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NEW MEXICO EDUCATIONAL RETIREMENT BOARD

Asset-Liability Study

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Overview

Introduction

Executive Summary

- **Capital markets backdrop continues to support a well diversified, globally balanced approach**
  - Current long-term strategic asset allocation policy target is a well diversified portfolio that strives for return without taking undue risk
  - Current policy target allocation expected to achieve an 8.4% return over 30 years using NEPC's 2016 capital markets forecasts, compared to a 7.75% expected return target

- **Statutory requirements will lead the New Mexico Educational Retirement Board to full funding if all contributions are met**
  - The Plan is utilizing a closed amortization schedule for the unfunded liability, with 27 years remaining to amortize

- **Plan benefit payments outweigh future contributions, generating a negative cash flow profile**

- **NEPC and Staff's proposed allocations are similar in many respects to the Plan's current policy target with a few strategic differences**
  - A small shift from public equity to private equity
  - A decrease in the private debt allocation
  - A reduction of the dedicated global asset allocation/risk parity allocation and creation of an opportunistic allocation to provide tactical exposure to attractive asset classes

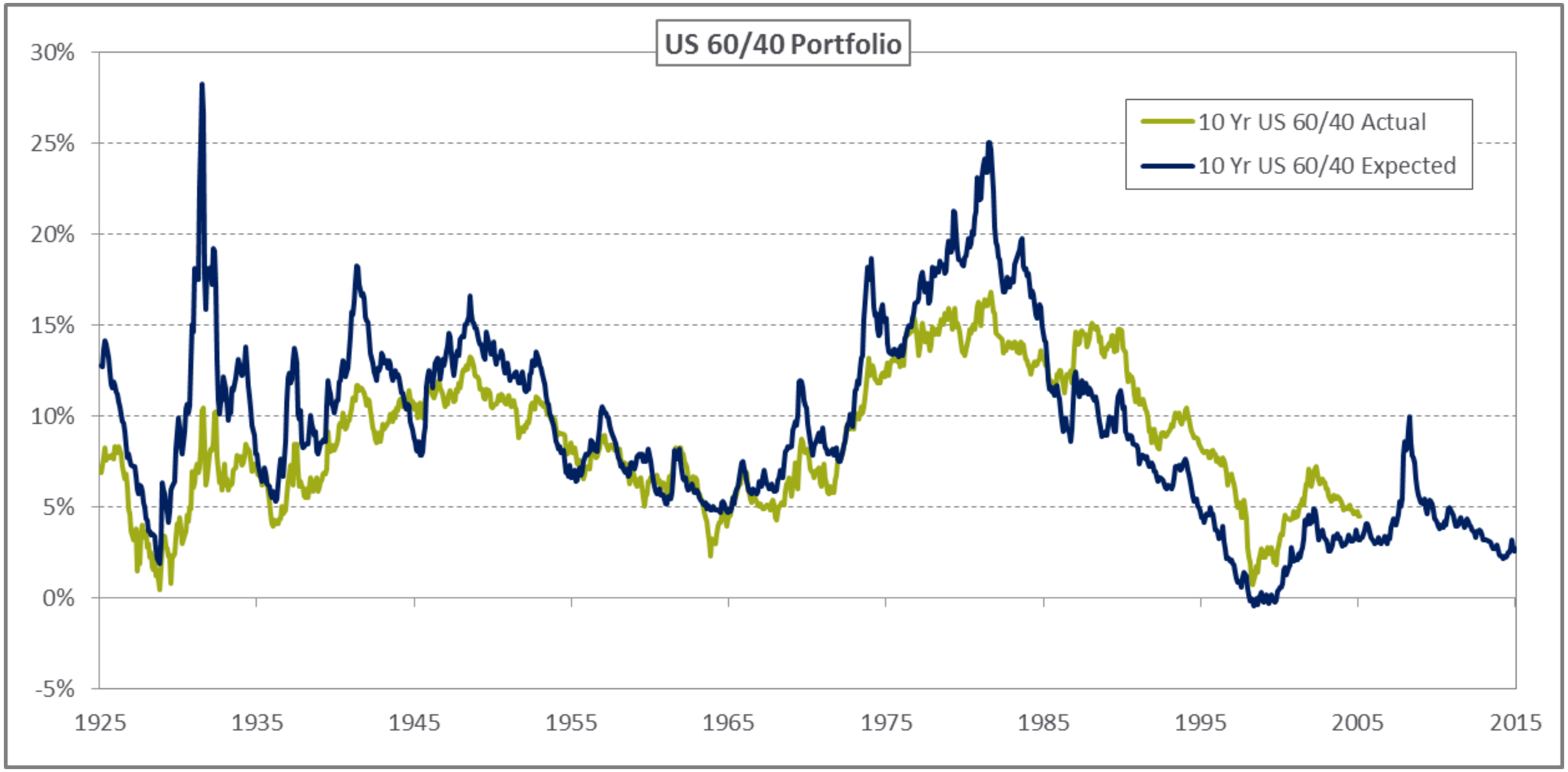
Facing the Challenge of Subdued Capital Market Forecasts

- **All investors face the same fundamental challenge**
  - Contributions + Investment Earnings must equal or exceed total Obligations (Benefits and Expenses)
  - For pension plans, this is the classic equation:

$$C + I = B + E$$

- **If investment return is lower than expected, adjustments are required to balance the equation**
  - Contributions must be higher,
  - Benefits + expenses must be lower, or
  - More risk must be taken to earn a similar return, or risk must be taken more efficiently
- **Adjusting investment return and risk is the most fluid of these factors**
  - Requires an understanding of both assets and liabilities to determine the “right” amount of risk in a portfolio
  - A key input is assessing the efficiency of a portfolio’s implementation of the risk target
  - Requires any potential structural challenges from future cash flow dynamics be addressed and understood
  - The portfolio’s macro economic bias must be evaluated and recognized

Low Global Cash Rates Suppress Long-Term Return Expectations



Source: Shiller Data, NEPC

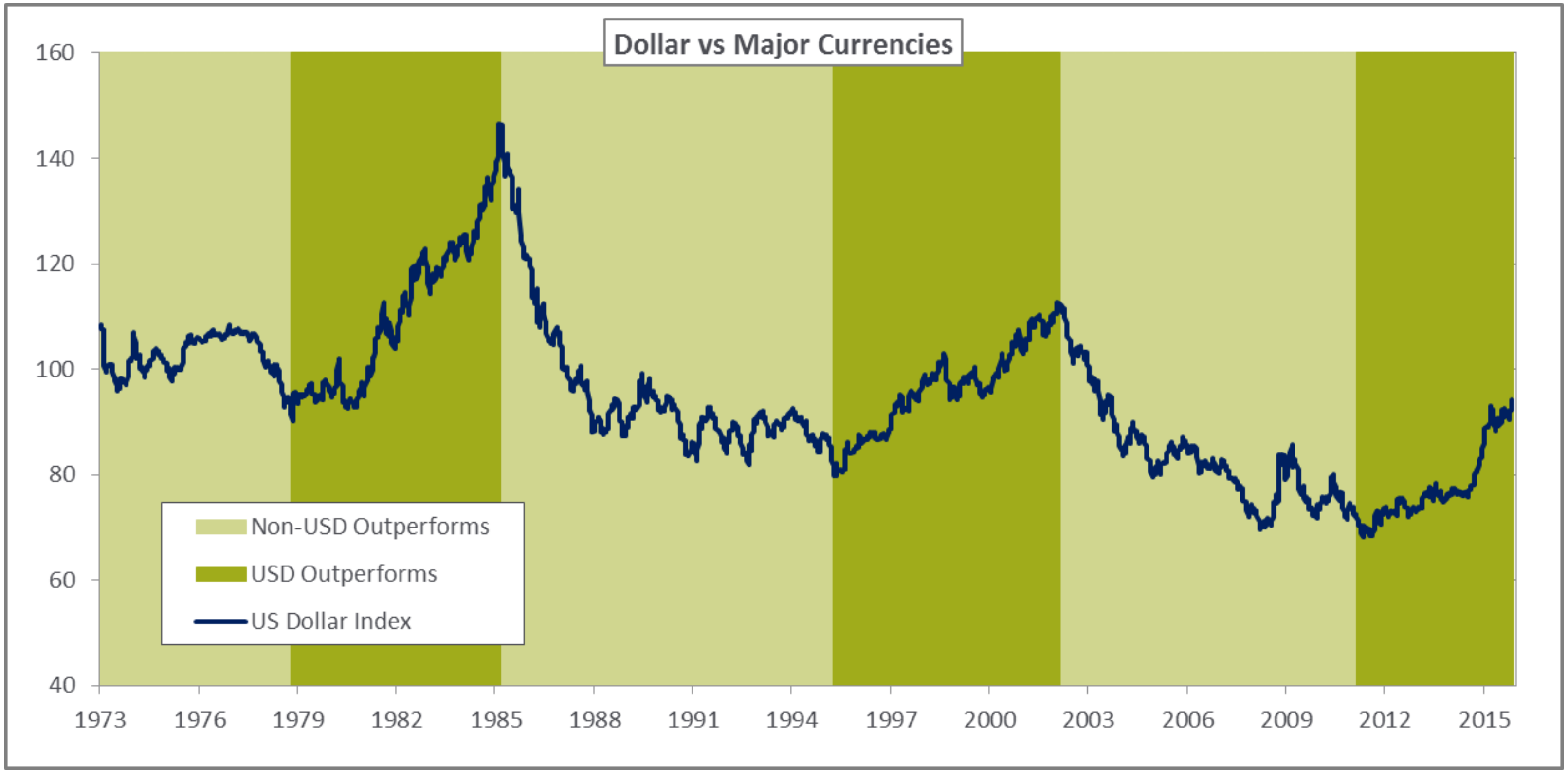
- **U.S. centric 60 / 40 portfolios have been sufficient historically, but forward-looking return prospects are subdued**
  - Asset prices can be sustained, but low yields portend below average expected returns
- **Conventional investment approaches may fall short going forward**
  - Adjustments will be necessary to effectively meet and exceed long-term objectives

NEPC Market Outlook

Key Themes and Background for 2016

- **NEPC's market outlook includes both an intermediate (5-7 years) and long-term (30 years) forecast horizon**
- **U.S. economic cycle and U.S. central bank policy are at the forefront of major cyclical and secular forces informing our Assumptions and Actions**
  - These factors interact to create a supportive environment for risk assets in the near term, but ultimately push long-term capital market forecasts lower relative to history
- **The U.S. economy is nearly 7 years removed from the previous recession, but the health of U.S. consumers can extend the expansion**
  - Prolonged U.S. economic cycle has the potential to push the U.S. dollar higher, straining commodity markets and international borrowers with dollar-based debt
- **Influence of central bank policies in the developed world remain broadly supportive for risk assets but come with long-term effects**
  - U.S. policy is diverging from Europe and Japan, but slow expected pace of hikes provides a positive backdrop for U.S. equities and credit in the near term
- **Emerging market growth compressed, yet still stronger than developed; fears of further adjustments in China remain a near-term concern**
  - Large currency adjustments across most emerging countries healthy for future prospects
  - Chinese Yuan (RMB) devaluation has been incremental relative to other EM FX adjustments

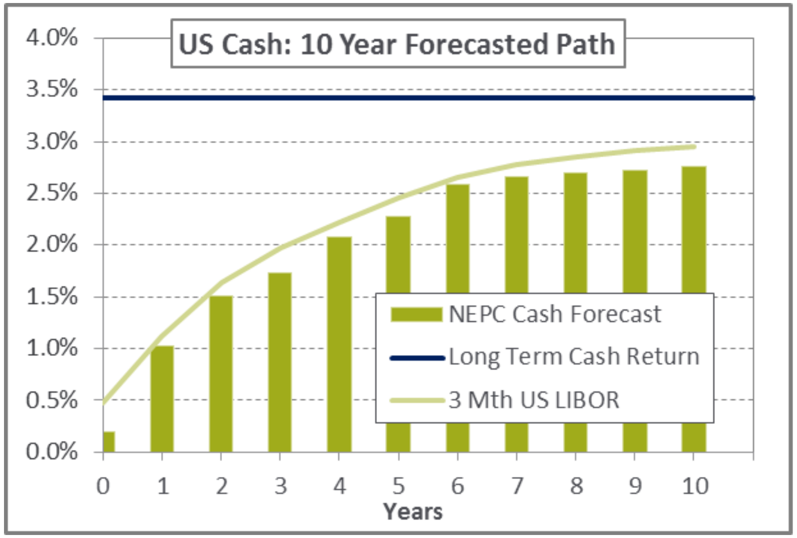
U.S. Dollar Cycle Characterized by Peaks of Overvaluation



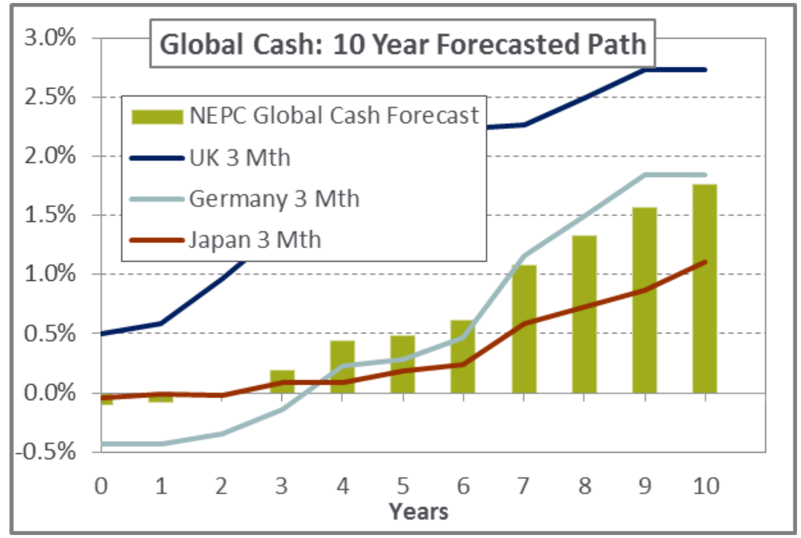
Source: Bloomberg, NEPC

- **A prolonged U.S. economic expansion is likely to have a significant influence on the U.S. dollar cycle**
  - Continued growth in consumer spending and U.S. economy have the potential to push the U.S. dollar to levels last seen in the late 1990's
- **U.S. dollar strength is interconnected with U.S. Federal Reserve policy**
  - Fed must balance the path of future interest rate increases relative to the disruptive effects of a strong dollar on global markets

Global Central Bank Policy: "Lower for Longer"



Source: Bloomberg, NEPC



Source: Bloomberg, NEPC

- **Accommodative global monetary policies flow through to markets, distorting the traditional asset return profile**
  - QE and negative interest rates suppress income while supporting higher valuations
  - Provides near-term support for market conditions in Europe and Japan

- **Potential extended period of low cash rates beyond market expectations poses challenges for all investors**
  - Subdued long-term cash expectations in the developed world compress long-term expected returns for both fixed income and equity

Asset Allocation Policy Analysis

Proposed and Comparative Asset Allocations

	Current Target	Proposed Target	0.5x Leverage	65/35	Avg. Public Fund >$1B
Cash	**1%**	**1%**	**-20%**	**0%**	**2%**
Large Cap Equities	18%	16%	24%	50%	22%
Small/Mid Cap Equities	2%	3%	5%	0%	7%
Int'l Equities (Unhedged)	5%	5%	8%	15%	17%
Emerging Int'l Equities	10%	9%	14%	0%	2%
Total Equity	**35%**	**33%**	**50%**	**65%**	**48%**
Core Bonds	6%	6%	9%	30%	18%
Global Bonds (Unhedged)	0%	0%	0%	0%	3%
EMD (External)	1%	1%	2%	0%	1%
EMD (Local Currency)	1%	1%	2%	0%	0%
Diversified Fixed Income	0%	0%	0%	0%	2%
Total Fixed Income	**8%**	**8%**	**12%**	**30%**	**24%**
Private Equity	11%	13%	13%	0%	6%
Private Debt	20%	18%	18%	0%	5%
Private Real Assets	8%	8%	8%	0%	0%
Real Estate (Core)	7%	7%	7%	5%	6%
Opportunity (Absolute Return)	0%	5%	5%	0%	0%
Total Alternatives	**46%**	**51%**	**51%**	**5%**	**21%**
Global Asset Allocation	5%	4%	4%	0%	4%
Risk Parity	5%	3%	3%	0%	0%
Commodities	0%	0%	0%	0%	1%
Total Other	**10%**	**7%**	**7%**	**0%**	**5%**

Expected Return 5-7 yrs	**7.6%**	**7.6%**	**8.5%**	**5.5%**	**6.1%**
Expected Cost (bps)	**0.84%**	**0.87%**	**0.93%**	**0.22%**	**0.43%**
Expected Cost ($$)	**$93,626,400**	**$96,970,200**	**$103,657,800**	**$24,521,200**	**$47,927,800**
Standard Deviation	**12.3%**	**12.2%**	**15.2%**	**11.9%**	**11.4%**
Sharpe Ratio	**0.49**	**0.50**	**0.46**	**0.34**	**0.41**
Sortino Ratio	**0.44**	**0.44**	**0.40**	**0.32**	**0.38**

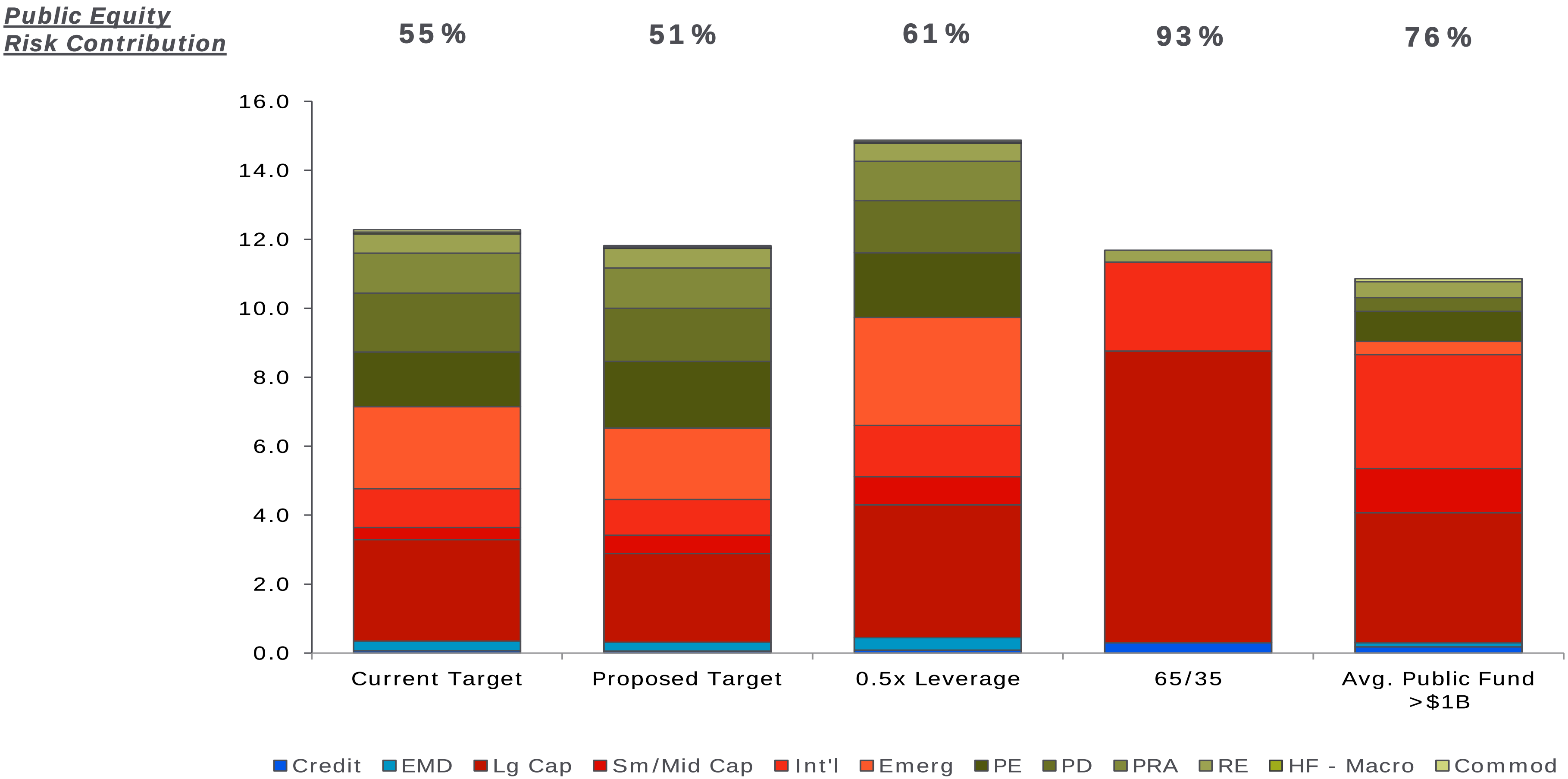
Expected Return 30 yrs	**8.4%**	**8.3%**	**9.2%**	**6.8%**	**7.3%**
Sharpe Ratio	**0.44**	**0.44**	**0.40**	**0.32**	**0.38**

Probability of 1-Year Return < 0%	**26.9%**	**26.7%**	**28.8%**	**32.2%**	**29.6%**
Probability of 5-Year Return < 0%	**8.4%**	**8.2%**	**10.6%**	**15.1%**	**11.5%**
Probability of 1-Year Return > 7.75%	**49.4%**	**49.4%**	**52.0%**	**42.4%**	**44.4%**
Probability of 5-Year Return > 7.75%	**61.1%**	**60.1%**	**69.3%**	**33.6%**	**41.7%**

Probabiilty of 30-Year Return > 7.75%	**61.1%**	**60.1%**	**69.3%**	**33.6%**	**41.7%**

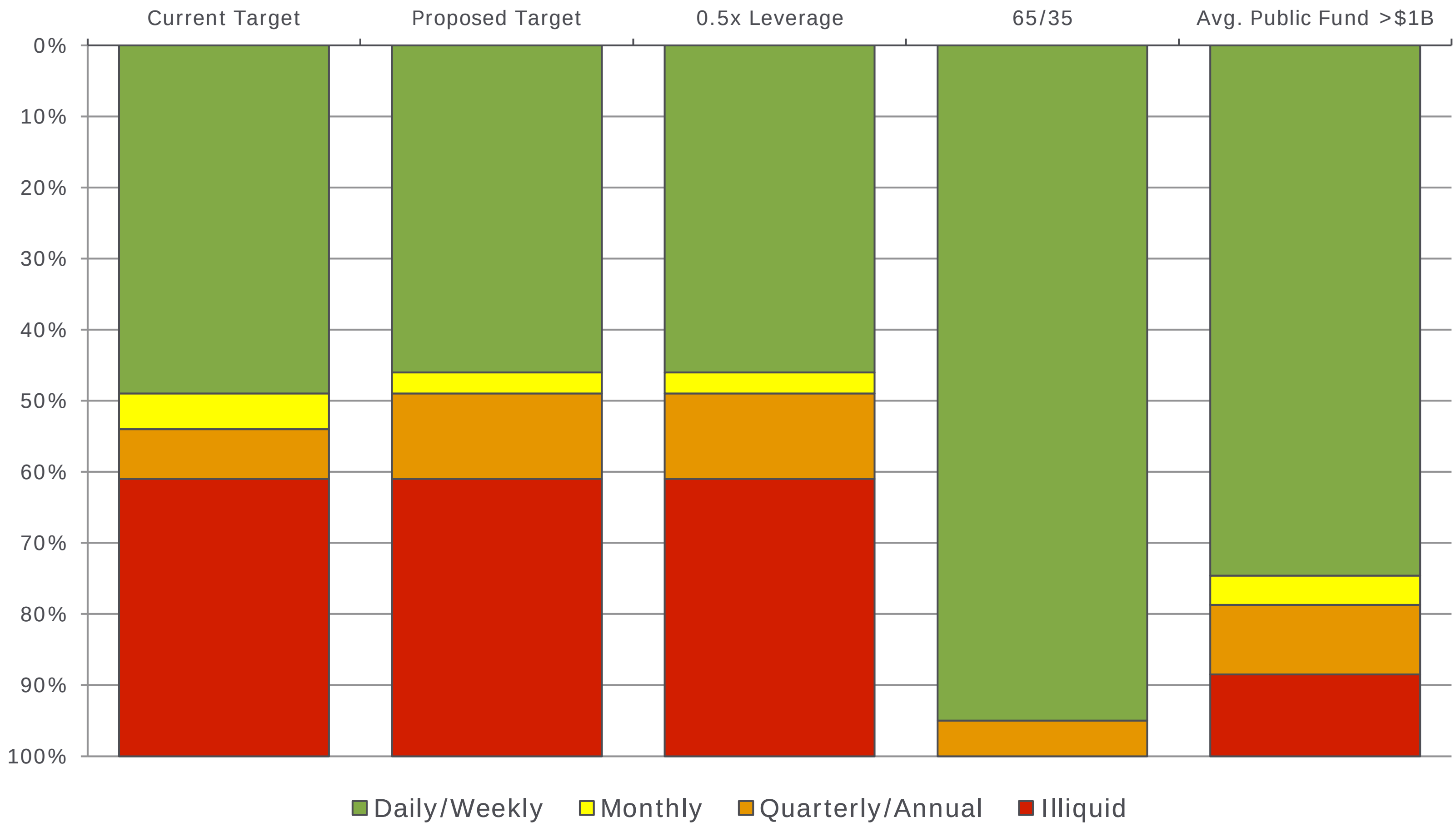
- **Current Target is a robust and well-diversified allocation that is expected to generate a return of 8.4% over 30 years**
- **Alternative allocations:**
  - Proposed Target shifts 2% from public to private equity, reduces private debt by 2%, and adds an opportunistic bucket
  - 0.5x Leverage levers up Proposed Target's public markets (both equities and fixed income) by 1.5x
- **Comparative allocations:**
  - 65/35 is a traditional allocation of 65% equities and 30% bonds, 5% real estate
  - Average Public Fund is drawn from our InvestorForce client database of public funds with over >$1 billion in assets

Risk Analysis - Allocation Comparison



- **The Proposed Target allocation has a broadly similar risk profile as the Current Target with slightly lower public equity risk**
- **A half turn of leverage increases asset volatility significantly and offers decreased risk diversification with more exposure to public equity market risk**

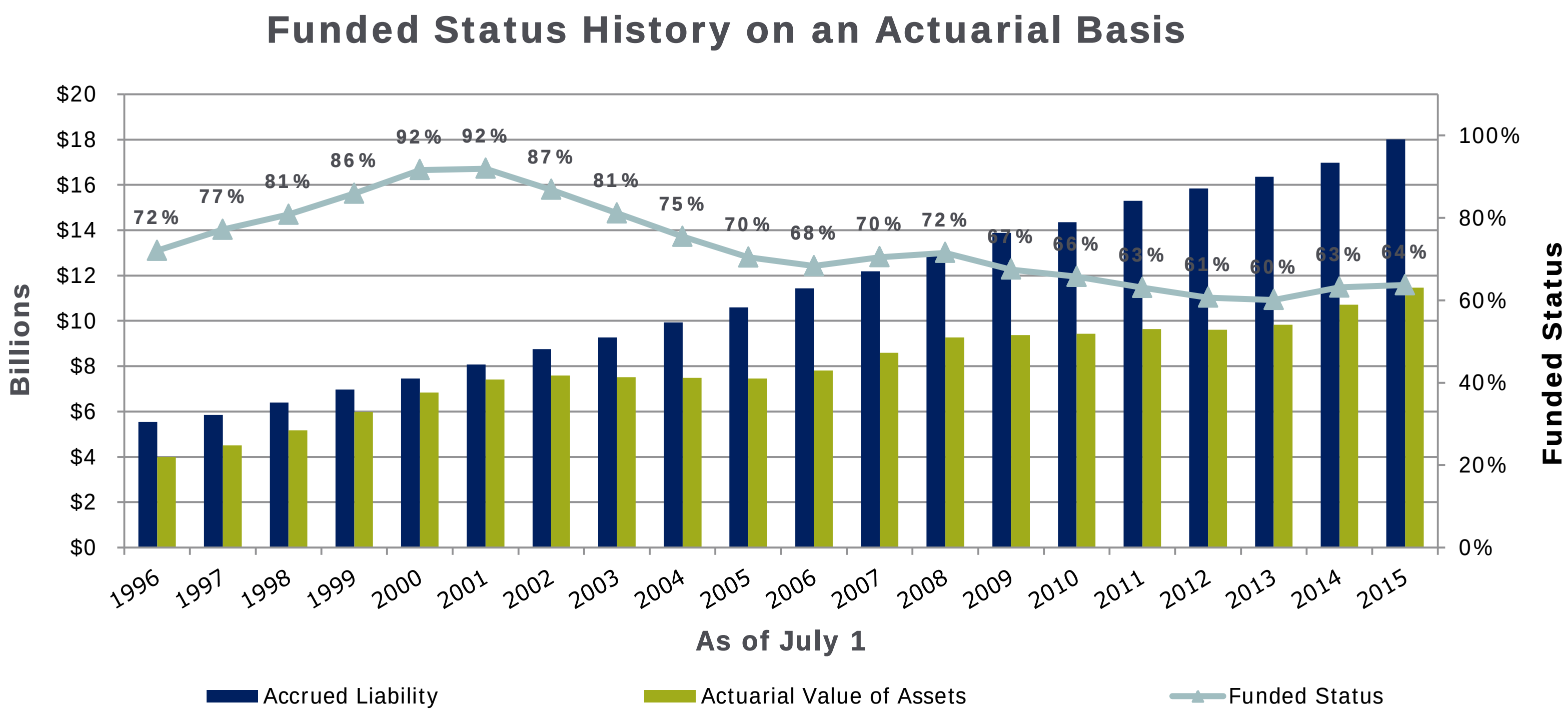
Liquidity Analysis - Allocation Comparison



- **The Proposed Target allocation and half turn leverage allocation have broadly the same liquidity risk profiles as the Current Target**
- **The 65/35 portfolio is very liquid with no alternative investments**

Asset-Liability Projections

Historical Review



Source: GRS

- **Over the past 20 years, both assets and liabilities have grown an average of 6.9% per year**
- **However, assets increases have recently not kept pace with liability growth, growing on average 7.9% per year in the first 10 years, and 4.5% per year in the last 10 years, as market turmoil has affected most pension plans**

Plan Funded Status

Plan Summary *(In $ millions)*	7/1/2014 Results	7/1/2015 Results	7/1/2016 Estimate
Assets			
1. Actuarial Value	$10,715	$11,472	*$11,871*
2. Market Value	$11,346	$11,498	*$11,896*
3. Prior Year Return on MV Assets	14.2%	3.7%	*7.6%*
Liabilities			
4. Accrued Liability	$16,971	$18,014	*$18,627*
5. Discount Rate	7.75%	7.75%	*7.75%*
Funded Status			
6. AV Funded Status (1 Divided By 4)	63.1%	63.7%	*63.7%*
7. MV Funded Status (2 divided by 4)	66.9%	63.8%	*63.9%*

Sources: 7/1/2015 values from GRS; 7/1/2016 estimated results calculated by NEPC using Base Case assumptions and Current Target allocation

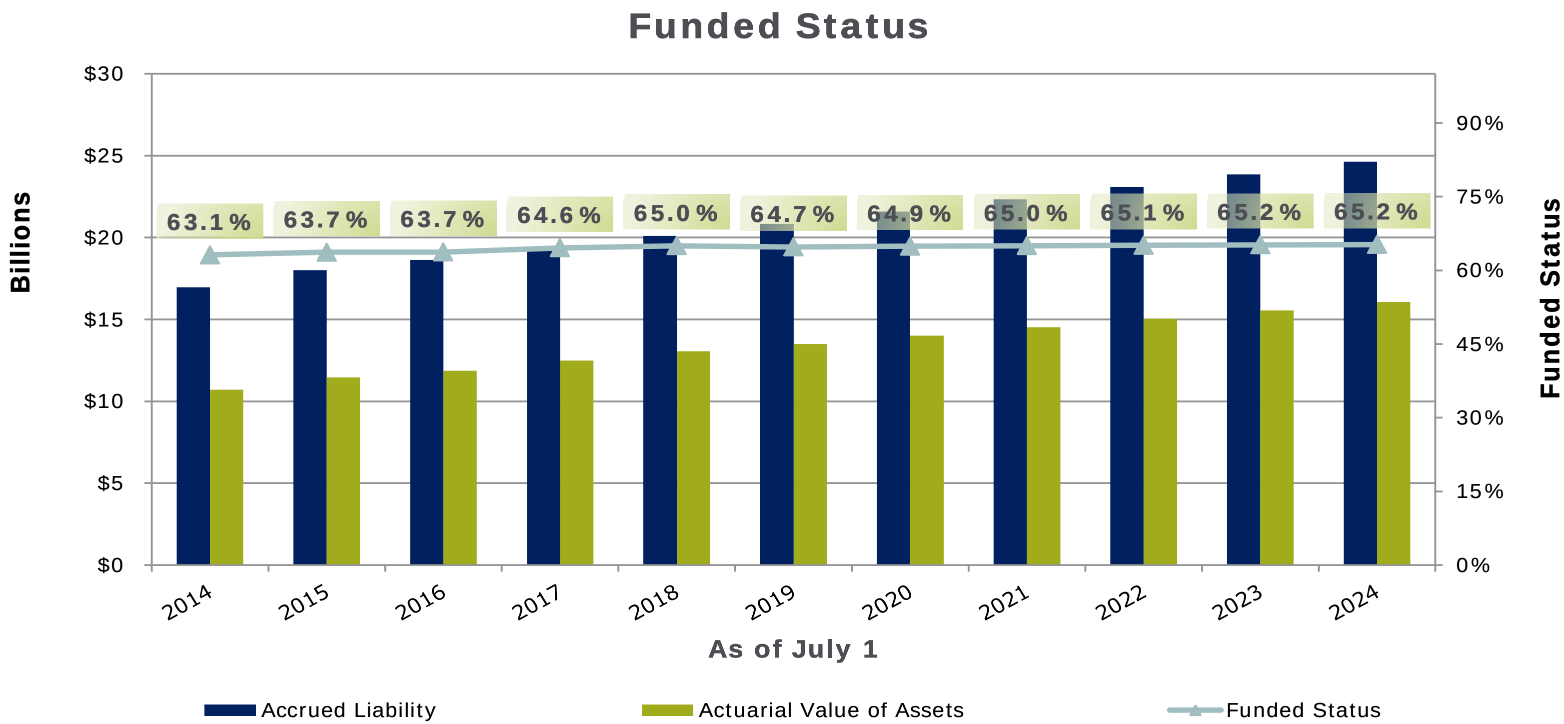
Plan Summary

- **As of June 30, 2015, the System was 63.7% funded on an actuarial basis**
  - Liabilities were discounted at a long-term rate of 7.75%
  - Discount rates for corporate pension plans have declined since the end of 2008
    - Public sector pension plans, however, are not immediately affected by moves in interest rates and have more gradual adjustments
- **As of June 30, 2016, the System is estimated to remain at 63.7% funded on an actuarial basis**
  - Using actual asset return information through December 31, 2015, with expected returns after that date based on NEPC 2016 assumptions
  - Discount rate is assumed to remain at 7.75%
- **“Actuarially Determined Contributions” are expected to increase over the projection period**
  - However, actual contributions are based on statutory rates determined by the Board, which are currently lower than Actuarially Determined Contributions
- **Annual benefit payments are greater than annual contributions from both employer and employee**
  - Any shortfall, therefore, needs to be made up through investment returns in excess of the expected 7.75%

Assumptions and Methodology

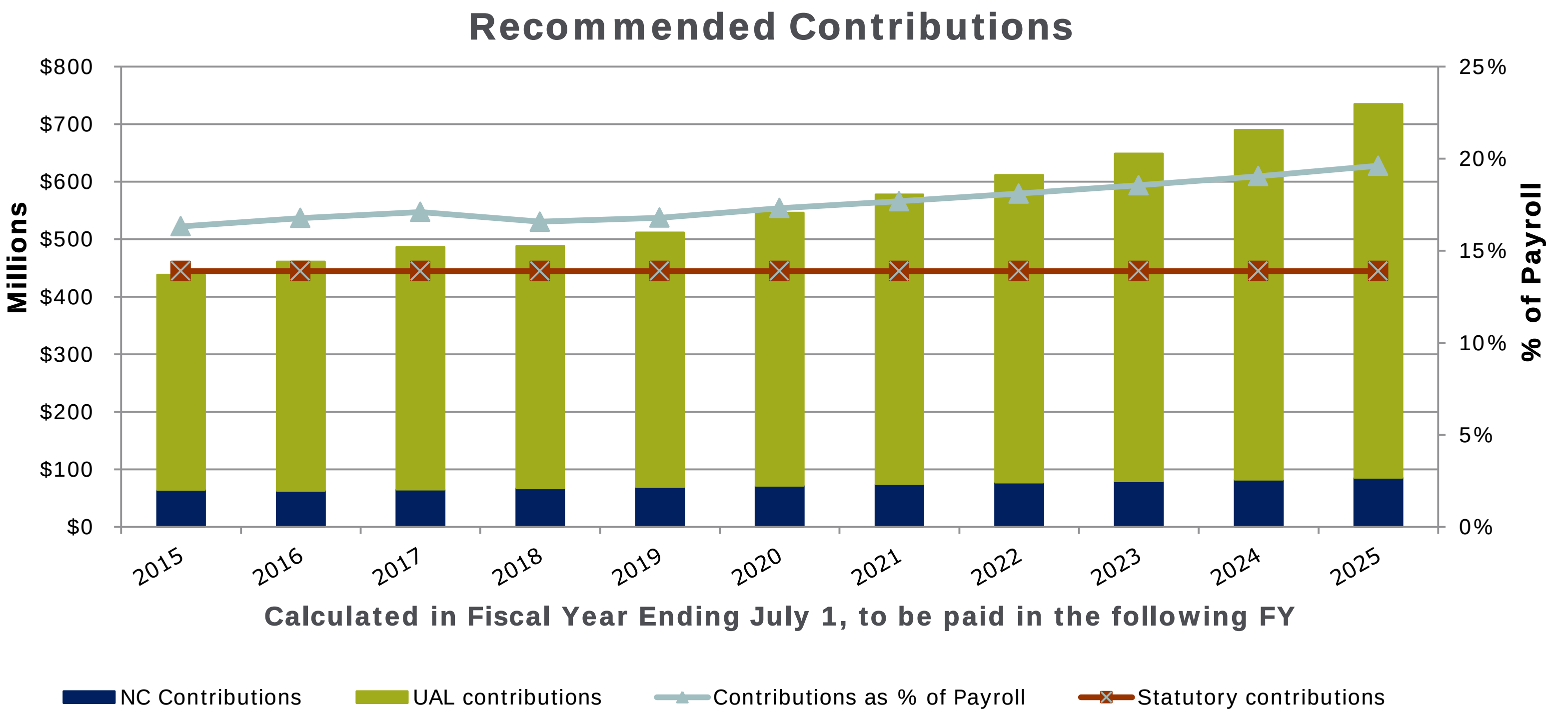
- **Liability calculations follow a roll-forward methodology based on:**
  - July 1, 2015 actuarial valuation by the Plan's actuary, GRS
  - Open group benefit payment projections from the actuary
- **NEPC projected liabilities in accordance with plan methodologies**
  - Payroll and normal cost assumed to grow at 3.5%
  - Discount rate/EROA for all future years modeled at 7.75%
- **Actual asset returns through December 31, 2015 were used, with NEPC 2016 assumptions used for expected returns after that date**
  - Gains/losses smoothed over 5 years for Actuarial Value of Assets methodology
- **Contributions based on calculated contribution rates**
  - Recommended Contributions = Normal Cost + closed period amortization of unfunded liability
    - Amortization at 27 years as of July 1, 2015
  - Actual Employer contributions assumed to remain at 13.9% of payroll
  - Employee contributions assumed to remain at 10.7% of payroll
- **No future benefit, assumption, or plan changes are assumed**

Deterministic Projections: Funded Status Percentage



- **Funded status is expected to increase gradually over the next 10 years**
  - Assets increase as expected contributions and asset returns are met
  - Liabilities grow on average 3.5% per year, with a flat discount rate of 7.75% assumed
- **Asset projection based on NEPC's 5-7 year return of 7.6% for the Current Target**

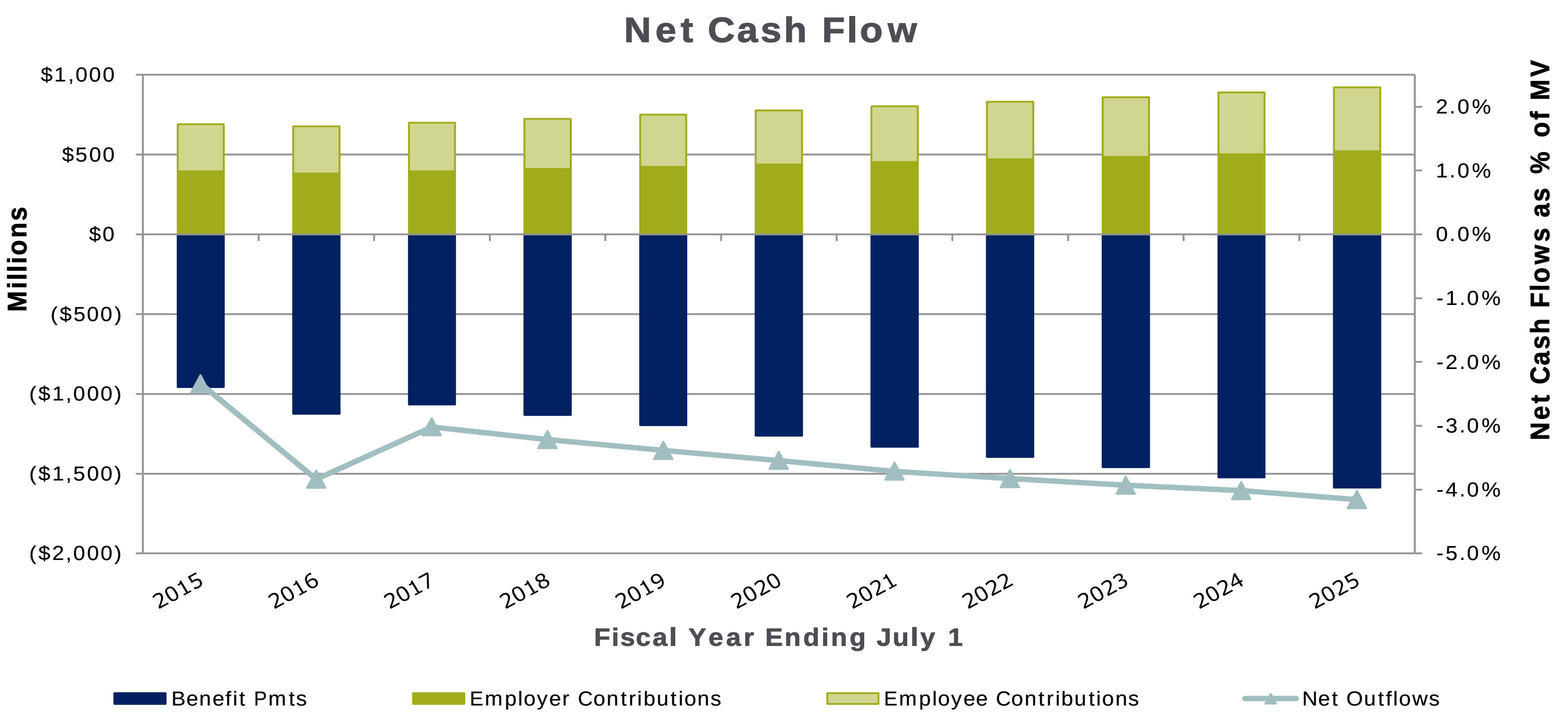
Deterministic Projections: Contributions (Current Policy Target)



- **Recommended contributions increase from 16.3% of payroll to 19.6% over 10 years**
  - Normal Cost remains at 12.98% of payroll, increasing by 3.5% per year
  - Unfunded Accrued Liability grows more quickly, with a decreasing amortization period each year

- **Statutory contributions remain level at 13.9% of payroll**

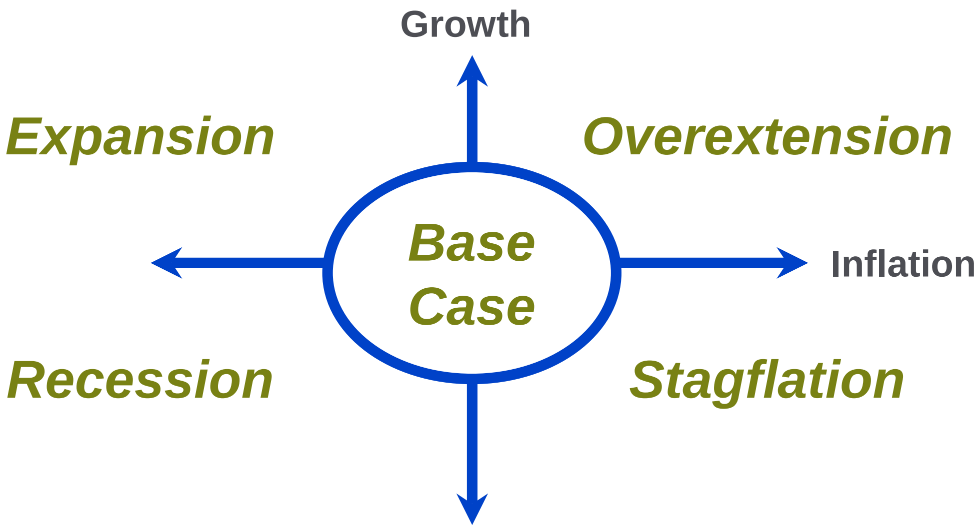
Deterministic Projections: Net Cash Flows (Current Policy Target)



- **Actual contributions reflect Employer contributions of 13.9% of payroll annually, and 10.7% of payroll from Employees**
- **Benefit payments are projected to increase from $0.96 billion to $1.59 billion by 2025**
  - Growing from 8.4% of total plan assets today to 9.9% of assets over 10 years
  - Net outflows (benefit payments offset by contributions) grows from 2.3% to 4.2% of Market Value of assets over the 10-year period

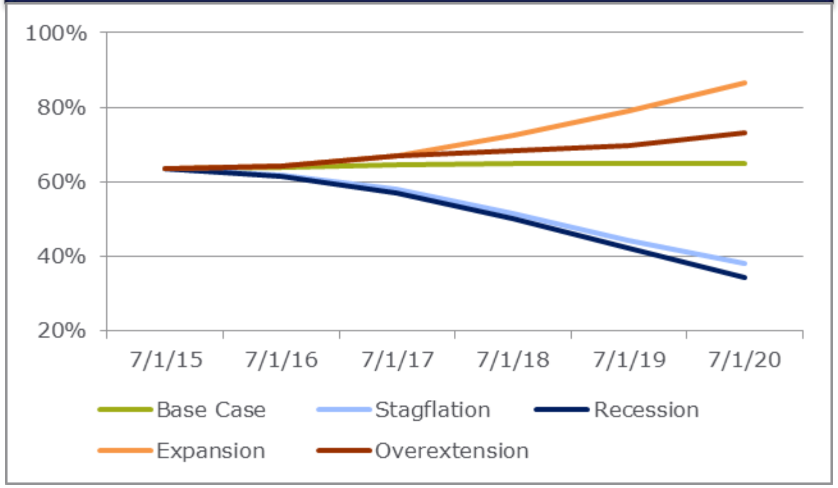
Scenario Analysis

- **NEPC Scenario Analysis allows plan sponsors to test the viability of asset mixes under multiple economic scenarios**
  - Allows better understanding of risk exposures under contrasting inflation and economic growth regimes
  - Can understand the effect on both assets and liabilities (funded status)

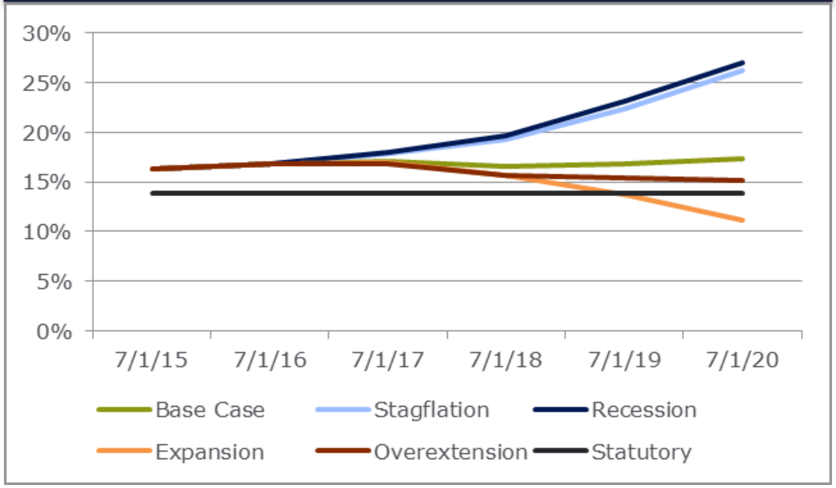


Scenario Analysis – Current Target

Funded Status



Contributions as % of Payroll

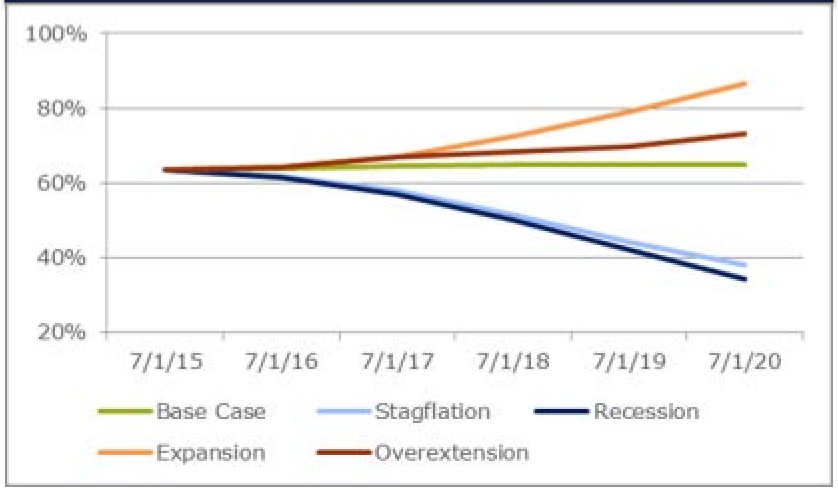


- **Funded status results range from 34% to 86% based on various economic outcomes**
  - Recession and Stagflation scenarios produce year-over-year low returns for risky assets, thus stifling asset growth and deteriorating funded status
- **Actuarially Determined Contributions follow an opposite path than funded status**
  - Contributions could decrease as much as 6% to 11% of payroll by 7/1/20 in a very robust economy with low interest rates
  - On the other hand, contributions could increase to as much as 27% of payroll in four years with multiple years of negative returns
  - Actual (statutory) contributions remain level throughout the projection period, below the suggested contribution in all years and all scenarios except under an economic Expansion

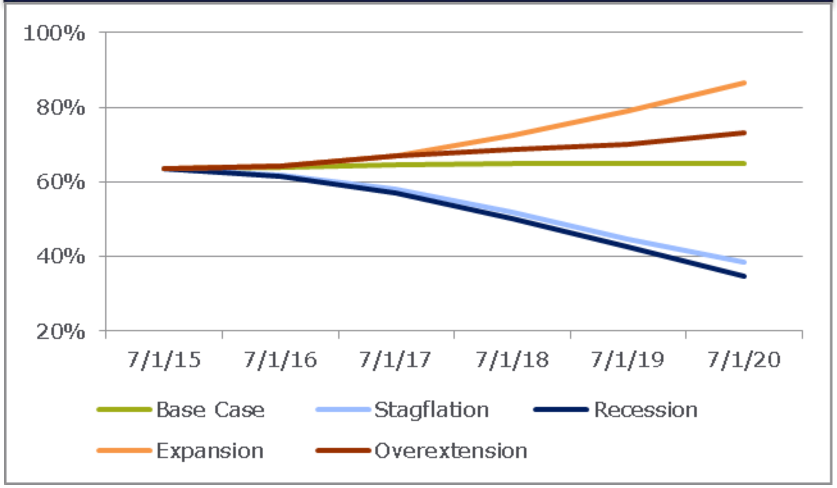
Scenario Analysis – Funded Status Percentage

- **Proposed Target has a small impact on funded status compared to Current Target**
  - Small changes in the portfolio modestly adjust returns rather than move the needle
- **0.5x leverage allocation increases the possibility of higher returns in a strong market, while producing lower outcomes in a Stagflation and Recessionary environment**
  - Volatility is increased, thus range of results is widened

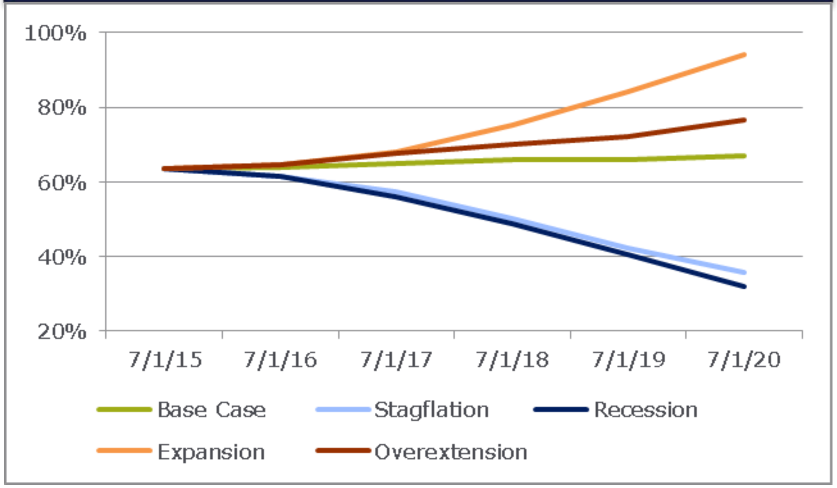
Current Target



Proposed Target



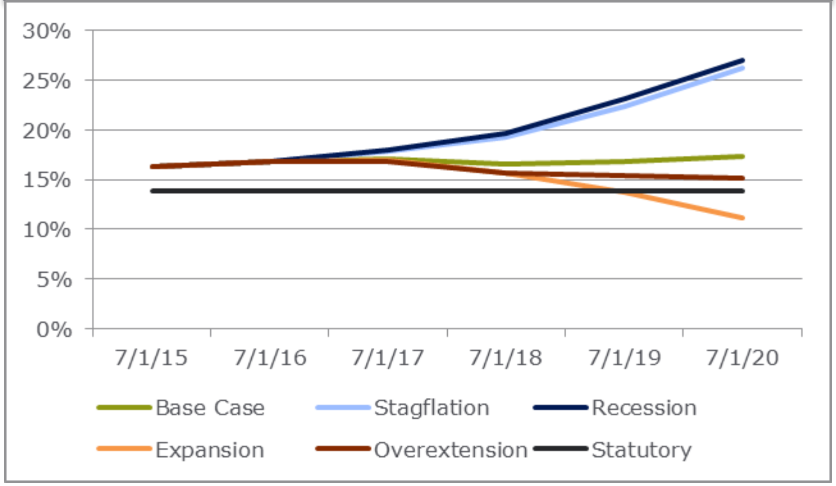
0.5x Leverage



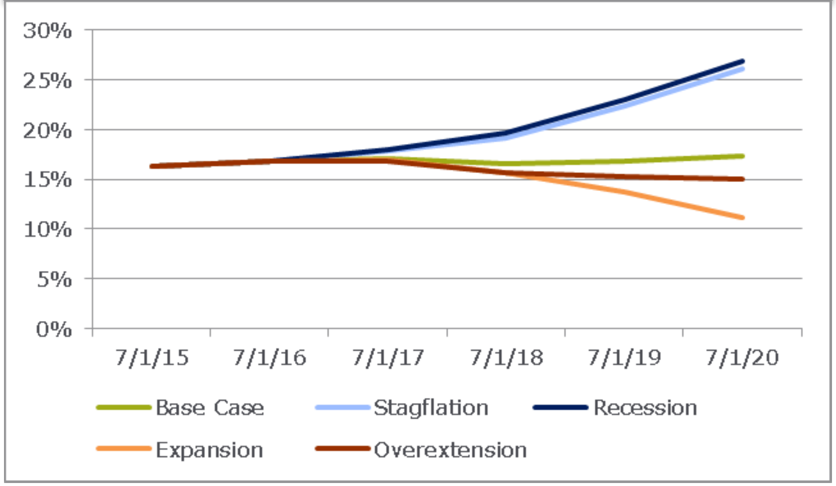
Scenario Analysis – Contributions as a % of Payroll

- **Proposed Target has slightly smaller (actuarially determined) contributions compared to Current Target**
  - Small changes in the portfolio modestly improve outcomes
- **0.5x leverage allocation adds volatility and widens the disparity between strong and weak economies**
  - Range of outcomes by 7/1/2020 is from 9% of payroll to 28% of payroll

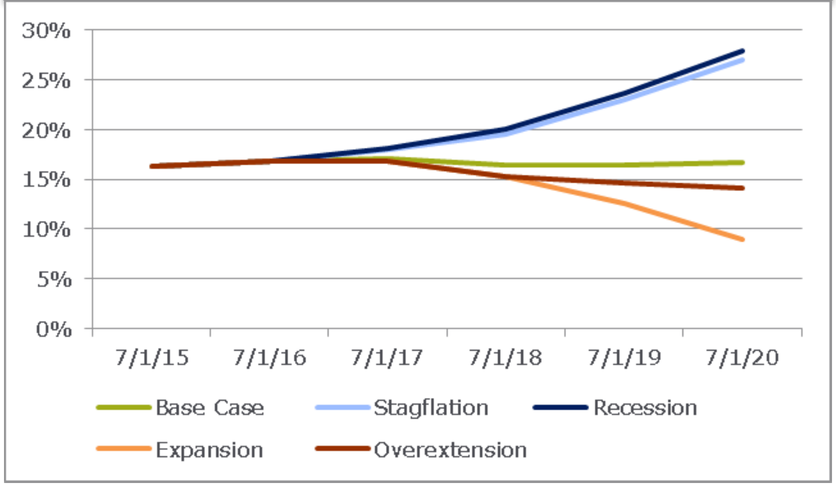
Current Target



Proposed Target



0.5x Leverage



5-Year Cost of Full Funding

	Current Target	Proposed Target	0.5x Leverage	65/35	Avg. Public Fund >$1B
Base Case					
PV of 2015-2019 Contributions	$1,682.8	$1,682.8	$1,682.8	$1,682.8	$1,682.8
PV of 7/1/2020 Unfunded Accrued Liability	$5,937.4	$5,937.2	$5,597.8	$6,661.2	$6,437.6
Total	$7,620.2	$7,619.9	$7,280.5	$8,344.0	$8,120.4
Change from Current		**($0.3)**	**($339.7)**	**$723.8**	**$500.2**
Stagflation					
PV of 2015-2019 Contributions	$1,682.8	$1,682.8	$1,682.8	$1,682.8	$1,682.8
PV of 7/1/2020 Unfunded Accrued Liability	$10,502.2	$10,439.8	$10,909.9	$9,935.5	$10,106.5
Total	$12,184.9	$12,122.6	$12,592.6	$11,618.3	$11,789.3
Change from Current		**($62.3)**	**$407.7**	**($566.6)**	**($395.6)**
Recession					
PV of 2015-2019 Contributions	$1,682.8	$1,682.8	$1,682.8	$1,682.8	$1,682.8
PV of 7/1/2020 Unfunded Accrued Liability	$11,117.2	$11,082.8	$11,533.4	$10,123.5	$10,463.1
Total	$12,800.0	$12,765.5	$13,216.1	$11,806.2	$12,145.9
Change from Current		**($34.4)**	**$416.2**	**($993.7)**	**($654.1)**
Expansion					
PV of 2015-2019 Contributions	$1,682.8	$1,682.8	$1,682.8	$1,682.8	$1,682.8
PV of 7/1/2020 Unfunded Accrued Liability	$2,265.2	$2,296.0	$968.9	$4,296.7	$3,749.5
Total	$3,948.0	$3,978.7	$2,651.6	$5,979.5	$5,432.3
Change from Current		**$30.7**	**($1,296.4)**	**$2,031.5**	**$1,484.3**
Overextension					
PV of 2015-2019 Contributions	$1,682.8	$1,682.8	$1,682.8	$1,682.8	$1,682.8
PV of 7/1/2020 Unfunded Accrued Liability	$4,566.7	$4,529.9	$3,966.4	$5,773.3	$5,422.3
Total	$6,249.5	$6,212.7	$5,649.1	$7,456.1	$7,105.1
Change from Current		**($36.8)**	**($600.3)**	**$1,206.6**	**$855.6**

- **Economic cost represents the present value of the unfunded liability in 2020 plus present value of contributions made over the next 5 years**
- **Green (negative) numbers are good, signaling *lower cost* than the current target allocation**
- **Red numbers indicate *higher cost* than the current target allocation**

5-Year Sum of Actuarially Determined Contributions

	Current Target	Change in contributions (in $millions) if allocation changed to:			
	Sum 2016-2020 Actuarially Determined Contributions	Proposed Target	0.5x Leverage	65/35	Avg. Public Fund >$1B
Base Case	$2,494.8	($0.0)	($34.0)	$73.7	$50.7
Stagflation	$3,049.0	($7.3)	$53.1	($73.8)	($51.5)
Recession	$3,112.3	($4.8)	$55.8	($135.4)	($90.0)
Expansion	$2,172.2	$3.0	($115.8)	$190.3	$138.0
Overextension	$2,350.0	($4.8)	($67.5)	$136.7	$95.4

- **This chart represents the sum of actuarially determined contributions from fiscal year 2016 through 2020**
  - Note that statutory contributions will not actually change unless voted on by the Board
- **Proposed Target does not affect budget significantly, with a range of $7.3 M less than and $3.0 M more than what would be suggested under Current Target**
- **However, adding leverage can decrease 5-year contributions by $116 M in a very strong economy, or increase contributions by $56 M if another major recession were to occur**

Conclusions

- **The funded status is projected to increase from 63.7% to more than 65% over the next 10 years**
  - The Current Target allocation is expected to meet the long-term expected return of 7.75%
    - NEPC expectations average 7.6% over the next 5-7 years and 8.4% over 30 years
  - Liability growth is moderate, averaging 3.5%, and assets can keep pace if expected returns and contributions are met

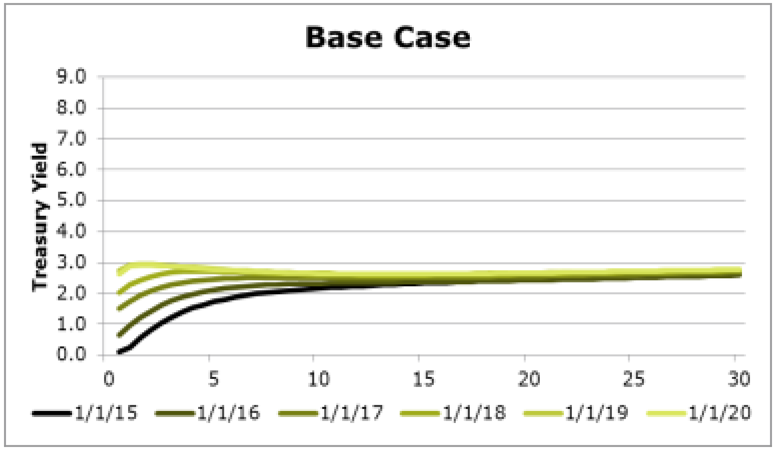
- **In the near term, the estimated funded status of the Plan cannot be significantly altered solely by asset allocation**
  - Proposed Target allocation modestly impacts estimated funded status but provides a slightly improved diversification profile relative to the Current Target
  - Asset growth and contributions are generally correlated to economic strength and could compound funding concerns in a recessionary environment

- **The 0.5x leverage allocation offers more significant adjustments**
  - Increases exposure to public equities and fixed income to improve the long-term return profile, but also increases risk profile

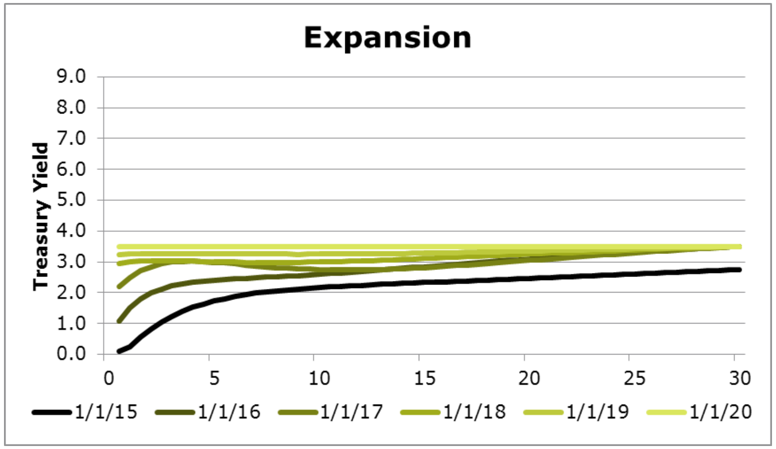
Appendix

Scenarios Considered

- **Base Case**
  - Asset returns over 5-year period in line with NEPC 2016 5-7 Year Assumptions
  - No volatility

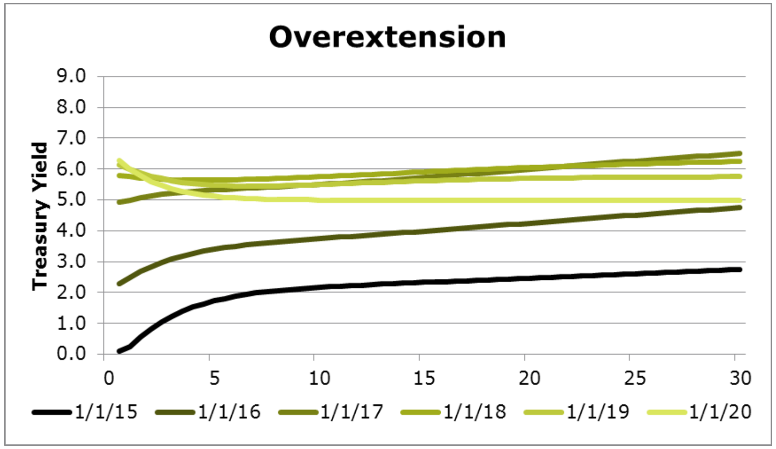


- **Expansion**
  - Economy is growing by a strong, but seemingly sustainable level
  - Bond yields are stable, inflation is manageable, equities and other high volatility asset classes perform quite well in this environment
  - Historical example: 2004-2006
  - *Large cap equities time-series: 10%, 17%, 28%, 12%, 10%*

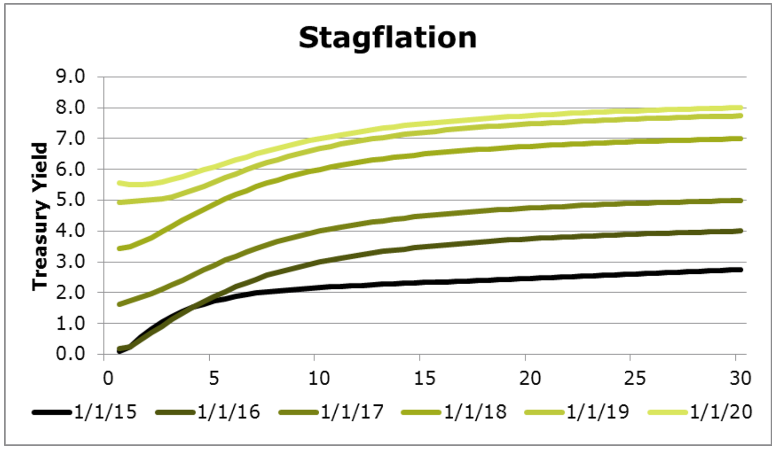


Scenarios Considered

- **Overextension**
  - Economy is growing at a rapid pace, inflation increases significantly – booming times but at the cost of future growth
  - Bond yields move higher as a result of inflation; high yield does well with confidence in the economy
  - Equities, real estate, and commodities fuel rapid expansion
  - Historical example: Vietnam War era (1967-1971)
  - *Large cap equities time-series: 12%, 16%, 0%, 12%, 16%*

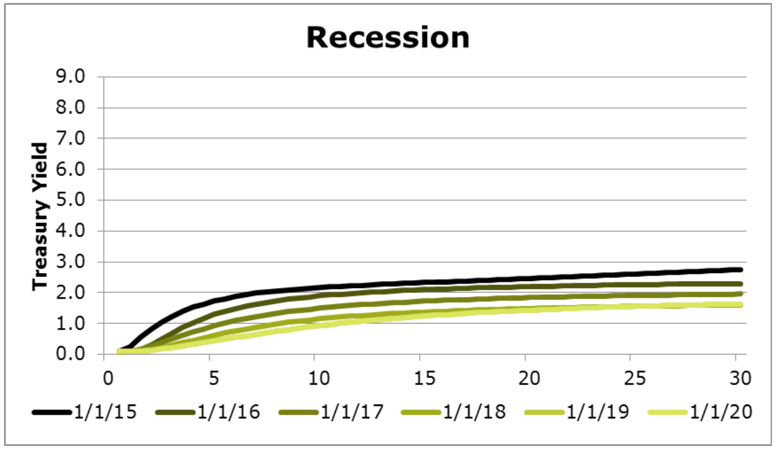


- **Stagflation**
  - Two problems – (1) the economy is not growing, (2) inflation has skyrocketed
    - Inflation is sticky – once it gets high, it stays high for several years
    - Fed has limited options to kick-start economy because easing only promotes further inflation
  - Equities sag; bonds lose real value; real assets such as TIPS perform well on a relative basis because they are linked to inflation
  - Historical example: flat stock market and double digit inflation of the mid-1970s
  - *Large cap equities time-series: -8%, -12%, -15%, 9%, 12%*



Scenarios Considered

- **Recession**
  - Economy stalls – there is a flight to quality as investors lose confidence
    - Equity markets fall
    - Bond yields fall
  - Interest-sensitive securities (bonds, especially long duration bonds) will perform well in this environment
  - Historical example: early 1990s
  - *Large cap equities time-series: -8%, -18%, -8%, 4%, -10%*



NEPC 2016 Asset Class Assumptions

Development of Asset Class Assumptions

- **We use November 30 market data for all asset class assumptions**
- **Combination of historical data and forward looking analysis**
  - Expected returns based on current market pricing and forward looking estimates
  - Volatility and correlations based on history, while recognizing current uncertainty
- **Historical data is used to frame current market environment as well as to compare to similar historical periods**
  - Incorporates historical index returns, volatility, correlations, valuations, and yields
- **Forward-looking analysis is based on current market pricing and a building blocks approach**
  - Return equals yield + changes in price (valuation, defaults, etc.)
  - Use of key economic observations (inflation, real growth, dividends, etc.)
  - Structural themes (supply and demand imbalances, capital flows, etc.)
- **Assumptions prepared by Asset Allocation Committee**
  - Asset Allocation team plus members of various consulting practice groups meet to develop themes and assumptions
  - Public markets, hedge fund and private market research teams provide insights
- **Assumptions and Actions reviewed and approved by Partners Research Committee**

Inflation

- **Inflation is an integral component of our asset allocation assumptions**
  - An essential building block for projecting returns in stocks, bonds, and commodities
- **There are several measures of inflation used to inform our view, all with some type of shortcoming**
  - Global forecasts, local consumer and producer price indices, TIPS break-even inflation
- **Institutional investment pools will experience asset inflation globally, encompassing both developed and emerging countries**
  - We use a 3% global inflation forecast over 5-7 years for our equity building blocks
    - Akin to assuming purchasing power parity holds across markets
  - Can be different from inflation experienced in local country liabilities or spending needs
    - Our expectation of U.S. CPI is 2.25% over 5-7 years and 2.75% over 30 years
- **Muted credit growth leaves inflation expectations unchanged in the near term, pressure for higher long-term inflation continues to build**
  - Money supply (M2) continued to expand while velocity remains depressed
  - Global monetary policy likely to remain stimulative in 2016
- **Given long-term inflation pressures, a modestly higher inflation assumption (3.25%) is used for determining 30 year equity return expectations**

Themes for 2016 Asset Class Assumptions

- **5-7 year return expectations moderately higher among global equity and credit assets relative to prior year**
  - Expected return outlook broadly remains subdued
  - Recent performance of emerging markets leads to increase in expectations
  - Expectations of slow Fed policy tightening reduce cash forecasts
  - Increase in expectations for credit markets reflect higher credit spread levels
  - Hedge Fund expectations unchanged but incorporate anticipation of greater divergences across and within global markets

- **30-year returns have similar themes to 5-7 year forecasts**
  - Lower cash assumption flows through to long-term fixed income returns
  - Equity market assumptions largely unchanged

- **Volatility expectations reduced incrementally in certain asset classes**
  - Private Market reductions echo normalized environment and asset class experience
  - Volatility for emerging markets and commodities increased to reflect probability of higher risk moments

2016 5-to-7 Year Return Forecasts

Geometric Expected Return			
Asset Class	**2015**	**2016**	**2016-2015**
Cash	1.75%	1.50%	-0.25%
Treasuries	1.75%	1.75%	
IG Corp Credit	3.25%	3.75%	0.50%
MBS	2.00%	2.00%	
*Core Bonds**	*2.30%*	*2.46%*	0.16%
TIPS	2.25%	2.50%	0.25%
High-Yield Bonds	4.00%	5.25%	1.25%
Bank Loans	4.50%	5.50%	1.00%
Global Bonds (Unhedged)	1.00%	1.00%	
Global Bonds (Hedged)	1.13%	1.09%	-0.04%
EMD External	4.50%	4.75%	0.25%
EMD Local Currency	5.50%	6.50%	1.00%
Large Cap Equities	6.00%	6.00%	
Small/Mid Cap Equities	6.00%	6.25%	0.25%
Int'l Equities (Unhedged)	7.00%	7.25%	0.25%
Int'l Equities (Hedged)	7.39%	7.57%	0.18%
Emerging Int'l Equities	9.00%	9.75%	0.75%
Private Equity	8.50%	8.50%	
Private Debt	7.50%	7.50%	
Private Real Assets	8.00%	8.25%	0.25%
Real Estate	6.50%	6.50%	
Commodities	5.25%	4.50%	-0.75%
Hedge Funds	5.75%	5.75%	

* Core Bonds assumption based on market weighted blend of components of Aggregate Index (Treasuries, IG Corp Credit, and MBS).

2016 30-Year Return Forecasts

Geometric Expected Return			
Asset Class	**2015**	**2016**	**2016-2015**
Cash	3.25%	3.00%	-0.25%
Treasuries	3.50%	3.25%	-0.25%
IG Corp Credit	4.75%	5.00%	0.25%
MBS	3.75%	3.50%	-0.25%
*Core Bonds**	*3.98%*	*3.89%*	*-0.09%*
TIPS	4.00%	4.00%	
High-Yield Bonds	5.75%	5.75%	
Bank Loans	6.00%	6.00%	
Global Bonds (Unhedged)	2.25%	2.75%	0.50%
Global Bonds (Hedged)	2.41%	2.87%	0.46%
EMD External	6.00%	6.00%	
EMD Local Currency	6.75%	6.50%	-0.25%
Large Cap Equities	7.50%	7.50%	
Small/Mid Cap Equities	7.75%	7.75%	
Int'l Equities (Unhedged)	8.00%	8.00%	
Int'l Equities (Hedged)	8.47%	8.39%	-0.08%
Emerging Int'l Equities	9.25%	9.50%	0.25%
Private Equity	9.50%	9.50%	
Private Debt	8.00%	8.00%	
Private Real Assets	7.75%	7.75%	
Real Estate	6.50%	6.50%	
Commodities	5.75%	5.50%	-0.25%
Hedge Funds	6.75%	6.50%	-0.25%

* Core Bonds assumption based on market weighted blend of components of Aggregate Index (Treasuries, IG Corp Credit, and MBS).

2016 Volatility Forecasts

Volatility			
Asset Class	**2015**	**2016**	**2016-2015**
Cash	1.00%	1.00%	
Treasuries	5.50%	5.50%	
IG Corp Credit	7.50%	7.50%	
MBS	7.00%	7.00%	
*Core Bonds**	*6.03%*	*6.03%*	
TIPS	7.50%	6.50%	-1.00%
High-Yield Bonds	13.00%	13.00%	
Bank Loans	8.00%	9.00%	1.00%
Global Bonds (Unhedged)	9.00%	8.50%	-0.50%
Global Bonds (Hedged)	5.00%	5.00%	
EMD External	12.00%	13.00%	1.00%
EMD Local Currency	15.00%	15.00%	
Large Cap Equities	17.50%	17.50%	
Small/Mid Cap Equities	21.00%	21.00%	
Int'l Equities (Unhedged)	21.00%	21.00%	
Int'l Equities (Hedged)	17.50%	18.00%	0.50%
Emerging Int'l Equities	26.00%	27.00%	1.00%
Private Equity	27.00%	18.00%	-9.00%
Private Debt	17.00%	10.00%	-7.00%
Private Real Assets	23.00%	20.00%	-3.00%
Real Estate	15.00%	15.00%	
Commodities	18.00%	19.00%	1.00%
Hedge Funds	9.00%	9.00%	

*Core Bonds assumption based on market weighted blend of components of Aggregate Index (Treasuries, IG Corp Credit, and MBS).
**Volatility adjusted year-over-year to reflect smoothing methodology.

2016 Correlations

Asset Class	Cash	Treas	Credit	MBS	TIPS	HY	Glob Bonds	Glob (H)	EMD (Ext)	EMD (Loc)	Large Cap	Sm / Mid	Intl Eq	Intl Eq (H)	EM Eq	Priv Eq	Priv Debt	Priv Real	Real Estate	Cmdy	Hedge Funds
Cash	1.00																				
Treasuries	0.20	1.00																			
IG Corp Credit	0.10	0.65	1.00																		
MBS	0.25	0.90	0.75	1.00																	
TIPS	0.00	0.65	0.60	0.70	1.00																
High-Yield Bonds	-0.05	0.20	0.55	0.30	0.20	1.00															
Global Bonds (Unhedged)	0.10	0.50	0.50	0.45	0.40	0.10	1.00														
Global Bonds (Hedged)	0.15	0.80	0.65	0.70	0.65	0.20	0.60	1.00													
EMD (External)	0.05	0.35	0.65	0.35	0.30	0.60	0.25	0.35	1.00												
EMD (Local Currency)	0.05	0.30	0.60	0.25	0.25	0.60	0.30	0.25	0.80	1.00											
Large Cap Equities	-0.10	-0.10	0.45	0.10	0.00	0.65	0.00	-0.10	0.55	0.65	1.00										
Small/Mid Cap Equities	-0.15	-0.15	0.45	0.10	-0.10	0.70	-0.05	-0.15	0.55	0.60	0.90	1.00									
Int'l Equities (Unhedged)	-0.10	0.00	0.30	0.05	-0.05	0.65	0.35	0.00	0.60	0.70	0.70	0.60	1.00								
Int'l Equities (Hedged)	0.00	0.00	0.30	0.05	-0.05	0.65	0.05	0.00	0.60	0.65	0.75	0.65	0.85	1.00							
Emerging Int'l Equities	-0.10	-0.10	0.25	-0.10	-0.10	0.70	0.05	-0.05	0.70	0.80	0.60	0.65	0.70	0.70	1.00						
Private Equity	-0.20	-0.15	0.30	0.10	-0.10	0.60	-0.15	-0.20	0.35	0.40	0.70	0.75	0.60	0.65	0.45	1.00					
Private Debt	0.00	-0.35	0.15	-0.15	-0.10	0.65	-0.10	-0.10	0.50	0.60	0.60	0.65	0.75	0.75	0.80	0.65	1.00				
Private Real Assets	0.15	-0.20	0.05	-0.15	0.00	0.40	-0.05	-0.05	0.40	0.40	0.55	0.60	0.50	0.50	0.50	0.65	0.60	1.00			
Real Estate (Core)	0.25	-0.05	0.15	0.05	0.10	0.25	0.05	-0.05	0.20	0.30	0.40	0.40	0.35	0.40	0.30	0.50	0.40	0.40	1.00		
Commodities	0.10	-0.10	0.10	-0.10	0.30	0.20	0.10	-0.10	0.35	0.45	0.30	0.30	0.35	0.35	0.40	0.25	0.30	0.45	0.30	1.00	
Hedge Funds	0.00	-0.20	0.35	-0.15	0.20	0.60	0.05	-0.20	0.55	0.60	0.60	0.65	0.70	0.65	0.70	0.75	0.80	0.65	0.25	0.50	1.00

Disclosures

- NEPC, LLC is an investment consulting firm. We provide asset-liability studies for certain clients but we do not provide actuarial services. Any projections of funded status or contributions contained in this report should not be used for budgeting purposes. We recommend contacting the plan's actuary to obtain budgeting estimates.

- The goal of this report is to provide a basis for substantiating asset allocation recommendations.

- The projection of liabilities in this report uses standard actuarial projection methods and does not rely on actual participant data. Asset and liability information was received from the plan's actuary, and other projection assumptions are stated in the report.

- Assets are projected using a methodology chosen by the client. Gains and losses are estimated through investment returns generated by applying NEPC's 5-7 year asset class assumptions and scenario assumptions for the current year.

- This report is based on forward-looking assumptions, which are subject to change.

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