



Board of Trustees

Asset Allocation Workshop

April 05, 2021

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## BOARD OF TRUSTEES ASSET ALLOCATION WORKSHOP Telephonic

**April 5, 2021**

**1:00 - 4:00 p.m.**

**Webinar Access (click link to join webinar)**

<https://apfc.webex.com/apfc/onstage/g.php?MTID=ed2e53b319c9bb017b5c61485f3805009>

Event Password: Asset

***Teleconference Option***

***If you are unable to join in-person or via webinar, please contact us at  
(907) 796-1519 to receive a teleconference number.***

### AGENDA

MONDAY, APRIL 5, 2021
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- |           |   |
|-----------|---|
| 1:00 p.m. | CALL TO ORDER   |
|           | SCHEDULED APPEARANCES AND PUBLIC PARTICIPATION  |
| 1:15 p.m. | INTRODUCTION TO APFC ASSET CLASSES AND CAPITAL MARKETS OVERVIEW<br>Greg Allen, Callan<br>Steve Center, Callan |
| 1:45 p.m. | DISCUSSION OF APFC'S ASSET CLASSES AND ASSET ALLOCATION THOUGHTS<br>Marcus Frampton, Chief Investment Officer |
| 2:30 p.m. | BREAK   |
| 2:45 p.m. | EFFICIENT FRONTIER AND PORTFOLIO OPTIONS<br>Greg Allen, Callan<br>Steve Center, Callan                        |
| 3:00 p.m. | ASSET ALLOCATION IMPLICATIONS FOR APFC FUND/ERA MODEL<br>Greg Allen, Callan<br>Steve Center, Callan           |
| 3:45 p.m. | TRUSTEE COMMENTS  |
| 4:00 p.m. | ADJOURNMENT   |



ALASKA PERMANENT  
FUND CORPORATION

April, 2021

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**APFC BOT Asset Allocation  
Workshop**

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**Gregory C. Allen**  
CEO, Chief Research Officer

**Steven J. Center, CFA**  
Senior Vice President

# Outline

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## Callan Presentation Agenda

### Part I

- Asset Allocation Overview.
- APFC Asset Classes Overview.
  - Return, Volatility, Liquidity, Cost
- Capital Market Projections

### Part II

- Efficient Frontier Analysis (Mean-Variance Optimization)
- History of Permanent Fund Financial Variables since 1997.
- Financial Risk Analysis using Monte Carlo Simulation

# Strategic Asset Allocation

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## Long Term Planning for Institutional Portfolios

- Asset allocation decision is primary driver of long term return and risk, explaining 85% - 90% of relative performance across institutional portfolios.
- Decisions are strategic and long-term, not tactical.
  - Long term return objective;
  - Target level of volatility;
  - Liquidity;
  - Implementation resources
- Typically the decisions are made at the Board or Investment Committee level.
- Revisited every 3-5 years, or when major structural changes are made to assets or liabilities.
- Most successful programs typically maintain relatively stable asset allocation policies over time.
- Dramatic (versus evolutionary) changes can come with high transactions costs.
- Peer comparisons are an important component. Radically divergent portfolios are difficult to maintain through full market cycles.

# Strategic Asset Allocation

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## Choosing Asset Classes – Key Inputs

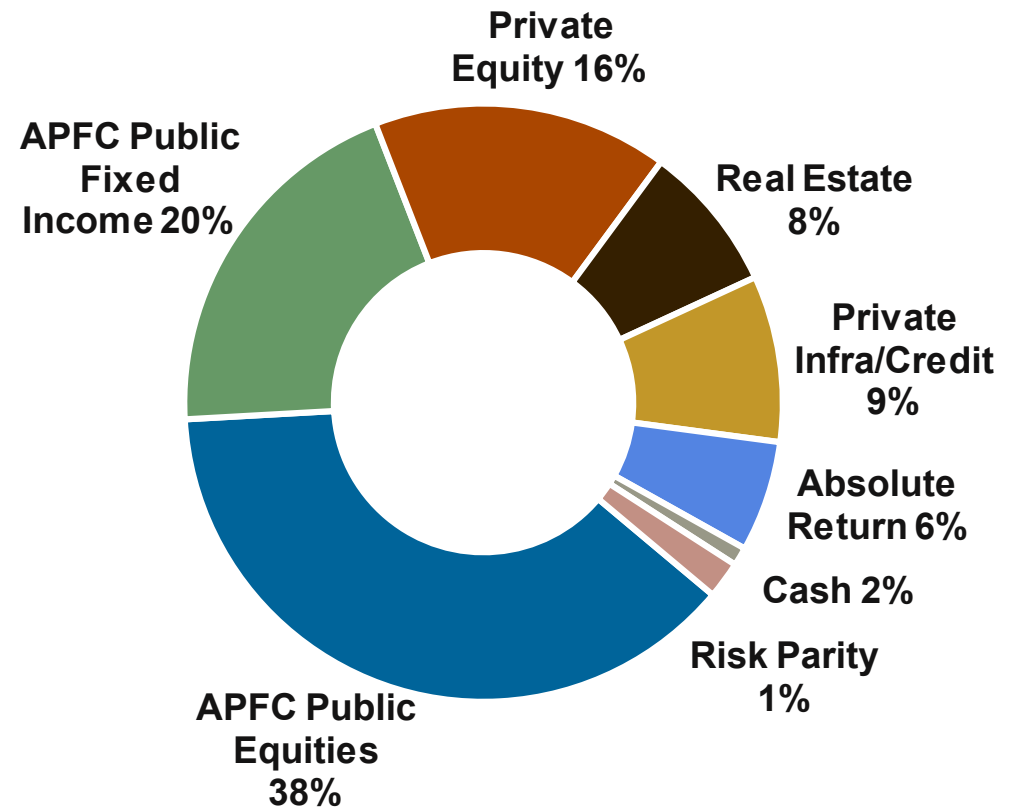
- Expected Return.
- Expected Volatility.
- Expected Correlation.
- Liquidity Profile.
- Implementation Difficulty vs Resources.
- Institutional Prevalence.
- Expense.
- Headline Risk.

# APFC Strategic Asset Allocation

## Eight Major Asset Classes

- **Global Public Equities** – US, Non-US Developed, Non-US Emerging, Small Cap
- **Global Public Fixed Income** - US and Non-US Investment Grade, High Yield, Emerging Markets, TIPS
- **Private Equity** – Venture capital, buy-out, special situation, and distressed.
- **Private Real Estate** – Direct investments, funds, REITs, real estate debt.
- **Private Infrastructure and Private Credit** – Infrastructure, private credit, income opportunities.
- **Absolute Return** – Direct hedge fund investments, low correlation to equity
- **Risk Parity** – Three complementary multi-asset strategies.
- **Cash**

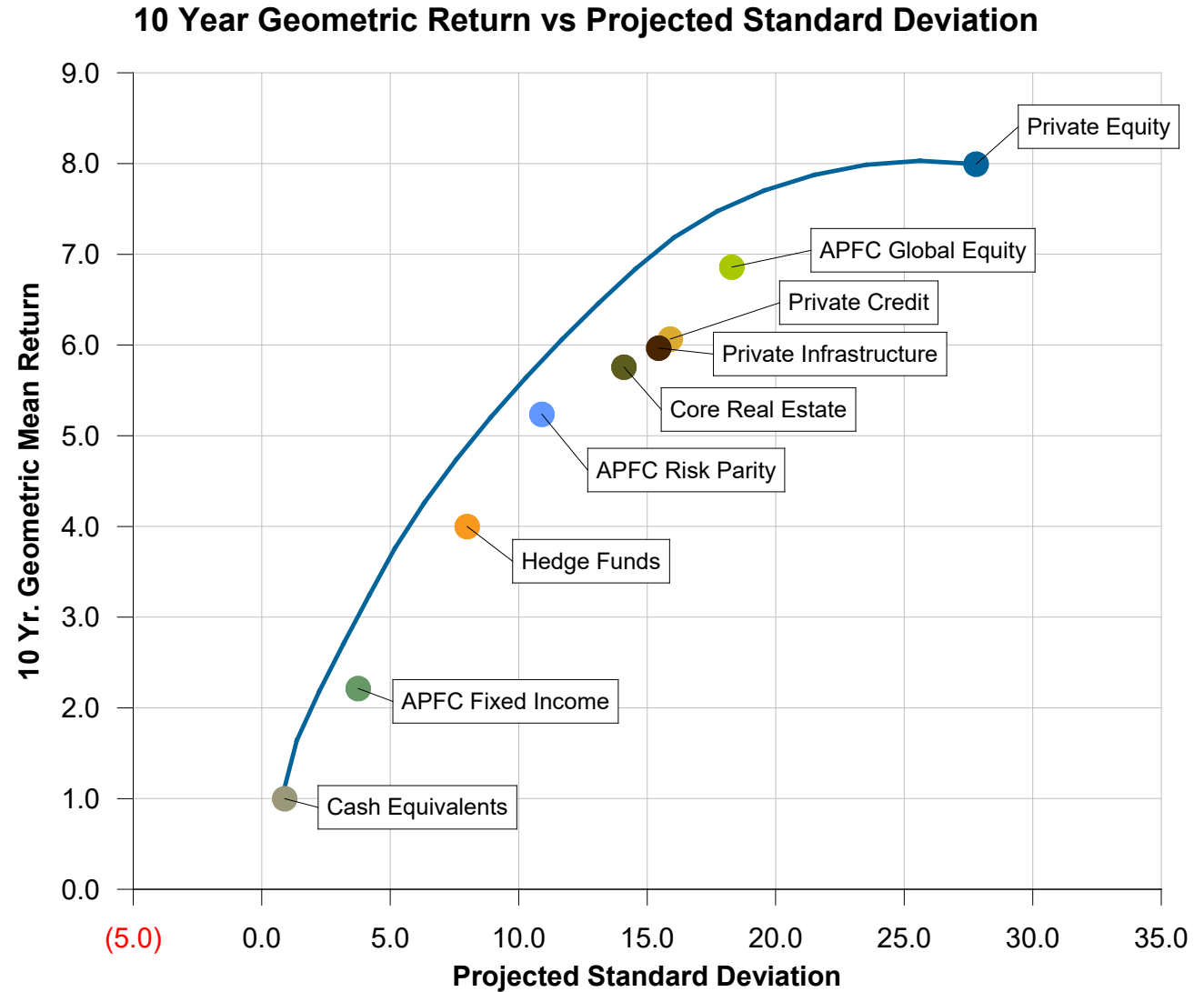
## APFC Total Fund Target



# Projected Return and Volatility

## Return, Volatility, Efficient Frontier

- Standard deviation is a measure of volatility and is used as the proxy for the riskiness of each asset class.
- Efficient markets mean that asset classes are generally arrayed from the lower left to the upper right along a relatively straight line.
- The blue locus of points represents the “efficient frontier”, the risk minimizing portfolios at each level of return (using the asset classes shown on the chart).



# Illiquidity Risk

## Liquidity Ranges by Asset Class

- Asset classes in the 1-3 range considered highly liquid and can typically be sold within 3-5 days.
- Private equity and private credit portfolios can be sold in the secondary market, typically with a meaningful haircut.
- Private real estate and infrastructure portfolios are very difficult to liquidate even under the best of circumstances.
- Adverse markets can effectively eliminate any liquidity for private markets portfolios.
- Institutional asset flow trends will impact liquidity of secondary markets for private investments.

	Highly Liquid			Highly Illiquid						
<b>Public Equity</b>										
US Large Cap	1									
US Small Cap		2	3							
Non-US Developed	1									
Emerging Markets		2	3							
<b>Public Fixed Income</b>										
US Core	1									
High Yield			3							
Non-US Developed	1									
Emerging Markets			3							
TIPS	1									
Cash	1									
<b>Private Markets</b>										
Private Real Estate								9	10	
Private Infrastructure						7	8	9	10	
Private Credit					6	7	8			
Private Equity							8	9	10	
<b>Other</b>										
Risk Parity	1	2	3							
Hedge Funds			3	4	5	6	7	8		

# Implementation Costs

## Management and Implementation Costs by Asset Class

- Public markets asset classes can generally be accessed passively at extremely low cost (single digit basis points).
- Active management fees in public markets are generally correlated with illiquidity due to the higher cost of research and the lack of ability to scale products.
- Private markets asset classes are more expensive and often include “carried interest” where the manager participates in profit.
- There is also a wider range of expense across private markets investments due the heterogeneous nature of the investments and the range of skill.

	Cheap			Expensive									
<b>Public Equity</b>													
US Large Cap	1												
US Small Cap		2											
Non-US Developed	1												
Emerging Markets		2											
<b>Public Fixed Income</b>													
US Core	1												
High Yield			3										
Non-US Developed		2											
Emerging Markets			3										
TIPS	1												
Cash	1												
<b>Private Markets</b>													
Private Real Estate					5	6	7	8					
Private Infrastructure						6	7	8					
Private Credit					5	6	7						
Private Equity										9			
<b>Other</b>													
Risk Parity	1	2	3										
Hedge Funds						6	7	8					

# Callan Capital Market Projection Process

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## Long Term Capital Market Projections

- Callan updates long term capital market projections each year in January and uses them for the full year with all clients for strategic planning purposes.
- Projections take into account long term relationships balanced with current market conditions.
- Consensus expectations (central banks, economists, asset managers, consultants, etc.) are carefully considered as an integral part of the process.
- Each number – **return, risk, correlation** – for every asset class must be individually defensible, and the numbers collectively need to work together as a set to generate reasonable portfolios during strategic planning exercises.
- Projections change slowly over time and are not designed to provide tactical insights.
- Process is executed by Callan's capital markets research group and projections are peer reviewed by Client Policy Review Committee as well as the hundreds of the clients that use them every year.
- Process is battle proven – it has evolved and improved, but hasn't fundamentally changed over the last four decades.

# Highlights of 2021 Capital Market Projections

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## Changes and Observations

- GDP growth of 2% to 2.5% for the U.S., 1.5% to 2% for developed ex-U.S. markets, and 4% to 5% for emerging markets. Embedded in all of these economic forecasts is the expectation that the path to this longer-term growth will include cycles with recessions.
- Inflation expectation lowered to 2.0%.
- Global equity, projected return of **6.85%** with a standard deviation (or risk) of 18.3%, roughly a **50 bp.** reduction from last year.
- For APFC public fixed income, projected return of **2.2%** (risk: 3.75%), roughly an **85 bp.** reduction from last year reflecting the low yield environment for fixed income.
- Gradually ratcheted down our expectations over recent years for equities to reflect higher valuations, a lower growth environment, and lower inflation.
- Continue to project a premium for private markets portfolios over public markets assuming long term commitment and institutional implementation.
  - Private equity **8.0%** projected return;
  - Private real estate **5.75%** projected return;
  - Private infrastructure/credit **6.40%** projected return.

# Capital Market Projections

## Projected Return, Standard Deviation, and Yield

### Summary of Callan's Long-Term Capital Market Projections for APFC Asset Allocation Model (FY 2022 - 2031)

Asset Class	Performance Index	FY 2021 Target Weight	PROJECTED RETURN		PROJECTED RISK	
			1-Year Arithmetic	10-Year Geometric Return	Annualized Standard Deviation	Projected Yield
<b>APFC Public Equities</b>		<b>38.00%</b>	<b>8.30%</b>	<b>6.85%</b>	<b>18.30%</b>	<b>2.40%</b>
Global Equity	MSCI ACWI - IMI	38.00%	8.30%	6.85%	18.30%	2.40%
<b>APFC Public Fixed Income</b>		<b>20.00%</b>	<b>2.25%</b>	<b>2.20%</b>	<b>3.75%</b>	<b>3.05%</b>
Money Markets	90-Day T-Bill	1.00%	1.00%	1.00%	0.90%	1.00%
TIPS	Bloomberg TIPS	1.00%	1.80%	1.70%	5.05%	2.35%
US Fixed Income	Bloomberg Aggregate	5.50%	1.80%	1.75%	3.75%	2.50%
US Investment Grade Credit	Bloomberg Credit	5.50%	2.30%	2.25%	4.25%	2.85%
Non-US Fixed Income	Bloomberg Global Treasury ex-US Hedged	2.00%	1.15%	0.75%	9.20%	1.80%
Emerging Market Debt	50/50 JPM EMBI/JPM GBI	1.00%	3.90%	3.50%	9.50%	5.95%
High Yield	Bloomberg US High Yield 2% Issuer Cap	2.00%	4.85%	4.35%	10.75%	6.70%
US Securitized	Bloomberg US Securitized	2.00%	2.00%	1.95%	4.00%	2.60%
<b>Private Equity/Growth Opps</b>		<b>16.00%</b>	<b>11.50%</b>	<b>8.00%</b>	<b>27.80%</b>	<b>0.00%</b>
Private Equity	Cambridge Private Equity (lag)	16.00%	11.50%	8.00%	27.80%	0.00%
<b>Private Real Estate</b>		<b>8.00%</b>	<b>6.60%</b>	<b>5.75%</b>	<b>14.10%</b>	<b>4.40%</b>
Real Estate	NCREIF Total Index (lag)	8.00%	6.60%	5.75%	14.10%	4.40%
<b>Private Infra/Credit/Income Opps</b>		<b>9.00%</b>	<b>7.05%</b>	<b>6.40%</b>	<b>13.30%</b>	<b>5.25%</b>
Private Infrastructure	Cambridge Global Private Infra (lag)	5.40%	7.55%	6.60%	15.20%	5.25%
Private Credit	Bloomberg US High Yield (lag)	3.60%	6.50%	5.90%	12.10%	5.25%
<b>Absolute Return</b>		<b>6.00%</b>	<b>4.25%</b>	<b>4.00%</b>	<b>8.00%</b>	<b>0.00%</b>
Hedge Funds	HFRI Total HFOF Universe	6.00%	4.25%	4.00%	8.00%	0.00%
<b>Risk Parity</b>		<b>1.00%</b>	<b>5.70%</b>	<b>5.25%</b>	<b>10.90%</b>	<b>2.45%</b>
Risk Parity	HFR Risk Parity Vol 12	1.00%	5.70%	5.25%	10.90%	2.45%
<b>Cash Equivalents</b>		<b>2.00%</b>	<b>1.00%</b>	<b>1.00%</b>	<b>0.90%</b>	<b>1.00%</b>
Hedge Funds	90-Day T-Bill	2.00%	1.00%	1.00%	0.90%	1.00%
<b>Total Fund</b>	APFC Total Fund Target	<b>100.00%</b>	<b>6.90%</b>	<b>6.20%</b>	<b>13.50%</b>	<b>2.40%</b>
<b>Inflation</b>	CPI-U			2.00%	1.50%	

# Capital Market Assumptions

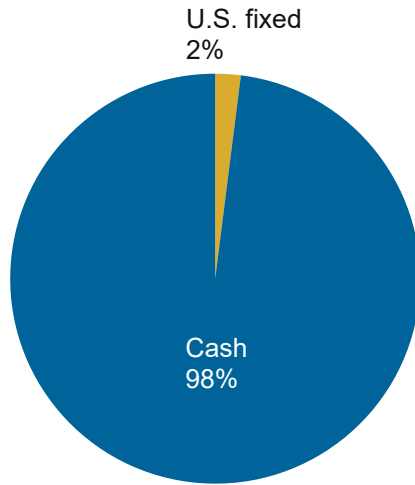
## Projected Correlation Matrix

Correlation Matrix	GE	FI	Cash	TIPS	Core FI	Credit	NU FI	EMD	GHY	MBS	PE	RE	PI	AR	RP	CPI
APFC Global Equity	<b>1.000</b>	0.331	-0.090	-0.090	-0.118	0.279	0.038	0.572	0.749	-0.109	0.831	0.724	0.853	0.809	0.991	-0.002
APFC Fixed Income	0.331	<b>1.000</b>	0.020	0.610	0.802	0.920	0.663	0.499	0.516	0.754	0.204	0.250	0.333	0.445	0.444	-0.175
Cash Equivalents	-0.090	0.020	<b>1.000</b>	0.120	0.150	-0.050	0.000	-0.070	-0.110	0.138	0.000	0.000	-0.075	-0.040	-0.070	0.050
TIPS	-0.090	0.610	0.120	<b>1.000</b>	0.654	0.520	0.400	0.180	0.055	0.602	-0.140	-0.020	-0.051	0.085	0.000	0.080
Core US Fixed	-0.118	0.802	0.150	0.654	<b>1.000</b>	0.796	0.500	0.120	-0.004	0.920	-0.190	-0.035	-0.019	0.142	0.019	-0.250
Inv Grade Credit	0.279	0.920	-0.050	0.520	0.796	<b>1.000</b>	0.490	0.350	0.400	0.732	0.150	0.240	0.312	0.390	0.390	-0.250
Global ex-US Fixed	0.038	0.663	0.000	0.400	0.500	0.490	<b>1.000</b>	0.150	0.120	0.460	0.060	-0.020	0.047	0.050	0.107	-0.100
EMD	0.572	0.499	-0.070	0.180	0.120	0.350	0.150	<b>1.000</b>	0.600	0.110	0.430	0.355	0.455	0.550	0.592	0.000
High Yield	0.749	0.516	-0.110	0.055	-0.004	0.400	0.120	0.600	<b>1.000</b>	-0.004	0.589	0.525	0.626	0.643	0.754	0.050
US Securitized	-0.109	0.754	0.138	0.602	0.920	0.732	0.460	0.110	-0.004	<b>1.000</b>	-0.175	-0.032	-0.018	0.131	0.017	-0.230
Private Equity	0.831	0.204	0.000	-0.140	-0.190	0.150	0.060	0.430	0.589	-0.175	<b>1.000</b>	0.600	0.732	0.602	0.811	0.060
Core Real Estate	0.724	0.250	0.000	-0.020	-0.035	0.240	-0.020	0.355	0.525	-0.032	0.600	<b>1.000</b>	0.777	0.520	0.724	0.100
Private Infra/Credit	0.853	0.333	-0.075	-0.051	-0.019	0.312	0.047	0.455	0.626	-0.018	0.732	0.777	<b>1.000</b>	0.599	0.856	0.065
Hedge Funds	0.809	0.445	-0.040	0.085	0.142	0.390	0.050	0.550	0.643	0.131	0.602	0.520	0.599	<b>1.000</b>	0.834	0.150
APFC Risk Parity	0.991	0.444	-0.070	0.000	0.019	0.390	0.107	0.592	0.754	0.017	0.811	0.724	0.856	0.834	<b>1.000</b>	-0.036
Inflation	-0.002	-0.175	0.050	0.080	-0.250	-0.250	-0.100	0.000	0.050	-0.230	0.060	0.100	0.065	0.150	-0.036	<b>1.000</b>

- Projected correlations between asset classes are the third dimension of capital market expectations.
- They are generally not discussed in detail but are very important in identifying and quantifying the diversification effects of asset classes.
- Negative correlations between asset classes (i.e. Core US Fixed and Global Equity) mean that the combination of the two has a powerful risk reduction impact when held together.
- Projected correlations take into account long term relationships between asset classes while also considering recent trends, particularly if they represent structural changes.
- Correlations are particularly tricky because the entire matrix must satisfy certain mathematical criteria (i.e. it must be positive semi-definite).

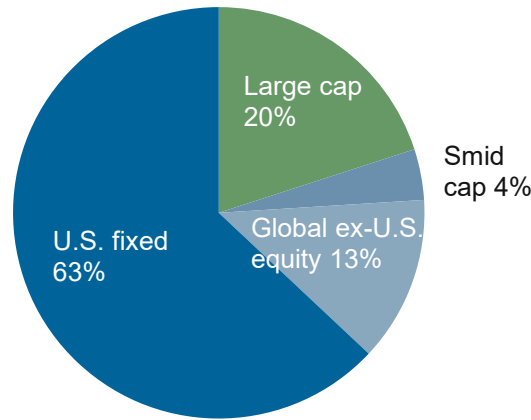
# 7% Expected Returns Over Past 30+ Years

Increasing Complexity



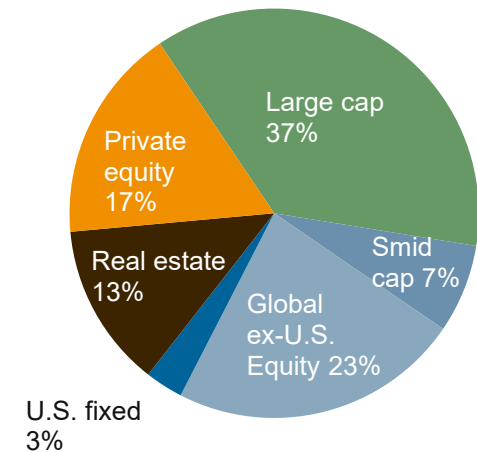
1991

Return: 7.0%  
Risk: 1.1%



2006

Return: 7.0%  
Risk: 6.7%



2021

Return: 7.0%  
Risk: 17.3%

Increasing Risk

In 1991, our expectations for cash and broad U.S. fixed income were 6.95% and 8.95%, respectively

Return-seeking assets were not required to earn a 7% projected return

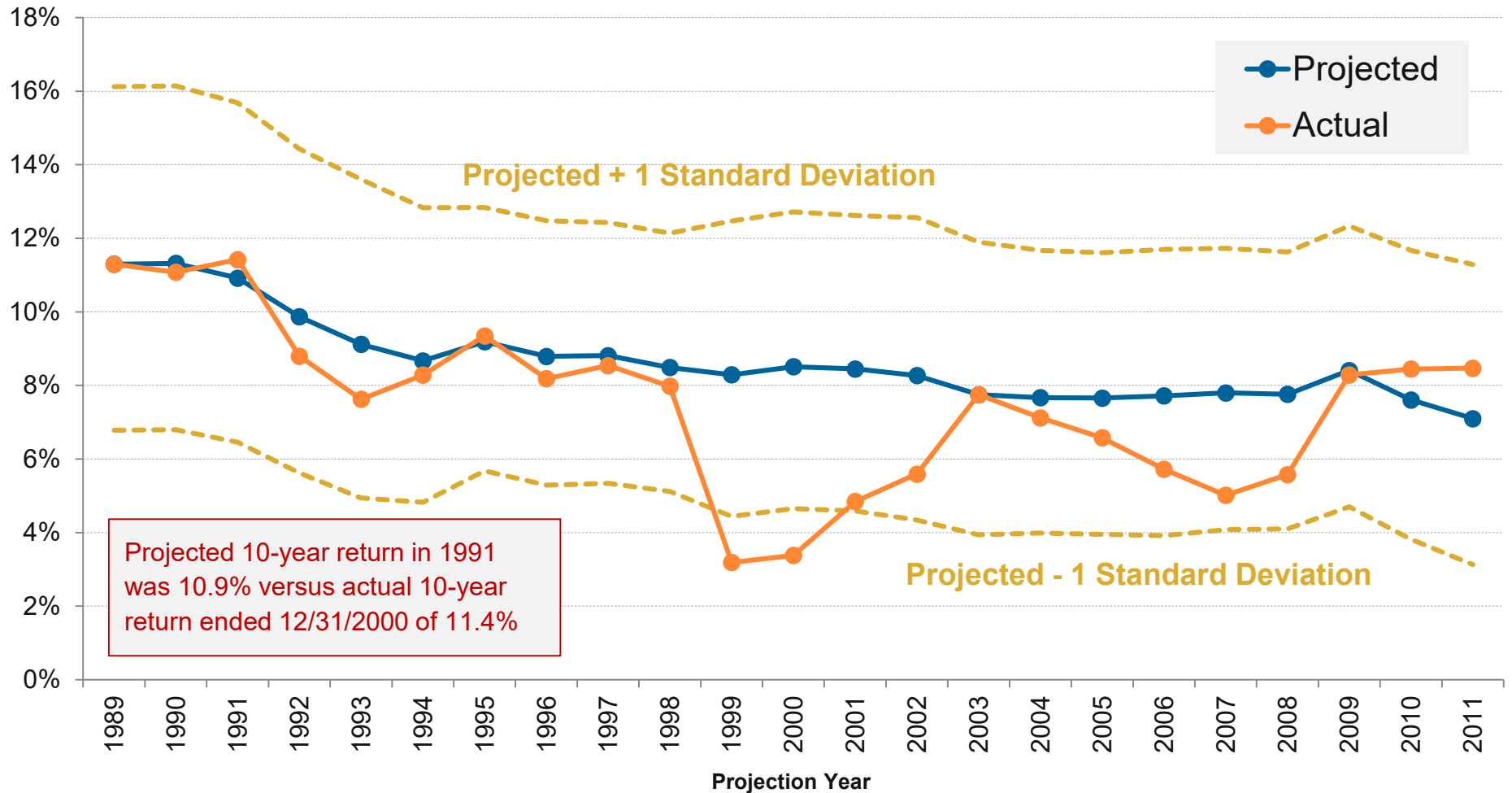
15 years later, an investor would have needed over a third of the portfolio in public equities to achieve a 7% projected return, with 6x the portfolio volatility of 1991

Today an investor is required to include 97% in return-seeking assets to earn a 7% projected return at almost 16x the volatility compared to 1991

Source: Callan

# Historical Accuracy – Actual versus Projected Return

Portfolio Returns – 60% Equity, 30% Fixed, 10% Real Estate

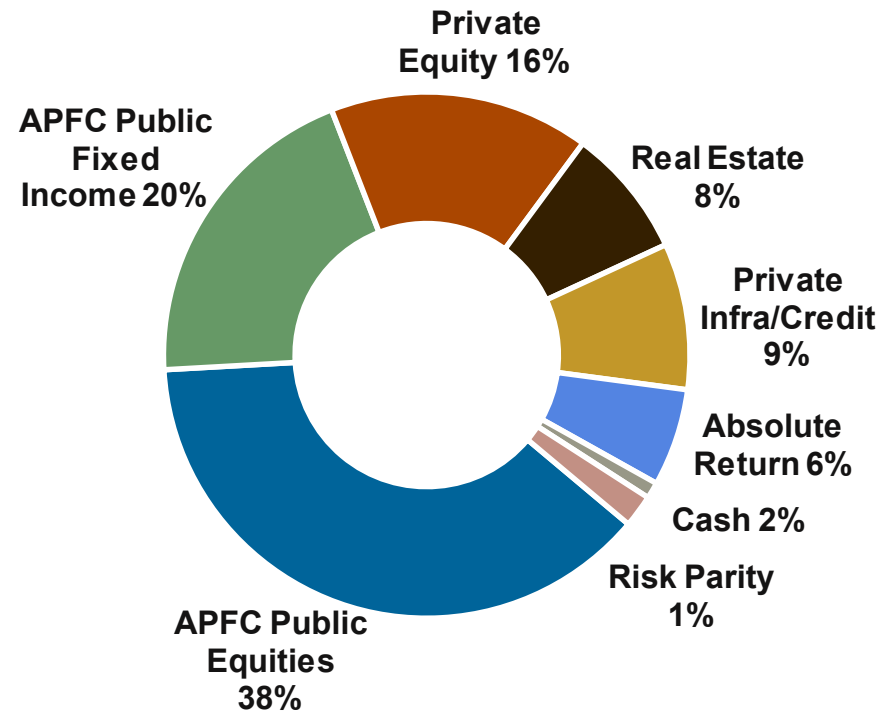


# APFC Total Fund Policy Target

## Projected Return and Standard Deviation

- Projected median 10-year annualized return of **6.20%** is a reduction of roughly 55 basis points relative to last year.
- Inflation expectation reduced from 2.25% to **2.00%**.
- Projected median 10-year annualized real return of **4.20%** is a reduction of roughly 30 basis points relative to last year.
- Projected standard deviation of **13.50%** is roughly the same as last year.
- Percent probability of exceeding 5% annualized real return over 10-year horizon is estimated to be **45.6%**.

## APFC Total Fund Target



**Expected 10-year Geometric Return: 6.20%**  
**Expected Standard Deviation: 13.50%**  
**Expected Inflation: 2.00%**  
**Expected Real Return: 4.20%**

# Part II – Mean Variance Optimization and Simulation

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## Asset Allocation and Risk Analysis

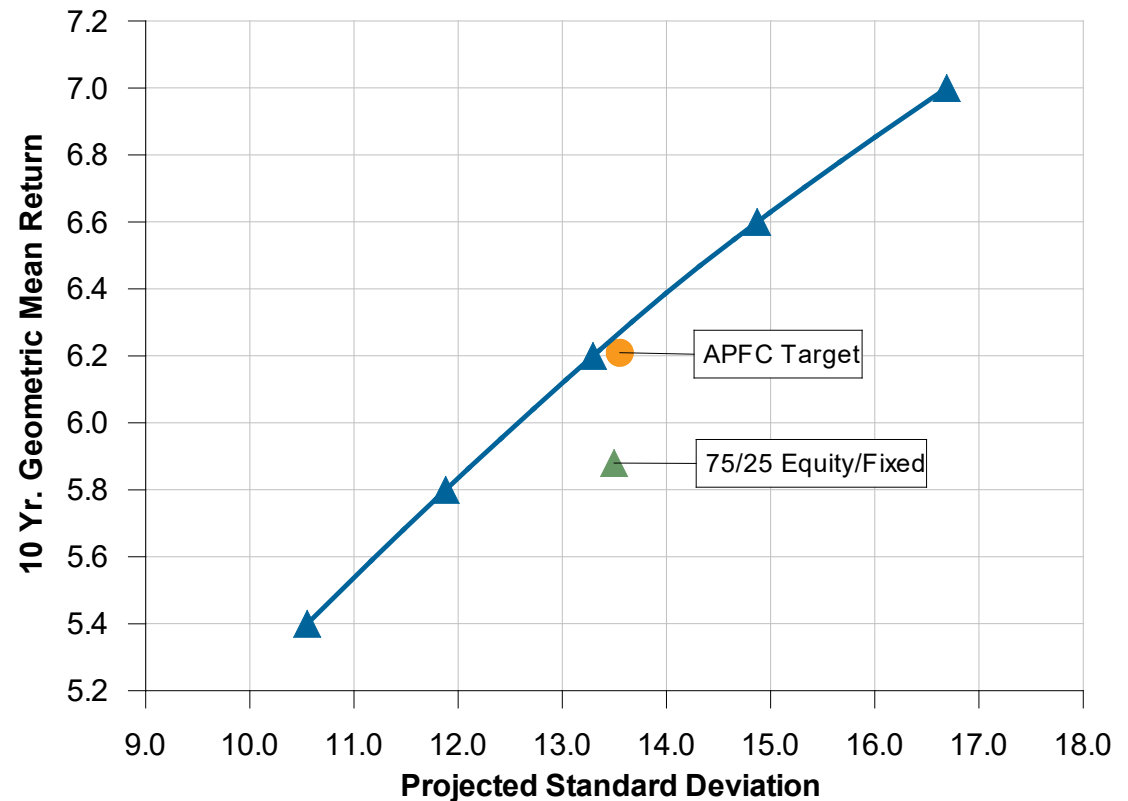
- Efficient Frontier and APFC Policy Mix.
- Range of expected returns over various periods.
- Historical review of key financial variables.
- Monte Carlo simulation and financial risk analysis.

# Efficient Frontier Analysis

## Projected Return and Standard Deviation

- Efficient frontier is locus of portfolios that minimize risk for each level of expected return.
- Output dependent on return, standard deviation, and correlation assumptions.
- APFC Target just below efficient frontier.
- Efficient portfolio at similar return level has higher real estate allocation and no allocation to cash.
- Difference in risk is relatively small (roughly 25 bps).

Projected 10-Year Geometric Mean Return versus Projected Standard Deviation



\*75/25 Equity/Fixed portfolio assumes 75% allocation to APFC Global Equity benchmark and 25% allocation to Bloomberg Aggregate Index

# Efficient Frontier Analysis

## Five Alternative Mixes

- Asset mix detail from previous slide.
- Alternative efficient mixes range from expected returns of 5.4% to 7.0%.
- Mix 5 has an expected real return of 5%.
- Mix 5 has only 11% allocated to public fixed income, and 46% allocated to private markets asset classes.
- The APFC policy target falls into the middle of this range with a similar risk level to a 75/25 public equity, public fixed income portfolio.

### Asset Mix Alternatives

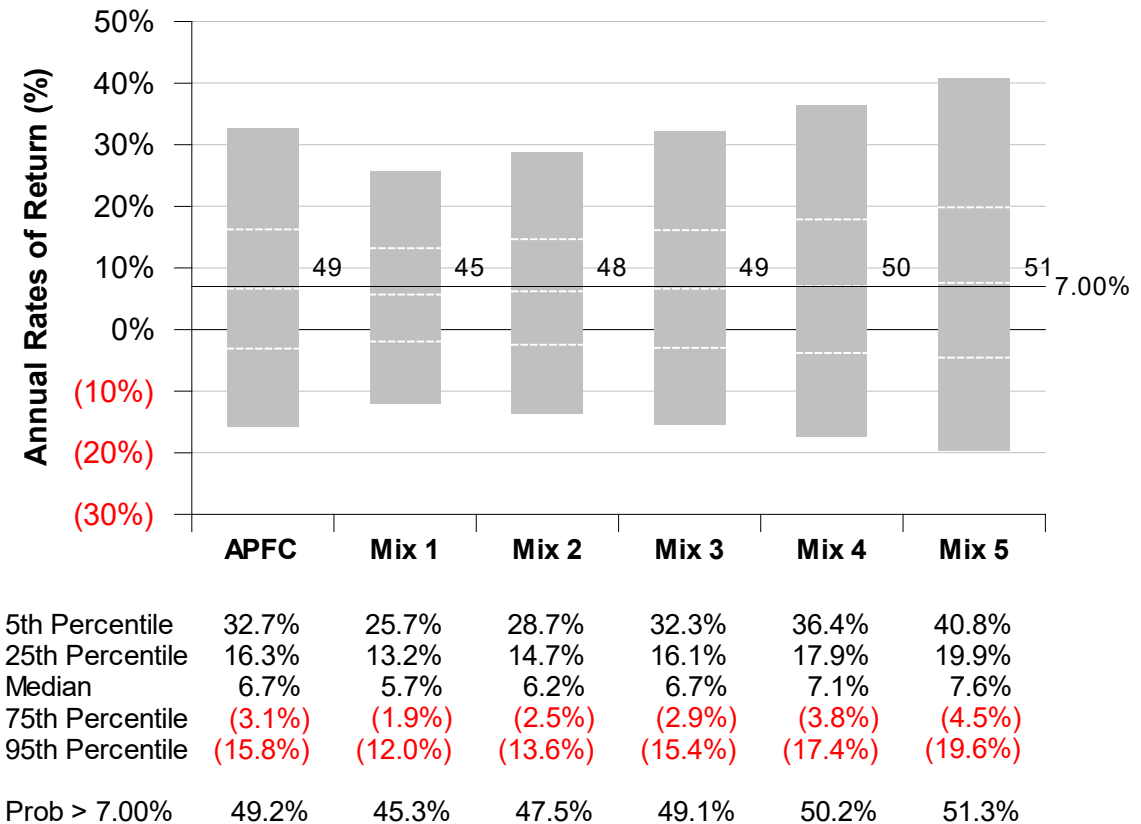
Portfolio Component	APFC	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
APFC Global Equity	38	27	32	36	35	43
Private Equity	16	12	13	15	23	26
Core Real Estate	8	9	11	12	12	15
Private Infra/Credit	9	8	9	10	10	5
APFC Fixed Income	20	40	31	22	20	11
Hedge Funds	6	4	4	5	0	0
APFC Risk Parity	1	0	0	0	0	0
Cash Equivalents	2	0	0	0	0	0
Totals	100	100	100	100	100	100
10 Yr. Geometric Mean Return	6.20%	5.40%	5.80%	6.20%	6.60%	7.00%
Projected Standard Deviation	13.55%	10.58%	11.91%	13.33%	14.93%	16.76%

# Efficient Frontier Analysis

## Range of Projected One-Year Return

- Graph shows the distribution of expected one-year returns for each asset mix.
- The ranges span 2 standard deviations (5<sup>th</sup> through 95<sup>th</sup> percentile).
- Numbers next to each bar show probability of exceeding 5% real return in any single year.
- Losses in a 95<sup>th</sup> percentile (1 in 20) outcome are projected to range from -12% to -19.6%.
- 95<sup>th</sup> percentile projected return for APFC Target is -15.8%, or roughly \$11 billion.

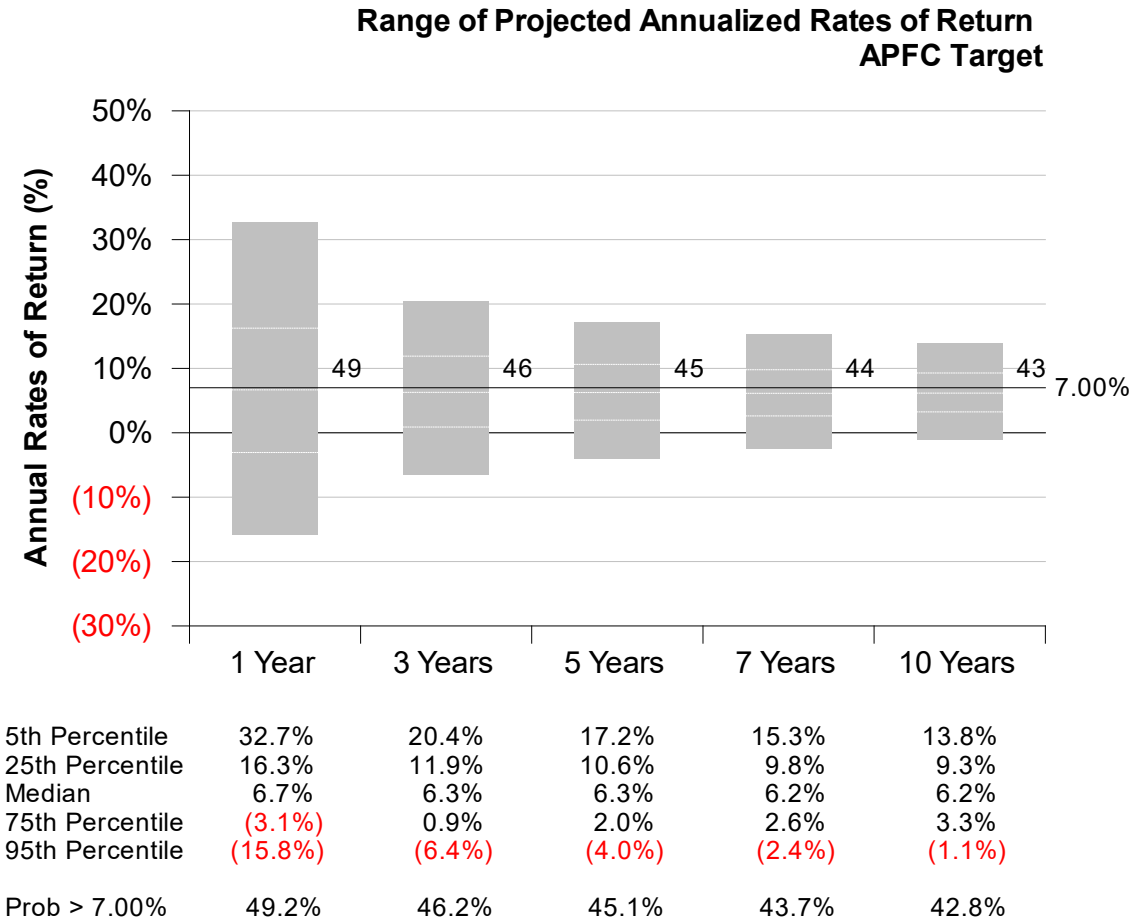
Range of Projected Annualized Return  
Projection Period: 1 Year



# Efficient Frontier Analysis

## Range of Projected Returns over Multiple Periods

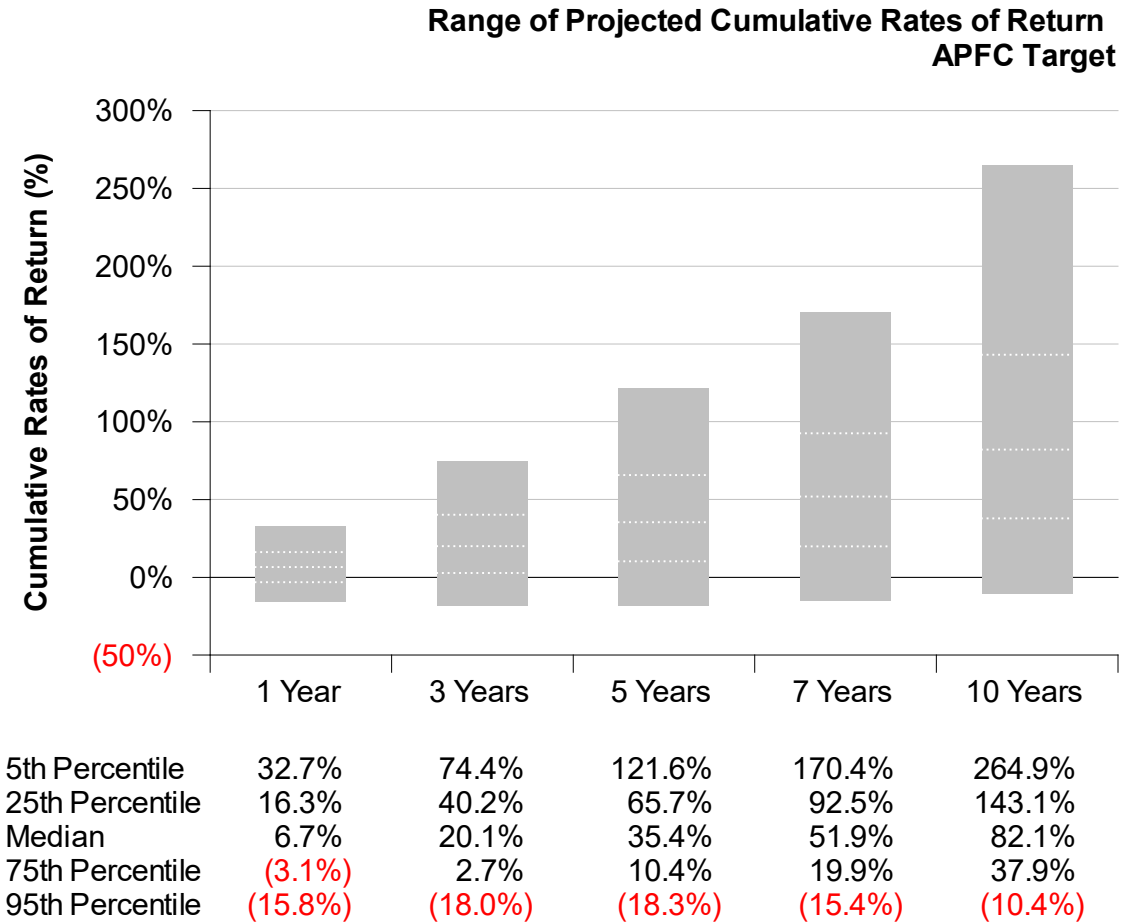
- Chart illustrates the impact of extending the time period on range of annualized returns.
- Range of annualized returns narrows, and the risk of a cumulative negative return is reduced.
- Median (expected) annualized return comes down as multi-year risk is incorporated.
- Median annualized return approaches its asymptote (stabilizes) at roughly 10 years.



# Efficient Frontier Analysis

## Range of Projected Cumulative Returns over Multiple Periods

- This chart translates the annualized 10-year returns shown in the previous chart to cumulative returns.
- Illustrates that annualized returns can conceal true range of outcomes over multi-year periods.
- Range of cumulative return increases as time horizon lengthens.
- For APFC Target 95<sup>th</sup> percentile negative return peaks at around 5 years at -18%.
- 10 year cumulative return ranges from +265% to -10%.

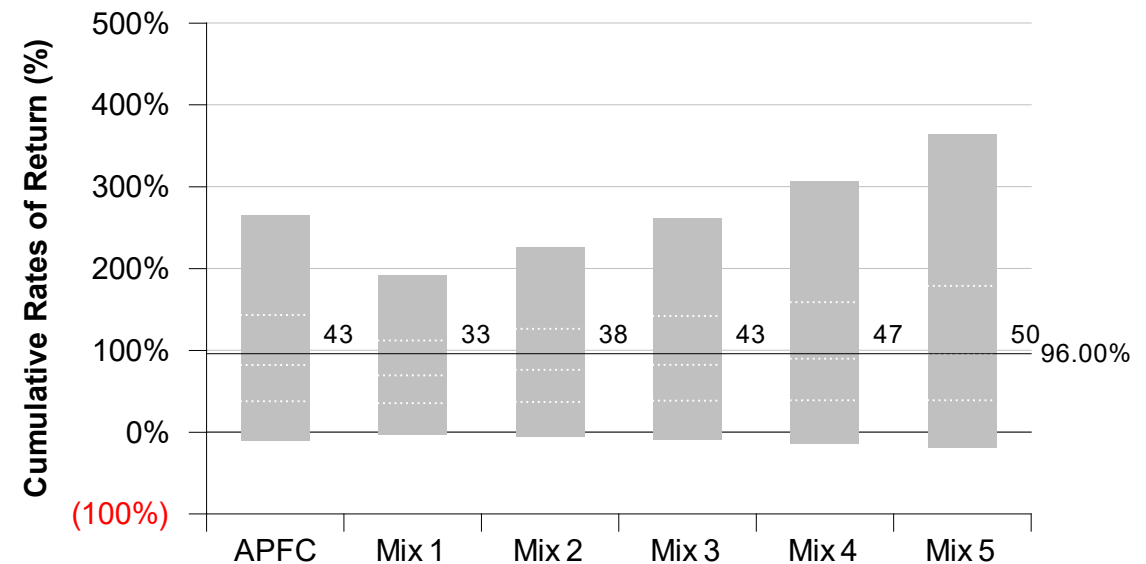


# Efficient Frontier Analysis

## Range of Projected Ten-Year Cumulative Return

- This chart shows the range of ten-year cumulative return for the APFC Target and the mixes shown on the efficient frontier.
- The additional risk of the APFC Target (relative to Mix 3) results in a higher best-case outcome, a lower worst-case outcome, and a similar median outcome.
- A 5% real return hurdle implies a roughly 96% cumulative return over 10 years.
- Mix 5 (5% real) loses close to twice as much over 10 years in a worst-case outcome relative to the APFC Target, but gains almost 100% more in the best case.

Range of Projected Cumulative Return  
Projection Period: 10 Years



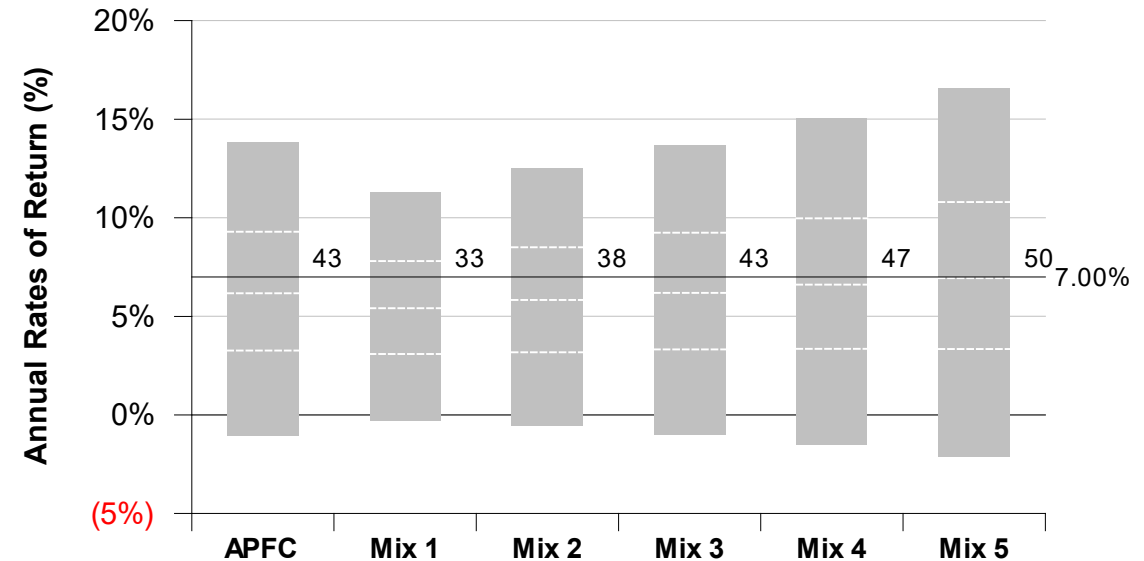
Metric	APFC	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
5th Percentile	264.9%	191.7%	225.7%	261.3%	307.1%	364.0%
25th Percentile	143.1%	112.1%	126.3%	142.0%	158.8%	178.9%
Median	82.1%	69.4%	76.2%	82.3%	89.7%	95.7%
75th Percentile	37.9%	35.6%	36.8%	38.6%	39.1%	39.0%
95th Percentile	(10.4%)	(2.6%)	(5.4%)	(9.5%)	(14.0%)	(19.1%)
Prob > 96.00%	43.2%	33.0%	38.2%	43.1%	47.0%	49.9%

# Efficient Frontier Analysis

## Range of Projected Ten-Year Annualized Return

- This chart translates the cumulative returns shown on the previous slide to annualized 10-year returns.
- This is the more standard format shown in asset allocation analysis.
- In this format, decisions to take on more or less risk seem to have a relatively small impact on expected risk and return.

Range of Projected Annualized Return  
Projection Period: 10 Years



	APFC	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
5th Percentile	13.8%	11.3%	12.5%	13.7%	15.1%	16.6%
25th Percentile	9.3%	7.8%	8.5%	9.2%	10.0%	10.8%
Median	6.2%	5.4%	5.8%	6.2%	6.6%	6.9%
75th Percentile	3.3%	3.1%	3.2%	3.3%	3.4%	3.3%
95th Percentile	(1.1%)	(0.3%)	(0.6%)	(1.0%)	(1.5%)	(2.1%)
Prob > 7.00%	42.8%	32.7%	37.8%	42.7%	46.7%	49.7%

# History and Interaction of Key Financial Variables

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## History of Permanent Fund Financials since 1997

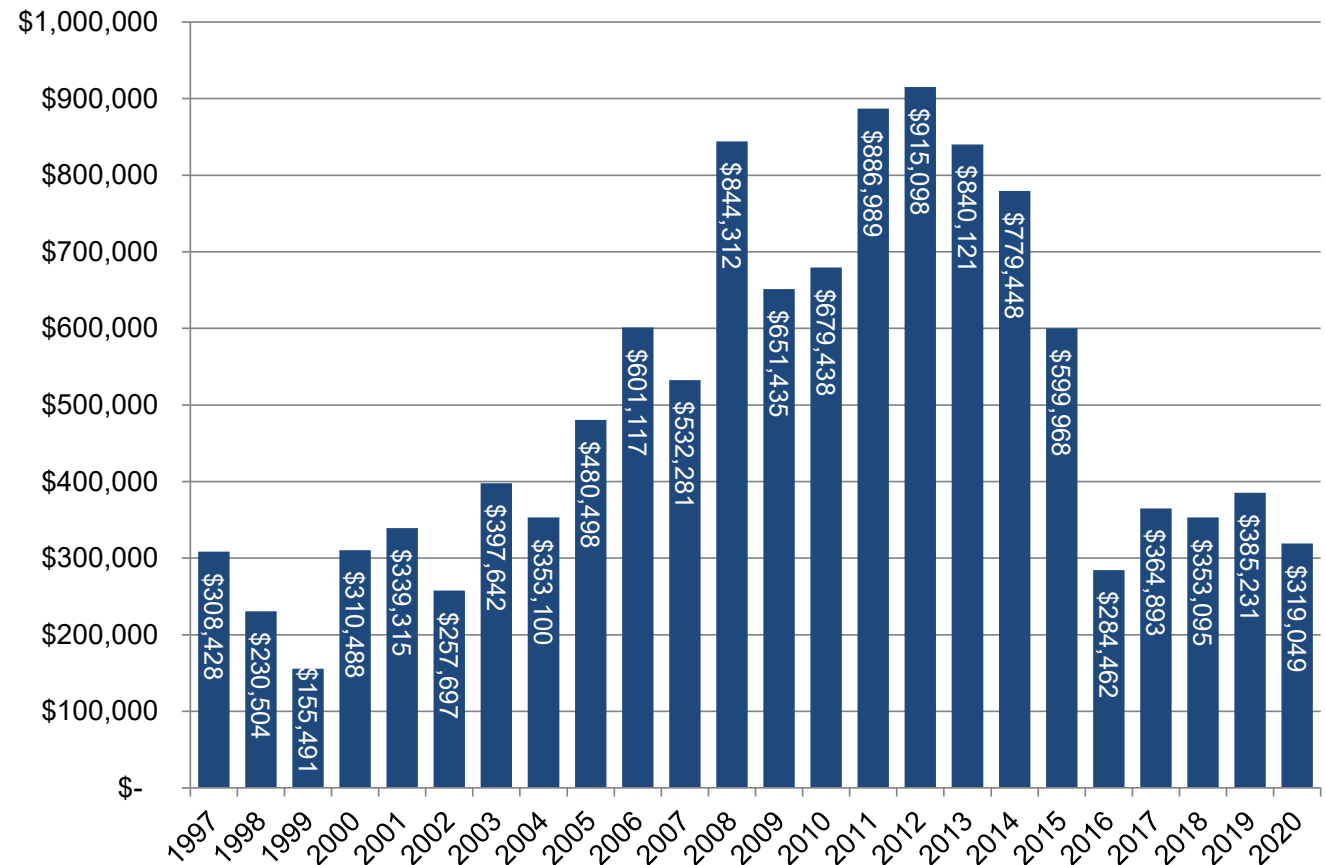
- Dedicated state revenues.
- Distributions.
- Statutory Net Income.
- Earnings Reserve Account Balance.
- Market Value.
- Five-Year Average Market Value.

# Key Financial Variables – Contributions

## Historical Experience

- Oil revenue, the original source of the Permanent Fund has been declining since 2012 when it peaked at \$915 million.
- In 2021 oil revenue represented roughly 0.5% of the Fund's market value, versus roughly 2.3% in 2012.
- Return on investments has become increasingly important in maintaining the purchasing power of the Permanent Fund over time.

**Historical Oil Revenue  
(1997 - 2020)**

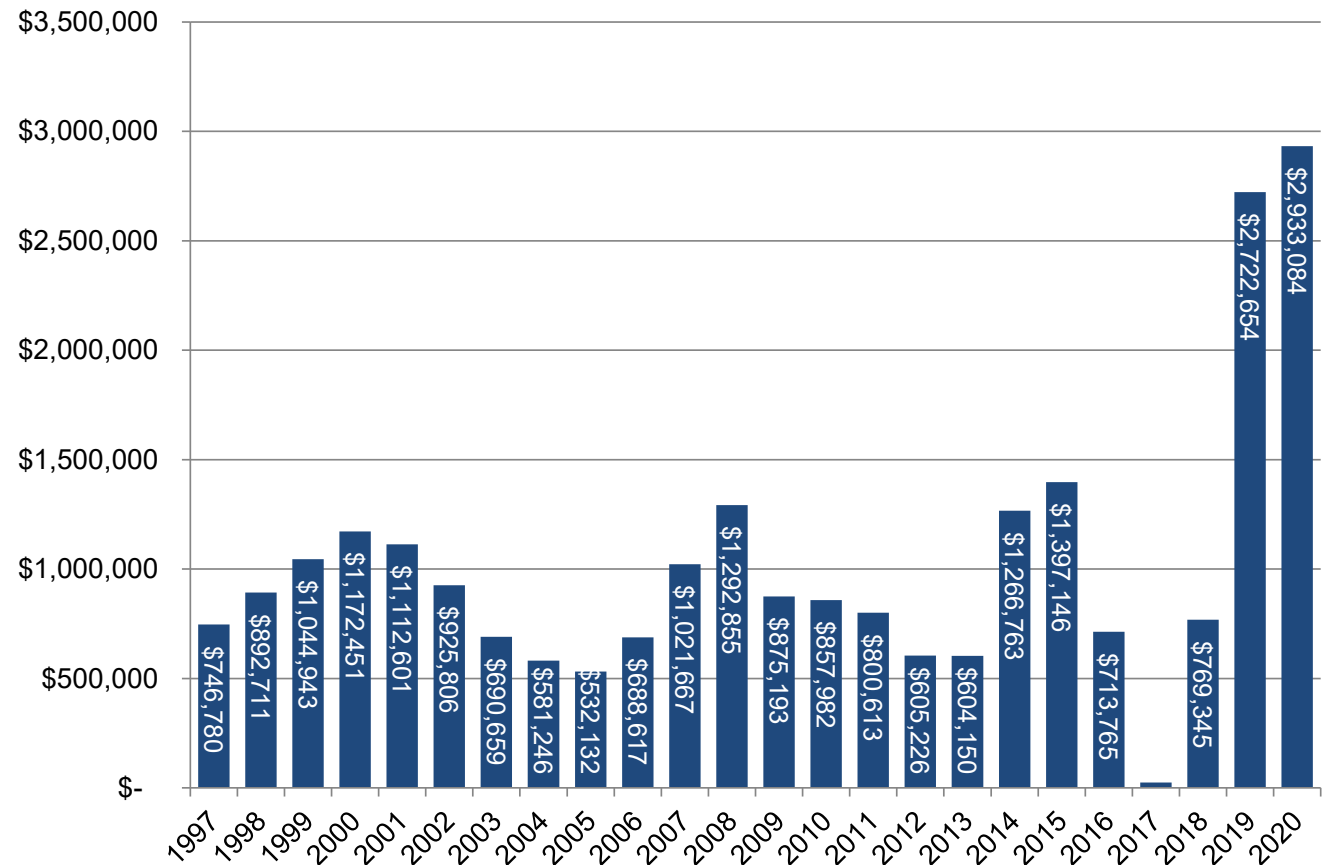


# Key Financial Variables – Distributions

## Historical Experience

- Up until 2018 distributions were made to fund the annual dividend.
- Distributions were roughly equal to ½ of the average Statutory Net Income over the previous five years.
- A Statutory Net Income formula is subject to the volatility introduced by realized gains and losses.
- Distributions under the POMV rule are roughly 3-4 times the size of distributions under the dividend formula.

**Historical Distributions  
(1997 - 2020)**

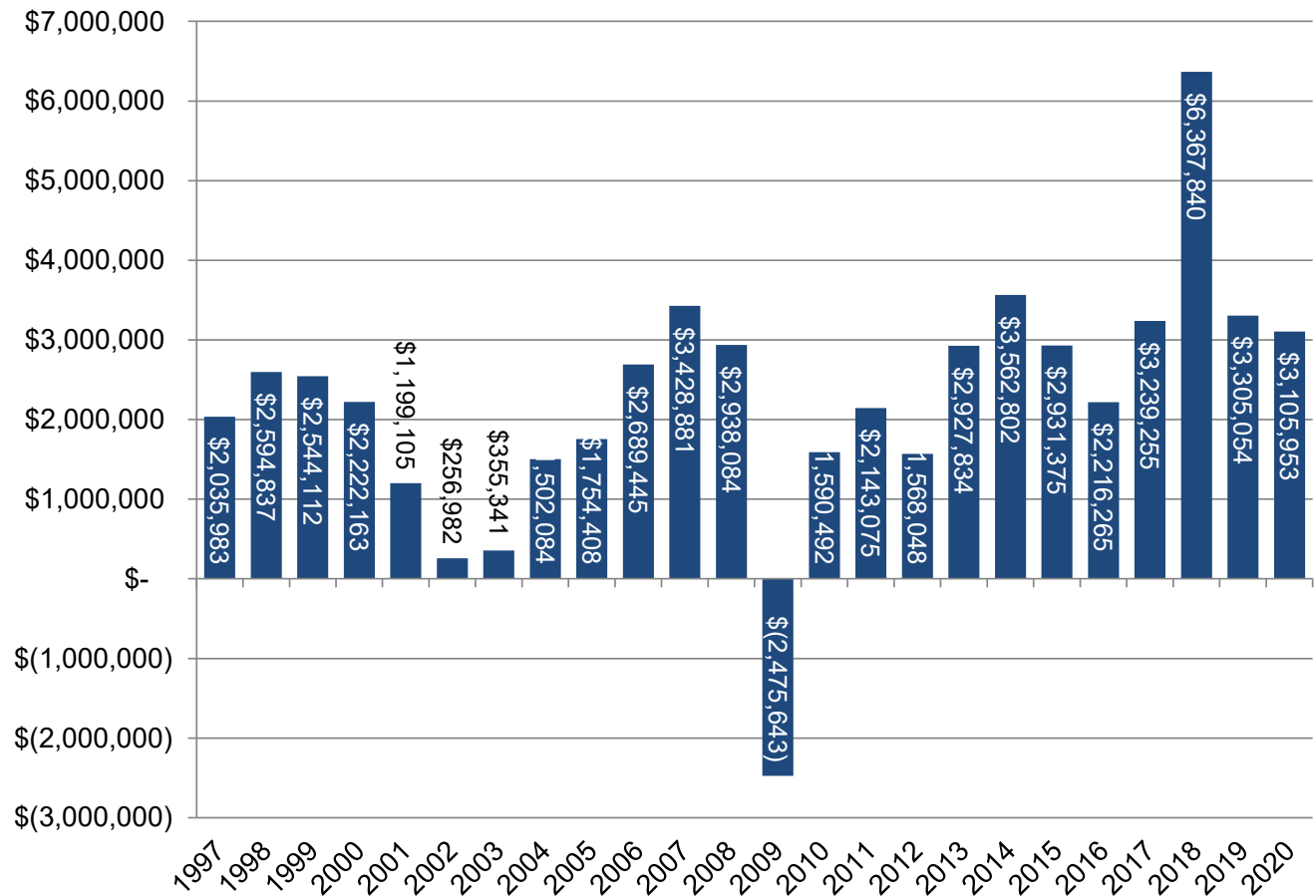


# Key Financial Variables – Statutory Net Income

## Historical Experience

- Statutory Net Income is the sum of income (dividends and bond interest) plus sum of realized gains/losses in a given year.
- SNI is an accounting construct that is a key determinant of the size of the Earnings Reserve Account balance (and previously the dividend formula).
- It has become more volatile over time as the Permanent Fund has shifted from primarily income producing investments to capital appreciation oriented investments.
- 2009 the only negative year due to realized losses.

**Historical Statutory Net Income  
(1997 - 2020)**

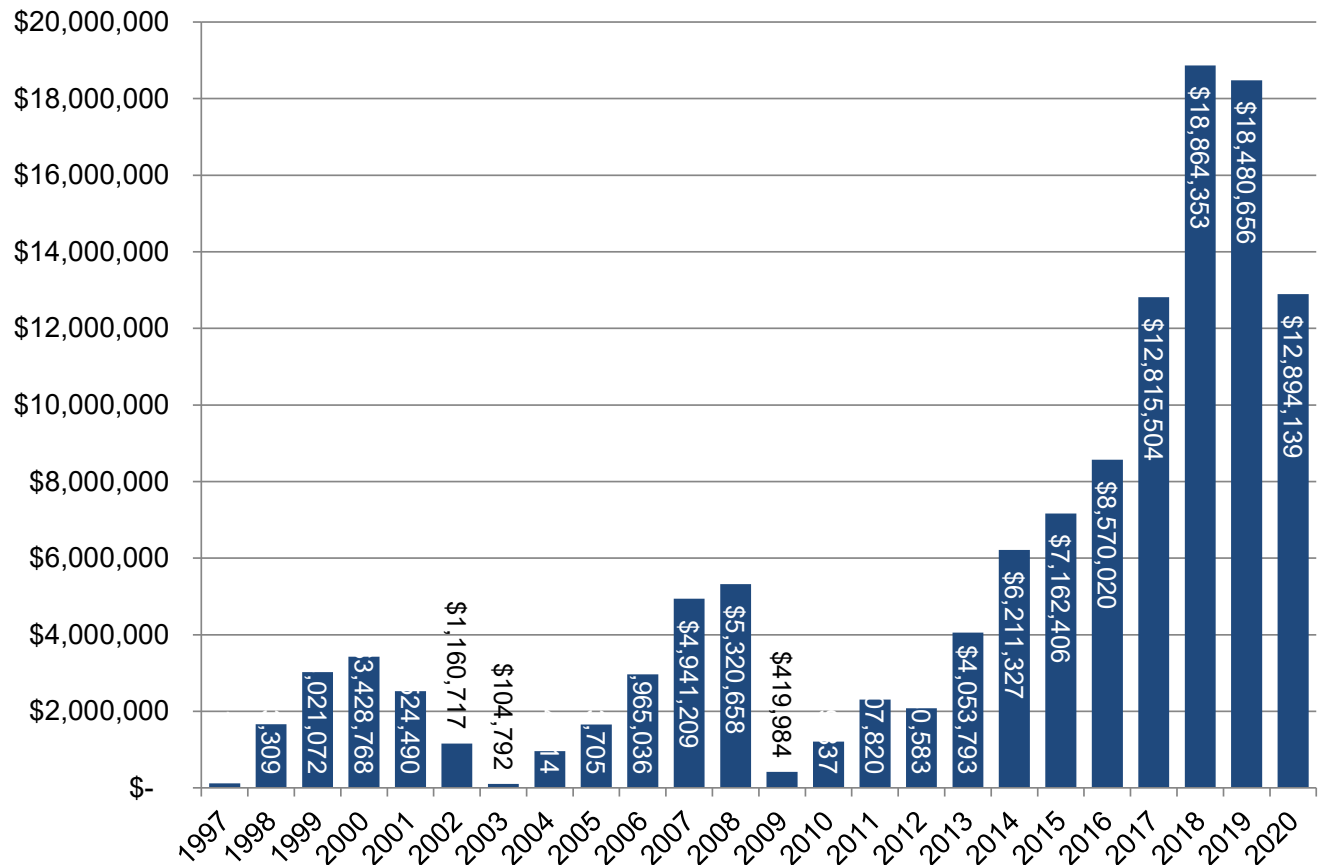


# Key Financial Variables – Earnings Reserve Account

## Historical Experience

- Earnings Reserve Account is the sum of all cumulative Statutory Net Income minus the sum of all cumulative appropriations.
- The ERA balance has grown considerably since 2009, peaking in 2018 and 2019.
- Combination of larger distributions in 2019 and 2020, with a \$4 billion appropriation to Principal resulted in a 2020 ERA balance of \$12.8 billion, roughly 4 times the size of the projected distribution.

**Historical Earnings Reserve Account Balance (1997 - 2020)**

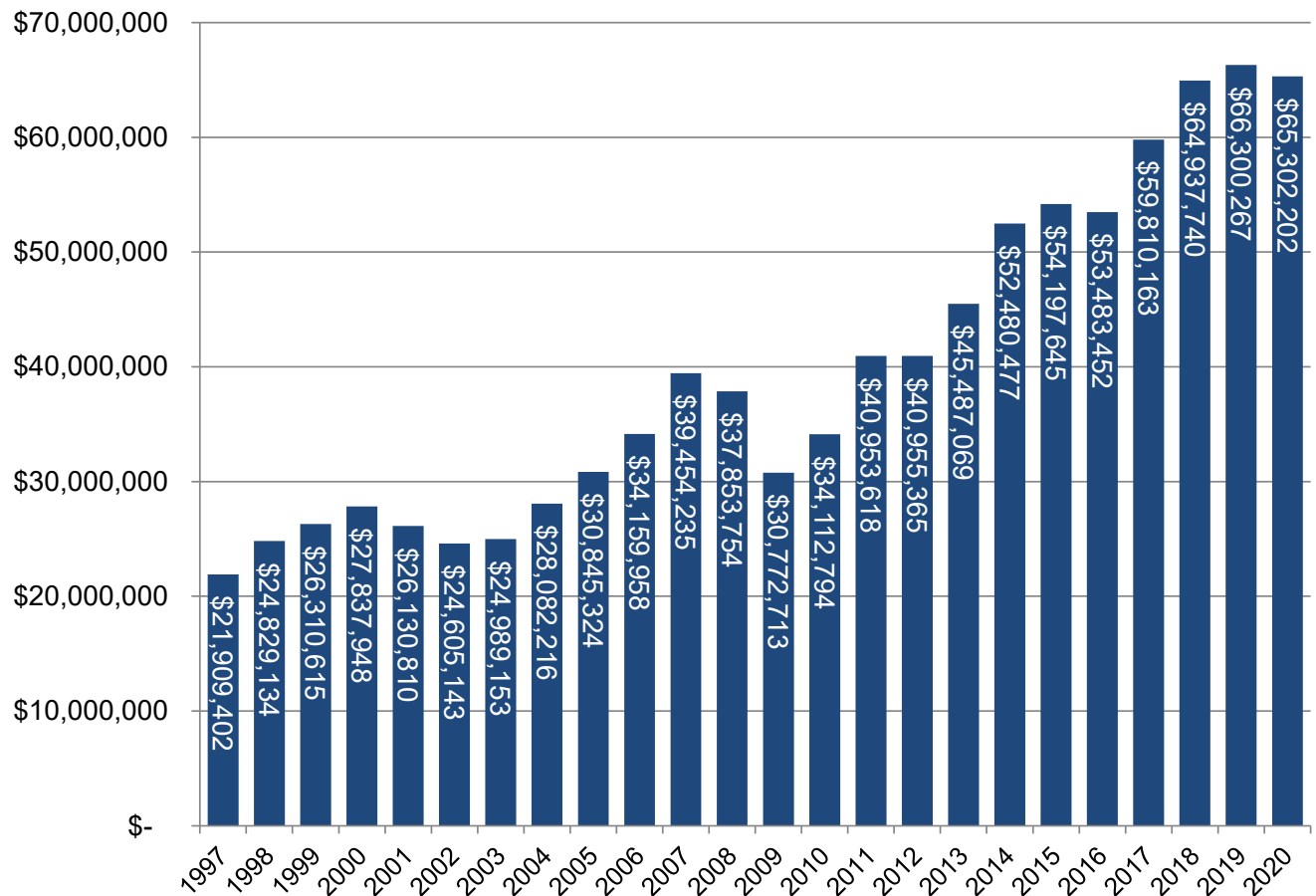


# Key Financial Variables – Market Value

## Historical Experience

- Permanent Fund has grown from \$21 billion in 1997 to \$65 billion as of June 30, 2021.
- 2007-2009 and 2000-2002 were largest drawdowns over this period with the fund dropping \$9 billion and \$3 billion in value over the two periods.
- In spite of the two major equity market contractions the market value of the fund has grown steadily over this period.

**Historical Ending Market Value  
(1997 - 2020)**

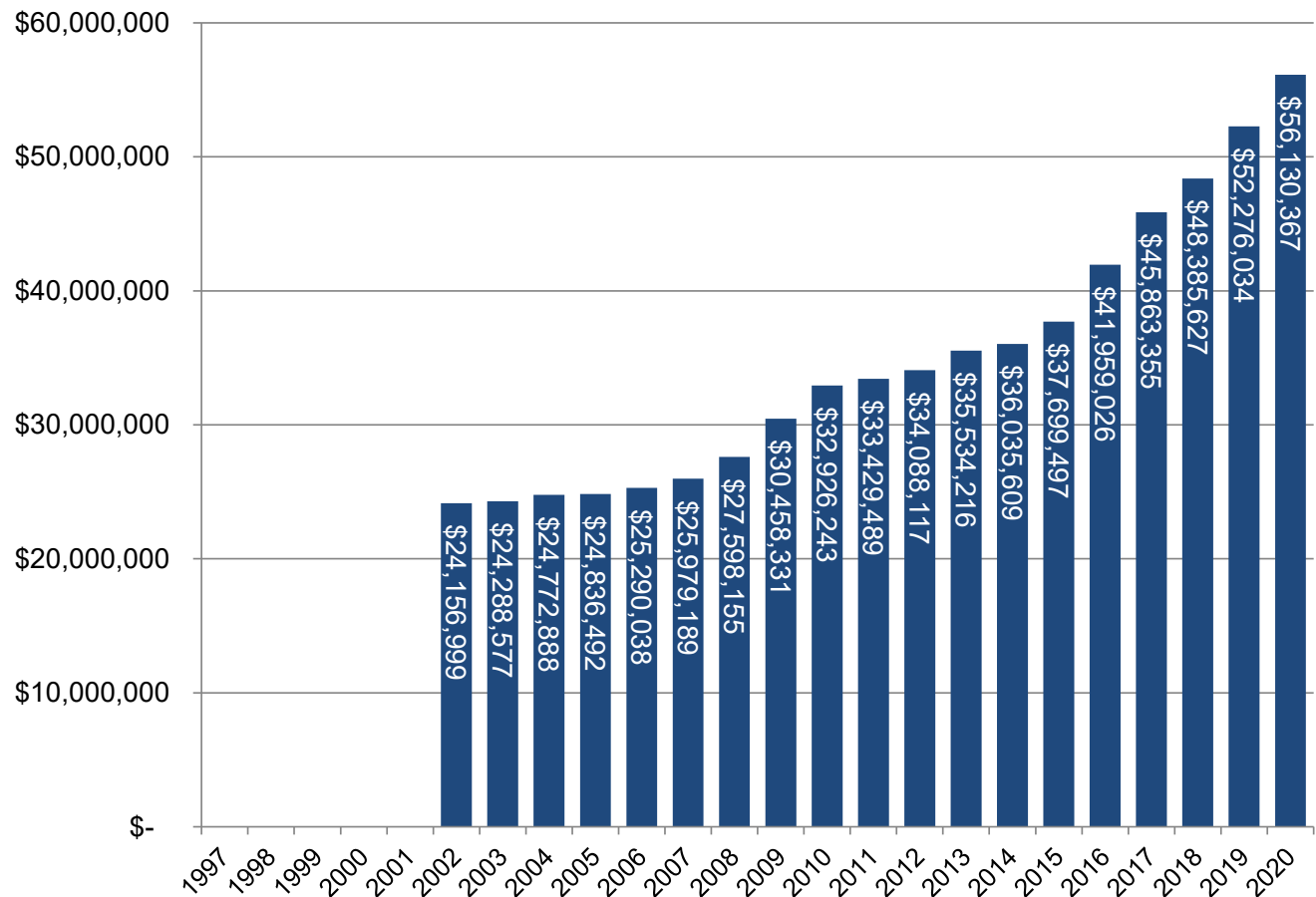


# Key Financial Variables – Five-Year Average Market Value

## Historical Experience

- Five-year average market value is the basis of the POMV spending rule.
- Averaging significantly reduces the volatility relative to the chart on the previous page.
- Over the historical period since 2002 there were no periods where the average declined relative to the previous year.
- The POMV spending rule achieves the key objectives of making spending stable, predictable, and sustainable.

**Five-Year Average Ending Market Value  
(1997 - 2020)**



# Monte Carlo Simulation Analysis

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## Using Simulation to Translate Return and Risk into Dollar Outcomes

- Optimization analysis estimates return and standard deviation for each asset mix and solves for the risk-minimizing mix for each level of return.
- Monte Carlo simulation analysis allows us to simulate the behavior of the Permanent Fund across a wide range of potential capital market scenarios and measure the impact of different asset allocation policies on key financial variables:
  - Market Value;
  - Statutory Net Income;
  - Earnings Reserve Balance;
  - Distributions.
- Callan has maintained a simulation model of the Permanent Fund since 1997.
- Model generates 2,000 potential capital market scenarios (trials) for each of the asset classes employed in the Permanent Fund portfolio.
- Each trial reflects the projected volatility of each asset class, its return and yield over time, as well as its correlation to the other asset classes.
- Together the 2,000 trials describe a full range of outcomes for each asset class and the total portfolio from best case to worst case over the 10-year projection period.
- The model then tracks the value of the key financial variables across each trial.

# Deterministic versus Stochastic Projections

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## Introducing Volatility into Financial Forecasts

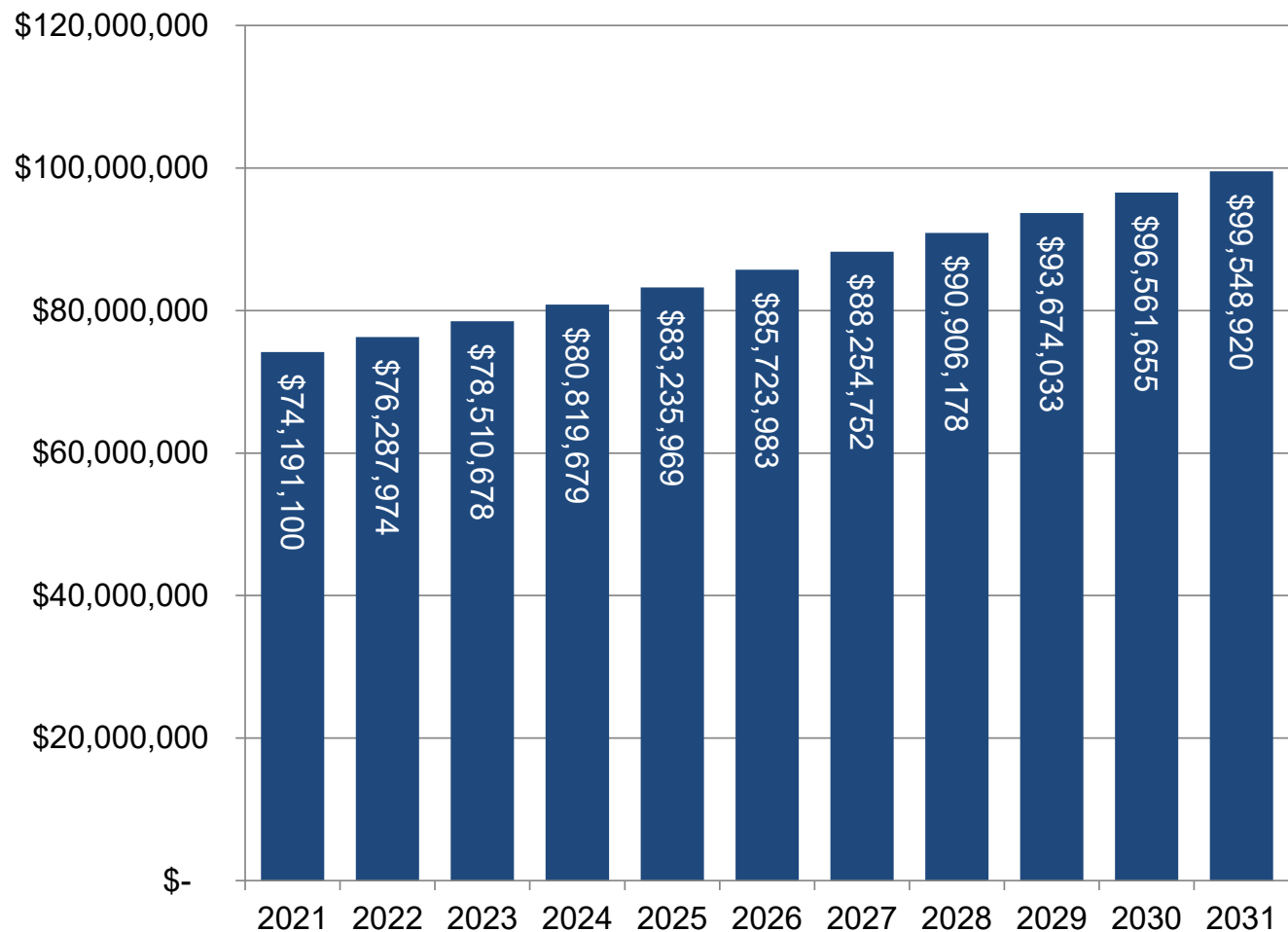
- In the context of capital market simulations a deterministic projection assumes that the portfolio earns the same rate-of-return in each year of the projection.
- This is the standard approach in financial modelling because it is easy to understand and it generates “expected case” output that is intuitive and relatively easy to explain.
- Stochastic projections introduce volatility into the year-to-year assumed return series, which is more realistic.
- Stochastic projections are harder to understand and explain because in order for them to make sense you must generate hundreds of them that, together, describe the range of potential future outcomes.
- In practice this means that your output describes a range of results from best-case to worst-case (with associated probabilities) for each of the variables that you are tracking.
- Stochastic projections are often used in financial modelling to help stakeholders understand the risk (typically defined as the 95<sup>th</sup> percentile worst-case outcome) and reward (typically defined as the median outcome) of various financial decisions.

# Ending Market Value

## Deterministic Projection

- Deterministic projection assumes portfolio earns median expected return each year over the 10-year projection horizon.
- This results in steady year-to-year growth in market value over time.
- As stated earlier, deterministic projections do not take into account volatility in return.
- Useful for understanding if a given spending rule is sustainable over the long term given an assumed rate-of-return.

## Projected Ending Market Value

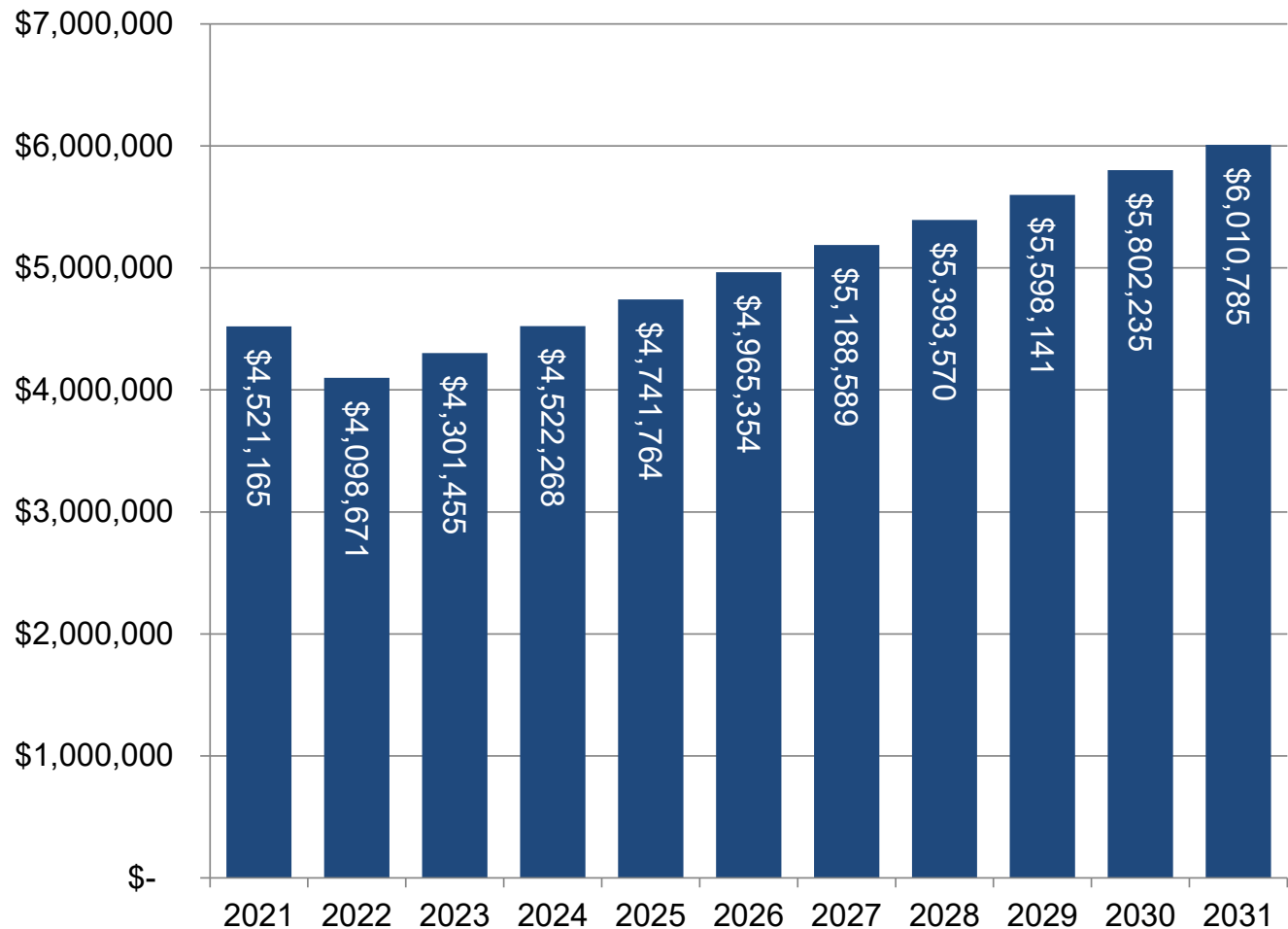


# Statutory Net Income

## Deterministic Projection

- Statutory net income is high in 2021 due to the realization of exceptionally high unrealized gains currently in the portfolio.
- SNI drops to more normal levels in 2022 as unrealized gains fall back in line with equilibrium levels.
- SNI gradually rises over time as the same realized return is applied to a larger and larger portfolio.

### Projected Annual Statutory Net Income

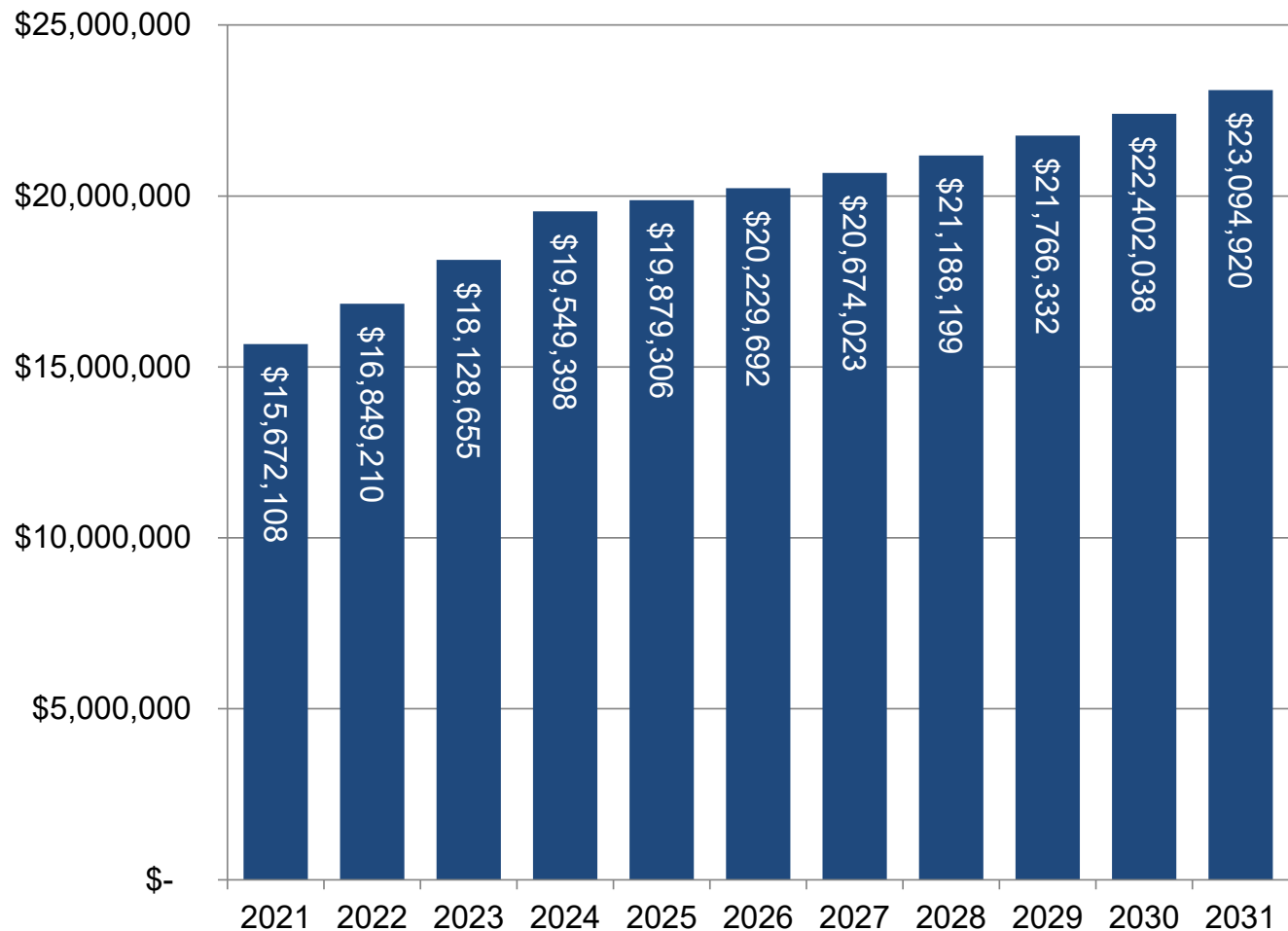


# Earnings Reserve Account Balance

## Deterministic Projection

- Earnings Reserve Account balance rises quickly in the first four years of the projection.
- This is due to the realization of the outsized unrealized gains in portfolio, combined with the POMV draw being based mostly on lower market values.
- Once outsized gains are realized and the higher market values are recognized in the POMV formula the growth of ERA balance stabilizes at a lower equilibrium rate.

### Ending Earnings Reserve Balance

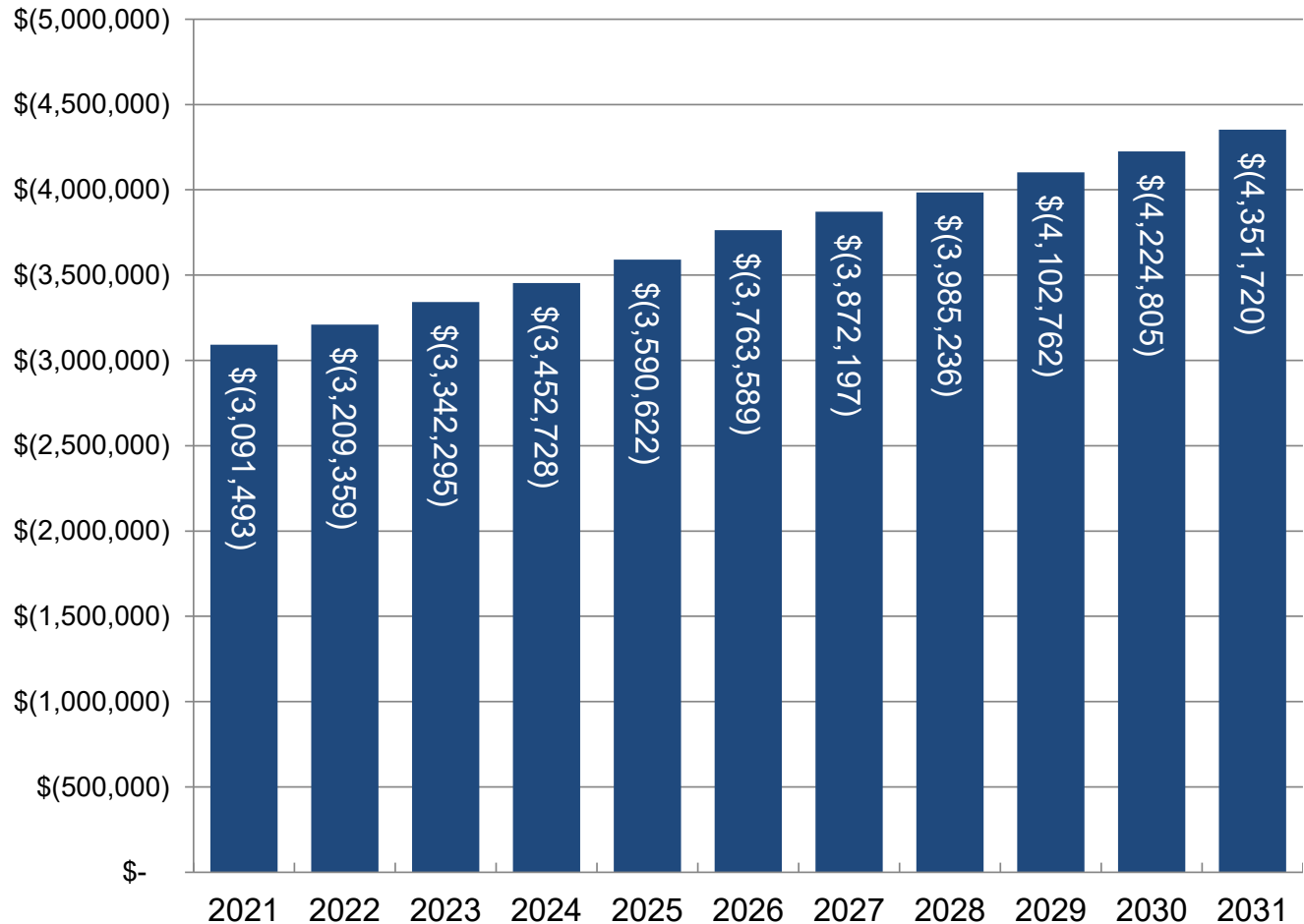


# POMV Distributions

## Deterministic Projection

- POMV distributions grow steadily over time under deterministic projection.
- Healthy ERA balance never interferes with POMV formula in deterministic projection.
- Distributions generally grow by roughly the same rate as the long term growth of the Fund once the equilibrium state of the deterministic projection is reached.

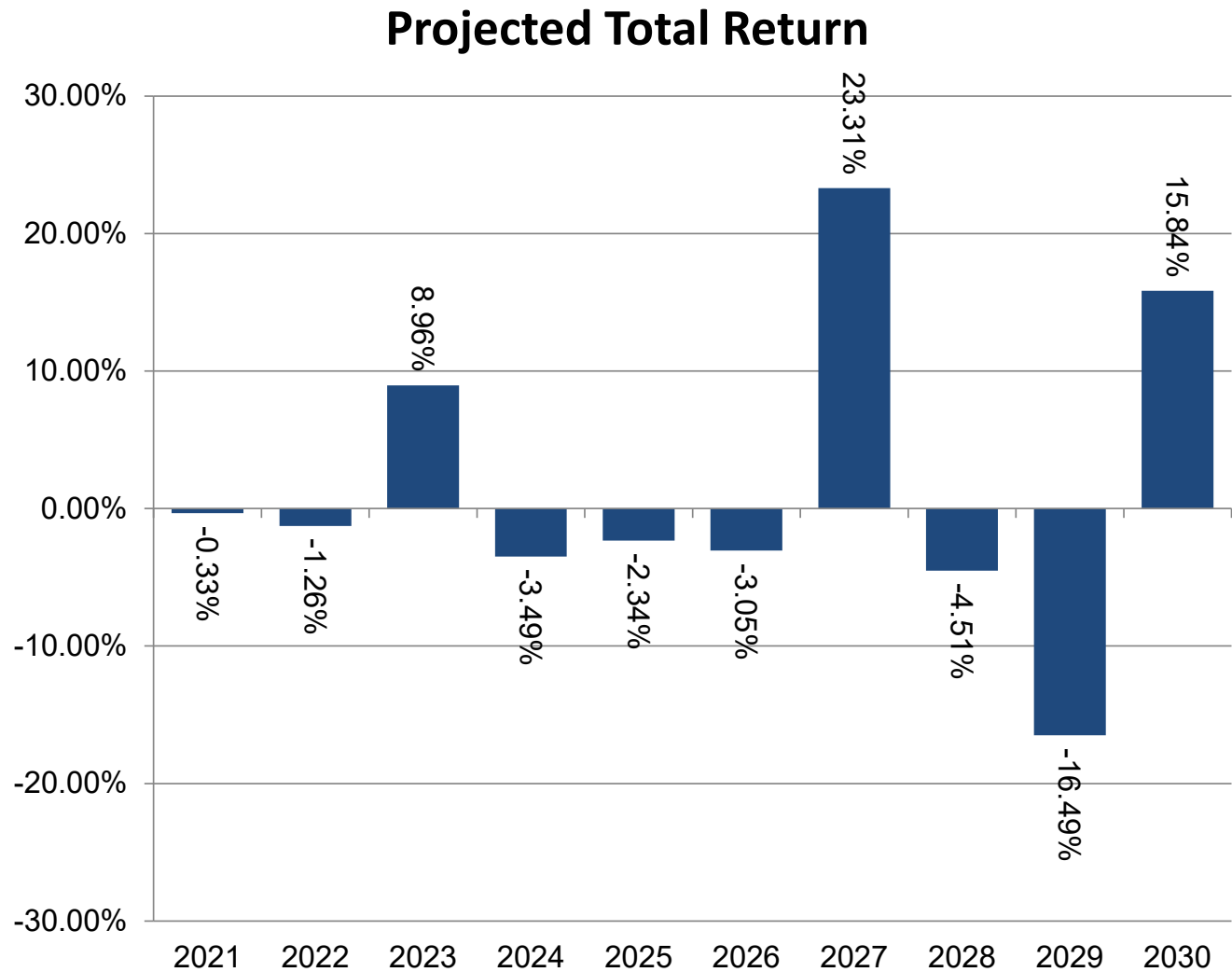
### Projected Annual Distribution



# Total Fund Return

Stochastic Projection (One of 2,000 Trials)

- Deliberately chose a trial near the 95<sup>th</sup> percentile worst case to illustrate impact on Fund.
- Annualized 10-year total return of 1.1%.
- Second half of 2021 especially bad in this scenario to overcome great first half.
- Multiple negative or very low returns in a row is worse than one bad year bracketed by generally good years.

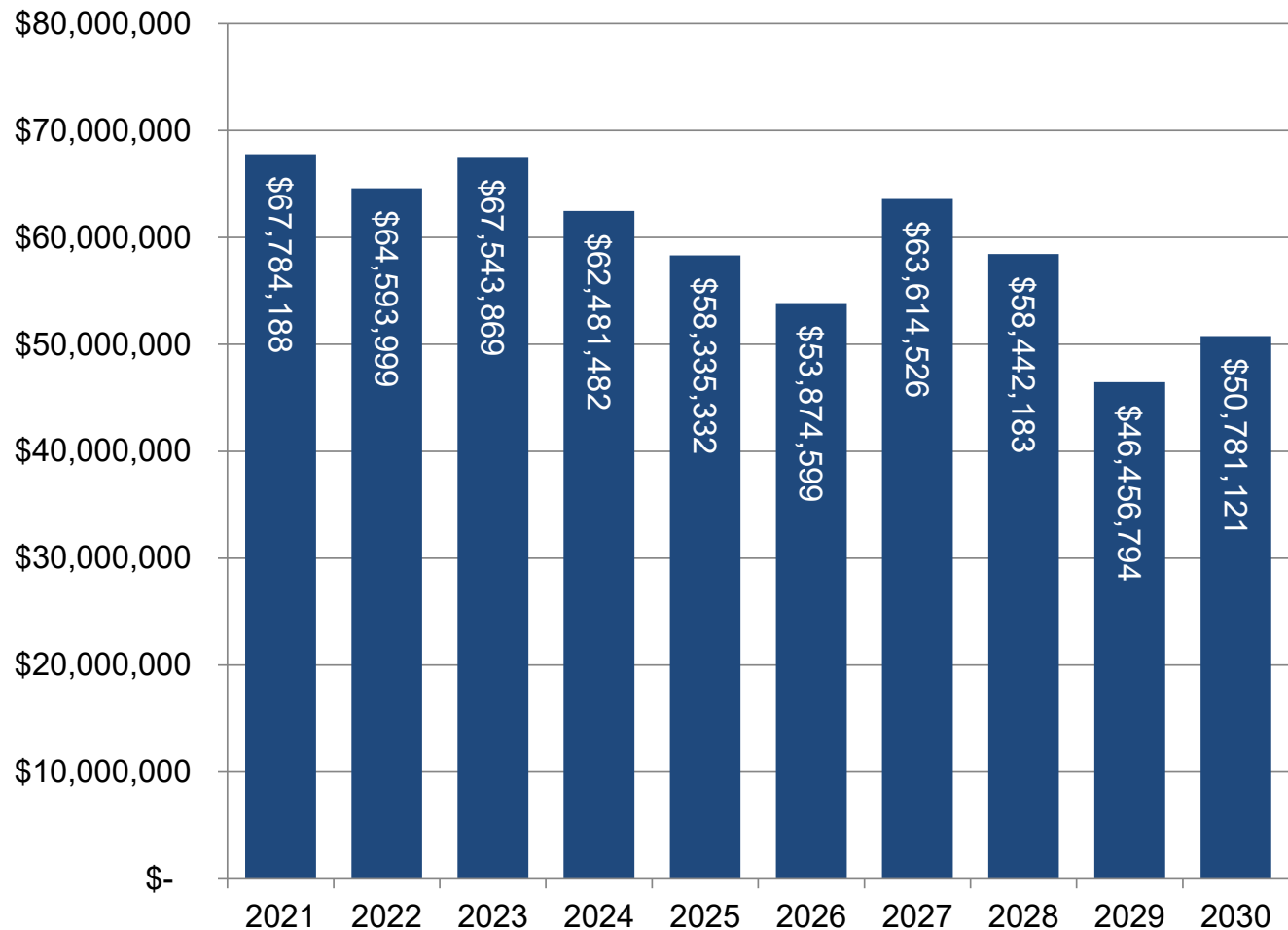


# Ending Market Value

Stochastic Projection (One of 2,000 Trials)

- Market value declines over most years in this trial.
- This is due to low or negative returns combined with a relatively stable POMV draw.
- Reductions in the market value also erode the unrealized capital gains in the portfolio.
- This tends to reduce the potential of the portfolio to generate Statutory Net Income over the short to intermediate term.

## Projected Ending Market Value

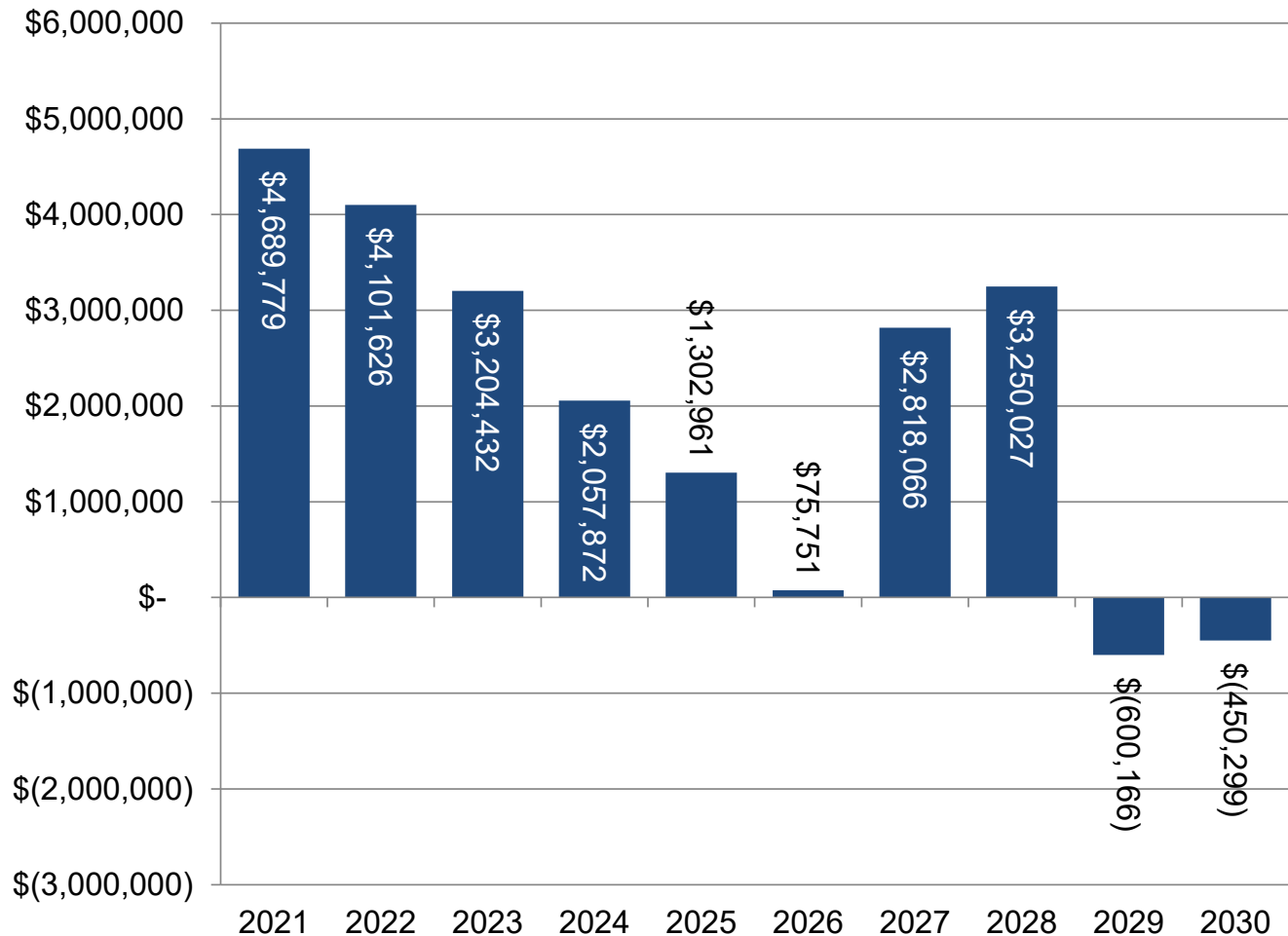


# Statutory Net Income

Stochastic Projection (One of 2,000 Trials)

- Statutory Net Income continually declines over first six years of this trial.
- This is due to the erosion of unrealized capital gains and the relatively low yield (income) on the APFC portfolio.
- 2027 saves the day (briefly) with a 23.31% return.
- Negative SNI in 2029 and 2030 reflects the realization of losses exceeding total dividend and interest income.

## Projected Annual Statutory Net Income

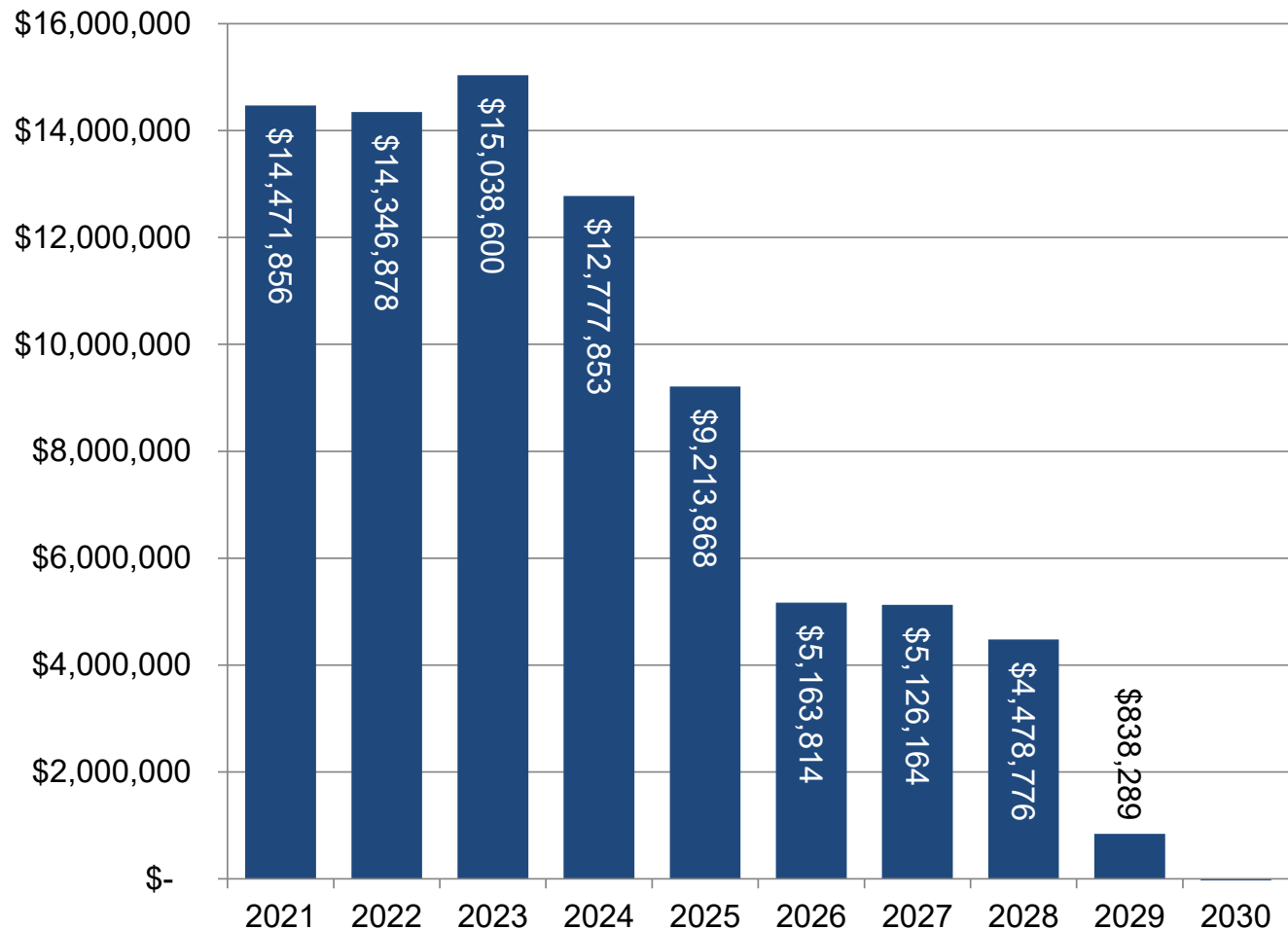


# Earnings Reserve Balance

Stochastic Projection (One of 2,000 Trials)

- The ERA starts with a very healthy balance and enjoys two good years of healthy SNI due to embedded realized gains.
- ERA begins to decline in 2024 and approaches zero by 2029 due to low (or negative returns) and the exhaustion of embedded realized gains.
- ERA totally depleted at year-end 2030.

## Ending Earnings Reserve Balance

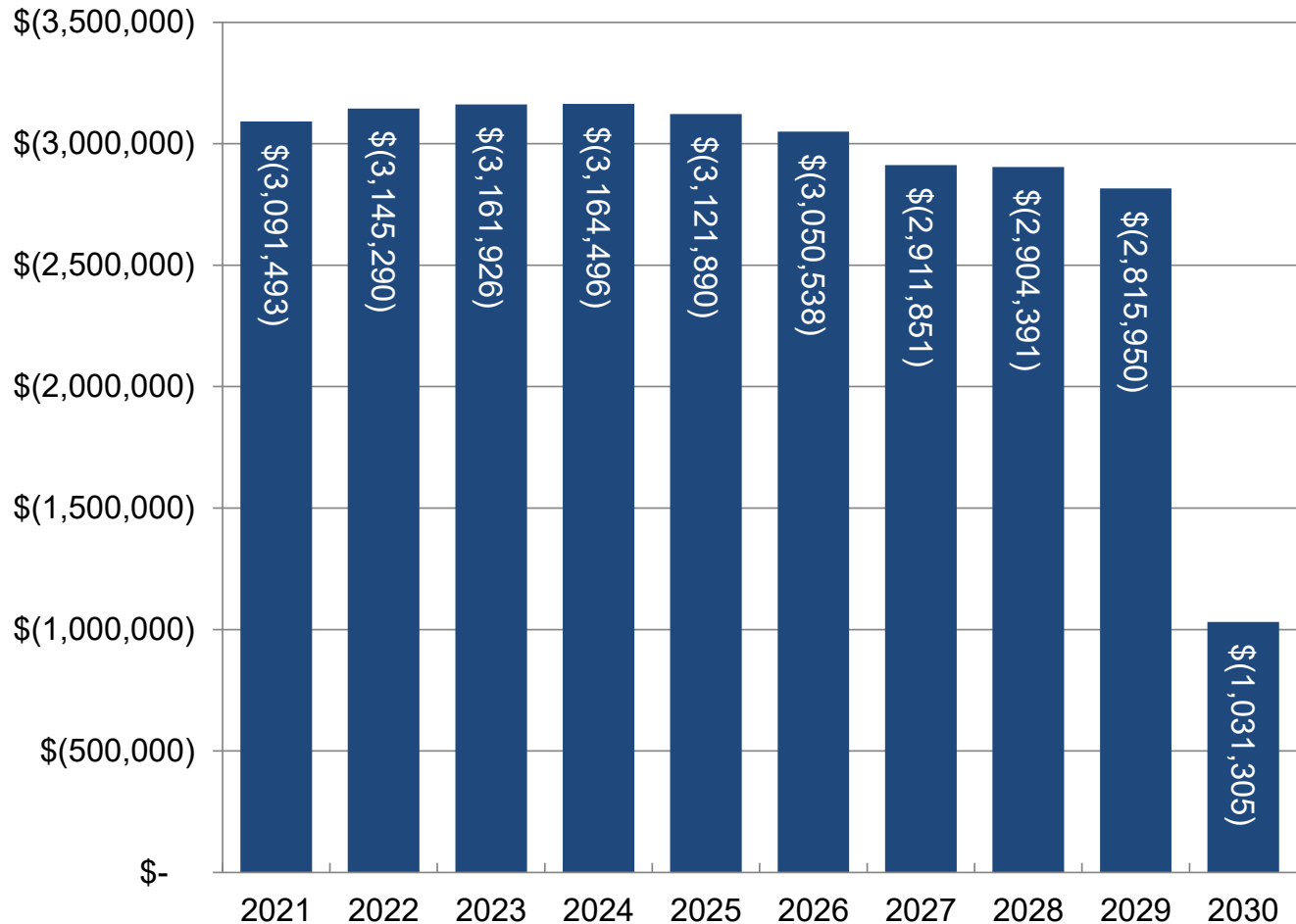


# Distributions

## Stochastic Projection (One of 2,000 Trials)

- In spite of this worst-case outcome for market value, SNI, and ERA balance, the POMV formula results in relatively stable distributions for the first nine years.
- In the last year the POMV formula is limited by the depleted ERA balance resulting in a significant reduction in the distribution.
- Given that 2031 starts with a zero ERA balance and relatively small unrealized gains, it is likely that the POMV formula would be limited in future years.

### Projected Annual Distribution



# Defining Risk Tolerance using Simulation Analysis

## Comparing the Financial Risks of Differing Asset Allocations

- Simulation allows you to estimate a probability distribution for key financial variables to better understand risk.
  - Market Value, 5 years, 10 years;
  - Statutory Net Income, 5 years, 10 years;
  - Earnings Reserve Balance, 5 years, 10 years;
  - Distributions, 5 years, 10 years;
- Simulation analysis will compare current APFC Policy Mix, to Mix 1 (lower risk), and Mix 5 (higher risk).

### Asset Mix Alternatives

Portfolio Component	Mix 1	APFC	Mix 5
APFC Global Equity	27	38	43
Private Equity	12	16	26
Core Real Estate	9	8	15
Private Infra/Credit	8	9	5
APFC Fixed Income	40	20	11
Hedge Funds	4	6	0
APFC Risk Parity	0	1	0
Cash Equivalents	0	2	0
<b>Totals</b>	<b>100</b>	<b>100</b>	<b>100</b>
10 Yr. Geometric Mean Return	5.40%	6.20%	7.00%
Projected Standard Deviation	10.58%	13.55%	16.76%

# Key Assumptions in Simulation Analysis

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## Comparing the Financial Risks of Differing Asset Allocations

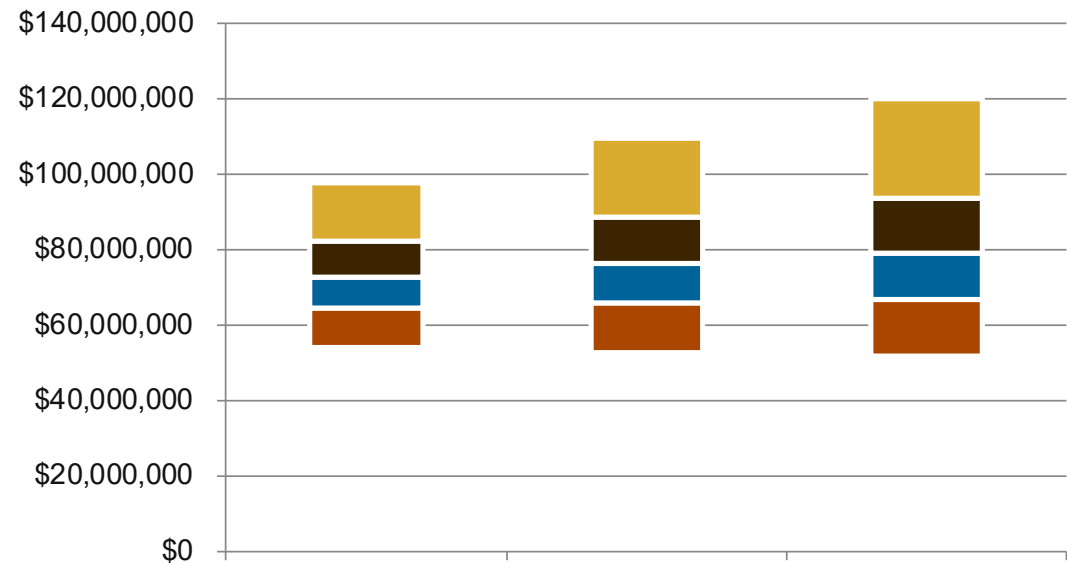
- Asset allocation in each case was assumed to be achieved on T=0 with no transactions costs.
- Market value to cost basis ratio for each asset class was assumed to be the same as in current portfolio.
- Starting point of simulation was July 1, 2020.
- Asset values (cost and market) were updated midway through the first fiscal year to reflect December 31, 2020 values.
- The second half of FY 2021 resumed using the underlying return and risk simulation assumptions for each asset class.
- No Inflation Proofing for first four years of simulation.
- **Note:** The Fund had a market value of \$71.8B market value as of 12/31/20 and a cost basis of \$58.6B (versus \$64.8B and 58.8B respectively as of 06/30/20).

# Range of Ending Market Value – Year 5

## Distribution of Outcomes

- Over five-year horizon expected (median) and 5<sup>th</sup> percentile best case market values increase as (efficient) risk is increased in portfolio.
- 95<sup>th</sup> percentile (worse case) market values decrease as (efficient) risk is increased.
- Differences at the median generally exceed differences in the 95<sup>th</sup> percentile case.

Range of Ending Market Value - Year 5



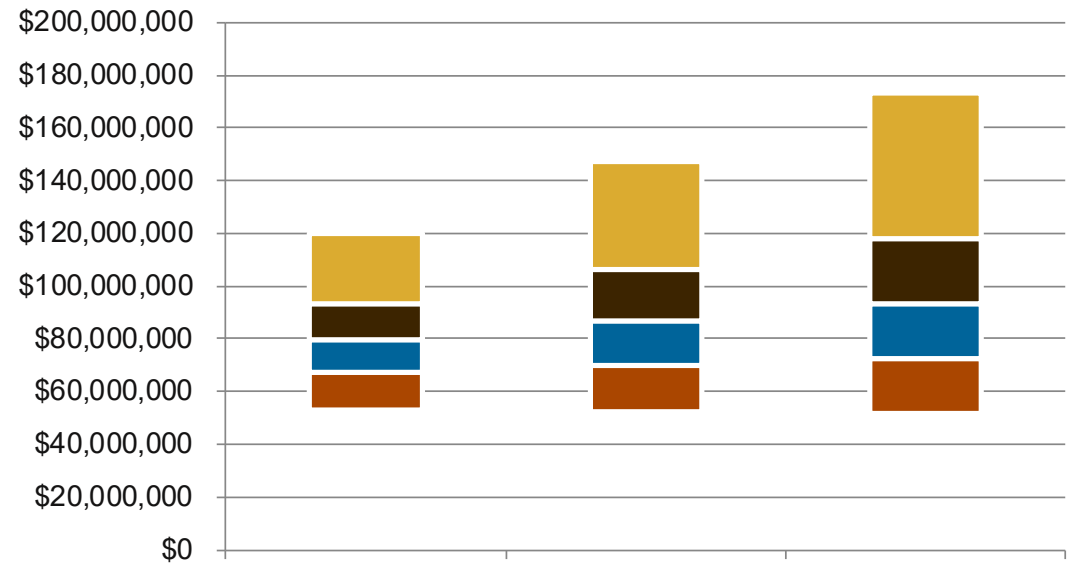
	Mix 1	APFC	Mix 5
5th Percentile	\$97,391,265	\$109,465,644	\$120,017,191
25th Percentile	\$82,181,591	\$88,443,438	\$93,458,495
Median	\$72,778,671	\$76,151,775	\$78,825,938
75th Percentile	\$64,615,903	\$65,818,120	\$66,602,822
95th Percentile	\$53,986,195	\$52,785,293	\$51,821,374

# Range of Ending Market Value – Year 10

## Distribution of Outcomes

- Over ten-year horizon expected (median) and 5<sup>th</sup> percentile best case market values increase as (efficient) risk is increased in portfolio.
- 95<sup>th</sup> percentile (worse case) market values actually increase as (efficient) risk is increased.
- Differences at the median almost always exceed differences in the 95<sup>th</sup> percentile case.
- The longer the time horizon the more risk a fund can afford to take.

Range of Ending Market Value - Year 10



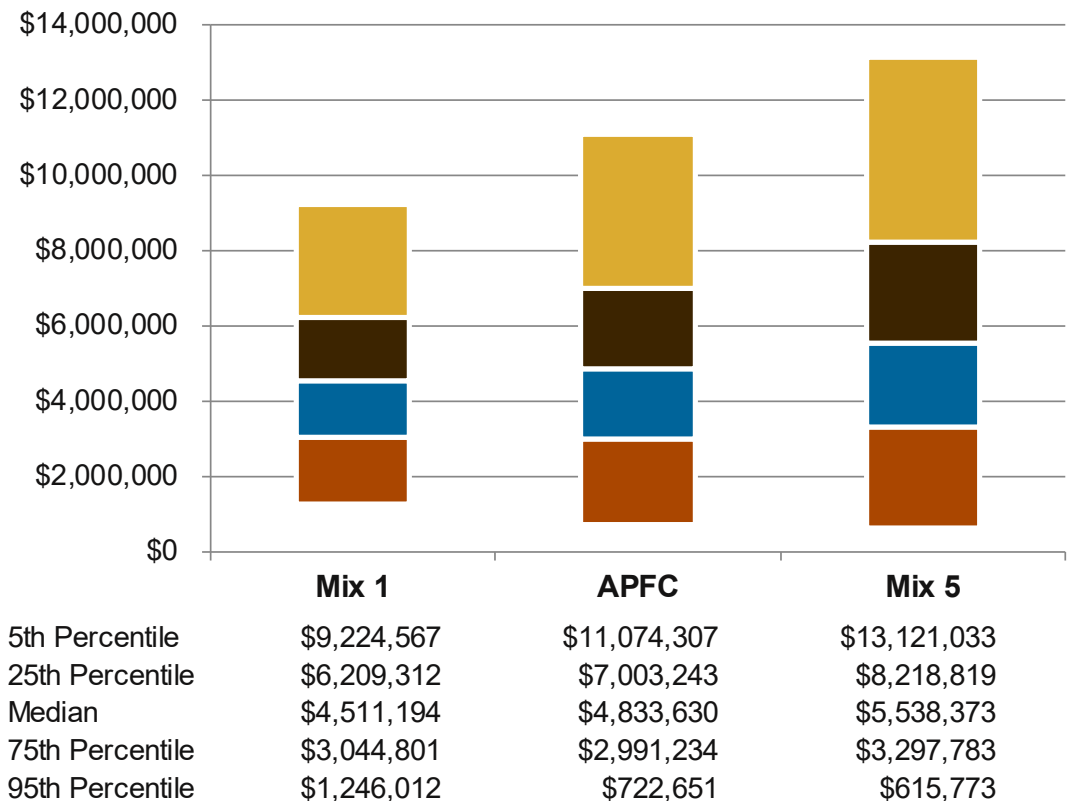
	Mix 1	APFC	Mix 5
5th Percentile	\$119,899,510	\$147,049,373	\$173,190,531
25th Percentile	\$93,423,694	\$106,327,668	\$117,848,898
Median	\$79,644,369	\$86,893,563	\$93,112,573
75th Percentile	\$67,149,544	\$69,852,657	\$72,771,130
95th Percentile	\$52,691,388	\$52,394,179	\$51,901,202

# Range of Statutory Net Income – Year 5

## Distribution of Outcomes

- Statutory Net Income follows a similar pattern to market value over five years with median and 5<sup>th</sup> percentile values trending higher with increased risk.
- 95<sup>th</sup> percentile decline with increased risk exposure.
- Generally riskier portfolios employ more growth oriented asset classes which generate less income and are more dependent on realized capital gains.
- Private equity, the highest returning asset class, has the lowest turnover and hence requires time to realize gains.

Range of Statutory Net Income - Year 5

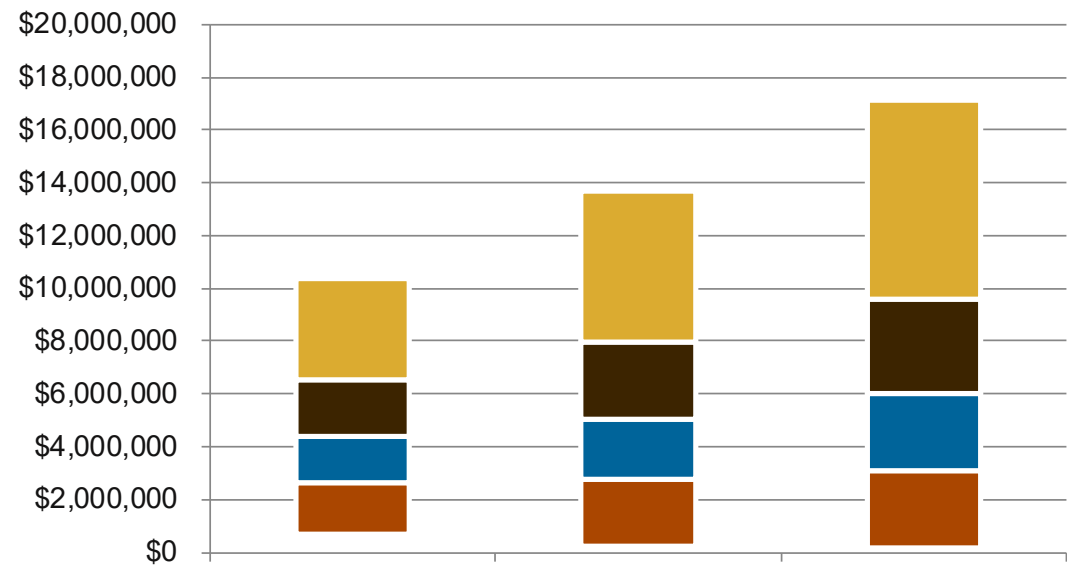


# Range of Statutory Net Income – Year 10

## Distribution of Outcomes

- All mixes have at least a 5% chance of generating positive Statutory Net Income even in the 10<sup>th</sup> year of the projection.
- In cases beyond the 95<sup>th</sup> percentile on the downside the realized losses can overwhelm the income generation and result in negative SNI.
- At the median the higher return (and hence market value) of the more risky mixes overwhelm the higher income production of the less risky mixes resulting in higher SNI.

Range of Statutory Net Income - Year 10



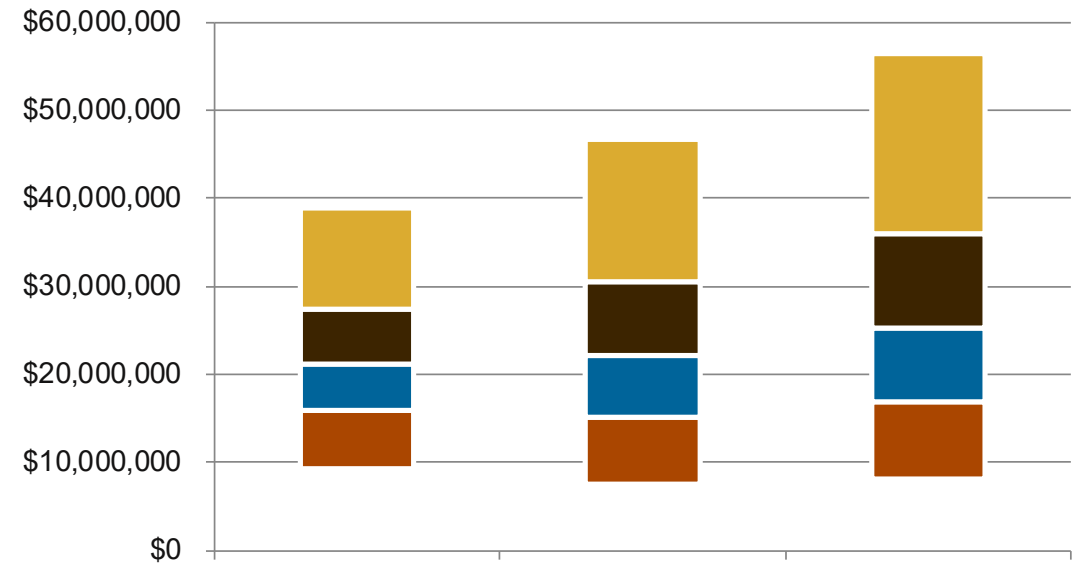
	Mix 1	APFC	Mix 5
5th Percentile	\$10,400,643	\$13,693,295	\$17,143,082
25th Percentile	\$6,526,420	\$7,962,258	\$9,583,372
Median	\$4,382,531	\$5,051,600	\$6,000,429
75th Percentile	\$2,644,921	\$2,780,729	\$3,115,455
95th Percentile	\$661,697	\$228,387	\$149,377

# Range of Earnings Reserve Balance – Year 5

## Distribution of Outcomes

- Given the current size of the Earnings Reserve (and the size of the embedded unrealized gains), none of the mixes have a 5% chance of depleting the ERA over the first five years of the projection.
- This assumes no additional appropriations to Principal or to the General Fund beyond the POMV appropriation and Inflation Proofing beginning in 2025.

Range of Earnings Reserve Balance - Year 5



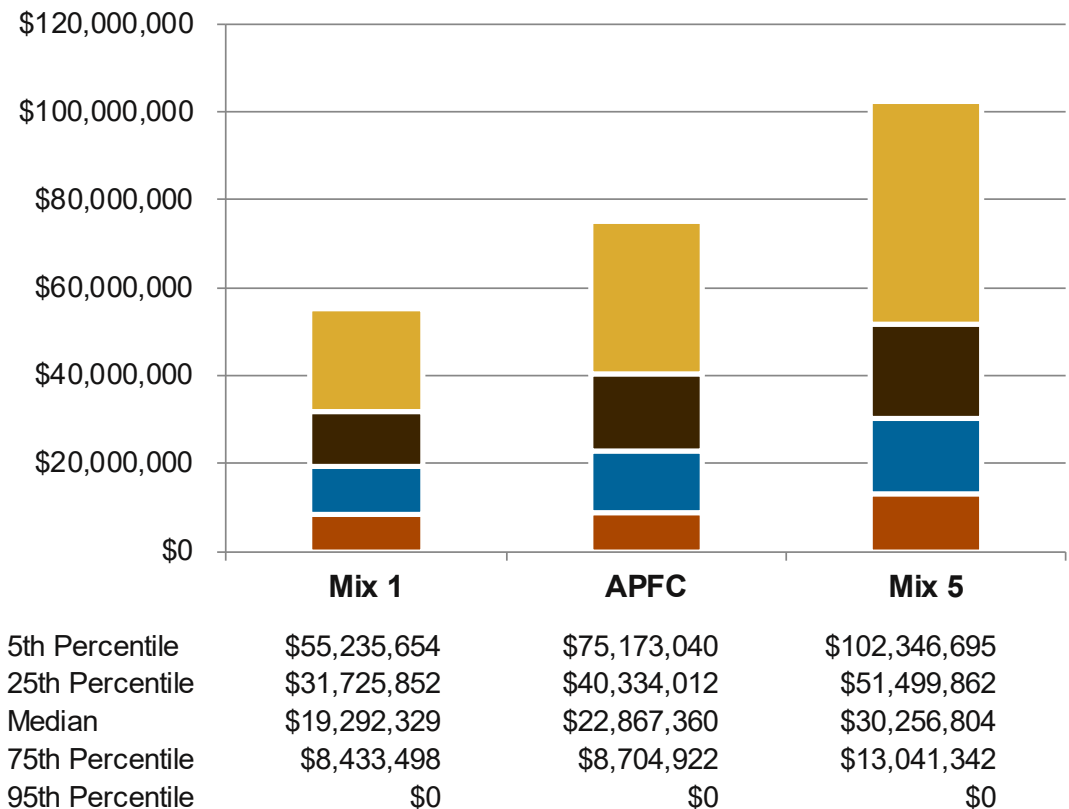
	Mix 1	APFC	Mix 5
5th Percentile	\$38,933,290	\$46,708,024	\$56,399,472
25th Percentile	\$27,446,769	\$30,565,166	\$35,924,892
Median	\$21,159,528	\$22,061,311	\$25,238,469
75th Percentile	\$15,824,079	\$15,175,309	\$16,946,787
95th Percentile	\$9,330,597	\$7,431,798	\$8,012,624

# Range of Earnings Reserve Balance – Year 10

## Distribution of Outcomes

- Over the ten-year projection horizon all of the mixes have at least a 5% chance of depleting the entire Earnings Reserve balance.
- In the median case the ERA balance at the end of 10 years is expected to range between \$19 billion and \$30 billion depending on the level of risk employed.
- In the best-case outcomes the ERA balance could exceed \$100 billion with the riskiest mix.
- All assumes no additional appropriations.

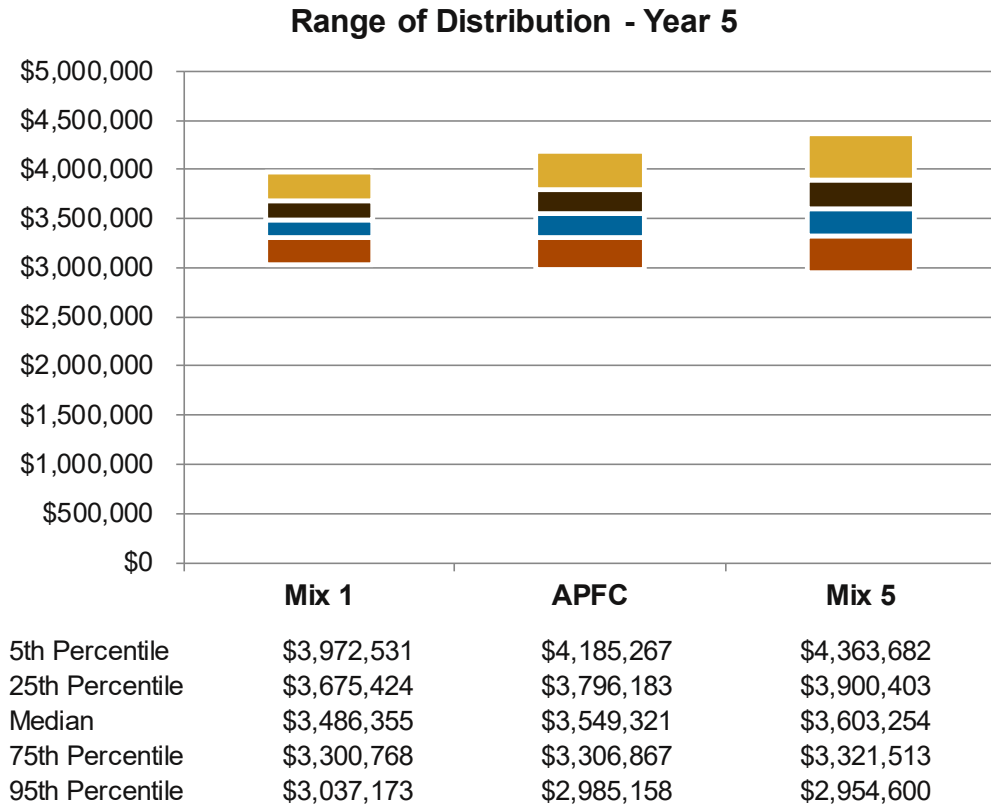
Range of Earnings Reserve Balance - Year 10



# Range of Distributions – Year 5

## Distribution of Outcomes

- This chart does a good job of demonstrating the benefit of basing the POMV formula on a five-year average.
- The range of distributions is relatively tight in the fifth year of the simulation for all of the mixes in spite of the relatively wide range in the value of SNI, ERA, and Market Value.
- Even in the fifth year two of the EMV points in the average (2019 and 2020) are already known and fixed.
- This makes distributions highly predictable for budgeting purposes.

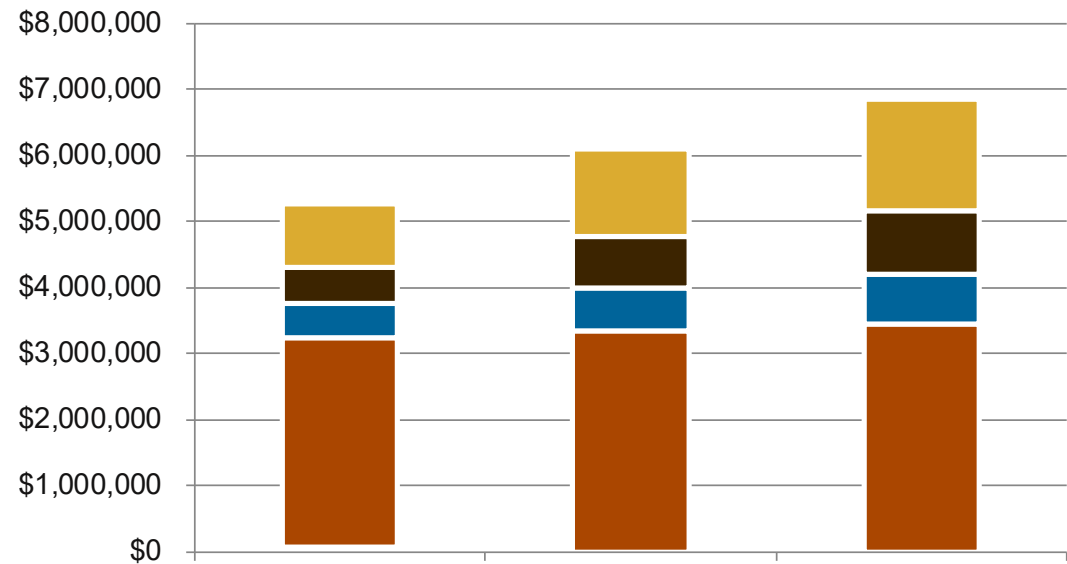


# Range of Distributions – Year 10

## Distribution of Outcomes

- In the out years (past about year 7) the POMV rule has the potential to collide with a restriction on distributions from a depleted ERA.
- All three mixes have at least a 5% chance of distributions being zero (effectively zero for Mix 1) in the tenth year of the simulation.
- The range between 5<sup>th</sup> percentile and 75<sup>th</sup> percentile (where there is no interference by the ERA limit) is still relatively tight reflecting the stability of the POMV formula.

Range of Distribution - Year 10

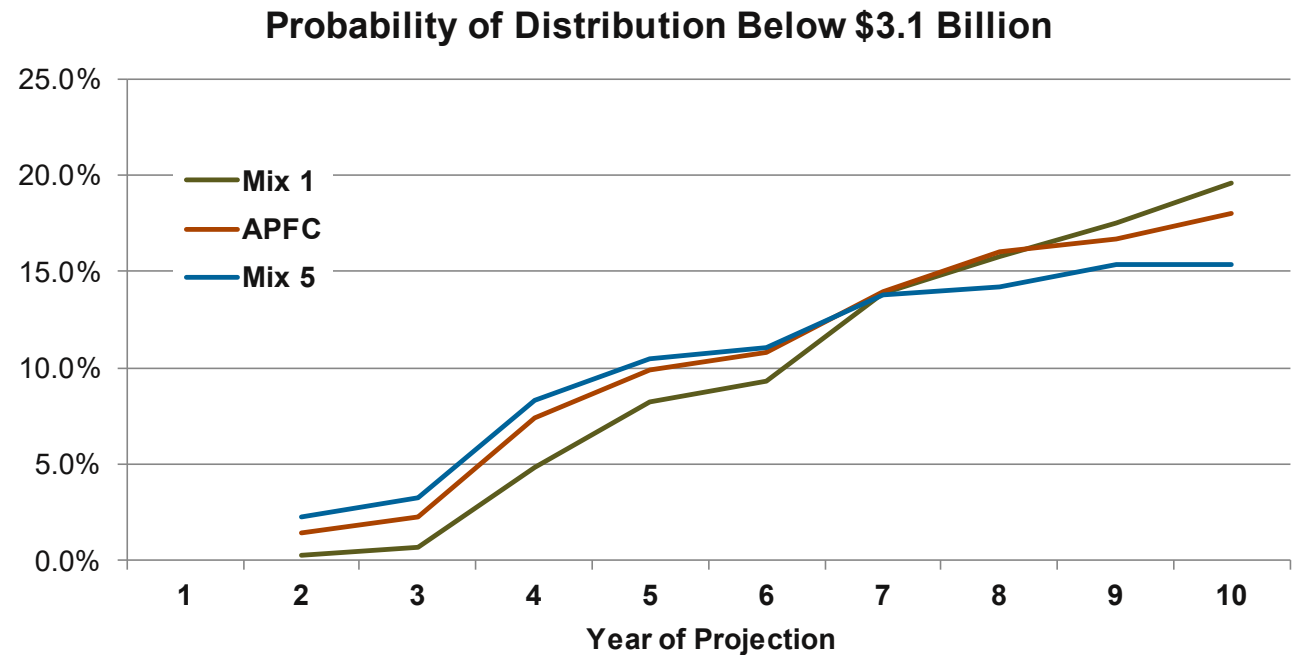


	Mix 1	APFC	Mix 5
5th Percentile	\$5,257,081	\$6,100,000	\$6,845,659
25th Percentile	\$4,312,415	\$4,774,455	\$5,164,709
Median	\$3,756,375	\$4,000,164	\$4,211,386
75th Percentile	\$3,243,637	\$3,332,171	\$3,446,531
95th Percentile	\$57,184	\$0	\$0

# Probability of Distribution Below \$3.1 Billion

## Distribution of Outcomes

- This chart does a good job of illustrating the impact of risk and return over increasing time horizons.
- Mix 5 has the highest probability of a distribution below \$3.1 billion over first 7 years of projection.
- After 7 years the long-term return potential of the higher risk asset classes starts to overwhelm their short term volatility.
- Over the longer time horizon the “lowest risk” mix has the highest probability of producing a distribution below the current level.



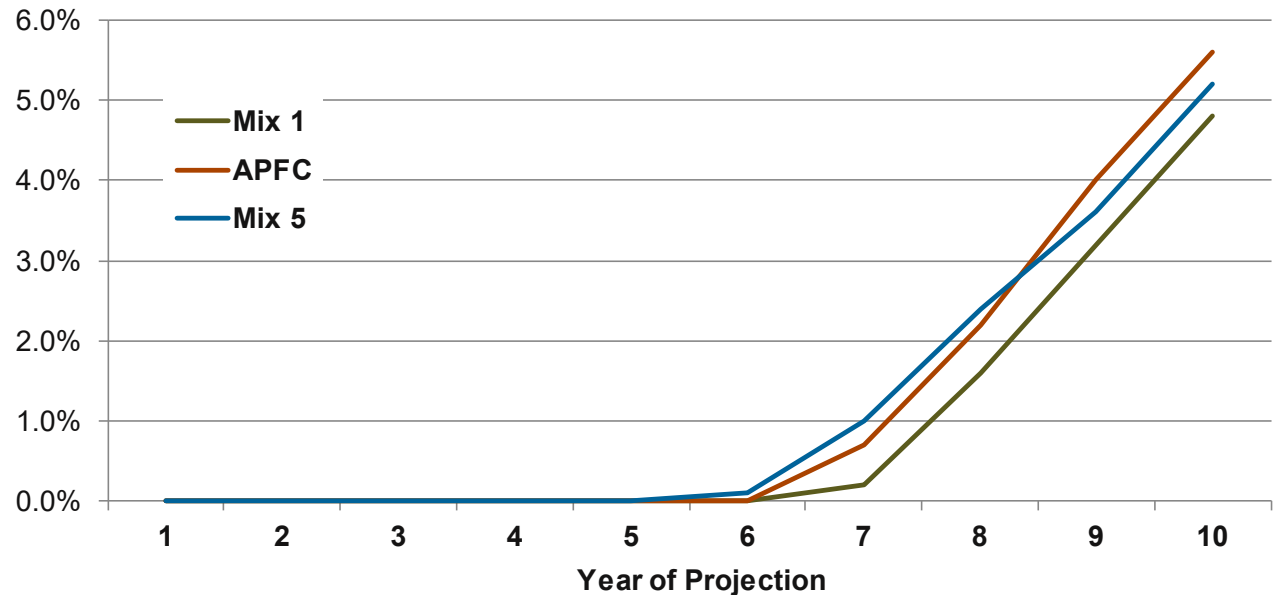
<b>Mix 1</b>	#N/A	0.3%	0.7%	4.8%	8.2%	9.3%	13.9%	15.8%	17.5%	19.6%
<b>APFC</b>	#N/A	1.4%	2.3%	7.4%	9.9%	10.8%	14.0%	16.0%	16.7%	18.0%
<b>Mix 5</b>	#N/A	2.3%	3.3%	8.3%	10.5%	11.1%	13.8%	14.2%	15.4%	15.4%

# Probability of No Distribution

## Distribution of Outcomes

- This chart shows the probability of the ERA limit completely eliminating the distribution.
- Given the assumptions used in the simulation none of these mixes had a single trial resulting in a zero distribution until the sixth year of the projection.
- Mix 1 (with the highest income but lowest return) consistently had the lowest probability of generating a zero distribution.
- Mix 5 and the current target were relatively close in this dimension.

Probability of Distribution of Zero



<b>Mix 1</b>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	1.6%	3.2%	4.8%
<b>APFC</b>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	2.2%	4.0%	5.6%
<b>Mix 5</b>	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	1.0%	2.4%	3.6%	5.2%

# Concluding Comments

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## Questions (Or Time for Quiet Reflection)

- The current APFC policy portfolio is relatively close to the efficient frontier but could be modestly improved (in theory based on Callan's baseline assumptions) by efficiently increasing the real estate exposure and minimizing the cash balance over time.
- Changing the risk posture of the Fund (efficiently) cannot be achieved quickly in practice due to the Fund's size and the illiquidity of some of the underlying asset classes.
- The current five-year asset allocation plan for the Fund puts it on a trajectory towards Mix 5 in the analysis employing a prudent and measured pace.
- Given the structure of the POMV spending rule, changes in risk posture will take multiple years to have any meaningful impact on the distributions of the Fund (in best, median, or worst-case outcomes).

The APFC logo consists of the letters 'APFC' in a white, serif font, centered within a dark blue rectangular box. The background of the slide features a teal-tinted photograph of a modern, multi-story office building with a grid of windows.

APFC

ALASKA PERMANENT  
FUND CORPORATION

# APFC Asset Classes and Staff Expectations

*Marcus Frampton, Chief Investment Officer*

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# Executive Summary

- Given the nature of APFC as a long-term investor and given the illiquid nature of several of the Fund’s asset classes, establishment of multi-year asset class plans is ideal for optimal execution and vintage year diversification
- In FY 2016 APFC established a five year asset class plan through FY 2021
- One year ago, in May 2020, this plan was updated and replaced by a new five year asset class plan, which Staff has been executing against for the past twelve months
- Even though we are only one year into a new five year plan, it remains prudent to periodically review asset allocation with the Board of Trustees to ensure the plan continues to align with goals, objectives, and risk tolerances
- The table below outlines the current five year asset allocation plan for the Fund:

	<u>Public Equity</u>	<u>Fixed Income</u>	<u>Private Equity</u>	<u>Real Estate</u>	<u>Private Income</u>	<u>Absolute Return</u>	<u>Risk Parity</u>	<u>Cash</u>
FY '21	39%	21%	15%	7%	9%	6%	1%	2%
FY '22	38%	20%	16%	8%	9%	6%	1%	2%
FY '23	36%	20%	17%	9%	9%	6%	1%	2%
FY '24	35%	19%	18%	10%	9%	6%	1%	2%
FY '25	33%	18%	19%	12%	9%	6%	1%	2%

# Executive Summary (cont'd)

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- In this presentation, APFC's current five year asset allocation plan is compared to three peers that also have relatively high private equity allocations (Yale Endowment, Washington State Investment Board, and Texas ERS)
  - The "Average" public pension plan portfolio is also examined for comparison purposes
- Both Yale Endowment and Texas ERS in their fund policies and other literature frequently reference the concept of "high market exposure" and "low market exposure" asset classes; this distinction can be useful when thinking about building a balanced portfolio with adequate levels of liquid exposures that can be relied upon for rebalancing and capital preservation in adverse markets
  - Texas ERS: *"The Board has adopted the asset allocation reflected in this Policy to improve the long-term expected return and information ratio of the Trust. This framework for the asset allocation between **return seeking** and **risk reduction/liquidity** assets provides broader diversification and improved returns in disparate economic regimes"*
  - Yale Endowment: *"Yale targets a minimum allocation of 30% of the endowment to **market insensitive assets** (cash, bonds and absolute return)"*
- **Very few institutional investors, whether they call out the concept of low vs. high market exposure or not, will operate with lower than ~20-25% in "low market exposure" assets; even the investors with the highest allocations to private equity (and therefore highest risk tolerance) maintain these levels of cash, fixed income and/or hedge funds**

# APFC Asset Class Discussion

	Public Equity	Fixed Income	Private Equity	Private Income	Real Estate	Absolute Return	Risk Parity & Other
FY 2021	39%	21%	15%	9%	7%	6%	1%
FY 2012	36%	21%	6%	6%	12%	6%	11%
FY 2025	33%	18%	19%	9%	12%	6%	1%
<b>Implementation</b>	<ul style="list-style-type: none"> <li>~85% managed by external managers</li> <li>~15% internally managed through ETFs and single-stock investment programs</li> </ul>	<ul style="list-style-type: none"> <li>Investment grade bond portfolio managed entirely in house</li> <li>Non-investment grade bonds mostly managed externally</li> </ul>	<ul style="list-style-type: none"> <li>~25% managed internally through direct and co-investments</li> <li>~75% managed as LP interest in funds</li> </ul>	<ul style="list-style-type: none"> <li>~25% managed internally through direct and co-investments</li> <li>~75% managed as LP interest in funds</li> </ul>	<ul style="list-style-type: none"> <li>Vast majority of properties held directly in APFC's name; variety of external advisors used on properties</li> <li>~15% of portfolio in REITS</li> </ul>	<ul style="list-style-type: none"> <li>Fund-of-funds program brought in house in 2016</li> </ul>	<ul style="list-style-type: none"> <li>Risk balanced portfolio; 100% externally managed</li> </ul>

# Changing Markets & APFC Staff Goals

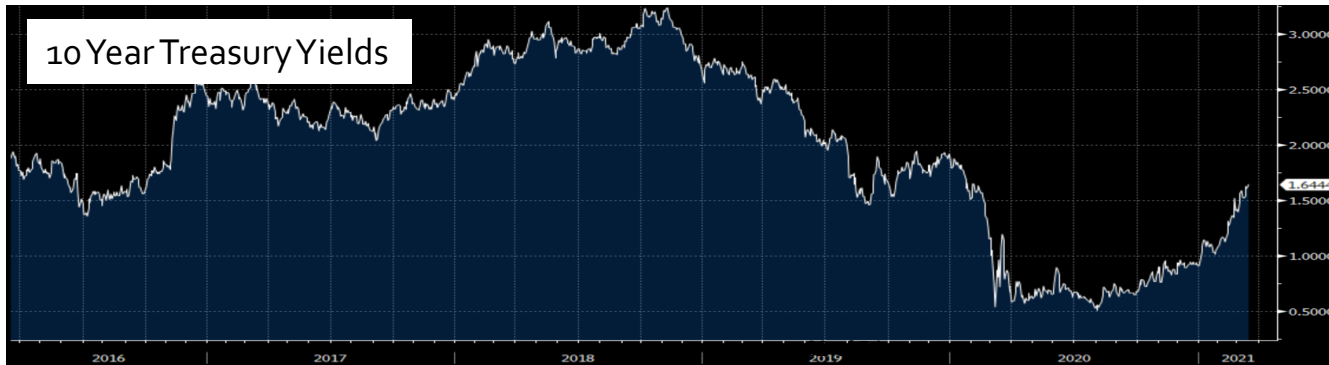
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- Fixed Income markets have moved since Callan Associates published their 2021 ten year capital market expectations, while the change in global equities has been more modest
- Since mid January 2021:
  - Global equities (MSCI ACWI) have returned ~-1.5%
  - Ten year inflation break-evens have increased by ~25-30 bps
  - The US ten year treasury yield has steepened by ~50-55 bps
- The reality is no one can forecast ten year returns with precision; but, nonetheless, Callan Associates' capital market expectations are an appropriate "official" anchoring point for the Board
  - APFC Staff clearly aspires to add value beyond base-line capital market returns and, in some cases, has different views than Callan on the ten year outlook; these together form the basis for a second set of projections labelled through-out this presentation as "CIO Aspirational Forecasts"

# Market has Changed Since Jan 2021...



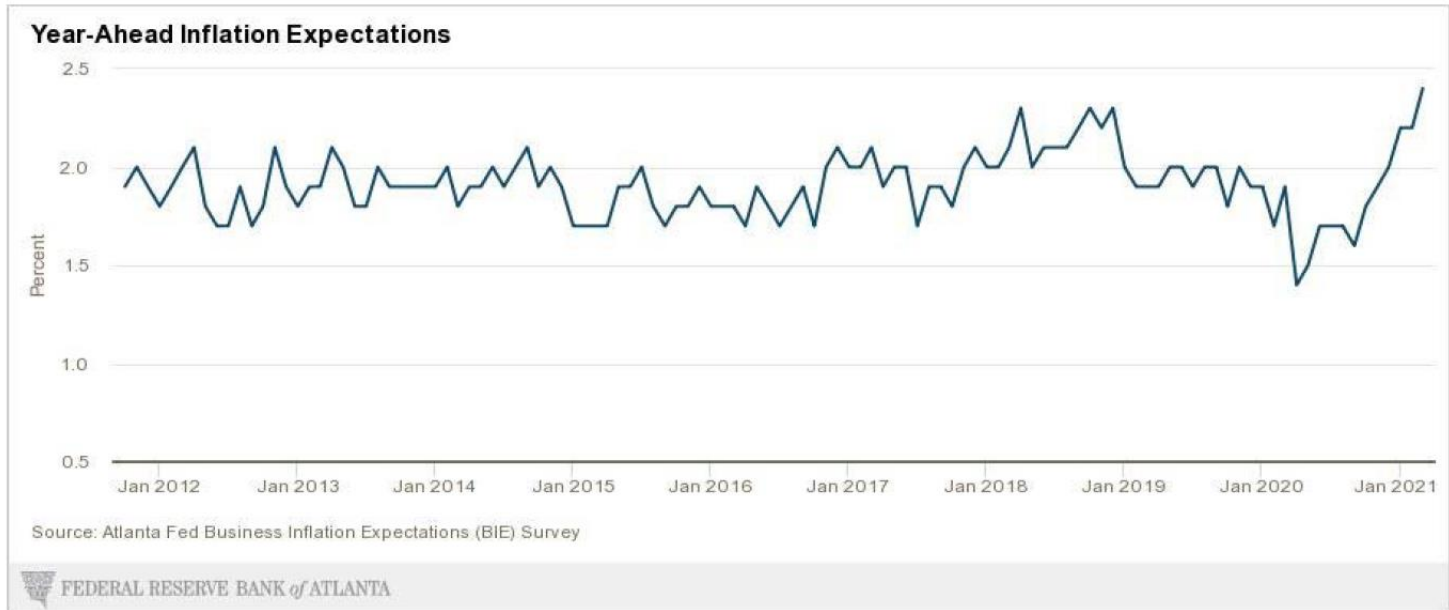
- Current 10 year breakeven is ~ 2.3%



- Current 10 year Treasury Yields at ~ 1.6 – 1.7%

Source: Bloomberg Finance L.P.

# ...Reflected in Survey Expectations...



# ...and Option Implied Probabilities of High Inflation



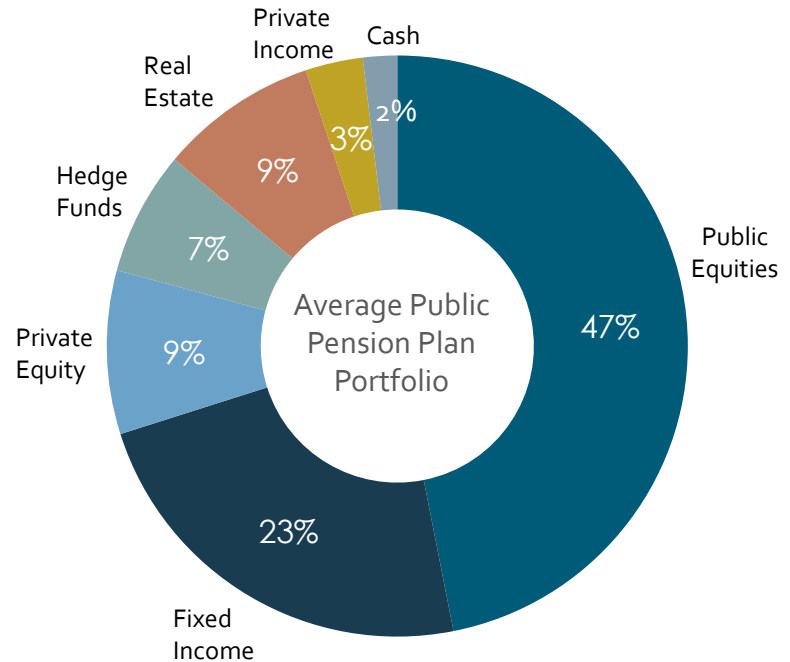
# Asset Class Return Characteristics

	Public Equity <sup>(1)</sup>	Fixed Income	Private Equity	Private Income	Real Estate	Absolute Return	Risk Parity	CPI
<b>Callan Forecasts</b>								
10-year Return	6.85%	2.20%	8.00%	6.40%	5.75%	4.00%	5.25%	2.0%
Standard Dev.	18.30%	3.75%	27.80%	13.30%	14.10%	8.00%	10.90%	-
Correlation to Equities	1.00	-0.09 to .7	0.83	0.85	0.72	0.81	0.99	-
<b>CIO Aspirational Forecasts</b>								
10-year Return	6.85%	2.50%	12.50%	7.50%	6.50%	5.50%	5.25%	2.5%
Correlation to Equities	1.00	-0.09 to .7	0.83	0.85	0.72	0.00	0.99	-

1. We believe and expect that APFC's public equity team will deliver alpha over a market cycle of ~50 bps per annum; optimism around this alpha generation potential is offset by a desire to be more conservative around baseline global equity returns; these factors offset each other to result in no change to Callan's ten year forecast for global equities at 6.85% nominal return per annum.

# Average Public Pension Fund Allocation

- APFC and peers reviewed herein have materially more illiquid exposures (and, therefore, a higher risk profile) than the average public pension fund<sup>(1)(2)</sup>
- Callan forecasts a **4.2%** real return for APFC's current portfolio; this average public pension portfolio earns **~4.0%** using similar assumptions



1. Source: [www.publicplansdata.org](http://www.publicplansdata.org) (Data from 2019 survey of 200 US public pension plans)

2. Infrastructure, commodities, and miscellaneous allocations included in Private Income  
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# Portfolio Allocation Comparisons

	Average Public Pension	Texas ERS	Yale Endowment	WSIB CTF	APFC FY '21	APFC FY '22	APFC FY '23	APFC FY '24	APFC FY '25
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## Market Exposed Asset Classes

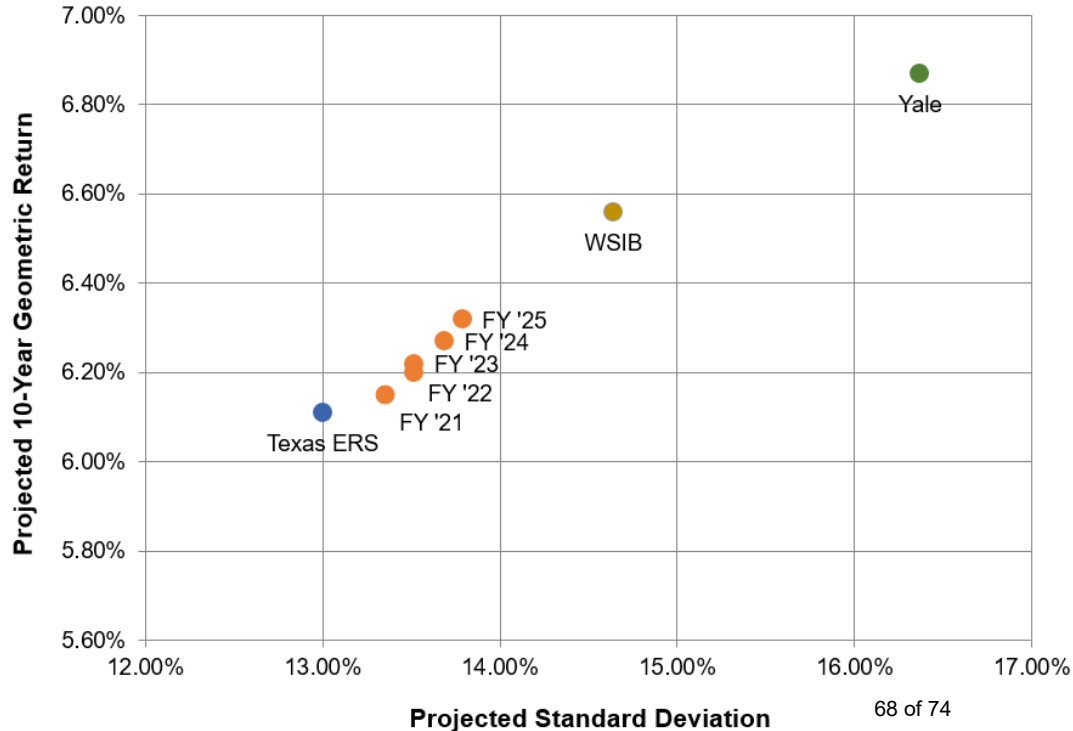
Public Equity	46.9%	37.0%	14.0%	32.0%	39.0%	38.0%	36.0%	35.0%	33.0%
Private Equity	9.1%	13.0%	41.0%	23.0%	15.0%	16.0%	17.0%	18.0%	19.0%
Real Estate	8.8%	12.0%	9.5%	18.0%	7.0%	8.0%	9.0%	10.0%	12.0%
Private Income	3.2%	10.0%	4.5%	7.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Risk Parity	0.0%	0.0%	0.0%	0.0%	1.0%	1.0%	1.0%	1.0%	1.0%

## Low Market Exposure Asset Classes

Fixed Income	23.2%	22.0%	7.5%	20.0%	21.0%	20.0%	20.0%	19.0%	18.0%
Absolute Return	6.9%	5.0%	23.5%	0.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Total Fund Cash	1.9%	1.0%	0.0%	0.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Total Fund	100%	100.0%	100%	67 of 74.0%	100%	100%	100%	100%	100%

# Callan Portfolio Optimization Results

Projected 10-Year Geometric Return versus Standard Deviation

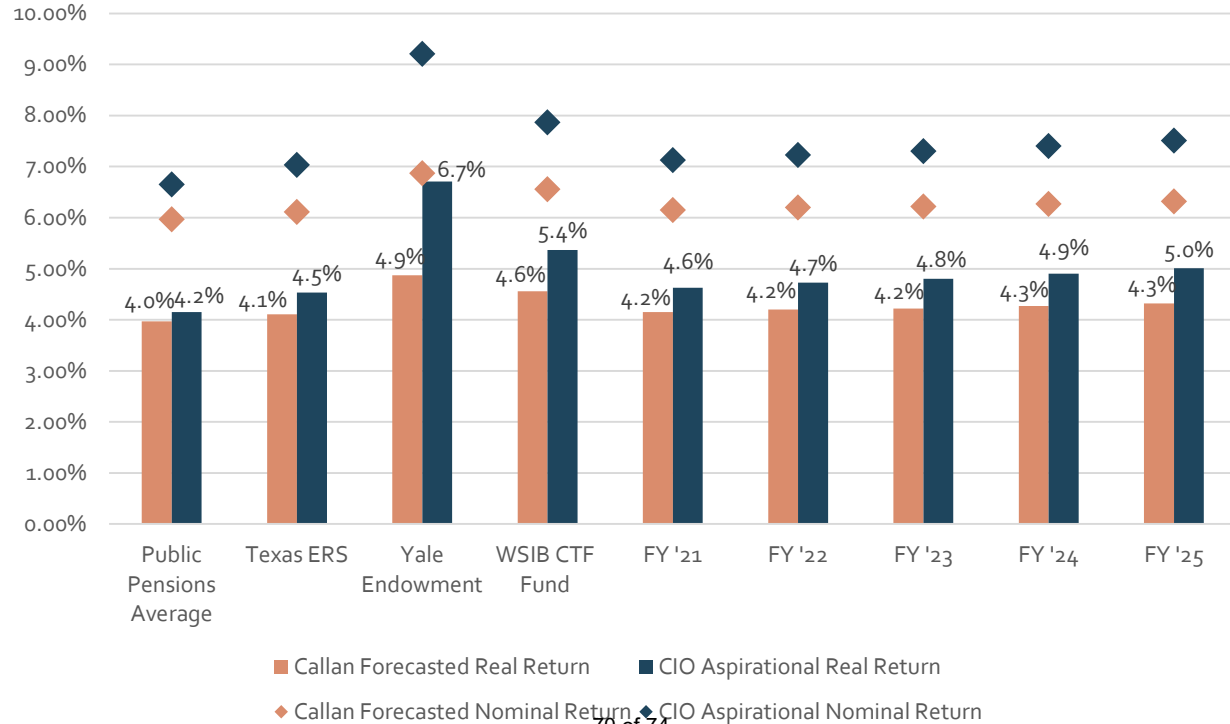


- For only 55 bps of incremental expected return, Yale has 258 bps greater risk than APFC FY '25 portfolio

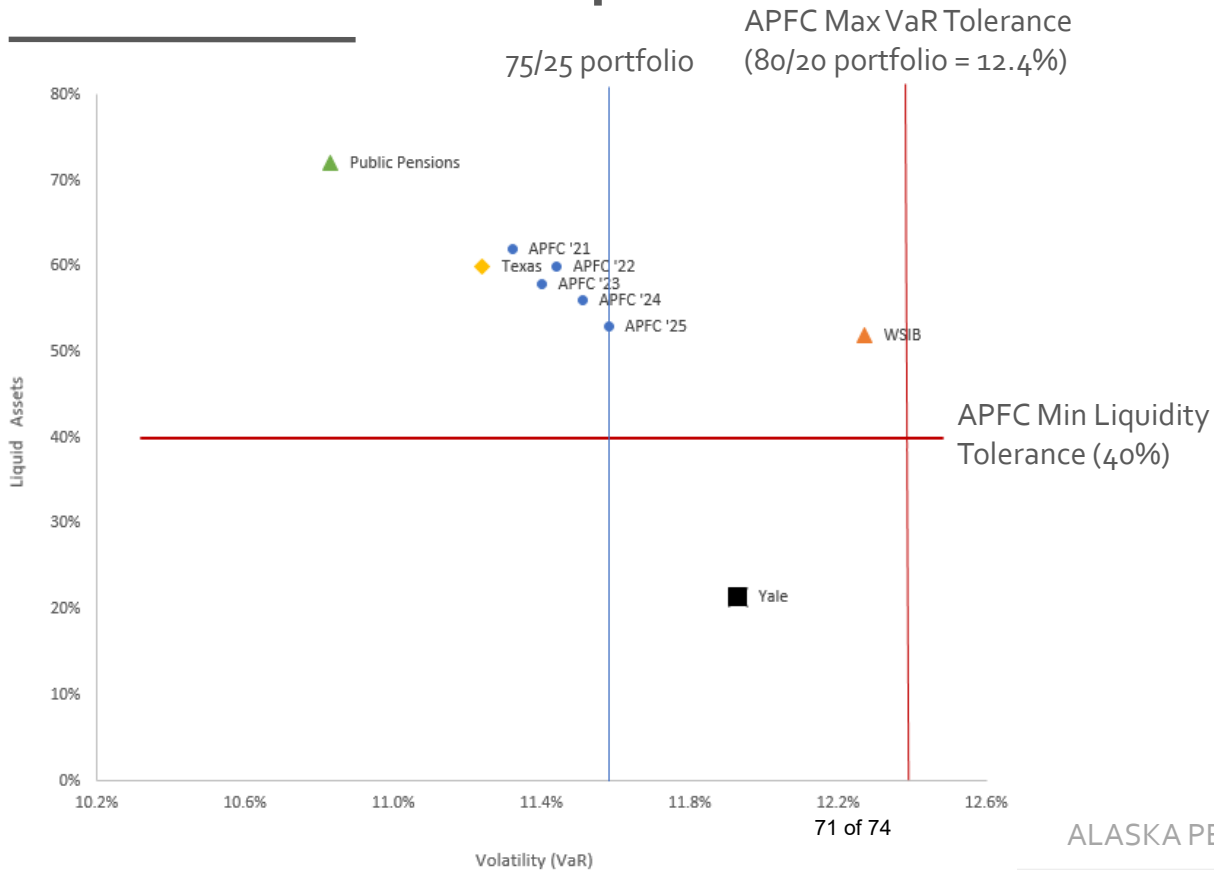
# Portfolio Comparisons – Callan vs. CIO Projected Returns

	Average Public Pension	Texas ERS	Yale Endowment	WSIB CTF	APFC FY '21	APFC FY '22	APFC FY '23	APFC FY '24	APFC FY '25
<b>Callan Forecast</b>									
Nominal Return	6.0%	6.1%	6.9%	6.6%	6.2%	6.2%	6.2%	6.3%	6.3%
Real Return	4.0%	4.1%	4.9%	4.6%	4.2%	4.2%	4.2%	4.3%	4.3%
<b>CIO Aspirational Return Forecast</b>									
Nominal Return	6.7%	7.0%	9.2%	7.9%	7.1%	7.2%	7.3%	7.4%	7.5%
Real Return	4.2%	4.5%	6.7%	5.4%	4.6%	4.7%	4.8%	4.9%	5.0%

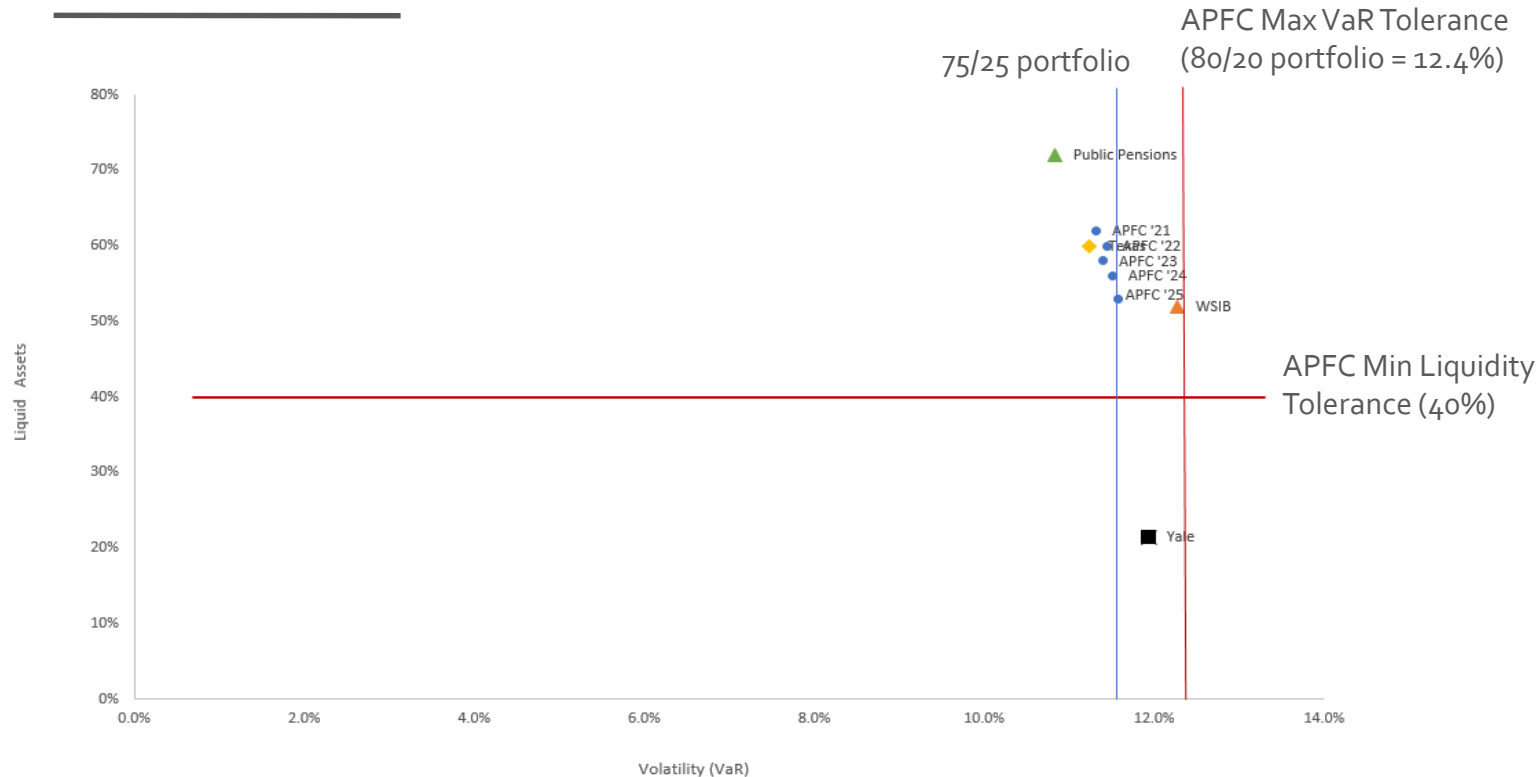
# Portfolio Comparisons – Projected Returns



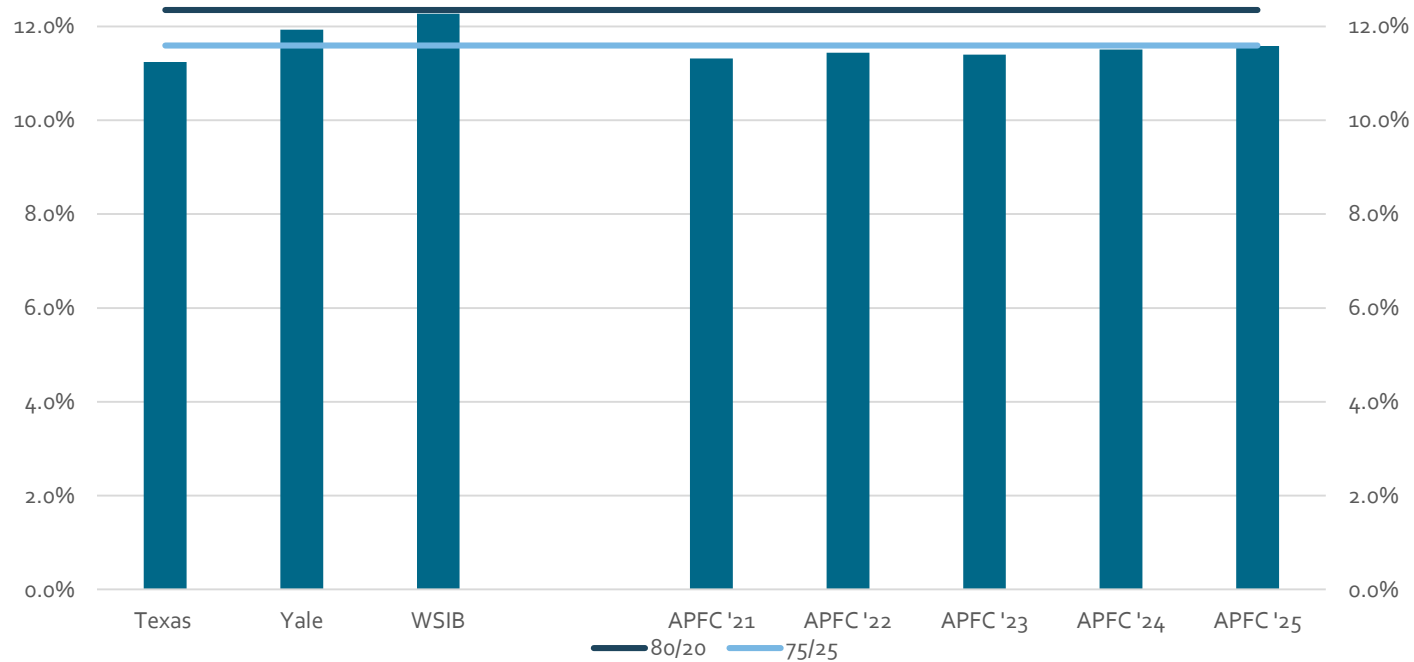
# Portfolio Comparisons – Risk Metrics



# Portfolio Comparisons – Risk Metrics



# Portfolio Comparisons – Risk Metrics



# Conclusion and Recommendation

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- While the FY '25 asset allocation (in the current plan) falls short of the Fund's CPI + 5% return objective based on Callan forecasts, Staff still focuses on crafting a portfolio that can outperform the baseline numbers and still deliver on this objective
- Market dynamics that impact ten year outlooks are **constantly** changing – CPI (inflation) outlook is a good case in point
- Certain of APFC's peer institutional investors have portfolios that score higher on expected ten year returns, however, these portfolios do have issues with respect to risk tolerance thresholds
  - In Yale Endowment's case, the portfolio features less liquidity than the Board's stated risk appetite
  - In Washington State Investment Board's case, the portfolio is right on the limit of stated portfolio risk tolerance limit (VAR) leaving minimal cushion for changing markets or other factors
- Today Callan Associates will present a variety of portfolio options along the efficient frontier; Staff recommends that the current five year plan remain the default option to continue executing against
  - Recommendation influenced by (a) execution realities of changing private market targets materially year-to-year, (b) reality that current five year plan brings portfolio very close to the max Risk Tolerance that has been articulated by the Board