

Callan

March 5, 2021

**Senate Finance Committee
Alaska State Legislature**

Alaska Permanent Fund and
Alaska Retirement Plans Update

Gregory C. Allen

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Outline

- Callan's capital market projection process
- Current economic and capital market environment
- Summary of Callan's 2021 capital market projections
- Projected return and risk for APFC policy portfolio
- Alaska Permanent Fund
 - Recent Performance Review
- Projected return and risk for Alaska Retirement Plans – PERS/TRS
- Alaska Retirement Plans – PERS/TERS
 - Recent Performance Review
- Concluding observations

Callan Capital Market Projection Process

Long Term Capital Market Projections

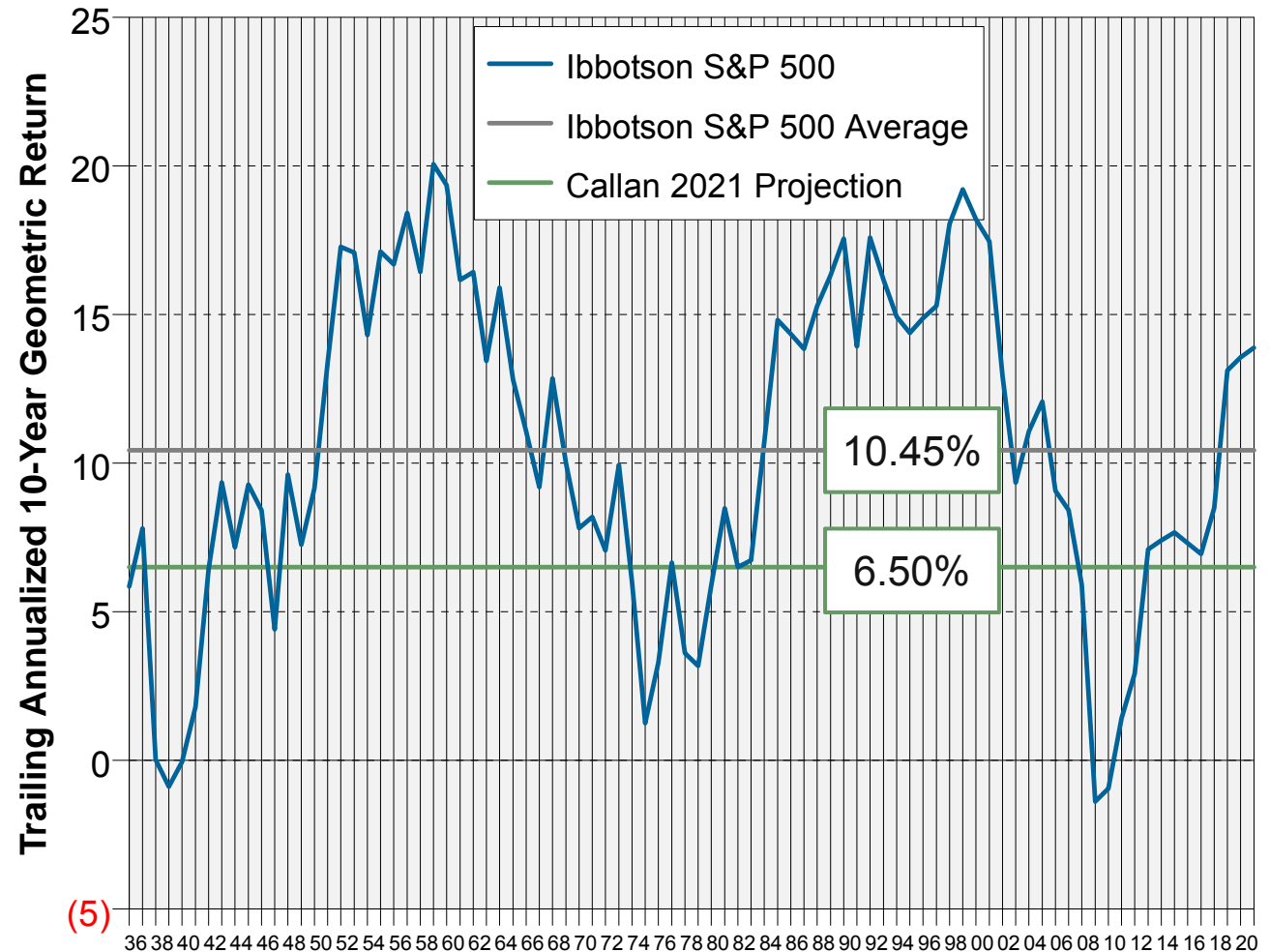
- Callan updates long term capital market projections each year in January and uses them for the full year with all clients for strategic planning purposes.
- Projections take into account long term relationships balanced with current market conditions.
- Consensus expectations (central banks, economists, 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.

Callan Capital Market Projection Process

Historical Rolling 10-year Return – US Large Cap Equity

- Historical 10-year return for US large cap has averaged 10.5%.
- 2021 Projection is 6.5%.
- Very few periods historically of negative 10-year return for US equities.
- Current outlook is in lower third of historical distribution, driven by relatively high valuations and low inflation outlook.
- Generally lower return periods have been associated with higher valuations at the beginning of the period or recession events.

Rolling 10 Year Returns
Ibbotson S&P 500

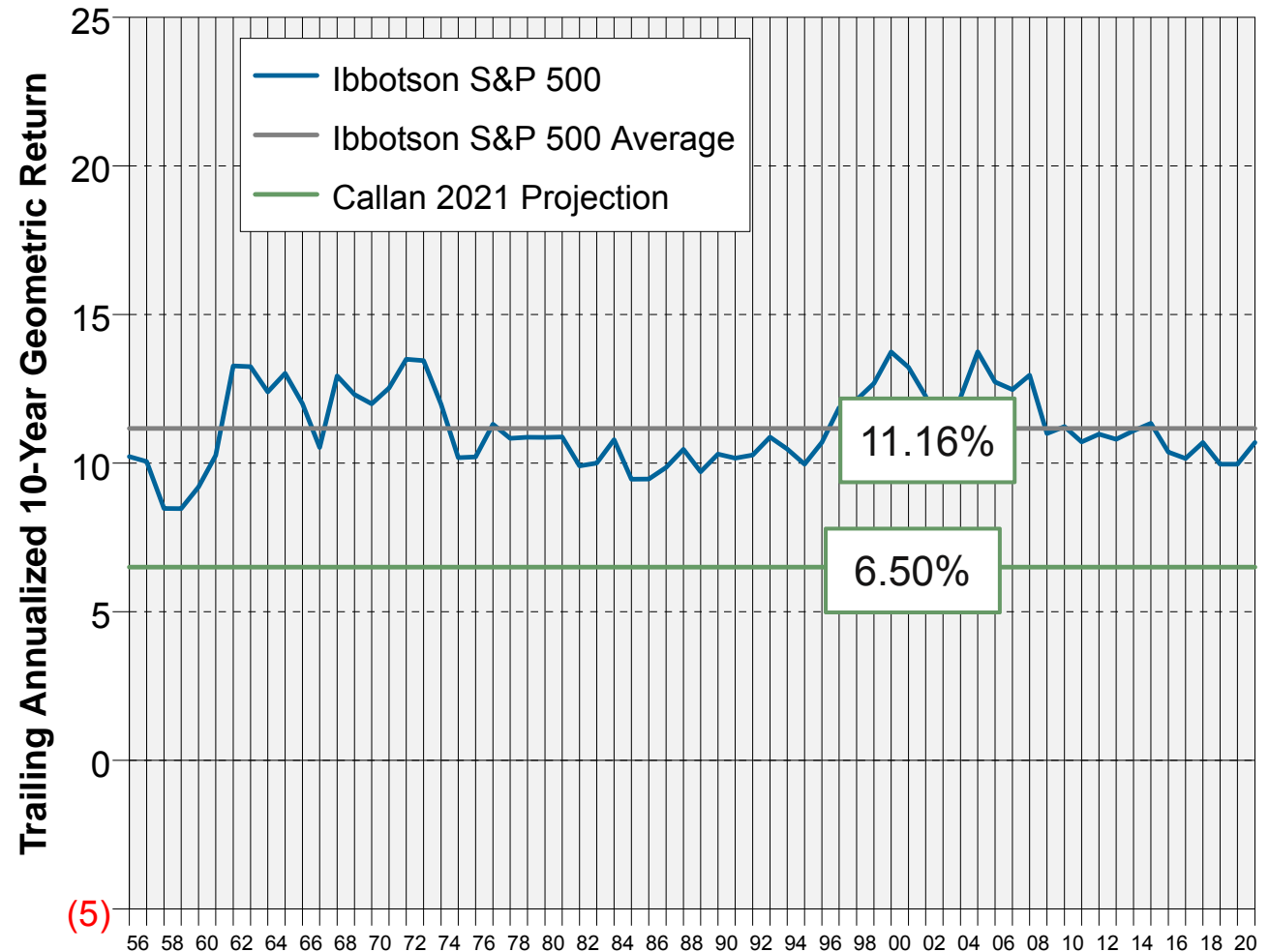


Callan Capital Market Projection Process

Historical Rolling 30-year Return – US Large Cap Equity

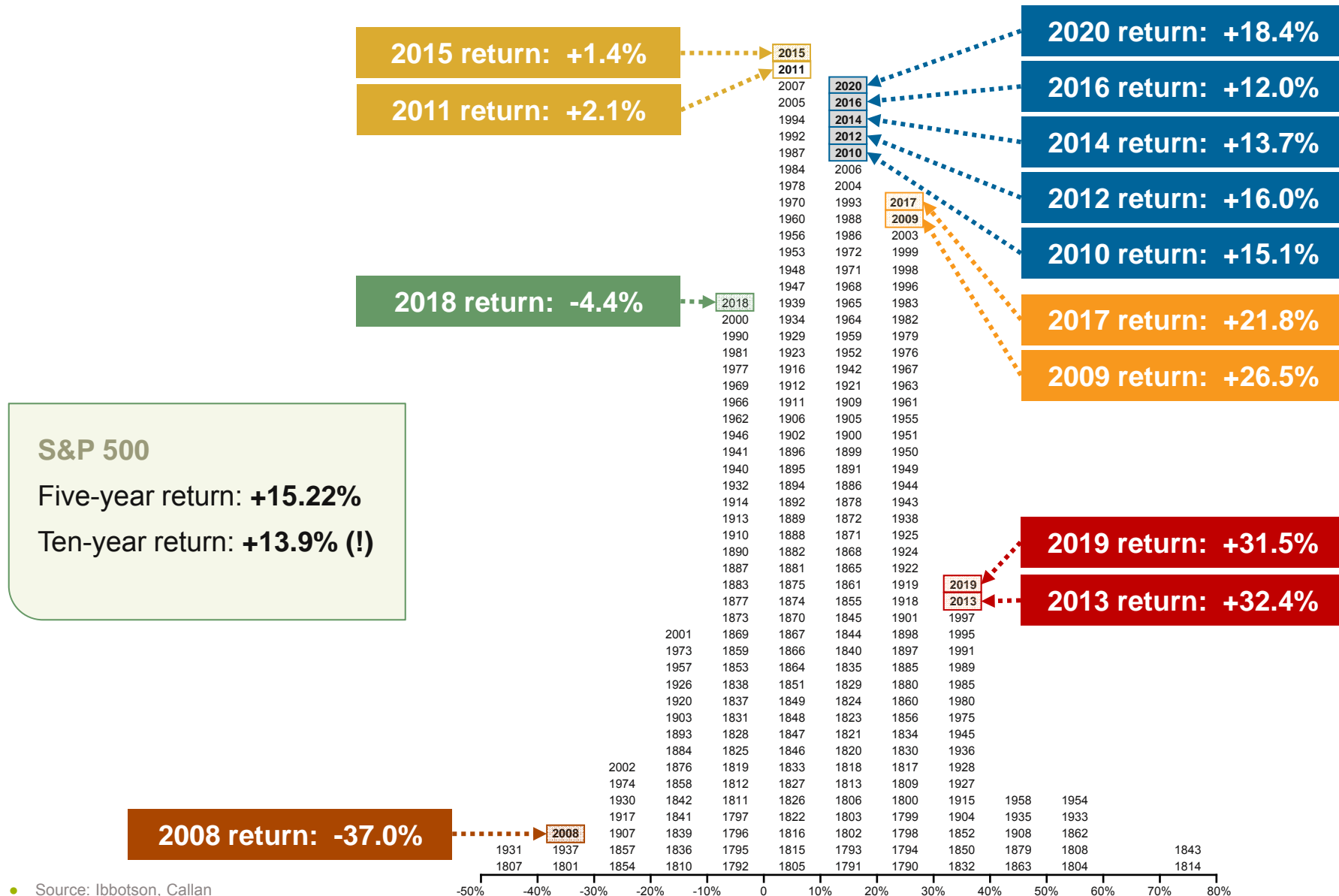
- Historical 30-year return for US large cap has averaged 11.16%.
- 2021 Projection is 6.5%.
- Worst historical 30-year return for S&P 500 was 8.47%.
- 30-year annualized returns in fairly tight range around long term average.
- Longer time horizons reward equity risk takers with more consistent positive returns.

Rolling 30 Year Returns
Ibbotson S&P 500



Stock Market Returns by Calendar Year

2020 performance in perspective: History of the U.S. stock market (231 years of returns)

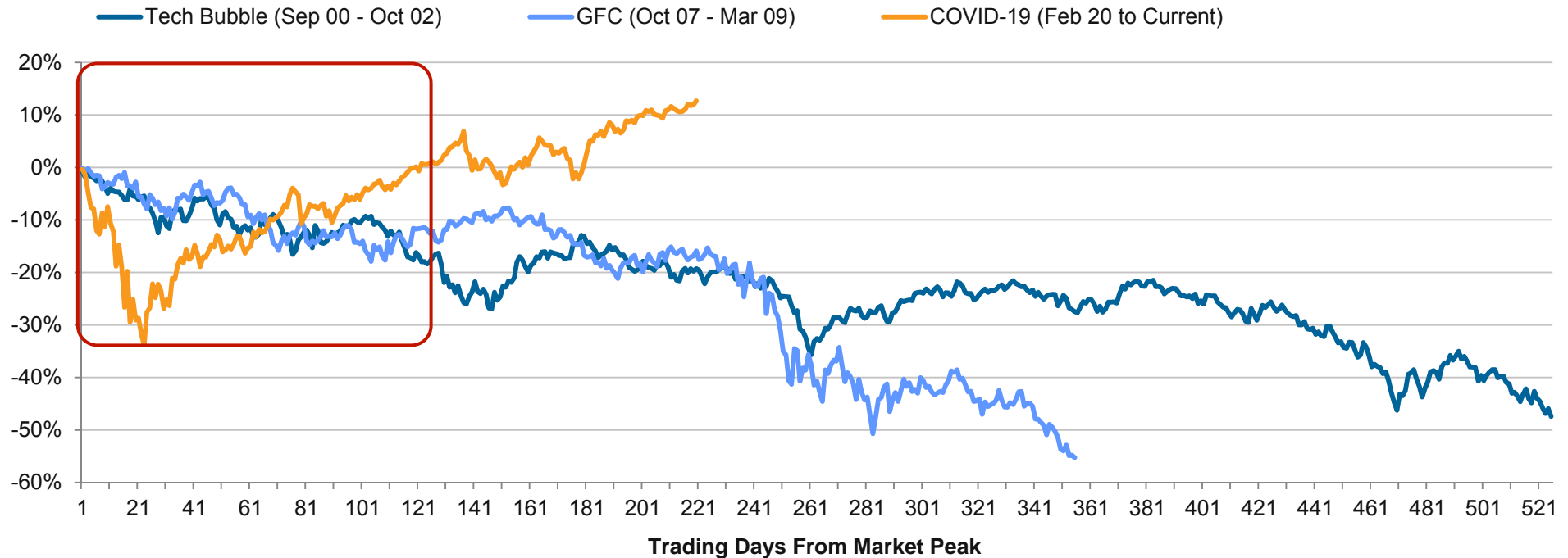


Unprecedented Shock to Global Capital Markets – Unprecedented Recovery?

- V-shaped recovery in equity—back in black by mid-August, up 18.4% for the year!

S&P 500 Cumulative Returns

Market Peak-to-Trough for Recent Corrections vs. Current Path of COVID-19 Correction Through 12/31/20



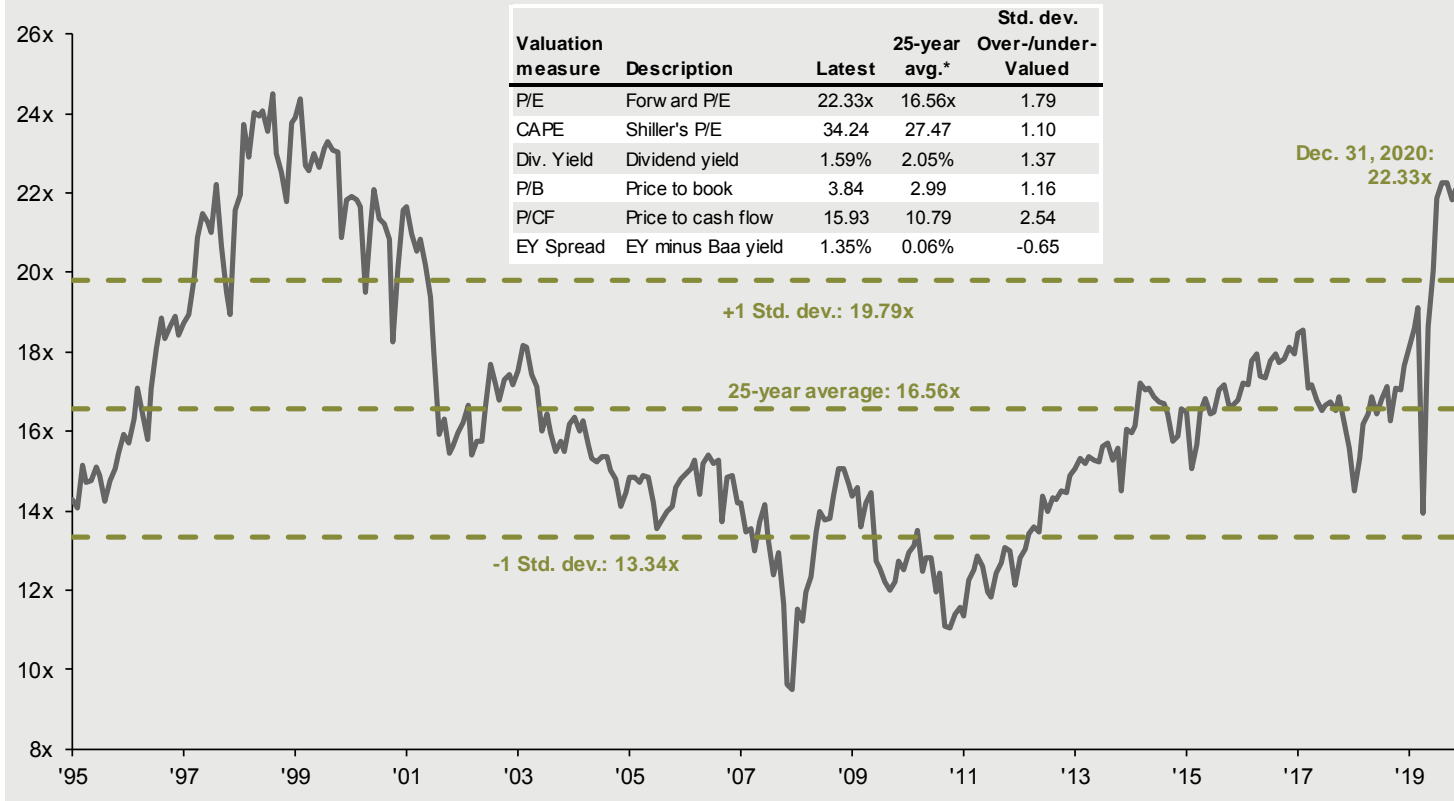
- The sharpest and fastest equity market decline ever: 16 trading days to reach bear market; -33% after just 23 days
 - Incredible rebound in U.S. equity market in 2Q and 3Q
 - *The S&P 500 recovered all of its COVID-19 related losses by August 10, only 97 days from the bottom*
 - *70% return from the market bottom through December 31, 2020*
 - *Positive return year-to-date (+18.4% through December 31, 2020)*

● Sources: Callan, S&P Dow Jones Indices

U.S. Equity Projections

Large cap valuations

S&P 500 Index: Forward P/E ratio



Price-to-earnings is price divided by consensus analyst estimates of earnings per share for the next 12 months as provided by IBES since December 1995, and FactSet for December 31, 2020. Current next 12-months consensus earnings estimates are \$167. Average P/E and standard deviations are calculated using 25 years of IBES history. Shiller's P/E uses trailing 10-years of inflation-adjusted earnings as reported by companies. Dividend yield is calculated as the next 12-months consensus dividend divided by most recent price. Price-to-book ratio is the price divided by book value per share. Price-to-cash flow is price divided by NTM cash flow. EY minus Baa yield is the forward earnings yield (consensus analyst estimates of EPS over the next 12 months divided by price) minus the Moody's Baa seasoned corporate bond yield. Std. dev. over-/under-valued is calculated using the average and standard deviation over 25 years for each measure.

Guide to the Markets – U.S. Data are as of December 31, 2020.

- Valuations are 1.8 standard deviations above the 25-year average based on forecast earnings
- Longer term historical valuations are also elevated
 - Shiller's cyclically adjusted price earnings (CAPE) ratio is 1.1 standard deviation above average
- Stock prices reflect anticipated rather than historical earnings
- Market is concentrated in Tech and Consumer Discretionary which both have high valuations.

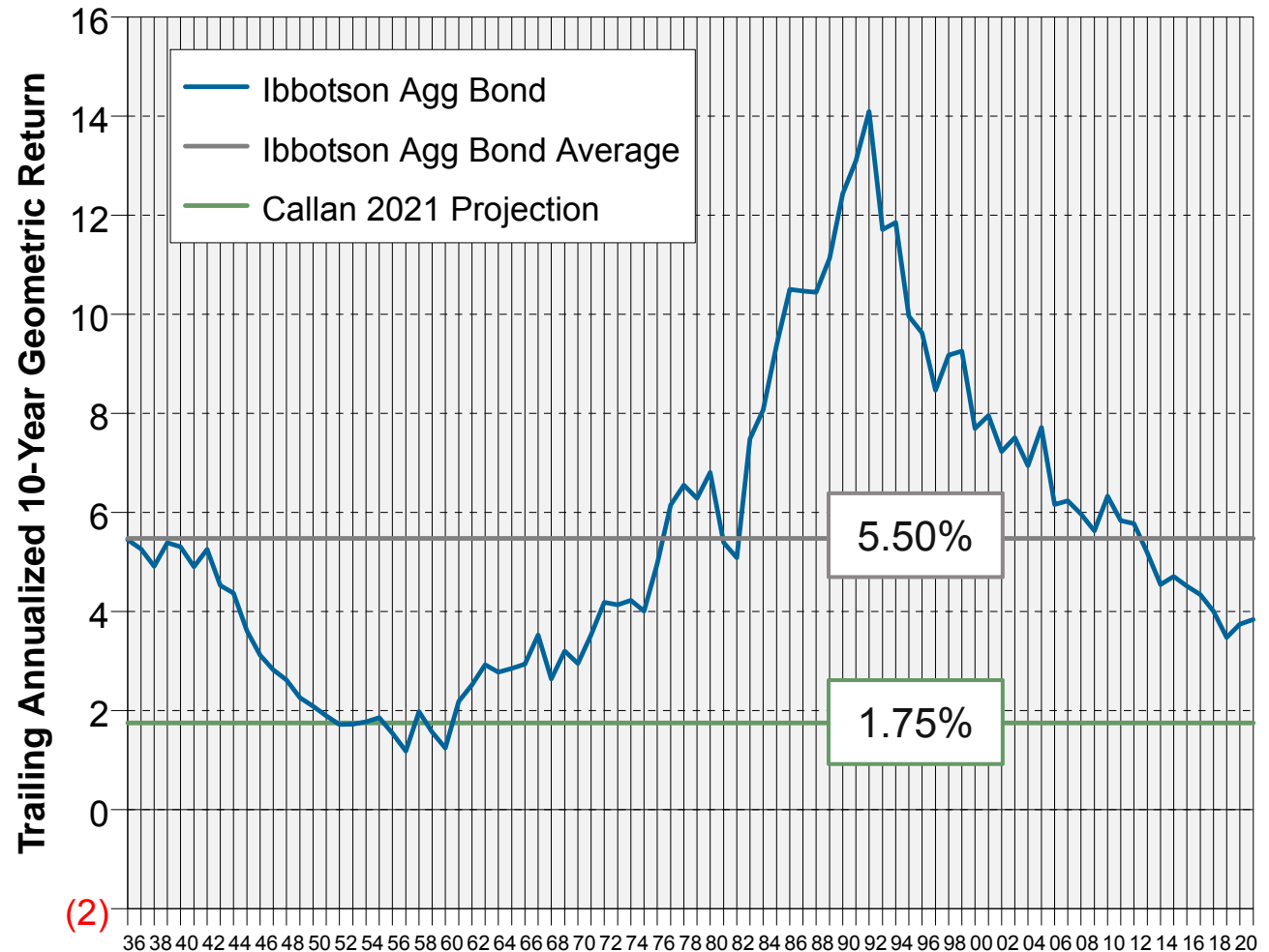
Sources: FactSet, FRB, Robert Shiller, S&P Dow Jones Indices, Thomson Reuters, J.P. Morgan Asset Management.

Callan Capital Market Projection Process

Historical Return – US Fixed Income

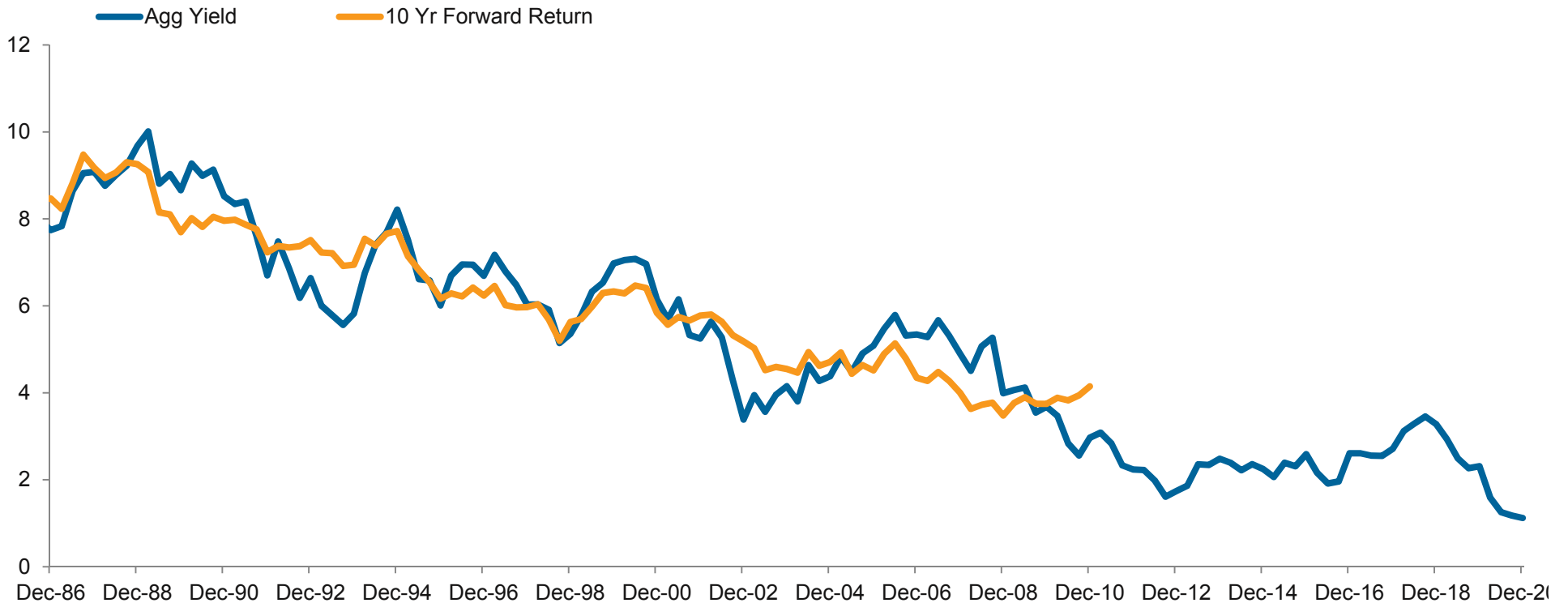
- Historical 10-year return for US bonds has averaged 5.5%.
- 2021 Projection is 1.75%.
- No periods historically of negative 10-year return for US bonds.
- Current outlook is in bottom decile of historical distribution due to low yields and low inflation outlook.
- Rising interest rates will eventually allow higher forward looking returns but will reduce return in the intermediate term.

Rolling 10 Year Returns Ibbotson Agg Bond



Starting Yield Strongly Predicts Forward Returns

Bloomberg Aggregate Index Starting Yield vs. 10-Year Forward Return



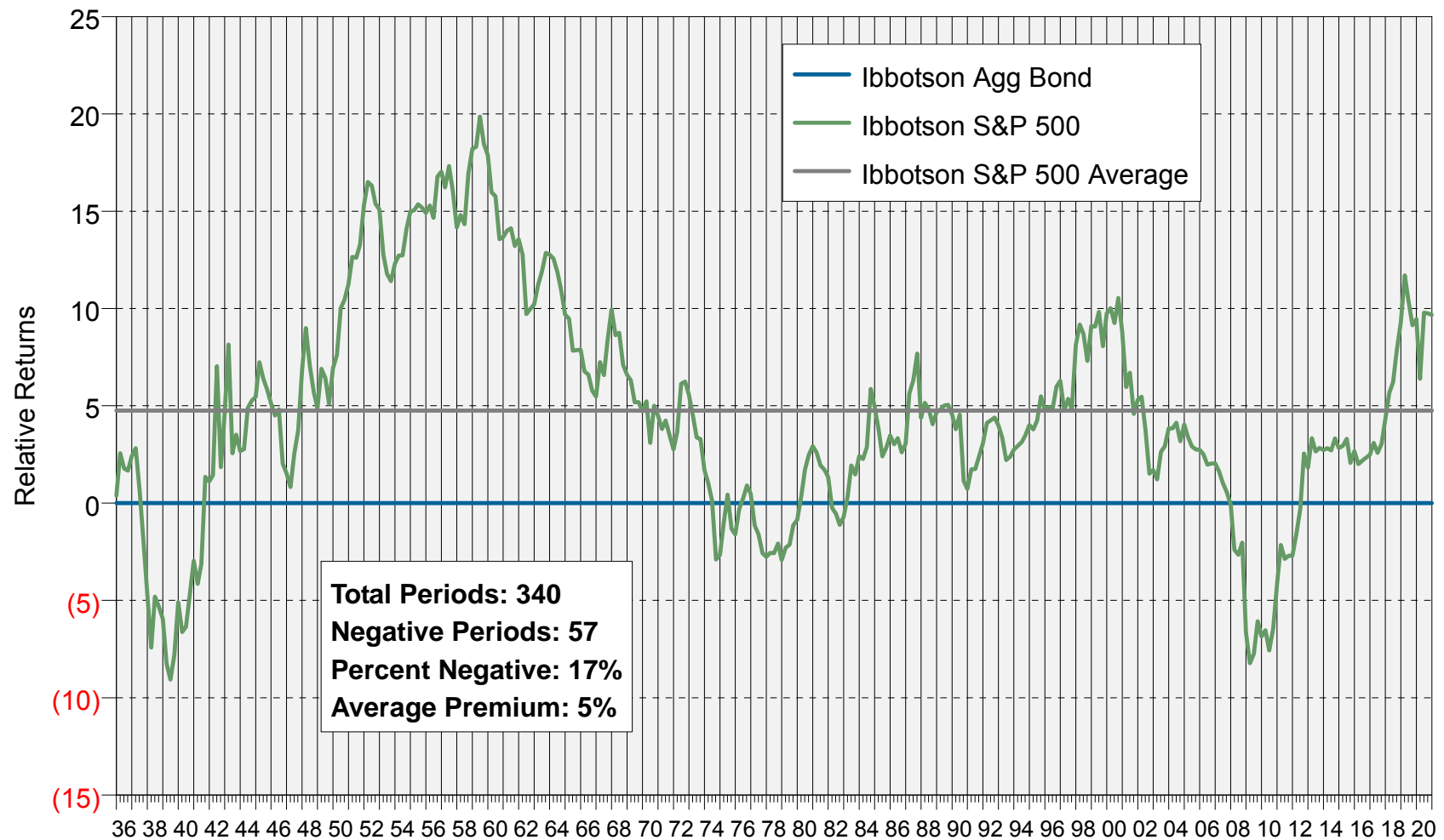
- There is a strong relationship between starting yields and subsequent 10-Year returns.
- Current yield on the Bloomberg Aggregate index is below 2%.
- Projection includes assumption of gradually rising yields over 10-year period.

● Sources: Bloomberg Barclays

Relative Returns Stocks versus Bonds – 10-year Roll

Long Term Relationship Between Stocks and Bonds

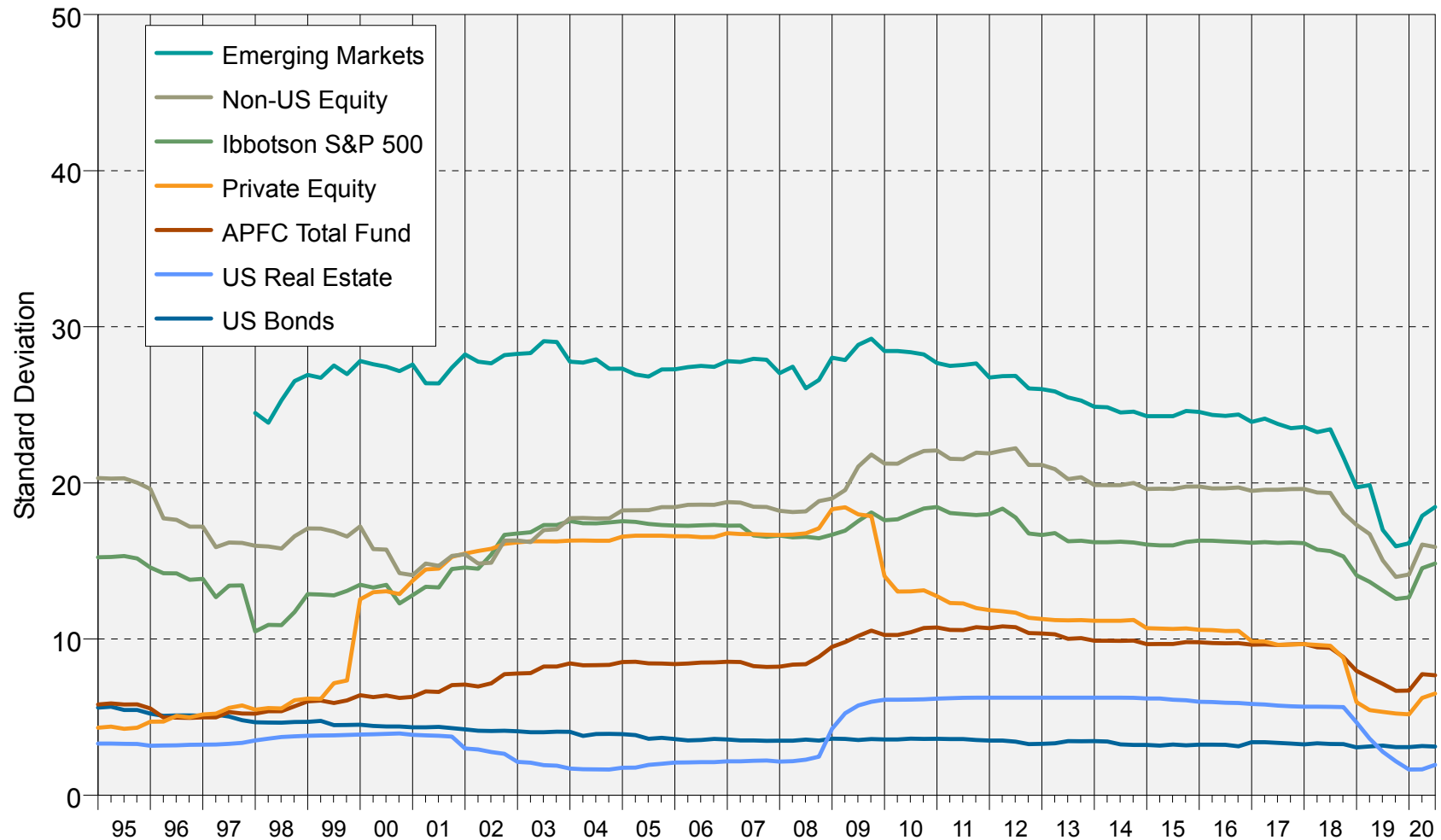
Rolling 10 Year Relative Returns US Stocks versus US Bonds



Rolling 10-Year Standard Deviation

Asset Class Volatility Over Time

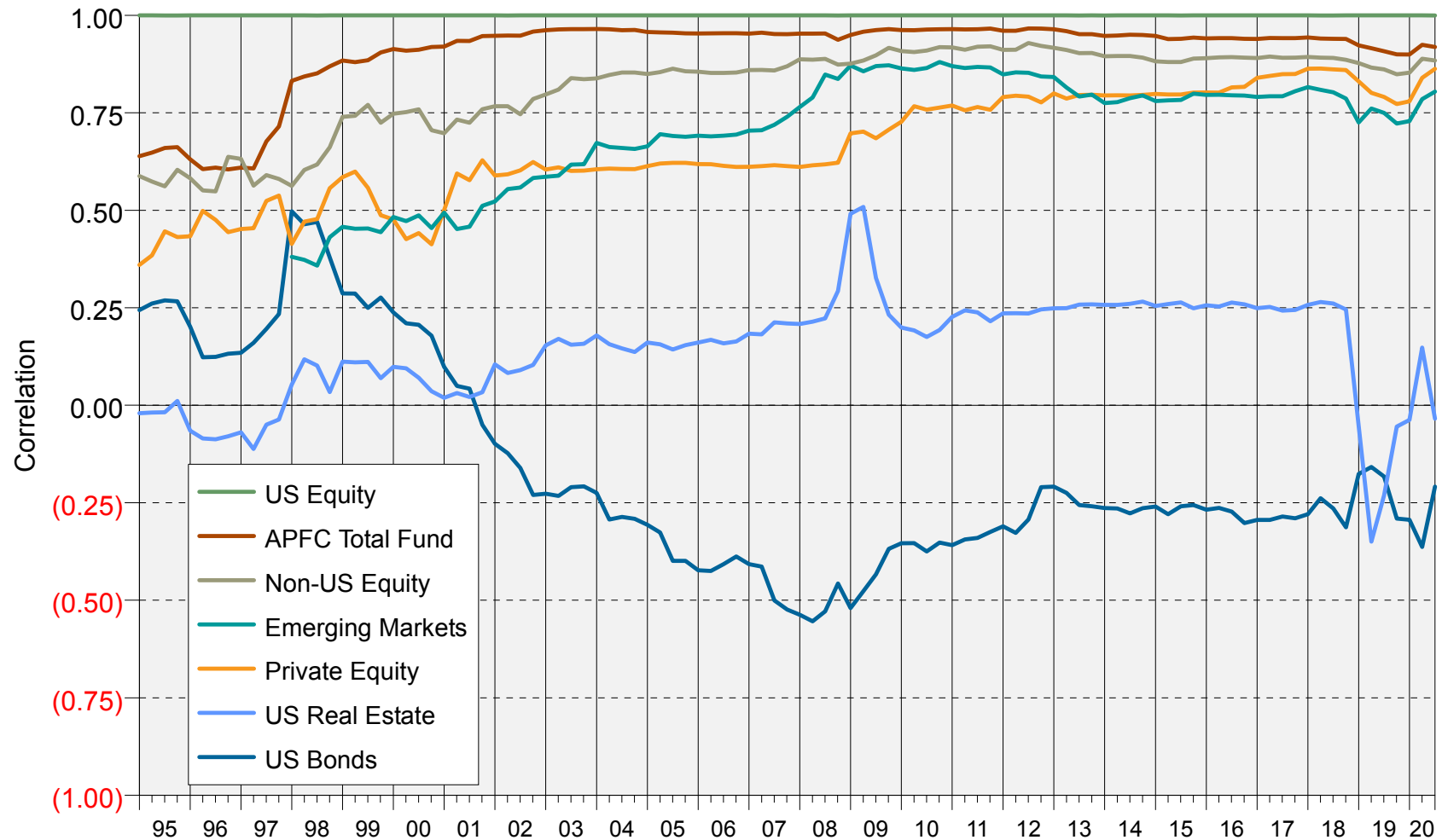
Rolling 10 Year Standard Deviation
25 1/2 Years ended June 30, 2020



Relative Returns Stocks versus Bonds

Correlations to US Equity Over Time

Rolling 10 Year Correlation with US Equity
25 1/2 Years ended June 30, 2020



Periodic Table of Investment Returns

Diversification Over Recent Calendar Year Periods

Periodic Table of Investment Returns for Calendar Years

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Emerging Markets	Real Estate	Emerging Markets	US Equity	US Equity	Real Estate	US Equity	Emerging Markets	Private Equity	US Equity
19.2%	14.3%	18.6%	33.6%	12.6%	13.3%	12.7%	37.8%	10.1%	31.0%
Private Equity	US Bonds	Non US Equity	Non US Equity	Private Equity	Private Equity	Emerging Markets	Non US Equity	Real Estate	Non US Equity
19.1%	7.8%	17.3%	22.8%	11.8%	8.5%	11.6%	25.0%	6.7%	22.0%
US Equity	Private Equity	US Equity	Private Equity	Real Estate	APFC Total Fund	Private Equity	US Equity	US Bonds	Emerging Markets
16.9%	7.2%	16.4%	21.2%	11.8%	3.4%	9.5%	21.1%	0.0%	18.9%
Real Estate	US Equity	Private Equity	APFC Total Fund	US Bonds	US Bonds	APFC Total Fund	Private Equity	APFC Total Fund	Private Equity
13.1%	1.0%	13.6%	12.8%	6.0%	0.5%	8.4%	19.4%	(1.1%)	16.1%
APFC Total Fund	APFC Total Fund	APFC Total Fund	Real Estate	APFC Total Fund	US Equity	Real Estate	APFC Total Fund	US Equity	APFC Total Fund
11.9%	0.4%	12.4%	11.0%	5.3%	0.5%	8.0%	16.2%	(5.2%)	15.7%
Non US Equity	Non US Equity	Real Estate	US Bonds	Emerging Markets	Non US Equity	US Bonds	Real Estate	Non US Equity	US Bonds
7.8%	(12.1%)	10.5%	(2.0%)	(1.8%)	(0.8%)	2.6%	7.0%	(13.8%)	8.7%
US Bonds	Emerging Markets	US Bonds	Emerging Markets	Non US Equity	Emerging Markets	Non US Equity	US Bonds	Emerging Markets	Real Estate
6.5%	(18.2%)	4.2%	(2.3%)	(4.9%)	(14.6%)	1.0%	3.5%	(14.2%)	6.4%

Periodic Table of Investment Returns

Diversification Over Ten-Year Periods

Periodic Table of Investment Returns for Rolling 10 Yr. Periods

4th Quarter 2010	4th Quarter 2011	4th Quarter 2012	4th Quarter 2013	4th Quarter 2014	4th Quarter 2015	4th Quarter 2016	4th Quarter 2017	4th Quarter 2018	4th Quarter 2019
Emerging Markets 16.2%	Emerging Markets 14.2%	Emerging Markets 16.9%	Private Equity 14.0%	Private Equity 12.8%	Private Equity 11.5%	Private Equity 9.4%	Private Equity 9.1%	Private Equity 13.7%	Private Equity 13.6%
Private Equity 7.9%	Private Equity 11.1%	Private Equity 13.8%	Emerging Markets 11.5%	Emerging Markets 8.8%	Real Estate 7.8%	US Equity 7.1%	US Equity 8.6%	US Equity 13.2%	US Equity 13.4%
Real Estate 7.4%	Real Estate 8.1%	Real Estate 8.4%	Real Estate 8.6%	Real Estate 8.4%	US Equity 7.4%	Real Estate 6.9%	Real Estate 6.1%	APFC Total Fund 8.5%	Real Estate 10.2%
US Bonds 5.8%	US Bonds 5.8%	Non US Equity 8.2%	US Equity 7.9%	US Equity 7.9%	APFC Total Fund 5.6%	APFC Total Fund 5.1%	APFC Total Fund 5.6%	Emerging Markets 8.4%	APFC Total Fund 8.4%
APFC Total Fund 5.3%	APFC Total Fund 5.6%	US Equity 7.7%	Non US Equity 6.9%	APFC Total Fund 6.1%	US Bonds 4.5%	US Bonds 4.3%	US Bonds 4.0%	Real Estate 7.5%	Non US Equity 5.5%
Non US Equity 3.5%	Non US Equity 4.7%	APFC Total Fund 7.4%	APFC Total Fund 6.7%	US Bonds 4.7%	Emerging Markets 3.9%	Emerging Markets 2.2%	Emerging Markets 2.0%	Non US Equity 6.3%	Emerging Markets 4.0%
US Equity 2.2%	US Equity 3.5%	US Bonds 5.2%	US Bonds 4.5%	Non US Equity 4.4%	Non US Equity 3.0%	Non US Equity 0.7%	Non US Equity 1.9%	US Bonds 3.5%	US Bonds 3.7%

Highlights of 2021 Capital Market Projections

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

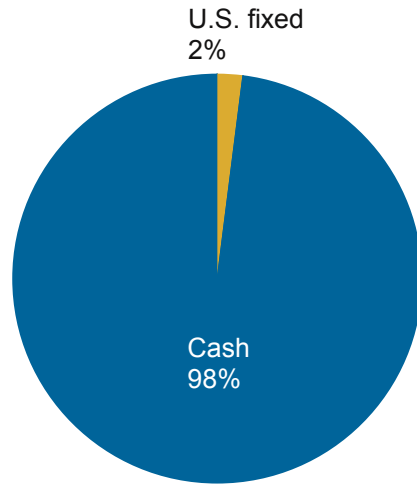
Summary of Callan's Long-Term Capital Market Projections for APFC Asset Allocation Model (FY 2022 - 2031)

Asset Class	Performance Index	PROJECTED RETURN			PROJECTED RISK	
		FY 2021 Target Weight	1-Year Arithmetic	10-Year Geometric Return	Annualized Standard Deviation	Projected Yield
APFC Public Equities		38.00%	8.30%	6.85%	18.30%	2.40%
Global Equity	MSCI ACWI - IMI	38.00%	8.30%	6.85%	18.30%	2.40%
APFC Public Fixed Income		20.00%	2.25%	2.20%	3.75%	3.05%
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%
Private Equity/Growth Opps		16.00%	11.50%	8.00%	27.80%	0.00%
Private Equity	Cambridge Private Equity (lag)	16.00%	11.50%	8.00%	27.80%	0.00%
Private Real Estate		8.00%	6.60%	5.75%	14.10%	4.40%
Real Estate	NCREIF Total Index (lag)	8.00%	6.60%	5.75%	14.10%	4.40%
Private Infra/Credit/Income Opps		9.00%	7.05%	6.40%	13.30%	5.25%
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%
Absolute Return		6.00%	4.25%	4.00%	8.00%	0.00%
Hedge Funds	HFRI Total HFOF Universe	6.00%	4.25%	4.00%	8.00%	0.00%
Risk Parity		1.00%	5.70%	5.25%	10.90%	2.45%
Risk Parity	HFR Risk Parity Vol 12	1.00%	5.70%	5.25%	10.90%	2.45%
Cash Equivalents		2.00%	1.00%	1.00%	0.90%	1.00%
Hedge Funds	90-Day T-Bill	2.00%	1.00%	1.00%	0.90%	1.00%
Total Fund	APFC Total Fund Target	100.00%	6.90%	6.20%	13.50%	2.40%
Inflation	CPI-U			2.00%	1.50%	

7% Expected Returns Over Past 30+ Years

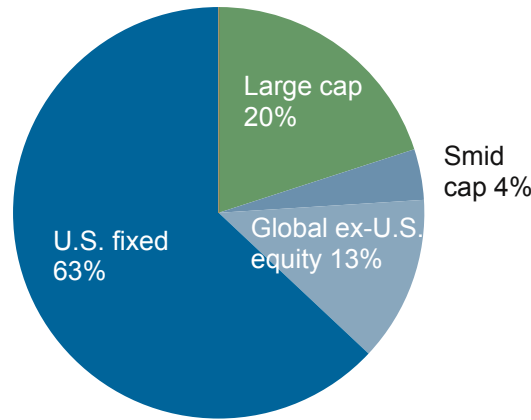
Declining bond yields have made it increasingly complex to achieve a 7% return

Increasing Complexity



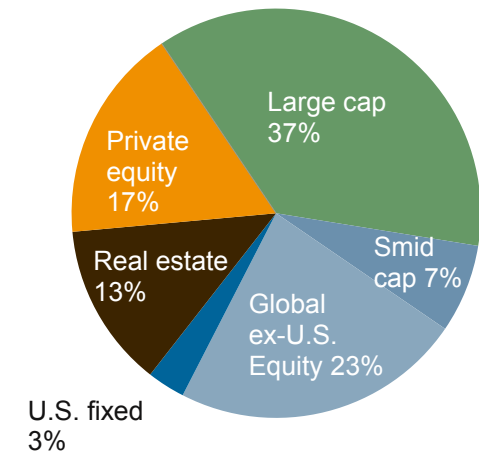
1991

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



**Alaska Permanent Fund
Corporation**

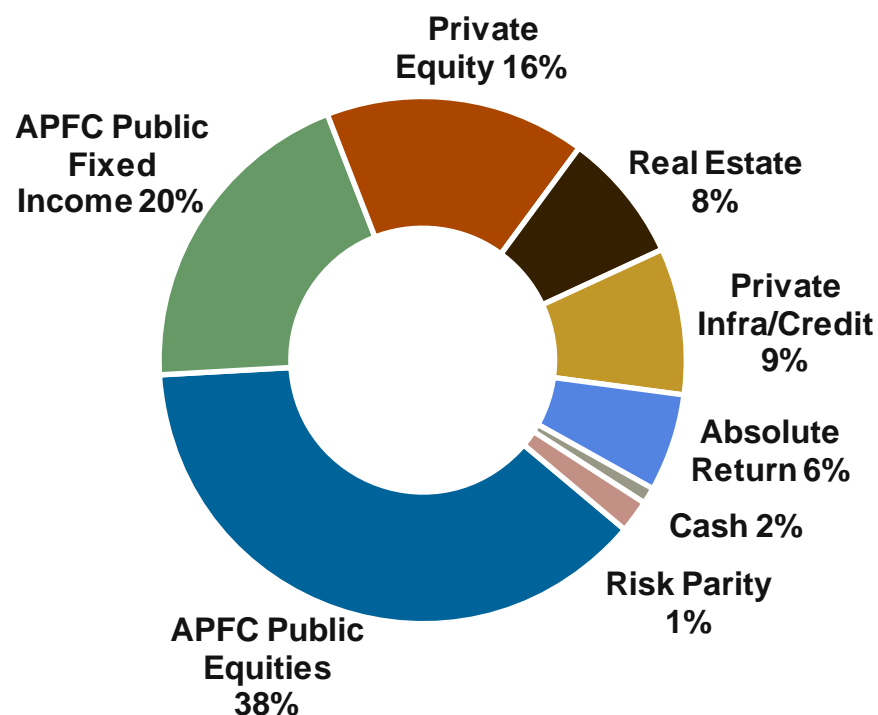
Projected Returns and Recent
Performance Review

APFC FY 2022 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%**.

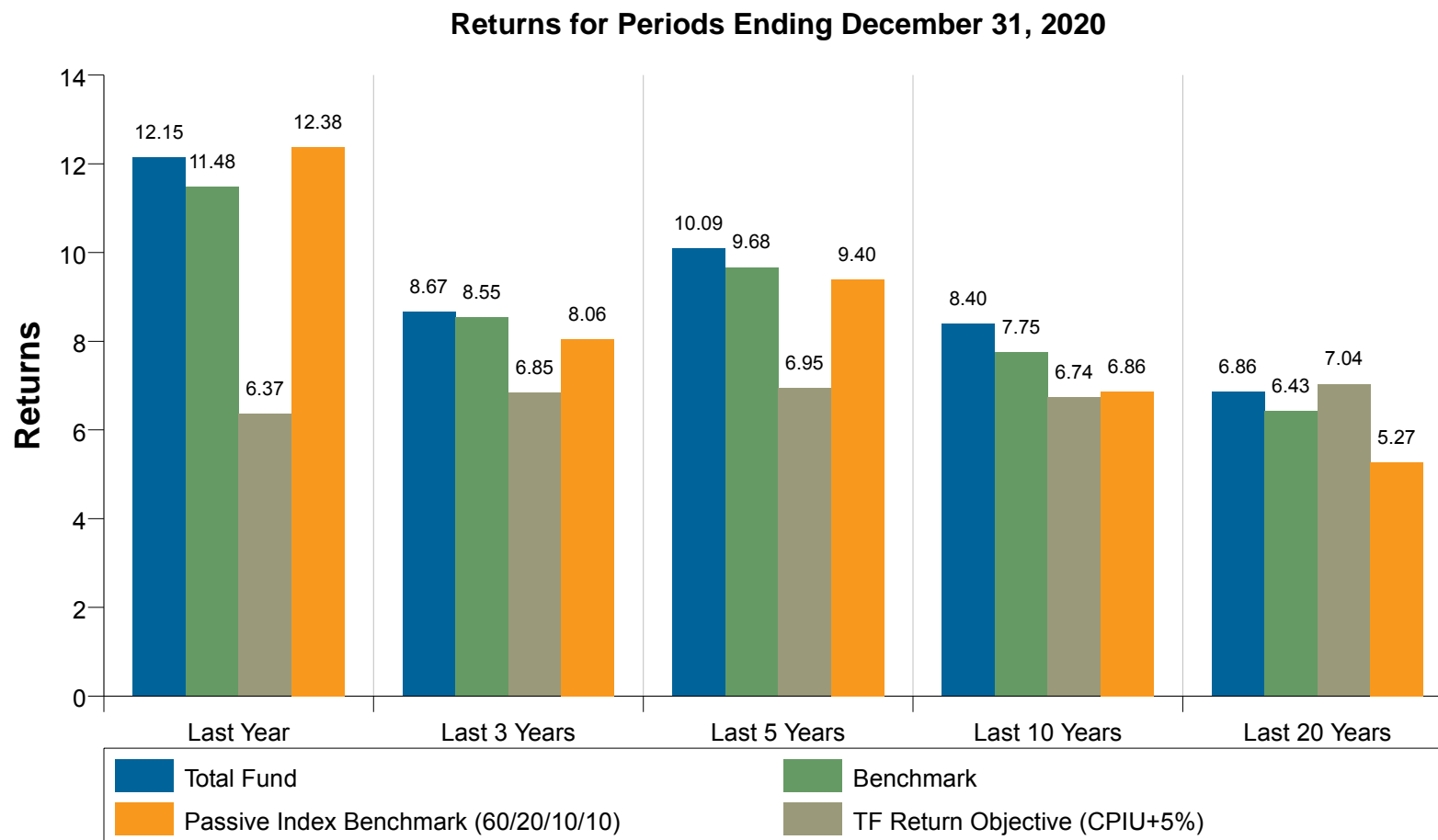
APFC Total Fund Target



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

APFC Total Fund Annualized Historical Returns

Total Fund versus Total Fund Targets

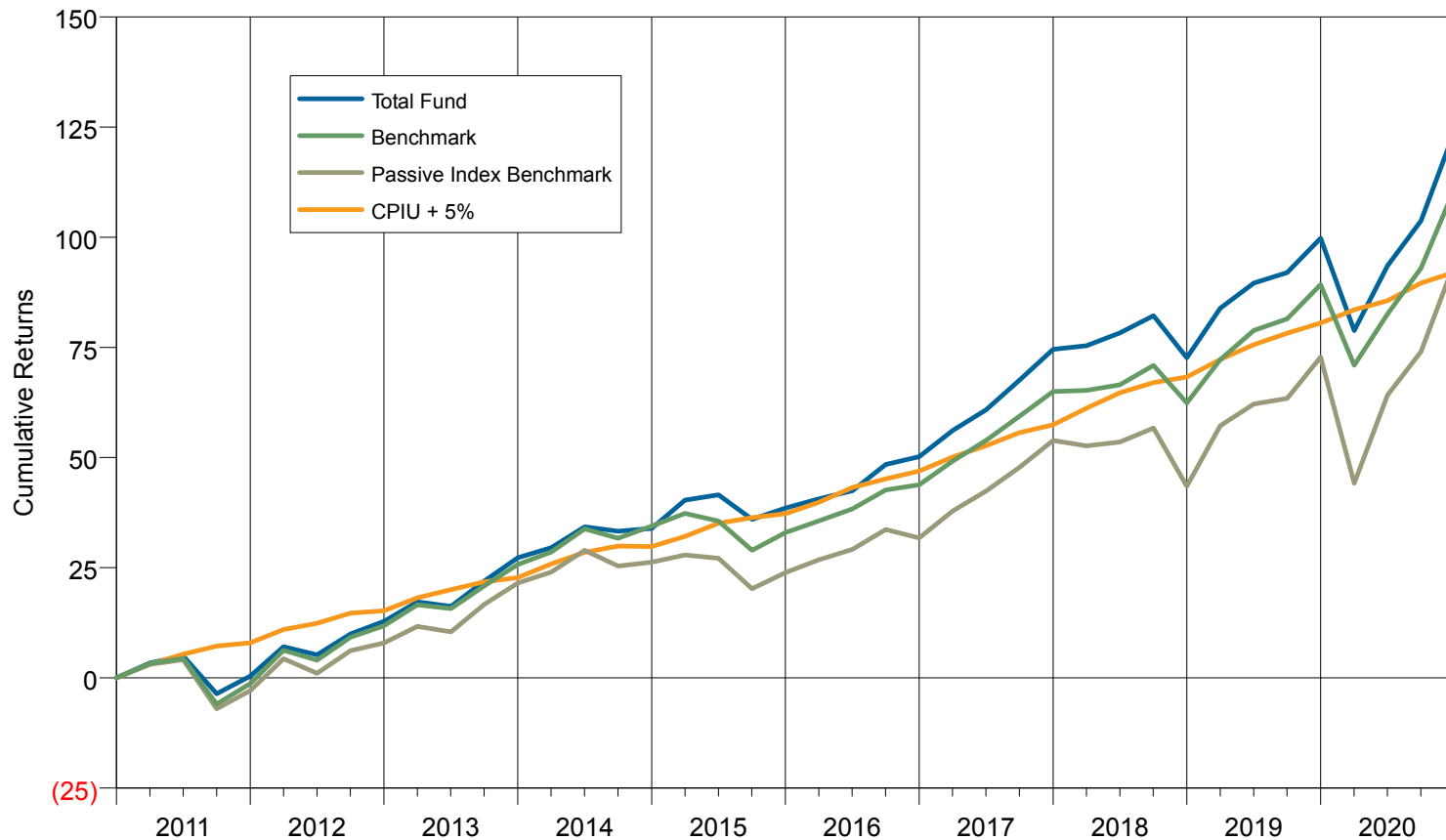


Benchmark (FY19-FY20) = 39% MSCI ACWI IMI, 1.1% 90 Day T-Bills, 1.1% BB US TIPS, 5.8% BB Agg, 5.8% BB Corp IG, 2.1% BB Global Treasury ex-US Hedged, 0.5% JPM EMBI Global Diversified, 0.5% JPM GBI-EM Global Diversified TR, 2.1% BB US High Yield 2% Issuer Cap, 2.1% BB US Securitized, 15% Cambridge PE (lagged), 6% NCREIF Total Index (lagged), 1.1% MSCI US REIT (lagged), 5.4% Cambridge Global Pvt. Infrastructure (lagged), 3.6% Cambridge Pvt Credit (lagged), 6% HFRI Total HFOF Universe (weighted), 2% 90 Day T-Bills, 1% HFR Risk Parity Vol 12% Institutional Index.

APFC Total Fund Cumulative Returns – Last 10 Years

Total Fund versus Total Fund Targets

Cumulative Returns for 10 Years Ended December 31, 2020

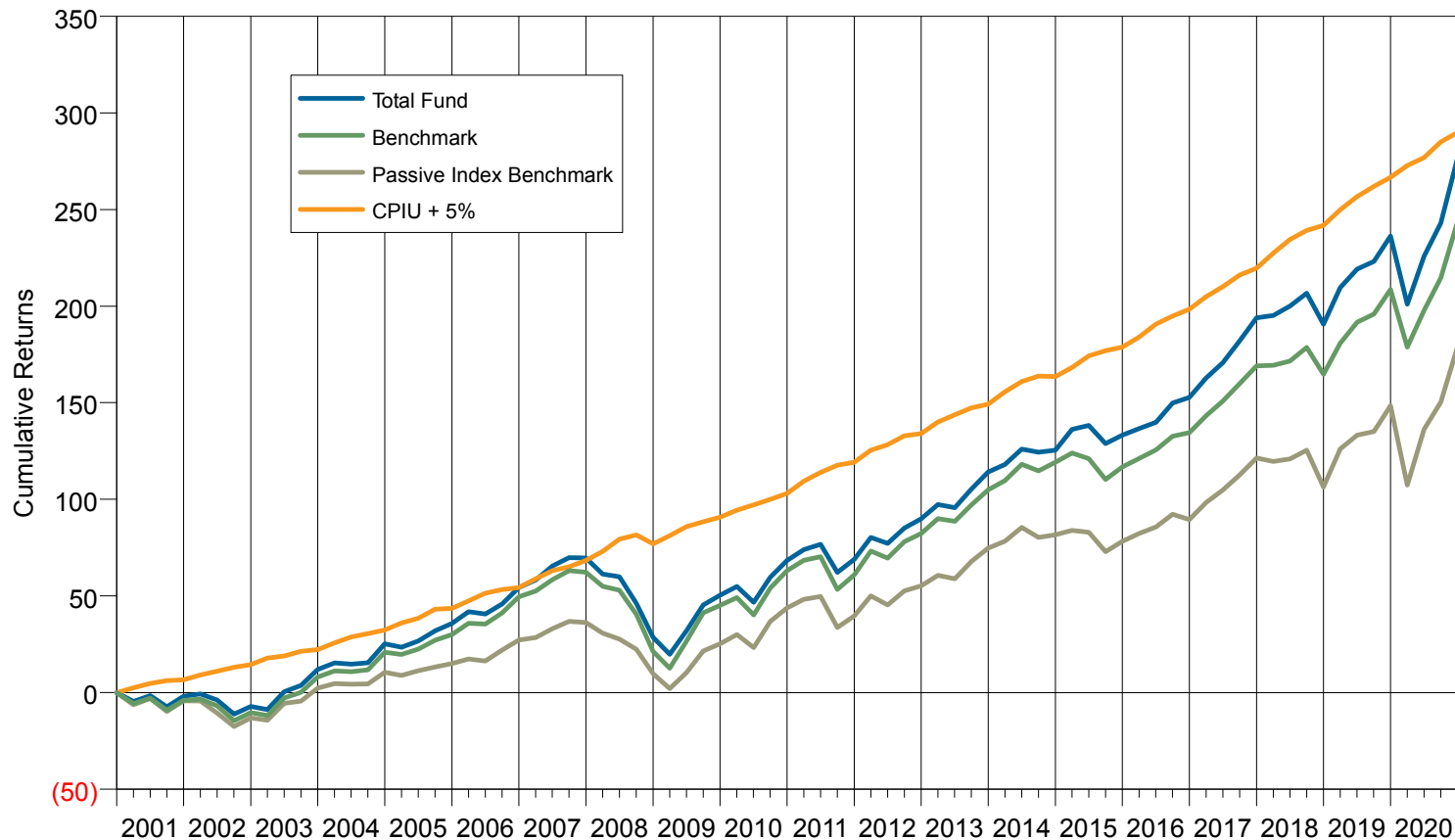


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APFC Total Fund Cumulative Returns – Last 20 Years

Total Fund versus Total Fund Targets

Cumulative Returns for 20 Years Ended December 31, 2020

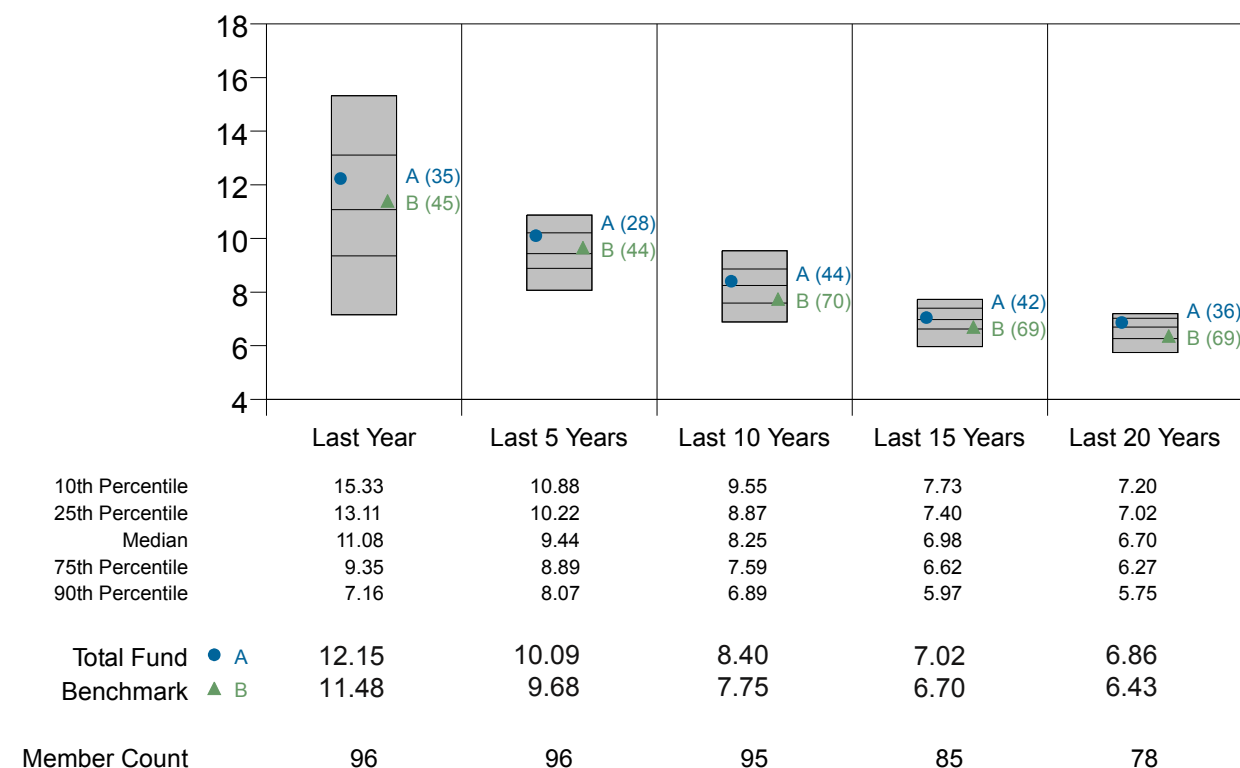


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APFC Total Fund Annualized Peer Group Comparison

Total Fund versus Total Fund Targets

Returns for Periods Ended December 31, 2020
Group: Callan Public Fund Sponsor - Large (>1B)



Benchmark (FY19-FY20) = 39% MSCI ACWI IMI, 1.1% 90 Day T-Bills, 1.1% BB US TIPS, 5.8% BB Agg, 5.8% BB Corp IG, 2.1% BB Global Treasury ex-US Hedged, 0.5% JPM EMBI Global Diversified, 0.5% JPM GBI-EM Global Diversified TR, 2.1% BB US High Yield 2% Issuer Cap, 2.1% BB US Securitized, 15% Cambridge PE (lagged), 6% NCREIF Total Index (lagged), 1.1% MSCI US REIT (lagged), 5.4% Cambridge Global Pvt. Infrastructure (lagged), 3.6% Cambridge Pvt Credit (lagged), 6% HFRI Total HFOF Universe (weighted), 2% 90 Day T-Bills, 1% HFR Risk Parity Vol 12% Institutional Index.



Alaska Retirement Plans – PERS/TRS/JRS

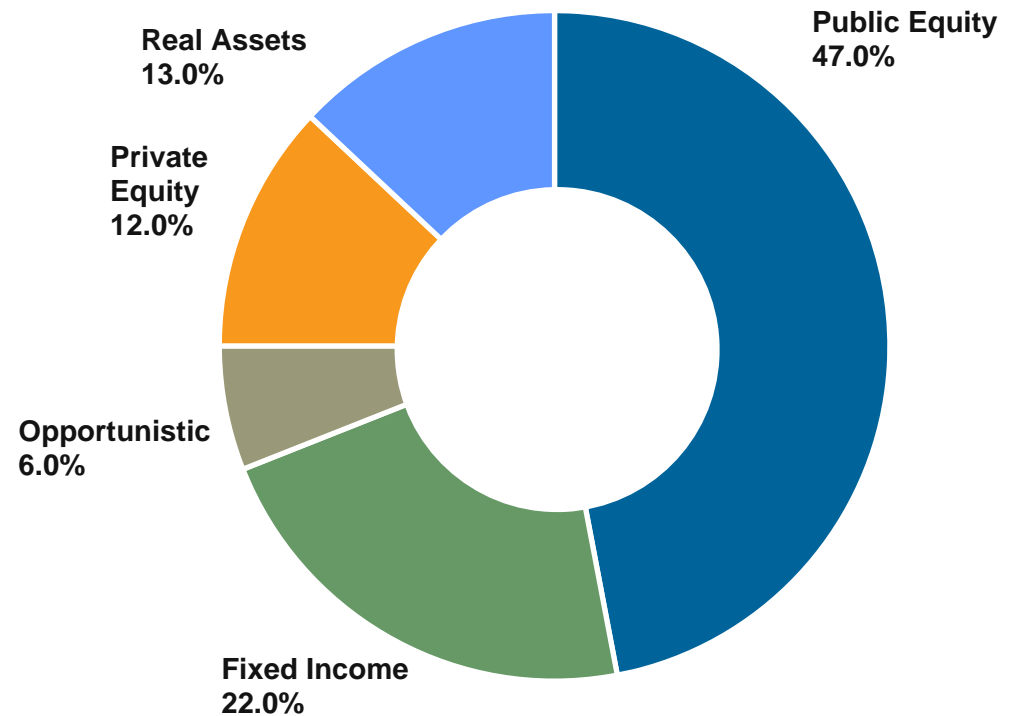
Projected Returns and Recent
Performance Review

ARMB PERS/TRS Current Total Fund Policy Target

Projected Return and Standard Deviation

- Projected median 10-year annualized return of **6.15%** is a reduction of roughly 65 basis points relative to last year.
- Inflation expectation reduced from 2.25% to **2.00%**.
- Projected median 10-year annualized real return of **4.15%** is a reduction of roughly 40 basis points relative to last year.
- Projected standard deviation of **13.56%** is roughly the same as last year.

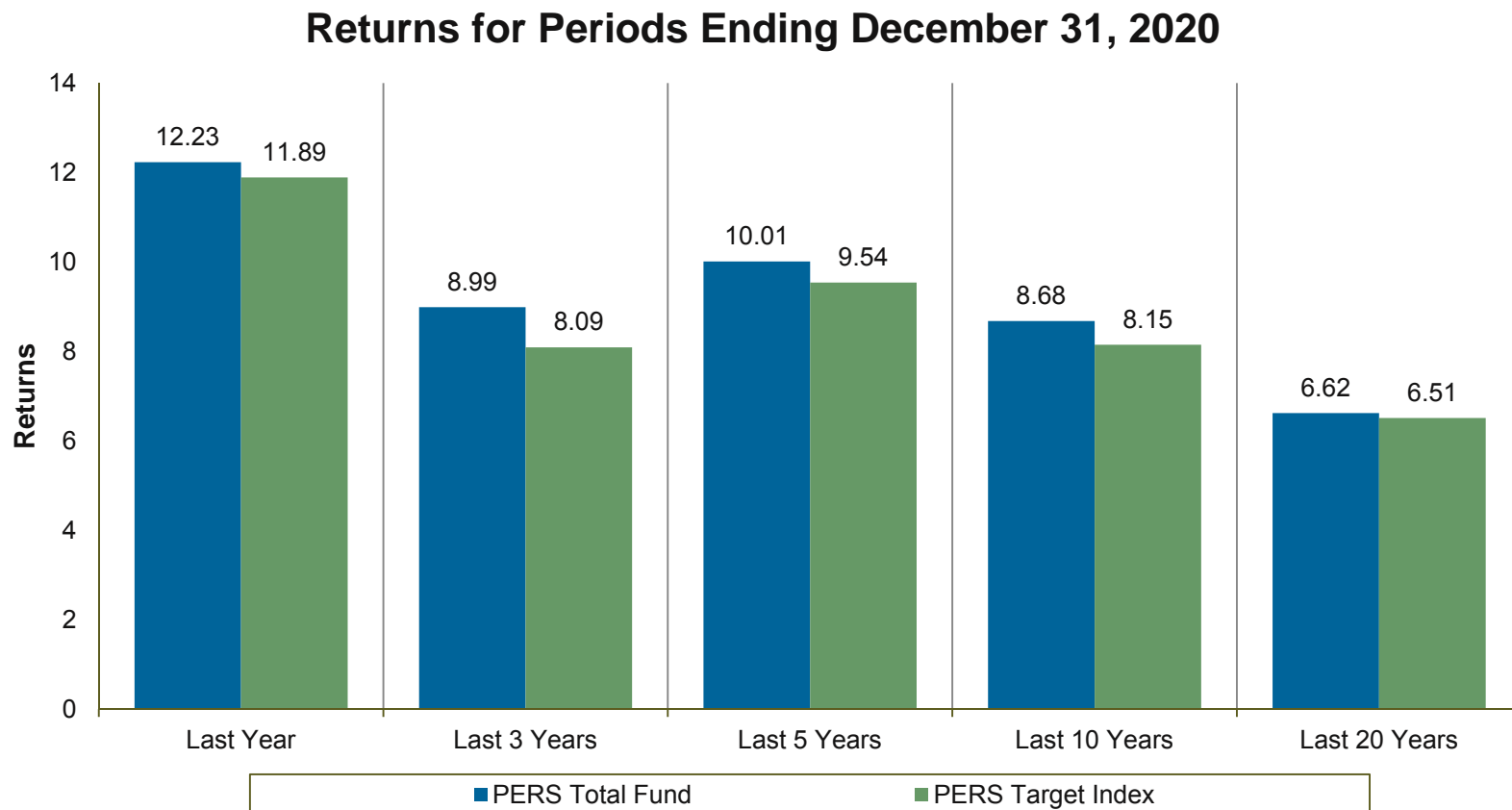
AK PERS/TRS Total Fund Target



Expected 10-year Geometric Return: 6.15%
Expected Standard Deviation: 13.56%
Expected Inflation: 2.00%
Expected Real Return: 4.15%

Alaska PERS Total Fund Annualized Historical Returns

Total Fund versus Total Fund Target



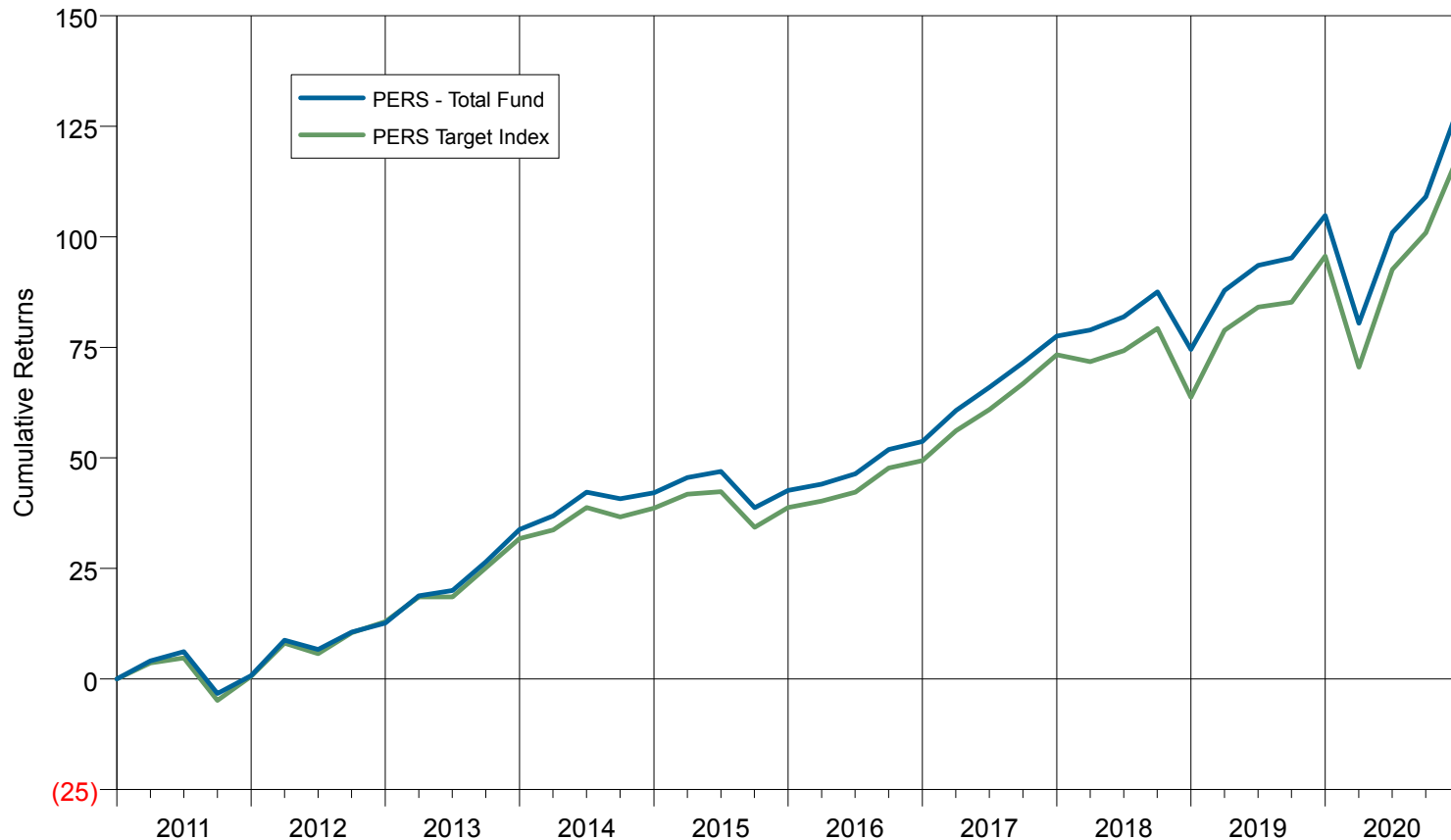
PERS used for illustrative purposes – TRS/JRS exhibits similar performance over time.

Current Benchmark (FY20-FY21) = 28.0% Russell 3000 Index, 20.9% Bloomberg Barclays Aggregate Index, 19.0% MSCI ACWI ex-US IMI (Net) Index, 4.9% NCREIF NFI-ODCE Value Weighted Net Index (lagged 3 months), 4.0% MSCI EAFE Index (lagged 3 months), 4.0% S&P 500 Index (lagged 3 months), 4.0% Russell 2000 Index (lagged 3 months), 3.6% MSCI ACWI IMI (Net) Index, 2.4% Bloomberg Barclays Aggregate Index, 3.2% NCREIF Farmland Index (lagged 3 months), 1.3% NCREIF Timberland Index (lagged 3 months), 1.3% FTSE NAREIT All Equity Index (lagged 3 months), 2.3% CPI-W (lagged 3 months), 1.1% 3-Month T-Bills.

Alaska PERS Total Fund Cumulative Returns – Last 10 Years

Total Fund versus Total Fund Target

Cumulative Returns for 10 Years Ended December 31, 2020



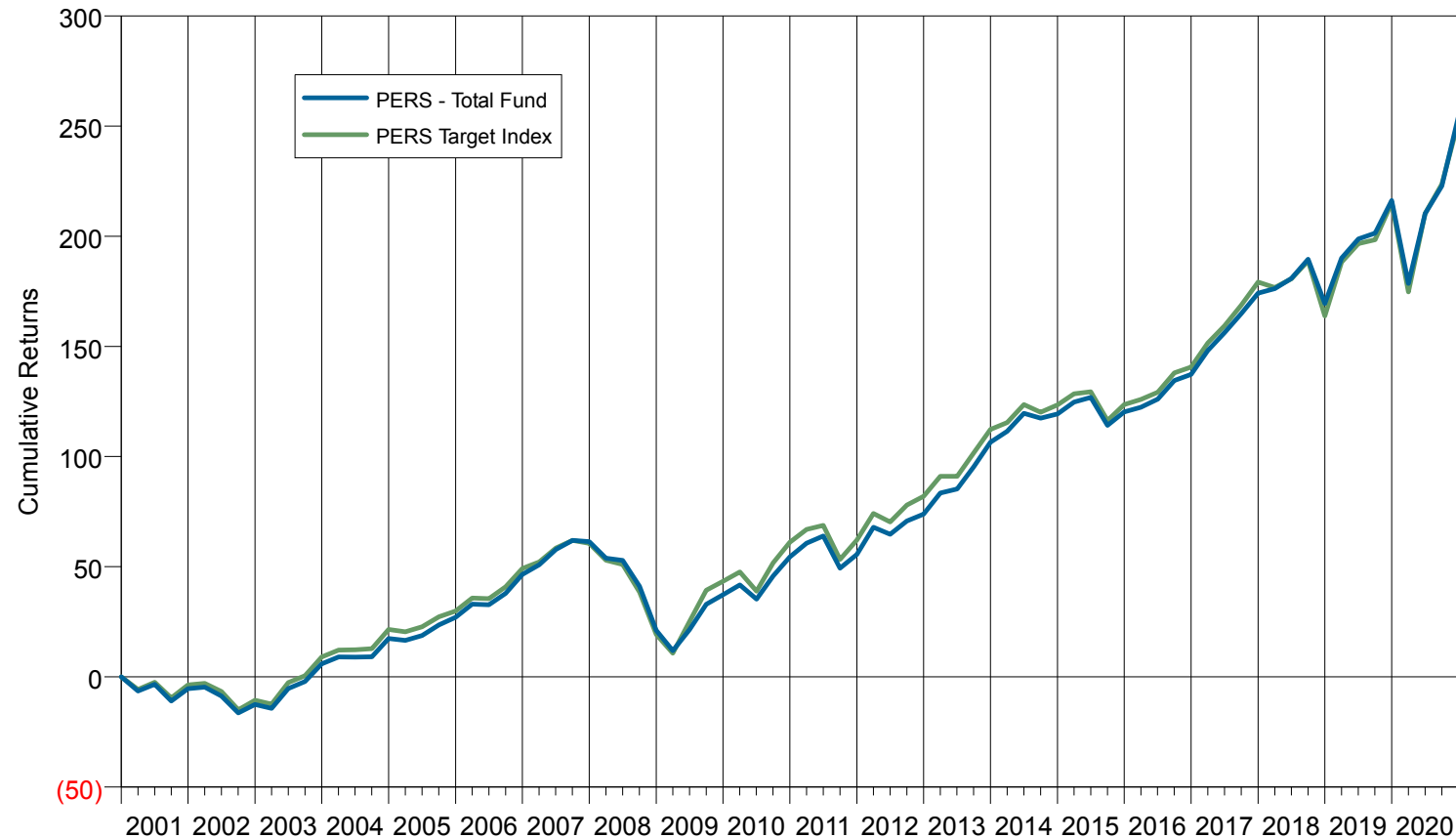
PERS used for illustrative purposes – TRS/JRS exhibits similar performance over time.

Current Benchmark (FY20-FY21) = 28.0% Russell 3000 Index, 20.9% Bloomberg Barclays Aggregate Index, 19.0% MSCI ACWI ex-US IMI (Net) Index, 4.9% NCREIF NFI-ODCE Value Weighted Net Index (lagged 3 months), 4.0% MSCI EAFE Index (lagged 3 months), 4.0% S&P 500 Index (lagged 3 months), 4.0% Russell 2000 Index (lagged 3 months), 3.6% MSCI ACWI IMI (Net) Index, 2.4% Bloomberg Barclays Aggregate Index, 3.2% NCREIF Farmland Index (lagged 3 months), 1.3% NCREIF Timberland Index (lagged 3 months), 1.3% FTSE NAREIT All Equity Index (lagged 3 months), 2.3% CPI-W (lagged 3 months), 1.1% 3-Month T-Bills.

Alaska PERS Total Fund Cumulative Returns – Last 20 Years

Total Fund versus Total Fund Target

Cumulative Returns for 20 Years Ended December 31, 2020

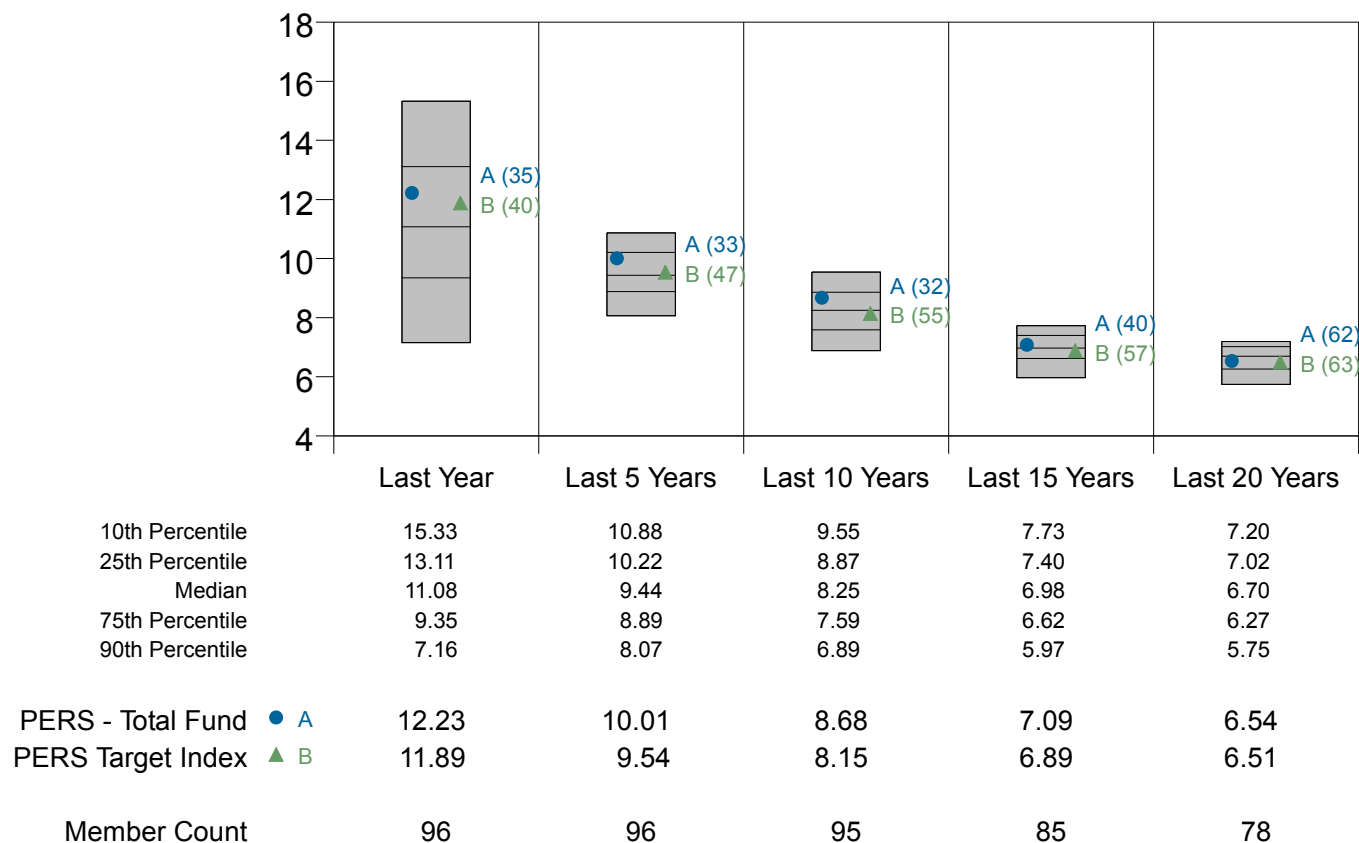


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Alaska PERS Annualized Peer Group Comparison

Returns for Periods Ended December 31, 2020
Group: Callan Public Fund Sponsor - Large (>1B)



PERS used for illustrative purposes – TRS/JRS exhibits similar performance over time.

Current Benchmark (FY20-FY21) = 28.0% Russell 3000 Index, 20.9% Bloomberg Barclays Aggregate Index, 19.0% MSCI ACWI ex-US IMI (Net) Index, 4.9% NCREIF NFI-ODCE Value Weighted Net Index (lagged 3 months), 4.0% MSCI EAFE Index (lagged 3 months), 4.0% S&P 500 Index (lagged 3 months), 4.0% Russell 2000 Index (lagged 3 months), 3.6% MSCI ACWI IMI (Net) Index, 2.4% Bloomberg Barclays Aggregate Index, 3.2% NCREIF Farmland Index (lagged 3 months), 1.3% NCREIF Timberland Index (lagged 3 months), 1.3% FTSE NAREIT All Equity Index (lagged 3 months), 2.3% CPI-W (lagged 3 months), 1.1% 3-Month T-Bills.

Concluding Observations

Callan's 2021 Capital Market Projections

- Reduction in fixed income return projections is the most significant year-over-year change in Callan's capital market projections.
- Callan's public equity return and risk projections were also reduced contributing to the reduction in expected total return for diversified portfolios.
- Private market return expectations have also come down, albeit moderately, relative to 2020 projections.
- The current COVID-19 pandemic has not had a material impact on our long run projections, they are much more influenced by GDP, inflation, current yield, and valuations.
- APFC Policy Target is well diversified and lies just below the efficient frontier for portfolios with a target of 39% private markets.
- APFC Policy Target has similar projected risk to a public markets portfolio with a 75% allocation to Global Equity and 25% allocation to US Fixed Income, but has a higher projected return.
- Gradually increasing private real estate exposure will modestly improve the risk/return profile of the APFC Policy Target over time.