%	88.0%	95.6%	102.9%	Return-Seeking Change	-20%	90.7%	92.8%	95.0%	97.3%	99.6%
	-10%	78.1%	85.8%	94.0%	102.3%	110.3%		-10%	92.7%	95.0%	97.5%	100.1%	102.7%
	0%	82.9%	91.1%	100.0%	109.0%	117.7%		0%	94.7%	97.2%	100.0%	102.9%	105.8%
	+10%	87.6%	96.5%	106.0%	115.7%	125.1%		+10%	96.6%	99.4%	102.5%	105.7%	108.9%
	+20%	92.3%	101.8%	112.0%	122.4%	132.4%		+20%	98.6%	101.7%	105.0%	108.5%	112.0%

## Sample Pension Plan Diagnostic: De-Risking Glidepath

*Develop and adopt a custom de-risking glidepath that will trigger an increase to the liability hedging portfolio as funded-status milestones are achieved.*



	CURRENT	→ GLIDEPATH BY FUNDED RATIO →				TARGET
	100%	90% - 95%	95% - 99%	100% - 104%	105% - 109%	≥ 110%
<b>Asset Allocation</b>						
Liability-Hedging Assets	40%	65% - 70%	70% - 75%	<b>75% - 80%</b>	80% - 85%	85% - 100%
Return-Seeking Assets	60%	30% - 35%	25% - 30%	<b>20% - 25%</b>	15% - 20%	0% - 15%
<b>Risk Profile</b>						
Portfolio IR Hedge Ratio	22%	59%	67%	<b>75%</b>	84%	94%

All amounts are in thousands of dollars unless otherwise noted.



## Our Approach

### Custom Liability Benchmark Construction

*Sage develops a custom liability benchmark (CLB) for all LDI clients based on the client's existing pension liabilities. The CLB measures the change in liabilities and provides the framework for portfolio construction.*

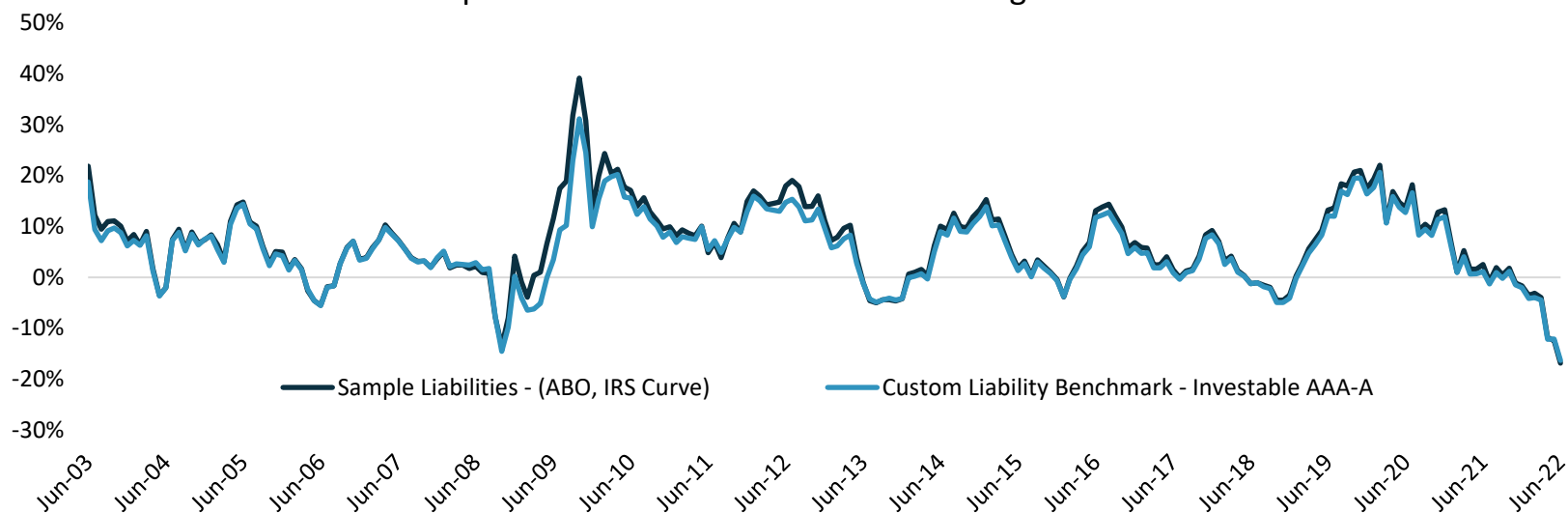


## Our Approach

### Benefits of Custom Liability Benchmark



Sample Liabilities vs Investable CLB: Rolling 1-YR Returns

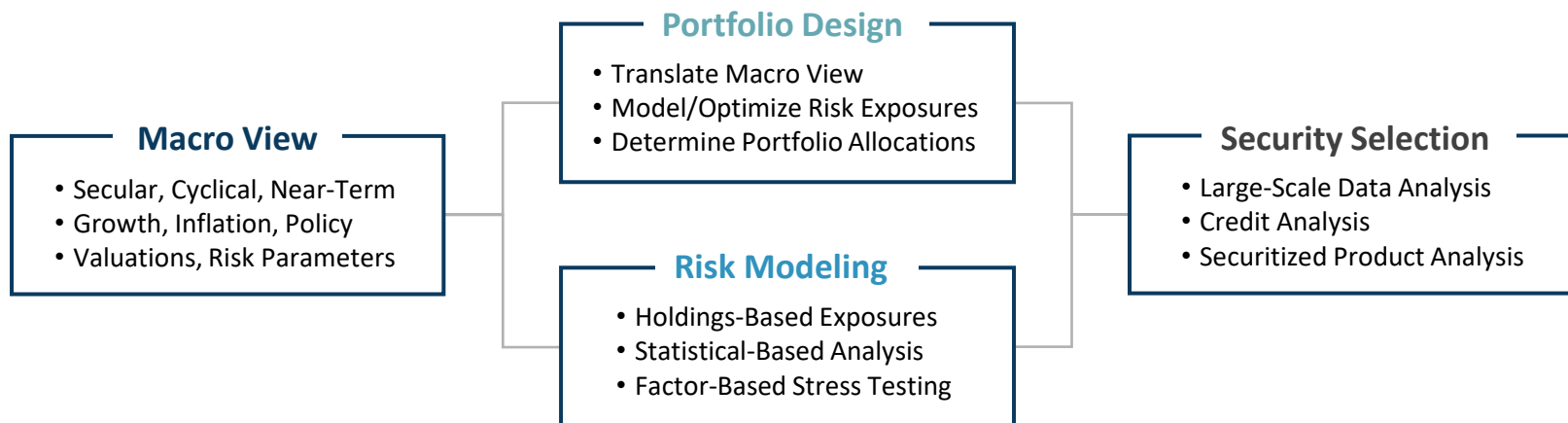


Sample liabilities are for illustrative purposes.

## Our Approach

### Investment Process

*Our teams work together to balance the development of our macro views with thoughtful portfolio design, value-driven security selection, and active risk management.*



## Sample Pension Plan: Portfolio Characteristics vs. CLB

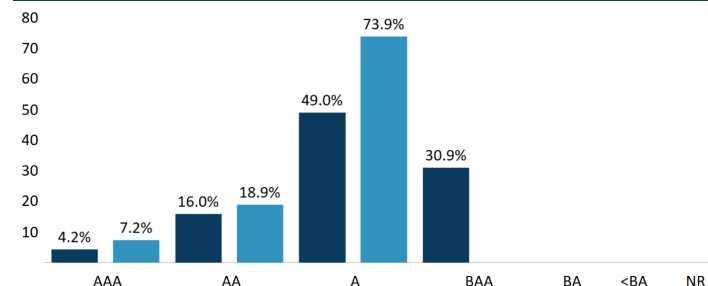
### PORTFOLIO SUMMARY

As of Date	September 30, 2024
Portfolio Market Value	\$190,027,529
Number of Securities	197
Benchmark	CLB Investable

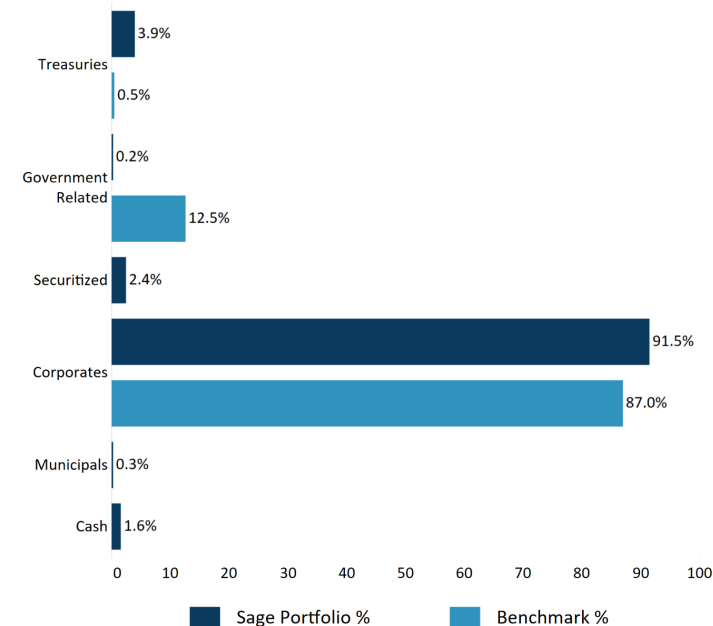
### PORTFOLIO CHARACTERISTICS

	Portfolio	Benchmark
Yield to Worst	4.96%	4.84%
Coupon	4.39%	4.26%
Effective Maturity	20.69	19.73
Effective Duration	11.67	11.57
Average Credit Rating	A	A+

### CREDIT RATING ALLOCATION

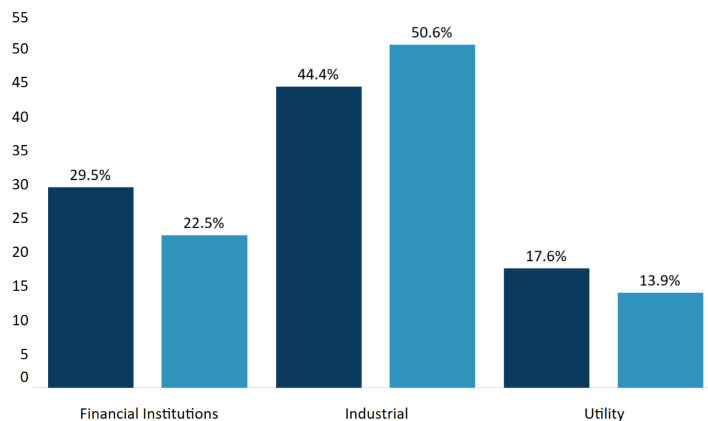


### SECTOR ALLOCATION

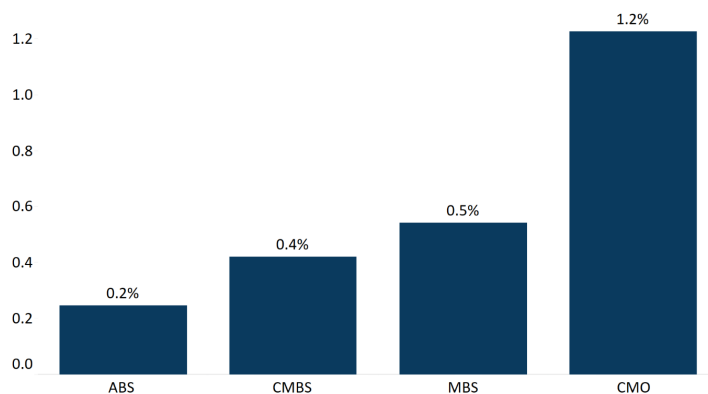


## Sample Pension Plan: Portfolio Characteristics vs. CLB

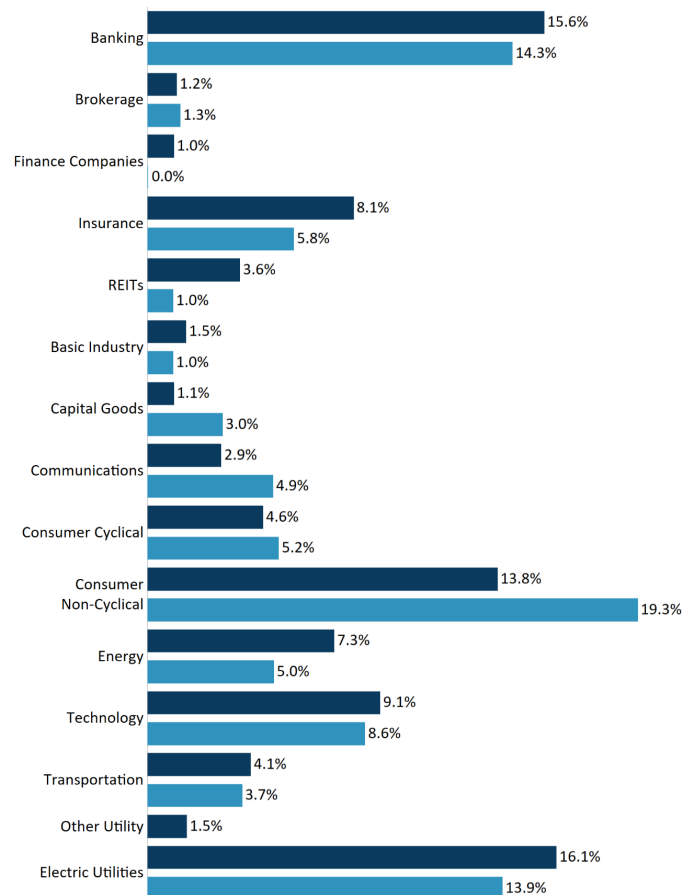
### CORPORATE SECTOR ALLOCATION



### SECURITIZED SECTOR ALLOCATION



### CORPORATE INDUSTRY ALLOCATION



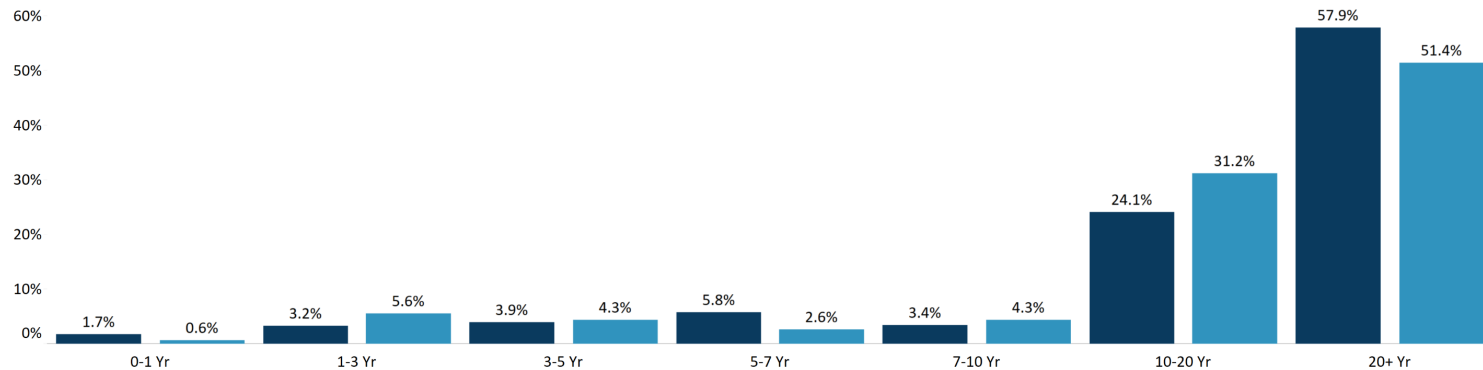
Sample portfolio characteristics are for illustrative purposes.

■ Sage Portfolio %

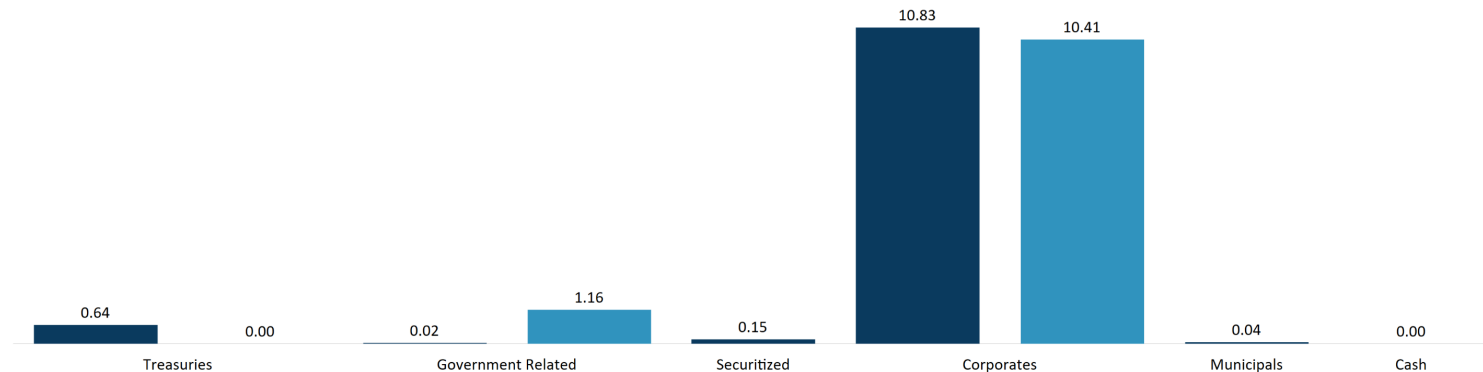
■ Benchmark %

## Sample Pension Plan: Portfolio Characteristics vs. CLB

### MARKET VALUE DISTRIBUTION BY MATURITY



### CONTRIBUTION TO DURATION DISTRIBUTION BY SECTOR



 Sage Portfolio %
  Benchmark %

Sample portfolio characteristics are for illustrative purposes.

## Sample Pension Plan: Quarterly Diagnostic

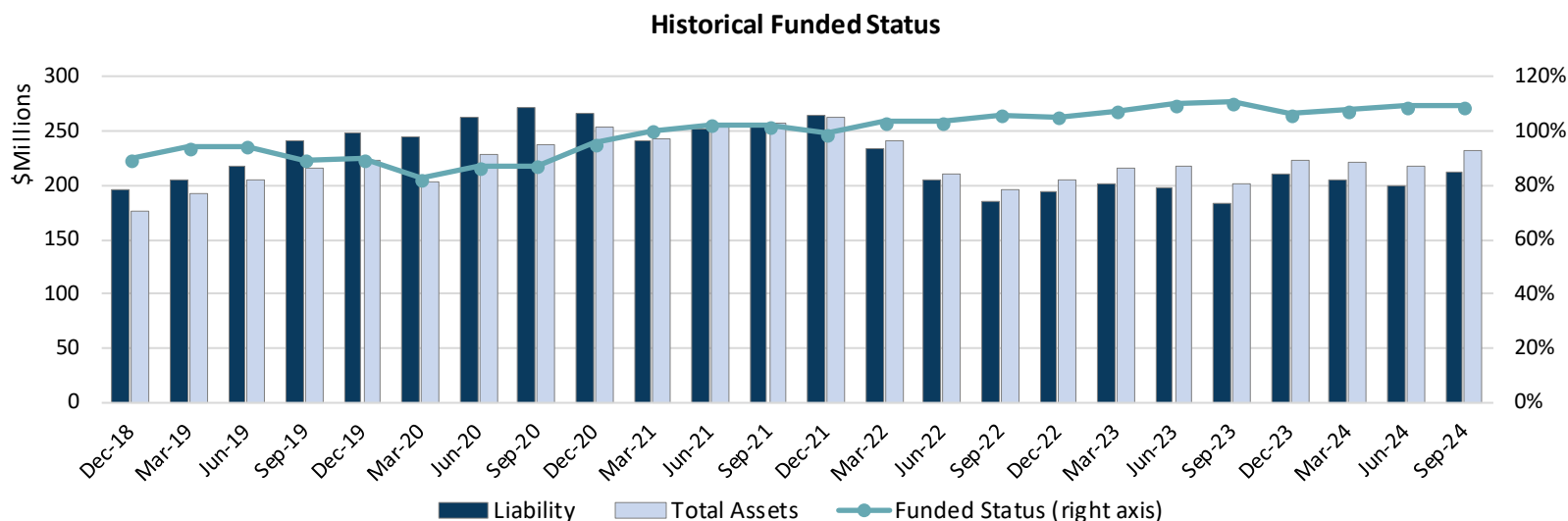
*Each LDI portfolio receives a quarterly diagnostic that estimates changes to plan health, the single-equivalent discount rate, and key risk characteristics.*

Key Characteristics	12/31/2023	3/31/2024	6/30/2024	9/30/2024
<b>Plan Status</b>				
Closed to new participants effective 4/28/2004				
<b>Assets</b>				
Total Plan Assets	222,879	221,485	218,284	<b>231,768</b>
Fixed Income LDI Market Value	181,331	178,927	176,322	<b>190,028</b>
Fixed Income LDI Allocation %	81%	81%	81%	<b>82%</b>
<b>Liabilities - PBO, IRS Corp Curve (EOM)</b>				
Present Value of Liabilities	210,025	205,328	200,253	<b>212,270</b>
Discount Rate	5.0%	5.2%	5.4%	<b>4.9%</b>
Funded Status	106%	108%	109%	<b>109%</b>
<b>Interest Rate Sensitivities</b>				
LDI Assets Duration (Years)	12.0	11.9	11.5	<b>11.7</b>
Liability Duration (Years)	12.0	11.7	11.3	<b>11.5</b>
Hedge Ratio	87%	89%	89%	<b>91%</b>

## Sample Pension Plan: Quarterly Diagnostic

The Sage team evaluates the performance of the LDI portfolio vs. the change in the custom liability benchmark (CLB), along with a historical change in funded status since the inception of the account.

	QTD	YTD	1 Year	3 Year	5 Year	Inception	Std Dev
<b>Fixed Income LDI Assets</b>	7.8%	4.8%	17.7%	-4.2%	0.0%	3.9%	13.0%
<b>CLB Investable</b>	7.6%	4.1%	16.8%	-4.7%	-0.9%	2.9%	12.0%
<b>Excess</b>	0.2%	0.7%	0.9%	0.5%	0.9%	1.1%	0.9%





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## IMPORTANT DISCLOSURES

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