



Asset Class Review

State Loan and Investment Board

August 11th, 2016



Current outlook

-World GDP growth remains subdued, currently in the 1.75% range. Forecasts and recent global data are projecting an upswing from depressed levels.

-\$11.7 trillion or 36% of total global developed government debt is trading with negative yields.

-Investors are reaching for yield. Spanish 50 year debt = 2.5%. Ireland and Belgium issued 100 year debt at 2.35%.

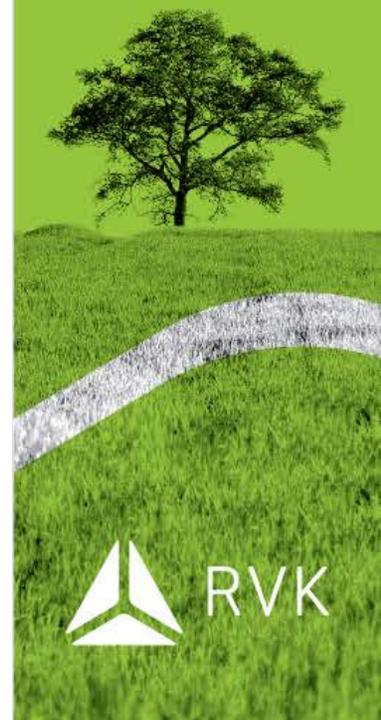
-Brexit impact is uncertain.

-US GDP growth remains stuck in the 2% range.

-US bonds traded at all time low yields while S&P 500 traded at all time highs. This has never happened before.

-US election is creating uncertainties as both candidates have differing agendas.

-The market is forecasting a 38% chance of a Fed rate hike by December.



Annual Asset Class Performance

Calendar Year Performance												Annualized Statistics (01/2006 - 03/2016)			
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	CYTD (As of 03/16)		Return	Standard Deviation	Sharpe Ratio
Best	26.86	18.11	5.24	49.13	26.86	15.99	16.83	38.82	13.89	15.01	11.02	US Equity Custom Index - US All Cap	7.15	15.05	0.45
	20.95	15.97	3.06	45.12	16.77	14.27	16.76	32.39	13.69	13.33	3.03	S&P 500 Index - US Large Cap	7.26	15.04	0.46
	18.37	15.83	-5.22	34.63	16.36	7.84	16.34	32.39	12.50	1.38	2.36	Russell 2000 Index - US Small Cap	6.47	19.81	0.36
	16.59	11.66	-6.46	32.46	15.68	3.49	16.13	24.96	11.81	0.55	2.21	MSCI ACW Index - Global	4.66	16.85	0.28
	16.32	11.63	-10.01	27.18	15.06	2.11	16.00	22.80	9.42	0.48	2.21	International Equity Custom Index - International	2.01	18.46	0.14
	15.79	9.91	-20.47	26.46	15.06	2.11	16.00	15.29	5.97	0.18	1.35	NCREIF ODCE Index - Core Real Estate	6.59	9.03	0.62
	15.79	6.97	-23.62	26.46	13.11	0.66	14.96	13.94	4.89	-1.24	0.97	NCREIF Property Index - Value-Added Real Estate	7.79	6.71	0.98
	15.22	5.49	-33.79	21.98	12.67	-1.75	10.94	10.99	4.16	-1.47	0.24	HFN FOF Multi-Strat Index - ARS	1.58	5.32	0.09
	12.83	5.49	-35.73	9.72	10.82	-4.18	10.77	9.10	3.03	-2.36	0.18	BofA ML All Cnvrts Index (All Qual) - Convertibles	6.32	12.67	0.45
	9.85	5.36	-37.00	5.93	9.28	-5.18	10.54	4.22	2.95	-3.24	-0.38	Barclays US Agg Bond Index - Fixed Income	4.71	3.19	1.07
	7.06	4.53	-37.00	1.17	6.54	-5.55	4.80	0.12	0.18	-4.41	-1.52	Credit Custom Index - Fixed Income	5.17	7.25	0.56
	4.93	2.76	-42.19	-16.86	4.77	-7.35	4.21	-2.02	-3.87	-5.66	-1.56	JPM GBI-EM Gbl Dvfd Index (USD) - EMD	5.27	12.93	0.37
Worst	4.33	-1.57	-43.06	-29.76	0.73	-13.71	0.26	-8.98	-5.72	-14.92	-3.19	JP Morgan Cash Custom Index - Cash Equiv	1.61	0.62	1.45

The US Equity Custom Index consists of the S&P 500 Index (Cap Wtd) through September 2014 and the Russell 3000 Index thereafter.

The International Equity Custom Index consists of the MSCI EAFE Index through July 2010 and the MSCI ACW Ex US Index thereafter.

The Credit Custom Index consists of 20% Barclays US Credit Index, 20% BofA Merrill Lynch US High Yield Master II Constrained Index, and 60% S&P/LSTA Leveraged Loan Index.

The JP Morgan Cash Custom Index is calculated monthly using beginning of the month investment weights applied to each corresponding primary benchmark return. Currently, the primary benchmark for JP Morgan Cash is the BofA ML 3 ML US T-Bill Index and for JP Morgan Extd is the JP Morgan Blended Index.



Equity:

Forward-Looking Return and Risk Assumptions

RVK Long-Term US Equity (10-20 Years):

Arithmetic Return	Standard Deviation	Compound Return	Sharpe Ratio (0.90% risk-free rate)
7.00%	17.75%	5.56%	0.34

Vanguard Long-Term US Equity (10 Years):

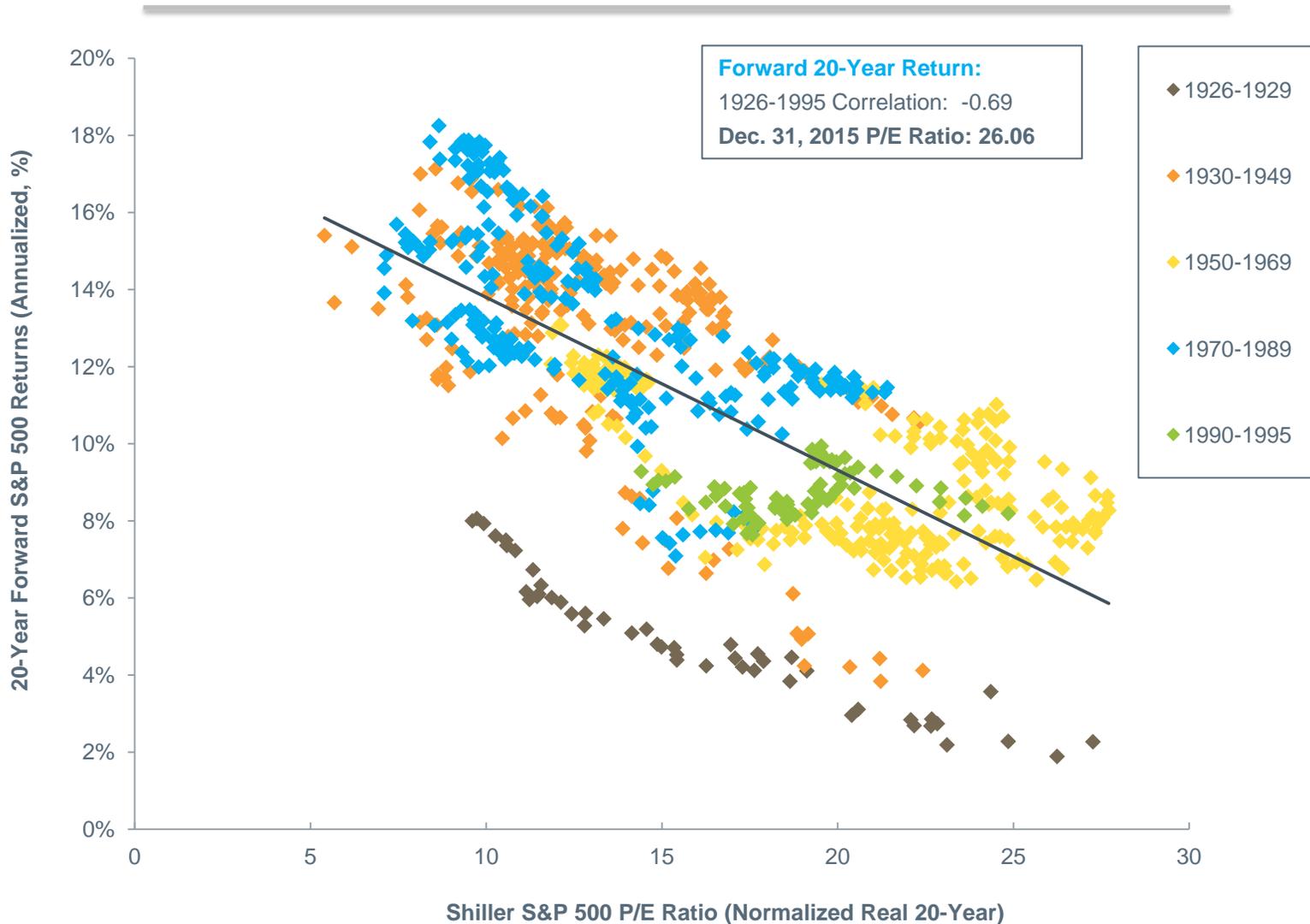
Arithmetic Return	Standard Deviation	Compound Return	Sharpe Ratio (0.90% risk-free rate)
6.90%	17.60%	5.48%	0.34

RVK assumption is for Large-Cap US Equity.

Sharpe Ratios using RVK's assumed risk-free rate of 2.25% are 0.26 for RVK's assumption and 0.26 for Vanguard's assumption.

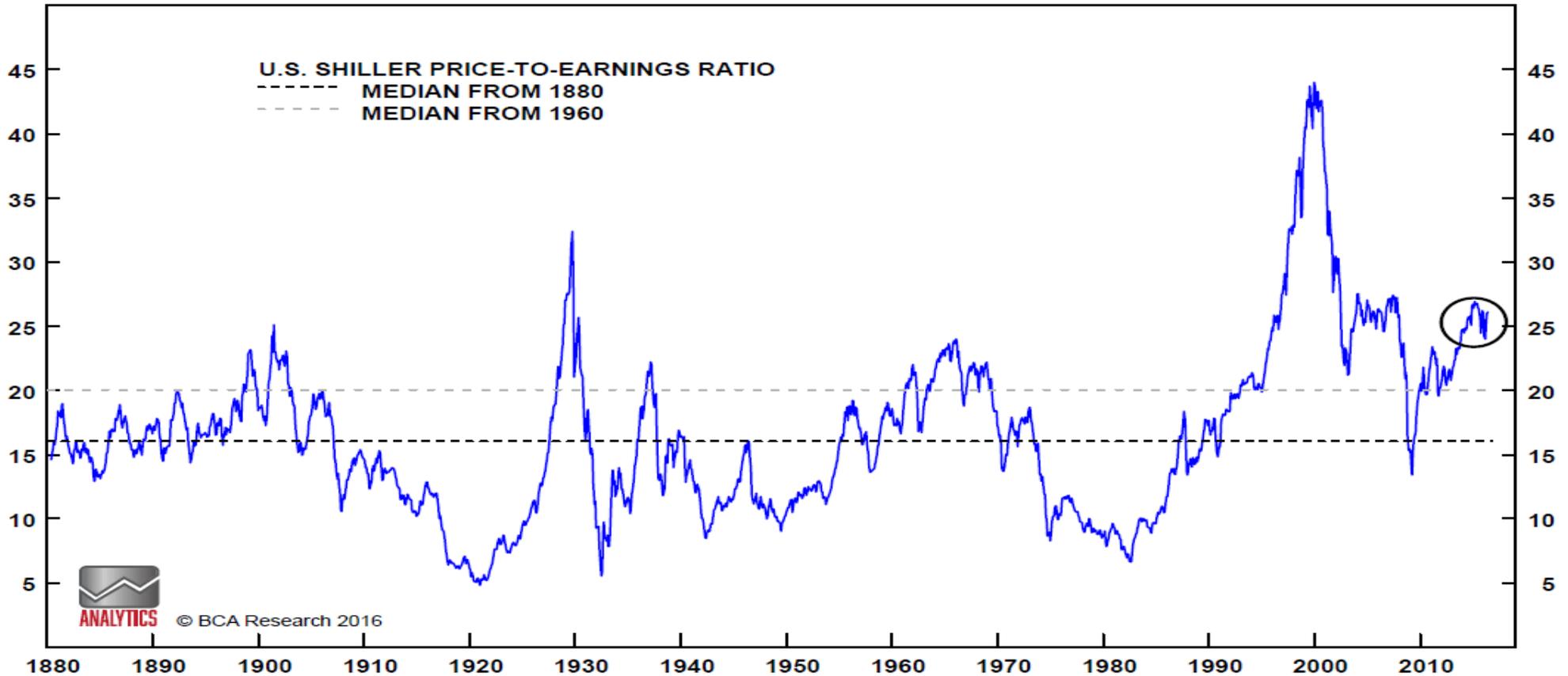
Equity: Shiller P/E vs. Forward Returns

Trend line at 12/31/2015 = 6.57%



Equity: Shiller P/E

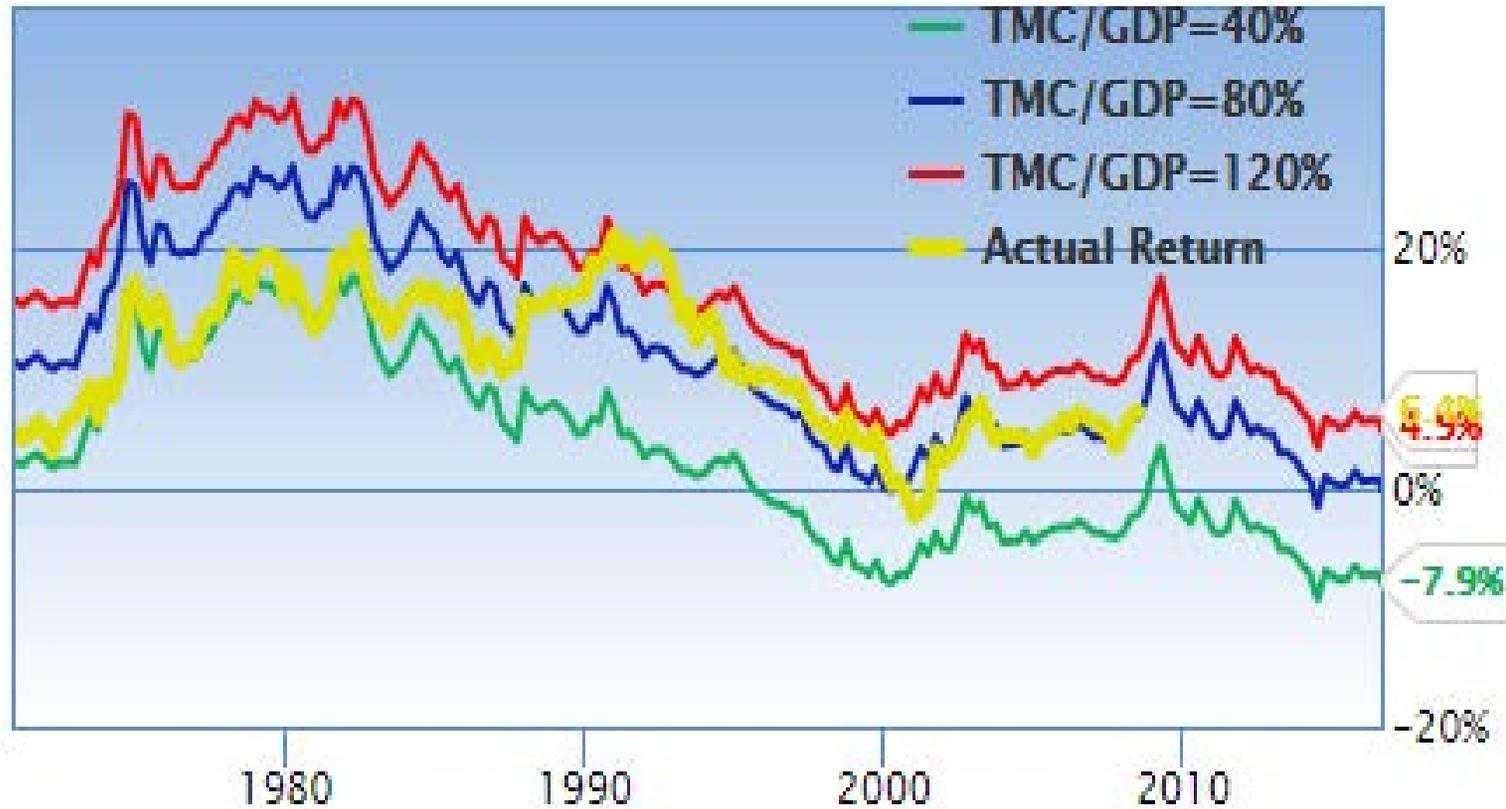
The current Shiller P/E Ratio is well above its historical average



Scenario	Shiller P/E after 8 Years	Annual Return from Today (%)
Really Lucky	Mean x 150%	4.2%
Lucky	Mean x 125%	1.9%
Reverse to the Mean	Mean x 100%	-0.7%
Unlucky	Mean x 75%	-4%
Really Unlucky	Mean x 50%	-8.5%

Equity: Total Market Cap / GDP

“Probably the best single measure of where valuations stand at any given moment.” Warren Buffett

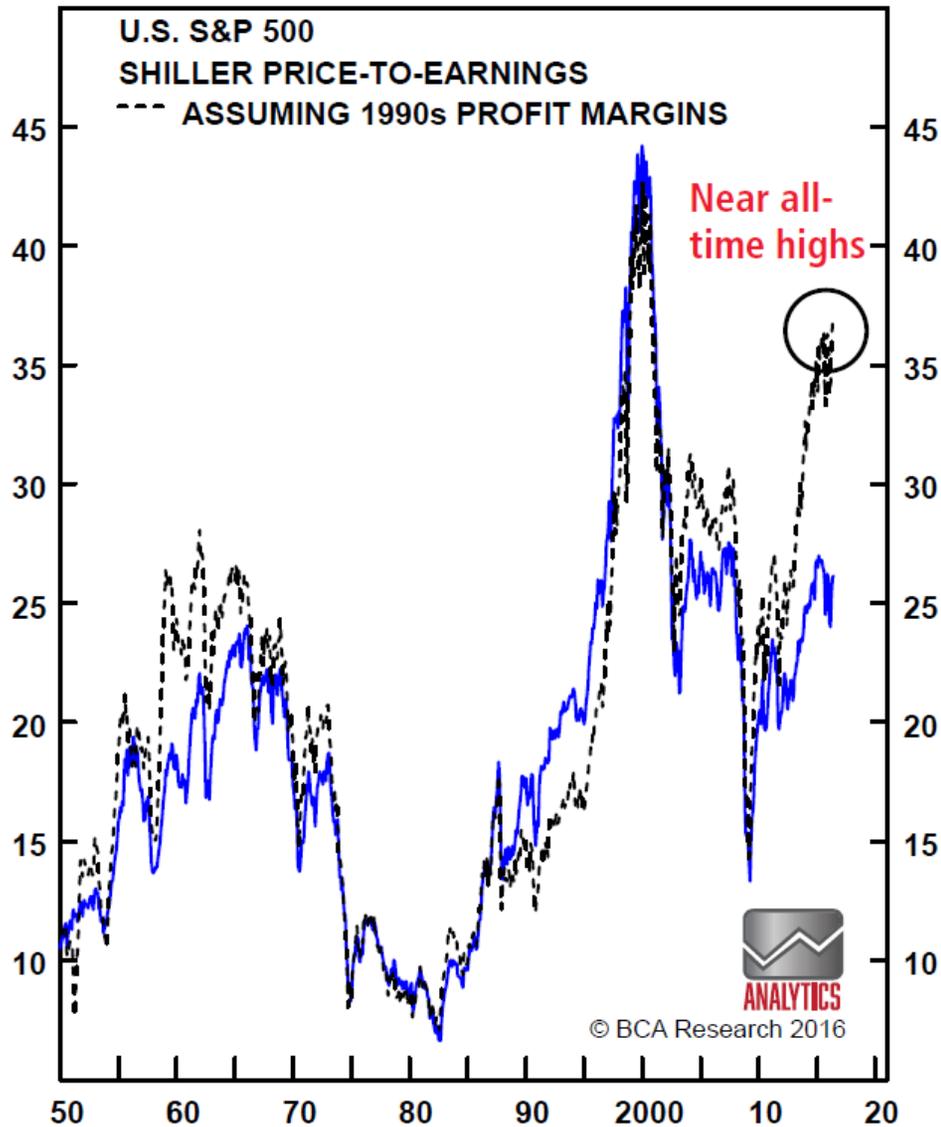


Ratio = Total Market Cap / GDP	Valuation
Ratio < 50%	Significantly Undervalued
50% < Ratio < 75%	Modestly Undervalued
75% < Ratio < 90%	Fair Valued
90% < Ratio < 115%	Modestly Overvalued
Ratio > 115%	Significantly Overvalued
Where are we today (08/09/2016)?	Ratio = 122.8%, Significantly Overvalued

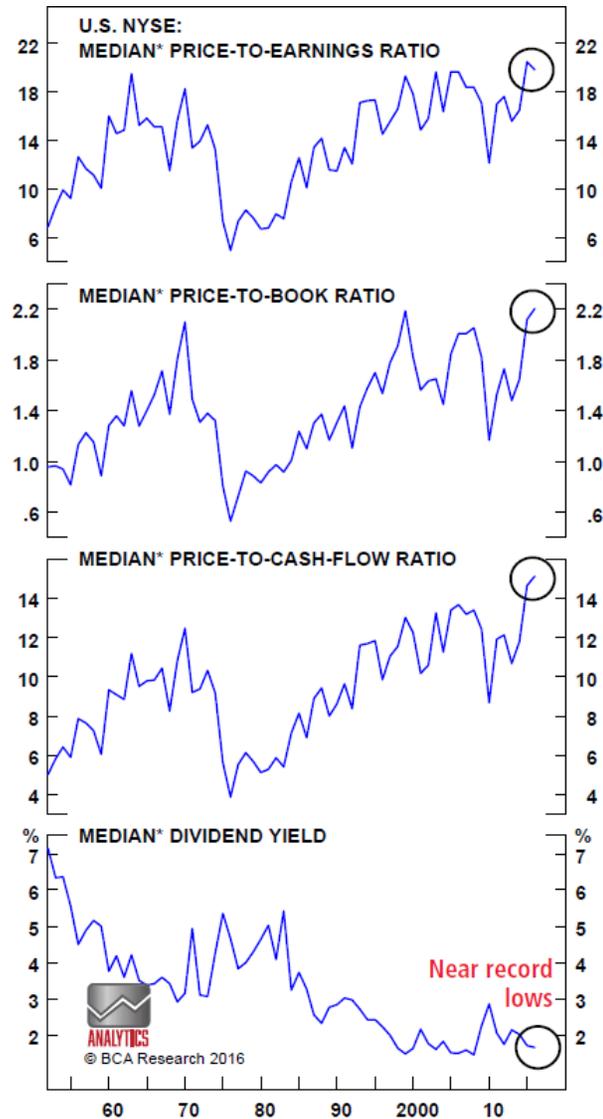
Equity:

Current Valuations and Profit Margins

Record-high profit margins have flattered equity valuations



The median stock in the U.S. is relatively expensive



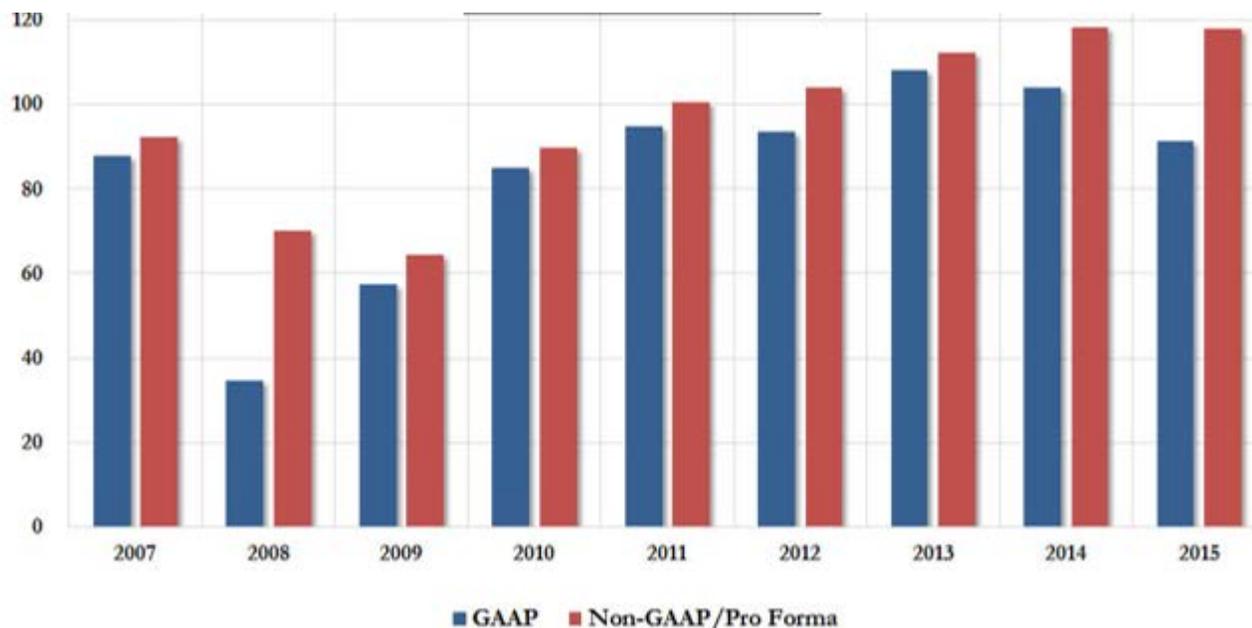
* SOURCE: KENNETH FRENCH DATABASE, DARTMOUTH TUCK SCHOOL OF BUSINESS.

Equity:

GAAP and Non-GAAP Earnings

S&P 500 EPS: GAAP vs. Non-GAAP

GAAP P/E = 24.9 NON GAAP P/E = 19.7



S&P 500 P/E: GAAP vs. Non-GAAP

	2008	2009	2010	2011	2012	2013	2014	2015	Current
Non-GAAP P/E	16.74	19.18	15.41	13.43	14.37	17.44	18.29	18.65	19.71
GAAP P/E	47.48	21.97	16.12	14.35	16.42	18.16	20.06	22.95	24.94
<i>Difference</i>	<i>-30.74</i>	<i>-2.79</i>	<i>-0.71</i>	<i>-0.92</i>	<i>-2.05</i>	<i>-0.72</i>	<i>-1.77</i>	<i>-4.30</i>	<i>-5.23</i>

Source: IBES, Deutsche Bank, Zero Hedge
P/E data provided by Bloomberg Analytics.

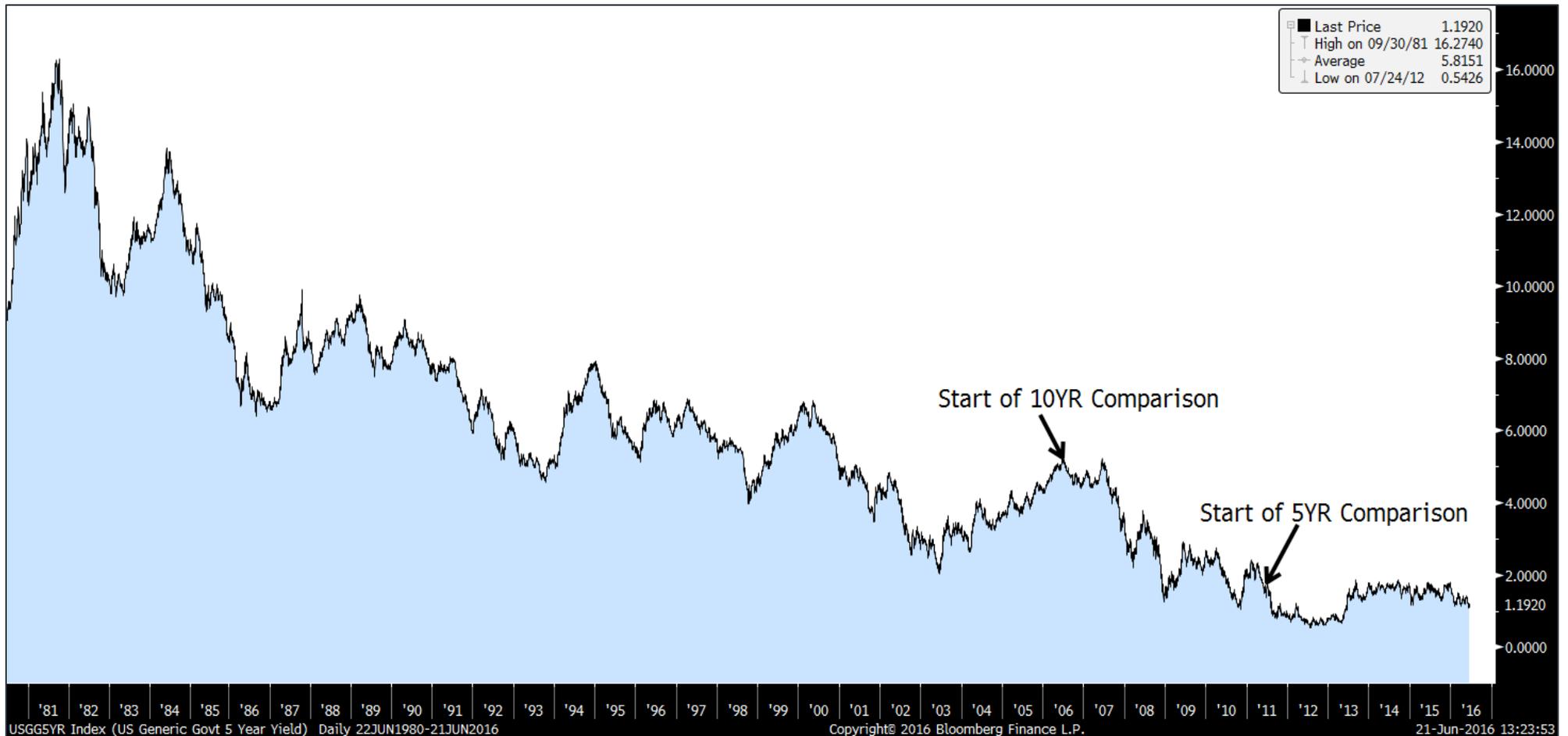
Fixed Income Valuations and Forward-Looking Returns



Fixed Income:

5 Year Treasury Yields: 1980 – Present

The average return for the Barclay Aggregate = 7.5%



“In order for bonds to replicate the 7.5% returns for the next 40 years, interest rates would need to go to -17%.” Bill Gross

Fixed Income:

Forward-Looking Return and Risk Assumptions

RVK Long-Term US Fixed Income (10-20 Years):

Arithmetic Return	Standard Deviation	Compound Return	Sharpe Ratio (0.90% risk-free rate)
3.50%	6.00%	3.33%	0.43

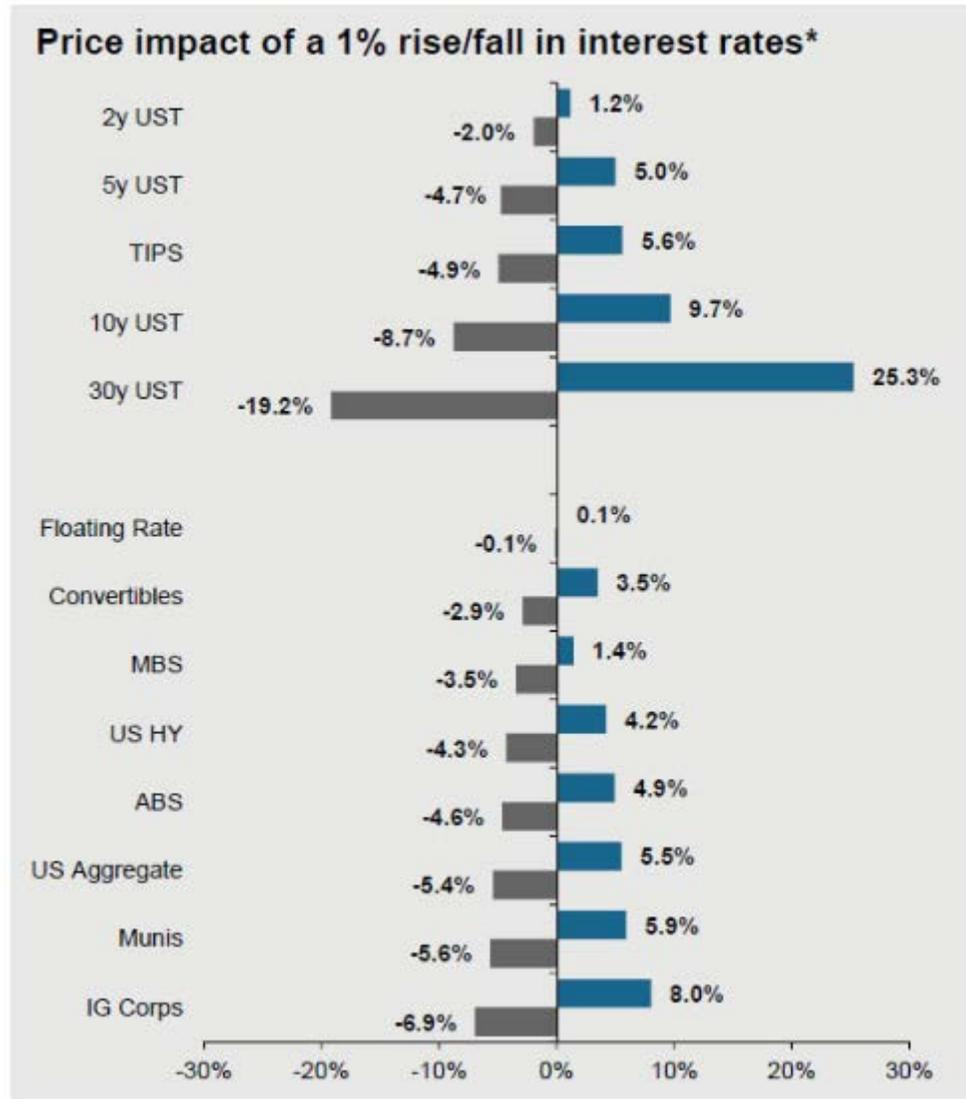
Vanguard Long-Term US Fixed Income (10 Years):

Arithmetic Return	Standard Deviation	Compound Return	Sharpe Ratio (0.90% risk-free rate)
2.30%	4.50%	2.20%	0.31

RVK assumption is for US Intermediate Duration Fixed Income.

Sharpe Ratios using RVK's assumed risk-free rate of 2.25% are 0.21 for RVK's assumption and 0.01 for Vanguard's assumption.

As Interest rates approach zero, bonds are becoming increasingly risky.



Alternatives Valuations and Forward-Looking Returns



Alternatives:

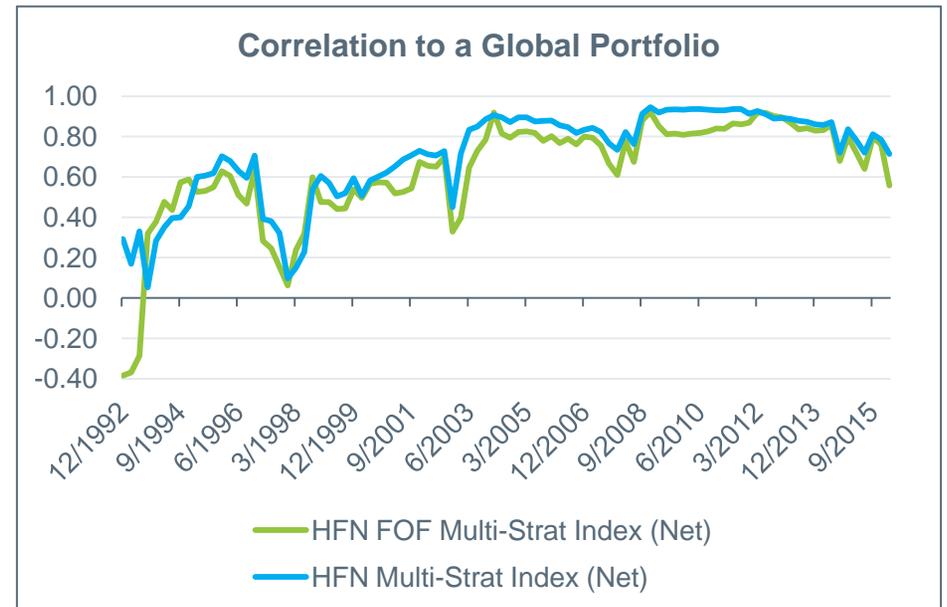
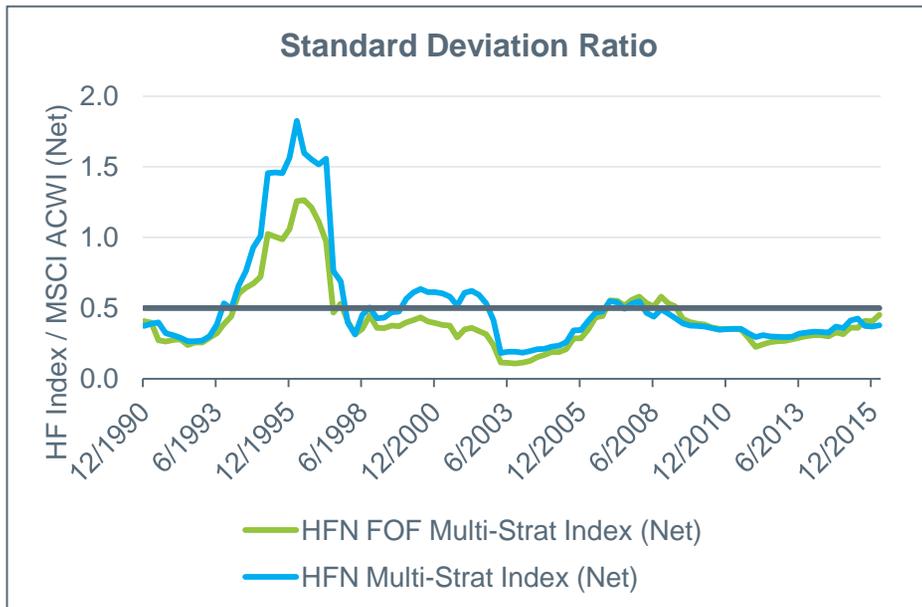
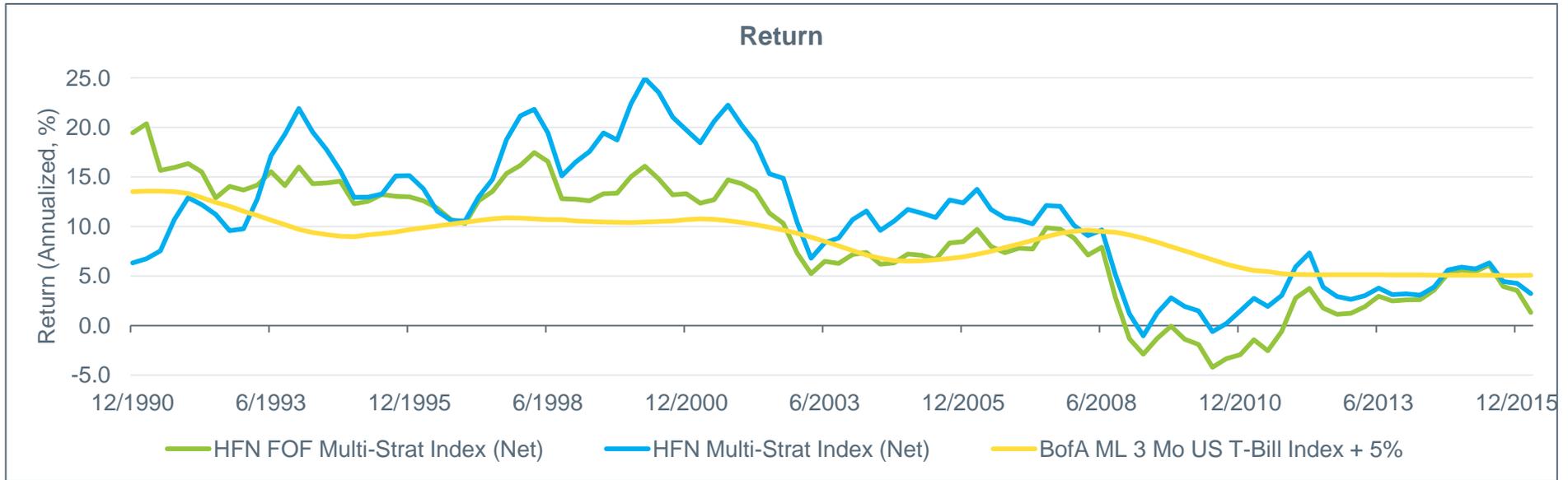
Forward-Looking Return and Risk Assumptions

RVK Long-Term Alternatives (10-20 Years):

	Arithmetic Return	Standard Deviation	Compound Return	Sharpe Ratio (0.90% risk-free rate)
Hedge Funds	6.50%	9.50%	6.08%	0.59
Core Real Estate	6.50%	12.50%	5.77%	0.45
Private Equity	10.25%	25.50%	7.41%	0.37

Sharpe Ratios using RVK's assumed risk-free rate of 2.25% are 0.45 for Diversified Hedge Funds, 0.34 for Core Real Estate, and 0.31 for Private Equity.

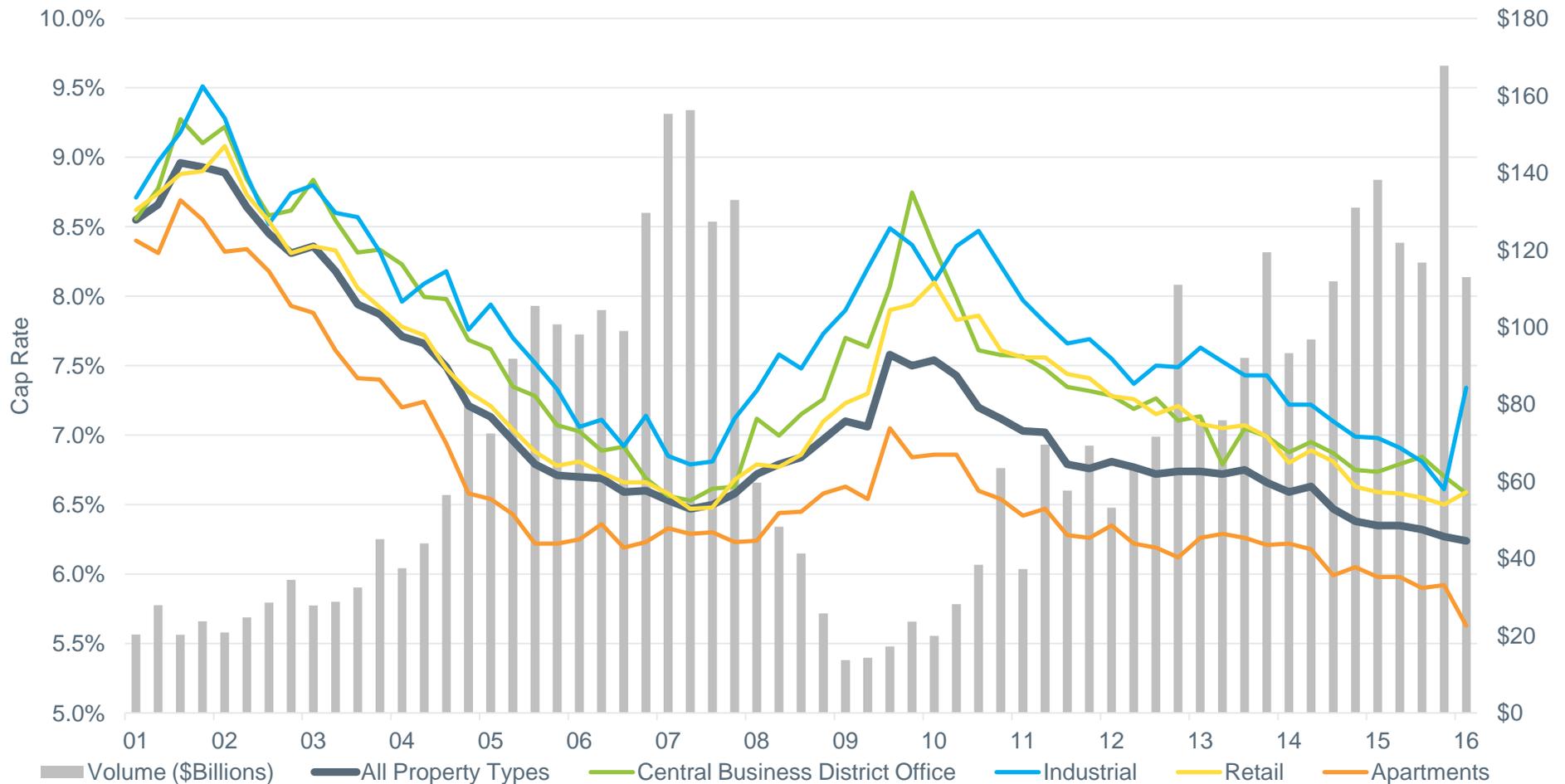
Hedge Funds: Rolling 3 Year Trends



Data is as of March 31, 2016. Calculations use quarterly periodicity and are annualized for periods greater than one year. "Global Portfolio" refers to 60% MSCI ACW Index (Net)/40% B Gbl Agg Index.

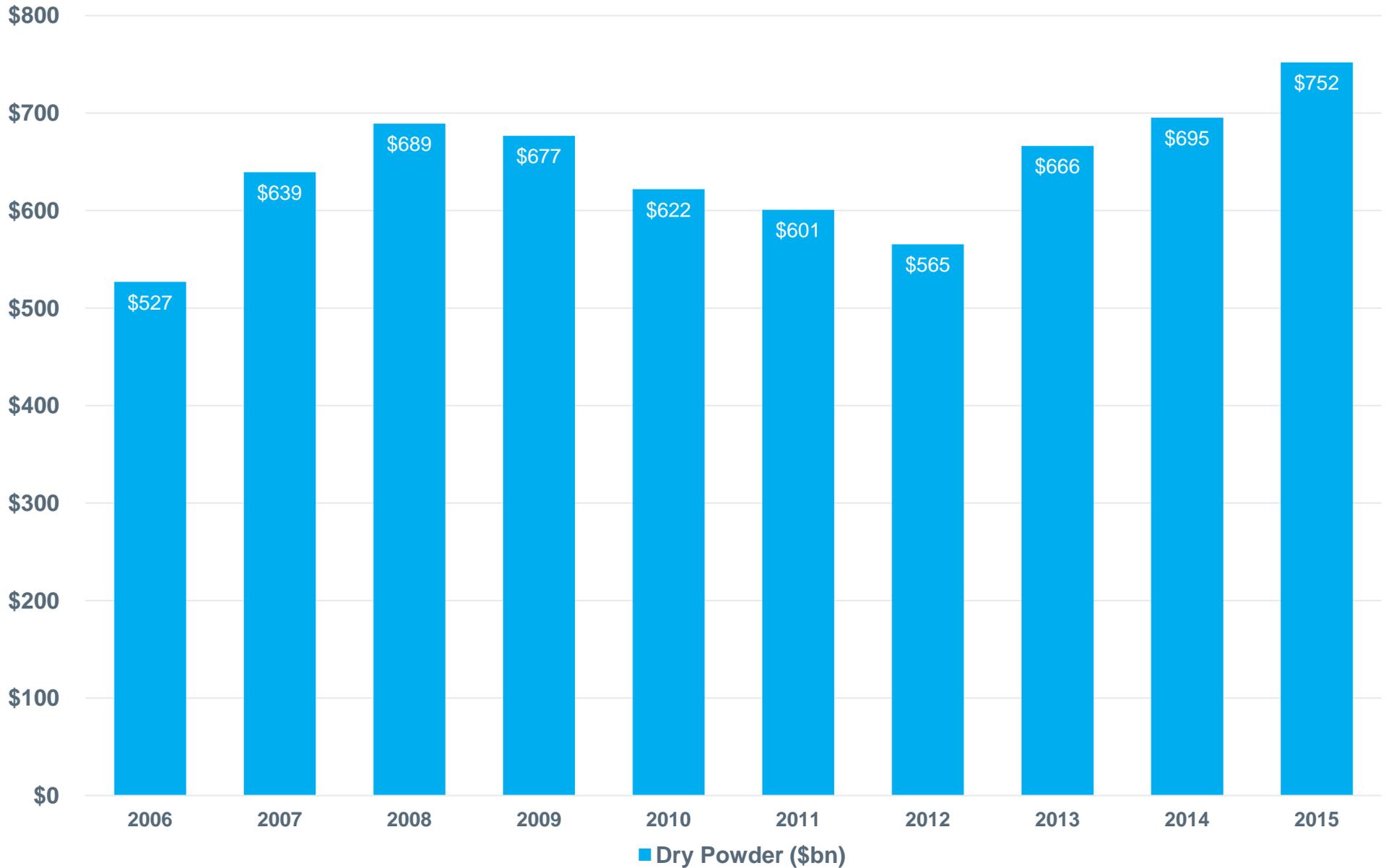
Real Estate: Cap Rate Trends

- Cap rates across sectors continue to tighten with Apartments and Central Business District Office reaching pre-crisis lows.
- The global “search for yield” continues to drive larger real estate allocations, significant capital inflows, and near-record transaction volume.



Historical Average Cap Rates – All Property Types: 7.16%, CBD Office: 7.54%, Industrial: 7.78%, Retail: 7.38%, Apartments: 6.71%
 Source: Real Capital Analytics. Data is as of March 31, 2016.

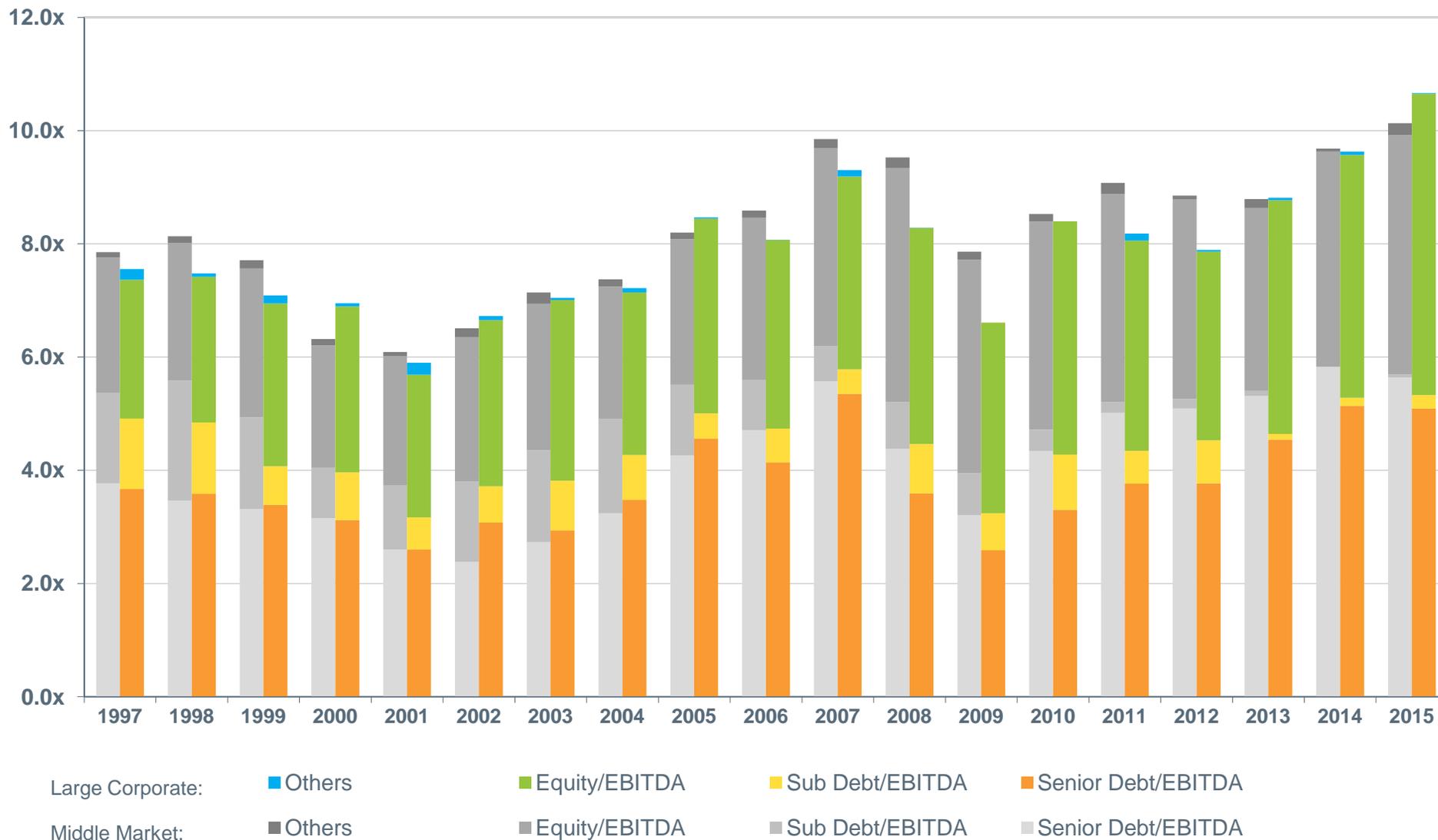
Private Equity: *Global Private Equity Dry Powder*



Source: Preqin (2016). Data is as of December 31, 2015.

Private Equity:

Avg. Purchase Price and Equity Contribution by Sponsors of LBO Loans



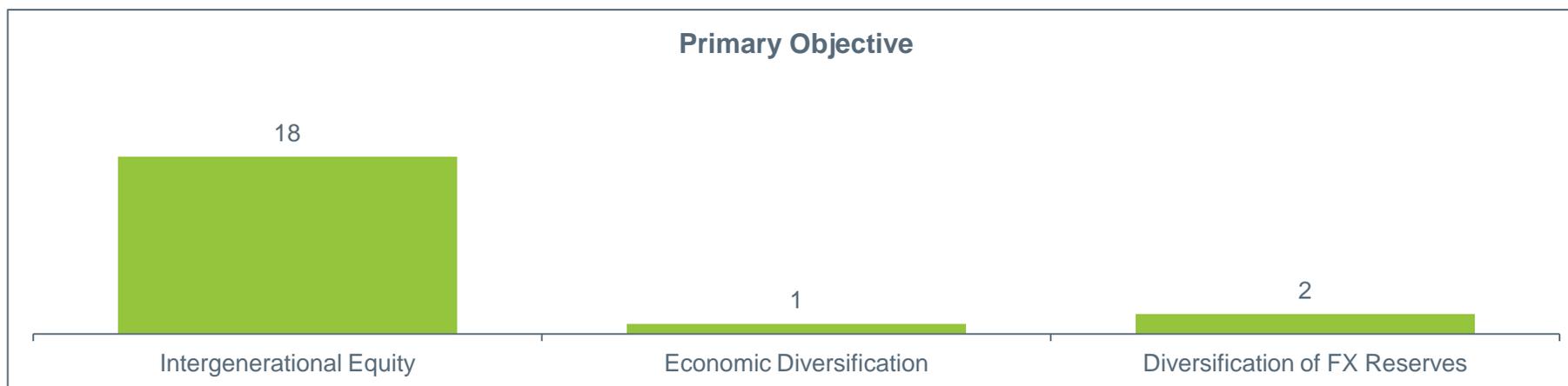
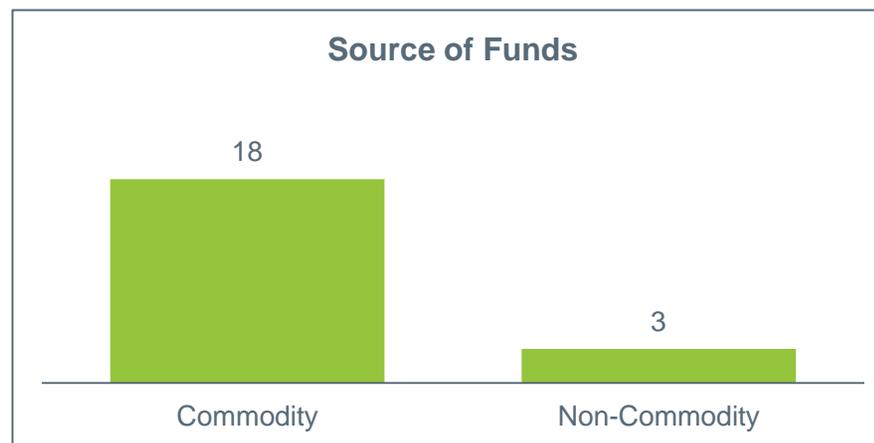
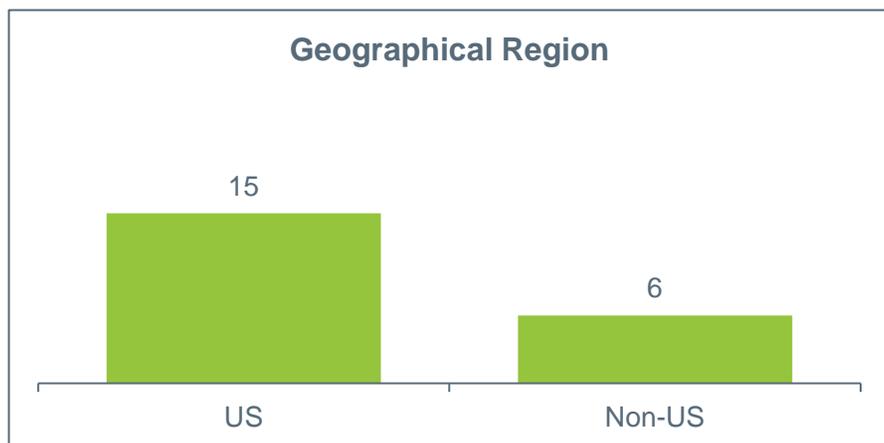
Source: S&P Capital IQ (2016). Data is as of December 31, 2015.
 Large corporate and middle market are defined as issuers with EBITDA of more and less than \$50M, respectively.

Global Sovereign Wealth Fund Universe Comparison



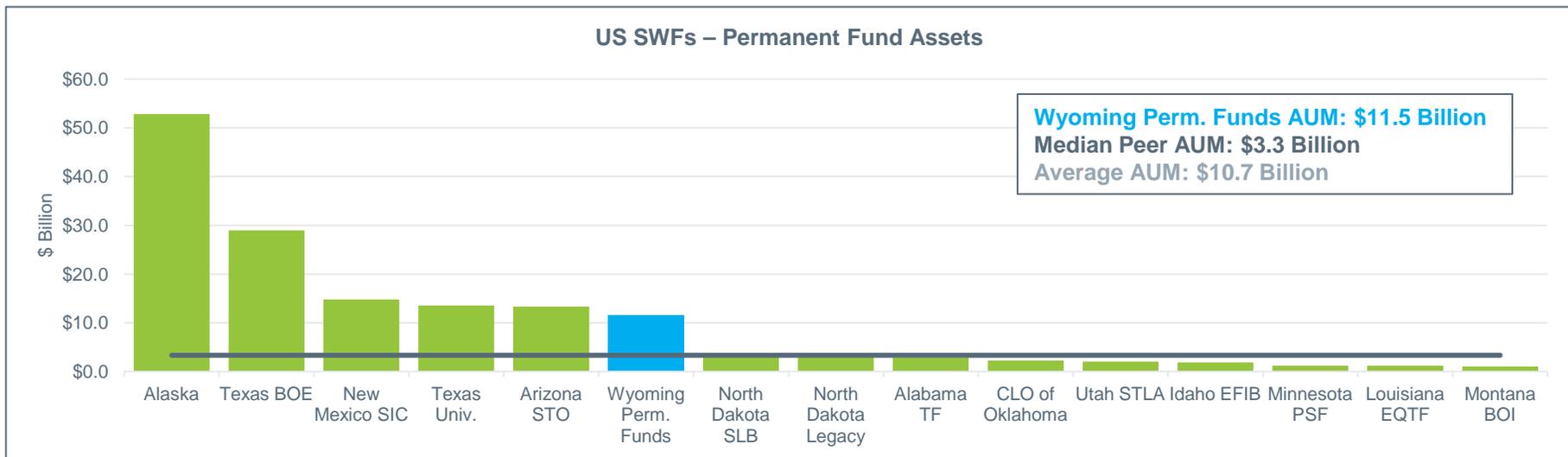
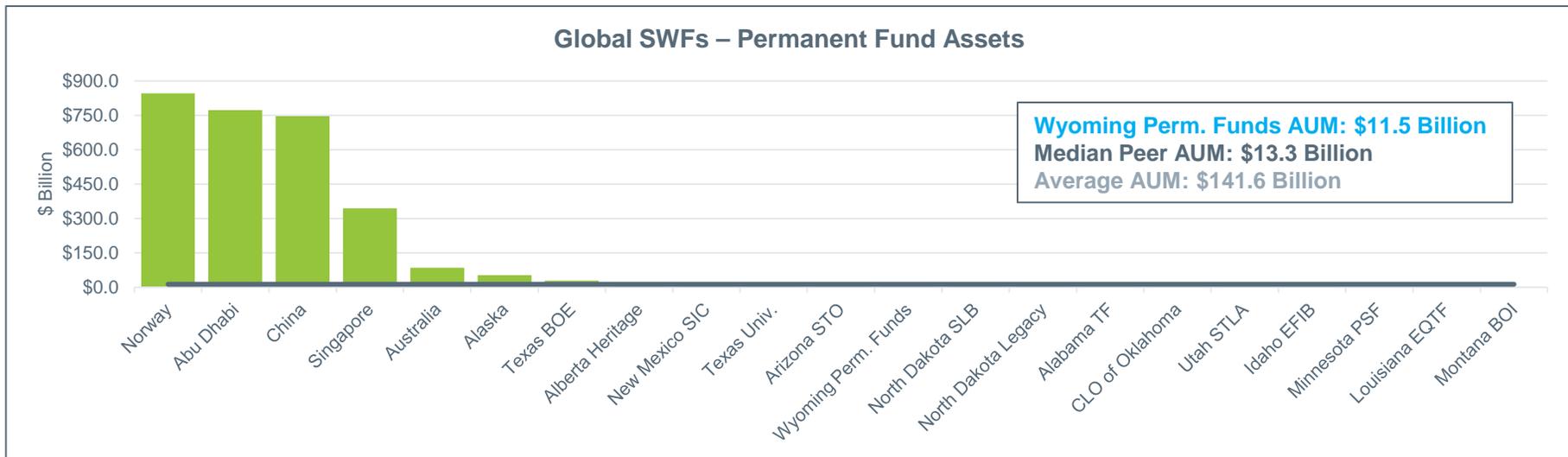
Universe Summary and Characteristics

RVK gathered publicly available data for 21 global sovereign wealth funds. The preponderance of the Universe consists of US-based funds, with an emphasis on Funds that receive proceeds from commodity-related sources.



Assets Under Management

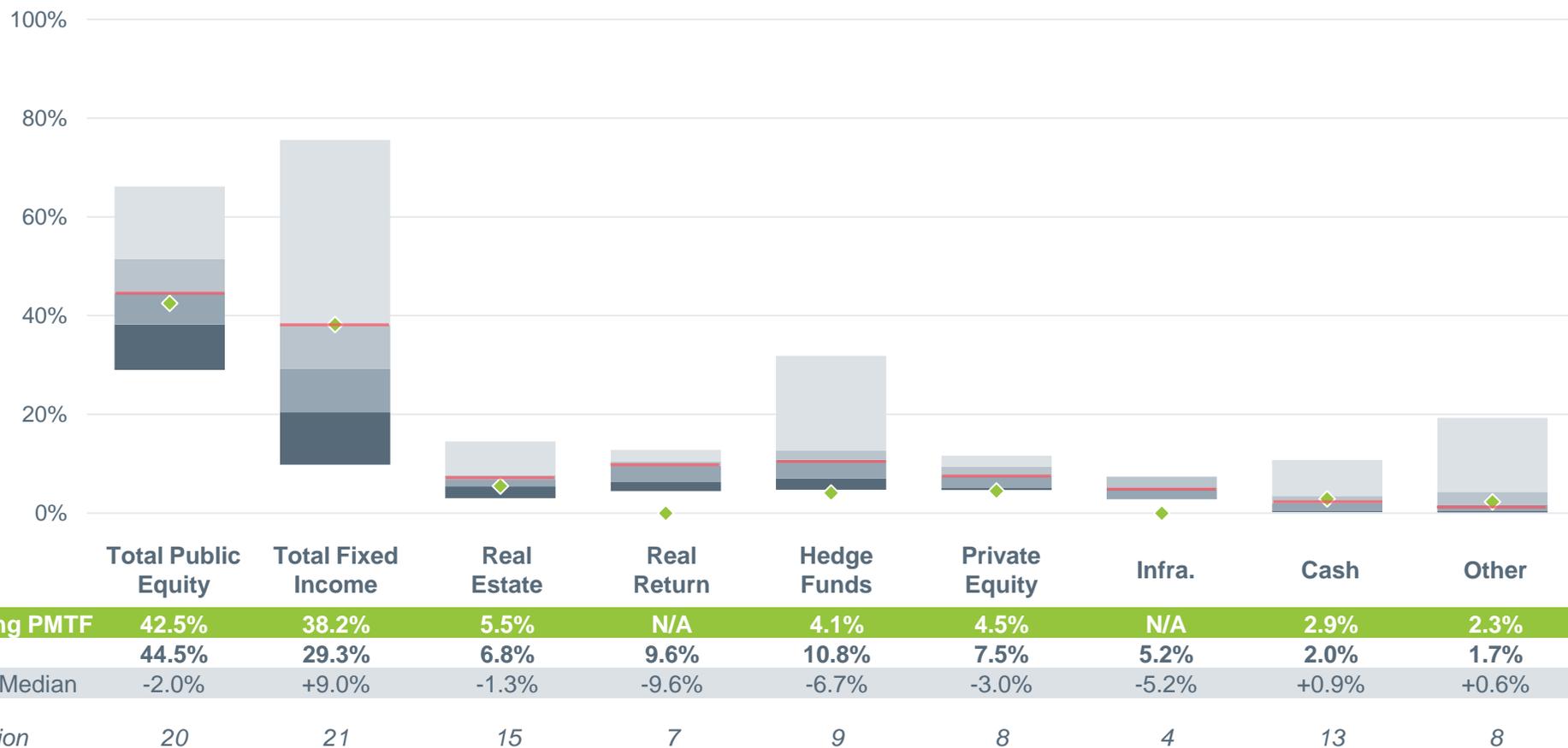
Asset levels for non-US sovereign wealth funds included in the Universe are significantly higher than for similar US sovereign wealth funds.



Data is as of June 30, 2015. Wyoming Perm. Funds includes the Permanent Mineral Trust Fund, Common School Permanent Land Fund, Permanent Land Fund, University Permanent Land Fund, Hathaway Scholarship, and Higher Education. Assets reflect permanent fund assets only and may differ from total AUM reported by the entity.

Asset Allocation – Global Sovereign Wealth Funds

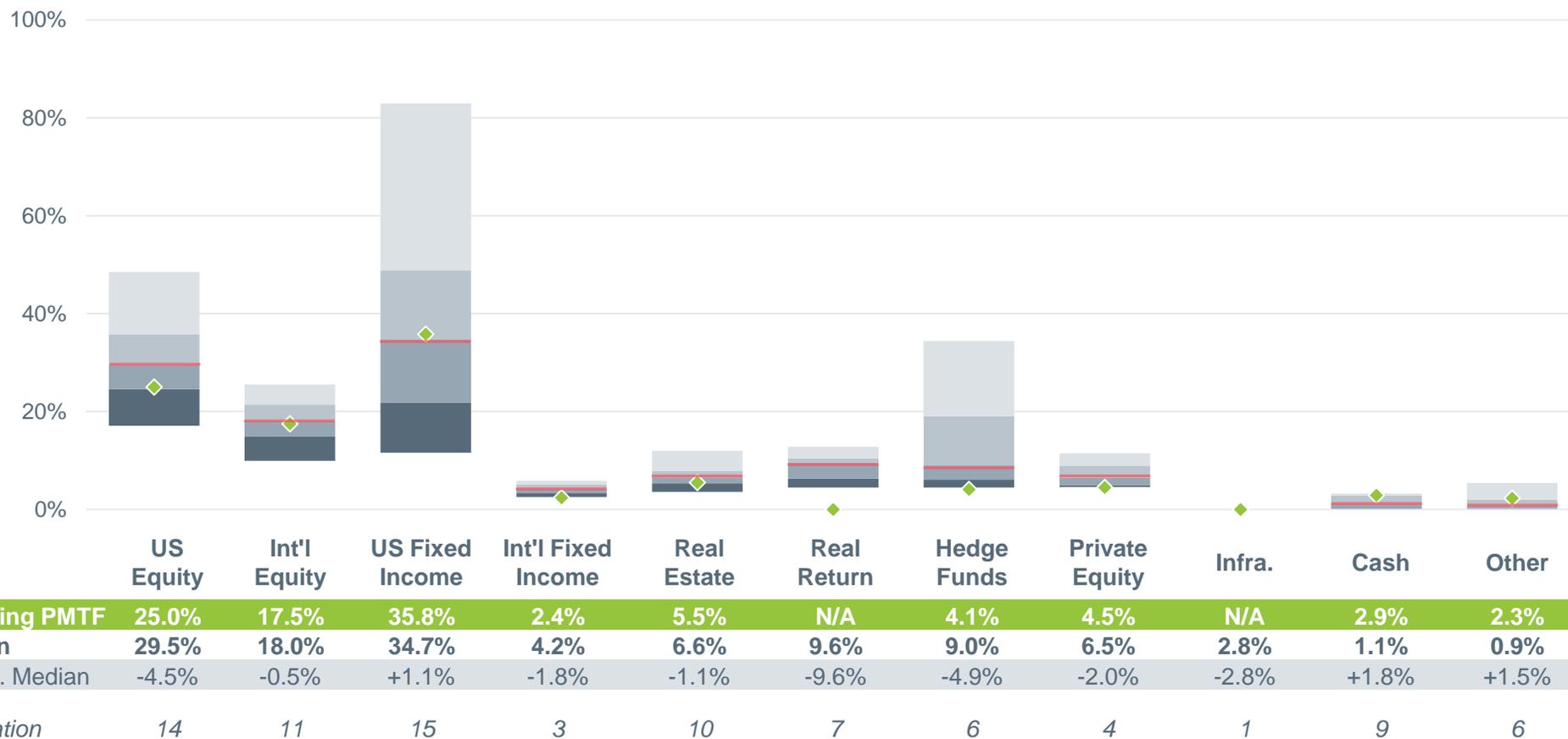
The Permanent Mineral Trust Fund has a higher allocation to public equities, fixed income, and cash with lower allocations to alternative assets compared to the median global sovereign wealth fund peer.



All data is as of June 30, 2015. PMTF "Other" consists of Public Purpose Investments. Universe includes all sovereign wealth funds. Universe "Other" includes beta overlay, risk parity, timber, and other alternative investments not broken out. Not all funds included also have publicly available performance data, therefore Universe asset allocation and performance data may not be compatible.

Asset Allocation – US Sovereign Wealth Funds

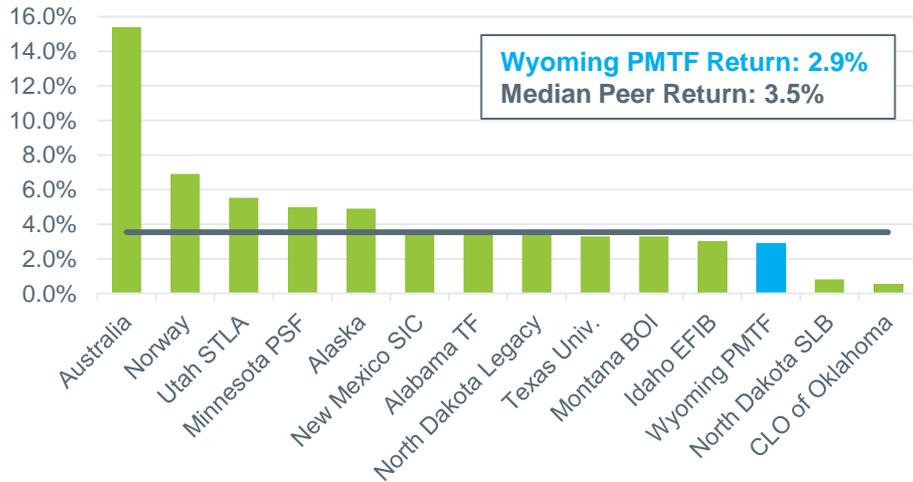
The Permanent Mineral Trust Fund has a higher allocation to US fixed income and cash, with lower allocations to public equities and alternatives compared to the median US sovereign wealth fund peer.



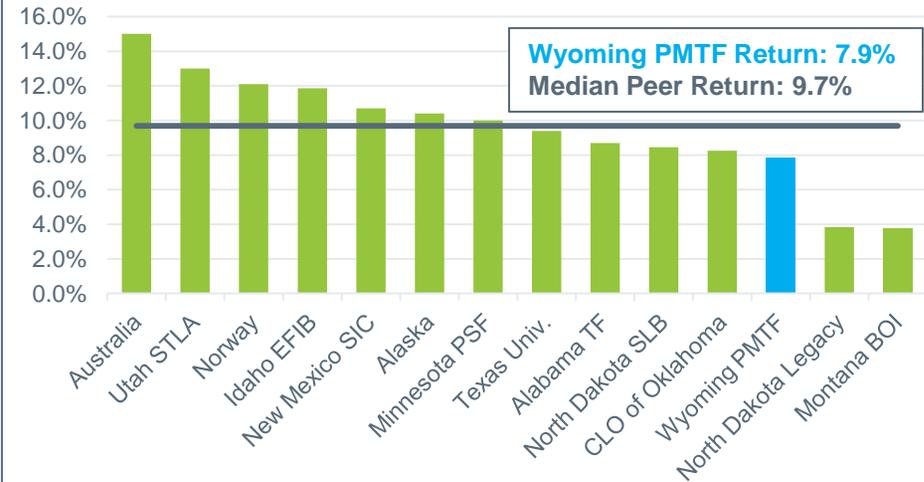
All data is as of June 30, 2015. PMTF "Other" consists of Public Purpose Investments. Universe includes US-based sovereign wealth funds only. Universe "Other" includes beta overlay, risk parity, timber, and other alternative investments not broken out. Not all funds included also have publicly available performance data, therefore Universe asset allocation and performance data may not be compatible.

Performance – Global Sovereign Wealth Funds

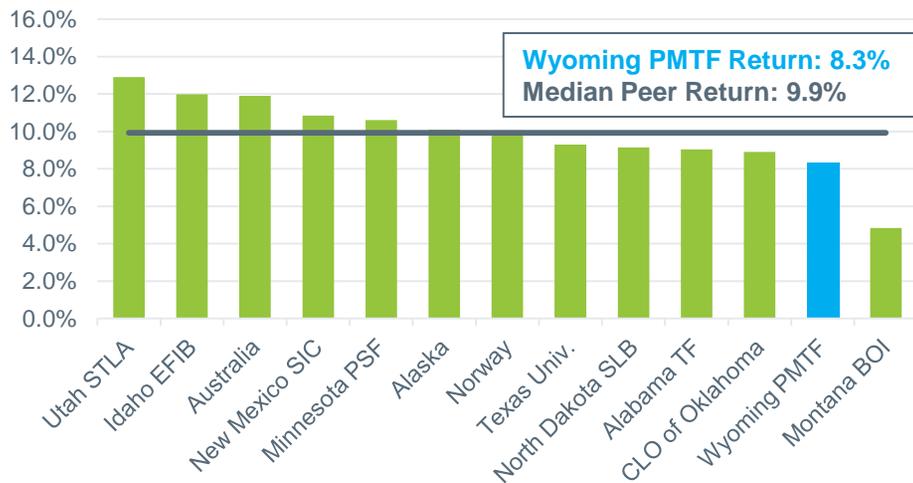
1 Year Returns



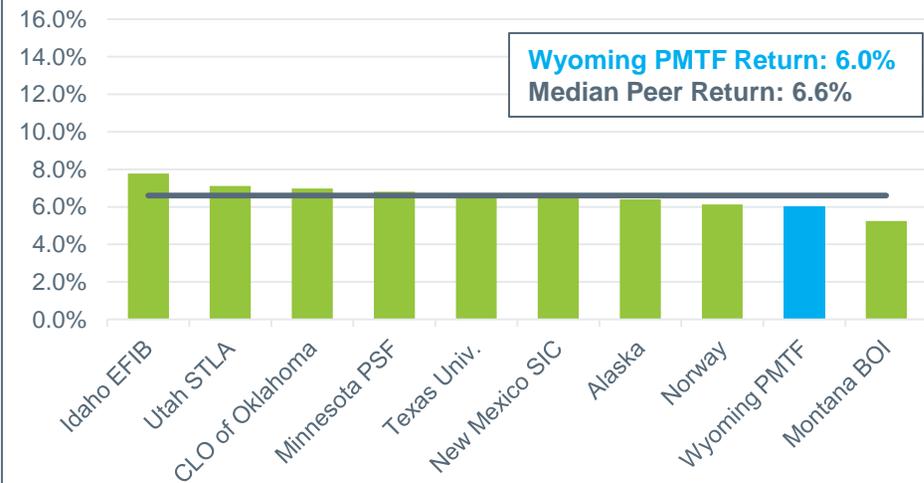
3 Year Returns



5 Year Returns



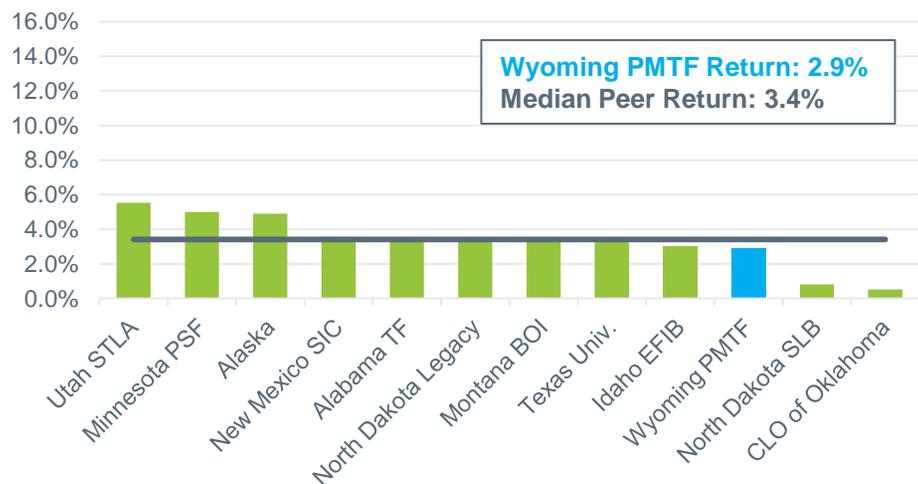
10 Year Returns



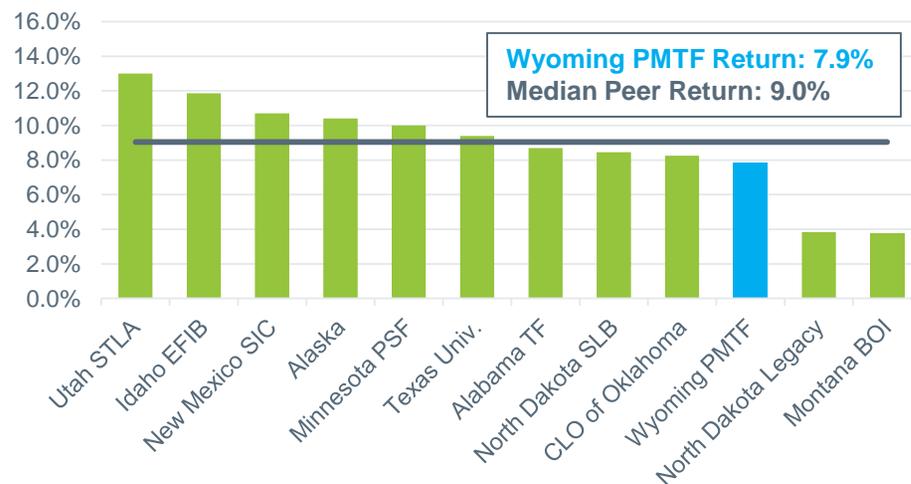
All data is as of June 30, 2015 and is gross of fees. Universe includes all sovereign wealth funds, endowments and foundations. Performance is reported in US Dollars and is reflective of permanent fund assets only.

Performance – US Sovereign Wealth Funds

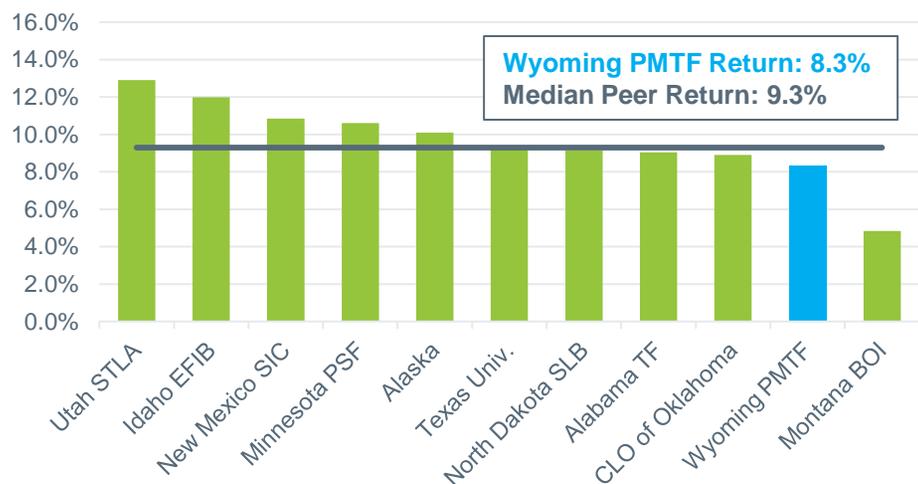
1 Year Returns



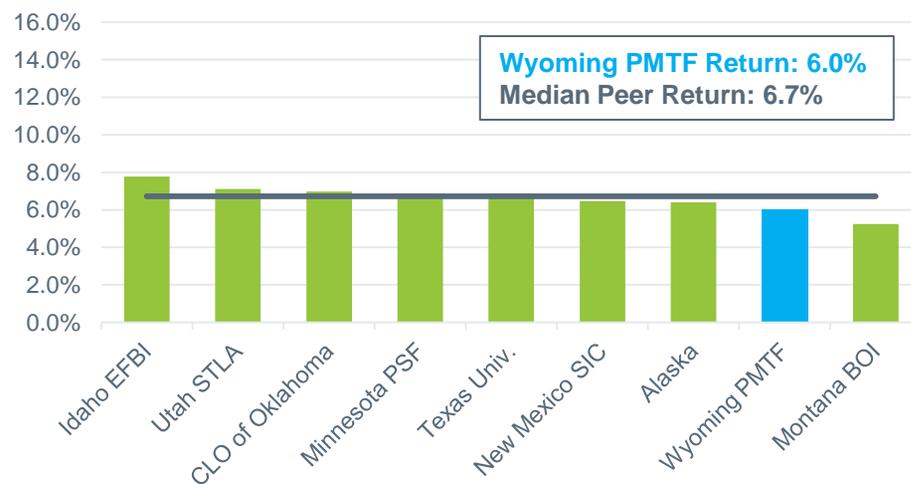
3 Year Returns



5 Year Returns

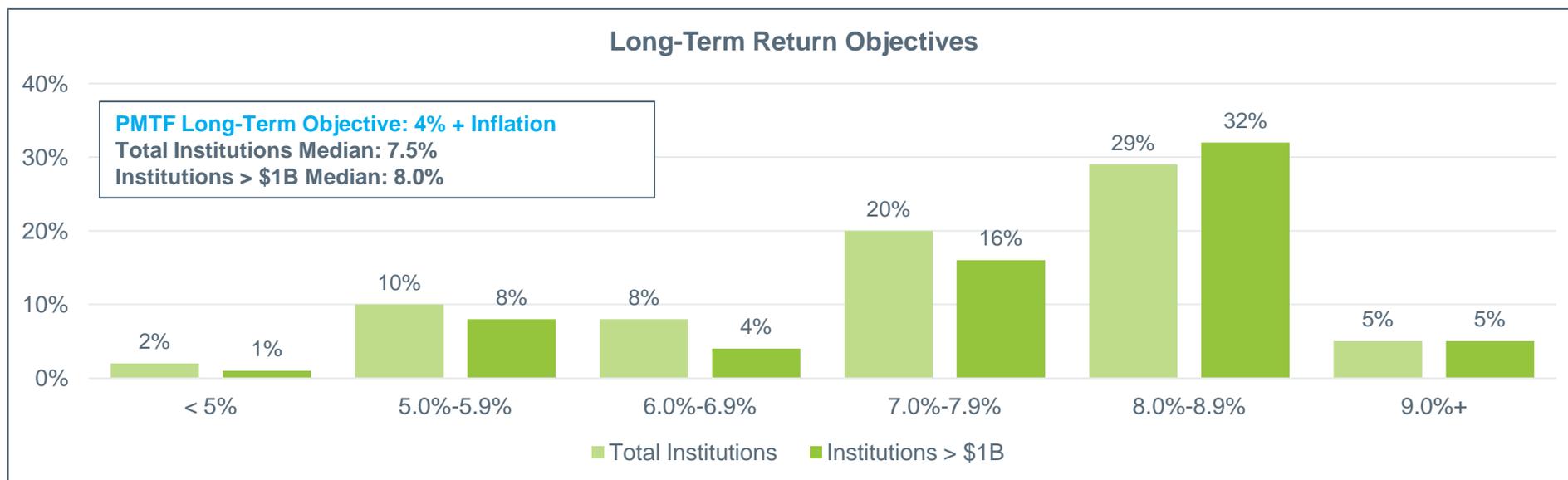
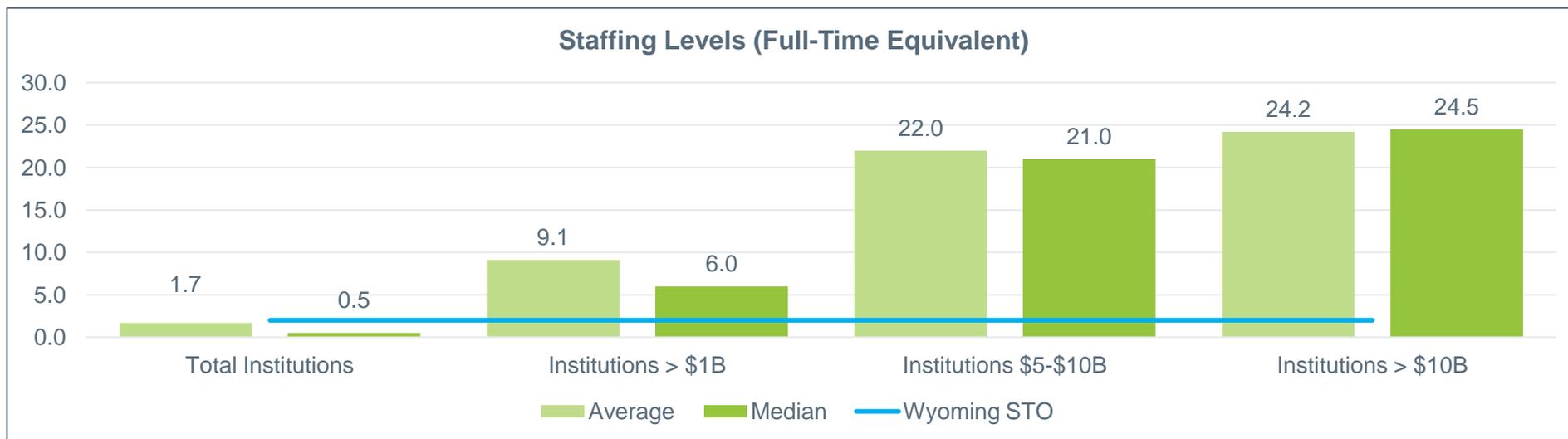


10 Year Returns



All data is as of June 30, 2015 and is gross of fees. Universe includes all sovereign wealth funds, endowments and foundations. Performance is reported in US Dollars and is reflective of permanent fund assets only.

Staffing Levels & Long-Term Return Objectives

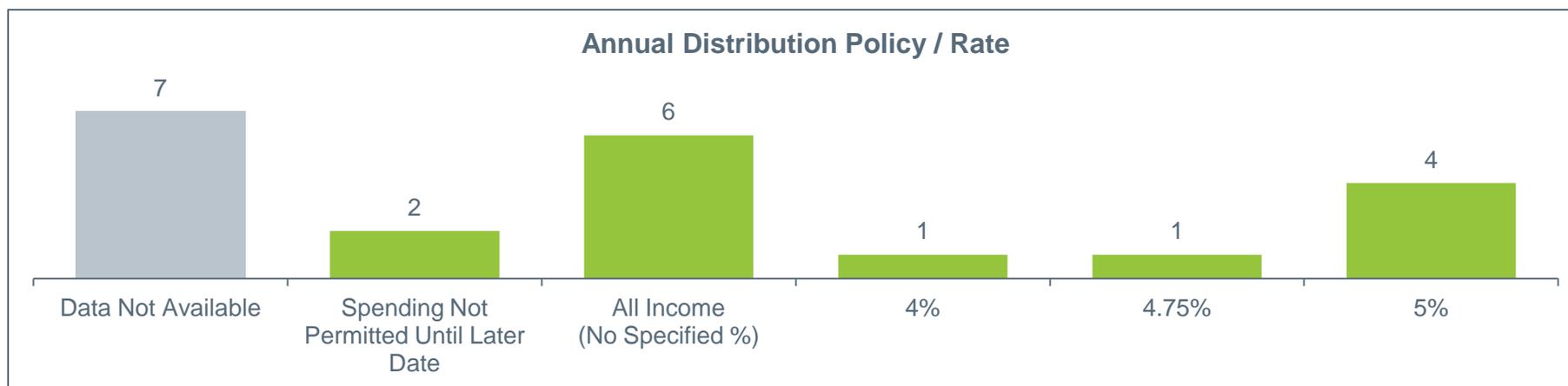
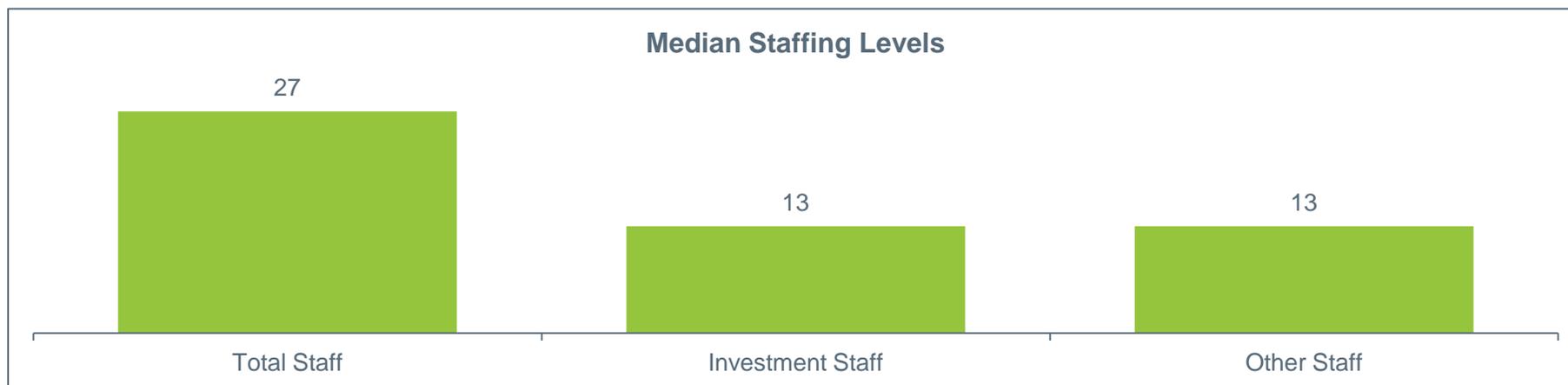


Full-Time Equivalent Staff included are those that “manage the investment function” of the respective institution.
 Long-Term Return Objective Responses - Total Institutions: 10% “Do not have return objectives” and 16% “No answer/uncertain”
 Institutions > \$1B: 10% “Do not have return objectives” and 24% “No answer/uncertain”



Staffing Levels and Annual Distribution Rates

The below contains a sampling of staffing levels and annual distribution policies within the Universe.



Staffing level data consists of available information for 12 Funds, representing an AUM range of \$1.9B to \$846B. "Investment Staff" plus "Other Staff" does not equal "Total Staff" since medians may not be additive.

Sovereign Wealth Fund Participant List

US Sovereign Wealth Funds

- Alabama Trust Fund*
- Alaska Permanent Fund*
- Arizona State Treasurer
- Commissioners of the Land, State of Oklahoma*
- Idaho Endowment Fund Investment Board*
- Louisiana Education Quality Trust Fund
- Minnesota Permanent School Fund*
- Montana Board of Investments*
- New Mexico State Investment Council*
- North Dakota Legacy Fund
- North Dakota State Land Board*
- Texas Board of Education
- Texas University Fund*
- Utah State Trust Lands Administration*
- Wyoming State Treasurer's Office*

Non-US Sovereign Wealth Funds

- Abu Dhabi Investment Authority
- Alberta Heritage Fund
- Australian Future Fund*
- China Investment Corporation
- Government of Singapore Investment Corporation
- Norway Global Pension Fund*

*Indicates fund with both publicly available performance and asset allocation data as of June 30, 2015.

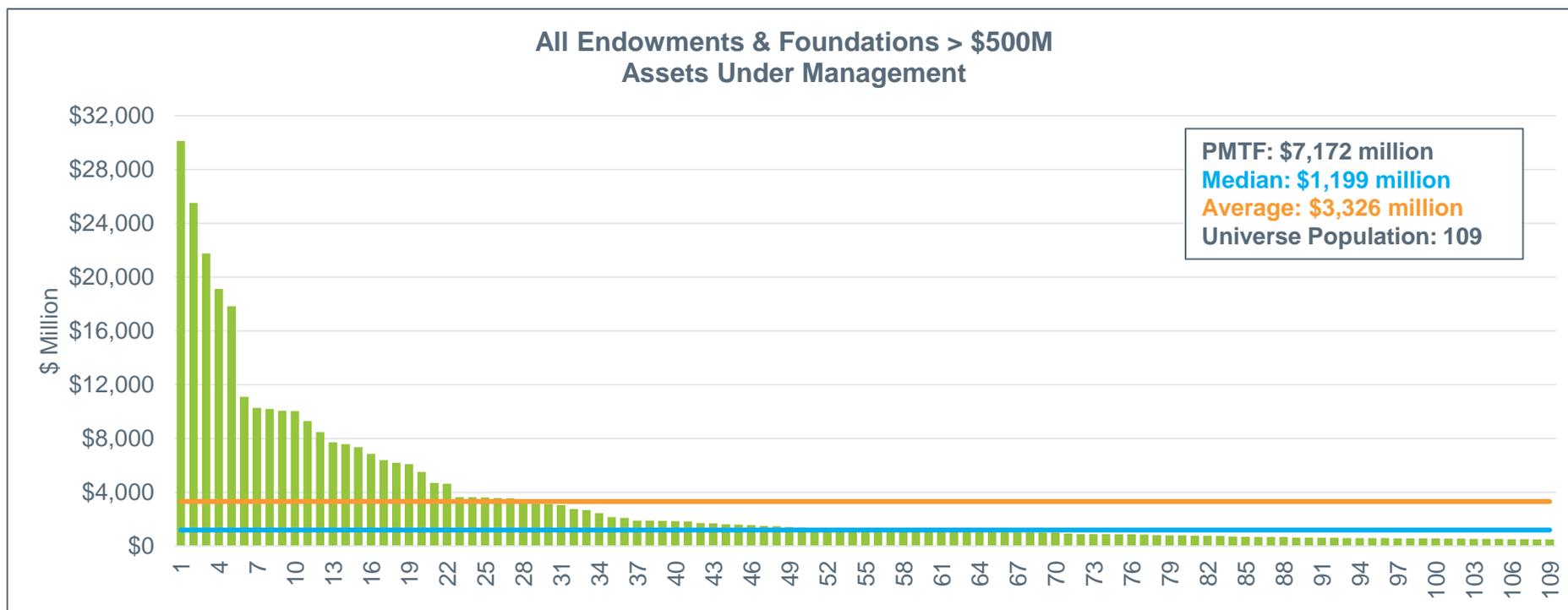
Endowments & Foundations > \$500 Million Comparison



Universe Summary and Characteristics

Data is provided by Investment Metrics and consists of the Investment Metrics Plan Sponsor Universe and the Mellon Analytics Solutions Trust Universe. The database includes data across multiple plan types including corporate, endowment, foundation, public, and Taft-Hartley plans.

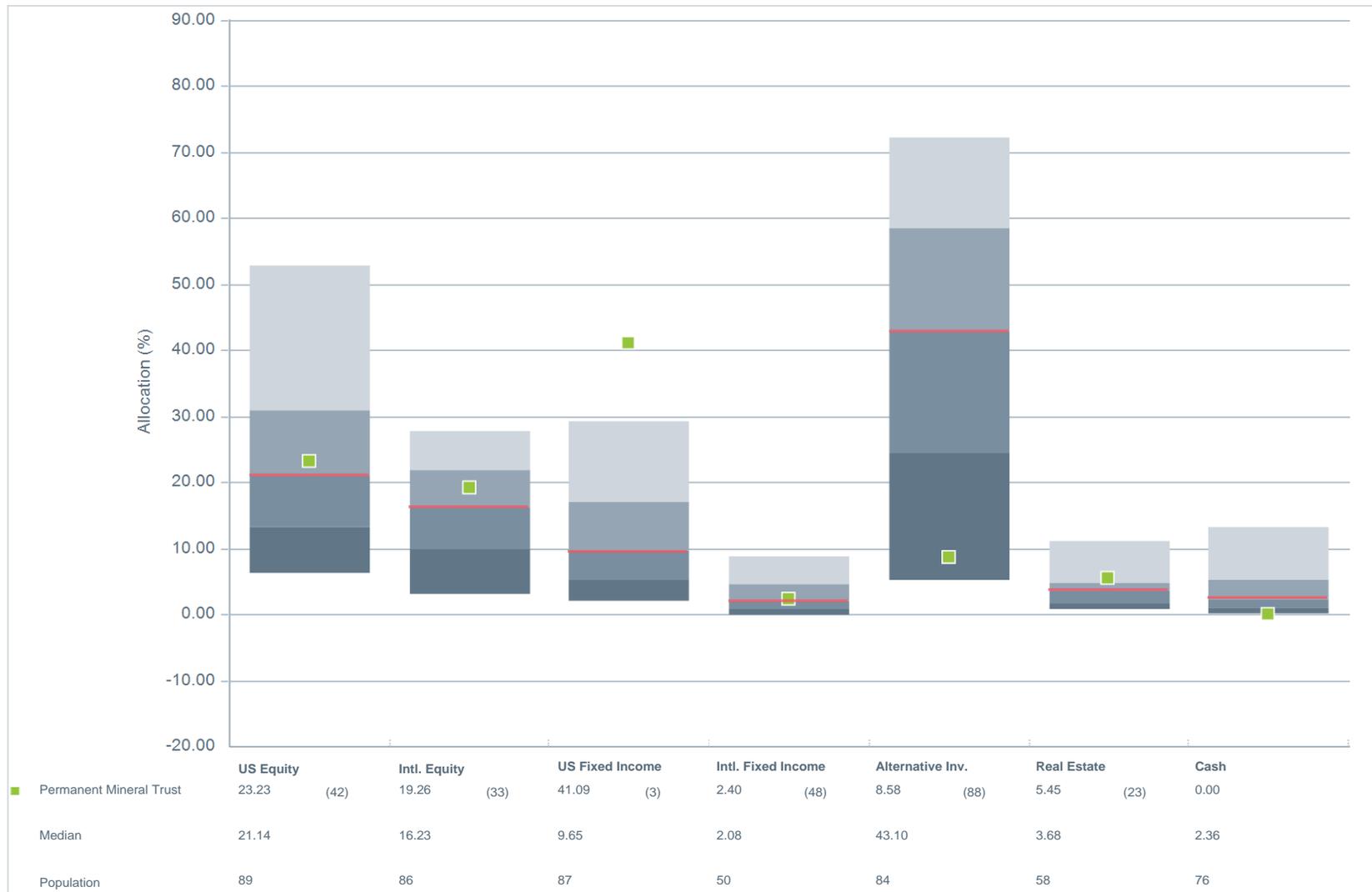
The Universe utilized throughout this presentation includes only endowment and foundation institutions, with total assets greater than \$500 million.



As of June 30, 2015. Not all institutions report both asset allocation and performance information. Therefore, populations listed for various data points may differ from the total.

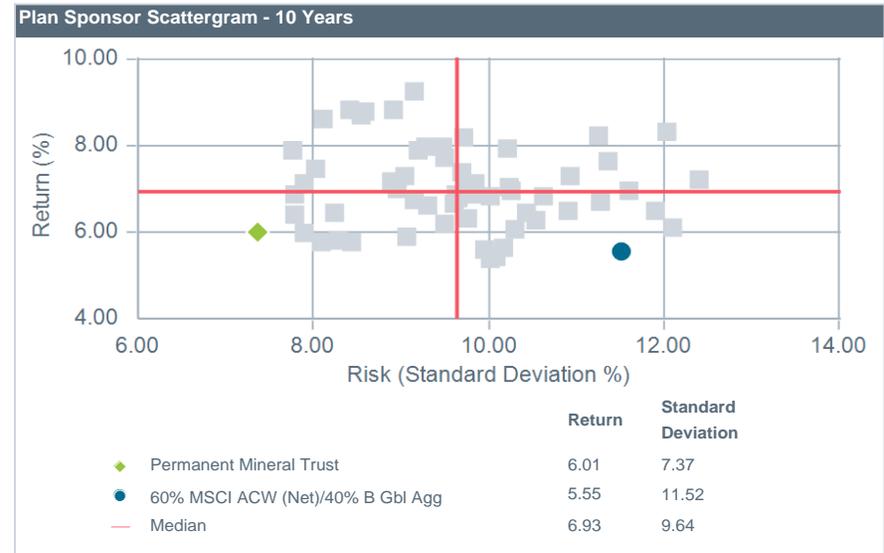
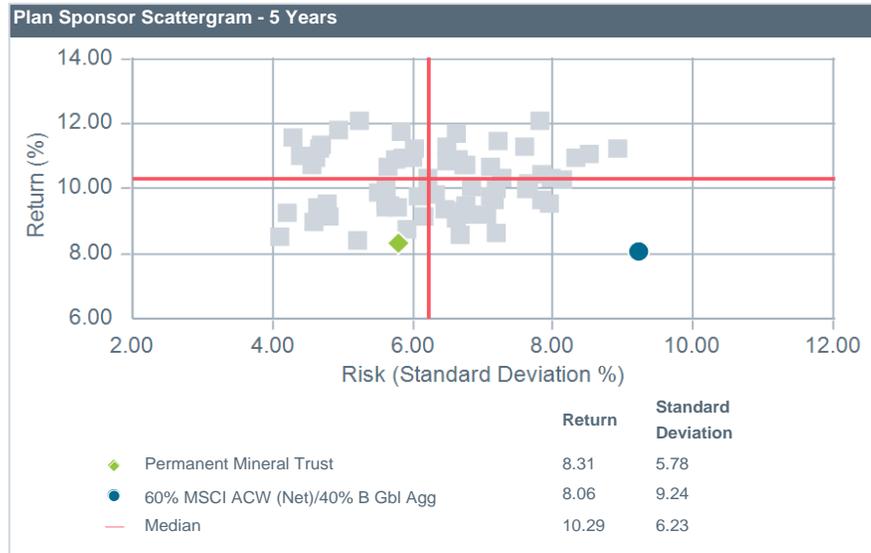
Asset Allocation

The Permanent Mineral Trust Fund has a smaller allocation to Alternative Investments relative to the median Endowment & Foundation > \$500M allocation, and a larger allocation to US Fixed Income.

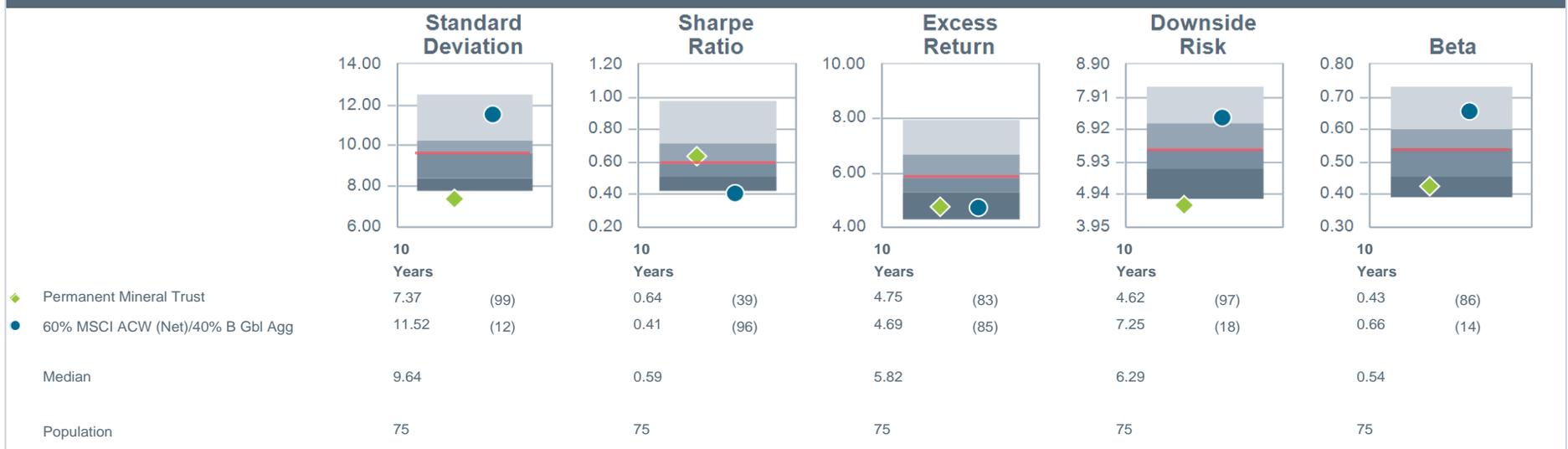


As of June 30, 2015. Intl. Equity allocation shown includes Global Equity.
 US Fixed Income allocation shown includes Convertibles, Cash (inv. In SAP) and Public Purpose Investments.

Performance – Risk and Return



Plan Sponsor Peer Group Analysis - Multi Statistics (Beta vs. S&P 500)



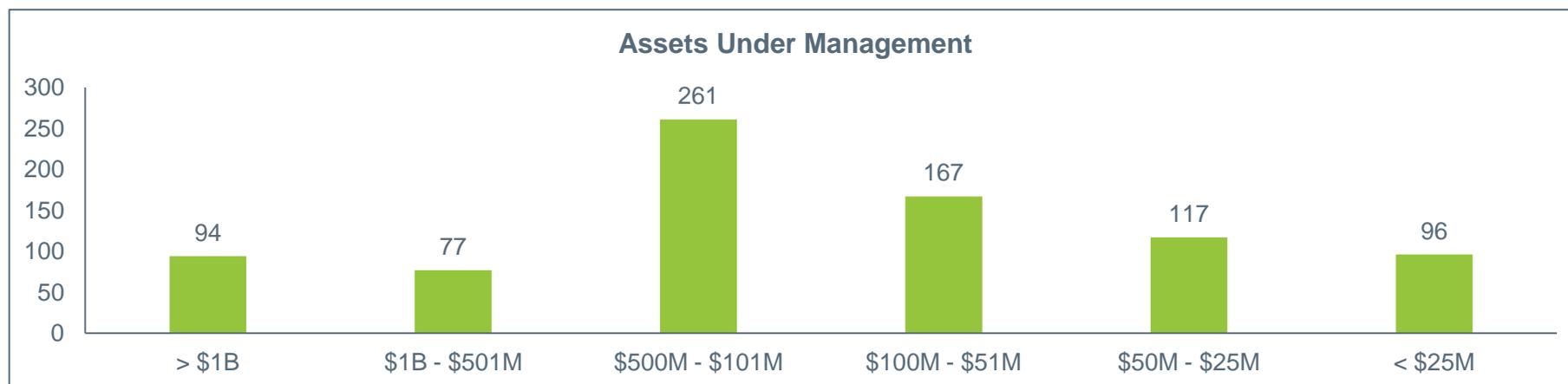
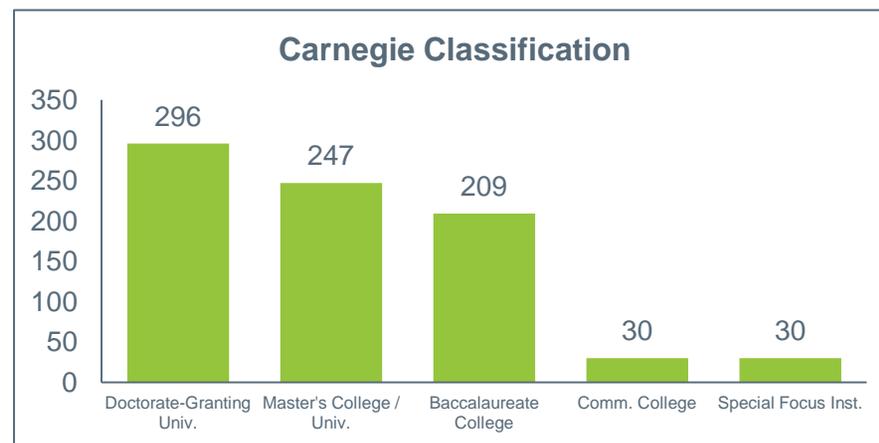
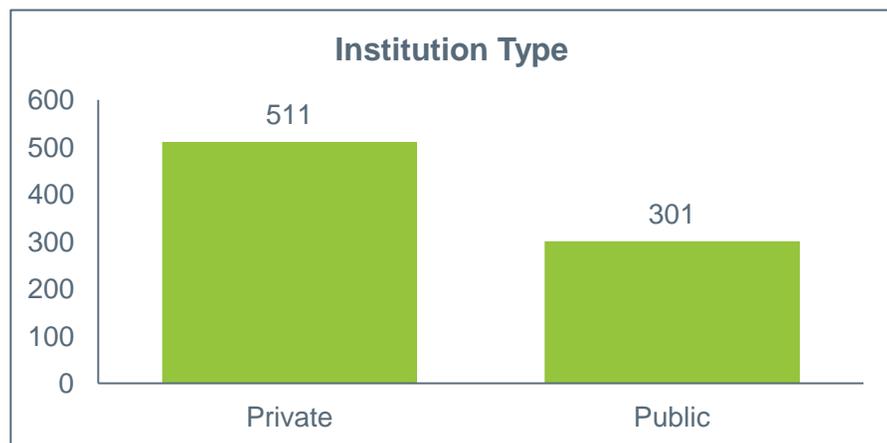
As of June 30, 2015. Performance shown is gross of fees. Calculation is based on monthly periodicity.

NACUBO-Commonfund Study of Endowments Comparison



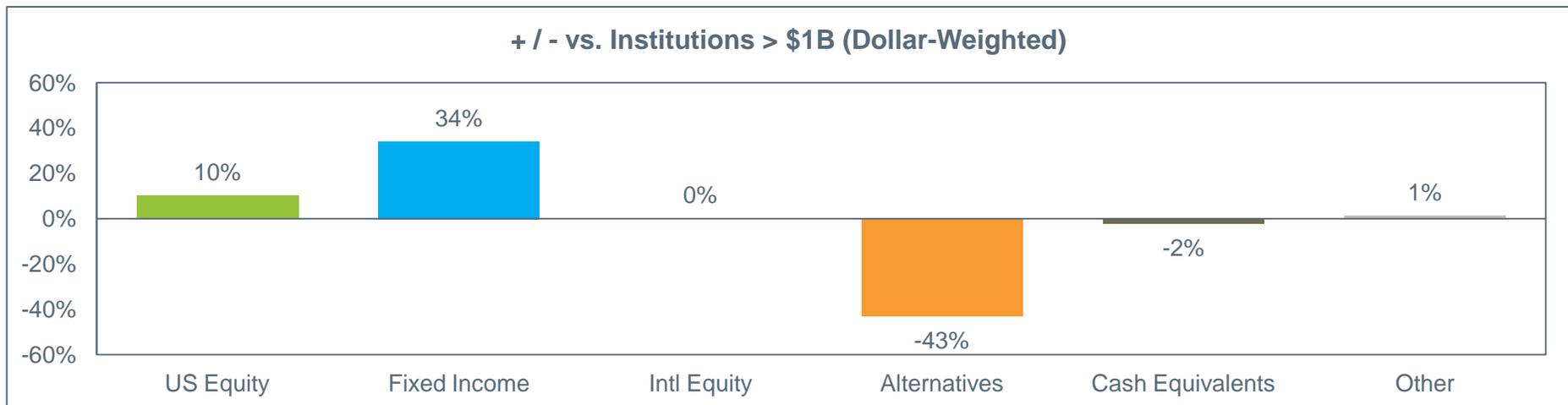
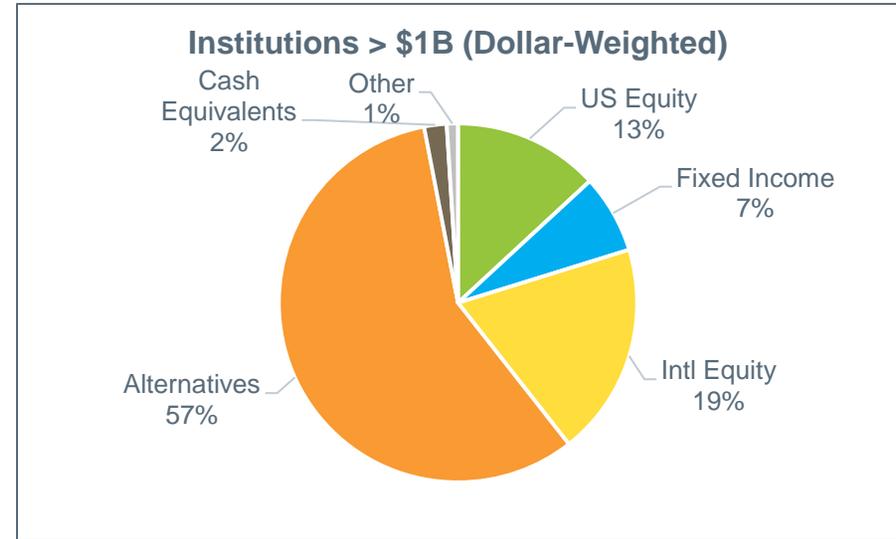
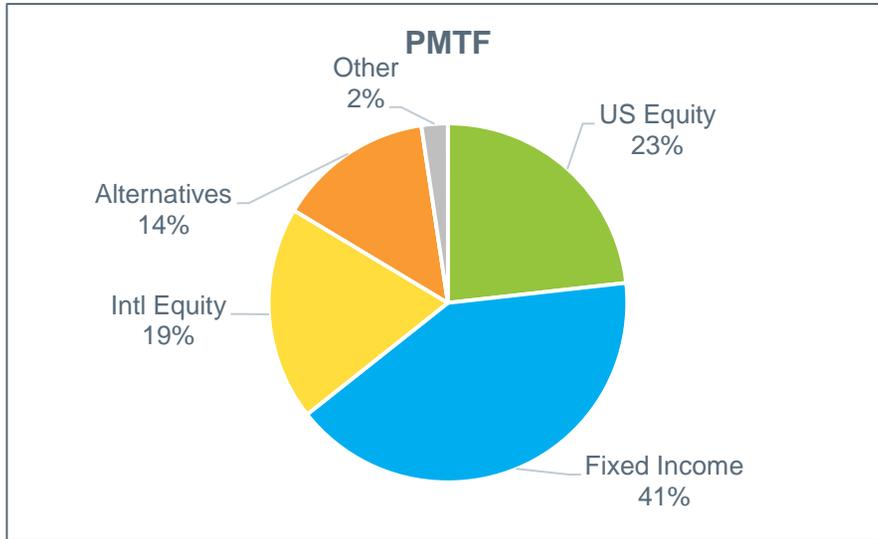
Universe Summary and Characteristics

Data is gathered by the NACUBO-Commonfund Study of Endowments on an annual basis. The 2015 study consists of 812 US college and university endowments.



Asset Allocation

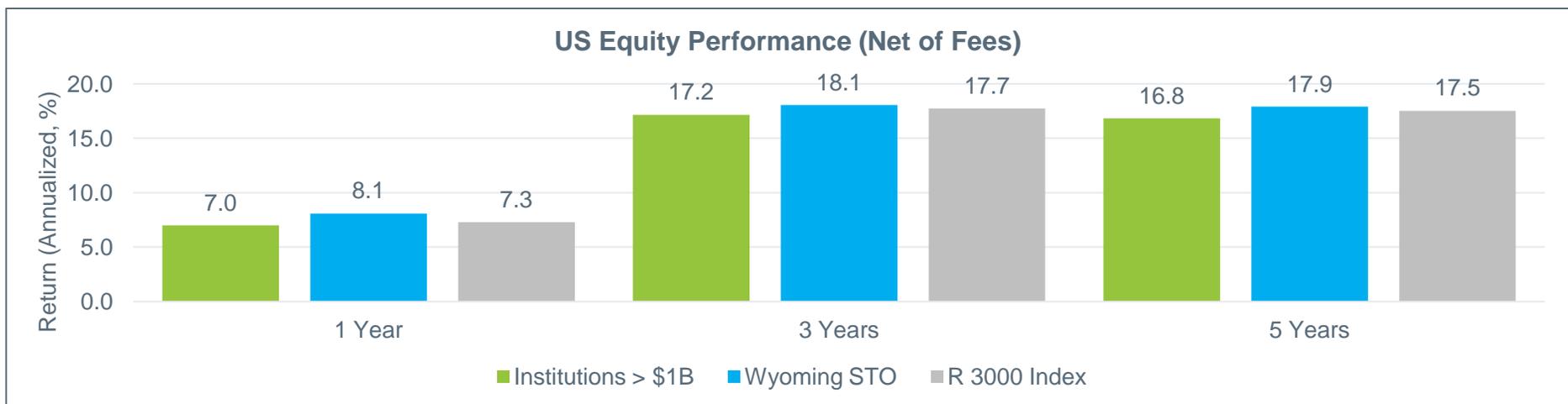
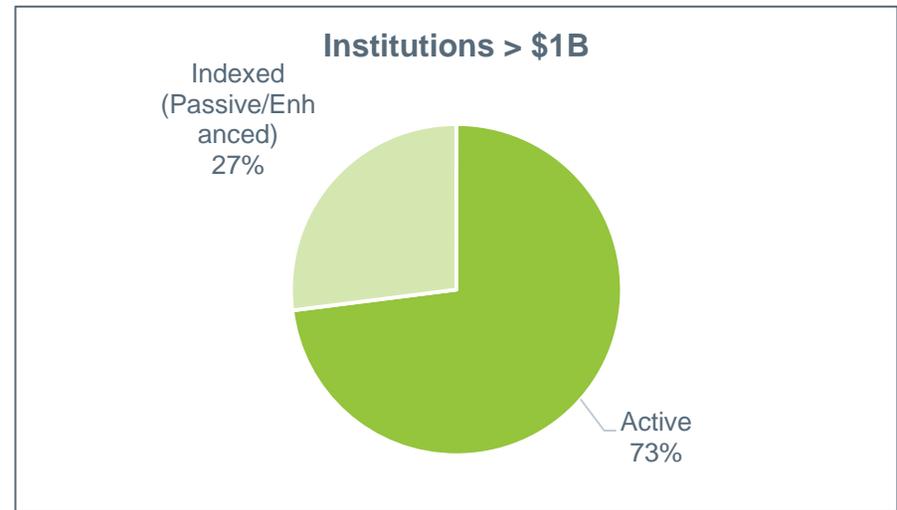
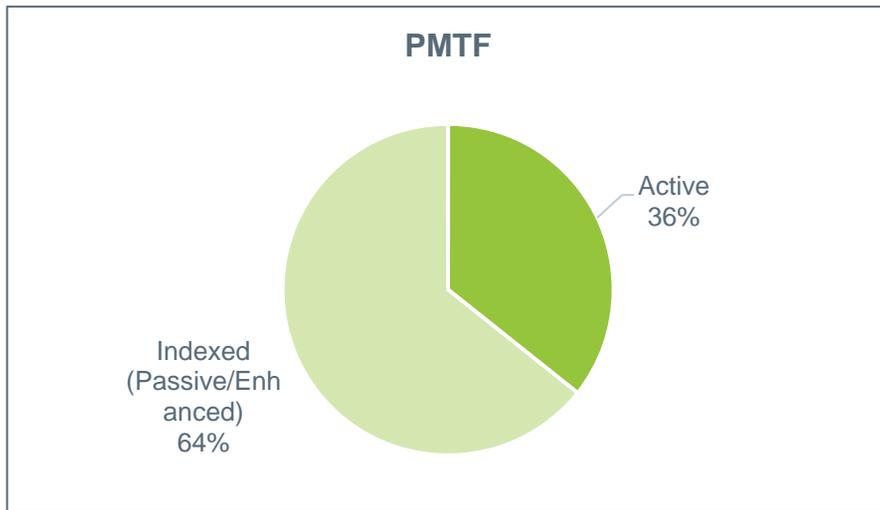
The Permanent Mineral Trust Fund has a higher allocation to Fixed Income and US Equities, and a lower allocation to Alternatives than the average US higher education endowment fund > \$1B.



As of June 30, 2015.

Asset Class Detail – US Equity

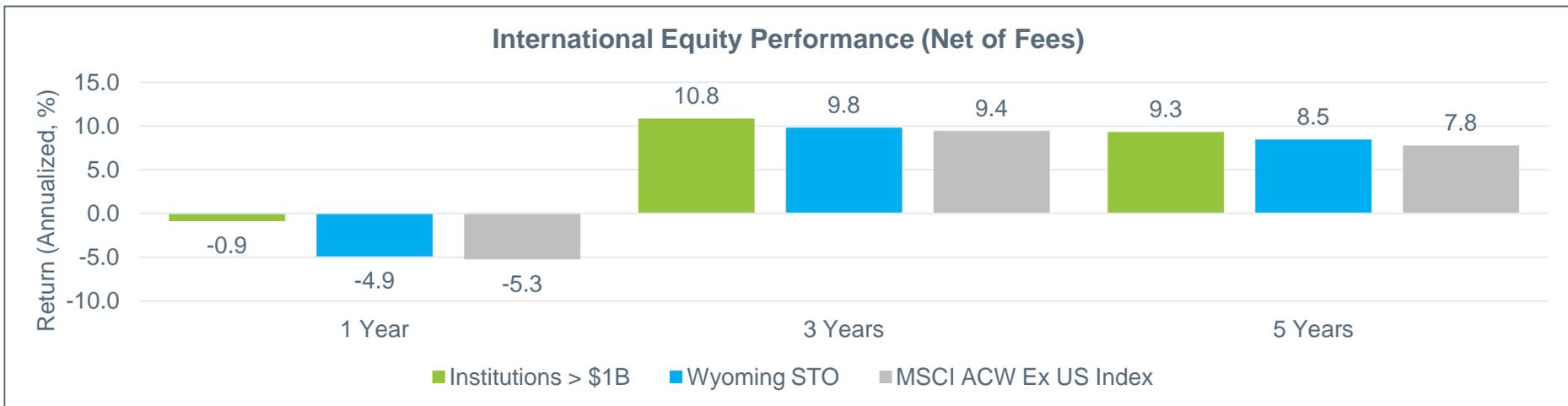
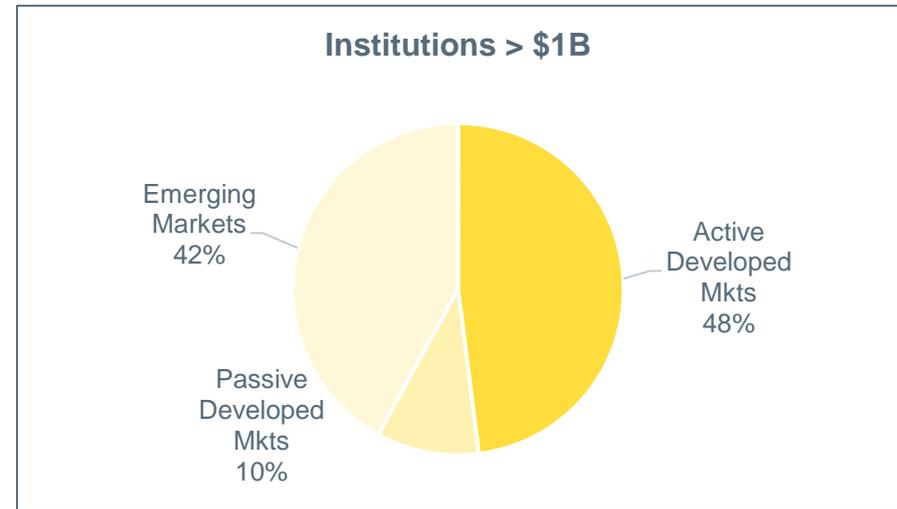
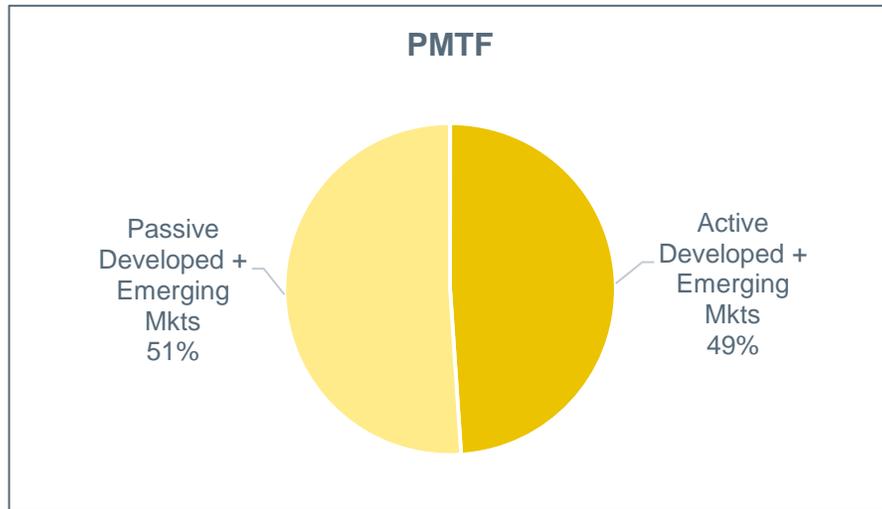
Utilizing a passive management strategy for most of the US Equity portfolio has been beneficial, as the past 7 years have been a period characterized by high correlation between stocks and widespread difficulty for the majority of active managers to add value after fees.



As of June 30, 2015. Performance shown is net of fees. Asset class detail is specific to PMTF. NACUBO universe performance data is based on an arithmetic average.

Asset Class Detail – International Equity

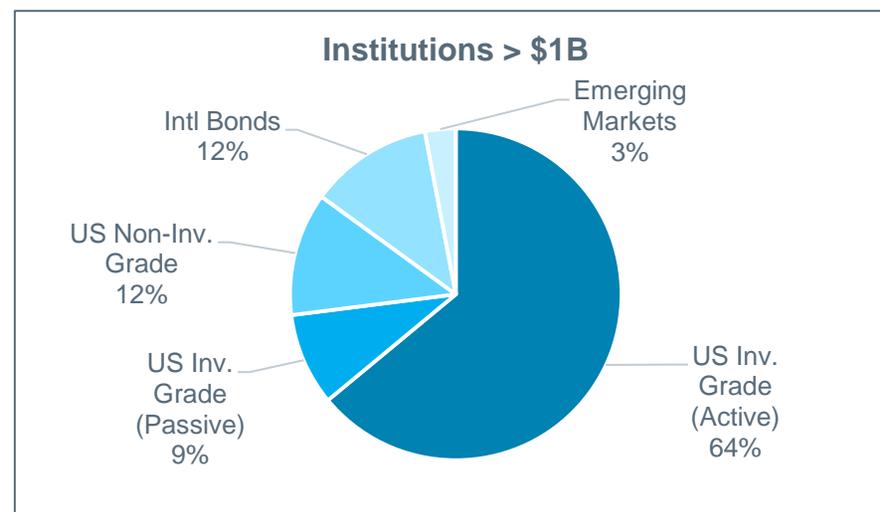
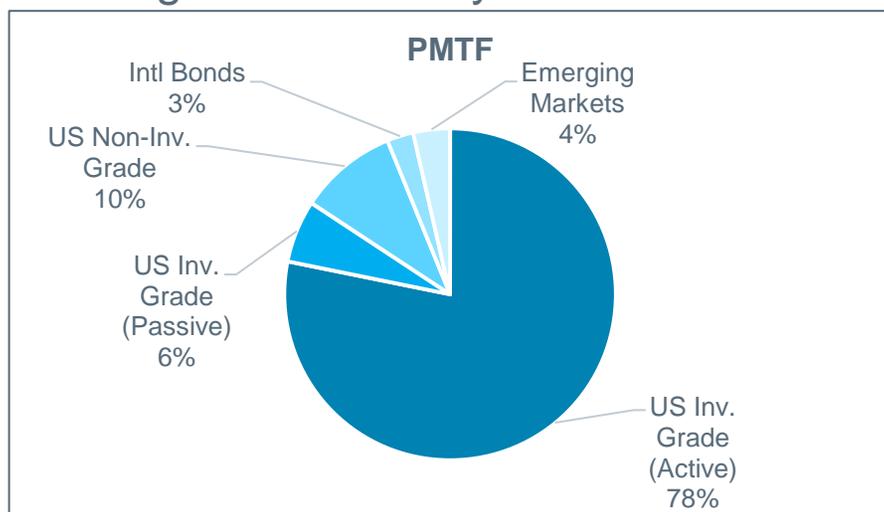
Trailing period performance is above the broad market but below the universe average, reflecting some near-term difficulty for a few of Wyoming's active managers.



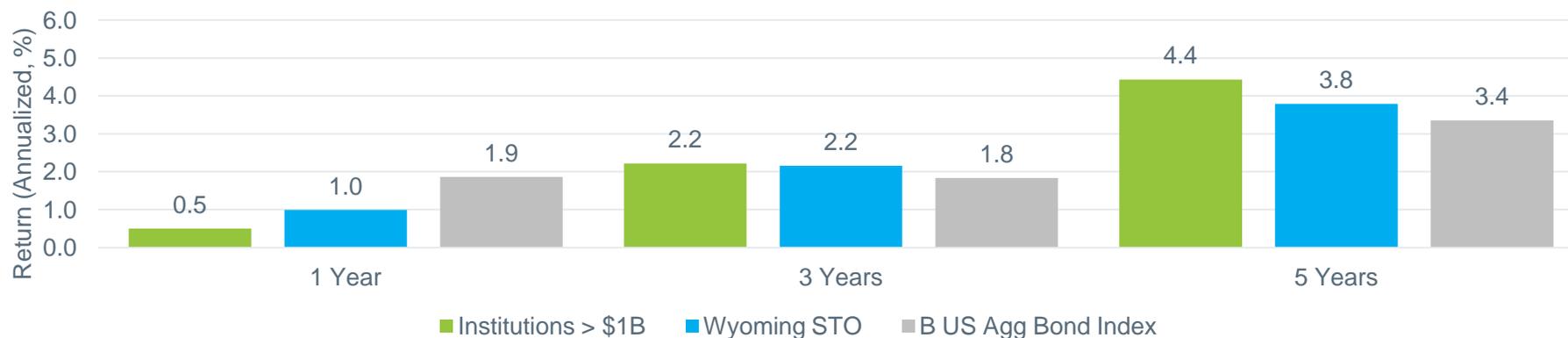
As of June 30, 2015. Performance shown is net of fees. Asset class detail is specific to PMTF. NACUBO universe performance data is based on an arithmetic average.

Asset Class Detail – Fixed Income

A significant restructuring of the fixed income portfolio took place in 2013, which was designed to retain a relatively conservative fixed income portfolio while repositioning to add diversifying sectors that should provide a better return profile in rising interest rate and higher inflationary environments.



Fixed Income Performance (Net of Fees)

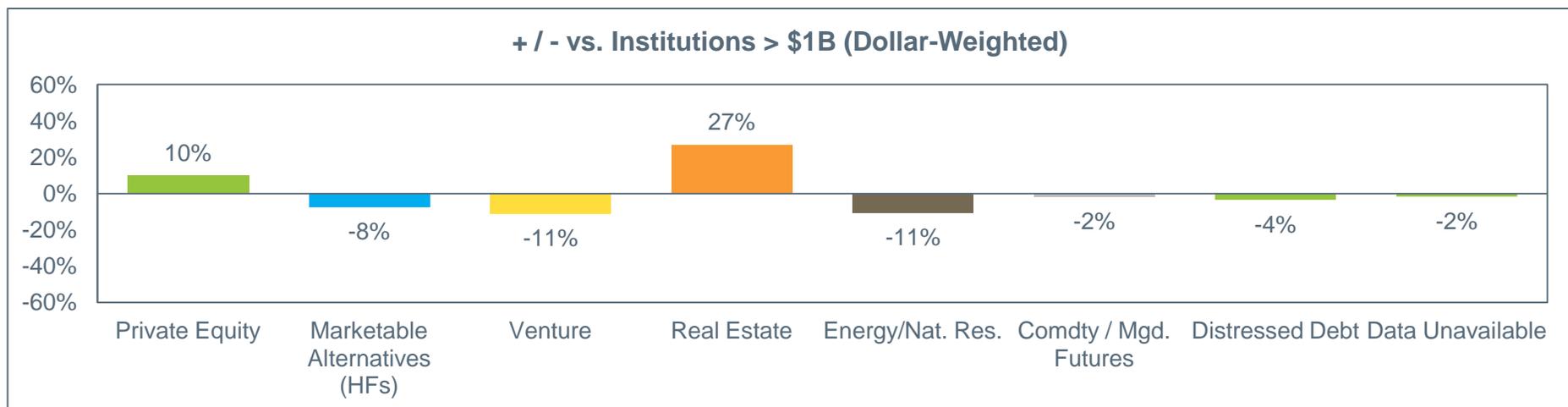
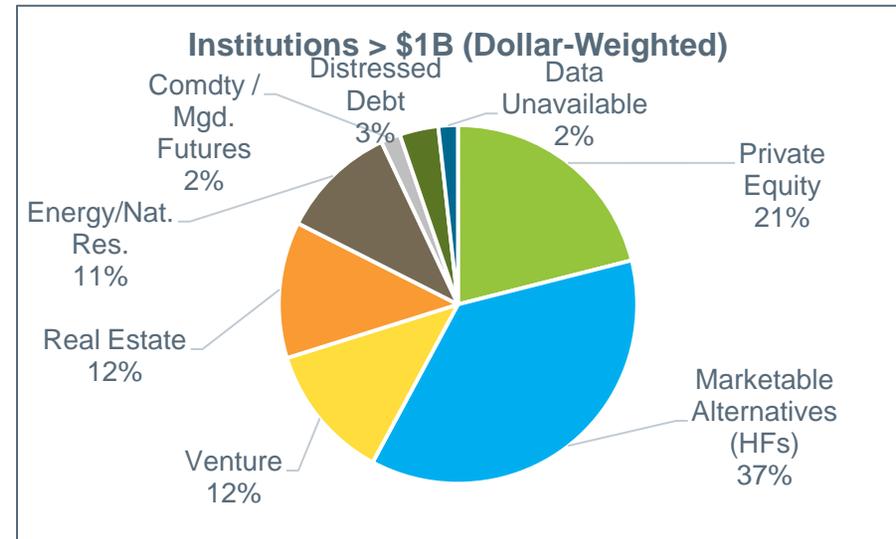
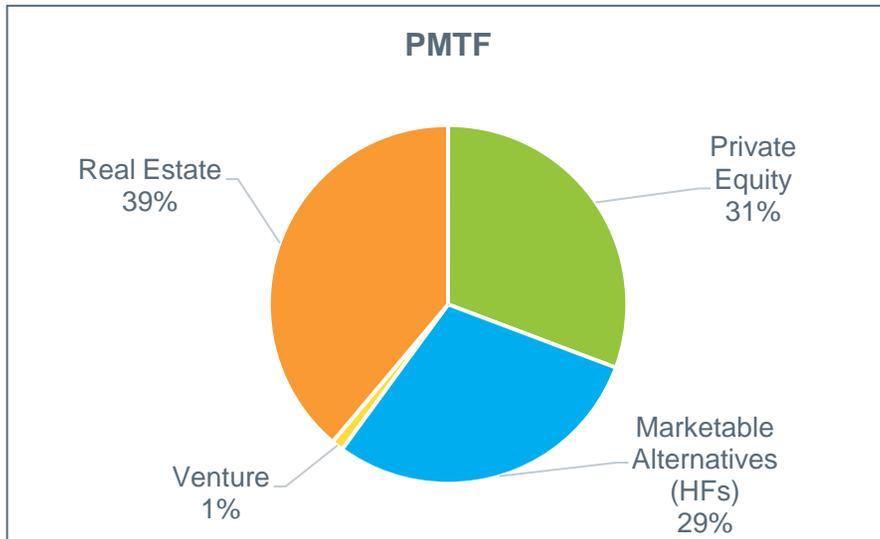


As of June 30, 2015. Performance shown is net of fees. Asset class detail is specific to PMTF.

Fixed Income statistics and performance exclude Convertibles. NACUBO universe performance data is based on an arithmetic average.

Asset Class Detail - Alternatives

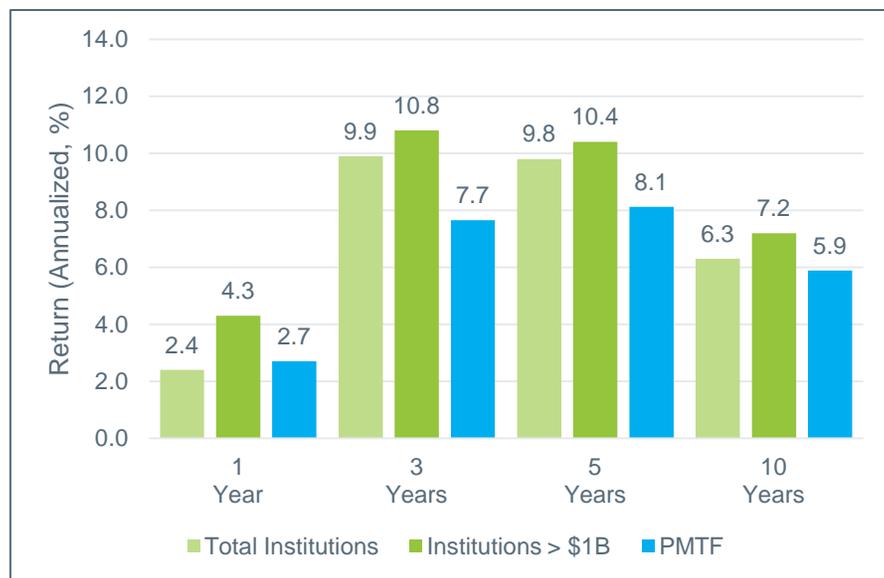
Private Equity and Real Estate make up a larger proportion of the Permanent Mineral Trust Fund's total alternatives allocation relative to the average US higher education endowment fund > \$1B.



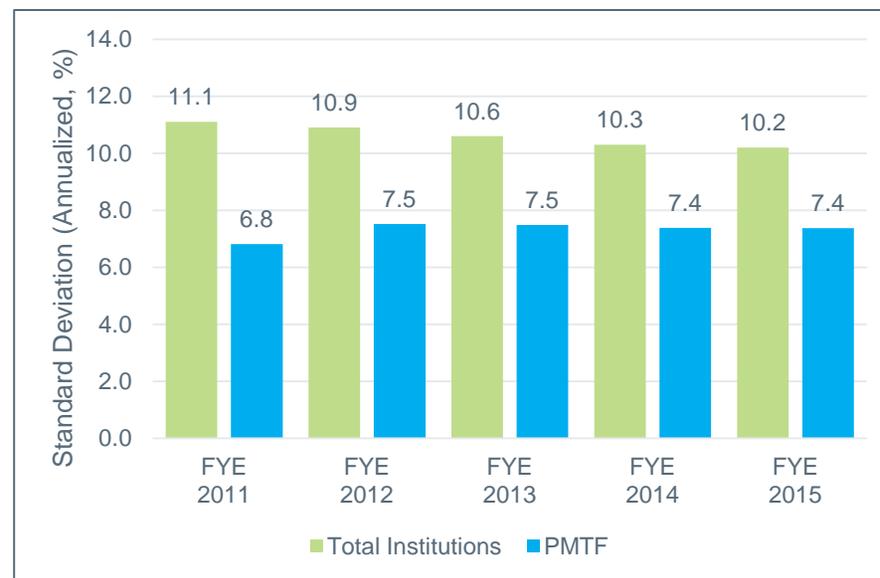
As of June 30, 2015.

Performance

**Performance (Net of Fees)
As of June 30, 2015**



**Standard Deviation
Rolling 10 Years as of June 30, 2015**



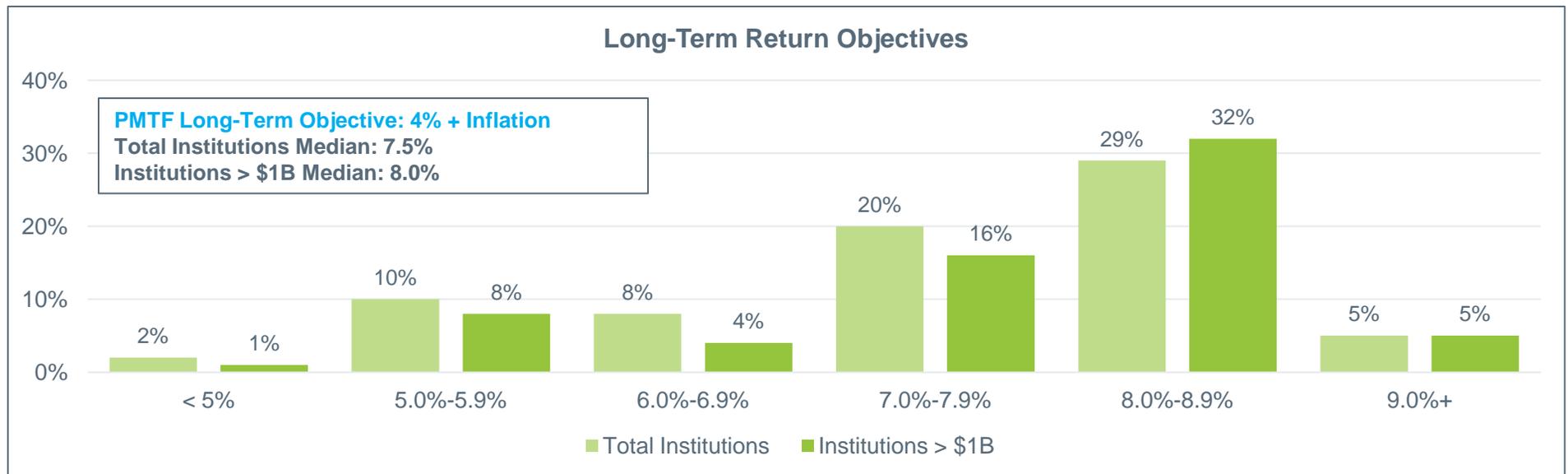
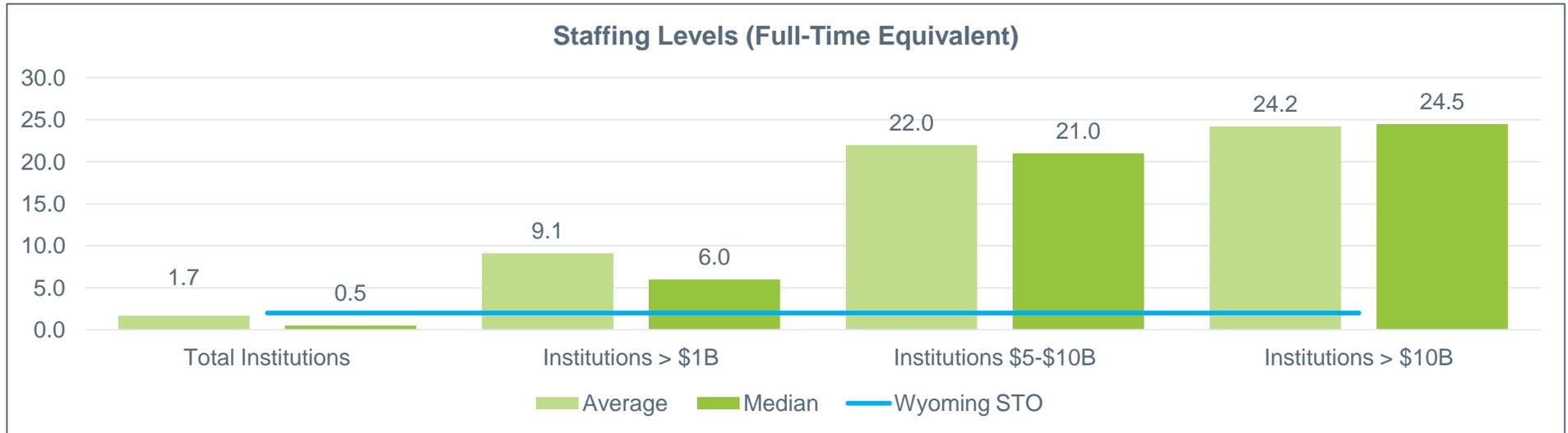
Annual Sharpe Ratios

	FYE 2006	FYE 2007	FYE 2008	FYE 2009	FYE 2010	FYE 2011	FYE 2012	FYE 2013	FYE 2014	FYE 2015
PMTF	1.0	4.8	-0.2	-1.3	1.3	3.4	0.2	2.0	6.7	1.0
Institutions > \$1B	1.9	3.2	-0.2	-1.4	1.0	1.6	0.1	1.7	1.9	0.8
Difference	-0.9	1.6	0.0	0.1	0.3	1.8	0.1	0.4	4.8	0.2

Performance shown is net of fees. PMTF net of fees performance is estimated by applying the gross/net spread for the Wyoming STO Total Fund Composite to each monthly return. NACUBO universe performance data is based on an arithmetic average. Standard deviation information for Institutions > \$1B is unavailable.



Staffing Levels & Long-Term Return Objectives



Full-Time Equivalent Staff included are those that “manage the investment function” of the respective institution.
 Long-Term Return Objective Responses - Total Institutions: 10% “Do not have return objectives” and 16% “No answer/uncertain”
 Institutions > \$1B: 10% “Do not have return objectives” and 24% “No answer/uncertain”



Summary Observations & Common Themes



Summary Observations & Common Themes

1. The Permanent Mineral Trust Fund (“PMTF”) has unique objectives and constraints, some of which are shared by other sovereign wealth funds, endowments, and foundations.
2. Relative to other institutions, PMTF has a larger allocation to fixed income assets, with a smaller allocation to alternatives and public equities.
3. On a risk-adjusted basis, the PMTF compares favorably to other institutions over longer time periods.
4. Due to PMTF’s relatively conservative positioning, PMTF has trailed the median institution during the current equity bull market across the various universes presented.
5. The median staffing levels of institutions with similar asset levels are significantly higher than investment staffing levels for the Wyoming State Treasurer’s Office.