



Water & Power Employees' Retirement Plan

Asset Allocation Study

September 23, 2015

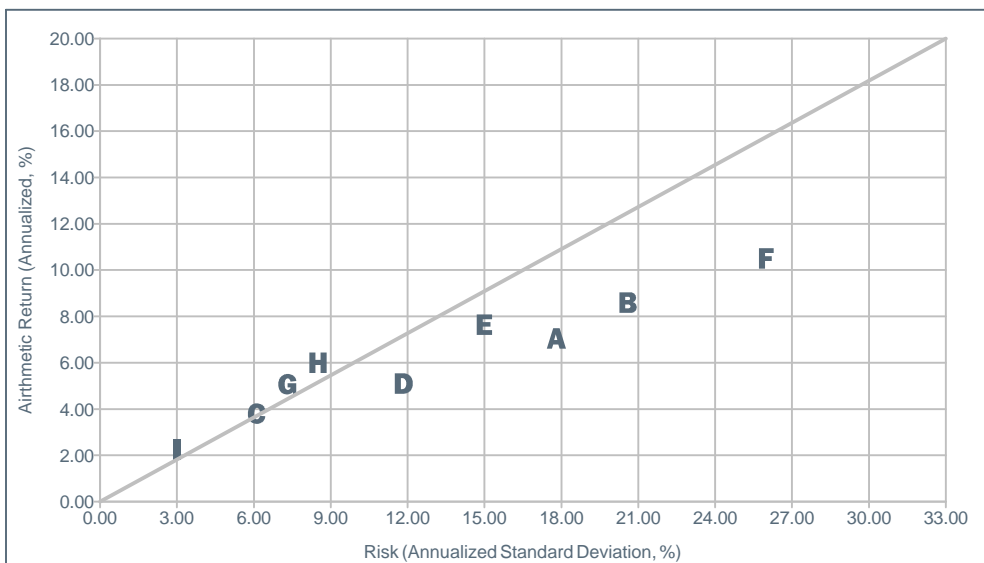


Figure 1 - RVK Assumptions vs. Longest Historical Time Frame

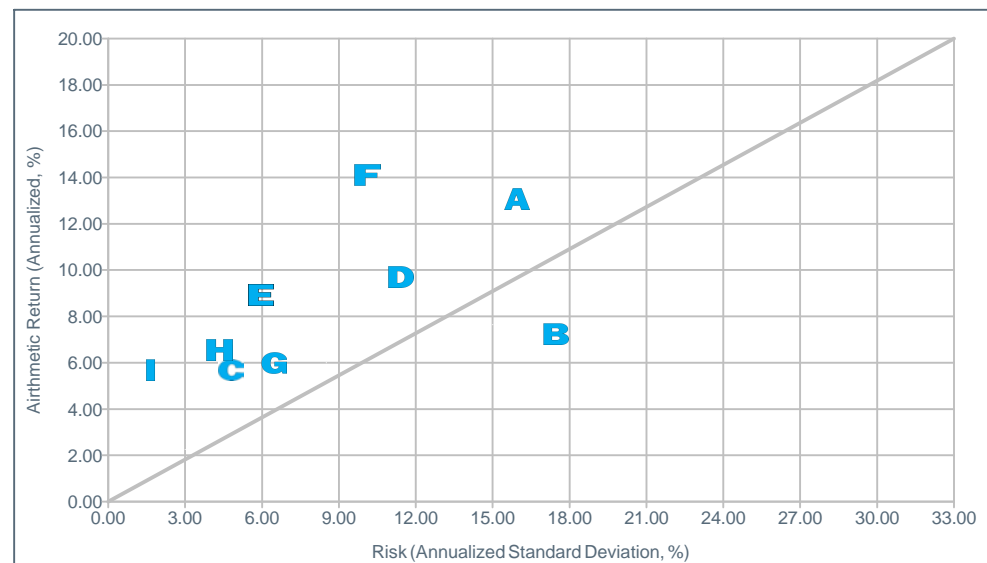
Statistics are calculated based on monthly periodicity, except where noted by a (Q) for quarterly periodicity.

Asset Class	Arithmetic Return Assumption	Standard Deviation Assumption
Broad US Equity	7.05	17.80
Broad International Equity	8.60	20.60
Fixed Income (Custom)	3.80	6.10
Covered Calls (Custom)	5.10	11.85
Real Estate	7.65	15.00
Private Equity	10.50	26.00
Real Return (Custom)	5.07	7.31
Hedge Funds (Custom)	6.00	8.50
Cash Equivalents	2.25	3.00

Index	Longest Historical Time Frame	Annualized Arithmetic Return	Annualized Standard Deviation
Russell 3000	Jan 1979 - Dec 2014	12.62	15.45
MSCI ACW Ex US IMI (Gross)	Jun 1994 - Dec 2014	6.78	16.97
Custom FI Index	Jan 2004 - Dec 2014	5.22	4.30
CBOE S&P 500 Buywrite	Jul 1986 - Dec 2014	9.28	10.93
NCREIF ODCE (Gross) (AWA)	Jan 1978 - Dec 2014 (Q)	8.47	5.46
Cambridge US Private Equity Index	Apr 1986 - Jun 2014 (Q)	13.65	9.63
Custom RR Index	Jan 1997 - Dec 2014	5.55	5.97
HFRI FoF Conservative	Jan 1990 - Dec 2014	6.12	3.85
BofA ML 3 Mo US T-Bill	Jan 1978 - Dec 2014	5.24	1.15



A Broad US **B** Broad IE **C** Fixed Income
H HF **I** Cash



D CC **E** RE **F** Priv. Eq. **G** RR

*See appendix for custom index definitions.



Table 1 - Correlation Matrix

	Broad US Equity	Broad International Equity	Fixed Income (Custom)	Covered Calls (Custom)	Real Estate	Private Equity	Real Return (Custom)	Hedge Funds (Custom)	Cash Equivalents
Broad US Equity	1.00	0.84	0.59	0.89	0.23	0.75	0.22	0.56	0.02
Broad International Equity	0.84	1.00	0.73	0.73	0.26	0.74	0.40	0.66	-0.07
Fixed Income (Custom)	0.59	0.73	1.00	0.58	0.19	0.45	0.62	0.49	-0.04
Covered Calls (Custom)	0.89	0.73	0.58	1.00	0.21	0.67	0.31	0.50	0.01
Real Estate	0.23	0.26	0.19	0.21	1.00	0.58	0.26	0.33	-0.01
Private Equity	0.75	0.74	0.45	0.67	0.58	1.00	0.44	0.79	0.07
Real Return (Custom)	0.22	0.40	0.62	0.31	0.26	0.44	1.00	0.47	0.13
Hedge Funds (Custom)	0.56	0.66	0.49	0.50	0.33	0.79	0.47	1.00	0.16
Cash Equivalents	0.02	-0.07	-0.04	0.01	-0.01	0.07	0.13	0.16	1.00

Table 2 - Historical Performance

Asset Class	Broad US Equity	Broad International Equity	Fixed Income (Custom)	Covered Calls (Custom)	Real Estate	Private Equity	Real Return (Custom)	Hedge Funds (Custom)	Cash Equivalents
Index	Russell 3000	MSCI ACW Ex US IMI (Gross)	Custom FI Index	CBOE S&P 500 Buywrite	NCREIF ODCE (Gross) (AWA)	Cambridge US Private Equity Index	Custom RR Index	HFRI FoF Conservative	BofA ML 3 Mo US T-Bill
1982	20.74				7.45				13.08
1983	22.74				13.24				9.26
1984	3.39				13.68				11.12
1985	32.16				9.36				8.46
1986	16.71				6.73				6.75
1987	1.94			-3.01	6.74	3.73			6.73
1988	17.82			21.02	7.32	12.01			6.93
1989	29.32			25.01	6.71	10.21			8.99
1990	-5.06			3.99	1.41	5.46		14.16	8.42
1991	33.66			24.4	-6.24	10.30		11.77	6.38
1992	9.68			11.52	-5.49	14.87		7.27	3.93
1993	10.87			14.1	0.55	24.23		16.35	3.19
1994	0.18			4.49	6.13	13.41		-1.17	4.19
1995	36.81	7.76		20.97	7.11	24.44		13.06	6.03
1996	21.82	5.30		15.5	11.71	27.48		13.73	5.30
1997	31.78	-3.11		26.64	15.11	31.28	7.74	14.95	5.33
1998	24.14	12.13		18.95	16.42	15.63	-1.33	-1.61	5.23
1999	20.90	37.92		21.17	13.17	43.38	10.18	18.93	4.85
2000	-7.46	-19.39		7.4	14.28	5.64	14.77	5.77	6.18
2001	-11.46	-19.59		-10.92	5.64	-12.00	-4.67	3.11	4.42
2002	-21.54	-12.63		-7.64	5.54	-7.65	14.6	3.57	1.78
2003	31.06	42.66		19.37	9.28	22.22	11.66	9.01	1.15
2004	11.95	22.32	7.03	8.3	13.06	25.95	9.14	5.83	1.33
2005	6.12	18.20	1.3	4.25	21.39	28.41	12.52	5.13	3.07
2006	15.72	26.90	7.19	13.33	16.32	28.71	3.45	9.21	4.85
2007	5.14	16.57	6.25	6.59	15.97	19.53	11.71	7.68	5.00
2008	-37.31	-45.61	-5.5	-28.65	-10.01	-22.32	-8.24	-19.86	2.06
2009	28.34	44.28	18.42	25.91	-29.76	13.40	9.81	9.65	0.21
2010	16.93	13.17	7.68	5.86	16.36	20.38	8.18	5.07	0.13
2011	1.03	-13.94	5.03	5.72	15.99	11.03	2.51	-3.55	0.10
2012	16.42	17.58	8.07	5.2	10.94	13.96	4.16	4.22	0.11
2013	33.57	16.31	1.07	13.26	13.94	20.77	-4.57	7.7	0.10
2014	12.55	-3.47	2.9	5.64	12.48		1.53	3.14	0.04

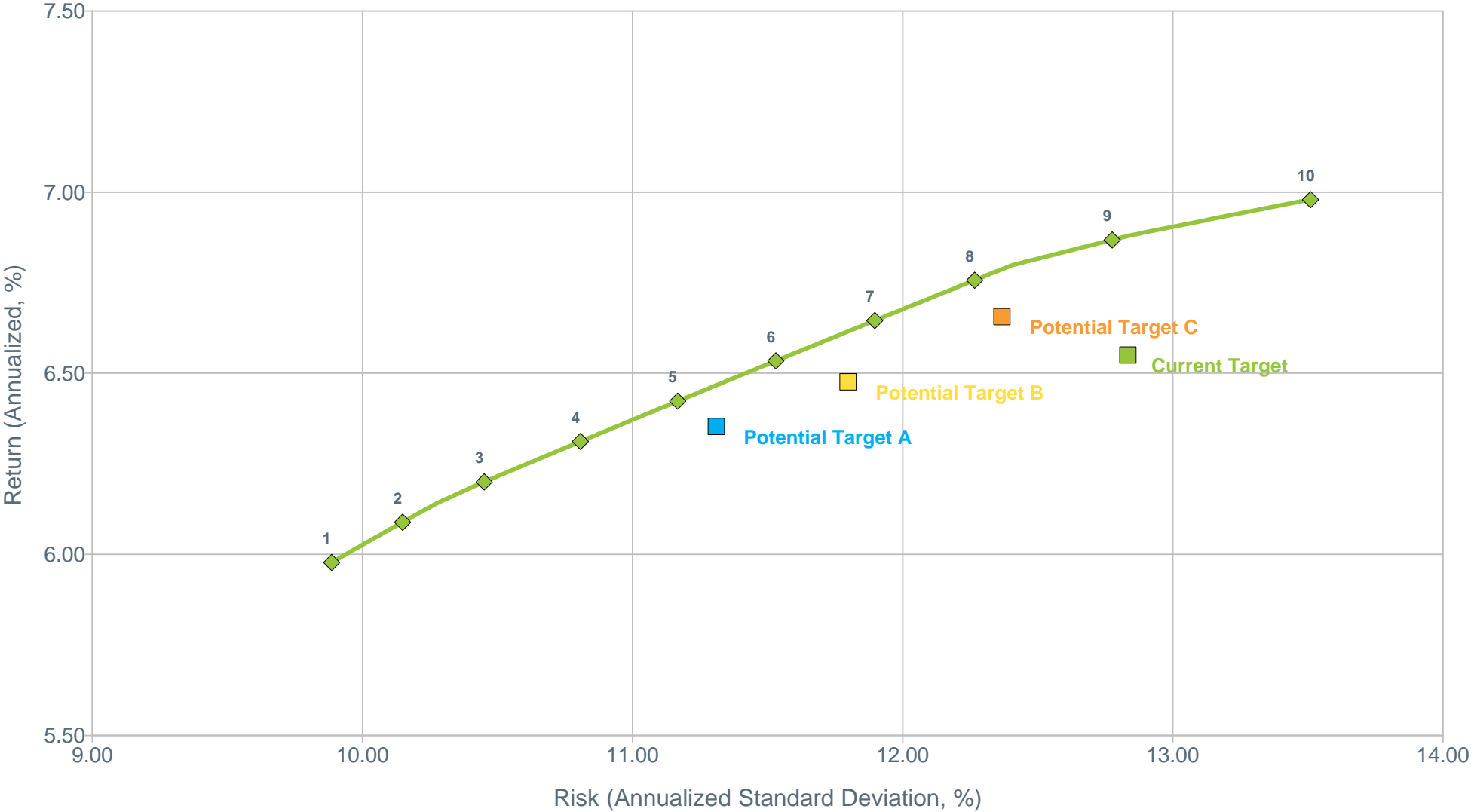
*See appendix for custom index definitions.



Efficient Frontier

The figure below illustrates the relationship between risk and return. The risk of each alternative allocation is plotted against the horizontal axis, while the return is measured on the vertical axis. The line connecting the points represents all the optimal portfolios subject to the given constraints and is known as the "efficient frontier." The upward slope of the efficient frontier indicates the direct relationship between return and risk.

Frontier 1



Efficient Allocations

The table below shows the range of possible optimal allocations given the selected asset classes and constraints listed under "Min" and "Max." This range illustrates the tradeoff between return and risk; additional return can only be achieved by undertaking additional risk.

Frontier 1

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target A	Potential Target B	Potential Target C
Broad US Equity	15	30	15	15	16	17	19	20	22	23	25	30	33	24	27	29
Broad International Equity	15	25	15	15	16	17	19	20	22	23	25	25	21	17	18	19
Fixed Income (Custom)	20	35	35	35	35	32	29	27	24	21	20	20	24	32	29	25
Covered Calls (Custom)	0	8	5	3	0	0	0	0	0	0	0	0	5	0	0	0
Real Estate	5	8	8	8	8	8	8	8	8	8	8	8	5	8	8	8
Private Equity	5	8	5	7	8	8	8	8	8	8	8	8	5	7	7	8
Real Return (Custom)	0	8	8	8	8	8	8	8	8	8	5	0	4	5	5	5
Hedge Funds (Custom)	0	8	8	8	8	8	8	8	8	8	8	8	2	6	5	5
Cash Equivalents	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			40	40	40	43	46	48	51	54	58	63	64	48	52	56
Capital Preservation			36	36	36	33	30	28	25	22	21	21	25	33	30	26
Alpha			8	8	8	8	8	8	8	8	8	8	2	6	5	5
Inflation			16	16	16	16	16	16	16	16	13	8	9	13	13	13
Expected Return			6.0	6.1	6.2	6.3	6.4	6.5	6.7	6.8	6.9	7.0	6.6	6.4	6.5	6.7
Risk (Standard Deviation)			9.9	10.2	10.5	10.8	11.2	11.5	11.9	12.3	12.8	13.5	12.8	11.3	11.8	12.4
Return (Compound)			5.5	5.6	5.7	5.8	5.8	5.9	6.0	6.1	6.1	6.2	5.8	5.8	5.9	6.0
Return/Risk Ratio			0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.5
RVK Exp Eq Beta (LCUS Eq = 1)			0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
RVK Liquidity Metric (T-Bills = 100)			71	69	68	68	69	69	70	70	71	72	79	71	72	72

Broad International Equity cannot exceed Broad US Equity. Please see the Glossary for statistics descriptions.

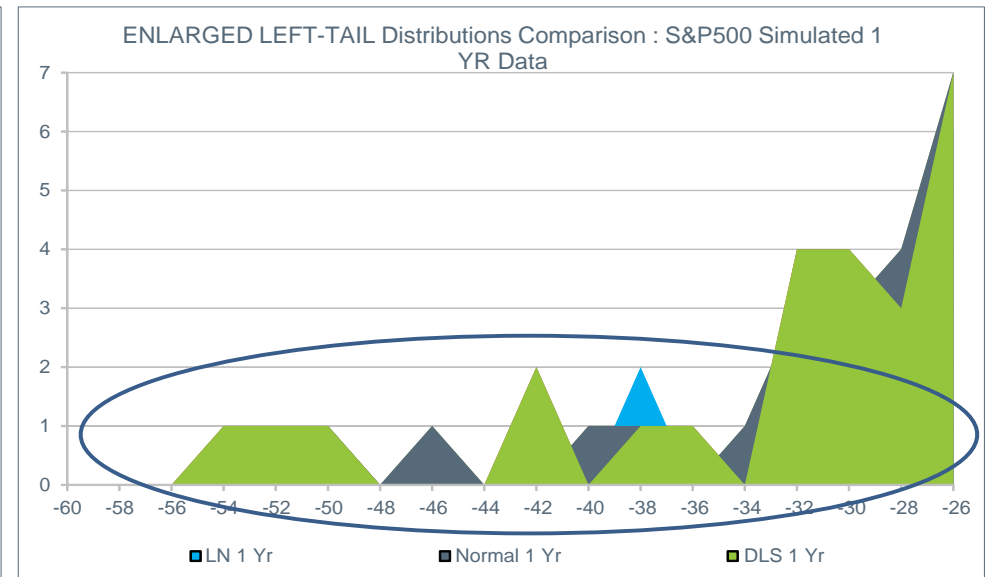
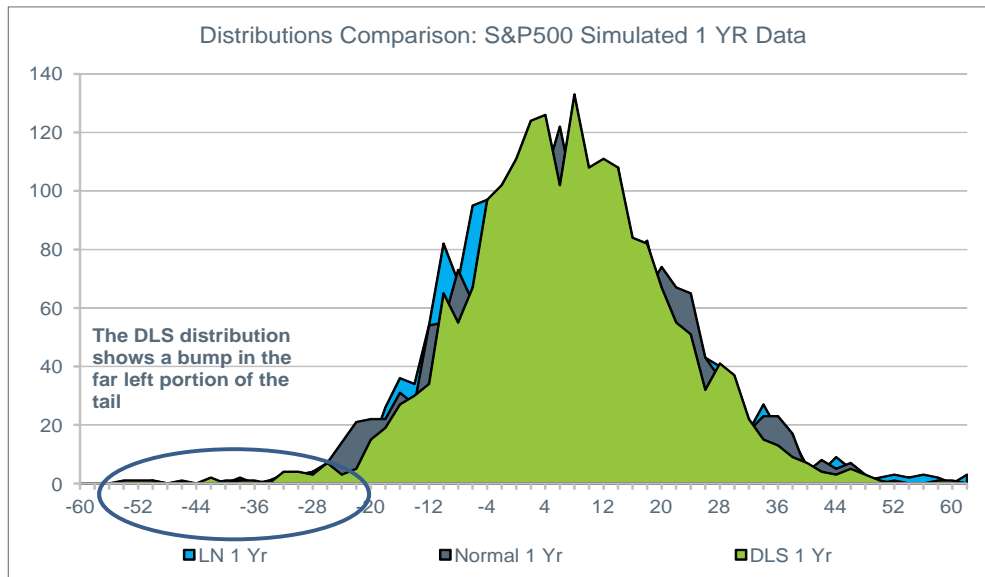
Monte Carlo Simulation

Monte Carlo simulation uses a random sampling of asset class returns, based on the probability distribution implied by the empirical returns, to create several thousand estimates of portfolio performance. Undergoing a Monte Carlo simulation provides insight into the performance of the asset allocation by examining many randomly sampled return outcomes.

An asset allocation study allows for the construction of an "efficient," or return-maximizing, portfolio of asset class investments at each given level of portfolio volatility. These calculations are based on expected return, risk, and correlations for each asset class. The asset allocation process provides a snapshot of portfolio performance that is highly dependent on the mean return expectations. A Monte Carlo simulation process "stress tests" these assumptions and asset allocation recommendations that stem from them through thousands of independent samplings of portfolio returns, based on the assumptions and indicated asset allocations. Through the Monte Carlo simulation process, we are better able to ascertain the real-world probability of achieving various return targets over time.

Our Monte Carlo simulation model assumes a non-normal (downside log-stable (DLS), or "fat-tailed") distribution of returns, which we believe provides a more realistic representation of historical market experience than the typically used normal or log-normal (LN) distribution. Given this non-normal distribution of random returns derived from our assumption inputs and empirical return dispersion, we can estimate the potential return for a given portfolio over the indicated time period. The charts below illustrate the differences between the above mentioned distributions.

It is important to note that the output that follows refers to geometric (compound) return, rather than the arithmetic return assumptions used in the asset allocation analysis. The geometric return of a portfolio will be less than (or equal to) its arithmetic return over time, because geometric return accounts for the dampening effect of volatility on the portfolio's compound returns.



The table below shows the expected return by percentile for each portfolio on Frontier 1 for the 1, 3, 5, and 10 year periods.

1 Year	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target A	Potential Target B	Potential Target C
1st Percentile	-21.6	-21.4	-21.8	-22.6	-23.6	-24.7	-25.6	-26.6	-28.2	-30.2	-29.7	-24.4	-25.8	-27.3
5th Percentile	-9.0	-9.0	-9.3	-9.8	-10.3	-10.9	-11.4	-11.9	-12.7	-13.8	-13.7	-10.9	-11.7	-12.5
25th Percentile	0.6	0.6	0.5	0.4	0.3	0.1	-0.1	-0.2	-0.4	-0.9	-1.0	0.0	-0.3	-0.5
50th Percentile	6.2	6.3	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.1	6.6	6.4	6.6	6.7
75th Percentile	11.8	12.0	12.3	12.7	13.0	13.4	13.7	14.1	14.6	15.2	14.5	13.1	13.6	14.2
95th Percentile	20.1	20.3	20.9	21.7	22.5	23.2	24.0	24.8	25.8	27.3	26.2	23.0	24.1	25.3
99th Percentile	26.7	27.4	28.2	29.2	30.4	31.4	32.5	33.7	35.1	37.1	35.7	31.2	32.7	34.3
3 Years														
1st Percentile	-11.16	-11.08	-11.14	-11.63	-12.13	-12.71	-13.27	-14.08	-14.87	-16.39	-16.51	-13.00	-13.74	-14.70
5th Percentile	-3.90	-3.86	-3.91	-4.24	-4.55	-4.89	-5.21	-5.54	-6.05	-6.85	-7.08	-5.04	-5.53	-6.00
25th Percentile	2.58	2.62	2.61	2.53	2.46	2.40	2.33	2.24	2.09	1.81	1.58	2.22	2.07	1.98
50th Percentile	6.02	6.11	6.17	6.27	6.35	6.44	6.52	6.60	6.70	6.73	6.39	6.28	6.35	6.47
75th Percentile	9.30	9.43	9.60	9.83	10.08	10.33	10.58	10.83	11.12	11.47	10.97	10.15	10.45	10.83
95th Percentile	14.07	14.32	14.66	15.10	15.56	16.03	16.49	16.94	17.50	18.36	17.64	15.77	16.42	17.13
99th Percentile	17.40	17.71	18.25	18.84	19.50	20.10	20.69	21.43	22.23	23.42	22.51	19.84	20.76	21.73
5 Years														
1st Percentile	-7.96	-7.79	-7.54	-8.06	-8.60	-9.14	-9.62	-10.10	-10.72	-12.00	-11.99	-9.33	-9.85	-10.47
5th Percentile	-2.03	-1.96	-2.00	-2.24	-2.47	-2.77	-3.07	-3.37	-3.77	-4.39	-4.56	-2.93	-3.30	-3.65
25th Percentile	3.03	3.09	3.12	3.07	3.04	2.99	2.96	2.89	2.80	2.60	2.30	2.83	2.71	2.67
50th Percentile	5.93	6.02	6.10	6.19	6.27	6.36	6.45	6.54	6.61	6.64	6.25	6.18	6.29	6.42
75th Percentile	8.56	8.69	8.85	9.05	9.25	9.46	9.66	9.87	10.11	10.41	9.90	9.27	9.53	9.83
95th Percentile	12.15	12.38	12.68	13.06	13.43	13.80	14.20	14.58	15.06	15.68	15.04	13.57	14.07	14.65
99th Percentile	14.81	15.09	15.49	15.96	16.42	16.92	17.43	17.96	18.63	19.55	18.68	16.71	17.47	18.20
10 Years														
1st Percentile	-4.37	-4.24	-4.23	-4.63	-4.92	-5.26	-5.50	-5.86	-6.58	-7.63	-7.82	-5.44	-5.90	-6.31
5th Percentile	0.03	0.07	0.09	-0.10	-0.27	-0.45	-0.62	-0.84	-1.09	-1.55	-1.77	-0.55	-0.85	-1.09
25th Percentile	3.67	3.75	3.78	3.77	3.76	3.75	3.72	3.70	3.64	3.48	3.18	3.57	3.51	3.52
50th Percentile	5.76	5.85	5.95	6.02	6.10	6.17	6.25	6.33	6.40	6.41	6.05	6.01	6.08	6.20
75th Percentile	7.68	7.79	7.93	8.10	8.28	8.45	8.62	8.78	8.96	9.18	8.72	8.25	8.46	8.73
95th Percentile	10.39	10.57	10.77	11.06	11.35	11.64	11.94	12.24	12.56	12.99	12.43	11.42	11.80	12.21
99th Percentile	12.19	12.39	12.72	13.10	13.46	13.83	14.19	14.55	15.02	15.59	14.95	13.55	14.06	14.62

Please see the Monte Carlo introduction for more information about assumed distribution.

The table below shows the **percentage** chance of achieving or exceeding the given return for each portfolio on Frontier 1 for the 1, 3, 5, and 10 year periods.

1 Year	1	2	3	4	5	6	7	8	9	10	Current Target	Potential Target A	Potential Target B	Potential Target C
Target 5.5%	53	54	54	54	54	55	55	55	55	55	54	54	54	55
Target 6%	51	51	52	52	52	53	53	53	53	54	52	52	52	53
Target 6.5%	49	49	49	50	50	50	51	51	51	52	51	50	50	51
Target 7%	46	47	47	47	48	48	49	49	50	50	49	48	48	49
Target 7.5%	44	45	45	45	46	47	47	47	48	48	47	46	46	47
Target 8%	41	42	43	43	44	44	45	46	46	47	45	44	44	45
3 Years														
Target 5.5%	54	55	55	56	56	56	57	57	57	57	55	55	56	56
Target 6%	50	51	51	52	53	53	53	54	54	54	52	52	52	53
Target 6.5%	46	47	47	48	49	50	50	51	51	51	49	48	49	50
Target 7%	42	43	44	45	45	46	47	48	48	49	47	45	46	47
Target 7.5%	38	39	40	41	42	43	44	44	45	46	44	42	43	44
Target 8%	35	35	36	38	38	39	40	41	42	43	41	38	39	41
5 Years														
Target 5.5%	54	55	55	56	56	57	57	58	58	58	55	56	56	56
Target 6%	49	50	51	52	52	53	54	54	54	54	52	52	52	53
Target 6.5%	45	46	46	47	48	49	49	50	51	51	48	47	48	49
Target 7%	40	41	42	43	44	45	46	46	47	47	45	43	44	45
Target 7.5%	35	36	37	38	40	41	42	42	43	44	41	39	40	42
Target 8%	30	31	32	34	35	36	38	39	40	41	38	35	37	38
10 Years														
Target 5.5%	54	55	56	56	57	58	58	59	59	58	55	56	56	57
Target 6%	47	48	49	50	51	52	53	53	54	54	51	50	51	52
Target 6.5%	40	41	42	44	45	46	47	48	49	49	46	44	45	47
Target 7%	33	35	36	38	39	40	41	43	44	44	40	38	40	41
Target 7.5%	27	29	30	32	33	35	36	37	38	40	36	33	34	36
Target 8%	22	23	24	26	28	30	31	32	34	35	31	28	29	31

Appendix

Definition of terms used in this analysis:

Asset Allocation is a systematic analysis of the properties of specified asset classes to determine the allocation of those assets that meet the return targets of a portfolio.

Correlation is a statistical measure of the relationship between asset class returns. A value of 1.00 is a perfect correlation; that is, the asset classes always move in the same direction. A value of -1.00 indicates a perfect negative correlation, in which the asset classes always move in opposite directions of each other. A value of 0 indicates there is no relationship between the direction of returns of the two asset classes. Correlation calculations only consider the direction of changes relative to two variables and not the magnitude of those changes.

The **Efficient Frontier** is the set of portfolios that minimizes risk at given target levels of return. This process takes into account the risk, return and correlation of the asset classes to arrive at the most efficient set of portfolios.

Expected Equity Beta is a measure of the sensitivity of a portfolio to movements in the Large/Mid Cap US Equity market. It is a measure of a portfolio's non-diversifiable or systematic risk.

Performance Expectation is the best estimate of the average annual percentage increase in the value of an asset class over the next ten years.

Risk is quantified by the *standard deviation* of returns. Also known as the volatility of returns, it provides a statistical range of performance relative to the average expectations. With this measure, we can establish a level of "confidence" about the expected range of returns for the portfolios.

RVK Liquidity Metric is a qualitative method for determining the relative amount of liquidity in a portfolio. The characteristics considered when determining relative liquidity include trading volume, gates for redemption, leverage, nature of transactions, and pricing mechanisms. The RVK Liquidity Metric is calculated using investment weights applied to each corresponding asset class liquidity rating. See next page for more details.

Thematic Classification - Represents dedicated manager allocations; as such, thematic allocations are approximations. RVK categorizes asset classes as Alpha, Capital Appreciation, Capital Preservation, and Inflation as displayed in the table on the next page.

Custom Index Definitions:

Custom Non-Core Real Estate Index = April 1, 2013 to Present = NCREIF-CEVA Index, Prior to April 1, 2013 = 70% NCREIF Townsend Value Added + 30% NCREIF Townsend Opportunistic

Custom Diversified Inflation Strategies Index = 1/3 Barclays US TIPS + 1/3 Bloomberg Commodity + 1/3 MSCI Global Real Estate (Gross)

Custom GTAA Index = 60% MSCI ACW IMI (Gross) + 40% Barclays US Aggregate Bond Index

Asset Class	Thematic Bucket	Liquidity Bucket	RVK Liquidity Metric
Broad US Equity	Capital Appreciation	Liquid	95
Large/Mid Cap US Equity	Capital Appreciation	Liquid	95
Broad International Equity	Capital Appreciation	Liquid	90
Dev'd Large/Mid Cap Int'l Equity	Capital Appreciation	Liquid	90
Global Equity	Capital Appreciation	Liquid	90
Dev'd Small Cap Int'l Equity	Capital Appreciation	Liquid	85
Emerging Markets Equity	Capital Appreciation	Liquid	85
Small Cap US Equity	Capital Appreciation	Liquid	85
Convertibles	Capital Appreciation	Liquid	80
Distressed Debt	Capital Appreciation	Less Liquid	50
Emerging Markets Debt (Local and Hard)	Capital Appreciation	Less Liquid	50
High Yield Fixed Income	Capital Appreciation	Less Liquid	50
Non-Core Real Estate	Capital Appreciation	Not Liquid	5
Private Equity	Capital Appreciation	Not Liquid	5
T-Bills and Treasurys	Capital Preservation	Liquid	100
Cash Equivalents	Capital Preservation	Liquid	98
Int. Duration Fixed Income	Capital Preservation	Liquid	85
Long Duration Fixed Income	Capital Preservation	Liquid	85
Low Duration Fixed Income	Capital Preservation	Liquid	85
Stable Value	Capital Preservation	Less Liquid	50
Non-US Dev'd Sovereign Fixed Income UH	Capital Preservation	Less Liquid	50
GTAA	Alpha	Liquid	88
Diversified Hedge Funds	Alpha	Less Liquid	35
Equity Market Neutral	Alpha	Less Liquid	35
Long-Biased Long/Short Equity	Alpha	Less Liquid	35
Managed Futures FoF	Alpha	Less Liquid	35
Commodities	Inflation	Liquid	98
TIPS	Inflation	Liquid	95
Diversified Inflation Strategies	Inflation	Liquid	93
Global REITs	Inflation	Liquid	85
Bank Loans	Inflation	Less Liquid	50
Core Real Estate	Inflation	Not Liquid	25
Infrastructure	Inflation	Not Liquid	5
Timber	Inflation	Not Liquid	5

PORTLAND

CHICAGO

NEW YORK

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