CDIAC and CMTA

Advanced Public Funds Investing Case Study

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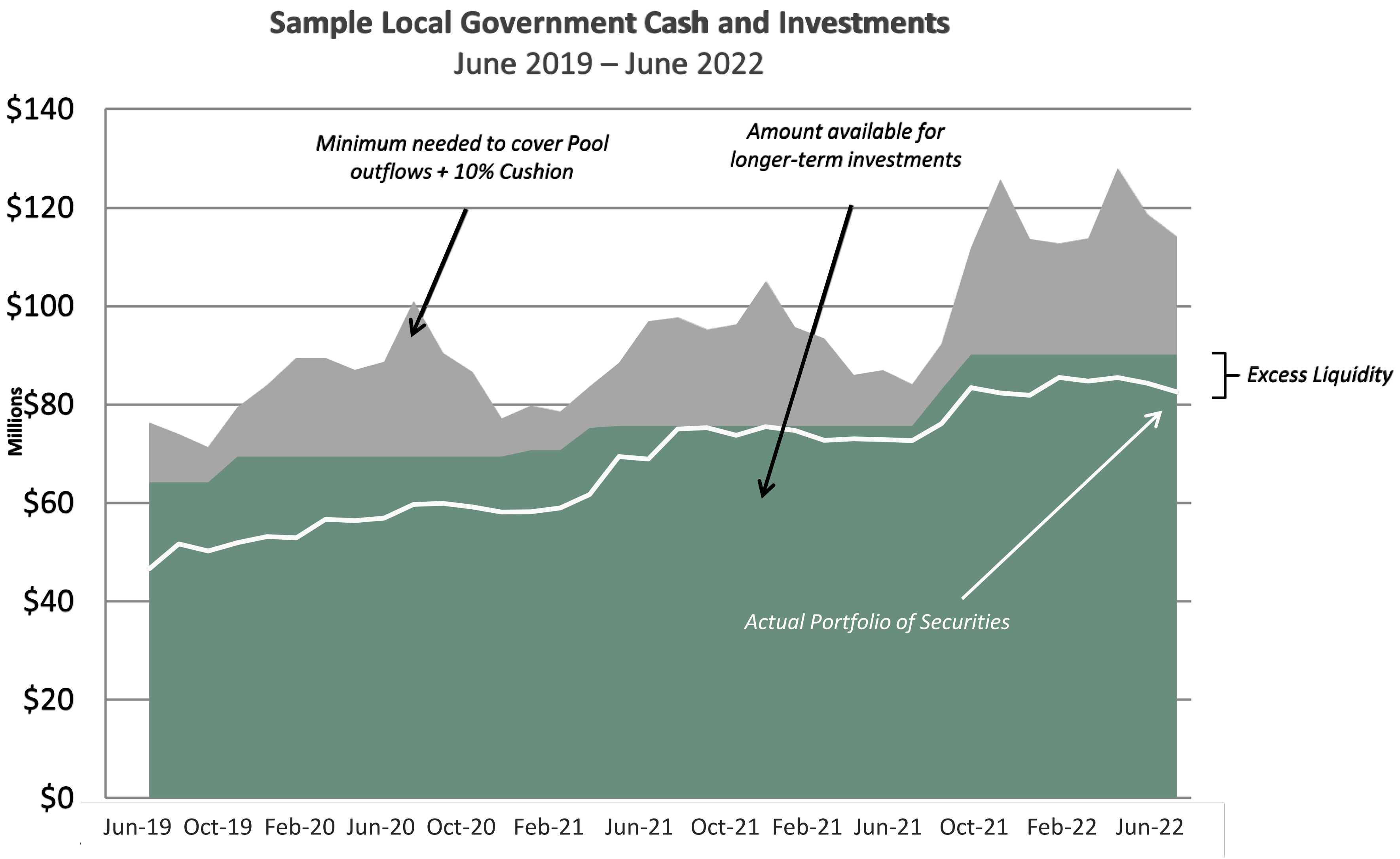
Approach to Building an Optimal Investment Program

Steps to building an investment program

Review/Update Investment Policy → **Understand Your Cash Needs** → **Develop Portfolio Strategy** → **Daily Investment Management**

Historical Balances - Statistical Analysis



This sample illustration is being provided to demonstrate the tools on how we analyze cash balances. Please see disclosures at the end of this presentation.

Segmenting the Portfolio for Optimal Structure

Total Investment Program

Liquid Funds

- Local Government Investment Pool (LGIP)
- Matching maturities to known expenditures
  - Common money market instruments
    - Agency Discount Notes
    - Commercial Paper
    - Certificates of Deposit

Long Term Funds

- Target generally to a higher duration to enhance the potential to increase earnings
  - Invest in all securities allowed by Code and the Agency's policy, such as:
    - U.S. Treasury Securities
    - U.S. Agency Securities
    - High-Grade Credit

Portfolio Management Considerations

1. **What are the objectives of the investment program**

2. **What are the investment constraints**
   a. State Statutes and/or Code
   b. Investment Policy
   c. Government’s risk tolerances
   d. Investment staff experience

3. **What strategies can be implemented that achieve stated objectives and are compliant with constraints**

Defining Investment Objectives

- **Safety?**
  - Preserve capital?
  - High credit quality?
  - Political considerations?
- **Liquidity?**
  - LAIF or other pools?
  - Short maturity investments?
  - Marketable securities?
- **Return?**
  - Earnings target?
  - Growth of portfolio?
  - Good relative performance?

Yield versus Total Return

1. **Yield**

    a. Snapshot in time earnings rate expressed on an annualized basis to measure future interest income earnings

    b. Assumes reinvestment at the same rate

    c. Presumes no changes in the portfolio

2. **Return**

    a. Measures value added to the portfolio over a specified period of time

    b. Book Return: includes **INTEREST INCOME** as well as **REALIZED** gains and losses

    c. Total Return: includes **INTEREST INCOME** as well as **REALIZED AND UNREALIZED** gains and losses

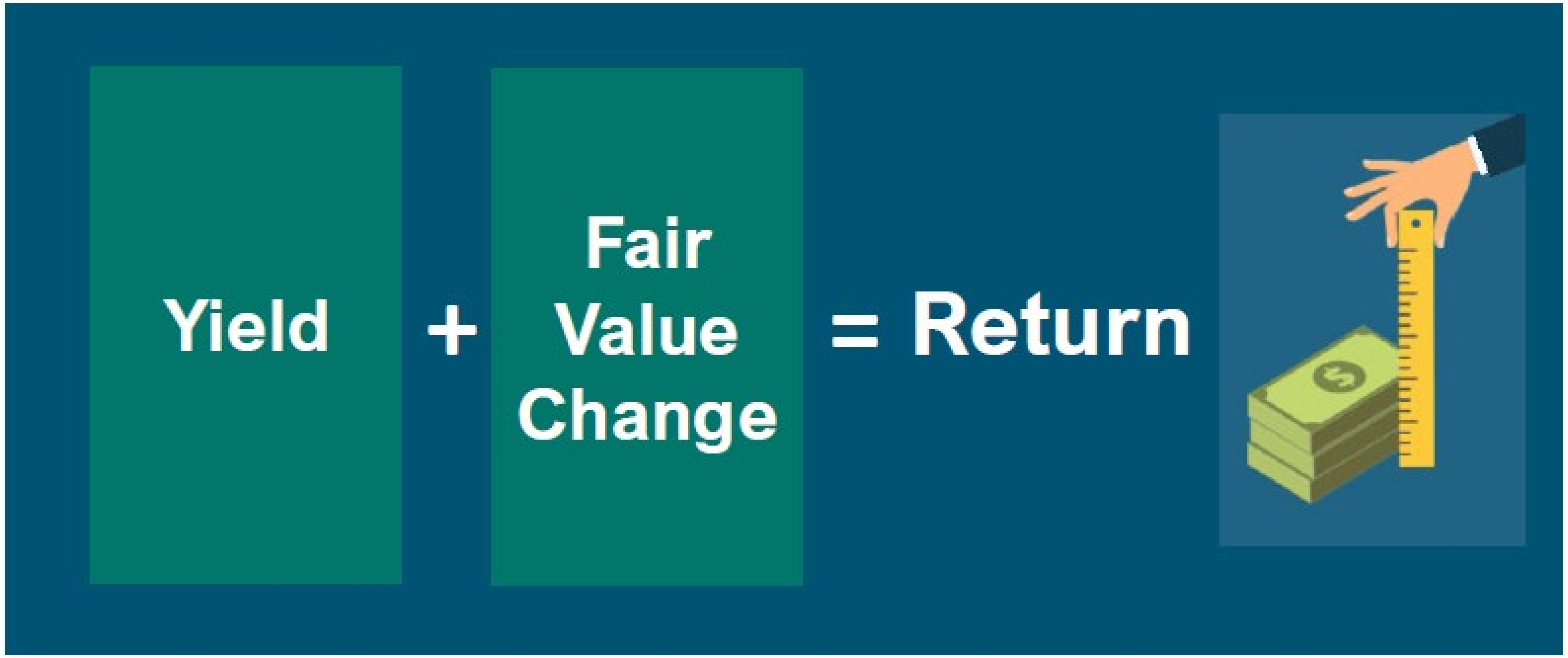
Strategies for Different Needs

- **Liquid Funds Strategy**
  - Emphasis in increasing *interest income*
  - Generally designed to meet or surpass an earnings target
  - Mostly hold-to-maturity, but may include sales before maturity
- **Long-Term Funds Strategy**
  - Encompasses *interest income* as well as *fair value appreciation*.
  - Designed to grow the City's funds over time
  - Assumes periodic sales before maturity to rebalance the portfolio

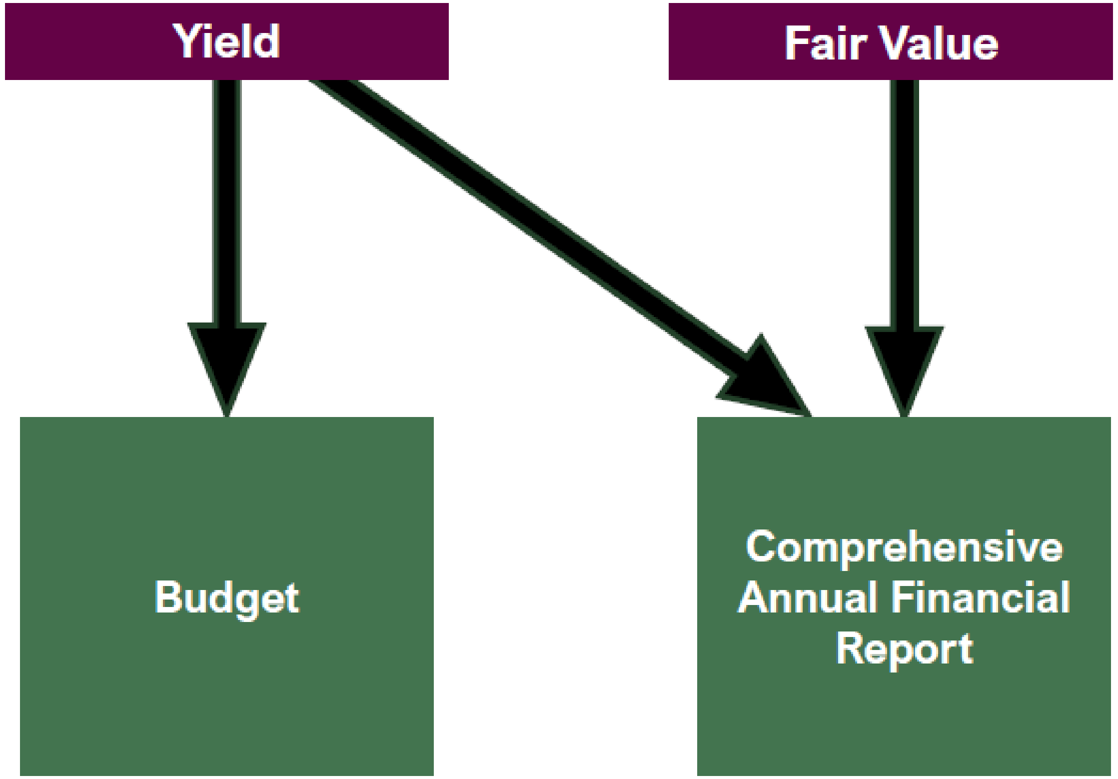
Yield Focuses On Income

$$\text{Yield} = \frac{\text{Annual Income}}{\text{Investment Value}}$$

Return Includes Interest Income and Fair Value Appreciation



Fair Value Doesn't Necessarily Change Budgets But Definitely Moves Financial Position



Adding Value and Controlling Risk

Four Key Elements of Investing Fixed-Income Funds

Portfolio Duration	Constraining portfolio duration relative to the benchmark
Sector Allocation	Strategic allocations to key sectors, with value-based rotation
Term Structure	Positioning securities along the yield curve to capture value across maturities
Security Selection	Selecting bonds that are undervalued and offer the greatest potential for risk-adjusted return

External Factors

1. **Economic Environment**
   a. Expanding/contracting
   b. Employment
   c. Inflation
   d. Monetary Policy
   e. Fiscal Policy

2. **Market Environment**
   a. Shape of yield curve
   b. Interest rate expectations
   c. Spread analysis

3. **Global Environment**
   a. Economic
   b. Markets
   c. Geo-political

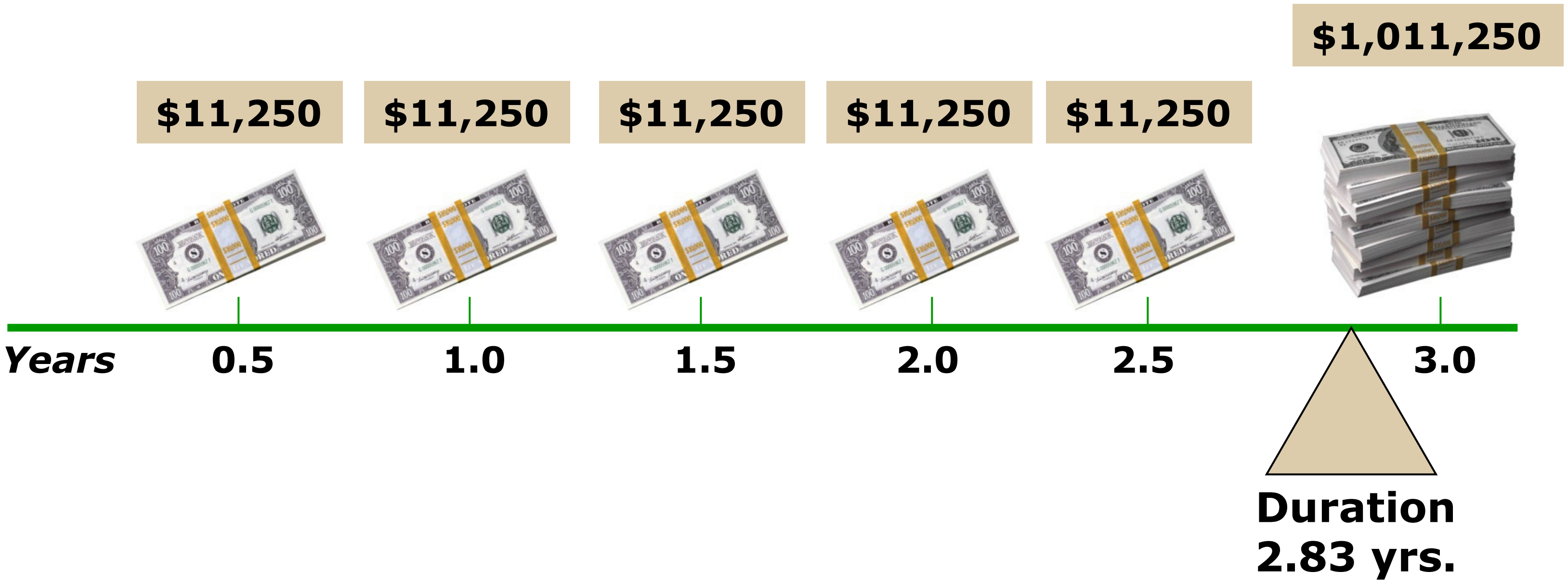
Active Management Portfolio Strategy

1. **Interest rate analysis**
    a. Interest rate trend
    b. Shape of yield curve
    c. Direction of yield curve (e.g. steepening; flattening, inverting)

2. **Selecting securities**
    a. Identify securities with good relative value
    b. Examine characteristics of bond
        - **Coupon, maturity, credit quality, options**
    c. Construct a portfolio that maximizes return/yield given a targeted level of risk

Measures price sensitivity of a bond to changes in interest rates

Invest in $1MM Tsy. 2.25% 2/15/23



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Impact of Duration

Portfolio #1: $50 million and 2.0 duration

- If rates **increase** 2.25%, then **($2,250,000) Loss**

  $50 million x 2 x 2.25% x -1 = $50 million x -4.5% = **($2,250,000)**

- If rates **decrease** 2.25%, then **$2,250,000 Gain**

  $50 million x 2 x 2.25% x 1 = $50 million x 4.5% = **2,250,000**

Portfolio 2 = $50 million and 1.0 duration

- If rates **increase** 2.25%, then **($1,125,000) Loss**

  $50 million x 1 x 2.25% x -1 = $50 million x -2.25% = **($1,125,000)**

- If rates **decrease** 2.25%, then **$1,125,000 Gain**

  $50 million x 1 x 2.25% x 1 = $50 million x 2.25% = **$1,125,000**

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Risk/Return Trade-off With Longer Duration Mandates

Annual Benchmark Study

Period Ending December 31, 2021

	ICE BofA 0-3 Yr US Treasury	ICE BofA 1-3 Yr US Treasury & Agency	ICE BofA 1-5 Yr US Treasury & Agency
0-6 months	13.50%		
6-12 months	17.03%		
1-3 years	69.47%	100.00%	62.17%
3-5 years			37.84%
5-10 years			
Treasury	100.00%	96.64%	96.58%
Agency		3.36%	3.42%
Corporate			
Modified Duration 12/31/2021	1.40	1.82	2.57
10 Year Annualized Total Return	0.99%	1.10%	1.35%
10 Year Standard Deviation	1.13%	1.28%	1.68%
Sharpe Ratio	0.32	0.37	0.43
Qualitative Risk Objective	**12/31/2001 – 12/31/2021**	**12/31/2002 – 12/31/2021**	**12/31/2001 – 12/31/2021**
Negative Quarterly Return Occurrences	13	14	19
2 Consecutive Negative Quarterly Return Occurrences	2	3	2
Negative Return For Year Occurrences	1	1	2
Worst Year Total Return	-0.37%	-0.55%	-1.09%

Source: ICE BofA Indices.

Index returns assume reinvestment of all distributions. Historical performance results for investment indexes generally do not reflect the deduction of transaction and/or custodial charges or the deduction of an investment management fee, the incurrence of which would have the effect of decreasing historical performance results. It is not possible to invest directly in an index. Please see disclosures at the end of this presentation.

Interest Rate Expectations

1. **Alter portfolio's duration (sensitivity to rate changes) based on interest rate forecast**
   a. Increase duration if rates are expected to fall and decrease duration if rates are expected to rise (relative to the benchmark)
   b. Degree to which the duration is permitted to diverge from the benchmark can be limited by the policy

2. **Portfolio is realigned through swapping to achieve duration target**
3. **Challenge: forecasting interest rates is very difficult. must be right on each of the following:**
   a. Direction
   b. Timing
   c. Magnitude

Yield Curve Strategies

1. **Position portfolio to capitalize on expected changes in the yield curve**

2. **The duration and spacing of the maturity of bonds will have a significant impact on the total rate of return (TRR) over a short horizon**

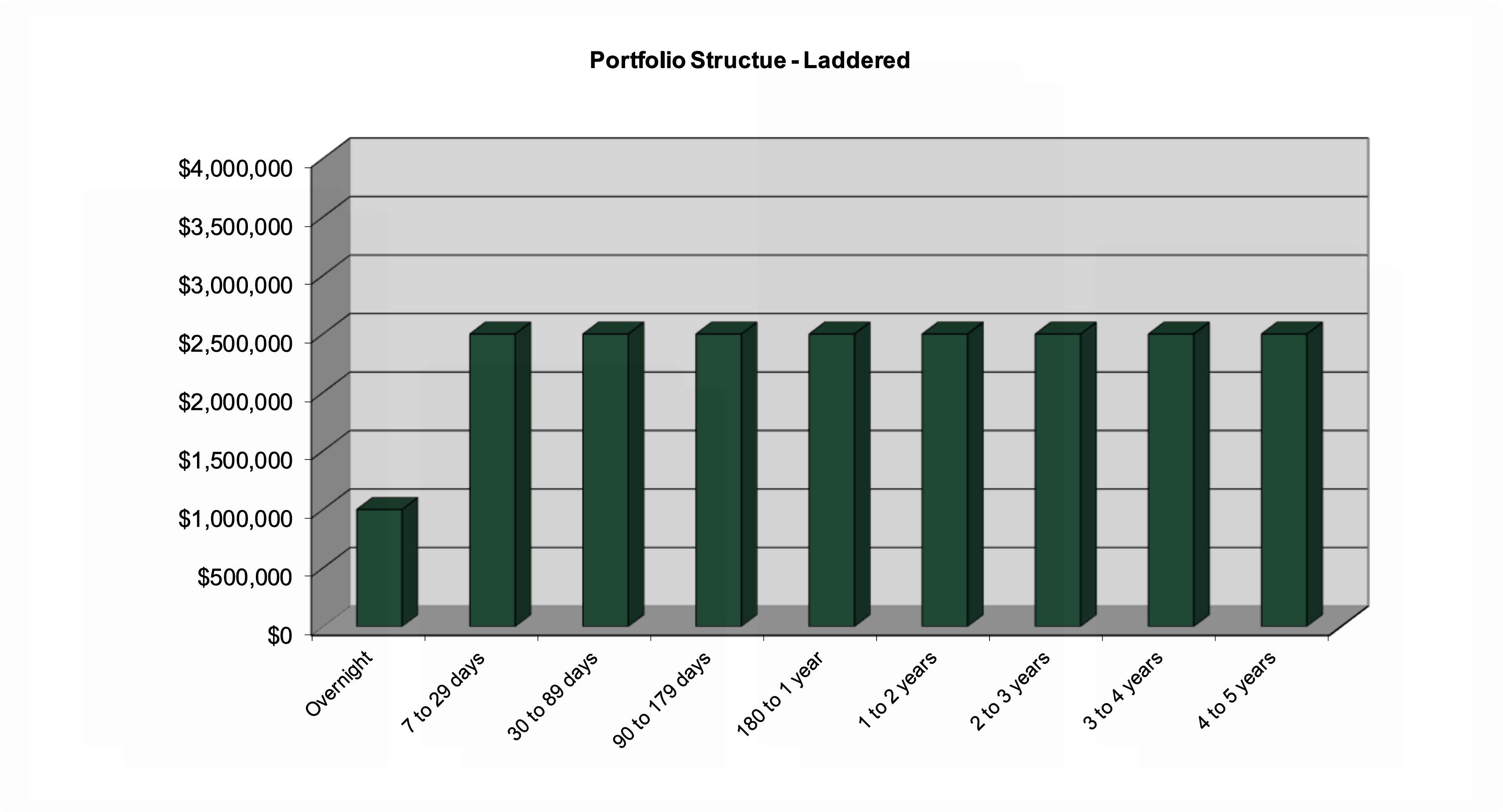
3. **Three Yield Curve Strategies**

   a. Bullet - maturity of the bonds in the portfolio are highly concentrated at one point on the curve

   b. Barbell - securities are concentrated at 2 extreme maturities

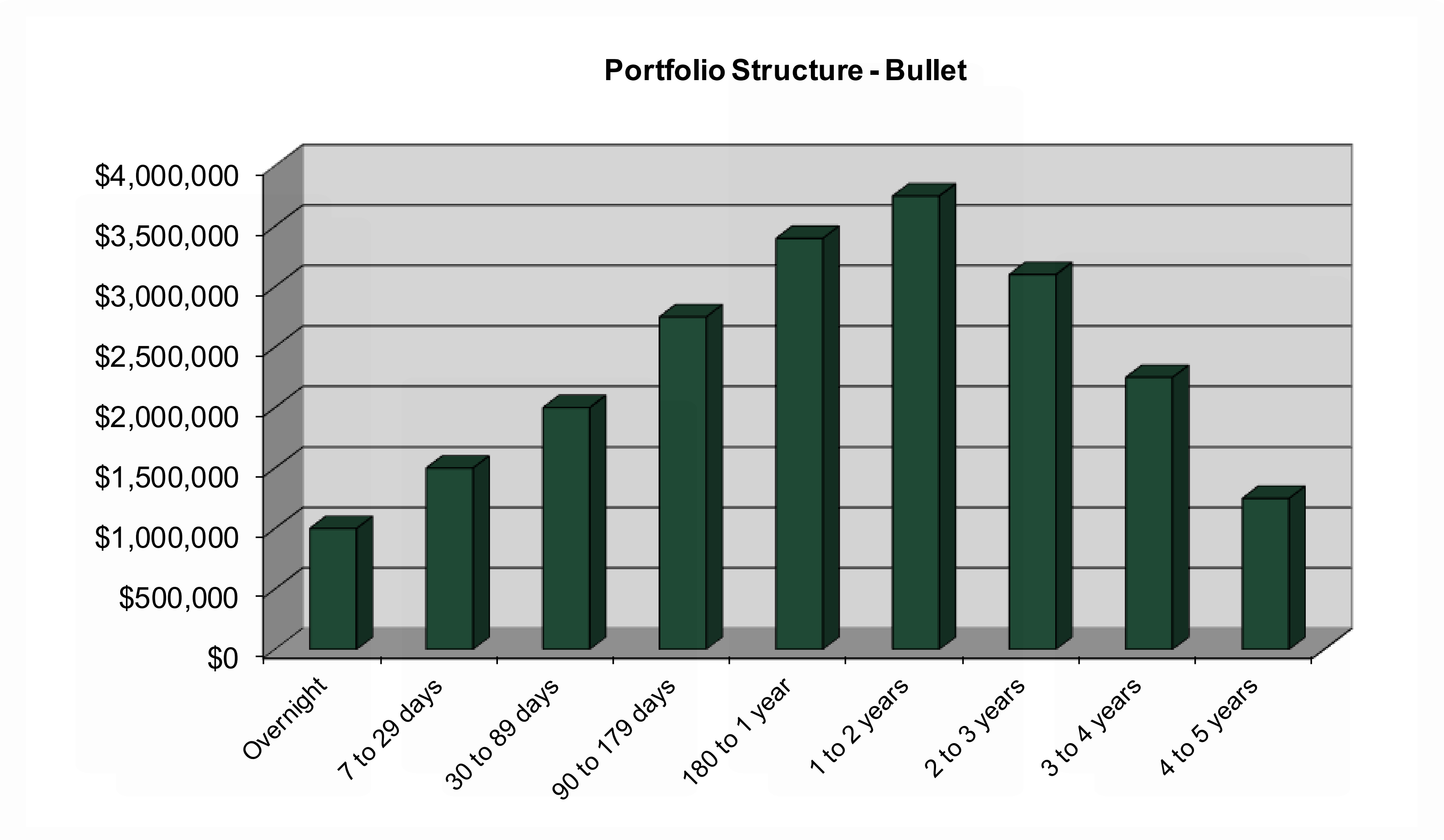
   c. Ladder - equal amounts at each maturity. For example, equal amounts maturing each month or quarter

Portfolio Structure—Ladder



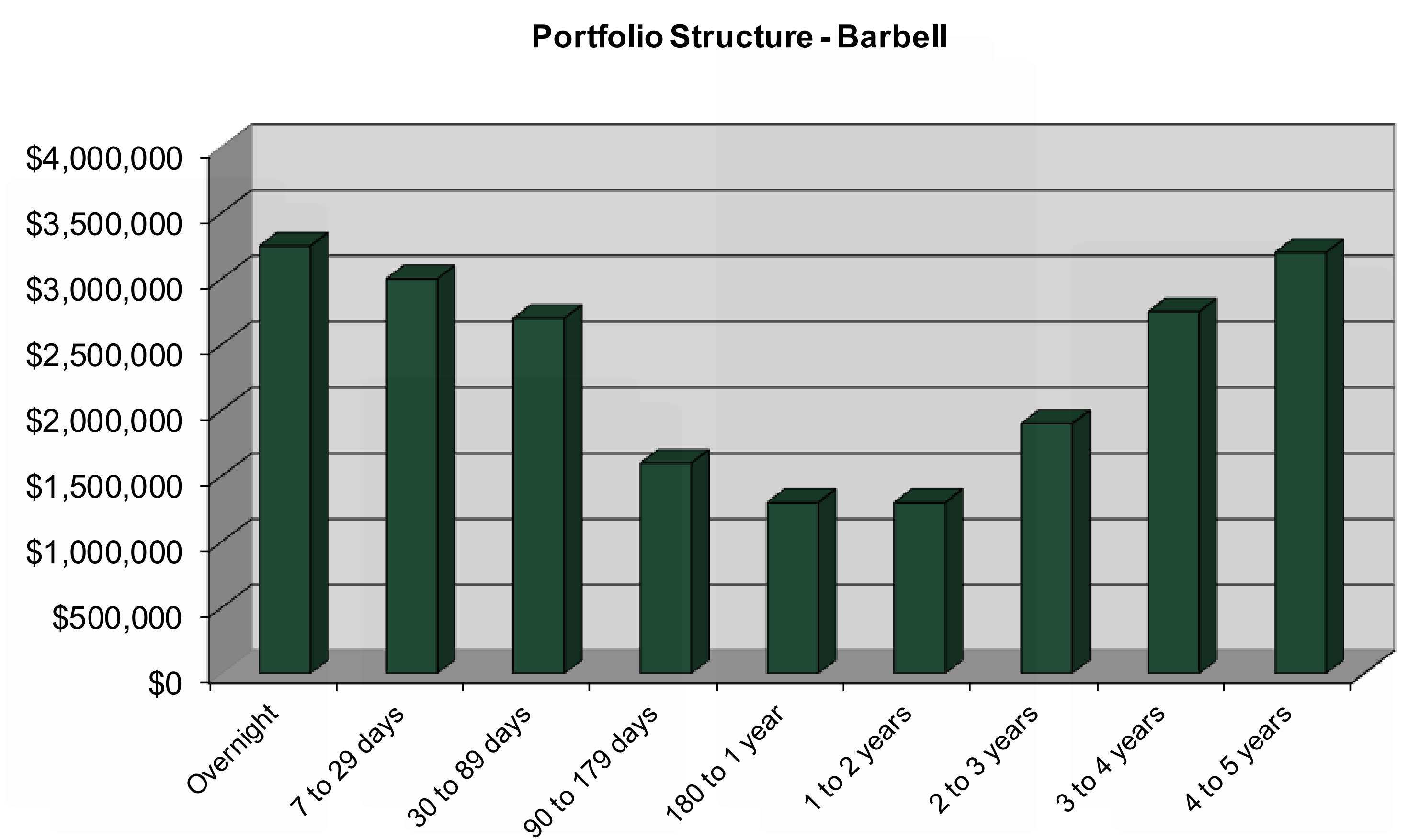
This sample illustration is being provided to demonstrate the Ladder portfolio structure.

Portfolio Structure—Bullet



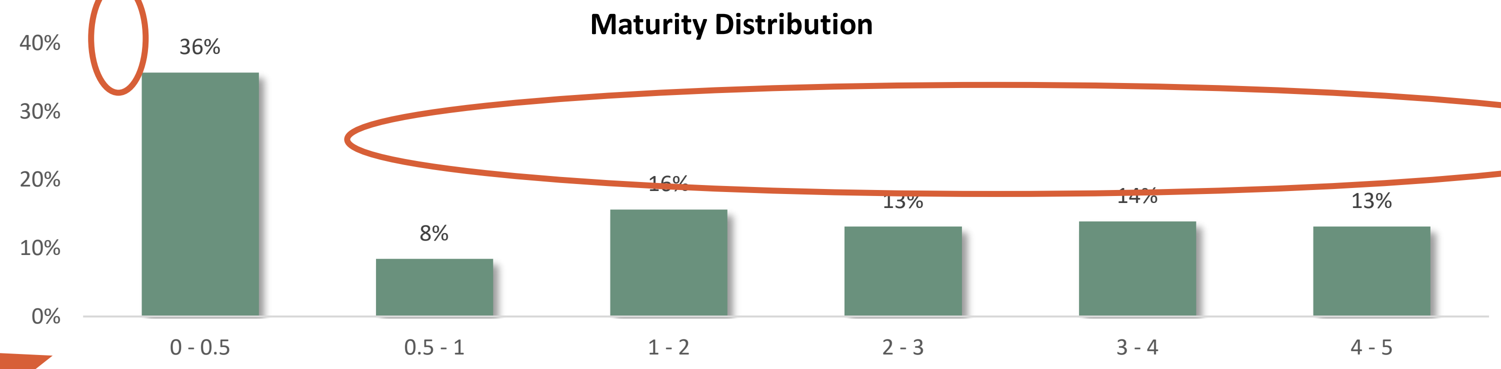
This sample illustration is being provided to demonstrate the Bullet portfolio structure.

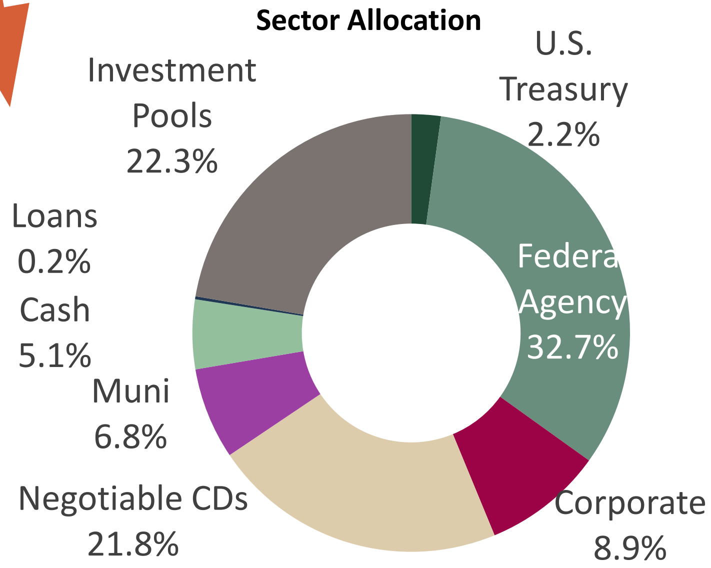
Portfolio Structure—Barbell

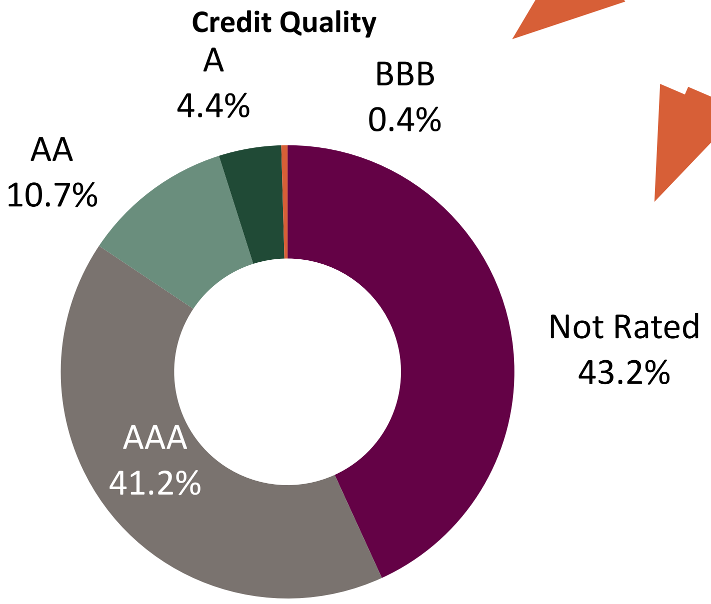


This sample illustration is being provided to demonstrate the Barbell portfolio structure.

Sample Portfolio—WWYD???







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The California State Local Agency Investment Fund (LAIF) is an investment portfolio managed by the State Treasurer. All securities are purchased under the authority of Government Code Section 16430 and 16480.4 and include securities issued by entities of the US Government, including the US Treasury and Agencies, Corporate debt, Certificates of Deposit, Mortgage Backed Securities and certain loans to the State and state agencies. The average maturity of the Fund will be between 120 days and 18 months.

Disclosures

ICE BofA 0-3 Year US Treasury Index

The ICE BofA 0-3 Year US Treasury Index tracks the performance of US Dollar denominated Sovereign debt publicly issued by the US government in its domestic market with maturities less than three years. Qualifying securities must have at least 18 months to maturity at point of issuance, at least one month and less than three years remaining term to final maturity, a fixed coupon schedule, and a minimum amount outstanding of $1 billion.

ICE BofA 1-3 Year US Treasury & Agency Index

The ICE BofA 1-3 Year US Treasury & Agency Index tracks the performance of US dollar denominated US Treasury and nonsubordinated US agency debt issued in the US domestic market. Qualifying securities must have an investment grade rating (based on an average of Moody's, S&P and Fitch). Qualifying securities must have at least one year remaining term to final maturity and less than three years remaining term to final maturity, at least 18 months to maturity at time of issuance, a fixed coupon schedule, and a minimum amount outstanding of $1 billion for sovereigns and $250 million for agencies.

ICE BofA 1-5 Year US Treasury & Agency Index

The ICE BofA US Treasury & Agency Index tracks the performance of US dollar denominated US Treasury and nonsubordinated US agency debt issued in the US domestic market. Qualifying securities must have an investment grade rating (based on an average of Moody's, S&P and Fitch). Qualifying securities must have at least one-year remaining term to final maturity and less than five years remaining term to final maturity, at least 18 months to maturity at time of issuance, a fixed coupon schedule and a minimum amount outstanding of $1 billion for sovereigns and $250 million for agencies. (Index: GVA0. Please visit www.mlindex.ml.com for more information).

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