PERA
Public Employees Retirement Association of New Mexico

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Investment Education Session

NM PERA ABQ Office • Board Room • 6300 Jefferson St, NE, Suite 100, Albuquerque, NM 87109

Virtual Webinar Link:
https://us02web.zoom.us/j/86063499853?pwd=UGlOZXduNFJyOENQTTM2dXJqbEFQUT09

Thursday, September 15, 2022
2:00pm MT

2:00pm	Introduction		Michael Shackelford Chief Investment Officer
2:10pm	Asset Allocation Review		Rose Dean Stephen DiGirolamo Wilshire
3:00pm	Private Market Refresher: • Private Equity • Illiquid Real Assets • Illiquid Real Estate • Illiquid Credit		LeAnne Larrañaga-Ruffy Head of Alpha Michael Killfoil Clayton Cleek Investment Associates
3:30pm	Benchmarking Review		Rose Dean Stephen DiGirolamo Wilshire
4:00pm	Investment Policy Statement Appendix Review		Kristin Varela Deputy Chief Investment Officer
4:15pm	Closing Remarks		Michael Shackelford Chief Investment Officer

Wilshire

Public Employees Retirement Association of New Mexico

Investment Retreat
Asset Allocation Review

September 2022

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Agenda

- Asset Allocation Process
- Assumptions
- Custom Illiquidity Analysis
- Portfolio Options
- Appendix

Asset Allocation Process

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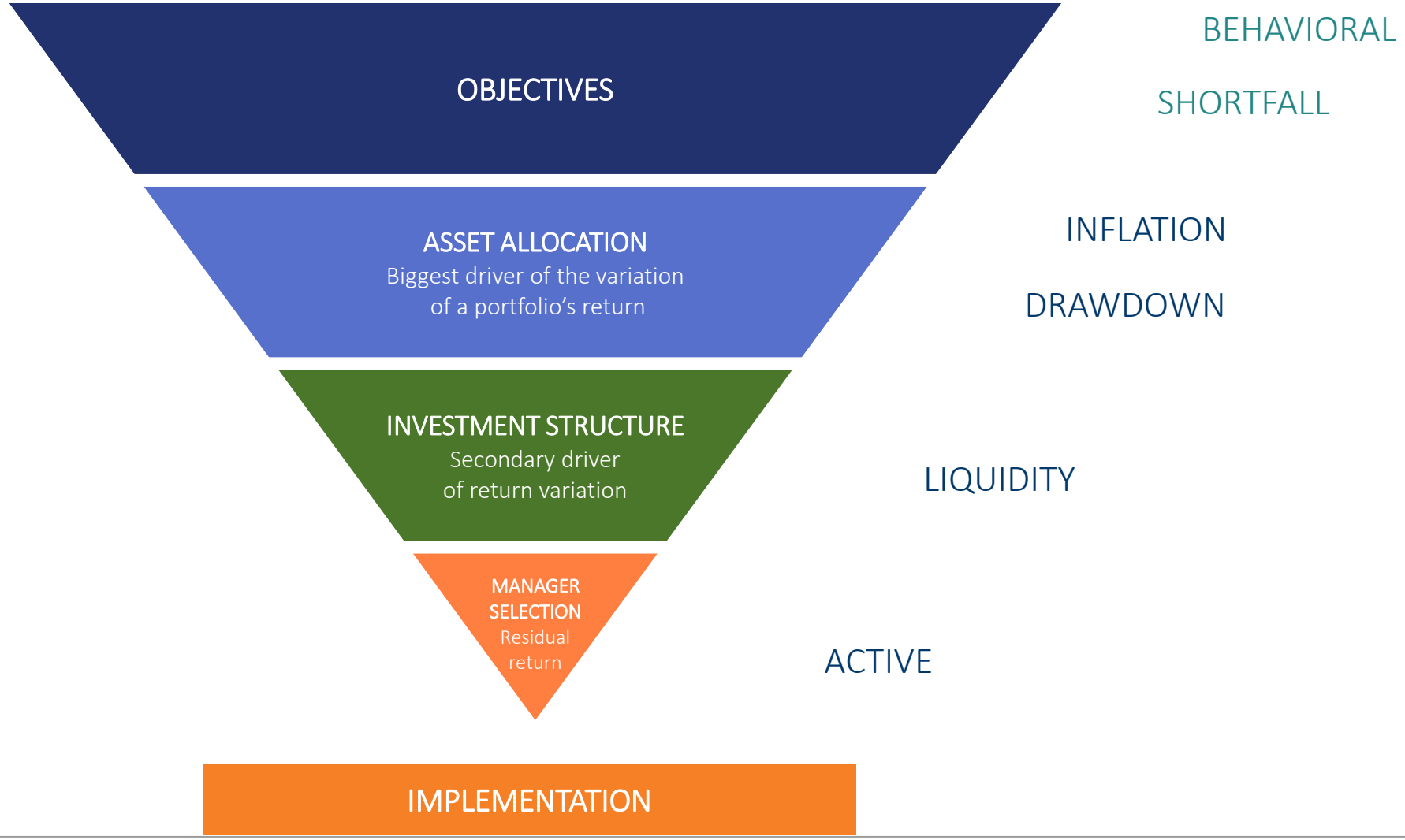
Focus on Decisions that Matter

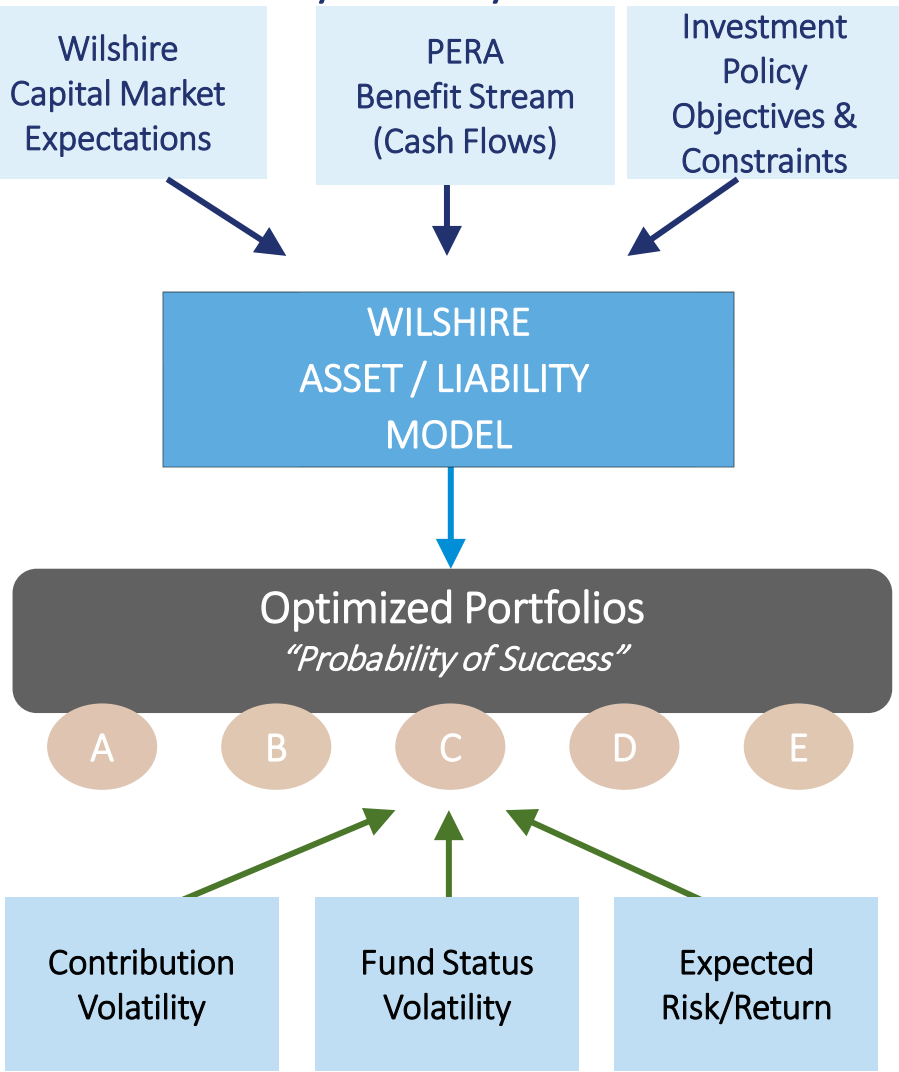


Risk Assessment Framework

Wilshire's multi-dimensional view of risk integrates organizational and investment considerations into a comprehensive framework for evaluating strategic decisions.

- Shortfall: Support distributions and long-term growth
- Behavioral: Instill strong governance
- Drawdown: Limit portfolio losses
- Inflation: Preserve long-term purchasing power
- Liquidity: Balance near-term needs, long-term opportunities
- Active: Ensure unique exposures
- Emerging & Long-Term: Environmental, Social & Governance risks, such as externalities, intangibles and reputation may be linked to various risk lenses

Asset Liability Analysis Model



- Wilshire believes the mission of a defined benefit plan is to fund benefits promised to participants
- The role of asset allocation is to manage risk in order to fulfill that core mission
  - Maximize safety of promised benefits
  - Minimize cost of funding these benefits
- Wilshire's Asset Liability Model provides methodology for selecting a target portfolio that considers both goals
- Rigorously developed capital market assumptions for risk and return (see appendix)
- Given that short-term volatility is also important, we identify the impact of the asset allocation decision on funded ratios, annual contribution requirements, and other metrics
- Strategic asset allocation is not a guide to outperforming in every market … but it should provide a roadmap for success over a market cycle

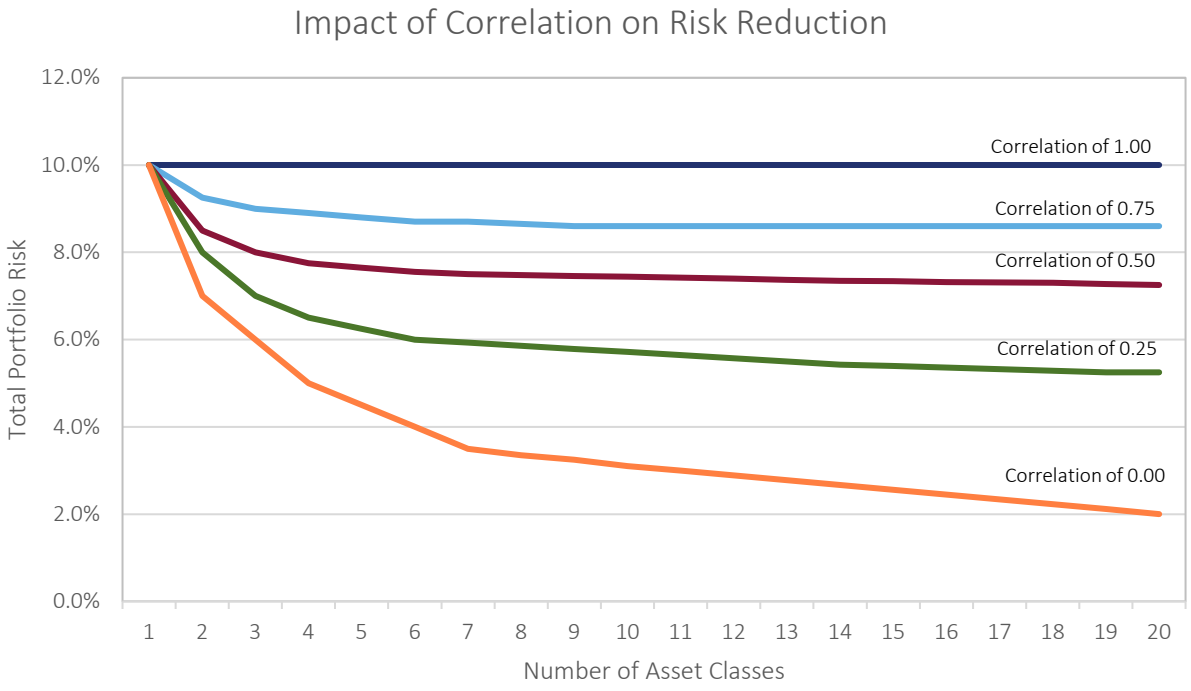
Benefits & Challenges of Diversification

Investors must take a thoughtful approach to diversification

- DINO (Diversification in name only)
- Diminishing marginal benefit by simply adding asset classes, even with uncorrelated assets

Utilize a factor-based and bucketing approach to asset allocation decisions

- Concept of grouping asset classes together that perform similarly in various market environments
- Emphasize asset class economic factors



Asset-Only Mean Variance Optimization

Role of asset allocation:

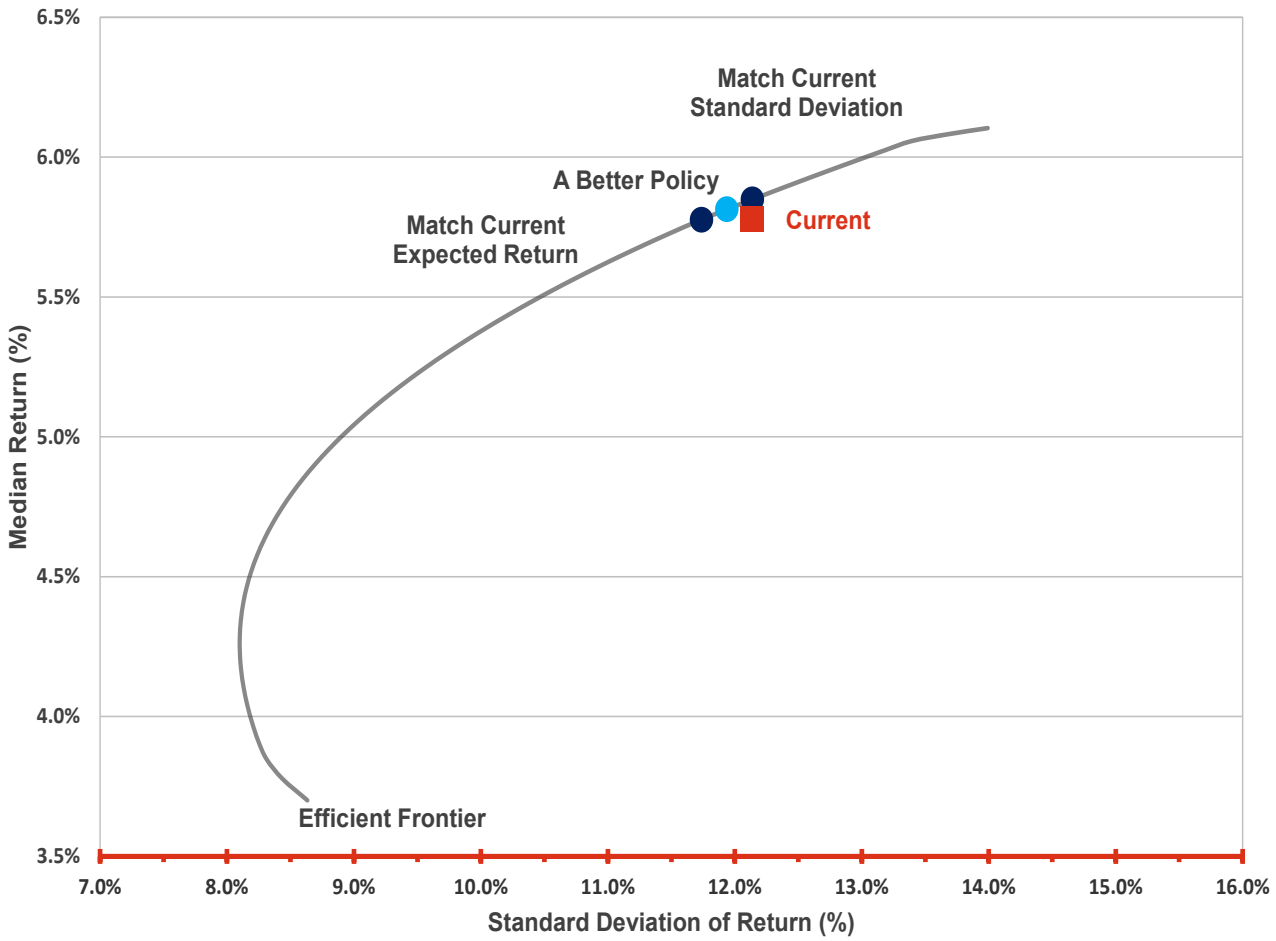
- To maximize return
- To minimize risk

Traditional mean-variance optimization considers the relationship of assets to each other when analyzing portfolios.

- Consider the relationship of asset classes and the role each asset class plays in a portfolio
  - Return, risk and correlation assumptions

Optimal portfolio is a balance of trade-offs.

- Return vs. risk
- Liquidity
- Diversification



Need for Constraints

Practical diversification

- Optimizer will not differentiate between public and private markets / factor exposure / role in portfolio
- Asset class roles (growth, defensive, inflation mitigation) are examples of practical portfolio considerations

Liquidity

- Private markets tend to have higher return expectations partially due to illiquidity premium
- In an optimization framework, private asset classes are very attractive based on risk/return inputs
- However, mean-variance optimization ignores the need for liquidity

Investability

- Investments in private market strategies take time to fully implement
- Implementation challenges in some sectors to deploy significant portion of the portfolio

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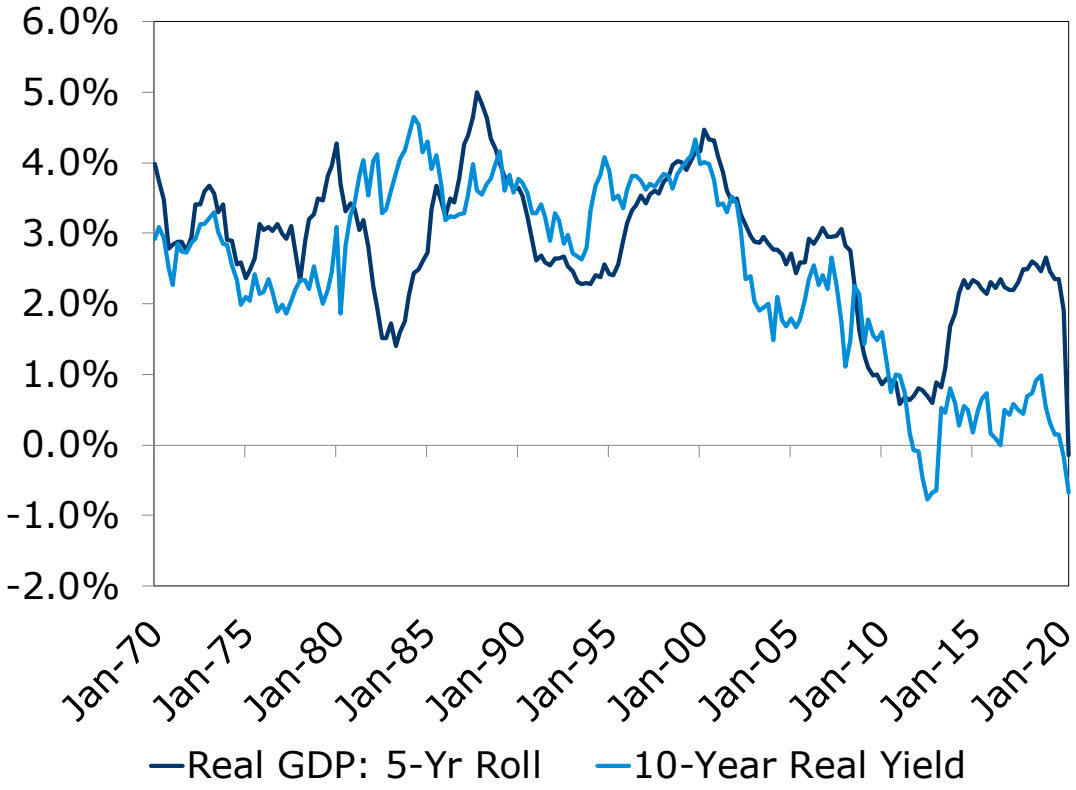
Economic Factor Exposure - Growth Proxy

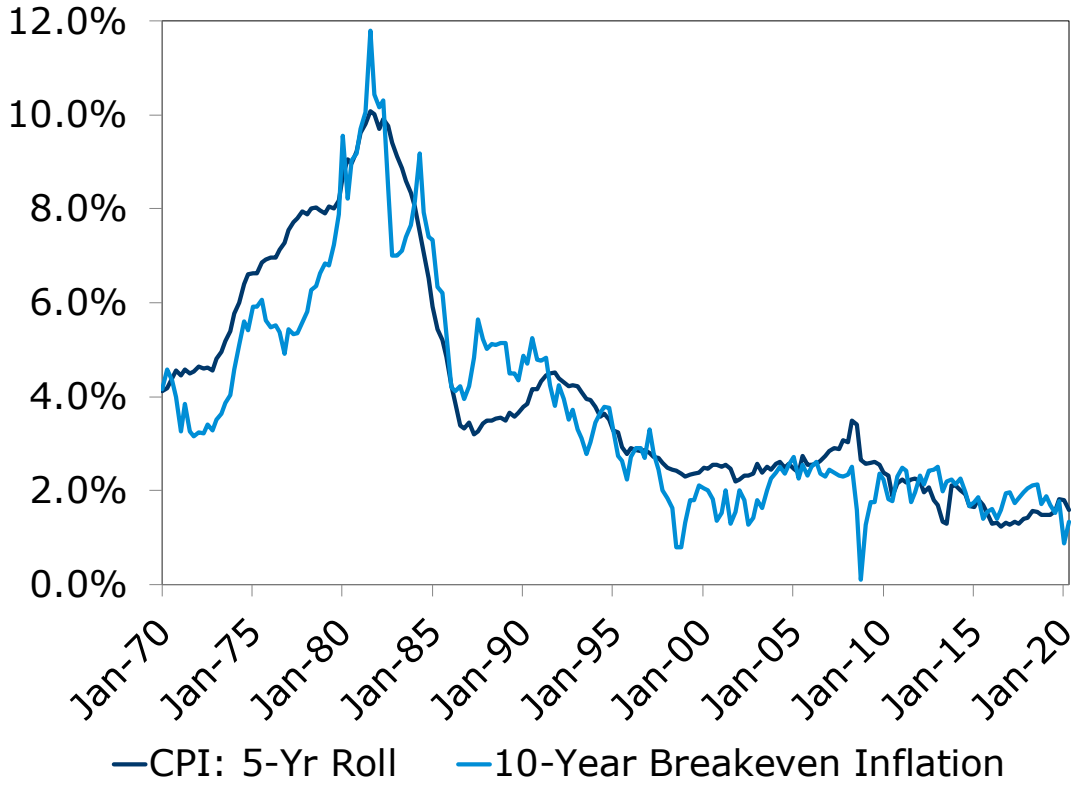
- Interest rates contain information and can reflect economic factors
- Nominal yields aggregate two important and distinct sources of economic information – real yields and expected inflation
- Disaggregating these factors should prove beneficial in developing a set of factors with improved explanatory power



Data Source: Federal Reserve, Bridgewater

Economic Factor Exposure - Inflation Proxy

- Breakeven inflation is the market's expectation for inflation
- Tends to follow closely with actual, recent inflation and can act as a timely signal of trends in consumer prices



Data Source: Federal Reserve, Bridgewater

Why Introduce Factors?

- **Risk Assessment:** Including factors within the asset allocation process provides an opportunity to measure asset class (and portfolio) exposures to key economic factors

- **Economic Efficiency:** If the underlying economic activity that drives asset performance can be identified, perhaps it can be used to assist in building economically-efficient portfolios

- **Portfolio Stability:** Macroeconomic risk factors – when separated from the valuation component inherent in investment pricing – may exhibit more stable correlations and, therefore, can better inform the allocation process

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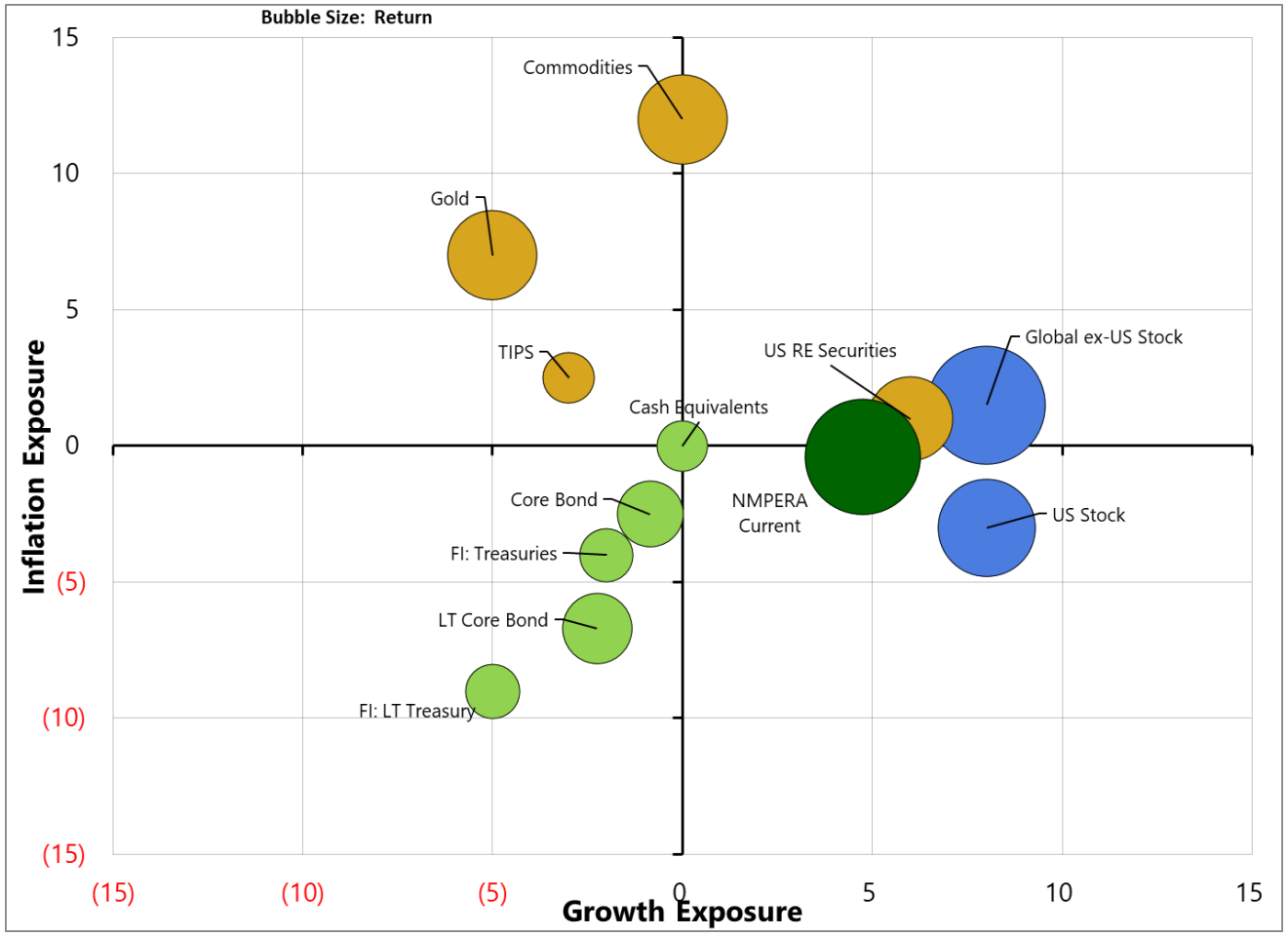
Economic Factor Model

- Employ a 2-factor regression model (growth and inflation) to formulate factor assumptions



Assumptions

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Capital Markets Assumptions – June 30,2022

	Public Equity - Global	Public Equity - Global Low Volatility	Private Equity	Core US Bond	Core Global Bond (Hedged)	Global High Yield (Hedged)	Emerging Market Debt	Alternative Credit	Private Credit (Blend)	Global Real Estate Securities	Global Listed Infrastructure	Private Real Estate (Blend)	Private Real Assets (Blend)	Risk Parity (15% Volatility)
Return - 10-Year (%)	6.60	6.65	10.24	4.05	2.97	6.50	5.89	6.65	7.49	5.35	5.25	5.89	6.65	7.69
Return - 20-Year (%)	6.98	7.02	10.43	4.24	3.42	6.68	6.11	6.58	7.44	5.86	5.99	6.25	7.41	8.46
Return - 30-Year (%)	7.35	7.38	10.62	4.43	3.86	6.87	6.34	6.50	7.39	6.38	6.73	6.60	8.17	9.22
Risk (%)	17.10	13.54	30.43	4.25	3.88	9.75	6.98	5.82	7.74	16.45	17.00	12.71	20.43	15.00
Correlations														
Public Equity - Global	1.00													
Public Equity - Global Low Volatility	0.97	1.00												
Private Equity	0.72	0.75	1.00											
Core US Bond	0.20	0.20	0.31	1.00										
Core Global Bond (Hedged)	0.21	0.20	0.29	0.87	1.00									
Global High Yield (Hedged)	0.51	0.51	0.31	0.25	0.28	1.00								
Emerging Market Debt	0.48	0.58	0.36	0.41	0.39	0.57	1.00							
Alternative Credit	0.56	0.52	0.28	0.29	0.29	0.70	0.61	1.00						
Private Credit (Blend)	0.57	0.54	0.27	0.16	0.16	0.82	0.59	0.95	1.00					
Global Real Estate Securities	0.65	0.73	0.57	0.17	0.10	0.61	0.49	0.63	0.68	1.00				
Global Listed Infrastructure	0.74	0.73	0.58	0.12	0.05	0.58	0.44	0.56	0.63	0.72	1.00			
Private Real Estate (Blend)	0.53	0.65	0.49	0.18	0.11	0.58	0.43	0.59	0.63	0.81	0.50	1.00		
Private Real Assets (Blend)	0.71	0.70	0.57	0.14	0.06	0.60	0.45	0.61	0.66	0.74	0.85	0.55	1.00	
Risk Parity (15% Volatility)	0.72	0.71	0.60	0.60	0.54	0.54	0.60	0.55	0.52	0.55	0.63	0.50	0.65	1.00

Current Portfolio

Asset Class	Current Policy
Global Equity	35.50%
Risk Reduction & Mitigation	19.50%
Credit Oriented Fixed Income	15.00%
Real Assets	20.00%
Multi-Risk Allocation	10.00%
Total Assets	**100.00%**
Expected Beta Return - 10 Years (%)	**7.11**
Expected Beta Return - 20 Years (%)	**7.46**
Expected Beta Return - 30 Years (%)	**7.82**
Standard Deviation of Return (%)	**11.43**
Sharpe Ratio	**0.35**

Based on Wilshire's June 30, 2022 capital markets assumptions

Asset Class	Current Portfolio
Public Equity - Global	16.50%
Public Equity - Global Low Volatility	7.00%
Private Equity	12.00%
Core US Bond	17.00%
Core Global Bond (Hedged)	2.50%
Global High Yield (Hedged)	2.00%
Emerging Market Debt	3.00%
Alternative Credit	4.00%
Private Credit (Blend)	6.00%
Global Real Estate Securities	0.00%
Liquid Real Assets	5.00%
Private Real Estate (Blend)	7.00%
Private Real Assets (Blend)	8.00%
Risk Parity (15% Volatility)	10.00%
Total Assets	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**
Expected Beta Return - 20 Years (%)	**7.46**
Expected Return - 30 Years (%)	**7.82**
Standard Deviation of Return (%)	**11.43**
Sharpe Ratio (10 Year)	**0.35**

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Custom Illiquidity Analysis

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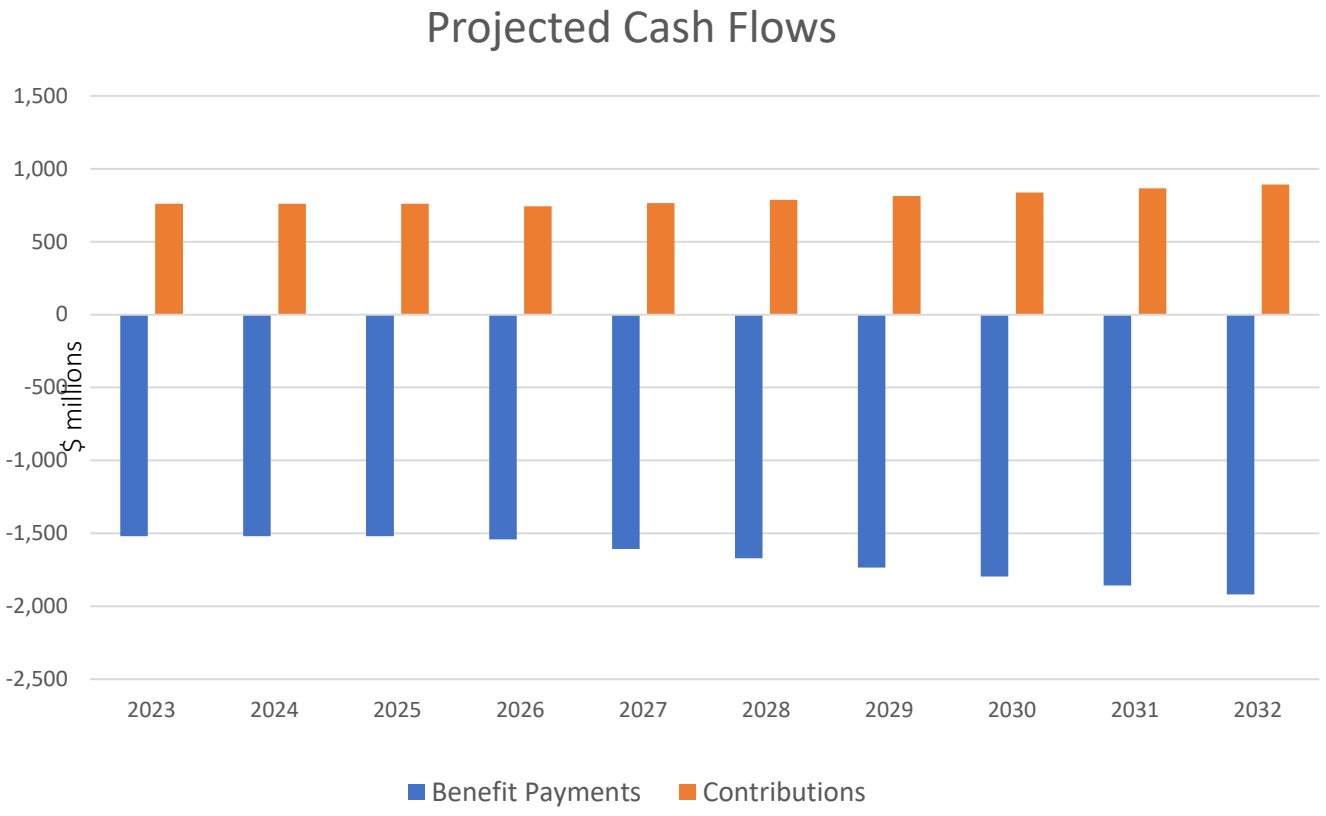
Cash Flow Projection



- Annual benefit payments are projected to increase faster than annual contributions
- The plan will remain cash flow negative over the foreseeable future
- The extent of illiquidity exposure for PERA must consider the extent of liquid assets to cover cash flow shortfall

Liquid Portfolio Value Simulation

Assumptions

- Simulation was run for 10 years using PERA projected benefit payments and contributions
- One time 20% / 30% / 40% drawdown in liquid assets assumed for one year starting year 2
- Liquid asset return assumption based on Wilshire CMA = 6.1%
- Then calculated the maximum allocation to private assets before depleting liquid assets

Caveats

- Simulation assumes you can get these exposure to private markets instantaneously – this is not realistic
- The plan has more than 10 years of benefits to payout
- Host of actuarial assumptions go into the cash flow projections. If any of these assumptions change, the results will change
- It would be prudent to apply qualitative adjustments to factor in these uncertainties

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Max Private Assets Allocation – 20% Drawdown Scenario

Market Value of PERA Liquid Assets (Simulation)										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Simulation 1	7,699	7,385	7,053	6,700	6,285	5,801	5,244	4,615	3,909	3,125
Simulation 2	7,699	5,479	5,030	4,554	4,008	3,385	2,681	1,895	1,024	64
Simulation 3	7,699	7,385	5,229	4,765	4,231	3,622	2,932	2,162	1,307	364
Simulation 4	7,699	7,385	7,053	4,963	4,441	3,845	3,169	2,412	1,573	646
Simulation 5	7,699	7,385	7,053	6,700	4,645	4,061	3,398	2,655	1,831	920
Simulation 6	7,699	7,385	7,053	6,700	6,285	4,275	3,625	2,897	2,086	1,191
Simulation 7	7,699	7,385	7,053	6,700	6,285	5,801	3,850	3,135	2,340	1,460
Simulation 8	7,699	7,385	7,053	6,700	6,285	5,801	5,244	3,371	2,590	1,725
Simulation 9	7,699	7,385	7,053	6,700	6,285	5,801	5,244	4,615	2,835	1,985
Simulation 10	7,699	7,385	7,053	6,700	6,285	5,801	5,244	4,615	3,909	2,239

- **Max allocation to private assets is 54% before depleting liquid assets in year 10**

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Max Private Assets Allocation – 30% Drawdown Scenario

Market Value of PERA Liquid Assets (Simulation)										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Simulation 1	8,703	8,451	8,183	7,900	7,558	7,151	6,677	6,135	5,522	4,836
Simulation 2	8,703	5,456	5,006	4,529	3,981	3,356	2,650	1,862	989	27
Simulation 3	8,703	8,451	5,280	4,819	4,289	3,683	2,997	2,230	1,380	441
Simulation 4	8,703	8,451	8,183	5,093	4,579	3,991	3,324	2,577	1,747	831
Simulation 5	8,703	8,451	8,183	7,900	4,861	4,290	3,641	2,913	2,104	1,210
Simulation 6	8,703	8,451	8,183	7,900	7,558	4,586	3,955	3,247	2,458	1,585
Simulation 7	8,703	8,451	8,183	7,900	7,558	7,151	4,266	3,577	2,808	1,957
Simulation 8	8,703	8,451	8,183	7,900	7,558	7,151	6,677	3,902	3,154	2,323
Simulation 9	8,703	8,451	8,183	7,900	7,558	7,151	6,677	6,135	3,493	2,683
Simulation 10	8,703	8,451	8,183	7,900	7,558	7,151	6,677	6,135	5,522	3,035

- **Max allocation to private assets is 48% before depleting liquid assets in year 10**

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Max Private Assets Allocation – 40% Drawdown Scenario

Market Value of PERA Liquid Assets (Simulation)										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Simulation 1	10,209	10,049	9,879	9,699	9,466	9,176	8,826	8,414	7,941	7,403
Simulation 2	10,209	5,537	5,092	4,619	4,077	3,458	2,759	1,977	1,111	156
Simulation 3	10,209	10,049	5,441	4,990	4,470	3,875	3,201	2,447	1,609	685
Simulation 4	10,209	10,049	9,879	5,339	4,840	4,268	3,618	2,889	2,078	1,183
Simulation 5	10,209	10,049	9,879	9,699	5,200	4,649	4,022	3,318	2,534	1,666
Simulation 6	10,209	10,049	9,879	9,699	9,466	5,028	4,424	3,744	2,985	2,145
Simulation 7	10,209	10,049	9,879	9,699	9,466	9,176	4,821	4,166	3,433	2,620
Simulation 8	10,209	10,049	9,879	9,699	9,466	9,176	8,826	4,581	3,874	3,088
Simulation 9	10,209	10,049	9,879	9,699	9,466	9,176	8,826	8,414	4,307	3,547
Simulation 10	10,209	10,049	9,879	9,699	9,466	9,176	8,826	8,414	7,941	3,995

- **Max allocation to private assets is 39% before depleting liquid assets in year 10**

Portfolio Options

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Portfolio Options – Max Private Markets 35%

Asset Class	Current	Constraints	11.5% Risk	12% Risk	12.5% Risk
Public Equity - Global	16.5%	15-100%[1]	15.0%	22.0%	27.0%
Public Equity - Global Low Volatility	7.0%	5-15%[1]	10.0%	5.0%	5.0%
Private Equity	12.0%	12-100%[1]	13.5%	14.0%	14.0%
Global Equity	35.5%		38.5%	41.0%	46.0%
Core US Bond	17.0%	15-100%[2]	15.0%	15.0%	15.0%
Core Global Bond (Hedged)	2.5%	0-100%[2]	0.0%	0.0%	0.0%
Risk Reduction & Mitigation	19.5%		15.0%	15.0%	15.0%
Global High Yield (Hedged)	2.0%	0-5%	5.0%	3.0%	0.0%
Emerging Market Debt	3.0%	0.0%	0.0%	0.0%	0.0%
Alternative Credit	4.0%	0-10%	10.0%	10.0%	8.0%
Private Credit (Blend)	6.0%	6-100%	6.5%	6.0%	6.0%
Credit Oriented Fixed Income	15.0%		21.5%	19.0%	14.0%
Global Real Estate Securities	0.0%	0-100%[3]	2.0%	2.0%	2.0%
Liquid Real Assets	5.0%	0-100%[3]	0.0%	0.0%	0.0%
Private Real Estate (Blend)	7.0%	7-100%	7.0%	7.0%	7.0%
Private Real Assets (Blend)	8.0%	8-100%	8.0%	8.0%	8.0%
Real Assets	20.0%		17.0%	17.0%	17.0%
Risk Parity (15% Volatility)	10.0%	0-8%	8.0%	8.0%	8.0%
Multi-Risk	10.0%		8.0%	8.0%	8.0%
Total Assets	**100.0%**		**100.0%**	**100.0%**	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**		**7.36**	**7.39**	**7.38**
Expected Beta Return - 20 Years (%)	**7.46**		**7.66**	**7.69**	**7.70**
Expected Return - 30 Years (%)	**7.82**		**7.96**	**8.00**	**8.02**
Standard Deviation of Return (%)	**11.43**		**11.53**	**11.98**	**12.54**
Sharpe Ratio	**0.35**		**0.37**	**0.35**	**0.34**
Total Private Markets (%)	**33%**		**35%**	**35%**	**35%**
Contribution to Asset Volatility (%)					
Global Equity	57.6		61.9	64.9	68.8
Risk Reduction & Mitigation	2.7		2.0	1.9	1.8
Credit Oriented Fixed Income	5.9		8.6	6.9	4.5
Real Assets	22.9		19.1	18.1	17.1
Multi-Risk	10.9		8.5	8.1	7.7
Factor Exposure_Growth	4.74		5.11	5.33	5.58
Factor Exposure_Inflation	-0.39		-0.59	-0.64	-0.67

[1] Total Growth Assets Max = 50%

[2] Total Risk Mitigation Assets Max = 20%

[3] Global REIT and Global Listed Infrastructure together has a minimum of 2%

Portfolio Options – Max Private Markets 40%

Asset Class	Current	Constraints	11.5% Risk	12% Risk	12.5% Risk
Public Equity - Global	16.5%	15-100%[1]	15.0%	15.0%	16.5%
Public Equity - Global Low Volatility	7.0%	5-15%[1]	5.0%	5.0%	5.0%
Private Equity	12.0%	12-100%[1]	15.0%	17.5%	19.0%
Global Equity	35.5%		35.0%	37.5%	40.5%
Core US Bond	17.0%	15-100%[2]	15.0%	15.0%	15.0%
Core Global Bond (Hedged)	2.5%	0-100%[2]	0.0%	0.0%	0.0%
Risk Reduction & Mitigation	19.5%		15.0%	15.0%	15.0%
Global High Yield (Hedged)	2.0%	0-5%	5.0%	5.0%	3.5%
Emerging Market Debt	3.0%	0.0%	0.0%	0.0%	0.0%
Alternative Credit	4.0%	0-10%	10.0%	10.0%	10.0%
Private Credit (Blend)	6.0%	6-100%	10.0%	7.5%	6.0%
Credit Oriented Fixed Income	15.0%		25.0%	22.5%	19.5%
Global Real Estate Securities	0.0%	0-100%[3]	2.0%	2.0%	2.0%
Liquid Real Assets	5.0%	0-100%[3]	0.0%	0.0%	0.0%
Private Real Estate (Blend)	7.0%	7-100%	7.0%	7.0%	7.0%
Private Real Assets (Blend)	8.0%	8-100%	8.0%	8.0%	8.0%
Real Assets	20.0%		17.0%	17.0%	17.0%
Risk Parity (15% Volatility)	10.0%	0-8%	8.0%	8.0%	8.0%
Multi-Risk	10.0%		8.0%	8.0%	8.0%
Total Assets	**100.0%**		**100.0%**	**100.0%**	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**		**7.48**	**7.58**	**7.63**
Expected Beta Return - 20 Years (%)	**7.46**		**7.76**	**7.87**	**7.93**
Expected Return - 30 Years (%)	**7.82**		**8.04**	**8.16**	**8.23**
Standard Deviation of Return (%)	**11.43**		**11.47**	**12.01**	**12.49**
Sharpe Ratio	**0.35**		**0.38**	**0.37**	**0.36**
Total Private Markets (%)	**33%**		**40%**	**40%**	**40%**
Contribution to Asset Volatility (%)					
Global Equity	57.6		60.1	63.6	66.8
Risk Reduction & Mitigation	2.7		2.1	2.0	1.9
Credit Oriented Fixed Income	5.9		10.2	8.4	6.6
Real Assets	22.9		19.2	18.0	17.1
Multi-Risk	10.9		8.5	8.1	7.7
Factor Exposure_Growth	4.74		5.13	5.39	5.61
Factor Exposure_Inflation	-0.39		-0.63	-0.71	-0.76

[1] Total Growth Assets Max = 50%

[2] Total Risk Mitigation Assets Max = 20%

[3] Global REIT and Global Listed Infrastructure together has a minimum of 2%

Portfolio Options – Max Private Markets 45%

Asset Class	Current	Constraints	11.5% Risk	12% Risk	12.5% Risk
Public Equity - Global	16.5%	15-100%[1]	15.0%	15.0%	15.0%
Public Equity - Global Low Volatility	7.0%	5-15%[1]	5.0%	5.0%	5.0%
Private Equity	12.0%	12-100%[1]	15.5%	17.5%	20.0%
Global Equity	35.5%		35.5%	37.5%	40.0%
Core US Bond	17.0%	15-100%[2]	15.0%	15.0%	15.0%
Core Global Bond (Hedged)	2.5%	0-100%[2]	0.0%	0.0%	0.0%
Risk Reduction & Mitigation	19.5%		15.0%	15.0%	15.0%
Global High Yield (Hedged)	2.0%	0-5%	0.0%	0.0%	0.0%
Emerging Market Debt	3.0%	0.0%	0.0%	0.0%	0.0%
Alternative Credit	4.0%	0-10%	10.0%	10.0%	10.0%
Private Credit (Blend)	6.0%	6-100%	14.5%	12.5%	10.0%
Credit Oriented Fixed Income	15.0%		24.5%	22.5%	20.0%
Global Real Estate Securities	0.0%	0-100%[3]	2.0%	2.0%	2.0%
Liquid Real Assets	5.0%	0-100%[3]	0.0%	0.0%	0.0%
Private Real Estate (Blend)	7.0%	7-100%	7.0%	7.0%	7.0%
Private Real Assets (Blend)	8.0%	8-100%	8.0%	8.0%	8.0%
Real Assets	20.0%		17.0%	17.0%	17.0%
Risk Parity (15% Volatility)	10.0%	0-8%	8.0%	8.0%	8.0%
Multi-Risk	10.0%		8.0%	8.0%	8.0%
Total Assets	**100.0%**		**100.0%**	**100.0%**	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**		**7.54**	**7.62**	**7.72**
Expected Beta Return - 20 Years (%)	**7.46**		**7.82**	**7.90**	**8.00**
Expected Return - 30 Years (%)	**7.82**		**8.09**	**8.18**	**8.29**
Standard Deviation of Return (%)	**11.43**		**11.53**	**11.96**	**12.53**
Sharpe Ratio	**0.35**		**0.38**	**0.37**	**0.36**
Total Private Markets (%)	**33%**		**45%**	**45%**	**45%**
Contribution to Asset Volatility (%)					
Global Equity	57.6		61.0	63.9	67.0
Risk Reduction & Mitigation	2.7		2.0	2.0	1.9
Credit Oriented Fixed Income	5.9		9.4	8.0	6.4
Real Assets	22.9		19.1	18.1	17.1
Multi-Risk	10.9		8.5	8.1	7.7
Factor Exposure_Growth	4.74		5.16	5.37	5.63
Factor Exposure_Inflation	-0.39		-0.62	-0.69	-0.77

[1] Total Growth Assets Max = 50%

[2] Total Risk Mitigation Assets Max = 20%

[3] Global REIT and Global Listed Infrastructure together has a minimum of 2%

Options to Consider

Asset Class	Current	38% Private Assets	40% Private Assets	42% Private Assets
Public Equity - Global	16.5%	16.0%	16.0%	16.0%
Public Equity - Global Low Volatility	7.0%	7.0%	5.0%	6.0%
Private Equity	12.0%	15.0%	17.0%	17.0%
Global Equity	35.5%	38.0%	38.0%	39.0%
Core US Bond	17.0%	18.0%	17.0%	15.0%
Core Global Bond (Hedged)	2.5%	0.0%	0.0%	0.0%
Risk Reduction & Mitigation	19.5%	18.0%	17.0%	15.0%
Global High Yield (Hedged)	2.0%	5.0%	4.0%	0.0%
Emerging Market Debt	3.0%	0.0%	0.0%	0.0%
Alternative Credit	4.0%	6.0%	7.0%	10.0%
Private Credit (Blend)	6.0%	8.0%	8.0%	10.0%
Credit Oriented Fixed Income	15.0%	19.0%	19.0%	20.0%
Global Real Estate Securities	0.0%	0.0%	0.0%	0.0%
Liquid Real Assets	5.0%	2.0%	3.0%	3.0%
Private Real Estate (Blend)	7.0%	7.0%	7.0%	7.0%
Private Real Assets (Blend)	8.0%	8.0%	8.0%	8.0%
Real Assets	20.0%	17.0%	18.0%	18.0%
Risk Parity (15% Volatility)	10.0%	8.0%	8.0%	8.0%
Multi-Risk	10.0%	8.0%	8.0%	8.0%
Total Assets	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**	**7.38**	**7.49**	**7.56**
Expected Beta Return - 20 Years (%)	**7.46**	**7.69**	**7.80**	**7.86**
Expected Return - 30 Years (%)	**7.82**	**7.99**	**8.11**	**8.15**
Standard Deviation of Return (%)	**11.43**	**11.69**	**12.07**	**12.14**
Sharpe Ratio	**0.35**	**0.36**	**0.36**	**0.36**
Total Private Markets (%)	**33%**	**38%**	**40%**	**42%**
Contribution to Asset Volatility (%)				
Global Equity	57.6	62.8	63.5	64.2
Risk Reduction & Mitigation	2.7	2.4	2.2	1.9
Credit Oriented Fixed Income	5.9	7.7	7.1	6.8
Real Assets	22.9	18.7	19.2	19.1
Multi-Risk	10.9	8.4	8.1	8.0
Factor Exposure_Growth	4.74	5.15	5.34	5.39
Factor Exposure_Inflation	-0.39	-0.67	-0.66	-0.60

- Simplify portfolio
- Take advantage of additional illiquidity premium opportunities
- Modest increase in risk profile with opportunity to increase return potential
- Increasing risk-adjusted return potential (higher Sharpe Ratio)

Wilshire's Asset Allocation Committee (WAAC) maintains standard asset allocation parameters which reflect generally observed market practices for institutional asset owners (a table of these ranges is provided in the Appendix). While we expect most client portfolios will fall within these asset allocation ranges. Wilshire recognizes and occasionally recommends portfolio allocations that may diverge from these general ranges based on a client's particular circumstances, goals or needs.

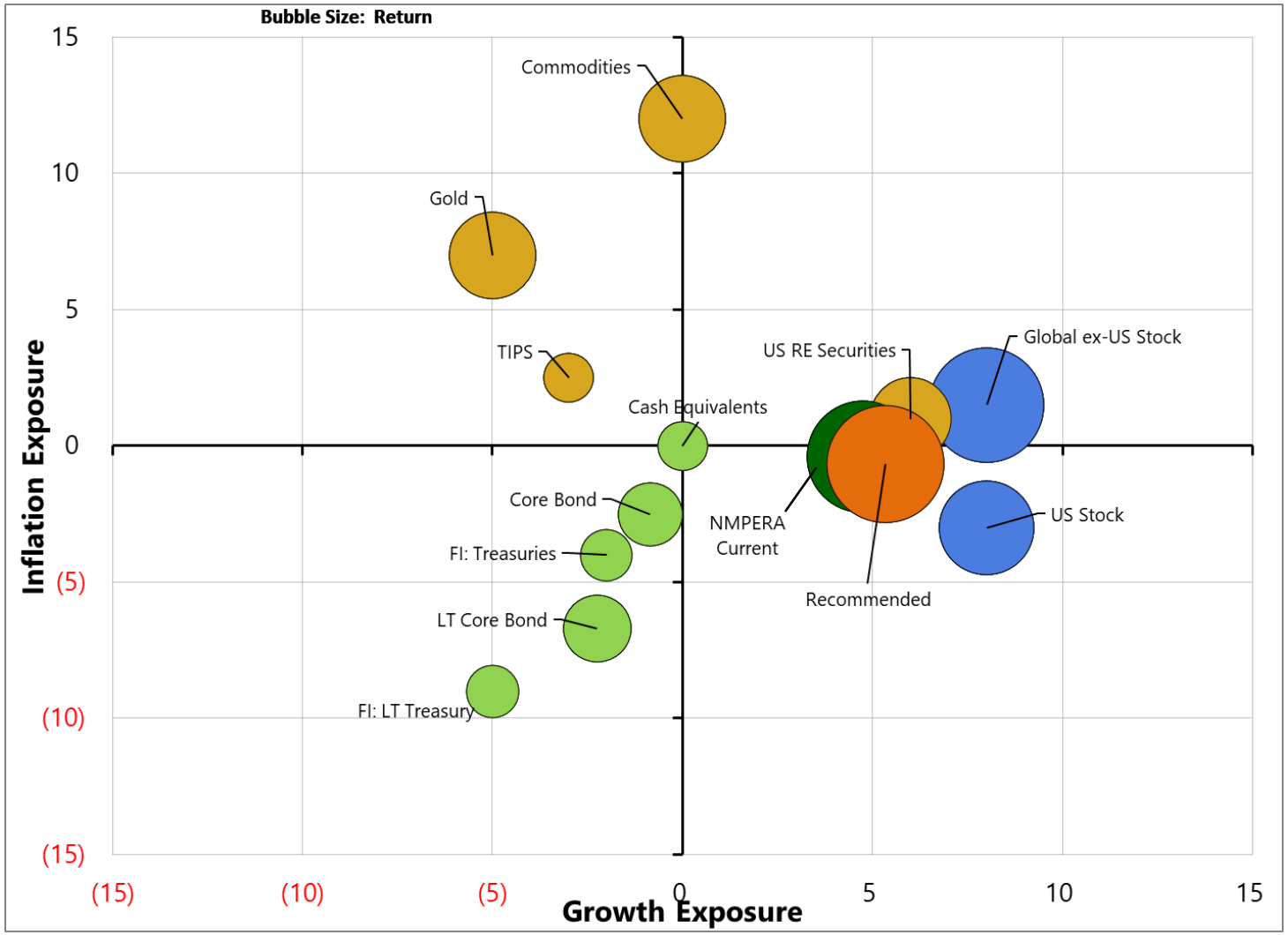
Recommended Policy Portfolio

Asset Class	Current Policy	Recommended
Global Equity	35.50%	38.00%
Risk Reduction & Mitigation	19.50%	17.00%
Credit Oriented Fixed Income	15.00%	19.00%
Real Assets	20.00%	18.00%
Multi-Risk Allocation	10.00%	8.00%
Total Assets	**100.00%**	**100.00%**
Expected Beta Return - 10 Years (%)	**7.11**	**7.49**
Expected Beta Return - 20 Years (%)	**7.46**	**7.80**
Expected Beta Return - 30 Years (%)	**7.82**	**8.11**
Standard Deviation of Return (%)	**11.43**	**12.07**
Sharpe Ratio	**0.35**	**0.36**

Wilshire's Asset Allocation Committee (WAAC) maintains standard asset allocation parameters which reflect generally observed market practices for institutional asset owners (a table of these ranges is provided in the Appendix). While we expect most client portfolios will fall within these asset allocation ranges. Wilshire recognizes and occasionally recommends portfolio allocations that may diverge from these general ranges based on a client's particular circumstances, goals or needs.

Asset Class	Current	40% Private Assets
Public Equity - Global	16.5%	16.0%
Public Equity - Global Low Volatility	7.0%	5.0%
Private Equity	12.0%	17.0%
Global Equity	35.5%	38.0%
Core US Bond	17.0%	17.0%
Core Global Bond (Hedged)	2.5%	0.0%
Risk Reduction & Mitigation	19.5%	17.0%
Global High Yield (Hedged)	2.0%	4.0%
Emerging Market Debt	3.0%	0.0%
Alternative Credit	4.0%	7.0%
Private Credit (Blend)	6.0%	8.0%
Credit Oriented Fixed Income	15.0%	19.0%
Global Real Estate Securities	0.0%	0.0%
Liquid Real Assets	5.0%	3.0%
Private Real Estate (Blend)	7.0%	7.0%
Private Real Assets (Blend)	8.0%	8.0%
Real Assets	20.0%	18.0%
Risk Parity (15% Volatility)	10.0%	8.0%
Multi-Risk	10.0%	8.0%
Total Assets	**100.0%**	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**	**7.49**
Expected Beta Return - 20 Years (%)	**7.46**	**7.80**
Expected Return - 30 Years (%)	**7.82**	**8.11**
Standard Deviation of Return (%)	**11.43**	**12.07**
Sharpe Ratio	**0.35**	**0.36**
Total Private Markets (%)	**33%**	**40%**
Contribution to Asset Volatility (%)		
Global Equity	57.6	63.5
Risk Reduction & Mitigation	2.7	2.2
Credit Oriented Fixed Income	5.9	7.1
Real Assets	22.9	19.2
Multi-Risk	10.9	8.1
Factor Exposure_Growth	4.74	5.34
Factor Exposure_Inflation	-0.39	-0.66

Factor Exposure Comparison



Takeaways

- **Simplify portfolio – consolidate where reasonable to have impact on total fund level**
  - Eliminate Core Global Bond (2.5% allocation), EM Debt (3%)
  - Increase Global HY from 2% to 4%
  - Increase Alt Credit from 4% to 7%

- **Take advantage of additional illiquidity premium opportunities**
  - Increase PE from 12% to 17%
  - Increase Private Credit from 6% to 8%

- Decrease Liquid Real Assets from 5% to 3%

- **Modest increase in risk profile with opportunity to increase return potential**
- **Increasing risk-adjusted return potential (higher Sharpe Ratio)**
- **Total private markets allocation target = 40%**

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Appendix – Asset Allocation Ranges

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Efficient Frontier Portfolios

Asset Class	Current Policy	Optimization Constraints	Minimum Risk	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Maximum Risk
Public Equity - Global	16.5%	15-100%[1]	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	17.8%	26.0%
Public Equity - Global Low Volatility	7.0%	5-15%[1]	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Private Equity	12.0%	12-100%[1]	12.0%	12.0%	12.0%	12.0%	13.5%	15.0%	16.5%	18.0%	19.0%	19.0%
Global Equity	35.5%		32.0%	32.0%	32.0%	32.0%	33.5%	35.0%	36.5%	38.0%	41.8%	50.0%
Core US Bond	17.0%	15-100%[2]	15.0%	19.1%	17.1%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Core Global Bond (Hedged)	2.5%	0-100%[2]	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Risk Reduction & Mitigation	19.5%		20.0%	19.1%	17.1%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Global High Yield (Hedged)	2.0%	0-5%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	2.2%	4.0%
Emerging Market Debt	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alternative Credit	4.0%	0-10%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	0.0%
Private Credit (Blend)	6.0%	6-100%	13.0%	13.0%	13.0%	13.0%	11.5%	10.0%	8.5%	7.1%	6.0%	6.0%
Credit Oriented Fixed Income	15.0%		28.0%	28.0%	28.0%	28.0%	26.5%	25.0%	23.5%	22.1%	18.2%	10.0%
Global Real Estate Securities	0.0%	0-100%[3]	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Global Listed Infrastructure	5.0%	0-100%[3]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Private Real Estate (Blend)	7.0%	7-100%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Private Real Assets (Blend)	8.0%	8-100%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Real Assets	20.0%		17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Risk Parity (15% Volatility)	10.0%	0-8%	3.0%	0.0%	5.9%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Multi-Risk	10.0%		3.0%	3.9%	5.9%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Total Assets	**100.0%**		**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Expected Beta Return - 10 Years (%)	**7.11**		**7.12**	**7.20**	**7.27**	**7.35**	**7.41**	**7.47**	**7.54**	**7.59**	**7.63**	**7.93**
Standard Deviation of Return (%)	**11.43**		**10.30**	**10.40**	**10.62**	**10.84**	**11.14**	**11.46**	**11.78**	**12.11**	**12.62**	**14.26**
Sharpe Ratio	**0.35**		**0.39**	**0.39**	**0.39**	**0.39**	**0.38**	**0.38**	**0.37**	**0.37**	**0.35**	**0.34**
Total Private Markets (%)	**33%**		**40%**	**40%**	**40%**	**40%**	**40%**	**40%**	**40%**	**40%**	**40%**	**40%**

[1] Total Growth Assets Max = 50%

[2] Total Risk Mitigation Assets Max = 20%

[3] Global REIT and Global Listed Infrastructure together has a minimum of 2%

Allowable Asset Allocation Ranges

Wilshire's Asset Allocation Committee (WAAC) maintains standard asset allocation parameters which reflect generally observed market practices for institutional asset owners. While Wilshire expects most client portfolios will fall within these asset allocation ranges. Wilshire recognizes and occasionally recommends portfolio allocations that may diverge from these general ranges based on a client's particular circumstances, goals or needs.

Asset Segment	Corporate DB	Public DB	E&F
Total Equity (Public+Private)	0% - 80%		
Private Equity (Aggregate)	0% - 15%	0% - 20%	0% - 30%
Fixed Income (Core/High-quality - Liquid IG)	10% - 100%	10% - 50%	
Other Fixed Income/Credit (Aggregate)	0% - 25%		
Private/Illiquid Credit (Aggregate)	0% - 15%		
High Yield	0% - 10%		
Other: EMD, Loans, Convertibles	0% - 7.5%		
Total Real Assets (Public + Private)	0% - 25%		
Total Real Estate (Public + Private)	0% - 25%		
RA Other: Commodities, Gold, Infra, GLI, MLPs, O&G, Timber	0% - 5%		
Marketable Alternatives (Aggregate)	0% - 12.5%		0% - 20%
Cash	0% - 5%		
Leverage	0% - 20%		
Total Private/Illiquid	0% - 25%	0% - 35%	0% - 50%

These thresholds were informed by allocation information from Greenwich Associates, and Wilshire Advisors, LLC, universe data and will be reviewed for reasonableness from time to time.

**Last Updated 12/2021*

Appendix – Regimes

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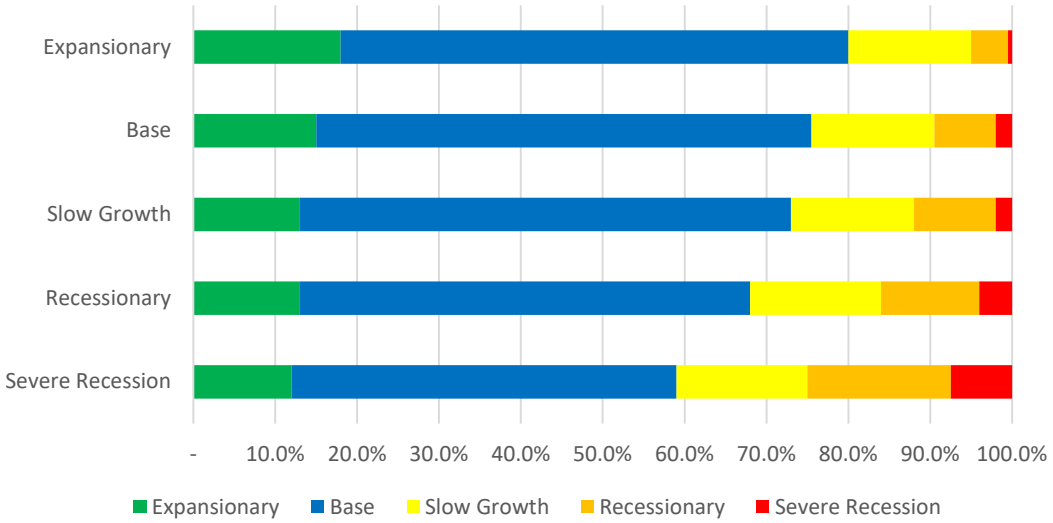
Efficient Frontier Portfolios

Managing drawdown risk – the "uncertainty around the uncertainty"

- Most simulation models assume returns are log-normally distributed
- Though reasonable in most years, left-tail events occur more frequently than predicted
- A regime switching model can help us pre-experience uncomfortable return paths that fall outside a normal distribution's field of view

	expansionary	base	slow growth	recessionary	severe recession
expansionary	18.0%	62.0%	15.0%	4.5%	0.5%
base	15.0%	60.5%	15.0%	7.5%	2.0%
slow growth	13.0%	60.0%	15.0%	10.0%	2.0%
recessionary	13.0%	55.0%	16.0%	12.0%	4.0%
severe recession	12.0%	47.0%	16.0%	17.5%	7.5%



Stress Testing: Regime Assumptions

- In below trend and worse environments, the portfolio's return expectations is materially lower and the volatility is materially higher
- Volatility in the below trend and worse environments are left-skewed, i.e. negative-skewed

	US Stocks	Dev xUS Stocks	EM Stocks	Prvt Mkts	Cash	Core Bonds	LT Bonds	US TIPS	HY	US RES	Private RE	Commodities	Current Policy
Expansionary/Above Trend Growth													
Return (%)	9.75	10.75	10.75	14.65	1.50	1.55	2.10	1.20	5.90	10.15	11.00	6.70	8.96
Risk (%)	12.00	13.00	21.00	20.50	1.00	4.80	9.85	6.50	8.00	13.00	11.00	15.00	8.27
Baseline/Trend Growth													
Return (%)	4.75	5.75	5.75	7.15	1.25	2.05	2.60	1.70	3.90	5.15	6.00	3.70	5.46
Risk (%)	17.00	18.00	26.00	28.00	0.75	4.30	8.85	6.00	10.00	17.00	14.00	15.00	11.27
Slow Growth/Below Trend													
Return (%)	2.75	3.75	3.75	4.15	1.00	3.05	4.10	2.20	2.90	3.15	4.00	2.70	4.37
Risk (%)	22.00	23.00	31.00	35.50	1.00	5.30	10.85	7.00	12.00	21.00	17.00	17.00	14.56
Recessionary/Negative Growth													
Return (%)	(5.25)	(4.25)	(4.25)	(7.85)	0.75	4.05	5.60	3.20	(0.10)	(4.85)	(4.00)	(0.30)	(1.08)
Risk (%)	27.00	28.00	36.00	43.00	1.00	6.30	12.85	8.00	15.00	25.00	20.00	20.00	17.93
Severe Recession/Deflation													
Return (%)	(45.25)	(44.25)	(44.25)	(42.85)	0.25	14.55	22.60	11.70	(16.10)	(44.85)	(44.00)	(3.30)	(23.33)
Risk (%)	42.00	43.00	51.00	53.00	1.00	14.30	18.85	16.00	20.00	42.00	34.00	25.00	25.74

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Stress Testing: Regime Descriptions

Regime Descriptions

- **Expansionary/Above Trend Growth** – Regime when the economy is coming out of a recession or the economy is running above long-run capacity. Wilshire does not project the economy to remain in this regime over longer periods.
- **Baseline/Trend Growth** – The long term expected state of the economy. Wilshire's capital market assumptions are based on this regime.
- **Slow Growth/Below Trend** – Regime when the economy is running at less than full capacity.
- **Recessionary/Negative Growth** – Regime when the economy has below zero growth. Wilshire expects the economy would be in a recession.
- **Severe Recession/Deflation** – Regime when the economy defined by significantly negative growth. Wilshire does not project the economy to remain in this regime over longer periods.

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Appendix – Liquidity Metric

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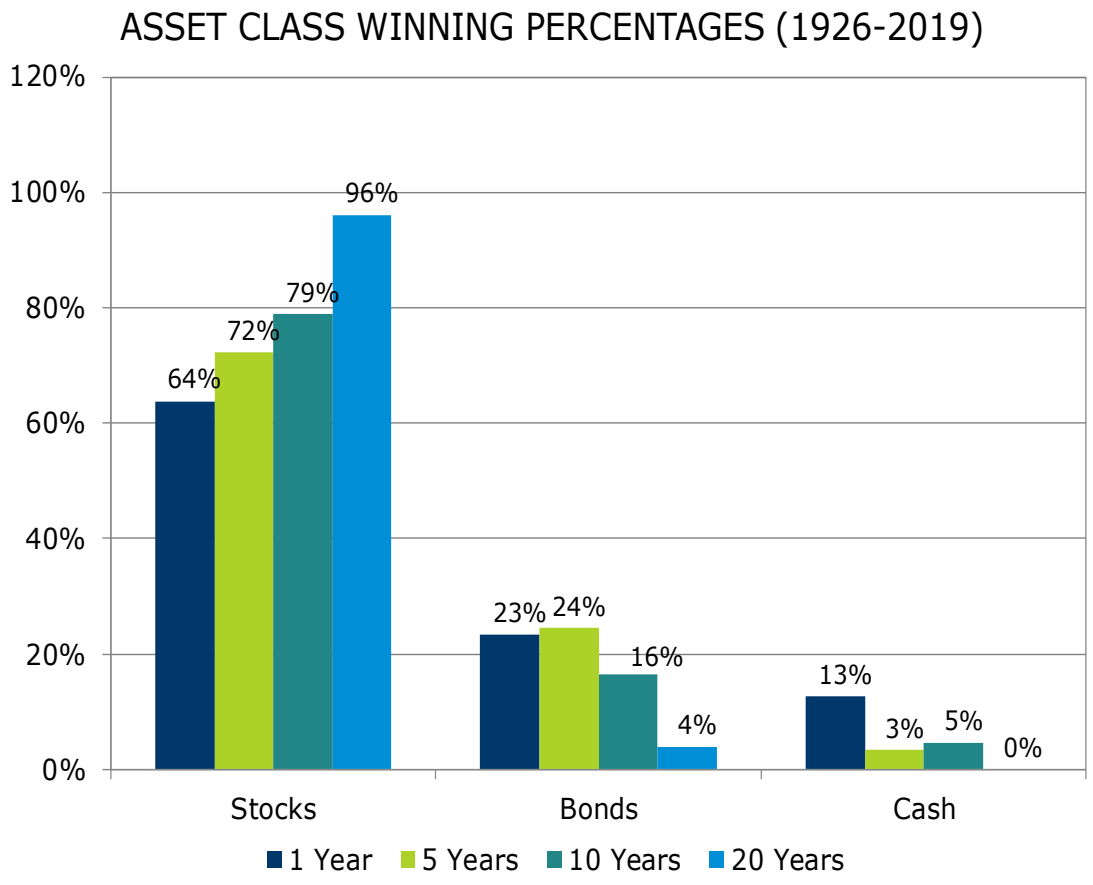
Liquidity Risk: What Are The Consequences?

Default/Insolvency is the most severe outcome from having insufficient liquidity, but…
There are many other, more likely, disruptive impacts that a lack of liquidity can impose on an investment portfolio

- Liquidity breaches can rob an investor of their biggest advantage: a long-term investment horizon
- The timing and price of such sales dictated by liquidity needs rather than by explicit investment rationale
- Can destroy portfolio value and effectively strip a portfolio from its ability to recover from market sell-offs



Wilshire Liquidity Metric

Wilshire's Liquidity Metric framework has two levels:

- Market Level of Liquidity
- Overall Level of Liquidity

Market Level of Liquidity

- Quantified on scale from 0% (low liquidity) to 100% (high liquidity)
- Designed to capture general notion of marketable versus private/off-market transactions
  - Marketable asset classes typically reflect a 90% or 100%
  - Private asset classes reflect 0%
- Goal is to reflect the tradability of assets, which is helpful in connecting these values back to our definitional framework (i.e., to quantify the differences between Convertible Liquidity and Delayed Liquidity)

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Wilshire Liquidity Metric

Wilshire's Liquidity Metric framework has two levels:

- Market Level of Liquidity
- Overall Level of Liquidity

Overall Liquidity Metric

Includes a penalty process to reflect the loss in practical liquidity due to asset class volatility and sensitivity to particular economic environments

Penalty components:

1. Growth Penalty:
   - Impacts asset classes with vulnerability to slowing growth
   - Recognizes the hit to liquidity that can occur during growth related bear markets
2. Inflation Penalty:
   - Impacts asset classes with vulnerability to rising inflation
   - Recognizes the hit to liquidity that can occur during inflation driven bear markets
3. Volatility Penalty:
   - Impacts higher volatility asset classes
   - Recognizes the hit to liquidity that can occur from any form of volatility

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Wilshire Stressed Liquidity Metric

Stressed Level of Liquidity Metric

Asset Class	Market Liquidity	Liquidity Penalty Components			Applied Penalty	Stressed Liquidity
		Growth	Inflation	Volatility		
US Equity	100	50		24	50	0
Dev ex-US Equity	100	50		26	50	0
EM Equity	90	50		40	50	0
Private Equity	0	50		40	0	0
Cash Equivalents	100				0	100
Core Bonds	100		8		8	86
High Yield Bonds	80	40		10	40	0
US Real Estate Securities	90	50		24	50	0
Private Real Estate	0	50		18	0	0
Commodities	90			20	20	55

Applied Penalty = Min(Max(Growth + Inflation, Volatility), Market Liquidity)

Stressed Liquidity * = Market Liquidity - (1.75 x Applied Penalty)

** If less than 20, Stressed Liquidity is assumed to be 0*

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PERA

Illiquid Asset Primer

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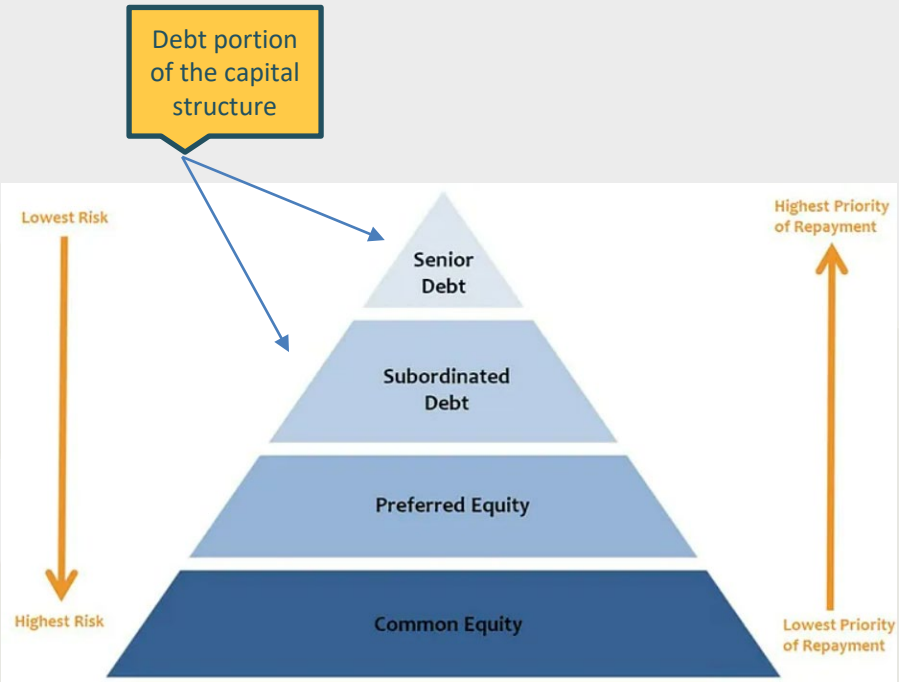
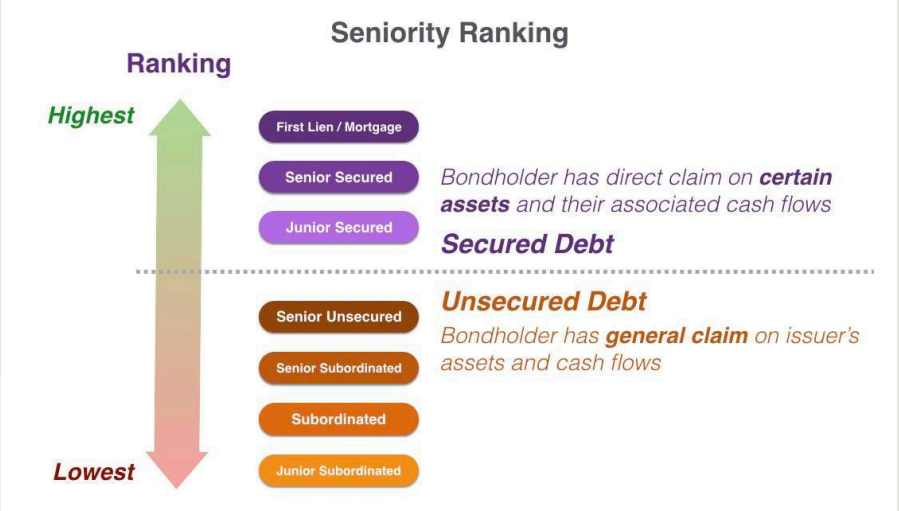
September 15, 2022

What is Private Credit?

- Private credit seeks to primarily take credit risk via debt instruments. This is the possibility of loss resulting from a borrower's failure to repay a loan or meet a contractual obligation.
- In return for bearing credit risk, the lender has a contractual right to pre-specified cash flows, typically in the form of a coupon payment. This is expressed as a percentage of the amount lent to the borrower (i.e. yield).
- Degrees of credit risk vary, generally based on a lender's position in the capital structure. Senior debt is repaid first and has a superior claim on a borrower's assets should it default on payment of principal and/or interest.





Source: Corporate Finance Institute

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Why Invest in Private Credit?

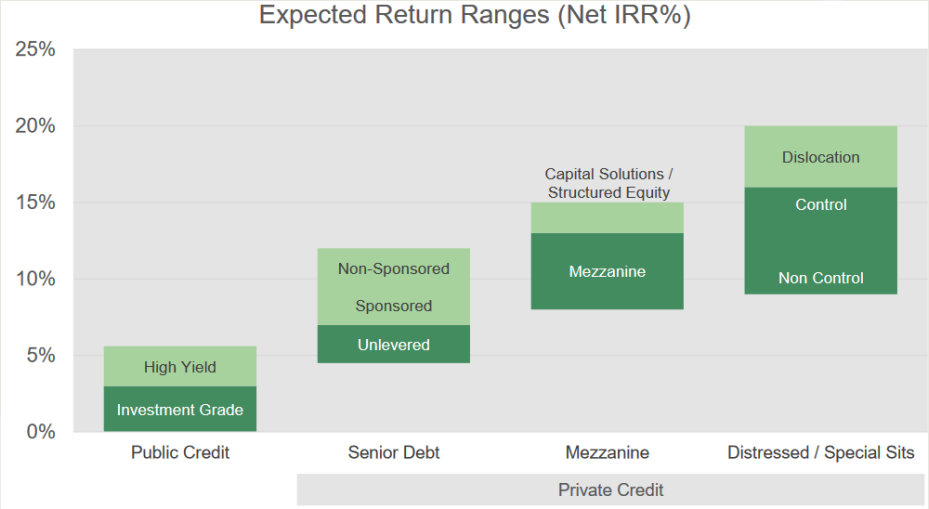
- **Downside protection:** credit returns are asymmetric. The best-case scenario is receiving principal + coupon. The worst-case scenario is losing 100% of principal and receiving no coupon. For this reason, debt investments are structured foremost to protect capital.

- **Cash flow:** equity instruments may pay out income, debt instruments must. Cash flow serves to dampen volatility and allows asset owners to more efficiently meet obligations to beneficiaries.

- **Diversification:** the top graphic displays the greater diversity of investment types available in private credit, as opposed to public.

- **Higher returns:** due to the additional risk premia available in private credit, prospective returns tend to be higher than public markets.

Traded Credit	Distressed	Private Lending	Structured Product	Real Asset & Esoteric Credit
Non-Control Corporate	Control Corporate*	Senior Debt	Corporate Structured Product	Infrastructure Credit
Relative Value Credit	Non-Control Corporate	Mezzanine	Real Estate Structured Product	Energy Credit
Traded Structured Product	Non-Corporate Distressed	Tradable	Capital Relief/Risk Transfer	Transportation Credit
	Special Situations Lending	Specialty Finance	Other Asset Backed Securities	Royalties, Litigation Credit
		Real Estate Lending		Mining Credit
		Venture Debt		Royalties
				Litigation



Source: Albourne

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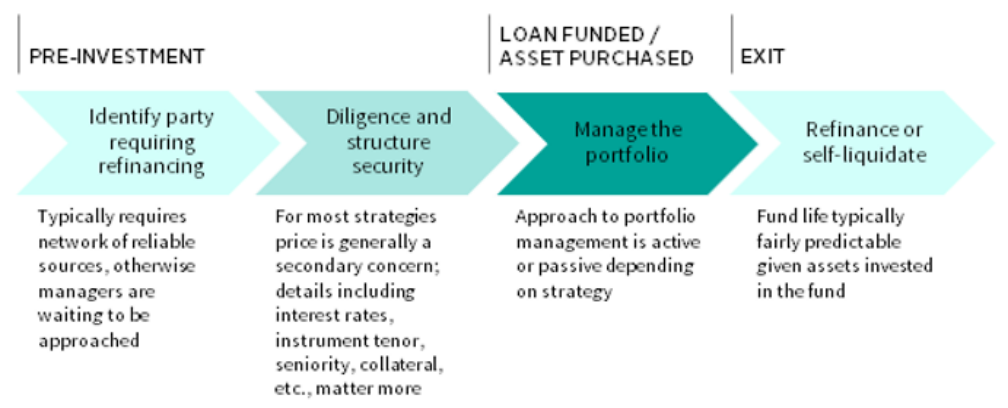
How to Invest in Private Credit

- The illiquid portion of the PERA credit portfolio holds private funds, which make investments meeting two main criteria – contractually obligated cash flows and repayment of principal.

- Private funds are typically blind pools, meaning capital is committed by limited partners like PERA and then called by the manager as investments are made. Strong limited partner protections and investment guidelines are a crucial aspect of private credit investing.

- A typical private credit fund has three years to call and invest committed capital, and four years to return it to investors in the form of principal and interest.



Source: Cambridge

- Private credit portfolios are typically structured by asset owners to serve as yield enhancements, diversifiers and/or total return enhancements to traditional liquid fixed income portfolios.

- Private credit fund strategies include first lien, second lien, mezzanine, special situations, opportunistic, distressed, asset-based, patent and litigation finance.

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PERA's Investment in Private Credit: Reasons to Invest

- Income: Yields available in private credit investments range from 300 to 1000bps above liquid high yield.

- Diversification: Risk premia and collateral types available in private credit investments exceed those available in liquid markets. Prospective private credit investments must show a demonstrable illiquidity premium, and for higher risk/return investments a complexity premium as well.

- Market opportunity: PERA's private credit component gives it access to the universe of private companies that may never go public. This component allows PERA to build long-term partnerships with exceptional firms around the globe. These investments are often proprietary and are not easily accessible to most individuals.

- Information Advantage: Private credit investors have much more transparency into company fundamentals and transactions than in liquid credit. This confers an information advantage that is valuable across the liquidity spectrum.

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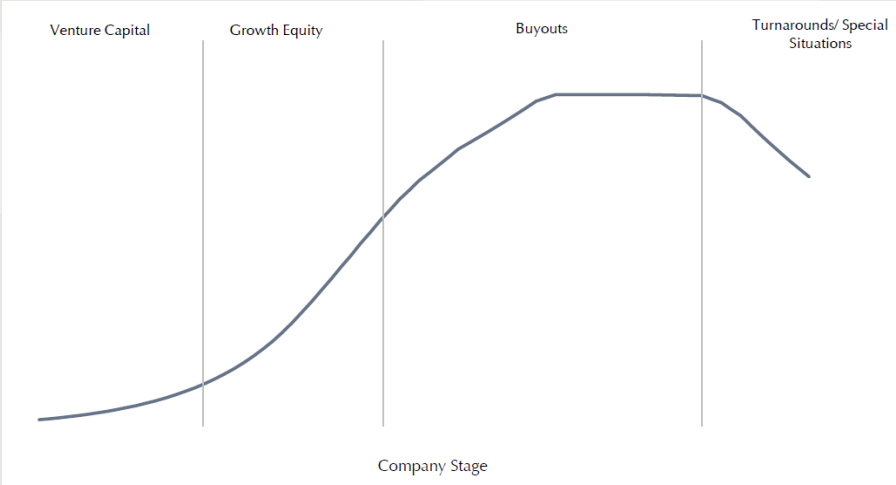
Private Equity

What is Private Equity?

- Private equity (PE) is an umbrella term for capital that is invested in privately held companies. The PE portfolio provides access to the large universe of companies that have not gone public yet or will never go public.

- The PE portfolio includes private company investments in venture capital, growth equity, and buyouts, both domestic and international. Illiquidity within PE is compensated by higher expected returns, but fees are typically on the higher end at a "2 and 20" – a 2% management fee and a 20% carried interest.



Source: Aksia TorreyCove

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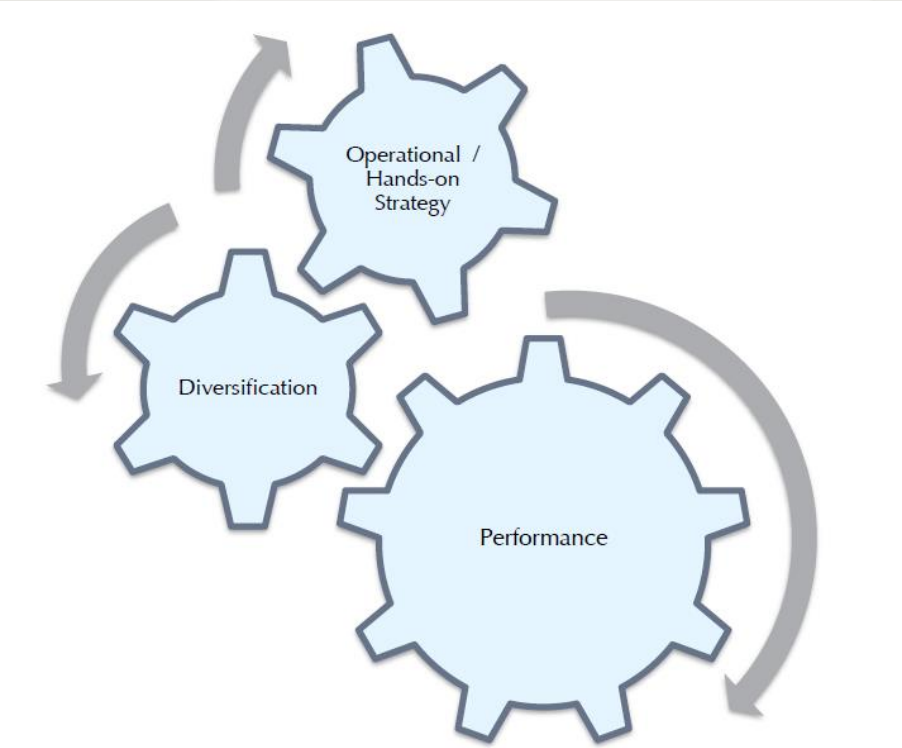
Why invest in Private Equity?

- PE allows those with capital to access entrepreneurs and invest in their vision. These investments often have the potential to generate outsized returns.
- PE allows access to companies earlier in their lifecycle. Often, once companies go public, they are more mature and have less future growth potential.
- PE provides a more staggered series of outbound cash flows and liquidity events since committed capital is not used immediately. Capital is deployed as investments are made and capital is returned as investments are realized.
- PE allows for a higher level of influence over company decisions. PE managers generally seek active participation in a company's strategic direction and can direct everything from the development of a business plan to selection of senior executives, introduction of potential customers or service lines, M&A strategy, and identification of eventual acquirers of the business.



Source: Aksia TorreyCove

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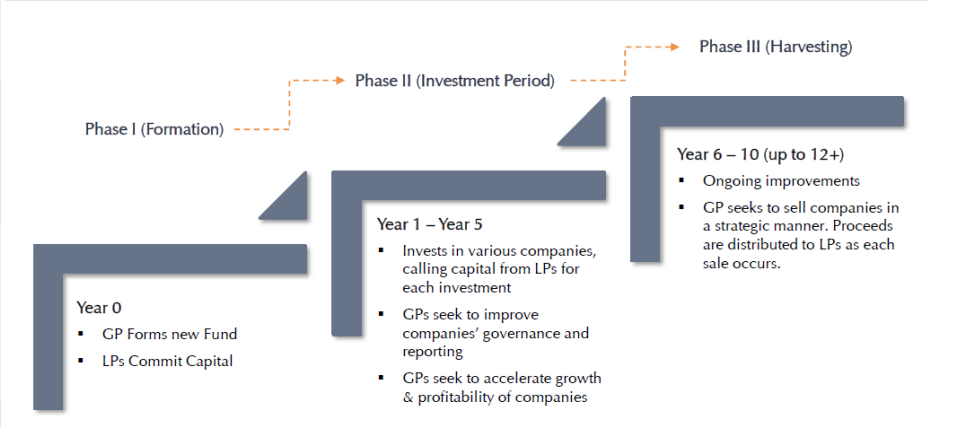
How to invest in Private Equity?

- A PE fund is a private joint venture to invest capital. Manager expertise and investor capital join to make portfolio investments on a private/negotiated basis. Investors invest as a limited partner (LP). An LP makes a capital commitment to fund and has limited participation in fund operations. The investment manager/sponsor acts as the general partner (GP) and makes investment decisions, executes investments, manages the day-to-day fund operations, and provides services for portfolio companies.

- A typical PE fund has five years to call and invest committed capital and five years to return capital to investors in the form of distributions.

- Manager quality is a key determinant of success within the PE portfolio. Ensuring alignment with a GP is critical, and this can be accomplished through ensuring the GP has an adequate commitment to the fund and that the fund's advisory board reflects a diversity of opinion and a specific LP's interests (i.e., a foreign government may have a very different set of goals or process than a U.S. public pension).

- There are a variety of ways to gain exposure to PE.
  - Primary Fund Investments: Primary fund investments make up the core of most investor PE allocations. A primary fund investment refers to an investment in a PE fund. Generally, a PE fund will specialize in a certain strategy (e.g., buyouts, venture capital, special situations).
  - Fund of Funds/Separate Accounts: A fund of funds (FOF) is a pooled investment fund that invests in other funds (essentially a portfolio of primary fund investments). A separately managed account is a fund structure between one fund manager and one investor.
  - Secondary Market Fund Investments: A secondary is the purchase (or sale) or an existing interest in a PE fund.
  - Co-Investments: A co-investment is a direct investment into a single company alongside an investment manager/sponsor.



BUYOUTS (Small, Medium, Large/Mega)	Funds that invest equity to acquire businesses, usually financed in part with debt. We classify these firms based on the enterprise values of companies in which they invest: small – up to $200 million enterprise value; medium – $200 million to $1 billion; large – over $1 billion. Investment Strategies Include: • Strategic Repositioning: Expansion of resources (such as sales force), business lines, or geographies. • Buy and Build: Acquisition of a platform company with the plan of acquiring competitors and combining them to create a larger business while consolidating a fragmented industry. • Carve outs: Separation of a business from a parent company, often without a dedicated management team or business systems like accounting and IT. • Turnarounds: Equity investment into companies that are struggling with the goal of changing operations to positively impact profitability.
VENTURE CAPITAL (Early, Late, Diversified) and GROWTH EQUITY	Funds that make equity investments in nascent companies developing new technologies and/or services, typically in the Information Technology (IT) and Life Sciences sectors. Market Segments Include: • Early Stage: Pre-revenue or pre-earnings companies • Late Stage: Post-revenue companies experiencing rapid growth • Growth Equity: Profitable companies experiencing rapid growth, transitioning to Corporate Finance.
SPECIAL SITUATIONS (DISTRESSED DEBT, SECONDARIES, OTHER)	Special Situations funds encompass many "outside the box" strategies. • Distressed debt strategies seek to invest in debt that is low relative to intrinsic value and which may convert to equity via a balance sheet restructuring. • Secondary strategies focus on buying existing LP interests in private equity funds from investors who wish to sell. Increasingly, secondary exposure can include individual assets or small portfolios of assets which a manager wishes to sell from the fund to a "continuation vehicle". The manager will continue with its investment and investors in the selling fund will receive liquidity or the option to reinvest their proceeds.

Source: Aksia TorreyCove

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PERA's Investment in Private Equity: Reasons to Invest

- Alpha: Enhances a portfolio by potentially providing attractive risk adjusted returns above that of the public equity markets.

- Diversification: Generates a capital appreciation return stream that should be less correlated to public equity markets.

- Market opportunity: Allows PERA to build long-term partnerships with exceptional private equity firms around the globe and invest in both commingled funds and co-investments. These investments are often proprietary and are not easily accessible to most investors.

- Portfolio construction: Permits PERA to tailor the portfolio for risk, reward, and liquidity needs and diversify by vintage year, sub-strategy, industry, and geography.

- Information advantage: Provides PERA with an opportunity to gain knowledge as companies move from public to private or vice versa.

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Real Assets

What are Illiquid Real Assets?

- Illiquid Real Assets (RA) is an umbrella term for capital that is invested in privately held Real Asset companies.

- Investments are typically in or backed by physical assets with commercial uses:
  - Dependent on the base asset and commodity driver
  - Requires varying degrees of operating expertise
  - Cyclical
  - Supply and demand driven
  - Tangible

- The main sectors in RA are Energy, Mining, Infrastructure, Agriculture, and Timber.

- The RA portfolio provides access to the large universe of companies that have not gone public yet or will never go public.

Examples:

Toll Roads
Gas Stations
Airports
Crematoriums
Permanent Crops
Metals
Oil wells and pipelines
Renewables
Seaports
Cellphone towers

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Why invest in Illiquid Real Assets?

- Correlations
  - Diversified and non-traditional source of returns exhibit low correlations to traditional asset classes
- Inflation protection
  - One of the only inflation-adjusted asset classes
  - Service contracts typically have inflation adjustments to protect against the effects of expected and unexpected inflation.
- Distribution rates
  - Long-term leases and contracts provide predictable cash flows and stability of returns.
- Capture inefficiencies
  - Direct link to owning and operating hard assets means real assets often store their long-term value better than traditional investments
  - Intrinsic value may increase due to higher utilizations and demand, and lower supply.
- Reduced volatility
  - Long-term time horizon on holding an asset provides substantial time to increase value of asset through CapEx and OpEx improvements
  - Competitive total returns

Alpha Capture through:

People

Processes

Product

Asset Transitions

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How to invest in Illiquid Real Assets

Open-end investment structures

- Assets valued on a quarterly basis
- Open-end funds typically provide quarterly liquidity, subject to lock-up periods (1-3 years) and redemption queues
- Focuses on core and/or value-add strategies

Separate accounts

- An exclusive investment vehicle designed and managed by a third-party fiduciary for an individual institution
- Allows the institution to pursue a specific investment strategy or individual property and have significant control over investments

Direct Investments

- Institution has complete control over investments

Closed-end investment structures

- Institution makes a commitment which is drawn down over time
- Most assets valued on a quarterly basis
- 10 – 15-year terms
- Limited rights as defined by the limited partner agreement (LPA)
- Focuses on value-add and opportunistic strategies. Higher risk and return spectrum.
- Carried interest / promote structures

Co-Investments

- An investment in a specific asset deal made by an investor of a main fund alongside, but not through, such main fund. Separately structured vehicle which is governed by a separate set of agreements.

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PERA's investment in Real Assets: Reasons to invest

Alpha: PERA's Real Asset portfolio is a key driver of stable fund returns in general.

Diversification: The private fund component can generate a capital appreciation return stream that is less correlated to the public markets.

Market opportunity:

- Access to private companies that may never go public.
- Digital Assets
- Decarbonization / Energy Transition
- Energy pricing arbitrage
- Supply chain logistics
- Asia
- Agriculture food security

Portfolio construction: The Real Assets portfolio can be tailored for risk, reward, and liquidity needs by diversifying by vintage year, sub-strategy, industry, and geography.

Information advantage: Long-duration investments into private assets give unique view into economic market cycles and market value. This gives a greater understanding of market fundamentals in the public markets and can lead to opportunities for take-private deals (public-to-private airport transaction).

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Real Estate

What is Illiquid Real Estate?

- Illiquid Real Estate (RE) is an umbrella term for capital that is invested in privately held Real Estate companies.

- Investments are typically in or backed by physical assets with commercial or residential uses:
    - Durable, immobile, tangible
    - Finite in supply
    - Useful to people
    - Unique in location and composition

- The main sectors in RE are Retail, Office, Residential, and Industrial.

- The RE portfolio provides access to the large universe of companies that have not gone public yet or will never go public.

Examples:

Grocery stores
Class “A” Office buildings
Industrial warehouses
Apartments and Condos
Data Centers
Student Housing
Senior Housing
Hotels
Resorts
Self Storage

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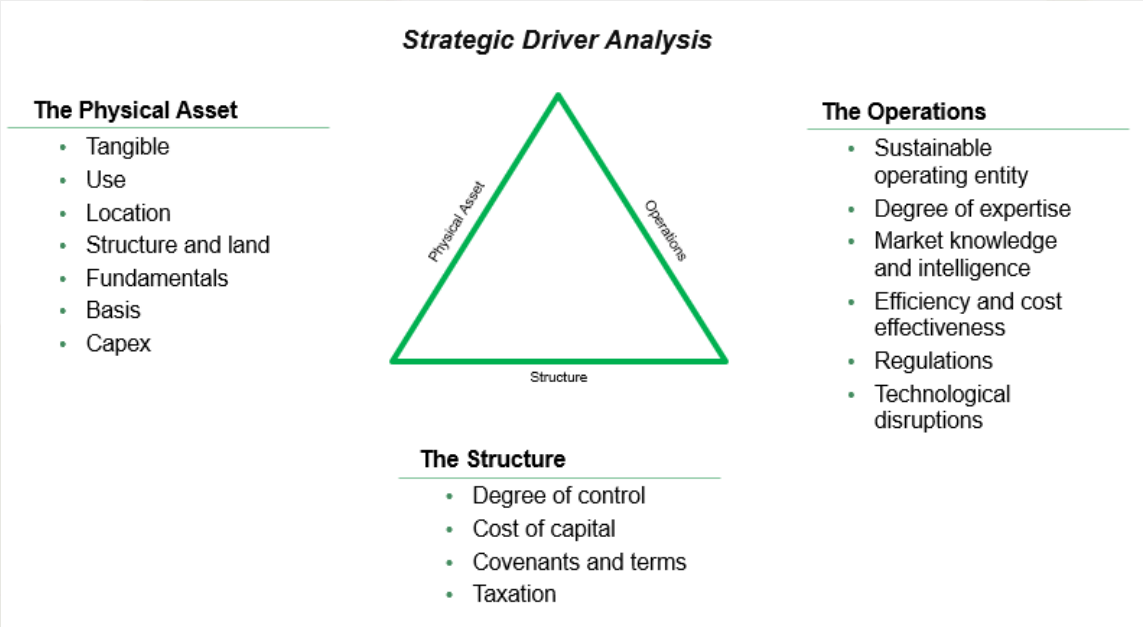
Why invest in Illiquid Real Estate?

- Capture inefficiencies
- Reduced volatility
- Long-term time horizon on holding an asset
- Ability to participate in inflation; rent escalators
- Some equity-like characteristics in the Value-add and Opportunistic space

- Diversification
- Return Enhancement
- Yield Generation



Source: Albourne

PERA

How to invest in Illiquid Real Estate

Open-end investment structures

- Assets valued on a quarterly basis
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PERA

PERA's investment in Real Estate: Reason to invest

Alpha: PERA's Real Estate portfolio is a key driver of stable fund returns in general.

Diversification: The private fund component can generate a capital appreciation return stream that is less correlated to the public markets.

Market opportunity:

- Access to private companies that may never go public.
- Targeted deals by:
  - Property type and sector
  - Geographic region and market
  - Size and ownership interest
  - Lifecycle stage (stabilized through development)
- Operations (lease-up, renovations, enhancements) and leverage

Portfolio construction: The Real Estate portfolio can be tailored for risk, reward, and liquidity needs by diversifying by vintage year, sub-strategy, industry, and geography.

Information advantage

- Private market transactions add value in identifying relative value and public-private real estate market arbitrage opportunities.
- Insight into the assessment of relevant equity metrics (AFFO multiples, NOI cap rates, levered discount rates)

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Wilshire

Public Employees Retirement Association of New Mexico

Investment Retreat
Benchmarking Education

September 2022

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Purpose of Benchmarking

Serves as a **clear** and **objective** means of evaluating performance

Benchmarks provide investors a realistic and achievable starting point – i.e., the passive portfolio held in the absence of a view on any given security

The purpose of benchmarking can be summarized as follows:

Performance Attribution	Decomposition of sources of return, such as asset allocation, active vs. passive management, manager skill, etc.
Insight on Risk/Returns	Insight into level of risk being taken to generate return and the volatility of return over time
Manager Evaluation	Measure against which manager performance can be evaluated to assist in retention / termination decisions

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Benchmark Selection Considerations

Total Fund Benchmark	Does it appropriately match the plan sponsor's investment philosophy and objectives and reflect the overall structure of the fund?
Asset Class Benchmark	Does it reflect a broad universe of investment opportunities in an asset class and offer a "target" for combining multiple managers within the asset class?
Manager Benchmark	Does it appropriately reflect the objective of the strategy and is it consistent with the asset class objective?

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Ideal Benchmark Characteristics

Unambiguous	Benchmark components and construction methodology are clearly identifiable.
Investable	It is possible to replicate and simply hold the benchmark.
Measurable	The benchmark's return is readily calculable on an on-going basis.
Appropriate	The benchmark is consistent with the composite's objective or manager's investment style.
Reflective of current investment options	The manager is knowledgeable of the securities or factor exposures within the benchmark.
Pre-specified	The benchmark is agreed upon prior to the start of the monitoring period.

Source : CFA Institute

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Appropriate Benchmarks

- The appropriate benchmark is a function of the return and risk characteristics of the asset class or portfolio being measured
- Benchmarks may be published market benchmarks or custom benchmarks
  - Published benchmarks are preferable; however, custom benchmarks may be optimal for some portfolio strategies such as Multi-Asset Risk Allocation
  - Generally, asset class benchmarks are published market indices which represent a broad investment opportunity set
    - E.g., Wilshire 5000, Bloomberg U.S. Aggregate
- Objective of benchmark selection process is to minimize benchmark "misfit" risk, which is uncompensated risk
  - "Misfit" risk is the return difference attributable to the benchmark characteristics that are not reflected in the portfolio and vice versa
    - E.g., All cap equity portfolio benchmarked to the S&P 500 Index or a Core Plus bond portfolio benchmarked to the Bloomberg U.S. Aggregate

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Total Fund Benchmarking

- Policy Portfolio Benchmark
  - Weighted blend of diversified asset class portfolios
  - Used as a benchmark to measure effective implementation, across a diversified portfolio of defined systematic exposures (i.e., the benefit of portfolio implementation decisions)
  - Policy portfolio concept meets the objectives of a good benchmark
    - Does present mismatch for illiquid/alternative investments
  - Targets the same diversified beta exposures as adopted in SAA
  - Serves as a clear and objective means of evaluating total fund performance over a long-term time horizon

- Current Weightings

PERA - Total Fund Benchmark					
		35.50%			**20.00%**
Global Equity	MSCI ACWI IMI ($N)	28.50%	**Real Assets**	Wilshire Global REIT	7.00%
	MSCI ACWI Minimum Volatility ($N)	7.00%		Alerian - MLP Index	2.00%
		19.50%		DJB Global Infrastructure	3.00%
Risk Reduction & Mitigation	Bloomberg U.S. Aggregate	17.00%		Bloomberg - U.S. TIPS	3.00%
	Bloomberg Global Aggregate Hedged	2.50%		Bloomberg Commodity Index (TR)	5.00%
		15.00%			**10.00%**
Credit Oriented Fixed Income	Bloomberg Global High Yield	12.00%	**Multi Risk**	Wilshire Risk Parity - 15%	10.00%
	50% JP Morgan EMBI ($)/ 50% JP Morgan GBI ($)	3.00%			

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Total Fund Benchmarking – Proposed Changes

- Policy Portfolio Benchmark Changes: targets asset allocation changes from pending Asset Allocation review recommendation

- Global Equity composite increases from 35.5% to 38.0%
  - MSCI ACWI IMI Index increases from 28.5% to 33.0%
  - MSCI ACWI Minimum Volatility Index decreases from 7.0% to 5.0%

- Risk Reduction & Mitigation composite decreases from 19.5% to 17.0%
  - Bloomberg Global Aggregate Hedged Index decreases from 2.5% to 0.0%

- Credit Oriented Fixed Income composite increases from 15.0% to 19.0%
  - Bloomberg Global High Yield Index increases from 12.0% to 19.0%
  - Custom Emerging Market Debt Blended Index decreases from 3.0% to 0.0%

- Real Assets composite decreases from 20.0% to 18.0%
  - DJ Brookfield Global Infrastructure Index increases from 2.0% to 9.0%
  - Bloomberg Commodity Index decreases from 3.0% to 2.0%
  - Alerian MLP Index decreases from 3.0% to 0.0%
  - Bloomberg Barclays U.S. TIPS Index decreases from 5.0% to 0.0%

- Multi Risk composite decreases from 10.0% to 8.0%
  - Wilshire Risk Parity (15%) Index decreases from 10.0% to 8.0%

Policy Portfolio Benchmark	Current Target	Proposed Target
Global Equity	**35.50%**	**38.00%**
MSCI ACWI IMI ($N)	28.50%	33.00%
MSCI ACWI Minimum Volatility ($N)	7.00%	5.00%
Risk Reduction & Mitigation	**19.50%**	**17.00%**
Bloomberg Barclays U.S. Aggregate	17.00%	17.00%
Bloomberg Barclays Global Aggregate (Hedged)	2.50%	0.00%
Credit Oriented Fixed Income	**15.00%**	**19.00%**
Bloomberg Barclays Global High Yield (Hedged)	12.00%	19.00%
50% JPM EMBI ($) / 50% JPM GBI ($)	3.00%	0.00%
Real Assets	**20.00%**	**18.00%**
Wilshire Global REITs	7.00%	7.00%
Dow Jones - Brookfield Global Infrastructure Index	2.00%	9.00%
Bloomberg Commodity Index (TR)	3.00%	2.00%
Alerian MLP Index	3.00%	0.00%
Bloomberg Barclays - U.S. TIPS	5.00%	0.00%
Multi-Risk Allocation	**10.00%**	**8.00%**
Wilshire Risk Parity - 15%	10.00%	8.00%

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Appendix

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Benchmarking Private Assets

Benchmarking private assets is not as straightforward as public assets

- Available private asset "benchmarks" from multiple providers are actually universe comparisons, either of private market funds or other plan sponsor private programs
  - Not Investable in the same manner as public indexes
  - Underlying constituents can shift depending on data availability
  - Data availability is limited to quarterly periodicity

Considerations:

- PERA currently utilizes public market benchmarks to most appropriately define investable market beta. Benchmarking challenges include:
  - Valuation and pricing of private assets occurs quarterly vs. daily for public assets
    - Timing mismatch leads to higher levels of measured active risk (tracking error) on a short-term basis; will normalize over longer-term periods
  - Valuation availability lags that of public assets, typically by one to three months, due to the time it takes to compile and translate financial statement information into an estimate of fair market value
    - Public market appraisals adjust much more quickly (both up and down) than private market appraisals
  - Potential future enhancement could include adjustment to index timing to align with the valuation of less liquid assets (i.e., quarterly lagged)

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Benchmarking Portable Alpha

Portable Alpha benchmark is based on the market beta over which the alpha portfolio is ported

- PERA Bonds Plus portfolio asset class benchmark is the Bloomberg U.S. Aggregate, which is the most widely used U.S. investment grade bond index

Differentiate between the strategy's benchmark index and the active return target over and above that benchmark

- PERA risk budget sets active risk budgets for Actionable (Public Markets) and Non-Actionable (Private Markets) assets
- Actionable (Public Markets) Active Risk: 1.25%
- Non-Actionable (Private Markets) Active Risk: 2.25%

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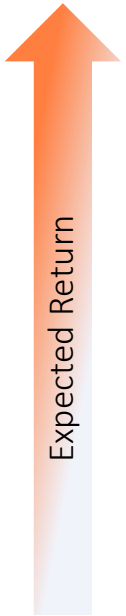
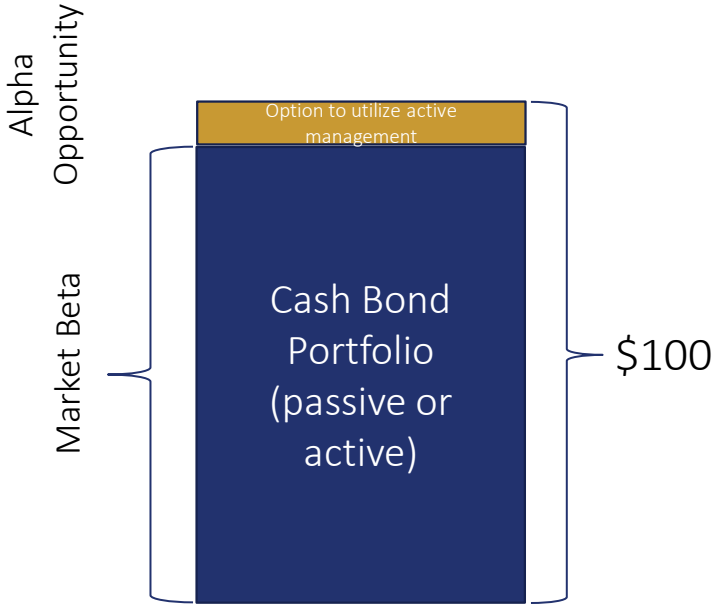
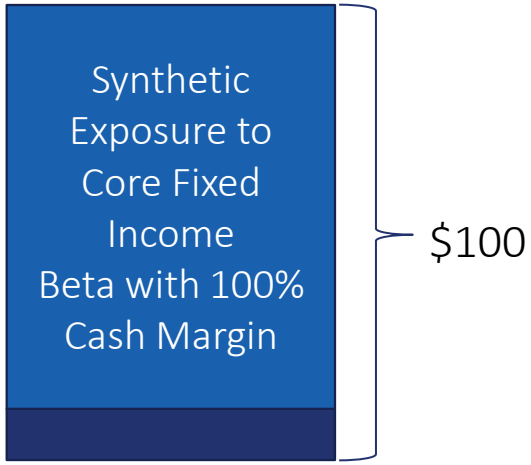
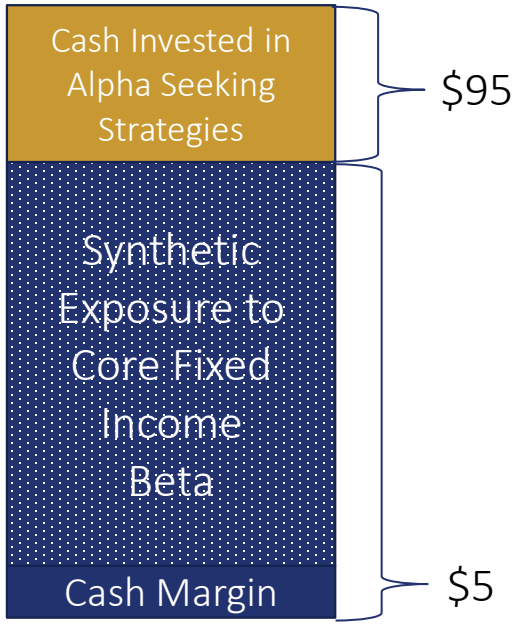
Portable Alpha Program Components of Return









Considerations

- Straightforward investment structure
- Reasonably liquid
- Low to moderate management fees
- Market exposure
- Passive or active implementation

- More complex structuring with derivative counterparties
- Cash margin enhances liquidity of Total Fund
- Lower management fees
- Market only exposure

- Most complex with derivative counterparties and hedge fund structures
- Least liquid
- Higher management fees
- Market exposure
- Potential alpha generation

Important Information

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APPENDIX A. ASSET ALLOCATION TARGETS AND REBALANCING RANGES

Effective ~~July 26, 2018~~ January 1, 2023

Asset Class	Lower Limit	Strategic Asset Allocation Target	Upper Limit
Global Equity	~~30.5~~ 33.0%	~~35.5~~ 38.0%	~~40.5~~ 43.0%
Risk Reduction and Mitigation	~~16.5~~ 14.0%	~~19.5~~ 17.0%	~~22.5~~ 20.0%
Credit Oriented Fixed Income	~~11.0~~ 15.0%	~~15.0~~ 19.0%	~~19.0~~ 23.0%
Real Assets	~~16.0~~ 14.0%	~~20.0~~ 18.0%	~~24.0~~ 22.0%
Multi-Risk Allocation	~~06.0~~ 04.0%	~~10.0~~ 08.0%	~~14.0~~ 12.0%

Adopted: ~~July 26, 2018~~ October 27, 2022

By:

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~~James Maxon,~~ Claudia Armijo, Board Chair
Public Employees' Retirement Association of New Mexico

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APPENDIX A. ASSET ALLOCATION TARGETS AND REBALANCING RANGES

Effective January 1, 2023

Asset Class	Lower Limit	Strategic Asset Allocation Target	Upper Limit
Global Equity	33.0%	38.0%	43.0%
Risk Reduction and Mitigation	14.0%	17.0%	20.0%
Credit Oriented Fixed Income	15.0%	19.0%	23.0%
Real Assets	14.0%	18.0%	22.0%
Multi-Risk Allocation	04.0%	08.0%	12.0%

Adopted: October 27, 2022

By:

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Claudia Armijo, Board Chair
Public Employees' Retirement Association of New Mexico

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APPENDIX B. BENCHMARKS

Effective: January 1, ~~2019~~2023

Global Equity	**~~Custom Blend~~Weighted Benchmark**
Global Public Stock	MSCI ACWI IMI ($net)
Global Low Volatility Equity	MSCI ACWI Minimum Volatility ($net)
~~Hedged Equity~~	~~MSCI ACWI Minimum Volatility ($net)~~
Private Equity	MSCI ACWI IMI ($net)
Risk Reduction & Mitigation	**~~Custom Blended~~ Weighted Benchmark**
Core Fixed Income	Bloomberg Barclays U.S. Aggregate
~~Global Core Fixed Income~~	~~Bloomberg Barclays Global Aggregate (Hedged)~~
Credit Oriented Fixed Income	**~~Custom Blended~~ Weighted Benchmark**
Liquid Credit	Bloomberg Barclays Global High Yield (Hedged)
~~Emerging Market Debt~~	~~50% JP Morgan EMBI Global Diversified ($) 50% JP Morgan GBI ($)~~
Illiquid Credit	Bloomberg Barclays Global High Yield (Hedged)
~~Credit Oriented Hedge Funds~~ Alternative Liquid Credit	Bloomberg Barclays Global High Yield (Hedged)
Real Assets	**~~Custom Blended~~ Weighted Benchmark**
~~Liquid Real Estate~~	~~Wilshire Global REITs~~
Illiquid Real Estate	Wilshire Global REITs
Liquid Real Assets	~~Alerian MLP Index /~~ Dow Jones – Brookfield Global Infrastructure Index ~~/ Bloomberg Barclays – U.S. TIPS / Bloomberg Commodity – Commodity Index (TR)~~
Illiquid Real Assets	Dow Jones – Brookfield Global Infrastructure Index Bloomberg Commodity – Commodity Index (TR)
Multi-Risk Allocation	**~~Custom Blended~~ Weighted Benchmark**
Risk Balance	~~Custom Blended Benchmark~~Wilshire Risk Parity Index – 15% Volatility

Adopted: ~~November 29, 2018~~ October 27, 2022

By:_____

~~James Maxon~~Claudia Armijo, Board Chair
Public Employees' Retirement Association of New Mexico

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APPENDIX B. BENCHMARKS

Effective: January 1, 2023

Global Equity	**Weighted Benchmark**
Global Public Stock	MSCI ACWI IMI ($net)
Global Low Volatility Equity	MSCI ACWI Minimum Volatility ($net)
Private Equity	MSCI ACWI IMI ($net)
Risk Reduction & Mitigation	**Weighted Benchmark**
Core Fixed Income	Bloomberg Barclays U.S. Aggregate
Credit Oriented Fixed Income	**Weighted Benchmark**
Liquid Credit	Bloomberg Barclays Global High Yield (Hedged)
Illiquid Credit	Bloomberg Barclays Global High Yield (Hedged)
Alternative Liquid Credit	Bloomberg Barclays Global High Yield (Hedged)
Real Assets	**Weighted Benchmark**
Illiquid Real Estate	Wilshire Global REITs
Liquid Real Assets	Dow Jones – Brookfield Global Infrastructure Index
Illiquid Real Assets	Dow Jones – Brookfield Global Infrastructure Index Bloomberg Commodity – Commodity Index (TR)
Multi-Risk Allocation	**Weighted Benchmark**
Risk Balance	Wilshire Risk Parity Index – 15% Volatility

Adopted: October 27, 2022

By:_____

Claudia Armijo, Board Chair
Public Employees' Retirement Association of New Mexico

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