**Kentucky Retirement Systems Board of Trustees**
**Special Called Board Meeting**
**January 30, 2024, 10:00 a.m. ET**
**Live Video Conference/Facebook Live**

**AGENDA**

| | | |
|---|---|---|
| 1. | **Call to Order** | **Lynn Hampton** |
| 2. | **Legal Public Statement** | **Office of Legal Services** |
| 3. | **Roll Call/Public Comment** | **Sherry Rankin** |
| 4. | **Investment Committee Report and Recommendations*** | **Prewitt Lane**<br>**Steve Willer**<br>**Anthony Chiu** |
| 5. | **Closed Session **** | **Lynn Hampton** |
| 6. | **Adjourn*** | **Lynn Hampton** |

*Board Action Required*
*Board Action May Be Required*

# M E M O R A N D U M

To: Kentucky Retirement Systems Board of Trustees

From: C. Prewitt Lane, Chair
Investment Committee

Date: January 30, 2024

Subject: Summary of Special Called Investment Committee Meeting

The Kentucky Retirement Systems Investment Committee held a Special Called meeting on January 18, 2024.

1. **The following actions were taken by the Investment Committee and are being forwarded to the Kentucky Retirement Systems Board of Trustees for ratification. ***

    a. Approved Staff's recommendation to invest up to $75 million in Closed-End Funds Separately Managed Accounts to be managed by Saba Capital Management subject to successful contract negotiations. This investment would be part of the Real Return asset allocation and would be allocated proportionally across all Pension and Insurance portfolios.
    b. Approved Staff and Wilshire's recommendation to revise Section III Asset Allocation Guidelines of the Kentucky Retirement Systems Investment Policy Statement Adopted March 2, 2022.

**KERS Non-Hazardous Pension and SPRS Pension**

| Asset Class | Proposed Target | Current Target |
|---|---|---|
| **Equity** | | |
| Public Equity | 30.0% | 32.5% |
| Private Equity | 6.0% | 7.0% |
| **Fixed Income** | | |
| Core Fixed Income | 27.0% | 20.5% |
| Specialty Credit* | 20.0% | 15.0% |
| Cash | 2.0% | 5.0% |
| **Inflation Protected** | | |
| Real Estate | 5.0% | 10.0% |
| Real Return | 10.0% | 10.0% |

*includes High Yield Fixed Income

**KERS Hazardous Pension and the KRS Insurance Trust**

| Asset Class | Proposed Target | Current Target |
|---|---|---|
| **Equity** | | |
| Public Equity | 40.0% | 43.5% |
| Private Equity | 8.0% | 10.0% |
| **Fixed Income** | | |
| Core Fixed Income | 10.0% | 10.0% |
| Specialty Credit* | 25.0% | 15.0% |
| Cash | 2.0% | 1.5% |
| **Inflation Protected** | | |
| Real Estate | 7.0% | 10.0% |
| Real Return | 8.0% | 10.0% |

*includes High Yield Fixed Income

RECOMMENDATION: The Investment Committee requests the Kentucky Retirement Systems Board of Trustees ratify the actions taken by the Investment Committee.

*Board of Trustees Action Required

**Wilshire**

# Kentucky Retirement Systems (KRS)

Kentucky Employees Retirement System (KERS)
State Police Retirement System (SPRS)

Asset Allocation Analysis

December 2023

**Wilshire**

# Contents

# Background & Overview

# Background & Overview

- The asset allocation decision is the most important decision an investor can make

  - The asset allocation decision drives 90% of return variability among portfolios

- Wilshire recommends revisiting the asset allocation decision every three to five years, or sooner, as market conditions warrant

  - KRS (pre-separation) last reviewed asset allocation in February of 2022; the last full asset-liability study was conducted in November 2020

  - In order to meet the discount rates, and given the capital markets assumptions at the time, increased exposure to public equities was approved while core fixed income and real return were reduced

- The market environment in 2023 is much different than that of 2020, largely driven by a regime change that resulted in significantly higher interest rates allowing fixed income to once again play a prominent role in client portfolios

- What have we done to date regarding the study?

  - Worked with the IC Chair and Staff based on comments from Board to identify risk-appetite of the Plans and appropriate policies to model as a component of a mean-variance analysis

  - Collected most recent KERS and SPRS actuarial data

**Wilshire**

# Opportunity

## KRS has the opportunity to reduce risk while maintaining expected returns

- Fixed income assets provide utility again
- Forward-looking returns on equities are subdued due to high valuations and recent strong returns
- Assumed rates of return are more easily achieved than what was possible during previous AA and AL studies

## Focus of the 2023 Asset Liability Study

- Consider alternative strategic asset allocation policies that reduce risk, as measured by expected volatility, but also in the context of economic factor exposure
- Consider allocations that provide an efficient and/or improved risk-return tradeoff given current market conditions

**Wilshire**

# Observations & Recommendation
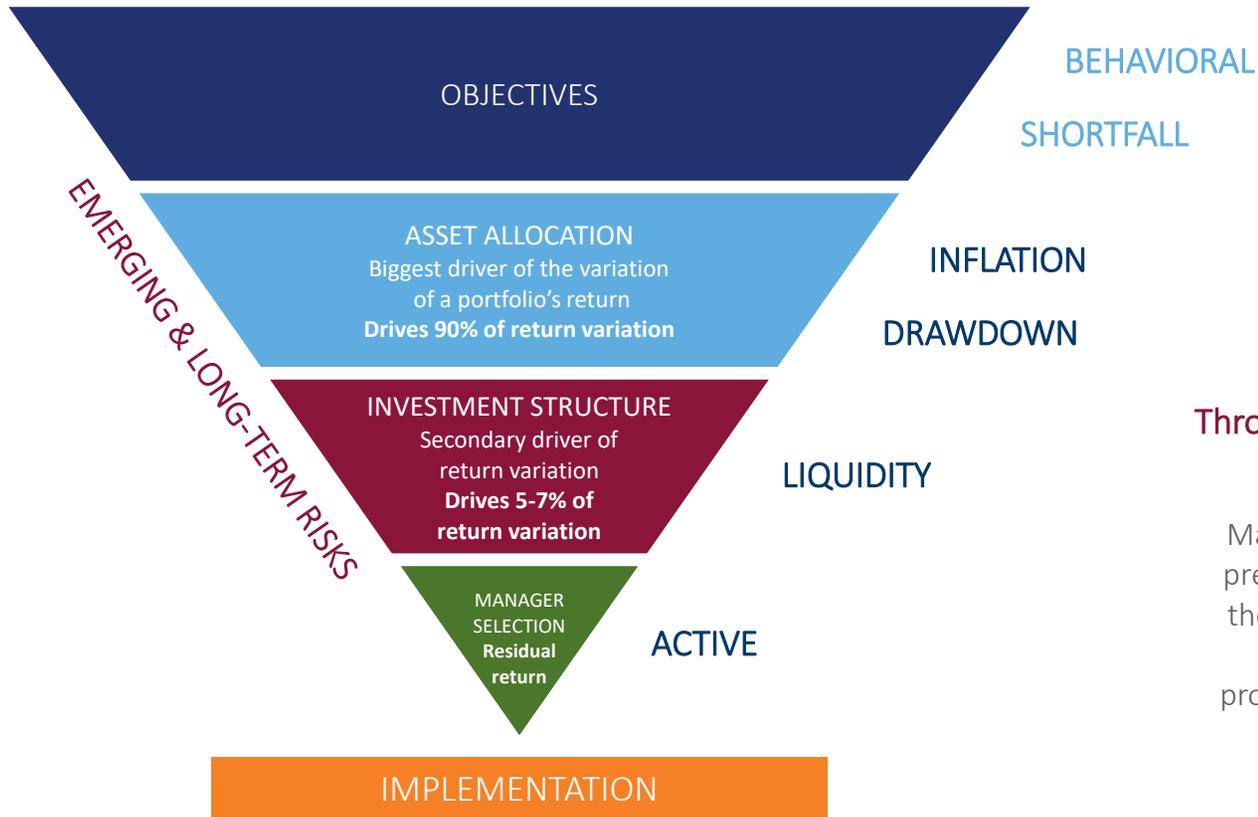
**Wilshire**

# Observations & Recommendation

Wilshire recommends that the Board adopt one of the lower risk policies based on the Board's desired risk profile

- All of the lower risk portfolio options have the following merits compared to the current asset allocation policy targets:

  - Expected returns in excess of the assumed rate while cutting risk

  - Reduced growth factor exposure (improves sensitivity to economic downturns)

  - Improved liquidity in normal and stressed market environments

  - Improved Sharpe ratio

- The lower risk portfolios sacrifice some upside potential in the optimistic scenarios (top 25% of modelled observations (see pages 44 and 54) and have modestly lower inflation factor scores

# Asset Allocation Approach

**Wilshire**

# Focus on Decisions That are Most Impactful



**OBJECTIVES**

BEHAVIORAL

SHORTFALL

**ASSET ALLOCATION**
Biggest driver of the variation
of a portfolio's return
**Drives 90% of return variation**

INFLATION

DRAWDOWN

**INVESTMENT STRUCTURE**
Secondary driver of
return variation
**Drives 5-7% of
return variation**

LIQUIDITY

**MANAGER
SELECTION
Residual
return**

ACTIVE

**IMPLEMENTATION**

EMERGING & LONG-TERM RISKS

## Address Key Risks Throughout the Investment Process

Many of the six key risks are present at multiple points in the investment process, but each distinct step in the process is focused on one or two primary risks.

**Wilshire**

# Risk Assessment Framework

Wilshire's multi-dimensional view of risk integrates organizational and investment considerations into a comprehensive framework for evaluating strategic decisions.

**Shortfall**: Support distributions and long-term growth

**Behavioral**: Instill strong governance

**Drawdown**: Limit portfolio losses

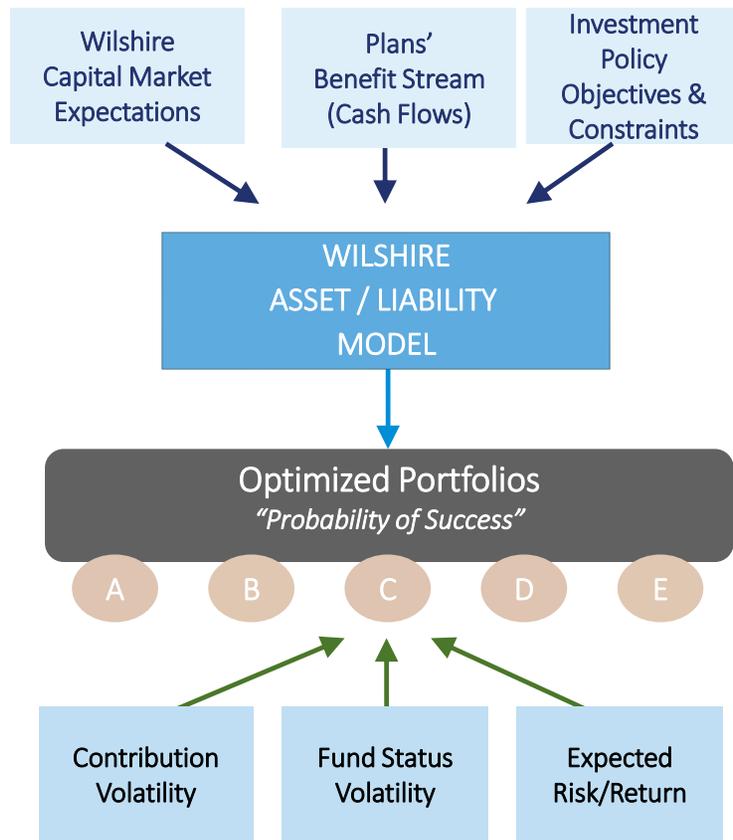**Inflation**: Preserve long-term purchasing power

**Liquidity**: Balance near-term needs, long-term opportunities

**Active**: Ensure unique exposures

**Emerging & Long-Term**: Environmental, Social & Governance risks, such as externalities, intangibles and reputation may be linked to various risk lenses



INVESTMENT RISK

ORGANIZATIONAL RISK

DRAWDOWN

INFLATION

LIQUIDITY

Risk Lenses for Plan Governance

BEHAVIORAL

SHORTFALL

ACTIVE

EMERGING & LONG-TERM RISKS

**Wilshire**

# Asset Allocation Process

| Wilshire Capital Market Expectations | Plans' Benefit Stream (Cash Flows) | Investment Policy Objectives & Constraints |
|---|---|---|

**WILSHIRE ASSET / LIABILITY MODEL**

**Optimized Portfolios**
*"Probability of Success"*

( A )  ( B )  ( C )  ( D )  ( E )

| Contribution Volatility | Fund Status Volatility | Expected Risk/Return |
|---|---|---|

- The mission of a defined benefit plan is to fund benefits promised to participants

- The role of asset allocation is to manage risk in order to fulfill that core mission
  - **Maximize safety** of promised benefits
  - **Minimize cost** of funding these benefits

- Wilshire's Asset Liability Model provides methodology for selecting a target portfolio that considers both goals

- Rigorously developed capital market assumptions for risk and return (see appendix)

- Given that short-term volatility is also important, we identify the impact of the asset allocation decision on funded ratios, annual contribution requirements, and other metrics

- Strategic asset allocation is not a guide to outperforming in every market ... but it should provide a roadmap for success over a market cycle
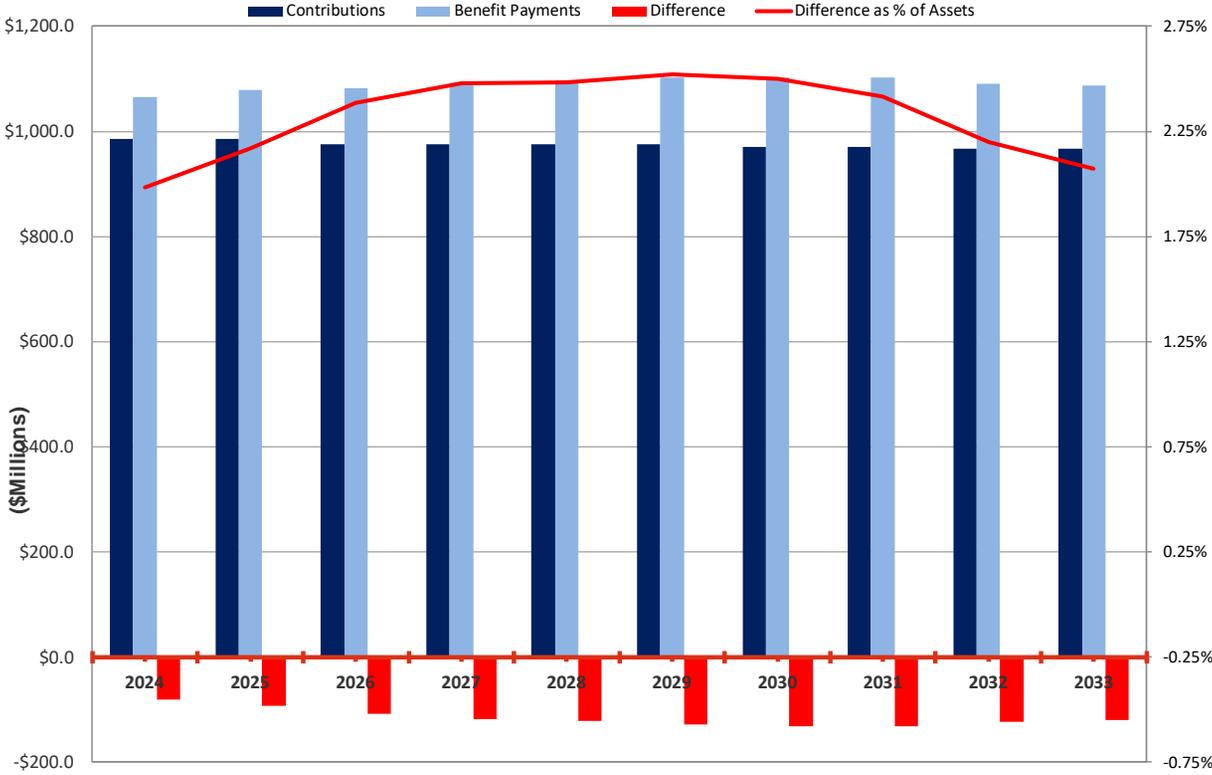
# Asset Allocation Inputs

KERS NON-HAZARDOUS RETIREMENT PLAN

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**Wilshire**

## Plan Status

| | June 30, 2022 | June 30, 2023 |
|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | |
| 1. Actuarial Accrued Liability (AAL) | 16,577.0 | 15,858.0 |
| 2. Market Value of Assets (MVA) | 3,013.8 | 3,522.0 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | 13,563.2 | 12,336.0 |
| 4. AAL MVA Funded Ratio (2. / 1.) | 18.2% | 22.2% |
| | | |
| 5. Actuarial Value of Assets (AVA) | 3,065.0 | 3,577.6 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | 13,512.0 | 12,280.4 |
| 7. AAL AVA Funded Ratio (5. / 1.) | 18.5% | 22.6% |
| | | |
| **Economic Assumptions** | | |
| Discount Rate | 5.25% | 5.25% |

- June 30, 2022, data was provided in the actuarial valuation report by the plan actuary.
- June 30, 2023, data was projected by Wilshire using data from the report and additional metrics provided by the actuary.

## Projected Cashflow



- *Benefit payments and contributions (both employer and member) were provided by plan actuary.*
- *Difference as a % of Assets is based on projected median asset values with the Current Target policy*
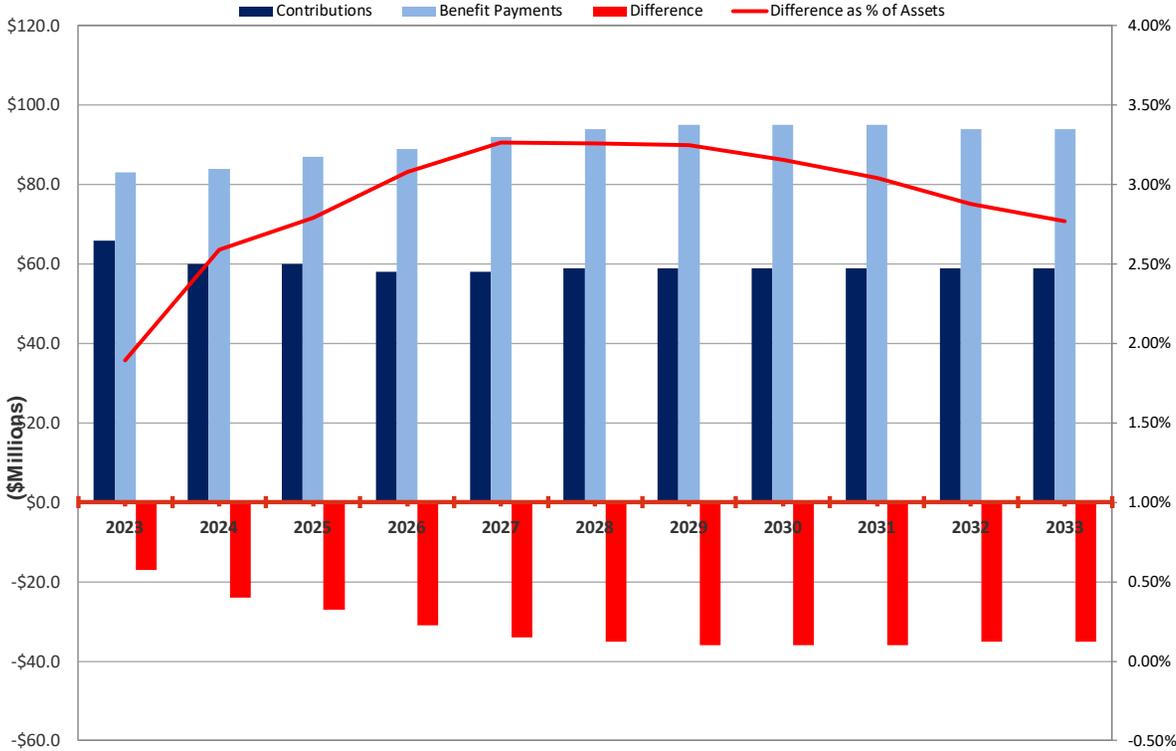
**Wilshire**

# KERS HAZARDOUS RETIREMENT PLAN

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**Wilshire**

## Plan Status

| | June 30, 2022 | June 30, 2023 |
|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | |
| 1. Actuarial Accrued Liability (AAL) | 1,317.0 | 1,321.0 |
| 2. Market Value of Assets (MVA) | 811.0 | 898.8 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | 506.0 | 422.2 |
| 4. AAL MVA Funded Ratio (2. / 1.) | 61.6% | 68.0% |
| | | |
| 5. Actuarial Value of Assets (AVA) | 832.0 | 878.9 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | 485.0 | 442.1 |
| 7. AAL AVA Funded Ratio (5. / 1.) | 63.2% | 66.5% |
| | | |
| **Economic Assumptions** | | |
| Discount Rate | 6.25% | 6.25% |

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- June 30, 2023, data was projected by Wilshire using data from the report and additional metrics provided by the actuary.

**Wilshire**

## Projected Cashflow



- Benefit payments and contributions (both employer and member) were provided by plan actuary.
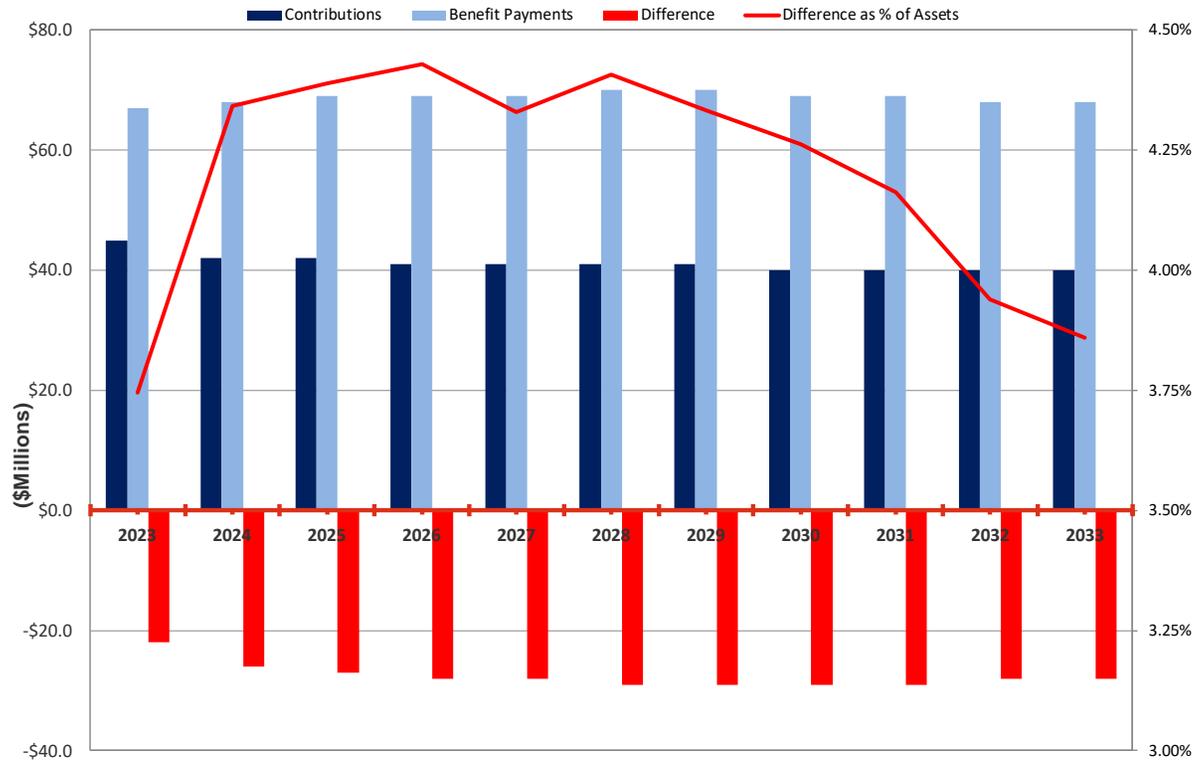- Difference as a % of Assets is based on projected median asset values with the Current Target policy.

**Wilshire**

# SPRS
# RETIREMENT PLAN

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**Wilshire**

## Plan Status

| | June 30, 2022 | June 30, 2023 |
|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | |
| 1. Actuarial Accrued Liability (AAL) | 1,067.0 | 1,039.0 |
| 2. Market Value of Assets (MVA) | 551.7 | 587.5 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | 515.3 | 451.5 |
| 4. AAL MVA Funded Ratio (2. / 1.) | 51.7% | 56.5% |
| | | |
| 5. Actuarial Value of Assets (AVA) | 560.0 | 576.5 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | 507.0 | 462.5 |
| 7. AAL AVA Funded Ratio (5. / 1.) | 52.5% | 55.5% |
| | | |
| **Economic Assumptions** | | |
| Discount Rate | 5.25% | 5.25% |

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- June 30, 2023, data was projected by Wilshire using data from the report and additional metrics provided by the actuary.

**Wilshire**

## Projected Cashflow



- Benefit payments and contributions (both employer and member) were provided by plan actuary.
- Difference as a % of Assets is based on projected median asset values with the Current Target policy
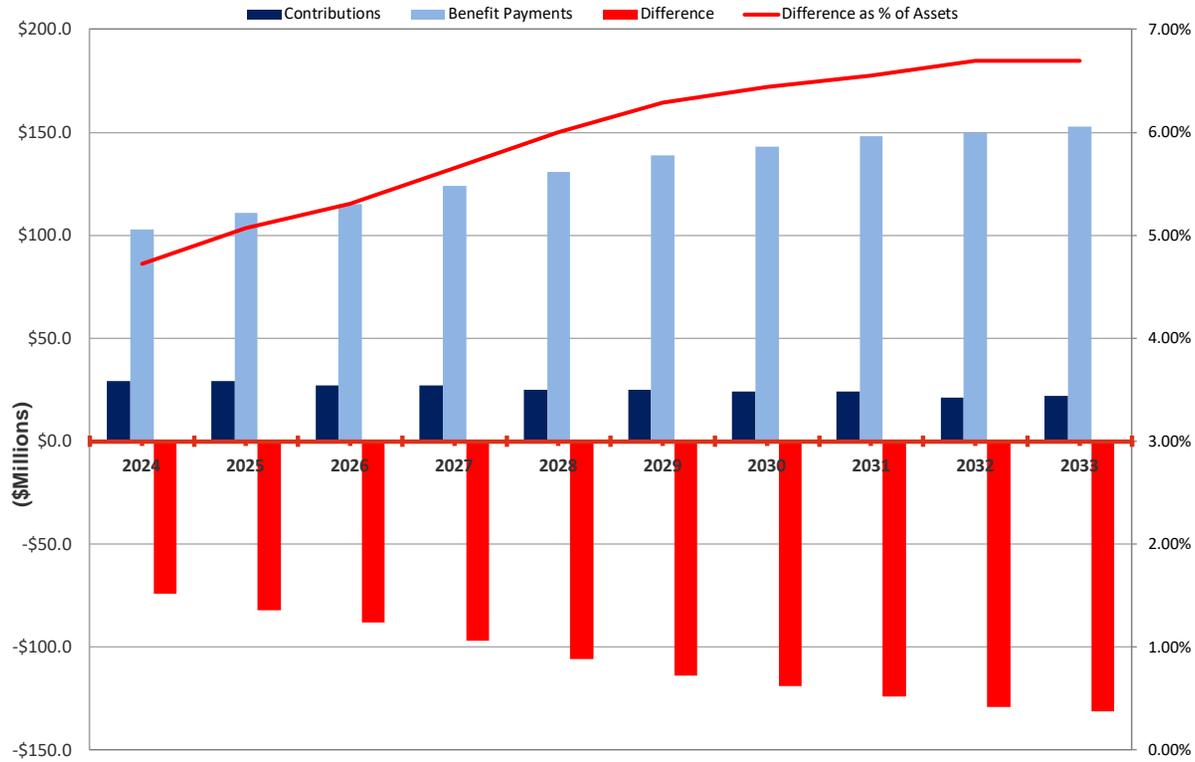
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**Wilshire**

# KERS NON-HAZARDOUS INSURANCE PLAN

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**Wilshire**

## Plan Status

| | June 30, 2022 | June 30, 2023 |
|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | |
| 1. Actuarial Accrued Liability (AAL) | 1,782.0 | 1,721.0 |
| 2. Market Value of Assets (MVA) | 1,364.4 | 1,452.3 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | 417.6 | 268.7 |
| 4. AAL MVA Funded Ratio (2. / 1.) | 76.6% | 84.4% |
| | | |
| 5. Actuarial Value of Assets (AVA) | 1,410.0 | 1,523.4 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | 372.0 | 197.6 |
| 7. AAL AVA Funded Ratio (5. / 1.) | 79.1% | 88.5% |
| | | |
| **Economic Assumptions** | | |
| Discount Rate | 6.25% | 6.50% |

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**Wilshire**

## Projected Cashflow



- Benefit payments and contributions (both employer and member) were provided by plan actuary.
- Difference as a % of Assets is based on projected median asset values with the Current Target policy

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**Wilshire**

# KERS HAZARDOUS INSURANCE PLAN

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**Wilshire**

## Plan Status

| | June 30, 2022 | June 30, 2023 |
|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | |
| 1. Actuarial Accrued Liability (AAL) | 347.0 | 340.0 |
| 2. Market Value of Assets (MVA) | 588.2 | 616.0 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | (241.2) | (276.0) |
| 4. AAL MVA Funded Ratio (2. / 1.) | 169.5% | 181.2% |
| | | |
| 5. Actuarial Value of Assets (AVA) | 598.0 | 616.8 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | (251.0) | (276.8) |
| 7. AAL AVA Funded Ratio (5. / 1.) | 172.3% | 181.4% |
| | | |
| **Economic Assumptions** | | |
| Discount Rate | 6.25% | 6.50% |

- June 30, 2022, data was provided in the actuarial valuation report by the plan actuary.
- June 30, 2023, data was projected by Wilshire using data from the report and additional metrics provided by the actuary.

**Wilshire**

# Projected Cashflow



- Benefit payments and contributions (both employer and member) were provided by plan actuary.
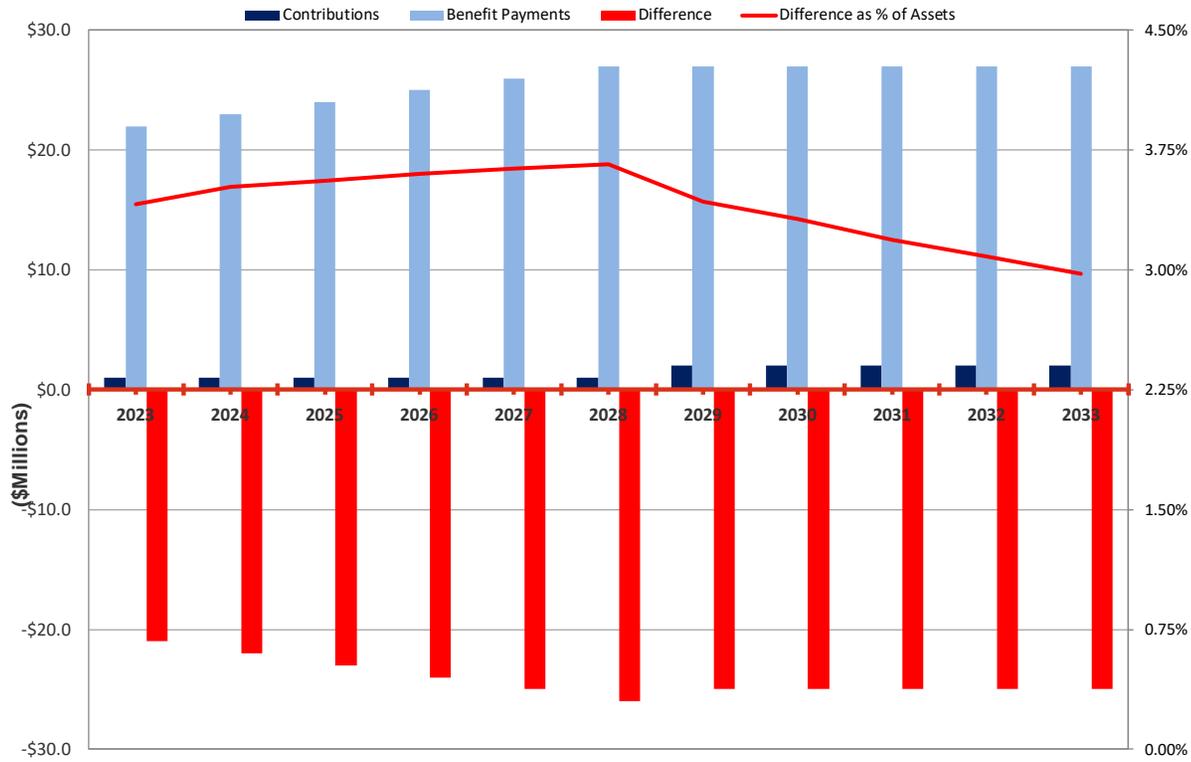- Difference as a % of Assets is based on projected median asset values with the Current Target policy

**Wilshire**

# SPRS
# INSURANCE PLAN

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**Wilshire**

## Plan Status

| | June 30, 2022 | June 30, 2023 |
|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | |
| 1. Actuarial Accrued Liability (AAL) | 233.0 | 230.0 |
| 2. Market Value of Assets (MVA) | 231.2 | 245.8 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | 1.8 | (15.8) |
| 4. AAL MVA Funded Ratio (2. / 1.) | 99.2% | 106.9% |
| | | |
| 5. Actuarial Value of Assets (AVA) | 234.0 | 239.2 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | (1.0) | (9.2) |
| 7. AAL AVA Funded Ratio (5. / 1.) | 100.4% | 104.0% |
| | | |
| **Economic Assumptions** | | |
| Discount Rate | 6.25% | 6.50% |

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- June 30, 2023, data was projected by Wilshire using data from the report and additional metrics provided by the actuary.

## Wilshire

# Projected Cashflow



- Benefit payments and contributions (both employer and member) were provided by plan actuary.
- Difference as a % of Assets is based on projected median asset values with the Current Target policy
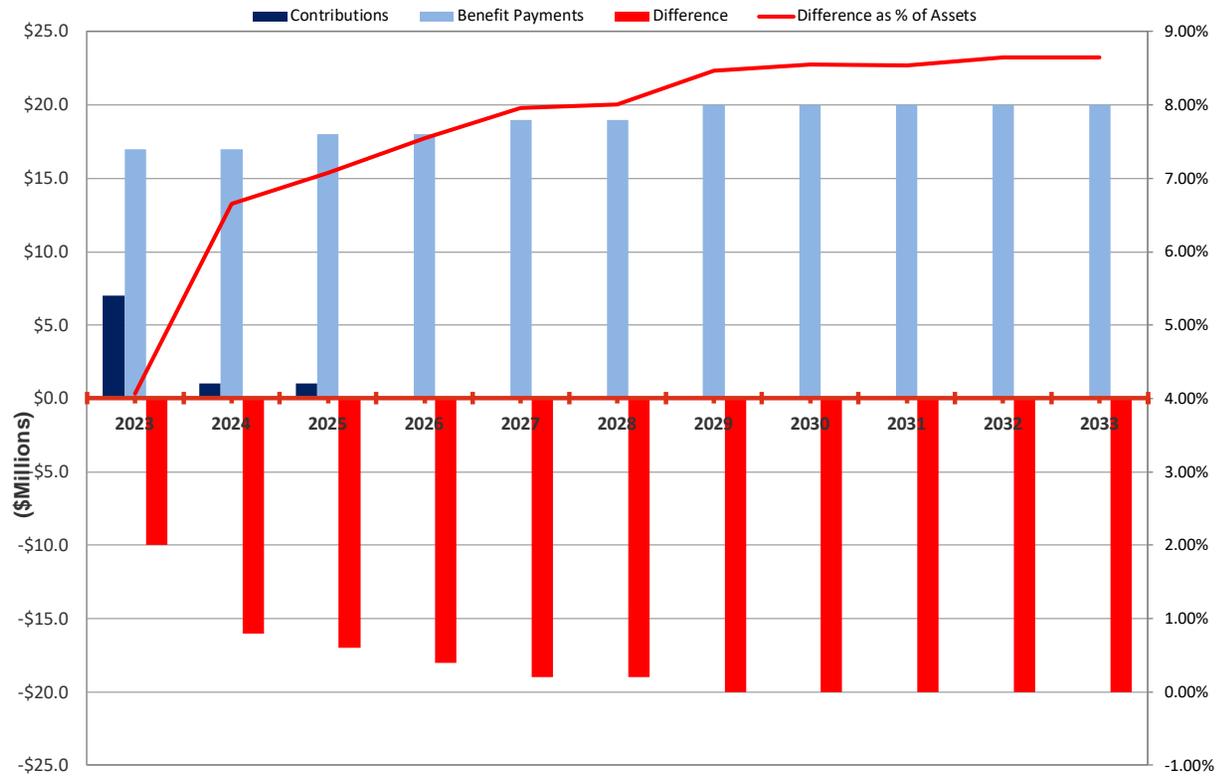
ALL PLANS

Wilshire

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**Wilshire**

# Plan Status – As of June 30, 2023

| | KERS Non-Hazardous Pension | KERS Hazardous Pension | SPRS Pension | KERS Non-Hazardous Insurance | KERS Hazardous Insurance | SPRS Insurance |
|---|---|---|---|---|---|---|
| **Asset and Liability Data ($ - Millions)** | | | | | | |
| 1. Actuarial Accrued Liability (AAL) | 15,858.0 | 1,321.0 | 1,039.0 | 1,721.0 | 340.0 | 230.0 |
| 2. Market Value of Assets (MVA) | 3,522.0 | 898.8 | 587.5 | 1,452.3 | 616.0 | 245.8 |
| 3. AAL MVA Funded Status (Unfunded Liability) (1. - 2.) | 12,336.0 | 422.2 | 451.5 | 268.7 | (276.0) | (15.8) |
| 4. AAL MVA Funded Ratio (2. / 1.) | 22.2% | 68.0% | 56.5% | 84.4% | 181.2% | 106.9% |
| | | | | | | |
| 5. Actuarial Value of Assets (AVA) | 3,577.6 | 878.9 | 576.5 | 1,523.4 | 616.8 | 239.2 |
| 6. AAL AVA Funded Status (Unfunded Liability) (1. - 5.) | 12,280.4 | 442.1 | 462.5 | 197.6 | (276.8) | (9.2) |
| 7. AAL AVA Funded Ratio (5. / 1.) | 22.6% | 66.5% | 55.5% | 88.5% | 181.4% | 104.0% |
| | | | | | | |
| **Economic Assumptions** | | | | | | |
| Discount Rate | 5.25% | 6.25% | 5.25% | 6.50% | 6.50% | 6.50% |

- June 30, 2023, data was projected by Wilshire using data from the report and additional metrics provided by the actuary.

**Wilshire**

# Capital Market Assumptions – KPPA Bucketing

Wilshire's Capital Market Assumptions as of **June 30, 2023**

Wilshire's asset class return, risk and correlation assumptions are developed on multi-year forward looking expected rates of return and historical risk and correlation, adjusted to incorporate recent trends

Public market return expectations represent a passive investment in the asset class (beta). They do not reflect value added from active management (alpha).

| Asset Classes | Expected Return 10 Years | Expected Return 30 Years | Risk | Cash Yield | Factor Exposure Growth | Factor Exposure Inflation | Liquidity Market Level | Liquidity Stressed Metric |
|---|---|---|---|---|---|---|---|---|
| Public Equity | 6.15 | 7.15 | 17.10 | 2.05 | 8.00 | -1.30 | 90 | 0 |
| Private Equity | 9.15 | 9.95 | 27.80 | 0.00 | 13.35 | -3.80 | 0 | 0 |
| Core Fixed Income | 4.85 | 4.80 | 4.70 | 4.95 | -0.95 | -2.50 | 100 | 85 |
| Specialty Credit | 7.40 | 7.40 | 9.05 | 9.70 | 3.50 | -0.50 | 30 | 0 |
| Cash | 3.85 | 3.55 | 0.75 | 3.85 | 0.00 | 0.00 | 100 | 100 |
| Real Estate | 6.00 | 6.95 | 13.95 | 2.30 | 3.70 | 1.00 | 0 | 0 |
| Real Return | 6.85 | 7.35 | 10.65 | 3.60 | 2.15 | 5.80 | 0 | 0 |

## Wilshire

# Capital Market Assumptions – Wilshire Bucketing

Wilshire's Capital Market Assumptions as of **June 30, 2023**

Wilshire's asset class return, risk and correlation assumptions are developed on multi-year forward looking expected rates of return and historical risk and correlation, adjusted to incorporate recent trends

Public market return expectations represent a passive investment in the asset class (beta). They do not reflect value added from active management (alpha).
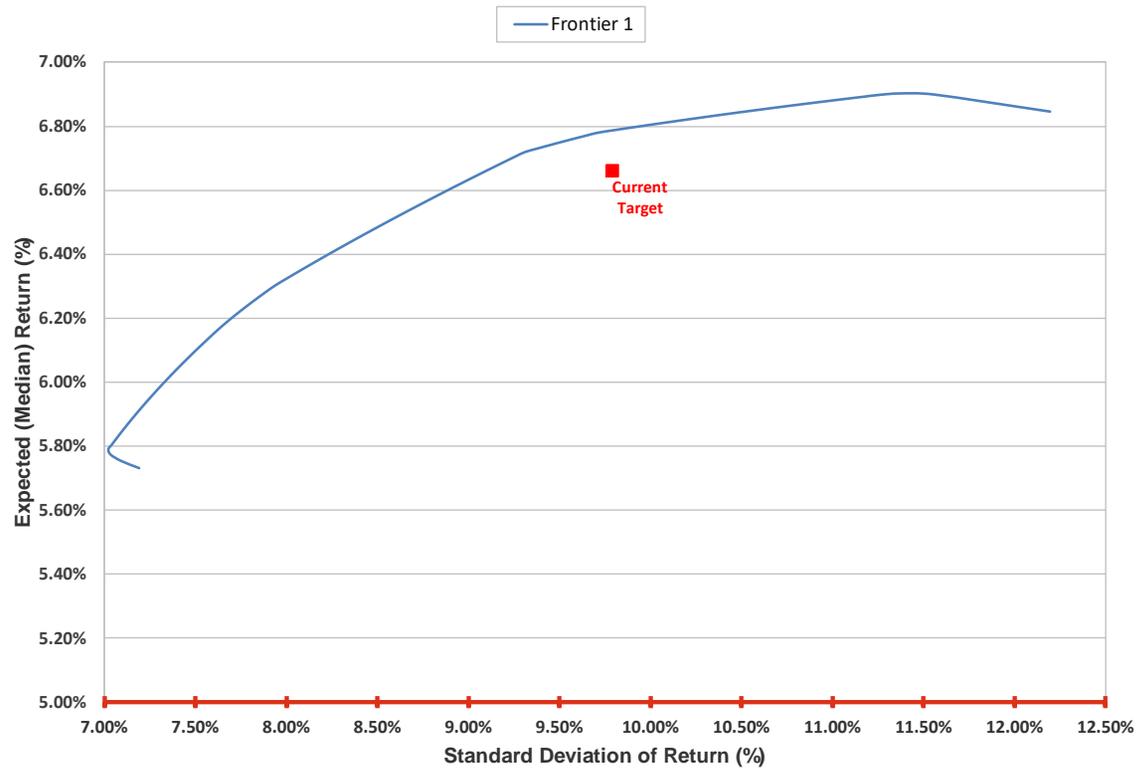
| Asset Classes | Expected Return 10 Years | Expected Return 30 Years | Risk | Cash Yield | Factor Exposure Growth | Factor Exposure Inflation | Liquidity Market Level | Liquidity Stressed Metric |
|---|---|---|---|---|---|---|---|---|
| Public Equity | 6.15 | 7.15 | 17.10 | 2.05 | 8.00 | -1.30 | 90 | 0 |
| Private Equity | 9.15 | 9.95 | 27.80 | 0.00 | 13.35 | -3.80 | 0 | 0 |
| Specialty Credit | 7.40 | 7.40 | 9.05 | 9.70 | 3.50 | -0.50 | 30 | 0 |
| Core Fixed Income | 4.85 | 4.80 | 4.70 | 4.95 | -0.95 | -2.50 | 100 | 85 |
| Cash | 3.85 | 3.55 | 0.75 | 3.85 | 0.00 | 0.00 | 100 | 100 |
| Real Estate | 6.00 | 6.95 | 13.95 | 2.30 | 3.70 | 1.00 | 0 | 0 |
| Real Return | 6.85 | 7.35 | 10.65 | 3.60 | 2.15 | 5.80 | 0 | 0 |

- Growth – Assets with significant growth factor exposure, high expected returns and high risk
- Defensive Growth – Assets with positive growth factor exposure with moderate risk
- Defensive/Rate Sensitive – Assets whose value/return is sensitive to changes in interest rates
- Real Assets/Inflation Sensitive – Assets whose value/return is sensitive to inflation

**KERS NON-HAZARDOUS RETIREMENT PLAN**

**SPRS RETIREMENT PLAN**

**5.25% DISCOUNT RATE**

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**Wilshire**

# Asset Only Efficient Frontier

## Given the asset classes and constraints, opportunities to enhance portfolio efficiency do exist

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**Wilshire**

# Portfolios Modeled – KPPA Bucketing

| Asset Class | Current Target | Optimization Constraints | Lower Risk X | Lower Risk Y | Lower Risk Z |
|---|---|---|---|---|---|
| Public Equity | 32.50% | 30% - 80% | 30.00% | 30.00% | 30.00% |
| Private Equity | 7.00% | 0% - 7% [1] | 6.00% | 3.00% | 0.00% |
| *Total Equity* | **39.50%** | | **36.00%** | **33.00%** | **30.00%** |
| | | | | | |
| Core Fixed Income | 20.50% | 10% - 50% | 27.00% | 30.00% | 40.00% |
| Specialty Credit | 15.00% | 0% - 20% [1] | 20.00% | 20.00% | 15.00% |
| Cash | 5.00% | 2% - 5% | 2.00% | 2.00% | 5.00% |
| *Total Fixed Income* | **40.50%** | | **49.00%** | **52.00%** | **60.00%** |
| | | | | | |
| Real Estate | 10.00% | 5% - 10% [1] | 5.00% | 5.00% | 5.00% |
| Real Return | 10.00% | 5% - 10% [1] | 10.00% | 10.00% | 5.00% |
| *Total Inflation Protected* | **20.00%** | | **15.00%** | **15.00%** | **10.00%** |
| | | | | | |
| *Total Assets* | **100.0%** | | **100.0%** | **100.0%** | **100.0%** |
| | | | | | |
| *Total Illiquid Assets* [1] | **29.50%** | 0% - 35% | **26.00%** | **23.00%** | **15.00%** |
| | | | | | |
| *Expected Return - 10 Years (%)* | **6.66** | | **6.66** | **6.48** | **6.04** |
| *Expected Return - 30 Years (%)* | **7.16** | | **7.08** | **6.88** | **6.38** |
| *Standard Deviation of Return (%)* | **9.79** | | **9.10** | **8.50** | **7.40** |
| | | | | | |
| *+/(-) in Expected Return - 10 Years (bps)* | | | **0** | **(18)** | **(62)** |
| *+/(-) in Expected Return - 30 Years (bps)* | | | **(8)** | **(28)** | **(78)** |
| *+/(-) in SD of Return (bps)* | | | **(69)** | **(129)** | **(239)** |
| | | | | | |
| *Sharpe Ratio* | **0.29** | | **0.31** | **0.31** | **0.30** |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# Portfolios Modeled – KPPA Bucketing

| Asset Class | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
|---|---|---|---|---|
| Total Equity | 39.50% | 36.00% | 33.00% | 30.00% |
| Total Fixed Income | 40.50% | 49.00% | 52.00% | 60.00% |
| Total Inflation Protected | 20.00% | 15.00% | 15.00% | 10.00% |
| Total Assets | 100.0% | 100.0% | 100.0% | 100.0% |
| Expected Return - 10 Years (%) | 6.66 | 6.66 | 6.48 | 6.04 |
| Expected Return - 30 Years (%) | 7.16 | 7.08 | 6.88 | 6.38 |
| Standard Deviation of Return (%) | 9.79 | 9.10 | 8.50 | 7.40 |
| Contribution to Asset Volatility (%): | | | | |
| Equity | 69.9 | 67.7 | 64.0 | 64.7 |
| Fixed Income | 12.9 | 19.4 | 22.1 | 24.6 |
| Inflation Protected | 17.2 | 12.9 | 13.9 | 10.7 |
| Cash Yield | 3.9 | 4.4 | 4.6 | 4.5 |
| Growth Factor | 4.4 | 4.0 | 3.6 | 2.8 |
| Inflation Factor | -0.6 | -0.8 | -0.7 | -1.1 |
| Liquidity | | | | |
| Market | 59.3 | 62.0 | 65.0 | 76.5 |
| Stressed | 22.4 | 25.0 | 27.5 | 39.0 |

**Wilshire**

# Portfolios Modeled – Wilshire Bucketing

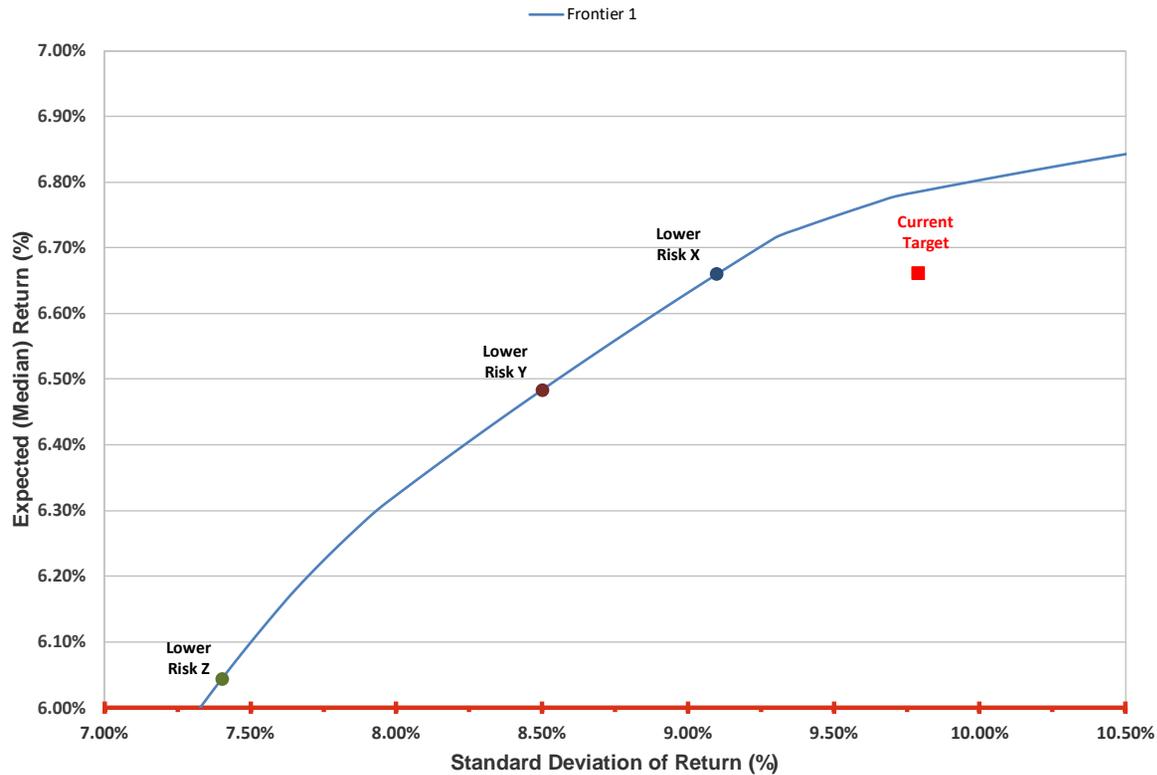| Asset Class | Current Target | Optimization Constraints | Lower Risk X | Lower Risk Y | Lower Risk Z |
|---|---|---|---|---|---|
| Public Equity | 32.50% | 30% - 80% | 30.00% | 30.00% | 30.00% |
| Private Equity | 7.00% | 0% - 7% [1] | 6.00% | 3.00% | 0.00% |
| **Total Growth Assets** | **39.50%** | | **36.00%** | **33.00%** | **30.00%** |
| Specialty Credit | 15.00% | 0% - 20% [1] | 20.00% | 20.00% | 15.00% |
| **Total Defensive Growth Assets** | **15.00%** | | **20.00%** | **20.00%** | **15.00%** |
| Core Fixed Income | 20.50% | 10% - 50% | 27.00% | 30.00% | 40.00% |
| Cash | 5.00% | 2% - 5% | 2.00% | 2.00% | 5.00% |
| **Total Defensive / Rate Sensitive Assets** | **25.50%** | | **29.00%** | **32.00%** | **45.00%** |
| Real Estate | 10.00% | 5% - 10% [1] | 5.00% | 5.00% | 5.00% |
| Real Return | 10.00% | 5% - 10% [1] | 10.00% | 10.00% | 5.00% |
| **Total RA / Inflation Sensitive Assets** | **20.00%** | | **15.00%** | **15.00%** | **10.00%** |
| **Total Assets** | **100.0%** | | **100.0%** | **100.0%** | **100.0%** |
| **Total Illiquid Assets [1]** | **29.50%** | 0% - 35% | **26.00%** | **23.00%** | **15.00%** |
| **Expected Return - 10 Years (%)** | **6.66** | | **6.66** | **6.48** | **6.04** |
| **Expected Return - 30 Years (%)** | **7.16** | | **7.08** | **6.88** | **6.38** |
| **Standard Deviation of Return (%)** | **9.79** | | **9.10** | **8.50** | **7.40** |
| **+/(-) in Expected Return - 10 Years (bps)** | | | **0** | **(18)** | **(62)** |
| **+/(-) in Expected Return - 30 Years (bps)** | | | **(8)** | **(28)** | **(78)** |
| **+/(-) in SD of Return (bps)** | | | **(69)** | **(129)** | **(239)** |
| **Sharpe Ratio** | **0.29** | | **0.31** | **0.31** | **0.30** |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# Portfolios Modeled – Wilshire Bucketing

| Asset Class | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
|---|---|---|---|---|
| Total Growth Assets | 39.50% | 36.00% | 33.00% | 30.00% |
| Total Defensive Growth Assets | 15.00% | 20.00% | 20.00% | 15.00% |
| Total Defensive / Rate Sensitive Assets | 25.50% | 29.00% | 32.00% | 45.00% |
| Total RA / Inflation Sensitive Assets | 20.00% | 15.00% | 15.00% | 10.00% |
| Total Assets | 100.0% | 100.0% | 100.0% | 100.0% |
| Total Illiquid Assets [1] | 29.50% | 26.00% | 23.00% | 15.00% |
| Expected Return - 10 Years (%) | 6.66 | 6.66 | 6.48 | 6.04 |
| Expected Return - 30 Years (%) | 7.16 | 7.08 | 6.88 | 6.38 |
| Standard Deviation of Return (%) | 9.79 | 9.10 | 8.50 | 7.40 |
| Contribution to Asset Volatility (%): | | | | |
| Growth | 69.9 | 67.7 | 64.0 | 64.7 |
| Defensive Growth | 9.6 | 14.2 | 15.7 | 13.2 |
| Defensive/Rate Sensitive | 3.3 | 5.2 | 6.4 | 11.4 |
| RA/Inflation Sensitve | 17.2 | 12.9 | 13.9 | 10.7 |
| Cash Yield | 3.9 | 4.4 | 4.6 | 4.5 |
| Growth Factor | 4.4 | 4.0 | 3.6 | 2.8 |
| Inflation Factor | -0.6 | -0.8 | -0.7 | -1.1 |
| Liquidity | | | | |
| Market | 59.3 | 62.0 | 65.0 | 76.5 |
| Stressed | 22.4 | 25.0 | 27.5 | 39.0 |

**Wilshire**

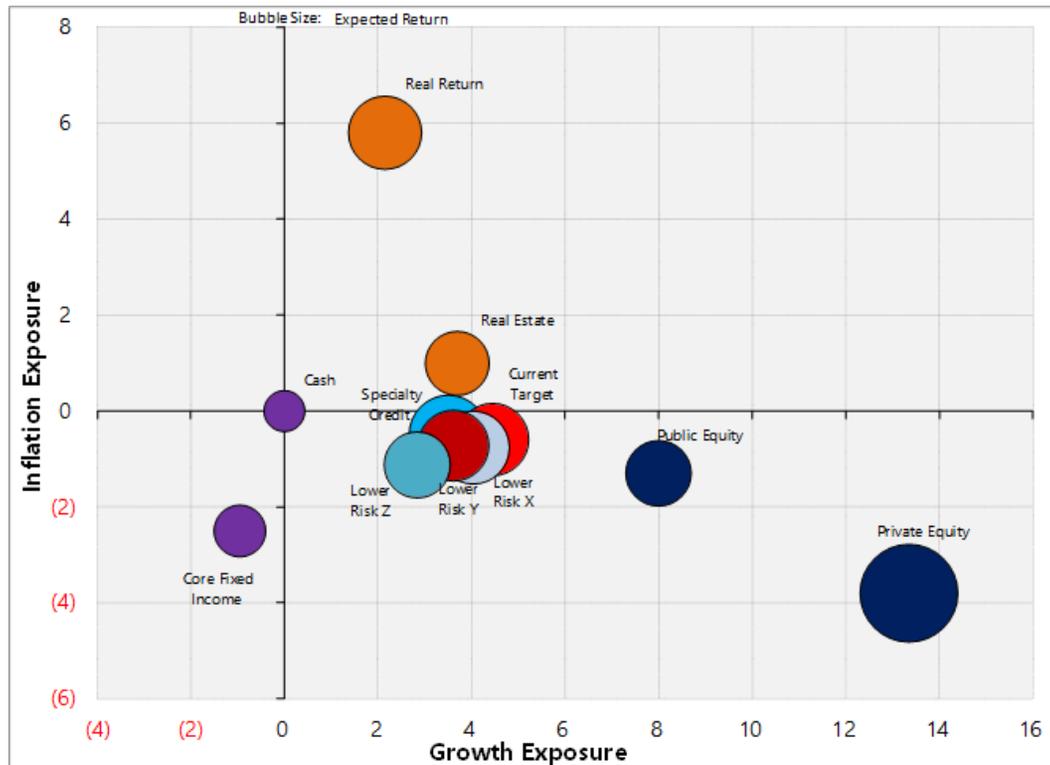# Asset Only Efficient Frontier

## Given the asset classes and constraints, opportunities to enhance portfolio efficiency do exist
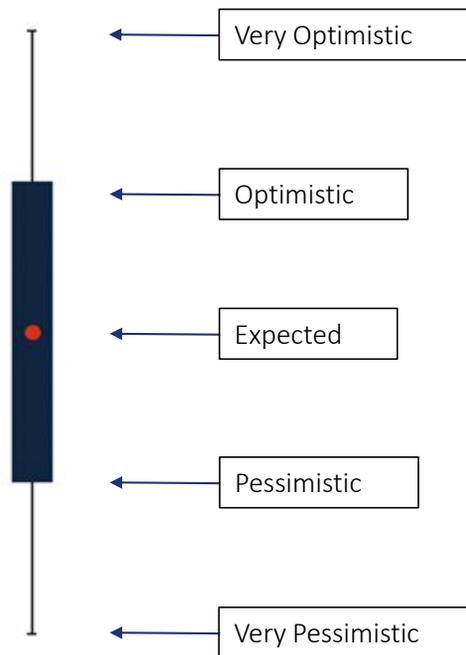
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## Wilshire

# Economic Factor Exposure

Concentrated factor tilts can represent portfolio vulnerability (e.g., reliance on growth markets)

To the extent possible, a portfolio with factor neutrality is desirable for weathering unexpected future market environments

**Wilshire**

# Box and Whisker Graphs

Very Optimistic

Optimistic

Expected

Pessimistic

Very Pessimistic

In each year of the simulation, there are 5,000 independent economic trial results.

**Expected:** 50% of the potential scenarios result in higher than this value and 50% results in lower

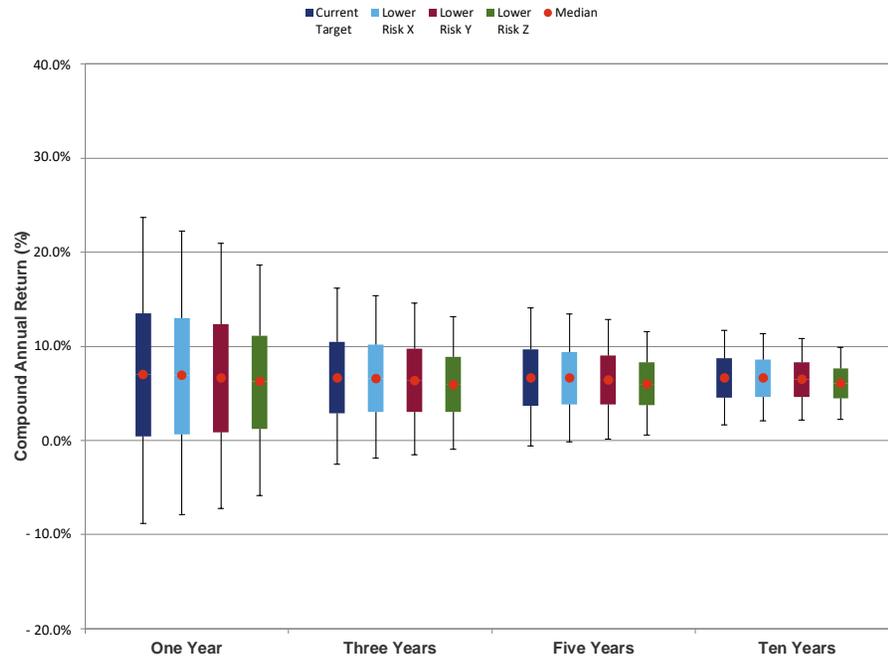**Very optimistic:** Only 5% of the scenarios result in higher than this value and 95% result in lower

**Optimistic:** Only 25% of the scenarios result in higher than this value and 75% result in lower

**Pessimistic:** 75% of the scenarios results in higher than this value and 25% result in lower

**Very pessimistic:** 95% of the scenarios result in higher than this value and 5% result in lower

**Wilshire**

# Distribution of Returns*



| (%) | One Year | | | | Three Years | | | | Five Years | | | | Ten Years | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Optimistic | 23.66 | 22.23 | 20.98 | 18.61 | 16.15 | 15.39 | 14.61 | 13.15 | 14.09 | 13.43 | 12.84 | 11.59 | 11.69 | 11.31 | 10.86 | 9.87 |
| Optimistic | 13.53 | 12.98 | 12.38 | 11.16 | 10.49 | 10.18 | 9.74 | 8.86 | 9.68 | 9.42 | 9.03 | 8.28 | 8.77 | 8.61 | 8.30 | 7.63 |
| **Median (Expected)** | **6.99** | **6.90** | **6.67** | **6.26** | **6.68** | **6.56** | **6.33** | **5.91** | **6.67** | **6.63** | **6.43** | **6.02** | **6.66** | **6.66** | **6.48** | **6.04** |
| Pessimistic | 0.45 | 0.67 | 0.83 | 1.20 | 2.87 | 3.00 | 3.03 | 3.06 | 3.68 | 3.82 | 3.81 | 3.75 | 4.52 | 4.65 | 4.62 | 4.44 |
| Very Pessimistic | -8.85 | -7.89 | -7.21 | -5.87 | -2.50 | -1.92 | -1.52 | -0.97 | -0.55 | -0.13 | 0.16 | 0.60 | 1.66 | 2.06 | 2.15 | 2.25 |

*For periods longer than one year, returns are compound annual.

**ALL OTHER PLANS:**

- KERS NON-HAZ INS
- KERS HAZ RET/INS
- SPRS INS

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**Wilshire**

# Asset Only Efficient Frontier

## Given the asset classes and constraints, opportunities to enhance portfolio efficiency do exist

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**Wilshire**
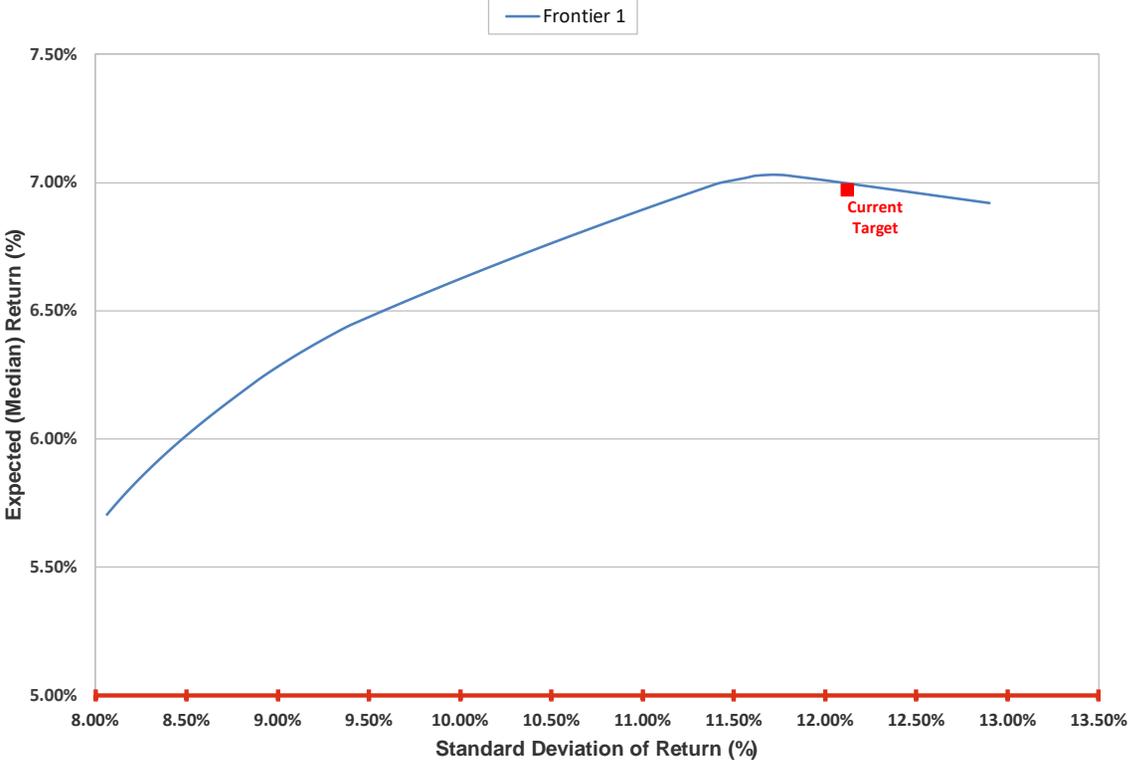
# Portfolios Modeled – KPPA Bucketing

| Asset Class | Current Target | Optimization Constraints | Lower Risk A | Lower Risk B |
|---|---|---|---|---|
| Public Equity | 43.50% | 40% - 80% | 40.00% | 40.00% |
| Private Equity | 10.00% | 0% - 10% [1] | 8.00% | 7.50% |
| **Total Equity** | **53.50%** | | **48.00%** | **47.50%** |
| | | | | |
| Core Fixed Income | 10.00% | 10% - 50% | 10.00% | 15.50% |
| Specialty Credit | 15.00% | 0% - 20% [1] | 25.00% | 20.00% |
| Cash | 1.50% | 2% - 5% | 2.00% | 2.00% |
| **Total Fixed Income** | **26.50%** | | **37.00%** | **37.50%** |
| | | | | |
| Real Estate | 10.00% | 5% - 10% [1] | 7.00% | 5.00% |
| Real Return | 10.00% | 0% - 10% [1] | 8.00% | 10.00% |
| **Total Inflation Protected** | **20.00%** | | **15.00%** | **15.00%** |
| | | | | |
| **Total Assets** | **100.0%** | | **100.0%** | **100.0%** |
| | | | | |
| **Total Illiquid Assets [1]** | **32.50%** | 0% - 35% | **31.50%** | **27.50%** |
| | | | | |
| **Expected Return - 10 Years (%)** | **6.97** | | **6.99** | **6.86** |
| **Expected Return - 30 Years (%)** | **7.62** | | **7.55** | **7.40** |
| **Standard Deviation of Return (%)** | **12.12** | | **11.29** | **10.88** |
| | | | | |
| **+/(-) in Expected Return - 10 Years (bps)** | | | **2** | **(11)** |
| **+/(-) in Expected Return - 30 Years (bps)** | | | **(7)** | **(22)** |
| **+/(-) in SD of Return (bps)** | | | **(83)** | **(124)** |
| | | | | |
| **Sharpe Ratio** | **0.26** | | **0.28** | **0.28** |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# Portfolios Modeled – KPPA Bucketing

| Asset Class | Current Target | Lower Risk A | Lower Risk B |
|---|---|---|---|
| Total Equity | 53.50% | 48.00% | 47.50% |
| Total Fixed Income | 26.50% | 37.00% | 37.50% |
| Total Inflation Protected | 20.00% | 15.00% | 15.00% |
| Total Assets | 100.0% | 100.0% | 100.0% |
| Expected Return - 10 Years (%) | 6.97 | 6.99 | 6.86 |
| Expected Return - 30 Years (%) | 7.62 | 7.55 | 7.40 |
| Standard Deviation of Return (%) | 12.12 | 11.29 | 10.88 |
| Contribution to Asset Volatility (%): | | | |
| Equity | 78.1 | 73.9 | 76.0 |
| Fixed Income | 8.5 | 15.4 | 13.5 |
| Inflation Protected | 13.4 | 10.7 | 10.5 |
| Cash Yield | 3.5 | 4.3 | 4.1 |
| Growth Factor | 5.8 | 5.5 | 5.2 |
| Inflation Factor | -0.6 | -0.7 | -0.7 |
| Liquidity | | | |
| Market | 55.2 | 55.5 | 59.5 |
| Stressed | 10.0 | 10.5 | 15.2 |

**Wilshire**

# Portfolios Modeled – Wilshire Bucketing

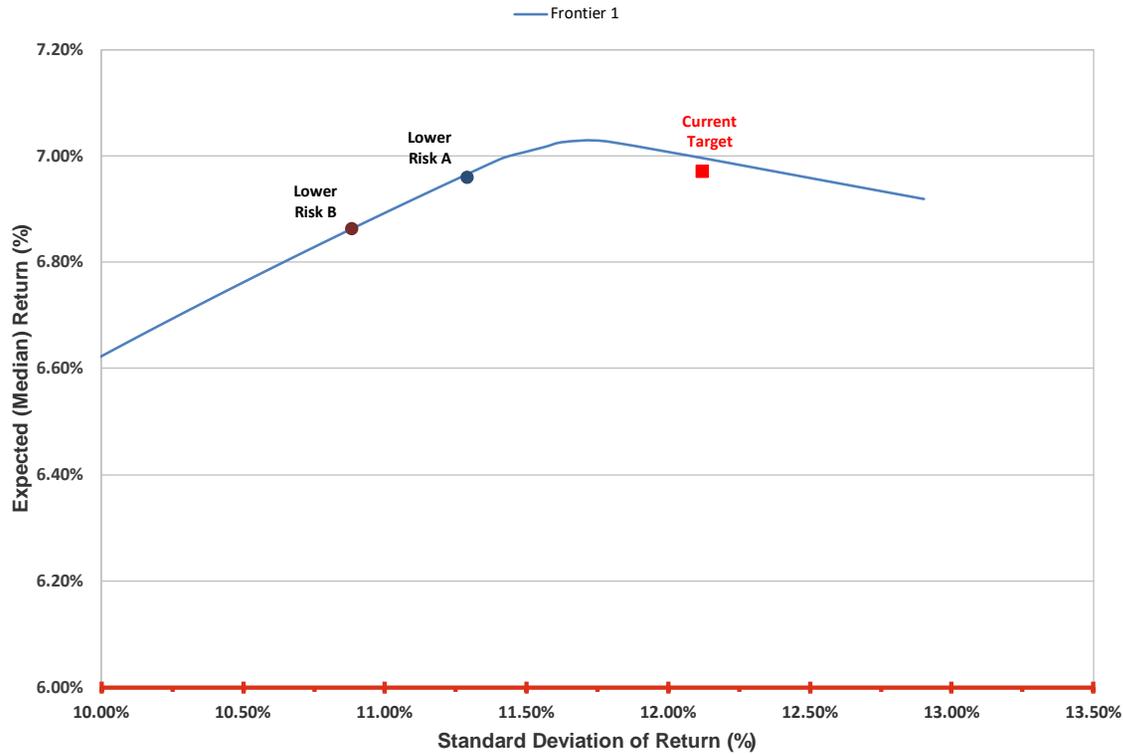| Asset Class | Current Target | Optimization Constraints | Lower Risk A | Lower Risk B |
|---|---|---|---|---|
| Public Equity | 43.50% | 40% - 80% | 40.00% | 40.00% |
| Private Equity | 10.00% | 0% - 10% [1] | 8.00% | 7.50% |
| **Total Growth Assets** | **53.50%** | | **48.00%** | **47.50%** |
| Specialty Credit | 15.00% | 0% - 20% [1] | 25.00% | 20.00% |
| **Total Defensive Growth Assets** | **15.00%** | | **25.00%** | **20.00%** |
| Core Fixed Income | 10.00% | 10% - 50% | 10.00% | 15.50% |
| Cash | 1.50% | 2% - 5% | 2.00% | 2.00% |
| **Total Defensive / Rate Sensitive Assets** | **11.50%** | | **12.00%** | **17.50%** |
| Real Estate | 10.00% | 5% - 10% [1] | 7.00% | 5.00% |
| Real Return | 10.00% | 0% - 10% [1] | 8.00% | 10.00% |
| **Total RA / Inflation Sensitive Assets** | **20.00%** | | **15.00%** | **15.00%** |
| **Total Assets** | **100.0%** | | **100.0%** | **100.0%** |
| **Total Illiquid Assets [1]** | **32.50%** | 0% - 35% | **31.50%** | **27.50%** |
| **Expected Return - 10 Years (%)** | **6.97** | | **6.99** | **6.86** |
| **Expected Return - 30 Years (%)** | **7.62** | | **7.55** | **7.40** |
| **Standard Deviation of Return (%)** | **12.12** | | **11.29** | **10.88** |
| **+/(-) in Expected Return - 10 Years (bps)** | | | **2** | **(11)** |
| **+/(-) in Expected Return - 30 Years (bps)** | | | **(7)** | **(22)** |
| **+/(-) in SD of Return (bps)** | | | **(83)** | **(124)** |
| **Sharpe Ratio** | **0.26** | | **0.28** | **0.28** |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# Portfolios Modeled – Wilshire Bucketing

| Asset Class | Current Target | Lower Risk A | Lower Risk B |
|---|---|---|---|
| Total Growth Assets | 53.50% | 48.00% | 47.50% |
| Total Defensive Growth Assets | 15.00% | 25.00% | 20.00% |
| Total Defensive / Rate Sensitive Assets | 11.50% | 12.00% | 17.50% |
| Total RA / Inflation Sensitive Assets | 20.00% | 15.00% | 15.00% |
| Total Assets | 100.0% | 100.0% | 100.0% |
| Total Illiquid Assets [1] | 32.50% | 31.50% | 27.50% |
| Expected Return - 10 Years (%) | 6.97 | 6.99 | 6.86 |
| Expected Return - 30 Years (%) | 7.62 | 7.55 | 7.40 |
| Standard Deviation of Return (%) | 12.12 | 11.29 | 10.88 |
| Contribution to Asset Volatility (%): | | | |
| Growth | 78.1 | 73.9 | 76.0 |
| Defensive Growth | 7.4 | 14.2 | 11.5 |
| Defensive/Rate Sensitive | 1.1 | 1.2 | 2.0 |
| RA/Inflation Sensitve | 13.4 | 10.7 | 10.5 |
| Cash Yield | 3.5 | 4.3 | 4.1 |
| Growth Factor | 5.8 | 5.5 | 5.2 |
| Inflation Factor | -0.6 | -0.7 | -0.7 |
| Liquidity | | | |
| Market | 55.2 | 55.5 | 59.5 |
| Stressed | 10.0 | 10.5 | 15.2 |

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**Wilshire**

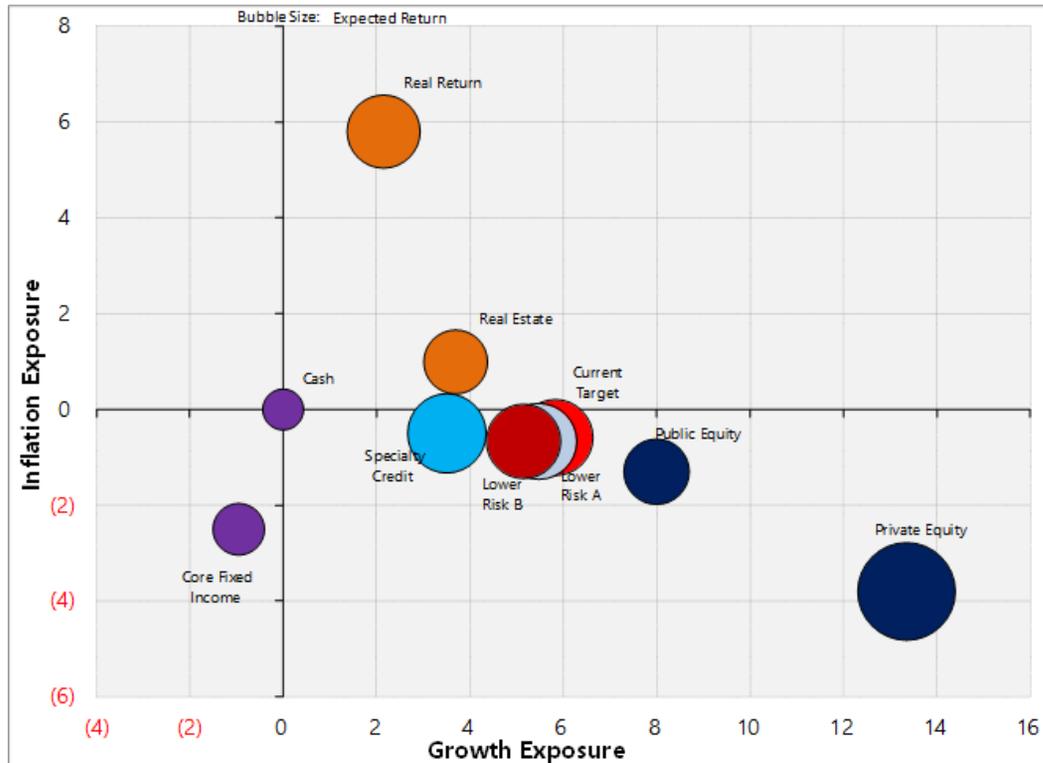# Asset Only Efficient Frontier

## Given the asset classes and constraints, opportunities to enhance portfolio efficiency do exist
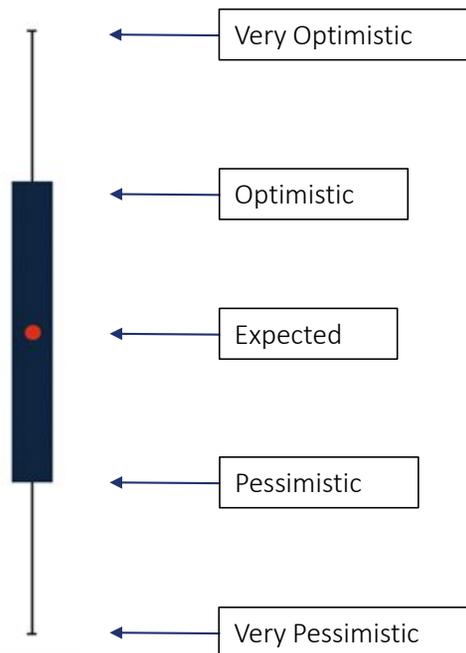
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**Wilshire**

# Economic Factor Exposure

Concentrated factor tilts can represent portfolio vulnerability (e.g., reliance on growth markets)

To the extent possible, a portfolio with factor neutrality is desirable for weathering unexpected future market environments

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**Wilshire**

# Box and Whisker Graphs

Very Optimistic

Optimistic

Expected

Pessimistic

Very Pessimistic

**In each year of the simulation, there are 5,000 independent economic trial results.**

**Expected:** 50% of the potential scenarios result in higher than this value and 50% results in lower

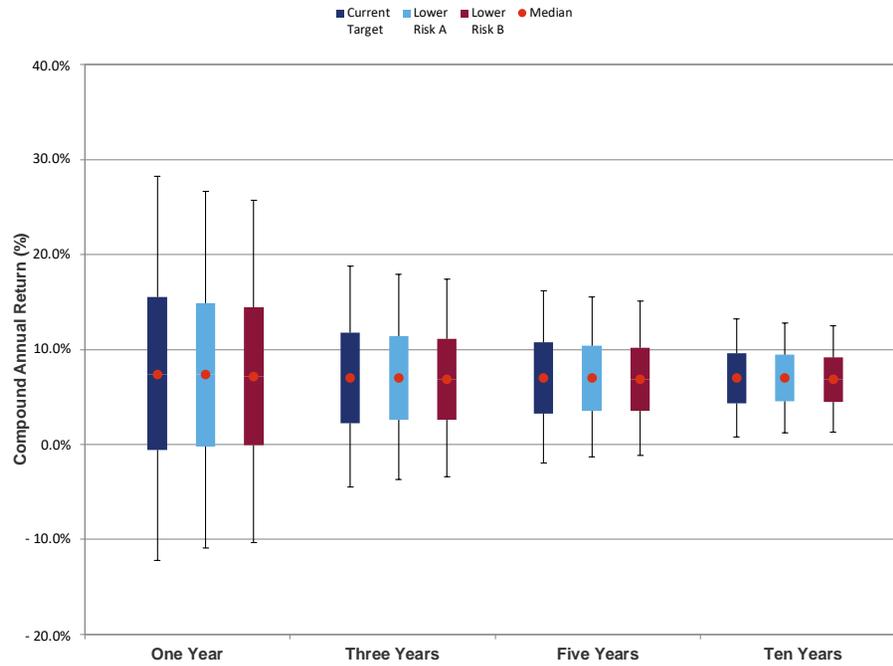**Very optimistic:** Only 5% of the scenarios result in higher than this value and 95% result in lower

**Optimistic:** Only 25% of the scenarios result in higher than this value and 75% result in lower

**Pessimistic:** 75% of the scenarios results in higher than this value and 25% result in lower

**Very pessimistic:** 95% of the scenarios result in higher than this value and 5% result in lower

**Wilshire**

# Distribution of Returns*



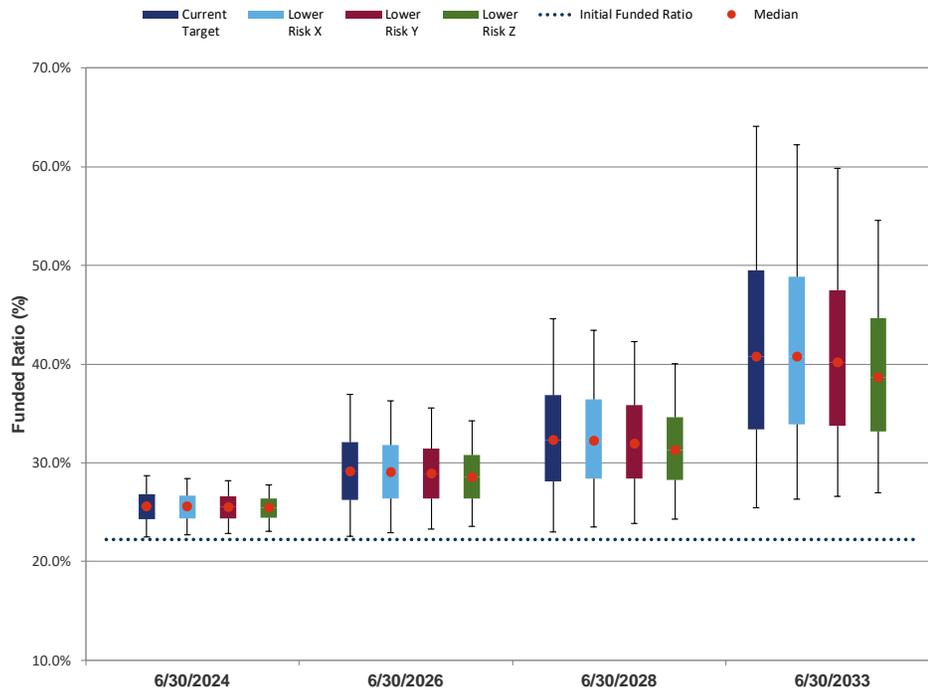| (%) | One Year | | | Three Years | | | Five Years | | | Ten Years | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 28.23 | 26.65 | 25.73 | 18.79 | 17.92 | 17.39 | 16.21 | 15.55 | 15.11 | 13.23 | 12.78 | 12.46 |
| Optimistic | 15.51 | 14.85 | 14.44 | 11.80 | 11.42 | 11.11 | 10.74 | 10.44 | 10.21 | 9.59 | 9.43 | 9.19 |
| **Median (Expected)** | **7.40** | **7.34** | **7.13** | **7.02** | **7.01** | **6.83** | **7.01** | **6.97** | **6.85** | **6.97** | **6.99** | **6.86** |
| Pessimistic | -0.60 | -0.24 | -0.09 | 2.24 | 2.57 | 2.62 | 3.28 | 3.51 | 3.52 | 4.34 | 4.53 | 4.48 |
| Very Pessimistic | -12.19 | -10.90 | -10.33 | -4.49 | -3.68 | -3.42 | -1.99 | -1.31 | -1.17 | 0.78 | 1.26 | 1.30 |

*For periods longer than one year, returns are compound annual.

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**Wilshire**

# Asset Liability Projections

# KERS NON-HAZARDOUS RETIREMENT PLAN

Wilshire

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**Wilshire**

# AAL MVA Funded Ratio

Legend: Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | ····· Initial Funded Ratio | ● Median



Shortfall Risk:

The potential for the current policy to have a lower median funded ratio than the alternative policies.

Drawdown Risk:

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 22.2%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -0.90%.*

| (%) | 6/30/2024 | | | | 6/30/2026 | | | | 6/30/2028 | | | | 6/30/2033 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Optimistic | 28.71 | 28.44 | 28.21 | 27.77 | 36.93 | 36.25 | 35.57 | 34.28 | 44.58 | 43.46 | 42.30 | 40.07 | 64.14 | 62.24 | 59.87 | 54.60 |
| Optimistic | 26.81 | 26.71 | 26.59 | 26.36 | 32.08 | 31.81 | 31.47 | 30.78 | 36.87 | 36.42 | 35.83 | 34.65 | 49.53 | 48.87 | 47.48 | 44.66 |
| Median (Expected) | 25.57 | 25.55 | 25.51 | 25.43 | 29.11 | 29.03 | 28.88 | 28.56 | 32.28 | 32.22 | 31.95 | 31.33 | 40.78 | 40.78 | 40.15 | 38.64 |
| Pessimistic | 24.32 | 24.36 | 24.39 | 24.46 | 26.27 | 26.37 | 26.37 | 26.39 | 28.15 | 28.38 | 28.39 | 28.28 | 33.42 | 33.87 | 33.77 | 33.20 |
| Very Pessimistic | 22.50 | 22.69 | 22.83 | 23.09 | 22.53 | 22.91 | 23.24 | 23.58 | 23.00 | 23.51 | 23.84 | 24.26 | 25.46 | 26.30 | 26.58 | 26.95 |

**Wilshire**

# AAL AVA Funded Ratio

Legend: Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | ····· Initial Funded Ratio | ● Median



**Shortfall Risk:**

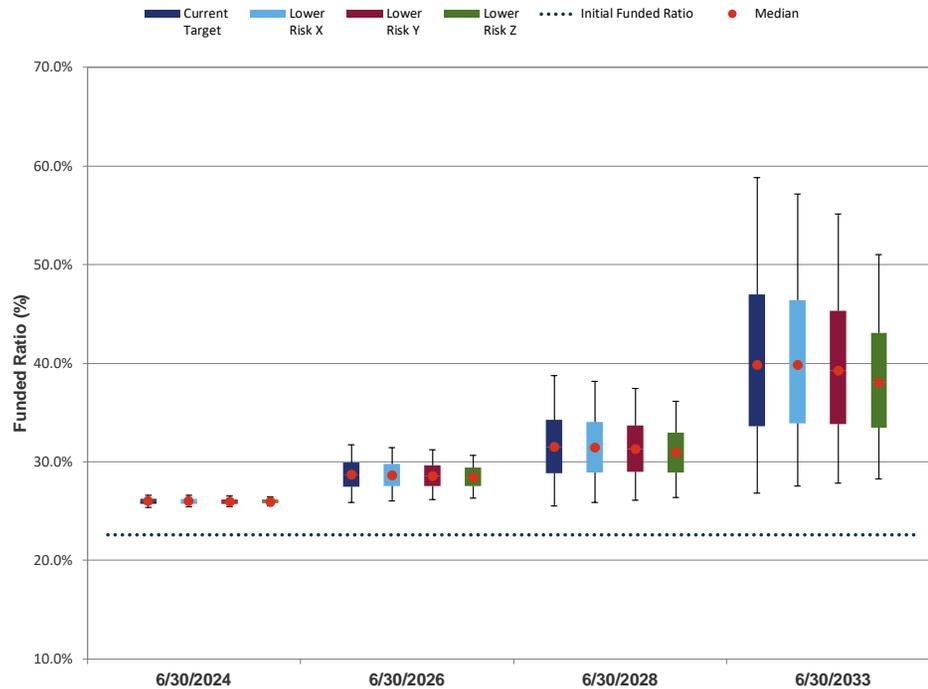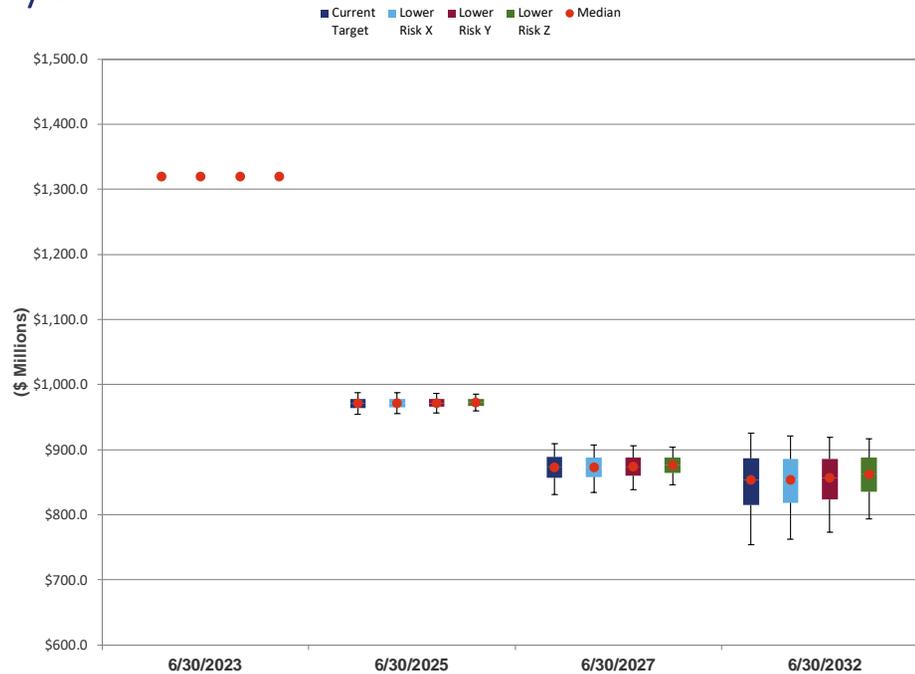The potential for the current policy to have a lower median funded ratio than the alternative policies.

**Drawdown Risk:**

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 22.6%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -0.90%.*

| (%) | 6/30/2024 | | | | 6/30/2026 | | | | 6/30/2028 | | | | 6/30/2033 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Optimistic | 26.62 | 26.57 | 26.52 | 26.43 | 31.70 | 31.45 | 31.19 | 30.67 | 38.71 | 38.14 | 37.44 | 36.17 | 58.85 | 57.13 | 55.17 | 51.03 |
| Optimistic | 26.24 | 26.22 | 26.20 | 26.15 | 29.90 | 29.80 | 29.66 | 29.38 | 34.27 | 34.02 | 33.65 | 32.97 | 46.98 | 46.42 | 45.31 | 43.08 |
| Median (Expected) | 25.99 | 25.99 | 25.98 | 25.97 | 28.66 | 28.62 | 28.57 | 28.43 | 31.54 | 31.47 | 31.28 | 30.92 | 39.79 | 39.80 | 39.27 | 38.03 |
| Pessimistic | 25.74 | 25.75 | 25.76 | 25.77 | 27.48 | 27.51 | 27.52 | 27.53 | 28.87 | 28.94 | 28.98 | 28.91 | 33.61 | 33.92 | 33.82 | 33.46 |
| Very Pessimistic | 25.38 | 25.42 | 25.44 | 25.50 | 25.86 | 26.04 | 26.15 | 26.30 | 25.53 | 25.86 | 26.06 | 26.35 | 26.80 | 27.51 | 27.86 | 28.23 |

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**Wilshire**

# Employer Contributions

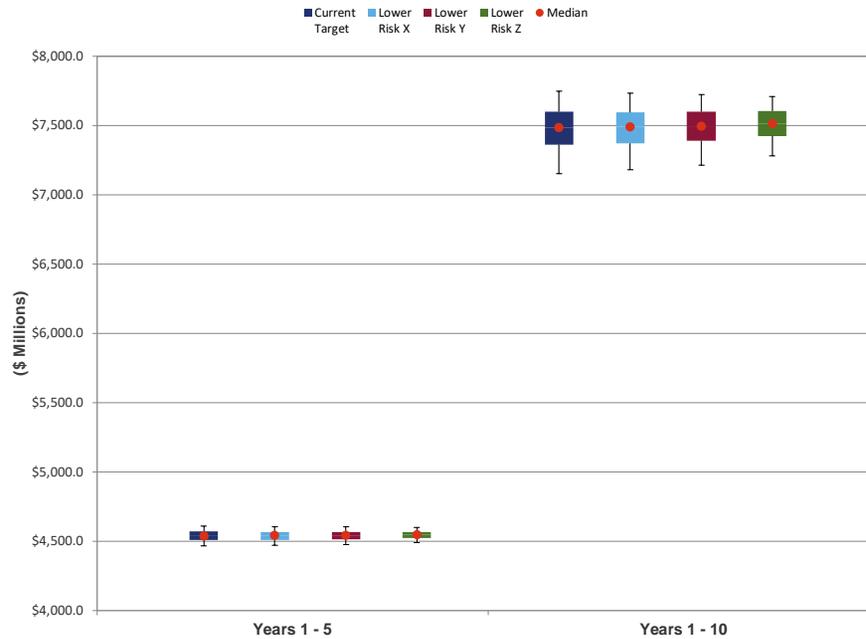Legend: ■ Current Target  ■ Lower Risk X  ■ Lower Risk Y  ■ Lower Risk Z  ● Median



**Shortfall Risk:**

The potential for the current policy to have higher median contributions than the alternative policies.

**Drawdown Risk:**

The potential for the current policy to have higher "very pessimistic" contributions than the alternative policies.

| ($ Millions) | 6/30/2023 | | | | 6/30/2025 | | | | 6/30/2027 | | | | 6/30/2032 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 1,319.8 | 1,319.8 | 1,319.8 | 1,319.8 | 988.0 | 987.1 | 986.2 | 985.0 | 908.9 | 907.1 | 906.0 | 903.8 | 924.9 | 920.8 | 918.6 | 916.5 |
| Pessimistic | 1,319.8 | 1,319.8 | 1,319.8 | 1,319.8 | 978.4 | 978.1 | 978.0 | 977.8 | 888.5 | 888.2 | 887.9 | 888.1 | 886.7 | 885.4 | 885.4 | 887.5 |
| Median (Expected) | 1,319.8 | 1,319.8 | 1,319.8 | 1,319.8 | 971.4 | 971.6 | 971.9 | 972.5 | 872.9 | 873.3 | 874.3 | 876.3 | 853.2 | 853.4 | 856.3 | 862.5 |
| Optimistic | 1,319.8 | 1,319.8 | 1,319.8 | 1,319.8 | 964.3 | 964.9 | 965.7 | 967.2 | 856.7 | 858.0 | 860.2 | 864.0 | 814.8 | 817.9 | 823.8 | 835.7 |
| Very Optimistic | 1,319.8 | 1,319.8 | 1,319.8 | 1,319.8 | 954.2 | 955.5 | 956.9 | 959.6 | 831.2 | 834.8 | 838.8 | 845.9 | 754.0 | 762.5 | 772.8 | 793.1 |

**Wilshire**

# Present Value of Contributions

Legend: ■ Current Target ■ Lower Risk X ■ Lower Risk Y ■ Lower Risk Z ● Median



| ($ Millions) | Years 1 - 5 | | | | Years 1 - 10 | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 4,608.0 | 4,604.2 | 4,601.7 | 4,597.1 | 7,744.3 | 7,730.7 | 7,722.1 | 7,709.7 |
| Pessimistic | 4,568.2 | 4,567.1 | 4,566.9 | 4,566.7 | 7,599.5 | 7,595.4 | 7,596.8 | 7,601.8 |
| **Median (Expected)** | **4,538.4** | **4,539.6** | **4,541.1** | **4,544.5** | **7,484.9** | **7,487.3** | **7,496.2** | **7,514.2** |
| Optimistic | 4,507.6 | 4,510.0 | 4,513.5 | 4,521.1 | 7,359.7 | 7,370.0 | 7,387.8 | 7,422.7 |
| Very Optimistic | 4,462.9 | 4,469.6 | 4,475.9 | 4,488.9 | 7,150.2 | 7,179.8 | 7,213.6 | 7,278.7 |

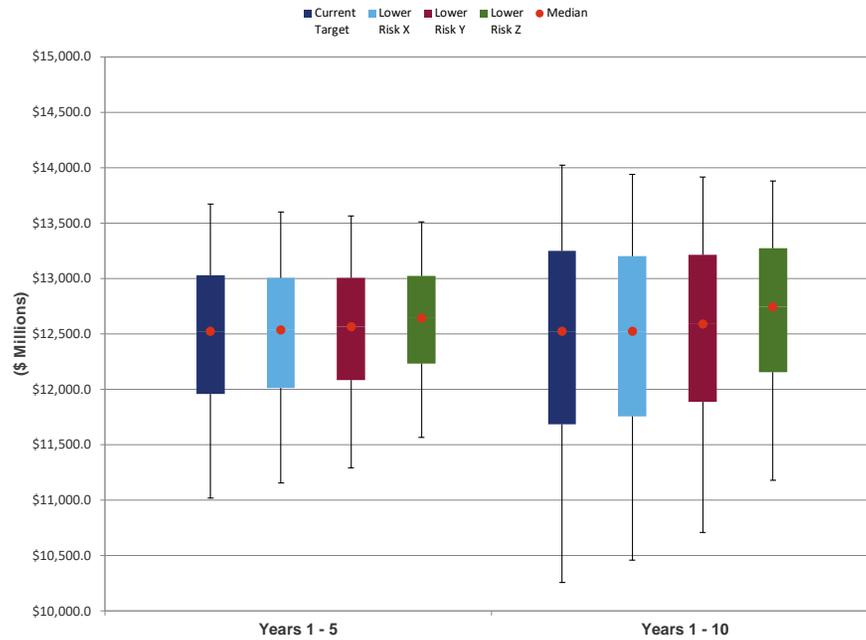### Shortfall Risk:

The potential for the current allocation to have higher median present value of contributions than the alternative policies.

### Drawdown Risk:

The potential for the current allocation to have higher "very pessimistic" present value of contributions than the alternative policies.

EROA = 5.25%

**Wilshire**

# MVA Economic Cost

Legend: ■ Current Target  ■ Lower Risk X  ■ Lower Risk Y  ■ Lower Risk Z  ● Median



| ($ Millions) | Years 1 - 5 | | | | Years 1 - 10 | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 13,673.4 | 13,602.5 | 13,564.5 | 13,510.1 | 14,022.9 | 13,938.5 | 13,916.0 | 13,881.8 |
| Pessimistic | 13,029.2 | 13,004.2 | 13,001.8 | 13,019.6 | 13,246.2 | 13,200.1 | 13,212.4 | 13,270.4 |
| **Median (Expected)** | **12,523.2** | **12,531.8** | **12,566.5** | **12,639.4** | **12,521.9** | **12,524.4** | **12,586.7** | **12,741.6** |
| Optimistic | 11,958.4 | 12,008.6 | 12,082.3 | 12,229.8 | 11,681.0 | 11,751.7 | 11,887.1 | 12,155.4 |
| Very Optimistic | 11,016.3 | 11,155.0 | 11,289.4 | 11,564.6 | 10,255.9 | 10,454.9 | 10,703.9 | 11,178.1 |

**Shortfall Risk:**

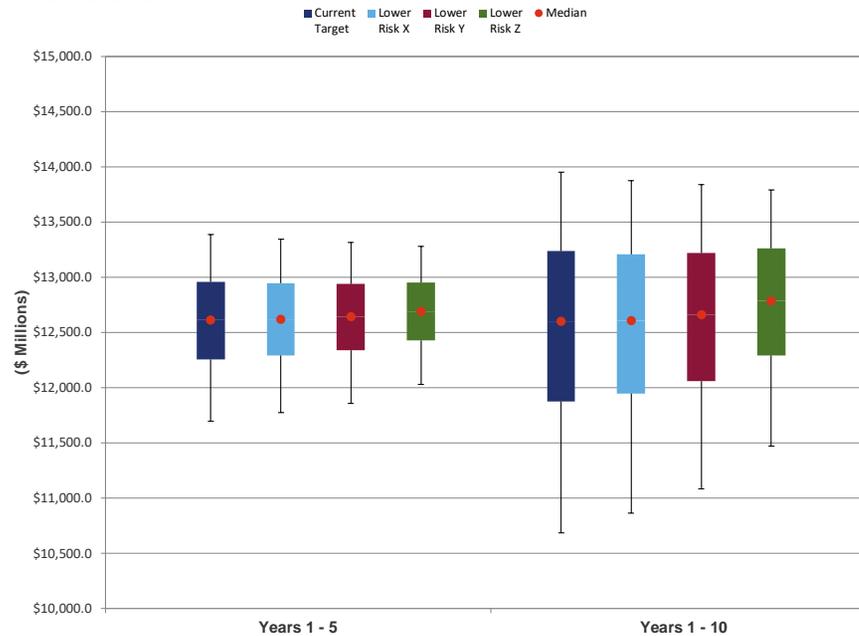The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

**EROA = 5.25%**

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# AVA Economic Cost

■ Current Target  ■ Lower Risk X  ■ Lower Risk Y  ■ Lower Risk Z  ● Median



| ($ Millions) | Years 1 - 5 | | | | Years 1 - 10 | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 13,385.8 | 13,341.8 | 13,316.2 | 13,276.9 | 13,949.0 | 13,871.2 | 13,837.2 | 13,791.3 |
| Pessimistic | 12,954.3 | 12,943.1 | 12,941.4 | 12,950.3 | 13,239.3 | 13,209.3 | 13,221.6 | 13,259.2 |
| **Median (Expected)** | **12,611.9** | **12,619.4** | **12,642.5** | **12,690.0** | **12,601.6** | **12,606.6** | **12,660.3** | **12,783.8** |
| Optimistic | 12,256.0 | 12,289.9 | 12,339.6 | 12,428.7 | 11,875.9 | 11,945.5 | 12,056.8 | 12,290.7 |
| Very Optimistic | 11,693.2 | 11,773.5 | 11,858.3 | 12,025.4 | 10,685.0 | 10,862.9 | 11,080.0 | 11,469.3 |

**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.
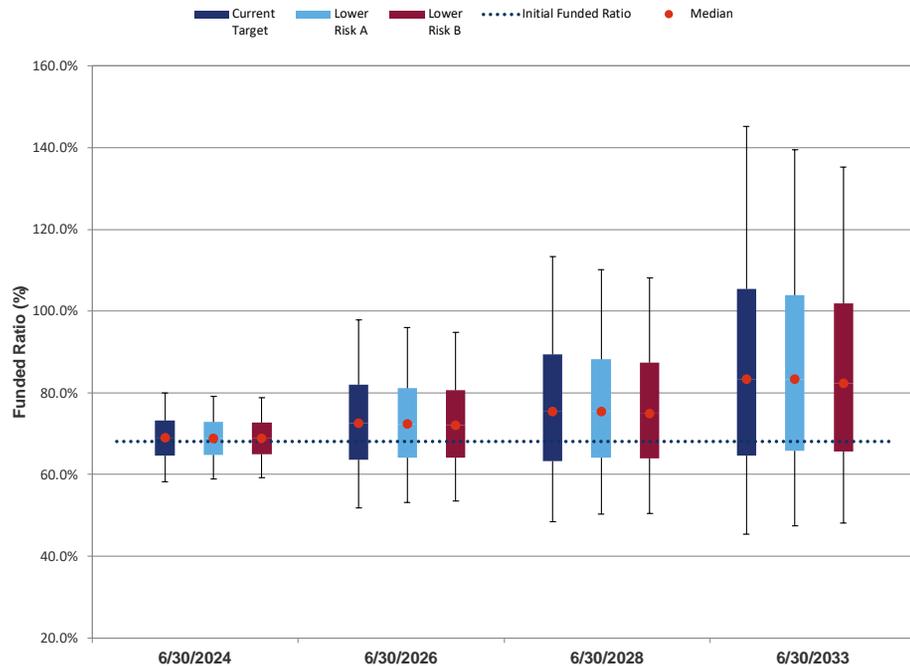
**EROA = 5.25%**

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

# KERS HAZARDOUS RETIREMENT PLAN

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## Wilshire

# AAL MVA Funded Ratio

Legend: Current Target | Lower Risk A | Lower Risk B | ••••• Initial Funded Ratio | ● Median



**Shortfall Risk:**

The potential for the current policy to have a lower median funded ratio than the alternative policies.
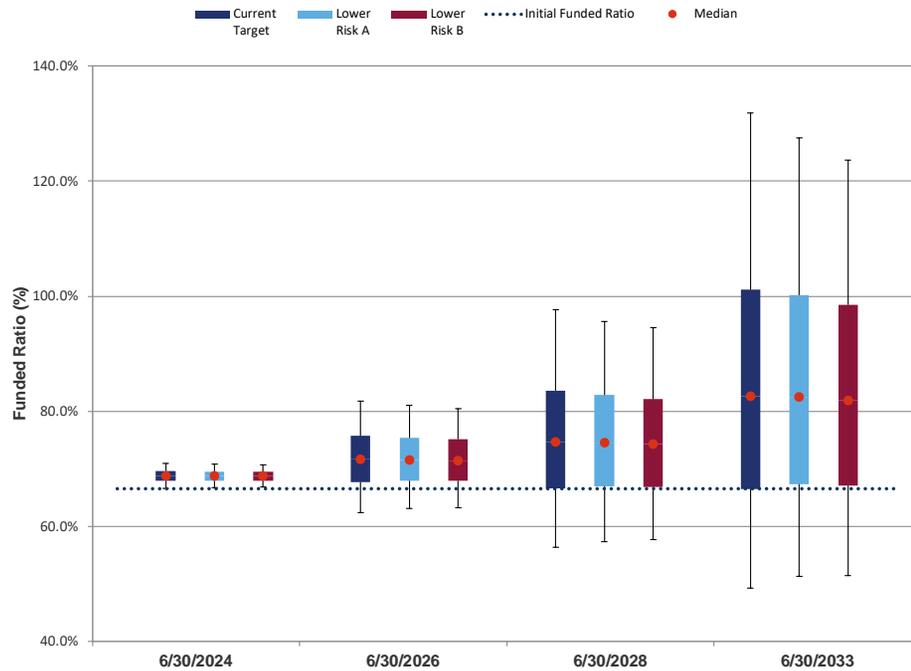
**Drawdown Risk:**

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

**Initial Funded Ratio = 68.0%**

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.14%.*

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 80.03 | 79.20 | 78.72 | 97.92 | 96.04 | 94.74 | 113.42 | 110.24 | 108.21 | 145.16 | 139.49 | 135.27 |
| Optimistic | 73.30 | 72.95 | 72.73 | 82.06 | 81.22 | 80.63 | 89.49 | 88.25 | 87.34 | 105.40 | 103.96 | 101.87 |
| Median (Expected) | 68.95 | 68.92 | 68.81 | 72.54 | 72.39 | 72.10 | 75.39 | 75.40 | 74.89 | 83.42 | 83.37 | 82.34 |
| Pessimistic | 64.61 | 64.81 | 64.89 | 63.59 | 64.11 | 64.12 | 63.23 | 64.08 | 63.92 | 64.69 | 65.80 | 65.64 |
| Very Pessimistic | 58.21 | 58.93 | 59.24 | 51.90 | 53.15 | 53.56 | 48.53 | 50.25 | 50.49 | 45.39 | 47.37 | 48.09 |

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# Wilshire

## AAL AVA Funded Ratio

Legend: Current Target | Lower Risk A | Lower Risk B | ..... Initial Funded Ratio | ● Median



**Shortfall Risk:**

The potential for the current policy to have a lower median funded ratio than the alternative policies.
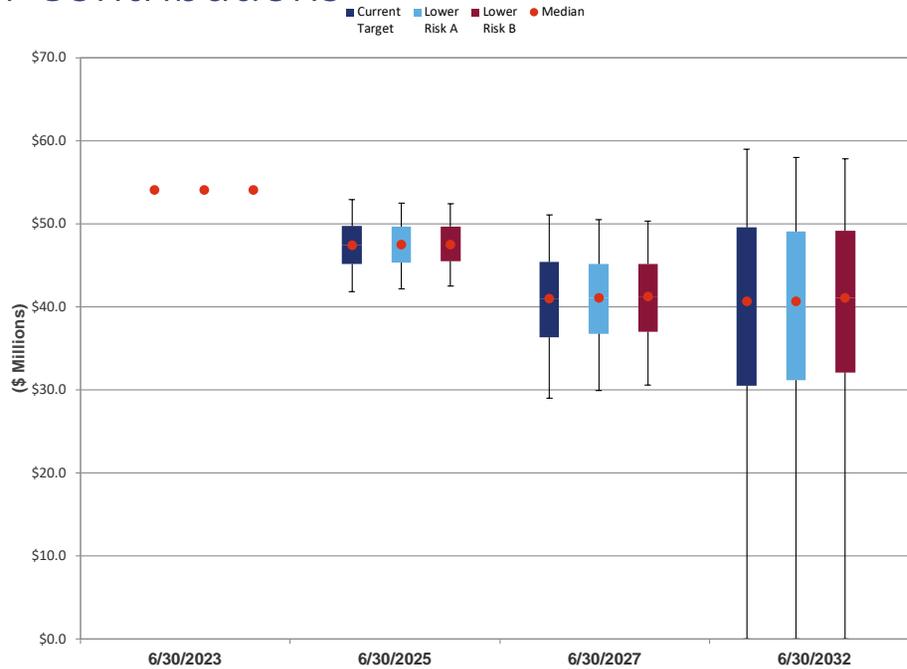
**Drawdown Risk:**

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

**Initial Funded Ratio = 66.5%**

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.14%.*

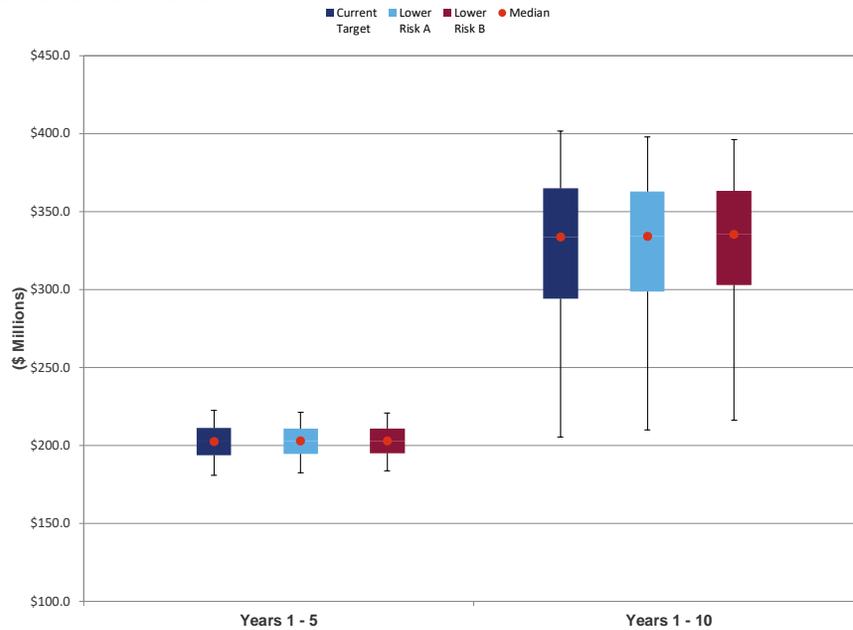| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 70.94 | 70.77 | 70.67 | 81.75 | 80.98 | 80.45 | 97.66 | 95.64 | 94.56 | 131.87 | 127.49 | 123.65 |
| Optimistic | 69.59 | 69.52 | 69.48 | 75.70 | 75.37 | 75.13 | 83.56 | 82.79 | 82.12 | 101.09 | 100.13 | 98.49 |
| Median (Expected) | 68.72 | 68.71 | 68.69 | 71.63 | 71.52 | 71.42 | 74.65 | 74.59 | 74.24 | 82.65 | 82.50 | 81.83 |
| Pessimistic | 67.85 | 67.89 | 67.91 | 67.67 | 67.88 | 67.90 | 66.53 | 66.94 | 66.86 | 66.43 | 67.32 | 67.08 |
| Very Pessimistic | 66.57 | 66.72 | 66.78 | 62.36 | 63.04 | 63.20 | 56.30 | 57.31 | 57.68 | 49.29 | 51.24 | 51.42 |

# Employer Contributions



### Shortfall Risk:

The potential for the current policy to have higher median contributions than the alternative policies.

### Drawdown Risk:

The potential for the current policy to have higher "very pessimistic" contributions than the alternative policies.

| ($ Millions) | 6/30/2023 | | | 6/30/2025 | | | 6/30/2027 | | | 6/30/2032 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 54.1 | 54.1 | 54.1 | 52.9 | 52.5 | 52.4 | 51.1 | 50.5 | 50.3 | 59.0 | 58.0 | 57.8 |
| Pessimistic | 54.1 | 54.1 | 54.1 | 49.7 | 49.7 | 49.6 | 45.4 | 45.1 | 45.1 | 49.6 | 49.1 | 49.1 |
| Median (Expected) | 54.1 | 54.1 | 54.1 | 47.4 | 47.5 | 47.5 | 41.0 | 41.0 | 41.2 | 40.6 | 40.6 | 41.1 |
| Optimistic | 54.1 | 54.1 | 54.1 | 45.2 | 45.3 | 45.5 | 36.3 | 36.7 | 37.0 | 30.5 | 31.1 | 32.0 |
| Very Optimistic | 54.1 | 54.1 | 54.1 | 41.8 | 42.1 | 42.4 | 29.0 | 29.9 | 30.6 | 0.0 | 0.0 | 0.0 |

# Present Value of Contributions

**Wilshire**

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 222.3 | 221.0 | 220.8 | 401.4 | 397.8 | 396.3 |
| Pessimistic | 211.0 | 210.6 | 210.6 | 364.7 | 362.8 | 363.1 |
| **Median (Expected)** | **202.6** | **202.7** | **202.9** | **333.6** | **334.0** | **335.4** |
| Optimistic | 193.7 | 194.5 | 195.0 | 294.1 | 298.6 | 302.6 |
| Very Optimistic | 180.8 | 182.4 | 183.7 | 205.1 | 209.7 | 216.3 |

**Shortfall Risk:**

The potential for the current allocation to have higher median present value of contributions than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have higher "very pessimistic" present value of contributions than the alternative policies.

EROA = 6.25%

**Wilshire**

# MVA Economic Cost



Legend: ■ Current Target   ■ Lower Risk A   ■ Lower Risk B   ● Median
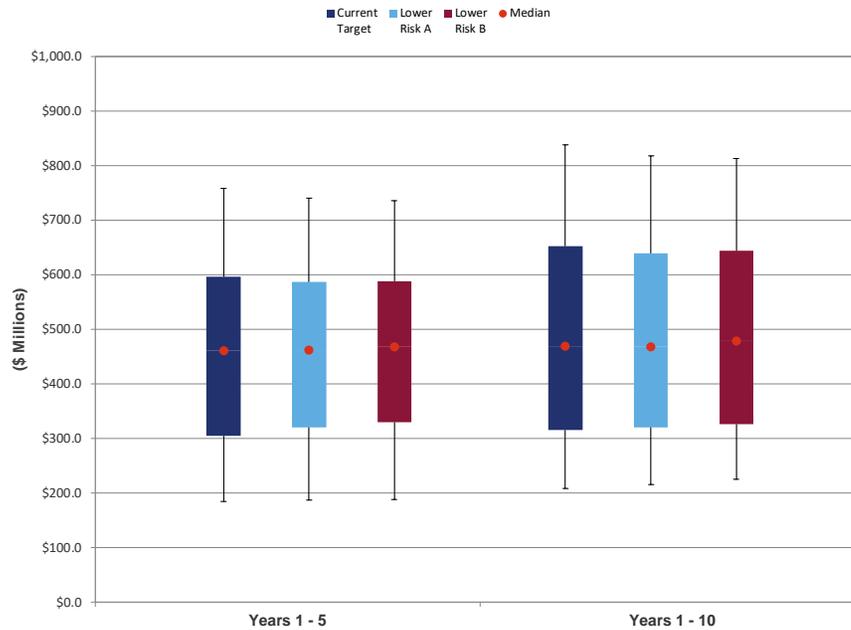
| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 758.4 | 739.8 | 735.1 | 837.5 | 817.2 | 813.3 |
| Pessimistic | 596.0 | 586.8 | 588.2 | 651.9 | 639.5 | 643.5 |
| **Median (Expected)** | **460.9** | **461.6** | **467.2** | **468.3** | **467.7** | **478.0** |
| Optimistic | 304.9 | 320.3 | 329.5 | 315.4 | 319.6 | 326.0 |
| Very Optimistic | 184.0 | 186.0 | 187.6 | 208.1 | 214.7 | 224.8 |

**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 6.25%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

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**Wilshire**

# AVA Economic Cost



Legend: Current Target, Lower Risk A, Lower Risk B, Median

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 681.0 | 669.0 | 664.1 | 813.1 | 792.0 | 788.7 |
| Pessimistic | 563.3 | 558.2 | 558.2 | 637.3 | 629.7 | 632.9 |
| **Median (Expected)** | **469.0** | **469.7** | **473.3** | **477.4** | **476.5** | **485.3** |
| Optimistic | 367.6 | 376.7 | 384.2 | 311.4 | 318.1 | 325.8 |
| Very Optimistic | 206.0 | 228.7 | 242.2 | 206.6 | 211.5 | 221.1 |

**Shortfall Risk:**

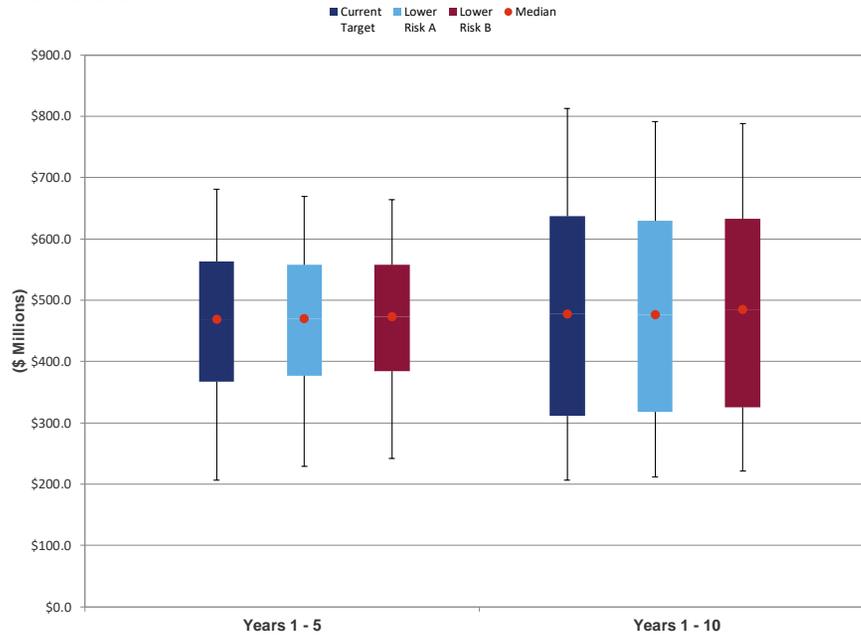The potential for the current allocation to have a higher median economic cost than the alternative policies.
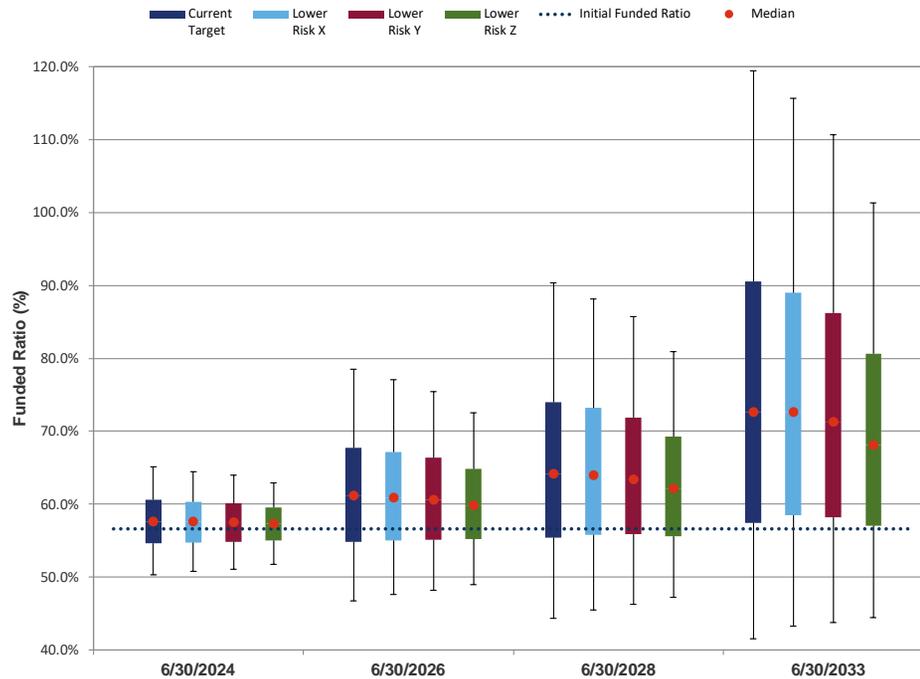
**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 6.25%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

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**Wilshire**

SPRS

RETIREMENT PLAN

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## Wilshire

# AAL MVA Funded Ratio

Legend: Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | •••• Initial Funded Ratio | ● Median



Shortfall Risk:

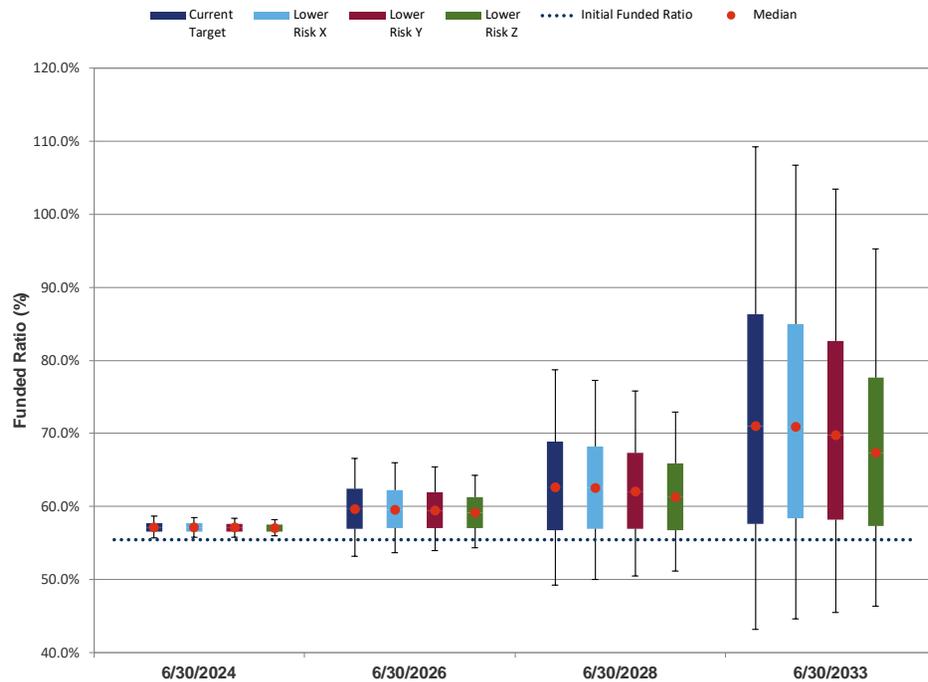The potential for the current policy to have a lower median funded ratio than the alternative policies.

Drawdown Risk:

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 56.5%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -0.93%.*

| (%) | 6/30/2024 | | | | 6/30/2026 | | | | 6/30/2028 | | | | 6/30/2033 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Optimistic | 65.12 | 64.48 | 63.93 | 62.87 | 78.53 | 77.04 | 75.42 | 72.52 | 90.40 | 88.11 | 85.70 | 80.91 | 119.48 | 115.68 | 110.66 | 101.37 |
| Optimistic | 60.58 | 60.33 | 60.06 | 59.51 | 67.75 | 67.11 | 66.35 | 64.87 | 74.01 | 73.19 | 71.83 | 69.22 | 90.53 | 89.06 | 86.22 | 80.67 |
| Median (Expected) | 57.62 | 57.58 | 57.48 | 57.29 | 61.14 | 60.92 | 60.55 | 59.86 | 64.13 | 64.01 | 63.42 | 62.15 | 72.62 | 72.62 | 71.26 | 68.15 |
| Pessimistic | 54.63 | 54.73 | 54.80 | 54.97 | 54.80 | 55.03 | 55.10 | 55.16 | 55.40 | 55.81 | 55.83 | 55.58 | 57.41 | 58.44 | 58.16 | 56.98 |
| Very Pessimistic | 50.32 | 50.77 | 51.09 | 51.71 | 46.70 | 47.60 | 48.20 | 48.95 | 44.34 | 45.51 | 46.24 | 47.20 | 41.52 | 43.28 | 43.76 | 44.43 |

**Wilshire**

# AAL AVA Funded Ratio



Legend: ■ Current Target  ■ Lower Risk X  ■ Lower Risk Y  ■ Lower Risk Z  ⋯⋯ Initial Funded Ratio  ● Median

**Shortfall Risk:**

The potential for the current policy to have a lower median funded ratio than the alternative policies.

**Drawdown Risk:**
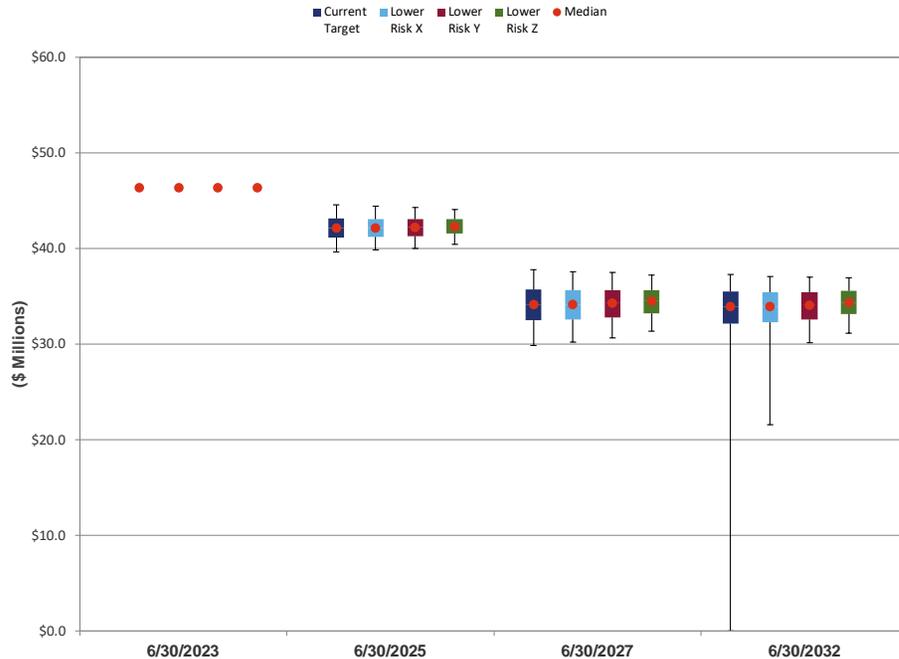
The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 55.5%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -0.93%.*

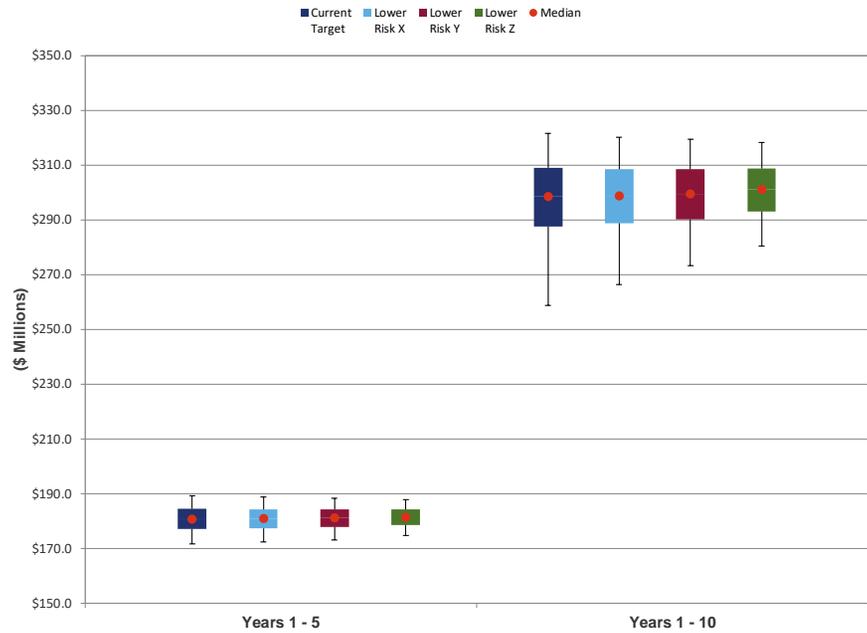| (%) | 6/30/2024 | | | | 6/30/2026 | | | | 6/30/2028 | | | | 6/30/2033 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Optimistic | 58.62 | 58.49 | 58.38 | 58.17 | 66.52 | 66.02 | 65.39 | 64.26 | 78.70 | 77.30 | 75.79 | 72.89 | 109.25 | 106.76 | 103.43 | 95.29 |
| Optimistic | 57.71 | 57.66 | 57.61 | 57.50 | 62.47 | 62.25 | 61.91 | 61.30 | 68.87 | 68.20 | 67.35 | 65.84 | 86.33 | 84.96 | 82.65 | 77.67 |
| Median (Expected) | 57.12 | 57.11 | 57.09 | 57.05 | 59.63 | 59.53 | 59.41 | 59.12 | 62.64 | 62.47 | 62.07 | 61.31 | 70.96 | 70.90 | 69.77 | 67.30 |
| Pessimistic | 56.52 | 56.54 | 56.55 | 56.59 | 56.90 | 57.01 | 57.04 | 57.04 | 56.70 | 56.89 | 56.89 | 56.78 | 57.63 | 58.34 | 58.14 | 57.28 |
| Very Pessimistic | 55.66 | 55.75 | 55.81 | 55.93 | 53.22 | 53.65 | 53.91 | 54.29 | 49.22 | 50.02 | 50.50 | 51.15 | 43.10 | 44.63 | 45.42 | 46.36 |

# Employer Contributions



Shortfall Risk:

The potential for the current policy to have higher median contributions than the alternative policies.

Drawdown Risk:

The potential for the current policy to have higher "very pessimistic" contributions than the alternative policies.

| ($ Millions) | 6/30/2023 | | | | 6/30/2025 | | | | 6/30/2027 | | | | 6/30/2032 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 46.3 | 46.3 | 46.3 | 46.3 | 44.5 | 44.4 | 44.3 | 44.1 | 37.8 | 37.5 | 37.5 | 37.2 | 37.3 | 37.1 | 37.0 | 36.9 |
| Pessimistic | 46.3 | 46.3 | 46.3 | 46.3 | 43.1 | 43.1 | 43.1 | 43.0 | 35.7 | 35.6 | 35.6 | 35.6 | 35.5 | 35.4 | 35.4 | 35.5 |
| Median (Expected) | 46.3 | 46.3 | 46.3 | 46.3 | 42.1 | 42.1 | 42.2 | 42.3 | 34.1 | 34.2 | 34.3 | 34.4 | 33.9 | 33.9 | 34.0 | 34.3 |
| Optimistic | 46.3 | 46.3 | 46.3 | 46.3 | 41.1 | 41.2 | 41.3 | 41.5 | 32.4 | 32.6 | 32.8 | 33.2 | 32.2 | 32.3 | 32.5 | 33.1 |
| Very Optimistic | 46.3 | 46.3 | 46.3 | 46.3 | 39.6 | 39.8 | 40.0 | 40.4 | 29.8 | 30.2 | 30.6 | 31.3 | 0.0 | 21.5 | 30.1 | 31.1 |

**Wilshire**

# Present Value of Contributions



Legend: Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Median

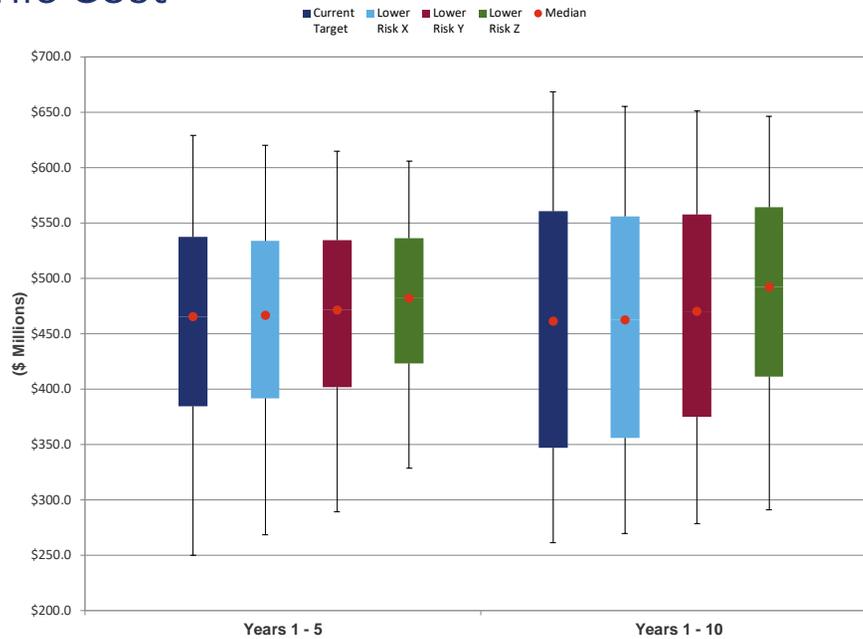| ($ Millions) | Years 1 - 5 | | | | Years 1 - 10 | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 189.2 | 188.7 | 188.4 | 187.8 | 321.5 | 320.2 | 319.6 | 318.3 |
| Pessimistic | 184.3 | 184.2 | 184.2 | 184.1 | 309.0 | 308.6 | 308.6 | 308.8 |
| **Median (Expected)** | **180.7** | **180.8** | **181.0** | **181.4** | **298.6** | **298.8** | **299.5** | **301.2** |
| Optimistic | 177.0 | 177.3 | 177.7 | 178.6 | 287.7 | 288.8 | 290.3 | 293.1 |
| Very Optimistic | 171.6 | 172.4 | 173.1 | 174.6 | 258.7 | 266.4 | 273.3 | 280.5 |

### Shortfall Risk:

The potential for the current allocation to have higher median present value of contributions than the alternative policies.

### Drawdown Risk:

The potential for the current allocation to have higher "very pessimistic" present value of contributions than the alternative policies.

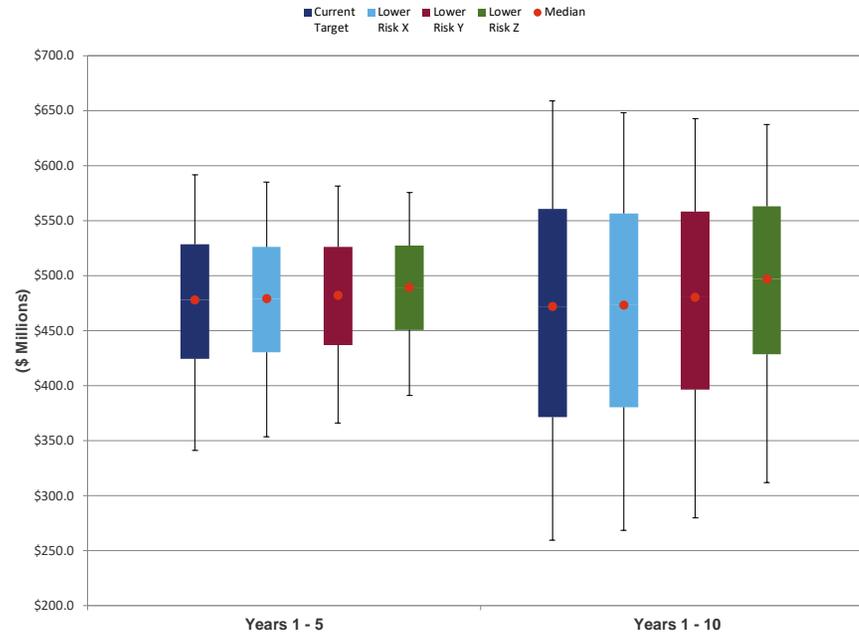EROA = 5.25%

# MVA Economic Cost



**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 5.25%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

| ($ Millions) | Years 1 - 5 | | | | Years 1 - 10 | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 629.3 | 620.4 | 614.9 | 605.6 | 668.1 | 655.3 | 651.1 | 646.2 |
| Pessimistic | 537.6 | 534.0 | 534.7 | 536.0 | 560.9 | 556.1 | 557.4 | 564.0 |
| **Median (Expected)** | **465.4** | **466.7** | **471.6** | **482.2** | **461.2** | **462.6** | **470.3** | **492.0** |
| Optimistic | 384.3 | 391.3 | 401.5 | 423.2 | 346.6 | 356.0 | 374.7 | 411.3 |
| Very Optimistic | 249.5 | 268.3 | 289.1 | 328.1 | 261.3 | 269.4 | 278.4 | 290.9 |

# Wilshire

# AVA Economic Cost



| ($ Millions) | Years 1 - 5 | | | | Years 1 - 10 | | | |
|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z | Current Target | Lower Risk X | Lower Risk Y | Lower Risk Z |
| Very Pessimistic | 591.6 | 584.9 | 581.4 | 575.2 | 658.7 | 648.4 | 642.6 | 637.5 |
| Pessimistic | 528.3 | 526.1 | 526.3 | 527.4 | 560.3 | 556.2 | 558.1 | 563.1 |
| **Median (Expected)** | **477.6** | **479.0** | **482.2** | **489.0** | **471.9** | **472.9** | **480.3** | **496.8** |
| Optimistic | 424.4 | 430.5 | 436.8 | 450.4 | 371.2 | 380.2 | 396.1 | 428.1 |
| Very Optimistic | 341.0 | 353.4 | 366.0 | 390.8 | 259.3 | 268.5 | 279.7 | 311.8 |

## Shortfall Risk:

The potential for the current allocation to have a higher median economic cost than the alternative policies.
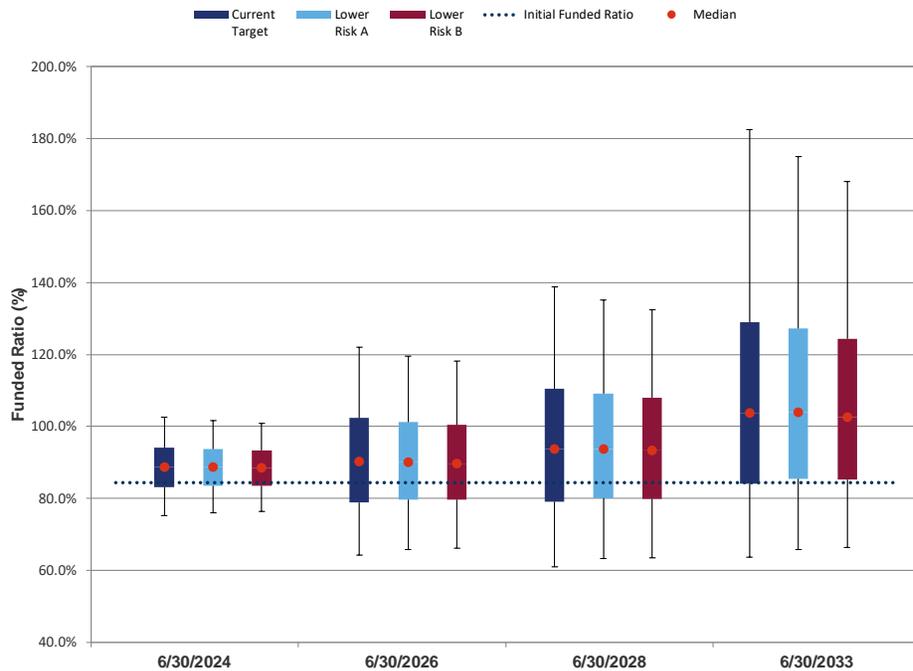
## Drawdown Risk:

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 5.25%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# KERS NON-HAZARDOUS INSURANCE PLAN

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**Wilshire**

# AAL MVA Funded Ratio

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ·····  Initial Funded Ratio  ● Median



### Shortfall Risk:

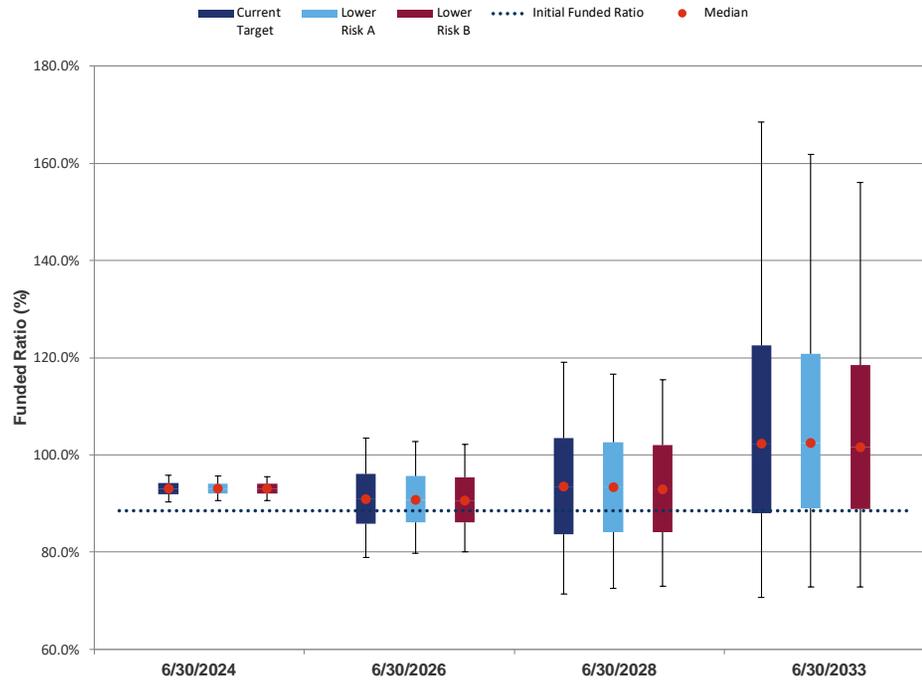The potential for the current policy to have a lower median funded ratio than the alternative policies.

### Drawdown Risk:

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 84.4%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.31%.*

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 102.57 | 101.53 | 100.92 | 122.00 | 119.59 | 118.09 | 138.89 | 135.16 | 132.41 | 182.51 | 175.06 | 168.13 |
| Optimistic | 94.13 | 93.69 | 93.41 | 102.33 | 101.21 | 100.46 | 110.51 | 109.03 | 107.87 | 128.97 | 127.26 | 124.38 |
| Median (Expected) | 88.66 | 88.62 | 88.48 | 90.23 | 90.11 | 89.73 | 93.75 | 93.80 | 93.27 | 103.68 | 103.91 | 102.60 |
| Pessimistic | 83.20 | 83.45 | 83.56 | 78.89 | 79.55 | 79.55 | 79.01 | 80.09 | 79.81 | 84.08 | 85.39 | 85.17 |
| Very Pessimistic | 75.16 | 76.06 | 76.46 | 64.15 | 65.71 | 66.21 | 60.93 | 63.26 | 63.44 | 63.62 | 65.78 | 66.31 |

**Wilshire**

# AAL AVA Funded Ratio



Legend: Current Target | Lower Risk A | Lower Risk B | ⋯ Initial Funded Ratio | ● Median

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 95.84 | 95.63 | 95.51 | 103.52 | 102.71 | 102.13 | 119.04 | 116.64 | 115.40 | 168.51 | 161.87 | 156.06 |
| Optimistic | 94.15 | 94.06 | 94.01 | 96.12 | 95.71 | 95.38 | 103.49 | 102.59 | 102.08 | 122.52 | 120.79 | 118.55 |
| Median (Expected) | 93.06 | 93.05 | 93.02 | 90.86 | 90.72 | 90.62 | 93.42 | 93.37 | 92.96 | 102.37 | 102.44 | 101.58 |
| Pessimistic | 91.96 | 92.01 | 92.03 | 85.77 | 86.06 | 86.06 | 83.59 | 84.09 | 84.03 | 88.04 | 89.01 | 88.87 |
| Very Pessimistic | 90.35 | 90.54 | 90.62 | 78.93 | 79.78 | 80.00 | 71.32 | 72.56 | 72.96 | 70.66 | 72.82 | 72.85 |

## Shortfall Risk:

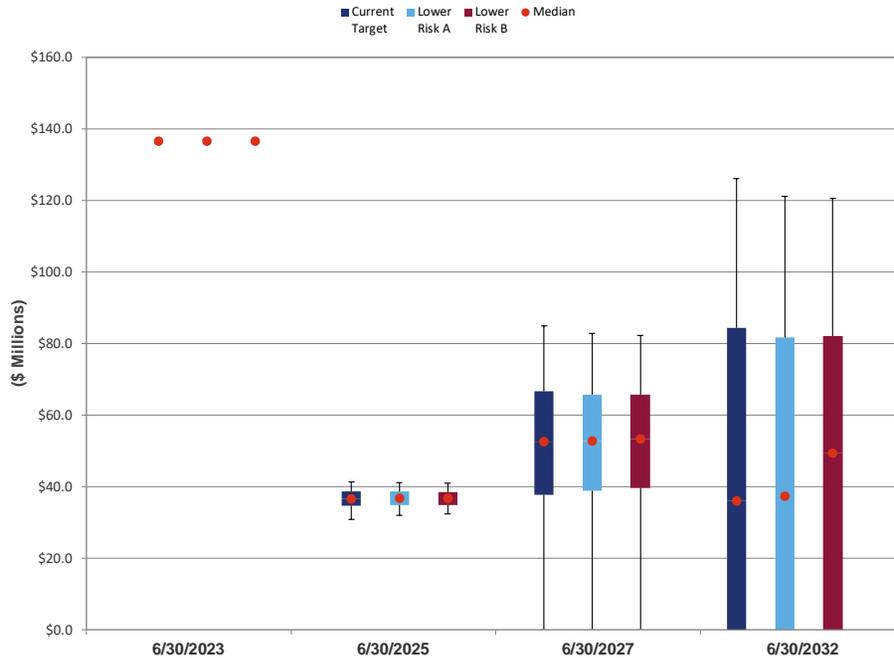The potential for the current policy to have a lower median funded ratio than the alternative policies.

## Drawdown Risk:

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

### Initial Funded Ratio = 88.5%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.31%.*

# Employer Contributions



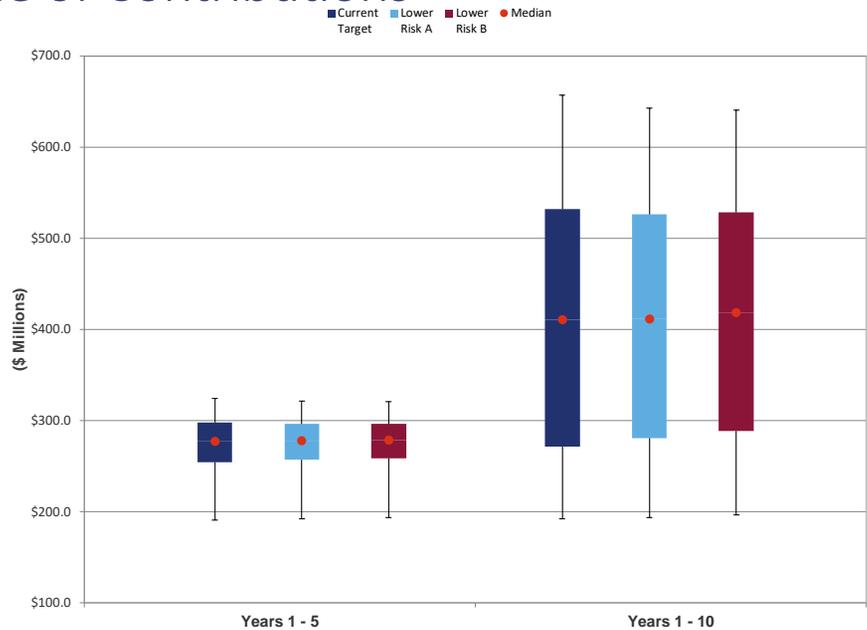| ($ Millions) | 6/30/2023 | | | 6/30/2025 | | | 6/30/2027 | | | 6/30/2032 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 136.6 | 136.6 | 136.6 | 41.4 | 41.0 | 40.9 | 84.8 | 82.8 | 82.3 | 126.1 | 121.1 | 120.5 |
| Pessimistic | 136.6 | 136.6 | 136.6 | 38.6 | 38.5 | 38.5 | 66.5 | 65.7 | 65.7 | 84.4 | 81.7 | 82.0 |
| Median (Expected) | 136.6 | 136.6 | 136.6 | 36.6 | 36.6 | 36.7 | 52.5 | 52.7 | 53.2 | 35.9 | 37.3 | 49.2 |
| Optimistic | 136.6 | 136.6 | 136.6 | 34.6 | 34.7 | 34.9 | 37.6 | 38.8 | 39.6 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 136.6 | 136.6 | 136.6 | 30.8 | 32.0 | 32.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Shortfall Risk: The potential for the current policy to have higher median contributions than the alternative policies.

Drawdown Risk: The potential for the current policy to have higher "very pessimistic" contributions than the alternative policies.

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## Present Value of Contributions



**Shortfall Risk:**

The potential for the current allocation to have higher median present value of contributions than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have higher "very pessimistic" present value of contributions than the alternative policies.

EROA = 6.50%

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 324.2 | 321.1 | 320.5 | 656.7 | 642.8 | 640.6 |
| Pessimistic | 297.4 | 296.2 | 296.2 | 532.1 | 526.6 | 528.3 |
| **Median (Expected)** | **277.2** | **277.3** | **278.1** | **410.6** | **411.1** | **418.6** |
| Optimistic | 253.9 | 256.8 | 258.3 | 271.1 | 280.2 | 288.3 |
| Very Optimistic | 190.8 | 192.2 | 193.2 | 192.1 | 193.3 | 196.4 |

**Wilshire**

# MVA Economic Cost
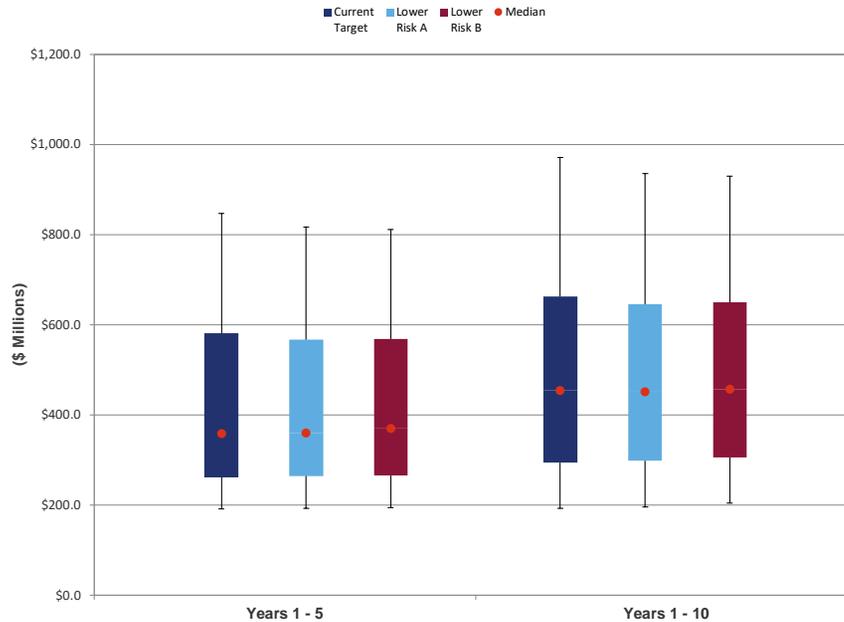


| Legend |
|---|
| ■ Current Target ■ Lower Risk A ■ Lower Risk B ● Median |

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 847.2 | 817.1 | 811.2 | 971.0 | 934.9 | 930.0 |
| Pessimistic | 580.4 | 566.0 | 568.0 | 662.9 | 645.5 | 650.1 |
| **Median (Expected)** | **358.2** | **360.3** | **369.1** | **453.3** | **451.0** | **456.9** |
| Optimistic | 261.2 | 263.2 | 265.2 | 293.6 | 298.1 | 306.0 |
| Very Optimistic | 191.5 | 192.5 | 193.9 | 192.8 | 194.6 | 204.1 |

### Shortfall Risk:

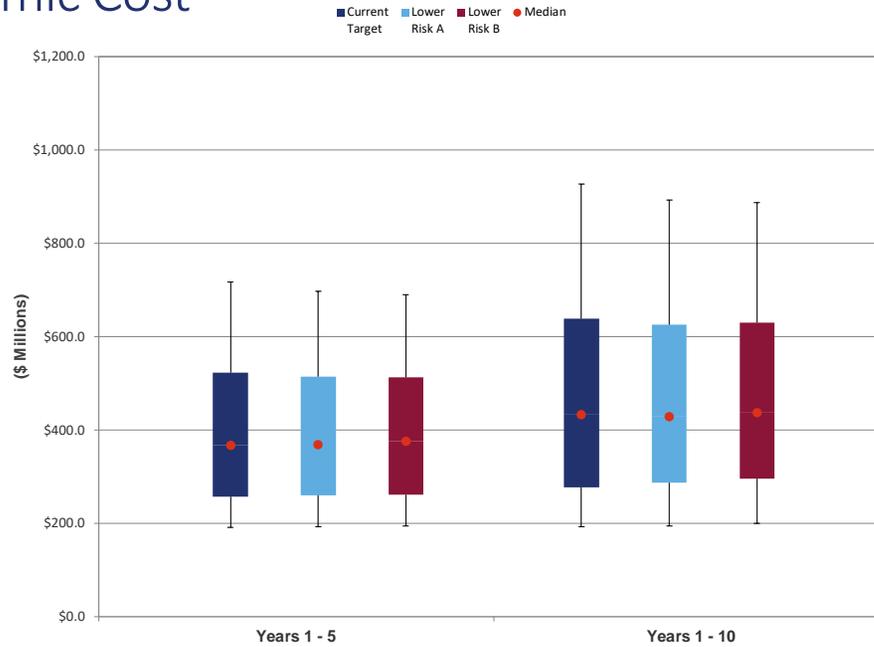The potential for the current allocation to have a higher median economic cost than the alternative policies.

### Drawdown Risk:

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 6.50%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# AVA Economic Cost

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median



| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 716.3 | 696.5 | 689.0 | 926.1 | 892.3 | 886.8 |
| Pessimistic | 522.2 | 514.1 | 513.1 | 637.9 | 625.8 | 630.2 |
| **Median (Expected)** | **366.8** | **367.9** | **374.8** | **431.7** | **428.8** | **437.2** |
| Optimistic | 256.5 | 259.0 | 261.4 | 276.8 | 286.7 | 294.6 |
| Very Optimistic | 190.9 | 192.3 | 193.3 | 192.3 | 193.6 | 199.2 |

**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.
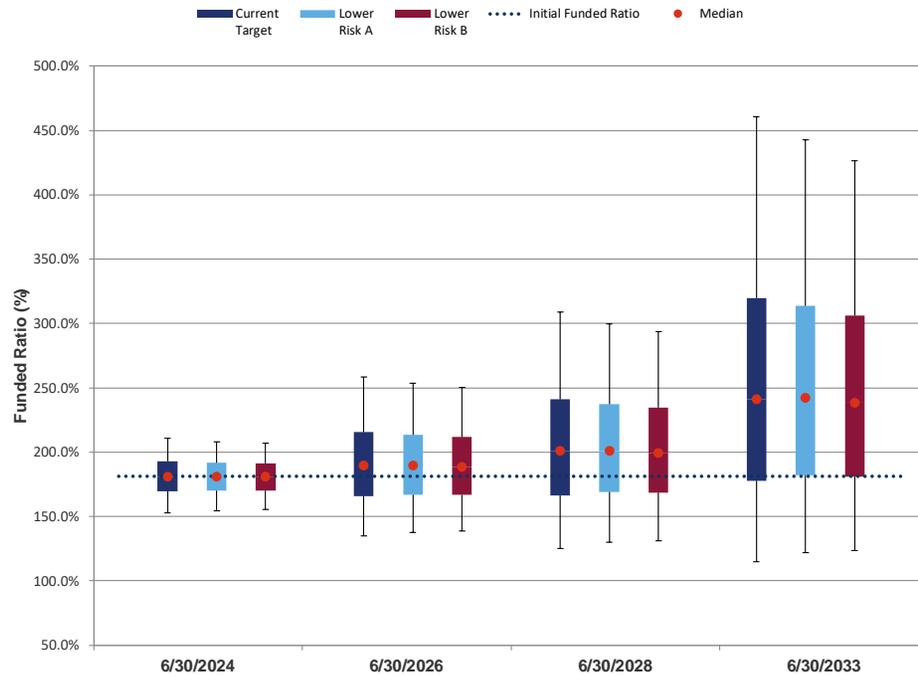
**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 6.50%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# KERS HAZARDOUS INSURANCE PLAN

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**Wilshire**

# AAL MVA Funded Ratio

Legend: ■ Current Target ■ Lower Risk A ■ Lower Risk B ⋯⋯ Initial Funded Ratio ● Median



**Shortfall Risk:**

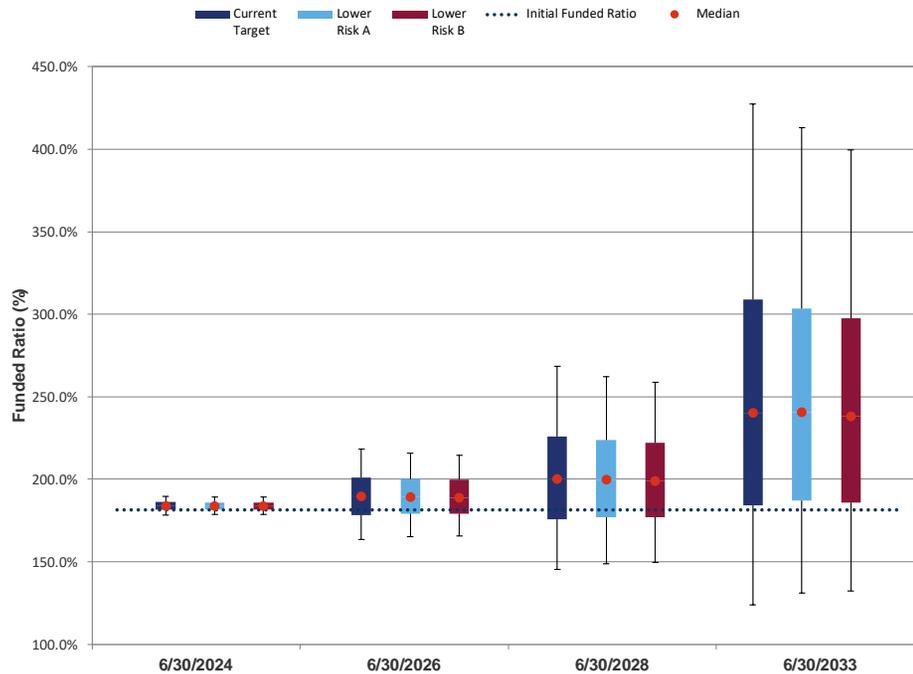The potential for the current policy to have a lower median funded ratio than the alternative policies.

**Drawdown Risk:**

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 181.2%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.09%.*

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 210.55 | 208.36 | 207.08 | 258.51 | 253.42 | 250.23 | 308.85 | 299.78 | 293.68 | 460.48 | 442.98 | 426.55 |
| Optimistic | 192.72 | 191.80 | 191.21 | 215.80 | 213.43 | 211.87 | 241.14 | 237.38 | 234.76 | 319.71 | 313.98 | 305.96 |
| Median (Expected) | 181.19 | 181.10 | 180.81 | 189.78 | 189.72 | 188.71 | 201.13 | 200.85 | 199.39 | 241.36 | 242.18 | 238.53 |
| Pessimistic | 169.68 | 170.21 | 170.43 | 165.72 | 167.01 | 167.11 | 166.62 | 168.85 | 168.61 | 177.81 | 182.20 | 180.99 |
| Very Pessimistic | 152.74 | 154.64 | 155.48 | 134.80 | 137.88 | 138.94 | 125.40 | 129.86 | 131.25 | 115.04 | 122.19 | 123.51 |

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# AAL AVA Funded Ratio

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ·······Initial Funded Ratio  ● Median



## Shortfall Risk:

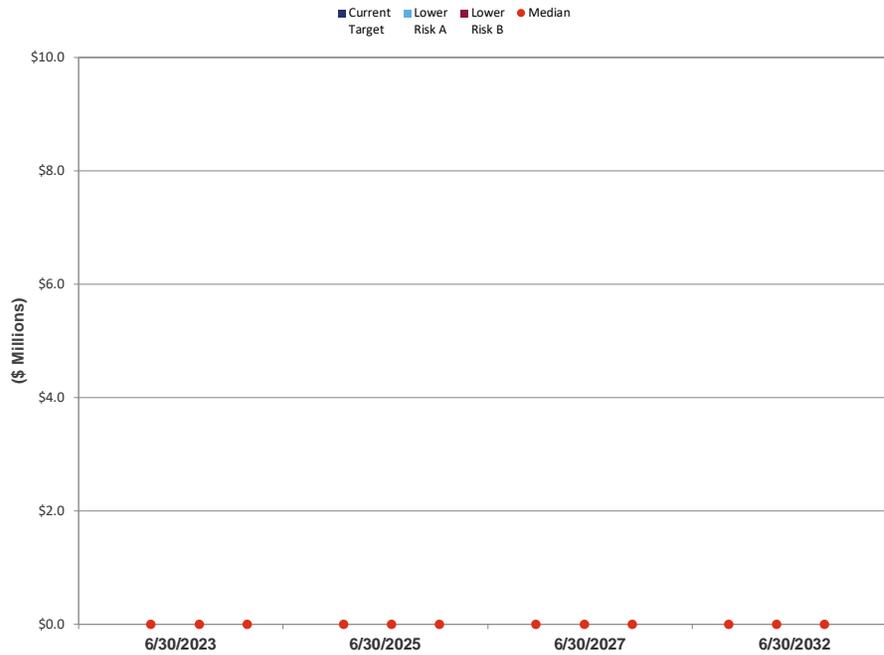The potential for the current policy to have a lower median funded ratio than the alternative policies.

## Drawdown Risk:

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

## Initial Funded Ratio = 181.4%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.09%.*

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 189.80 | 189.36 | 189.10 | 218.21 | 215.96 | 214.40 | 268.34 | 262.38 | 258.93 | 427.36 | 412.87 | 399.40 |
| Optimistic | 186.23 | 186.04 | 185.93 | 201.19 | 200.21 | 199.59 | 226.12 | 223.76 | 222.08 | 308.89 | 303.42 | 297.70 |
| Median (Expected) | 183.92 | 183.91 | 183.85 | 189.66 | 189.35 | 188.99 | 200.02 | 199.86 | 198.80 | 240.23 | 240.74 | 237.97 |
| Pessimistic | 181.62 | 181.73 | 181.77 | 178.48 | 179.06 | 179.09 | 175.67 | 176.91 | 176.88 | 184.25 | 187.24 | 186.02 |
| Very Pessimistic | 178.23 | 178.61 | 178.78 | 163.49 | 165.08 | 165.75 | 145.31 | 148.70 | 149.69 | 123.95 | 131.09 | 132.24 |

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# Employer Contributions

■ Current Target　■ Lower Risk A　■ Lower Risk B　● Median



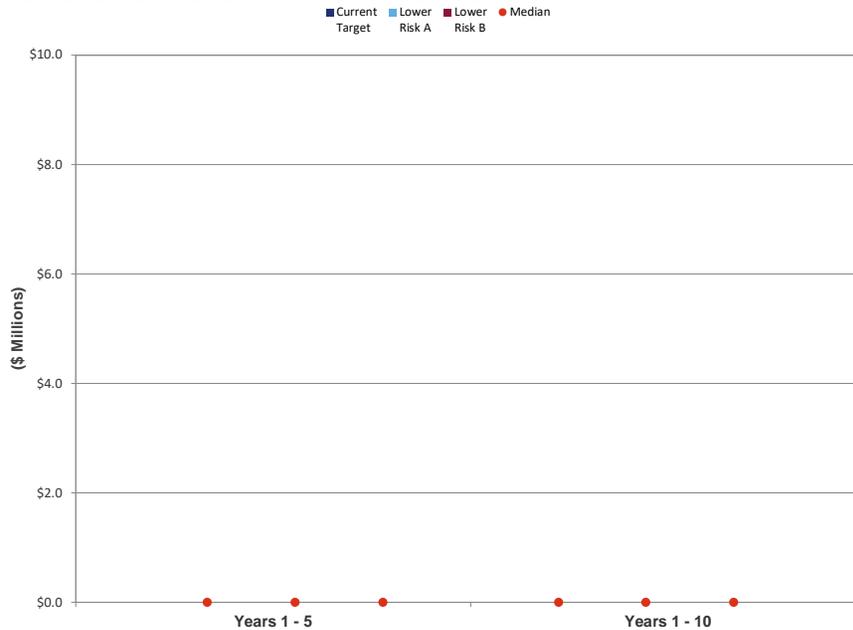| ($ Millions) | 6/30/2023 | | | 6/30/2025 | | | 6/30/2027 | | | 6/30/2032 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Median (Expected)** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

### Shortfall Risk:

The potential for the current policy to have higher median contributions than the alternative policies.

### Drawdown Risk:

The potential for the current policy to have higher "very pessimistic" contributions than the alternative policies.

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# Present Value of Contributions

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Median (Expected)** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Shortfall Risk:**

The potential for the current allocation to have higher median present value of contributions than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have higher "very pessimistic" present value of contributions than the alternative policies.

EROA = 6.50%

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# MVA Economic Cost

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median



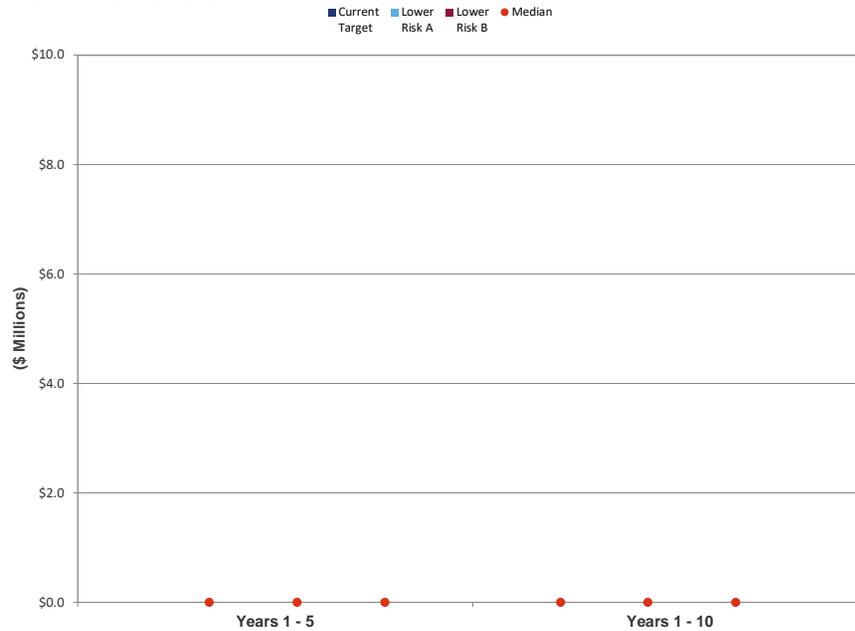| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Median (Expected)** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 6.50%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# AVA Economic Cost



Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pessimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Median (Expected)** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Shortfall Risk:**

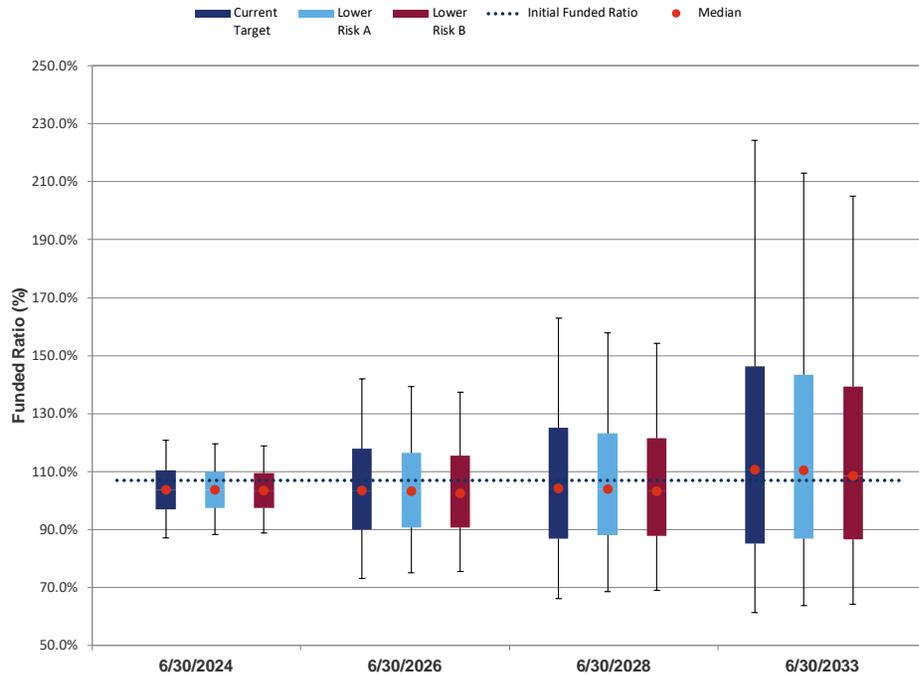The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

EROA = 6.50%

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

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## Wilshire

# AAL MVA Funded Ratio



| Current Target | Lower Risk A | Lower Risk B | ••••• Initial Funded Ratio | ● Median |

**Shortfall Risk:**

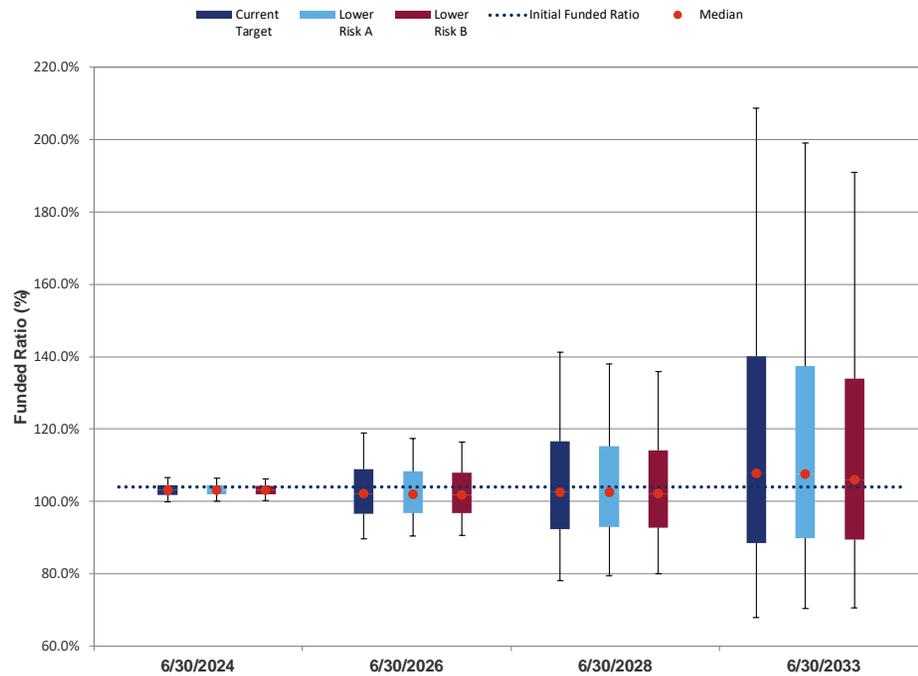The potential for the current policy to have a lower median funded ratio than the alternative policies.

**Drawdown Risk:**

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 106.9%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.13%.*

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 120.81 | 119.53 | 118.78 | 142.05 | 139.33 | 137.39 | 162.95 | 157.94 | 154.25 | 224.41 | 213.11 | 205.05 |
| Optimistic | 110.40 | 109.87 | 109.52 | 117.81 | 116.41 | 115.54 | 125.08 | 123.16 | 121.53 | 146.34 | 143.42 | 139.24 |
| **Median (Expected)** | **103.68** | **103.63** | **103.46** | **103.30** | **103.12** | **102.50** | **104.13** | **103.97** | **103.24** | **110.70** | **110.34** | **108.48** |
| Pessimistic | 96.97 | 97.28 | 97.41 | 89.97 | 90.68 | 90.75 | 86.85 | 88.04 | 87.85 | 85.17 | 86.89 | 86.50 |
| Very Pessimistic | 87.11 | 88.22 | 88.70 | 73.09 | 74.91 | 75.37 | 66.03 | 68.52 | 69.04 | 61.21 | 63.70 | 64.09 |

# Wilshire

## AAL AVA Funded Ratio



**Legend:** Current Target | Lower Risk A | Lower Risk B | ••••• Initial Funded Ratio | ● Median

| (%) | 6/30/2024 | | | 6/30/2026 | | | 6/30/2028 | | | 6/30/2033 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Optimistic | 106.58 | 106.32 | 106.17 | 118.82 | 117.43 | 116.48 | 141.17 | 137.96 | 135.81 | 208.74 | 199.00 | 190.94 |
| Optimistic | 104.50 | 104.39 | 104.32 | 108.80 | 108.24 | 107.86 | 116.55 | 115.22 | 114.10 | 140.07 | 137.42 | 133.85 |
| Median (Expected) | 103.15 | 103.14 | 103.11 | 102.11 | 101.95 | 101.70 | 102.62 | 102.48 | 102.14 | 107.73 | 107.46 | 106.06 |
| Pessimistic | 101.81 | 101.87 | 101.90 | 96.60 | 96.81 | 96.78 | 92.29 | 92.84 | 92.71 | 88.48 | 89.83 | 89.40 |
| Very Pessimistic | 99.84 | 100.06 | 100.16 | 89.54 | 90.36 | 90.63 | 77.96 | 79.44 | 79.92 | 67.75 | 70.35 | 70.52 |

### Shortfall Risk:

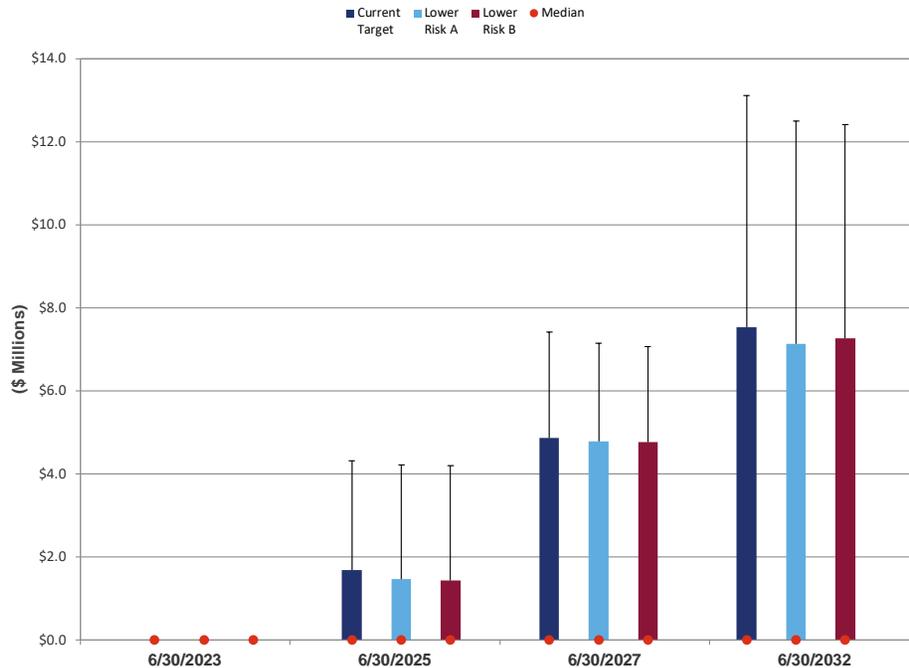The potential for the current policy to have a lower median funded ratio than the alternative policies.

### Drawdown Risk:

The potential for the current policy to have a lower "very pessimistic" funded ratio than the alternative policies.

Initial Funded Ratio = 104.0%

*One Year Simulation (6/30/2024) reflects 8/31/2023 Fiscal Year to Date Return of -1.13%.*
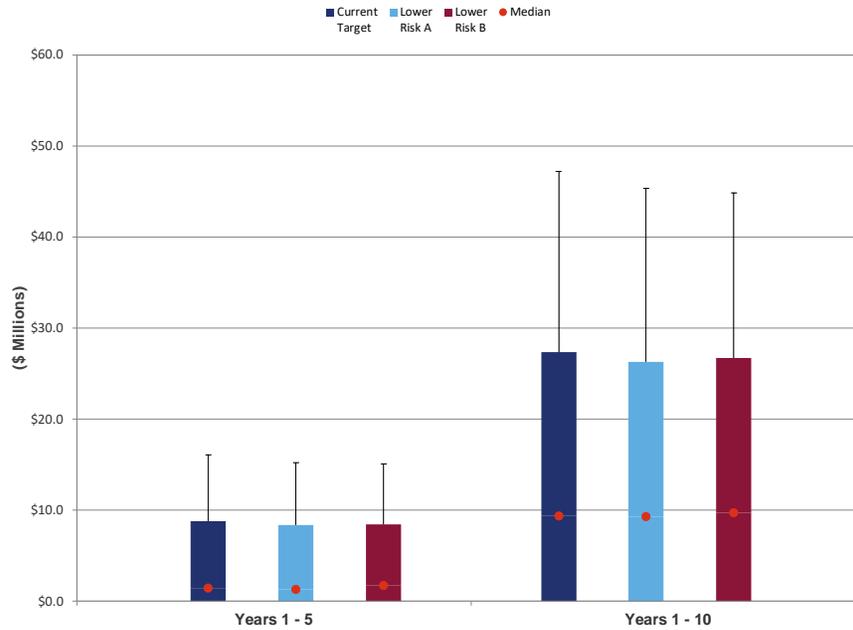
# Employer Contributions

**Shortfall Risk:**

The potential for the current policy to have higher median contributions than the alternative policies.

**Drawdown Risk:**

The potential for the current policy to have higher "very pessimistic" contributions than the alternative policies.

| ($ Millions) | 6/30/2023 | | | 6/30/2025 | | | 6/30/2027 | | | 6/30/2032 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 0.0 | 0.0 | 0.0 | 4.3 | 4.2 | 4.2 | 7.4 | 7.1 | 7.1 | 13.1 | 12.5 | 12.4 |
| Pessimistic | 0.0 | 0.0 | 0.0 | 1.7 | 1.5 | 1.4 | 4.9 | 4.8 | 4.8 | 7.5 | 7.1 | 7.3 |
| Median (Expected) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Wilshire**

# Present Value of Contributions



**Shortfall Risk:**

The potential for the current allocation to have higher median present value of contributions than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have higher "very pessimistic" present value of contributions than the alternative policies.

EROA = 6.50%

| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 16.0 | 15.2 | 15.1 | 47.2 | 45.4 | 44.9 |
| Pessimistic | 8.7 | 8.4 | 8.4 | 27.3 | 26.3 | 26.7 |
| **Median (Expected)** | **1.4** | **1.3** | **1.7** | **9.3** | **9.3** | **9.7** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
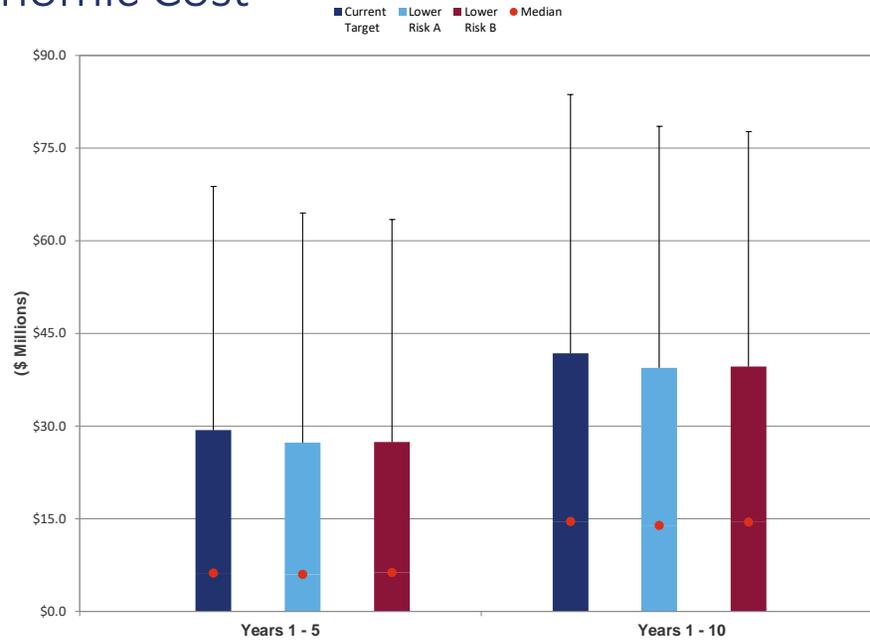
**Wilshire**

# MVA Economic Cost

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median



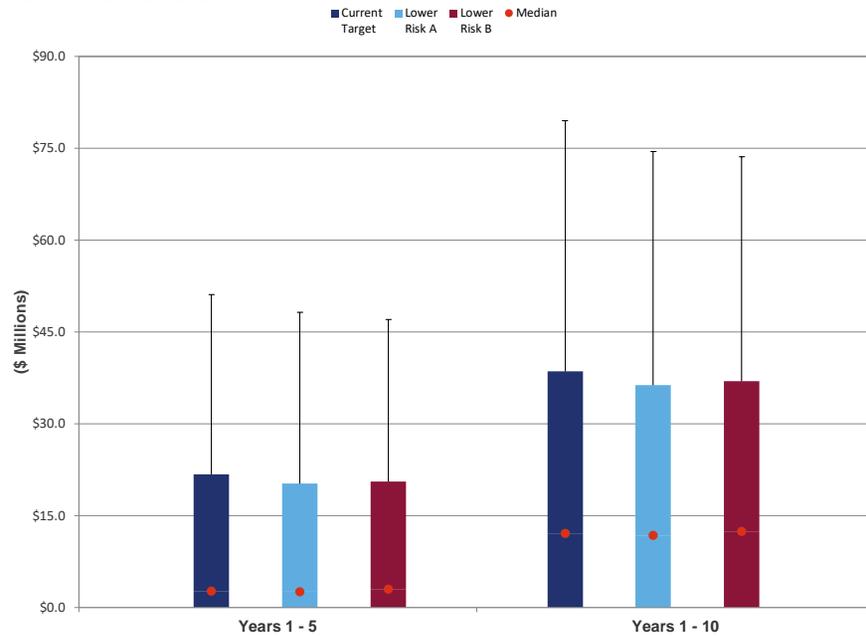| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 68.7 | 64.5 | 63.4 | 83.6 | 78.5 | 77.7 |
| Pessimistic | 29.4 | 27.3 | 27.4 | 41.8 | 39.4 | 39.7 |
| **Median (Expected)** | **6.2** | **6.0** | **6.3** | **14.6** | **13.9** | **14.4** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

**EROA = 6.50%**

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# AVA Economic Cost

Legend: ■ Current Target  ■ Lower Risk A  ■ Lower Risk B  ● Median



| ($ Millions) | Years 1 - 5 | | | Years 1 - 10 | | |
|---|---|---|---|---|---|---|
| | Current Target | Lower Risk A | Lower Risk B | Current Target | Lower Risk A | Lower Risk B |
| Very Pessimistic | 51.1 | 48.2 | 47.1 | 79.5 | 74.4 | 73.6 |
| Pessimistic | 21.7 | 20.2 | 20.5 | 38.6 | 36.3 | 36.9 |
| **Median (Expected)** | **2.7** | **2.6** | **3.0** | **12.1** | **11.7** | **12.4** |
| Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Very Optimistic | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Shortfall Risk:**

The potential for the current allocation to have a higher median economic cost than the alternative policies.

**Drawdown Risk:**

The potential for the current allocation to have a higher "very pessimistic" economic cost than the alternative policies.

**EROA = 6.50%**

Economic Cost is defined as the present value of contributions plus contributions necessary to fully fund the plan at the end of the projection period.

**Wilshire**

# Appendix – Correlation Matrix

**Wilshire**

# Capital Market Assumptions

- Wilshire's Capital Market Assumptions as of **June 30, 2023**

- Wilshire's asset class return, risk and correlation assumptions are developed on multi-year forward looking expected rates of return and historical risk and correlation, adjusted to incorporate recent trends

- Public market return expectations represent a passive investment in the asset class (beta). They do not reflect value added from active management (alpha).

| | Public Equity | Private Equity | Specialty Credit | Core Fixed Income | Cash | Real Estate | Real Return |
|---|---|---|---|---|---|---|---|
| Return - 10-Year (%) | 6.15 | 9.15 | 7.40 | 4.85 | 3.85 | 6.00 | 6.85 |
| Return - 30-Year (%) | 7.15 | 9.95 | 7.40 | 4.80 | 3.55 | 6.95 | 7.35 |
| Risk (%) | 17.10 | 27.80 | 9.05 | 4.70 | 0.75 | 13.95 | 10.65 |
| | | | | | | | |
| Correlations | | | | | | | |
| Public Equity | 1.00 | | | | | | |
| Private Equity | 0.74 | 1.00 | | | | | |
| Specialty Credit | 0.57 | 0.31 | 1.00 | | | | |
| Core Fixed Income | 0.20 | 0.31 | 0.15 | 1.00 | | | |
| Cash | -0.06 | 0.00 | -0.09 | 0.18 | 1.00 | | |
| Real Estate | 0.54 | 0.52 | 0.63 | 0.19 | -0.05 | 1.00 | |
| Real Return | 0.50 | 0.44 | 0.58 | 0.15 | 0.01 | 0.49 | 1.00 |

Wilshire

# Appendix – Asset Allocation Ranges

**Wilshire**

# Allowable Asset Allocation Ranges

Wilshire's Asset Allocation Committee (WAAC) maintains standard asset allocation parameters which reflect generally observed market practices for institutional asset owners. While Wilshire expects most client portfolios will fall within these asset allocation ranges. Wilshire recognizes and occasionally recommends portfolio allocations that may diverge from these general ranges based on a client's particular circumstances, goals or needs.

| Asset Segment | Corporate DB | Public DB | E&F |
|---|---|---|---|
| Total Equity (Public+Private) | | 0% - 80% | |
|     Private Equity (Aggregate) | 0% - 15% | 0% - 20% | 0% - 30% |
| Fixed Income (Core/High-quality - Liquid IG) | 10% - 100% | 10% - 50% | |
| Other Fixed Income/Credit  (Aggregate) | | 0% - 25% | |
|     Private/Illiquid Credit (Aggregate) | | 0% - 15% | |
|     High Yield | | 0% - 10% | |
|     Other: EMD, Loans, Convertibles | | 0% - 7.5% | |
| Total Real Assets (Public + Private) | | 0% - 25% | |
|     Total Real Estate (Public + Private) | | 0% - 25% | |
|     RA Other: Commodities, Gold, Infra, GLI, MLPs, O&G, Timber | | 0% - 5% | |
| Marketable Alternatives (Aggregate) | 0% - 12.5% | | 0% - 20% |
| Cash | | 0% - 5% | |
| Leverage | | 0% - 20% | |
| Total Private/Illiquid | 0% - 25% | 0% - 35% | 0% - 50% |

These thresholds were informed by allocation information from Greenwich Associates, and Wilshire Advisors, LLC, universe data and will be reviewed for reasonableness from time to time.

*Last Updated 12/2021*

Wilshire

# Appendix – Efficient Frontier

**KERS NON-HAZARDOUS RETIREMENT PLAN**

**SPRS RETIREMENT PLAN**

**5.25% DISCOUNT RATE**

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**Wilshire**

# Efficient Frontier Portfolios – KPPA Bucketing

| Asset Class | Current Target | Optimization Constraints | Minimum Risk | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5 | Portfolio 6 | Portfolio 7 | Portfolio 8 | Portfolio 9 | Maximum Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Public Equity | 32.50% | 30% - 80% | 30.00% | 30.00% | 30.00% | 30.00% | 30.00% | 32.00% | 35.50% | 39.50% | 44.50% | 51.00% |
| Private Equity | 7.00% | 0% - 7% [1] | 0.00% | 0.00% | 2.00% | 4.50% | 7.00% | 7.00% | 7.00% | 7.00% | 7.00% | 7.00% |
| **Total Equity** | **39.50%** | | **30.00%** | **30.00%** | **32.00%** | **34.50%** | **37.00%** | **39.00%** | **42.50%** | **46.50%** | **51.50%** | **58.00%** |
| Core Fixed Income | 20.50% | 10% - 50% | 50.00% | 36.50% | 31.00% | 28.50% | 24.50% | 19.00% | 15.50% | 11.50% | 10.00% | 10.00% |
| Specialty Credit | 15.00% | 0% - 20% [1] | 0.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |
| Cash | 5.00% | 2% - 5% | 5.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% |
| **Total Fixed Income** | **40.50%** | | **55.00%** | **58.50%** | **53.00%** | **50.50%** | **46.50%** | **41.00%** | **37.50%** | **33.50%** | **32.00%** | **32.00%** |
| Real Estate | 10.00% | 5% - 10% [1] | 10.00% | 5.00% | 5.00% | 5.00% | 6.50% | 10.00% | 10.00% | 10.00% | 6.50% | 5.00% |
| Real Return | 10.00% | 5% - 10% [1] | 5.00% | 6.50% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 5.00% |
| **Total Inflation Protected** | **20.00%** | | **15.00%** | **11.50%** | **15.00%** | **15.00%** | **16.50%** | **20.00%** | **20.00%** | **20.00%** | **16.50%** | **10.00%** |
| **Total Assets** | **100.0%** | | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |
| **Expected Return - 10 Years (%)** | **6.66** | | **5.73** | **6.23** | **6.42** | **6.59** | **6.74** | **6.80** | **6.84** | **6.88** | **6.90** | **6.84** |
| **Standard Deviation of Return (%)** | **9.79** | | **7.19** | **7.76** | **8.30** | **8.84** | **9.44** | **9.98** | **10.52** | **11.08** | **11.56** | **12.20** |
| **+/(-) in Expected Return - 10 Years (bps)** | | | **(93)** | **(43)** | **(24)** | **(7)** | **8** | **14** | **18** | **22** | **24** | **18** |
| **+/(-) in SD of Return (bps)** | | | **(260)** | **(203)** | **(149)** | **(95)** | **(35)** | **19** | **73** | **129** | **177** | **241** |
| **Sharpe Ratio** | **0.29** | | **0.26** | **0.31** | **0.31** | **0.31** | **0.31** | **0.30** | **0.28** | **0.27** | **0.26** | **0.25** |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# Efficient Frontier Portfolios – Wilshire Bucketing

| Asset Class | Current Target | Optimization Constraints | Minimum Risk | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5 | Portfolio 6 | Portfolio 7 | Portfolio 8 | Portfolio 9 | Maximum Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Public Equity | 32.50% | 30% - 80% | 30.00% | 30.00% | 30.00% | 30.00% | 30.00% | 32.00% | 35.50% | 39.50% | 44.50% | 51.00% |
| Private Equity | 7.00% | 0% - 7% [1] | 0.00% | 0.00% | 2.00% | 4.50% | 7.00% | 7.00% | 7.00% | 7.00% | 7.00% | 7.00% |
| *Total Growth Assets* | *39.50%* | | *30.00%* | *30.00%* | *32.00%* | *34.50%* | *37.00%* | *39.00%* | *42.50%* | *46.50%* | *51.50%* | *58.00%* |
| Specialty Credit | 15.00% | 0% - 20% [1] | 0.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |
| *Total Defensive Growth Assets* | *15.00%* | | *0.00%* | *20.00%* | *20.00%* | *20.00%* | *20.00%* | *20.00%* | *20.00%* | *20.00%* | *20.00%* | *20.00%* |
| Core Fixed Income | 20.50% | 10% - 50% | 50.00% | 36.50% | 31.00% | 28.50% | 24.50% | 19.00% | 15.50% | 11.50% | 10.00% | 10.00% |
| Cash | 5.00% | 2% - 5% | 5.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% |
| *Total Defensive / Rate Sensitive Assets* | *25.50%* | | *55.00%* | *38.50%* | *33.00%* | *30.50%* | *26.50%* | *21.00%* | *17.50%* | *13.50%* | *12.00%* | *12.00%* |
| Real Estate | 10.00% | 5% - 10% [1] | 10.00% | 5.00% | 5.00% | 5.00% | 6.50% | 10.00% | 10.00% | 10.00% | 6.50% | 5.00% |
| Real Return | 10.00% | 5% - 10% [1] | 5.00% | 6.50% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 5.00% |
| *Total RA / Inflation Sensitive Assets* | *20.00%* | | *15.00%* | *11.50%* | *15.00%* | *15.00%* | *16.50%* | *20.00%* | *20.00%* | *20.00%* | *16.50%* | *10.00%* |
| *Total Assets* | *100.0%* | | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* |
| *Expected Return - 10 Years (%)* | *6.66* | | *5.73* | *6.23* | *6.42* | *6.59* | *6.74* | *6.80* | *6.84* | *6.88* | *6.90* | *6.84* |
| *Standard Deviation of Return (%)* | *9.79* | | *7.19* | *7.76* | *8.30* | *8.84* | *9.44* | *9.98* | *10.52* | *11.08* | *11.56* | *12.20* |
| *+/(-) in Expected Return - 10 Years (bps)* | | | *(93)* | *(43)* | *(24)* | *(7)* | *8* | *14* | *18* | *22* | *24* | *18* |
| *+/(-) in SD of Return (bps)* | | | *(260)* | *(203)* | *(149)* | *(95)* | *(35)* | *19* | *73* | *129* | *177* | *241* |
| *Sharpe Ratio* | *0.29* | | *0.26* | *0.31* | *0.31* | *0.31* | *0.31* | *0.30* | *0.28* | *0.27* | *0.26* | *0.25* |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# ALL OTHER PLANS:

- ## KERS NON-HAZ INS
- ## KERS HAZ RET/INS
- ## SPRS INS

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**Wilshire**

# Efficient Frontier Portfolios – KPPA Bucketing

| Asset Class | Current Target | Optimization Constraints | Minimum Risk | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5 | Portfolio 6 | Portfolio 7 | Portfolio 8 | Portfolio 9 | Maximum Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Public Equity | 43.50% | 40% - 80% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 42.00% | 53.00% |
| Private Equity | 10.00% | 0% - 10% [1] | 0.00% | 0.00% | 0.00% | 1.50% | 4.00% | 7.00% | 9.50% | 10.00% | 10.00% | 10.00% |
| *Total Equity* | *53.50%* | | *40.00%* | *40.00%* | *40.00%* | *41.50%* | *44.00%* | *47.00%* | *49.50%* | *50.00%* | *52.00%* | *63.00%* |
| Core Fixed Income | 10.00% | 10% - 50% | 50.00% | 35.50% | 27.50% | 21.50% | 19.00% | 16.00% | 13.50% | 10.50% | 10.00% | 10.00% |
| Specialty Credit | 15.00% | 0% - 20% [1] | 0.00% | 14.50% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |
| Cash | 1.50% | 2% - 5% | 5.00% | 5.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% |
| *Total Fixed Income* | *26.50%* | | *55.00%* | *55.00%* | *49.50%* | *43.50%* | *41.00%* | *38.00%* | *35.50%* | *32.50%* | *32.00%* | *32.00%* |
| Real Estate | 10.00% | 5% - 10% [1] | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 7.50% | 6.00% | 5.00% |
| Real Return | 10.00% | 0% - 10% [1] | 0.00% | 0.00% | 5.50% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 0.00% |
| *Total Inflation Protected* | *20.00%* | | *5.00%* | *5.00%* | *10.50%* | *15.00%* | *15.00%* | *15.00%* | *15.00%* | *17.50%* | *16.00%* | *5.00%* |
| *Total Assets* | *100.0%* | | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* | *100.0%* |
| *Expected Return - 10 Years (%)* | *6.97* | | *5.70* | *6.07* | *6.35* | *6.54* | *6.68* | *6.83* | *6.96* | *7.03* | *7.03* | *6.92* |
| *Standard Deviation of Return (%)* | *12.12* | | *8.06* | *8.60* | *9.15* | *9.70* | *10.19* | *10.75* | *11.28* | *11.64* | *11.80* | *12.90* |
| *+/(-) in Expected Return - 10 Years (bps)* | | | *(127)* | *(90)* | *(62)* | *(43)* | *(29)* | *(14)* | *(1)* | *6* | *6* | *(5)* |
| *+/(-) in SD of Return (bps)* | | | *(406)* | *(352)* | *(297)* | *(242)* | *(193)* | *(137)* | *(84)* | *(48)* | *(32)* | *78* |
| *Sharpe Ratio* | *0.26* | | *0.23* | *0.26* | *0.27* | *0.28* | *0.28* | *0.28* | *0.28* | *0.27* | *0.27* | *0.24* |

[1] Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.

**Wilshire**

# Efficient Frontier Portfolios – Wilshire Bucketing

| Asset Class | Current Target | Optimization Constraints | Minimum Risk | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5 | Portfolio 6 | Portfolio 7 | Portfolio 8 | Portfolio 9 | Maximum Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Public Equity | 43.50% | 40% - 80% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 40.00% | 42.00% | 53.00% |
| Private Equity | 10.00% | 0% - 10% [1] | 0.00% | 0.00% | 0.00% | 1.50% | 4.00% | 7.00% | 9.50% | 10.00% | 10.00% | 10.00% |
| *Total Growth Assets* | 53.50% | | 40.00% | 40.00% | 40.00% | 41.50% | 44.00% | 47.00% | 49.50% | 50.00% | 52.00% | 63.00% |
| Specialty Credit | 15.00% | 0% - 20% [1] | 0.00% | 14.50% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |
| *Total Defensive Growth Assets* | 15.00% | | 0.00% | 14.50% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |
| Core Fixed Income | 10.00% | 10% - 50% | 50.00% | 35.50% | 27.50% | 21.50% | 19.00% | 16.00% | 13.50% | 10.50% | 10.00% | 10.00% |
| Cash | 1.50% | 2% - 5% | 5.00% | 5.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% | 2.00% |
| *Total Defensive / Rate Sensitive Assets* | 11.50% | | 55.00% | 40.50% | 29.50% | 23.50% | 21.00% | 18.00% | 15.50% | 12.50% | 12.00% | 12.00% |
| Real Estate | 10.00% | 5% - 10% [1] | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 7.50% | 6.00% | 5.00% |
| Real Return | 10.00% | 0% - 10% [1] | 0.00% | 0.00% | 5.50% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 10.00% | 0.00% |
| *Total RA / Inflation Sensitive Assets* | 20.00% | | 5.00% | 5.00% | 10.50% | 15.00% | 15.00% | 15.00% | 15.00% | 17.50% | 16.00% | 5.00% |
| *Total Assets* | 100.0% | | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| *Expected Return - 10 Years (%)* | 6.97 | | 5.70 | 6.07 | 6.35 | 6.54 | 6.68 | 6.83 | 6.96 | 7.03 | 7.03 | 6.92 |
| *Standard Deviation of Return (%)* | 12.12 | | 8.06 | 8.60 | 9.15 | 9.70 | 10.19 | 10.75 | 11.28 | 11.64 | 11.80 | 12.90 |
| *+/(-) in Expected Return - 10 Years (bps)* | | | (127) | (90) | (62) | (43) | (29) | (14) | (1) | 6 | 6 | (5) |
| *+/(-) in SD of Return (bps)* | | | (406) | (352) | (297) | (242) | (193) | (137) | (84) | (48) | (32) | 78 |
| *Sharpe Ratio* | 0.26 | | 0.23 | 0.26 | 0.27 | 0.28 | 0.28 | 0.28 | 0.28 | 0.27 | 0.27 | 0.24 |

[1] *Total Illiquid Assets are constrained to not exceed 35%. Illiquid Assets are defined as total of Private Equity, 50% of Speciality Credit, Real Estate and 50% of Real Return.*

**Wilshire**

# Appendix – Regimes

# Wilshire

## Efficient Frontier Portfolios

Managing drawdown risk –
the "uncertainty around
the uncertainty"

- Most simulation models assume returns are log-normally distributed

- Though reasonable in most years, left-tail events occur more frequently than predicted

- A regime switching model can help us pre-experience uncomfortable return paths that fall outside a normal distribution's field of view

|  | expansionary | base | slow growth | recessionary | severe recession |
|---|---|---|---|---|---|
| expansionary | 18.0% | 62.0% | 15.0% | 4.5% | 0.5% |
| base | 15.0% | 60.5% | 15.0% | 7.5% | 2.0% |
| slow growth | 13.0% | 60.0% | 15.0% | 10.0% | 2.0% |
| recessionary | 13.0% | 55.0% | 16.0% | 12.0% | 4.0% |
| severe recession | 12.0% | 47.0% | 16.0% | 17.5% | 7.5% |

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# Wilshire
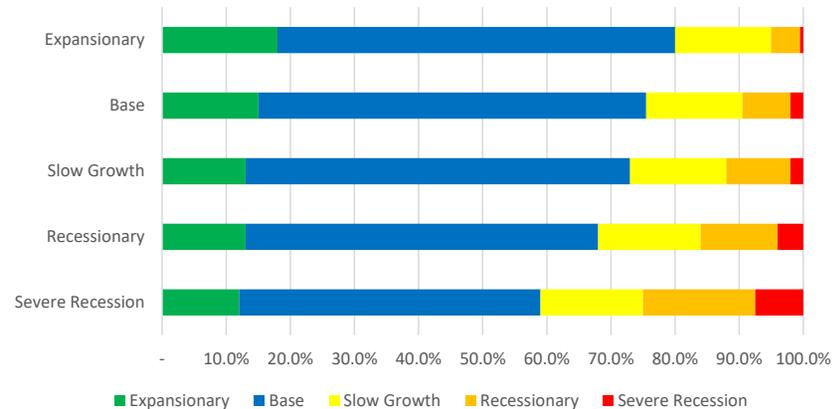
# Stress Testing: Regime Assumptions

- In below trend and worse environments, the portfolio's return expectations is materially lower and the volatility is materially higher

- Volatility in the below trend and worse environments are left-skewed, i.e. negative-skewed

| | US Stocks | Dev xUS Stocks | EM Stocks | Prvt Mkts | Cash | Core Bonds | LT Bonds | US TIPS | HY | US RES | Private RE | Commodities | Current Target * | Current Target ** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Expansionary/Above Trend Growth** | | | | | | | | | | | | | | |
| Return (%) | 10.50 | 11.50 | 11.75 | 16.50 | 4.10 | 4.35 | 4.30 | 3.55 | 8.20 | 10.75 | 11.00 | 9.10 | 9.69 | 10.81 |
| Risk (%) | 12.00 | 13.00 | 21.00 | 22.15 | 0.75 | 5.20 | 10.85 | 6.50 | 8.00 | 13.50 | 10.90 | 16.00 | 7.43 | 9.05 |
| **Baseline/Trend Growth** | | | | | | | | | | | | | | |
| Return (%) | 5.50 | 6.50 | 6.75 | 9.00 | 3.85 | 4.85 | 4.80 | 4.05 | 6.20 | 5.75 | 6.00 | 6.10 | 6.66 | 6.97 |
| Risk (%) | 17.00 | 18.00 | 26.00 | 29.65 | 0.75 | 4.70 | 9.85 | 6.00 | 10.00 | 17.50 | 13.90 | 16.00 | 9.79 | 12.12 |
| **Slow Growth/Below Trend** | | | | | | | | | | | | | | |
| Return (%) | 3.50 | 4.50 | 4.75 | 6.00 | 3.85 | 5.85 | 6.30 | 4.55 | 5.20 | 3.75 | 4.00 | 5.10 | 5.73 | 5.59 |
| Risk (%) | 22.00 | 23.00 | 31.00 | 37.15 | 0.75 | 5.70 | 11.85 | 7.50 | 12.00 | 21.50 | 16.90 | 18.00 | 12.73 | 15.89 |
| **Recessionary/Negative Growth** | | | | | | | | | | | | | | |
| Return (%) | (4.50) | (3.50) | (3.25) | (6.00) | 3.35 | 6.85 | 7.80 | 6.55 | 1.20 | (4.25) | (4.00) | 2.10 | 0.87 | (0.64) |
| Risk (%) | 27.00 | 28.00 | 36.00 | 44.65 | 0.75 | 6.70 | 13.85 | 9.00 | 15.00 | 27.50 | 21.90 | 21.00 | 15.88 | 19.82 |
| **Severe Recession/Deflation** | | | | | | | | | | | | | | |
| Return (%) | (44.50) | (43.50) | (43.25) | (41.00) | 2.85 | 14.85 | 19.80 | 16.55 | (13.80) | (44.25) | (34.00) | (1.90) | (18.89) | (27.12) |
| Risk (%) | 42.00 | 43.00 | 51.00 | 54.65 | 0.75 | 14.70 | 29.85 | 21.00 | 20.00 | 42.50 | 33.90 | 26.00 | 23.66 | 29.57 |

\* For Plans: KERS Non-Hazardous Retirement and SPRS Retirement.
\*\* For All Remaining Plans: KERS Hazardous Retirement, KERS Non-Haz, Hazardous Insurance and SPRS Insurance.

**Wilshire**

# Stress Testing: Regime Descriptions

## Regime Descriptions

- **Expansionary/Above Trend Growth** – Regime when the economy is coming out of a recession or the economy is running above long-run capacity.  Wilshire does not project the economy to remain in this regime over longer periods.

- **Baseline/Trend Growth** – The long term expected state of the economy.  Wilshire's capital market assumptions are based on this regime.

- **Slow Growth/Below Trend** – Regime when the economy is running at less than full capacity.

- **Recessionary/Negative Growth** – Regime when the economy has below zero growth.  Wilshire expects the economy would be in a recession.

- **Severe Recession/Deflation** – Regime when the economy defined by significantly negative growth.  Wilshire does not project the economy to remain in this regime over longer periods.

# Appendix – Economic Factor Exposures

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# Why Introduce Factors?

- **Risk Assessment:** Including factors within the asset allocation process provides an opportunity to measure asset class (and portfolio) exposures to key economic factors

- **Economic Efficiency:** If the underlying economic activity that drives asset performance can be identified, perhaps it can be used to assist in building economically-efficient portfolios

- **Portfolio Stability:** Macroeconomic risk factors – when separated from the valuation component inherent in investment pricing – may exhibit more stable correlations and, therefore, can better inform the allocation process

# Growth Proxy

- Interest rates contain information and can reflect economic factors

- Nominal yields aggregate two important and distinct sources of economic information – real yields and expected inflation

- Disaggregating these factors should prove beneficial in developing a set of factors with improved explanatory power



Data Source: Federal Reserve, Bridgewater

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# Inflation Proxy

- Breakeven inflation is the market's expectation for inflation

- Tends to follow closely with actual, recent inflation and can act as a timely signal of trends in consumer prices



Data Source: Federal Reserve, Bridgewater

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# Wilshire's Approach

- Employ a 2-factor regression model (growth and inflation) to formulate factor assumptions

- Growth proxy is enhanced by high yield bond spreads to better capture shifts in growth forecasts
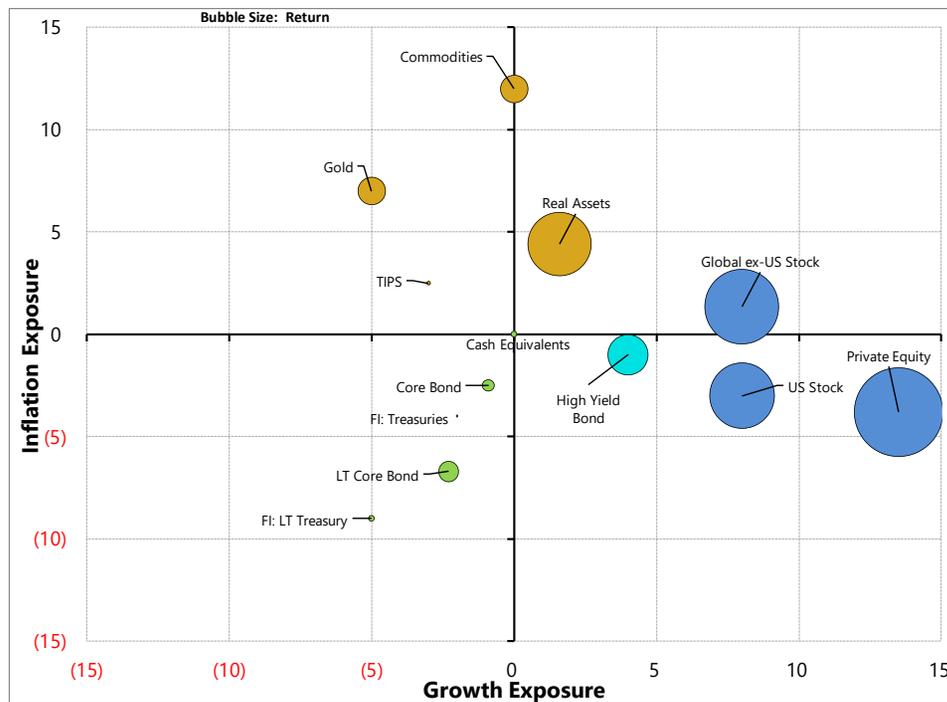
Wilshire

# Appendix – Liquidity

**Wilshire**

# Liquidity Risk: What Are The Consequences?

Default/Insolvency is the most severe outcome from having insufficient liquidity, but...
There are many other, more likely, disruptive impacts that a lack of liquidity can impose on an investment portfolio

- Liquidity breaches can rob an investor of their biggest advantage: a long-term investment horizon

- The timing and price of such sales dictated by liquidity needs rather than by explicit investment rationale

- Can destroy portfolio value and effectively strip a portfolio from its ability to recover from market sell-offs
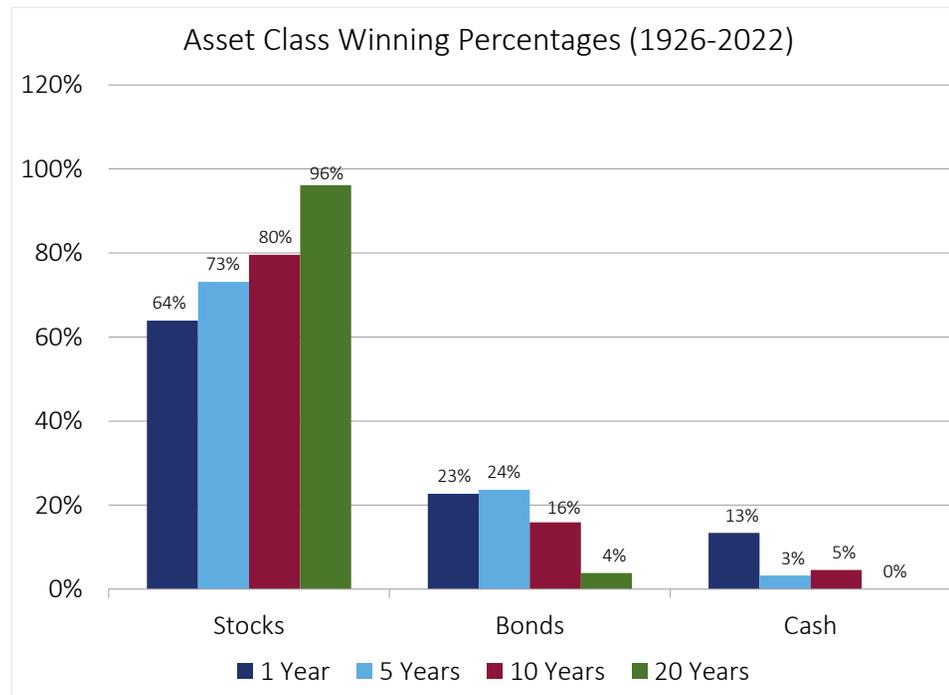
**Asset Class Winning Percentages (1926-2022)**



Bar chart showing Asset Class Winning Percentages (1926-2022):

| | 1 Year | 5 Years | 10 Years | 20 Years |
|---|---|---|---|---|
| Stocks | 64% | 73% | 80% | 96% |
| Bonds | 23% | 24% | 16% | 4% |
| Cash | 13% | 3% | 5% | 0% |

**Wilshire**

# Wilshire Liquidity Metric

Wilshire's Liquidity Metric framework has two levels:

- **Market Level of Liquidity**
- **Stressed Level of Liquidity**

## Market Level of Liquidity

- Quantified on scale from 0% (low liquidity) to 100% (high liquidity)

- Designed to capture general notion of marketable versus private/off-market transactions

  - Marketable asset classes typically reflect a 90% or 100%

  - Private asset classes reflect 0%

- Goal is to reflect the tradability of assets, which is helpful in connecting these values back to our definitional framework (i.e., to quantify the differences between Convertible Liquidity and Delayed Liquidity)

**Wilshire**

# Wilshire Liquidity Metric

**Wilshire's Liquidity Metric framework has two levels:**
- **Market Level of Liquidity**
- **Stressed Level of Liquidity**

## Stressed Liquidity Metric

Includes a penalty process to reflect the loss in practical liquidity due to asset class volatility and sensitivity to particular economic environments

Penalty components:

1. Growth Penalty:
   - Impacts asset classes with vulnerability to slowing growth
   - Recognizes the hit to liquidity that can occur during growth related bear markets

2. Inflation Penalty:
   - Impacts asset classes with vulnerability to rising inflation
   - Recognizes the hit to liquidity that can occur during inflation driven bear markets

3. Volatility Penalty:
   - Impacts higher volatility asset classes
   - Recognizes the hit to liquidity that can occur from any form of volatility

**Wilshire**

# Wilshire Stressed Liquidity Metric

## Stressed Level of Liquidity Metric

| Asset Class | Market Liquidity | Liquidity Penalty Components | | | Applied Penalty | Stressed Liquidity |
|---|---|---|---|---|---|---|
| | | Growth | Inflation | Volatility | | |
| US Equity | 100 | 50 | | 24 | 50 | 0 |
| Dev ex-US Equity | 100 | 50 | | 26 | 50 | 0 |
| EM Equity | 90 | 50 | | 40 | 50 | 0 |
| Private Equity | 0 | 50 | | 40 | 0 | 0 |
| Cash Equivalents | 100 | | | | 0 | 100 |
| Core Bonds | 100 | | 8 | | 8 | 86 |
| High Yield Bonds | 80 | 40 | | 10 | 40 | 0 |
| US Real Estate Securities | 90 | 50 | | 24 | 50 | 0 |
| Private Real Estate | 0 | 50 | | 18 | 0 | 0 |
| Commodities | 90 | | | 20 | 20 | 55 |

Applied Penalty = Min(Max(Growth + Inflation, Volatility), Market Liquidity)

Stressed Liquidity * = Market Liquidity - (1.75 x Applied Penalty)

*If less than 20, Stressed Liquidity is assumed to be 0*

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# KRS Investment Committee

Real Return Recommendation – Saba Capital

January 18, 2024

# Top Candidate Characteristics – Saba Capital

## Closed-End Funds Separately Managed Account
### *$75 Million Recommendation*

Saba Capital Management ("Saba") is a New York-based investment firm founded in 2009 focused on relative value and arbitrage strategies. The firm was founded by Boaz Weinstein, who was previously co-head of the Global Credit Trading business at Deutsche Bank. Saba utilizes its credit analysis and trading background to arbitrage dislocations and hedge risk across capital structures and markets.

Since 2013, the firm has been investing in listed closed-end funds and investment trusts that trade at sizable discounts to net asset value (NAV). Saba selectively pursues activism and legal judgments to unlock shareholder value and monetize the discount to NAV.

During 2023, Saba won legal judgments or helped closed discounts related to funds managed by BlackRock, Brookfield, Franklin Templeton, and Goldman Sachs, among others.

This investment would provide exposure to listed equity and fixed income securities at a discount, including meaningful exposure to real assets through the energy, utilities, materials, and infrastructure sectors.

## Due Diligence Summary

Date of First KPPA Meeting
1/28/2020 (Conference)

Date of Subsequent Meetings
3/3/2023 (Call)
4/24/2023 (Call)
6/26/2023 (Call)
8/2/2023 (Onsite – NYC)
8/22/2023 (Call)
10/11/2023 (Virtual)
10/31/2023 (Call)
12/7/2023 (Call)

Date of Operational Due Diligence Report
6/28/2023

Date of Consultant Manager Report
7/7/2023

Legal Negotiation Initiated
8/18/2023

Comparable Strategies Reviewed
10 (closed end funds)

# Executive Summary

**Saba** | Capital

**Saba is a registered investment advisor focused on relative value strategies. The Firm seeks to profit from dislocations between credit and equity instruments and deliver convex returns, particularly in volatile markets.**

**Saba has $4.7 billion in AUM and 51 employees, including 15 investment professionals.[1]**

- Saba was founded in 2009 by Boaz Weinstein, who was previously co-head of the Global Credit Trading business at Deutsche Bank, where he managed a team of approximately 650 people. Boaz is known for pioneering a number of credit relative value and capital structure investing strategies.

- Boaz's 28 years of experience in relative value credit strategies deeply informs Saba's investment philosophy.

- Saba's investment team has been at the forefront of hedging tail risk and arbitraging dislocations between bonds, loans, structured credit, and derivatives across capital structures and term structures.

- Saba uses a rigorous investment process that combines quantitative models with fundamental and technical analysis.

- Saba began investing in investment trusts/closed-end funds in 2013 and is the industry leader in activism and relative value trading, currently managing a ~$5.1 billion[2] portfolio.

- Saba pursues activism where corporate actions may be an effective tool to unlock shareholder value and monetize the discount to NAV.

- Saba has a diverse institutional investor base, including funds of funds, pensions, foundations, endowments, family offices and HNW individuals.

[1]As of 1/1/2024. [2]Long exposure of closed-end funds owned firm-wide as of 12/31/2023. Nothing here is a guarantee or assurance of successful or profitable outcomes.

# Firm Overview

**Saba | Capital**

## Founded in 2009, Saba manages $4.7 billion in several Funds:

- Multi-Strategy Relative Value (Flagship)

- Tail Hedge

- Closed-End Fund Arbitrage

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**SABA CAPITAL MANAGEMENT, L.P.**

Founded in 2009

| **FLAGSHIP[1]** | **TAIL HEDGE** | **CLOSED-END FUND ARBITRAGE[2]** | **EXCHANGE LISTED (Tickers: CEFS, BRW)** |
|---|---|---|---|
| Launched: 4/2009 | Launched: 4/2011 | Launched: 10/2015 | Launched: 3/2017, 6/2021 |
| Strategy AUM: $1,580mm | Strategy AUM: $1,510mm | Strategy AUM: $1,030mm | Strategy AUM: $515mm |

[1]Includes funds of one for Flagship as well as funds and accounts for sub-strategies not currently available for investment.
[2]Strategy AUM includes AUM for Saba's sub-advised Fund, The Saba Closed-End Funds ETF (CEFS).
AUM estimated as of 1/1/2024.

# Current Closed-End Fund Universe[1]

**Saba | Capital**

- The closed-end fund universe is substantial with over $440 billion AUM across 735+ funds globally

- Currently, at least $58 billion market value of CEFs trade at a discount to NAV greater than 15%

  - The opportunity to own assets at double digit discounts is diversified across equities, corporate credit, municipal bonds and more

**Closed-End Fund Universe**



- **>15% Discount**
- **10-15% Discount**
- **<10% Discount**
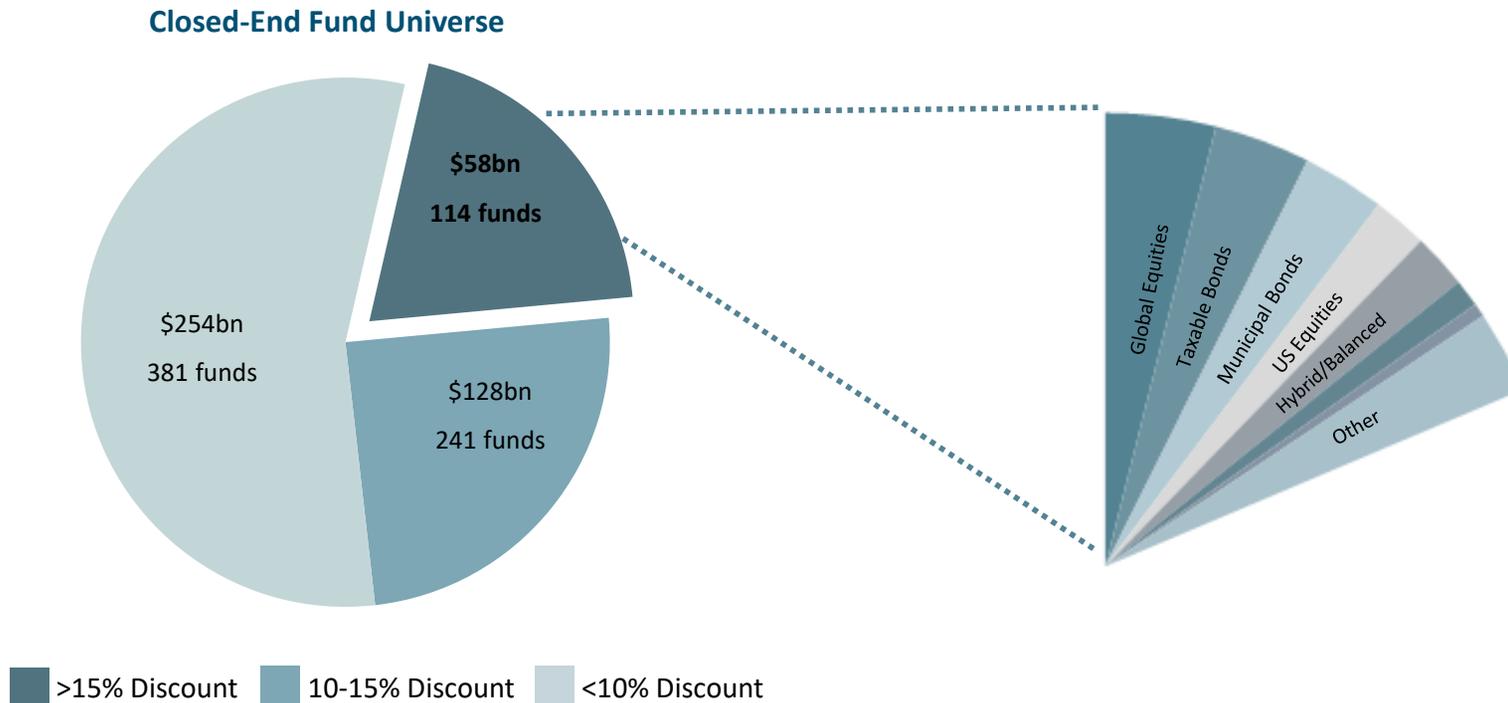
[1]Includes all active listed closed-end funds in USD, GBP, AUD and CAD, excluding interval funds and funds where asset class is Private Equity or Real Estate and for which current and historical data is available on Bloomberg. As of 11/30/2023. Sources: Saba, Bloomberg, Bloomberg Fund Screening Tool (FSRC). Statements about the investment universe or pipeline are not a guarantee that certain investments will be available, or that such investments will be profitable.

# Bloomberg 2023 Global Activism Review

**Saba** Capital

| By All Campaigns | | Top Activists of 2023 | By $1b+ Only |
|---|---|---|---|
| **Activist** | **Total Campaigns** | **Activist** | **$1b+ Campaigns** |
| **Saba Capital Management** | **64** | Elliott Investment Management | 15 |
| Elliott Investment Management | 17 | Dalton Investments LLC | 7 |
| Nippon Active Value Fund | 12 | Starboard Value LP | 7 |
| Dalton Investments LLC | 10 | ValueAct Capital Management | 7 |
| Murakami Funds | 10 | **Saba** / Align / Ancora (*tie*) | **6** |
| Oasis Management | 10 | Inclusive Capital | 5 |

Investment Companies
& EMEA REITs
Sales Desk Note
21st June 2023

**From Jefferies market communication on the UK CEF market**

*"The investment trusts sector has become fat on cheap money and it needs to adapt. There are also too many funds. Many are obsolete because they could be equally well managed in an open-ended wrapper. Many are sub-scale and trade at permanent discounts. But that doesn't mean that there aren't many good ones run by first-class management teams which have sufficient scale and liquidity not only to survive but thrive. **Activist capital is probably required to catalyse the creative destruction necessary to shift the sector into a healthier position better tailored to the buy-side's needs.**"*

Source: Bloomberg. For Fiscal Year 2023. League table rankings may vary between quarterly/year-end publications and data found on the Bloomberg Professional Service. While Saba believes that the information from Bloomberg L.P. and its suppliers was obtained from reliable sources, it cannot guarantee its accuracy. Information contained herein is not a rating or endorsement by any third party.

**KENTUCKY PUBLIC PENSIONS AUTHORITY**

INVESTMENTS

| | |
|---|---|
| To: | KRS Investment Committee |
| From: | Anthony Chiu, Deputy CIO |
| Date: | January 18, 2024 |
| Subject: | Investment Recommendation – Saba Capital Closed-End Funds strategy |

KPPA Investment Staff is proposing a separate account investment with Saba Capital Management ("Saba" or the "Firm"). Based in New York, Saba is pursuing a value and activist strategy targeting listed closed-end funds ("CEF" or "CEFs") that are trading at significant (>15%) discounts to their net asset value ("NAV").

Currently there are more than 735 closed-end funds globally with $440 billion of assets under management. These funds are retail investment products that are sold (not bought) through the wealth management channel and largely consist of portfolios of listed securities. Equity and fixed income funds each comprise around 40% of the market, with the rest in real assets funds that hold utilities, MLPs, infrastructure).

As a result of the asset allocation that took effect in 2022, KPPA's target portfolio weight for Real Return was increased to either 10% or 13%, depending on the underlying plan. After a sizable Putnam mandate was terminated in 2022, KPPA's plans each had around a 2-3% allocation to Real Return. This proposed investment would help the plans continue moving toward target weights and be fully invested during the first half of 2024.

In identifying this investment opportunity, KPPA staff utilized a competitive search process in accordance with the Investment Policy Statement and Investment Procurement Policy in its search for strategies that provide favorable stand-alone risk-adjusted returns, low correlations to the existing portfolio, and a propensity for positive real returns across the cycle.

**Business / People:**
Saba was founded in 2009 by Boaz Weinstein to focus on relative value and arbitrage strategies. Boaz was previously co-head of Global Credit Trading at Deutsche Bank, where he worked for 11 years and led a team of over 600 people. Saba Capital was a liftout of the proprietary credit trading group that Boaz started and utilizes its credit analysis and trading background to arbitrage dislocations and hedge risk across capital structures and markets. At the beginning of 2024, Saba had $4.7 billion of assets under management and a team of 51, including 15 investment professionals.

Saba's flagship fund allocates flexibly across market opportunities. In the firm's early years, it was perhaps most famous for the "London whale" trade, in which Saba noticed and took advantage of a market anomaly in the credit default swaps market that turned out to be the result of a JPMorgan trader's outsized "hedging" positions.

Saba began trading CEFs in 2013 shortly after Paul Kazarian joined from RBC Capital Markets, where he had worked in proprietary trading and bond ETF arbitrage for 6 years. While Boaz is Saba's Chief Investment Officer, Paul has primary responsibility for CEFs and is the key person on this strategy. Paul is solely dedicated to CEFs and makes day-to-day decisions with close oversight from Boaz.

Pierre Weinstein (no relation) has worked with Boaz since 2005 at Deutsche Bank, where he managed the equity derivatives, international convertible bond and SPAC arbitrage strategies. He joined Saba at launch in 2009 and worked on CEFs more when Saba was first getting involved. Pierre spends a large majority of his time on convert and volatility arbitrage but still contributes to the CEF strategy as well.

**Investment Process and Portfolio:**
Because CEFs are sold and not bought, they do not have a naturally consistent source of demand. As a result, when investors look to sell, a discount is typically required to clear the market. Since the underlying assets of CEFs are often listed and straightforward to value, the 10-year median discount for CEFs is 7% as of November 2023.

However, market and investor sentiment can significantly influence the discount toward the 13-15% levels that start to interest Saba. The Federal Reserve's interest rate hikes and 2022's market rout have helped push CEF discounts to historically wide levels. For example, in October 2023 municipal CEF discounts were near the widest levels seen over the past 20 years, as shown below.

Daily Premium / Discount Observations for Municipal CEFs (Oct 2003 – Oct 2023)
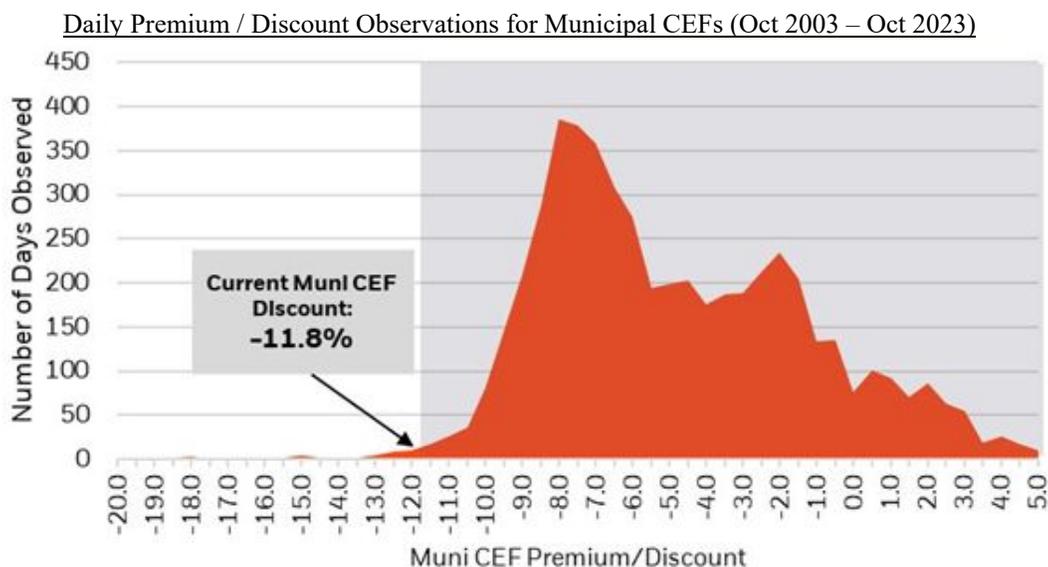


*Sources: BlackRock, Morningstar*

Saba first started investing in CEFs in 2013 and currently has over $5 billion of long exposure across the firm in what on the surface appears to be a thinly traded market. However, a combination of steady daily buying and block trades has allowed Saba to accumulate meaningful positions in dozens of CEFs.

While buying assets inexpensively can be a good investment strategy, discounts can also persist indefinitely, especially if maintaining the status quo serves the interest of the asset manager. In the case of closed-end funds, the fund manager can instantly close the discount if they choose. Tendering for shares, merging with an open-end fund, or simply liquidating the underlying assets will do the job – but also reduce the manager's fee income. So that is unlikely without a catalyst.

Thus, the second part of Saba's strategy is activism. Saba has taken 92 corporate actions since 2015 that have resulted in a partial or full monetization of the discount to NAV. Since January 2021, Saba was the lead activist on 28 of the 29 corporate actions it undertook and currently has 13Ds filed (>5% ownership) in 53 different closed-end funds.

## CEF Return Decomposition
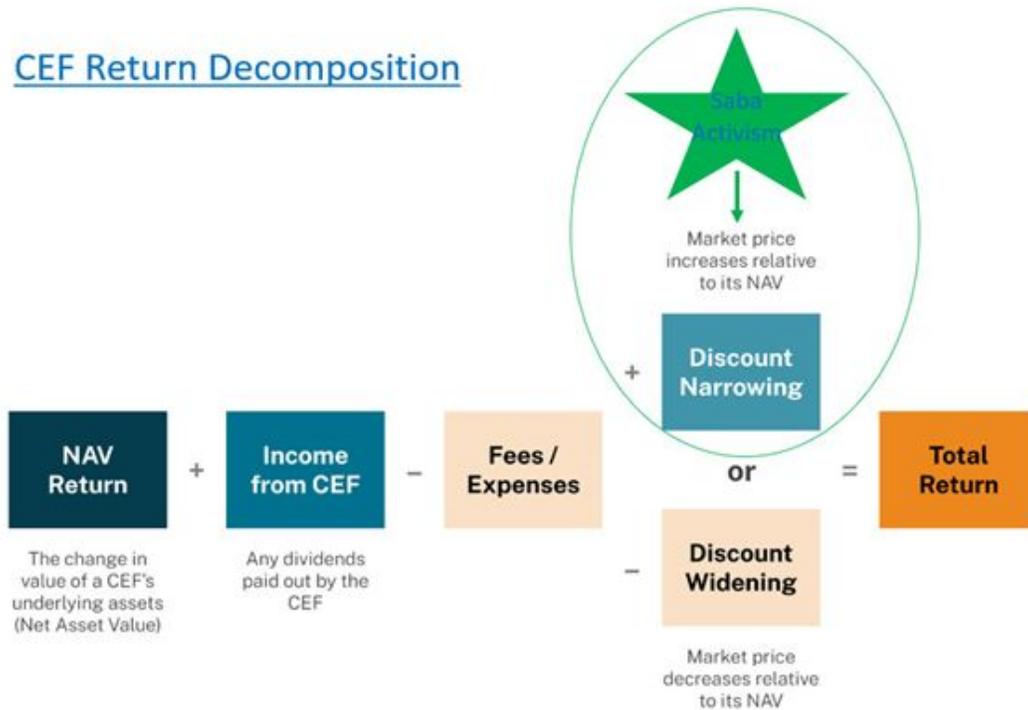


An example of Saba catalyzing action is Salient Midstream & MLP Fund (SMM), which traded at a 19% discount at the beginning of November 2021 when Saba filed their initial 13D. Saba nominated Paul and Pierre for SMM board membership at Salient's annual meeting in late June 2022. The following week the fund's trading was halted and Salient agreed to merge SMM into Salient MLP & Energy Infrastructure Fund (SMLPX), its open-end mutual fund. As shown below, about 2/3 of the discount was closed immediately when the merger was announced, with the remainder occurring when the merger closed.



# SALIENT MIDSTREAM & MLP FUND ANNOUNCES PLANNED REORGANIZATION

Salient

NEWS PROVIDED BY
**Salient Partners, L.P.** →
28 Jun, 2022, 12:26 ET

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HOUSTON, June 28, 2022 /PRNewswire/ -- Salient Midstream & MLP Fund (the "Fund") (NYSE: **SMM**) announced today that its Board of Trustees determined to reorganize SMM into Salient MLP & Energy Infrastructure Fund ("SMLPX") (the reorganization of SMM into SMLPX is the "Reorganization"). SMLPX is an open-end fund that is a series of Salient MF Trust with approximately $849 million in net assets and is also managed by Salient Capital Advisors, LLC, the investment adviser of SMM, using a similar investment strategy.

After careful consideration of a variety of factors and alternatives, the Board of Trustees determined that it would be in the best interest of shareholders to merge SMM into SMLPX.
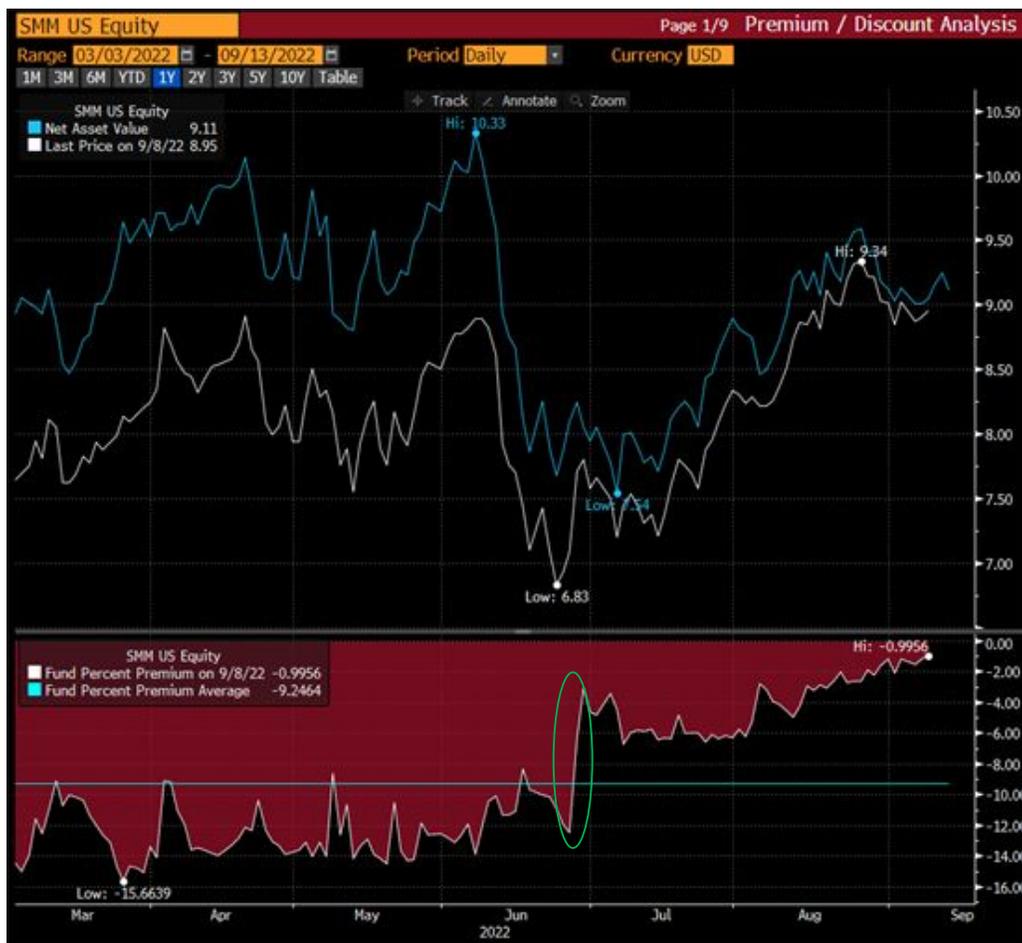
With Saba's growing activity and success, CEF managers that find Saba as a top holder of their funds have occasionally been proactive in improving shareholder value. For example, Saba initiated a position in the Goldman Sachs MLP and Energy Renaissance fund (GER) in 1Q 2022 and became the fund's largest holder by the end of 1Q 2023. But before Saba even engaged, Goldman announced in early June that it was liquidating the fund, which instantly closed the fund's 20% discount to NAV.

## Goldman Sachs Asset Management Announces Liquidation of Goldman Sachs MLP and Energy Renaissance Fund

New York, NY, June 7, 2023 — Goldman Sachs Asset Management ("GSAM"), investment adviser for the Goldman Sachs MLP and Energy Renaissance Fund (the "Fund") (NYSE: GER), announced today that the Fund's Board of Trustees, at the recommendation of GSAM, has approved a plan of liquidation and dissolution (the "Plan") for the Fund. Under the Plan, which is effective today, the Fund will begin the process of liquidating portfolio assets and unwinding its affairs in an orderly fashion over time. The Plan is not subject to shareholder approval.
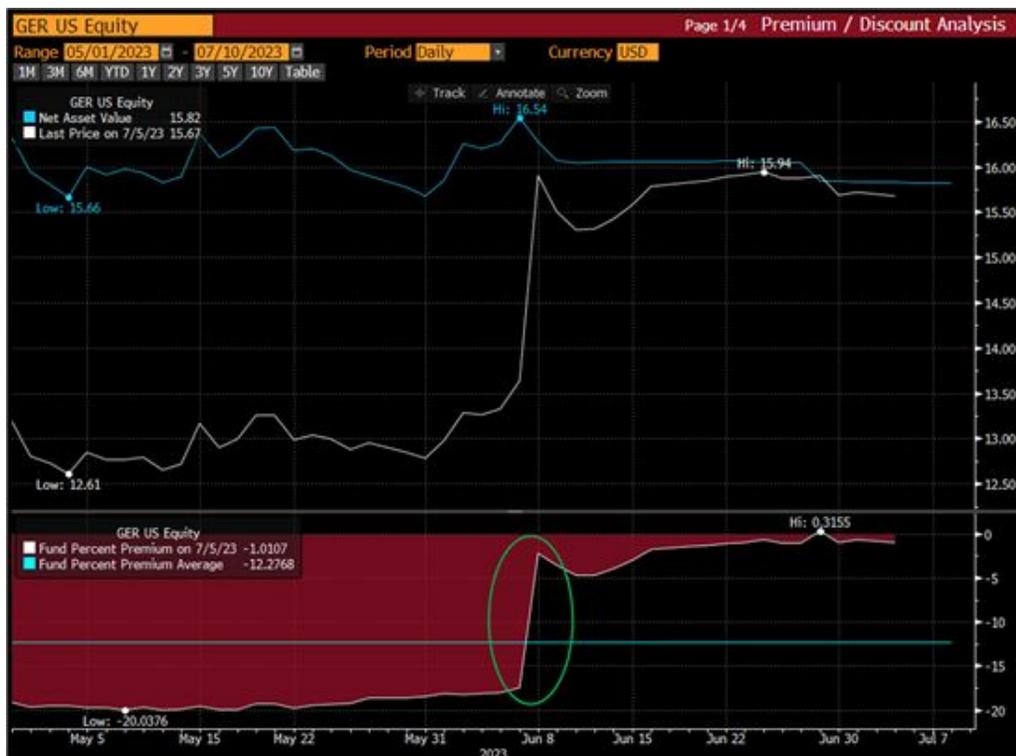
Many CEF managers have been less cooperative, which has led to a significant amount of litigation. Saba has sued and recently won judgments against managers including BlackRock, Eaton Vance, and Nuveen that have implemented provisions that limit Saba's shareholder voting rights.

Saba believes their activist trades typically span 1 to 1.25 years from inception to exit. However, with litigation some campaigns could stretch to 2 years or more – and could end up with a legal loss at the end. Additionally, the sentiment dynamics mentioned above that are a feature of the CEF landscape could cause additional discount widening, volatility, and negative returns in the short to medium term.

However, we believe Saba's approach of finding assets at discount and creating value through activism is likely to continue having success, and today's historically wide discounts provide an attractive entry point. Saba seems to share that belief as well, with its flagship fund having increased its exposure to CEFs from 9% at the end of 2021 to 46% at the end of November 2023.

**Performance:**

| Fund | 1 yr | 3 yr | 5 yr | Since Inception | Inception Date |
|---|---|---|---|---|---|
| Saba CEF Opportunities 1 | 17.8% | 7.3% | 12.3% | 10.7% | Oct-15 |
| 60/40 Portfolio | 17.7% | 4.7% | 10.0% | 8.9% | |
| S&P Real Assets Index | 7.8% | 3.9% | 5.9% | 5.1% | |

Source: Bloomberg, Saba Capital as of 12/31/2023

Since inception in October 2015, Saba's closed-end fund strategy has outpaced a blended equity and fixed income portfolio (which comprises the majority of the CEF universe) as well as a real assets benchmark.

**Conclusion:** Given the attractive economics and compelling market opportunity, Staff is recommending an investment of $75 million to be shared among all K and S plans pending successful investment management agreement negotiations. When fully funded, this would represent an additional ~1.0-1.1% of plan assets (depending on fluctuations in market value). It is anticipated this investment would be funded by existing cash or the unwinding of proxy positions based on the specific needs of each plan.

Investment and Terms Summary

**Type of Investment:** Real Return

**Structure:**          Separate Account

**Management Fee:**    0.75%

**Performance Fee:**    25% over a benchmark (60/40 portfolio)

**Purpose:**           Provide KRS with exposure to listed real asset, fixed income, and equity securities at a discount. Earn yield and monetize closed-end fund discounts through successful shareholder activism and litigation.

**Risks:**              Volatility, Liquidity, Key Person, Legal

**Exp. Net Return:**    8% - 12%

*No placement agents have been involved or will be compensated as a result of this recommendation.