



2011 Asset/Liability Study Preliminary Results



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Jay Kloepfer
Executive Vice President and
Director of Capital Market and Alternatives Research



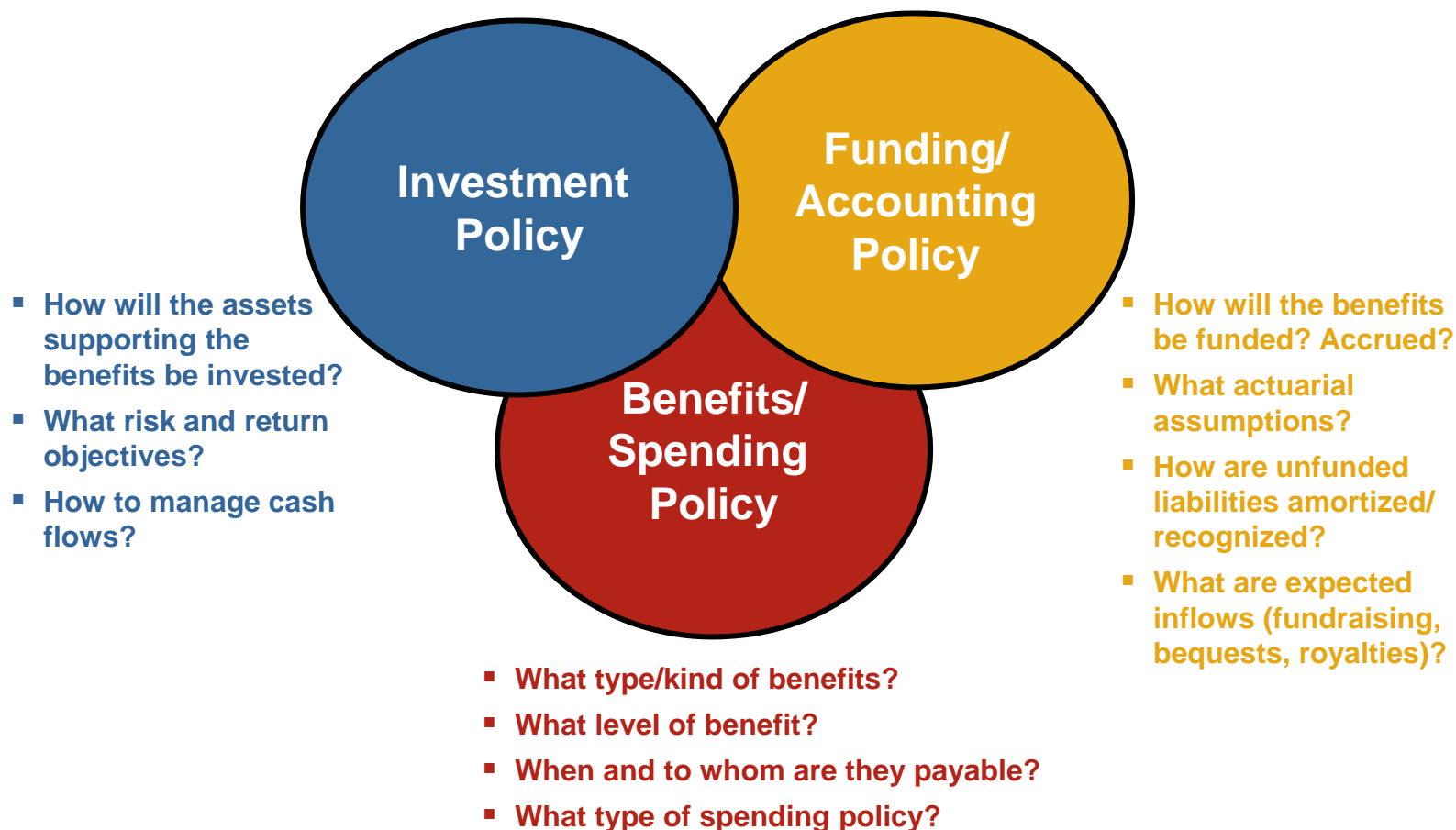
What is Asset Allocation

- **Asset Allocation - The process of determining the optimal allocation of a portfolio among broad asset classes based upon, among other factors:**
 - Liability characteristics
 - Capital market expectations
 - Cash flow considerations
 - Investment goals and objectives
 - Risk tolerance
 - Time horizon
- **Appropriate target asset allocation:**
 - Asset classes for inclusion
 - Special considerations – liquidity needs, asset class limitations, implementation challenges, administrative/legal burdens, size or capacity constraints
 - Liquidity constraints
 - Rebalancing discipline.



What Is an Asset/Liability Study?

Evaluating the interaction of the three key policies that govern a benefit plan with the goal of establishing the best investment policy.



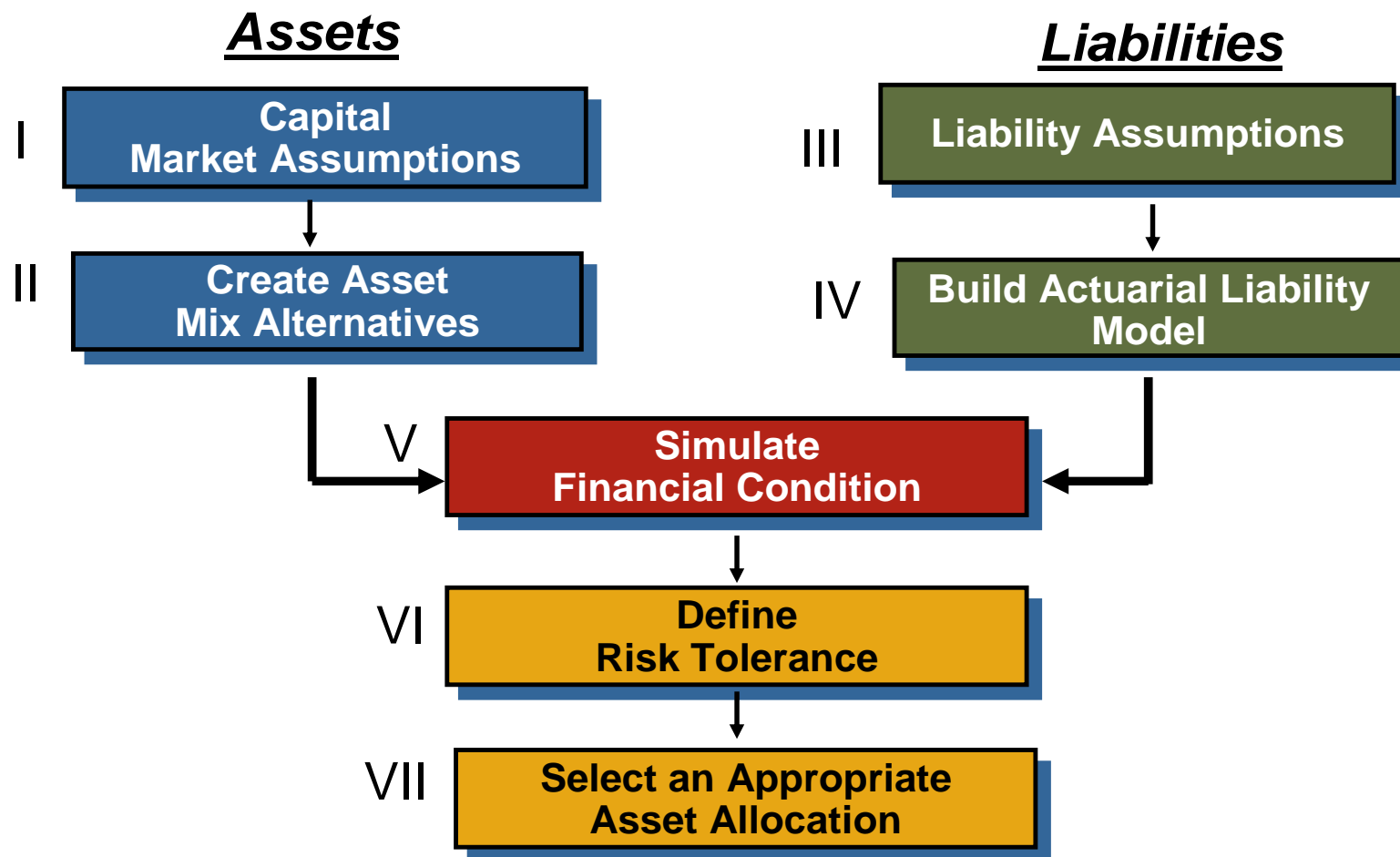


Why Conduct an Asset/Liability Study?

- **The cornerstone of a prudent process for a pension plan is the careful re-examination of the long-term strategic plan.**
- **Acknowledge change and uncertainty in the capital markets.**
- **Establish reasonable rate-of-return and risk expectations.**
- **Reflect expected contribution policy in coming years.**
- **Project and evaluate impact on assets, liabilities and funded status.**
- **Confirm an investment policy to meet return and risk objectives in relation to funding goals.**



Callan Asset/Liability Study Process





Callan Asset/Liability Process

- **Review MCERA's current investment program.**
 - Strategic allocation to broad asset classes.
 - Important to distinguish between “strategy” (i.e.—the target asset class/benchmark) and “implementation” (i.e.—the way the manager constructs the portfolio).
 - Annual review ties changes back to broad target set in the last asset/liability study (2003).
- **Evaluate potential new asset classes/strategies.**
 - Annual consideration of new asset classes/strategies.
- **Construct a preliminary asset-liability evaluation.**
 - Detailed model of plan liabilities constructed in accordance with actuarial valuation.
 - Review preliminary asset-liability results with actuary.
 - Confirm model assumptions and decision variables.
 - Ascertain risk tolerance and effective investment time horizon.
 - Develop draft asset-liability study.
- **Develop the final asset-liability study.**
 - Callan conducts an internal peer review of the study's results.
 - Present finalized asset-liability results to MCERA Board of Trustees.
 - MCERA Board selects an appropriate asset allocation.



Capital Market Expectations and Asset Classes



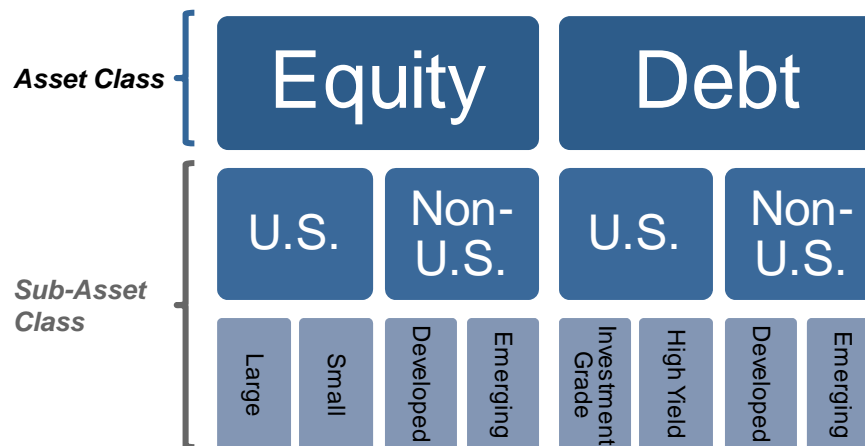
Asset Class Characteristics

- **All asset classes represent a stake in economic activity.**
 - Ownership of a firm or asset
 - Public equity
 - Commodities
 - Private equity
 - Lending to a government, firm or individual
 - Bonds
 - Bank loans
 - Residential mortgages
 - A combination of ownership and lending
 - Convertible bonds
 - Hedge funds
- **Performance is related to the economic stake.**
 - The value of ownership is volatile
 - Depends on the fortunes of the firm
 - Large losses are possible including the potential for a complete loss
 - The value of lending is relatively consistent
 - Interest payments
 - Seniority in the capital structure (bond holders have first claim on assets of failed firms)
 - Returns are proportionate to risk
 - Ownership requires relatively high expected returns to compensate for the risk
 - Lending requires relatively low expected returns due to the stability



Asset Class Characteristics

- **Asset allocation focuses on broad asset classes.**
- **Breakdowns between investment styles within asset classes (growth vs. value, large cap vs. small cap) are best addressed in a manager structure analysis.**
- **Primary asset classes and important sub-asset classes include:**
 - U.S. Stocks
 - U.S. Bonds
 - Non-U.S. Stocks
 - Non-U.S. Bonds
 - Real Estate
 - Alternative Investments
 - Private equity
 - Hedge Funds
 - Commodities
 - Cash





Asset Class Roles

- **High Growth Assets**
 - US equity
 - Non-US equity
 - Private equity
 - Private real estate
- **Diversification**
 - TIPS
 - Private real estate
 - Commodities
- **Expand Opportunity Set**
 - Non-US equity
 - Private equity
 - Hedge funds
 - Timber
- **Reduce Volatility**
 - US fixed income
 - Hedge funds
 - TIPS
- **Add Value**
 - Small/mid cap US equity
 - Non-US equity
 - Private equity
 - Private real estate
 - Hedge funds
- **Hedge Deflation**
 - US fixed Income
- **Hedge Inflation**
 - TIPS
 - Private real estate
 - Commodities
 - Timber



Asset Class Considerations

- **High fees**
 - Hedge funds
 - Private equity
 - Timber
- **Illiquidity**
 - Private equity
 - Private real estate
 - Hedge funds
 - Timber
- **Lack of transparency**
 - Private equity
 - Hedge funds
- **Susceptible to prolonged periods of underperformance**
 - Commodities
 - Emerging markets
- **High volatility**
 - Emerging markets
 - Non-US\$ bonds
 - Private equity
 - Commodities
- **Implementation risk**
 - Private equity
 - Private real estate
 - Hedge funds
- **Complexity**
 - Hedge funds
 - Private equity
 - Commodities



Capital Market Projections

- **Cornerstones of strategic planning – expectations and time horizon.**
- **Projections represent our best thinking regarding the long-term (5- to 10-year) outlook, recognizing our median projections represent the midpoint of a range, rather than a specific number. The range is defined by the risk as measured by standard deviation.**
- **Develop results that are readily defensible both for individual asset classes and for total portfolios.**
- **Be conscious of the level of change suggested in strategic allocations for long-term investors.**
- **Reflect common sense and recent market developments.**
- **Balance conflicting goals and conflicting opinions.**



Capital Market Projection Process

- **Evaluate the current environment and economic outlook for the U.S. and other major industrial countries:**
 - Business cycles, relative growth, inflation.
- **Examine the relationships between the economy and asset class performance patterns.**
- **Examine recent and long-run trends in asset class performance.**
- **Apply market insight:**
 - Consultant experience - Plan Sponsor, Manager Search, Specialty
 - Industry consensus
 - Callan's Client Policy Review Committee (CPRC)
- **Test the projections for reasonable results.**



Forecast Capital Market Performance

Summary of Long-Term Capital Market Projections (2011-2020)

		Projected Return		Projected Risk	
Asset Class	Index	Nominal	Real	Standard Deviation	Projected Yield
Equities					
Broad Domestic Equity	Russell 3000	8.00%	5.50%	18.10	2.00
Large Cap	S&P 500	7.85%	5.35%	17.25	2.20
Small/Mid Cap	Russell 2500	8.25%	5.75%	23.00	1.20
International Equity	MSCI EAFE	7.85%	5.35%	19.75	2.00
Emerging Markets Equity	MSCI EMF	8.35%	5.85%	27.50	0.00
Global ex-US Equity	MSCI ACWI ex-US	8.20%	5.70%	20.90	1.70
Fixed Income					
Defensive	BC Gov't 1-3 Year	3.25%	0.75%	2.50	3.25
Domestic Fixed	BC Aggregate	3.75%	1.25%	4.50	3.80
Long Duration	BC Long Gov't/Credit	4.00%	1.50%	11.15	4.55
TIPS	BC TIPS	3.50%	1.00%	5.90	3.60
High Yield	CSFB High Yield	5.60%	3.10%	11.55	6.15
Non-US\$ Fixed	Citi Non-US Gov't	3.35%	0.85%	9.70	3.75
Other					
Real Estate	Callan Real Estate	6.75%	4.25%	16.35	5.00
Private Equity	VE Post Venture Cap	9.00%	6.50%	30.00	0.00
Absolute Return	Callan Hedge FoF	5.90%	3.40%	10.00	0.00
Commodities	S&P GSCI	3.75%	1.25%	24.00	3.00
Cash Equivalents	90-Day T-Bill	3.00%	0.50%	0.90	3.00
Inflation	CPI-U	2.50%		1.40	

✓ Long-term geometric return expectations represent 10-year annualized compound returns.



Forecast Capital Market Correlations

Correlation	Broad	Lg Cap	Sm/Mid	Int'l Eq	Emerg	Glob xUS	Defensive	Dom Fix	Long Dur	TIPS	Hi Yield	NUS Fix	Real Est	Pvt Eq	Abs Ret	Comm	T-Bill
Broad Dom Eq	1.000																
Large Cap	0.995	1.000															
Small/Mid Cap	0.954	0.920	1.000														
Int'l Equity	0.802	0.800	0.760	1.000													
Emerging Mkts	0.838	0.830	0.810	0.830	1.000												
Global ex-US Eq	0.845	0.841	0.806	0.983	0.918	1.000											
Defensive	-0.109	-0.100	-0.130	-0.080	-0.120	-0.096	1.000										
Domestic Fixed	0.010	0.020	-0.020	0.000	-0.030	-0.010	0.820	1.000									
Long Duration	0.164	0.168	0.145	0.125	0.094	0.120	0.760	0.913	1.000								
TIPS	-0.103	-0.095	-0.120	-0.090	-0.115	-0.102	0.460	0.660	0.610	1.000							
High Yield	0.612	0.610	0.580	0.530	0.551	0.050	0.160	0.230	0.060	1.000							
Non-US\$ Fixed	-0.071	-0.060	-0.100	0.050	-0.090	0.006	0.420	0.430	0.350	0.300	0.000	1.000					
Real Estate	0.736	0.730	0.710	0.640	0.620	0.658	0.000	0.080	0.191	-0.020	0.540	0.000	1.000				
Private Equity	0.947	0.940	0.910	0.870	0.890	0.910	-0.160	-0.070	0.114	-0.160	0.600	-0.070	0.730	1.000			
Absolute Return	0.741	0.740	0.700	0.680	0.670	0.703	0.050	0.230	0.340	0.100	0.510	0.000	0.560	0.710	1.000		
Commodities	0.221	0.220	0.210	0.210	0.210	0.218	-0.150	-0.020	-0.094	0.140	0.120	-0.050	0.180	0.190	0.200	1.000	
T-Bills	-0.043	-0.030	-0.080	-0.010	-0.100	-0.040	0.350	0.100	0.043	0.070	-0.110	0.000	-0.060	-0.150	0.150	0.070	1.000

- The capital market expectations represent passive exposure to capital markets (beta only) and are net-of-fees with the exception of alternative investments.
- Correlations measure the pair-wise diversification available between asset classes.
- Low correlations offer more diversification than high correlations.



Selecting Asset Classes to Evaluate

- **The primary purpose of an asset allocation and liability study is to broadly define the allocations to the “ownership” and “lending” asset classes.**
- **This is done using broad proxies for each of these types of asset classes.**
- **Once the allocations to ownership and lending asset classes have been roughly defined, allocations within these asset classes can be defined**
 - Ownership
 - US large and small/mid cap equity
 - Non-US large and small cap equity
 - Non-US developed and emerging equity
 - Public and private equity
 - Public and private real estate
 - Lending
 - Investment grade fixed income
 - Nominal and real bonds
 - Hybrid
 - Hedge funds



Selecting Asset Classes to Evaluate

- **Select asset classes from each category in “Asset Class Roles”.**
 - High Growth Assets
 - US equity
 - Non-US equity
 - Diversification
 - Private real estate
 - Expanded Opportunity Set
 - Non-US equity
 - Reduce Volatility
 - US fixed income
 - Add Value
 - Small/mid cap equity
 - Non-US equity
 - Hedge Deflation
 - US fixed income
 - Hedge Inflation
 - Private real estate
- **The asset classes currently held by the Fund cover a broad range of categories.**



Creating Asset Mix Alternatives

- **The range of asset mixes to evaluate should have returns that encompass the actuarially assumed rate of return (discount rate).**
 - Asset mixes with returns below the discount rate should be evaluated
 - May be employed during periods of low expected returns, high volatility or both
 - Mixes with lower returns hold more bonds which are better at asset preservation; this may be a high priority many plans especially for underfunded plans
 - Are useful for evaluating the volatility “cost” of a mix earning the discount rate
 - Some or all of the gap may be closed through the use of additional asset classes or the value added from active management
 - The probability of earning the actuarial discount rate may still be relatively high
 - Asset mixes with returns above the discount rate should also be evaluated
 - May be employed during periods of high expected returns, low volatility or both
 - Excess returns can substitute for future contributions
 - Larger allocations to higher returning asset classes reduce the dependence on active management value added which can itself be volatile
- **Only “optimal” mixes should be evaluated**
 - Optimal mixes are those which earn a targeted rate of return with the least amount of volatility
 - There is an optimal mix for each return target including those above and below the actuarial discount rate
 - The line representing the optimal mixes from all target returns is called the “efficient frontier”



MCERA - 2011 Efficient Mixes Real Estate Unconstrained

Asset Mix Alternatives
Optimization Set: 2011 Unconstrained

Portfolio Component	12/31/10	Interim Target	Final Target	Min	Max	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
Broad Domestic Equity	43%	41%	33%	0%	100%	22%	26%	30%	35%	39%
Global (ex-US) Equity	22%	21%	21%	0%	100%	16%	20%	24%	27%	31%
Domestic Fixed	25%	26%	26%	0%	100%	54%	43%	31%	20%	8%
Real Estate	9%	11%	12%	0%	100%	6%	7%	9%	10%	12%
Private Equity	1%	1%	8%	0%	100%	2%	4%	6%	8%	10%
Totals	100%	100%	100%			100%	100%	100%	100%	100%
10 Yr. Geometric Mean Return	7.37%	7.30%	7.45%			6.23%	6.77%	7.26%	7.70%	8.09%
Projected Standard Deviation	13.46%	13.14%	13.86%			8.72%	10.78%	12.93%	15.12%	17.35%

% equity	66%	63%	62%			40%	50%	60%	70%	80%
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- No new asset classes.
- Actual mix and current target lie between Mix 3 and Mix 4.
- Unconstrained real estate lower than 12% at portfolios with comparable risk and return.



MCERA - 2011 Efficient Mixes

Minimum Real Estate Allocation of 12%

Asset Mix Alternatives
Optimization Set: 2011 12% Real Estate

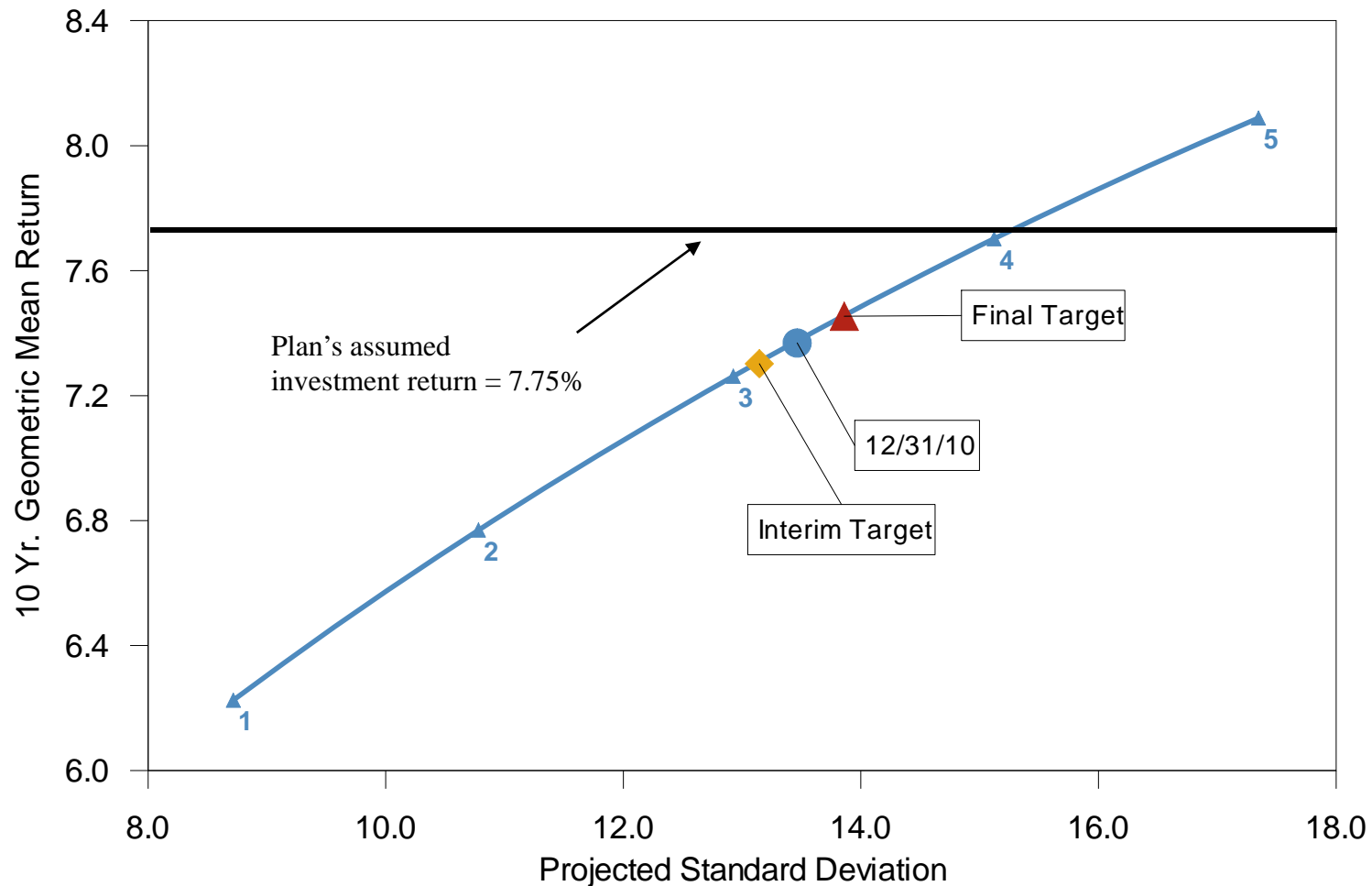
Portfolio Component	12/31/10	Interim Target	Final Target	Min	Max	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
Broad Domestic Equity	43%	41%	33%	0%	100%	20%	24%	29%	34%	39%
Global (ex-US) Equity	22%	21%	21%	0%	100%	16%	20%	24%	27%	31%
Domestic Fixed	25%	26%	26%	0%	100%	51%	41%	30%	19%	8%
Real Estate	9%	11%	12%	12%	100%	12%	12%	12%	12%	12%
Private Equity	1%	1%	8%	0%	100%	1%	3%	5%	8%	10%
Totals	100%	100%	100%			100%	100%	100%	100%	100%
10 Yr. Geometric Mean Return	7.37%	7.30%	7.45%			6.22%	6.77%	7.26%	7.70%	8.09%
Projected Standard Deviation	13.46%	13.14%	13.86%			8.74%	10.79%	12.93%	15.12%	17.35%

% equity	66%	63%	62%			37%	47%	58%	69%	80%
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- For the same level of expected return, mixes constrained to hold a minimum of 12% real estate have virtually the same level of risk.
- The current 12% real estate target does not render the current or new target mixes inefficient, and maintaining a 12% target is reasonable. The new target mix lies on the unconstrained efficient frontier.
- Consider expanding the real estate allocation category to include other real assets, such as timber, infrastructure, energy. Retain real estate as the core, add diversification.



MCERA - 2011 Efficient Frontier Real Estate Unconstrained

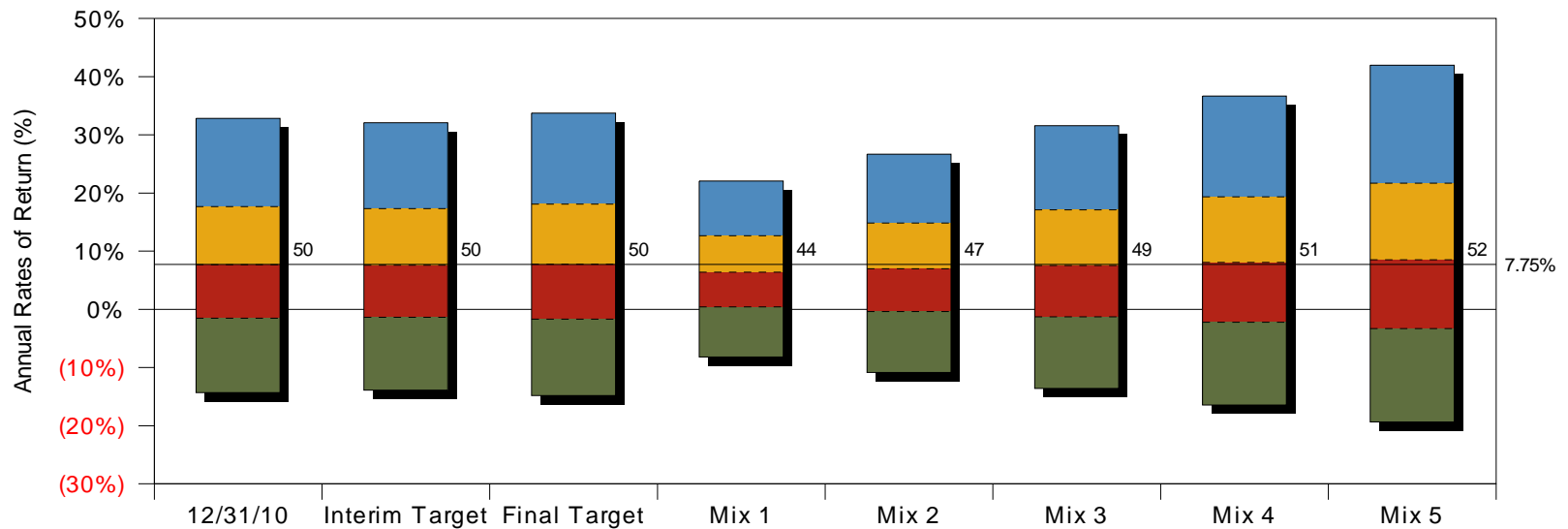


MCERA's current asset allocation target is an optimal allocation, since it lies on the efficient frontier depicting risk and return.



Projected Rates of Return – One Year Real Estate Unconstrained

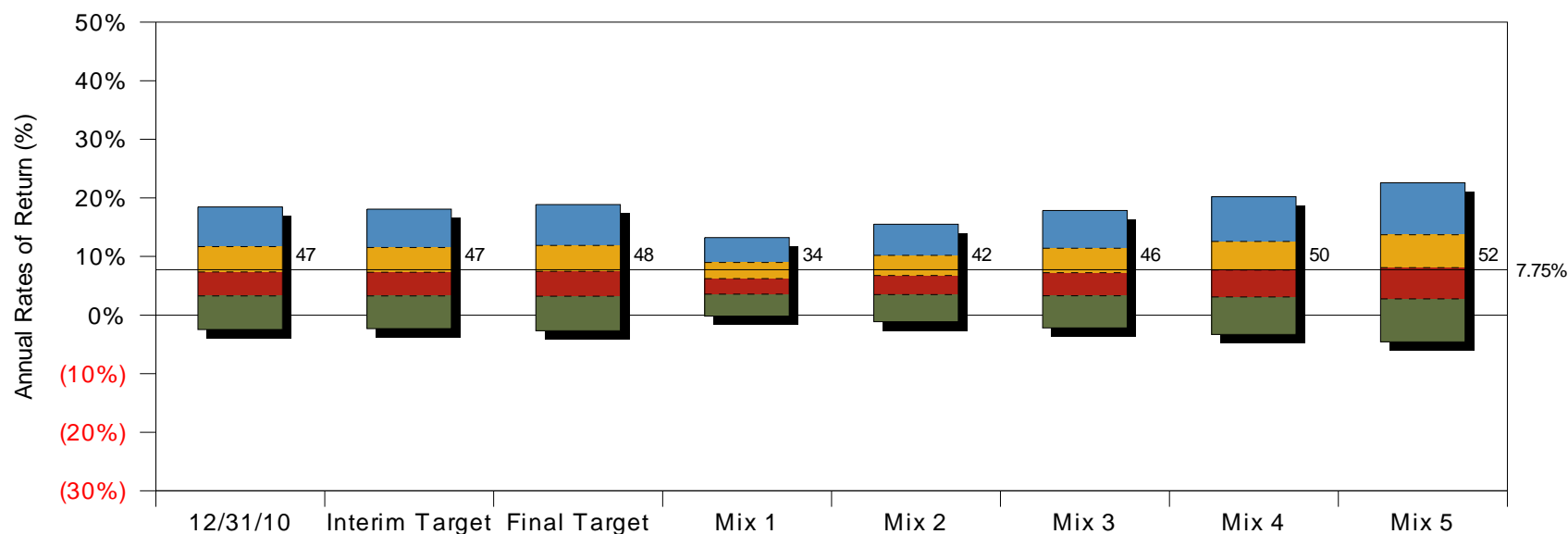
Range of Projected Rates of Return
Projection Period: 1 Year
Optimization Set: 2011 Unconstrained





Projected Rates of Return – Five Years Real Estate Unconstrained

Range of Projected Rates of Return
Projection Period: 5 Years
Optimization Set: 2011 Unconstrained



5th Percentile	18.4%	18.1%	18.9%	13.2%	15.5%	17.9%	20.2%	22.6%
25th Percentile	11.7%	11.5%	11.9%	9.0%	10.2%	11.4%	12.6%	13.7%
Median	7.4%	7.3%	7.5%	6.2%	6.8%	7.3%	7.7%	8.1%
75th Percentile	3.3%	3.3%	3.2%	3.6%	3.5%	3.3%	3.1%	2.8%
95th Percentile	(2.5%)	(2.3%)	(2.7%)	(0.2%)	(1.1%)	(2.2%)	(3.3%)	(4.6%)
Prob > 7.75%	47.3%	46.8%	48.0%	34.4%	42.1%	46.4%	49.7%	52.0%

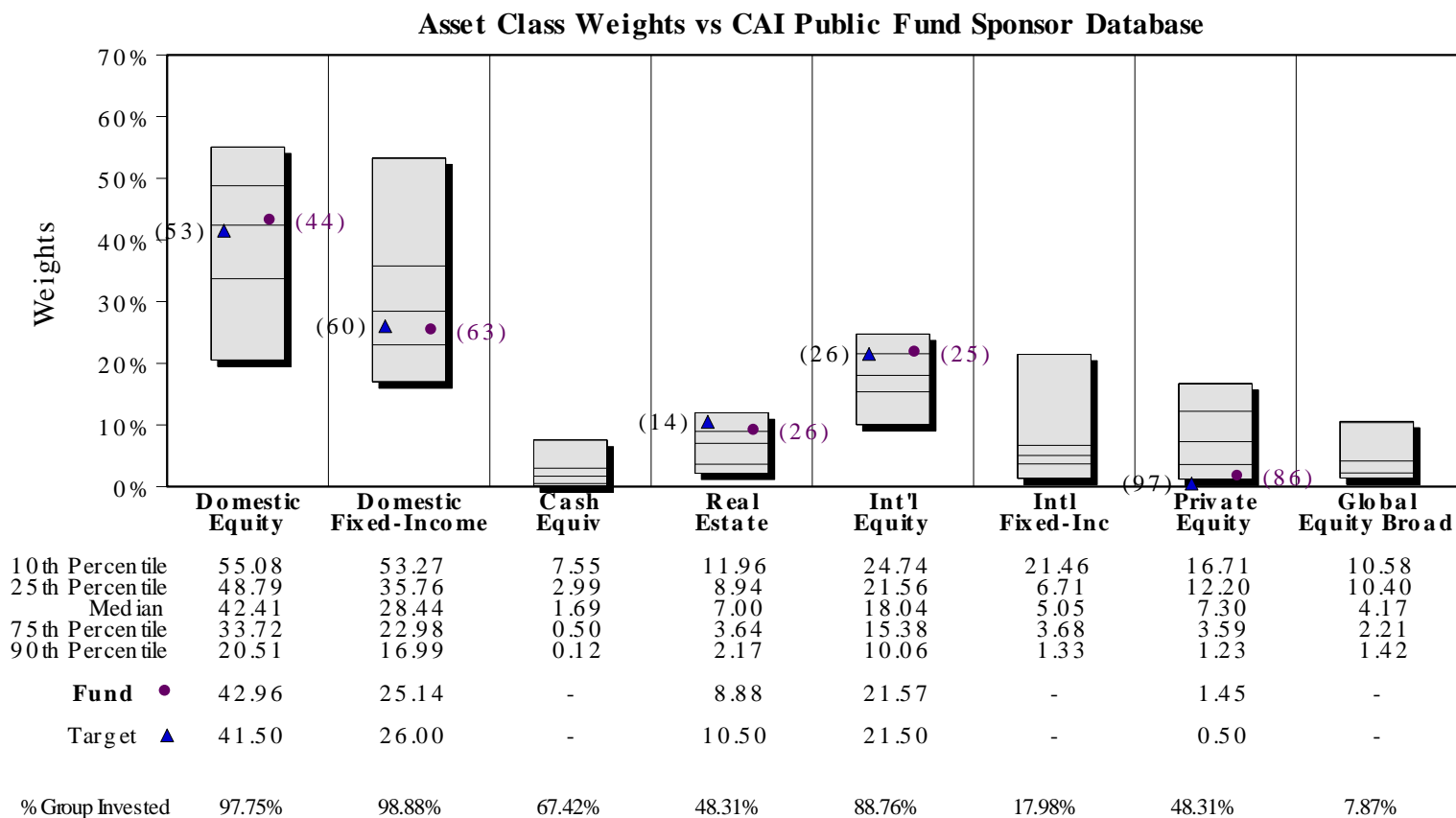


Policy Target Mix 2011 Expected Return versus 7.75% Actuarial Target

- **Expected return for the Policy Target Mix under Callan's 2011 capital market expectations is 7.45%, below the 7.75% return assumed in the actuarial valuation. Three important points to consider:**
 - Callan's return expectations are for a 5-10 year outlook; the actuary sets expectations for a 30-year (plus) time horizon. Over the very long run, it is reasonable to expect returns may revert toward the long term average, which is higher than Callan's 5-10 year outlook.
 - Callan uses a 2.5% inflation assumption, implying a real return of close to 5%. The actuary uses a **3.5% inflation assumption**, which implies a real return of 4.25%. Real return matters because wage inflation feeds into the benefit formula, and ultimately the liabilities. If the plan achieves a 7.5% return with 2.5% inflation, it will make the same progress toward funding as if it achieved 8.5% return with 3.5% inflation.
 - Callan's expectations reflect passive exposure to the broad, liquid markets, with no accommodation for potential active management value-added. To the extent the Fund can expect active management to add value, the Fund can expect this incremental return on top of the expectations for individual asset classes and the total portfolio.



MCERA Peer Comparison Public Plan Sponsors 6/30/11



* Current quarter target = 41.5% Russell 3000 Index, 26.0% BC Aggregate Index, 21.5% MSCI ACWI ex-US IMI Index, 10.5% NCREIF Total Index, 0.3% Russell 3000 Index and 0.2% MSCI ACWI ex-US IMI Index.



Summary of Results

- **MCERA's current asset allocation target is an optimal allocation, since it lies on the efficient frontier depicting risk and return.**
- **Risk/reward analysis of the financial condition of the MCERA plan in this asset/liability study will show whether the current target remains a viable and appropriate choice.**
- **MCERA's actuarial return target is 7.75%. The Target Mix is expected to generate a return of 7.45%, below this 7.75% actuarial discount rate over the next five years (assuming passive implementation).**



MCERA Strategic Plan Re-examining Implementation

- **A cornerstone of a prudent process is the careful re-examination of the MCERA strategic plan conducted each year:**
 - Asset allocation, and the assumptions driving the allocations.
 - Long-term return assumptions.
 - Asset class portfolio structures.
 - New asset classes or investment strategies.
- **MCERA has added new and innovative strategies:**
 - Market neutral strategies coupled with a portable alpha process.
 - International small cap.
 - Active extension (130/30) equity strategy.
 - Emerging market equity
 - Expanded fixed income core-plus mandate
- **MCERA is already invested in asset classes outside of the traditional liquid markets:**
 - Real estate – long-standing investment program.
 - Private equity – commenced funding over the past two years.



MCERA Strategic Plan Re-examining Implementation

- **Real estate allocation is currently at 8.9%.**
 - Rebalance back to 12%? Requires directing additional funding to the asset class.
 - Consider expanding the definition of the investment category to encompass real assets:
 - Timber
 - Infrastructure
 - Energy (public stocks, private investments)
 - Commodities
 - TIPS
 - Real estate would comprise the core exposure in a real asset allocation. New strategies would add diversification, additional inflation hedging, potential for return from both asset exposure and active management.
- **Considerations for fixed income in an expected low interest rate environment; should the plan “do something” about the potential for rising interest rates?**
 - Alter the implementation to change duration or sector exposure.
 - Reduce fixed income allocation – counter to asset/liability results?
- **Consider alternative implementation for existing asset classes.**
 - As an open, active plan, MCERA is likely to retain an equity orientation in pursuit of return for long-term funding purposes. As a result, the plan’s risk is driven by the equity exposure.
 - Given the need for return, the plan could consider implementation options to diversify and perhaps mitigate the public equity risk.
 - Hedge funds within the equity portfolio
 - Public or private market real return portfolios (can also be considered for the real asset allocation above).
 - Global Tactical Asset Allocation (GTAA)
 - Risk Parity
 - Alternative beta exposures - equal-weighted, fundamental and dividend-oriented indexes or active management strategies.



Deterministic Forecast



III – Define Liability Assumptions

Liability Model

- **Liability model based on June 30, 2010 actuarial valuation report produced by EFI Actuaries.**
- **No future plan amendments anticipated.**
- **Demographic projections:**
 - Assumed 0% workforce growth.
 - Future new hires replace future plan exits (via retirement, death, disability and withdrawal).
 - New entrant demographic profile based on hires in the 2009-2010 Plan Year.
- **Simulations begin at 6/30/2011:**
 - One-year ending investment return at 6/30/2011 (+24.11%) is reflected in all projections.
- **Key actuarial assumptions:**
 - Actuarial discount rate = 7.75%
 - Price inflation = 3.5%
 - Salary increase assumption = 3.5% + merit
- **Asset gains and losses are smoothed over 5 years.**



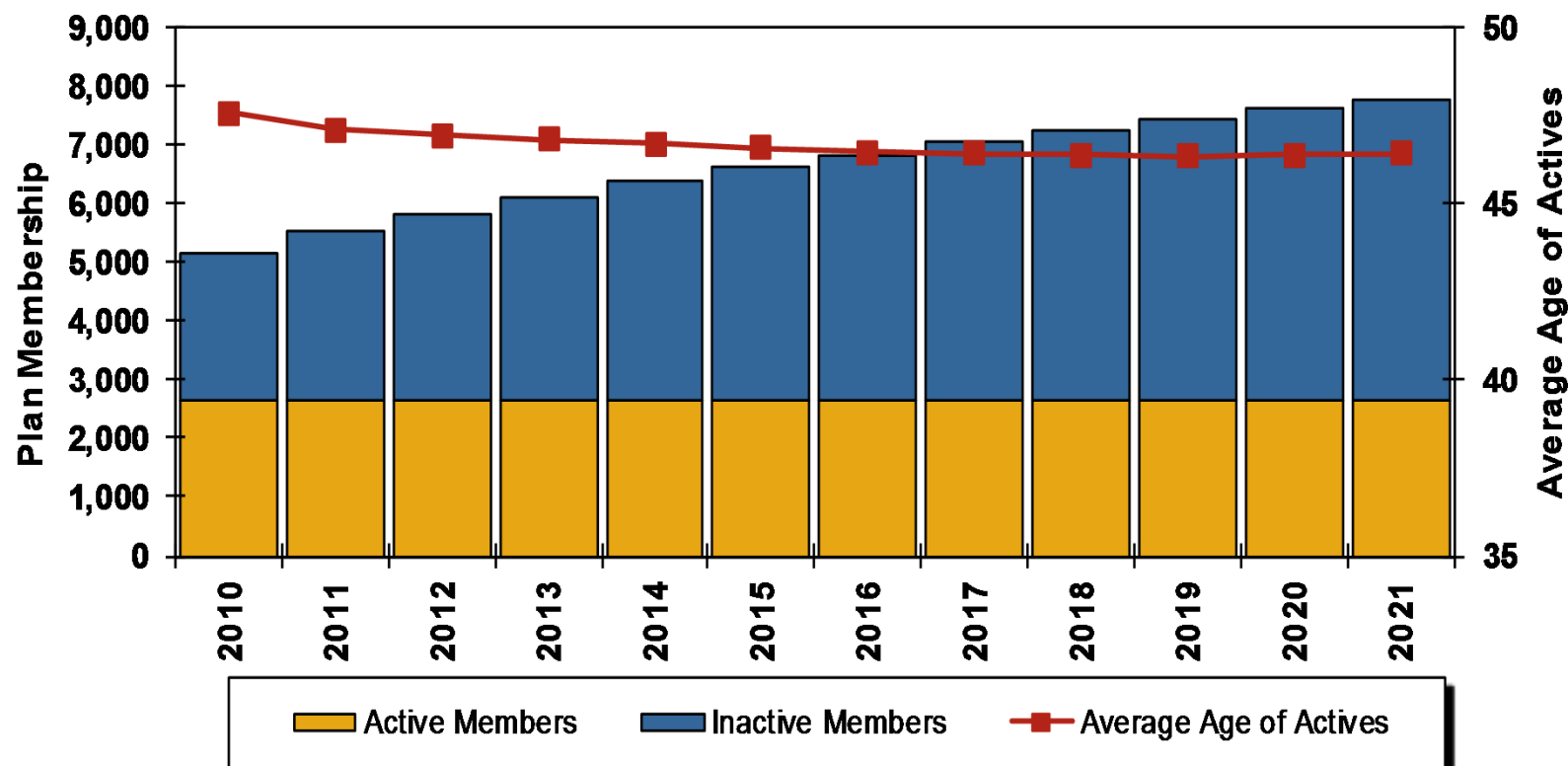
III – Define Liability Assumptions MCERA Funding Policy

- Entry Age Normal (as a % of pay) + Amortization of Gains/Losses
- Amortization payments increase each year with payroll at assumed 3.5% growth rate
- Special base for an “extraordinary investment loss” in 2009 is amortized over 30 years from June 30, 2009 valuation date
- Amortization of the non-extraordinary portion of the unfunded liability is anticipated to be amortized over a rolling 17 year period for 5 years and then decrease each valuation year thereafter until 10 years is reached.
 - Callan estimated this anticipated amortization schedule by assuming a 17-year closed amortization schedule.

	MCERA Anticipated Amortization Schedule	Callan Approximation to Amortization Periods
2010	17	17
2011	17	16
2012	17	15
2013	17	14
2014	16	13
2015	15	12
2016	14	11
2017	13	10
2018	12	9
2019	11	8
2020	10	7
2021	10	6



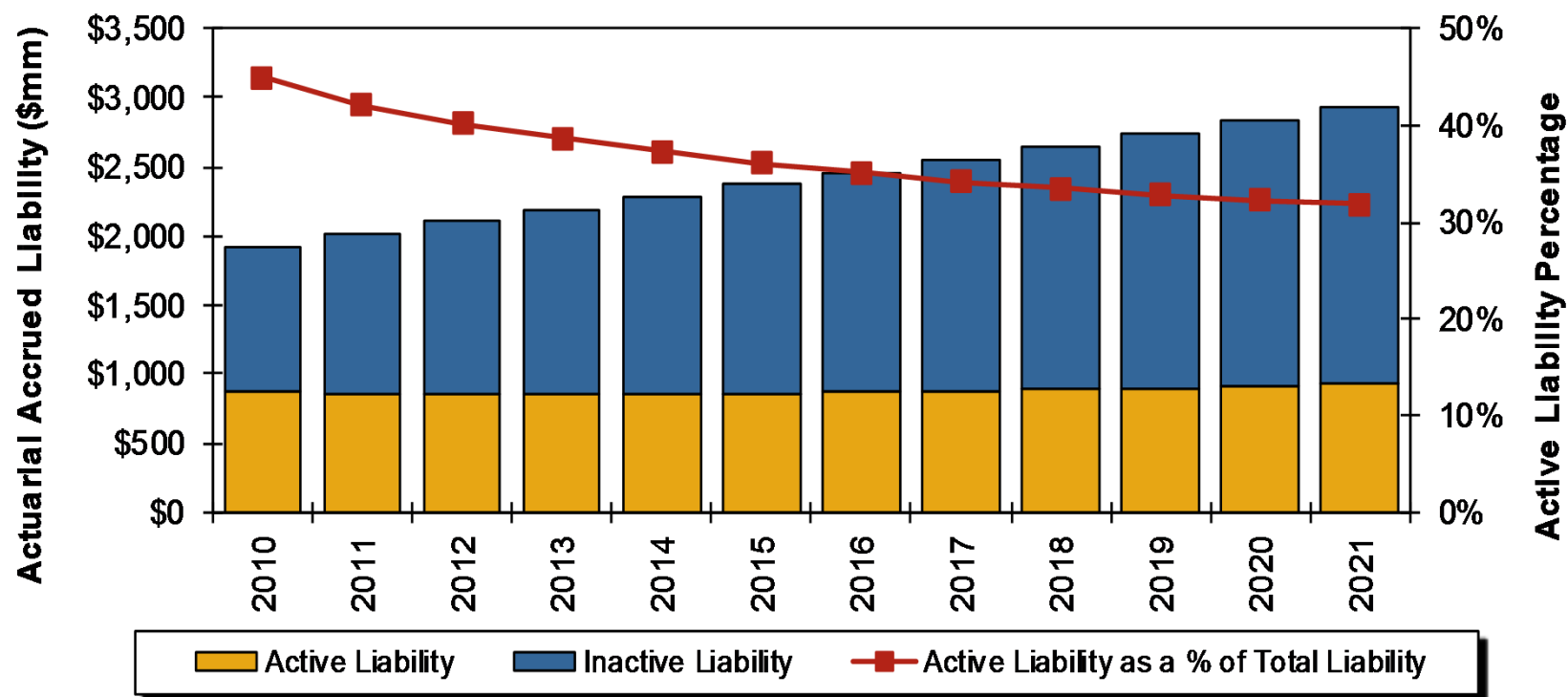
IV – Build Actuarial Liability Model Demographic Projection



- Active population held constant at 2,628 active members.
- Inactives - retirees and term vesteds - are increasing 5.1% per year over 2011 to 2021.
- Average age of active members decreases slightly from 47.5 to 46.5.



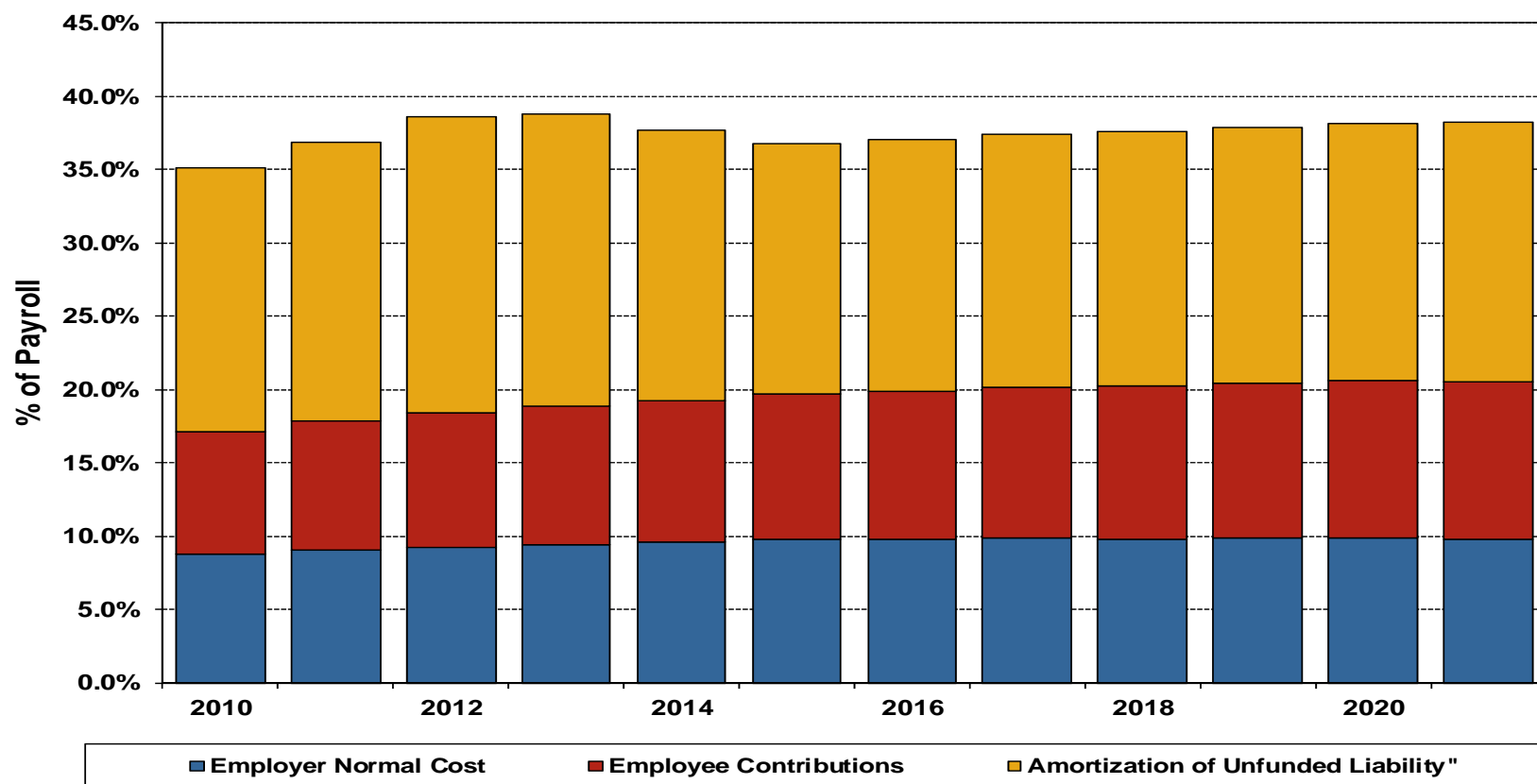
IV – Build Actuarial Liability Model Liability Projection



- Over the projection period, the liability increases 3.8% per year
 - Assumes a static discount rate of 7.75% for all years.
- Active liability as a percentage of total liability decreases from 45% to 32% as the Plan matures.



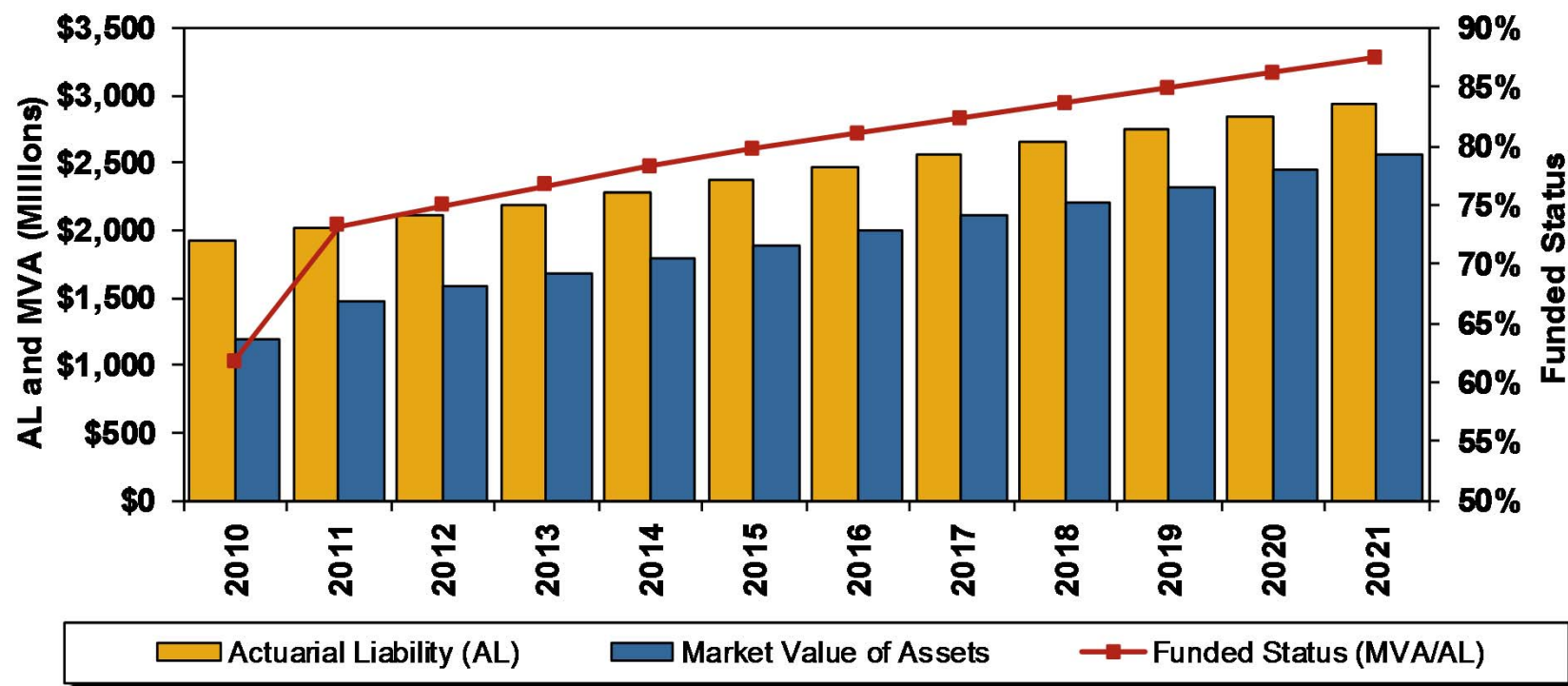
IV – Build Actuarial Liability Model Projected Pension Cost (% of pay)



- The graph depicts the total cost of the Plan, as a percentage of pay, if a 7.5% return is earned every year after 6/30/2011.
- The total cost is expected to rise from 35% to 39% over the next 4 years as prior investment losses are smoothed into the employer rates.



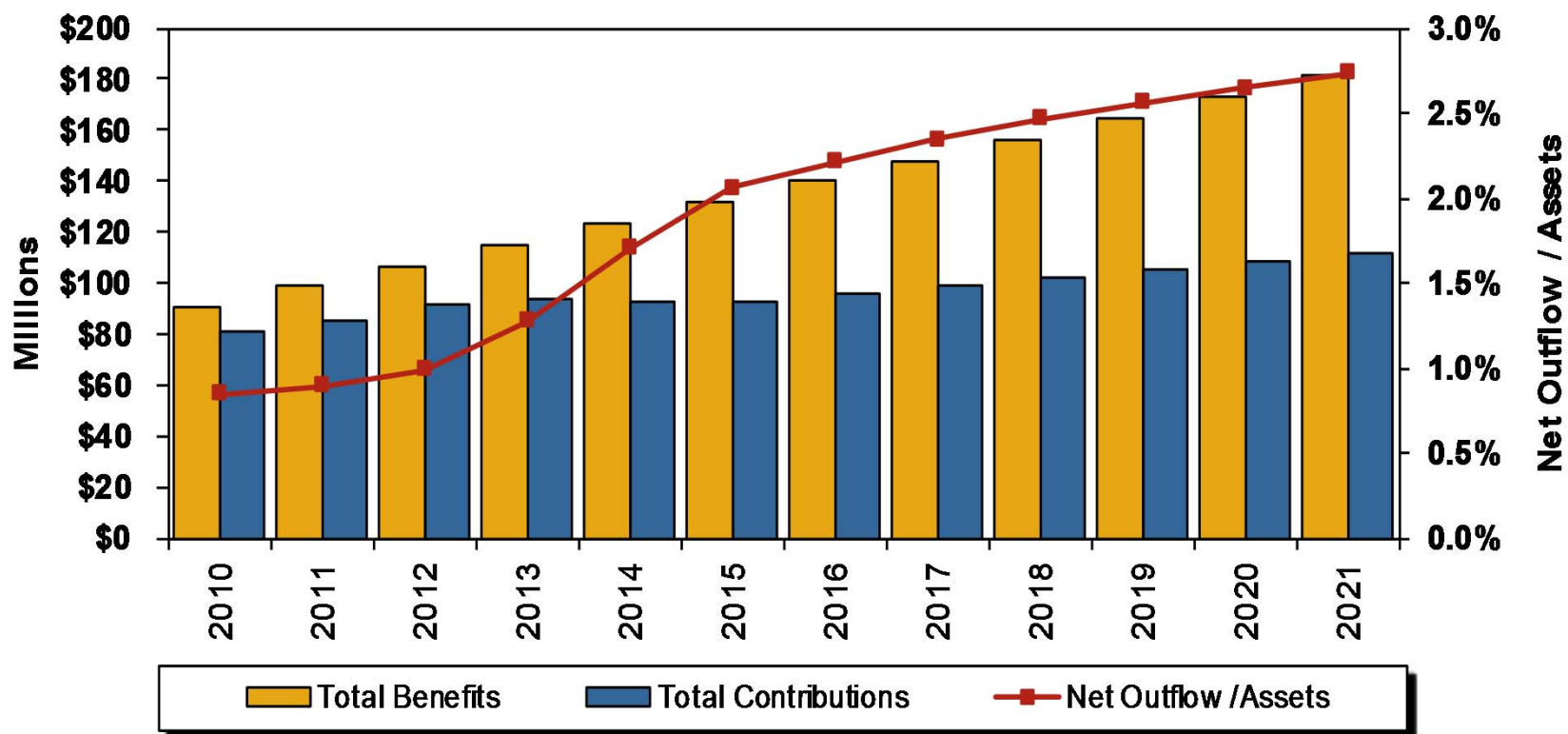
IV – Build Actuarial Liability Model Projected Funded Status



- Funded status improves due to strong performance in last two fiscal years and assumes contributions as required by the current policy will be met.
- Funded status is defined as actuarial liability/market value of assets.
- Projections reflect realization of the following key assumptions (tied to Callan's capital market expectations):
 - Price inflation = 2.5%.
 - Annual salary increase = 2.5% + merit.
 - Expected annual return after 6/30/2011 = 7.5%



IV – Build Actuarial Liability Model Cash Flow Projection



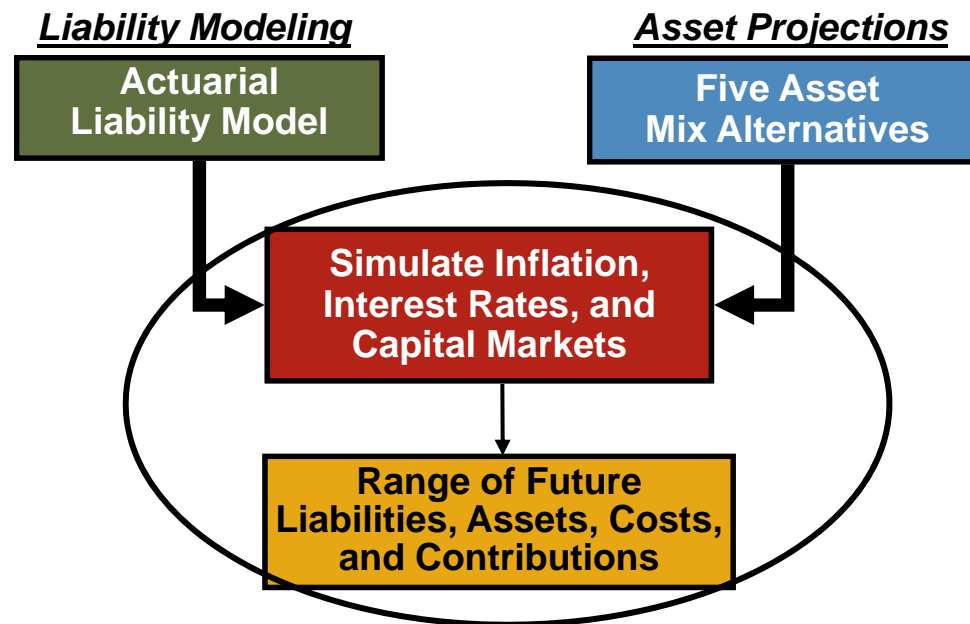
- $\text{Net Outflow / Assets} = (\text{Benefits} - \text{Contributions}) / \text{Assets}$
- General observation: liquidity needs are considered manageable if net outflow as a percentage of assets is less than 5%. When net cash flows fall between 5% and 10% of the Total Fund market value, the size of the allocation to illiquid investments becomes a material consideration.
- The liquidity needs for MCERA plan are expected to be manageable and should not impact asset allocation over the next 20 years.
- **By 2021, the Net Outflow / Assets should reach 3% and is projected to rise to 3.5% by 2030.**



Stochastic Forecast



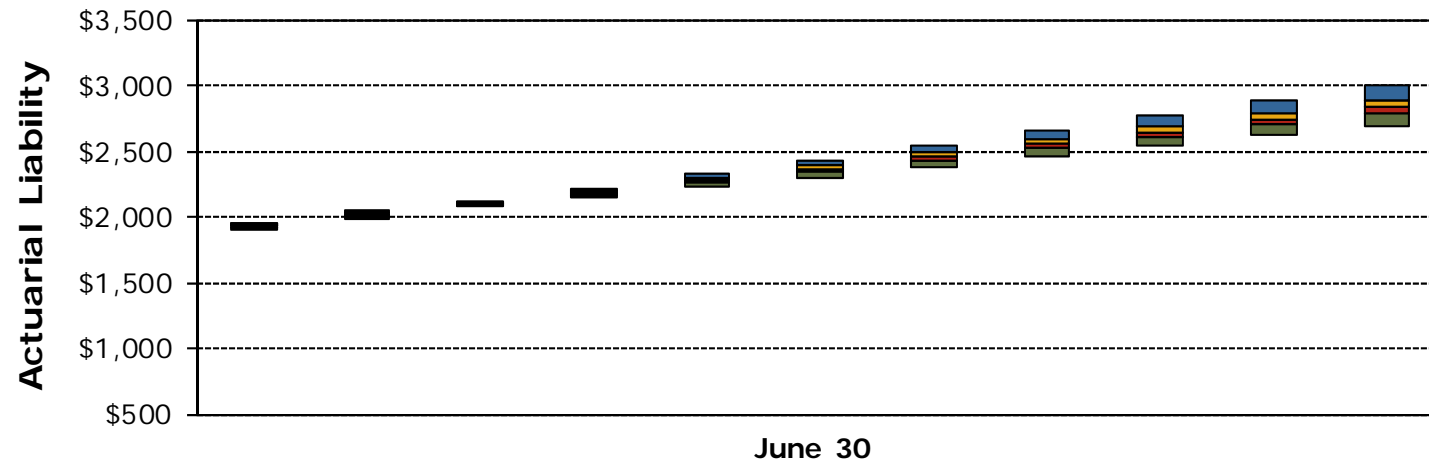
V - Simulate Financial Condition



- “Stochastic” modeling generates ranges of outcomes to capture future uncertainty.
- Generate 2,000 simulations per year, per asset mix to capture possible future economic scenarios and their effect on the portfolio. The simulation results were then ranked from highest to lowest to develop probability distributions.
- Focus on 10-year planning horizon (7/1/2011 – 7/1/2021).
- **Simulation analysis focuses on the Current Target and Mixes 1-5 (current asset classes), using Callan’s capital market and inflation expectations.**



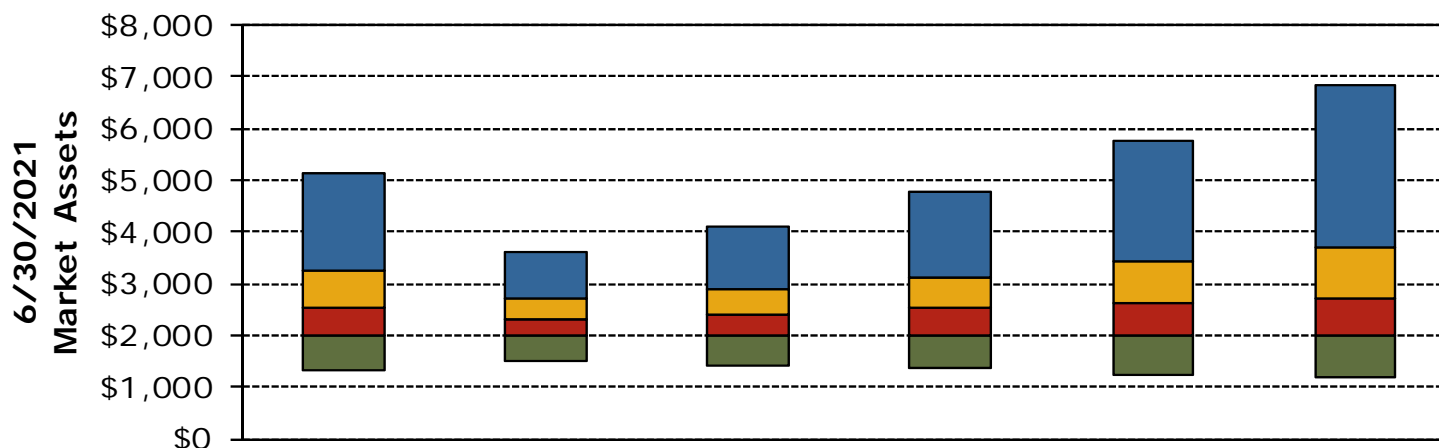
V – Simulate Financial Condition Actuarial Accrued Liability



- The actuarial liability increases 3.3% - 4.5% per year from 6/30/2011 to 6/30/2021.
- The Plan's liabilities are sensitive to changes in inflation and the resulting impact on salaries.



V – Simulate Financial Condition Range of 6/30/2021 Market Assets

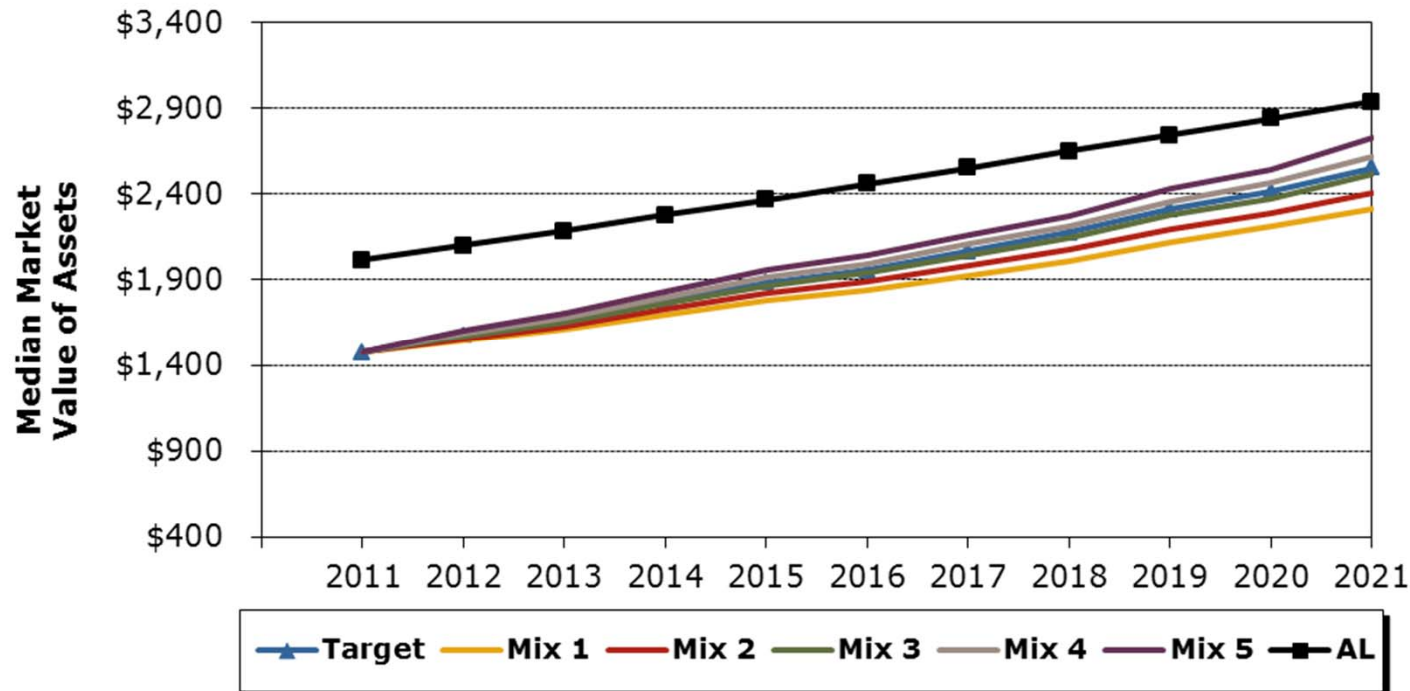


Percentile	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
2.5th	\$5,122	\$3,613	\$4,120	\$4,787	\$5,761	\$6,829
25th	3,259	2,703	2,915	3,139	3,424	3,696
50th	2,553	2,313	2,407	2,516	2,619	2,731
75th	2,005	1,986	1,999	2,005	2,002	1,987
97.5th	1,307	1,512	1,431	1,349	1,255	1,174
97.5th - 50th	1,246	801	976	1,167	1,364	1,557

- The 50th percentile represents the expected case (50% chance of occurrence).
- The 97.5th percentile represents a worse-case scenario or 2 standard deviation event (a 2.5% probability that assets will be the value shown or lower).
- Capital market risk is reflected mainly in the market value of assets. As you move from left to right (Mix 1 to Mix 5) the range of results widens as you take on more risk (greater equity exposure).



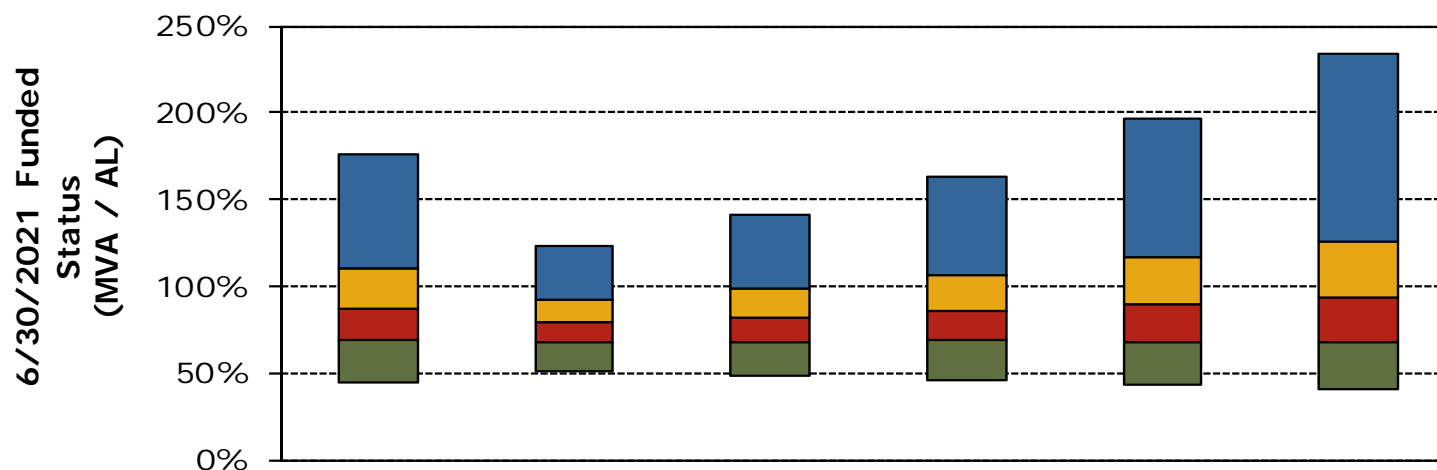
V – Simulate Financial Condition Market Assets and Actuarial Liability



- The chart above compares the median **market value of assets** to the median **actuarial liability (AL)** over the next 10 years.
- **Assuming no further changes to funding or benefit levels, MCERA's deficit in dollar terms is expected to shrink and the funded status is expected to improve for most mixes.**



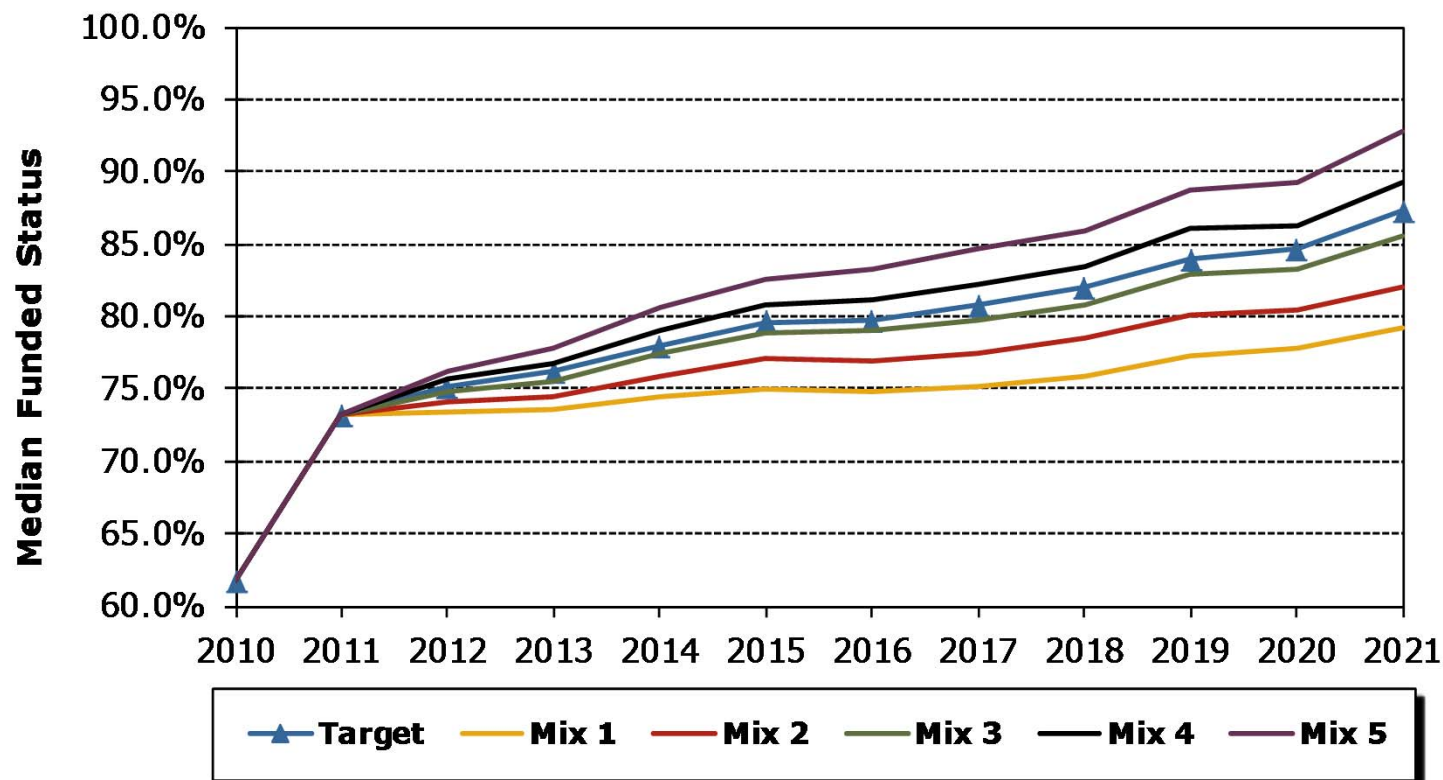
V – Simulate Financial Condition 6/30/2021 Projected Funded Status



- **Funded Status = Market Assets / Actuarial Liability**
 - Examining the funding ratio using the actuarial value of assets results in similar median-case results but slightly narrower ranges due to the smoothing of assets.
- **None of the mixes are expected (50th percentile) to be fully funded in ten years.**



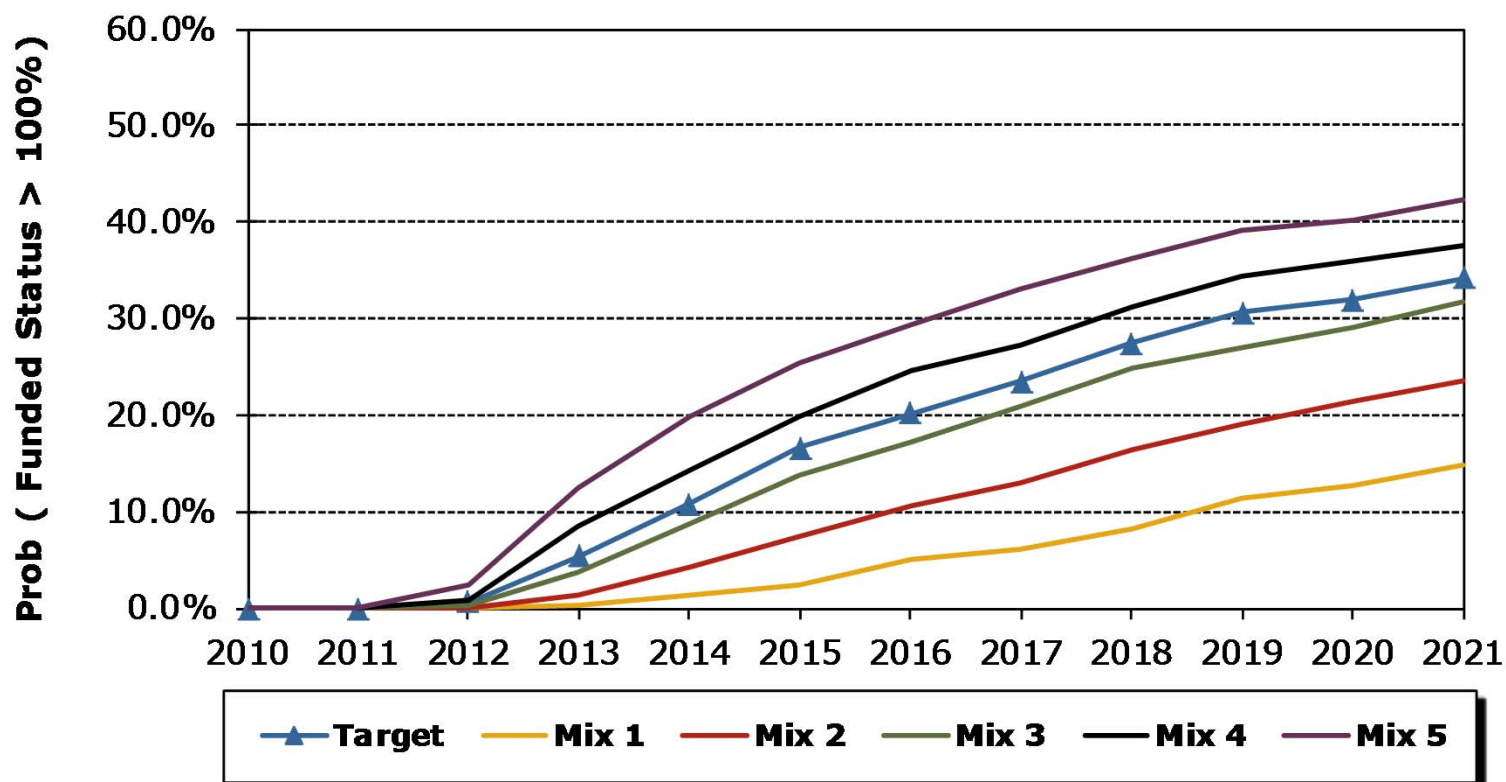
V – Simulate Financial Condition Median Funded Status



- Median Funded Status is expected to increase with a more aggressive target allocation over the next 10 years.



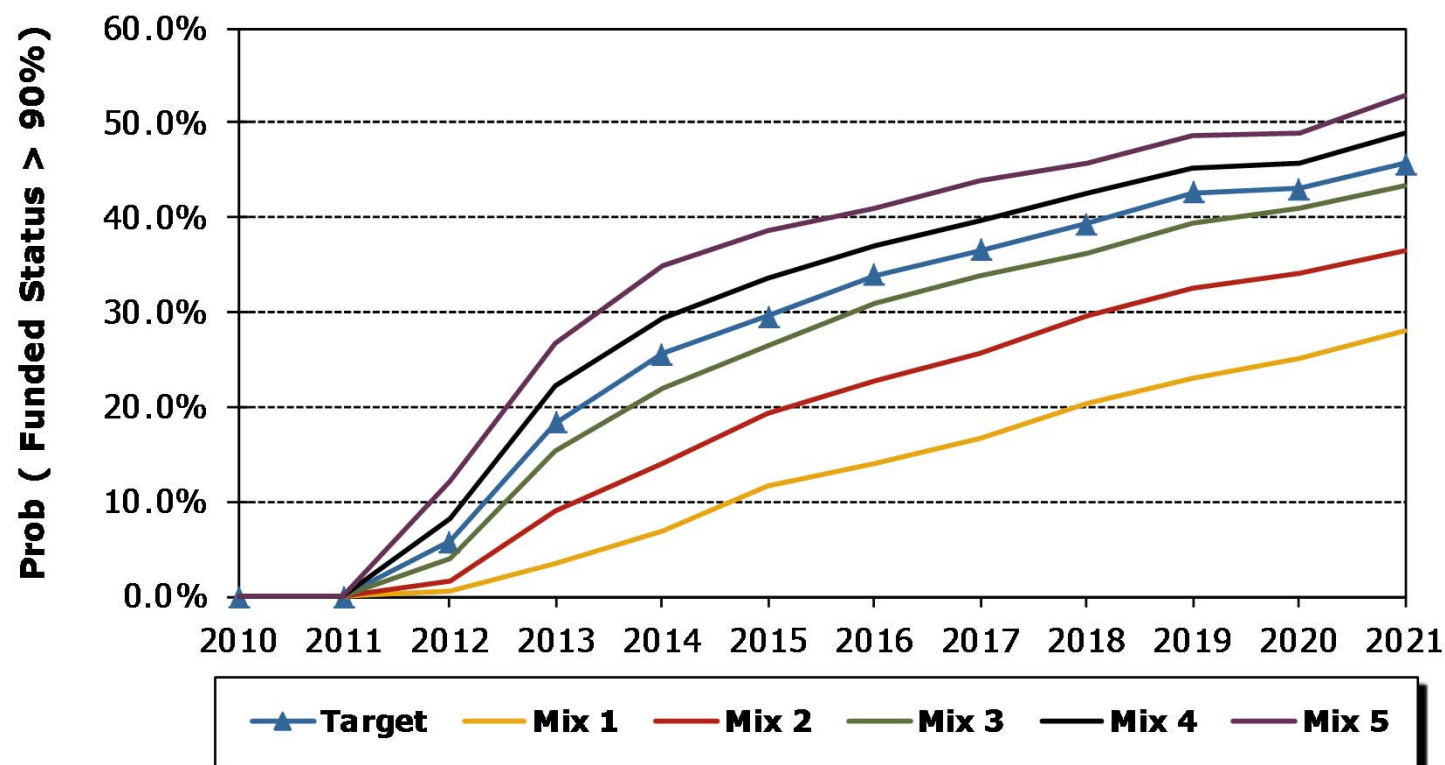
V – Simulate Financial Condition Probability (Funded Status > 100%)



- Probability of being fully funded increases with a more aggressive target allocation.



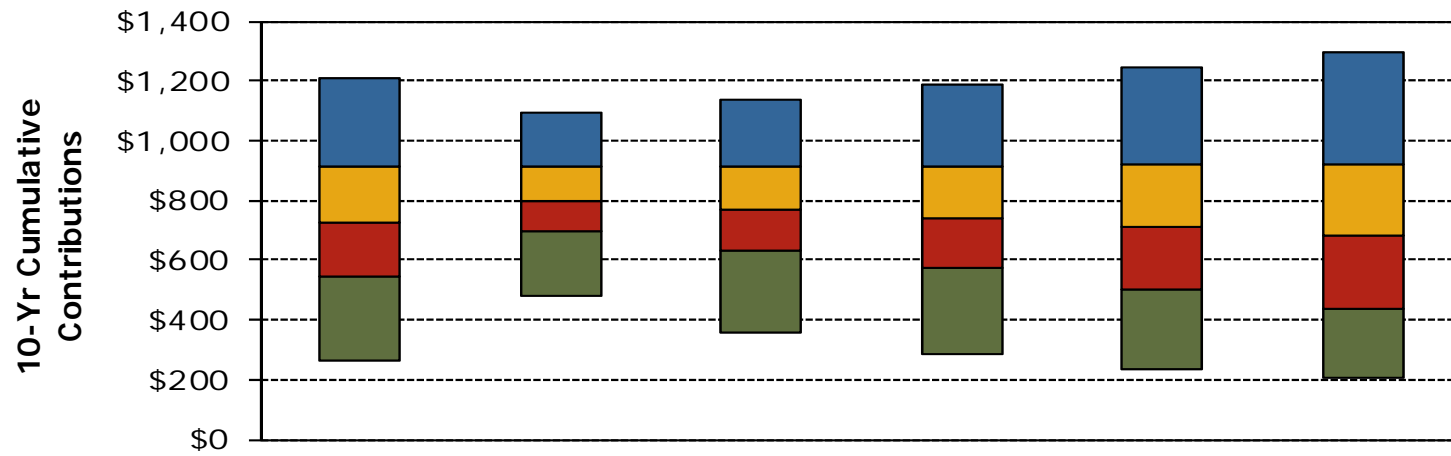
V – Simulate Financial Condition Probability (Funded Status > 90%)



- Probability of being over 90% funded increases with a more aggressive target allocation.



V – Simulate Financial Condition 6/30/2011-6/30/2021 Cumulative Contributions

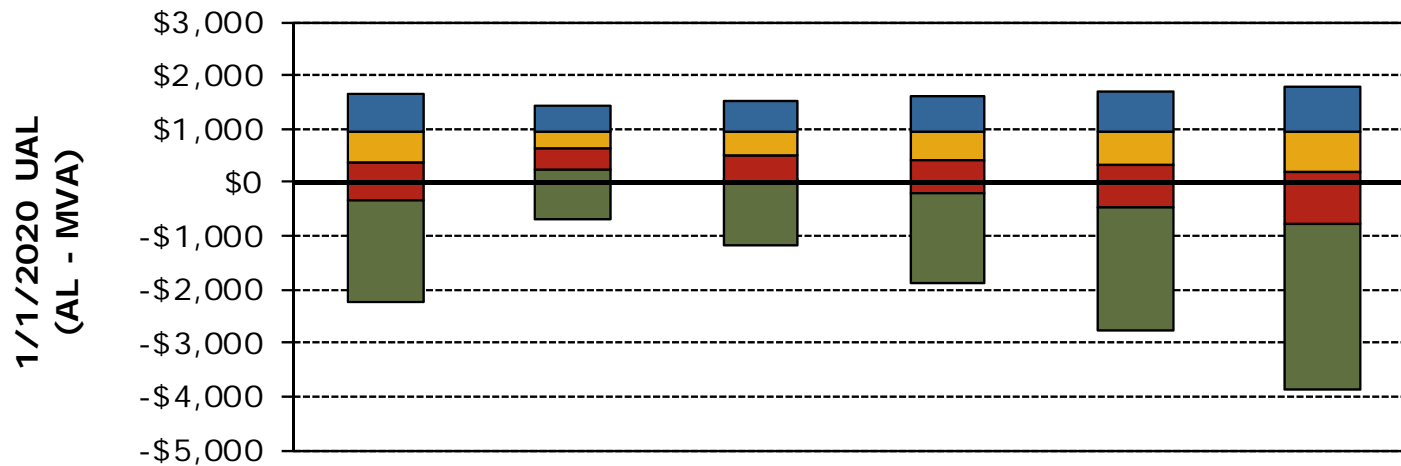


- In the expected case (50th percentile), the contribution outlay decreases as you get more aggressive. However, in a worse-case scenario (97.5th percentile), the amount of actuarially required contributions would be higher.



V – Simulate Financial Condition

7/1/2021 Projected Unfunded Liability



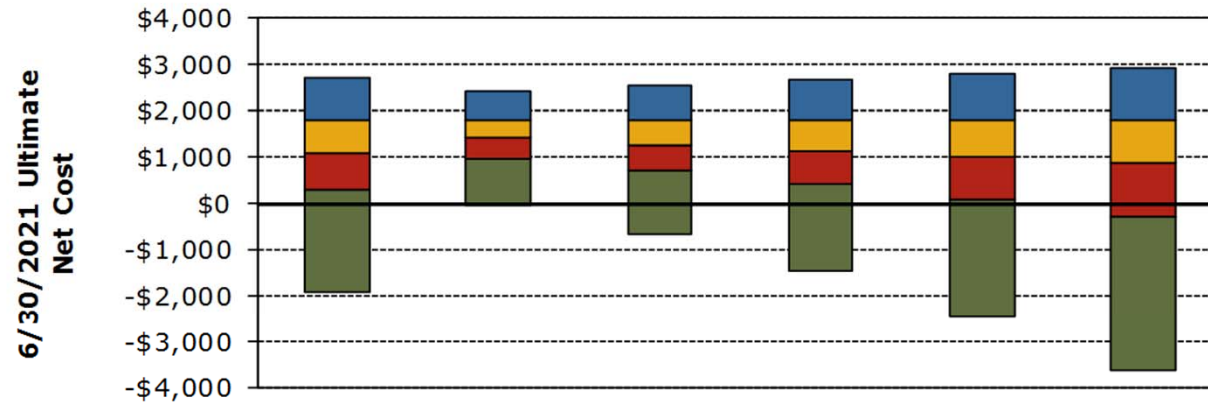
Percentile	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
97.5th	\$1,644	\$1,436	\$1,511	\$1,596	\$1,704	\$1,795
75th	936	944	933	933	928	935
50th	373	616	522	424	316	211
25th	-320	243	37	-198	-484	-759
2.5th	-2,246	-694	-1,191	-1,863	-2,782	-3,889
97.5th - 50th	1,271	820	989	1,172	1,389	1,584

- “Unfunded Liability” = Actuarial Liability - Market Value of Assets
- The 7/1/2011 unfunded liability is expected to be **\$547** million but is expected to decrease over the next 10 years.



V – Simulate Financial Condition

Range of Ultimate Net Cost



Percentile	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
97.5th	\$2,709	\$2,444	\$2,547	\$2,666	\$2,797	\$2,916
75th	1,789	1,828	1,817	1,795	1,802	1,811
50th	1,092	1,416	1,285	1,158	1,011	887
25th	286	980	714	429	88	-271
2.5th	-1,889	-44	-674	-1,468	-2,468	-3,622
97.5th - 50th	1,617	1,028	1,263	1,508	1,786	2,029

- Ultimate Net Cost (UNC)= Present Value of 10-Year Cumulative Contributions + Present Value of 12/31/2021 Unfunded Liability
- UNC is a more complete measure of the cost to the Plan since it captures what is expected to be paid over 10 years plus what is owed at the end of the 10-year period.
- Negative numbers indicate that the Plan is in a surplus position at 12/31/2021.
- Expected Ultimate Net Cost to the Plan decreases as mixes get more aggressive. A reward for taking risk over the long run.
- However, in a worse-case scenario (97.5th percentile), the Ultimate Net Cost to the Plan increases as mixes get more aggressive, the cost of taking on increasing risk.



Investment policy should match the priority of MCERA's goals & objectives

MCERA will need to identify priorities that can be used as decision variables.

Metric	MCERA	Implication
Investment Goals	Reduced Funded Status Volatility OR Reduced Costs over the Long-Run OR Importance of Income Generation for Liquidity	Reducing FS volatility implies higher but more stable contribution rates. Long term focus implies financial ability to absorb volatility
Investment Time Horizon	Linked to Duration of Liabilities Investment Goals	Reducing FS volatility implies a shortening of your time horizon Long run focus requires time horizon of 10+ years
Risk Tolerance	Define Key Risk Metrics: Liquidity Risk Volatility of Funded Status/Contribution Liability risks	High liquidity needs implies less equity Low funded status may lead to greater tolerance for risk Create better asset-liability match
Acceptable Assets	Restrictions on New Investment Strategies? Importance of Liquidity? Peer Comparisons	High liquidity requirements can limit the extent illiquid investments can be considered
Constraints	Statutory Internal	Acceptable Assets under Statute Any portfolio constraints?



VI – Define Risk Tolerance Summary

- Open Plans are typically considered to have indefinite time horizons for assuming investment risk.
 - **Assuming MCERA receives the funding dictated by the current contribution policy, the analysis confirms that the time horizon for taking risk in the MCERA investment program is long-term.**
- The MCERA fund is expected to face manageable liquidity needs over the next 20 years.
 - Net Outflow / Assets < 5% through 2030.
- Liability growth is linked to the actuarial discount rate (7.75%) and implies a nominal return target for the Plan.
 - Capital markets will be challenged to generate a long-term return $\geq 7.75\%$.
 - Pursuing a higher expected return is tempting in order to assist with closing the Plan deficit and offsetting future benefit accruals.
 - However, simply meeting the 7.75% discount rate would require taking on greater risk than the current investment policy, given current expectations for the capital markets. Lowering the discount rate to match expectations will likely worsen expected funded status.
 - The 7.75% rate assumes 3.5% inflation, implying a 4.25% real return target. Under Callan's capital market assumptions, with lower return but lower inflation, the current target portfolio is expected to surpass this real return, countering the pressure to pursue higher nominal return.
- **Regardless of the exact policy target, the analysis suggests the plan will need to retain a strong orientation toward risk assets (equity) in pursuit of return to achieve its funding goals.**



VI – Define Risk Tolerance Risk Factors

- **Asset-liability study evaluates a multitude of risk factors to establish appropriate risk tolerance.**
 - Size of plan
 - Financial strength of sponsor
 - Plan funded status
 - Willingness to take risk
 - Time horizon (open vs. frozen)
 - Liquidity needs
 - Liability characteristics
 - Net growth rate
 - Interest rate risk
 - Inflation risk
 - Contribution risk