Semi-Annual Treasury Analysis and Liquidity Status

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CalPERS

Overview

- Integrating Treasury Management Policy into Program
- Fund Liquidity Coverage Analysis
- Cash Flow Forecasting Analysis
- Treasury Management Look Ahead

Treasury Management Function Development

A Long-term Journey

2008
Liquidity Crisis

Stressed market event triggered by Lehman bankruptcy

2012
CalPERS CFO Function Created

Leadership role to ensure financial stability

2013
Asset Liability Management (ALM) Workshop

INVO, FINO and ACTO recommended change in Strategic Allocation for Liquidity from 4% to 2%

2014
Treasury Management Program Created

An internal control that optimizes cash management and mitigates liquidity risk

2015
Treasury Management Policies Approved by the Board

- Treasury Management Policy
- Treasury Management Reserve policy
- Changed Strategic Target Allocation for Liquidity from 2% to 1% (+ -3%)

I. Integrating Treasury Management Policy into Program

Treasury Management Policy

Strategic Objectives

Ensure payment of member benefits and enterprise obligations without interruption regardless of financial markets and environmental conditions	Provide an integrated process for the oversight and management of enterprise cash and liquidity during normal, stressed and crisis events	Maintain appropriate coverage levels for the enterprise	Oversee enterprise liquidity risk
✓ Treasury Management Reserve Policy ✓ Prefunding member benefits for trusts ✓ Funding and payment continuity planning	✓ Establishment of Enterprise Treasury Management Office (ETMO) ✓ Enterprise Treasury Team (ETT) monthly meetings	✓ Liquidity coverage level KPIs for each fund ✓ Reporting on fund coverage ratios ✓ Cash flow forecasting KPIs for each fund ✓ Funding Contingency Plan	✓ Program risk logs for monthly cash flow forecasts ✓ Monitor liquidity levels on a monthly basis ✓ Monthly ETT reporting

CalPERS

II. Fund Liquidity Coverage Analysis

PERF Liquidity Coverage Analysis

Coverage Ratio Methodology

$$\text{Liquidity Coverage Ratios (LCR)} = \frac{\text{cash + assets convertible to cash + incoming cash sources}}{\text{outgoing cash uses + contingent cash uses}}$$

The Liquidity Ratio Tells Us:

LCR > 1.0 = Adequate cash/liquidity to meet monthly obligations

LCR < 1.0 = Potential cash shortfall for monthly obligations

Example: LCR of 2.5 would mean that cash and assets convertible to cash is equal to 2 ½ times the projected monthly cash outflow.

PERF Liquidity Coverage Ratios

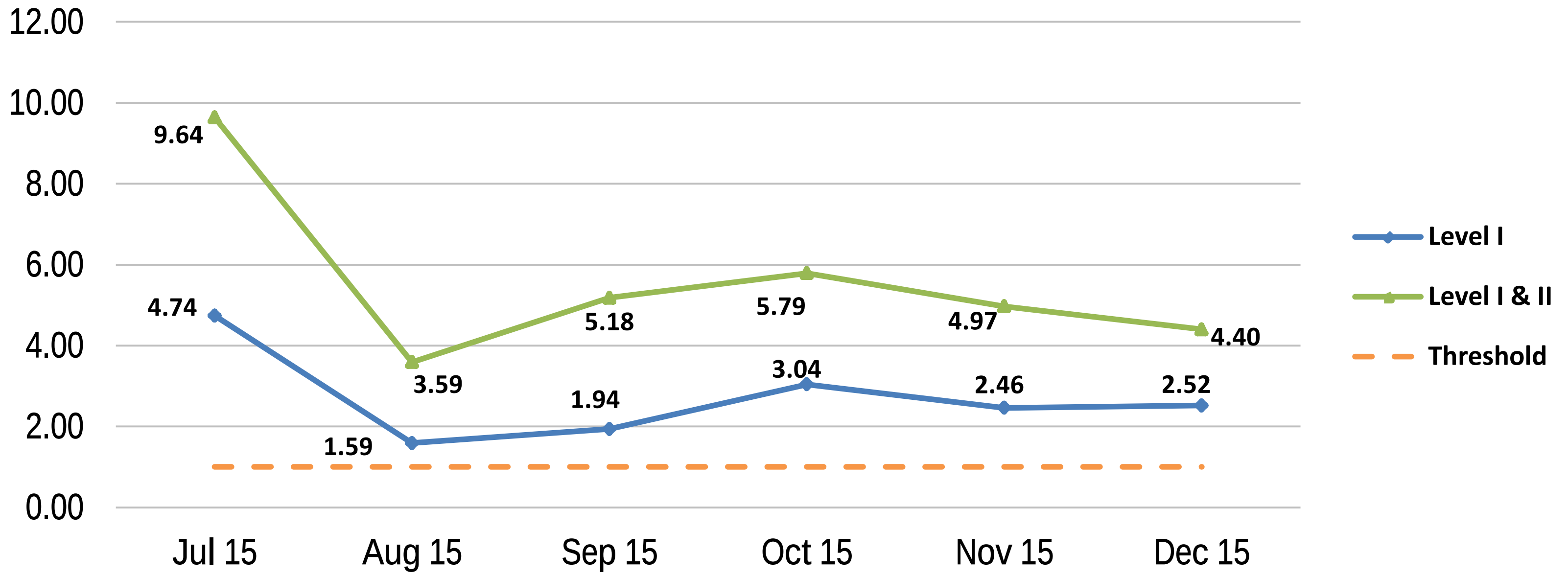
Funding Sources

Coverage calculations take into consideration three categories of assets, each with different liquidity characteristics.

Liquidity Level	Description
Level I	Cash and cash equivalents ▪ Cash at State Street Bank (SSB) ▪ Uncommitted Cash at State Treasurers Office (STO)
Level II	Potential Borrowed liquidity held in cash ▪ Public Equity Cash Equivalents ▪ Securities Lending Cash Collateral
Level III	Sale of public assets ▪ Global Equities ▪ Global Fixed Income

Normal Environment

30 Day Coverage Ratios



Level I: The coverage ratios exceeded the threshold due to excess liquidity and changes in liquidity operations. In addition, July's ratio was much higher due to an influx of contributions from the Unfunded Accrued Liability prepayment option becoming available to employers.

Level I & II: Since Level I coverage ratio remained strong, it was not necessary utilize Level II assets.

PERF Liquidity Coverage Analysis

Stressed Environment

DEFINITION: A severe market or non-market event for which Funding contingency plans have been made and options are identified and available to meet CalPERS' obligations.

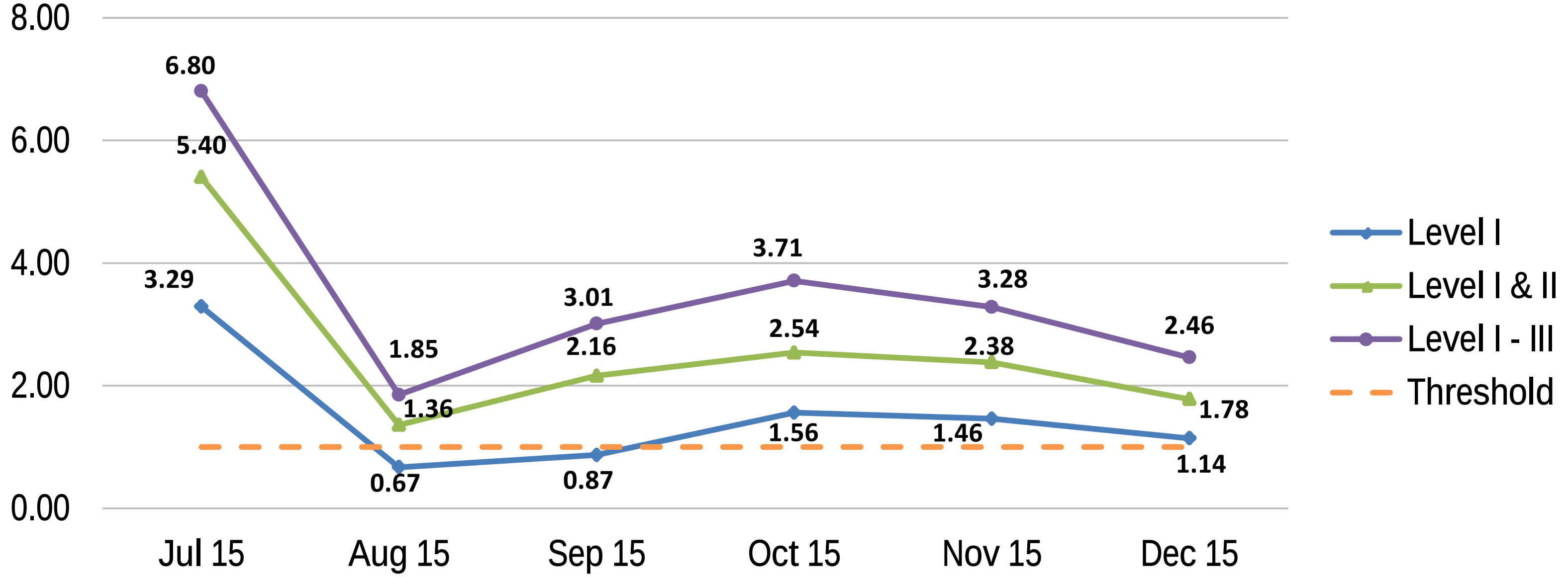
There are two approved scenarios used to simulate stressed events and their impact on liquidity: (1) 1987 "Black Monday" market crash and (2) the 2008 Liquidity Crisis.

Liquidity Coverage Ratio Calculation Assumptions:

- Asset class **sources are reduced to zero**, which assumes no cash can be generated from the sale of CalPERS' assets. In addition, **uses are doubled**.
- Assets are stressed by the percentages actually experienced during the 1987 "Black Monday" market crash and the 2008 Liquidity Crisis.

PERF Liquidity Coverage Analysis

Stressed Environment (Black Monday)



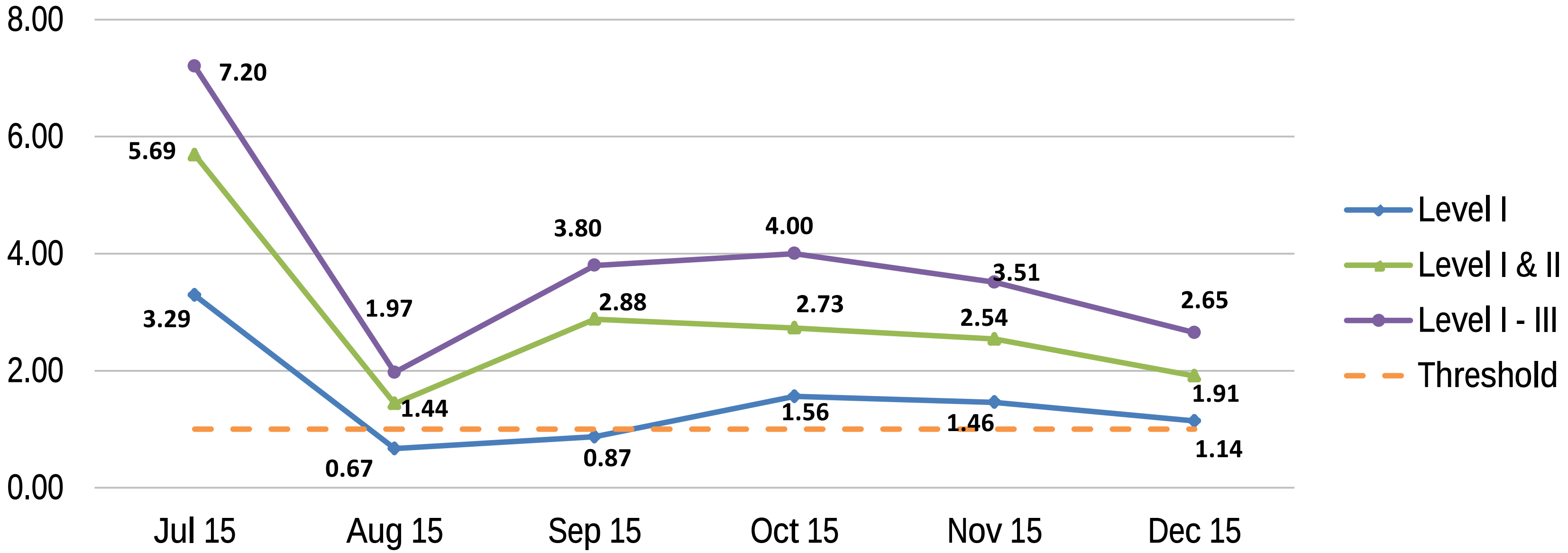
Level I: With the exception of August and September 2015, liquidity coverage ratios for Level I were adequate.

Level I & II: If a stressed event similar to Black Monday were to occur in August and September 2015, CalPERS might have utilized Level II liquidity in order to meet monthly obligations because Level I fell short of the 1.0 threshold.

Level I – III: CalPERS would not have to utilize Level III assets.

PERF Liquidity Coverage Analysis

Stressed Environment (2008 Liquidity Crisis)



Level I: With the exception of August and September 2015, liquidity coverage ratios for Level I were adequate.

Level I & II: If a stressed event similar to the 2008 Liquidity Crisis were to have occurred in August and September 2015, CalPERS might have utilized Level II assets in order to meet monthly obligations because Level I fell short of the 1.0 threshold.

Level I – III: CalPERS would not have needed to utilize Level III assets.

PERF Liquidity Coverage Analysis

Crisis Environment

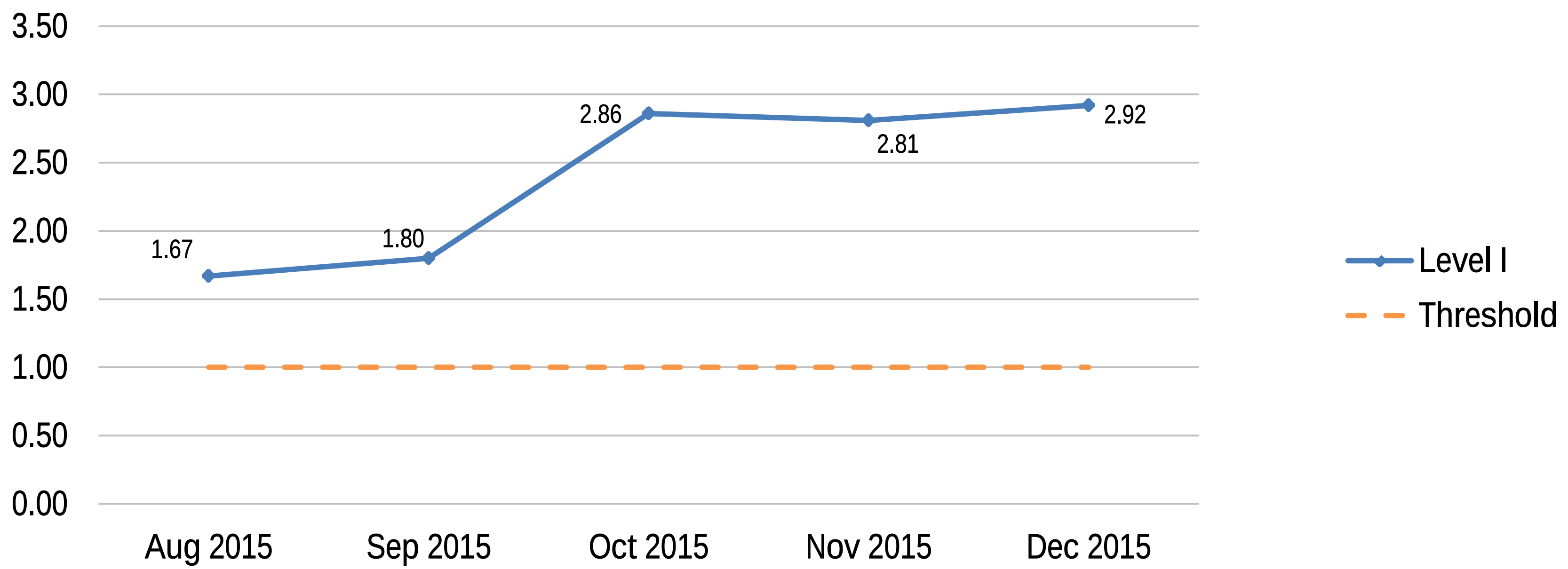
DEFINITION: A severe, unanticipated market or non-market event for which the Funding contingency plans require the options for the payment of CalPERS' obligations to be identified and evaluated based on the nature of the event.

Liquidity Coverage Ratio Calculation Assumptions

- 100% reliant on cash and cash equivalents held in the PERF to meet obligations.
- Coverage ratios are calculated 10-days prior to the payment of benefits.
- Asset class cash outflows are not stressed since investment partners are contractually obligated to provide a 10-days notice for capital calls.

PERF Liquidity Coverage Analysis

Crisis Environment (10-Day Liquidity)



Level I: The PERF had sufficient cash to cover obligations 10-days prior to the payment date for member benefits.

Note: Liquidity coverage ratio for the 10-day liquidity Crisis Environment was introduced in August 2015.

PERF liquidity Coverage Analysis

Enterprise Liquidity Health

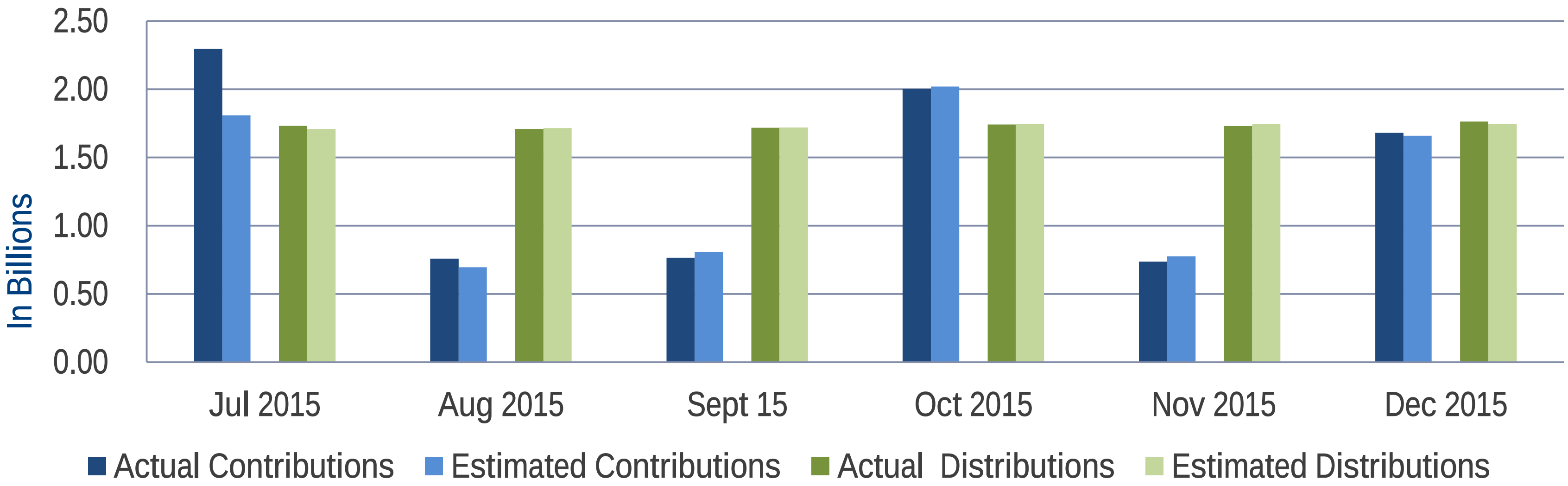
Based on Q1 and Q2 Coverage Ratio Analysis:

- ✓ PERF liquidity exceeded target threshold in normal environment.
- ✓ PERF liquidity was adequate under stressed and crisis scenarios.
- ✓ CalPERS was able to make payments for benefits, operating expenses and projected investments regardless of market conditions.
- ✓ Staff will continue to monitor the PERF's liquidity health using liquidity coverage ratios.

III. Cash Flow Forecasting Analysis

PERF Cash Flow Forecasting

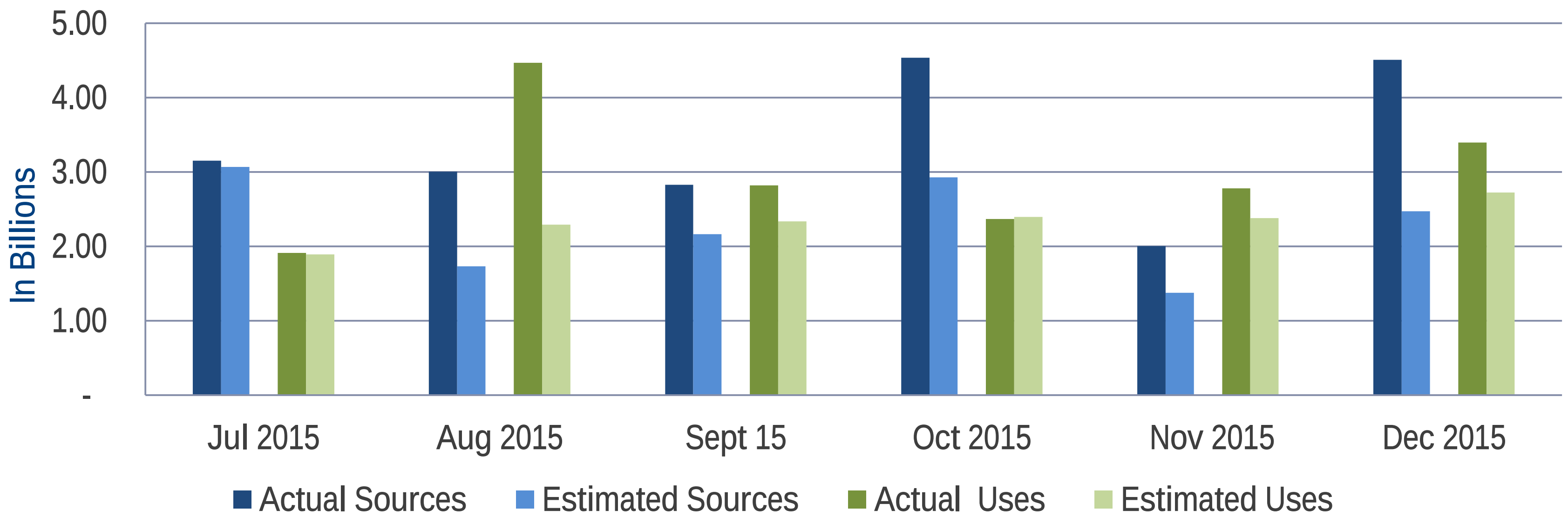
Actual vs. Estimated Non-Investment Cash Flows



- With the exception of July 2015, cash flow forecasting accuracy was in the 90th percentile.
- In July 2015, employers prepaid employer contributions and made lump sum payments for the Unfunded Accrued Liability prepayment option. This resulted in greater actuals than forecasted contributions.

PERF Cash Flow Forecasting

Actual v Estimated Non-Investment and Investment Cash Flows



- INVO considers Treasury Management's forecasts in determining an appropriate investment liquidity level that will meet the Fund's obligation of paying member benefits each month.
- Components that drive forecast volatility include, but are not limited to: private equity activity, real estate, investment expenses, etc.

Treasury Management Look Ahead

Next Steps

1. Board Update on Affiliate Fund Coverage Ratio Analysis
2. Board Update on Affiliate Cash Flow Forecasting & KPIs
3. Fund Contingency Plans for all funds