1Q2016 IAC Meeting Materials

IAC Meeting – May 17, 2016

Callan Presentation

SBI Asset/Liability Study

Callan

May 17, 2016

MN SBI Asset/Liability Study

Presentation to
Investment Advisory Council

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Senior Vice President

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Today's conversation

- Overview of an Asset/Liability Study

- Executive summary of the SBI study

- Details of key components

  Phase 1 – establish process and inputs

  – Methodology
  – Liability assumptions
  – Capital markets assumptions

  Phase 2 – calculate possible outcomes

  – Liability projections
  – Alternative asset mixes
  – Distribution of financial outcomes
  – Risk tolerance determination

- Observations and conclusions

  – Proposed policy mix
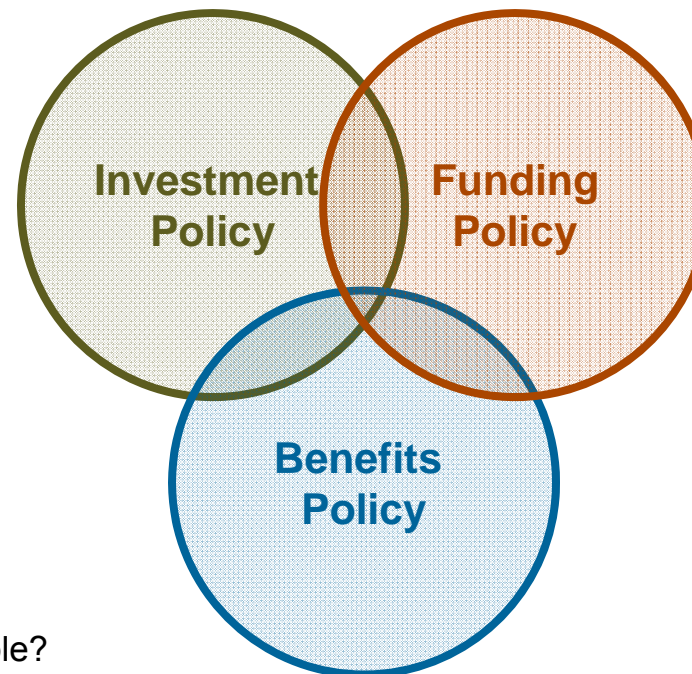
Overview of an Asset/Liability Study

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

Investment Policy

- How will the assets supporting the benefits be invested?
- What are the return and risk objectives?
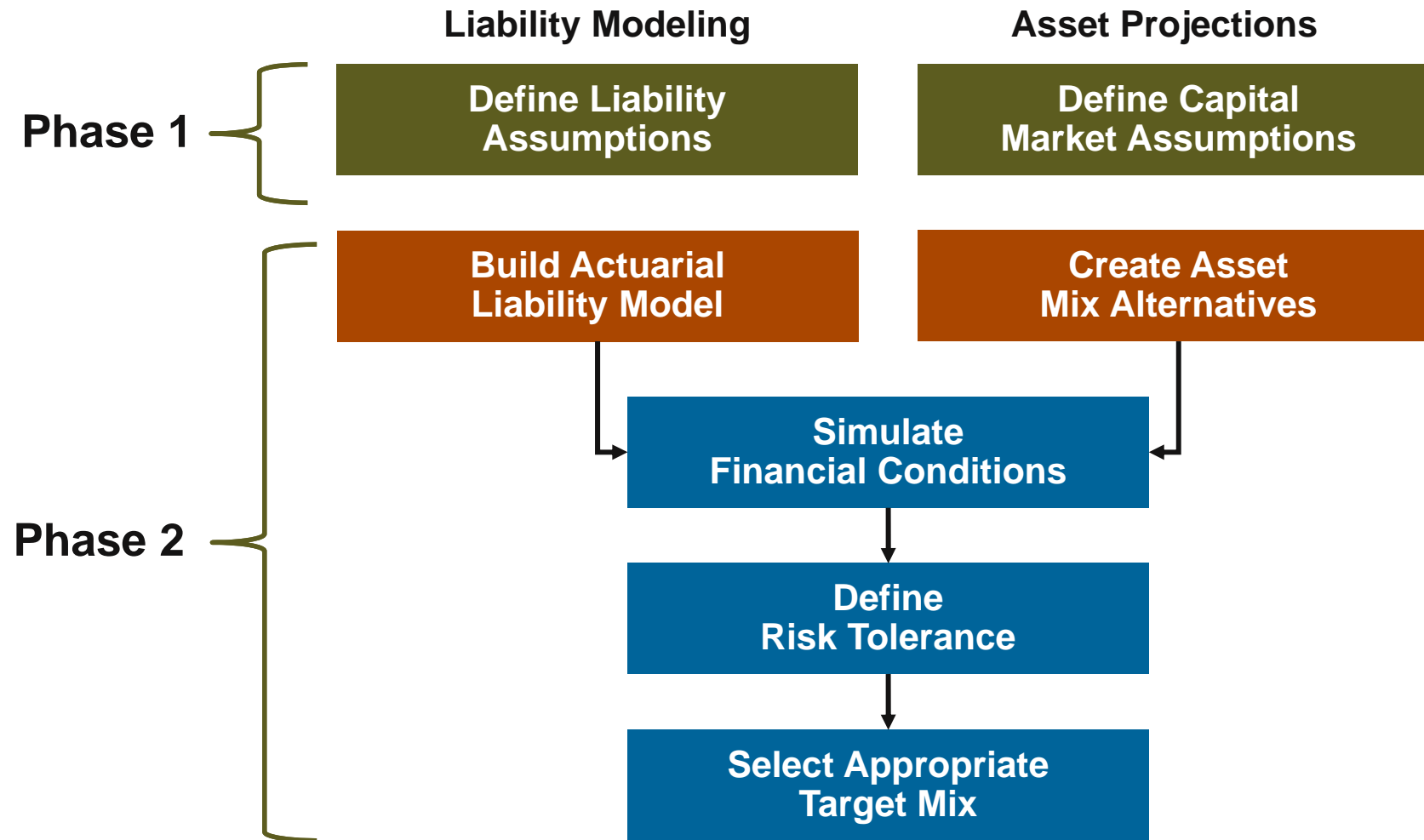- How will the cash flows be managed?

Funding Policy

- How will the benefits be funded?
- What is the assumed investment return?
- How are deficits amortized?
- Is contribution volatility dampened? If so, how?

Benefits Policy

- What is the nature of the benefits?
- What are the benefit parameters?
- When and to whom are they payable?

Investment Policy

Funding Policy

Benefits Policy

Callan's Asset Allocation and Liability Process

Liability Modeling

Asset Projections

Phase 1

> Define Liability Assumptions

> Define Capital Market Assumptions

Phase 2

> Build Actuarial Liability Model

> Create Asset Mix Alternatives

> Simulate Financial Conditions

> Define Risk Tolerance

> Select Appropriate Target Mix

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Executive Summary

Process

- Asset/liability study for MNSBI Combined Funds was conducted in two phases
  - Phase I: Methodology and Assumptions
  - Phase II: Build liability model, Create asset mixes, Simulate financial condition, Define risk tolerance

- Study modeled liabilities of the four largest Plans
  - MSRS
  - TRA
  - PERA - General
  - PERA - Fire/Police

Key findings

- Re-affirmed that one asset allocation policy can serve all participating plans well
  - Same actuarial discount rate today, and proposed for the future
  - Similar rates of plan maturity
  - Similar funded ratio level trends and continued convergence around 75-80%

- Modest changes to current policy could improve risk/reward and decrease expected costs
  - Confirmed long-term horizon with focus on growth of assets. Evaluated modest changes to overall equity/bond mix
  - Affirmed that the program can maintain current target allocation to illiquid investments. The duration of liabilities is 11 years and 60% of cash flows are beyond 20 years. Thus allocations to Private Equity and Cash were held constant
  - Considered a reduction of the relative allocation to US vs Non US equity to improve median expected returns without increasing risk
  - Revisited the current policy of using fixed income as the "parking" spot for un-invested private equity and considered an alternative to shift the parking spot to public equity

Phase I: Methodology and Assumptions

Phase 1: Methodology and Assumptions

Single versus Separate Asset Allocations for the Combined Funds

- **Primary factors that would drive the need for separate asset allocations for each plan:**
  - Discount rates
    - *Set by legislature*
    - *Actuarially assumed discount rate for future liabilities and proxy target for investment returns*
  - Levels of maturity
    - *Benefit payments as a percent of market assets*
    - *Net cash flow, plans with positive net cash flow would have longer investment horizons*
  - Funded Ratio
    - *Overfunded plans can use surplus to reduce investment risk*
  - Asset Size
    - *Access to investment strategies*
    - *Lower fees*
  - Risk tolerance of Plan fiduciaries
    - *Trustee dependent, if governance model is unique to each plan*

- **Conclusion – no compelling reason to move to separate asset allocations, given**:
  - Same actuarial discount rate today, and proposed for the future
  - Similar rates of plan maturity
  - Similar funded ratio level trends

Phase 1: Methodology and Assumptions

Liability Assumptions and Projections

- This study is based on the consolidated the data from the four largest plans
  - TRA, PERA, MSRS and Police and Fire make up approximately $56.5B
  - SBI Combined Funds total assets cover 10 Plans
  - The Asset Liability Study completed in 2008 covered the same 4 funds

- Actuarial Data Sources are the 2014 valuations for each plan
  - Projected 2015 liabilities reflect the 2014 liabilities rolled forward based on the actuarial assumptions in the 2014 valuations .
  - The 2015 valuations reflect the impact from a later experience study without offsetting changes, thus not used in the study
  - The emphasis of the evaluation is focused on the relative impact of alternative asset mixes on the overall financial health of the consolidated plans

- To model consolidated future liabilities, each plan was modeled individually based is own benefit structure, population and actuarial assumptions
  - One consolidated cash flow stream was created (contributions and benefit payments)
  - Liabilities for each plan grew through time based on own characteristics and were summed

From 2014 Valuations	Total
Initial Actuarial Values	
Actuarial Liabilities	$75.5 B
Market Value of Assets	$56.5 B
Actuarial Value of Assets	$50.7 B
Market Value Funded Status	74.8%
Actuarial Value Funded Status	67.1%
Actuarial Assumptions	
Discount Rate	8.00%
Price Inflation	3.00%
Salary Growth Rate*	3.75%
Cost of Living Adjustments	1%-2%

* Includes productivity and merit increases

Phase 1: Methodology and Assumptions

Long-Term Capital Market Projections (2016 – 2025)

Asset Class	Index	PROJECTED RETURN			PROJECTED RISK
		1-Year Arithmetic	10-Year Geometric*	Real	Standard Deviation
Equities					
US Broad Equity	Russell 3000	8.85%	7.35%	5.10%	18.70%
International Equity	MSCI ACWI ex USA	9.55%	7.55%	5.30%	21.30%
Fixed Income					
Domestic Fixed	Barclays Aggregate	3.05%	3.00%	0.75%	3.75%
Other					
Private Equity	TR Post Venture Capital	13.15%	8.15%	5.90%	32.80%
Cash Equivalents	90-Day T-Bill	2.25%	2.25%	0.00%	0.90%
Inflation	CPI-U		2.25%		1.50%

Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

Phase 1: Methodology and Assumptions

2016 Capital Market Expectations: Summary Themes

- **Broad market bond returns held at 3.0%**
  - We expect interest rates to rise, especially if the economy continues to expand and the Fed executes on its stated monetary policy. Bonds will suffer capital loss before higher yields kick in. We expect cash yields to move toward 2.5% and 10-year Treasury yields to reach 3.3% over the ten-year projection – a reversion to mean, but lower than the long run averages.
  - Project an upward sloping yield curve, but a very slim risk premium for bonds over cash (0.75%).
  - Cash returns held at 2.25%, reflecting an expected rise in Fed Funds rate.
  - Longer duration returns raised, reflecting sharp reduction in yields in 2014.

- **Domestic Equity reduced to 7.35%, Non-U.S. Equity to 7.55%, both 25 bps reductions**
  - U.S. markets went sideways in 2015, but the U.S. economic outlook is more muted; fundamentals remain reasonable.
  - Building equity returns from long-term fundamentals, we can build an expectation to just shy of 7.5%:
    - *2.5-3.0% real GDP growth, which means roughly 4.75-5.25% nominal earnings growth,*
    - *2.5 % dividend yield,*
    - *Expect something more from return on free cash flow, besides dividends (The "buyback yield" has been exceptional, one good use of all that cash), perhaps 50-100 bps,*
    - *Small premium for Non-U.S. over Domestic, largely due to Emerging Markets.*

- **Private Equity**
  - Callan's return of 8.15% assumes a portfolio that can be implemented by a broad range of institutional investors including smaller investors and those making their first commitments to private equity

Phase 1: Methodology and Assumptions

2016 Correlation Matrix

		1	2	3	4	5	6
1	Broad Domestic Equity	1.000					
2	International Equity	0.882	1.000				
3	Domestic Fixed	-0.108	-0.123	1.000			
4	Private Equity	0.948	0.934	-0.190	1.000		
5	Cash Equivalents	-0.043	-0.040	0.100	0.000	1.000	
6	Inflation	-0.011	0.010	-0.280	0.000	0.000	1.000

- Relationships between asset classes is as important as standard deviation.

- To determine portfolio mixes, Callan employs mean-variance optimization.

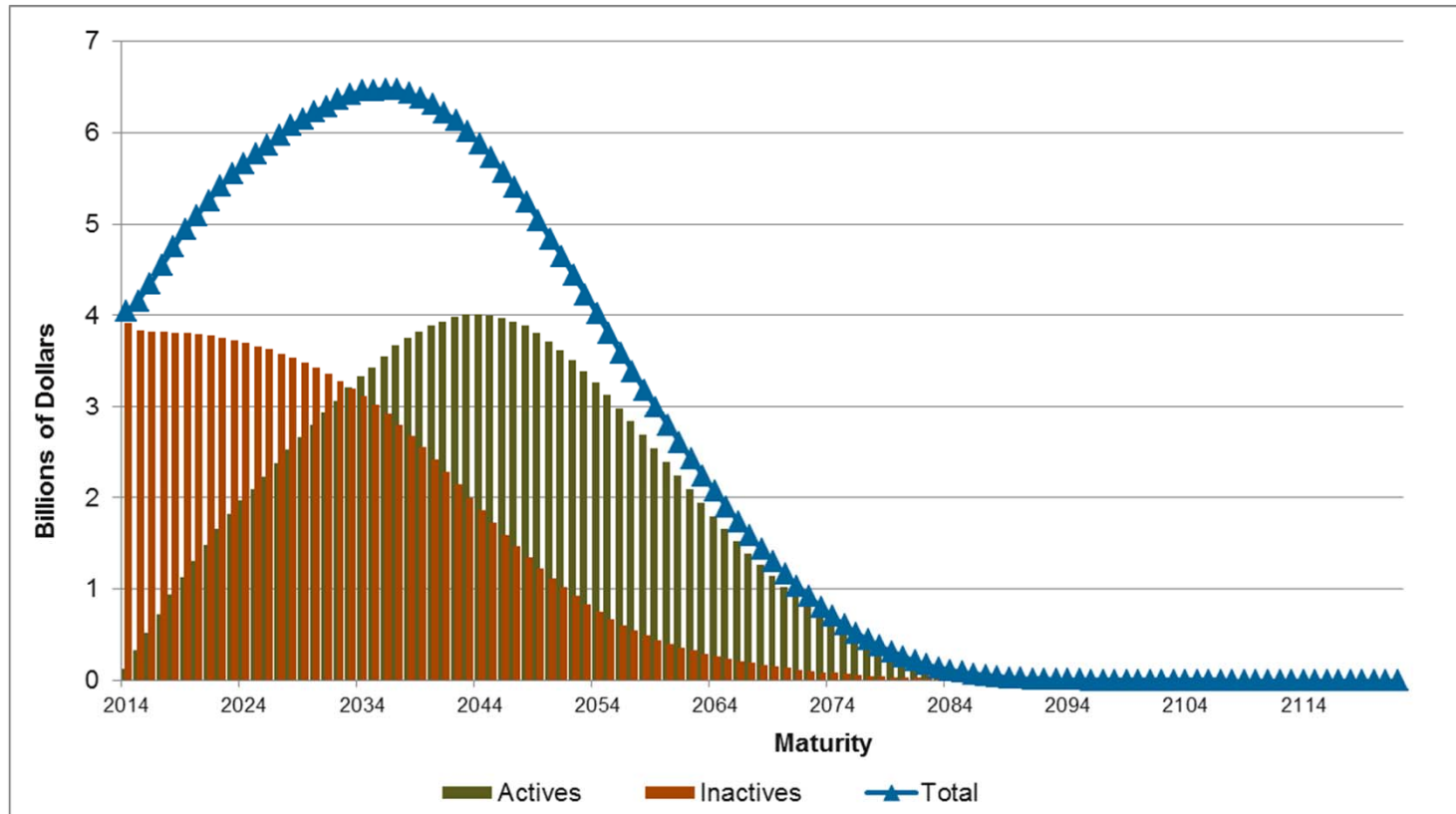- Return, standard deviation and correlation determine the composition of efficient asset mixes.

Source: Callan Associates

Phase II –Build Liability Model, Create Asset Mixes, Simulate Financial Conditions, Define Risk Tolerance

# Phase II: Build Actuarial Valuation Model

Projected Cash Flows (Accrued)

- The graph shows cash flows for benefits that members have already earned
  - The discounted value of these cash flows is the liability
  - Cash flows peak in 2035
  - 60% of Cash flows are beyond 20 years
  - The duration of the consolidated liabilities is 11 years which indicates long investment time horizon is appropriate

Phase II: Build Actuarial Valuation Model

Funded Status (Actuarial Projections)
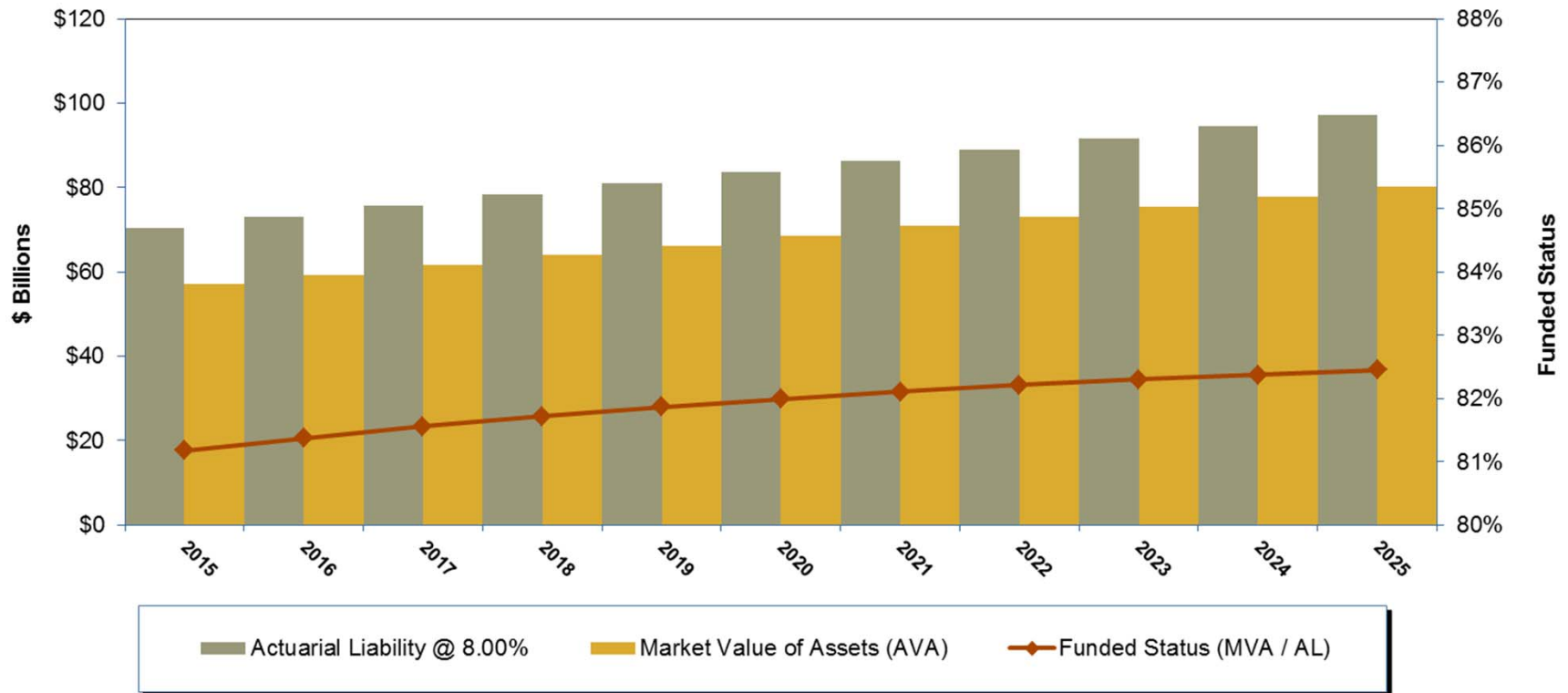
- The graph shows the future liabilities and assets of the plans
  - Liabilities grow in line with actuarial assumptions (decrements, 8% discount rate, 3.75% salary growth)
  - Assets are assumed to grow at a constant 8%

- Asset growth keeps pace with liability growth if the actuarial assumptions are realized
  - Funded status grows to more than 82% in 2025 based on actual contributions
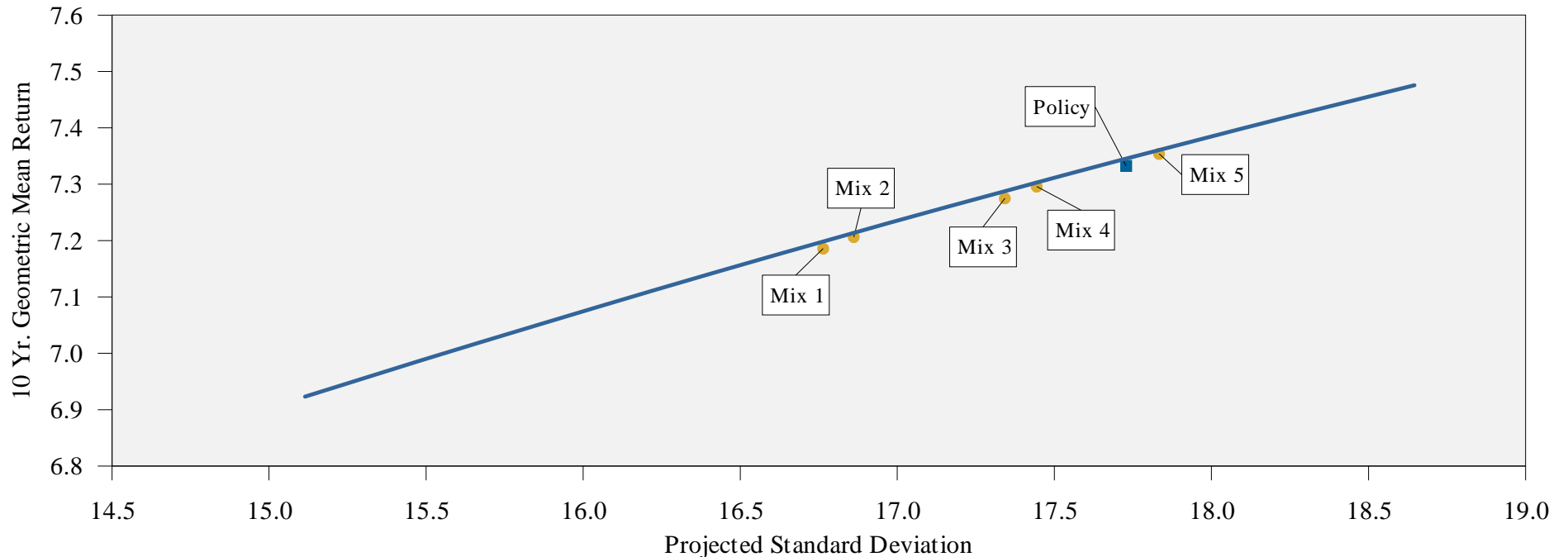
Phase II: Create Alternative Asset Mixes

Asset Classes	Policy	Constraints		Optimal Mixes				
		Min	Max	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
US Broad Equity	45	0	100	41	37	44	39	40
International Equity	15	0	100	14	18	15	19	20
Domestic Fixed	18	0	100	23	23	20	20	18
Private Equity	20	0	100	20	20	20	20	20
Cash Equivalents	2	2	100	2	2	2	2	2
Totals	100			100	100	100	100	100
Arithmetic Return	8.65			8.35	8.39	8.53	8.57	8.69
Compound Expected Return	7.34			7.19	7.21	7.27	7.30	7.35
Risk (Standard Deviation)	17.73			16.76	16.86	17.34	17.44	17.83
Public Equity	60.00			55.00	55.00	58.00	58.00	60.00
Public Fixed	20.00			25.00	25.00	22.00	22.00	20.00

- The alternative mixes were created by staff to compare allocations to fixed income and public equity US vs Non US ratio
  - All mixes hold allocations to private equity constant at the current policy weight of 20%
  - Cash equivalents are held constant at 2% to accommodate cash flows

- Mixes 1 and 2 have 23% in domestic fixed income
  - Mix 1 reflects current US vs Non US ratio of 75/25
  - Mix 2 reflects US vs Non US ratio of 67/33

- Mixes 3 and 4 have 20% in domestic fixed income
  - Mix 3 reflects current US vs NonUS ratio (75/25)
  - Mix 4 reflects US vs Non US ratio of 67/33

- Mix 5 has 18% in domestic fixed with US vs Non US ratio of 67/33

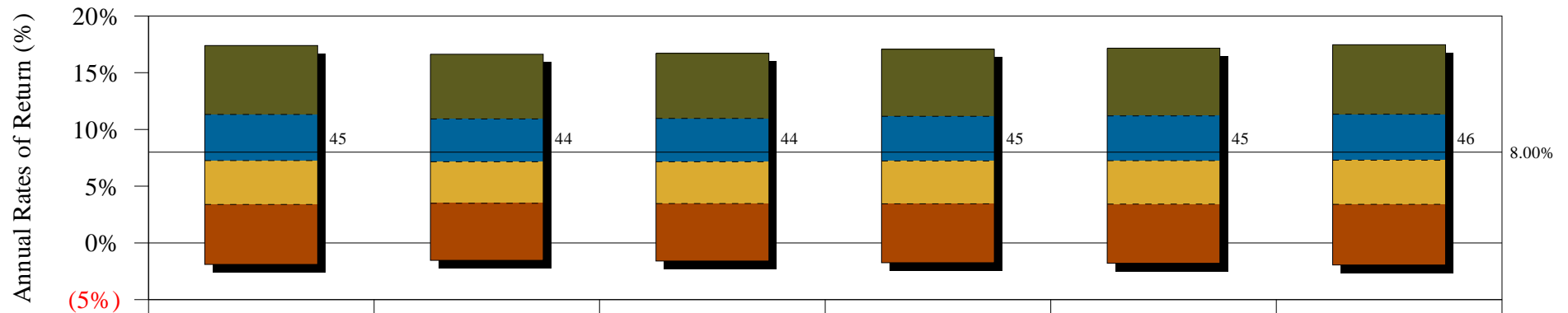# Phase II: Create Alternative Asset Mixes

Efficient Frontier

- All of the asset mixes lie close to the efficient frontier
  - Mixes 1 and 3 lie slightly below the frontier

- When all mixes under consideration are essentially efficient, the mix with the maximum acceptable risk is often chosen

# Phase II: Create Alternative Asset Mixes

Range of Returns, 10 Years

	Policy	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
5th Percentile	17.4%	16.6%	16.7%	17.1%	17.2%	17.5%
25th Percentile	11.3%	10.9%	11.0%	11.2%	11.2%	11.3%
Median	7.3%	7.1%	7.2%	7.2%	7.3%	7.3%
75th Percentile	3.4%	3.5%	3.5%	3.4%	3.4%	3.4%
95th Percentile	(1.9%)	(1.5%)	(1.6%)	(1.7%)	(1.8%)	(1.9%)
Prob > 8.00%	45.3%	44.3%	44.3%	44.9%	45.0%	45.5%

- All of the mixes have similar return and risk profiles
  - The asset mixes have very similar allocations
- The probability of achieving 8% is near 45%

Phase II: Simulate Financial Condition

Range of Ultimate Net Cost (UNC) in 2024
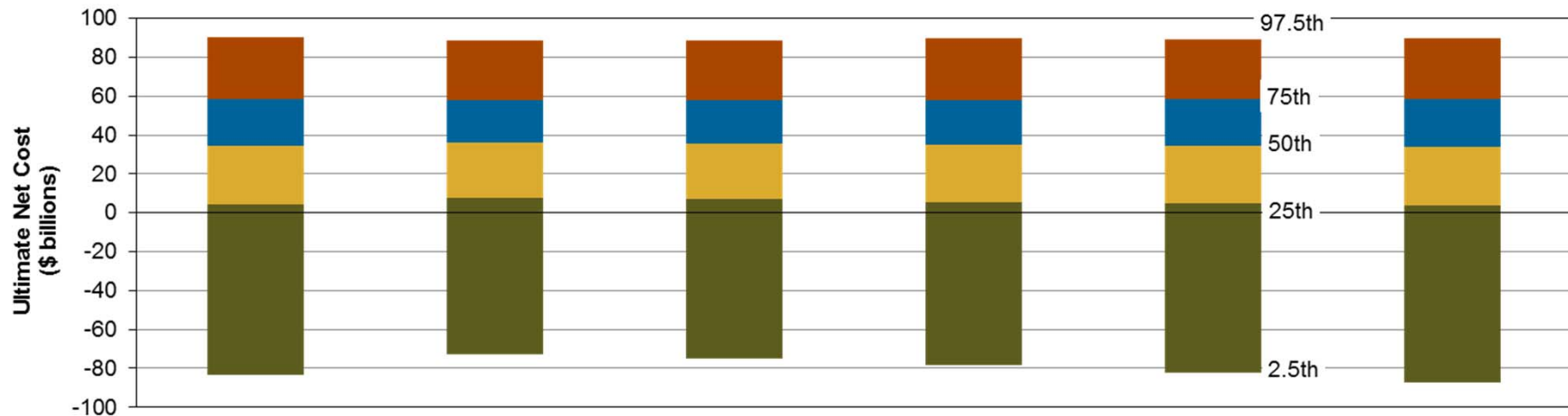
| Percentile	Policy	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
97.5th	**$90.16**	**$88.80**	**$88.47**	**$89.62**	**$89.32**	**$89.88**
75th	$58.17	$58.07	$58.14	$58.11	$58.31	$58.36
50th	**$34.51**	**$35.92**	**$35.45**	**$35.10**	**$34.48**	**$34.03**
25th	$4.03	$7.35	$7.14	$5.32	$4.97	$3.70
2.5th	-$83.16	-$72.57	-$75.12	-$78.34	-$82.28	-$87.15
Downside	**$55.65**	**$52.88**	**$53.02**	**$54.52**	**$54.83**	**$55.86**
Percentage	161%	147%	150%	155%	159%	164%

* Negative numbers represent surpluses.

- Projected cumulative contributions (PVCC) and unfunded liabilities (PVUL) for the next 10 years are combined and present-valued back to today for each mix. This the "Ultimate Net Cost" (UNC)

- The UNCs across asset mixes differ due to the differences in PVCCs and PVULs
    - More aggressive asset mixes have lower median UNCs
    - More aggressive asset mixes have higher 97.5[th] percentile UNCs
    - The differences in the UNCs are small because the mixes are similar

Phase II: Define Risk Tolerance

Ultimate Net Cost Reward and Risk

- Mixes 1, 3 and 5 have larger median UNCs than mixes 2, 4 and Policy for comparable UNCs in the 97.5th percentile outcomes
  - Mixes 2, 4 and 5 have more optimal non-US equity weightings

- Mixes 2, 4 or 5 have the same proportionate tradeoff between expected and 97.5th percentile outcomes

- Of the superior mixes, mix 4 represents a balanced tradeoff between reducing UNC in the median outcomes while controlling UNC when investments perform poorly

Ultimate Net Cost, 10 Years

Y-axis: Median Ultimate Net Cost ($ billions)
X-axis: 97.5th Percentile Ultimate Net Cost ($ billions)
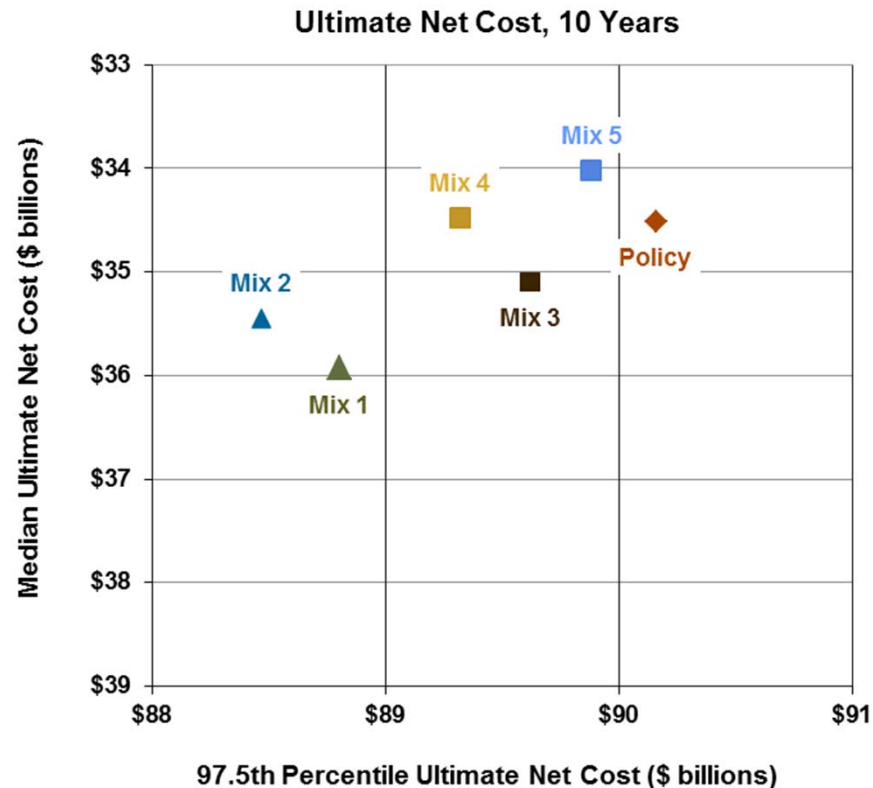
Summary

Observations and Conclusions

- Cash flows indicate that the fund has a long-term time horizon
  - 60% of the absolute cash flows and 20% of the discounted cash flows are beyond 20 years
  - Net cash out flows are not expected to exceed 5% of fund assets
  - Funds with longer time horizons can invest relatively large allocations in illiquid assets

- Allocations to NonUS equity that are closer to capitalization weights are anticipated to improve median outcomes without increasing risks
  - Ultimate net cost is improved in the median scenarios with minimal differences in the 97.5th outcomes

- Swapping public equity for public fixed income decreases ultimate net cost in the median outcomes proportionately with increases in ultimate net cost in the 97.5th percentile outcomes
  - There are no efficiency gains to be realized by becoming more or less aggressive
  - The selection of asset mix depends on factors such as maximum tolerable ultimate net cost in the 97.5th scenario or maximum acceptable ultimate net cost in the median outcomes

- The current policy to allocate uninvested private equity in fixed income is expected to be costly

- Mix 4 is recommended as it represents modest improvement over the current policy

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Summary

Observations and Conclusions

- Comparison of the expected returns used in this study to the 8% assumed return

- Expected Returns:

Nominal	-	Inflation	=	Real
7.30%		2.25%		5.05%
8.00%		2.75%		5.25%

- The study planning period is 10 years versus a longer term time horizon of 50 years used by the actuaries

- Callan's assumption for inflation was 2.25% vs the actuarial inflation rate of 2.75%

- Callan's expected returns reflect beta and do not include active management (alpha)

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