ACERA

Alameda County Employees' Retirement Association
BOARD OF RETIREMENT

INVESTMENT COMMITTEE/BOARD MEETING

ACERA MISSION:
To provide ACERA members and employers with flexible, cost-effective, participant-oriented benefits through prudent investment management and superior member services.

Wednesday, May 15, 2019
9:30 a.m.

LOCATION	COMMITTEE MEMBERS	
ACERA **C.G. "BUD" QUIST BOARD ROOM** **475 14TH STREET, 10TH FLOOR** **OAKLAND, CALIFORNIA 94612-1900** **MAIN LINE: 510.628.3000** **FAX: 510.268.9574**	**ELIZABETH ROGERS, CHAIR**	**ELECTED GENERAL**
	TARRELL GAMBLE, VICE CHAIR	**APPOINTED**
	DALE AMARAL	**ELECTED SAFETY**
	OPHELIA BASGAL	**APPOINTED**
	KEITH CARSON	**APPOINTED**
	JAIME GODFREY	**APPOINTED**
	LIZ KOPPENHAVER	**ELECTED RETIRED**
	HENRY LEVY	**TREASURER**
	GEORGE WOOD	**ELECTED GENERAL**
	NANCY REILLY	**ALTERNATE RETIRED**[1]
	DARRYL L. WALKER	**ALTERNATE SAFETY**[2]

Should a quorum of the Board attend this meeting, this meeting shall be deemed a joint meeting of the Board and Committee.
The order of agenda items is subject to change without notice. Board and Committee agendas and minutes are available online at www.acera.org.

Note regarding public comments: Public comments are limited to four (4) minutes per person in total.

Note regarding accommodations: The Board of Retirement will provide reasonable accommodations for persons with special needs of accessibility who plan to attend Board meetings. Please contact ACERA at (510) 628-3000 to arrange for accommodation.

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[1] Alternate Retired Member (Votes in the absence of the Elected Retired Member, or, if the Elected Retired Member is present, then votes if both Elected General Members, or the Elected Safety Member and an Elected General Member, are absent.
[2] Alternate Safety Member (Votes in the absence of (1) the Elected Safety, (2) either of the two Elected General Members, or (3) both the Retired and Alternate Retired Members).

Call to Order: 9:30 a.m.

Public Input (Time Limit: 4 minutes per speaker)

Action Items: Matters for discussion and possible motion by the Committee

1. Discussion of and Possible Motion to Recommend to the Board to Adopt an up to $60 million Investment in Great Hill Equity Partners VII as part of ACERA's Private Equity Portfolio – Buyouts and Venture Capital[3]

   9:30 – 10:15   Mary Kate Bertke, Great Hill Partners
   Nick Cayer Great Hill Partners
   Faraz Shooshani, Verus Advisory Inc.
   John Ta, ACERA
   Betty Tse, ACERA

2. Discussion of and Possible Motion to Recommend to the Board to Adopt Alternative #2 in the Asset — Liability Integration Study

   10:15 – 11:00   Marc Gesell, Verus Advisory Inc.
   Margaret Jadallah, Verus Advisory Inc.
   Betty Tse, ACERA

Information Items: These items are not presented for Committee action but consist of status updates and cyclical reports

1. Education Session: Timberland

   John Nicolini, Verus Advisory Inc.
   Clint Kuboyama, ACERA
   Betty Tse, ACERA

2. Real Assets Policy Update: Modification of Index Name in Benchmark Composite

   John Nicolini, Verus Advisory Inc.
   Clint Kuboyama, ACERA
   Betty Tse, ACERA

Trustee Remarks

Future Discussion Items

Establishment of Next Meeting Date
June 12, 2019 at 9:30 a.m.

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[3] Written materials and investment recommendations from the consultants, fund managers and ACERA Investment Staff relating to this alternative investment are exempt from public disclosure pursuant to CA Gov. Codes § 6254.26 and § 6255.

TO: Members of the Investment Committee

FROM: Betty Tse – Chief Investment Officer

DATE: May 15, 2019

SUBJECT: Discussion of and Possible Motion to Recommend to the Board to Adopt Alternative #2 in the Asset Liability Integration Study

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Recommendation:

Adopt Alternative 2 in the Asset – Liability Integration Study

Background and Discussion:

At the April ICM, Verus reviewed the Asset – Liability Integration study. The objective of this study which uses the Asset – Liability data as of 12/31/2017, is to review and prioritize the risk and return characteristics of all the asset classes in the Total Fund, and to modify the asset allocations, if warranted.

Based on Verus' capital markets assumptions, e.g. expected return range from 6.3-6.9%, and the matching of ACERA's assets with its liabilities, e.g. inflation and mortality rates, Verus has narrowed the range of sample portfolios to mixes between ACERA's Policy and the Peer Group. The mixes include risk/return profiles that are slightly more or less aggressive than that of the current ACERA portfolio. Verus also considered the result of the Enterprise Risk Tolerance Survey.

Verus has narrowed the asset mixes to Alternatives 1 and 2 between the Policy and the Peer Group in light of the following considerations: 1) ACERA's gradual increase in its Total Fund value with a moderate funding status (currently about 76%); 2) the Committee's priority in its long term objectives; 3) the Committee's comfort in accepting more long term risk in certain asset classes such as that from the bond markets; and importantly, 4) Diversifications.

Conclusion:

Verus concludes that Alternative #2 which improves diversification and supports the long term sustainability of the Plan is the most appropriate Policy target. Staff concurs with Verus.

PERSPECTIVES
THAT DRIVE ENTERPRISE SUCCESS

MAY 15, 2019

Asset-Liability Integration – Part 2

ACERA

Table of contents

I. Introduction and asset mixes

Session objectives

— Review risk and return characteristics of ACERA's current policy and refined asset mixes

— Review asset-liability integration results

— Discuss and prioritize risk and liquidity considerations

— Determine asset allocation mix to recommend to Board

Key considerations

— Asset allocation drives the bulk of the variation in portfolio returns over time.

— This relationship must hold over the long-term:

| Contributions | **+** | Investment Returns | **=** | Benefit Payments | **+** | Expenses |

— A more aggressive asset allocation will increase the likelihood that future contributions may be lower.

— A more aggressive allocation also increases the likelihood of future volatility in contributions.

Modern portfolio theory

First introduced in 1952 by nobel prize winner Harry Markowitz

Basic Assumptions (It's all about risk and return)
— Investors are rational
— A rational investor will choose the highest rate of return for taking on a given amount of risk
— Risk and return can be reasonably estimated
— Diversification of investments provides the investor with a so-called "free lunch"

Basic Principles
— Return
— Risk
— Correlation ("the magic in the mix")

Functional labels

Growth
- Equity
- High Yield
- Private Credit

Hedge Funds
Bank Loans

Inflation
- Real Estate
- Real Assets
- Commodities

Diversifying
- Core Fixed Income
- US Treasury
- Global Sovereign
- EM Debt
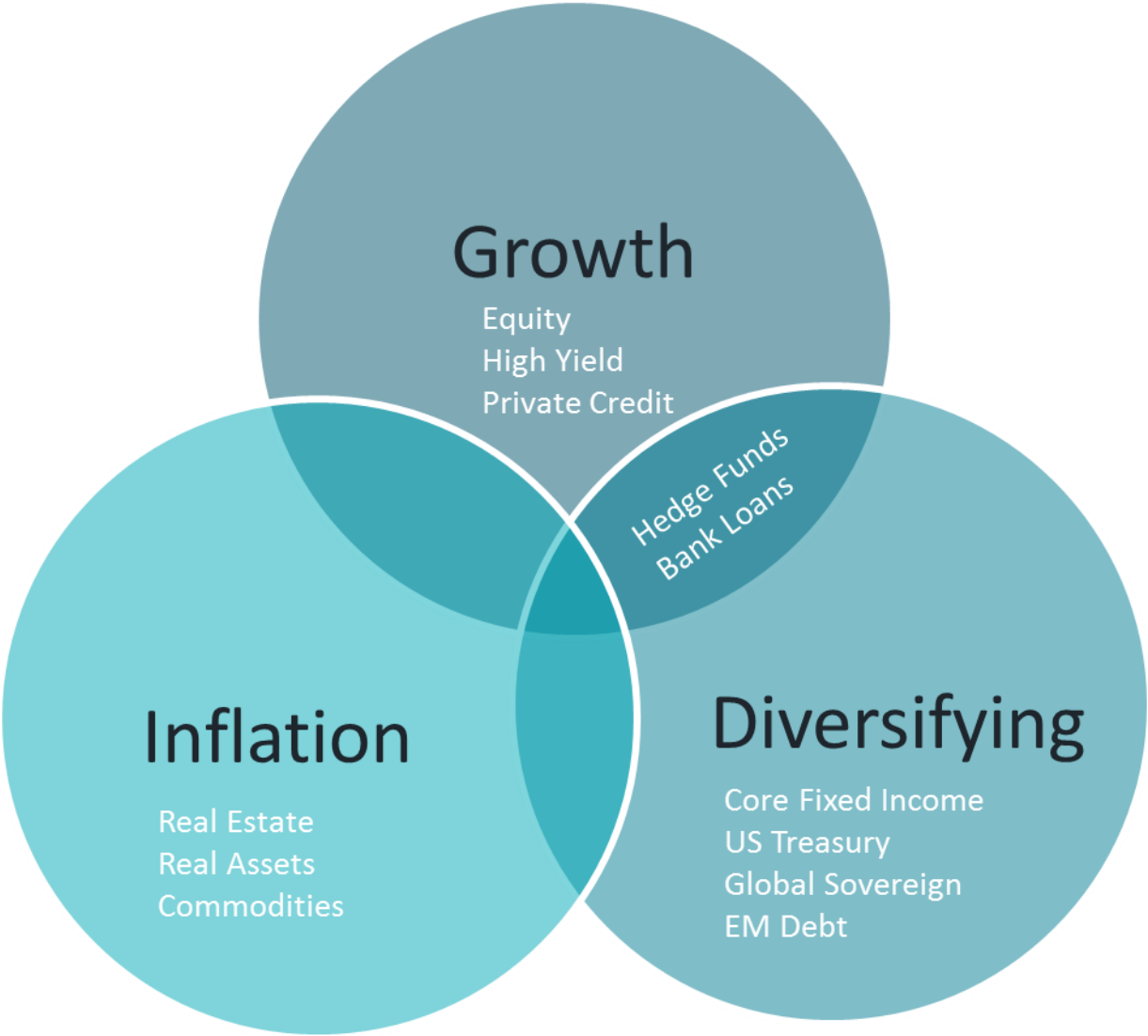
Range of likely 10 year outcomes

10 YEAR RETURN 90% CONFIDENCE INTERVAL

High Volatility → Low Volatility

Legend: ■ 5th to 25th ■ 25th to 50th ■ 50th to 75th ■ 75th to 95th ○ Expected Return

Investment models

Asset Class	Port.	Policy	Alt 1	Alt 2	Peer	CMA Assumptions Return (g)	Standard Deviation	Sharpe Ratio
US Large	29.6%	25.0%	26.0%	22.4%	26.0%	5.8	15.6	0.31
US Small	3.1%	3.0%	2.9%	2.5%	0.0%	5.4	21.3	0.25
Intl. Developed	18.8%	18.0%	20.2%	17.0%	23.2%	7.7	17.8	0.39
Intl. Small	2.50%	3.0%	3.0%	3.0%	0.0%	6.5	22.4	0.30
EM	4.7%	5.0%	5.8%	5.0%	3.5%	8.6	26.1	0.36
High Yield	2.0%	1.5%	0.8%	1.6%	0.0%	5.7	11.5	0.37
Private Equity	8.0%	11.3%	12.5%	10.5%	8.3%	8.8	25.6	0.37
Private Credit	0.0%	0.0%	2.0%	4.0%	0.0%	7.7	10.2	0.60
Growth	**68.7%**	**66.8%**	**73.2%**	**66.0%**	**61.0%**			
Core Fixed Income	10.0%	11.3%	5.7%	11.4%	21.9%	3.3	6.4	0.22
Global Sovereign Ex US	3.9%	2.3%	1.5%	3.0%	0.0%	0.8	9.8	-0.08
Hedge Fund	8.6%	9.0%	9.0%	9.0%	7.6%	4.4	7.8	0.33
Cash	0.2%	0.0%	0.0%	0.0%	1.3%	2.1	1.2	-
Diversifying	**22.7%**	**22.6%**	**16.2%**	**23.4%**	**30.8%**			
Commodities	0.6%	0.8%	0.8%	0.8%	2.0%	4.2	15.7	0.20
Core Real Estate	6.7%	8.0%	8.0%	8.0%	6.2%	6.1	12.9	0.37
Infrastructure	1.3%	1.8%	1.8%	1.8%	0.0%	7.9	18.2	0.40
Real Return	**8.6%**	**10.6%**	**10.6%**	**10.6%**	**8.2%**			
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**			

	Port	Policy	Alt 1	Alt 2	Peer
Mean Variance Analysis					
Forecast 10 Year Return	*6.5*	*6.7*	*7.0*	*6.7*	*6.4*
Standard Deviation	12.8	12.9	13.8	12.3	11.3
Return/Std. Deviation	*0.5*	*0.5*	*0.5*	*0.5*	*0.6*
1st percentile ret. 1 year	-18.4	-17.2	-18.7	-15.4	-15.1
Sharpe Ratio	0.39	0.41	0.41	0.42	0.42

Investment model forecasts

Compound Nominal Return

| | 6.5% | 6.7% | 7.0% | 6.7% | 6.4% |

Verus
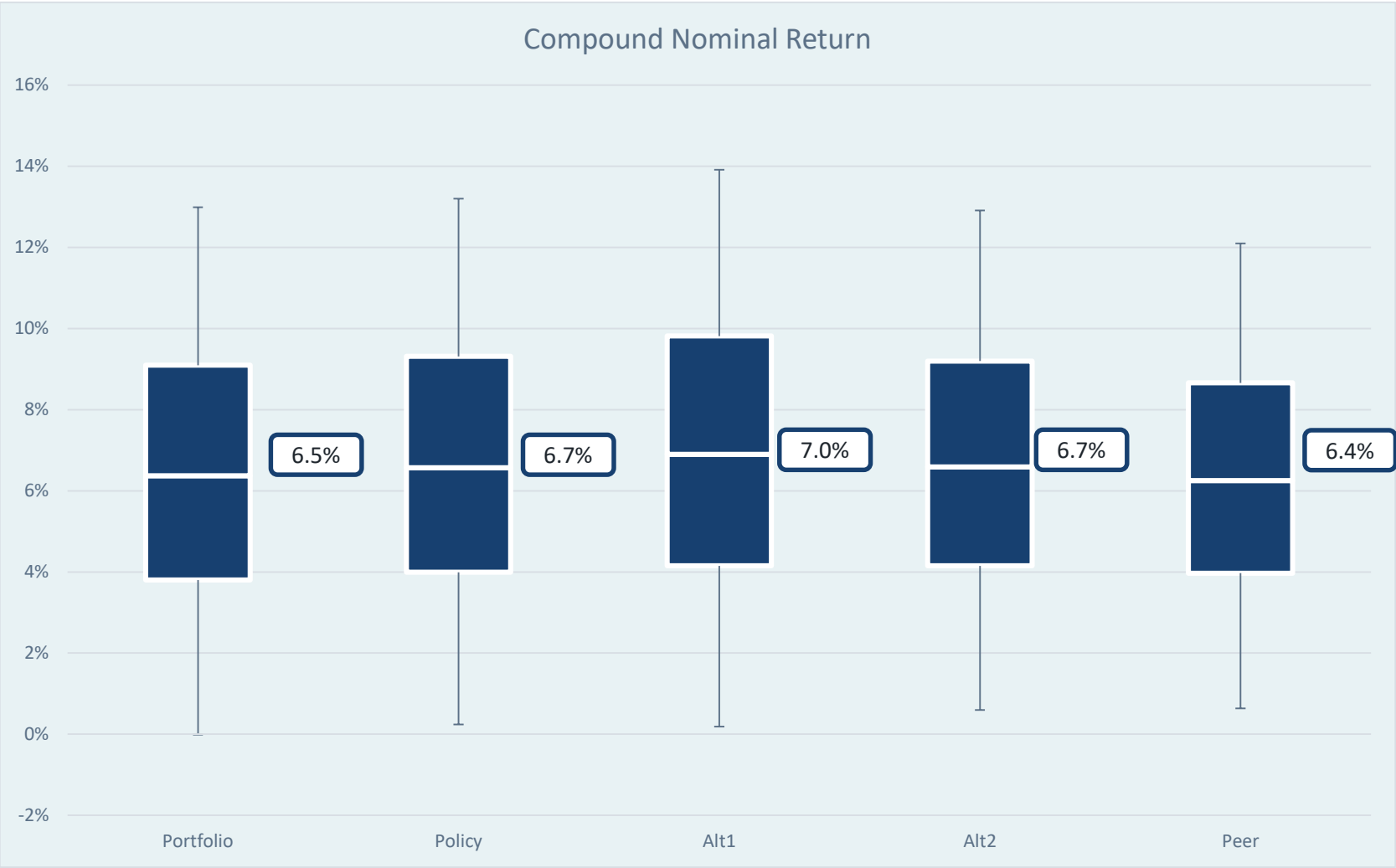
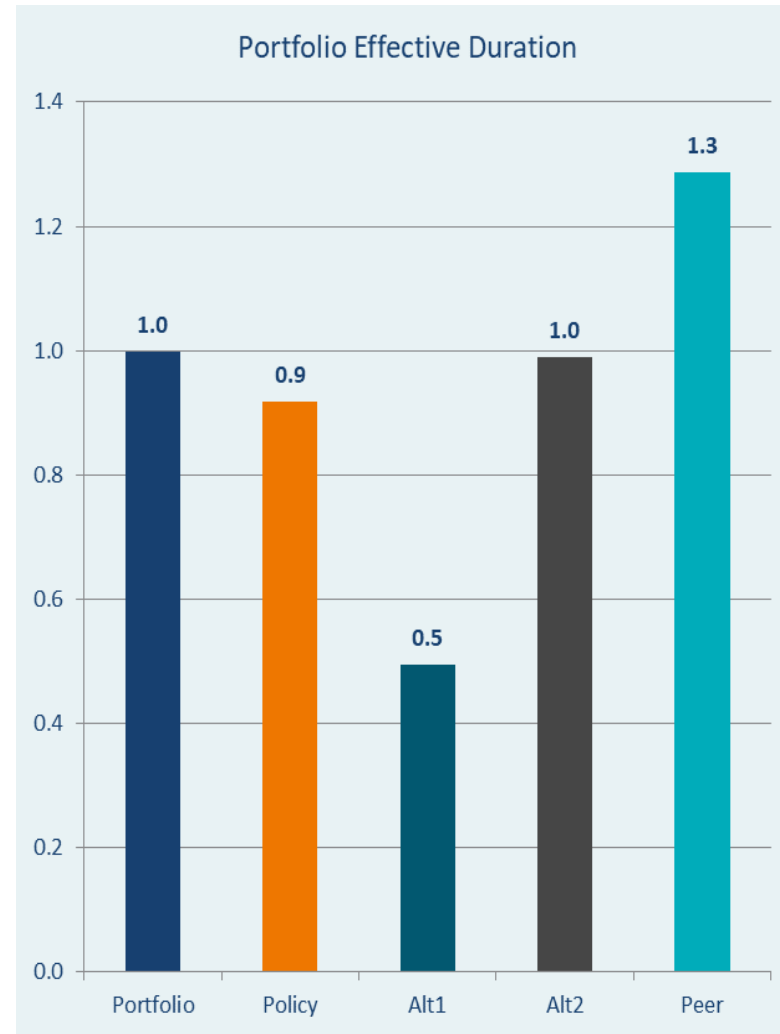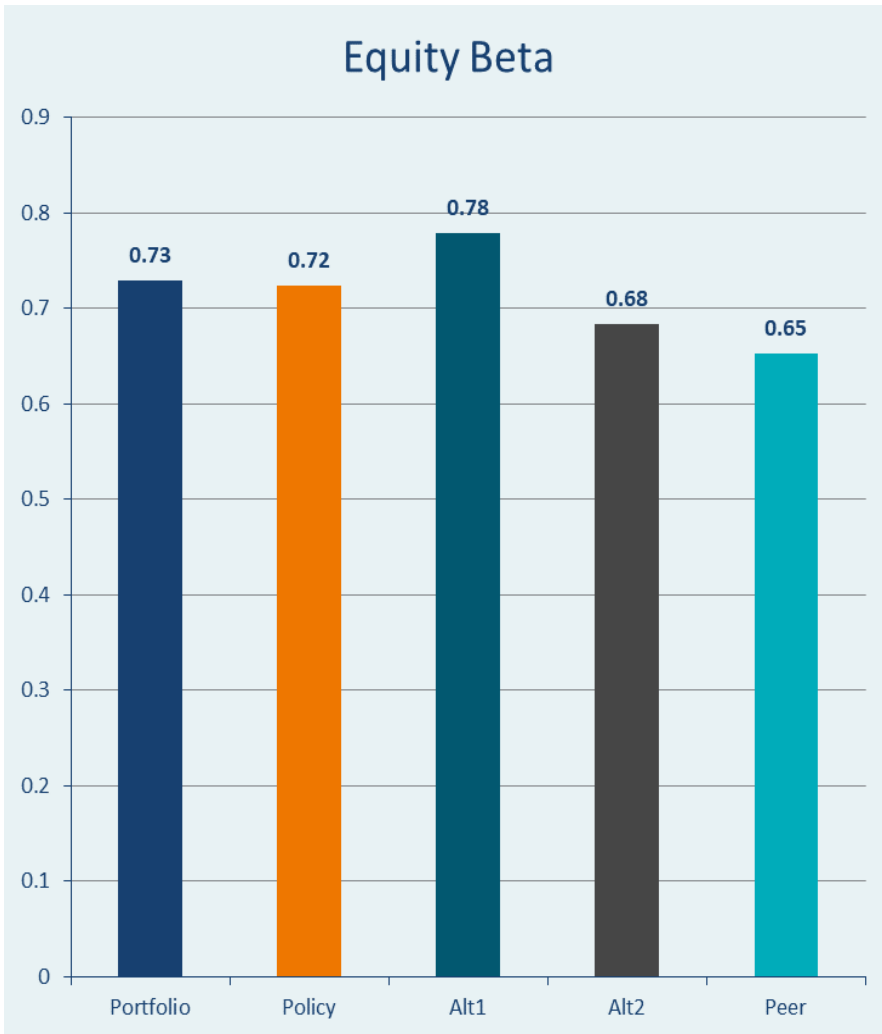# Risk decomposition
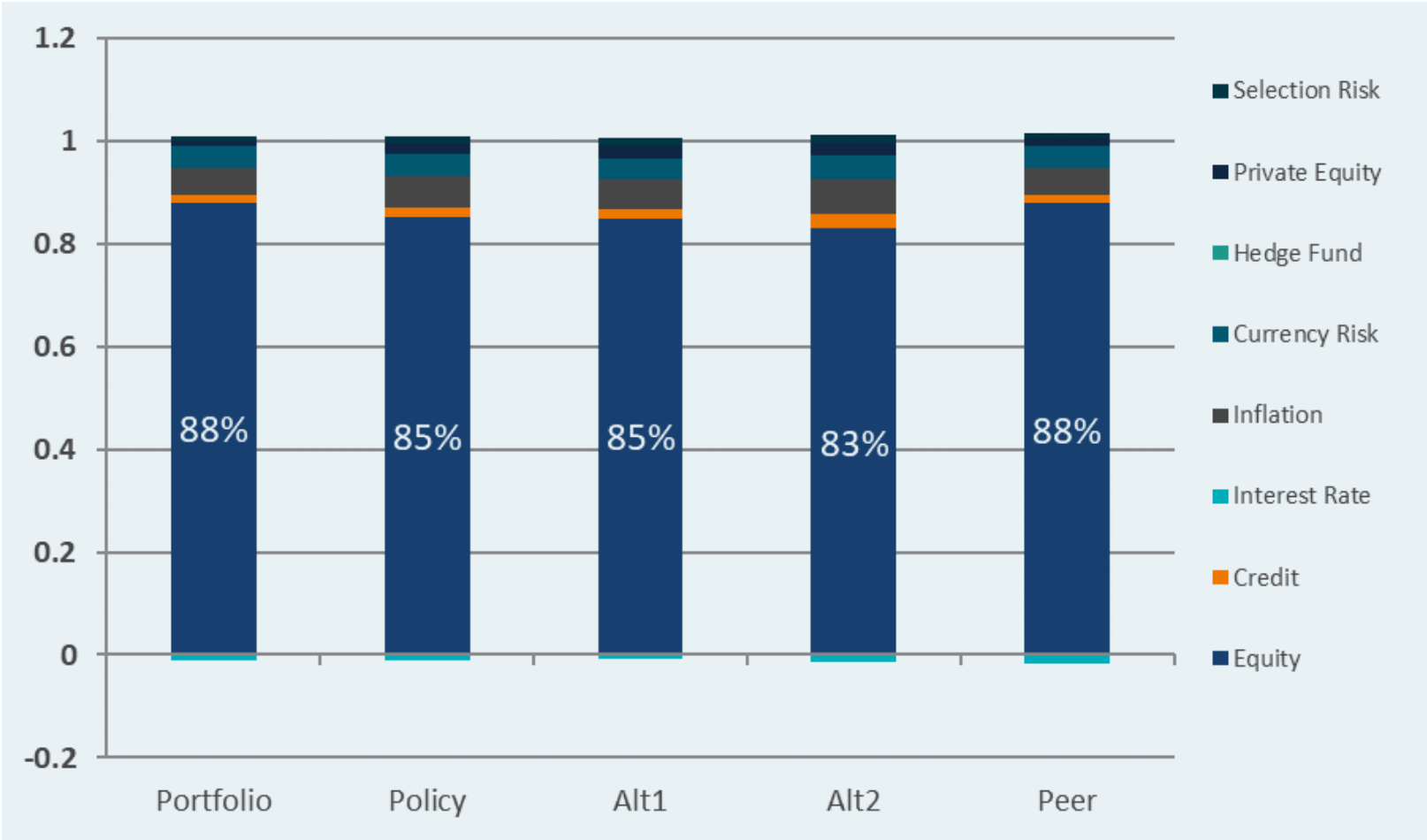
Source: MSCI BARRA

Note: Selection Risk is the risk attributable to unassigned factors

Sources of risk

Equity beta measures the sensitivity to the risks of the broad equity market.

Duration measures the sensitivity of the portfolio to a change in interest rates.

Source: MSCI BARRA

Scenario analysis

Source: MSCI BARRA

Verus
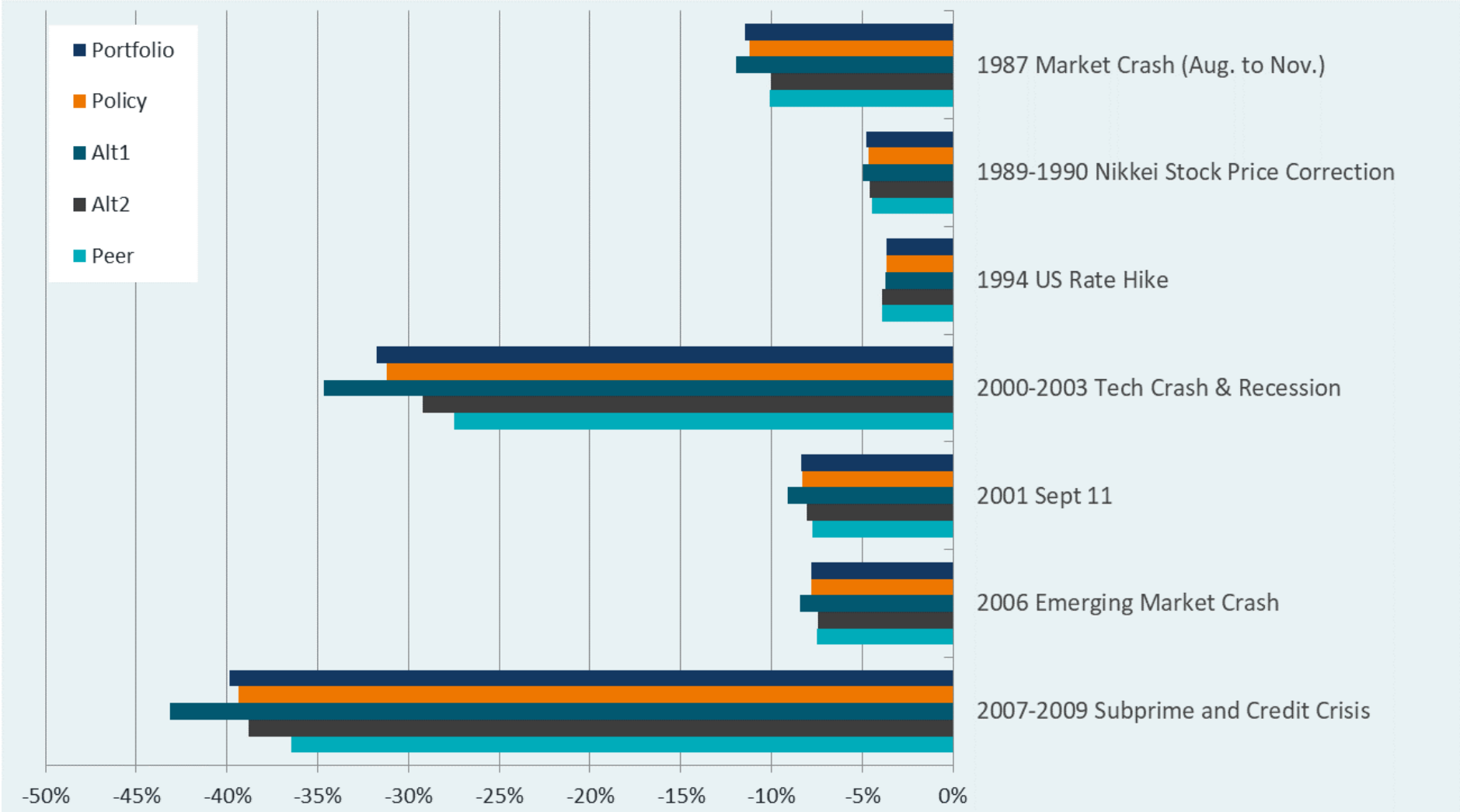
Stress tests
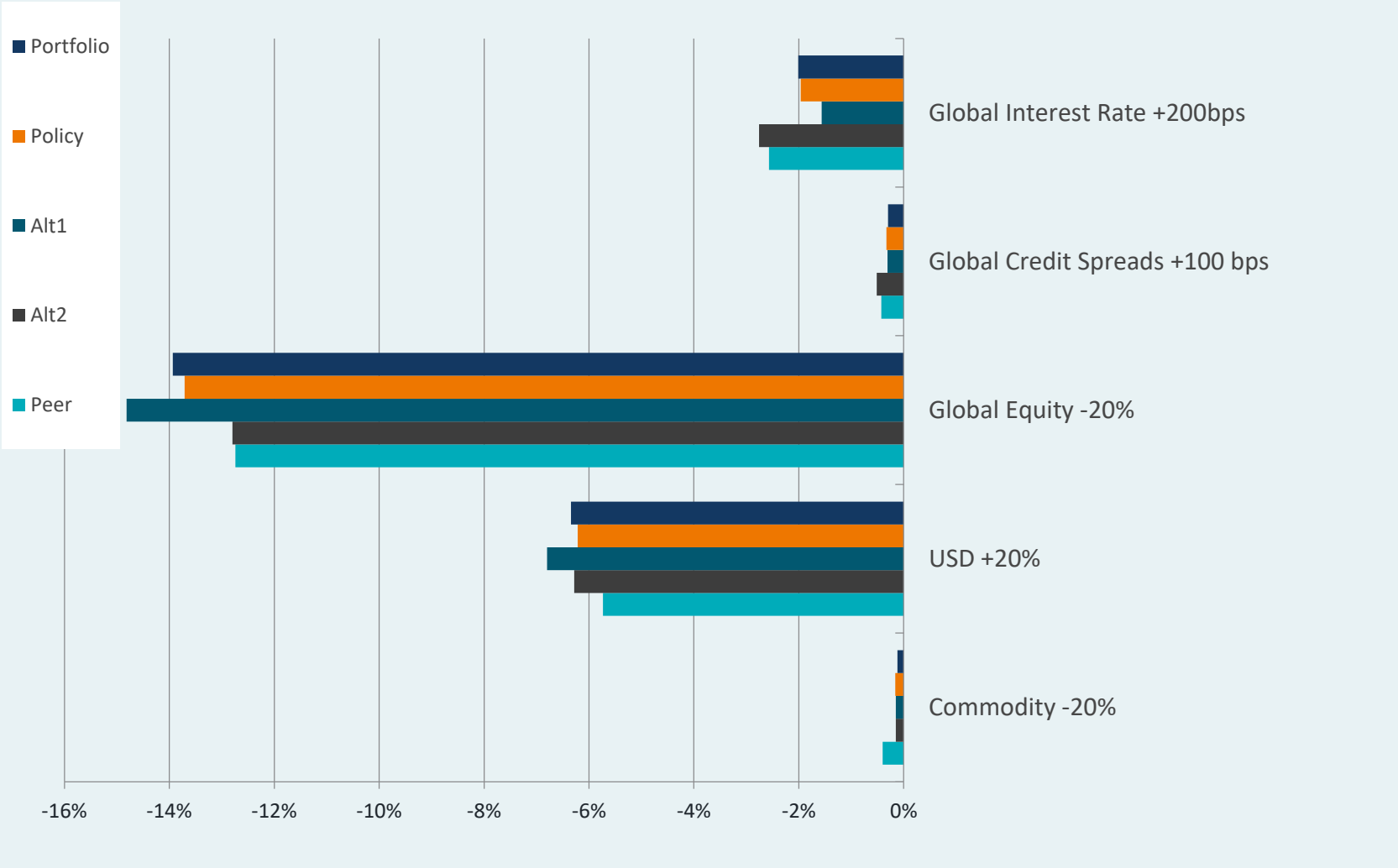
Source: MSCI BARRA

Summary findings

— Based on capital market assumptions:

- Expected Returns range from 6.4%-7.0%

- Equity Risk exposure ranges from 83% to 88%

— From a mean/variance standpoint, the risk and return metrics are comparable across portfolios

- More aggressive mix (Alt 1) has slightly higher expected return with slightly greater standard deviation and downside risk; has lowest duration risk

- More conservative mix (Alt 2) has slightly lower expected return with slightly lower risk; has greater duration risk although lower than peer average

- Alt 2 has same expected return as current ACERA policy

II. ACERA historical experience

Verus

Historical funding status

Historical Assets and Funding Status

Legend: Valuation Value of Assets | Liability | FR

Verus

Historical contributions
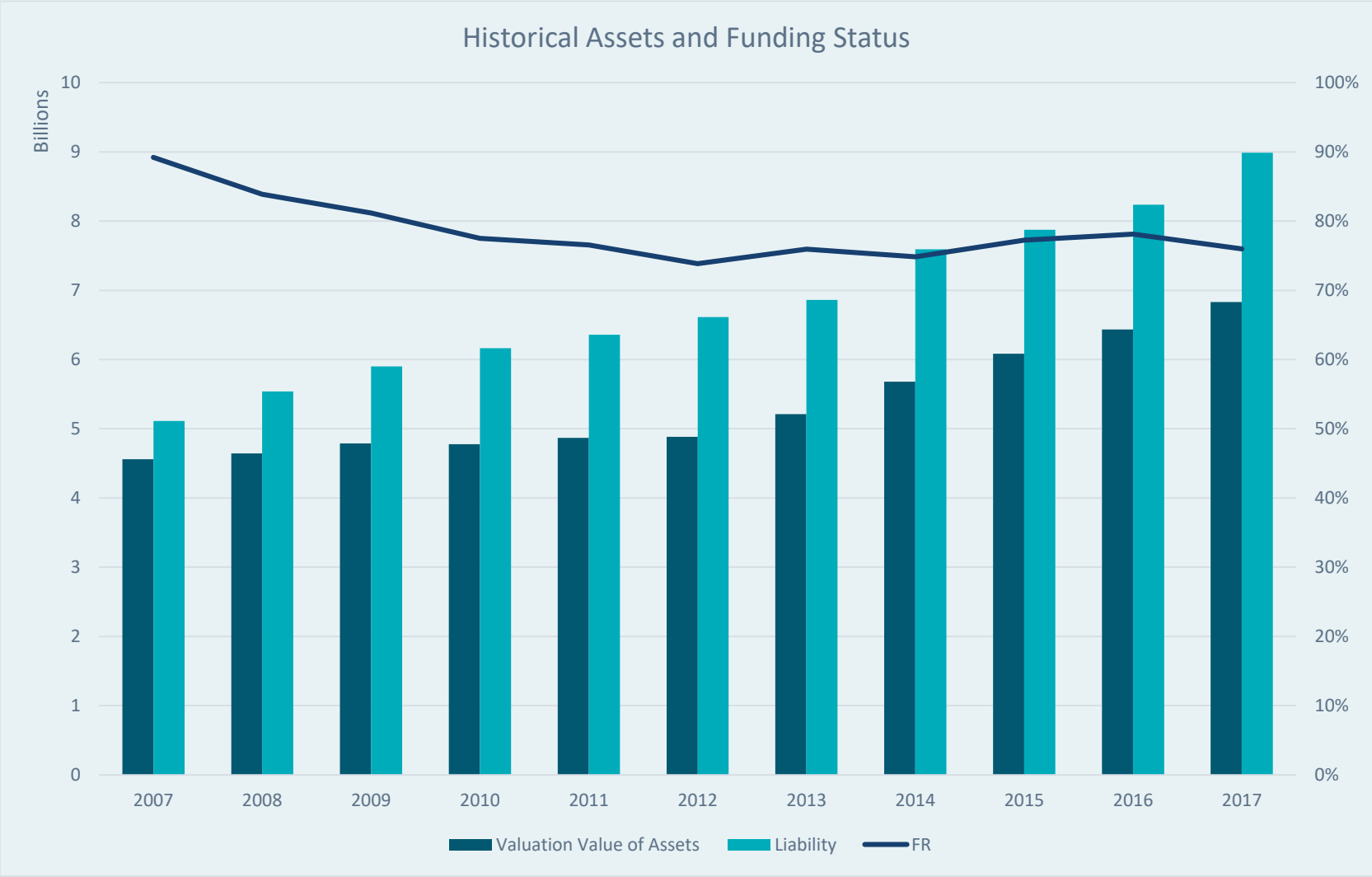
ACERA Historical Contributions

III. Asset-liability integration

Verus

Expected contributions

Baseline Deterministic Forecast (7.25% Return)

Legend:
- Employer Contribution
- Employee Contribution
- Act. Funded Ratio

*Not including SRBR

Expected contributions

Deterministic Forecast (6.60% Return)

*Not including SRBR

Expected contributions with 10% drawdown

CONTRIBUTION SIMULATION

Deterministic Forecast (-10% Yr1, 7.25% Thereafter)

Legend: Employer Contribution · Employee Contribution · Act. FR

Not including SRBR

Verus
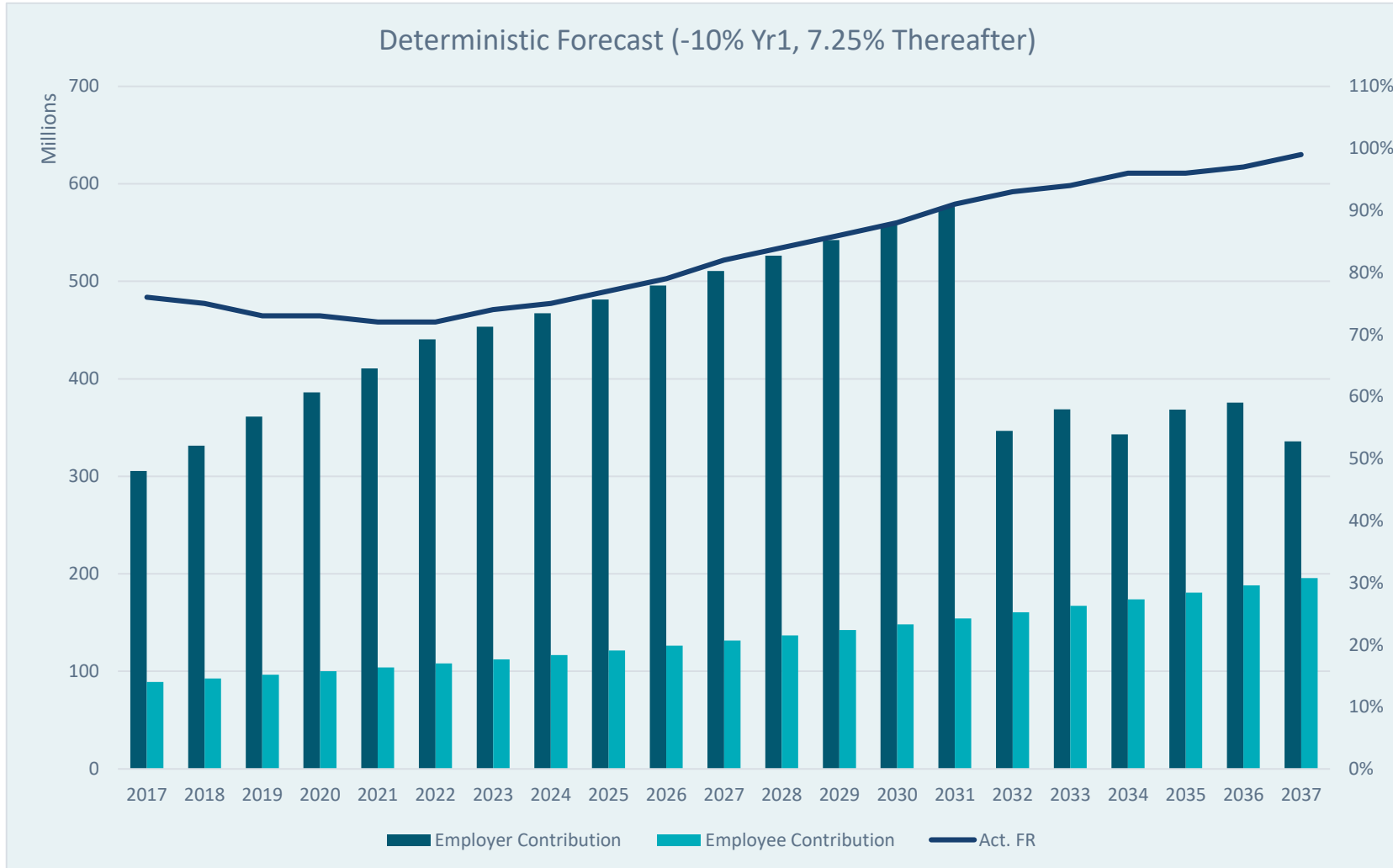
Funded ratio projections

Median Projections: Actuarial Funded Ratio (EOY 2028)

Actuarial Funded Ratio (EOY 2028)
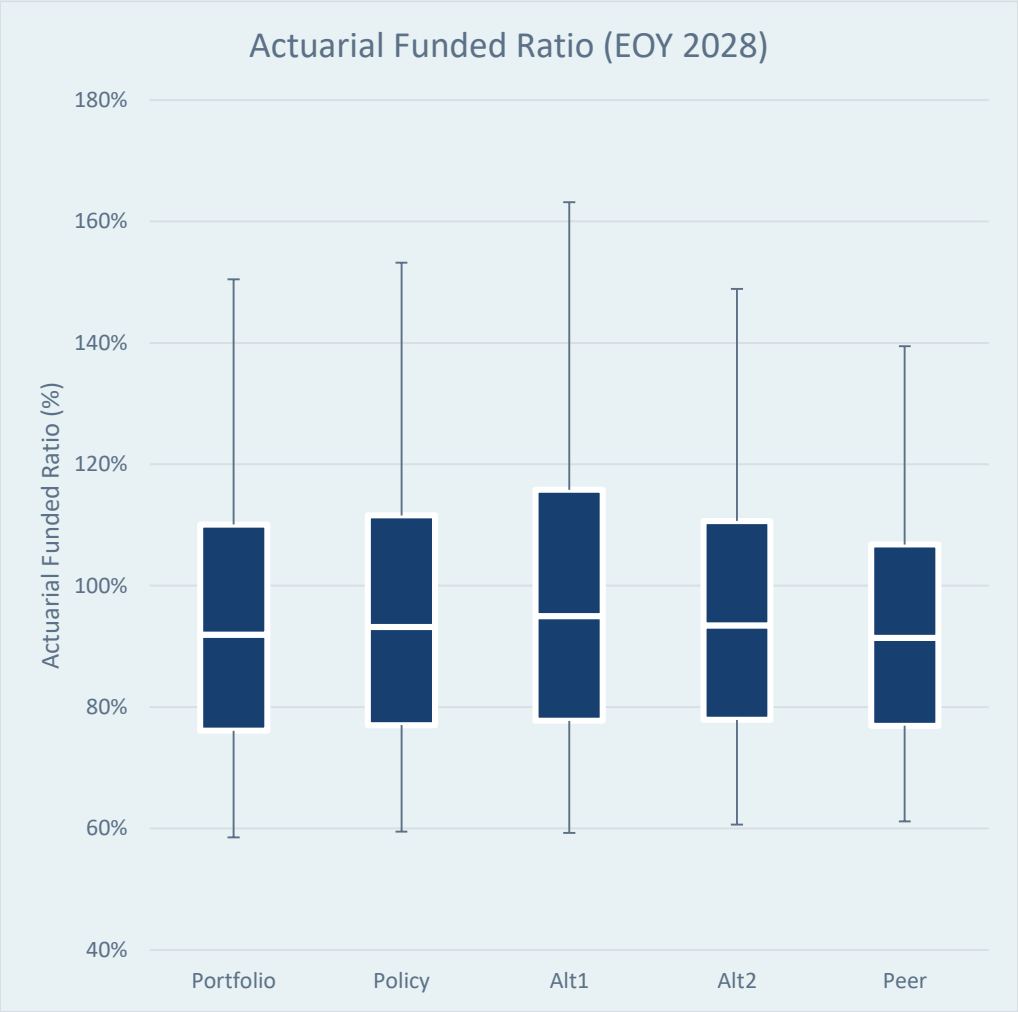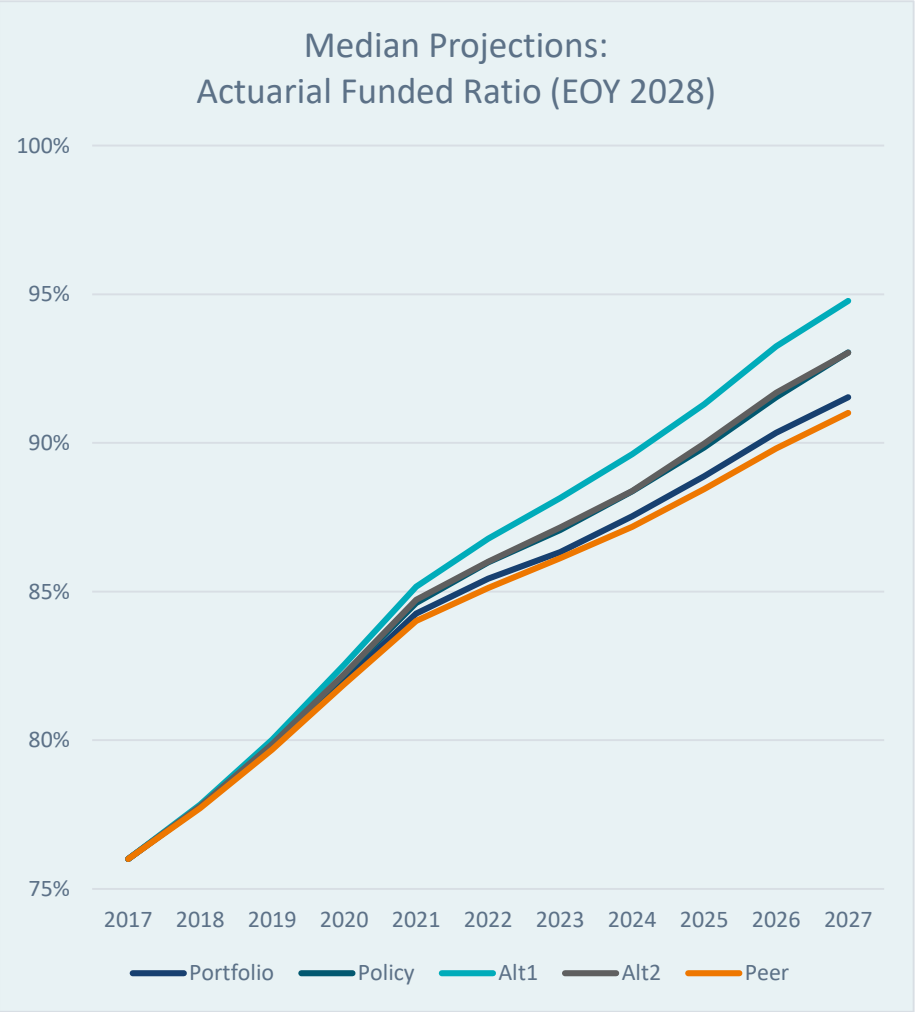
Not Including SRBR

Employer contribution projections (10 years)

Employer Contribution ($)
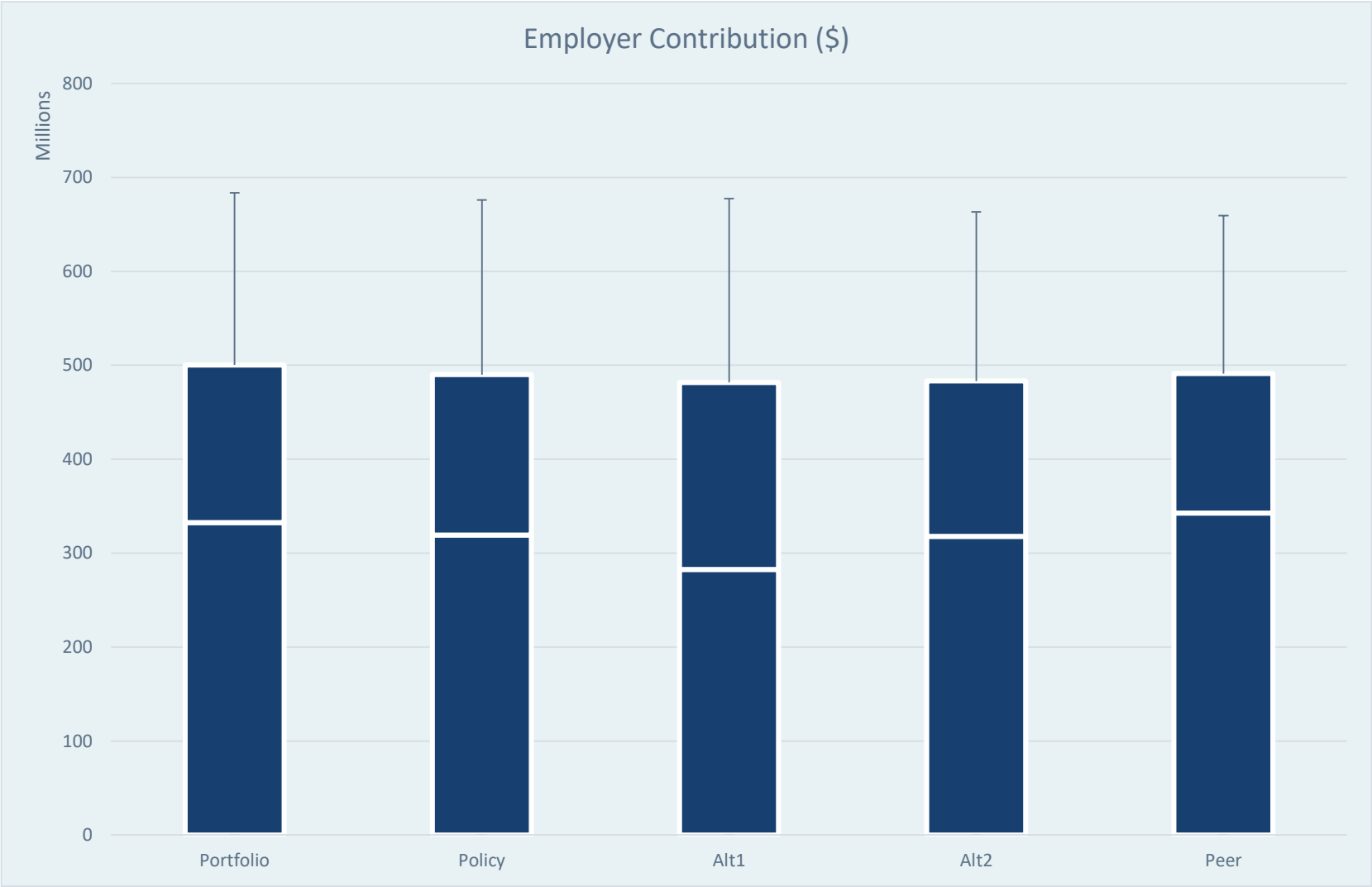
*Not Including SRBR

SRBR effect on ACERA

Valuation Funded Ratio (EOY 2028)

SRBR Assets (EOY 2028)
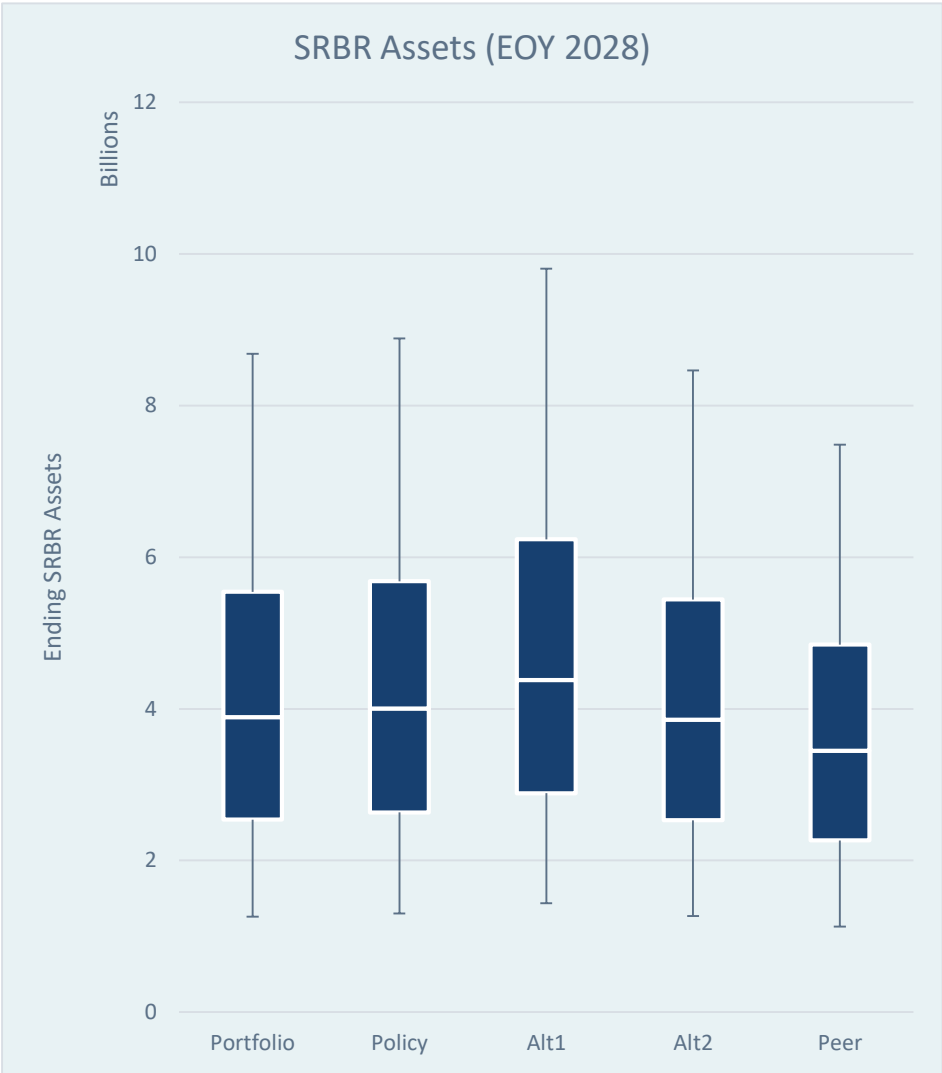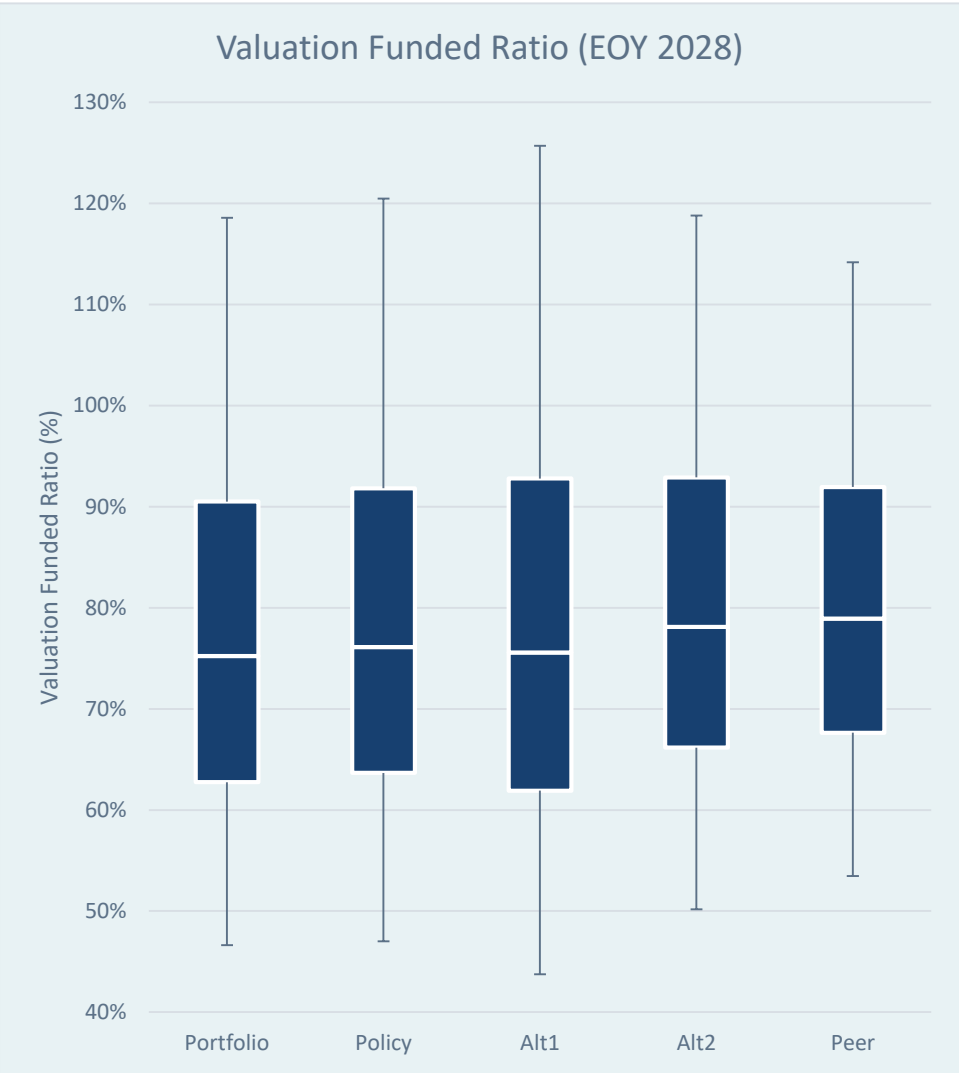
Summary findings of asset-liability integration

— Alternative 1

- Increases the equity risk of the portfolio

- Lowers the portfolio's effective duration

- Has highest return expectation and increases volatility

— Alternative 2

- Lowers equity risk relative to current policy

- Performs better than policy and alternative 1 in stress tests and scenario analysis

- Same expected return as current policy

— Funded ratio estimated to be 90-95% in 10 years given our assumptions

— Funded Ratio including SRBR estimated to be 75-80% in 10 years

IV. ERT survey results

Verus

Long-term objectives – ERT results

LONG TERM OBJECTIVES

Objective	Value
Prevent deterioration in the funded status of the Plan	3.0
Long term sustainability of the Plan	3.0
Minimize portfolio downside risk (Great Financial Crisis/2008 type market event)	2.8
Portfolio diversification	2.8
Improve the funded status of the Plan	2.6
Maximize portfolio returns to achieve/exceed the actuarial expected rate of return assumption	2.4
Incorporate additional risk considerations viewed as financially material (ex., ESG)	2.2
Improve cash flow of plan to meet liabilities/pay retirees	2.2
Maximize short/medium term plan performance (less than 10-year results)	1.8
Minimize employer contribution rate	1.2

Verus

Conclusions – Relative to objectives

— Alternative 1

- Prevent deterioration of funded status
- Improve funded ratio
- Maximize return to increase probability to achieve/outperform actuarial rate

Objective Rank

- 1
- 5
- 6

— Alternative 2

- Long Term sustainability of plan
- Minimize downside risk
- Improved Diversification

Objective Rank

- 2
- 3
- 4

— *Verus believes that Alternative 2 is the most appropriate Policy target based on survey objectives*

Verus

V. Appendix

Verus

The role of asset classes

GROWTH

Rising growth
Falling inflation

Equities, corporate bonds, emerging market debt, infrastructure, mortgages, government bonds, real estate, commodities

Commodities, infrastructure, real estate, equities, corporate bonds, emerging market debt

Rising growth
Rising inflation

INFLATION

Falling growth
Falling inflation

Government bonds, corporate bonds, emerging market debt, inflation linked bonds

Inflation linked bonds, commodities, infrastructure, real estate

Falling growth
Rising inflation

CMA methodology

Asset	Return Methodology	Volatility Methodology*
Inflation	25% weight to the University of Michigan Survey 5-10 year ahead inflation expectation and the Survey of Professional Forecasters (Fed Survey), and the remaining 50% to the market's expectation for inflation as observed through the 10-year TIPS breakeven rate	-
Cash	Real yield estimate + inflation forecast	Long-term volatility
Bonds	Nominal bonds: current yield; Real bonds: real yield + inflation forecast	Long-term volatility
International Bonds	Current yield	Long-term volatility
Credit	Current option-adjusted spread + U.S. 10-year Treasury – effective default rate	Long-term volatility
International Credit	Current option-adjusted spread + foreign 10-year Treasury – effective default rate	Long-term volatility
Private Credit	Bank loan forecast + 1.75% private credit premium**	Long-term volatility
Equity	Current yield + real earnings growth (historical average) + inflation on earnings (inflation forecast) + expected P/E change	Long-term volatility
Intl Developed Equity	Current yield + real earnings growth (historical average) + inflation on earnings (intl. inflation forecast) + expected P/E change	Long-term volatility
Private Equity	US large cap domestic equity forecast * 1.85 beta adjustment	1.2 * Long-term volatility of U.S. small cap
Commodities	Collateral return (cash) + spot return (inflation forecast) + roll return (assumed to be zero)	Long-term volatility
Hedge Funds	Return coming from traditional betas + 15-year historical idiosyncratic return	Long-term volatility
Core Real Estate	Cap rate + real income growth – capex + inflation forecast	65% of REIT volatility
REITs	Core real estate	Long-term volatility
Value-Add Real Estate	Core real estate + 2%	Volatility to produce Sharpe Ratio (g) equal to core real estate
Opportunistic Real Estate	Core real estate + 4%	Volatility to produce Sharpe Ratio (g) equal to core real estate
Infrastructure	Current yield + real income growth + inflation on earnings (inflation forecast)	Long-term volatility
Risk Parity	Expected Sharpe Ratio * target volatility + cash rate	Target volatility

10 year return & risk assumptions

Asset Class	Index Proxy	Ten Year Return Forecast		Standard Deviation Forecast	Sharpe Ratio Forecast (g)	Sharpe Ratio Forecast (a)	10-Year Historical Sharpe Ratio (g)	10-Year Historical Sharpe Ratio (a)
		Geometric	Arithmetic					
Equities								
U.S. Large	S&P 500	5.8%	6.9%	15.6%	0.24	0.31	0.94	0.95
U.S. Small	Russell 2000	5.4%	7.5%	21.3%	0.15	0.25	0.63	0.69
International Developed	MSCI EAFE	7.7%	9.1%	17.8%	0.31	0.39	0.37	0.43
International Small	MSCI EAFE Small Cap	6.5%	8.8%	22.4%	0.20	0.30	0.61	0.66
Emerging Markets	MSCI EM	8.6%	11.6%	26.1%	0.25	0.36	0.40	0.48
Global Equity	MSCI ACWI	6.8%	8.2%	17.1%	0.27	0.36	0.62	0.67
Private Equity*	Cambridge Private Equity	8.8%	11.7%	25.6%	0.26	0.37	-	-
Fixed Income								
Cash	30 Day T-Bills	2.1%	2.1%	1.2%	-	-	-	-
U.S. TIPS	BBgBarc U.S. TIPS 5-10	3.0%	3.1%	5.5%	0.16	0.18	0.67	0.68
U.S. Treasury	BBgBarc Treasury 7-10 Year	2.7%	2.9%	6.7%	0.09	0.12	0.46	0.48
Global Sovereign ex U.S.	BBgBarc Global Treasury ex U.S.	0.8%	1.3%	9.8%	-0.13	-0.08	0.14	0.18
Core Fixed Income	BBgBarc U.S. Aggregate Bond	3.3%	3.5%	6.4%	0.19	0.22	1.09	1.08
Core Plus Fixed Income	BBgBarc U.S. Corporate IG	4.1%	4.4%	8.4%	0.24	0.27	1.23	1.22
Short-Term Gov't/Credit	BBgBarc U.S. Gov't/Credit 1-3 Year	2.8%	2.9%	3.6%	0.19	0.22	1.38	1.37
Short-Term Credit	BBgBarc Credit 1-3 Year	3.2%	3.2%	3.7%	0.30	0.30	1.66	1.64
Long-Term Credit	BBgBarc Long U.S. Corporate	4.3%	4.7%	9.4%	0.23	0.28	0.88	0.89
High Yield Corp. Credit	BBgBarc U.S. Corporate High Yield	5.7%	6.3%	11.5%	0.31	0.37	1.39	1.36
Bank Loans	S&P/LSTA Leveraged Loan	5.9%	6.4%	10.2%	0.37	0.42	1.50	1.47
Global Credit	BBgBarc Global Credit	2.1%	2.4%	7.5%	0.00	0.04	0.88	0.89
Emerging Markets Debt (Hard)	JPM EMBI Global Diversified	6.7%	7.4%	12.6%	0.37	0.42	1.19	1.18
Emerging Markets Debt (Local)	JPM GBI-EM Global Diversified	6.9%	7.6%	12.1%	0.40	0.45	0.26	0.31
Private Credit	Bank Loans + 175bps	7.7%	8.2%	10.2%	0.55	0.60	-	-
Other								
Commodities	Bloomberg Commodity	4.2%	5.3%	15.7%	0.13	0.20	-0.29	-0.22
Hedge Funds*	HFRI Fund Weighted Composite	4.4%	4.7%	7.8%	0.29	0.33	0.76	0.76
Core Real Estate	NCREIF Property	6.1%	6.9%	12.9%	0.31	0.37	1.28	1.26
Value-Add Real Estate	NCREIF Property + 200bps	8.1%	9.8%	19.4%	0.31	0.40	-	-
Opportunistic Real Estate	NCREIF Property + 400bps	10.1%	13.0%	25.9%	0.31	0.42	-	-
REITs	Wilshire REIT	6.1%	7.8%	19.3%	0.21	0.30	0.55	0.63
Global Infrastructure	S&P Global Infrastructure	7.9%	9.3%	18.2%	0.32	0.40	0.52	0.57
Risk Parity	Risk Parity	7.1%	7.6%	10.0%	0.50	0.55	-	-
Currency Beta	Russell Conscious Currency	2.1%	2.2%	4.1%	0.02	0.02	0.25	0.26
Inflation		2.0%	-	-	-	-	-	-

Investors wishing to produce expected geometric return forecasts for their portfolios should use the arithmetic return forecasts provided here as inputs into that calculation, rather than the single-asset-class geometric return forecasts. This is the industry standard approach, but requires a complex explanation only a heavy quant could love, so we have chosen not to provide further details in this document – we will happily provide those details to any readers of this who are interested.

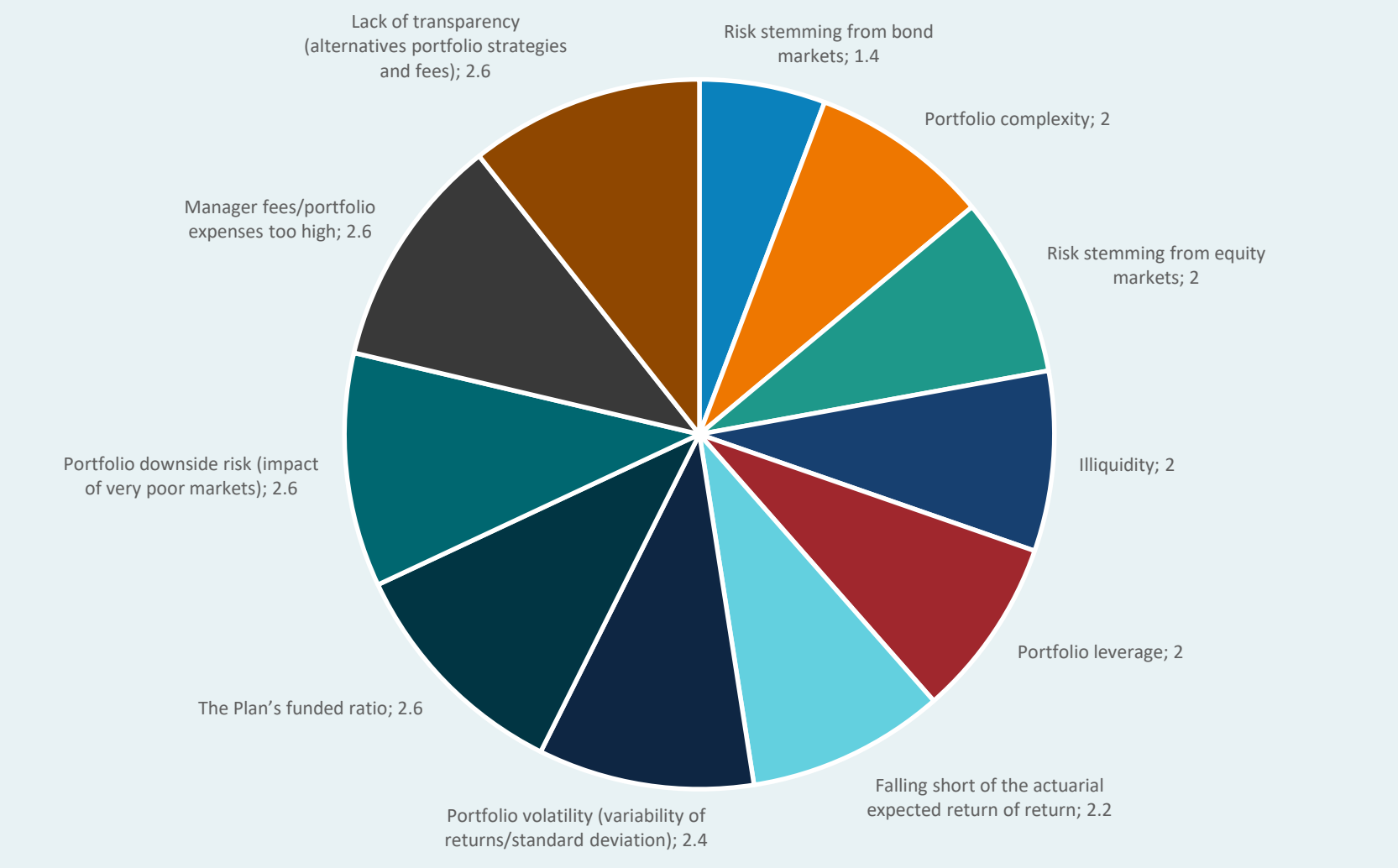**Return expectations differ depending on method of implementation*

Correlation assumptions

	Cash	US Large	US Small	Intl Large	Intl Large Hdg	Intl Small	Intl Small Hdg	EM	Global Equity	PE	US TIPS	US Treasury	Global Sovereign ex US	Global Sovereign ex US Hdg	US Core	US Core Plus	ST Govt/Credit	Short-Term Credit	Long-Term Credit	US HY	Bank Loans	Global Credit	Global Credit Hdg	EMD USD	EMD Local	Commodities	Hedge Funds	Real Estate	REITs	Infrastructure	Risk Parity	Currency Beta	Inflation
Cash	1.0																																
US Large	-0.3	1.0																															
US Small	-0.2	0.9	1.0																														
Intl Large	-0.3	0.9	0.8	1.0																													
Intl Large Hdg	-0.4	0.9	0.8	0.9	1.0																												
Intl Small	-0.3	0.9	0.8	1.0	0.9	1.0																											
Intl Small Hdg	-0.4	0.8	0.8	0.9	1.0	0.9	1.0																										
EM	-0.3	0.8	0.7	0.9	0.8	0.9	0.8	1.0																									
Global Equity	-0.3	1.0	0.9	1.0	0.9	0.9	0.9	0.9	1.0																								
PE	-0.2	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.7	1.0																							
US TIPS	0.0	0.2	0.1	0.3	0.1	0.3	0.2	0.4	0.3	0.1	1.0																						
US Treasury	0.1	-0.3	-0.3	-0.2	-0.3	-0.2	-0.3	-0.2	-0.2	-0.2	0.6	1.0																					
Global Sovereign ex US	0.1	0.3	0.1	0.4	0.1	0.4	0.1	0.4	0.4	0.0	0.6	0.5	1.0																				
Global Sovereign ex US Hdg	0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.1	0.4	0.8	0.4	1.0																			
US Core	0.0	0.0	-0.1	0.2	0.0	0.2	0.0	0.2	0.1	-0.1	0.8	0.9	0.6	0.7	1.0																		
US Core Plus	-0.2	0.4	0.3	0.5	0.4	0.5	0.4	0.5	0.5	0.1	0.7	0.5	0.5	0.4	0.8	1.0																	
ST Govt/Credit	0.3	-0.1	-0.1	0.1	-0.1	0.1	-0.1	0.1	0.0	-0.1	0.6	0.6	0.6	0.5	0.7	0.6	1.0																
Short-Term Credit	-0.1	0.3	0.3	0.5	0.4	0.5	0.4	0.5	0.4	0.2	0.6	0.2	0.4	0.2	0.5	0.8	0.7	1.0															
Long-Term Credit	-0.2	0.3	0.2	0.4	0.3	0.4	0.4	0.4	0.4	0.0	0.6	0.5	0.5	0.5	0.8	1.0	0.5	0.6	1.0														
US HY	-0.3	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.4	0.5	-0.2	0.3	-0.2	0.2	0.6	0.2	0.6	0.5	1.0													
Bank Loans	-0.4	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.4	0.3	-0.4	0.0	-0.3	0.0	0.4	-0.1	0.5	0.3	0.9	1.0												
Global Credit	-0.2	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.2	0.7	0.2	0.7	0.2	0.6	0.8	0.5	0.7	0.8	0.8	0.5	1.0											
Global Credit Hdg	-0.2	0.5	0.4	0.6	0.6	0.6	0.6	0.7	0.6	0.2	0.7	0.3	0.5	0.4	0.6	1.0	0.5	0.8	0.9	0.8	0.6	0.9	1.0										
EMD USD	-0.2	0.6	0.5	0.7	0.6	0.7	0.6	0.7	0.7	0.3	0.7	0.3	0.5	0.2	0.6	0.8	0.4	0.7	0.7	0.8	0.6	0.9	0.9	1.0									
EMD Local	0.0	0.6	0.6	0.7	0.6	0.7	0.6	0.8	0.7	0.3	0.6	0.2	0.7	0.1	0.5	0.6	0.4	0.5	0.6	0.7	0.4	0.8	0.7	0.8	1.0								
Commodities	-0.1	0.5	0.4	0.6	0.4	0.6	0.4	0.7	0.6	0.3	0.4	-0.2	0.4	-0.3	0.1	0.3	0.2	0.4	0.2	0.5	0.5	0.6	0.4	0.5	0.6	1.0							
Hedge Funds	-0.4	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.5	0.3	-0.3	0.1	-0.2	0.0	0.4	-0.1	0.5	0.3	0.7	0.7	0.6	0.5	0.5	0.5	0.6	1.0						
Real Estate	-0.1	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.1	-0.1	0.1	0.0	0.0	0.2	0.0	0.1	0.1	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.4	1.0					
REITs	-0.1	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	0.4	0.3	0.0	0.4	0.1	0.3	0.5	0.1	0.3	0.4	0.7	0.5	0.6	0.6	0.6	0.6	0.3	0.4	0.6	1.0				
Infrastructure	-0.3	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.2	0.4	-0.1	0.5	-0.1	0.2	0.5	0.1	0.5	0.5	0.7	0.5	0.8	0.7	0.7	0.7	0.6	0.6	0.1	0.6	1.0			
Risk Parity	-0.1	0.5	0.4	0.6	0.4	0.6	0.5	0.6	0.6	0.3	0.7	0.3	0.6	0.3	0.6	0.7	0.5	0.6	0.6	0.6	0.3	0.8	0.7	0.7	0.7	0.6	0.5	-0.1	0.5	0.7	1.0		
Currency Beta	-0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.2	-0.2	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	0.1	0.0	0.1	1.0	
Inflation	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	-0.3	0.0	-0.3	-0.2	-0.1	-0.2	0.0	-0.2	0.3	0.4	0.1	0.0	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	-0.1	1.0

Note: Correlation assumptions are based on the last ten years. Private Equity and Real Estate correlations are especially difficult to model – we have therefore used BarraOne correlation data to strengthen these correlation estimates.

SRBR modeling assumptions

— Impacts from the contingency reserve are excluded from the analysis for simplicity.

— 50% of a given years actuarial gain on the total pension assets are attributed to the SRBR fund. The remaining 50% is realized by the pension.

— In addition, the SRBR fund is attributed between 0% and 7.25% return in a given year depending on portfolio performance. The fund is never attributed a negative return. If a negative return event occurs, those losses are covered by the pension's assets and a 0% return is attributed to the SRBR for the year.

— Expected withdrawals from the SRBR fund are taken to be those projected from the actuary found in the 12/31/2017 OPEB and non-OPEB valuation, section 2 page 9.

— Calculations for the SRBR fund are created as broad approximations with a focus on its impact on the pension's funds assets. Differences in smoothing methodology and return attribution may materially alter SRBR projected asset results.

Long-term risks – ERT results

Lack of transparency (alternatives portfolio strategies and fees); 2.6

Risk stemming from bond markets; 1.4

Portfolio complexity; 2

Manager fees/portfolio expenses too high; 2.6

Risk stemming from equity markets; 2

Portfolio downside risk (impact of very poor markets); 2.6

Illiquidity; 2

Portfolio leverage; 2

The Plan's funded ratio; 2.6

Falling short of the actuarial expected return of return; 2.2

Portfolio volatility (variability of returns/standard deviation); 2.4

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Private credit – investor's perspective

Key benefits:

— Illiquidity premium

— Contractual yield

— Higher in the capital stack

  ▪ lenders have priority over equity holders on cash flows

Key considerations:

— Borrowers may be of lower credit quality or may be unrated

  ▪ However, there are funds across the credit quality spectrum including investment grade private credit

— Limited liquidity

  ▪ as a result of capital lock-ups or lack of secondary buyers

— Tough to benchmark

— High fees (often private equity-like fees)

Risk and return characteristics

	Direct Lending	Mezzanine Financing	Stressed and Distressed
Relative risk	Moderate	Higher	Highest
Expected returns*	5 – 8% (10 – 16% after fund level leverage)	8 – 12%	12% and up
Return characteristics	Most of the return comes from contractual yield (coupon payments)	Typically more equity like in terms of return characteristics with less return coming from contractual yield	Varies depending on the situation

— Direct lending and mezzanine financing expected returns are similar so the investor must decide on where to take risk

— The tradeoff to achieve the expected low-double-digit returns involves either leverage to a senior part of the capital structure (direct lending) or investing in a lower part of the capital structure (mezzanine financing)

Expected returns are estimates based on manager survey

Glossary

Active management The process of constructing a portfolio with the goal of generating a return on investment that is greater than the general market would otherwise provide. Asset-liability studies exclude the potential gains/losses from active management.

Actuarial expected return - A pension fund portfolio's actuarial expected return is the rate used to discount future benefits to determine plan liabilities and is designed to be a reasonable expectation of the future rate of return on the pension plan's assets. Also known as the actuarial assumed rate and the discount rate.

Actuarial liability The present value of benefits earned to date plus the present value of benefits that will result from future increases in salary and service already earned.

Asset allocation – Asset allocation is the process by which an investor aims to balance risk and reward according to the plan's goals, risk tolerance and investment horizon. Assets are allocated between asset classes that have different levels of risk and return and behave differently from one another to provide diversification.

Asset/liability analysis A study that analyzes the future relationships between assets, liabilities, benefits and funding. A projection model previews how liabilities and required contributions react in various capital market environments, relying on assumptions regarding markets, plan membership, inflation, and various assumptions made by the plan's actuary.

Contributions – Employer and employee contributions into the system are determined by the plan's annual actuarial valuation and are updated regularly to ensure that contribution rates are sufficient to fund the plan. Actuarial valuations are based on the benefit formulas for the employee groups covered.

Glossary (continued)

Correlation – A measure of the relative movement of returns of one security or asset class relative to another over time. A correlation of 1 means the returns of two securities move in lock step, a correlation of -1 means the returns of two securities move in the exact opposite direction over time. Correlation is used as a measure to help optimize the benefits of diversification when constructing an investment portfolio.

Diversification – Diversification is a form of risk management whereby a variety of investments that are uncorrelated are combined in a portfolio with the goal of providing the highest return for a given level of risk. Diversification also mitigates unsystematic (company specific) risk.

Downside risk (drawdown risk) - A measure of volatility, or risk, focusing on downside or negative performance time periods. Drawdown risk is a subset of downside risk that measures peak to trough declines and is defined as the negative half of standard deviation.

Enterprise risk tolerance (ERT) - A holistic assessment of risk for a plan that incorporates and extends beyond portfolio risk. In addition to investment risk, the ERT assessment includes regulatory risk, headline risk, peer risk and organizational risk to the system. A plan's ERT is incorporated into strategic decision-making.

Funded ratio (funded status) – A measurement of the funded status of the system. The funded ratio is calculated by dividing the valuation assets by the actuarial accrued liability. For example, a funded ratio of 90% indicates that assets are 10% less than liabilities.

Glossary (continued)

Normal cost – Represents the portion of the cost of projected benefits allocated to the current plan year.

Peer risk - Peer risk refers to having a plan portfolio that looks different from the average pension plan. Peer risk is most often highlighted during periods of underperformance versus average plans.

Standard deviation A measure of volatility, or risk. Measures risk by indicating how far from the average, or mean, return one is likely to fall in any given time period. The rules of statistics dictate that you will fall within 1 standard deviation of the mean 2/3 of the time and within 2 standard deviations 95% of the time. For example, if a security has an average annual rate of return of 10% and a standard deviation of 5%, then two-thirds of the time, one would expect to receive an annual rate of return between 5% and 15%.

Volatility - A statistical measure of the dispersion of returns for a security, index or portfolio. Generally speaking, the higher the volatility, the riskier the investment. Volatility is most commonly measured using standard deviation (defined above).

Notices & disclosures

PERSPECTIVES
THAT DRIVE ENTERPRISE SUCCESS

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MAY 2019

Timberland Overview and Market Update

Alameda County Employees' Retirement Association

Table of Contents

Timberland: What are we talking about?

— Investing in timberland means owning commercial tree plantations

— The two primary tree types are hardwood and softwood

  ▪ Generally, softwood trees dominate the Pacific Northwest and Southeast (Spruce, Pines, Firs, Junipers)

  ▪ Hardwoods are generally grown in the Northeast/North Central regions (Birch, Hickory, Maple, Oak, etc.)

— Returns are driven by the appreciation of the land and trees, income from harvesting the trees and non-timber income

— Timber Investment Management Organizations (TIMOs) are the managers that invest and operate the timberland on behalf of investors

  ▪ TIMOs can add value by improving crop yields, harvesting schedules and seeking higher and better use of the timberland (i.e. mitigation banking, selling to developers, etc.)

— Timber is a global commodity with opportunities to invest beyond North America

Timberland sources of return
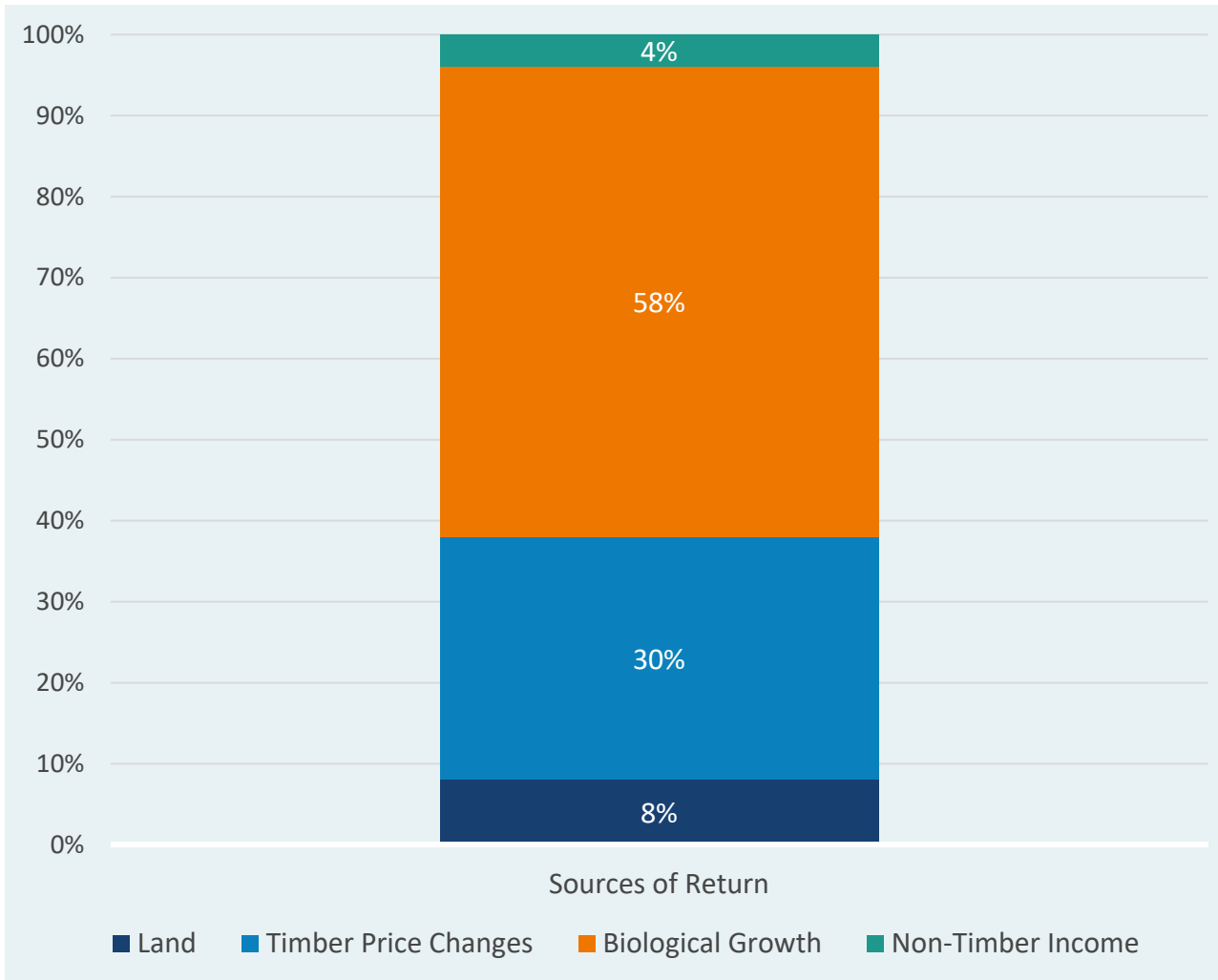
Biological growth is the largest component of return within timberland. As trees mature they increase in volume and value.

More mature trees can be used for higher value sawtimber

Land returns are in part inflation driven but also higher-and-better-use opportunities (i.e. selling the land to developers or land trusts)

Non-timber income includes recreational leasing, mineral rights, mitigation banking and carbon-offset markets

Source: Campbell Global

Value and product changes over time

Hypothetical Yield Curve – Southern Pine
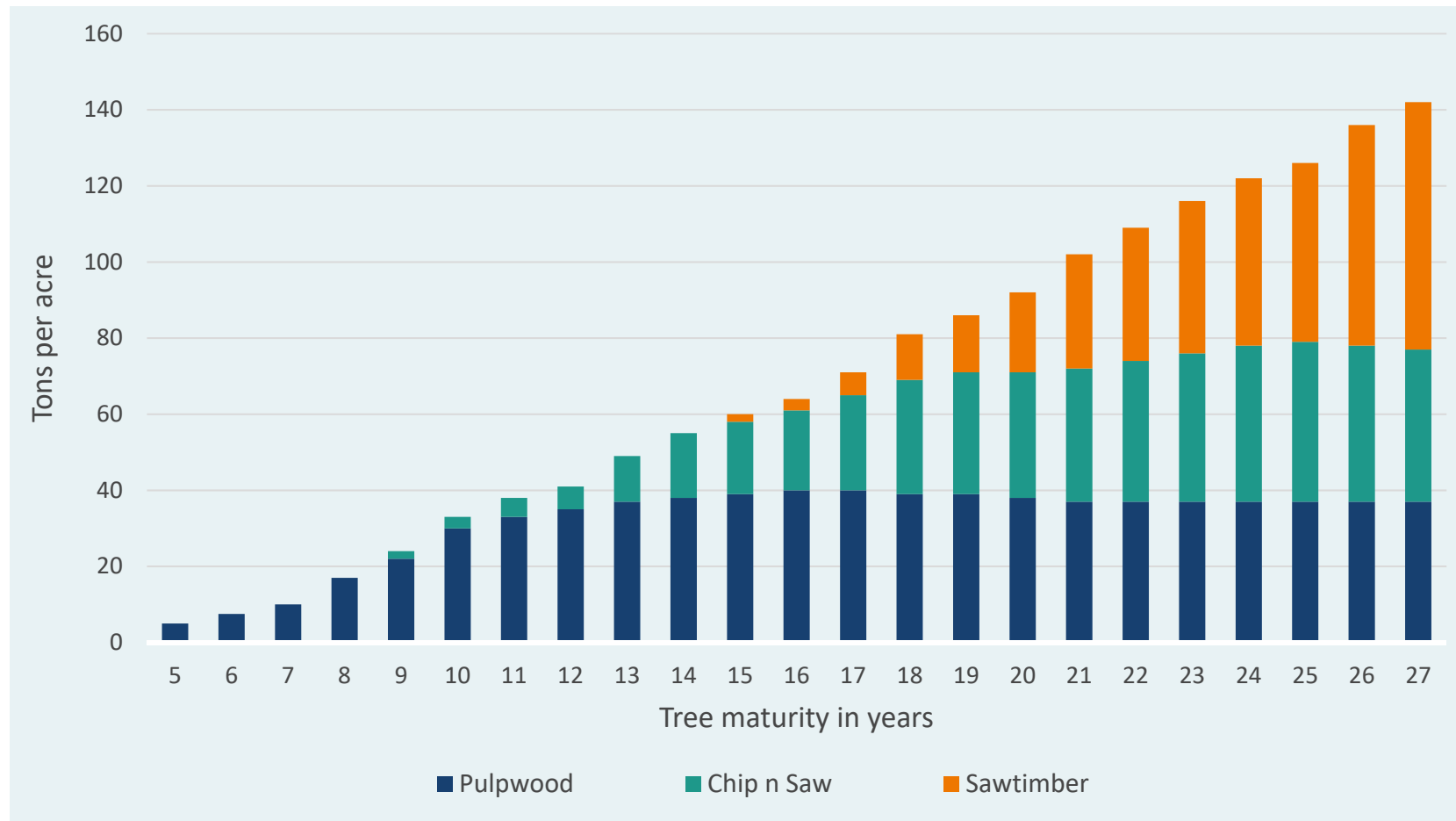
Sawtimber is a higher value product relative to pulpwood

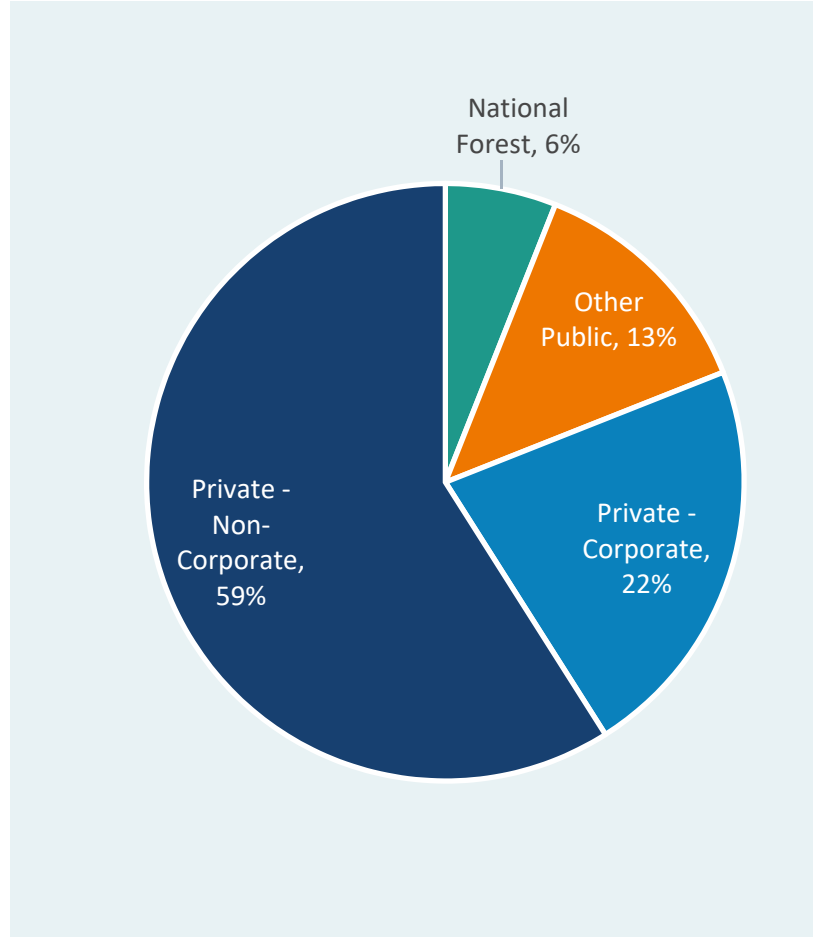Tree volume is increasing as the tree matures, as well

Source: Forestry Research Group

Forestry land ownership in the U.S.

FORESTRY LAND OWNERSHIP IN THE U.S. WEST

Private - Non-Corporate, 22%
Private - Corporate, 9%
Other Public, 22%
National Forest, 47%

FORESTRY LAND OWNERSHIP IN THE U.S. EAST

National Forest, 6%
Other Public, 13%
Private - Corporate, 22%
Private - Non-Corporate, 59%
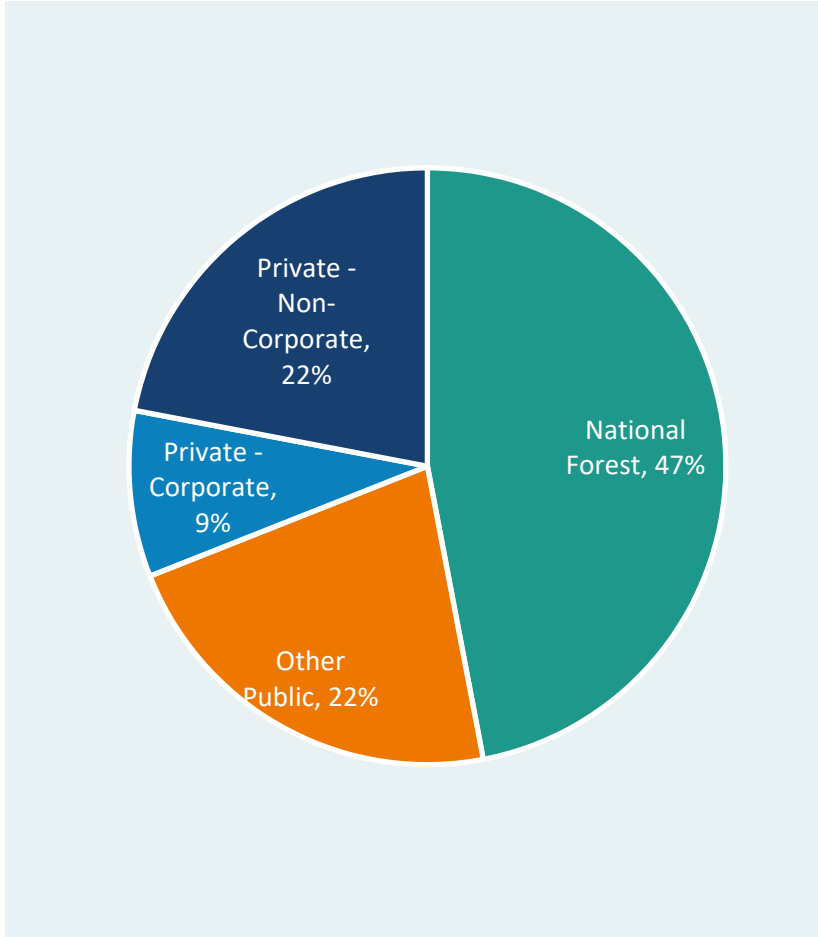
U.S. South and Northeast have a larger share of available timberland held in private hands

Much of the U.S. West is unavailable for purchase by private investors; off limits for timber harvesting

Source: US Forestry Service

Timberland diversification

CORRELATION MATRIX (1992-2018)

	Bloomberg Barclays Aggregate	NCREIF Farmland	NCREIF ODCE	NCREIF Timberland	Russell 3000
Bloomberg Barclays US Aggregate	1.00	-0.10	-0.11	0.08	-0.20
NCREIF Farmland	-0.10	1.00	0.14	0.40	0.13
NCREIF Property - ODCE	-0.11	0.14	1.00	0.02	0.16
NCREIF Timberland	0.08	0.40	0.02	1.00	0.04
Russell 3000	-0.20	0.13	0.16	0.04	1.00

— Timberland has a unique return driver that does not correlate with any other asset class – biological growth

— Demand drivers for lumber and perhaps wood fiber correlate with economic activity but that can be episodic over short-to-medium time periods (i.e. homebuilding)

— As a component of a portfolio, timberland provides an interesting diversifier but that alone does not make the asset class compelling as an investment

Timberland risks

Operational risk
— Harvest strategy
— Infrastructure/transportation costs
— Financing/Cap structure
— Supply agreements
— Easements/encumbrances
— Non-timber income

Price risk
— Supply/Demand volatility
— Mill density
— Harvest timing/strategy
— Maturity of trees

Risk factors

Loss of inventory
— Weather
— Fire
— Pests
— Regulatory changes

Valuation
— Changes in discount rates
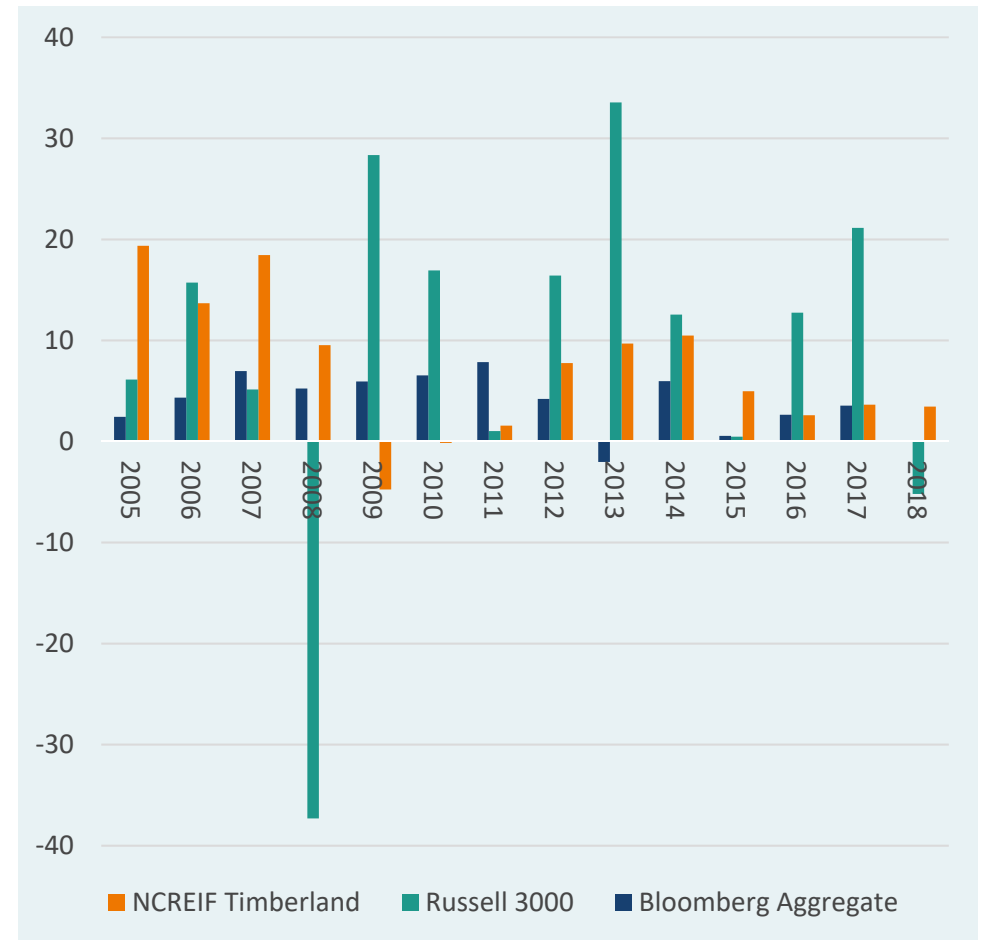— Liquidity
— Operating margins
— Product obsolescence
— Entry vs Exit valuation

Timberland performance

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Timberland performance

TRAILING PERFORMANCE

CALENDAR YEAR PERFORMANCE

Legend: NCREIF Timberland, Russell 3000, Bloomberg Aggregate
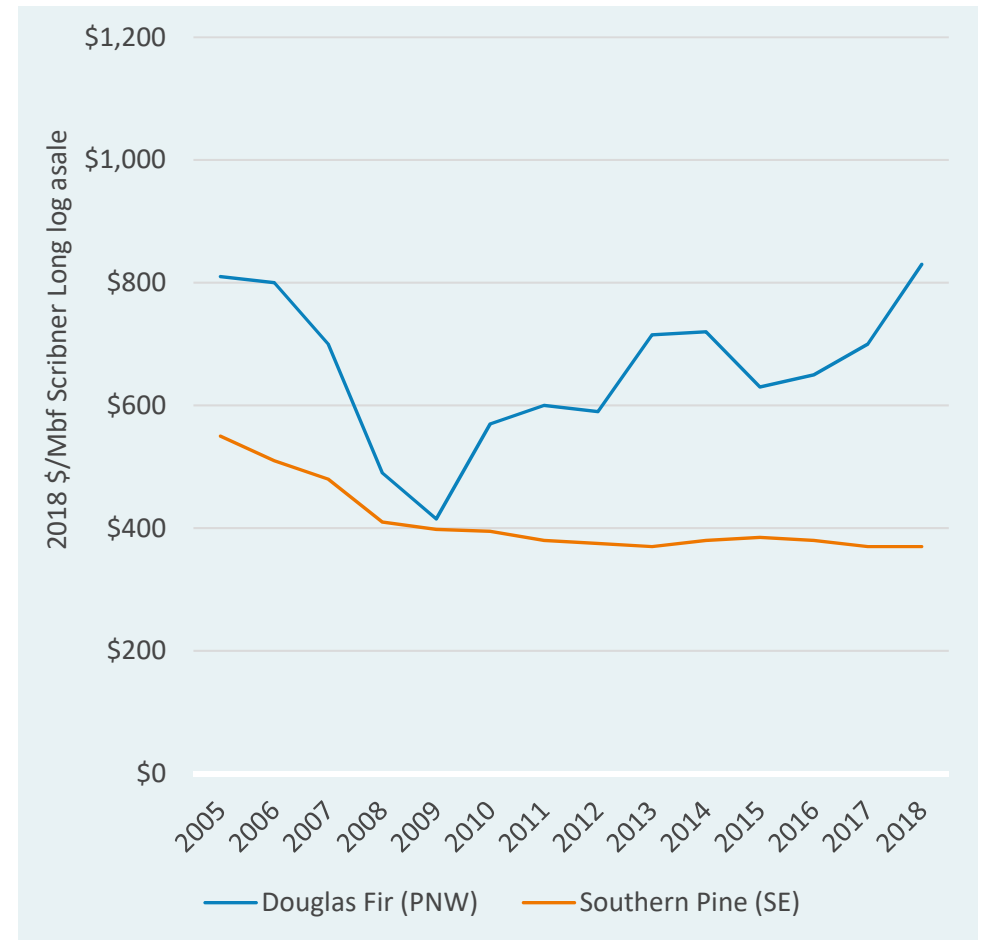
As of 12/31/18

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Timberland performance by region

HISTORICAL PERFORMANCE BY REGION
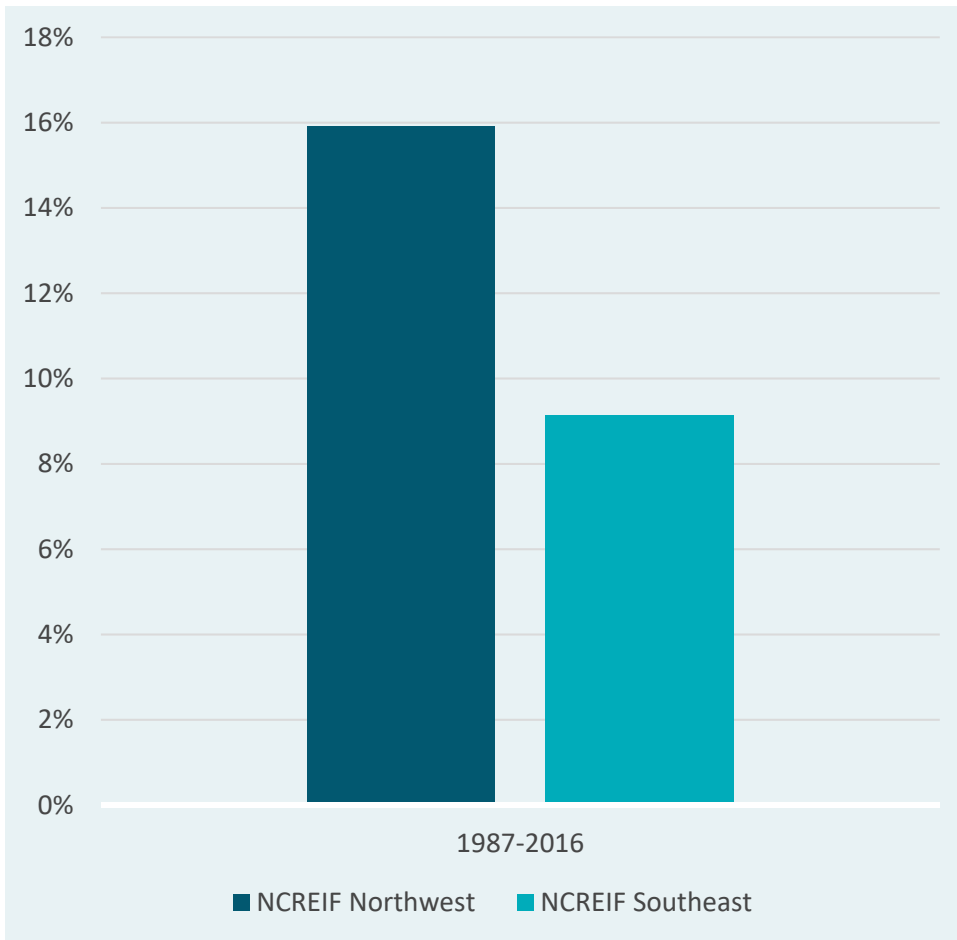
SAWLOG PRICES BY REGION/SPECIES

Source: Campbell Global

Performance challenges since GFC

— Timberland as an asset class has faced several headwinds since the GFC

- Home building is a primary end market for saw timber which has struggled to recover since the GFC

- Paper/pulp demand has been challenged by the digitization of our information and increased supply from South America

- Low interest rates and greater competition from investors have driven valuations higher

— Divergence in performance between Pacific Northwest (PNW) and Southeast timberland

- Historically, the Pacific Northwest timberland has enjoyed a substantial return premium above Southeast timberland.

- Douglas Fir has enjoyed strong prices, driven largely by lumber exports to Asia and supply constraints out of Canada and the U.S. from regulatory, weather and pest issues.

- The availability of timberland and small size of the PNW create a challenge for TIMOs to access acreage of scale. Most TIMOs instead focus on the Southeast where transactions and large acreage positions are more readily available.

- An abundance of supply in the US South has kept prices flat since the GFC for Southern Pine logs

ESG/Impact

ESG/Impact investing

— Timberland is a compelling asset class for investors interested in Impact and/or ESG investing

- Plant life and phytoplankton consume CO2 from our atmosphere

- Trees are particularly important in the regulation of CO2 due to their size and ability to store large amounts of carbon

- Harvesting trees traps the carbon in lumber/wood products and allows the planting of new trees

- Younger forests consume several times the amount of carbon dioxide that mature forests consume

— Biomass as a fuel

- Biomass as a fuel is not carbon-neutral when factoring in transportation and harvesting but is more sustainable and cleaner than fossil fuels

- Growing biomass fuel industry in the Asia and Europe is creating a demand for wood products

- U.S. timberland is a growing supplier for wood pellet plants globally
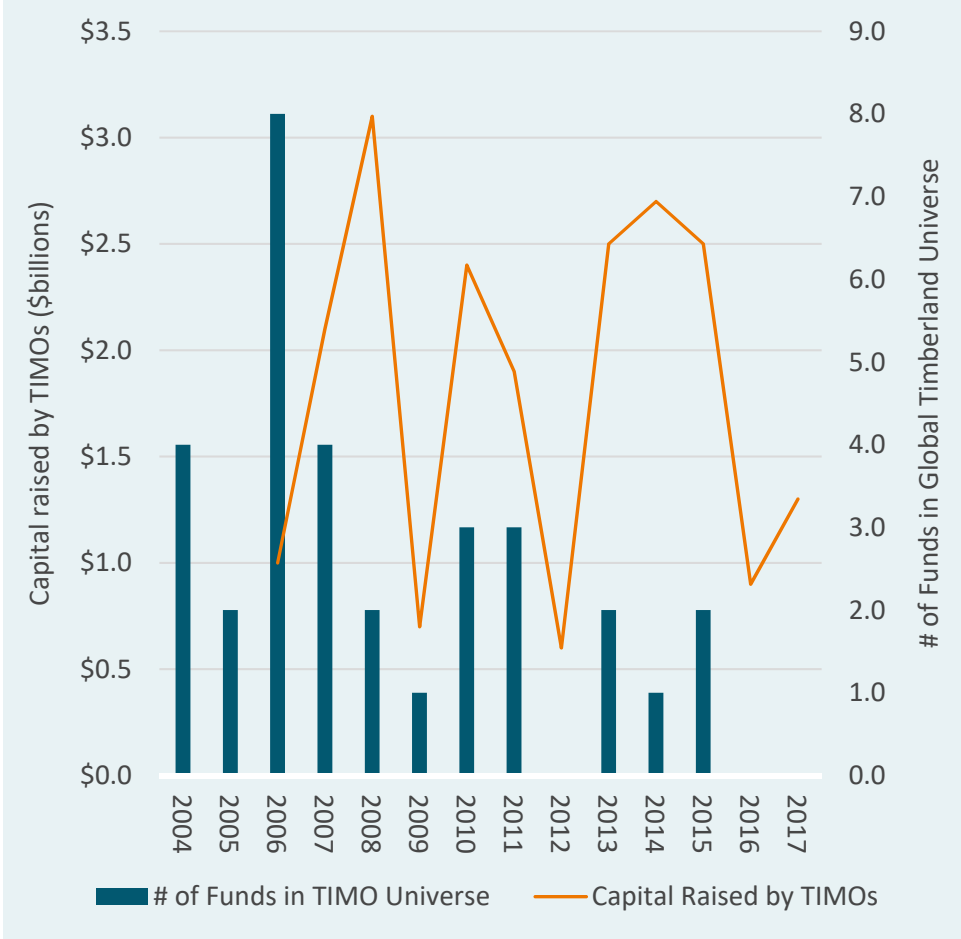
Market opportunity in timberland

Stalled M&A market

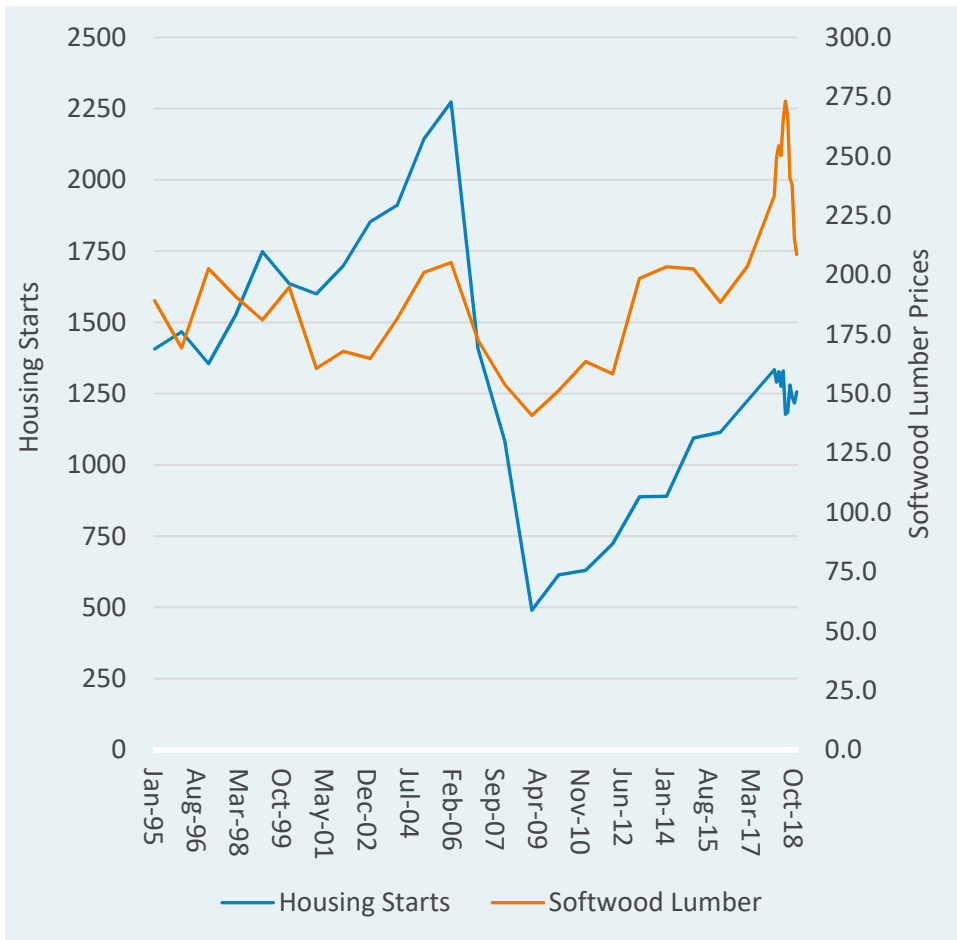**TIMBERLAND TRANSACTIONS IN THE UNITED STATES**
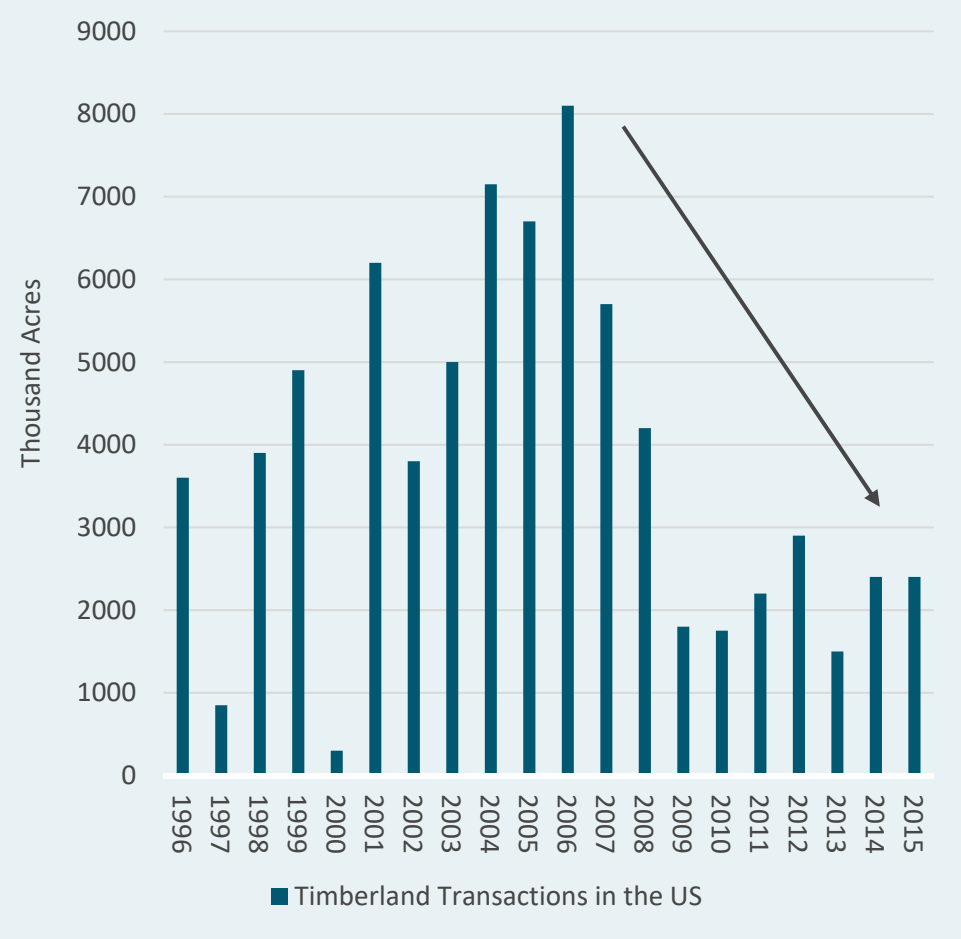
CAPITAL RAISED BY TIMO FUNDS & # OF FUNDS IN TIMO UNIVERSE

Source: Campbell Global

Source: Preqin & Cambridge Associates – Global Timberland Manager Universe

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Divergence in softwood log vs lumber prices

HOUSING STARTS & SOFTWOOD LUMBER PRICES

SOUTHERN PINE LOGS VS SOFTWOOD LUMBER

Source: St. Louis Fed

Market outlook

— Performance challenges in the asset class

- Home building is a primary end market for saw timber which has struggled to recover since the GFC

- Lumber prices are at historic highs but that has not translated into higher prices at the stump. Oversupply of timber and a shortage of mills has contributed to the price divergence

- Low interest rates have driven cap rates to historic lows

— Demand

- Lumber demand has been strong both domestically and abroad

- New mill construction and expansions will alleviate the bottleneck in Southern Pine milling

- Exports to China slowed in the last couple years but are expected to remain strong in Asia broadly

— Supply

- Excess supply from Southern Pine has depressed prices since the GFC; still working through excess inventory

- Lack of supply in the PNW has driven prices higher for softwood from that region

Market outlook (cont.)

— Interest rates

  ▪ Like all financial assets, timberland is exposed to interest rate risk through the discounting of future cash flows

  ▪ With discount rates around 5.25-5.5% today, investors should expect to exit at a higher rate in the future

— Trade Policy

  ▪ The Trump administration has enacted trade policy initiatives which impact the forest products industry

    • A tariff placed on Canadian timber imports has reduced Canadian softwood imports into the U.S.

    • Exports of U.S. timber to China collapsed in September as retaliatory tariffs from China halted sales of U.S. softwood logs & lumber

— Exit market uncertainty

  ▪ The lack of fundraising success for TIMOs presents an opportunity for buyers today but also presents a risk in the future as investors seek an exit of their own

Return expectations

— Depending on your start and end date, timberland has either returned in the low-teens historically or in the mid-to-high single digits. We believe the asset class was undergoing a unique shift in the 90s and early 2000s that drove high double digit returns that aren't repeatable in today's market. Investors should not be looking at timberland as a high return driver for their portfolio, despite the illiquid nature of the asset class.

— Return drivers within timber come from the appreciation of the land (inflation + timber value) and income from both harvesting timber and non-timber income sources (i.e. hunting leases, mineral interest, etc.). Rising discount rates will be a key headwind for the asset class but could be offset by diligent underwriting and rising prices for timber. We are guiding investors toward an expected return within timberland of 7-9% (gross).

— There appears some tailwinds to the timberland story but we are hesitant to invest in an illiquid asset class on those uncertainties. Timberland as an investment is not for everyone and given the modest returns and illiquid nature, we believe is most appropriate for investors with a low cost of capital and an interest in renewable resources.

TIMBERLAND RETURNS HISTORICALLY
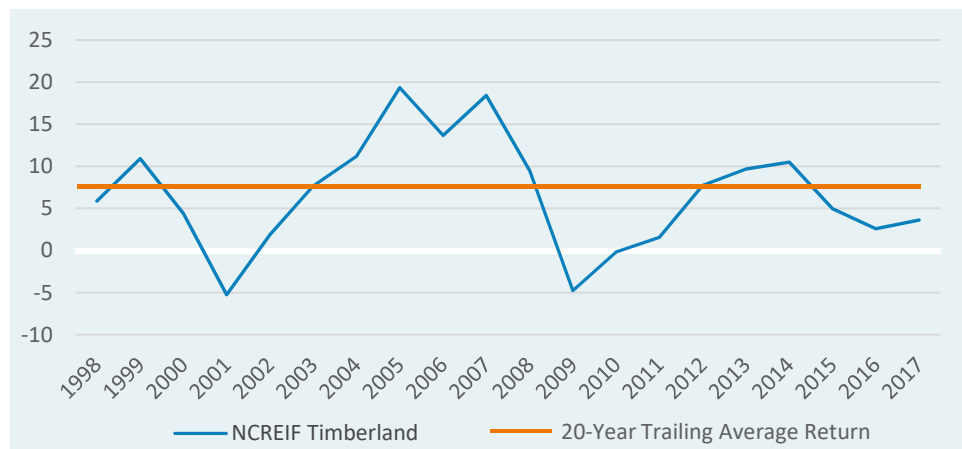
TIMBERLAND RETURN BRIDGE
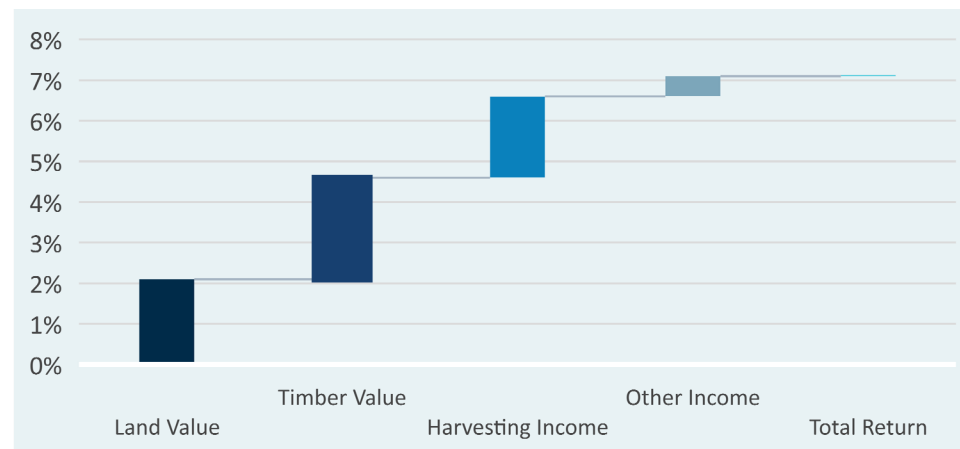
Source: St. Louis Fed, as of 3/31/18

To:	Members of the Investment Committee
Date:	May 15, 2019
From:	Betty Tse, Chief Investment Officer
Subject:	Real Assets Policy Update: Modification of Index Name in Benchmark Composite

Recommendation:

No recommendation. This is an information item.

Background:

As part of the October 18, 2018 amendments to the Real Assets (RA) Policy, the "Natural Resources" Index in the benchmark composite was changed to the "S&P Global LargeMidCap Natural Resources Index". However, an error was made in the name of this index. It should have been the "S&P Global LargeMidCap Commodity and Resources Index". As a result, Staff is notifying the Committee that the benchmark in question will be modified accordingly.