



Cash Flow Analysis and Portfolio Optimization

Core Concepts for the Investment Officer

January 23, 2019

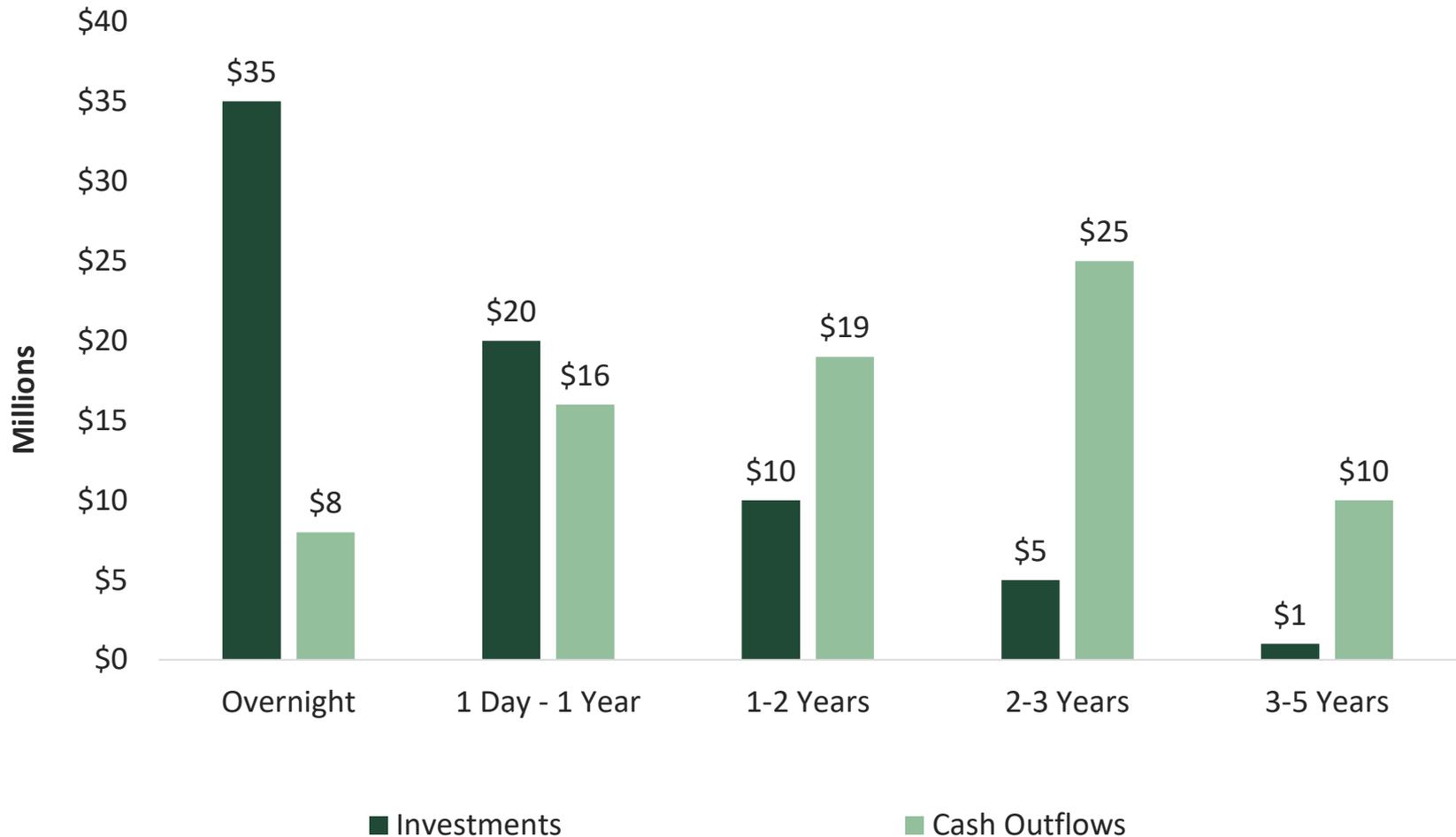
Carlos Oblites

Senior Vice President, Portfolio Strategist

How Much Liquidity Is Enough?



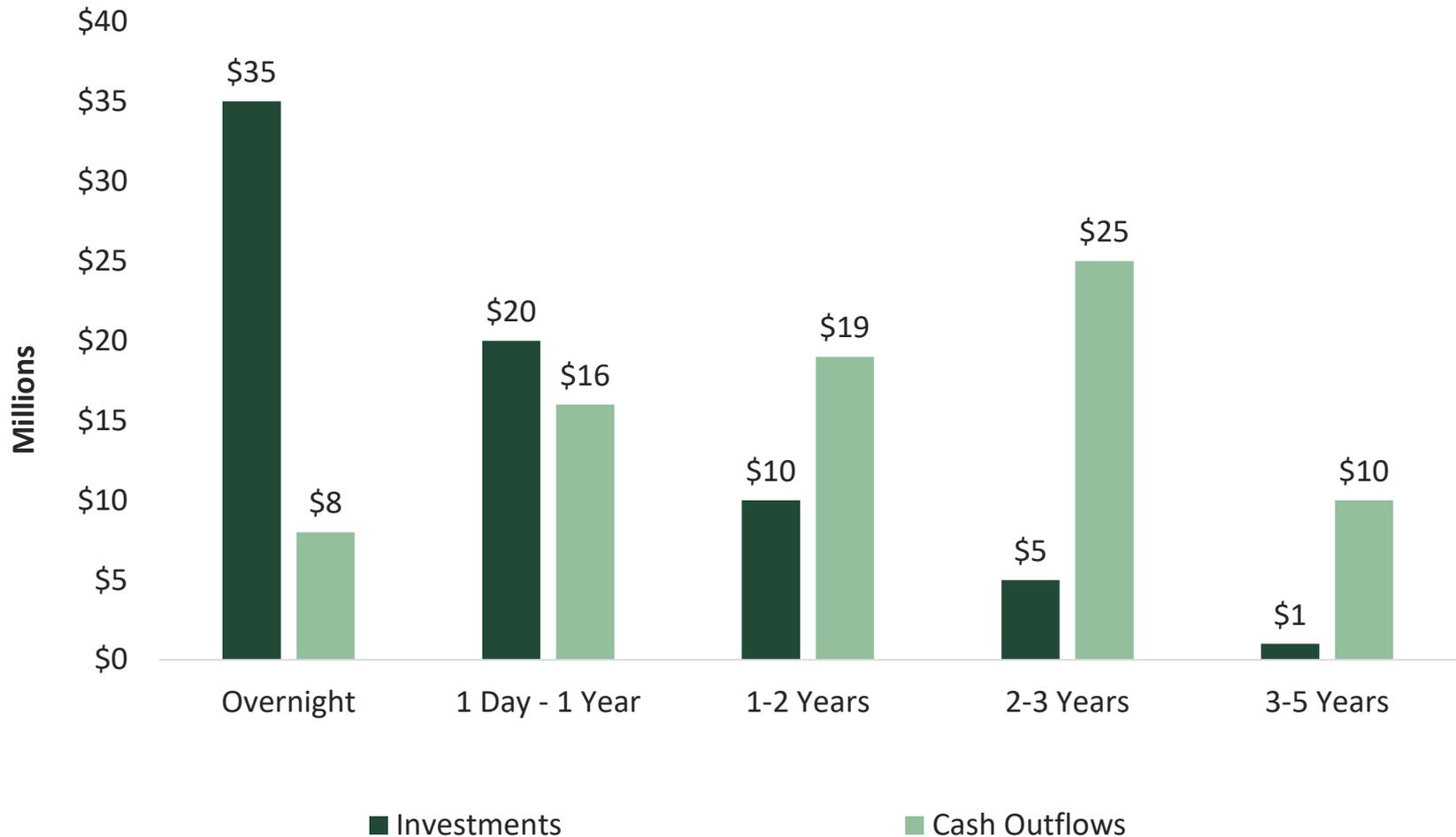
Do your investments meet cash needs?



How Much Liquidity Is Enough?



Are your investments optimized for return?





- 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



- 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?



Select Fixed-Income 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. 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 the benchmark disclosures at the end of this presentation for further details.



“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”

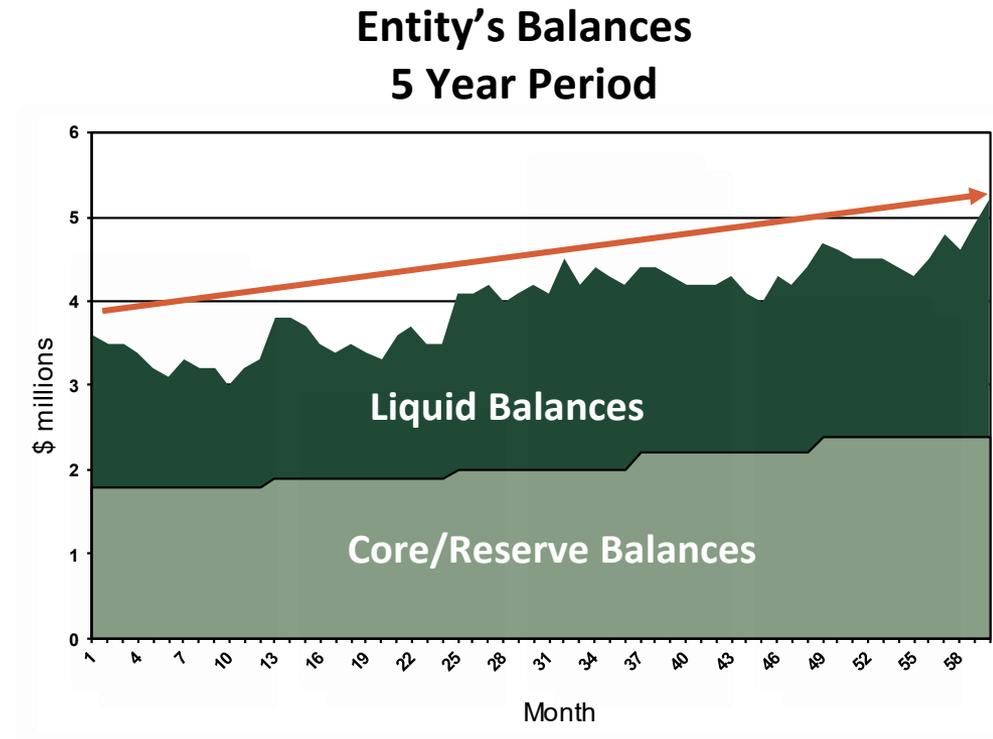


- Projection of anticipated cash receipts
- Projection of anticipated cash disbursements
- It considers all funds
- It considers timing of receipts and expenses
- To create an estimate of investable cash balances, categorize your funds:
 - Funds that need to be kept liquid = Liquidity Funds
 - Funds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



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

- 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





- 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



- 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



- 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



- 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 |



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 |

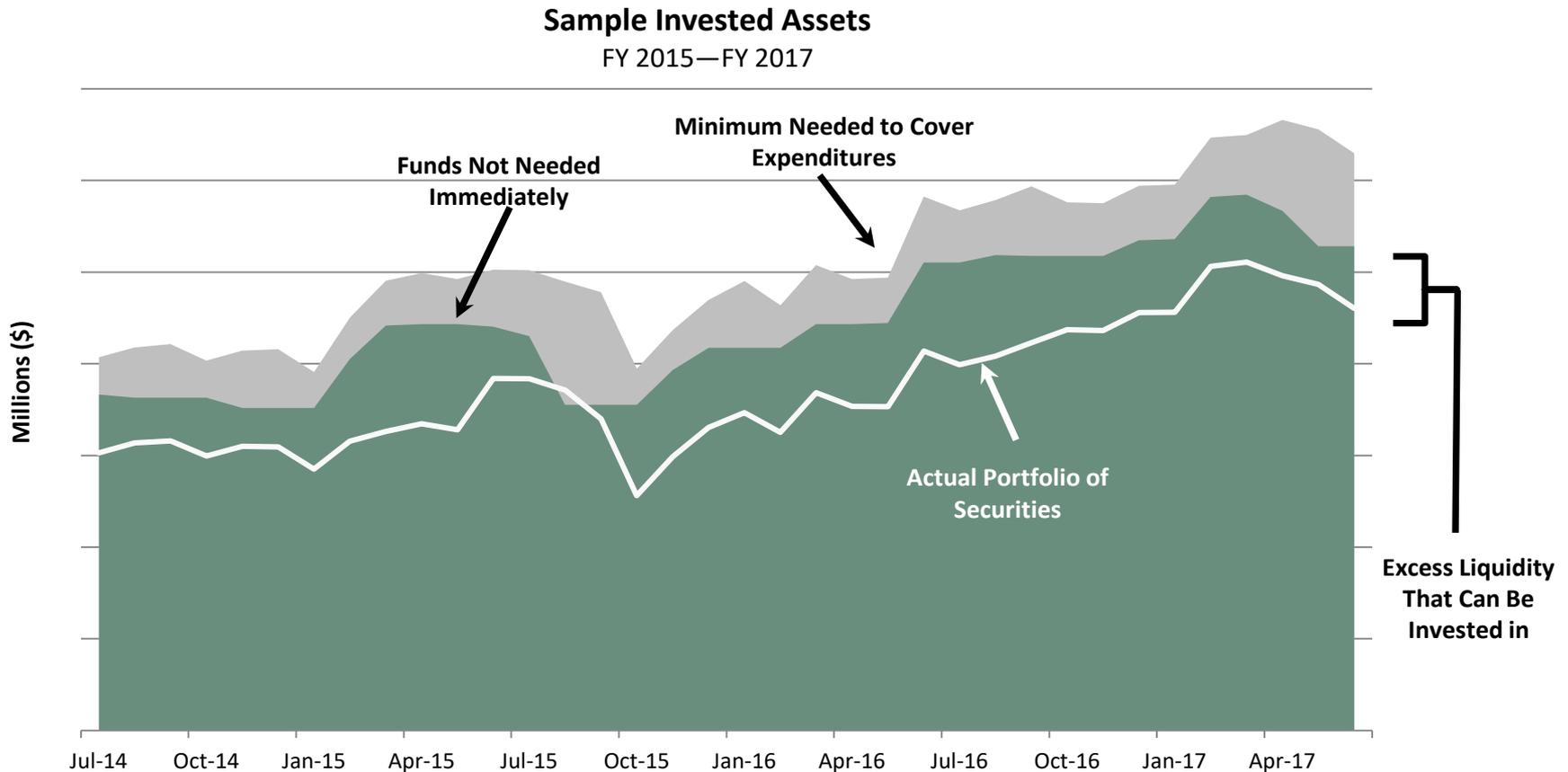
Average Balance

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

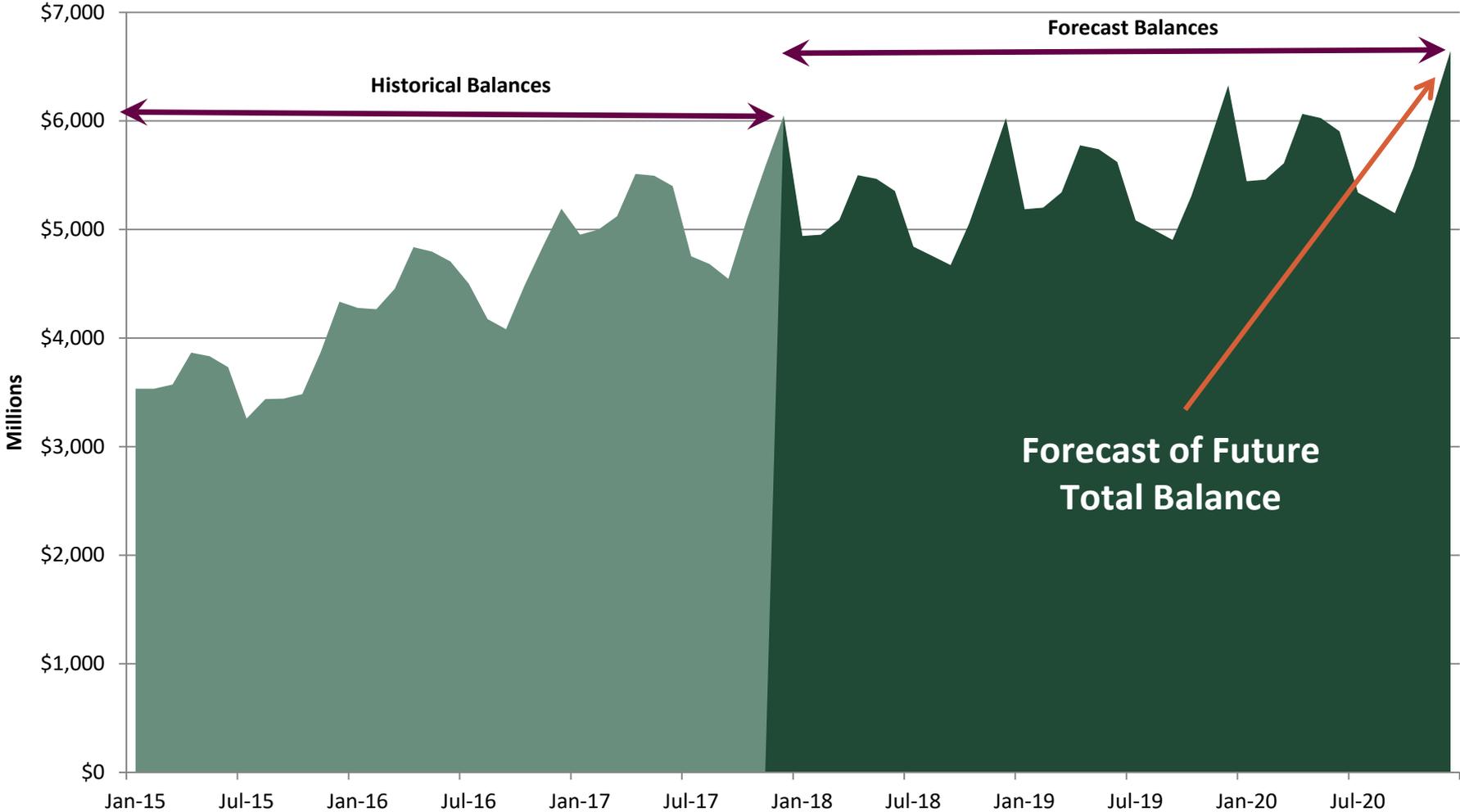
Graphing Balances Over Time



- 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



Statistical Forecast of Future Balances



This sample illustration is being provided to demonstrate the tools on how we analyze cash balances.

- 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



- 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



- 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



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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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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.



ICE BAML 1 Year US Treasury Note Index

The ICE BAML 1-Year US Treasury Note Index is comprised of a single issue purchased at the beginning of the month and held for a full month. At the end of the month that issue is sold and rolled into a newly selected issue. The issue selected at each month-end rebalancing is the outstanding two-year Treasury note that matures closest to, but not beyond, one year from the rebalancing date. (Index: GC03. Please visit www.mlindex.ml.com for more information).

ICE BAML 1-3 Year US Treasury Index

The ICE BAML 1-3 Year US Treasury Index tracks the performance of US dollar denominated sovereign debt publicly issued by the US government in its domestic market. Qualifying securities must have at least one year remaining term to final maturity and less than three years remaining term to final maturity, a fixed coupon schedule and a minimum amount outstanding of \$1 billion. Qualifying securities must have at least 18 months to final maturity at the time of issuance. (Index: G1O2. Please visit www.mlindex.ml.com for more information).

ICE BAML US 1-5 Year Treasury Index

The ICE BAML US 1-5 Year Treasury Index tracks the performance of US dollar denominated sovereign debt publicly issued by the US government in its domestic market. Qualifying securities must have at least one year remaining term to final maturity and less than five years remaining term to final maturity, a fixed coupon schedule and a minimum amount outstanding of \$1 billion. Qualifying securities must have at least 18 months to final maturity at the time of issuance. (Index: GVQ0. Please visit www.mlindex.ml.com for more information).

ICE BAML 3-5 Year US Treasury Index

The ICE BAML 3-5 Year US Treasury Index tracks the performance of US dollar denominated sovereign debt publicly issued by the US government in its domestic market. Qualifying securities must have at least three years remaining term to final maturity and less than five years remaining term to final maturity, a fixed coupon schedule and a minimum amount outstanding of \$1 billion. Qualifying securities must have at least three years to final maturity at the time of issuance. (Index: G2O2. 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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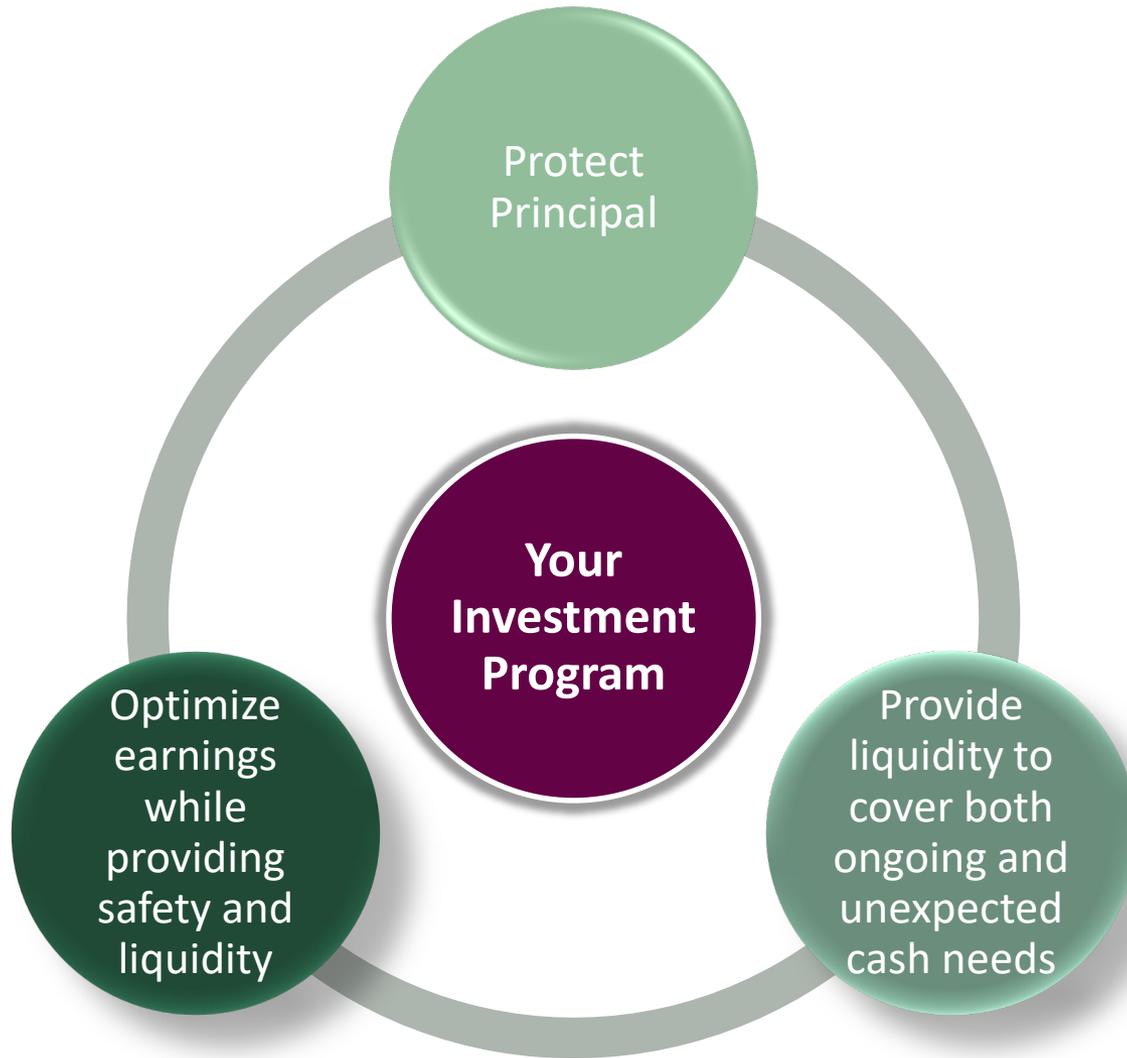




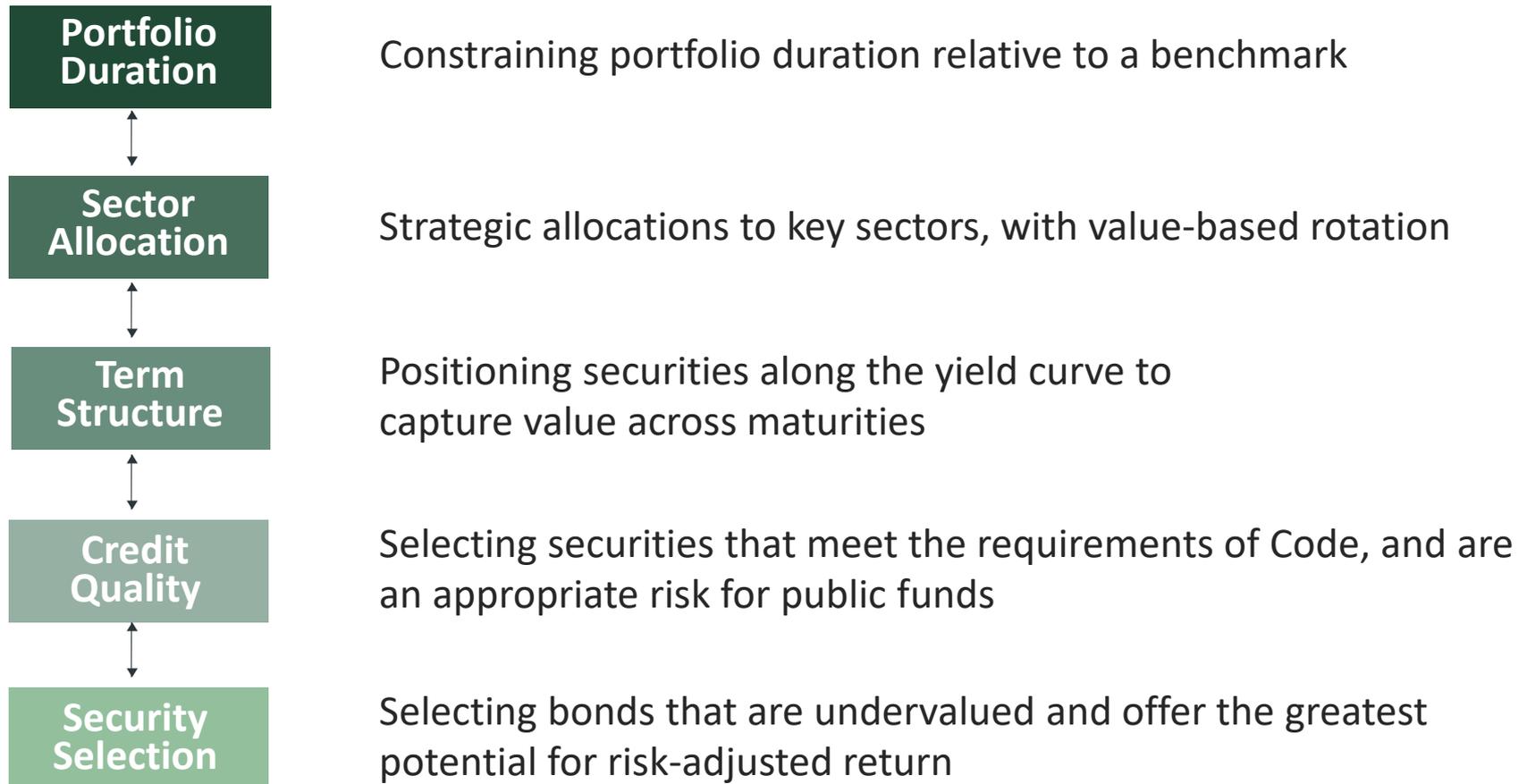
Fundamentals of Public Funds Investing

January 23, 2019

Genny Lynkiewicz, CFA
*Vice President,
Portfolio Manager*



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





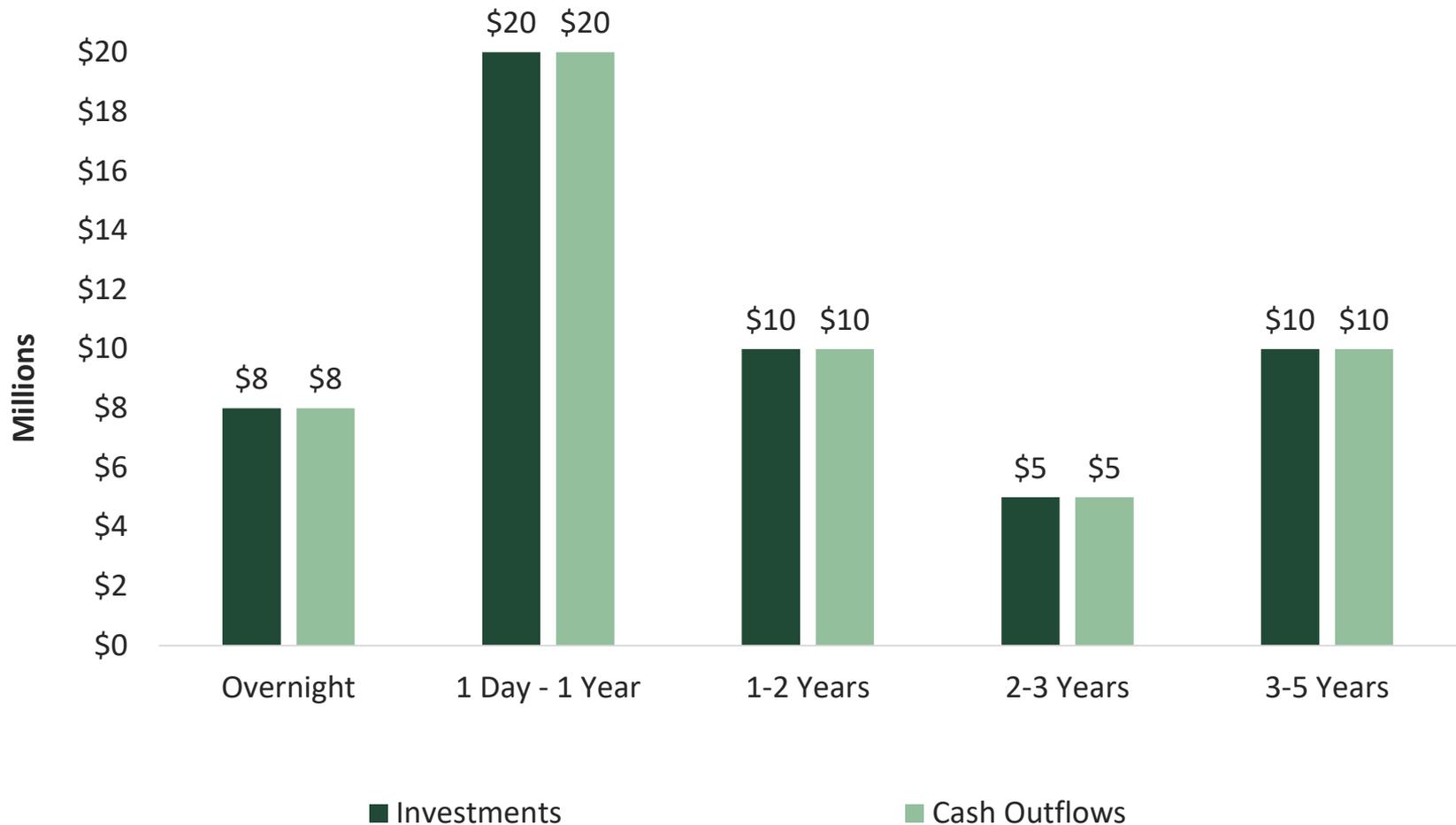
- Local Government Investment Pool (LGIP)
- Matching maturities to known expenditures
 - Money market instruments
 - Agency Discount Notes
 - Commercial Paper
 - Certificates of Deposit

- 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



- Having selected a target duration, build a portfolio structure that will capitalize on market conditions
 - Match cash flows
 - Ladder the maturities
 - Set up a bullet structure
 - Set up a barbell structure
 - Total return strategy

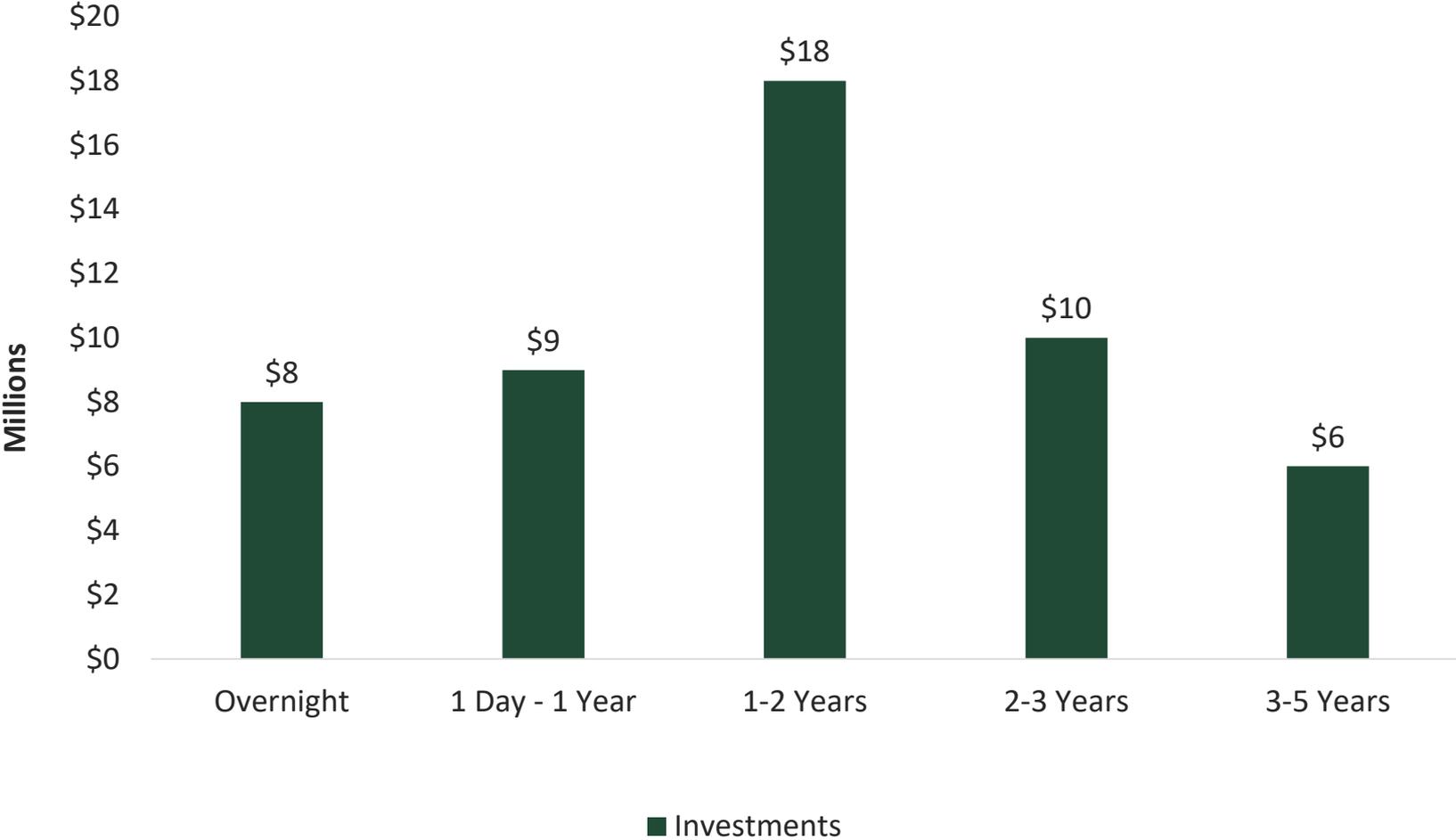
Matching Cash Flows Maturity Structure



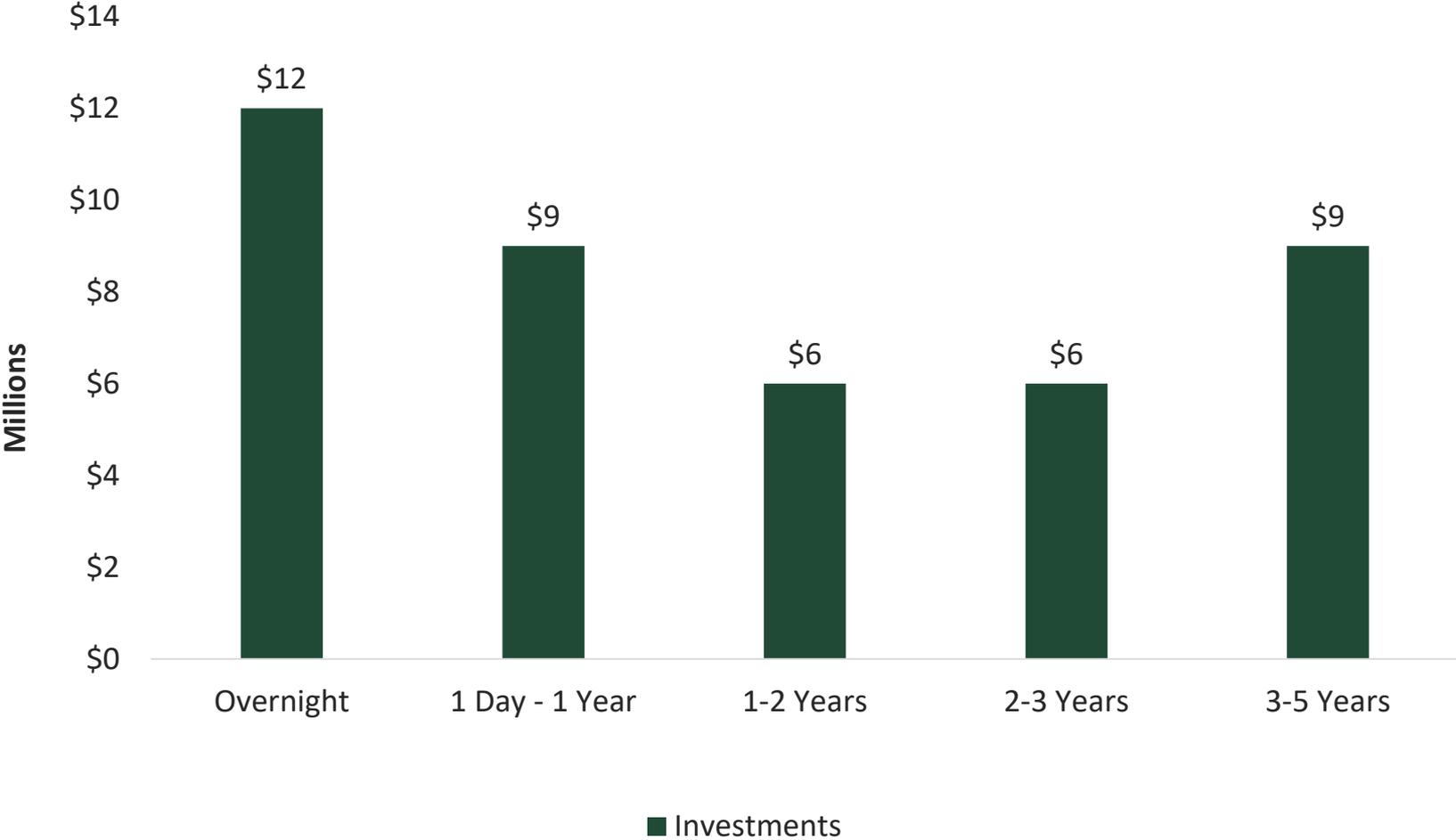
Laddered Maturity Structure



Bullet Maturity Structure



Barbell Maturity Structure





Period Ending December 31, 2017

| | 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% | 59.18% | 42.31% |
| 3-5 years | | 40.82% | 29.18% |
| 5-10 years | | | 28.51% |
| Treasury | 92.92% | 94.55% | 95.73% |
| Agency | 7.08% | 5.45% | 4.27% |
| Corporate | | | |
| Modified Duration 12/31/2017 | 1.86 | 2.63 | 3.69 |
| 10 Year Annualized Total Return | 1.51% | 2.05% | 2.73% |
| 10 Year Standard Deviation | 2.50% | 2.93% | 3.82% |
| Sharpe Ratio | 0.45 | 0.56 | 0.61 |
| Qualitative Risk Objective | 12/31/1988 - 12/31/2017 | 12/31/1988 - 12/31/2017 | 12/31/1988 - 12/31/2017 |
| Negative Quarterly Return Occurrences | 12 | 22 | 31 |
| 2 Consecutive Negative Quarterly Return Occurrences | 1 | 2 | 6 |
| 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.



Providing Value Over Time

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 |
|-------------------------------------------|--------------------|----------------------------------------|------------------------------------------|-----------------------|
| LAIF | 0.57 | 0.68% | \$10.7 million | N/A |
| 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. 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 the GIPS and benchmark disclosures at the end of this presentation for further details.



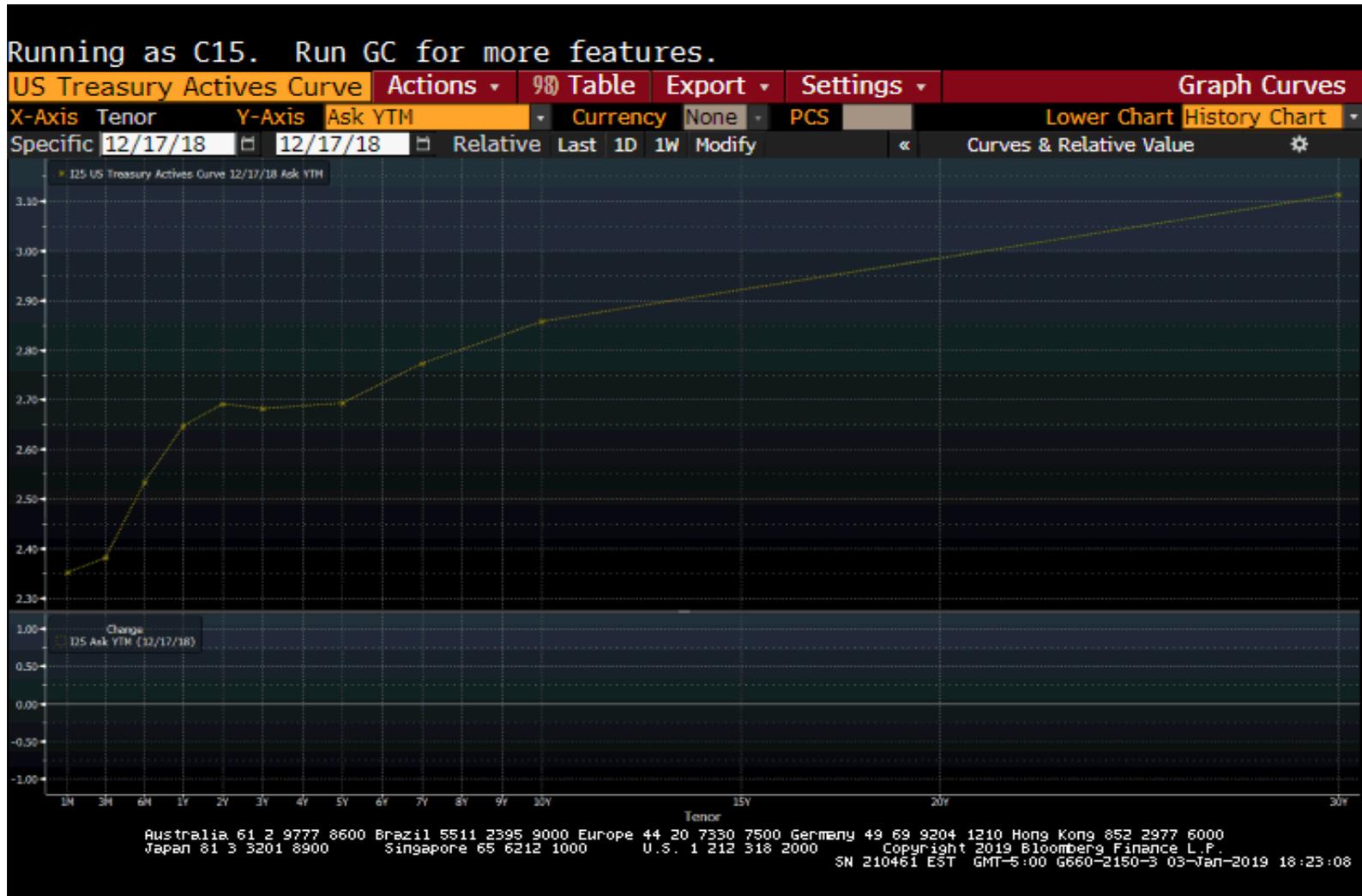
- LGIPs
- Government MMFs
- Separately-Managed Accounts

Normal Yield Curve



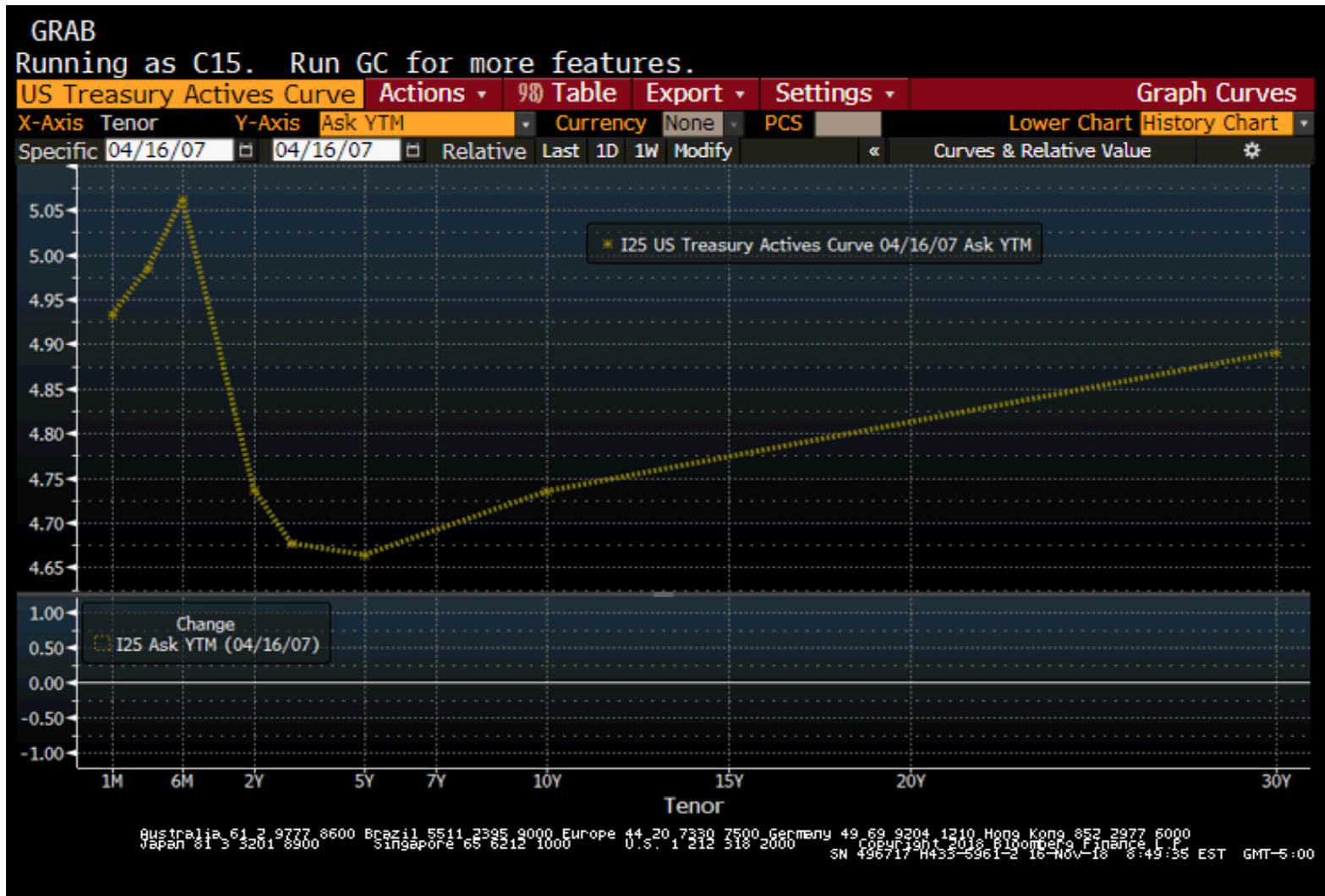
Source: Bloomberg

Flattening Yield Curve



Source: Bloomberg

Inverted Yield Curve



Source: Bloomberg

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



Source: Bloomberg



| LAIIF | 1 Year | 2 Years | 3 Years | 4 Years | 5 Years |
|-------|--------|---------|---------|---------|---------|
| 2.32% | 2.60% | 2.58% | 2.57% | 2.57% | 2.58% |

What are the risks of keeping assets in investments maturing in one year or less?



- A Public Agency has a total portfolio size that generally fluctuates between \$80 and \$100 million during the year.
- Total Return Investment Portfolio is \$50 million, the remainder is in LAIF.
- How much can be considered core funds and invested in a total return strategy?
- How much needs to remain liquid in LAIF or another LGIP?
- How much can be invested in a short-term separately managed account that matches expected cash outflows?



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ICE BAML 1-3 Year US Treasury & Agency Index

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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).

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