# The Enterprise Risks Facing California's Pension Systems

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# Introduction

# Expected returns and discount rates

Funded Ratios

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**Actuarial Rate**  **Expected Return**

Confidence Levels

Time Horizons
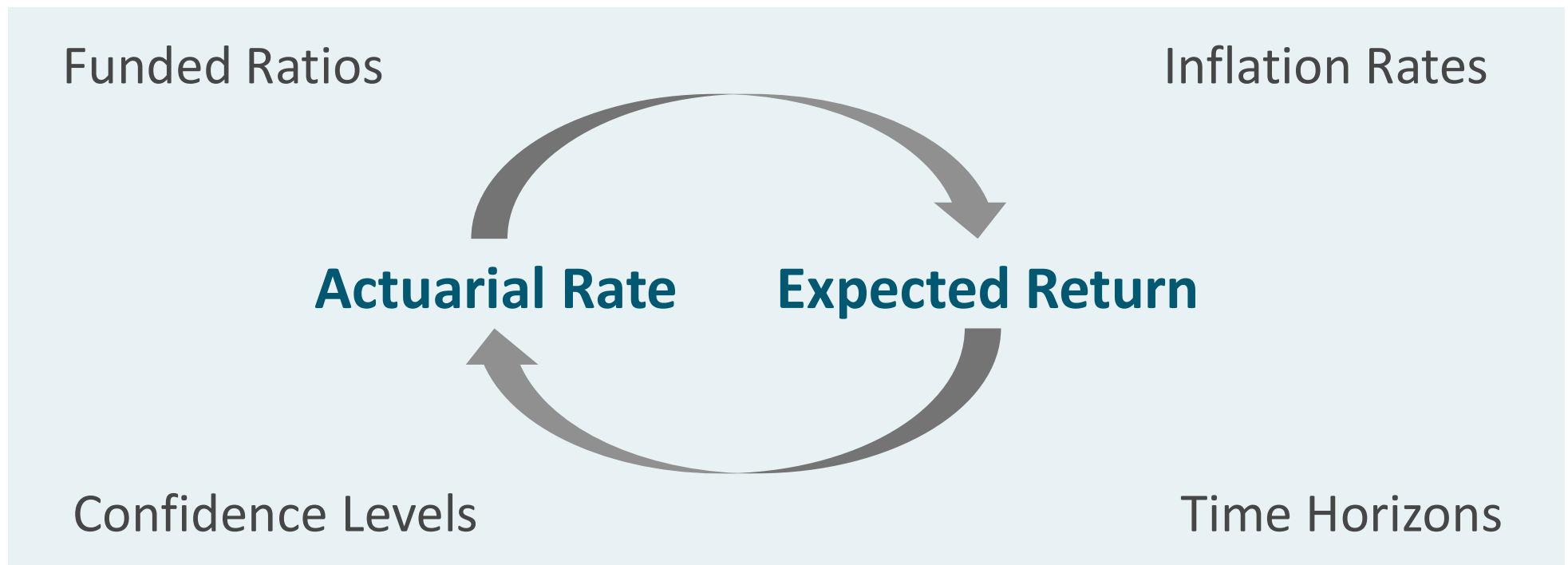
# The risk-free rate vs. expected returns

**10-YR U.S. TREASURY RATES VS. 7%**



**4.32%**

Investment programs are forced into riskier (higher volatility) portfolios to achieve the same but riskless return as in 1995.

*Source: Federal Reserve Economic Data (https://fred.stlouisfed.org)*

# Consequences of excess investment risk



Increased contributions; reduced benefits

Tighter budgets / Crowding out

Lower credit rating

Higher borrowing costs

Tighter budgets / Crowding out
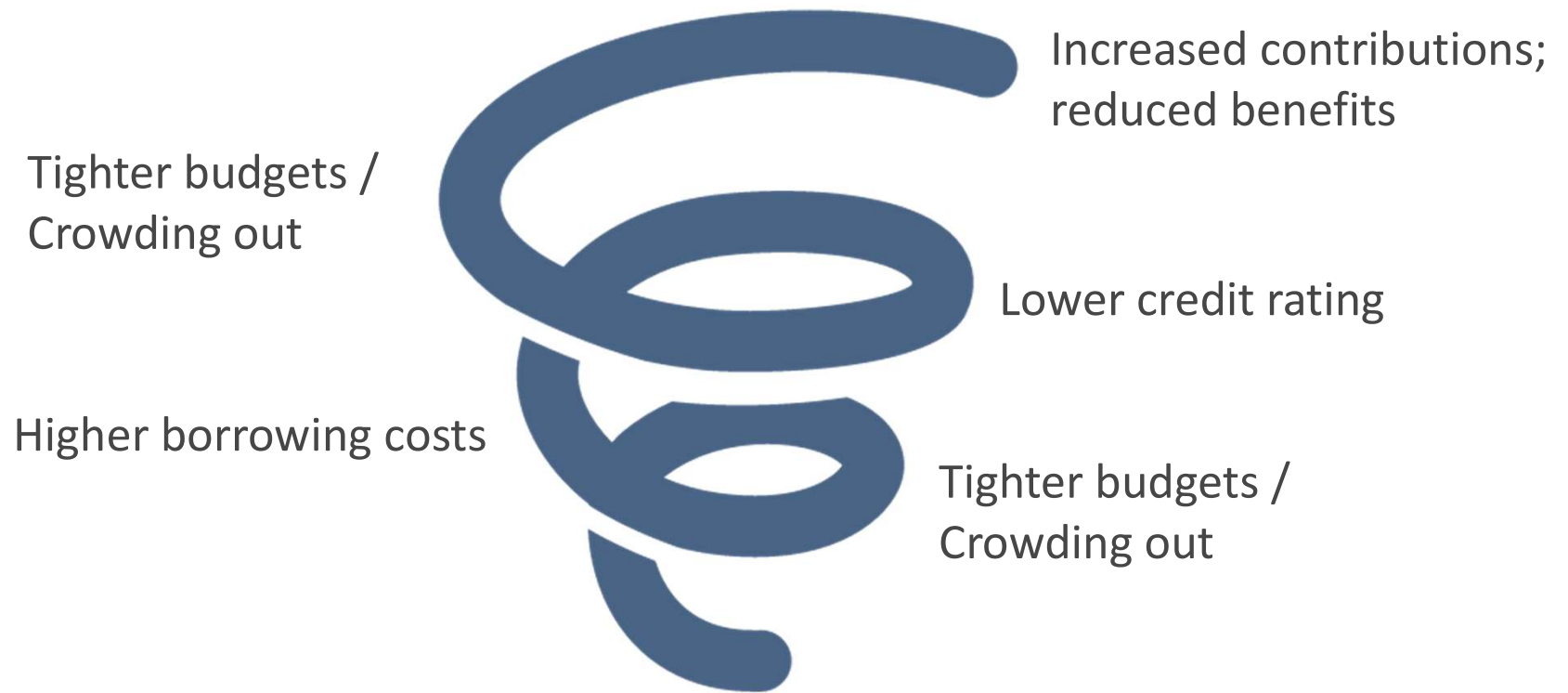
# Investment risk

# "Expected return" vs. simulated results



*Source: MPI, Verus .  Diversified portfolio 60% global equities, 20% US core bonds, 10% hedge funds, 7% real estate, 3% commodities.*
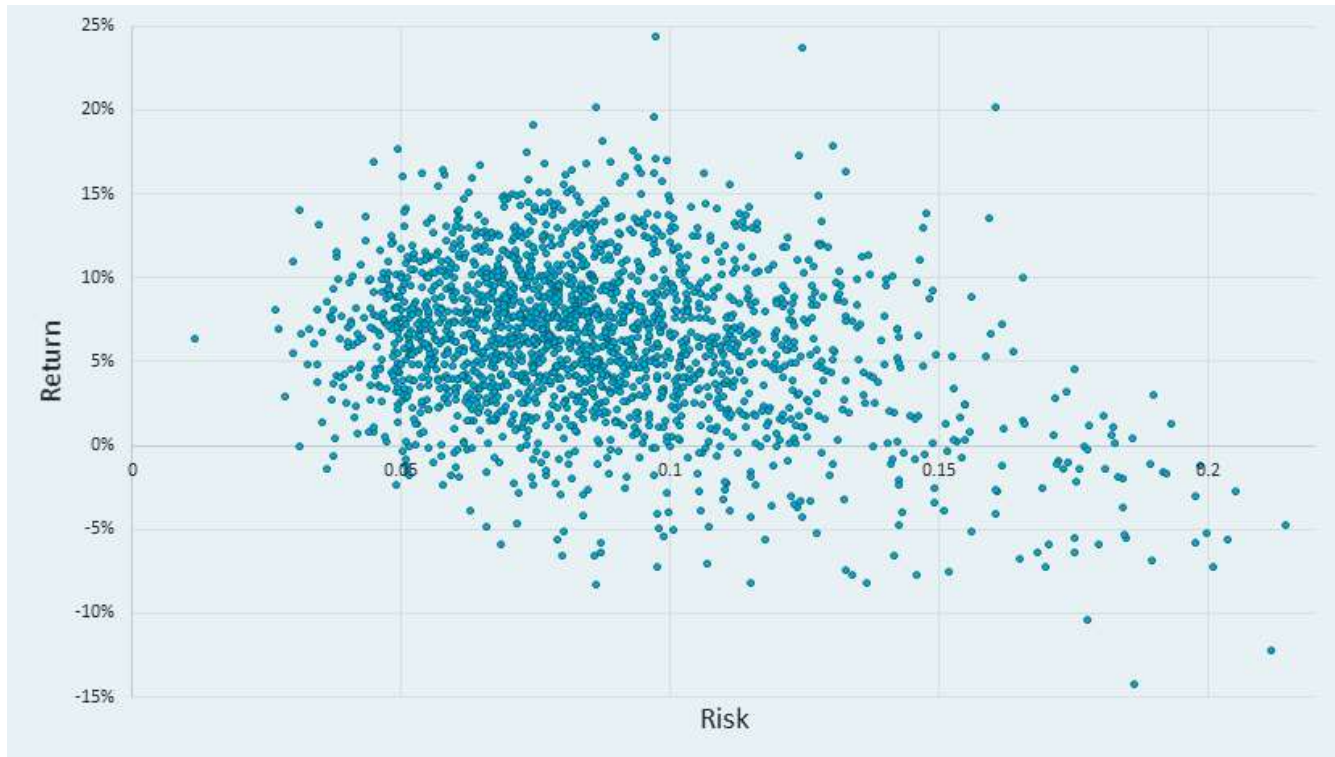
Even within the area of concentration, results vary considerably.

# Path dependency: 1-yr simple portfolio +28%



How we get to the dot is potentially more important than where the dot lands.

| Expected return | 7% | | Initial Price $S_0$ | $100.00 |
|---|---|---|---|---|
| Expected vol. | 12.0% | | Ending Price $S_{250}$ | $127.56 |
| Realized vol. | 12.7% | | Realized return | 28% |

# Path dependency: 1-yr simple portfolio +3%
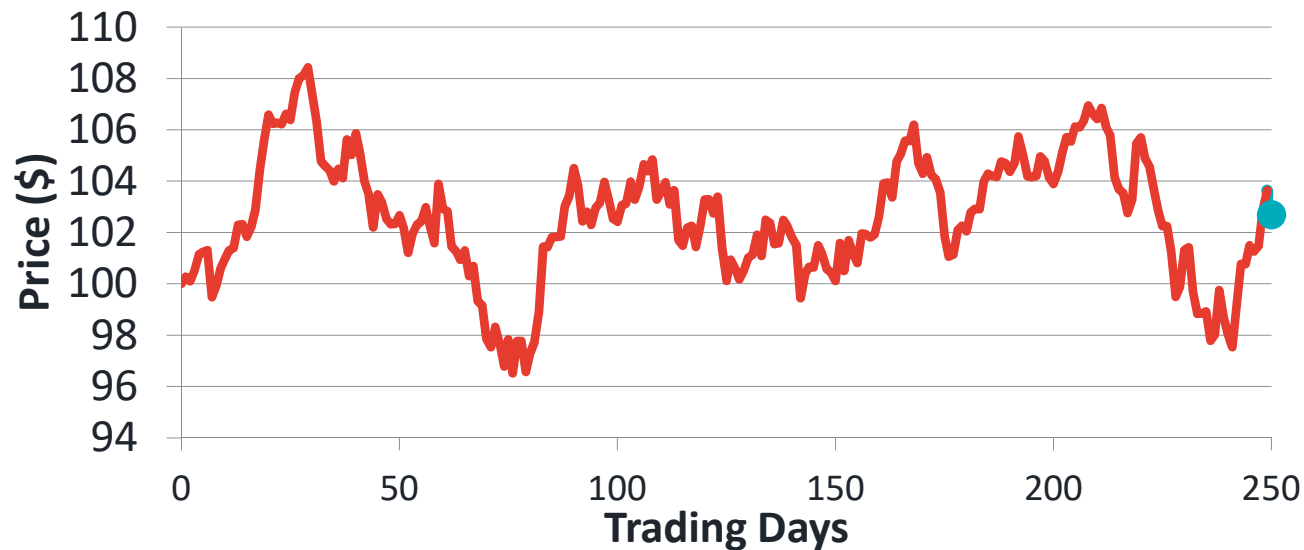


How we get to the dot is potentially more important than where the dot lands.

| | | | | |
|---|---|---|---|---|
| Expected return | 7% | Initial Price $S_0$ | | $100.00 |
| Expected vol. | 12.0% | Ending Price $S_{250}$ | | $102.69 |
| Realized vol. | 12.6% | Realized return | | 3% |

Verus

# Path dependency:  1-yr simple portfolio -14%



How we get to the dot is potentially more important than where the dot lands.

| Expected return | 7% | Initial Price $S_0$ | $100.00 |
|---|---|---|---|
| Expected vol. | 12.0% | Ending Price $S_{250}$ | $ 86.09 |
| Realized vol. | 11.9% | Realized return | -14% |

# 10-yr model with payments +11% return
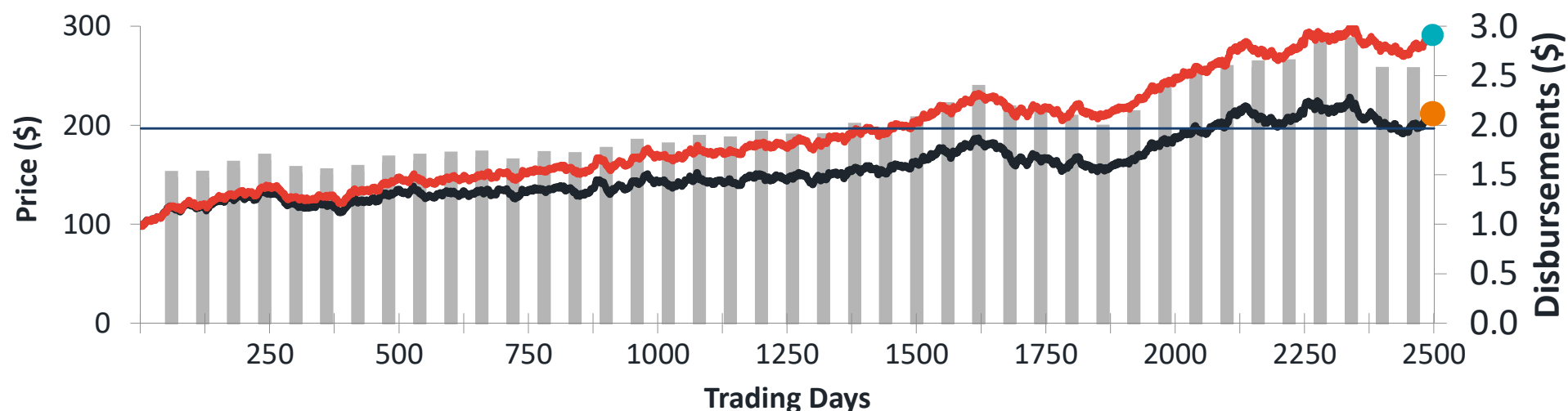


| | Disbursements | Total Value | Invest Gain | Avg. Disbursement |
|---|---|---|---|---|

| Expected return | 7.0% | Initial Price $S_0$ | $100.00 | Annual disbursement | 5.0% |
|---|---|---|---|---|---|
| Expected vol. | 12.0% | Ending Price $S_{2500}$ | $295.28 | Max. qtrly disbursement | 2.83 |
| Realized return | 11.4% | Ending Acct. Value | $214.56 | Min. qtrly disbursement | 1.47 |
| Realized vol. | 12.0% | Annualized growth of account | 7.9% | Stnd. Dev. | 38.4% |

# 10-yr model with payments 0% return



| | | | | | |
|---|---|---|---|---|---|
| Expected return | 7.0% | Initial Price $S_0$ | $100.00 | Annual disbursement | 5.0% |
| Expected vol. | 12.0% | Ending Price $S_{2500}$ | $103.28 | Max. qtrly disbursement | 1.41 |
| Realized return | 0.3% | Ending Acct. Value | $ 60.06 | Min. qtrly disbursement | 0.69 |
| Realized vol. | 12.2% | Annualized growth of account | -5.0% | Stnd. Dev. | 23.2% |

# 10-yr model with payments 7% return



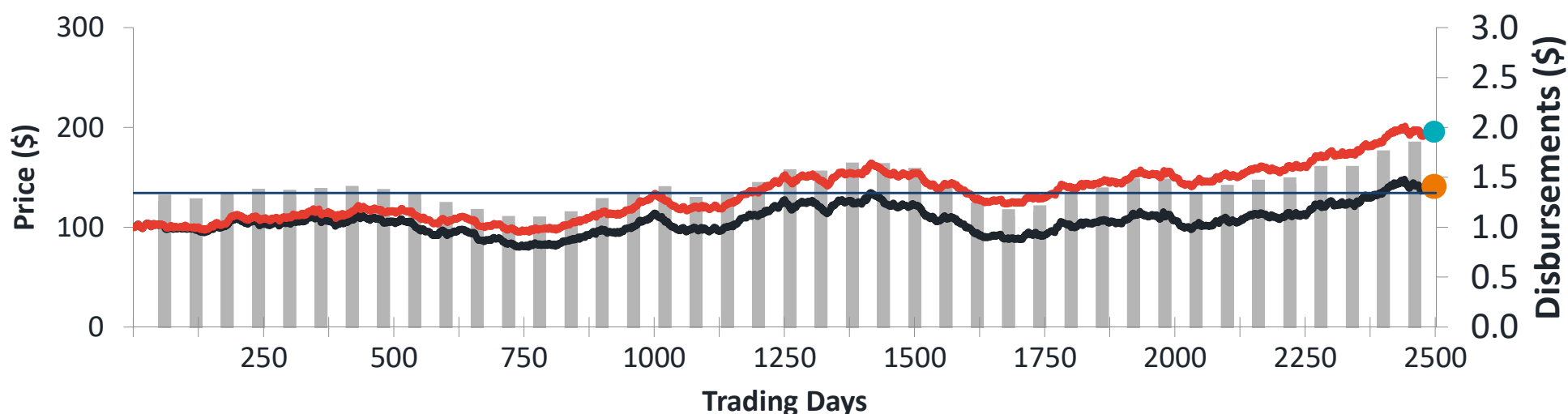| | | | | | |
|---|---|---|---|---|---|
| Expected return | 7.0% | Initial Price $S_0$ | $100.00 | Annual disbursement | 5.0% |
| Expected vol. | 12.0% | Ending Price $S_{2500}$ | $195.89 | Max. qtrly disbursement | 1.79 |
| Realized return | 7.0% | Ending Acct. Value | $140.88 | Min. qtrly disbursement | 1.04 |
| Realized vol. | 12.1% | Annualized growth of account | 3.5% | Stnd. Dev. | 16.8% |

# Timing matters (for mature plans)

**THREE RETURN SCENARIOS WITH SIMILAR RISK/RETURN CHARACTERISTICS**

|  | Flat 6.5% | Middle | Early | Late |
|---|---|---|---|---|
| Year 1 | 6.5% | 13.0% | -4.5% | 15.0% |
| Year 2 | 6.5% | -3.5% | -12.0% | 12.0% |
| Year 3 | 6.5% | -6.0% | 20.0% | 18.0% |
| Year 4 | 6.5% | 19.0% | 11.0% | 11.0% |
| Year 5 | 6.5% | -4.5% | 10.0% | 10.0% |
| Year 6 | 6.5% | 17.5% | 12.0% | -7.0% |
| Year 7 | 6.5% | 13.5% | 12.5% | -10.0% |
| Arithmetic Avg. | 6.5% | 7.0% | 7.0% | 7.0% |
| Geometric Avg. | 6.5% | 6.5% | 6.5% | 6.5% |
| Volatility (yrs 1 - 7) | 0.0% | 11.1% | 11.1% | 11.0% |

# Timing matters (continued)

**FUNDED LEVEL OVER TIME FOR THE THREE RETURN SCENARIOS**
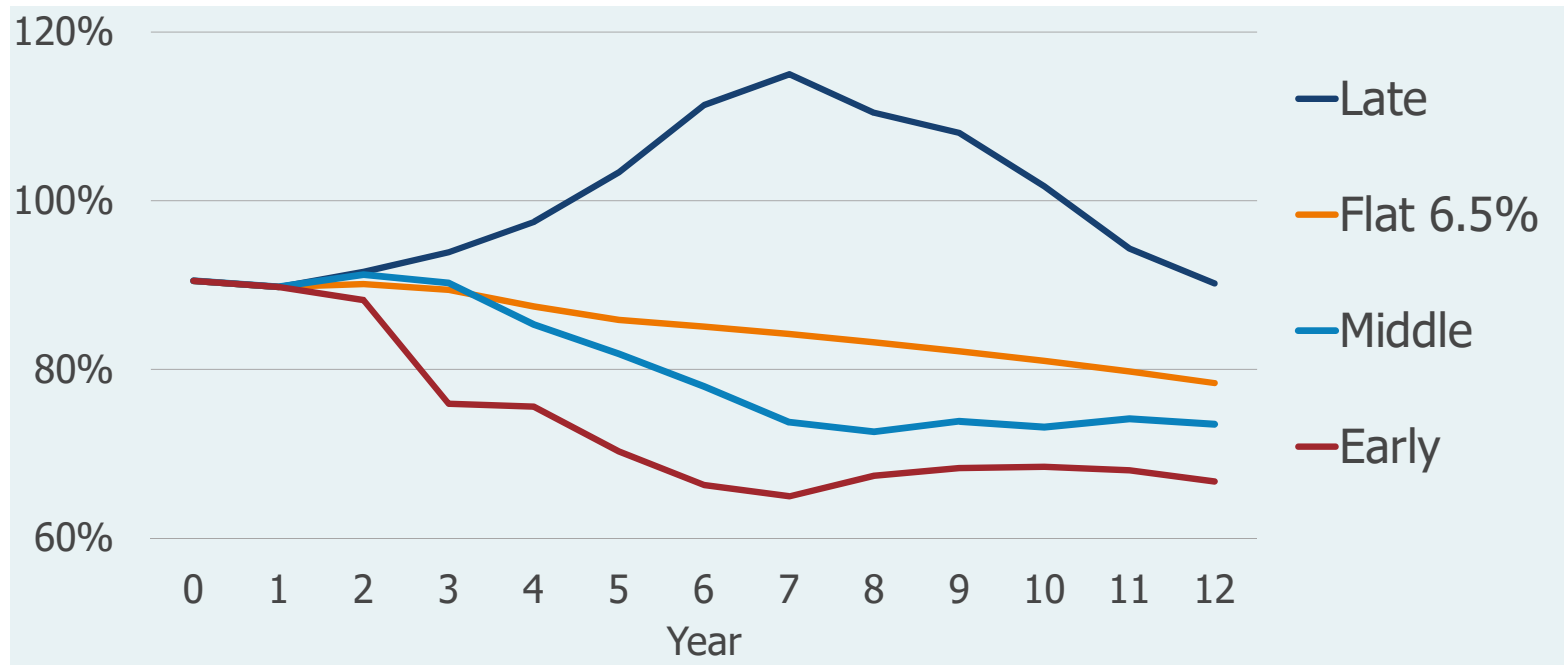
For a plan in net cash outflows, timing of volatility can significantly impact funded status



*Source: Venuti & Associates*

# Drawdown

## S&P 500 MONTHLY RETURNS SINCE 1950 VS. NORMAL DISTRIBUTION
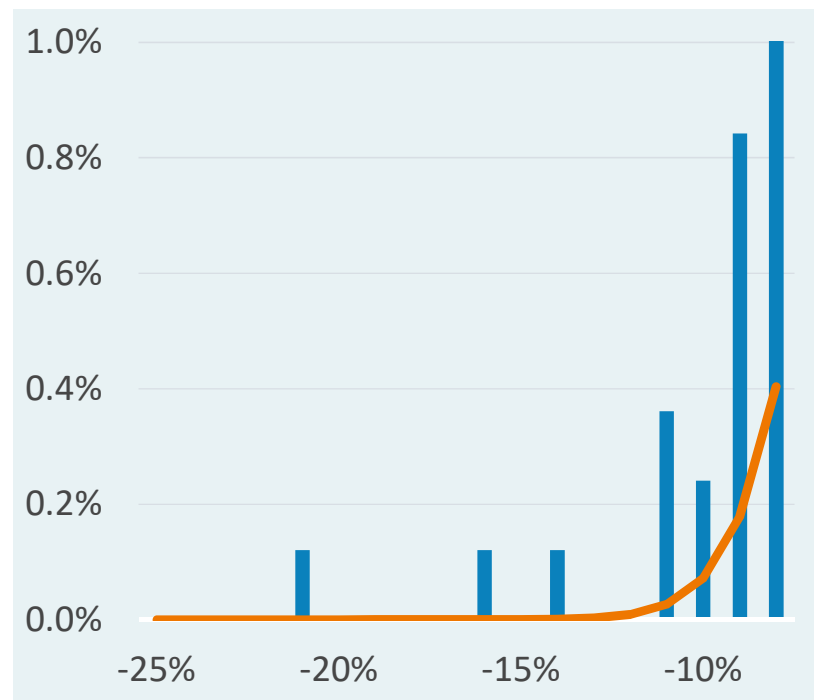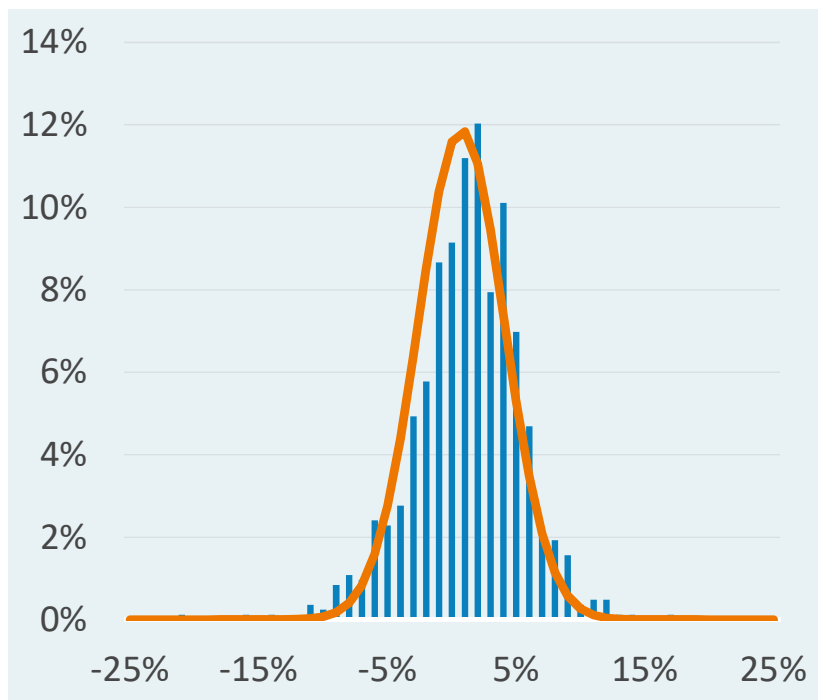


Worst monthly returns:

-21% 10/1987

-17% 10/2008

-15% 8/1998

-12% 9/1974

-11.4% 11/1973

-11% 9/2002 and 2/2009

-10% 3/1980

*Source: Yahoo! Finance, Verus*

# Scenarios

**HISTORICAL SCENARIOS OF ALTERNATIVE PORTFOLIOS**



| | Policy | A | B |
|---|---|---|---|
| 2009 July - January | 13% | 12% | 13% |
| 2007-2009 Subprime Mortgage Meltdown (Oct. to Feb.) | -32% | -30% | -33% |
| 2001 Dot-com Slowdown | -20% | -17% | -19% |
| 1997 - 1999 Oil Price Decline | 40% | 24% | 26% |

Legend: Policy, A, B
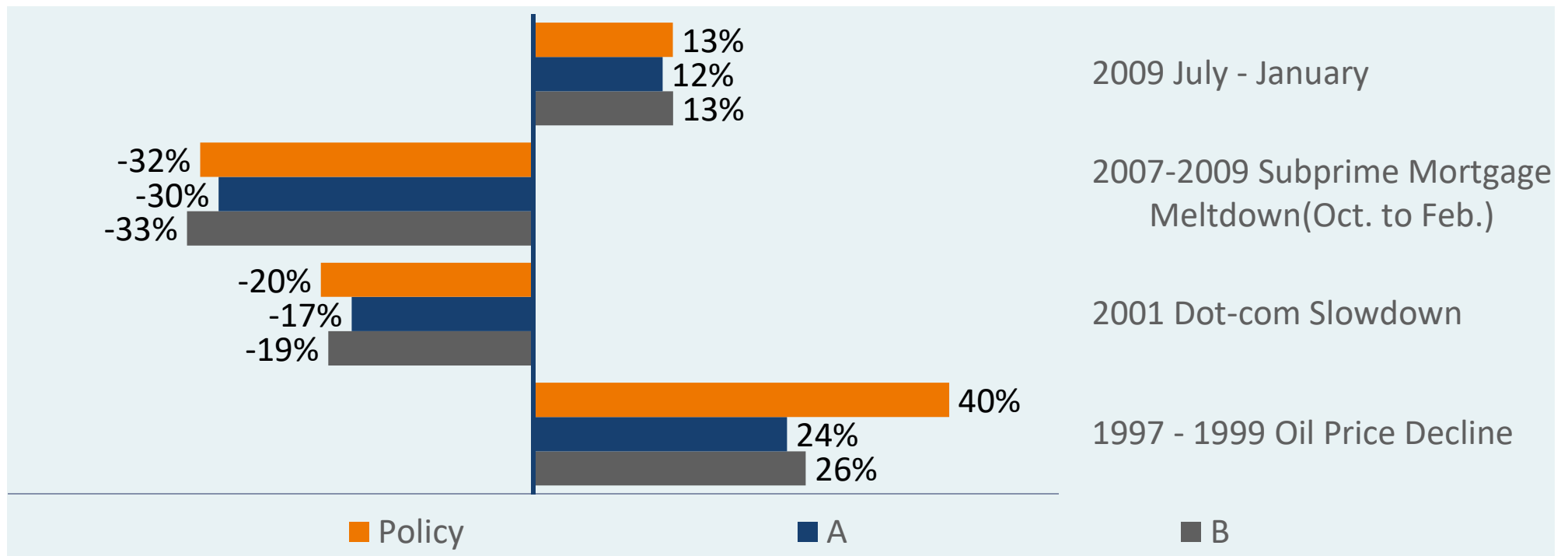
# Sponsor's financial health

# Balance sheet: Long-term liabilities



Other

G.O. Bonds
15%

Airport
Rev. Bonds
52%

Lease Rev.
Bonds
26%

Tax Bonds
6%
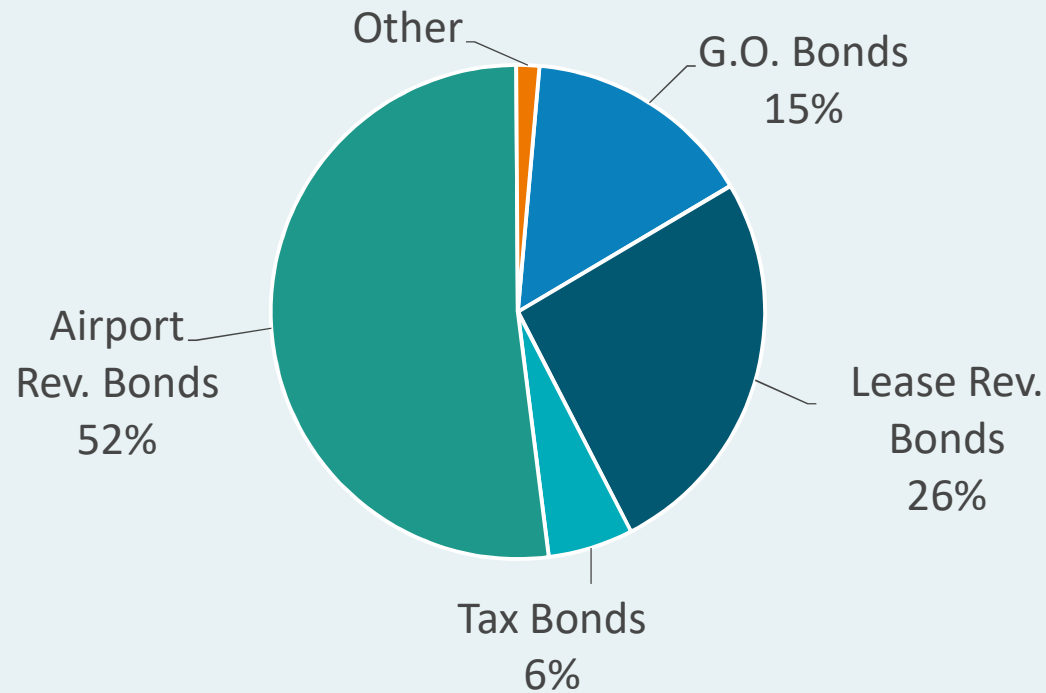
Pension obligations
are often just one
of several financial
responsibilities of a
plan sponsor.

*Source: City of San Jose 2017 Comprehensive Annual Financial Report.*

# Cash flow activity

**GENERAL FUND REVENUES**
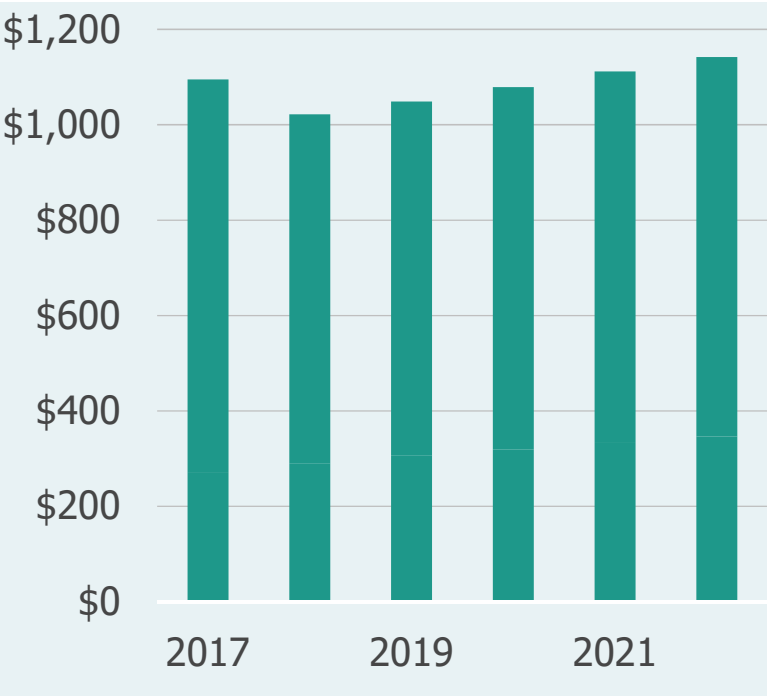


**RETIREMENT CONTRIBUTIONS**
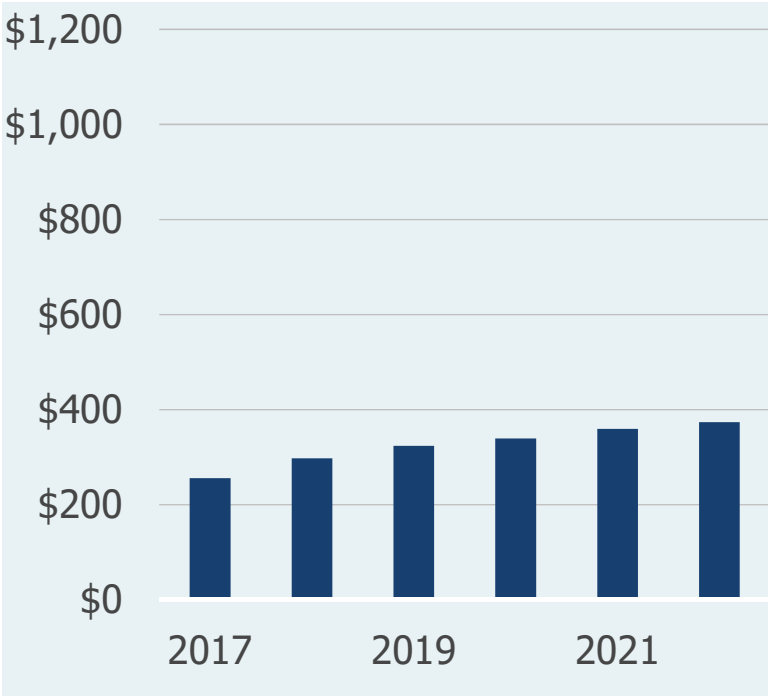


Historical and/or projected revenues and expenses reflect the relative size of the pension obligations for the sponsor.

*Source: City of San Jose 2017-2018 City Manager's Budget Request & 2018-2022 Five-Year Forecast and Revenue Projections For the General Fund and Capital Improvement Program, February 2017.*

# Underlying fundamentals

### POPULATION GROWTH
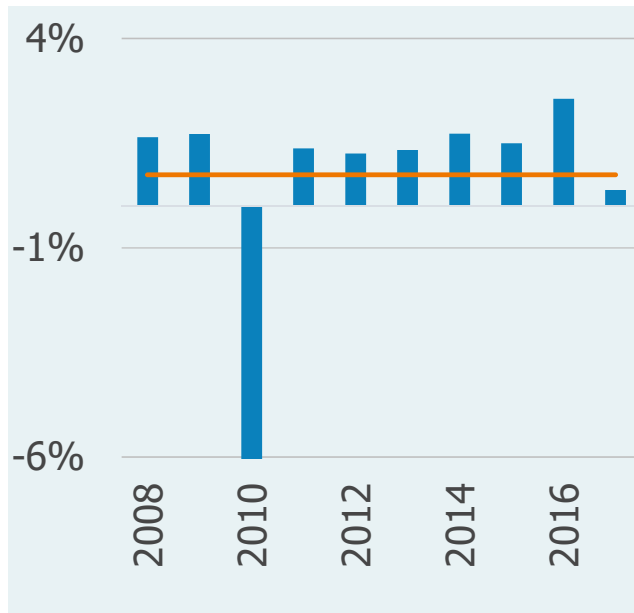


### TAXABLE PROPERTY VALUES
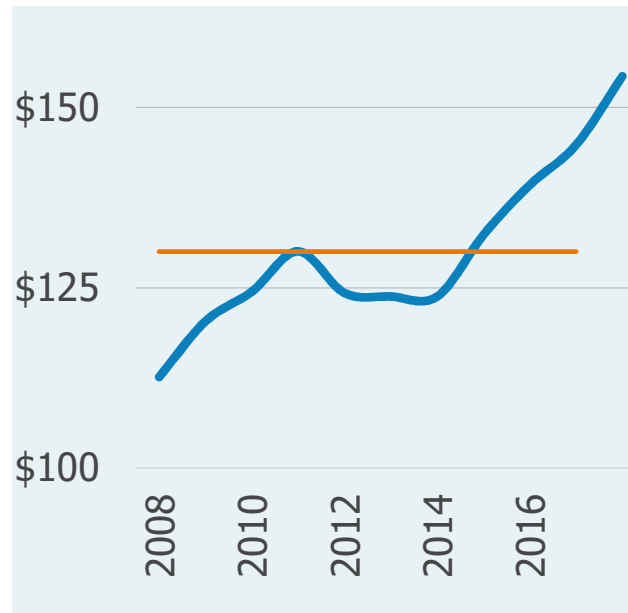


### UNEMPLOYMENT RATE
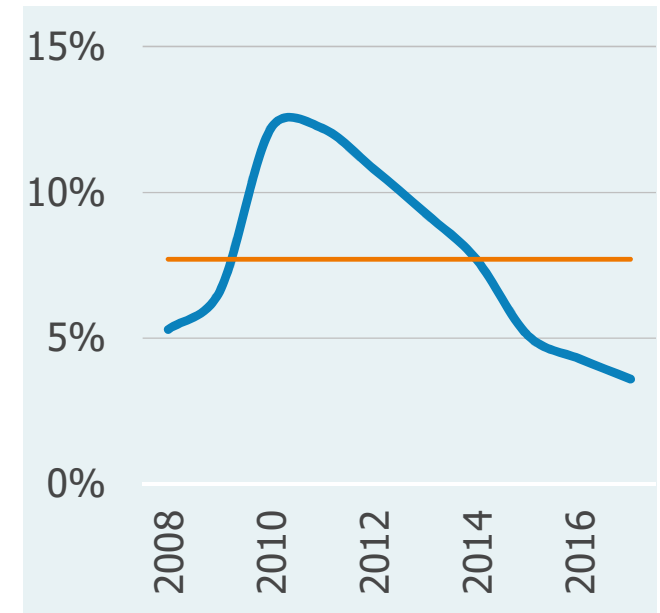


*Source: City of San Jose Comprehensive Annual Financial Reports 2009 – 2017.*

# Underlying fundamentals (continued)

**SOURCES OF EMPLOYMENT**

# '37 Act Systems

# Funding and Support ratios

| County | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Funded ratio (AVA) | 89% | 88% | 81% | 70% | 72% | 80% | 65% | 77% | 74% | 88% |
| Support ratio | 0.80 | 1.28 | 1.23 | 0.58 | 0.95 | 1.13 | 0.92 | 0.68 | 0.89 | 0.87 |

| County | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Funded ratio (AVA) | 92% | 88% | 88% | 78% | 81% | 64% | 84% | 65% | 80% | 76% |
| Support ratio | 0.88 | 0.67 | 0.79 | 0.72 | 0.82 | 0.68 | 0.69 | 0.81 | 0.69 | 0.95 |

Just based on this data…

Which systems can take on more risk and why?

*Sources: latest actuarial valuation reports for each SACRS county posted to its website as of April 17, 2019.*

# Balance sheets and income statements

## County

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| Assets / L-T Liabilities | 1.4 | 1.7 | 0.7 | 0.9 | 1.6 | 1.8 | 1.2 | 1.3 | 1.6 | 2.3 |
| Margin | 10.5% | 2.0% | -3.6% | 1.0% | 8.5% | -23.6% | 5.4% | 6.0% | -2.5% | 8.3% |
| Unemployment Rate | 2.9% | 17.2% | 4.6% | 4.2% | 2.8% | 4.0% | 6.1% | 4.0% | 6.3% | 3.8% |

## County

| | K | L | M | N | O | P | Q | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|
| Assets / L-T Liabilities | 2.8 | 2.2 | 2.7 | 1.5 | 1.1 | 1.5 | 2.8 | 1.3 | 1.0 | 1.6 |
| Margin | 2.9% | 10.8% | 13.8% | 13.7% | -43.1% | 8.1% | -57.1% | 7.1% | 13.6% | 3.7% |
| Unemployment Rate | 9.6% | 2.6% | 2.1% | 3.2% | 3.6% | 8.2% | 2.3% | 7.7% | 7.5% | 2.9% |

*Sources: latest County CAFR's as of April 17, 2019. Unemployment data from California Employment Development Department January 2019.*

# Pension contribution rates

| | County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** |
| Normal Cost (% of Revs) | 4.1% | 3.7% | 3.0% | 3.2% | 6.3% | 5.5% | 4.2% | 6.2% | 3.3% | 3.6% |
| UAL Contrib (% of Revs) | 4.8% | 1.9% | 3.3% | 6.7% | 9.3% | 8.1% | 8.4% | 9.1% | 5.4% | 6.9% |

| | County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **K** | **L** | **M** | **N** | **O** | **P** | **Q** | **R** | **S** | **T** |
| Normal Cost (% of Revs) | 2.8% | 4.3% | 2.5% | 14% | 4.8% | 2.5% | 9.3% | 5.3% | 4.7% | 3.7% |
| UAL Contrib (% of Revs) | 1.4% | 2.5% | 5.6% | 27% | 5.0% | 11% | 9.2% | 11% | 10% | 5.9% |

# Portfolio construction

| | County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| Expected return | 6.6% | 6.7% | 6.3% | 6.6% | 7.5% | 7.6% | 6.9% | 7.1% | 6.6% | 7.0% |
| Expected volatility | 10.7% | 11.9% | 12.0% | 13.1% | 12.4% | 11.6% | 9.7% | 12.2% | 10.5% | 13.5% |
| Implied Sharpe Ratio | 0.41 | 0.37 | 0.34 | 0.33 | 0.42 | 0.46 | 0.48 | 0.40 | 0.41 | 0.35 |

| | County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| Expected return | 5.6% | 6.5% | 6.0% | 6.5% | 7.2% | 6.0% | 6.9% | 6.4% | 6.2% | 6.1% |
| Expected volatility | 10.9% | 11.0% | 11.0% | 11.2% | 10.5% | 12.5% | 14.6% | 10.8% | 12.8% | 13.2% |
| Implied Sharpe Ratio | 0.31 | 0.39 | 0.34 | 0.38 | 0.47 | 0.30 | 0.32 | 0.38 | 0.31 | 0.29 |

# Situations

# Situation 1: Goldilocks

Conditions:

- Well funded

- Strong cash flows / support ratio...for now

- Financially healthy plan sponsor

Available approaches:

- Reduce risk, preserve funded status, re-evaluate when markets correct; tighten actuarial assumptions; payoff POB; *-OR-*

- Increase risk, reduce financial burden on sponsor but expose plan & sponsor to drawdown; tighten actuarial assumptions; payoff POB; fund a contingent "reserve"

# Situation 2: Lean times

Conditions:

- Poorly funded

- Negative cash flows / support ratio...for now

- Financially unhealthy plan sponsor

Available approaches:

- Reduce risk to guard against any further drawdown, review flexibility of actuarial assumptions; *-OR-*

- Increase risk, potentially reduce financial burden on sponsor but expose plan & sponsor to drawdown; review flexibility of actuarial assumptions; *-AND-*

- Open dialogue with plan sponsor.  Solution may not be investment related.

# Situation 3: Strong sponsor; challenged plan

Conditions:

- Underfunded

- Negative cash flows / support ratio…for now

- Financially healthy plan sponsor

Available approaches:

- Pension obligation bond to utilize sponsor's financial health to improve the funding of the plan; -*AND/OR-*

- Increase (or maintain) investment risk hoping returns will solve the problem; exposing the plan to potential drawdown.

# Situation 4: Challenged sponsor and plan

Conditions:

- Underfunded

- Negative cash flows / support ratio…for now

- Financially healthy plan sponsor in one dimension (balance sheet or cash flows)

Available approaches:

- Pension obligation bond to utilize sponsor's balance sheet, if available; -OR-

- Reduce assumed rate to utilize sponsor's cash flows, if available; -AND-

- Maintain investment risk hoping returns will solve the problem; exposing the plan to potential drawdown.

# Investment solutions

# Creating efficient portfolios
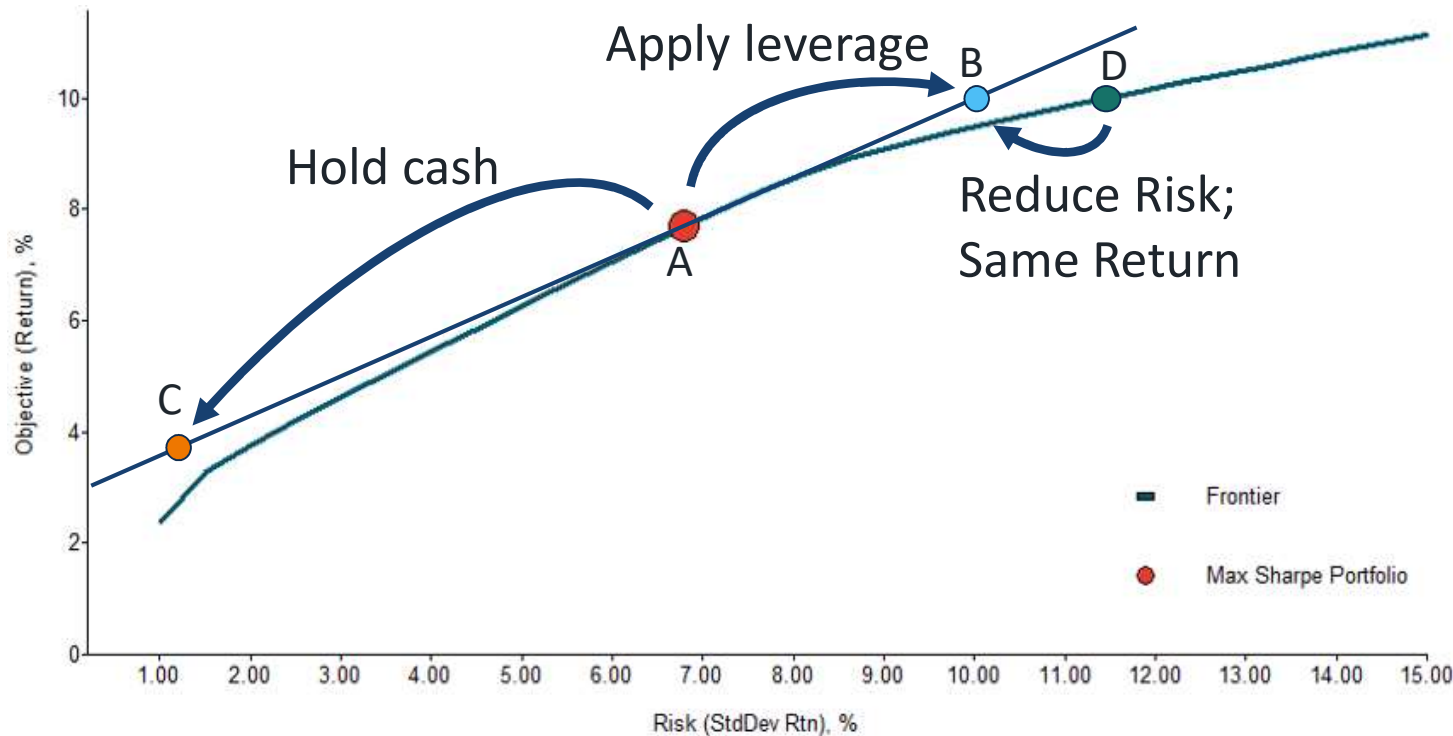


The most efficient portfolio (A) may not generate the desired risk and return. Leverage can be applied to increase the risk & return (B), while cash can reduce it (C).

Leveraging the most efficient portfolio results in lower risk than a less efficient portfolio that avoids leverage (D).

*Efficient frontier created with MPI Analytics using Verus' 2019 Capital Market Assumptions*

# Preparing for drawdowns

When the next drawdown happens, how will you respond?

1. Keep calm and carry on?

2. Sell assets to meet obligations?

3. Rebalance into depressed assets to capture future expected upside?

Alternatives to consider:

1. Earmark positions in the portfolio to meet obligations and/or capitalize on corrections

2. Pre-commit to contingent strategies

3. Establish a line of credit

What does your governance model, staffing, and delegation of duties allow, or how can it be refined in advance of the next correction?
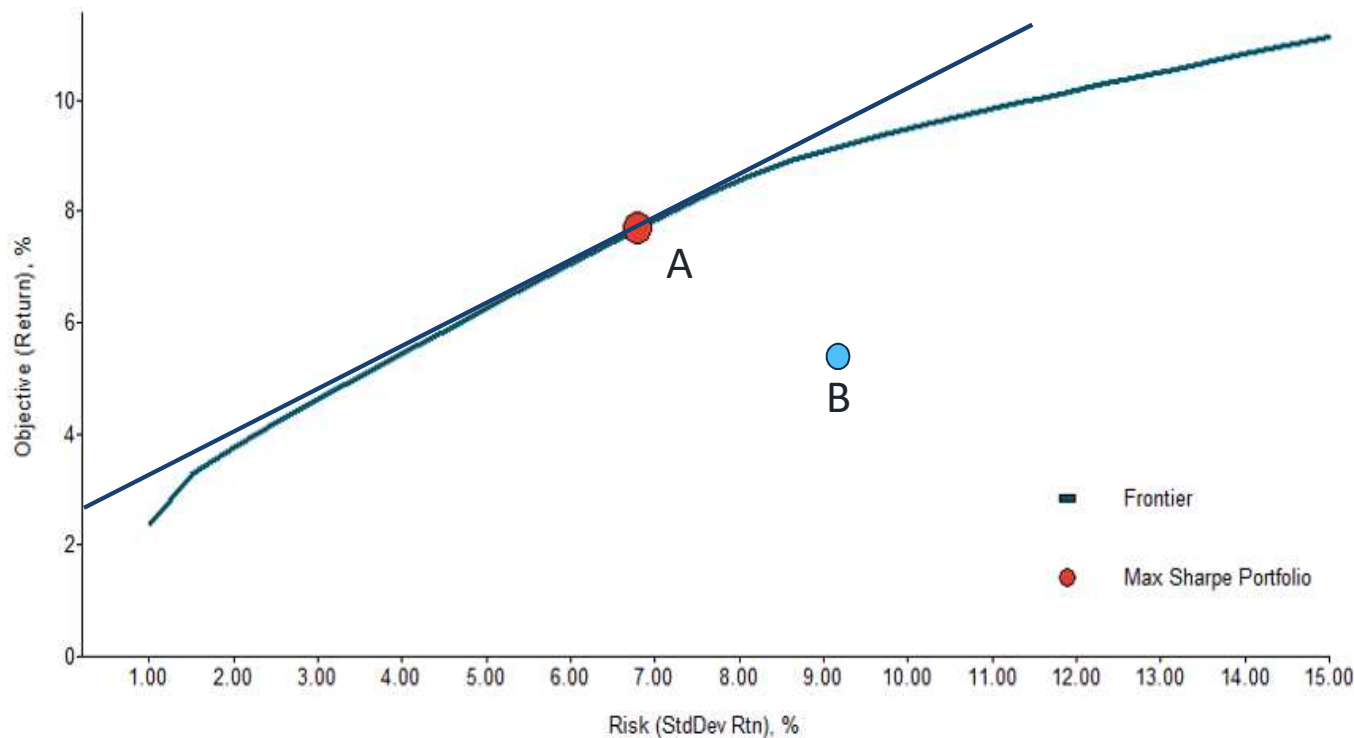
# Providing & preserving liquidity
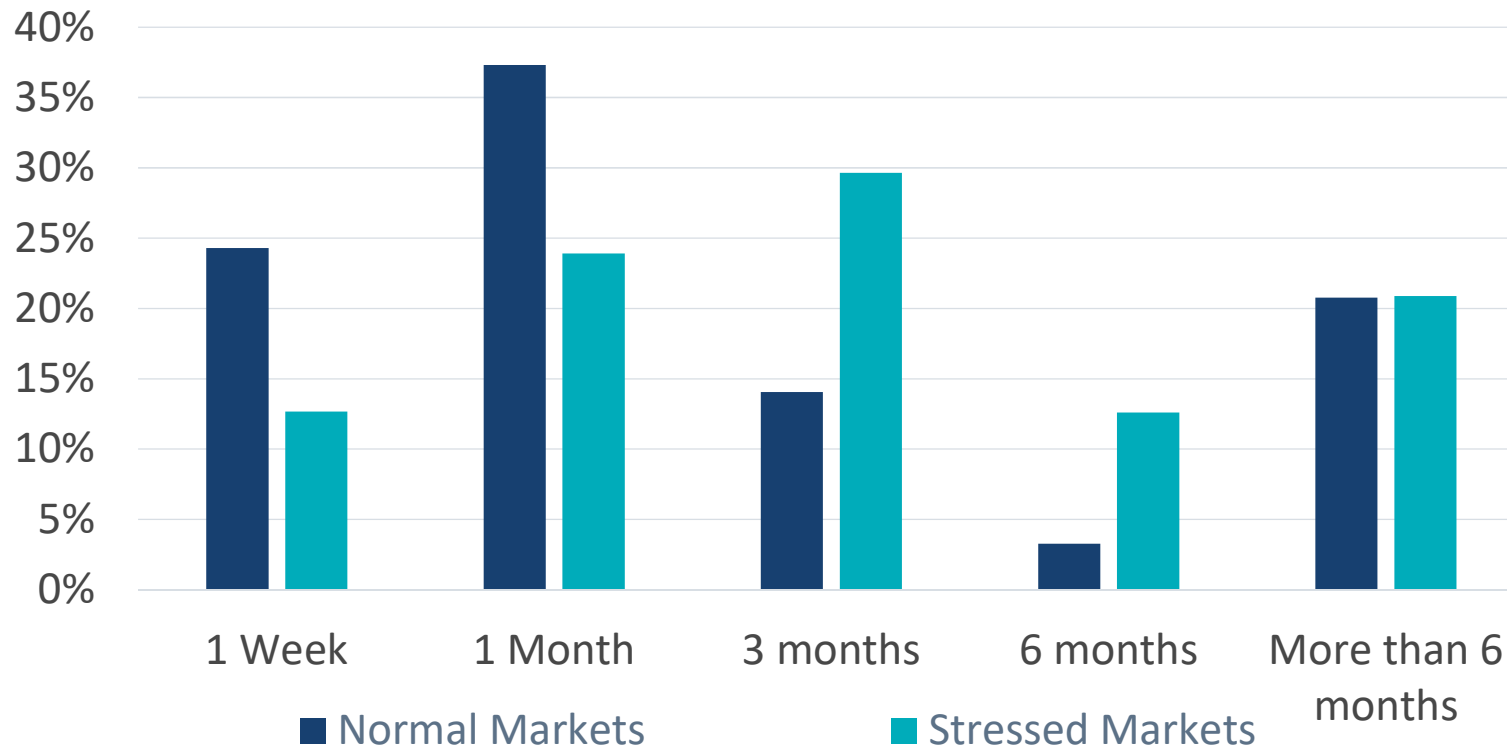


Understanding how portfolio liquidity changes in stressed periods allows investors to better anticipate reactions during drawdowns.

Verus

# Implications

# Implication 1: Efficiency



Efficient frontier created with MPI Analytics using Verus' 2019 Capital Market Assumptions

Examine what might be compromising efficiency.

Restricting asset classes, investment strategies, or specific security types may limit efficiency. Consider how they can be used effectively while controlling other risks.

# Implication 2: Peer groups

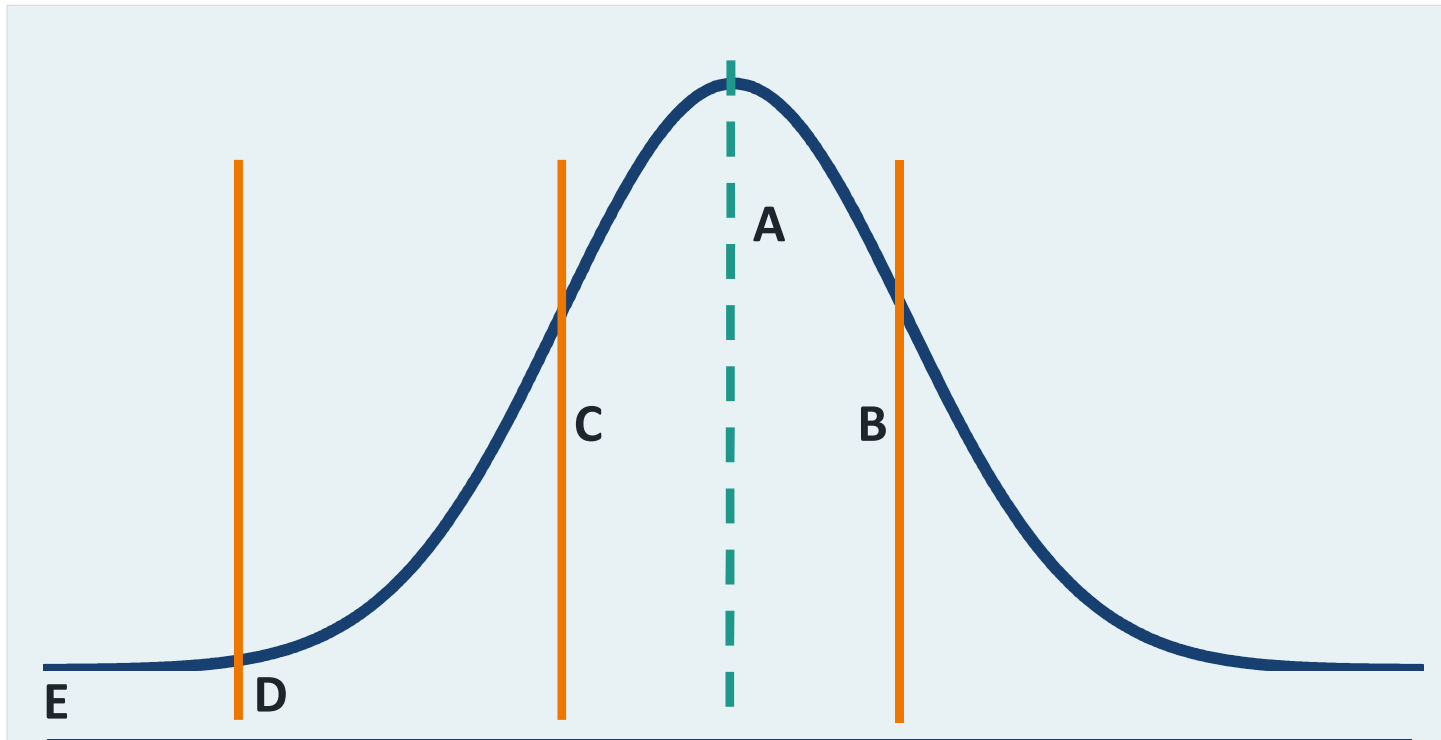Traditional:

- Public Pension Plans between $x and $y
- SACRS

Alternatives:

- SACRS - with similar sponsor characteristics,
- Systems with similar volatility targets,
- Systems with similar constraints, and
- Public Pension Plans between $x and $y

Peer group comparisons are an essential part of fiduciary responsibilities.

# Implication 3: Risk levels



We look at "A" too much. We need to understand "C" and "D" and "E" better.

# Takeaways

# Questions you may want to ask

1.  Does our board collectively understand the financial health of the plan sponsor today and in the future?

2.  Does the investment risk (volatility, drawdown, and timing) assumed within the investment program align with the financial health?

3.  Is our investment program efficient (risk/return) and flexible?

4.  Are we comparing ourselves to peers facing similar challenges?

5.  Does our governance model, staffing, and capabilities allow us to do what we believe is necessary?

# Q&A