

April 8, 2021

Wyoming State Loan & Investment Board

Asset Allocation Recommendations



Capital Market Assumptions



Themes for 2021 Capital Markets Assumptions

Inflation

Past and future inflation levels are studied and considered given market conditions, break-even indications, sovereign intervention, and inflation component pricing behavior. *The 2021 inflation assumption remained the same at 2.0%, given ongoing debt and demographic issues – though new potentially inflationary policy considerations are being monitored closely.*

Mean-reversion

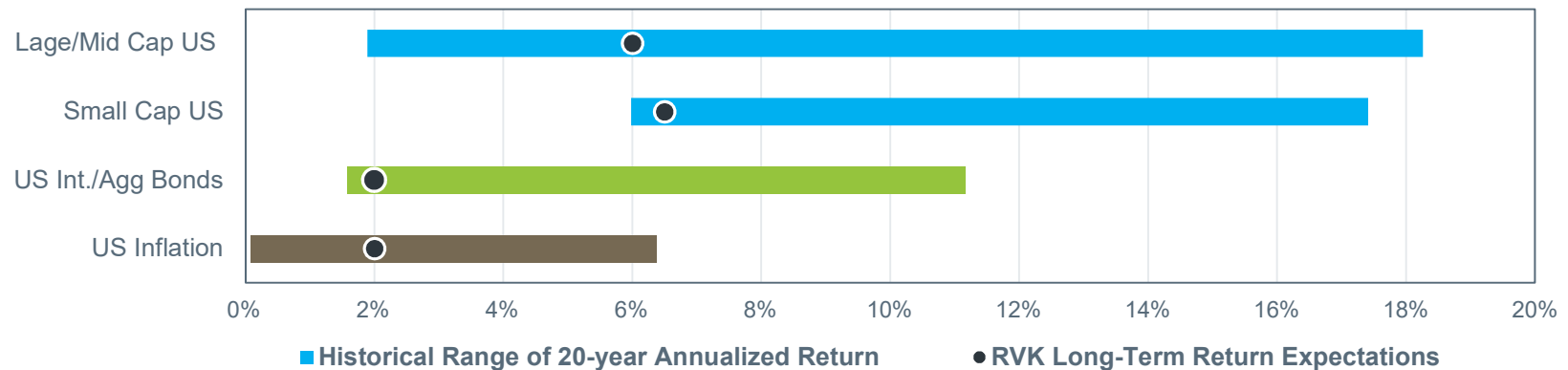
Mean reversion is considered for asset classes that demonstrated strong performance over the last year (or longer). *All equity return assumptions were decreased, given the historically elevated valuation levels and reduced dividend yields.*

Low yields

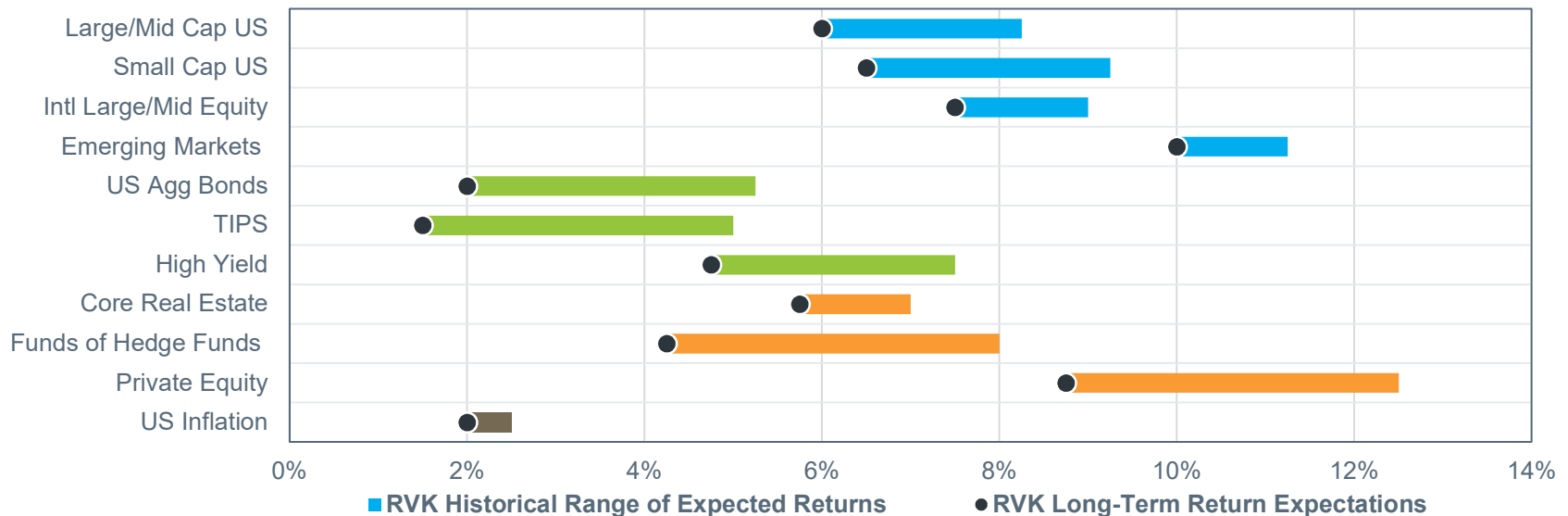
Yield history, current environment, and prospective environments are considered. *The majority of the fixed income return assumptions were decreased, given historically low starting yields and reduced spreads.*

Historical Perspective of Expected Returns

RVK Long-Term Expected Returns vs. Historical Range of Returns¹



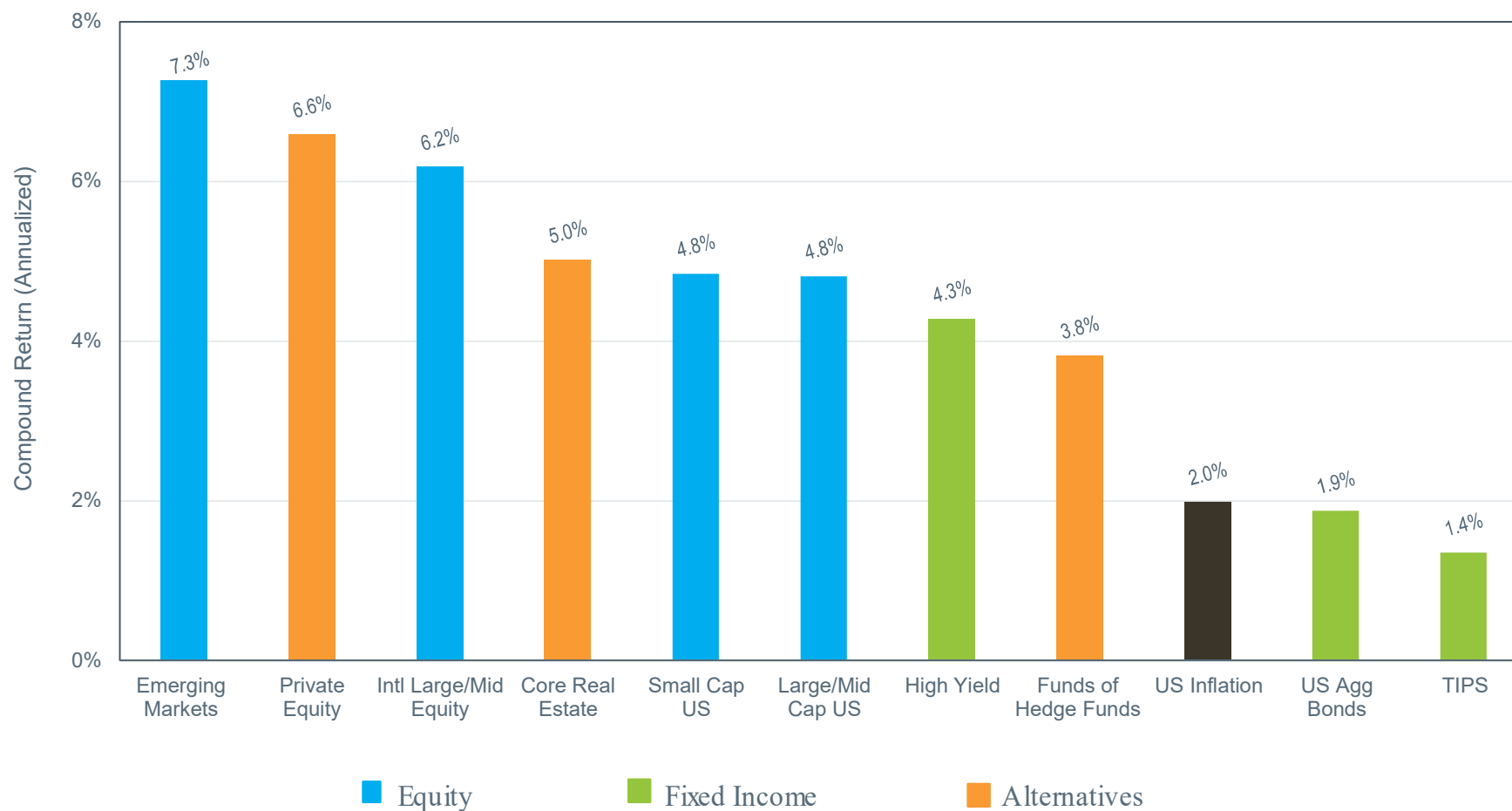
2021 Expected Returns vs. RVK Historical Range of Expected Returns²



¹ Historical range shows the minimum and maximum 20-year annualized return for a given asset class based on monthly rolling 20-year annualized return series starting from Jan 1926. Large/Mid Cap US is represented by S&P 500 US Large Stock; Small Cap US by S&P 500 US Small Stock; US Int./Agg Bonds by S&P 500 US Intermediate Government Bond Index; and US Inflation by S&P 500 US Inflation.

² Data shown includes 2007 through 2021 Capital Market Assumptions for selected asset classes.

RVK 2021 Compound Return Assumptions



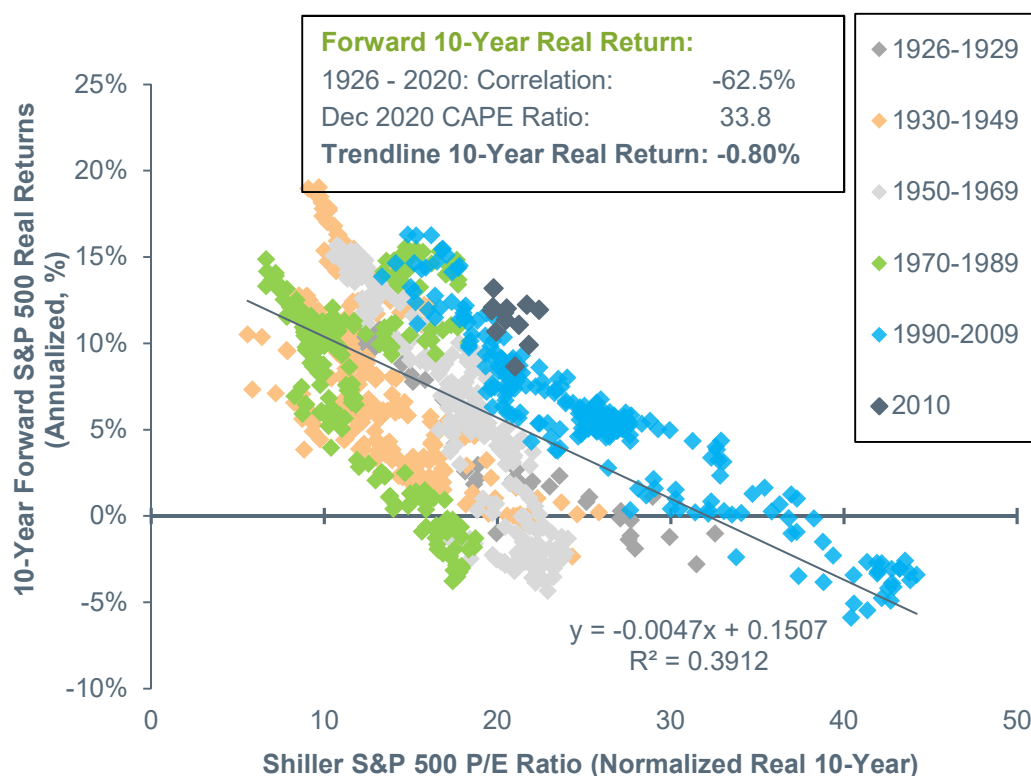
Summary of Expected Return Methodology

Building Block Methodology	Income	+	Inflation	+	Real Growth	+ -	Valuation Change
Cash Equivalents	Income						
Fixed Income	Income + OAS change + Expected interest rate changes (and duration impact)						
TIPS	Real Income + Inflation						
Public Equity	Income + Inflation + Real GDP/earnings growth + / - Valuation						
Core Real Estate	Income + Inflation + / - Valuation – Investment fees						
Hedge Funds	Income (collateral return, cash) + Beta return + Alpha return						
Commodities	Collateral return (cash assumption) + Spot return (inflation assumption) + Roll return						
Spread Methodology	Beta assumption	+	Illiquidity premium				
Private Credit	Bank loan assumption + Return premium						
Private Equity	US large/mid cap equity assumption + Return premium						
Asset Blend Methodology							
GTAA	30% global equity + 25% US Agg fixed income + 5% int'l developed fixed income + 10% EMD (local) + 10% TIPS + 10% high yield + 10% commodities						
Diversified Inflation Strategies	1/3 TIPS + 1/3 commodities + 1/3 global REITs						

While the above factors generally inform the direction and magnitude of the capital market assumptions, RVK also considers qualitative, triangulation, and other factors as needed, when arriving at final assumption values.

Public Equity – US

Public Equity: US									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
Large/Mid Cap US	7.25%	16.00%	6.08%	6.00%	16.00%	4.81%	-1.25%	--	-1.26%
Small Cap US	8.50%	19.00%	6.87%	6.50%	19.00%	4.84%	-2.00%	--	-2.03%
Broad US Equity	7.30%	16.00%	6.13%	6.05%	16.05%	4.86%	-1.25%	+0.05%	-1.27%



- Decreased all US equity return forecasts relative to Q1 2020.
- The decrease was largely valuation driven, as year-end equity valuations were significantly elevated following the very strong rally to finish the year, and despite the initial COVID drop in Q1 2020.
- The decrease also reflected lower starting dividend yield as compared to the historical averages.
- Current return assumptions remain lower than historical averages.

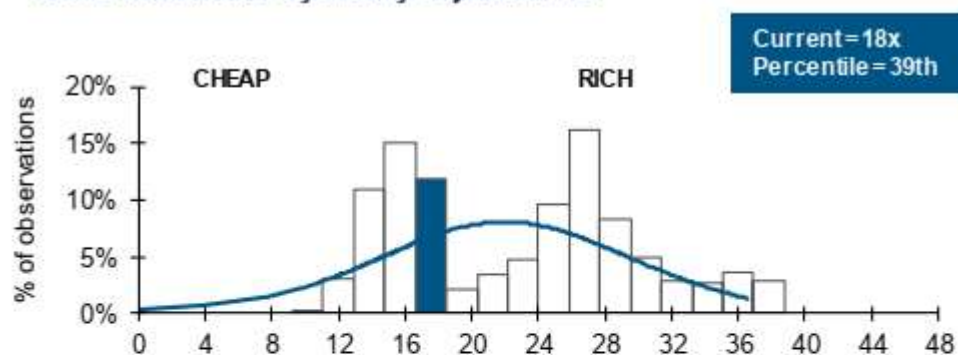
RVK Broad US Equity assumption is a combination of 92.9% Large/Mid Cap US Equity and 7.1% Small Cap US Equity.

Chart Source: RVK, based on data from the Robert Shiller Database (2020). December 2020 CAPE ratio uses the S&P 500 earnings estimate for the fourth quarter of 2020.

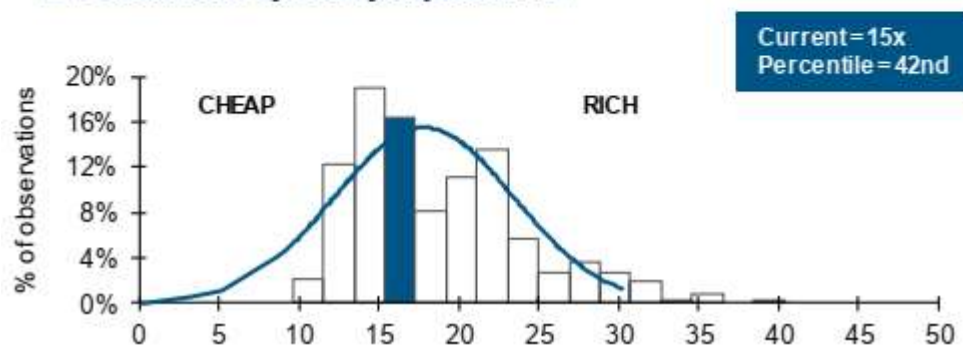
Public Equity – International

Public Equity: International									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
Intl Large/Mid Equity	9.00%	17.00%	7.70%	7.50%	17.00%	6.18%	-1.50%	--	-1.52%
Dev'd Small Cap	10.00%	20.00%	8.23%	8.00%	20.00%	6.19%	-2.00%	--	-2.03%
Emerging Markets	11.25%	25.00%	8.54%	10.00%	25.00%	7.26%	-1.25%	--	-1.28%
Broad International	9.70%	18.30%	8.20%	8.30%	18.80%	6.70%	-1.40%	+0.50%	-1.50%

EAFE valuations: Cyclically-adjusted P/E



EM valuations: Cyclically-adjusted P/E



- Decreased international equity assumptions due to significantly lower dividend yields, as well as regional inflation and currency considerations, but also some valuation impact.
- However, valuation levels that include longer historical periods, such as those in the chart shown, suggest potentially more attractive levels for both Int'l Developed and Emerging Markets.
- Risk assumption for broad international equity increased due to emerging markets continuing to become a larger segment of the broad market.

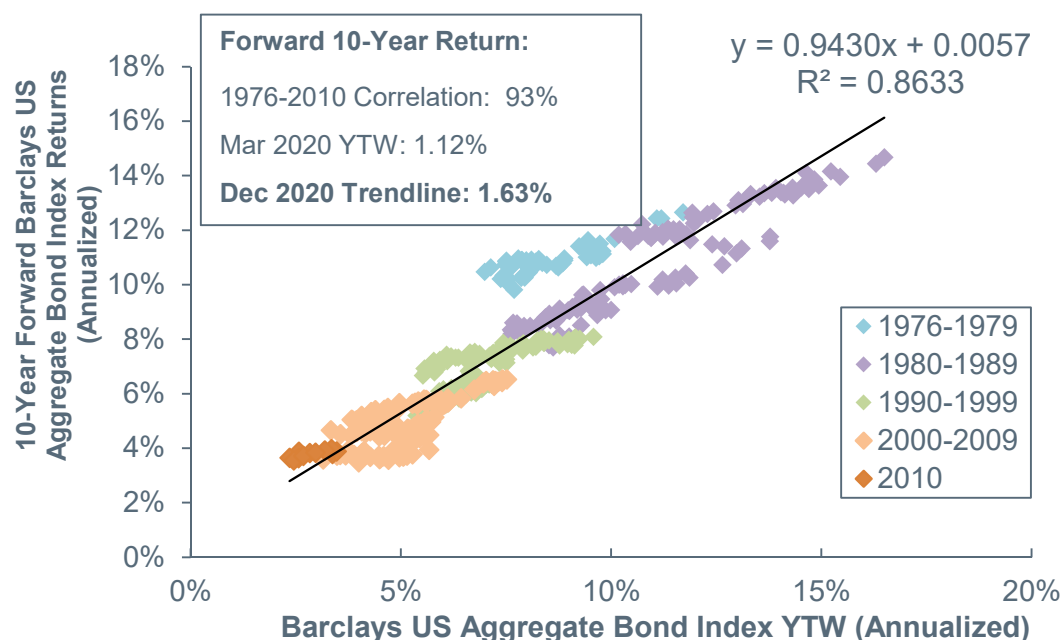
RVK Broad International equity is a combination of 64.0% Dev'd Large/Mid Cap Int'l Equity, 10.7% Dev'd Small Cap Int'l Equity, and 25.3% Emerging Markets Equity.

Source: Research Affiliates (RA); EAFE valuations represented by MSCI EAFE CAPE calculations by RA since December 1982; EM represented by MSCI EM CAPE calculations by RA since Jan 1990. Data as of December 31, 2020.

Fixed Income

Fixed Income									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
US Aggregate	2.50%	5.00%	2.38%	2.00%	5.00%	1.88%	-0.50%	--	-0.50%
Non-US Dev. Sovereign	1.25%	8.50%	0.90%	1.00%	8.50%	0.64%	-0.25%	--	-0.25%
Low Duration	2.00%	2.50%	1.97%	1.50%	2.50%	1.47%	-0.50%	--	-0.50%
Long Duration	3.00%	10.00%	2.52%	2.50%	10.00%	2.02%	-0.50%	--	-0.50%
TIPS	2.50%	5.50%	2.35%	1.50%	5.50%	1.35%	-1.00%	--	-1.00%

Relationship between YTW and Forward 10 Year Returns

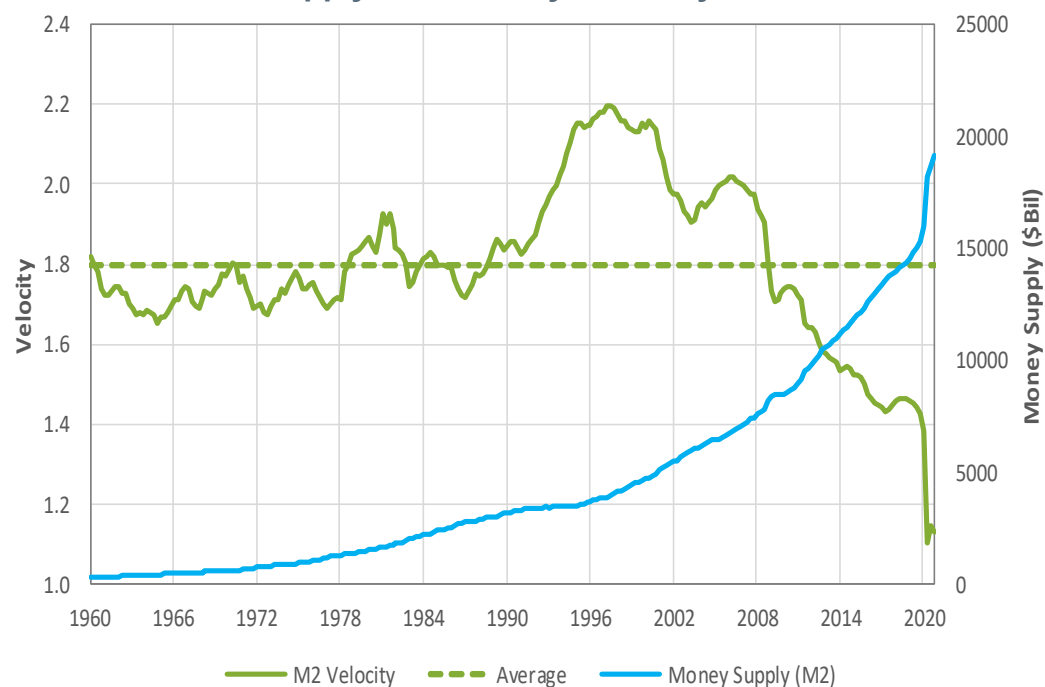


- The initial yield has historically been a reasonable starting point when forecasting future fixed income returns.
- Therefore, most bond return assumptions decreased due to historically low starting yields.
- Reduced spreads and elevated durations (combined with the potential for rising rates) also negatively impacted the return forecasts.

US Inflation & Cash Equivalents

US Inflation & Cash Equivalents									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
US Inflation	2.00%	1.50%	1.99%	2.00%	1.50%	1.99%	--	--	--
Cash Equivalents	1.50%	2.00%	1.48%	1.50%	2.00%	1.48%	--	--	--

Supply and Velocity of Money

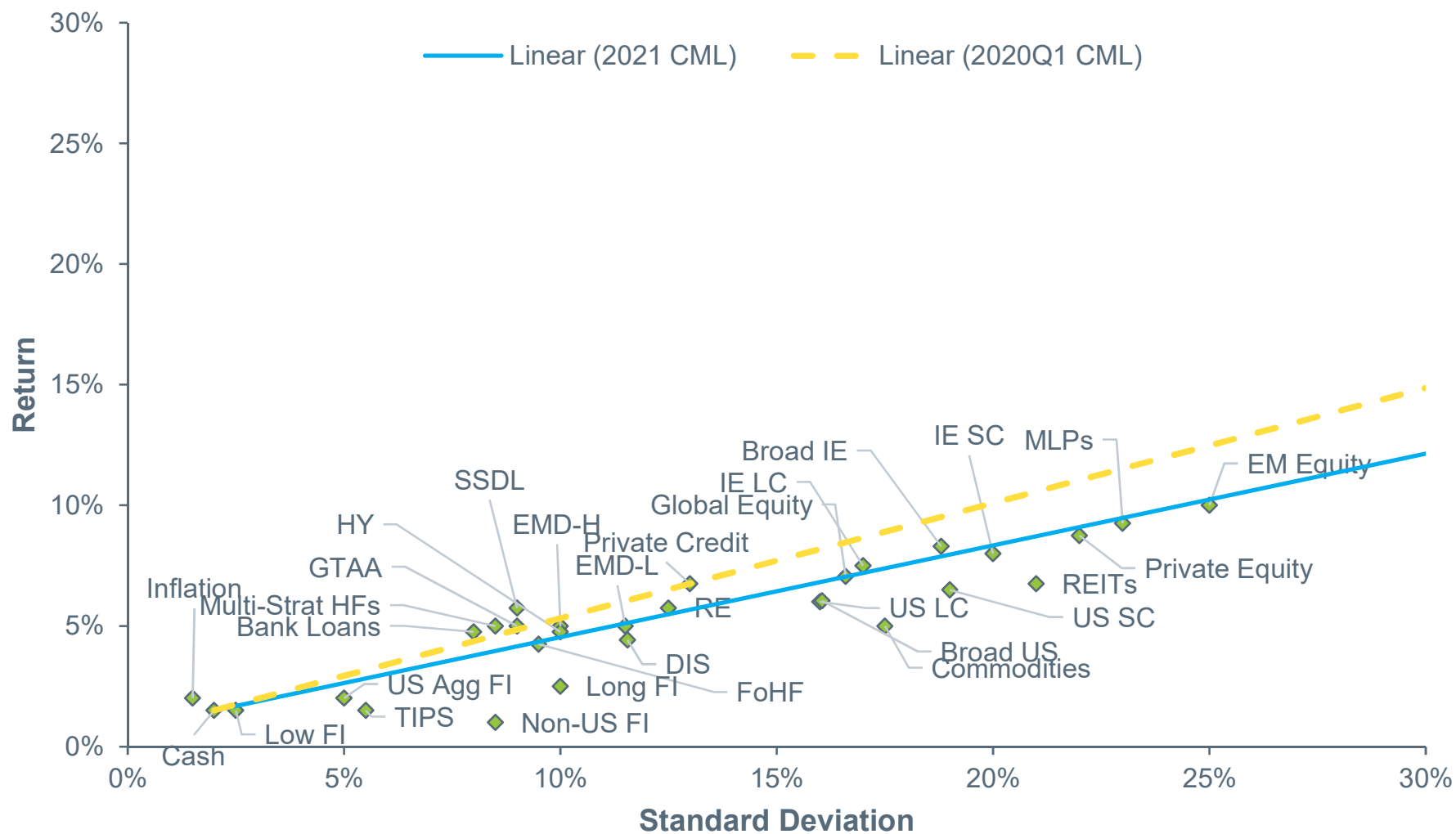


- US inflation assumption was held constant as market expectations for inflation remain muted – as outlined in the table shown.
- While the supply of money has drastically increased in 2020, the velocity has fallen drastically as well – as outlined in the chart shown. We are closely monitoring these (as well as other) offsetting impacts on inflation expectations.
- Cash assumption was also held constant.

As of December 31, 2020	5-Year	7-Year	10-Year	20-Year	30-Year
Treasury Yield	0.36%	0.65%	0.93%	1.45%	1.65%
TIPS Yield	-1.59%	-1.31%	-1.06%	-0.61%	-0.37%
Implied Expected Inflation	1.95%	1.96%	1.99%	2.06%	2.02%

Source: FactSet (2021).

Capital Markets Line



RVK 2021 Capital Market Assumptions

Asset Class	2021				2020 Q1				One Year Adjustment (2021 - 2020 Q1)			
	Nominal Return (Geo.)	Risk (StDev)	Nominal Return (Arith.)	Return / Risk Ratio	Nominal Return (Geo.)	Risk (StDev)	Nominal Return (Arith.)	Return / Risk Ratio	Nominal Return (Geo.)	Risk (StDev)	Nominal Return (Arith.)	Return / Risk Ratio
Large/Mid Cap US Equity	4.81%	16.00%	6.00%	0.38	6.08%	16.00%	7.25%	0.45	-1.26%	--	-1.25%	-0.08
Small Cap US Equity	4.84%	19.00%	6.50%	0.34	6.87%	19.00%	8.50%	0.45	-2.03%	--	-2.00%	-0.11
Broad US Equity	4.86%	16.05%	6.05%	0.38	6.13%	16.00%	7.30%	0.46	-1.27%	+0.05%	-1.25%	-0.08
Dev'd Large/Mid Cap Int'l Equity	6.18%	17.00%	7.50%	0.44	7.70%	17.00%	9.00%	0.53	-1.52%	--	-1.50%	-0.09
Emerging Markets Equity	7.26%	25.00%	10.00%	0.40	8.54%	25.00%	11.25%	0.45	-1.28%	--	-1.25%	-0.05
Broad International Equity	6.70%	18.80%	8.30%	0.44	8.20%	18.30%	9.70%	0.53	-1.50%	+0.50%	-1.40%	-0.09
Preferred Stock	4.70%	15.00%	5.75%	0.38	4.95%	15.00%	6.00%	0.40	-0.25%	--	-0.25%	-0.02
MLPs	6.91%	23.00%	9.25%	0.40	9.46%	23.00%	11.75%	0.51	-2.55%	--	-2.50%	-0.11
Low Duration Fixed Income	1.47%	2.50%	1.50%	0.60	1.97%	2.50%	2.00%	0.80	-0.50%	--	-0.50%	-0.20
US Aggregate Fixed Income	1.88%	5.00%	2.00%	0.40	2.38%	5.00%	2.50%	0.50	-0.50%	--	-0.50%	-0.10
Long Duration Fixed Income	2.02%	10.00%	2.50%	0.25	2.52%	10.00%	3.00%	0.30	-0.50%	--	-0.50%	-0.05
Bank Loans	4.45%	8.00%	4.75%	0.59	6.70%	8.00%	7.00%	0.88	-2.26%	--	-2.25%	-0.28
Custom EMD	4.16%	10.33%	4.67%	0.45	5.33%	10.33%	5.83%	0.56	-1.17%	--	-1.17%	-0.11
EMD (Local)	4.38%	11.50%	5.00%	0.43	5.13%	11.50%	5.75%	0.50	-0.75%	--	-0.75%	-0.07
EMD (Hard)	4.53%	10.00%	5.00%	0.50	6.53%	10.00%	7.00%	0.70	-2.00%	--	-2.00%	-0.20
EMD (Corp)	3.57%	9.50%	4.00%	0.42	4.32%	9.50%	4.75%	0.50	-0.75%	--	-0.75%	-0.08
Core Real Estate	5.02%	12.50%	5.75%	0.46	5.02%	12.50%	5.75%	0.46	--	--	--	--
Non-Core Real Estate	5.47%	22.50%	7.75%	0.34	5.47%	22.50%	7.75%	0.34	--	--	--	--
Custom Hedge Funds	4.25%	9.00%	4.63%	0.51	4.74%	9.00%	5.13%	0.57	-0.50%	--	-0.50%	-0.06
Private Equity	6.59%	22.00%	8.75%	0.40	7.86%	22.00%	10.00%	0.45	-1.27%	--	-1.25%	-0.06
Commodities	3.57%	17.50%	5.00%	0.29	3.57%	17.50%	5.00%	0.29	--	--	--	--
Private Credit	5.97%	13.00%	6.75%	0.52	8.23%	13.00%	9.00%	0.69	-2.27%	--	-2.25%	-0.17
Private Core Infrastructure	5.96%	15.00%	7.00%	0.47	--	--	--	--	--	--	--	--
Private Non-Core Infrastructure	6.87%	19.00%	8.50%	0.45	--	--	--	--	--	--	--	--
Cash Equivalents	1.48%	2.00%	1.50%	0.75	1.48%	2.00%	1.50%	0.75	--	--	--	--
US Inflation	1.99%	1.50%	2.00%	1.33	1.99%	1.50%	2.00%	1.33	--	--	--	--

Blue highlighted cells indicate values are being calculated base on a roll up of underlying asset classes.

Broad US Equity is a combination of 93.4% Large/Mid Cap US Equity and 6.6% Small Cap US Equity.

Broad International equity is a combination of 64.0% Dev'd Large/Mid Cap Int'l Equity, 10.7% Dev'd Small Cap Int'l Equity, and 25.3% Emerging Markets Equity.

Custom Hedge Funds is a combination of 50.0% Diversified Hedge Fund of Funds and 50.0% Multi-Strategy Hedge Funds.

Estimated Asset Class Yields

Asset Class	Dec-2020 Yield (%)	Dec-2019 Yield (%)	One Year Adjustment
Broad US Equity	1.52	1.78	-0.26
Small Cap US Equity	1.20	1.46	-0.26
Broad International Equity	2.29	3.03	-0.74
MLPs	9.15	8.83	+0.32
Preferred Stock	5.58	4.77	+0.81
Core Real Estate	3.55	3.74	-0.19
Non-Core Real Estate	4.41	3.64	+0.77
US Agg Fixed Income	1.14	2.32	-1.18
Long Duration Fixed Income	2.29	3.08	-0.79
Low Duration Fixed Income	0.14	1.60	-1.46
Bank Loans	5.02	6.35	-1.33
EMD (Custom Blend)	3.94	4.95	-1.01
Private Core Infrastructure	4.56	--	--
Private Credit	7.02	--	--
Cash Equivalents	0.08	1.51	-1.43
Private Equity	--	--	--
Custom Hedge Funds	--	--	--

As of December 31, 2020.

Estimated asset class yields are benchmark specific, with the exception of real estate and diversified hedge funds which are specific to Wyoming's current managers. Fixed income yields are yield to maturity.

RVK 2021 Correlation Matrix

Interrelationship of Various Asset Class Pairings

	Broad US Equity	S/MC US Eq	Broad Intl Eq	US Agg FI	Short TIPS	LD FI	PC	Pref	Bank Loans	Core RE	Non Core RE	Infra	MLPs	PE	Comm	Metals	Custom EMD	Custom HF	Custom LH FI	U.S. Inflation	Cash Equiv
Broad US Equity	1.00																				
Small/Mid Cap US Equity	0.90	1.00																			
Broad International Equity	0.85	0.78	1.00																		
US Agg Fixed Income	0.15	0.06	0.01	1.00																	
Short TIPS	0.21	0.18	0.33	0.56	1.00																
Low Duration Fixed Income	0.08	0.01	-0.09	0.89	0.59	1.00															
Private Credit	0.65	0.62	0.67	-0.15	0.54	-0.18	1.00														
Preferred Stock	0.58	0.52	0.59	0.27	0.27	0.22	0.51	1.00													
Bank Loans	0.52	0.52	0.56	0.01	0.44	-0.09	1.00	0.43	1.00												
Real Estate	0.22	0.18	0.28	-0.05	0.08	-0.09	0.21	0.24	0.21	1.00											
Non-Core Real Estate	0.13	0.09	0.15	-0.04	-0.03	-0.13	0.14	0.03	0.14	0.78	1.00										
Infrastructure	0.83	0.80	0.91	0.02	0.39	-0.06	0.69	0.69	0.69	0.37	0.24	1.00									
MLPs	0.52	0.51	0.49	0.08	0.28	0.06	0.67	0.50	0.58	0.19	0.14	0.71	1.00								
Private Equity	0.79	0.75	0.79	-0.27	0.41	-0.28	0.69	0.54	0.69	0.33	0.18	0.77	0.53	1.00							
Commodities	0.38	0.38	0.53	0.01	0.50	0.02	0.58	0.34	0.43	0.25	0.04	0.64	0.38	0.56	1.00						
Metals and Mining Equities	0.62	0.56	0.78	0.01	0.37	-0.03	0.62	0.47	0.42	0.19	0.04	0.79	0.46	0.60	0.62	1.00					
Custom EMD	0.63	0.56	0.77	0.49	0.60	0.33	0.71	0.54	0.61	0.19	0.09	0.82	0.50	0.59	0.54	0.64	1.00				
Custom Hedge Funds	0.67	0.68	0.77	0.12	0.44	0.06	0.74	0.51	0.69	0.23	0.21	0.81	0.55	0.79	0.50	0.60	0.69	1.00			
Custom Liability Hedging Fixed Income	0.16	0.08	0.03	0.97	0.46	0.79	-0.19	0.26	0.01	-0.05	-0.02	0.03	0.07	-0.28	-0.01	0.01	0.47	0.11	1.00		
U.S. Inflation	-0.03	-0.02	0.05	-0.09	0.25	0.03	0.38	-0.06	0.26	0.21	0.06	0.16	0.04	0.17	0.24	0.06	0.04	0.15	-0.15	1.00	
Cash Equivalents	-0.02	-0.05	-0.11	0.28	0.06	0.52	-0.11	-0.16	-0.11	0.05	0.00	0.00	-0.05	-0.14	0.01	-0.07	-0.09	0.04	0.18	0.36	1.00

Correlation greater than 0.50

Correlation between 0.00 and 0.50

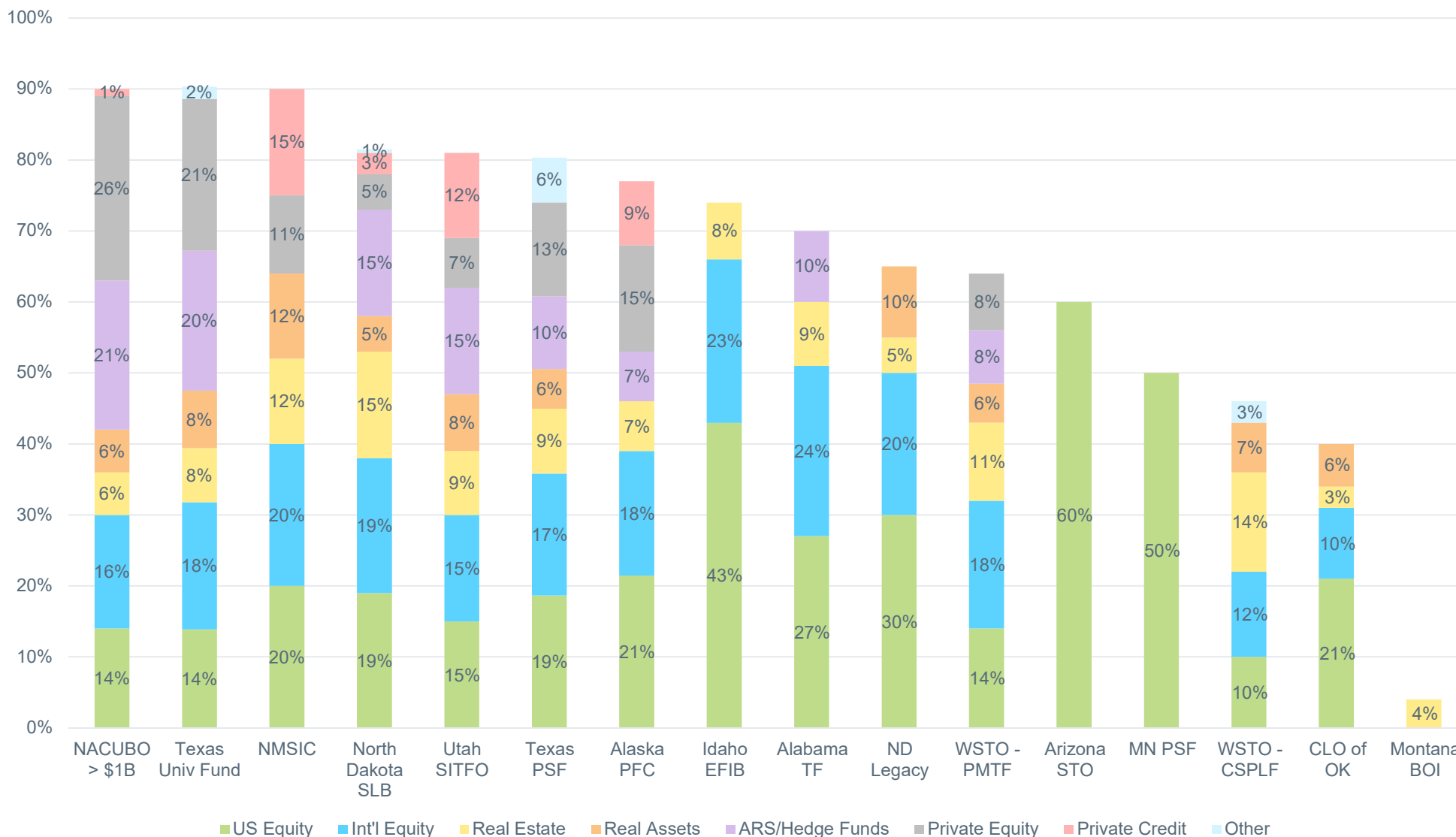
Correlation less than 0.00

Peer Comparisons



RVK SWF Survey – Asset Allocation

Target Allocation to Risk Assets as of June 30, 2020



All data is as of June 30, 2020.

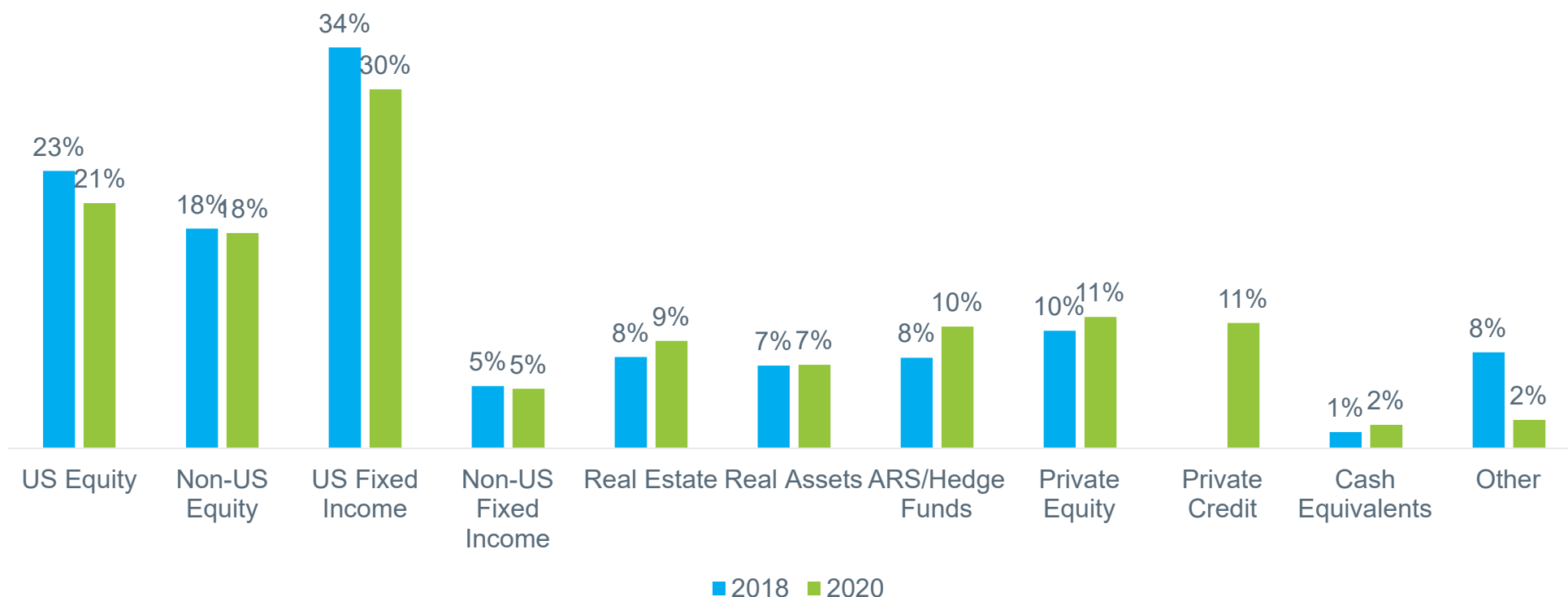
Allocation to "Other" includes risk parity, strategic partnerships, and preferred securities.

RVK SWF Survey – Asset Allocation

Asset Allocation Trends

- ❖ Allocations to Real Estate, Private Equity, Hedge Funds and other alternative investments have increased

Median Asset Allocation



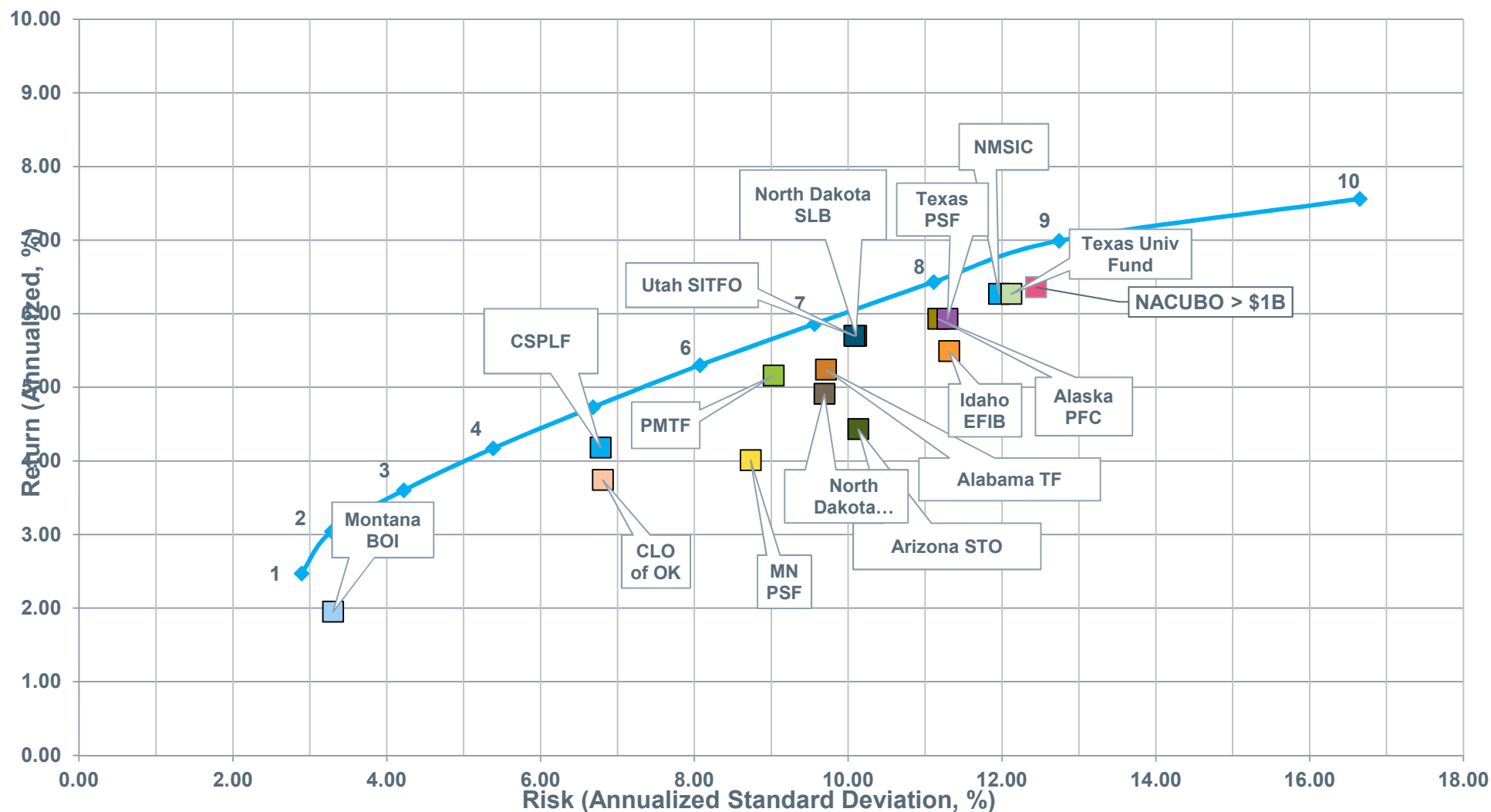
All data is as of June 30, 2020.

Allocation to "Other" includes risk parity, strategic partnerships, and preferred securities.

2020 Private Credit allocations may have been included in Fixed Income and/or Other in the 2018 survey.

RVK SWF Survey – Asset Allocation

- ❖ The expected risk and return of each US SWF is modeled below using RVK's 2021 capital markets assumptions, and Fund asset allocations as of June 30, 2020.



Asset Allocation Survey

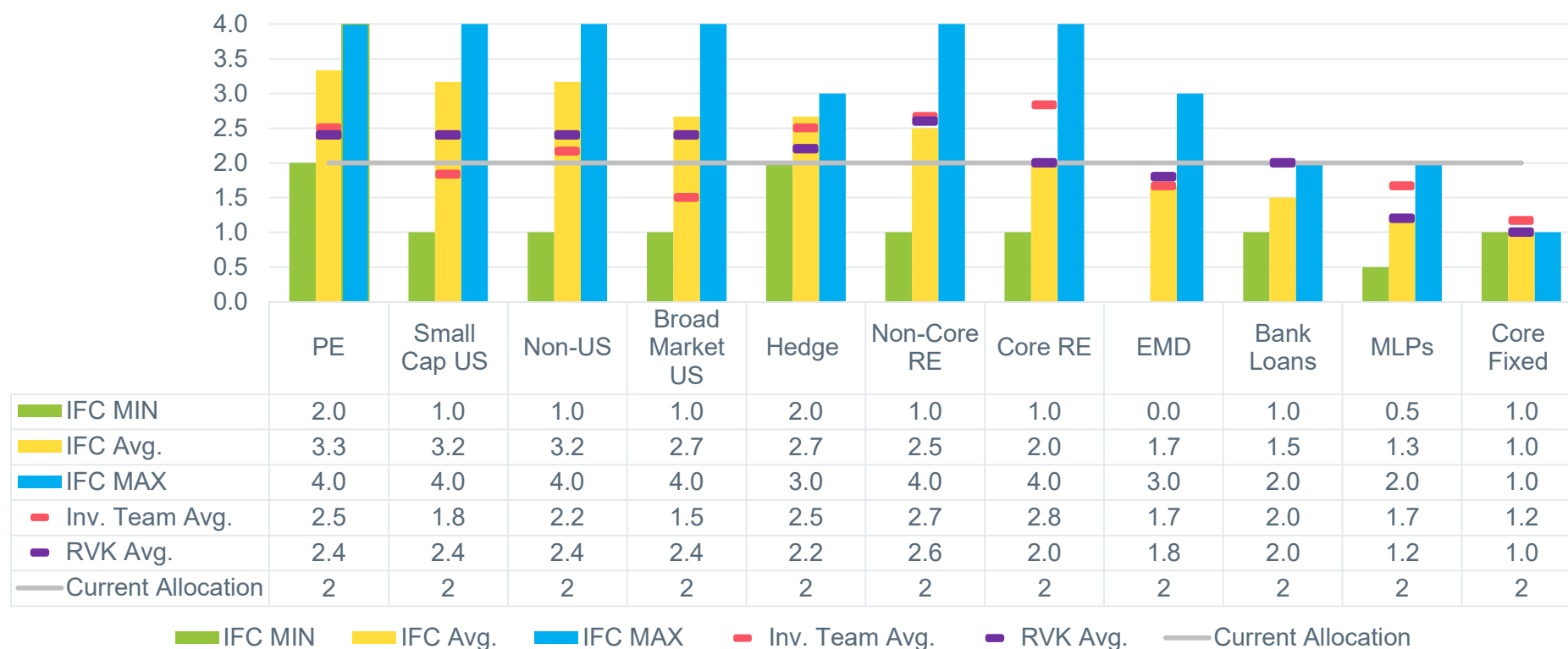


Current Asset Classes

① Provide a numerical rating for each of the asset classes currently in the PMTF:

- 4 = very interested in increasing exposure
- 3 = moderately interested in increasing exposure
- 2 = allocation should remain the same
- 1 = preference for reduced exposure
- 0 = should be removed

Current PMTF Asset Classes

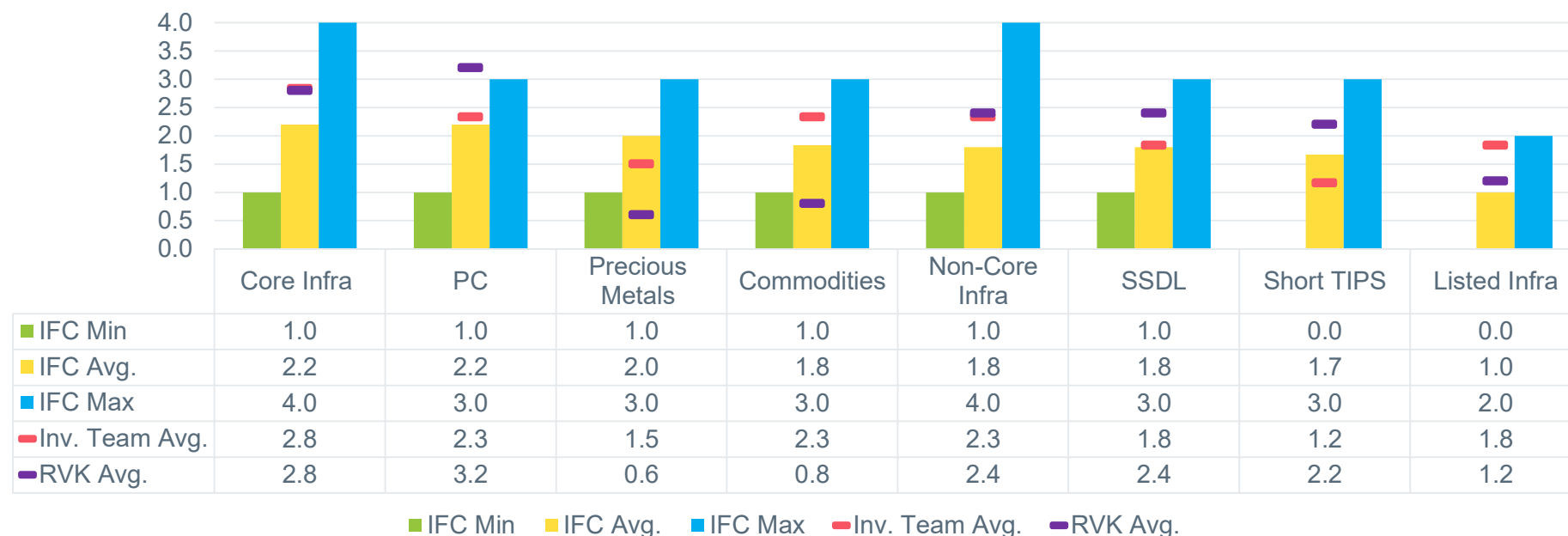


Potential Asset Classes

② Provide a numerical rating for each of the asset classes currently in the PMTF:

- 4 = very interested in adding to the portfolio with meaningful exposure
- 3 = very interested in adding but exposure should be low to moderate
- 2 = moderately interested in adding to the portfolio
- 1 = not interested in adding
- 0 = we should run the other way as fast as we can

Potential Asset Class Additions



Other:

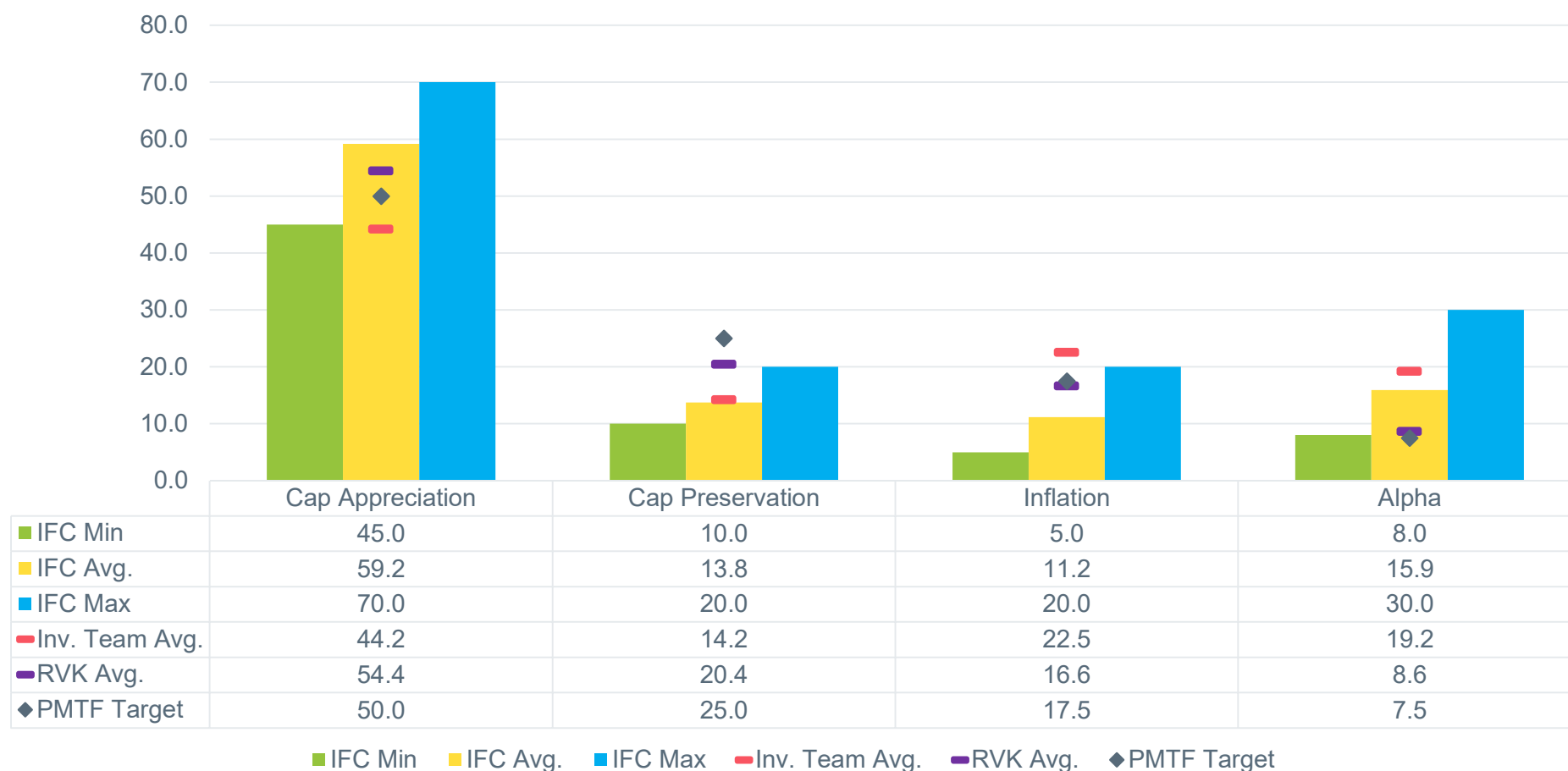
- Futures and options
- Opportunistic investments
- Equal weighted S&P 500 (reduce exposure to technology)

- Assets with a somewhat dependable revenue stream that can be levered accretively
- Classify preferred stock and potentially real estate as income

Thematic Allocation

- ③ Please assign percentage weightings to each of the following thematic asset classes that you believe to be most appropriate for the long-term strategic allocation of Wyoming's Permanent Fund Investments (Capital Appreciation, Capital Preservation, Inflation, Alpha).

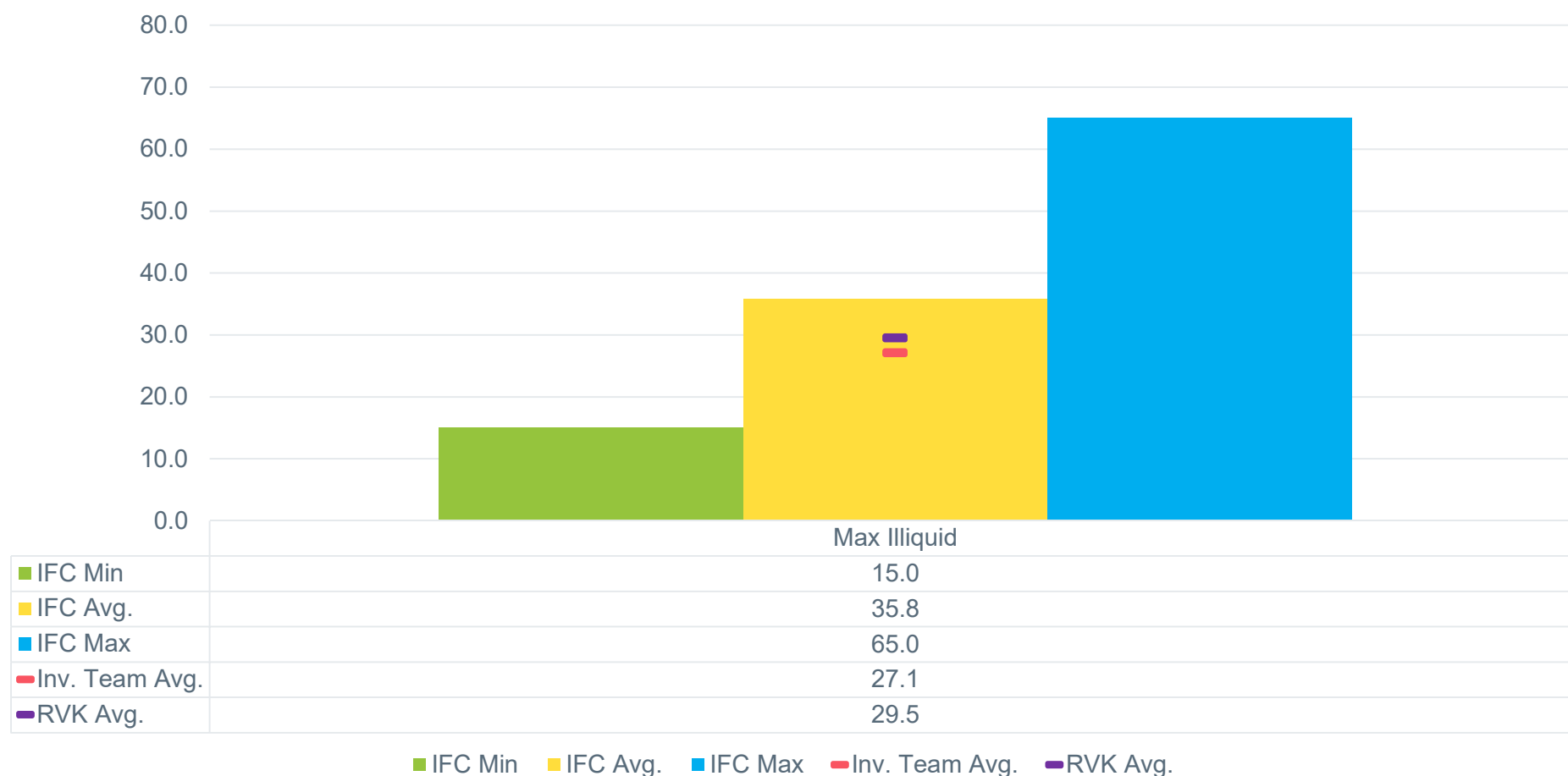
Potential Thematic Exposure



Liquidity

- ④ What is your general sense for the maximum percentage of the Permanent Funds that can reasonably be invested in illiquid asset classes (defined as any investment requiring a commitment to lock-up of capital for a period of 1 year or more)?

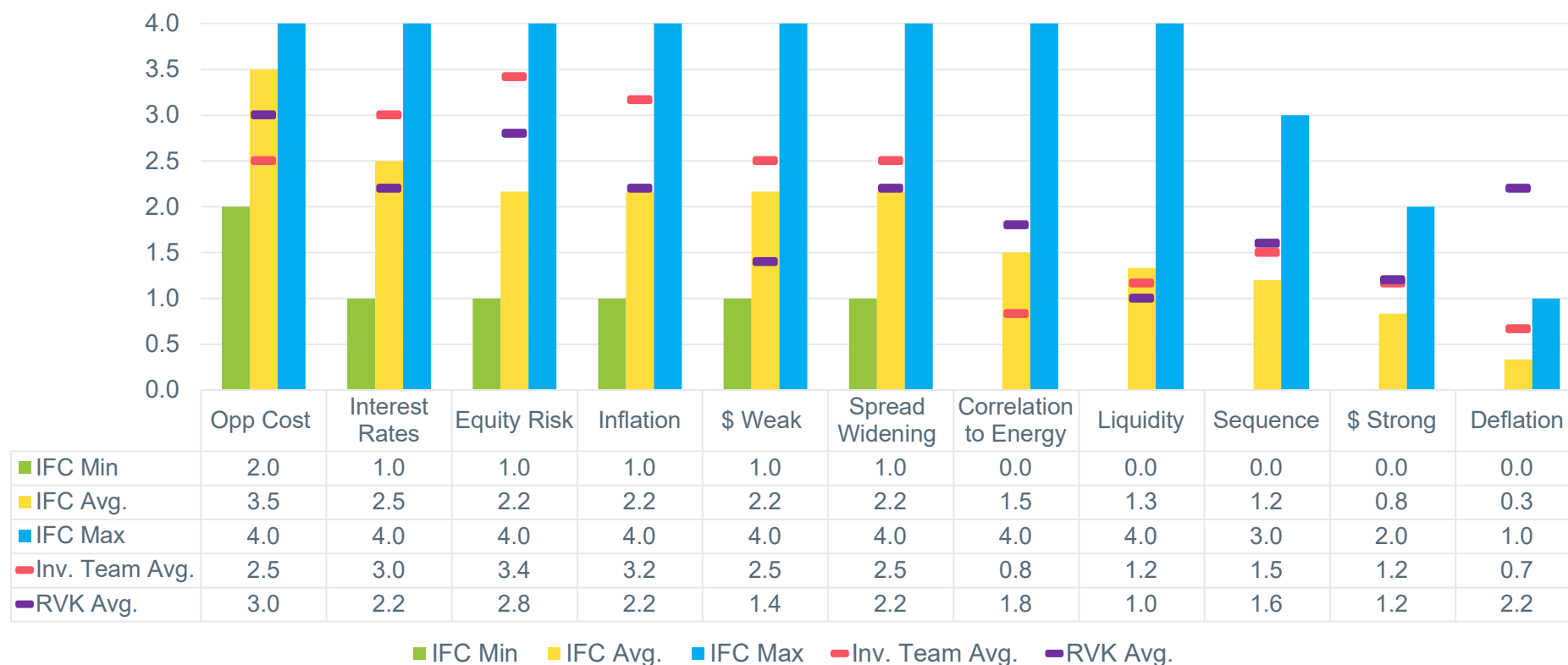
Maximum Tolerance for Illiquid Assets



Portfolio Risk

- ⑤ On a scale of 0 - 4 (where 0 = not worried at all, and 4 = extremely concerned) how concerned are you as it relates to the risk factors below and Wyoming Permanent Fund's current strategic asset allocation?

Risk Concerns with Current AA



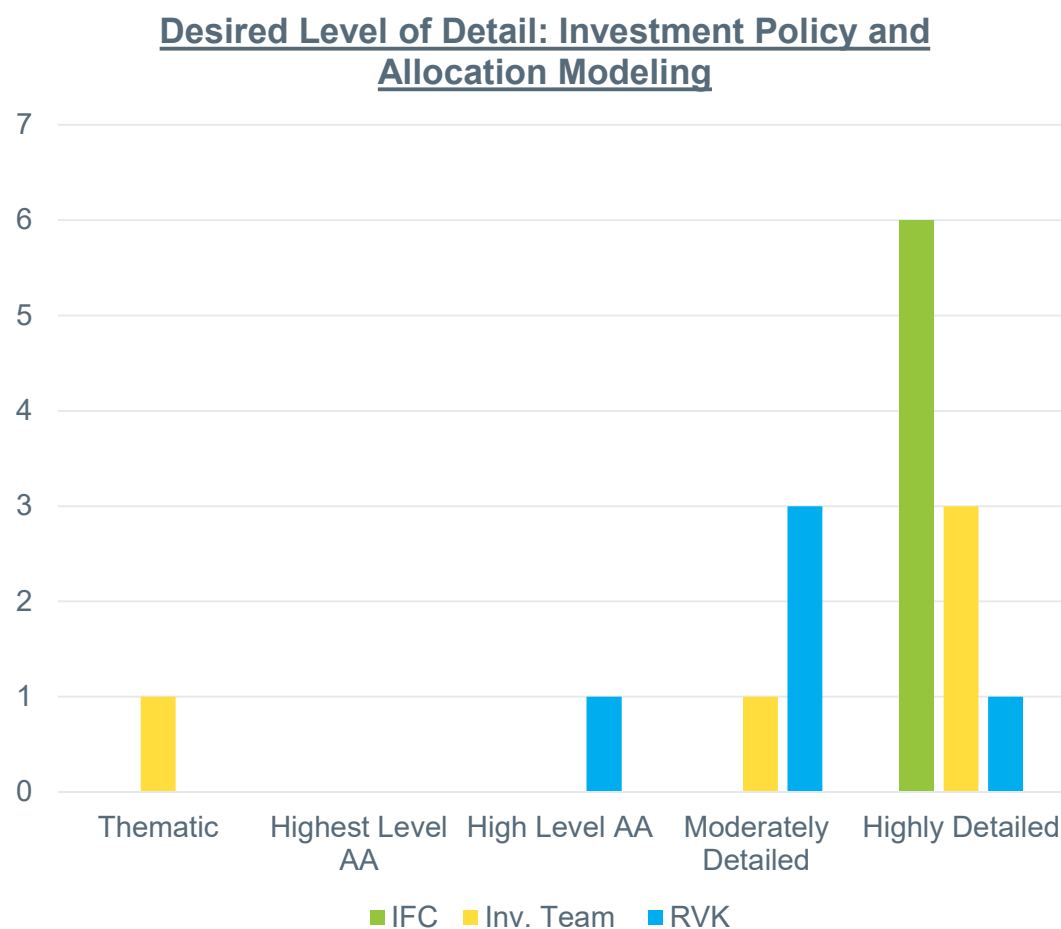
Other:

- Geopolitical
- Technological obsolescence
- Stranded Capital
- Political Risk - Wyoming
- Income based spending

Asset Class Detail

- ⑥ With regards to the structure of the formal investment policy and modeling/establishing the strategic asset allocation for each portfolio, please indicate from the list below what level of detail you believe is most appropriate (equity examples provided as representative of each):

Equity Example	
Thematic	<ul style="list-style-type: none"> • Growth
Highest Level	<ul style="list-style-type: none"> • Equity (Public & Private)
High Level	<ul style="list-style-type: none"> • Public Equity • Private Equity
Moderately Detailed	<ul style="list-style-type: none"> • US Equity • Non-US Equity • Preferred Equity • Private Equity
Highly Detailed	<ul style="list-style-type: none"> • Large-Cap US Equity • Small/Mid-Cap US Equity • Developed Non-US Equity • Emerging Markets Equity • Preferred Equity • Private Equity



Individual Investment Pool Characteristics



Overview of Investment Funds

Permanent Funds

A maximum of 70% of the total book value of permanent funds may be invested in equities and alternative investments

- Long-Term Total Return Focus
 - Permanent Mineral Trust Fund
 - Permanent Land Fund
 - University Permanent Land Fund
 - Hathaway Scholarship Fund
- Income Focus
 - Common School Permanent Land Fund
 - Higher Education Endowment Fund
- Workers' Compensation Fund (reclassified as Permanent Fund in Q4 2015)

Non-Permanent Funds

- Pool A Investment Account (Formerly the Tobacco Settlement Trust)
 - *Per the recent amendment to Wyoming Constitution Article 16 Section 6, can now invest in public equity and alternative investments*
- State Agency Pool
 - *Restricted by statutes from any investments in equities*
- LSRA
 - New Investment Fund (Formerly a part of State Agency Pool)

Summary of 2020 Asset Allocation Enhancements

Total Return Focus

- ✓ Increase Broad International Equity (+4%)
- ✓ Decrease Core Fixed Income (-4%)

Income Focus

- ✓ Increase Broad International Equity (+2%)
- ✓ Decrease Core Fixed Income (-2%)

Pool A

- ✓ Add Core Real Estate (+4%)
- ✓ Decrease Non-Core Real Estate (-4%)

Workers Compensation

- ✓ Increase Broad International Equity (+2.5%)
- ✓ Decrease Emerging Markets Debt (-2.5%)

Wyoming Permanent Funds vs. Endowments

	Wyoming Permanent Funds	Endowments
Investment Objective	<ul style="list-style-type: none"> Intergenerational Equity 	
Spending of Corpus/ Principal	<ul style="list-style-type: none"> Corpus <u>cannot</u> be spent. <ul style="list-style-type: none"> Requires careful consideration of risk levels and reserve fund features, as realized losses can present significant issues. 	<ul style="list-style-type: none"> Corpus <u>can</u> be spent. <ul style="list-style-type: none"> Allows for total return portfolio construction, with increased emphasis on capital appreciation assets.
Asset Allocation Constraints	<ul style="list-style-type: none"> Maximum of 70% of the total book value may be invested in equities and alternative investments. 	<ul style="list-style-type: none"> Typically no limit on equity and alternative investments. <ul style="list-style-type: none"> Average allocation to equity and alternative investments for university Endowments with at least \$1 billion is 88% (NACUBO Study of Endowments).
Funding Source	<ul style="list-style-type: none"> Mineral royalties, severance taxes and other land revenues. <ul style="list-style-type: none"> Variable, declining over time. 	<ul style="list-style-type: none"> Donations <ul style="list-style-type: none"> Variable, potential to increase over time.
Spending Constraints	<ul style="list-style-type: none"> Only income and capital gains can be spent. Guaranteed spending levels: <ul style="list-style-type: none"> PMTF: 2.5%, CSPLF: 5% (full amount). 	<ul style="list-style-type: none"> Typically very few constraints. <ul style="list-style-type: none"> The majority of university endowments spending policies are based on a moving average of the endowment's market value (average effective rate is 4.6%).

Asset Allocation Modeling

Permanent Funds: Total Return Focus

- Permanent Mineral Trust Fund*
- Permanent Land Fund*
- University Permanent Land Fund*
- Hathaway Scholarship Fund*



Total Return Focus – Current vs. Proposed

ASSET CLASS	CURRENT	IFC PROPOSED	CHANGE
Broad US Equity	11.0	11.0	-
Small Cap US Equity	3.0	3.0	-
Broad International Equity	18.0	18.0	-
MLPs	5.5	5.5	-
Preferred Stock	-	-	-
Private Equity	8.0	11.0	+3.0
Custom Emerging Markets Debt	5.0	5.0	-
Private Credit	-	5.0	+5.0
US Agg Fixed Income	25.0	11.0	-14.0
Core Real Estate	6.0	6.0	-
Non-Core Real Estate	5.0	7.0	+2.0
Private Core Infrastructure	-	2.0	+2.0
Bank Loans	6.0	6.0	-
Hedge Funds	7.5	9.5	+2.0
Cash Equivalents	-	-	-
Total	100.0	100.0	-

Asset Class Composition - Asset classes defined by their primary category

Fixed Income & Cash	36.0	27.0	-9
Public Equity & Alternatives	64.0	73.0	9

Thematic Composition - Asset classes defined by their primary investment objective

Total Growth	50.5	58.5	8.0
Total Capital Preservation	25.0	11.0	-14.0
Total Alpha	7.5	9.5	2.0
Total Inflation	17.0	21.0	4.0

RVK 2021 Capital Market Assumptions - Return, standard deviation, and yield

Expected Return (Arithmetic)	5.66	6.37	0.71
Expected Risk (Standard Deviation)	9.61	11.19	1.58
Expected Return (Compound)	5.23	5.79	0.56
Est. Yield (12/31/20)	2.34	2.71	0.37

RVK 2021 Capital Market Assumptions - Risk metrics

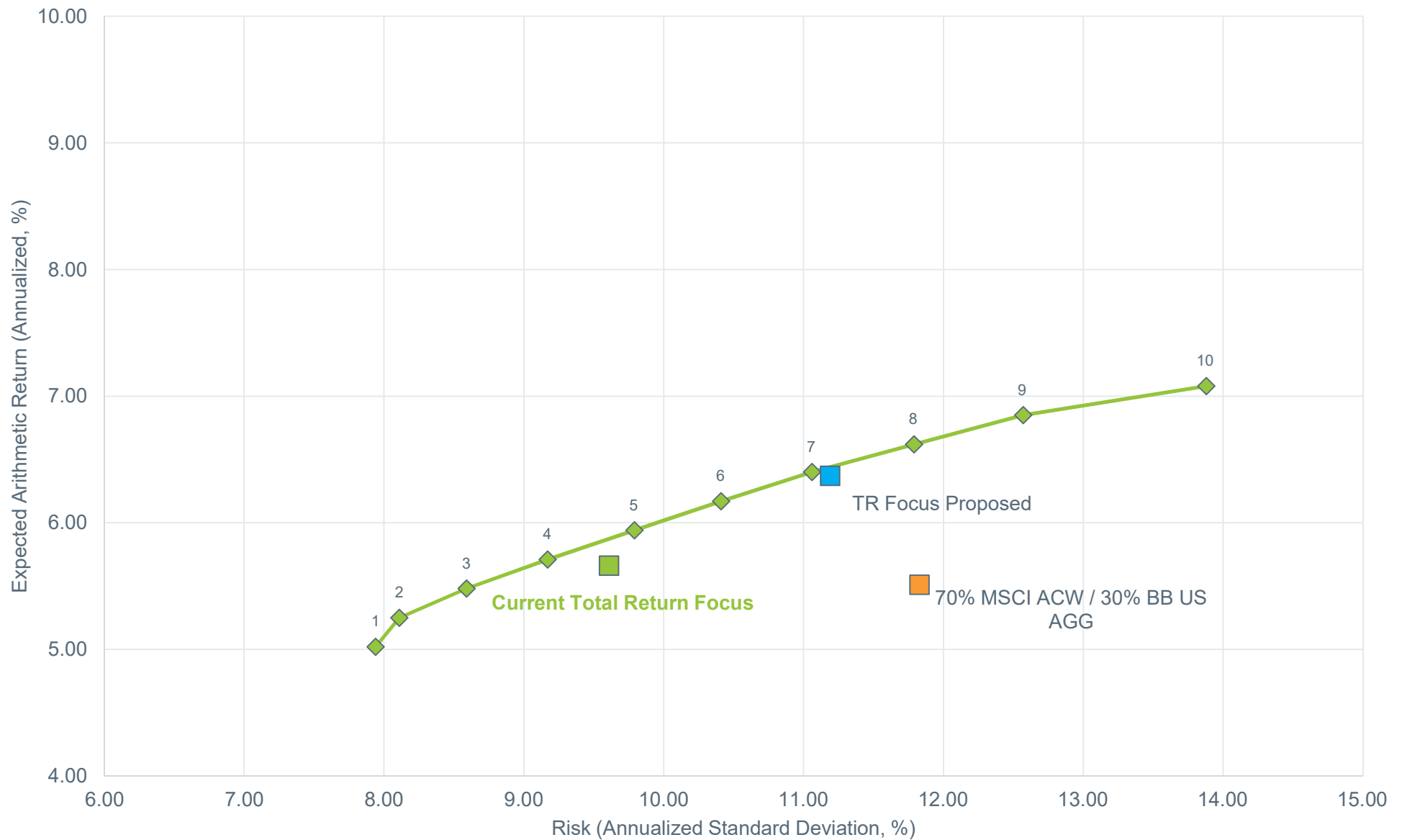
Expected Arithmetic Return/Risk Ratio	0.59	0.57	-0.02
Expected Sharpe Ratio (RF = 1.50%)	0.43	0.44	0.00
RVK Expected Eq Beta (LCUS = 1)	0.53	0.61	0.08
RVK Liquidity Metric (T-Bills = 100)	65	55	-10

Monte Carlo Analysis

1st Percentile 1 Year Nominal Return	-20.42	-21.40	-0.98
50th Percentile 10 Year Nominal Return	5.41	6.10	0.69

Efficient Frontier: Total Return Focus

Expected Return & Risk



Efficient Allocations: Total Return Focus

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Total Return Focus	TR Focus Proposed	70% MSCI ACW / 30% BB US AGG
Broad US Equity	8	30	14	8	8	8	8	8	8	11	10	16	11.0	11	40
Small Cap US Equity	2	6	2	2	2	2	2	2	2	2	6	6	3.0	3	0
Broad International Equity	8	30	8	11	14	15	15	15	15	19	24	30	18.0	18	30
MLPs	0	5.5	0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	0.0
Private Equity	0	12	0	0	3	6	8	8	11	12	12	12	8.0	11	0
Custom Emerging Markets Debt	0	5	5	5	3	3	5	5	2	0	0	0	5.0	5	0
Private Credit	0	7	7	7	7	7	7	7	7	7	7	7	0.0	5	0
US Agg Fixed Income	10	25	25	25	25	22	17	12	10	10	10	10	25.0	11	30
Core Real Estate	0	7	7	7	7	7	7	7	7	7	7	0	6.0	6	0
Non-Core Real Estate	0	7	7	7	7	7	7	7	7	7	7	7	5.0	7	0
Private Core Infrastructure	0	7	2	0	0	0	1	5	7	7	7	7	0.0	2	0
Bank Loans	0	6	6	6	6	6	6	6	6	6	5	0	6.0	6	0
Commodities	0	5	5	5	0	0	0	0	0	0	0	0	0.0	0	0
Custom Hedge Funds	0	12	12	12	12	12	12	12	12	7	0	0	7.5	9.5	0.0
Total			100	100	100	100	100	100	100	100	100	100	100	100	100
Total Equity			24	27	33	37	39	39	42	50	58	70	45.5	48.5	70
Total Growth Assets			36	39	43	47	51	51	51	57	65	77	50.5	58.5	70
Total Capital Preservation			25	25	25	22	17	12	10	10	10	10	25.0	11.0	30
Total Real Assets			16	14	14	14	15	19	21	21	21	14	11.0	15.0	0
Total Inflation Assets			27	25	20	20	21	25	27	27	26	14	17.0	21.0	0
Total Alpha Assets			12	12	12	12	12	12	12	7	0	0	7.5	9.5	0
Total Illiquid Assets			23	21	24	27	30	34	39	40	40	33	19.0	31.0	0
Expected Arithmetic Return			5.02	5.25	5.48	5.71	5.94	6.17	6.40	6.62	6.85	7.08	5.66	6.37	5.51
Expected Risk (Standard Deviation)			7.94	8.11	8.59	9.17	9.79	10.41	11.06	11.79	12.57	13.88	9.61	11.19	11.83
Expected Compound Return			4.72	4.94	5.13	5.31	5.49	5.66	5.83	5.97	6.12	6.19	5.23	5.79	4.85
Expected Return (Arithmetic)/Risk Ratio			0.63	0.65	0.64	0.62	0.61	0.59	0.58	0.56	0.54	0.51	0.59	0.57	0.47
RVK Expected Eq Beta (LCUS Eq = 1)			0.42	0.41	0.45	0.49	0.52	0.56	0.59	0.64	0.69	0.79	0.53	0.61	0.71
RVK Liquidity Metric (T-Bills = 100)			61	62	60	57	55	52	49	52	56	63	65	55	91
Total Fixed Income & Cash			43.0	43.0	41.0	38.0	35.0	30.0	25.0	23.0	22.0	17.0	36	27	30
Estimated Yield (12/31/20)			2.34	2.73	2.72	2.71	2.78	2.90	2.85	2.91	3.01	2.74	2.34	2.71	1.64

Group constraints: (i) Total US equity must be at least 40% of total public equity.

Monte Carlo: Total Return Focus

The table below shows the expected nominal 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 Total Return Focus	Total Return Focus Proposed	70% MSCI ACW / 30% BB US AGG
1st Percentile	-12.37	-11.45	-13.97	-14.96	-16.05	-17.35	-18.18	-18.38	-18.52	-25.50	-20.42	-21.40	-28.77
5th Percentile	-4.71	-4.24	-5.59	-6.16	-6.70	-7.17	-7.52	-7.75	-8.03	-11.67	-9.02	-9.24	-14.33
25th Percentile	1.27	1.64	1.33	1.14	1.09	1.06	1.04	1.01	0.85	-0.41	0.22	0.50	-2.32
50th Percentile	5.21	5.46	5.62	5.81	5.95	6.16	6.30	6.41	6.59	6.84	5.87	6.60	5.59
75th Percentile	8.99	9.01	9.72	10.21	10.60	11.00	11.36	11.68	12.01	13.89	11.48	12.57	13.61
95th Percentile	14.85	14.48	16.25	17.32	18.06	18.88	19.60	20.14	20.84	25.16	20.49	22.16	26.77
99th Percentile	19.47	18.74	20.95	22.22	23.20	24.14	25.01	25.77	26.59	32.95	26.65	28.67	35.60
3 Years													
5th Percentile	-1.23	-0.76	-1.60	-1.99	-2.22	-2.54	-2.70	-2.86	-2.89	-5.37	-3.82	-3.84	-7.70
25th Percentile	2.66	2.94	2.71	2.68	2.70	2.72	2.77	2.80	2.85	1.94	2.05	2.52	0.28
50th Percentile	4.99	5.18	5.36	5.52	5.68	5.87	6.03	6.17	6.28	6.41	5.61	6.31	5.18
75th Percentile	7.35	7.41	7.92	8.27	8.57	8.86	9.13	9.39	9.66	10.61	9.02	9.93	10.13
95th Percentile	10.67	10.60	11.64	12.27	12.80	13.31	13.76	14.14	14.65	16.98	14.06	15.35	17.21
5 Years													
5th Percentile	0.10	0.55	-0.16	-0.43	-0.60	-0.79	-0.92	-0.94	-0.92	-3.07	-1.96	-1.73	-5.27
25th Percentile	3.12	3.36	3.24	3.23	3.27	3.33	3.38	3.45	3.50	2.78	2.73	3.23	1.23
50th Percentile	4.97	5.13	5.27	5.42	5.58	5.75	5.89	6.04	6.17	6.22	5.49	6.17	5.09
75th Percentile	6.83	6.90	7.33	7.63	7.88	8.17	8.41	8.63	8.86	9.63	8.23	9.06	8.96
95th Percentile	9.42	9.33	10.13	10.68	11.09	11.52	11.90	12.23	12.62	14.49	12.09	13.17	14.47
10 Years													
5th Percentile	1.38	1.74	1.26	1.11	1.03	0.89	0.84	0.89	0.89	-0.74	-0.04	0.27	-2.71
25th Percentile	3.62	3.85	3.77	3.82	3.89	3.93	4.01	4.10	4.18	3.58	3.40	3.95	2.11
50th Percentile	4.92	5.11	5.24	5.39	5.54	5.70	5.85	5.99	6.11	6.12	5.41	6.10	4.93
75th Percentile	6.25	6.38	6.74	6.97	7.19	7.44	7.66	7.85	8.05	8.58	7.40	8.19	7.72
95th Percentile	8.08	8.10	8.71	9.15	9.52	9.87	10.17	10.45	10.74	12.13	10.15	11.11	11.65

*Investment Policy Guidelines: Total portfolio risk should be managed with a goal of avoiding annual losses greater than 22% with a 99% confidence level.

Monte Carlo: Total Return Focus

The table below shows the **percentage** chance of achieving or exceeding the given real 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 Total Return Focus	Total Return Focus Proposed	70% MSCI ACW / 30% BB US AGG
Target 3%	51	53	54	54	55	56	57	57	57	57	54	57	52
Target 4%	44	45	47	49	49	50	51	52	53	53	49	53	48
Target 5%	37	38	41	42	44	45	46	47	48	49	44	48	45
Target 5.5%	34	35	38	39	41	42	44	44	45	47	42	46	43
3 Years													
Target 3%	50	51	53	54	56	57	58	59	60	58	54	59	51
Target 4%	39	40	43	45	46	48	49	50	52	52	47	52	45
Target 5%	28	29	33	35	38	39	41	43	44	46	39	44	40
Target 5.5%	24	24	29	31	33	35	37	38	40	42	35	41	37
5 Years													
Target 3%	49	51	53	54	56	58	59	61	62	59	55	60	50
Target 4%	35	37	40	42	44	46	48	49	51	51	44	51	43
Target 5%	23	24	29	31	33	36	38	40	41	43	35	41	36
Target 5.5%	18	18	23	26	29	31	33	35	37	39	31	37	33
10 Years													
Target 3%	48	51	53	55	57	60	61	63	64	61	55	62	49
Target 4%	29	31	36	39	42	45	47	49	51	51	42	50	39
Target 5%	15	16	21	24	27	30	32	35	37	40	29	38	30
Target 5.5%	10	10	15	18	21	24	26	29	31	35	23	32	26

Asset Allocation Modeling

Permanent Funds: Income Focus

- Common School Permanent Land Fund*
- Higher Education Endowment Fund*



Income Focus – Current vs. Proposed

ASSET CLASS	CURRENT	IFC PROPOSED	CHANGE
Broad US Equity	8.0	8.0	-
Small Cap US Equity	2.0	2.0	-
Broad International Equity	12.0	15.0	+3.0
MLPs	7.0	7.0	-
Preferred Stock	3.0	6.0	+3.0
Private Equity	-	-	-
Custom Emerging Markets Debt	7.0	7.0	-
Private Credit	-	7.0	+7.0
US Agg Fixed Income	35.0	12.0	-23.0
Core Real Estate	11.0	9.0	-2.0
Non-Core Real Estate	3.0	5.0	+2.0
Private Core Infrastructure	-	5.0	+5.0
Bank Loans	12.0	12.0	-
Hedge Funds	-	5.0	+5.0
Cash Equivalents	-	-	-
Total	100.0	100.0	-

Asset Class Composition - Asset classes defined by their primary category

Fixed Income & Cash	54.0	38.0	-16
Public Equity & Alternatives	46.0	62.0	16

Thematic Composition - Asset classes defined by their primary investment objective

Total Growth	39.0	52.0	13.0
Total Capital Preservation	35.0	12.0	-23.0
Total Alpha	0.0	5.0	5.0
Total Inflation	26.0	31.0	5.0

RVK 2021 Capital Market Assumptions - Return, standard deviation, and yield

Expected Return (Arithmetic)	4.89	5.95	1.06
Expected Risk (Standard Deviation)	7.41	9.74	2.33
Expected Return (Compound)	4.63	5.51	0.88
Est. Yield (12/31/20)	3.03	3.74	0.71

RVK 2021 Capital Market Assumptions - Risk metrics

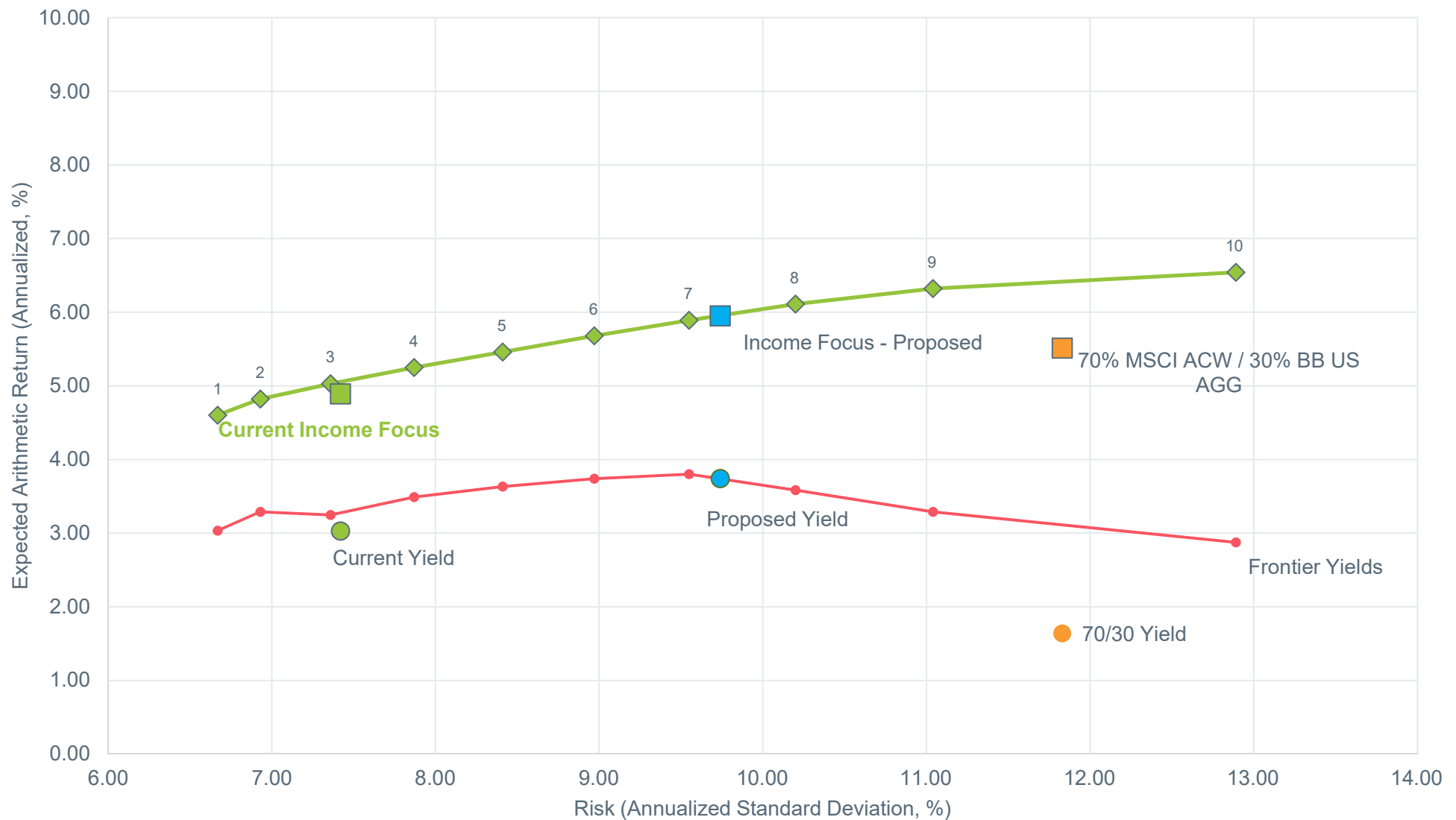
Expected Arithmetic Return/Risk Ratio	0.66	0.61	-0.05
Expected Sharpe Ratio (RF = 1.50%)	0.46	0.46	0.00
RVK Expected Eq Beta (LCUS = 1)	0.38	0.51	0.13
RVK Liquidity Metric (T-Bills = 100)	71	60	-11

Monte Carlo Analysis

1st Percentile 1 Year Nominal Return	-15.28	-16.39	-1.11
50th Percentile 10 Year Nominal Return	4.82	5.83	1.01

Efficient Frontier: Income Focus

Expected Return & Risk



Efficient Allocations: Income Focus

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Income Focus	Income Focus - Proposed	70% MSCI ACW / 30% BB US AGG
Broad US Equity	6	30	8	6	6	6	6	7	8	7	11	24	8.0	8.0	40
Small Cap US Equity	2	6	2	2	2	2	3	2	2	6	6	6	2.0	2.0	0
Broad International Equity	6	30	6	6	12	12	13	14	15	20	25	30	12.0	15.0	30
MLPs	0	6	0	6	6	6	6	6	6	6	6	6	7.0	7.0	0
Preferred Stock	0	6	6	2	3	6	6	6	6	3	0	0	3.0	6.0	0
Custom Emerging Markets Debt	0	7	7	6	0	4	7	7	5	0	0	0	7.0	7.0	0
Private Credit	0	7	7	7	7	7	7	7	7	7	7	7	0.0	7.0	0
US Agg Fixed Income	15	35	35	35	35	28	23	18	15	15	15	15	35.0	12.0	30
Core Real Estate	0	12	12	12	12	12	12	12	12	12	12	0	11.0	9.0	0
Non-Core Real Estate	0	5	5	5	5	5	5	5	5	5	5	5	3.0	5.0	0
Private Core Infrastructure	0	7	0	0	0	0	1	4	7	7	7	7	0.0	5.0	0
Bank Loans	0	12	12	12	12	12	12	12	12	12	6	0	12.0	12.0	0
Commodities	0	5	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0
Custom Hedge Funds	0	0	0	0	0	0	0	0	0	0	0	0	0.0	5.0	0.0
Total			100	100	100	100	100	100	100	100	100	100	100	100	100
Total Equity			22	22	29	32	34	35	37	42	48	66	32.0	38	70
Total Growth Assets			36	35	36	43	48	49	49	49	55	73	39.0	52	70
Total Capital Preservation			35	35	35	28	23	18	15	15	15	15	35.0	12	30
Total Real Assets			17	17	17	17	18	21	24	24	24	12	14.0	19	0
Total Inflation Assets			29	29	29	29	30	33	36	36	30	12	26.0	31	0
Total Alpha Assets			0	0	0	0	0	0	0	0	0	0	0.0	5	0
Total Illiquid Assets			30	26	27	30	31	34	37	34	31	19	17.0	32	0
Expected Arithmetic Return			4.60	4.82	5.03	5.25	5.46	5.68	5.89	6.11	6.32	6.54	4.89	5.95	5.51
Expected Risk (Standard Deviation)			6.67	6.93	7.36	7.87	8.41	8.97	9.55	10.20	11.04	12.89	7.42	9.74	11.83
Expected Compound Return			4.39	4.59	4.77	4.96	5.13	5.30	5.46	5.62	5.75	5.77	4.63	5.51	4.85
Expected Return (Arithmetic)/Risk Ratio			0.69	0.70	0.68	0.67	0.65	0.63	0.62	0.60	0.57	0.51	0.66	0.61	0.47
RVK Expected Eq Beta (LCUS Eq = 1)			0.33	0.34	0.37	0.40	0.43	0.46	0.50	0.55	0.61	0.75	0.38	0.51	0.71
RVK Liquidity Metric (T-Bills = 100)			63	63	65	64	63	61	60	62	64	75	71	60	91
Total Fixed Income & Cash			61.0	60.0	54.0	51.0	49.0	44.0	39.0	34.0	28.0	22.0	54	38	30
Estimated Yield (12/31/20)			3.03	3.29	3.25	3.49	3.63	3.74	3.80	3.58	3.29	2.87	3.03	3.74	1.64

Group constraints: (i) Total US equity must be at least 40% of total public equity.

Monte Carlo: Income Focus

The table below shows the expected nominal 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 Income Focus	Income Focus Proposed	70% MSCI ACW / 30% BB US AGG
1st Percentile	-9.98	-11.09	-12.19	-12.74	-13.95	-14.30	-14.46	-15.32	-19.58	-24.58	-15.28	-16.39	-28.88
5th Percentile	-3.87	-4.34	-4.81	-5.05	-5.49	-5.56	-5.66	-6.07	-8.61	-11.13	-6.28	-6.27	-14.80
25th Percentile	1.32	1.30	1.18	1.34	1.32	1.41	1.47	1.39	0.60	-0.20	0.74	1.42	-2.41
50th Percentile	4.70	4.89	5.04	5.25	5.47	5.62	5.82	5.96	6.11	6.24	4.98	6.04	5.17
75th Percentile	8.01	8.43	8.89	9.19	9.66	9.91	10.23	10.66	11.93	13.35	9.28	10.68	13.64
95th Percentile	12.66	13.39	14.28	14.80	15.52	15.99	16.50	17.47	20.46	24.00	15.42	17.50	26.44
99th Percentile	16.37	17.30	18.77	19.32	20.29	20.87	21.53	23.05	27.21	31.78	20.20	22.94	35.82
3 Years													
5th Percentile	-0.66	-0.91	-1.11	-1.14	-1.38	-1.36	-1.36	-1.61	-3.19	-5.13	-2.19	-1.82	-7.98
25th Percentile	2.66	2.73	2.73	2.85	2.95	3.06	3.21	3.21	2.69	2.05	2.31	3.19	0.23
50th Percentile	4.64	4.86	5.02	5.21	5.41	5.61	5.79	5.95	6.15	6.29	4.92	5.95	5.23
75th Percentile	6.58	6.94	7.29	7.55	7.89	8.14	8.38	8.74	9.50	10.42	7.52	8.71	10.15
95th Percentile	9.36	9.88	10.52	10.91	11.46	11.78	12.12	12.76	14.57	16.55	11.09	12.71	17.48
5 Years													
5th Percentile	0.41	0.23	0.08	0.08	-0.11	-0.07	-0.03	-0.15	-1.47	-2.96	-0.79	-0.36	-5.31
25th Percentile	2.99	3.10	3.13	3.24	3.33	3.46	3.58	3.62	3.25	2.70	2.75	3.60	1.09
50th Percentile	4.64	4.82	5.00	5.20	5.38	5.57	5.76	5.92	6.05	6.14	4.86	5.91	5.01
75th Percentile	6.13	6.42	6.73	7.01	7.32	7.57	7.85	8.13	8.77	9.46	6.92	8.15	9.04
95th Percentile	8.29	8.78	9.26	9.58	10.04	10.34	10.64	11.19	12.59	14.04	9.73	11.16	14.47
10 Years													
5th Percentile	1.61	1.58	1.51	1.54	1.46	1.55	1.64	1.58	0.61	-0.61	0.75	1.42	-2.66
25th Percentile	3.44	3.54	3.63	3.76	3.84	3.98	4.13	4.20	3.90	3.55	3.30	4.15	2.15
50th Percentile	4.55	4.74	4.92	5.11	5.30	5.49	5.68	5.85	5.96	6.02	4.82	5.83	4.96
75th Percentile	5.67	5.95	6.23	6.45	6.72	6.94	7.18	7.43	7.88	8.36	6.23	7.43	7.72
95th Percentile	7.24	7.60	8.01	8.33	8.70	8.95	9.22	9.62	10.67	11.77	8.29	9.65	11.69

*Investment Policy Guidelines: Total portfolio risk should be managed with a goal of avoiding annual losses greater than 22% with a 99% confidence level.

Monte Carlo: Income Focus

The table below shows the **percentage** chance of achieving or exceeding the given real 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 Income Focus	Income Focus Proposed	70% MSCI ACW / 30% BB US AGG
Target 3%	47	49	50	51	53	54	55	55	55	54	49	56	51
Target 4%	39	42	43	45	47	48	49	50	50	51	43	50	47
Target 5%	32	34	37	39	40	42	43	45	46	47	37	44	44
Target 5.5%	28	31	33	35	37	39	40	42	44	45	34	41	42
3 Years													
Target 3%	45	48	50	53	55	57	59	59	59	57	49	59	51
Target 4%	32	36	39	41	44	47	49	50	51	52	39	49	46
Target 5%	21	24	28	31	34	36	39	42	44	46	29	40	40
Target 5.5%	16	20	23	26	29	31	34	38	40	43	24	35	37
5 Years													
Target 3%	43	46	50	52	55	57	60	60	60	58	48	60	49
Target 4%	27	31	35	39	42	45	48	49	51	50	35	48	43
Target 5%	15	18	23	26	30	32	35	39	41	43	24	36	37
Target 5.5%	10	13	17	20	24	27	30	33	37	40	19	31	34
10 Years													
Target 3%	38	44	48	52	56	59	62	63	63	60	46	62	49
Target 4%	19	24	29	33	37	41	45	48	50	50	28	46	39
Target 5%	7	10	14	17	22	25	29	33	37	40	15	30	30
Target 5.5%	4	6	9	12	15	18	21	26	30	34	10	23	26

Asset Allocation Modeling

-Pool A



Pool A – Current vs. Proposed

ASSET CLASS	CURRENT	IFC PROPOSED	CHANGE
Broad US Equity	7.5	5.0	-2.5
Small Cap US Equity	1.0	2.0	+1.0
Broad International Equity	7.5	10.0	+2.5
MLPs	5.0	5.0	-
Preferred Stock	7.0	7.0	-
Private Equity	-	-	-
Custom Emerging Markets Debt	-	-	-
Private Credit	-	5.0	+5.0
US Agg Fixed Income	49.0	30.0	-19.0
Core Real Estate	4.0	10.0	+6.0
Non-Core Real Estate	4.0	6.0	+2.0
Private Core Infrastructure	-	-	-
Bank Loans	10.0	10.0	-
Hedge Funds	-	5.0	+5.0
Cash Equivalents	5.0	5.0	-
Total	100.0	100.0	-

Asset Class Composition - Asset classes defined by their primary category

Fixed Income & Cash	64.0	50.0	-14
Public Equity & Alternatives	36.0	50.0	14

Thematic Composition - Asset classes defined by their primary investment objective

Total Growth	28.0	34.0	6.0
Total Capital Preservation	54.0	35.0	-19.0
Total Alpha	0.0	5.0	5.0
Total Inflation	18.0	26.0	8.0

RVK 2021 Capital Market Assumptions - Return, standard deviation, and yield

Expected Return (Arithmetic)	4.08	4.89	0.81
Expected Risk (Standard Deviation)	5.94	7.07	1.13
Expected Return (Compound)	3.91	4.65	0.74
Est. Yield (12/31/20)	2.53	3.00	0.47

RVK 2021 Capital Market Assumptions - Risk metrics

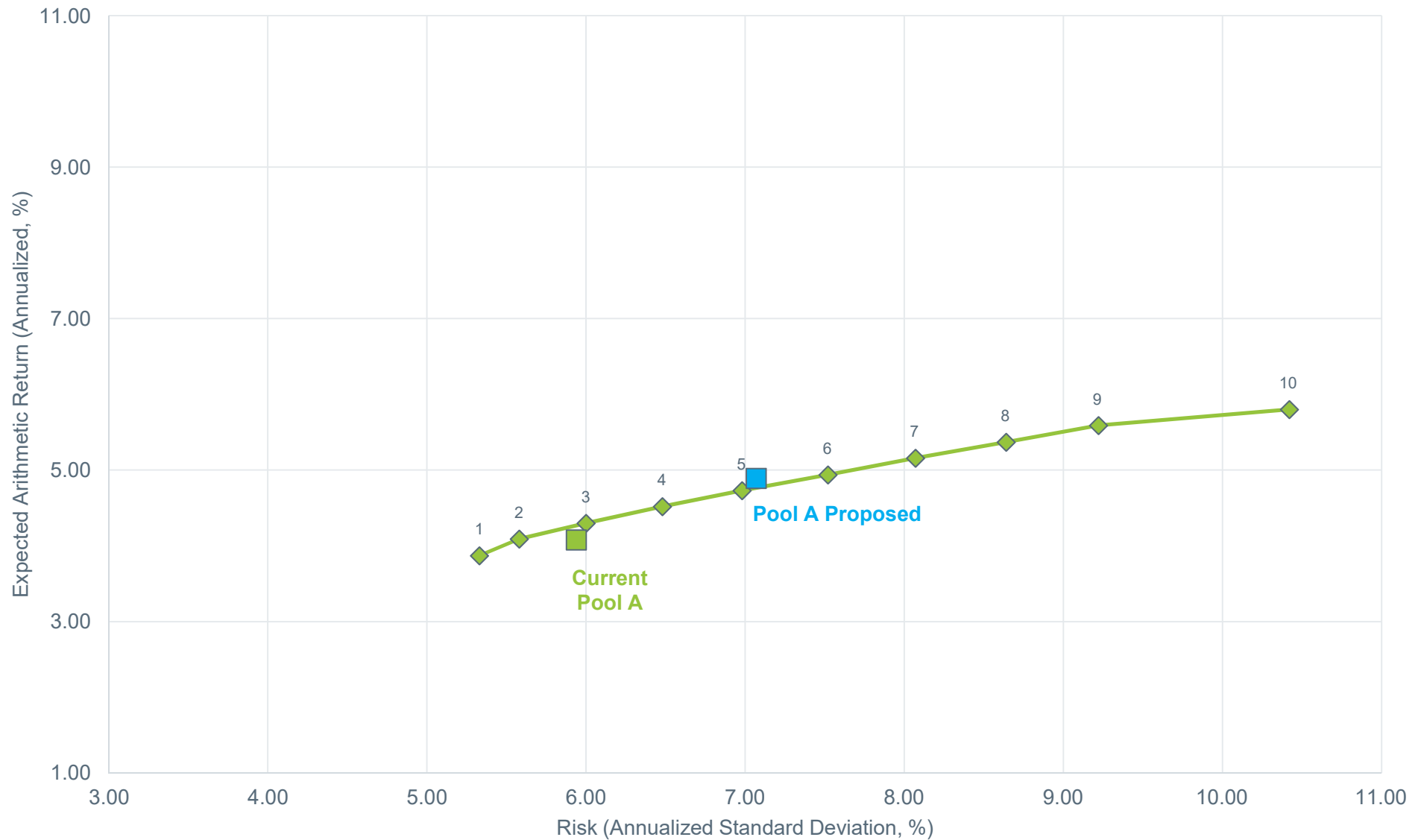
Expected Arithmetic Return/Risk Ratio	0.69	0.69	0.00
Expected Sharpe Ratio (RF = 1.50%)	0.43	0.48	0.05
RVK Expected Eq Beta (LCUS = 1)	0.30	0.35	0.05
RVK Liquidity Metric (T-Bills = 100)	78	66	-12

Monte Carlo Analysis

1st Percentile 1 Year Nominal Return	-10.35	-10.93	-0.58
50th Percentile 10 Year Nominal Return	4.00	4.81	0.81

Efficient Frontier: Pool A

Expected Return & Risk



Efficient Allocations: Pool A

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current Pool A	Pool A Proposed
Broad US Equity	5	20	5	5	5	5	5	6	7	8	10	20	7.5	5.0
Small Cap US Equity	1	4	1	1	1	1	2	2	2	3	3	4	1.0	2.0
Broad International Equity	5	20	5	7	9	9	10	12	14	16	19	20	7.5	10.0
MLPs	0	5	0	5	5	5	5	5	5	5	5	5	5.0	5.0
Preferred Stock	0	7	7	1	2	4	5	7	7	7	7	5	7.0	7.0
Private Credit	0	5	5	5	5	5	5	5	5	5	5	5	0.0	5.0
US Agg Fixed Income	25	50	50	50	46	41	37	32	31	30	26	25	49.0	30.0
Cash Equivalents	0	5	5	5	5	5	5	5	2	0	0	0	5.0	5.0
Core Real Estate	0	6	6	6	6	6	6	6	6	6	6	6	4.0	10.0
Non-Core Real Estate	0	5	5	5	5	5	5	5	5	5	5	5	4.0	6.0
Private Core Infrastructure	0	5	1	0	1	4	5	5	5	5	5	5	0.0	0.0
Bank Loans	0	10	10	10	10	10	10	10	10	10	10	0	10.0	10.0
Custom Hedge Funds	0	0	0	0	0	0	0	0	0	0	0	0	0.0	5.0
Total			100	100	100	100	100	100	100	100	100	100	100	100
Total Equity			18	19	22	24	27	32	35	39	44	54	28.0	29.0
Total Growth Assets			23	24	27	29	32	37	40	44	49	59	28.0	34.0
Total Capital Preservation			55	55	51	46	42	37	33	30	26	25	54.0	35.0
Total Real Assets			12	11	12	15	16	16	16	16	16	16	8.0	16.0
Total Inflation Assets			22	21	22	25	26	26	26	26	26	16	18.0	26.0
Total Alpha Assets			0	0	0	0	0	0	0	0	0	0	0.0	5.0
Total Illiquid Assets			17	16	17	20	21	21	21	21	21	21	8.0	21.0
Expected Arithmetic Return			3.87	4.09	4.30	4.52	4.73	4.94	5.16	5.37	5.59	5.80	4.08	4.89
Expected Risk (Standard Deviation)			5.33	5.58	6.00	6.48	6.98	7.52	8.07	8.64	9.22	10.42	5.94	7.07
Expected Compound Return			3.73	3.94	4.13	4.32	4.50	4.67	4.85	5.02	5.19	5.29	3.91	4.65
Expected Return (Arithmetic)/Risk Ratio			0.73	0.73	0.72	0.70	0.68	0.66	0.64	0.62	0.61	0.56	0.69	0.69
RVK Expected Eq Beta (LCUS Eq = 1)			0.25	0.27	0.30	0.33	0.36	0.40	0.43	0.47	0.51	0.60	0.30	0.35
RVK Liquidity Metric (T-Bills = 100)			71	71	71	69	69	69	69	69	69	74	78	66
Total Fixed Income & Cash			70	70	66	61	57	52	48	45	41	30	64	50
Estimated Yield (12/31/20)			2.50	2.62	2.72	2.92	3.01	3.12	3.17	3.23	3.28	2.84	2.53	3.00

Group constraints: (i) Total US equity must be at least 40% of total public equity.

Monte Carlo: Pool A

The table below shows the expected nominal 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	Pool A	Pool A Proposed
1st Percentile	-6.58	-9.13	-9.55	-9.20	-9.91	-11.13	-12.37	-13.74	-15.14	-19.61	-10.35	-10.93
5th Percentile	-2.86	-3.81	-3.87	-3.57	-3.85	-4.39	-5.00	-5.73	-6.52	-9.02	-4.27	-4.09
25th Percentile	1.27	1.06	1.18	1.43	1.49	1.48	1.38	1.20	1.04	0.10	0.88	1.58
50th Percentile	3.89	4.13	4.35	4.57	4.77	5.02	5.21	5.45	5.67	5.73	4.14	4.97
75th Percentile	6.62	7.31	7.61	7.73	8.16	8.63	9.19	9.75	10.36	11.66	7.45	8.43
95th Percentile	10.50	11.71	12.22	12.40	13.01	13.86	15.02	16.15	17.39	20.62	12.25	13.42
99th Percentile	13.49	14.73	15.29	15.39	16.26	17.55	19.04	20.67	22.36	26.93	15.76	17.13
3 Years												
5th Percentile	-0.10	-0.71	-0.69	-0.39	-0.45	-0.65	-1.05	-1.50	-2.01	-3.51	-1.08	-0.55
25th Percentile	2.27	2.21	2.38	2.61	2.72	2.76	2.74	2.71	2.68	2.13	2.08	2.81
50th Percentile	3.87	4.13	4.35	4.58	4.80	5.01	5.21	5.39	5.58	5.65	4.09	4.95
75th Percentile	5.44	5.92	6.19	6.38	6.69	7.06	7.48	7.90	8.37	9.14	6.04	6.96
95th Percentile	7.72	8.51	8.87	9.02	9.51	10.08	10.83	11.57	12.29	14.11	8.76	9.87
5 Years												
5th Percentile	0.72	0.30	0.33	0.61	0.56	0.44	0.18	-0.08	-0.37	-1.70	-0.05	0.51
25th Percentile	2.59	2.60	2.77	3.00	3.14	3.22	3.26	3.29	3.28	2.83	2.46	3.25
50th Percentile	3.85	4.09	4.31	4.52	4.71	4.91	5.12	5.31	5.51	5.62	4.08	4.88
75th Percentile	5.11	5.51	5.77	5.97	6.25	6.56	6.93	7.31	7.66	8.30	5.60	6.48
95th Percentile	6.88	7.57	7.87	8.03	8.48	9.00	9.58	10.17	10.80	12.17	7.83	8.74
10 Years												
5th Percentile	1.66	1.39	1.49	1.70	1.74	1.69	1.56	1.41	1.23	0.41	1.15	1.78
25th Percentile	2.94	2.99	3.16	3.41	3.54	3.62	3.70	3.75	3.79	3.51	2.86	3.64
50th Percentile	3.83	4.03	4.24	4.46	4.66	4.86	5.06	5.25	5.42	5.50	4.00	4.81
75th Percentile	4.72	5.08	5.31	5.52	5.78	6.05	6.36	6.67	6.98	7.44	5.14	5.97
95th Percentile	5.97	6.51	6.77	6.96	7.29	7.71	8.17	8.65	9.19	10.19	6.60	7.55

***Investment Policy Guidelines: Total portfolio risk should be managed with a goal of avoiding annual losses greater than 20% with a 99% confidence level.**

Asset Allocation Modeling

-Workers' Compensation Fund



Workers' Compensation – Current vs. Proposed

ASSET CLASS	CURRENT	IFC PROPOSED	CHANGE
Broad US Equity	8.0	6.0	-2.0
Small Cap US Equity	2.0	-	-2.0
Broad International Equity	12.5	9.0	-3.5
MLPs	4.5	5.0	+0.5
Custom Emerging Markets Debt	2.5	5.0	+2.5
Private Credit	-	5.0	+5.0
Core Real Estate	4.5	5.0	+0.5
Non-Core Real Estate	4.0	4.0	-
Private Core Infrastructure	-	5.0	+5.0
WC Liability Hedging Fixed Income*	62.0	56.0	-6.0
Cash Equivalents	-	-	-
Total	100.0	100.0	-

*Consists of 50% Long Duration Fixed Income and 50% US Agg Fixed Income with an estimated duration of 11.4 years.

Asset Class Composition - Asset classes defined by their primary category

Fixed Income & Cash	64.5	66.0	2
Public Equity & Alternatives	35.5	34.0	-2

Thematic Composition - Asset classes defined by their primary investment objective

Total Growth	29.5	30.0	0.5
Total Capital Preservation	62.0	56.0	-6.0
Total Alpha	0.0	0.0	0
Total Inflation	8.5	14.0	5.5

RVK 2021 Capital Market Assumptions - Return, standard deviation, and yield

Expected Return (Arithmetic)	4.15	4.35	0.20
Expected Risk (Standard Deviation)	7.17	7.06	-0.11
Expected Return (Compound)	3.90	4.11	0.21
Est. Yield (12/31/20)	2.34	2.85	0.50

Liability-Driven Risk Metrics - Applicable to Workers' Compensation only

Expected Risk (Surplus Volatility)	5.73	5.88	0.15
Est. Interest Hedge Ratio	106%	99%	-7%
Est. Funded Status -2 STDEV Event**	149%	148%	-1%

** (Current Est. WC Funded Status = 168%)

RVK 2021 Capital Market Assumptions - Risk metrics

Expected Arithmetic Return/Risk Ratio	0.58	0.62	0.04
Expected Sharpe Ratio (RF = 1.50%)	0.37	0.40	0.03
RVK Expected Eq Beta (LCUS = 1)	0.33	0.33	0.00
RVK Liquidity Metric (T-Bills = 100)	73	68	-5

Monte Carlo Analysis

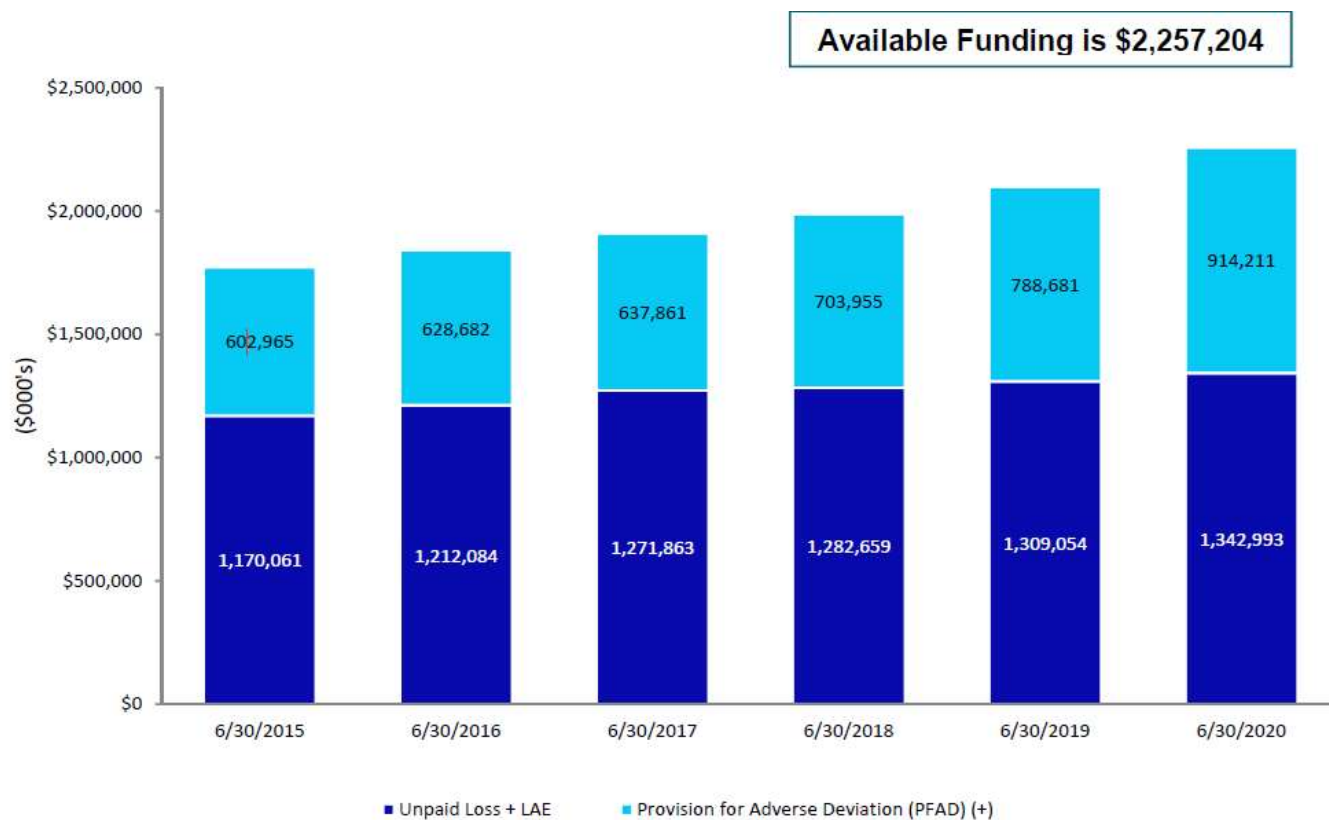
1st Percentile 1 Year Nominal Return	-14.47	-11.58	2.89
50th Percentile 10 Year Nominal Return	4.02	4.27	0.25

Workers' Compensation Fund: Key Terms

Plan Attributes as of June 30, 2020

- Funded Status: 168%
- Duration of Liabilities: 11.4 years

Funding Position – Discounted (from Actuarial Report)*

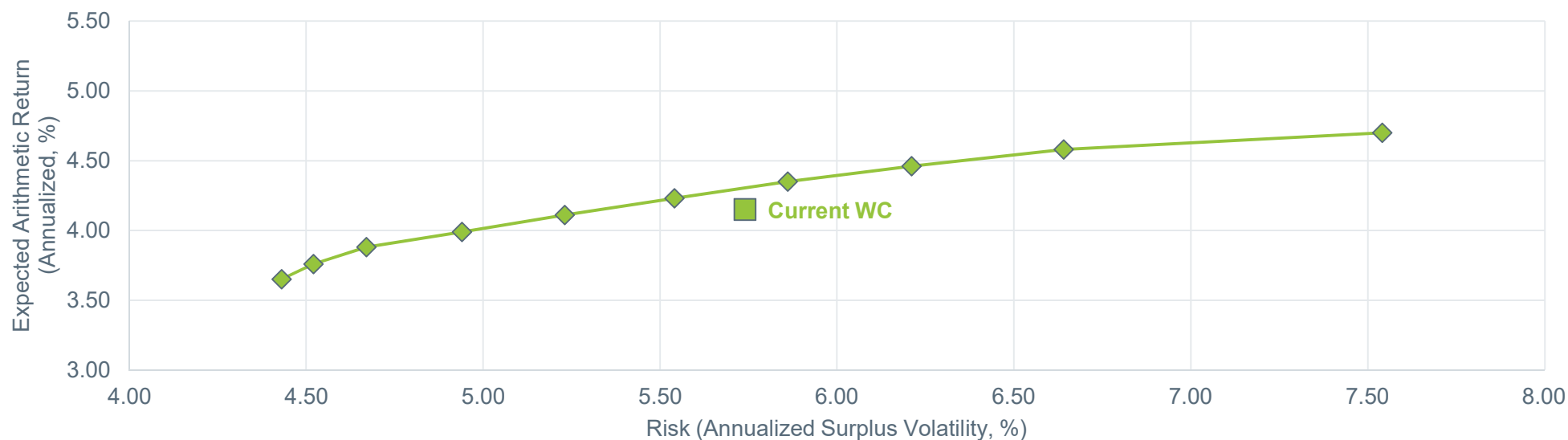


Workers' Compensation Fund: Asset Allocation

Strategy: The Workers' Compensation uses a liability driven investing strategy, in which the majority of plan assets are invested in a custom liability hedging fixed income portfolio (a mix of long duration and core fixed income), constructed to match the duration of plan liabilities. The objective of the asset allocation strategy is to minimize funded status volatility.

Asset Allocation Modeling: Since the liability hedging strategy was implemented, the annual asset allocation process has been based upon decisions made for the Total Return Focused Permanent Funds. The assets not invested in liability hedging fixed income (i.e. "return seeking assets"), are allocated in the same portions as the Total Return portfolios, excluding other fixed income assets, hedge funds, and private equity.

Efficient Frontier (Expected Return and Surplus Volatility)



Efficient Allocations: Workers' Compensation Fund

Expected Return and Surplus Volatility

	Min	Max	1	2	3	4	5	6	7	8	9	10	Current WC	WC Proposed
Broad US Equity	0	30	11	7	3	3	4	5	6	6	4	9	8.0	6.0
Small Cap US Equity	0	5	0	0	0	0	0	0	0	2	5	5	2.0	0.0
Broad International Equity	0	30	0	2	4	5	6	8	9	11	13	22	12.5	9.0
MLPs	0	5	0	2	5	5	5	5	5	5	5	5	4.5	5.0
Custom Emerging Markets Debt	0	5	5	5	5	5	5	5	5	3	0	0	2.5	5.0
Private Credit	0	5	5	5	5	5	5	5	5	5	5	0	0.0	5.0
Core Real Estate	0	5	5	5	5	5	5	5	5	5	4	0	4.5	5.0
Non-Core Real Estate	0	4	4	4	4	4	4	4	4	4	4	4	4.0	4.0
Private Core Infrastructure	0	5	5	5	5	5	5	5	5	5	5	0	0.0	5.0
Custom Liability Hedging Fixed Income	55	65	65	65	65	63	61	58	56	55	55	55	62.0	56.0
Total			100	100	100	100	100	100	100	100	100	100	100	100
Total Return Seeking Assets			35	35	36	37	39	42	44	46	45	45	38.0	44.0
Total Liability Hedging Assets			65	65	65	63	61	58	56	55	55	55	62.0	56.0
Total Equity			11	11	12	13	15	18	20	24	27	41	27.0	20.0
Total Growth Assets			21	21	22	23	25	28	30	32	32	41	29.5	30.0
Total Capital Preservation			65	65	65	63	61	58	56	55	55	55	62.0	56.0
Total Real Assets			14	14	14	14	14	14	14	14	13	4	8.5	14.0
Total Inflation Assets			14	14	14	14	14	14	14	14	13	4	8.5	14.0
Total Alpha Assets			0	0	0	0	0	0	0	0	0	0	0.0	0.0
Total Illiquid Assets			19	19	19	19	19	19	19	19	18	4	8.5	19.0
Expected Equity Beta (LC US Eq = 1)			0.26	0.25	0.25	0.27	0.29	0.31	0.33	0.35	0.38	0.45	0.33	0.33
Expected Return (Arithmetic)			3.65	3.76	3.88	3.99	4.11	4.23	4.35	4.46	4.58	4.70	4.15	4.35
Risk (Surplus Volatility)			4.43	4.52	4.67	4.94	5.23	5.54	5.86	6.21	6.64	7.54	5.74	5.88
Expected Compound Return			3.44	3.56	3.67	3.78	3.89	4.00	4.10	4.21	4.30	4.36	3.90	4.11
Risk (Standard Deviation)			6.52	6.52	6.56	6.66	6.79	6.93	7.10	7.29	7.58	8.45	7.17	7.06
Est. Interest Hedge Ratio			114%	114%	114%	110%	106%	103%	99%	95%	92%	92%	106%	99%
Est. Funded Status -2 STDEV Event (Current = 168%)*			153%	153%	152%	151%	150%	149%	148%	147%	146%	143%	149%	148%
Total Fixed Income & Cash			65	65	65	63	61	58	56	55	55	55	62	56
Estimated Yield (12/31/20)			2.42	2.58	2.84	2.83	2.83	2.84	2.85	2.82	2.72	2.28	2.34	2.85

*WC Liability Hedging Fixed Income consists of 50% Long Duration Fixed Income and 50% US Agg Fixed Income.

Group constraints: (i) Total US equity must be at least 40% of total public equity.

Workers' Compensation Fund: Key Terms

Funded Status: the fair value of a Plan's assets divided by the projected benefit obligation. A fully funded Plan is one in which the fair value of the assets is enough to cover at least 100 percent of the projected benefits.

Duration of Liabilities: the sensitivity of Plan liabilities to a change in interest rates. A duration of 10 years implies that for every 1.00% change in interest rates, the liability would change by 10.00% in the inverse direction.

Surplus Volatility: the funded status volatility or tracking error of the investment return relative to the change in present value of the Plan liabilities.

Interest Hedge Ratio: the estimate of how well a Plan's investment portfolio is hedged against changes in interest rates – a primary driver of funded status movements. This is calculated by dividing the dollar-weighted values of both the Plan asset duration by the liability duration and multiplying by the estimated funded status. An estimated plan hedge ratio of zero indicates that the Plans' liabilities have not been hedged, whereas a value of one indicates fully hedged.

Estimated Funded Status – 2 STDEV Event: the estimated funded status of a Plan in one year assuming investment returns during that year are 2 standard deviations below the mean. The value assumes interest plus service costs are equal to expected return.

Asset Allocation

-LSRA



Legislative Stabilization Reserve Account (LSRA)

Total Assets (12/31/20): \$1,472 million

Fund Horizon: Non-Permanent Fund

Primary Investment Goal: To obtain the highest possible return while seeking to preserve the balance of the account necessary to address potential budget shortfalls or a structural budget deficit.

Investment Constraints:

- This fund dispenses income and capital gains.
- LSRA will be invested in 3 different pools, as detailed below
- To the extent funds are available and prior to making any other investments, \$500 million shall be invested in the short-term reserve.

Implementation:

- 3 separate pools: Long-Term (capital appreciation assets), Intermediate-Term (intermediate duration/core fixed income), Short-Term (low duration fixed income).
- **Long-term reserve allocation is intended to be constructed similar to the Total Return Focus portfolios, excluding fixed income, private equity, and real estate.**

Legislative Stabilization Reserve Account (LSRA)

Long-Term Reserve

Long-Term Asset Class Targets	Asset Classes	Long-Term Target (%)*	Min (%)	Max (%)
Public Equity (68.5%)	Broad US Equity	22.00	17.00	27.00
	Small Cap US Equity	6.00	4.00	8.00
	Broad Int'l Equity	28.00	21.00	35.00
	MLPs	12.50	10.00	15.00
Alternatives (19.0%)	Diversified Hedge Funds	19.00	15.00	23.00
Fixed Income & Cash (12.5%)	Bank Loans	12.50	10.00	15.00
	Cash Equivalents	--	--	--

Thematic Composition



Intermediate-Term Reserve

Long-Term Asset Class Targets	Asset Classes	Long-Term Target (%)
Fixed Income (100%)	Core Fixed Income	100.00



Short-Term Reserve

Long-Term Asset Class Targets	Asset Classes	Long-Term Target (%)
Fixed Income (100%)	Low Duration Fixed Income	100.00



Recommendation Summary



Summary of Asset Allocation Recommendations

2021 Capital Markets Assumptions

ASSET CLASS	TOTAL RETURN			INCOME			POOL A			WORKERS' COMPENSATION			LSRA LT RESERVE
	CURRENT	IFC PROPOSED	CHANGE	CURRENT	IFC PROPOSED	CHANGE	CURRENT	IFC PROPOSED	CHANGE	CURRENT	IFC PROPOSED	CHANGE	CURRENT
Broad US Equity	11.0	11.0	-	8.0	8.0	-	7.5	5.0	-2.5	8.0	6.0	-2.0	22.0
Small Cap US Equity	3.0	3.0	-	2.0	2.0	-	1.0	2.0	+1.0	2.0	-	-2.0	6.0
Broad International Equity	18.0	18.0	-	12.0	15.0	+3.0	7.5	10.0	+2.5	12.5	9.0	-3.5	28.0
MLPs	5.5	5.5	-	7.0	7.0	-	5.0	5.0	-	4.5	5.0	+0.5	12.5
Preferred Stock	-	-	-	3.0	6.0	+3.0	7.0	7.0	-	-	-	-	-
Private Equity	8.0	11.0	+3.0	-	-	-	-	-	-	-	-	-	-
Custom Emerging Markets Debt	5.0	5.0	-	7.0	7.0	-	-	-	-	2.5	5.0	+2.5	-
Private Credit	-	5.0	+5.0	-	7.0	+7.0	-	5.0	+5.0	-	5.0	+5.0	-
US Agg Fixed Income	25.0	11.0	-14.0	35.0	12.0	-23.0	49.0	30.0	-19.0	-	-	-	-
Core Real Estate	6.0	6.0	-	11.0	9.0	-2.0	4.0	10.0	+6.0	4.5	5.0	+0.5	-
Non-Core Real Estate	5.0	7.0	+2.0	3.0	5.0	+2.0	4.0	6.0	+2.0	4.0	4.0	-	-
Private Core Infrastructure	-	2.0	+2.0	-	5.0	+5.0	-	-	-	-	5.0	+5.0	-
Bank Loans	6.0	6.0	-	12.0	12.0	-	10.0	10.0	-	-	-	-	12.5
Hedge Funds	7.5	9.5	+2.0	-	5.0	+5.0	-	5.0	+5.0	-	-	-	19.0
WC Liability Hedging Fixed Income*	-	-	-	-	-	-	-	-	-	62.0	56.0	-6.0	-
Cash Equivalents	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-
Total	100.0	100.0	-	100.0	100.0	-	100.0	100.0	-	100.0	100.0	-	100.0

*Consists of 50% Long Duration Fixed Income and 50% US Agg Fixed Income with an estimated duration of 11.4 years.

Asset Class Composition - Asset classes defined by their primary category

Fixed Income & Cash	36.0	27.0	-9	54.0	38.0	-16	64.0	50.0	-14	64.5	66.0	2	12.5
Public Equity & Alternatives	64.0	73.0	9	46.0	62.0	16	36.0	50.0	14	35.5	34.0	-2	87.5

Thematic Composition - Asset classes defined by their primary investment objective

Total Growth	50.5	58.5	8.0	39.0	52.0	13.0	28.0	34.0	6.0	29.5	30.0	0.5	68.5
Total Capital Preservation	25.0	11.0	-14.0	35.0	12.0	-23.0	54.0	35.0	-19.0	62.0	56.0	-6.0	0.0
Total Alpha	7.5	9.5	2.0	0.0	5.0	5.0	0.0	5.0	5.0	0.0	0.0	0	19.0
Total Inflation	17.0	21.0	4.0	26.0	31.0	5.0	18.0	26.0	8.0	8.5	14.0	5.5	12.5

RVK 2021 Capital Market Assumptions - Return, standard deviation, and yield

Expected Return (Arithmetic)	5.66	6.37	0.71	4.89	5.95	1.06	4.08	4.89	0.81	4.15	4.35	0.20	6.67
Expected Risk (Standard Deviation)	9.61	11.19	1.58	7.41	9.74	2.33	5.94	7.07	1.13	7.17	7.06	-0.11	13.19
Expected Return (Compound)	5.23	5.79	0.56	4.63	5.51	0.88	3.91	4.65	0.74	3.90	4.11	0.21	5.86
Est. Yield (12/31/20)	2.34	2.71	0.37	3.03	3.74	0.71	2.53	3.00	0.47	2.34	2.85	0.50	2.82

Liability-Driven Risk Metrics - Applicable to Workers' Compensation only

Expected Risk (Surplus Volatility)	-	-	-	-	-	-	-	-	-	5.73	5.88	0.15	-
Est. Interest Hedge Ratio	-	-	-	-	-	-	-	-	-	106%	99%	-7%	-
Est. Funded Status -2 STDEV	-	-	-	-	-	-	-	-	-	149%	148%	-1%	-

** (Current Est. WC Funded Status = 168%)

RVK 2021 Capital Market Assumptions - Risk metrics

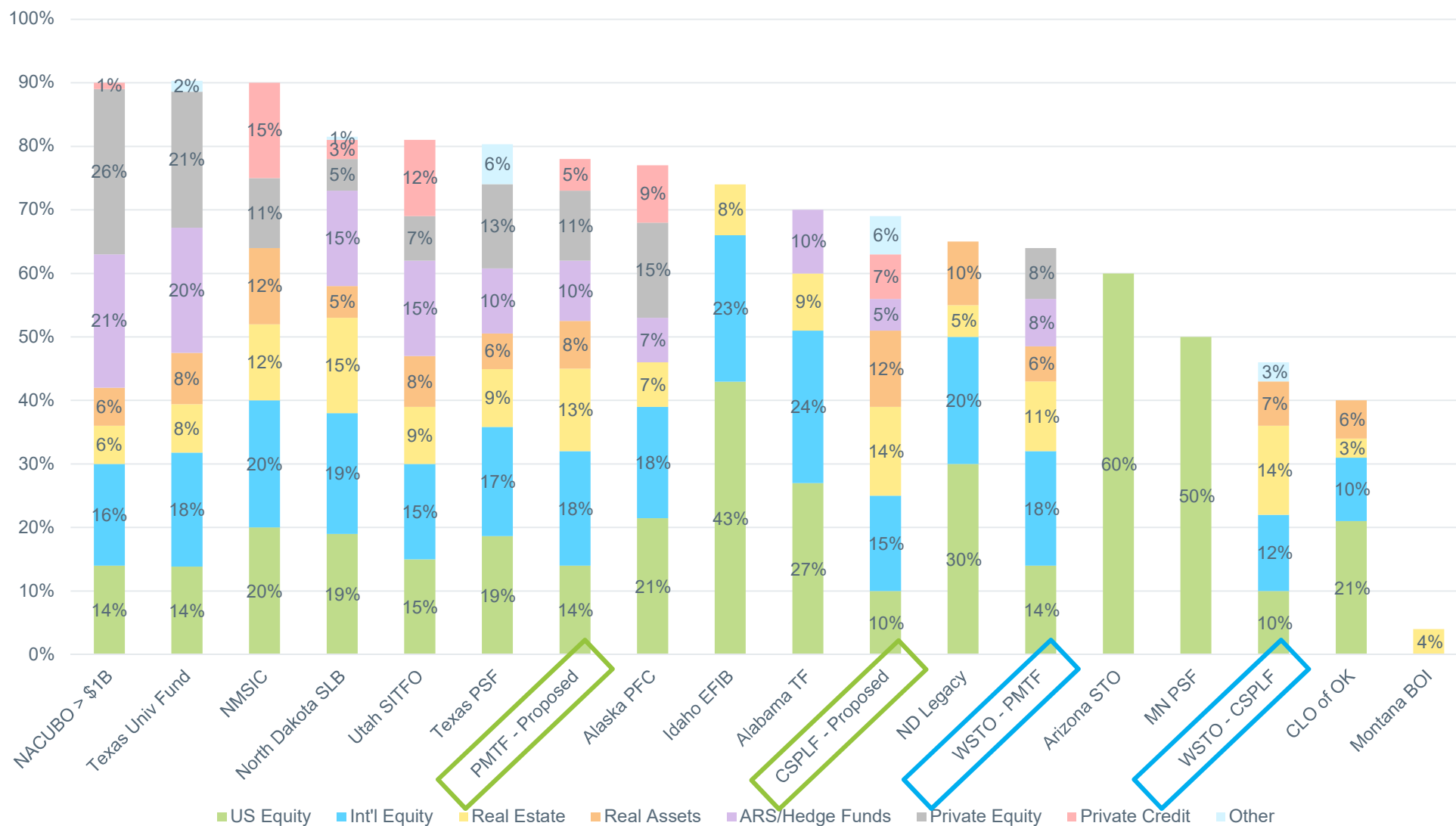
Expected Arithmetic Return/Risk Ratio	0.59	0.57	-0.02	0.66	0.61	-0.05	0.69	0.69	0.00	0.58	0.62	0.04	0.51
Expected Sharpe Ratio (RF = 1.50%)	0.43	0.44	0.00	0.46	0.46	0.00	0.43	0.48	0.05	0.37	0.40	0.03	0.39
RVK Expected Eq Beta (LCUS = 1)	0.53	0.61	0.08	0.38	0.51	0.13	0.30	0.35	0.05	0.33	0.33	0.00	0.74
RVK Liquidity Metric (T-Bills = 100)	65	55	-10	71	60	-11	78	66	-12	73	68	-5	75

Monte Carlo Analysis

1st Percentile 1 Year Nominal Return	-20.42	-21.40	-0.98	-15.28	-16.39	-1.11	-10.35	-10.93	-0.58	-14.47	-11.58	2.89	-33.88
50th Percentile 10 Year Nominal Return	5.41	6.10	0.69	4.82	5.83	1.01	4.00	4.81	0.81	4.02	4.27	0.25	6.13

RVK SWF Survey – Asset Allocation

Target Allocation to Risk Assets as of June 30, 2020 & 2021 Proposed Allocations

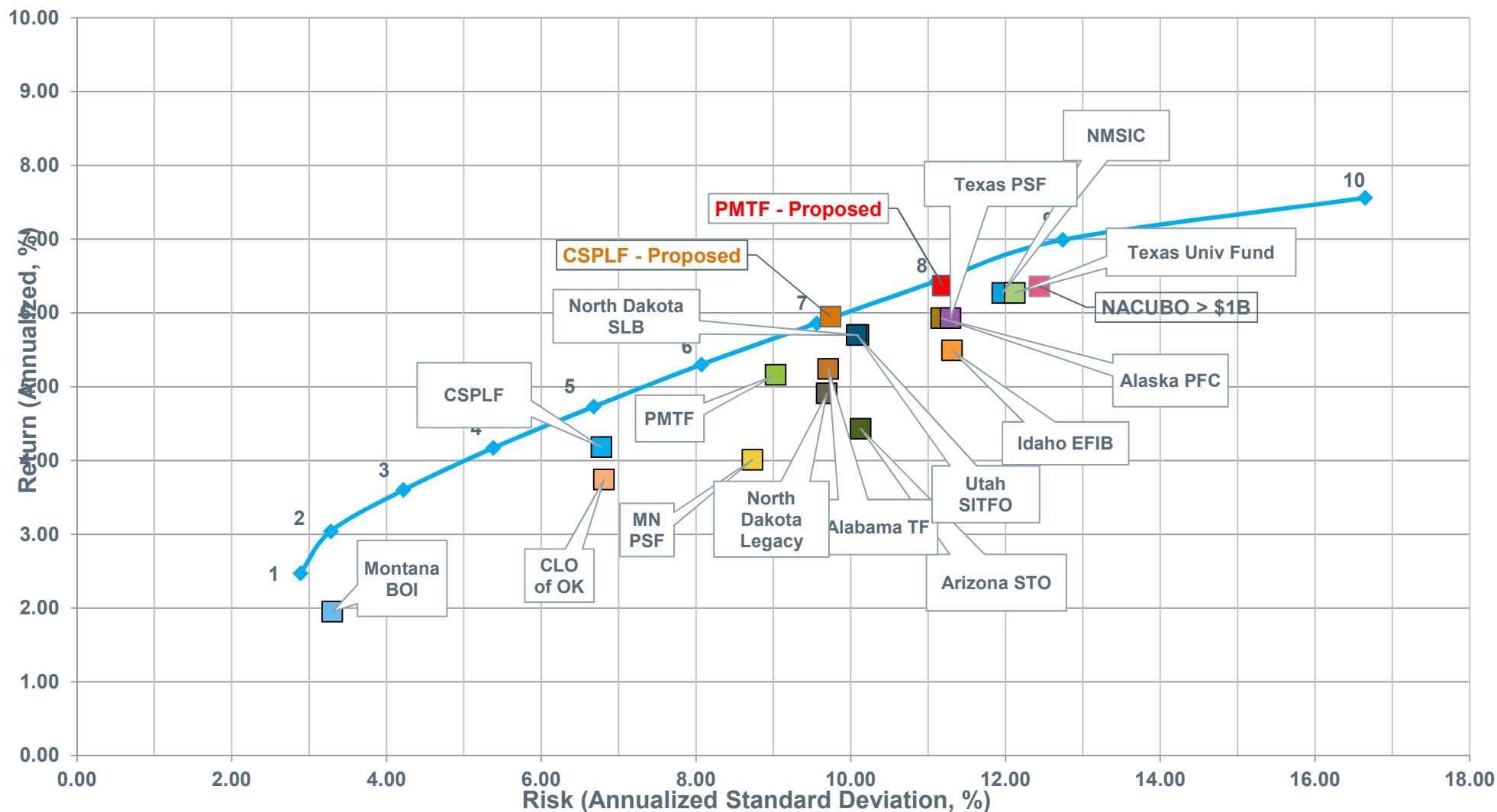


All data is as of June 30, 2020.

Allocation to "Other" includes risk parity, strategic partnerships, and preferred securities.

RVK SWF Survey – Asset Allocation

- ❖ The expected risk and return of each US SWF is modeled below using RVK's 2021 capital markets assumptions, and Fund asset allocations as of June 30, 2020.



Implementation & Transition Considerations

- Significant asset transition that will likely take multiple years to fully implement
- Large movement from liquid to illiquid asset categories that will to varying degrees require pacing analysis and staged commitments
 - Private Equity: Updated pacing analysis to reflect higher long-term targets
 - Private Credit: Evaluation of evergreen structures vs closed end funds or potential hybrids
 - Infrastructure: Evaluation of core open end funds vs direct investment or potential hybrids
- Potential use of liquid proxies – pros and cons
- Careful and thoughtful implementation will be important
- Benchmarking considerations

Appendix



Permanent Funds – Total Return Focus

Permanent Mineral Trust Fund, Permanent Land Fund, University Permanent Land Fund, and Hathaway Scholarship Fund

Combined Assets (12/31/20): \$9,826 million

Fund Horizon: Permanent Fund (Perpetual)

Primary Investment Goal: Preserve long-term purchasing power after spending and inflation, while providing stable income for distributions

Investment Constraints:

- The corpus must be held inviolate and cannot be spent
- Only income and net capital gains can be spent (realized losses can become problematic in this regard)
- Maximum of 70% of the total book value of permanent funds may be invested in equities and alternative investments (has been increased several times beginning with the initial allowance to invest in equities in 1996)

Spending Policy:

Permanent Mineral Trust Fund: 5% of the trailing 5-year average market value, with 2.5% guaranteed to the General Fund.

- FY 2023: 4.75% of the trailing 5-year average market value
- FY 2024 and thereafter: 4.5% of the trailing 5-year average market value
- Amounts must be sourced from investment income (interest and dividends) and realized capital gains.
- Earnings in excess of the spending policy are appropriated to the reserve account. Reserve account balance must exceed 150% of the current fiscal year's spending policy before transferring any excess funds to the corpus.

Hathaway Scholarship Fund: The amount necessary to fully fund scholarships awarded under W.S. 21-16-1301 *et seq.*

- Amounts must be sourced from investment income (interest and dividends) and realized capital gains.
- Earnings in excess of the spending policy are appropriated from the Hathaway expenditure account to the Hathaway Fund reserve account. Reserve account balance must exceed \$12 million or an amount equal to 4.5% of the previous 5-year average market value before transferring any excess funds to the corpus.

Other Considerations: Avoid a high correlation with mineral prices

Permanent Funds – Income Focus

Common School Permanent Land Fund and Higher Education Endowment Fund

Combined Assets (12/31/20): \$4,558 million

Fund Horizon: Permanent Fund (Perpetual)

Primary Investment Goal: Provide sufficient income to meet guaranteed spending levels, while preserving long-term purchasing power after spending and inflation

Investment Constraints:

- The corpus must be held inviolate and cannot be spent
- Only income and net capital gains can be spent (realized losses can become problematic in this regard)
- Maximum of 70% of the total book value of permanent funds may be invested in equities and alternative investments (has been increased several times beginning with the initial allowance to invest in equities in 1996)

Spending Policy:

Common School Permanent Land Fund: 5% of trailing 5-year average market value, with the full spending policy amount guaranteed to the General Fund.

- FY 2025: 4.75% of the trailing 5-year average market value
- FY 2026 and thereafter: 4.5% of the trailing 5-year average market value
- Amounts must be sourced from investment income (interest and dividends) and realized capital gains.
- Earnings in excess of the spending policy are appropriated to the reserve account. Reserve account balance must exceed 150% of the current fiscal year's spending policy before transferring any excess funds to the corpus.

Higher Education Endowment Fund: 4.75% of trailing 5-year average market value of the fund, calculated on the first day of the fiscal year.

- Amounts must be sourced from investment income (interest and dividends) and realized capital gains.
- Earnings in excess of the spending policy are appropriated to the reserve account. Reserve account balance must exceed 150% of the current fiscal year's spending policy before transferring any excess funds to the corpus.

Other Considerations: Avoid a high correlation with mineral prices.

State Agency Pool

Total Assets (12/31/20): \$4,344 million

Fund Horizon: Non-Permanent Fund

Primary Investment Goal: Stability assuring that appropriated funds remain to the greatest extent possible intact for their intended purposes. SAP is intended to be moderately liquid.

- SAP is one of two pools holding a diverse array of individual funds ranging from agency budgets to reserve accounts.

Investment Constraints:

- This fund dispenses income and capital gains.
- Cannot invest in equities or alternative investments

Spending Policy: Investment income (interest, dividends, and capital gains) is deposited as prescribed by statute.

Legislative Stabilization Reserve Account (LSRA)

Total Assets (12/31/20): \$1,472 million

Fund Horizon: Non-Permanent Fund

Primary Investment Goal: To obtain the highest possible return while seeking to preserve the balance of the account necessary to address potential budget shortfalls or a structural budget deficit.

Investment Constraints:

- This fund dispenses income and capital gains.
- LSRA will be invested in 3 different pools, as detailed below
- To the extent funds are available and prior to making any other investments, \$500 million shall be invested in the short-term reserve.

Implementation:

- 3 separate pools: Long-Term (capital appreciation assets), Intermediate-Term (intermediate duration/core fixed income), Short-Term (low duration fixed income).
- **Long-term reserve allocation is intended to be constructed similar to the Total Return Focus portfolios, less fixed income, private equity, and real estate.**

Workers' Compensation Fund

Total Assets (12/31/20): \$2,593 million

Fund Horizon: Permanent Fund (Perpetual)

Primary Investment Goal: To provide for a return that assures the Fund will be self-funding or nearly self-funding in order to substantially reduce or eliminate the need for employer contributions.

Funded Status 168%

Duration of Liabilities 11.4 years

Investment Constraints:

- Maximum of 70% of the total book value of permanent funds may be invested in equities and alternative investments (has been increased several times beginning with the initial allowance to invest in equities in 1996).
- This fund retains income and capital gains.

Spending Policy: The exact cash level shall be determined by the Staff of the Wyoming Department of Workforce Services and dependent on the liquidity needs of the Fund. Those cash estimates shall be presented to the State Treasurer's Office on an annual basis.

Pool A Investment Account

(Formerly Tobacco Settlement Fund)

Total Assets (12/31/20): \$266 million

Fund Horizon: Non-Permanent Fund

Primary Investment Goal: Stability and return on investment. Pool A is intended to be moderately liquid and safely invested, but also be invested for return and growth.

- Pool A is one of two pools holding a diverse array of individual funds from agency budgets to reserve accounts.

Investment Constraints:

- This fund dispenses income and capital gains.
- Maximum of 60% of the total book value of Pool A may be invested in equities and alternative investments.

Spending Policy: Investment income (interest, dividends, and capital gains) is deposited as prescribed by statute.

Capital Markets Assumptions

Philosophy

- Each year, RVK's general consulting and research teams collaborate to review the capital market environment and update long-term, forward-looking capital market (CM) expectations for each asset class utilized by our clients.
- The forecast horizon is for long-term periods, typically 10 years or more.
- The components we estimate include:
 - Return
 - Risk (volatility of returns)
 - Correlation (relationship of asset class returns with all other asset classes)
- Return assumptions are generally index-based and assume no investment manager alpha.
- Annual updates are typically gradual and incorporate historical performance, current valuations, as well as the overall economic environment.

Summary of Expected Return Methodology

Building Block Methodology

Cash Equivalents	Current yield
Fixed Income	Current yield + option-adjusted spread change
TIPS	Current real yield + inflation assumption
Public Equity	Current dividend yield + real GDP/earnings growth + inflation assumption + expected P/E change
Core Real Estate	Current yield + inflation assumption + valuation
Hedge Funds	Beta return + alpha return + risk-free return (cash assumption)
Commodities	Collateral return (cash assumption) + spot return (inflation assumption) + roll return

Build-Up/Spread Methodology

Non-Core Real Estate	Core real estate assumption + 2.00% return premium
Private Equity	US large/mid cap equity assumption + 2.75% return premium

While the above factors generally inform the direction and magnitude of the capital market assumptions, RVK also considers qualitative, triangulation, and other factors as needed, when arriving at final assumption values.

What does it mean to get CM Assumptions “right”?

Relative accuracy is most important...

- **Relative Accuracy:** Assumptions capture the relative relationships between asset classes – particularly closely related ones.
 - Having some assumptions that are spot on and others that are far off will produce unbalanced and poorly diversified portfolios.

But “absolute” accuracy matters too—just not as much.

- **Absolute Accuracy:** Assumptions reflect the absolute values actually experienced in future long-term market environments.
 - Having CM assumptions that are too high or too low across the board can cause a Fund to believe it can spend more than it can afford or restrict spending more than necessary.

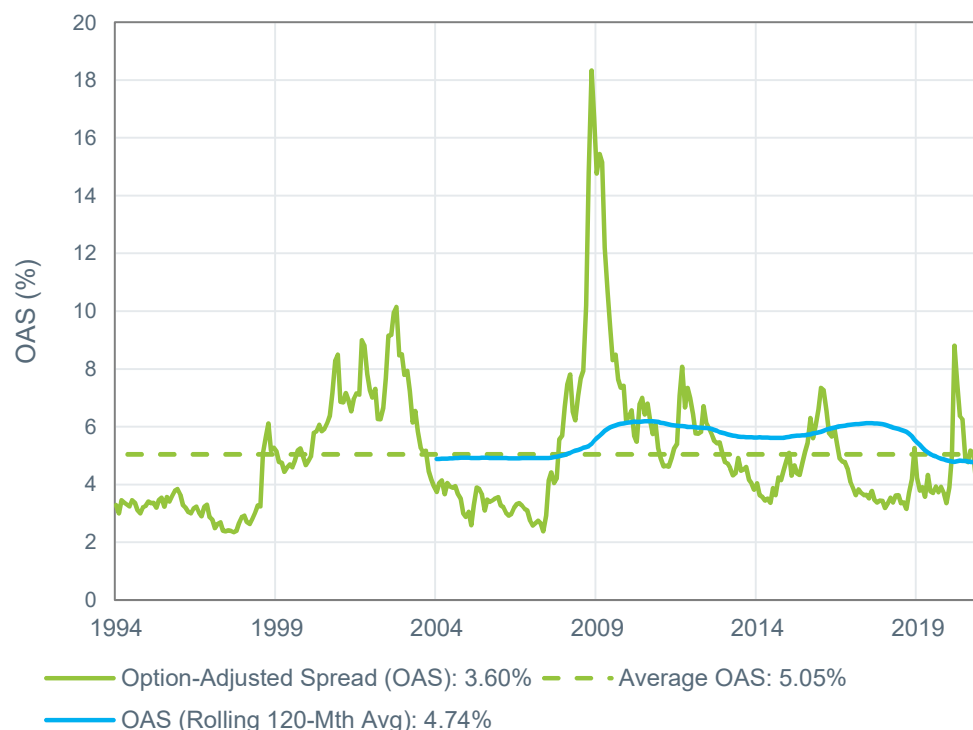
Factors to keep in mind when evaluating assumptions...

- While excessively high capital market assumptions provide the hope of higher rates of expected return, this prospect may not actually materialize if the market environment does not support them and can often lead to suboptimal portfolio structures.
- A well-structured and executed investment program will be best positioned to benefit from the available market returns ***regardless of the forecasts for total return.***
- Well-structured asset allocations (and the resulting outcomes) are largely produced by the relative accuracy of assumptions, not simply by forecasting higher absolute returns.

Fixed Income – Spread Assets

Fixed Income: Spread Sectors									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
High Yield	7.50%	10.00%	7.04%	4.75%	10.00%	4.28%	-2.75%	--	-2.76%
Emerging Markets Debt (HC)	7.00%	10.00%	6.54%	5.00%	10.00%	4.53%	-2.00%	--	-2.01%
Emerging Markets Debt (LC)	5.75%	11.50%	5.13%	5.00%	11.50%	4.38%	-0.75%	--	-0.75%
Bank Loans	7.00%	8.00%	6.70%	4.75%	8.00%	4.45%	-2.25%	--	-2.26%

BB US Corporate High Yield Index Option-Adjusted Spread (OAS)

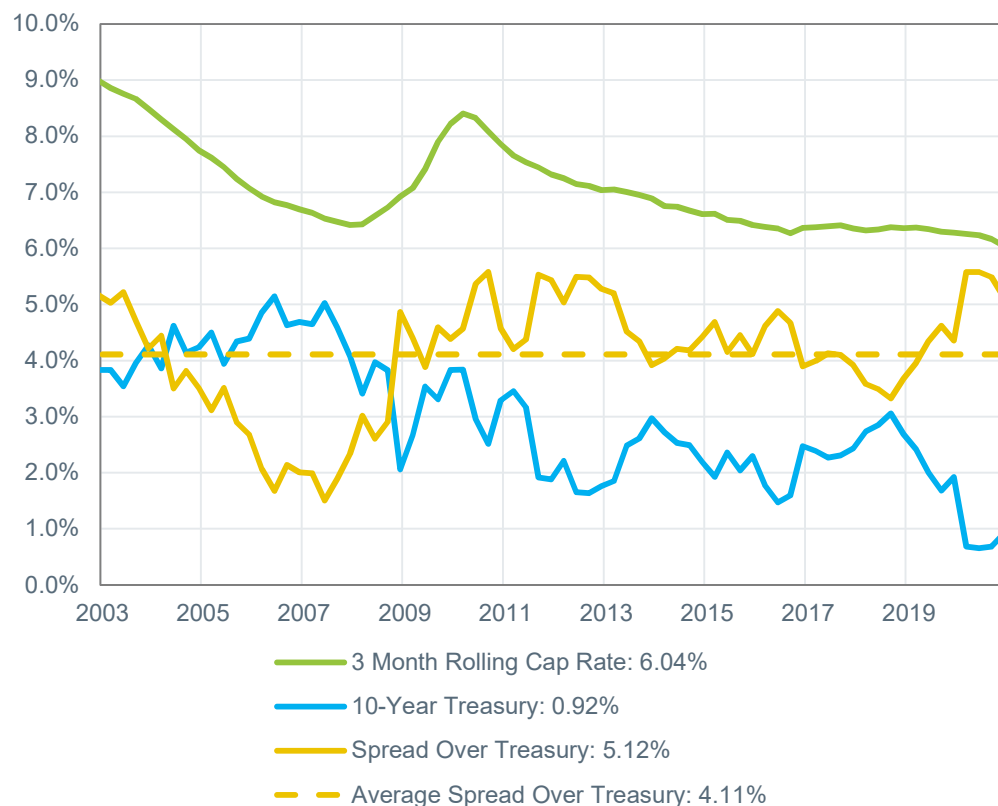


- Decreased return expectations for all fixed income spread sectors.
- Significantly reduced OAS, in addition to the historically depressed starting yields, create a twofold negative impact for spread assets.

Real Estate

Real Estate									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
Core Real Estate	5.75%	12.50%	5.02%	5.75%	12.50%	5.02%	--	--	--
Global REITs	7.50%	21.00%	5.51%	6.75%	21.00%	4.74%	-0.75%	--	-0.76%

Cap Rates and Spread to Treasuries



- Cap rates remain near historic lows.
- However, on a relative basis – with Treasury rates so low – income yields for core real estate assets remain reasonably attractive.
- Maintained our long-term core real estate assumption.
- Decreased global REITs assumption due to a reduction in the starting yield and an elevated valuation.

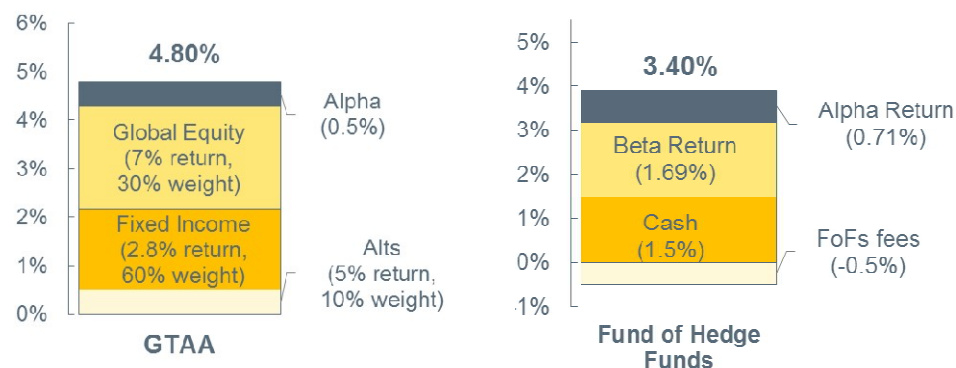
Hedge Funds

Hedge Funds and GTAA									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
Funds of Hedge Funds	4.75%	9.50%	4.32%	4.25%	9.50%	3.82%	-0.50%	--	-0.50%
Multi-Strat. Hedge Funds	5.50%	8.50%	5.16%	5.00%	8.50%	4.66%	-0.50%	--	-0.50%
GTAA	5.50%	9.00%	5.12%	5.00%	9.00%	4.62%	-0.50%	--	-0.50%

HFRI Multi-Strategy Blend 1-Year Rolling Alpha



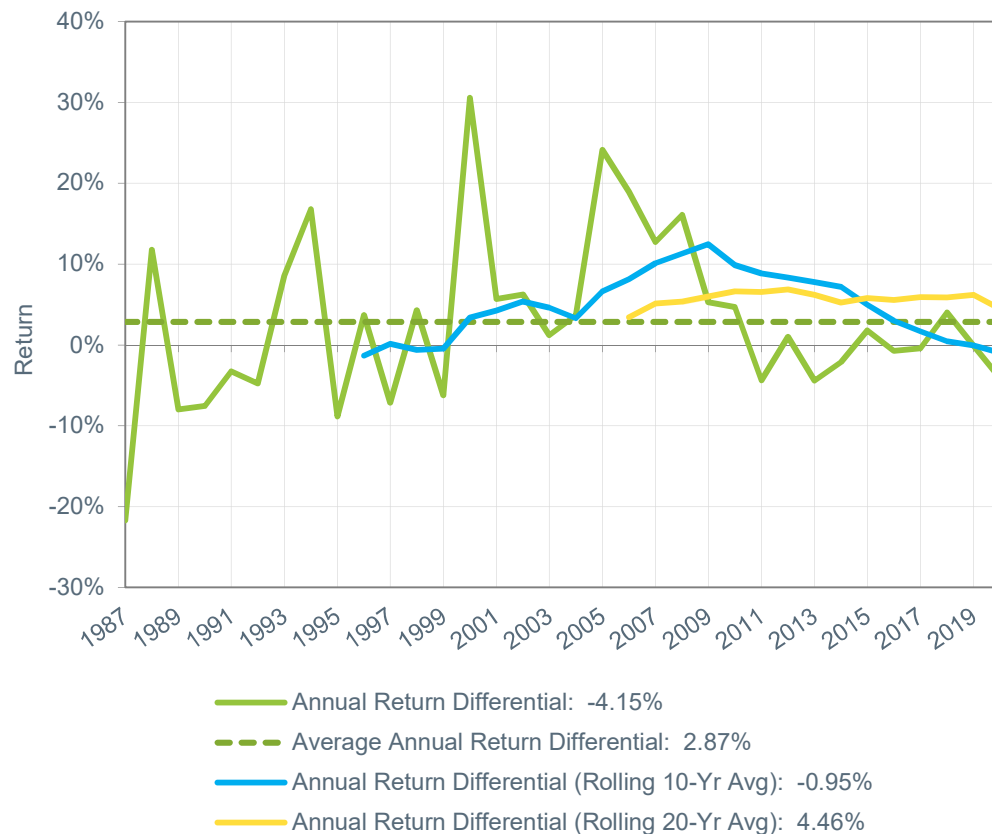
- Hedge fund return assumptions decreased as both beta and alpha levels dropped
- While alpha levels remain fairly robust since inception, post-GFC alpha levels are more muted
- The GTAA return assumption also decreased given lower beta returns across most of the underlying asset classes used in these portfolios



Private Equity

Private Equity									
Asset Class	2020 Q1			2021			One Year Adjustment		
	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)	Nominal Return	Risk (StDev)	Nominal Return (Geo.)
Private Equity	10.00%	22.00%	7.86%	8.75%	22.00%	6.59%	-1.25%	--	-1.27%

**Annual Return Differential:
Cambridge US Private Equity Index vs. S&P 500 Index**

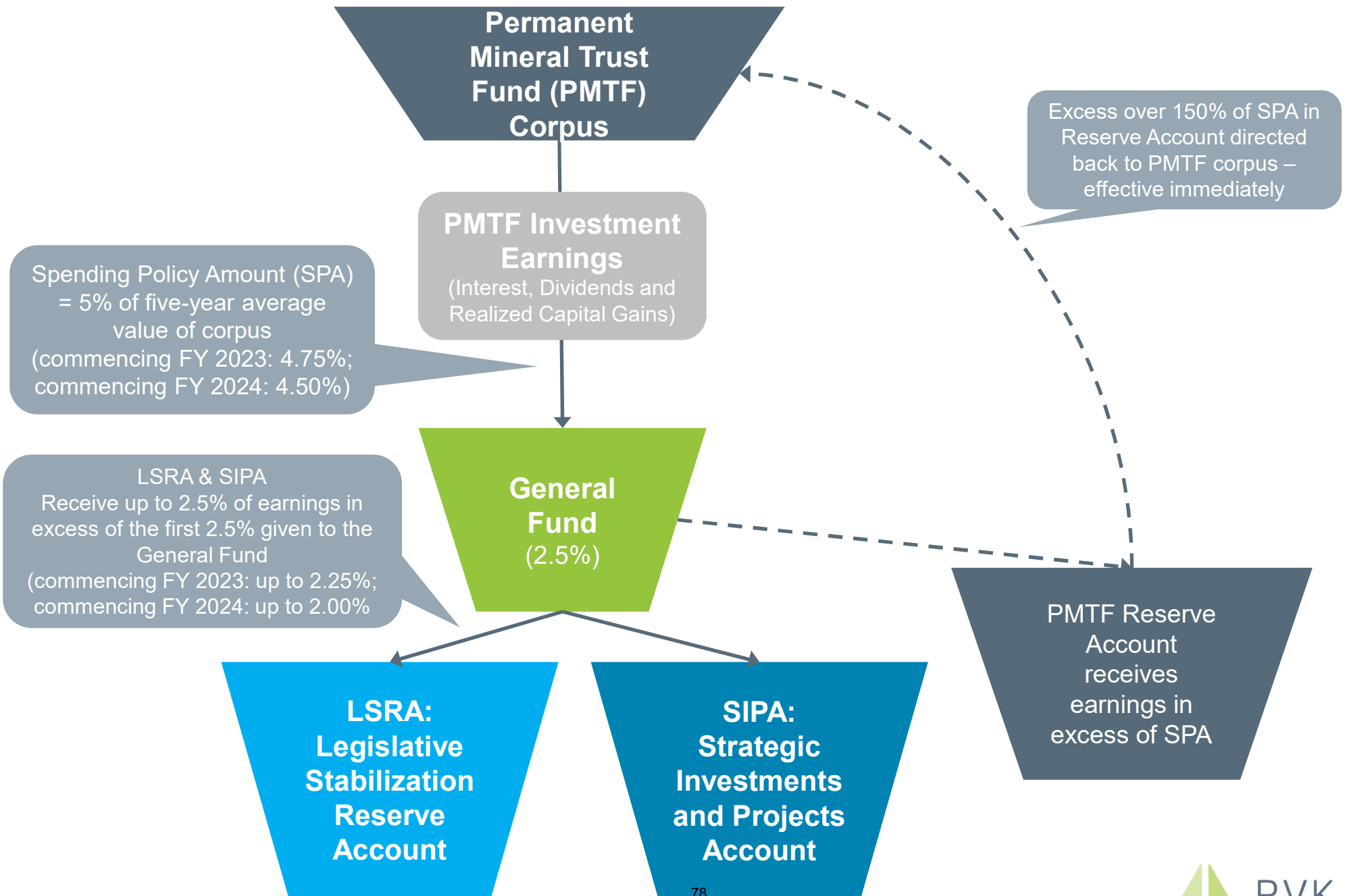


- Maintained our spread assumption of 275 basis points above Large/Mid Cap US Equities.
- This spread differential is similar to the historical spread differential, as outlined in the chart shown.
- However, with public market forecasts falling due to yield and valuation impacts the PE assumption has decreased (thus maintaining the spread differential).

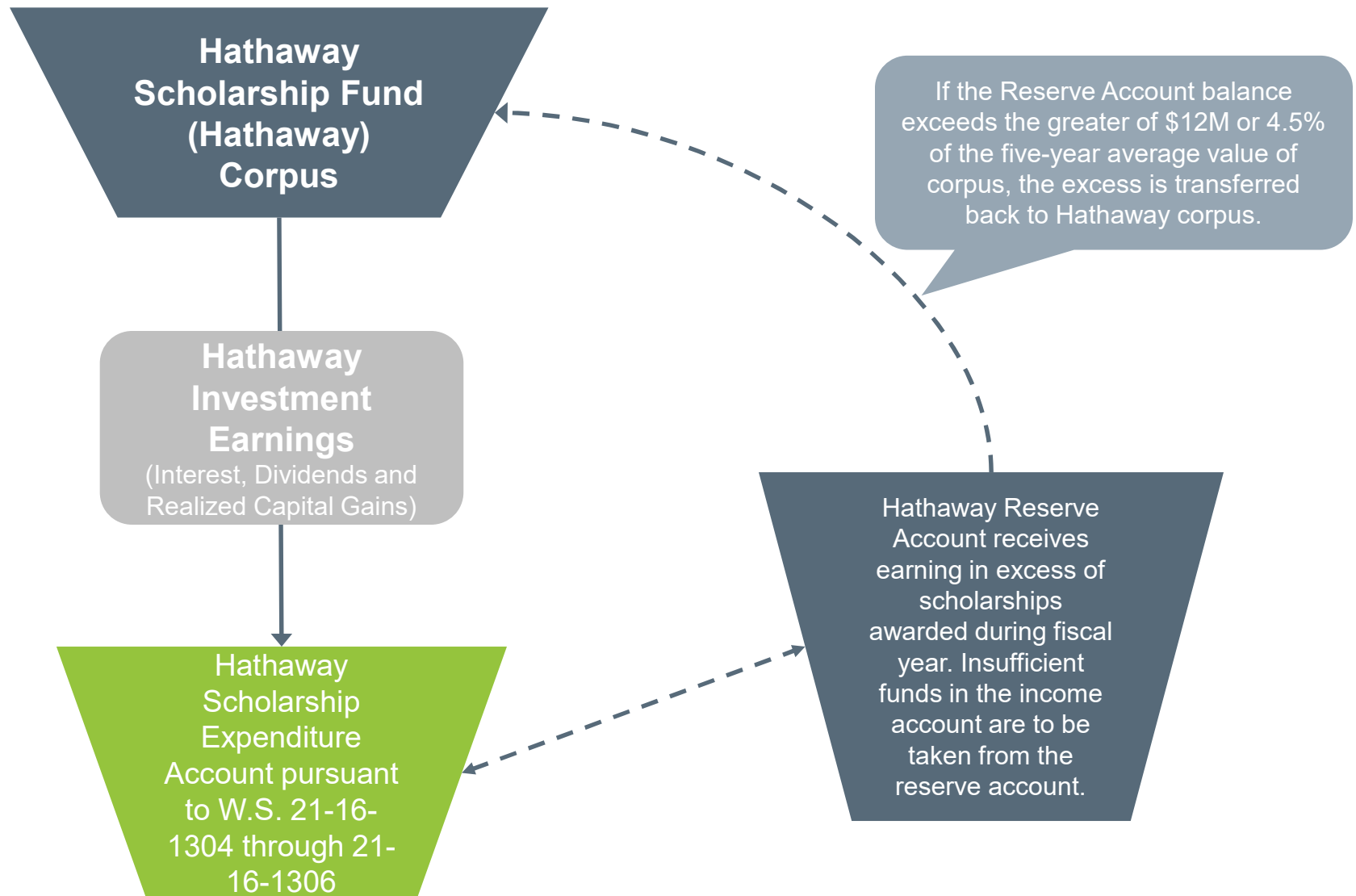
Appendix: Spending Policy Mechanics



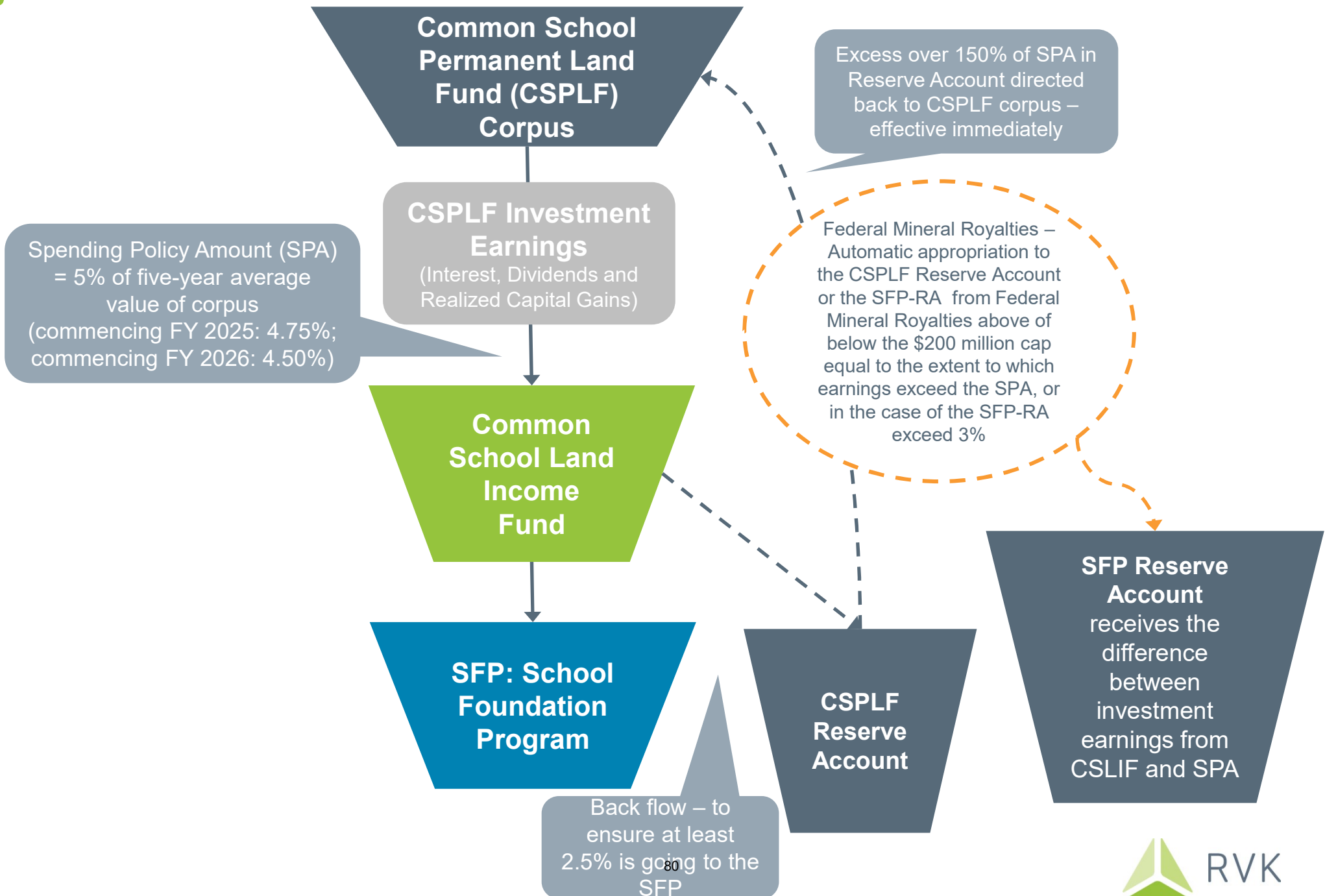
Permanent Mineral Trust Fund Spending Policy



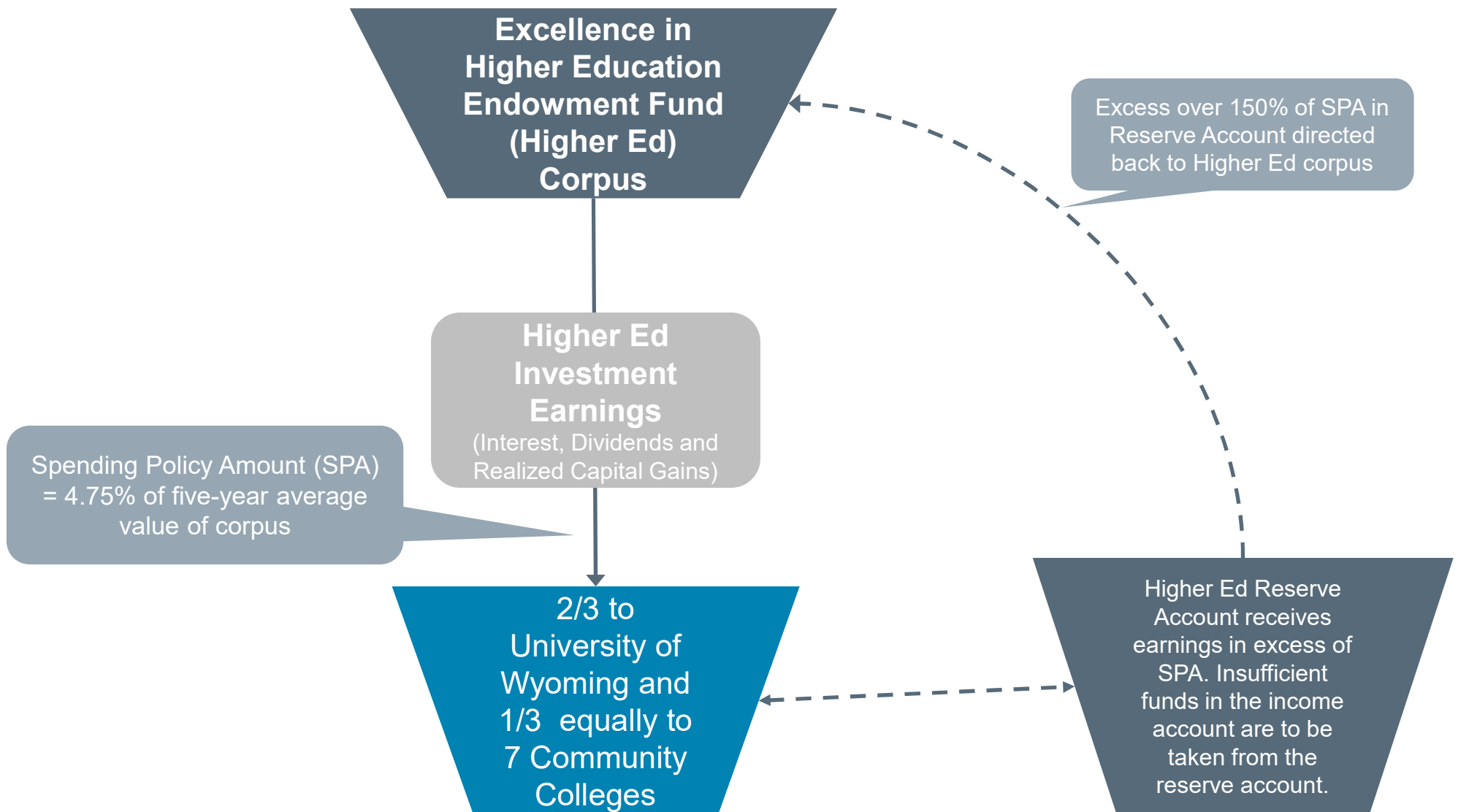
Hathaway Scholarship Fund Spending Policy



Common School Permanent Land Fund Spending Policy



Higher Education Endowment Fund Spending Policy



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