February, 2017

Callan's Return Projection Methodology for the Alaska Permanent Fund

Capital Market Expectations, Total Return, and Statutory Return

Gregory C. Allen
President & Director of Research

Steven J. Center, CFA
Senior Vice President

Projected Returns for the Alaska Permanent Fund

Background

- Callan has maintained a financial model of the Alaska Permanent Fund for the past 15 years, and provides projections to assist the Board and Staff in the management of the Fund.
- The model employs capital market projections maintained by Callan, Fund specific information provided by APFC Staff, and a sophisticated and flexible model of the accounting framework to allow us to test various spending and asset allocation proposals.
- The model uses Monte Carlo simulation to generate a full range of potential outcomes from best-case to worst-case, with associated probabilities.
- The model provides projections for many key financial variables including
  - Total Return
  - Statutory Return
  - Market Value
  - Earnings Reserve Balance
  - Distributions
- The model has been used many times over the years to analyze various proposals related to the Permanent Fund, including three legislative proposals in February of 2016.

Return Projections FY 2017

Latest Projections for Total and Statutory Return

- Return projection period was assumed to begin July 1, 2016.
- Market values and cost-basis inputs were as of June 30, 2016.
- 1-year returns for FY 2017 do not take into account performance in the first half of the fiscal year.
- Median 10-year total **real** return expectation is 4.70%, below the 5% real return expectation that has been employed as a target by the APFC.
- The mid-point of these distributions is just one potential outcome. It is important to recognized that the Fund takes on risk therefore there can be significant variance relative to the mid-point projections.

Period Beginning July 1, 2016

Percentiles	10-Year Total Return	10-Year Statutory Return
10%	1.05%	2.92%
25%	3.99%	4.55%
50%	**6.95%**	**6.24%**
75%	10.16%	7.77%
90%	12.96%	9.10%

Percentiles	1-Year Total Return	1-Year Statutory Return
10%	-6.84%	3.51%
25%	-1.24%	4.32%
50%	**6.70%**	**5.43%**
75%	14.44%	6.81%
90%	22.26%	8.15%

Inflation: 2.25%

Capital Market Assumptions

Projected Return and Standard Deviation

- Employed Callan's 2016 10-year capital market expectations for all models.
- Expectations are developed annually and used for strategic planning work for all client types.
- Represent long-term consensus expectations.
- Designed to work as a set in optimization and simulation analysis.
- Generally these expectations evolve slowly with only modest year-to-year changes.

Asset Category	Projected Arithmetic Return	Projected 10-Year Geometric Return	Annualized Standard Deviation
Global Equities	9.20%	7.60%	19.35%
Cash Equivalents	2.25%	2.27%	0.90%
US TIPS	3.10%	3.00%	5.30%
US Fixed Income	3.05%	3.00%	4.05%
Investment Grade Credit	3.80%	3.71%	5.40%
Global Fixed Income	2.15%	1.70%	9.70%
Emerging Markets Debt	4.80%	4.49%	8.90%
High Yield Fixed Income	5.90%	5.41%	11.10%
Global REITS	8.85%	6.85%	21.20%
Global Listed Infrastructure	6.80%	5.58%	16.60%
Private Equity	10.95%	8.60%	22.85%
Real Estate	6.80%	5.99%	14.00%
Private Infrastructure	6.45%	5.69%	13.50%
Absolute Return	5.55%	5.23%	9.30%

Capital Market Assumptions

Projected Correlation Matrix

Asset Category	Global Equities	Cash	US TIPS	Fixed Income	Credit	Global Fixed	EMD	High Yield	Global REITS	Listed Infra	Private Equity	Real Estate	Private Infra	Absolute Return
Global Equities	1.000	-0.042	-0.053	-0.120	0.298	0.014	0.330	0.320	0.702	0.670	0.699	0.551	0.235	0.801
Cash Equivalents	-0.042	1.000	0.070	0.100	0.000	-0.090	-0.070	0.050	0.000	0.000	0.000	-0.060	0.000	-0.070
US TIPS	-0.053	0.070	1.000	0.580	0.021	0.340	0.590	0.580	0.060	0.050	-0.100	0.005	0.018	0.055
US Fixed Income	-0.120	0.100	0.580	1.000	0.035	0.510	0.610	0.625	0.030	-0.100	-0.130	-0.020	-0.035	0.080
Investment Grade Credit	0.298	0.000	0.021	0.035	1.000	0.000	0.250	0.178	0.700	0.350	0.270	0.245	0.035	0.089
Global Fixed Income	0.014	-0.090	0.340	0.510	0.000	1.000	0.640	0.570	0.000	0.100	-0.060	-0.040	0.035	-0.080
Emerging Markets Debt	0.330	-0.070	0.590	0.610	0.250	0.640	1.000	0.780	0.400	0.370	0.200	0.250	0.158	0.320
High Yield Fixed Income	0.320	0.050	0.580	0.625	0.178	0.570	0.780	1.000	0.350	0.340	0.200	0.190	0.150	0.390
Global REITS	0.702	0.000	0.060	0.030	0.700	0.000	0.400	0.350	1.000	0.760	0.720	0.660	0.350	0.596
Global Listed Infrastructure	0.670	0.000	0.050	-0.100	0.350	0.100	0.370	0.340	0.760	1.000	0.600	0.630	0.700	0.604
Private Equity	0.699	0.000	-0.100	-0.130	0.270	-0.060	0.200	0.200	0.720	0.600	1.000	0.460	0.210	0.540
Real Estate	0.551	-0.060	0.005	-0.020	0.245	-0.040	0.250	0.190	0.660	0.630	0.460	1.000	0.243	0.490
Private Infrastructure	0.235	0.000	0.018	-0.035	0.035	0.035	0.158	0.150	0.350	0.700	0.210	0.243	1.000	0.211
Absolute Return	0.801	-0.070	0.055	0.080	0.089	-0.080	0.320	0.390	0.596	0.604	0.540	0.490	0.211	1.000

- Projected correlations between asset classes are the third dimension of capital market expectations.
- Historical trending behavior is evaluated for each pair in the matrix.
- Correlations must be consistent (positive semi-definite) as a set in order to work properly in optimization and simulation analysis.

Assumed Asset Allocation

Used 2017 Target Allocation Adopted by Board in September, 2016

- Assumed constant target asset allocation across entire 10-year projection period.
- Target asset allocation was very close to actual asset allocation as of June 30, 2016.
- Quarterly rebalancing was assumed which yields more comparable results across the models.
- Rebalancing assumptions are important because they impact turnover in the portfolio which results in gains realization.

Asset Category	Target
Global Equities	41.7%
Cash Equivalents	3.2%
US TIPS	1.1%
US Fixed Income	5.7%
Investment Grade Credit	5.7%
Global Fixed Income	2.3%
Emerging Markets Debt	1.1%
High Yield Fixed Income	4.4%
Global REITS	2.3%
Global Listed Infrastructure	1.1%
Private Equity	11.5%
Real Estate	11.5%
Private Infrastructure	3.1%
Absolute Return	5.2%

Expected Return: 6.95%
Standard Deviation: 12.38%
Expected Real Return: 4.70%

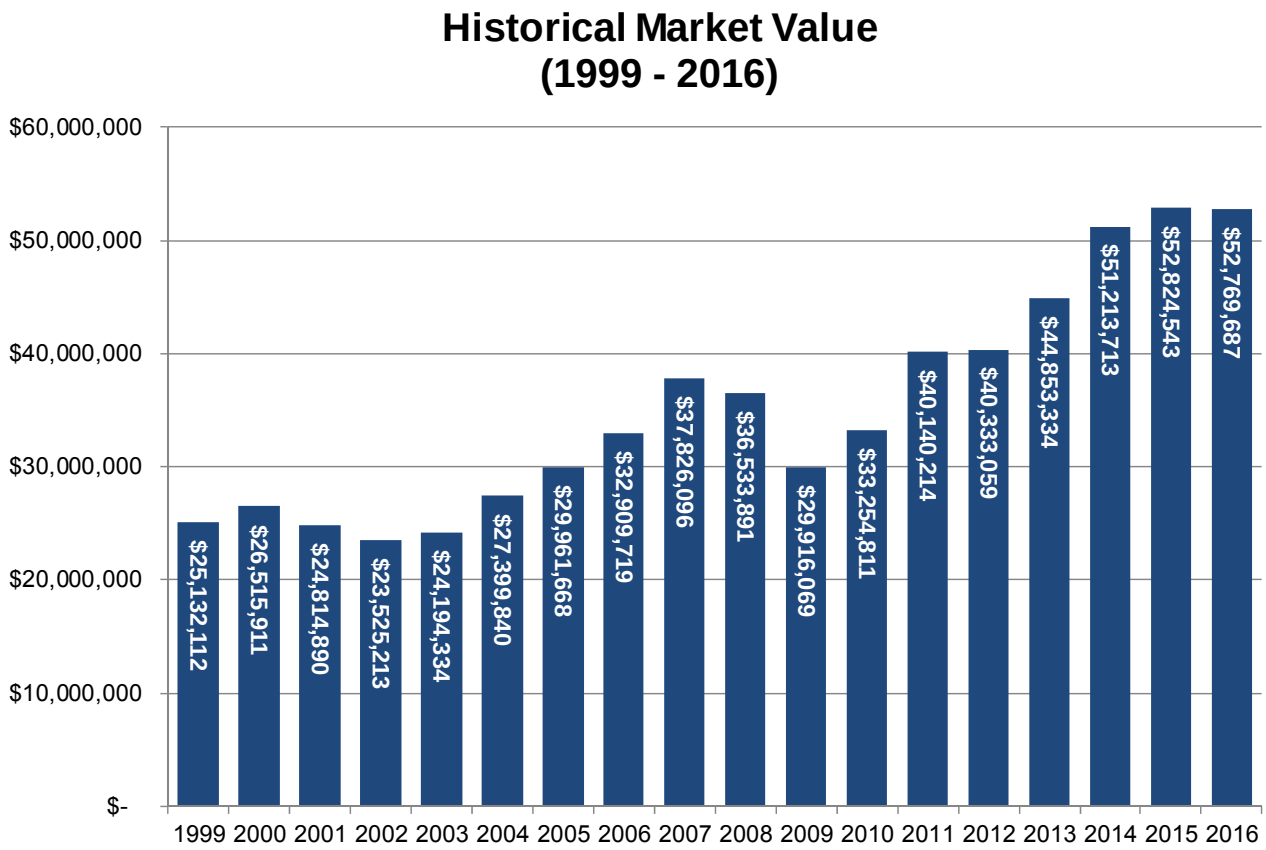
Statutory Net Income and Permanent Fund Mechanics

- Understanding the mechanics of the Permanent Fund can lend some insight into the expectations for Statutory Net Income which determines Statutory Net Return.
- Statutory Net Return is the total of realized income and realized capital gains in each fiscal year.
- The asset allocation determines the Fund's exposure to a number of factors which, in turn, will influence the Statutory Net Return over time.
  - Ratio of income producing assets to capital gains oriented assets;
  - Turnover;
  - Active versus passive management;
  - The use of illiquid asset classes such as real estate, private equity, infrastructure;
- We review the mechanics of the Fund, and look at the history of a number of important variables to help put Statutory Net Income into context.
  - Fund Market Value;
  - Oil revenue;
  - Statutory Net Income (realized income);
  - Earnings reserve balance;

Mechanics of the Permanent Fund

Market Value over Time

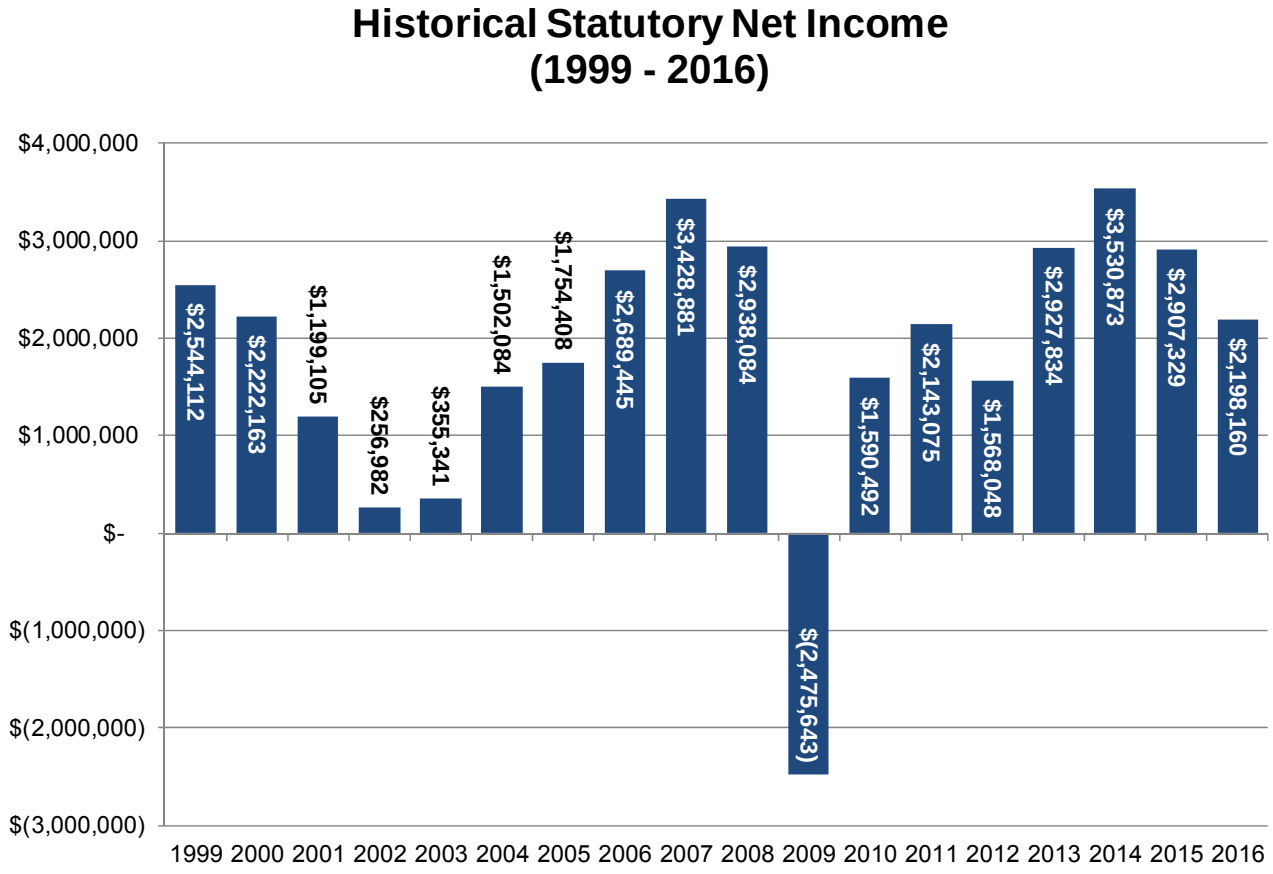
- The market value of the Fund has fluctuated from year to year based on market performance.
- The trend has generally been upward since 1999 with downturns in 2001-2002, and 2009-2009.
- As of FYE 2016 the market value of the Fund was roughly $53 Billion.
- Market value is impacted by market return, distributions, and to a limited extent, oil revenue.



Statutory Net Income

Statutory Net Income over Time

- Statutory Net Income is the total of realized income and realized capital gains.
- It is impacted by asset allocation and turnover.
- As the fund has moved away from bonds (and bond yields have declined) Statutory Net Income has become increasingly dominated by realized gains and losses.
- Statutory Net Income reacts with a lag to changes in market value.
- This can be seen in 2002 and 2009, both of which had positive total fund returns but very low to negative Statutory Net Income.



Statutory Net Income Projection

Conclusions

- Statutory Net Income is influenced by a number of different dynamic factors besides the total return on the portfolio.
- The ratio of income producing investments to capital appreciation focused investments will have a significant impact.
- The amount of turnover in the capital appreciation focused investments will also have an impact.
- Rebalancing frequency between asset classes will also have a meaningful impact.
- Cash raised for distributions can accelerate the realization of gains or losses in the portfolio and will have an impact.
- Callan's projections for statutory net income are probably on the high side due to the assumption of quarterly rebalancing. APFC Investment Staff employs a much more efficient and sensible rebalancing approach in practice.