

CDIAC

**CALIFORNIA
DEBT AND
INVESTMENT
ADVISORY
COMMISSION**

UNDERSTANDING CASH FLOW AND CASH FLOW FORECASTING

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February 21, 2019

10:00 AM – 11:30 AM



Cash Flows Webinar – Cash Flow Analysis

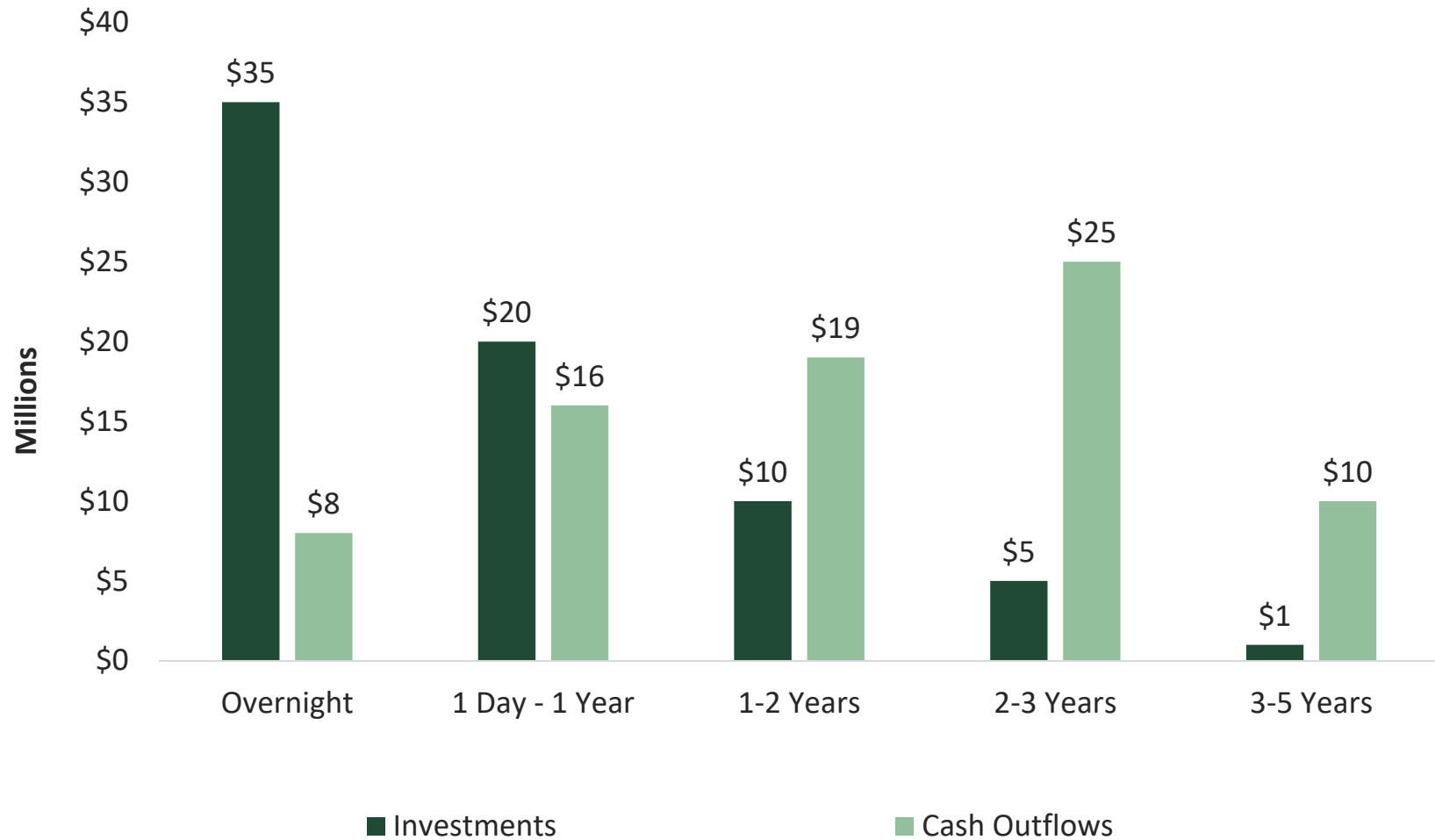
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How Much Liquidity Is Enough?



Do your investments meet cash needs?



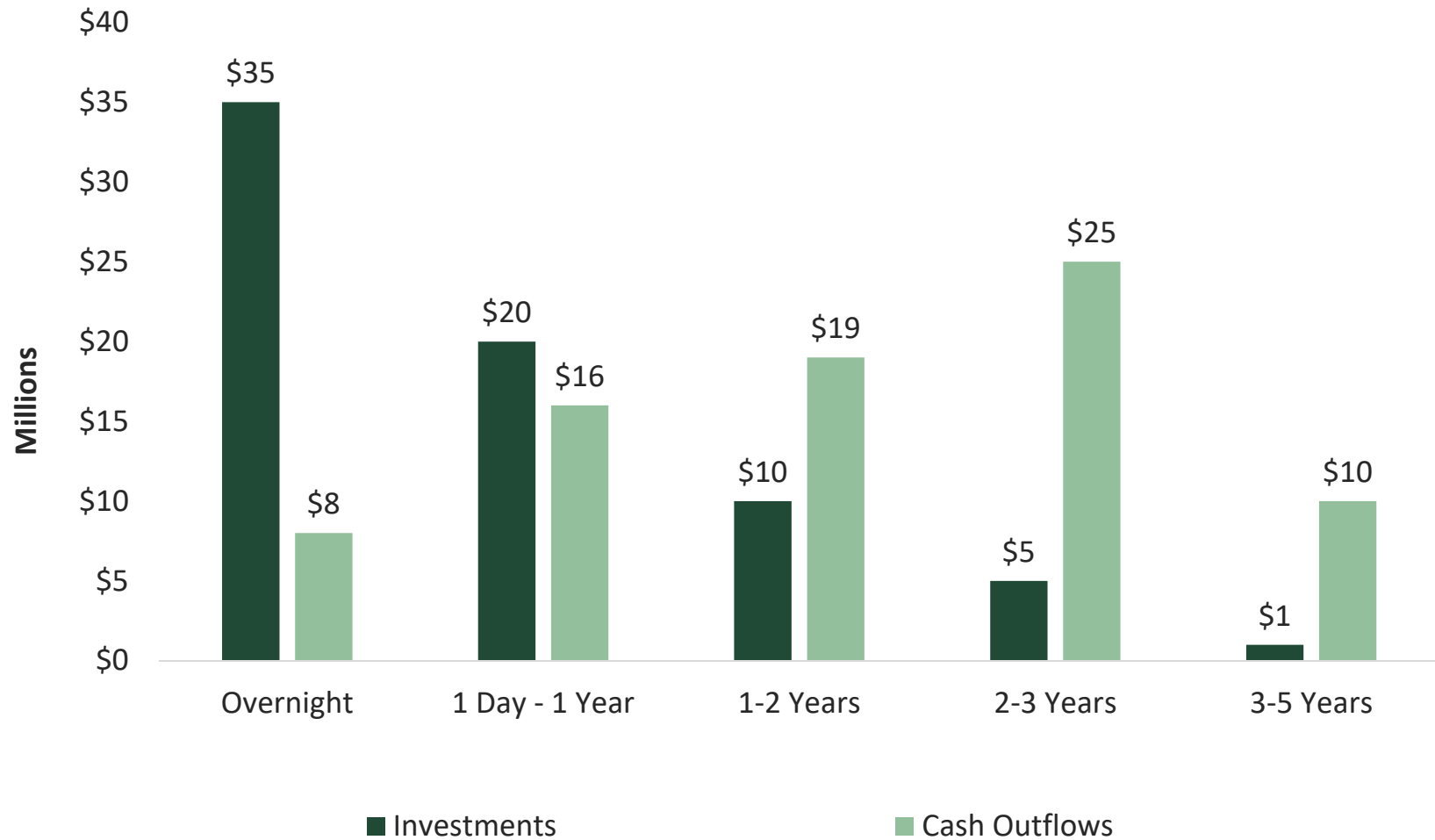
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How Much Liquidity Is Enough?



Are your investments optimized for return?



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How Much Liquidity Is Enough?



- Cost of insufficient liquidity
 - Delayed payments
 - Additional borrowing costs
 - Additional transaction costs
 - Negative headlines, both internally and externally

- Cost of excess liquidity
 - Lost investment income
 - Bad press

How Much Liquidity Is Enough?



- Most Crucial Questions:
 - *Am I meeting my Code-mandated goal of safety and liquidity?*
 - *Will I have the cash available when I need it?*
 - *Am I earning as much as I could?*

The Cost of Too Much Liquidity



Select Fixed-Income Hypothetical Returns By Duration

Index	Duration	10 YR Annualized Return	Cumulative Value of \$100 Million	Additional Value Over LAIF
Local Agency Investment Fund	0.57 Years	0.680%	\$107,011,898	N/A
ICE BAML 1 YR Treasury Index	0.98 Years	0.619%	\$106,365,300	(\$646,598)
ICE BAML 1-3 YR Treasury Index	1.87 Years	0.951%	\$109,927,475	\$2,915,577
ICE BAML 1-5 YR Treasury Index	2.62 Years	1.332%	\$114,147,432	\$7,135,534
ICE BAML 3-5 YR Treasury Index	3.76 Years	1.916%	\$120,899,276	\$13,887,378

Source: Bloomberg, ICE BAML Indices and LAIF. Data as of December 31, 2018. Performance for ICE BAML benchmarks based on a \$100 million portfolio, relative to LAIF. Performance shown is hypothetical and not based on an actual client's account. LAIF returns include an administrative fee charged to investors by the California State Treasurer. LAIF duration estimated based on average maturity in days, as of December 31, 2018, divided by 365 days. Past performance is not a guarantee of future results. Please see disclosures at the end of this presentation for further details.

Why Cash Flow Analysis?



“The analysis is intended to measure and assess the government’s ability to meet its needs, to negate the need for any short-term borrowing or liquidation of long-term investments before maturity, and to identify any idle funds, and the duration of that idle period, to determine whether those funds could be invested over that time frame. Cash flow analysis is therefore an essential tool for informed management decision making.”

- GFOA Best Practice: “Cash Flow Analysis”



Question 1

Liquidity has several definitions. Which is most applicable for our cash flow discussion?

- a) The investment has a sizeable secondary market
- b) The investment maturity coincides with cash needs
- c) The investment has high credit quality and is widely held

What is Cash Flow Analysis?



- Projection of anticipated cash receipts
- Projection of anticipated cash disbursements
- It considers all funds
- It considers timing of receipts and expenses
- To create an estimate of investable cash balances, categorize your funds:
 - Funds that need to be kept liquid = Liquidity Funds
 - Funds available to invest longer = Core Funds

What Cash Flow Analysis Is Not

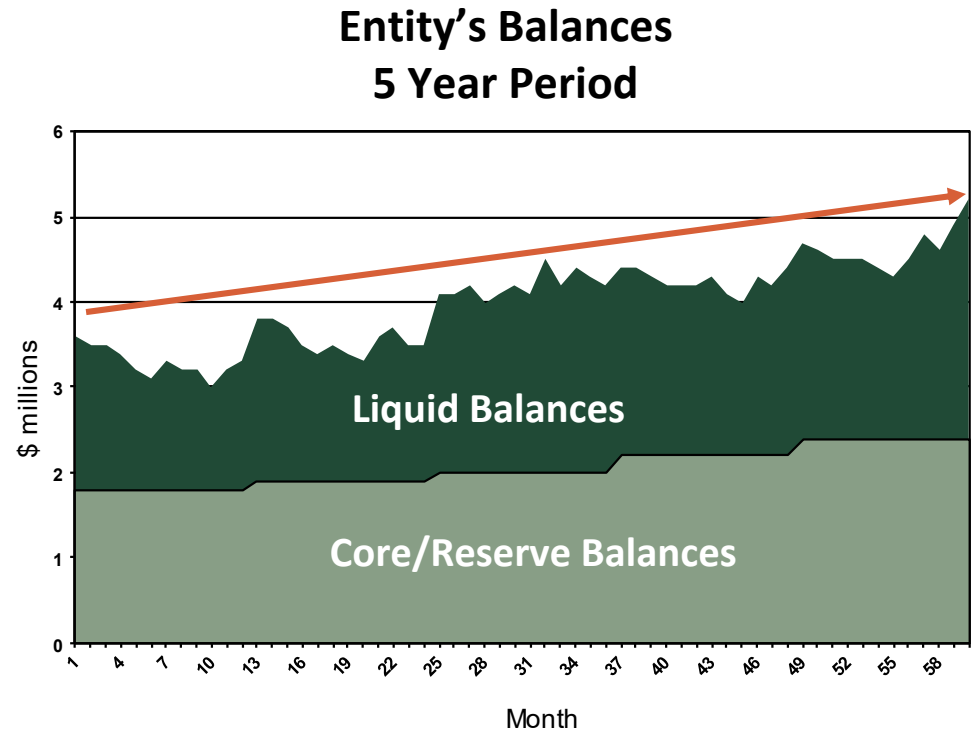


- “Cash” is the operative word in “Cash Flow Forecasting”
 - It is not accruals or budgeted funds
 - Only cash is spendable or investable!

Identify Liquid & Reserve Balances



- Total balances are trending higher
- But balances fluctuate throughout the year
- The “Liquid Balances” are established to meet cash needs
- The “Core/Reserve Balances” are generally stable and available for longer-term more diversified investing



Objectives of Cash Flow Forecasting



- Ensure sufficient liquidity for 6-12 month disbursements
- Improve investment earnings by:
 - Matching sources and uses of funds
 - Investing reserve/core funds longer-term and more diversified
 - Managing investment risks
 - Liquidity risk
 - Market risk
- Identify short-term cash deficits
- Warn of impending budget problems

Annual Cash Flow Forecasts



- Estimates monthly cash position
- Determines cash available for investments of more than 30 days
- Provides a useful monthly overview for investment decision-making
- Prepared for this fiscal year and next one to three fiscal years

Creating Annual Cash Flow Forecast



- Beginning balance of cash and investments
- Monthly revenue projections
- Monthly expenditure projections
- Projected net change
- Projected cumulative balance of cash and investments
- Schedule of current investments and coupon payments



Major Revenues

- Property tax
- Sales and use tax
- User fees
- Shared revenues
- Non-recurring
 - Bond proceeds
- Other

Major Expenditures

- Payroll and benefits
- Operating expenses
- Debt service
- Capital projects
 - Draw-down schedule
- Non-recurring
- Other

Sources of Information



- Historical data from general ledger
- Historical data from bank and pool statements
- Current year budget
- Capital project spending projections
- Schedule of investment maturities and coupon payments

Annual Cash Flow - Example



	Beg. Balance	Jan-18	Feb-18	Mar-18	Apr-18	May-18
Liquid Fund Balance	95,542,961.00	94,422,259.00	93,301,557.00	92,180,855.00	91,060,153.00	89,939,451.00
Inflow						
Sales Tax Collections		3,516,116	3,516,116	3,516,116	3,516,116	3,516,116
Property Tax Collections		10,507,259	10,507,259	10,507,259	10,507,259	10,507,259
Intergovernmental		10,264,623	10,264,623	10,264,623	10,264,623	10,264,623
Other Revenues		7,919,282	7,919,282	7,919,282	7,919,282	7,919,282
Outflows						
Personnel		(12,778,319)	(12,778,319)	(12,778,319)	(12,778,319)	(12,778,319)
Operating & Maintenance		(1,199,030)	(1,199,030)	(1,199,030)	(1,199,030)	(1,199,030)
Charges for Services		(1,597,717)	(1,597,717)	(1,597,717)	(1,597,717)	(1,597,717)
Debt Service		(1,093,706)	(1,093,706)	(1,093,706)	(1,093,706)	(1,093,706)
Other Expenses		(6,659,210)	(6,659,210)	(6,659,210)	(6,659,210)	(6,659,210)
Actual/Projected Net Change		(1,120,702)	(1,120,702)	(1,120,702)	(1,120,702)	(1,120,702)
Projected Liquid Balance		94,422,259	93,301,557	92,180,855	91,060,153	89,939,451
Projected Invested Balance		141,565,000	141,565,000	141,565,000	141,565,000	141,565,000
Total Projected Balance		235,987,259	234,866,557	233,745,855	232,625,153	231,504,451
Actual Liquid Balance		85,562,465	203,231,573	124,216,038	201,625,430	150,181,434
Actual Invested Balance		141,565,000	146,645,000	146,645,000	146,645,000	149,645,000
Total Actual Balance		227,127,465	349,876,573	270,861,038	348,270,430	299,826,434
Difference		(8,859,794)	115,010,016	37,115,183	115,645,277	68,321,983

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



Consolidated Cash Flow

Fund Balance

Month	Beg Balance	Cash Inflows	Cash Outflows	Net Change
January-16	95,542,961	243,572,384	(253,257,765)	(9,685,381)
February-16	85,857,580	143,962,217	(26,607,427)	117,354,790
March-16	203,212,370	41,584,603	(119,098,784)	(77,514,181)
April-16	125,698,189	94,526,488	(17,116,990)	77,409,498
May-16	203,107,687	33,277,738	(84,727,349)	(51,449,611)
June-16	151,658,076	102,278,132	(76,404,216)	25,873,916
July-16	177,531,992	2,747,874	(36,416,262)	(33,668,388)
August-16	143,863,604	32,888,804	(39,493,932)	(6,605,128)
September-16	137,258,476	251,833,487	(251,697,780)	135,707
October-16	137,394,183	242,834,825	(242,187,729)	647,096
November-16	138,041,279	232,485,117	(239,719,807)	(7,234,690)

For Period

Low Balance	\$85,857,580
High Balance	\$259,994,231

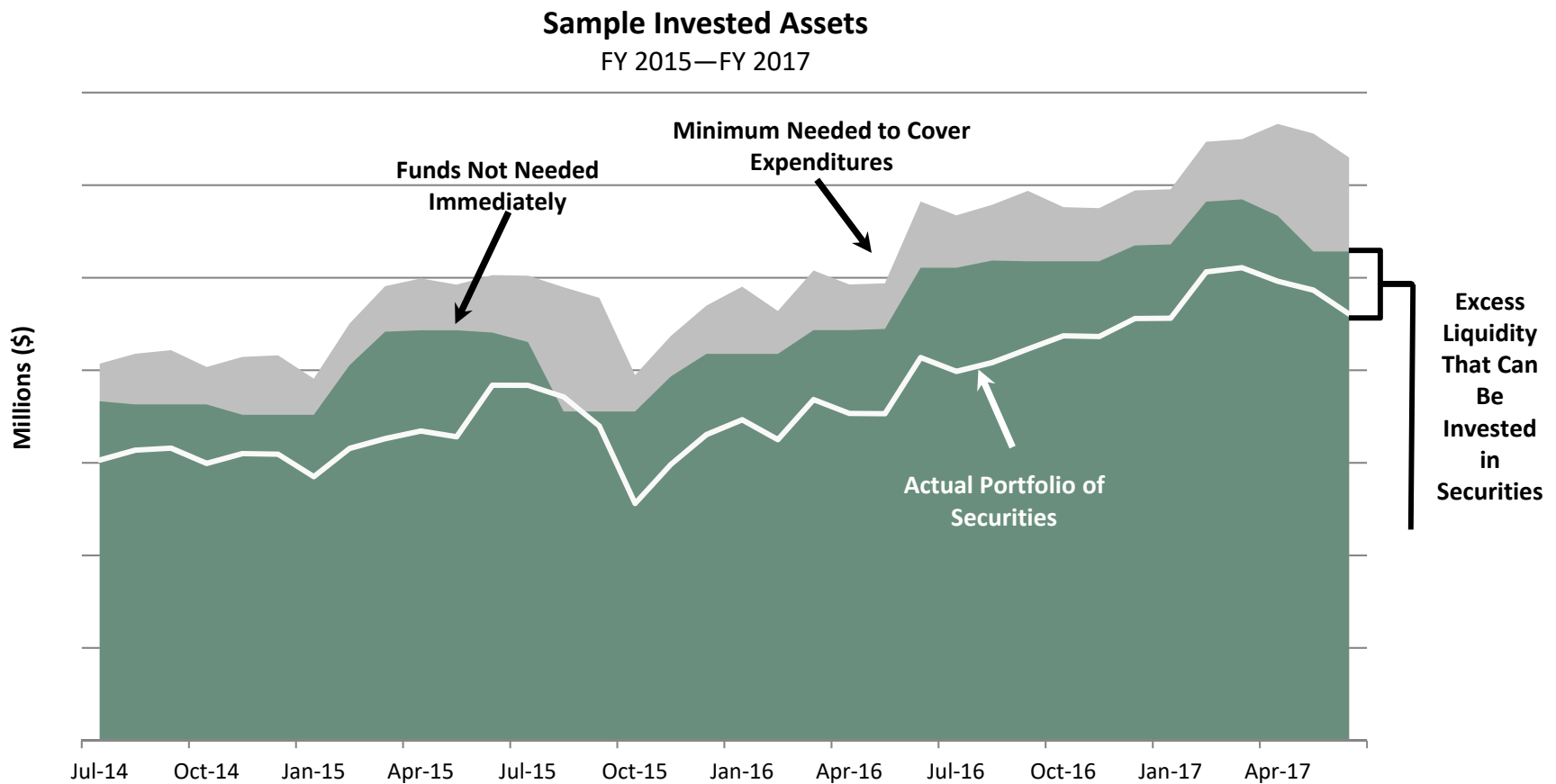
Average Balance

Prior 12 Months	\$155,641,677
Prior 36 Months	\$159,324,198



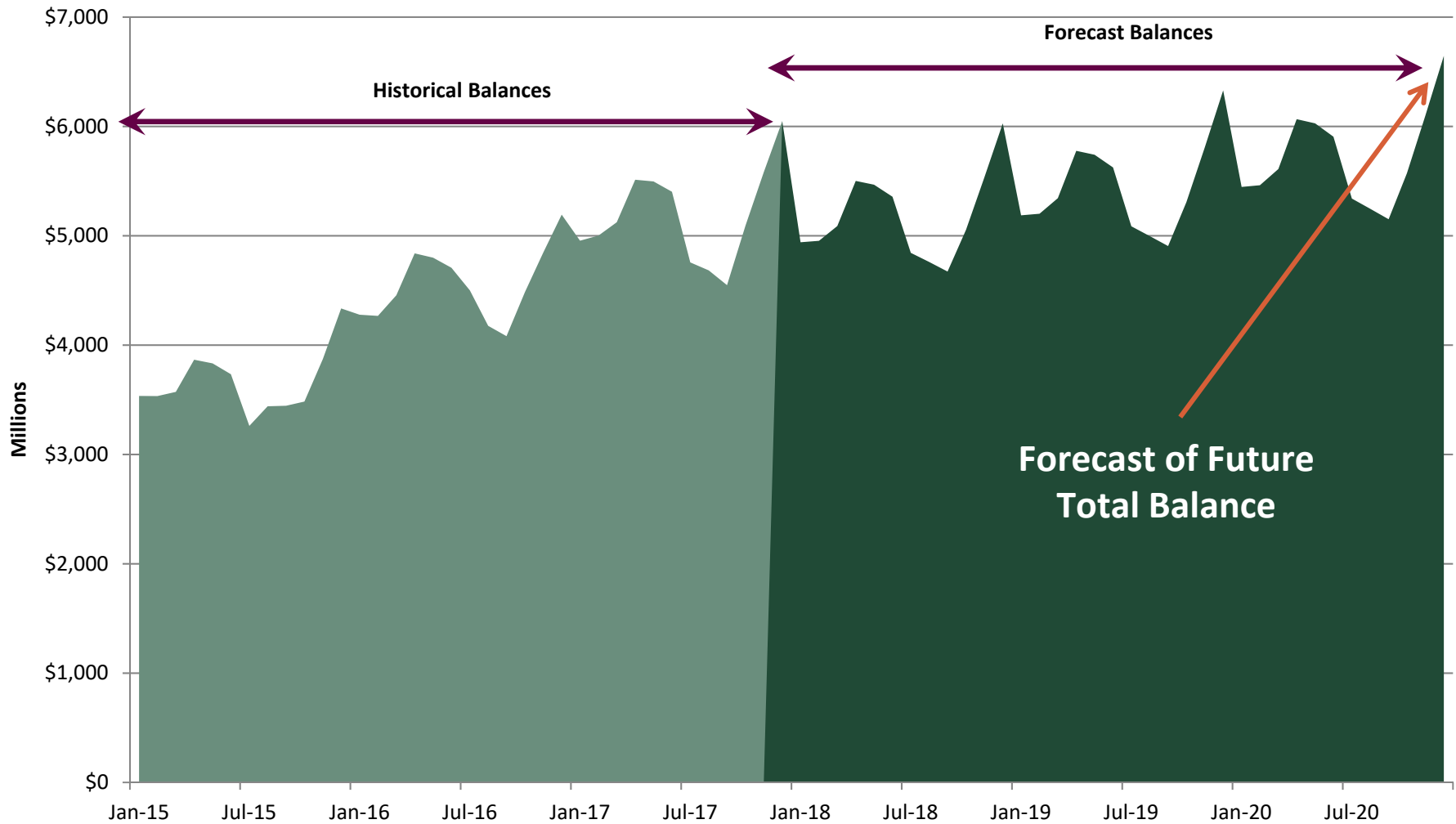
Graphing Balances Over Time

- Identify past growth rates
- Observe seasonal changes in balances
- Pinpoint how much is needed liquid and how much can be invested in a portfolio of securities



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

Statistical Forecast of Future Balances



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



- **Systems**
 - Limitations of computer systems for historical data or data management

- **Physical Structure**
 - Locations of people

- **Political**
 - Elected officials agenda

- **Inter-departmental Communications**
 - Departments not understanding importance of information

Review and Maintain Cash Flow Forecast



- Compare actual versus forecast
- Identify reasons for variances
- Adjust assumptions if warranted
- Follow up with department heads on capital project slippage
- Update database for accurate future projection
- Retain documentation for future reference

How Do I Invest It?



- You must take into account:
 - Cash flow needs
 - California Government Code
 - Investment policy
 - Investment objectives
 - Current market conditions

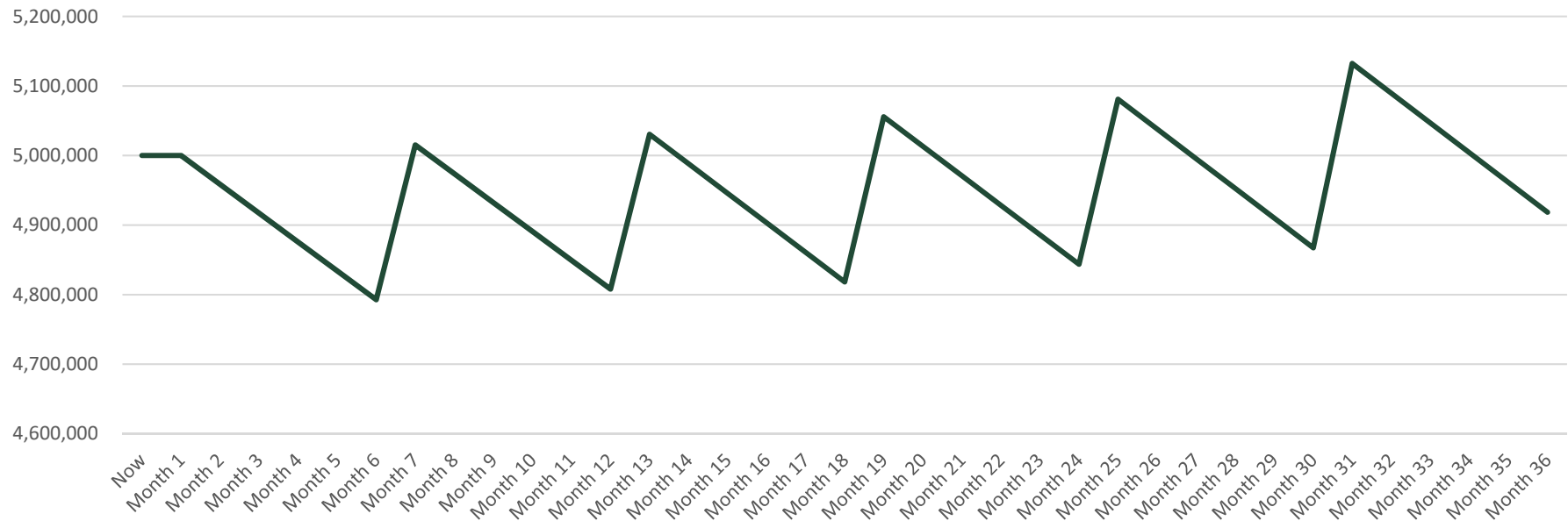


- Determine how much to keep liquid - the rest is core funds
- Check in with all of your sources
 - Revenues and expenditures historical and to date
 - Debt payments
 - Everchanging CIP schedules
- Reduce unnecessary liquidity
- Make sure you emphasize safety and correct liquidity level before optimizing



Questions 2, 3, & 4

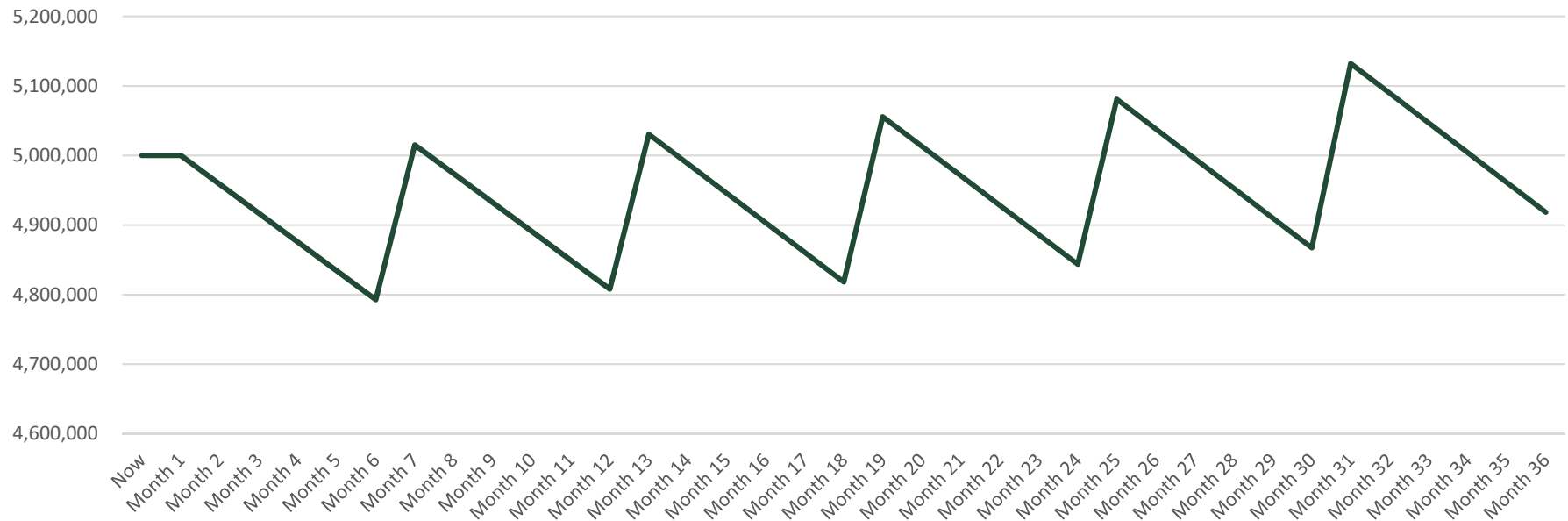
Sample Cash Flow Projection



An initial view of the chart shows that

- a) On average, balances have been falling**
- b) On average, balances have been growing**
- c) Balances have periodically fluctuated by about \$500,000**

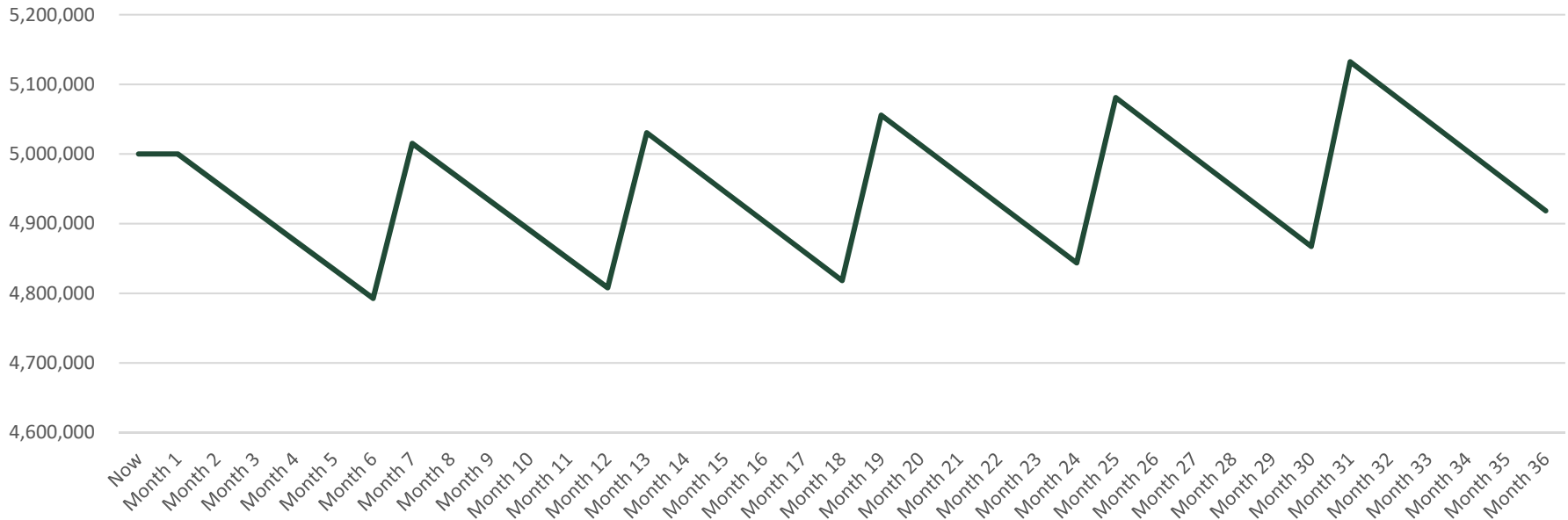
Sample Cash Flow Projection



The public agency that put this chart together can count on

- a) Balances growing forever**
- b) At least \$4.7 million in core funds that will not likely be spent**
- c) No discernable seasonality to the flows of funds**

Sample Cash Flow Projection



To make this projection more accurate, the agency can

- a) Continue projecting growth of funds at historical growth**
- b) Lower the balances by 10% to create a cushion**
- c) Compare actual vs. projected receipts/expenses and adjust**

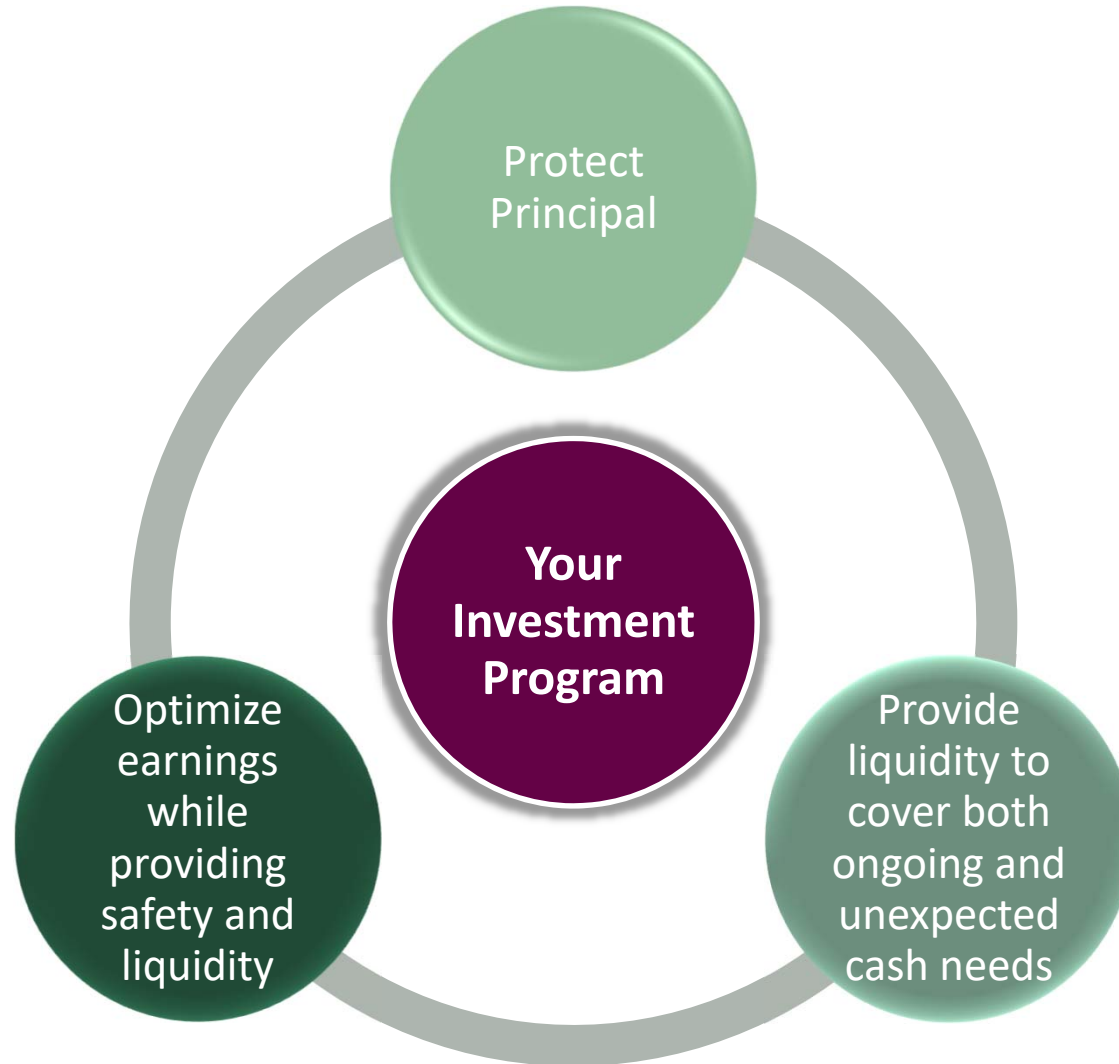


Cash Flows Webinar – Investing Cash Flows

February 21, 2019

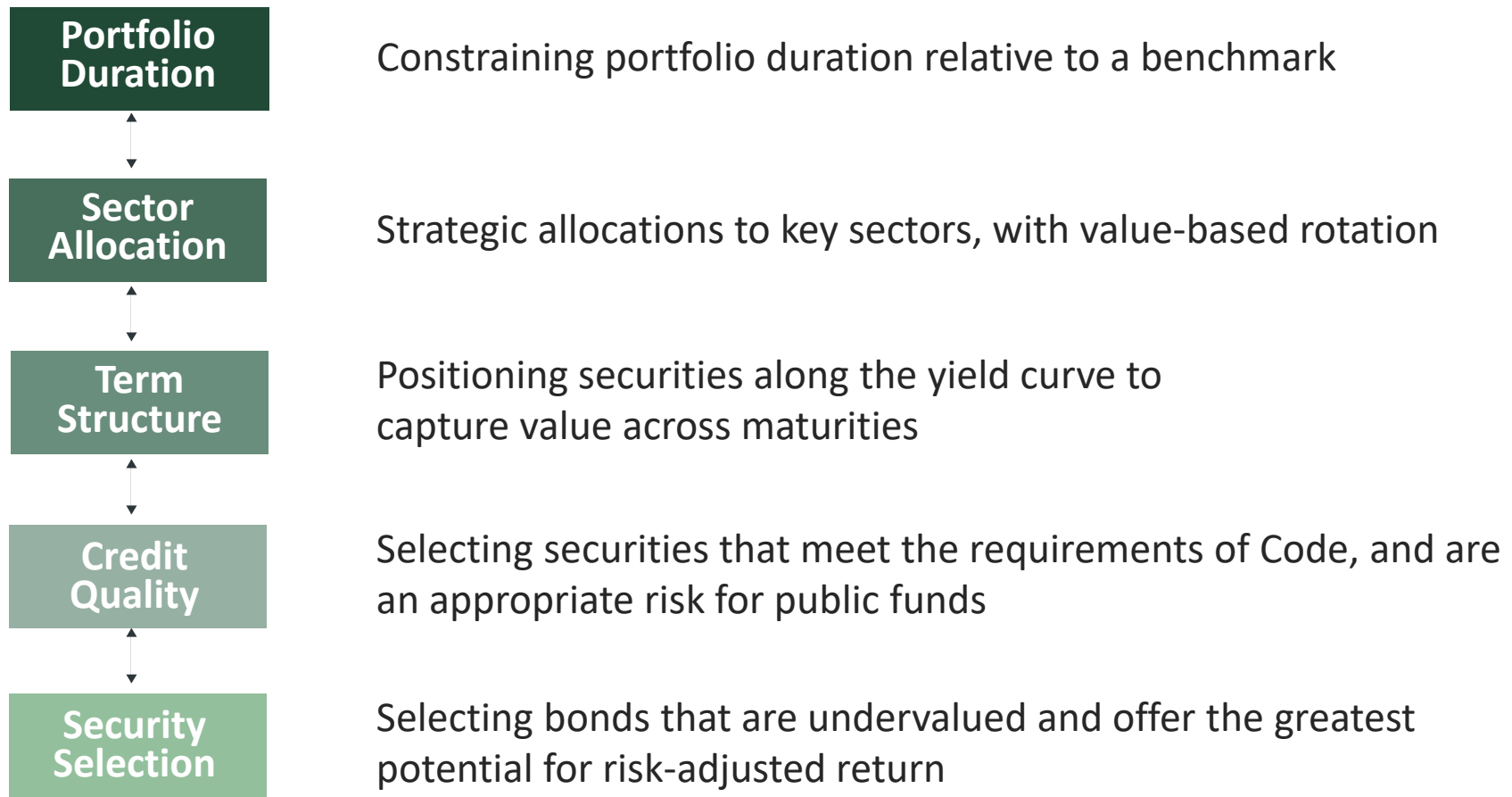
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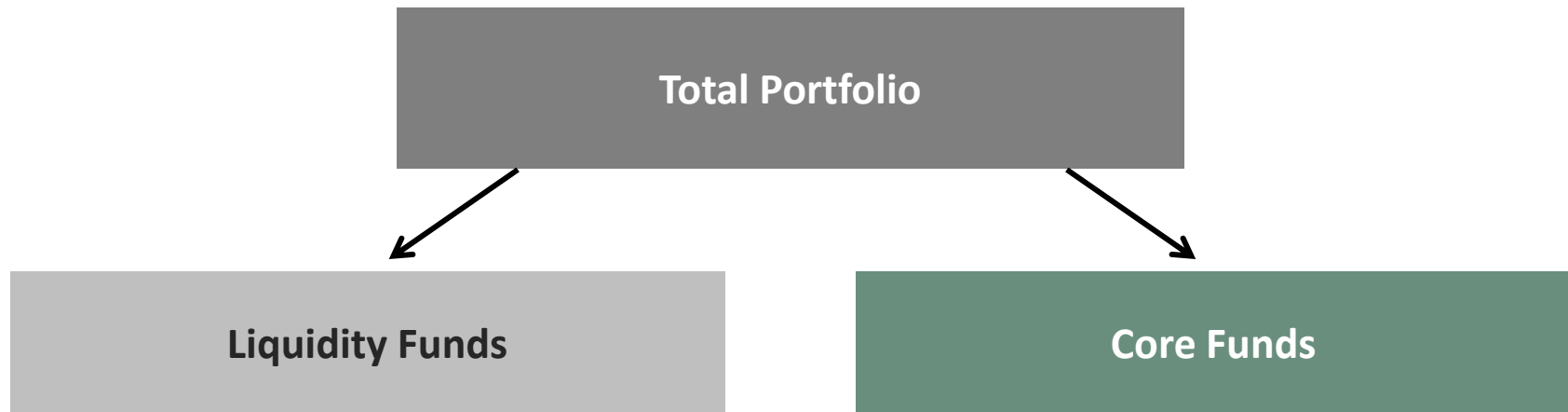
Meet Your Code-Mandated Objectives





Based on cash flow analysis, California Government Code, and the Investment policy, these decisions must be made:





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

- Target generally to a higher duration to enhance the potential to increase earnings
 - Invest in securities allowed by Code:
 - U.S. Treasury Securities
 - U.S. Agency Securities
 - High-Grade Credit

Question 1 - Investing



Approximately what percentage of your public agency's assets are liquid vs. core?

- a) 25% liquid
- b) 50% liquid
- c) 75% liquid
- d) 100% liquid
- e) Not sure

Structuring Your Maturities



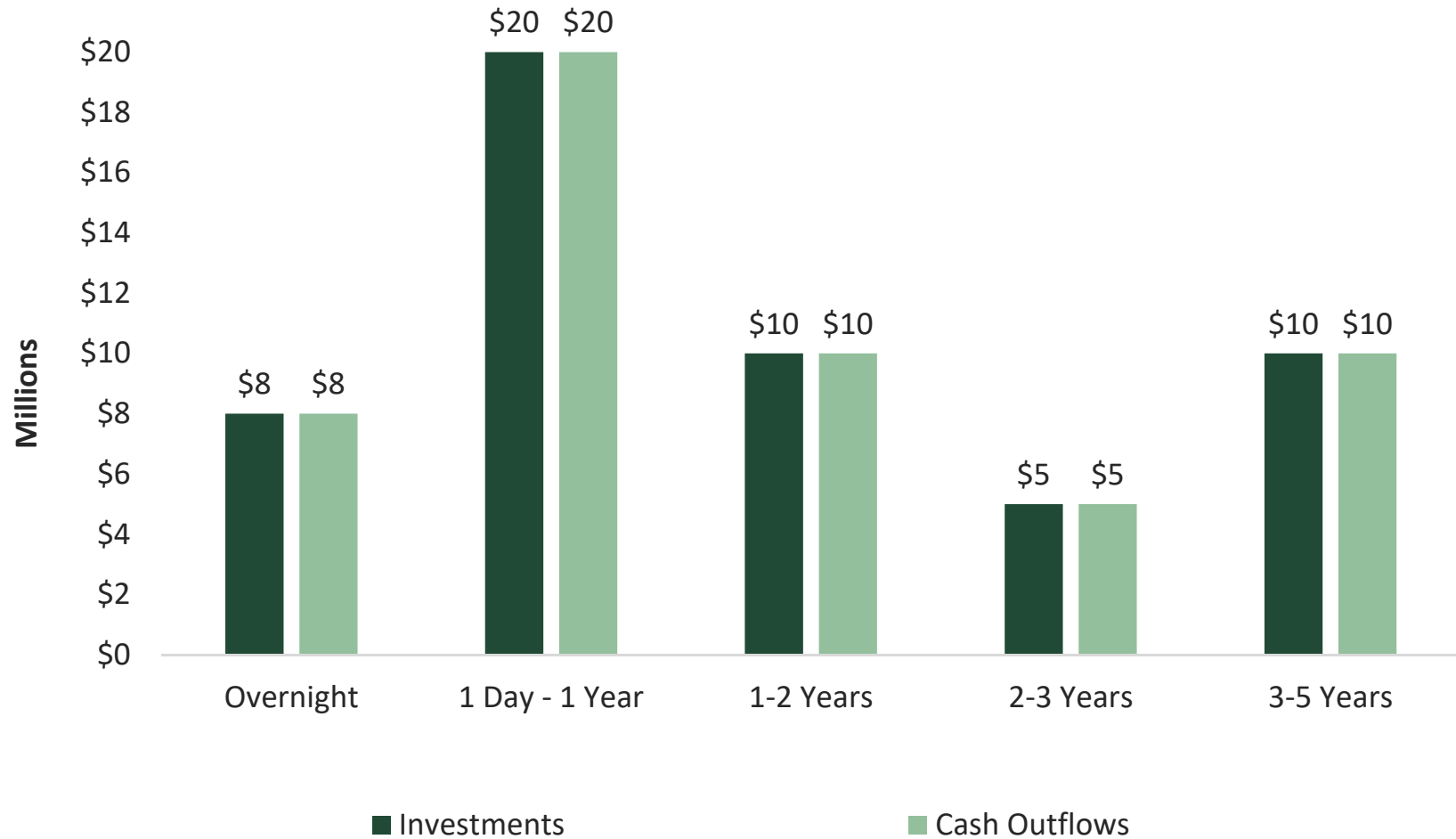
- Having selected a target duration, build a portfolio structure that will capitalize on market conditions
 - Liquidity
 - LGIPs
 - Money Funds
 - SMAs
 - Match cash flows
 - Bond Ladder
 - Bullet structure
 - Barbell structure
 - Total return strategy

Liquidity



- Bank Accounts
- LGIPs
- Money Market Funds
- Separately-Managed Accounts

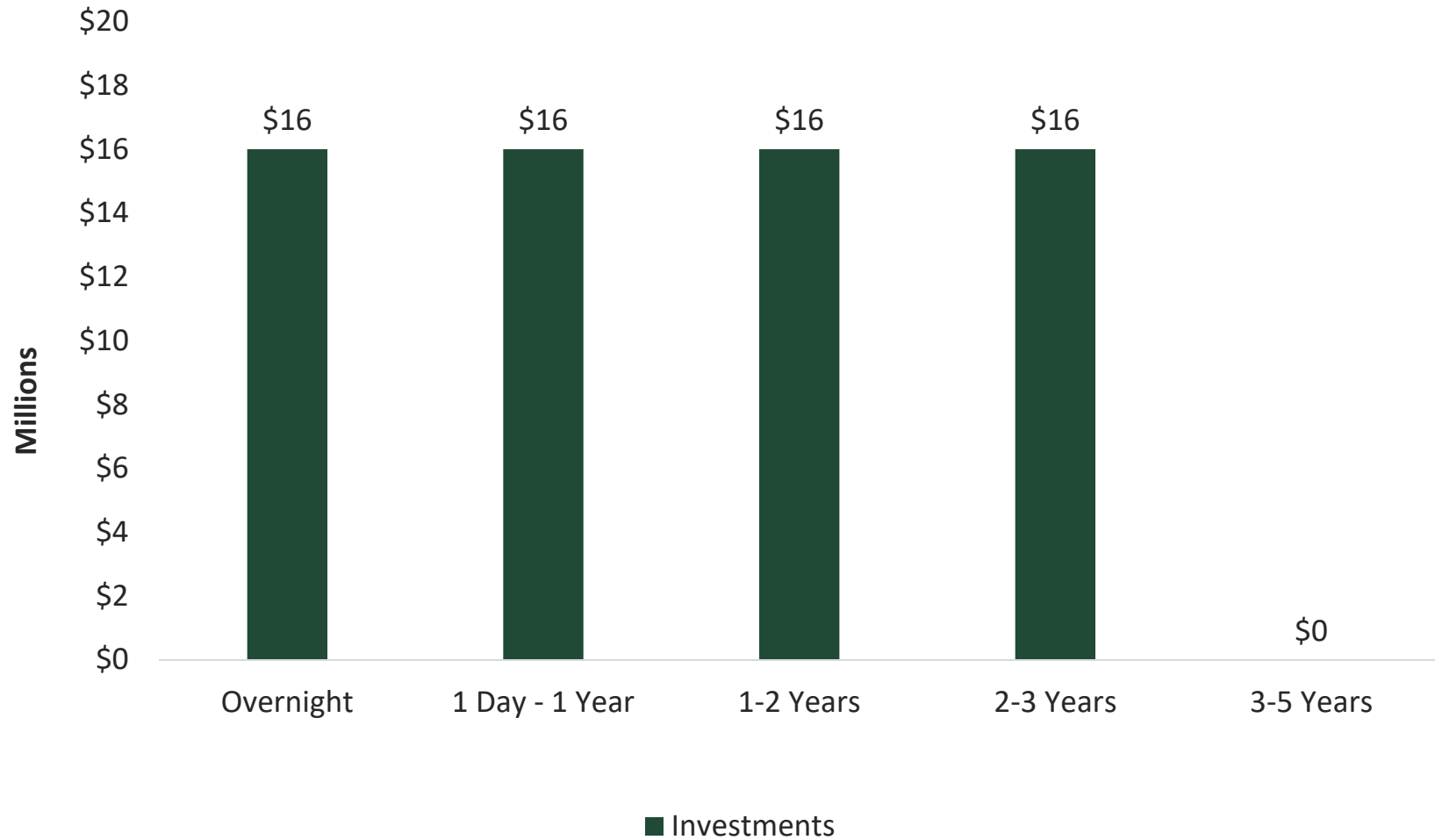
Matching Cash Flows Maturity Structure



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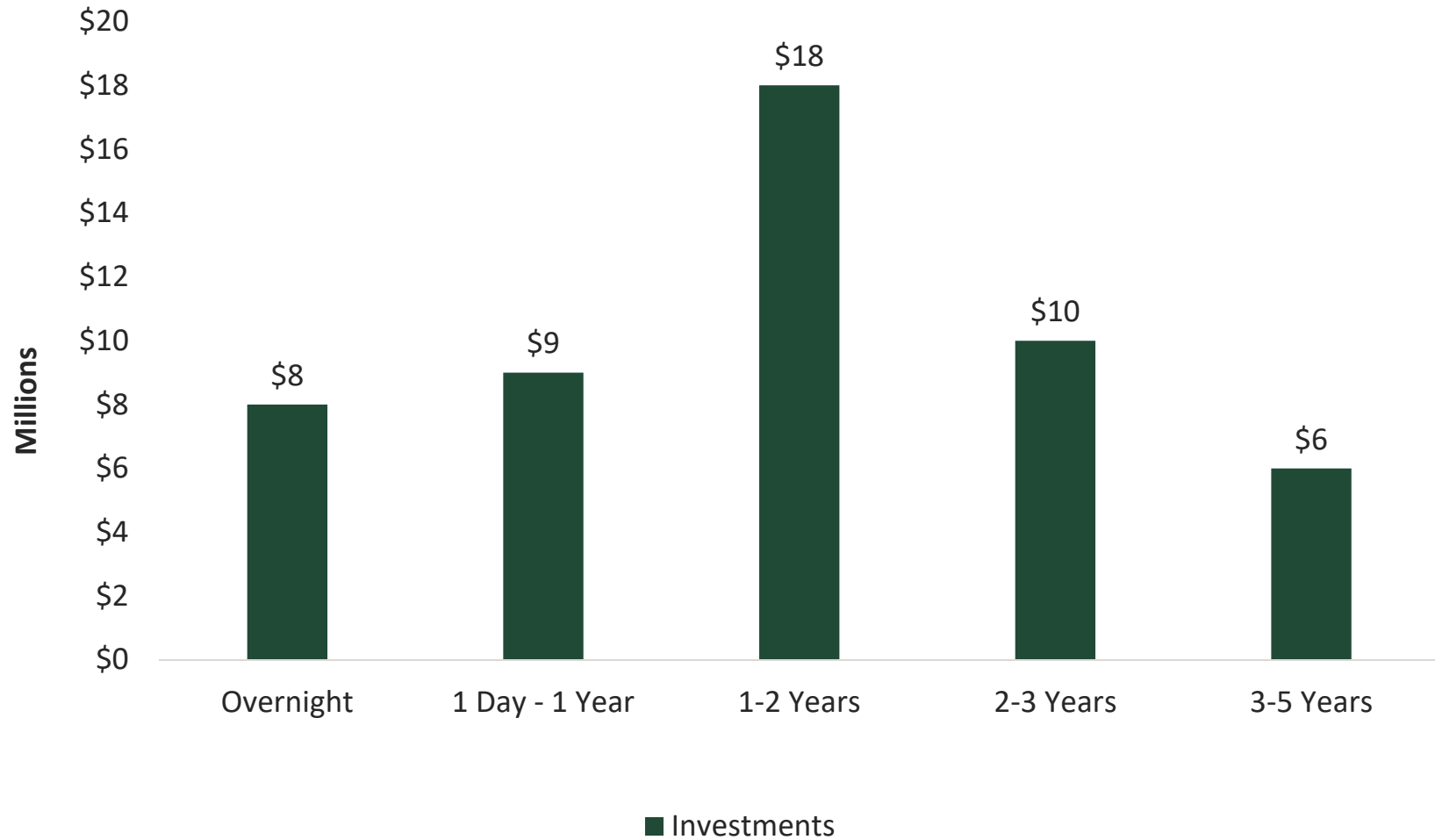
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Laddered Maturity Structure



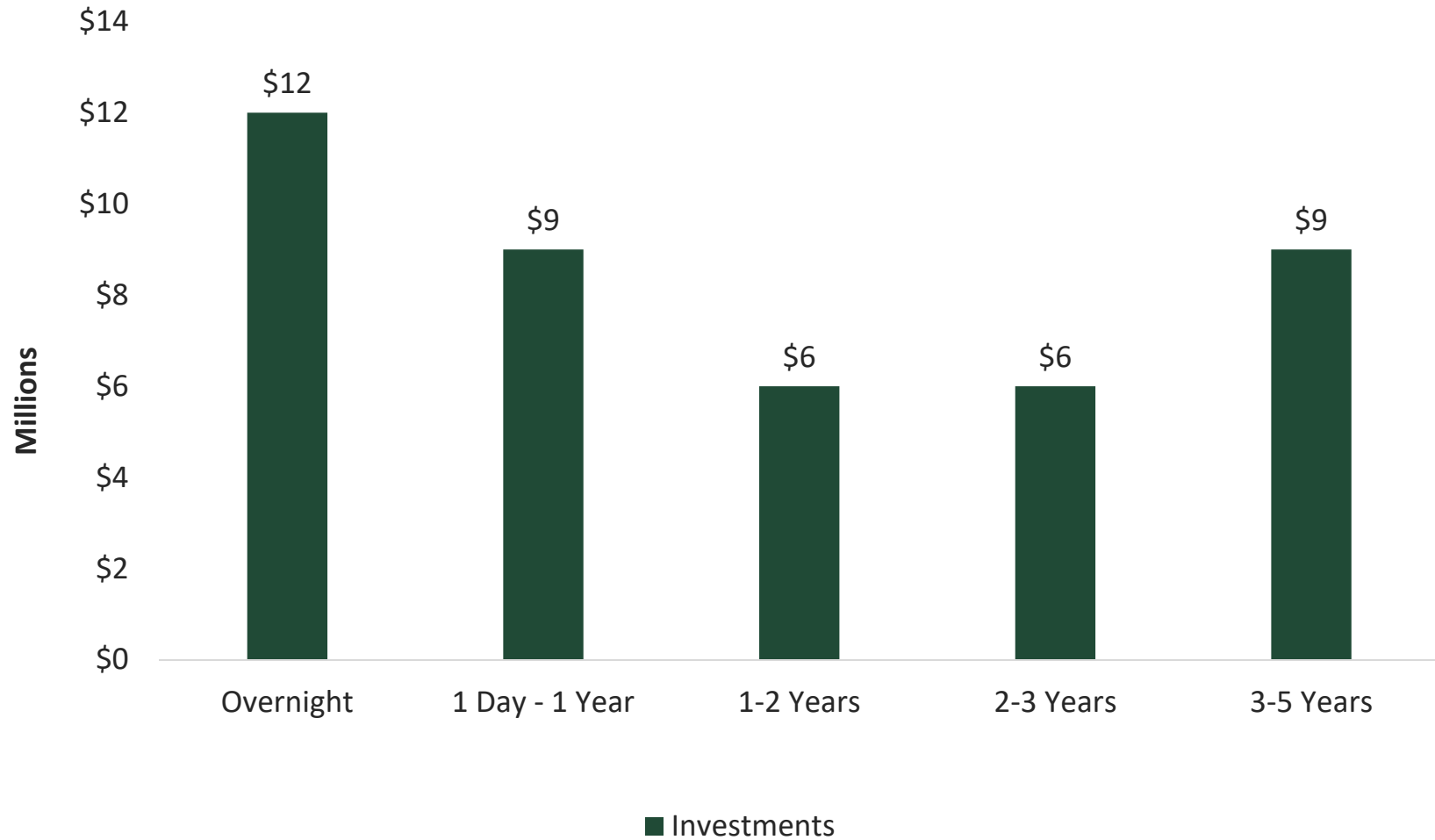
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Bullet Maturity Structure



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Barbell Maturity Structure



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Annual Benchmark Study



Period Ending December 31, 2018

	ICE BAML 1-3 Yr US Treasury/Agency Index	ICE BAML 1-5 Yr US Treasury/Agency Index	ICE BAML 1-10 Yr US Treasury/Agency Index
0-6 months			
6-12 months			
1-3 years	100.00%	61.09%	43.81%
3-5 years		38.91%	27.90%
5-10 years			28.29%
Treasury	94.92%	96.00%	96.78%
Agency	5.08%	4.00%	3.22%
Corporate			
Modified Duration 12/31/2018	1.87	2.60	3.64
10 Year Annualized Total Return	1.01%	1.38%	1.85%
10 Year Standard Deviation	1.84%	2.36%	3.43%
Sharpe Ratio	0.34	0.43	0.43
Qualitative Risk Objective	12/31/1988 - 12/31/2018	12/31/1988 - 12/31/2018	12/31/1988 - 12/31/2018
Negative Quarterly Return Occurrences	13	23	33
2 Consecutive Negative Quarterly Return Occurrences	2	3	7
Negative Return For Year Occurrences	0	2	3
Worst Year Total Return	0.37%	-0.63%	-1.61%

Source: ICE BAML Indices. Please see Benchmark disclosures; Past performance is not indicative of future results. Index returns assume reinvestment of all distributions and do not reflect fees or expenses. It is not possible to invest directly in an index.

Developing Solutions Designed to Meet Your Goals



Demonstrated Value Over Time

Hypothetical 10-Year Benchmark Performance

December 2008 – December 2018

Investment Style	Portfolio Duration	Annualized Total Return 10 Year Period	10-Year Growth of \$10 Million Portfolio	Added Value Over LAIF
<i>LAIF</i>	<i>0.57</i>	<i>0.68%</i>	<i>\$10.7 million</i>	<i>N/A</i>
ICE BAML 1-3 Yr US Treasury/Agency Index	1.80	1.01%	\$11.1 million	\$0.4 million
ICE BAML 1-5 Yr US Treasury/Agency Index	2.54	1.38%	\$11.5 million	\$0.8 million
ICE BAML 1-10 Yr US Treasury/Agency Index	3.58	1.85%	\$12.0 million	\$1.3 million

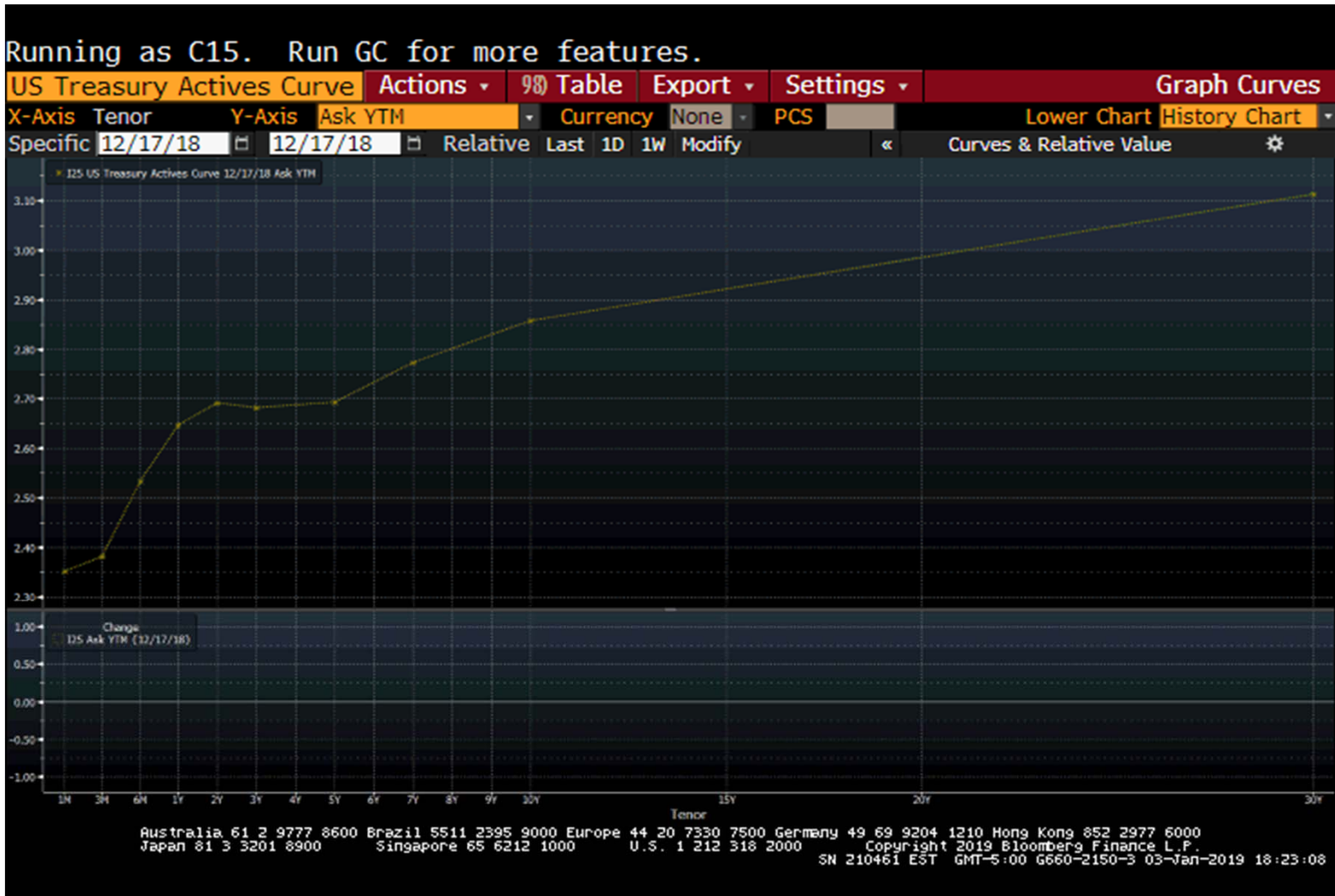
Performance for ICE BAML benchmarks based on a \$10 million portfolio, relative to LAIF. Performance shown is hypothetical and not based on an actual client's account. Data as of December 31, 2018. LAIF returns include an administrative fee charged to investors by the California State Treasurer. LAIF duration estimated based on average maturity in days, as of November 30, 2018, divided by 365 days. Past performance is not a guarantee of future results. Please see disclosures at the end of this presentation for further details.

Normal Yield Curve



Source: Bloomberg

Flattening Yield Curve



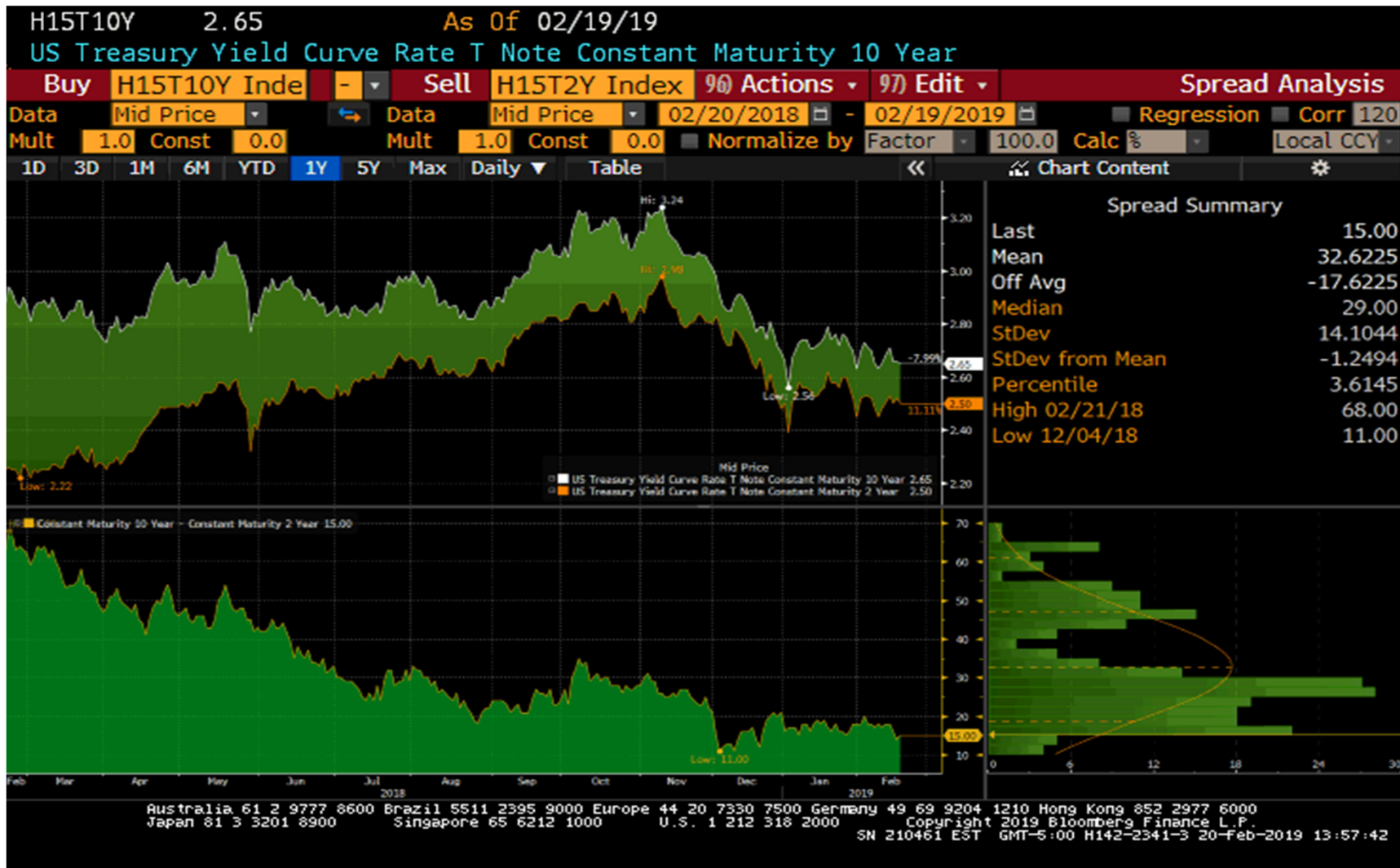
Source: Bloomberg

Inverted Yield Curve



Source: Bloomberg

Yield Spread Between 2-Year and 10-Year Treasury Securities



Source: Bloomberg

Yield Levels *as of February 13, 2019*



LAIF	1 Year	2 Years	3 Years	4 Years	5 Years
2.39%	2.55%	2.52%	2.52%	2.53%	2.53%

Assuming a long-term time horizon, what is the main risk of keeping funds invested one year or less?



What is the main risk of keeping longer-term core funds invested one year or less?

- a) Interest Rate Risk
- b) Reinvestment Risk
- c) Credit Risk
- d) Liquidity Risk



- A Public Agency has a total portfolio size that generally fluctuates between \$80 and \$100 million during the year.
- Total assets have been growing slowly over time.
- Total Return Investment Portfolio is \$50 million, the remainder is in LAIF.
- ***Assuming a \$100 million current portfolio size, approximately how much can be considered core funds and invested into a longer-term strategy?***
- ***What strategy would you use for core funds?***

Question 3 - Investing



Assuming a \$100 million current portfolio size, how much can be considered core funds and invested into a longer-term strategy?

- a) \$50 million
- b) \$60 million
- c) \$70 million
- d) \$80 million
- e) Not sure

Question 4 - Investing



What strategy would you use for core funds?

- a) Ladder
- b) Bullet
- c) Barbell
- d) Total Return
- e) None of the above

Disclosures



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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. Past performance is not indicative of future results.

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Economic factors, market conditions and investment strategies will affect the performance of any portfolio and there are no assurances that it will match or outperform any particular benchmark. The data contained in this presentation is the property of those providers, which was obtained from sources believed to be reliable, but are subject to change at any time at the provider's discretion. Unless otherwise noted, Chandler is the source of data contained in this presentation.

Fixed income investments are subject to interest, credit and market risk. Interest rate risk: the value of fixed income investments will decline as interest rates rise. Credit risk: the possibility that the borrower may not be able to repay interest and principal. Low rated bonds generally have to pay higher interest rates to attract investors willing to take on greater risk. Market risk: the bond market in general could decline due to economic conditions, especially during periods of rising interest rates.

Disclosures



ICE BAML 1-3 Year US Treasury & Agency Index

The ICE BAML 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. (Index: G1A0. Please visit www.mlindex.ml.com for more information).

ICE BAML 1-5 Year US Treasury & Agency Index

The ICE BAML 1-5 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 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).

ICE BAML 1-10 Year US Treasury & Agency Index

The ICE BAML 1-10 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 ten 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: G5A0. Please visit www.mlindex.ml.com for more information).

LAIF

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.

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