MarquetteAssociates

June 13, 2024

2024 PA County Database Overview & Reassessing Portfolio Objectives

Presented by

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But first…a quiz

1

How much did the average PA County Retirement Fund actuarial assumed rate of return decrease from 2018 to 2023?

A. 0.11 percentage points

B. 0.16 percentage points

C. 0.21 percentage points

2

What was the average 5-Year annualized return for PA County Retirement Funds as of January 1, 2023?

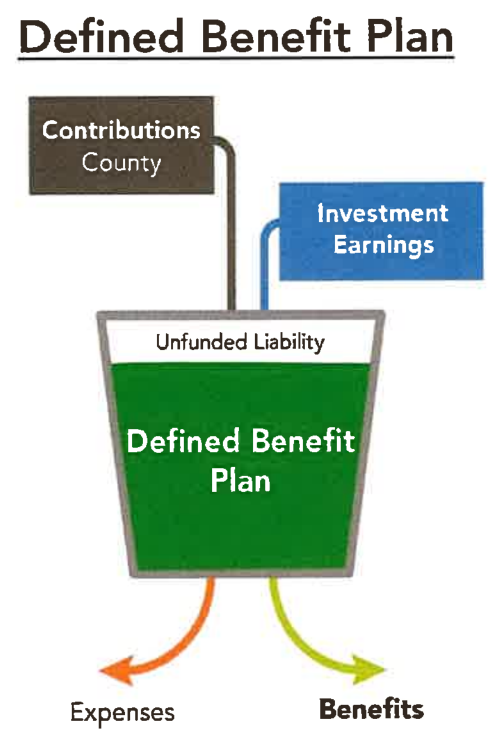
A. 4.9%

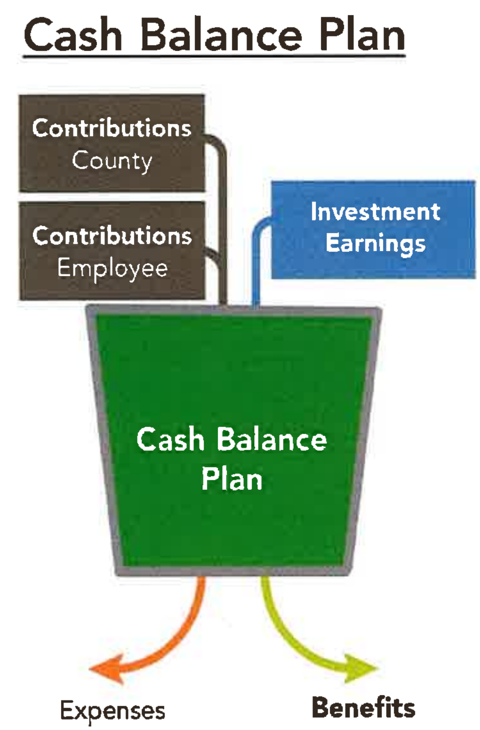
B. 5.4%

C. 5.9%

PA County Database

PA County Pension System





County Pension System

ADC & Funded Ratio affected by:

Actuarial Assumptions:

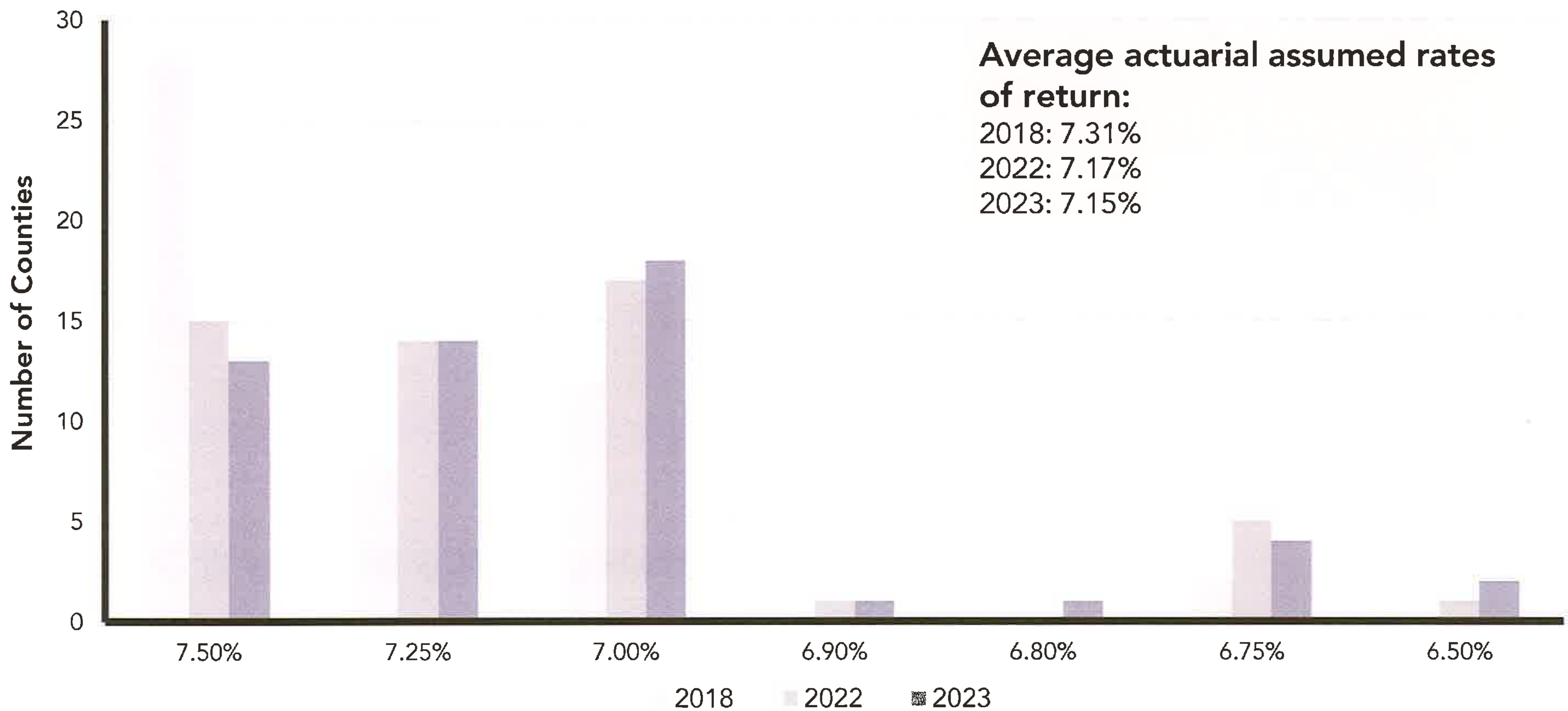
- Investment Return
- Salary Increase
- Mortality Tables

Actual:

- Benefit Class
- COLA
- Investment Return
- Payroll
- Years of Service
- Employee Crediting Rate

Actuarial Assumed Rate of Return

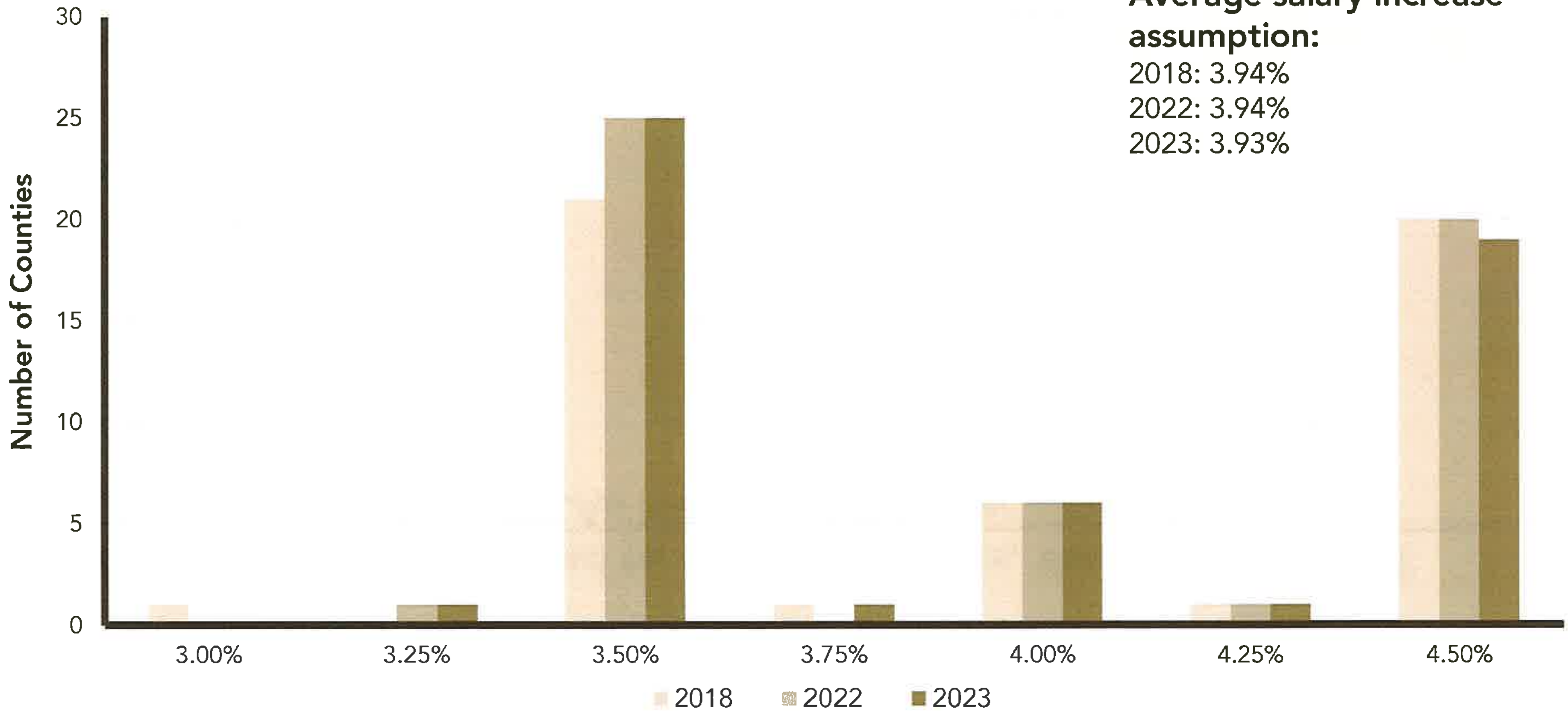
Over the past 5 years, the average actuarial assumed rate of return assumption has declined by 0.16 percentage points



Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022

Salary Increase Assumption

The average assumption is little changed over the past five years; but what about moving forward?

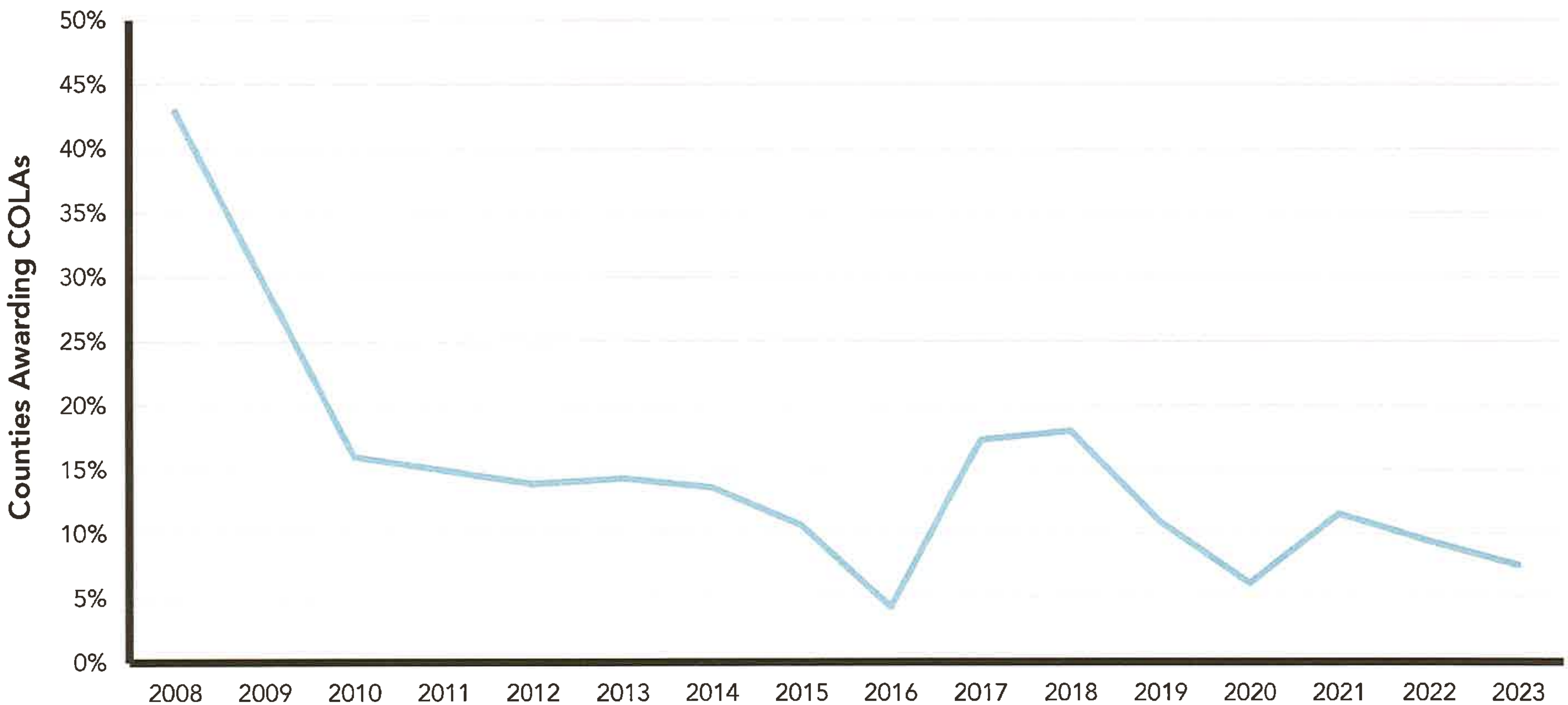


Average salary increase assumption:
2018: 3.94%
2022: 3.94%
2023: 3.93%

Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022

Cost of Living Adjustments Trends

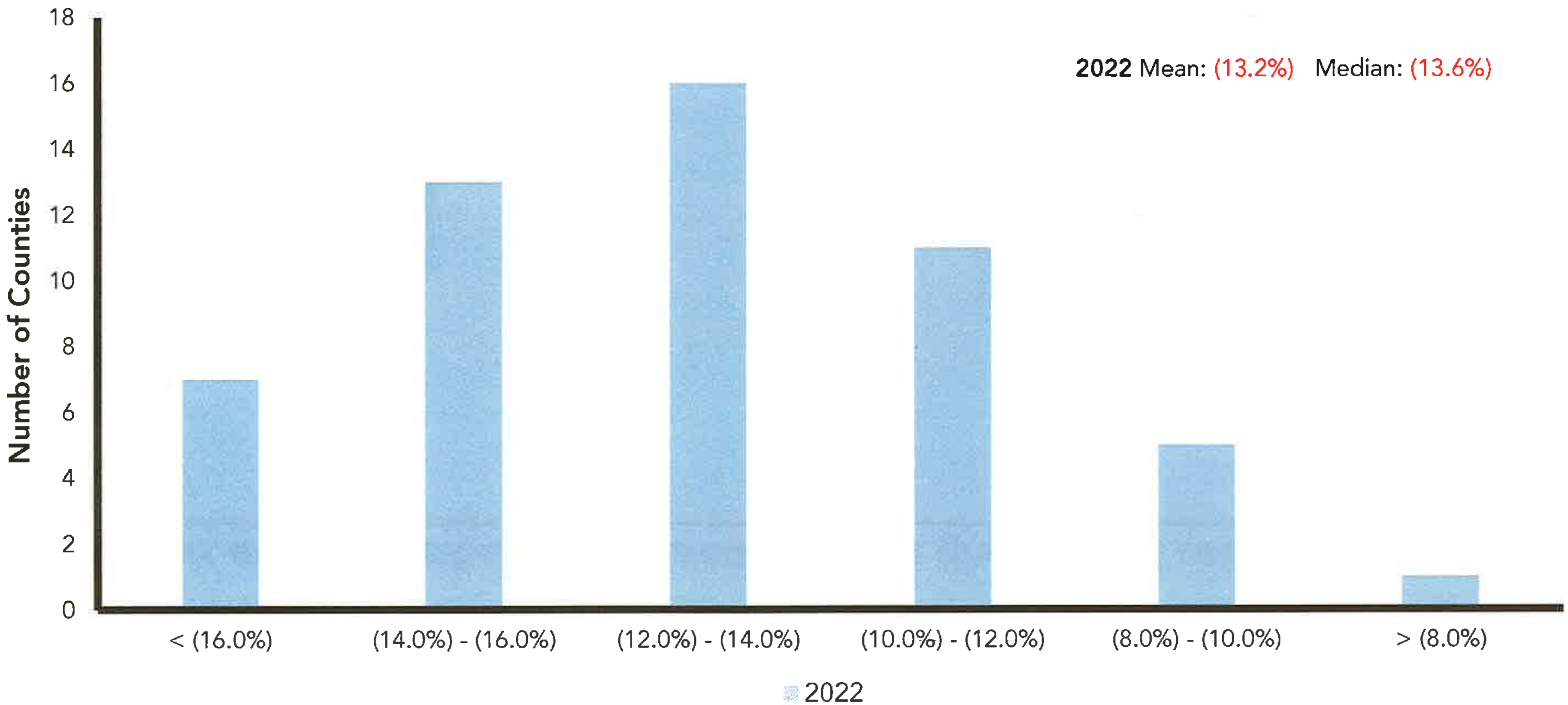
While ACT 63 in 2017 led to uptick in COLAs, the percentage of Counties awarding COLAs has trended lower since then



Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022

Navigating Negative Markets

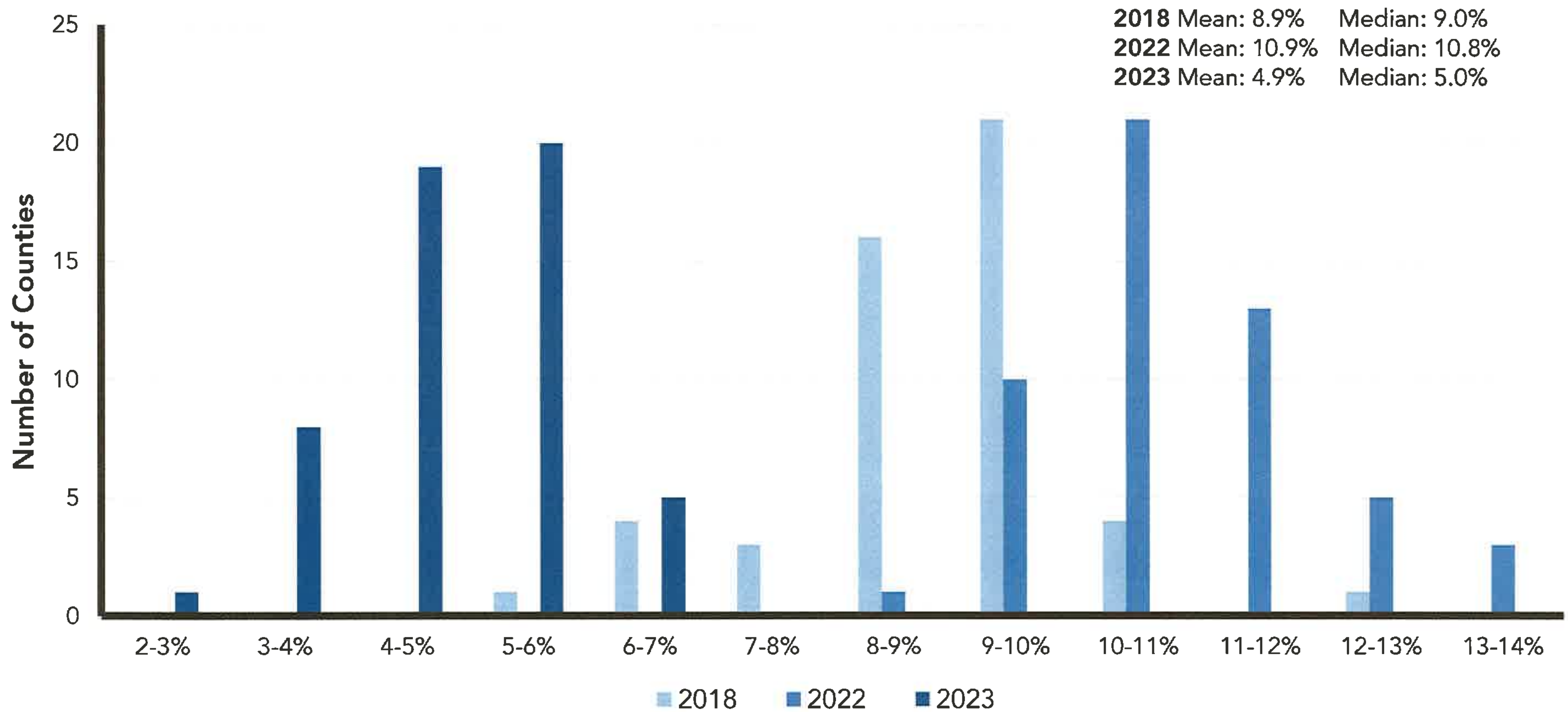
2022 was the worst year for PA County Retirement Fund returns since 2008 as both equities and fixed income were under pressure



Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022. Past performance is not indicative of future results.

5-Year Returns

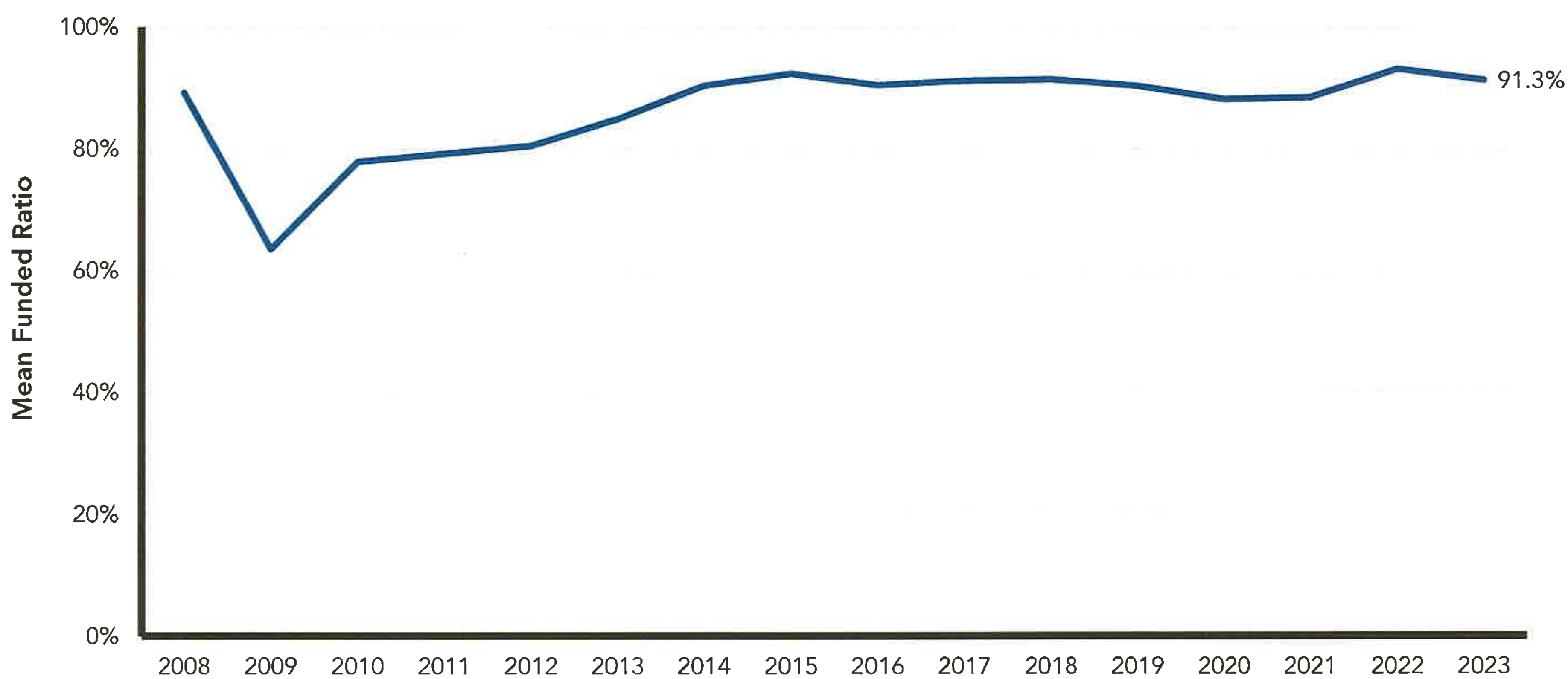
5-year average returns dropped notably given 2022 returns



Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022. Past performance is not indicative of future results.

Mean Funded Ratio Trend

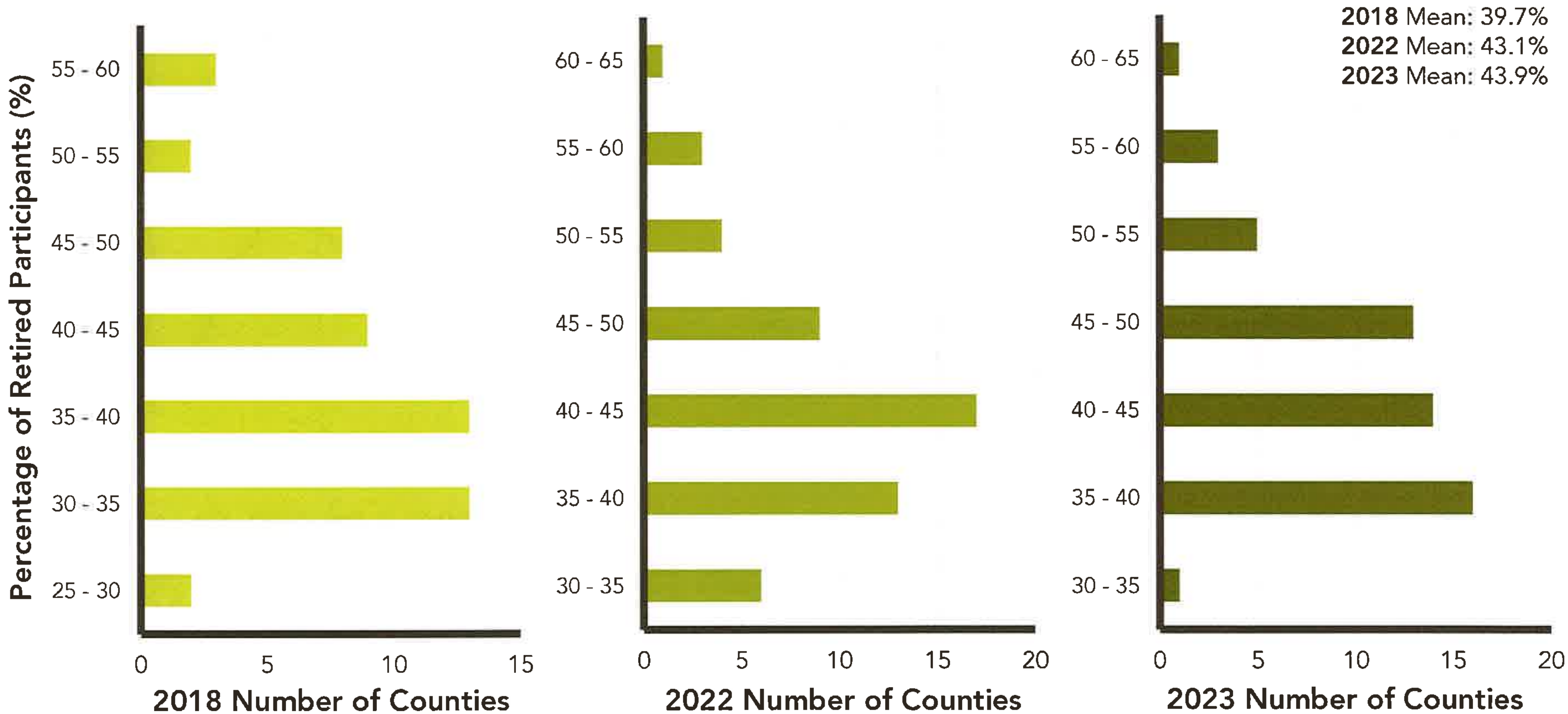
The average County funded ratio ticked down to 91.3% from 93.1% the previous year



Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022

Retired Participants

Retirees as a percent of participants continues to increase, affecting cash flow management



Source: 2023 Pennsylvania County Pension Plan Report prepared by Marquette Associates, data period ending December 31, 2022

Reassessing Portfolio Objectives

But first…a quiz (cont'd)

3

What has been the best performing major asset class over the 5-year period from 2018-2023?

A. U.S. Large-Cap stocks

B. U.S. Small-Cap Stocks

C. Commodities

D. Emerging Market Stocks

E. High Yield Bonds

4

In what year of the four-year Presidential cycle, have markets posted the strongest stock market returns on average?

A. Year 1

B. Year 2

C. Year 3

D. Year 4

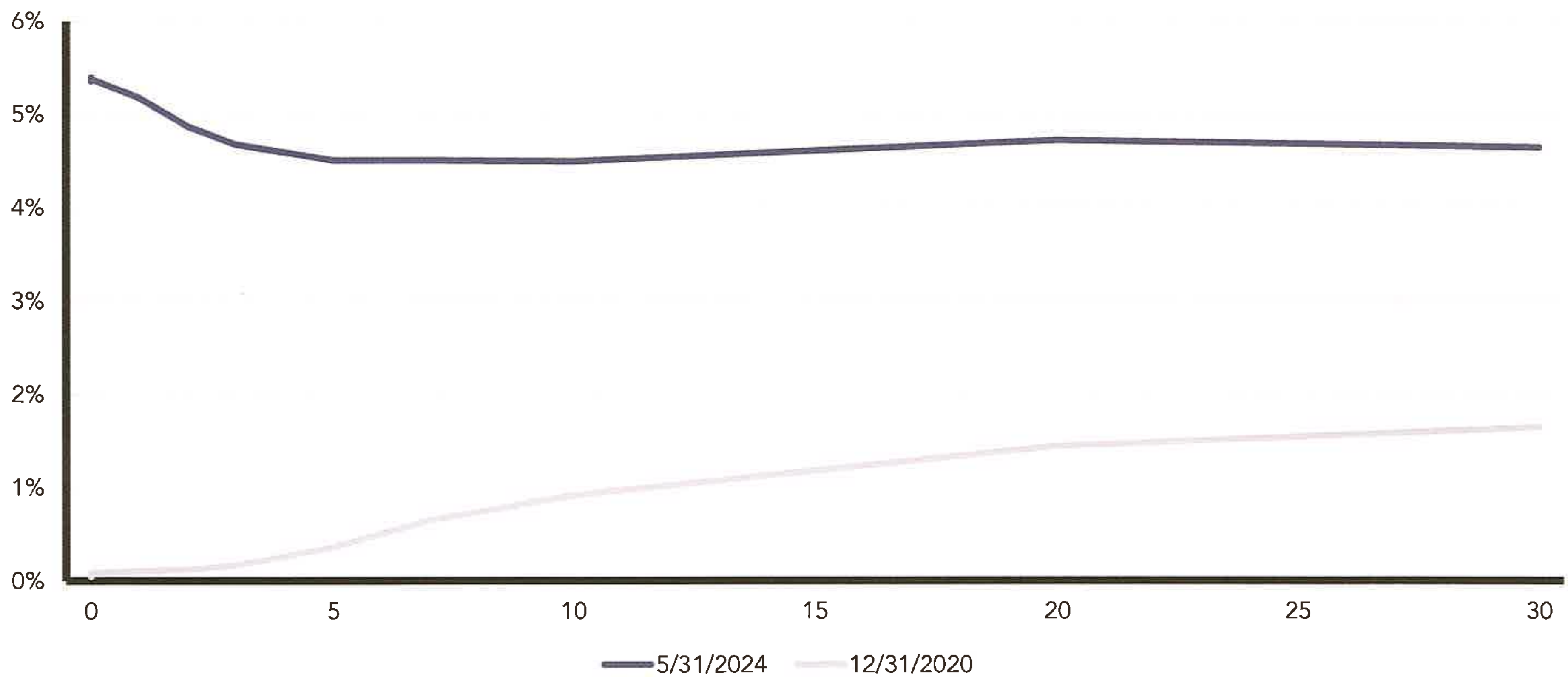
Portfolio objectives

- Asset growth
- Risk mitigation
- Spending/benefit payments
- Liquidity

Client return targets uniquely reflect the convergence of these objectives

Rapid rise in interest rates...

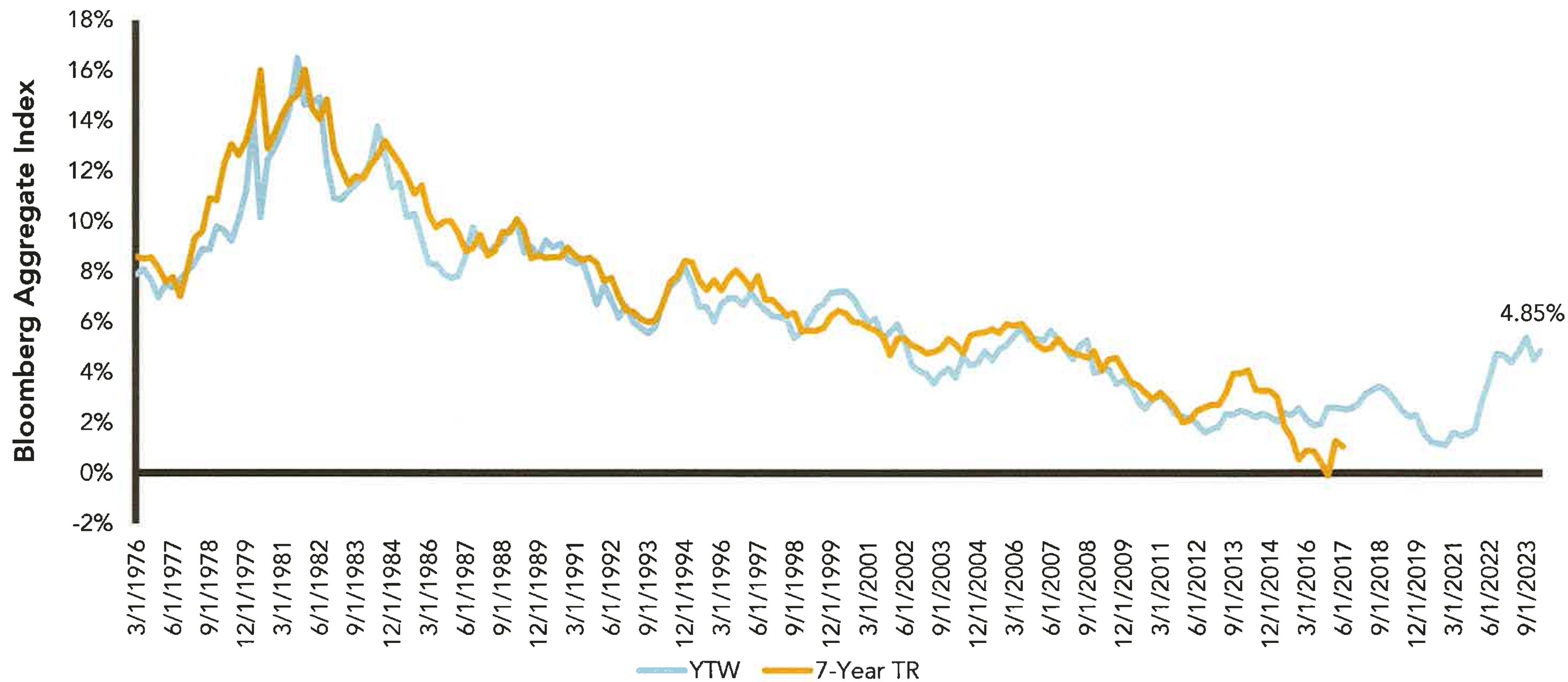
Aggressive Fed policy to curb inflation has led to a new yield environment



Source: Bloomberg, Federal Reserve

...has materially impacted return expectations

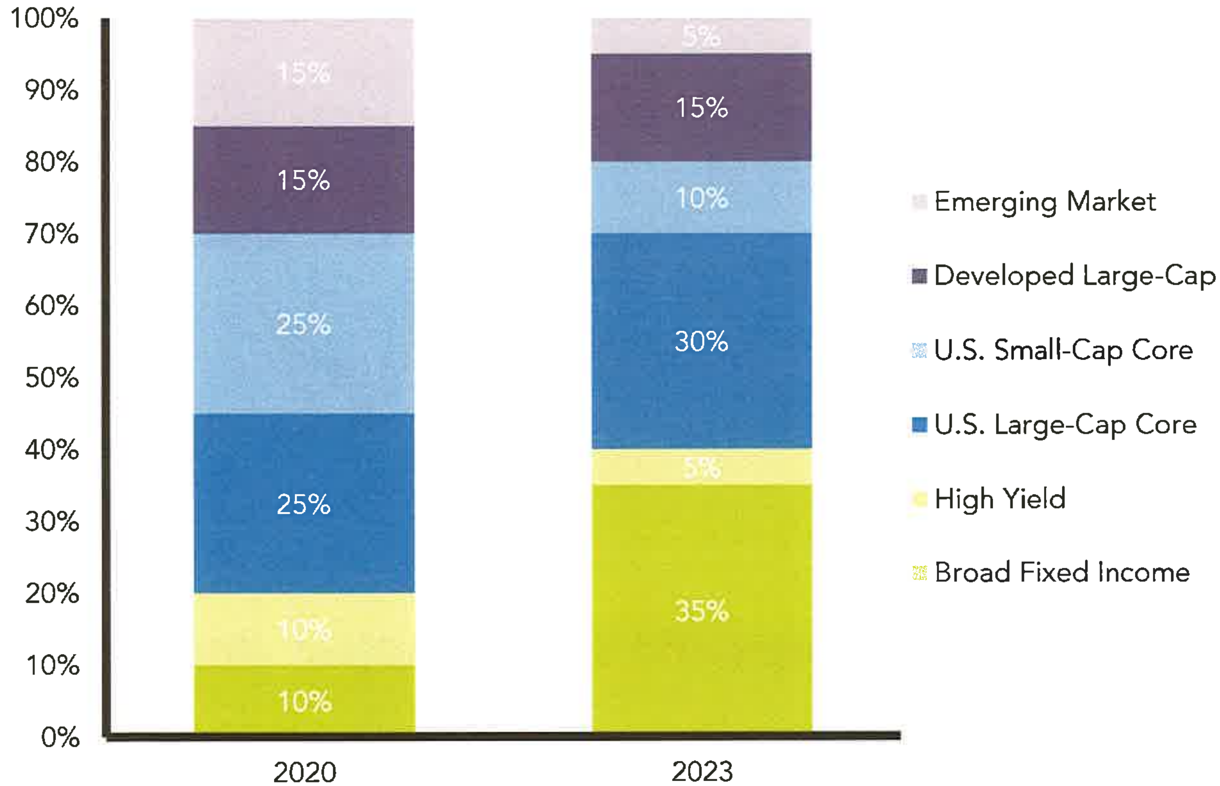
Higher yields leave a much-improved outlook for fixed income



Source: Refinitiv

Same goal, less volatile portfolio

Investors can allocate more to fixed income now to meet return targets, reducing volatility



2020	
Avg. Annualized 10 Yr. Return	**7.25%**
Avg. Annualized 10 Yr. Volatility	**14.75%**

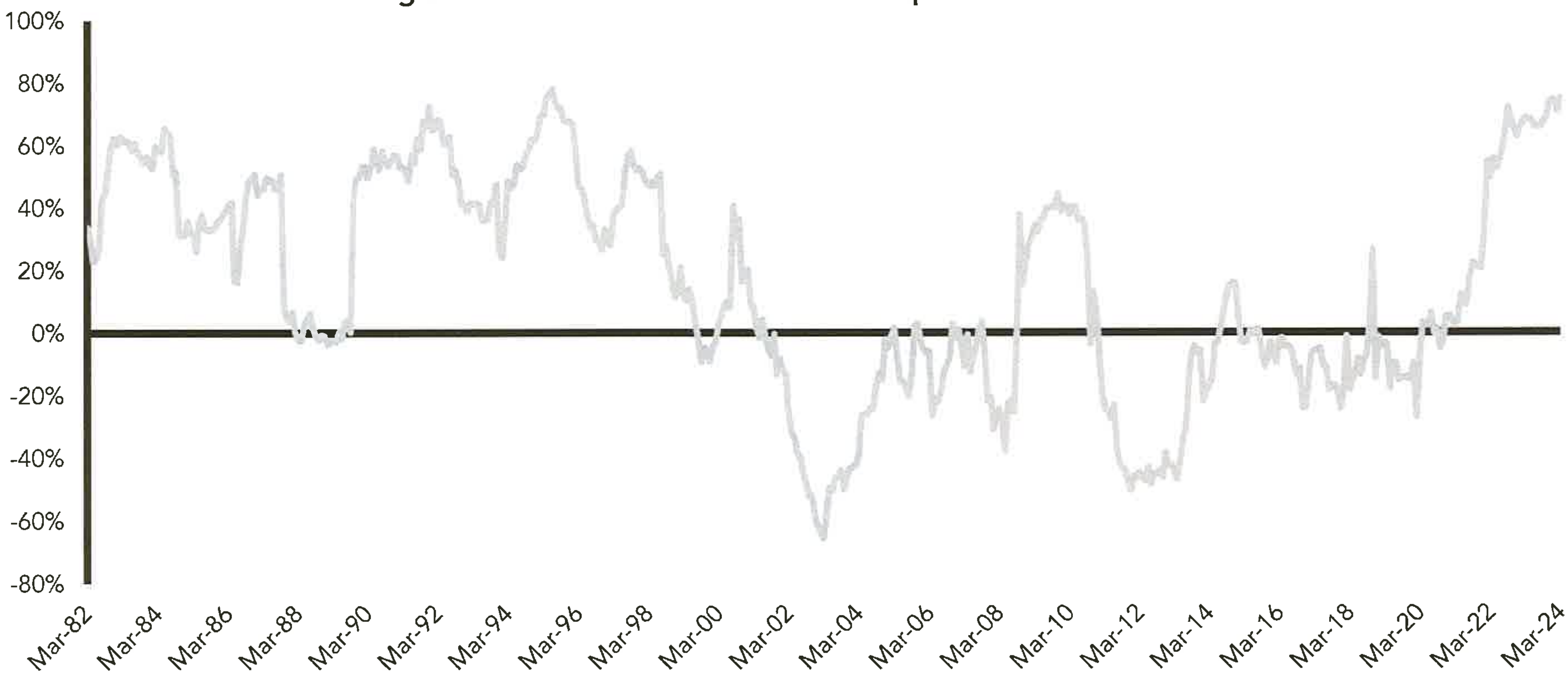
2023	
Avg. Annualized 10 Yr. Return	**7.25%**
Avg. Annualized 10 Yr. Volatility	**10.46%**

Source: Marquette Associates Asset Allocation Software as of December 31, 2023. Please see the disclosure at the end of the presentation.

Relationship between equities and fixed income

That said, the correlation between equities and fixed income has shifted notably and may leave such projections overly optimistic

Rolling 2-Year Correlation Between U.S. Equities and Fixed Income



Source: Refinitiv

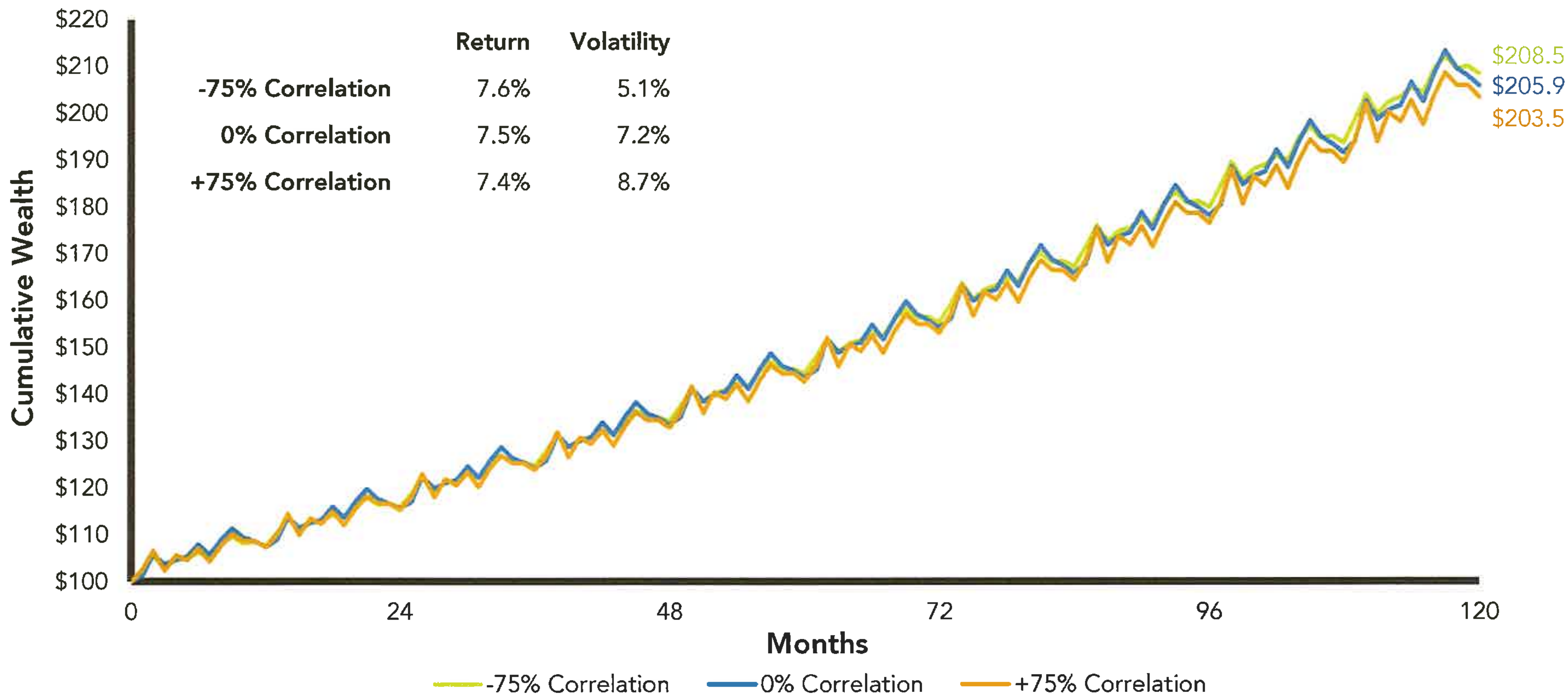
Impact of different correlations...an example

- Two-asset 50/50 portfolio (Equities and Fixed Income)
- Same asset returns (9.0% and 5.5%)
- Same asset volatility (12.5% and 5.0%)
- Different correlations
- Portfolio rebalanced monthly

Impact of different correlations…an example

If equities and fixed income correlations are higher than the recent past, that will lead to lower returns and higher volatility

	Return	Volatility
-75% Correlation	7.6%	5.1%
0% Correlation	7.5%	7.2%
+75% Correlation	7.4%	8.7%



Source: Refinitiv

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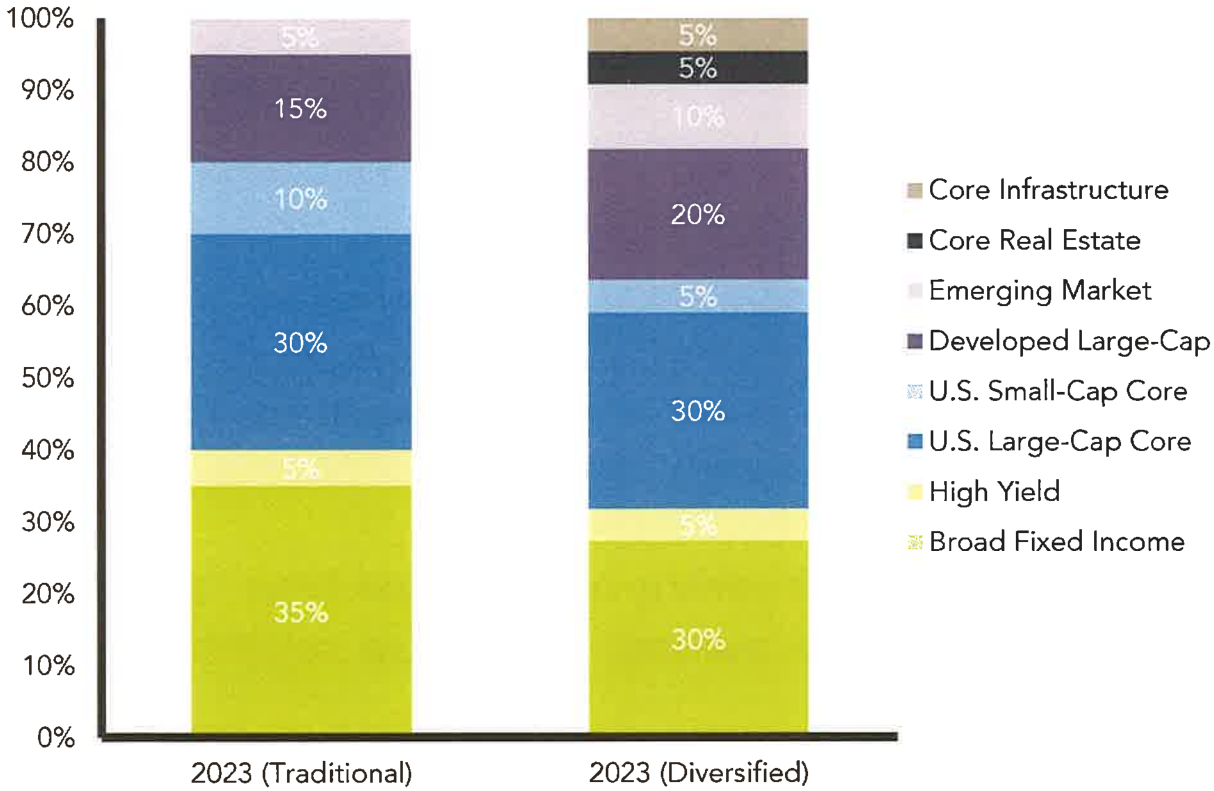
Same goal, less volatile portfolio

Investors should consider other diversifying assets to protect against this risk



2023 (Traditional)	
Avg. Annualized 10 Yr. Return	7.25%
Avg. Annualized 10 Yr. Volatility	10.46%

2023 (Diversified)	
Avg. Annualized 10 Yr. Return	7.25%
Avg. Annualized 10 Yr. Volatility	9.95%

Source: Marquette Associates Asset Allocation Software as of December 31, 2023. Please see the disclosure at the end of the presentation.

Key takeaways

- Plan specific objectives converge to inform return targets
- Higher rate environment increases the probability of achieving return targets
- Consider the impact of higher correlations between Equities and Fixed Income
- Diversifying with non-traditional asset classes will likely combat rising correlations

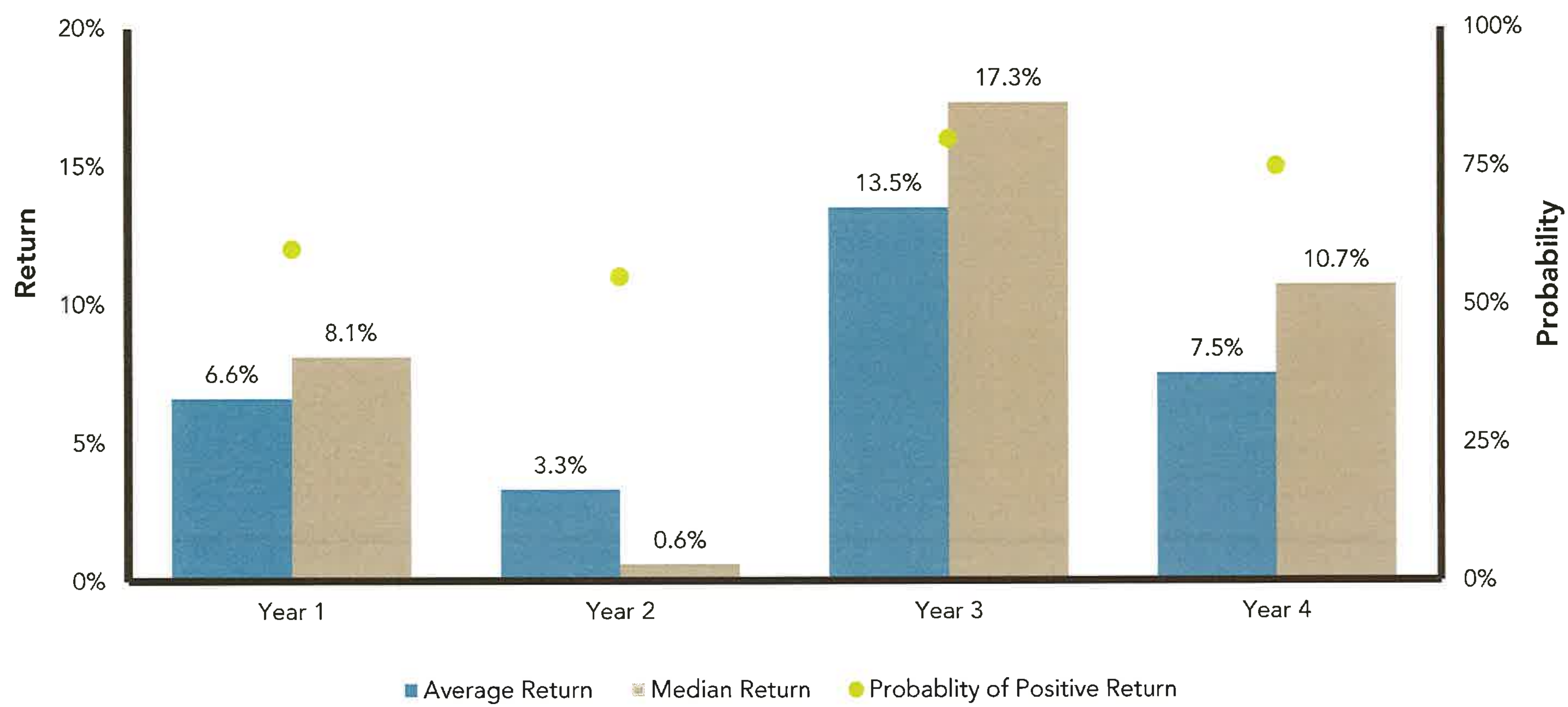
Best Performing Asset Class 2018-2023

2023	2022	2021	2020	2019	2018	5yr
Large Cap 26.3%	Commodities 26.0%	Commodities 40.4%	Broad U.S. Equities 20.9%	Large Cap 31.5%	Bank Loans 1.1%	Large Cap 15.0%
Broad U.S. Equities 26.0%	Bank Loans -1.1%	Large Cap 28.7%	Small Cap 20.0%	Broad U.S. Equities 31.0%	Core Bond 0.0%	Broad U.S. Equities 14.3%
Intl Large Cap 18.2%	High Yield -11.2%	Broad U.S. Equities 25.7%	Large Cap 18.4%	Mid Cap 30.5%	High Yield -2.1%	Mid Cap 11.1%
Mid Cap 17.2%	Core Bond -13.0%	Mid Cap 22.6%	Emerging Markets 18.3%	Small Cap 25.5%	Large Cap -4.4%	Commodities 7.8%
Small Cap 16.9%	Intl Large Cap -14.5%	Small Cap 14.8%	Mid Cap 17.1%	Intl Small Cap 25.0%	Broad U.S. Equities -5.2%	Intl Large Cap 7.3%
Broad Intl Equities 15.6%	Broad Intl Equities -16.0%	Intl Large Cap 11.3%	Intl Small Cap 12.3%	Intl Large Cap 22.0%	Mid Cap -9.1%	Small Cap 8.1%
High Yield 13.4%	Mid Cap -17.3%	Intl Small Cap 10.1%	Broad Intl Equities 10.7%	Broad Intl Equities 21.5%	Small Cap -11.0%	Broad Intl Equities 6.0%
Intl Small Cap 13.2%	Large Cap -18.1%	Broad Intl Equities 7.8%	Intl Large Cap 7.8%	Emerging Markets 18.4%	Intl Large Cap -13.8%	Bank Loans 5.3%
Bank Loans 13.0%	Broad U.S. Equities -19.2%	Bank Loans 5.4%	Core Bond 7.5%	Commodities 17.6%	Commodities -13.8%	Intl Small Cap 4.9%
Emerging Markets 9.8%	Emerging Markets -20.1%	High Yield 5.3%	High Yield 7.1%	High Yield 14.3%	Broad Intl Equities -14.2%	High Yield 4.2%
Core Bond 5.5%	Small Cap -20.4%	Core Bond -1.5%	Bank Loans 2.8%	Core Bond 8.7%	Emerging Markets -14.6%	Emerging Markets 2.2%
Commodities -4.3%	Intl Small Cap -21.4%	Emerging Markets -2.5%	Commodities -23.7%	Bank Loans 8.2%	Intl Small Cap -17.9%	Core Bond 0.4%

Source: Bloomberg as of March 31, 2024. Please see end of document for benchmark information.

Timing the Presidential Cycle?

Presidential Cycle Returns



Source: KKR

Purpose:

Empower our clients to meet their investment objectives

Vision
Be a trusted partner to our clients through effective investment programs

Mission
Provide independent and thoughtful investment guidance

Why Marquette?
- ✓ Our people
- ✓ Independent expertise
- ✓ Focused client service
- ✓ Careful research

Periodic table benchmarks

Core Bond	Bloomberg Aggregate
High Yield	Bloomberg High Yield
Bank Loans	CS Leverage Loan
Broad U.S. Equities	Russell 3000
Large Cap	S&P 500
Mid Cap	Russell Mid Cap
Small Cap	Russell 2000
Broad Intl Equities	MSCI ACWI ex-U.S.
Intl Large Cap	EAFE
Intl Small Cap	EAFE Small Cap
Emerging Markets	MSCI EM
Commodities	S&P GSCI

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This document may contain hypothetical performance that is intended for institutional and/or those investors with access to the resources to independently analyze this information and who have the financial expertise to understand the risks and limitations of these types of presentations.

Criteria Used and Assumptions Made in Calculating Hypothetical Performance: Asset Allocation Analysis

The return and risk projections included in this document are based on a Monte Carlo simulation of macroeconomic factors, which are used to model monthly return outcomes of capital markets. The simulations are created by a powerful economic scenario generator that simulates the future performance of the capital markets and macro-economy and are updated quarterly; the underlying models are calibrated based on the long-term historical record, so that they will reproduce the kinds of volatility and stress scenarios that have been observed over the 20th and 21st centuries. The models are linked and correlated so that the behavior of different asset classes and economic variables is consistent within each random scenario.

Total portfolio returns are time weighted, using underlying asset class returns. This assumes that either passive or active management will match or exceed the returns of the indices. Returns are annualized returns based on the average 10-year returns generated in the 1,000 Monte Carlo simulations. The returns for the total portfolio are calculated by the following formula:

$$Ret_{t=i} = [(MV_{t=i} - MV_{t=i-1}) - NetCashFlow_{t=i} - Fee_{t=i}] / [MV_{t=i-1} + NetCashFlow_{t=i}]$$

Risks and Limitations of Using Hypothetical Performance in Making Investment Decisions

While the asset allocation model incorporates average correlations between asset classes, this can vary depending on what is happening in the market. This is especially true when financial markets are in flux. For example, while we expect international equities to decline in a similar manner to domestic equities, the possibility exists — though unlikely — for the next bear market to be concentrated in the U.S. Every market downturn has its own unique nuances, so while these scenarios demonstrate what might happen and how they could affect a portfolio, it is critical that the investor understands the unpredictable nature of financial markets and that any downturn will not exactly match the generic scenarios and investment decisions should not be made based on hypothetical scenarios. Models cannot capture every potential outcome across all economic scenarios. While re-balancing is incorporated in the construction of each portfolio, the model does not reflect transaction costs associated with re-balancing.

The sources of information used herein are believed to be reliable. Marquette Associates has not independently verified all of the data used herein and its accuracy cannot be guaranteed. Estimates and projections of financial market performance do not guarantee future performance. Since the model used to create this report relies on market data, results will vary depending on the date of the study. Past results do not guarantee future results and are subject to change as more data becomes available.

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