STATE OF RHODE ISLAND

ASSET ALLOCATION FOLLOW UP

November, 2019

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SIC GOALS & RISK PREFERENCES: DISCUSSED IN JULY

SIC Goals:

Improving Fund sustainability and progressing towards a fully funded plan

- Maintain or improve probability of 100% funding ratio in 20 years

Risk Constraints:

Achieve a more stable return path by managing and mitigating risks accordingly

- Limit the probability of funding level falling below 50% in next 5 years (current funding level 54%) to ~15%
- Limit the probability of a 2% absolute increase in employer contribution rate (expressed as a percentage of payroll) to ~25% in any given year within next 10 years
  - Note that the discount rate has been updated from 7.5% to 7.0% from the previous objective which was set in September 2016
- Within 90% confidence, maintain at least 3x the annual benefit payment amount in assets with daily/weekly liquidity profile in a recessionary scenario

*The above figures were presented as part of the September 2019 SIC Asset Allocation meeting

PROPOSED NEW ALLOCATIONS TO SAA

- **As part of the asset allocation proposal, we are asking the SIC to make three major decisions:**
  - 1) Whether to add an allocation to **Emerging Market Debt (EMD)**
  - 2) Whether to add an allocation to **Equity Options**
  - 3) Whether to increase the **CPC program** or keep it as is

- **The mixes that have been profiled provide flexibility around the adoption of the above proposals**
  - **Mix E:** Introduce EMD at 2% funded from reductions to Core Bonds & Cash
    - Formally eliminate unfunded Commodity target in favor of small increase to TIPS
    - Disaggregate Core Bonds to Inv. Grade Credit and Securitized sector-focused mandates

  - **Mix EC:** Introduce EMD at 2% and increase CPC allocation by 2% funded from Core Bonds & Cash
    - Formally eliminate unfunded Commodity target in favor of small increase to TIPS
    - Disaggregate Core Bonds to Inv. Grade Credit and Securitized sector-focused mandates

  - **Mix ECO:** Introduce EMD, Increase CPC and introduce Equity Option mandate of 2% to income category funded from Core Bonds (-5%) & Cash (-1%)
    - Formally eliminate unfunded Commodity target in favor of small increase to TIPS
    - Disaggregate Core Bonds to Inv. Grade Credit and Securitized sector-focused mandates

ASSET ALLOCATION REVIEW

							Individual Asset Classes		
		Current Target	Current Allocation	Mix E	Mix EC	Mix ECO	Expected Return 5-7 Year*	Expected Risk	Beta to ACWI
Growth	US Equities	22.0%	15.9%	12.7%	12.7%	12.7%	6.1%	17.6%	0.90
Growth	Int'l Equities	13.3%	9.2%	7.6%	7.6%	7.6%	6.8%	20.5%	1.07
Growth	Emerging Int'l Equities	4.7%	5.1%	4.7%	4.7%	4.7%	9.3%	28.0%	1.27
Growth	Global Equity	0%	15%	15%	15%	15%	7.0%	17.6%	1.00
Growth	**Global Equity**	**40%**	**45%**	**40%**	**40%**	**40%**	**6.7%**	**19.8%**	
Growth	Private Equity	11.25%	6.96%	11.25%	11.25%	11.25%	10.0%	24.2%	1.28
Growth	Non-Core Real Estate	2.25%	1.78%	2.25%	2.25%	2.25%	7.0%	17.0%	0.45
Growth	Opp. Private Credit	1.5%	0.6%	1.5%	1.5%	1.5%	8.5%	16.0%	0.63
Growth	**Private Growth**	**15%**	**9%**	**15%**	**15%**	**15%**	**9.4%**	**22.3%**	
Growth	**TOTAL GROWTH**	**55%**	**54%**	**55%**	**55%**	**55%**	**7.4%**	**20.4%**	**1.03**
Income	Equity Options	0.0%	0.0%	0.0%	0.0%	2.0%	4.8%	11.0%	0.70
Income	Liquid Credit	2.8%	3.9%	2.8%	2.8%	2.8%	5.4%	10.8%	0.35
Income	EMD (Blended)	0%	0%	2.0%	2.0%	2.0%	5.6%	13.0%	0.51
Income	HY Infrastructure	1%	1%	1%	1%	1%	9.5%	21.0%	0.50
Income	REITs	1%	1%	1%	1%	1%	6.8%	20.0%	0.64
Income	Private Credit	3.2%	1.7%	3.2%	3.2%	3.2%	7.6%	12.0%	0.44
Income	**TOTAL INCOME**	**8%**	**8%**	**10%**	**10%**	**12%**	**7.0%**	**13.7%**	**0.44**
Stability	Long Treasuries	4%	4%	4%	5%	5%	1.8%	12.0%	-0.10
Stability	Systematic Trend	4%	4%	4%	5%	5%	6.0%	9.5%	0.18
Stability	**CPC**	**8%**	**8%**	**8%**	**10%**	**10%**	**3.9%**	**10.8%**	
Stability	Core Real Estate	3.6%	4.5%	3.6%	3.6%	3.6%	6.0%	13.0%	0.28
Stability	Private Infrastructure	2.4%	2.0%	2.4%	2.4%	2.4%	6.3%	12.0%	0.34
Stability	TIPS	1%	2%	2%	2%	2%	3.0%	6.5%	-0.05
Stability	Commodities	1%	0%	0%	0%	0%	4.3%	19.0%	0.34
Stability	**Inflation Protection**	**8%**	**8%**	**8%**	**8%**	**8%**	**5.5%**	**12.6%**	
Stability	Core Bonds	11.5%	11.8%	0.0%	0.0%	0.0%	3.0%	6.1%	0.02
Stability	IG Corp. Credit (Core Bonds)	0%	0%	5.25%	4.25%	3.25%	4.0%	7.5%	0.11
Stability	Securitized Credit (Core Bonds)	0%	0%	5.25%	4.25%	3.25%	2.8%	7.0%	0.02
Stability	Absolute Return	6.5%	7.0%	6.5%	6.5%	6.5%	5.7%	8.1%	0.39
Stability	Strategic Cash	3%	3%	2%	2%	2%	2.5%	1.0%	0.00
Stability	**Volatility Protection**	**21%**	**22%**	**19%**	**17%**	**15%**	**3.8%**	**6.0%**	
Stability	**TOTAL STABILITY**	**37%**	**38%**	**35%**	**35%**	**33%**	**4.2%**	**8.5%**	**0.14**
Other	Short-Term Cash	0%	0%	0%	0%	0%	2.8%	1.0%	0.00
Other	Russell Overlay	0%	0%	0%	0%	0%	0.5%	1.0%	0.00
Other	**Total Cash**	**0%**	**0%**	**0%**	**0%**	**0%**	0.0%	0.0%	**0.00**

	Current Target	Current Allocation	Mix E	Mix EC	Mix ECO
Expected Return 5-7 yrs	**6.70%**	**6.52%**	**6.79%**	**6.80%**	**6.83%**
Expected Return 30 yrs	**7.81%**	**7.63%**	**7.88%**	**7.89%**	**7.90%**
Standard Dev	**11.9%**	**11.6%**	**12.1%**	**12.0%**	**12.2%**
Sharpe Ratio (5-7 years)	**0.35**	**0.35**	**0.36**	**0.36**	**0.36**
Total Duration	**1.64**	**1.79**	**1.65**	**1.72**	**1.62**
Total Beta to ACWI	**0.65**	**0.64**	**0.67**	**0.67**	**0.67**

*Expected Risk/Return figures for each functional bucket and composite is based on the weighted average of the underlying asset classes

**The Beta of each functional bucket is based on the current target

**Current allocation is as of May 2019

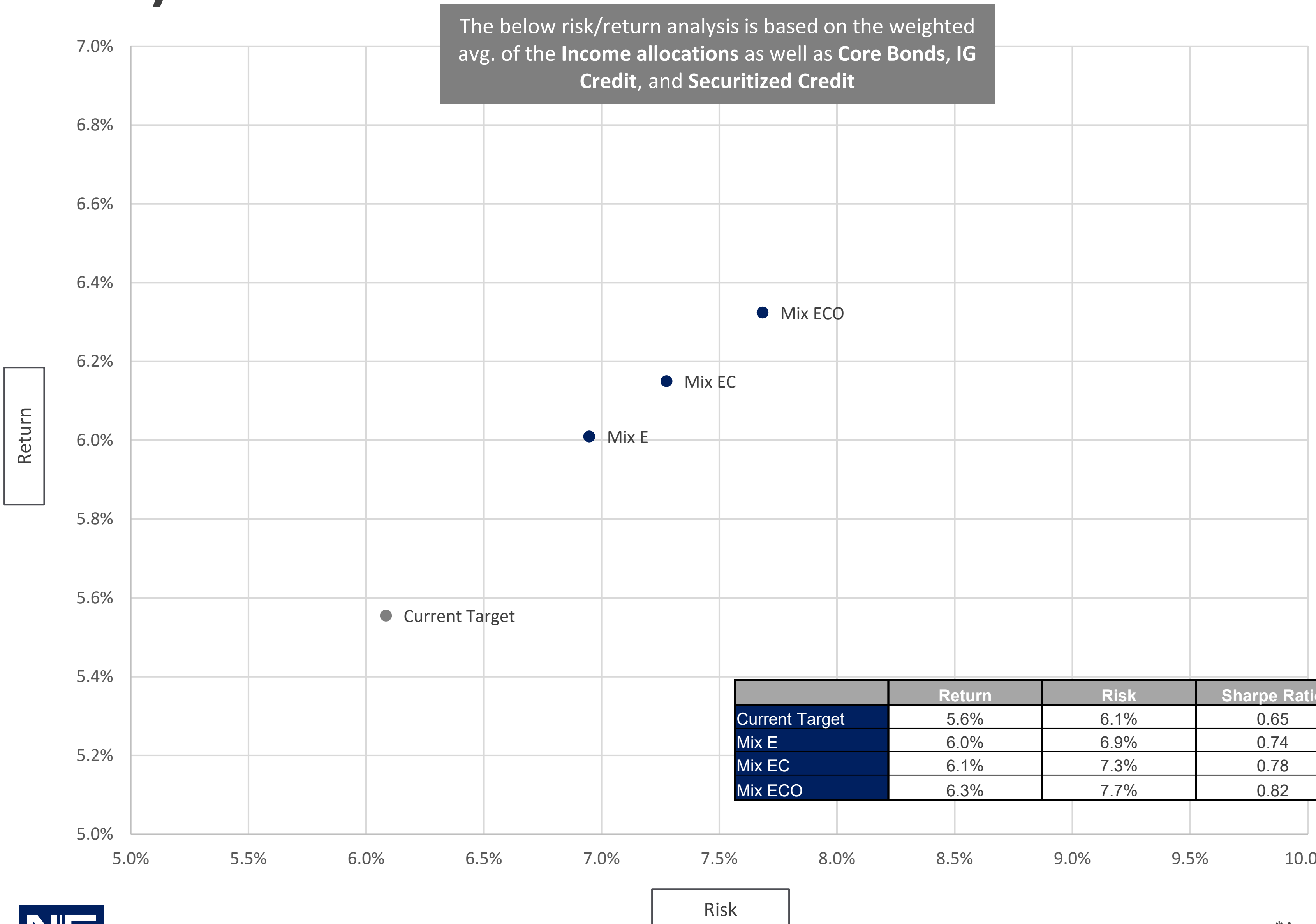
STOCHASTIC RESULTS

	Current Target	Mix E	Mix EC	Mix ECO
Expected Return 5-7 years	6.7%	6.8%	6.8%	6.8%
Expected Return 30 years	7.8%	7.9%	7.9%	7.9%
Standard Deviation	11.9%	12.1%	12.0%	12.2%
Sharpe Ratio (5-7 years)	0.35	0.36	0.36	0.36
Worst Decile 5-Year Return	-0.1%	-0.1%	-0.1%	-0.2%
Chance of Falling Below 50% Funded	14.8%	15.1%	14.3%	14.3%
Chance of 2% ARC Increase	22.5%	22.3%	21.9%	22.3%

Versus Current Target

Chance of Falling Below 50% Funded	–	↑	↓	↓
Chance of 2% ARC Increase	–	↓	↓	↓

INCOME PORTFOLIO: TRAILING 15 YEAR RISK/RETURN

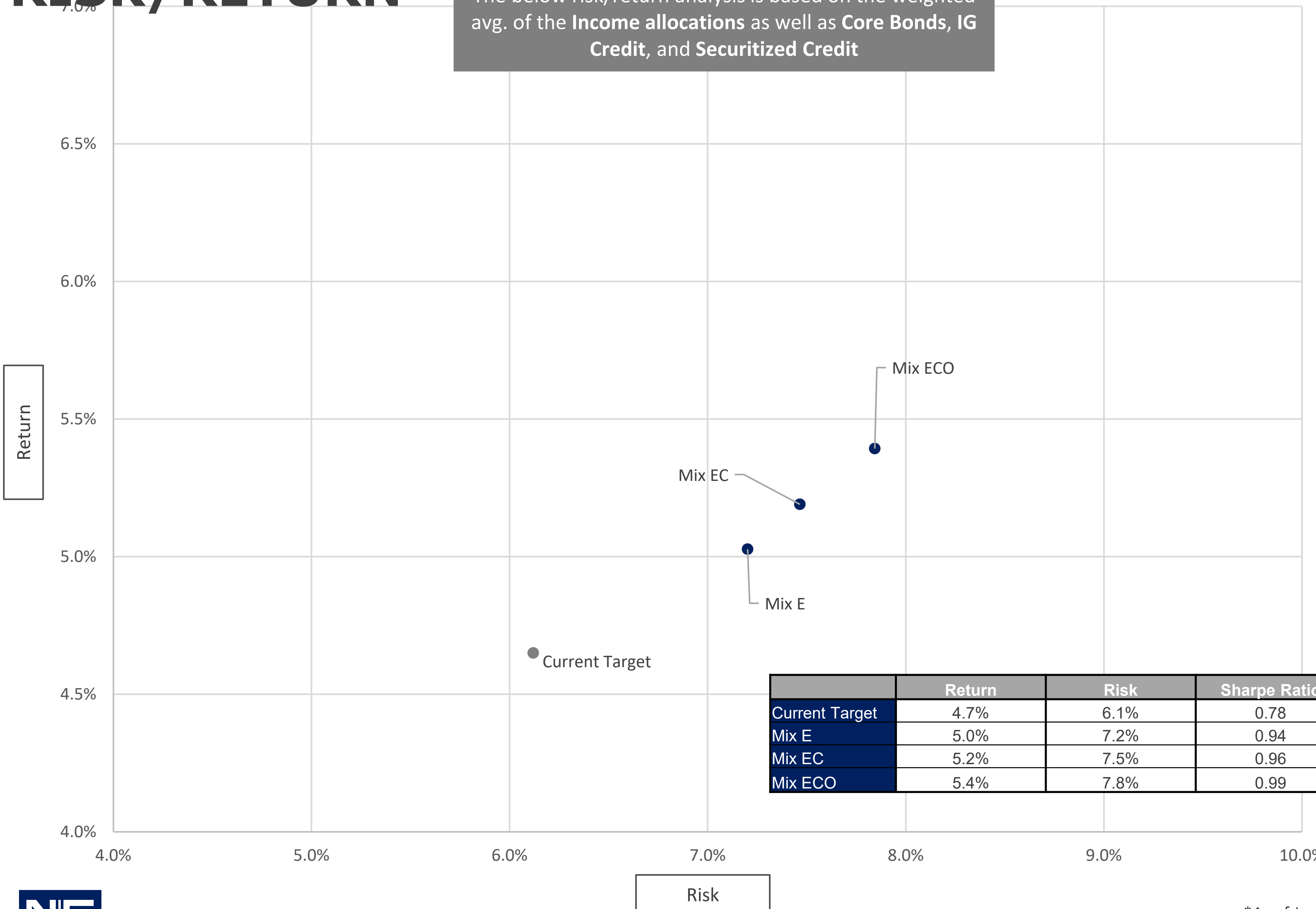


	Return	Risk	Sharpe Ratio
Current Target	5.6%	6.1%	0.65
Mix E	6.0%	6.9%	0.74
Mix EC	6.1%	7.3%	0.78
Mix ECO	6.3%	7.7%	0.82

*As of June, 2019

INCOME PORTFOLIO: EXPECTED 5-7 YEAR RISK/RETURN

The below risk/return analysis is based on the weighted avg. of the **Income allocations** as well as **Core Bonds**, **IG Credit**, and **Securitized Credit**

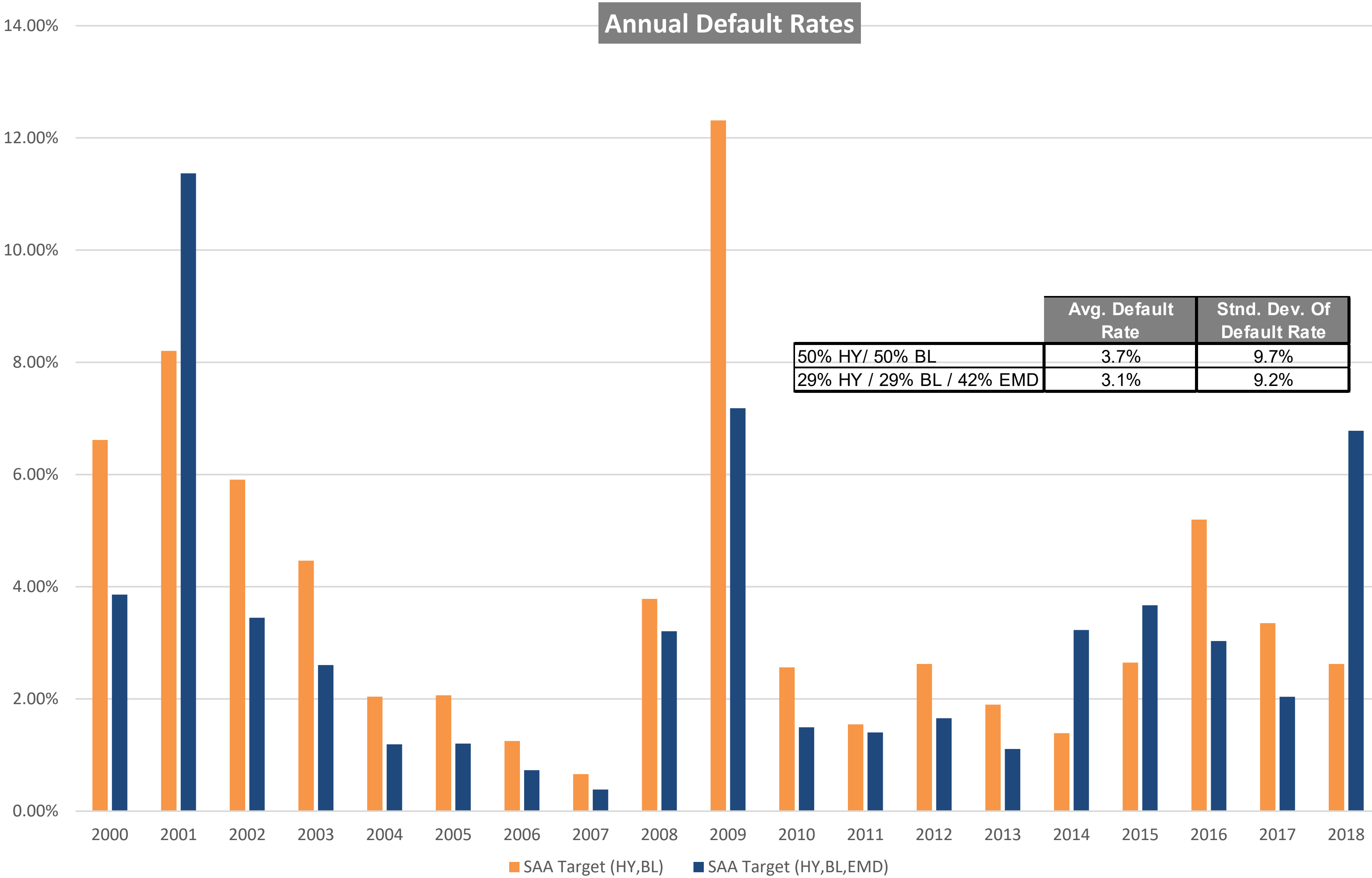


	Return	Risk	Sharpe Ratio
Current Target	4.7%	6.1%	0.78
Mix E	5.0%	7.2%	0.94
Mix EC	5.2%	7.5%	0.96
Mix ECO	5.4%	7.8%	0.99

*As of June, 2019

EMD

EMERGING MARKET DEBT DEFAULT RATES



	Avg. Default Rate	Stnd. Dev. Of Default Rate
50% HY/ 50% BL	3.7%	9.7%
29% HY / 29% BL / 42% EMD	3.1%	9.2%

EMD COUNTRY WEIGHTS: TOP 25

EM External Sovereign

Countries	JPM EMBI GD
Mexico	5.1%
China	4.7%
Indonesia	4.6%
Turkey	3.7%
Russia	3.6%
Brazil	3.4%
Philippines	3.4%
Colombia	3.1%
Chile	2.9%
Peru	2.9%
Kazakhstan	2.8%
Panama	2.8%
South Africa	2.8%
Argentina	2.7%
Dominican Republic	2.7%
Malaysia	2.7%
Ecuador	2.6%
Oman	2.6%
Ukraine	2.6%
Egypt	2.5%
Uruguay	2.5%
Hungary	2.3%
Lebanon	2.3%
Poland	2.1%
Nigeria	1.9%

EM Local Sovereign

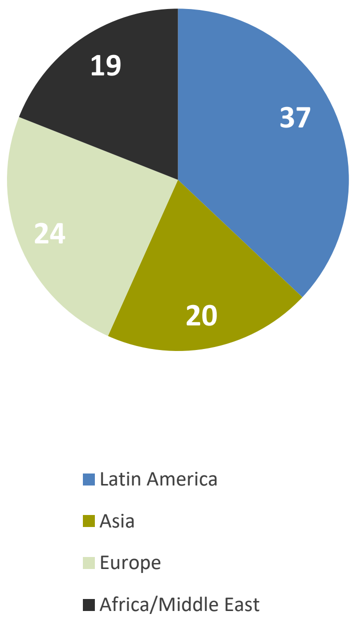
Countries	JPM GBI-EM GD
Mexico	10.0%
Brazil	10.0%
Indonesia	9.4%
Poland	9.3%
South Africa	8.5%
Thailand	8.3%
Russia	7.1%
Colombia	7.1%
Malaysia	5.7%
Turkey	5.0%
Hungary	4.8%
Czech Republic	4.1%
Chile	3.2%
Peru	3.2%
Romania	3.2%
Argentina	0.6%
Philippines	0.3%
Uruguay	0.2%
Dominican Republic	0.1%
China	0.0%
Kazakhstan	0.0%
Panama	0.0%
Ecuador	0.0%
Oman	0.0%
Ukraine	0.0%

50/50 Blend

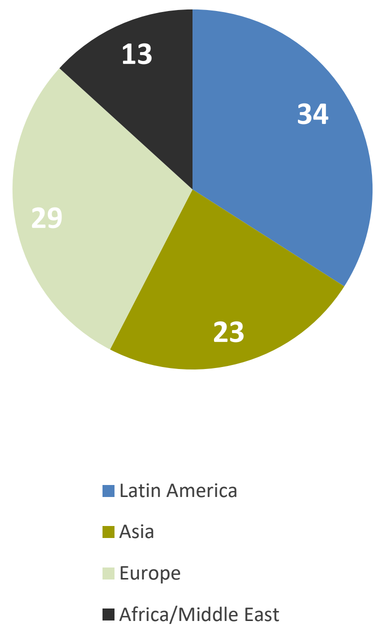
Countries	Blended
Mexico	7.55%
Indonesia	7.00%
Brazil	6.70%
Poland	5.70%
South Africa	5.65%
Russia	5.35%
Colombia	5.10%
Turkey	4.35%
Malaysia	4.20%
Thailand	4.15%
Hungary	3.55%
Chile	3.05%
Peru	3.05%
China	2.35%
Romania	2.30%
Czech Republic	2.05%
Philippines	1.85%
Argentina	1.65%
Dominican Republic	1.40%
Kazakhstan	1.40%
Panama	1.40%
Uruguay	1.35%
Ecuador	1.30%
Oman	1.30%
Ukraine	1.30%

EMD INVESTMENT UNIVERSES

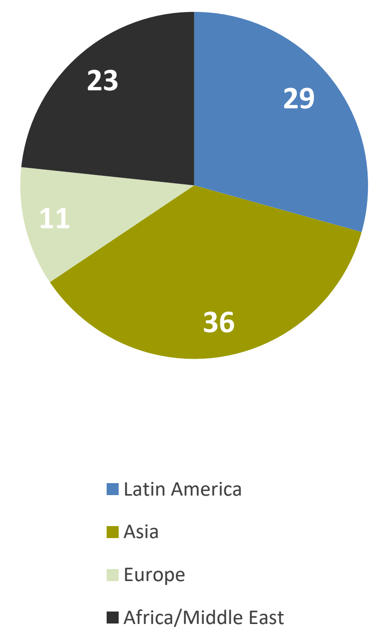
	EM External Sovereign (Hard Currency)	**EM Local (Local Currency Sovereign)**	**EM Corporates (Hard Currency)**
	JPM EMBI Global Diversified	JPM GBI-EM Global Diversified	JPM CEMBI Broad Diversified
Duration (years)	6.5	5.1	4.5
Market Value (US $bn)	520	844	461
Yield (%)	7.1	6.5	6.2
High Yield (% of index)	46.1%	15.7%	38.1%
Investment Grade (% of Index)	53.9%	84.3%	61.9%



Total ex-Asia: 80%



Total ex-Asia: 77%



Total ex-Asia: 64%

Source: Ashmore Group, Bloomberg, J.P. Morgan, as of December 2018

EQUITY OPTIONS: RETURN ANALYSIS

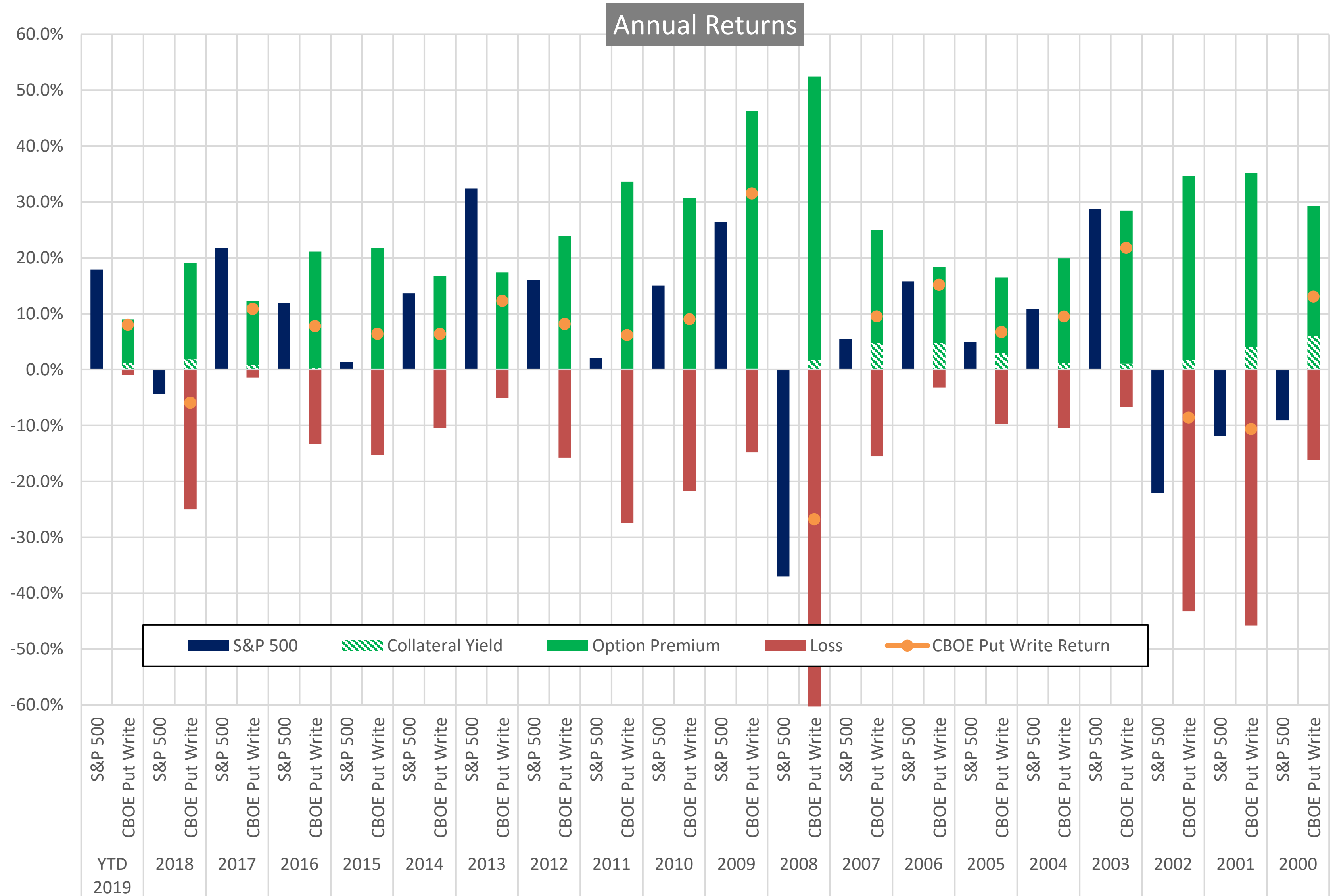
HOW ARE CLIENTS USING OPTIONS?

- **Institutional clients have been more willing to adopt options as a tool to manage risk and produce a differentiated return stream**
  - Most institutional clients who use options at the total Fund level have outsourced implementation via a specialized provider

- **Investors have also used options as a return enhancer by capturing the volatility risk premia through the sale of options**
  - Selling options produces income helping investors capture a risk premium that can be a strong diversifier

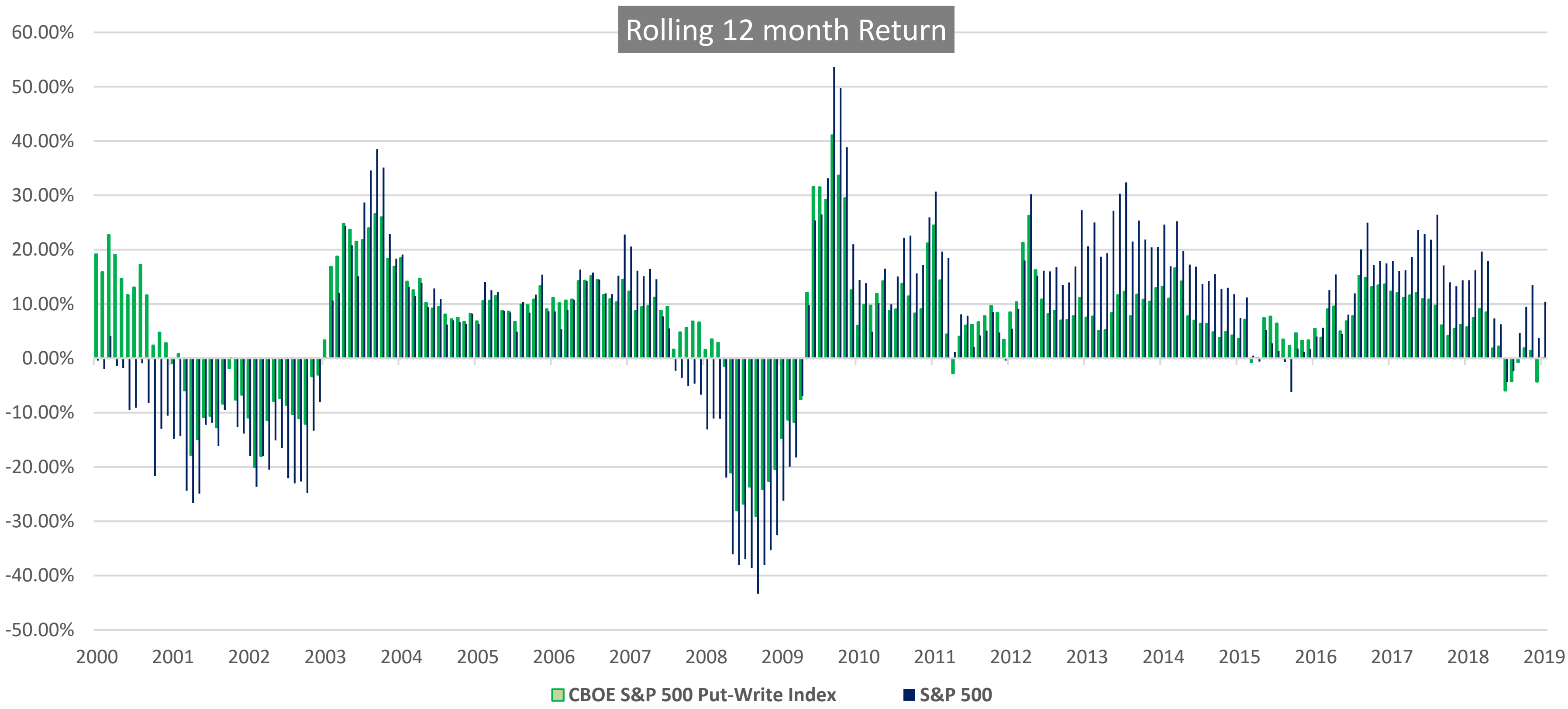
Public Plan	Mandate	Portfolio Sizing
Alaska Permanent Fund	Custom	1%
Arkansas Teachers Retirement	Custom	NA
Baltimore ERS	US Index Put Write	3-4%
Chicago Municipal Employees	US Index Put Write	NA
Hawaii ERS	US & Global Index Put Write	14-16%
Illinois SURS	Custom	2.50%
Massachusetts PRIM	Custom	3-5%+
Texas ERS	Custom	NA

ANNUAL PUT WRITING RETURNS VS. S&P 500



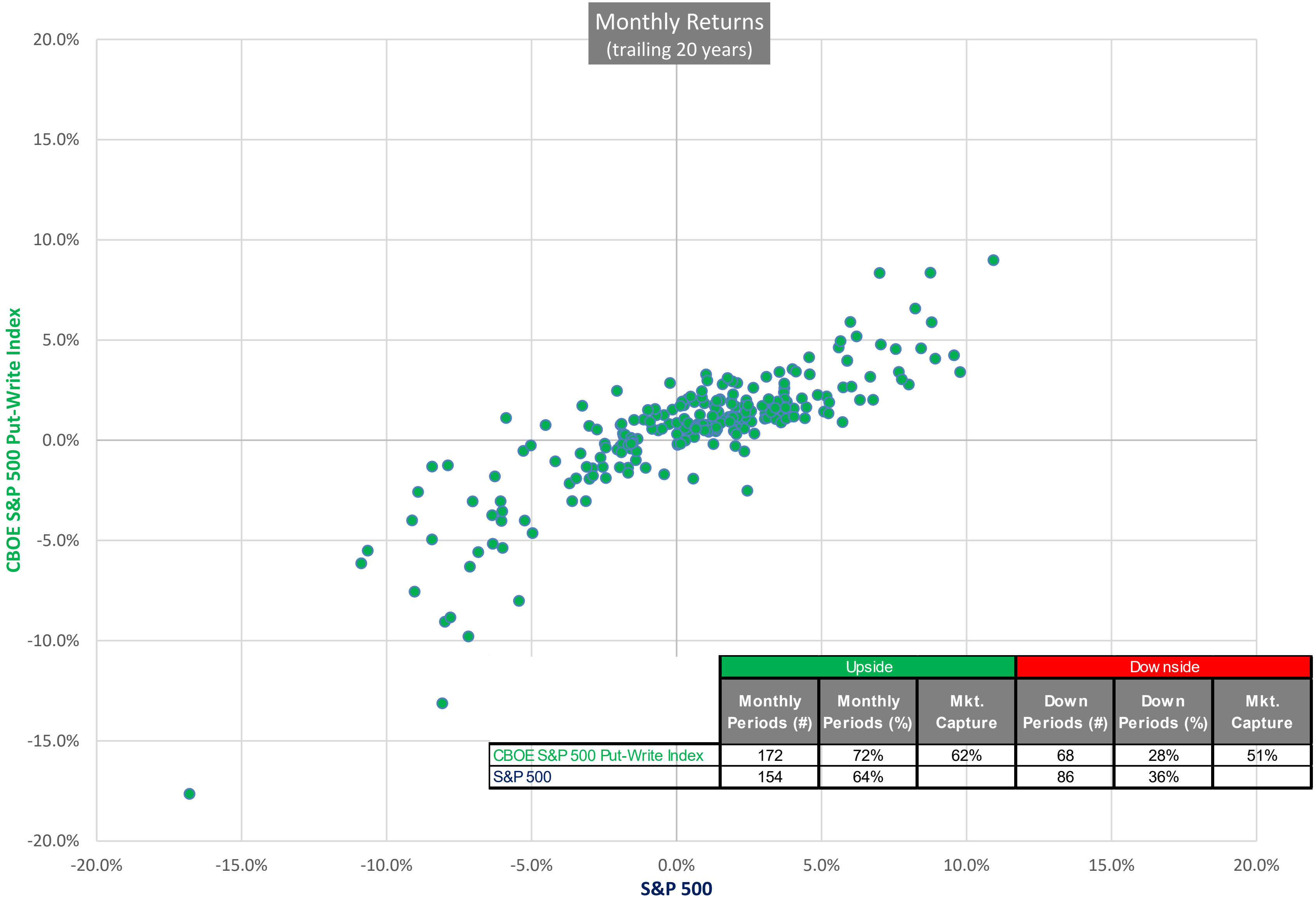
*As of June, 2019

ROLLING 12 MONTH PUT WRITING RETURNS VS. S&P 500



*As of June, 2019

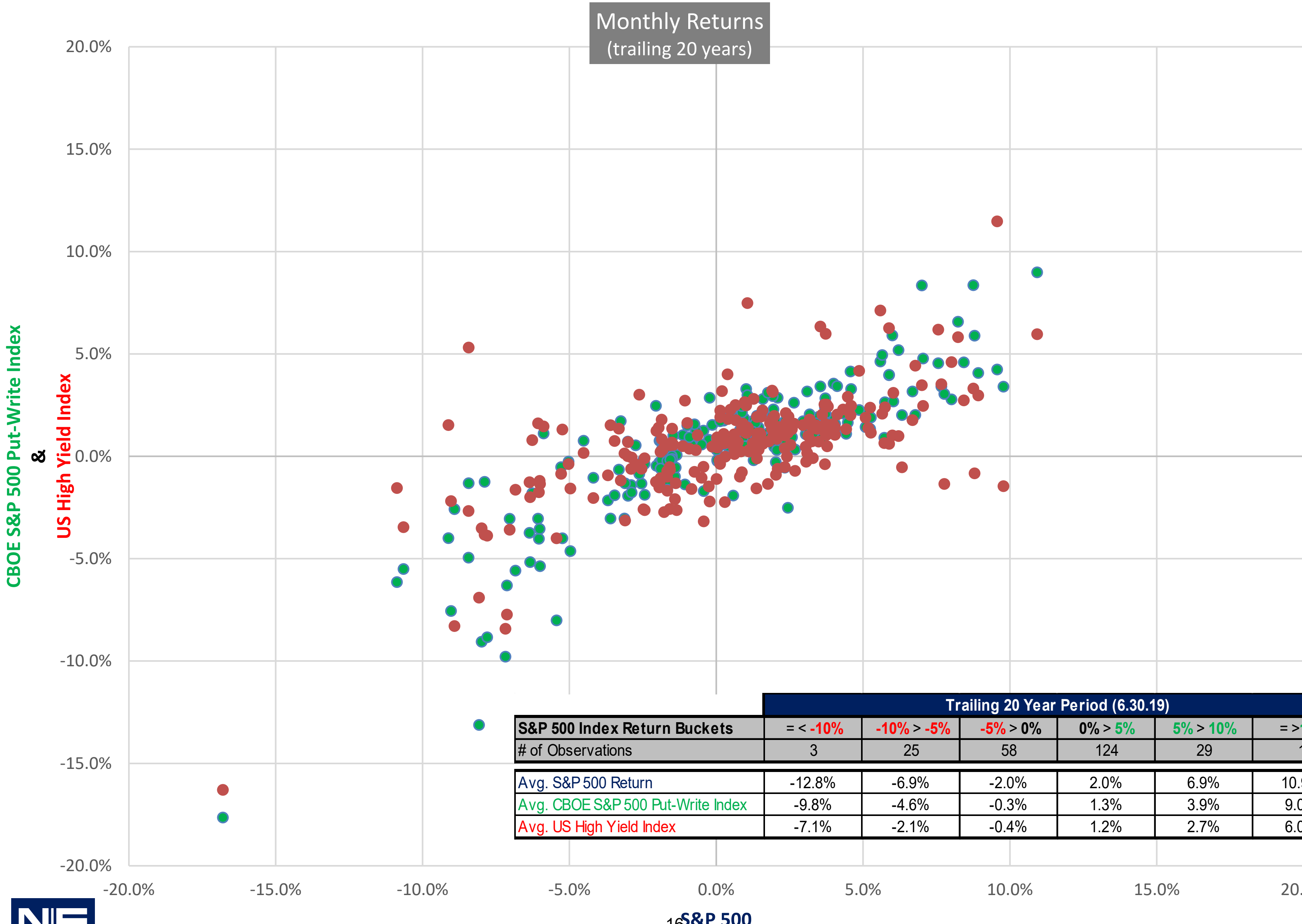
MONTHLY PUT WRITING RETURNS VS. S&P 500



	Upside			Downside		
	Monthly Periods (#)	Monthly Periods (%)	Mkt. Capture	Down Periods (#)	Down Periods (%)	Mkt. Capture
CBOE S&P 500 Put-Write Index	172	72%	62%	68	28%	51%
S&P 500	154	64%		86	36%	

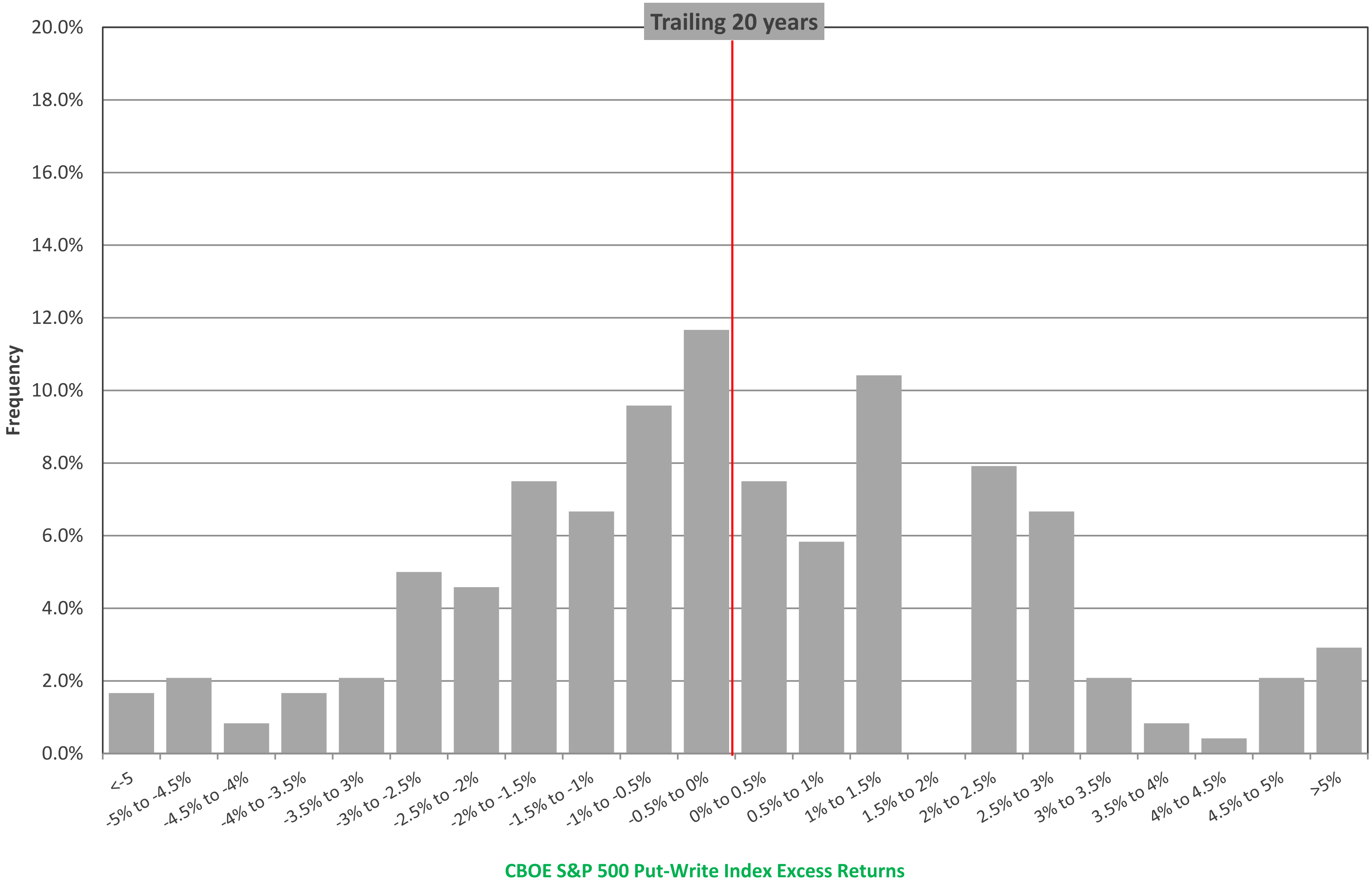
*As of June, 2019

MONTHLY PUT WRITING RETURNS VS. S&P 500



	Trailing 20 Year Period (6.30.19)					
S&P 500 Index Return Buckets	= < -10%	-10% > -5%	-5% > 0%	0% > 5%	5% > 10%	= >10%
# of Observations	3	25	58	124	29	1
Avg. S&P 500 Return	-12.8%	-6.9%	-2.0%	2.0%	6.9%	10.9%
Avg. CBOE S&P 500 Put-Write Index	-9.8%	-4.6%	-0.3%	1.3%	3.9%	9.0%
Avg. US High Yield Index	-7.1%	-2.1%	-0.4%	1.2%	2.7%	6.0%

MONTHLY PUT WRITING EXCESS RETURNS VS. S&P 500



*As of June, 2019

APPENDIX

INDEX PUTWRITE INVESTMENT OBJECTIVES

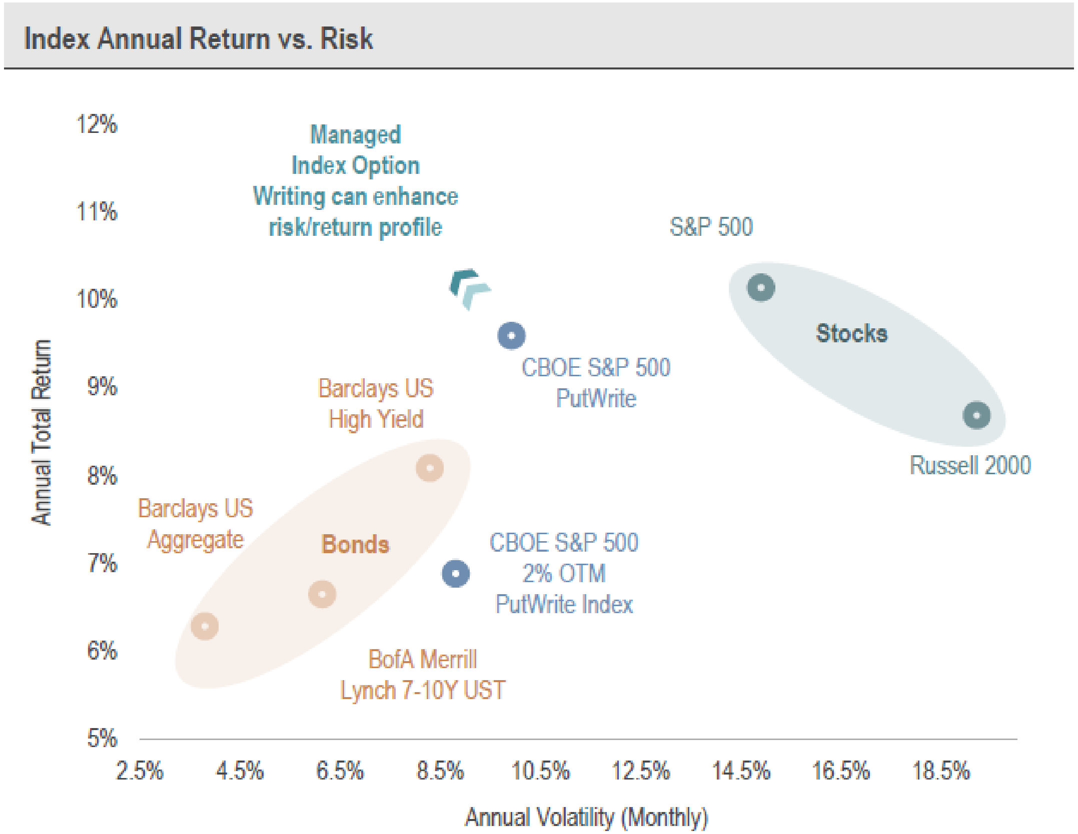
Capturing equity volatility premiums: June 1986 – August 2019

Our Objectives:

- Earn index option volatility premiums
- Experience lower return volatility than equity indexes
- Exhibit reduced market risk (lower beta)
- Mitigate drawdowns

Why investors are adopting index put writing:

- Institutional quality
- Index based exposures
- Structural diversification
- Standardized benchmarks
- Implementation:
  - Transparent, liquid, unlevered, cost-effective



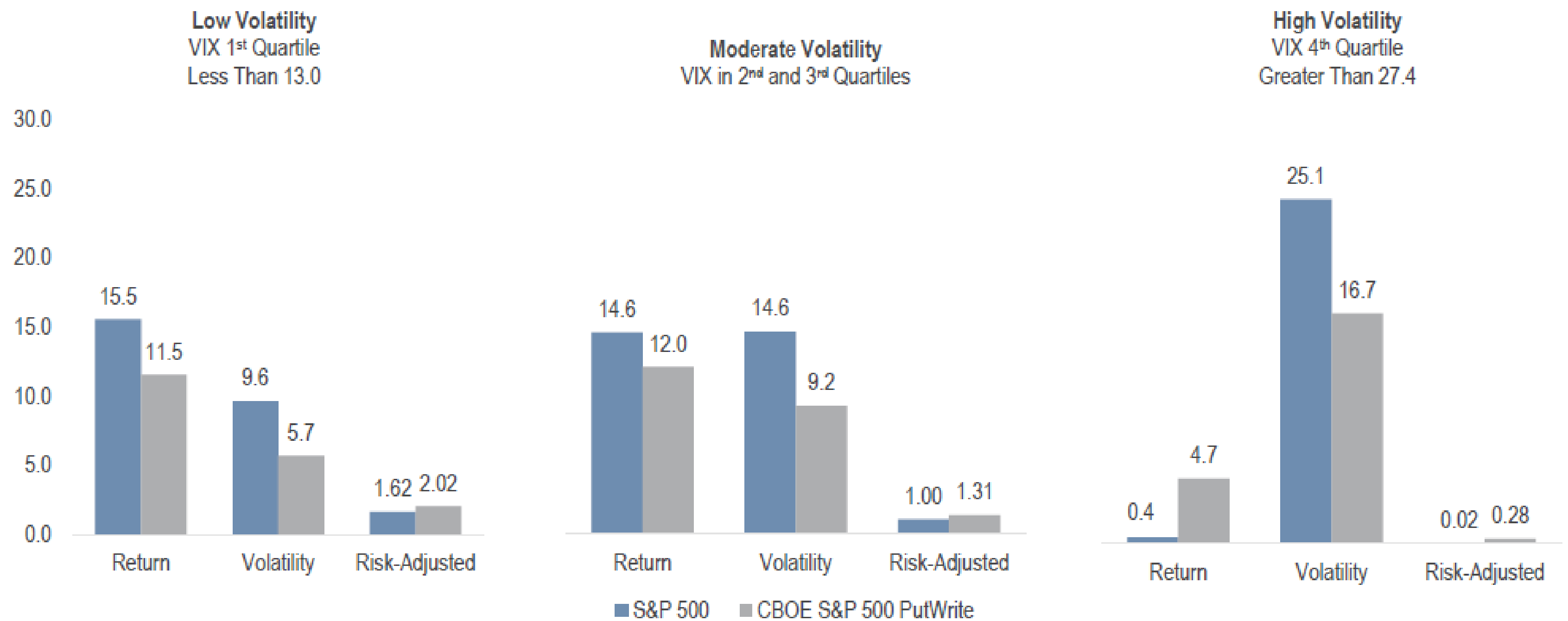
* Index data sourced from Bloomberg LP and is gross of fees unless stated otherwise. Selected time period reflects longest common history of indexes.
This material is intended as a broad overview of the Portfolio Managers' style, philosophy and process and is subject to change without notice. Analysis limited to inception of HFRI indexes of 12/31/1989. The CBOE S&P 500 PutWrite ("PUT") Index incepted in June 2007 with historical back-tested data available since 6/30/1986. Please refer to disclosures and definitions for additional information regarding indexes. The use of tools cannot guarantee performance. Unless otherwise indicated, returns shown reflect reinvestment of dividends and distributions. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal. Past performance is no guarantee of future results. See Additional Disclosures at the end of this piece, which are an important part of this presentation.

*Source: Neuberger Berman

PUTWRITING CAN BE SUCCESSFUL ACROSS VOLATILITY REGIMES

CBOE S&P 500 PutWrite Index average 1-year rolling statistics: January 1990 – August 2019[1]

CBOE S&P 500 Volatility Index (VIX) Regimes



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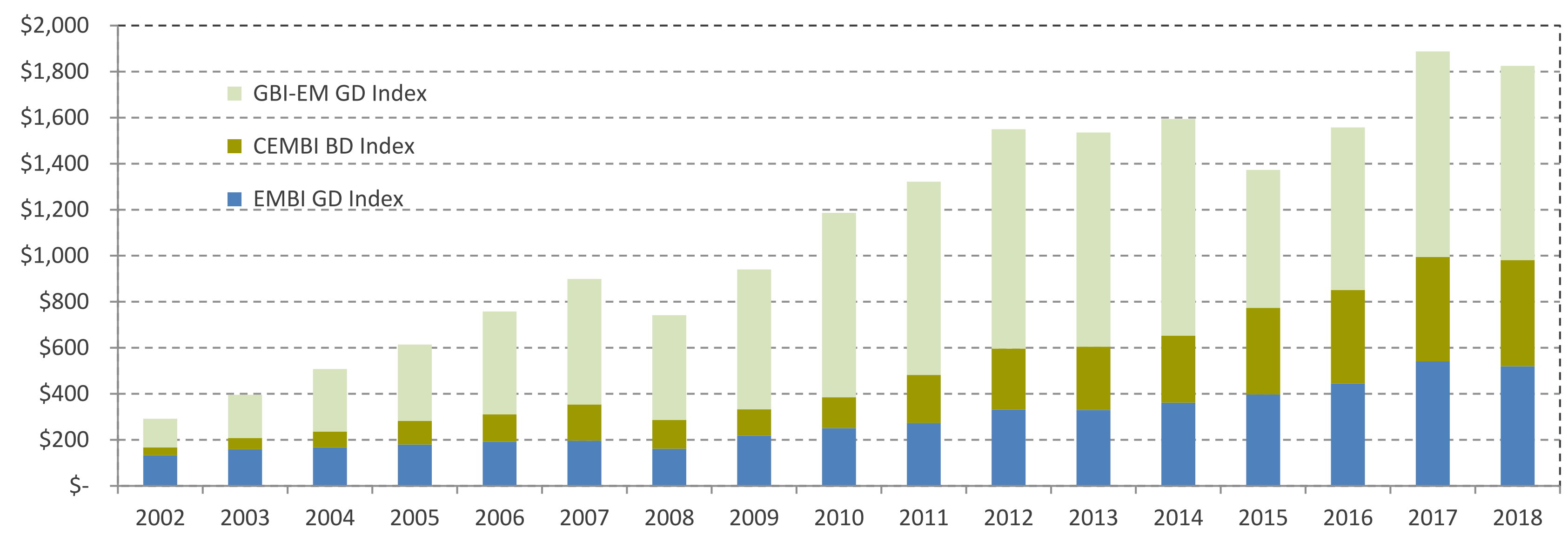
*Source: Neuberger Berman

EMD: AN EXPANDING OPPORTUNITY SET

EMD Investment Universe Growth



Yield and Ratings

Asset Type	Yield (%)	Average Ratings
EM Local (JPM GBI EM Global Index)	6.5	BBB
EM Hard Currency Corporate (JPM CEMBI Broad Index)	6.2	BBB
EM Hard Currency Sovereigns (JPM EMBI Global)	7.1	BB

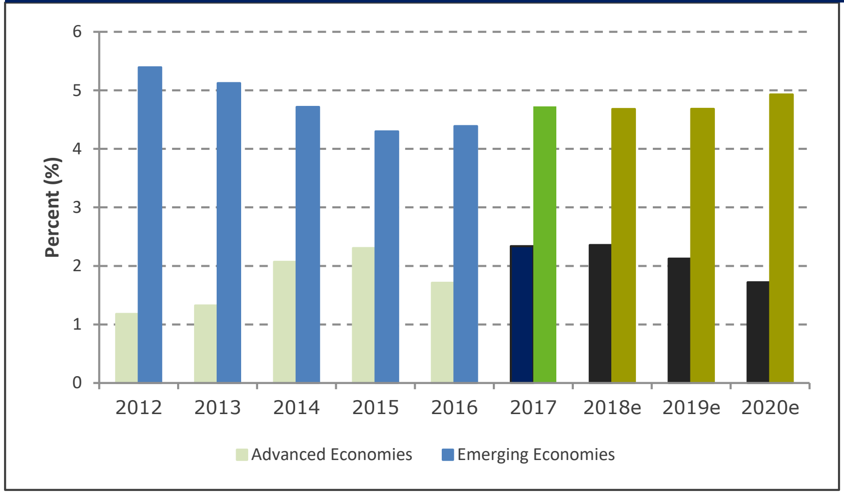
Comments

- **Total emerging market debt universe has grown substantially, from $500 million at the end of 2000 to almost $2 trillion by 2019**
- **This is helped by the ability of EM countries to issue debt in their local currencies, and the growth of the EM corporate sectors**

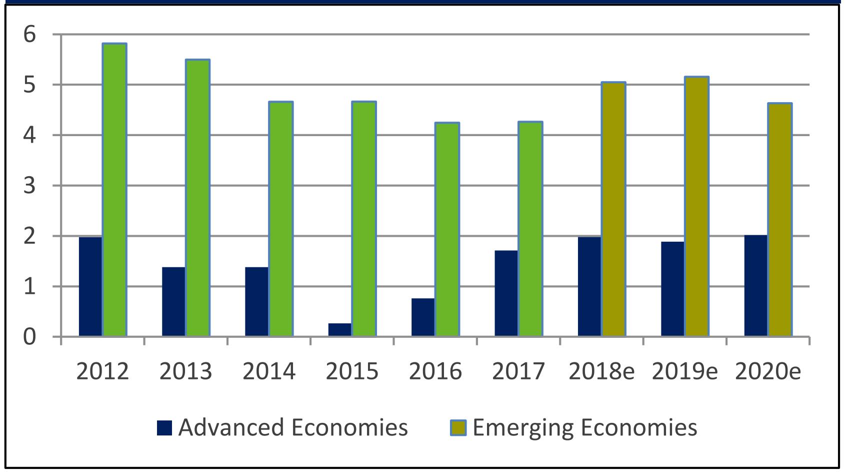
Source: J.P. Morgan, as of Dec 2018

SUPERIOR GROWTH IN EMERGING MARKETS

Real GDP Growth (%)



Inflation Rates (%)



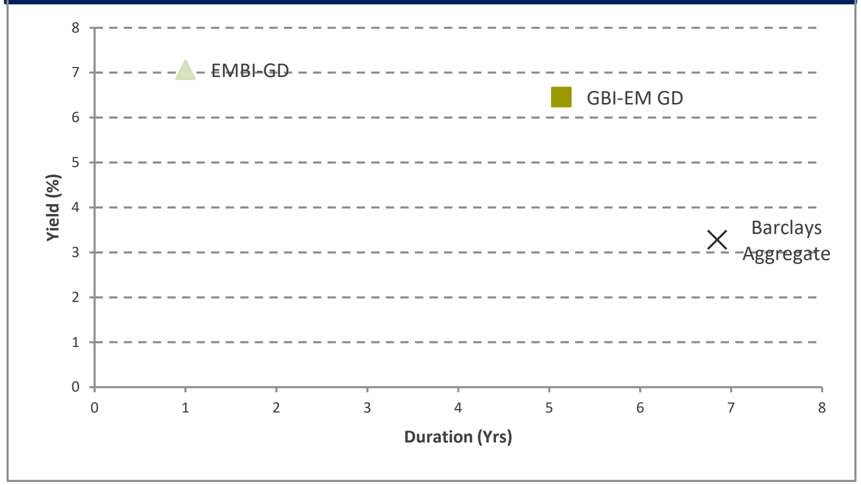
Comments

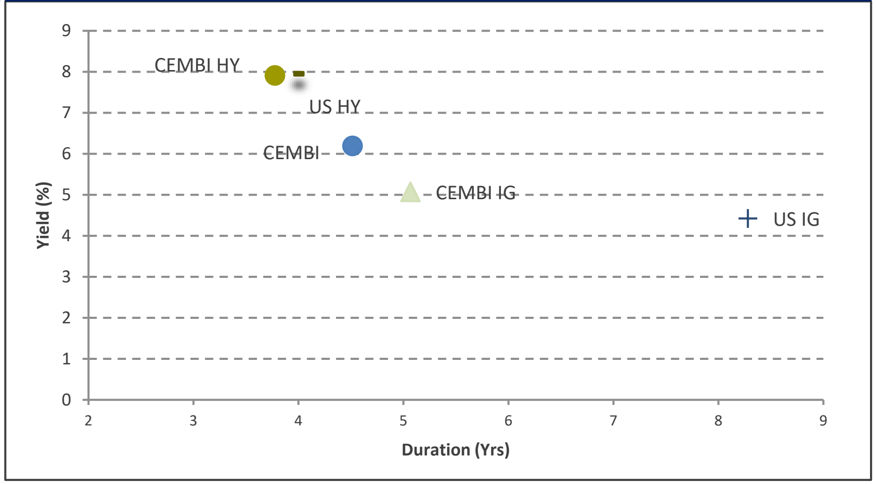
- **Real GDP growth rates for emerging economies continue to outpace advanced economies**
- **Growth gap between EM vs. DM is forecasted to widen for the next three years in favor of emerging countries as developed markets slow down slightly**
- **Inflation however is stabilizing and forecast to come down in EM**
  - **Inflation gap between EM vs. DM might trend narrower in the near future**

Source: International Monetary Fund (IMF), as of October 2018

EMERGING MARKET CORPORATE DEBT: BETTER YIELD WITH SIMILAR OR LOWER DURATION RISK

EM Sovereigns vs. US Barclays Aggregate	EM Corporates vs. US HY and IG





Comments

- **EM Local and Hard currency sovereigns (GBI-EM GD and EMBI-GD indices respectively) have shorter duration and higher yields compared to the US Barclays Aggregate which is concentrated in US duration risk**
- **Emerging markets high yield corporates offer better yield for slightly shorter duration profile versus US high yield**
- **In investment grade sector, EM Corporates offer better yield for much lower interest rate risk (over 3 years shorter duration)**

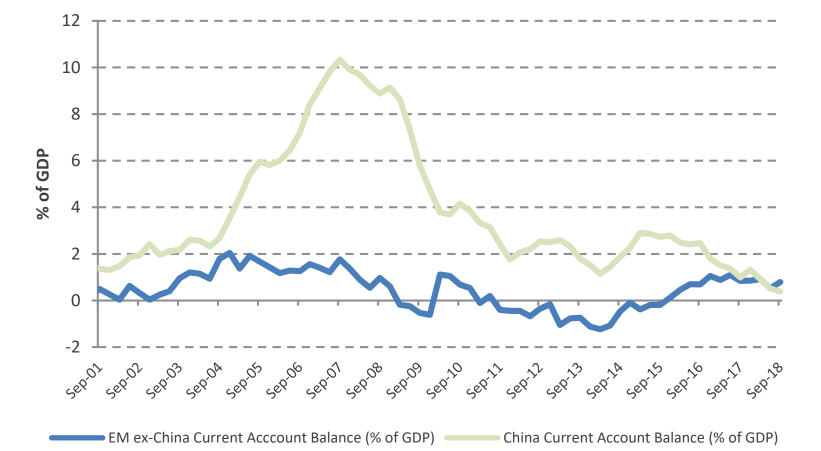
Source: Bloomberg, J.P. Morgan, as of December 2018

EM COUNTRY FUNDAMENTALS

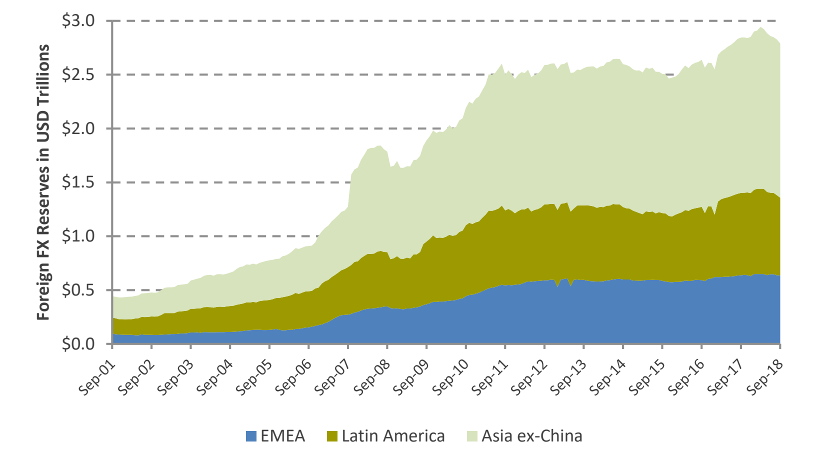
Comments

- **EM ex China current accounts have recovered and continue to stabilize**
- **Foreign reserves are at healthy levels, mitigating concerns of FX crisis**
- **EM growth has slowed in the near term, but forecasts remain at a healthier level compared to DM**

EM current accounts recovered materially



Foreign FX Reserves (ex-China)



Source: IMF, J.P. Morgan

ASSUMPTIONS AND METHODOLOGY

- **Liability calculations follow a roll-forward methodology based on the June 30, 2018 actuarial valuation by GRS**
  - Accrued Liability and Normal Cost rolled forward each year
  - Discount rate is assumed to remain at 7.00% each year
  - Benefit payments as projected by the plan's actuary
  - Accrued liability and benefit payments adjusted for differences in projected COLA vs. assumed COLA
  - Other than those described herein, all assumptions remain unchanged from the actuarial valuation report

- **Actual asset returns through May 31, 2019 (2.9%)[1] assumed for FY2019, thereafter:**
  - 5-7 year return assumption of 6.7% for medium-term projections
  - 30 year return assumption of 7.8% for long-term projections

- **Employer contributions are based on the plan's funding policy**
  - Employer normal cost plus amortization of the unfunded liability
  - Future gains and losses are laddered and amortized over 20 years
  - "Staggering" of losses due to 2016 assumption changes
  - Once 100% funded, all amortization bases are assumed to be fully amortized
  - Employer normal cost contribution will always be made (the effective minimum employer contribution)

- **Employee contribution rates are assumed to remain level**

- **Fiscal year contributions are budgeted based on the valuation year three years prior**
  - E.g., FYE 2021 contribution is determined by the FYE 2018 valuation

[1] *Per May 31, 2019 Flash Report*

2019 5-7 YEAR RETURN FORECASTS

Geometric Expected Return			
Asset Class	**2019**	**2018**	**2019-2018**
Cash	2.50%	2.00%	+0.50%
Large Cap Equities	6.00%	5.25%	+0.75%
Small/Mid Cap Equities	6.25%	5.75%	+0.50%
Int'l Equities (Unhedged)	6.75%	7.50%	-0.75%
Int'l Sm Cap Equities (Unhedged)	7.25%	7.75%	-0.50%
Emerging Int'l Equities	9.25%	9.00%	+0.25%
Emerging Int'l Sm Cap Equities	9.50%	9.25%	+0.25%
Hedge Funds - Long/Short	5.50%	6.25%	-0.75%
TIPS	3.00%	3.25%	-0.25%
Treasuries	2.50%	2.25%	+0.25%
IG Corp Credit	4.00%	3.50%	+0.50%
MBS	2.75%	2.50%	+0.25%
High-Yield Bonds	5.25%	3.75%	+1.50%
Bank Loans	5.50%	4.50%	+1.00%
EMD (External)	4.75%	4.25%	+0.50%
EMD (Local Currency)	6.50%	6.00%	+0.50%
Municipal Bonds	3.00%	2.50%	+0.50%
High-Yield Municipal Bonds	3.00%	3.75%	-0.75%
Hedge Funds – Credit	5.50%	5.00%	+0.50%

2019 5-7 YEAR RETURN FORECASTS

Geometric Expected Return			
Asset Class	**2019**	**2018**	**2019-2018**
Long Treasuries	1.75%	2.00%	-0.25%
Long Credit	3.50%	4.00%	-0.50%
IG CLO	4.00%	N/A	N/A
HY CLO	6.00%	N/A	N/A
Commodities	4.25%	4.75%	-0.50%
Midstream Energy	8.25%	7.25%	+1.00%
REITs	6.75%	6.50%	+0.25%
Core Real Estate	6.00%	5.75%	+0.25%
Non-Core Real Estate	7.00%	7.00%	-
Private RE Debt	5.75%	N/A	N/A
Private Real Assets - Energy/Metals	9.50%	8.00%	+1.50%
Private Real Assets - Infra/Land	6.25%	6.00%	+0.25%
Hedge Funds - Macro	6.00%	6.25%	-0.25%
*Global Equity**	*6.99%*	*6.88%*	*+0.11%*
*Private Equity**	*10.01%*	*8.00%*	*+2.01%*
*Core Bonds**	*3.04%*	*2.75%*	*+0.29%*
*Private Debt**	*7.60%*	*6.50%*	*+1.10%*
*Long Govt/Credit**	*2.84%*	*3.26%*	*-0.42%*
*Hedge Funds**	*5.74%*	*5.83%*	*-0.09%*

*Multi-asset assumptions derived from the sum of underlying equity, credit, and real asset building blocks

2019 VOLATILITY FORECASTS

Volatility			
Asset Class	**2019**	**2018**	**2019-2018**
Cash	1.00%	1.00%	-
Large Cap Equities	16.50%	17.50%	-1.00%
Small/Mid Cap Equities	20.00%	21.00%	-1.00%
Int'l Equities (Unhedged)	20.50%	21.00%	-0.50%
Int'l Sm Cap Equities (Unhedged)	22.00%	22.00%	-
Emerging Int'l Equities	28.00%	28.00%	-
Emerging Int'l Sm Cap Equities	31.00%	31.00%	-
Hedge Funds - Long/Short	11.00%	11.00%	-
TIPS	6.50%	6.50%	-
Treasuries	5.50%	5.50%	-
IG Corp Credit	7.50%	7.50%	-
MBS	7.00%	7.00%	-
High-Yield Bonds	12.50%	13.00%	-0.50%
Bank Loans	9.00%	9.00%	-
EMD (External)	13.00%	13.00%	-
EMD (Local Currency)	13.00%	13.00%	-
Municipal Bonds	7.00%	7.00%	-
High-Yield Municipal Bonds	12.00%	12.00%	-
Hedge Funds - Credit	9.50%	9.50%	-

2019 VOLATILITY FORECASTS

Volatility			
Asset Class	**2019**	**2018**	**2019-2018**
Long Treasuries	12.00%	12.00%	-
Long Credit	12.00%	12.00%	-
IG CLO	7.50%	N/A	N/A
HY CLO	11.00%	N/A	N/A
Commodities	19.00%	19.00%	-
Midstream Energy	18.50%	19.00%	-0.50%
REITs	20.00%	21.00%	-1.00%
Core Real Estate	13.00%	13.00%	-
Non-Core Real Estate	17.00%	17.00%	-
Private RE Debt	11.00%	N/A	N/A
Private Real Assets - Energy/Metals	21.00%	21.00%	-
Private Real Assets - Infra/Land	12.00%	12.00%	-
Hedge Funds - Macro	9.50%	9.50%	-
*Global Equity**	*17.57%*	*18.22%*	*-0.65%*
*Private Equity**	*24.16%*	*23.00%*	*+1.16%*
*Core Bonds**	*6.10%*	*5.99%*	*+0.11%*
*Private Debt**	*11.97%*	*13.00%*	*-1.03%*
*Long Gov/Credit**	*11.26%*	*11.25%*	*+0.01%*
*Hedge Funds**	*8.15%*	*9.07%*	*-0.92%*

*Multi-asset assumptions derived from the sum of underlying equity, credit, and real asset building blocks

2019 30 YEAR RETURN FORECASTS

Geometric Expected Return			
Asset Class	2019	2018	2019-2018
Cash	3.00%	2.75%	+0.25%
Large Cap Equities	7.50%	7.50%	-
Small/Mid Cap Equities	7.75%	7.75%	-
Int'l Equities (Unhedged)	7.75%	7.75%	-
Int'l Sm Cap Equities (Unhedged)	8.00%	8.00%	-
Emerging Int'l Equities	9.25%	9.25%	-
Emerging Int'l Sm Cap Equities	9.50%	9.50%	-
Hedge Funds - Long/Short	6.50%	7.25%	-0.75%
TIPS	4.00%	3.75%	+0.25%
Treasuries	3.75%	3.25%	+0.50%
IG Corp Credit	5.75%	4.75%	+1.00%
MBS	3.75%	3.25%	+0.50%
High-Yield Bonds	6.50%	5.50%	+1.00%
Bank Loans	5.50%	5.50%	-
EMD (External)	6.25%	5.00%	+1.25%
EMD (Local Currency)	6.75%	6.50%	+0.25%
Municipal Bonds	3.75%	3.50%	+0.25%
High-Yield Municipal Bonds	5.25%	5.50%	-0.25%
Hedge Funds - Credit	6.75%	5.25%	+1.50%

2019 30 YEAR RETURN FORECASTS

Geometric Expected Return			
Asset Class	**2019**	**2018**	**2019-2018**
Long Treasuries	3.75%	3.50%	+0.25%
Long Credit	6.00%	5.25%	+0.75%
IG CLO	4.50%	N/A	N/A
HY CLO	6.25%	N/A	N/A
Commodities	5.50%	5.50%	-
Midstream Energy	7.50%	7.50%	-
REITs	7.00%	6.75%	+0.25%
Core Real Estate	6.25%	6.50%	-0.25%
Non-Core Real Estate	7.25%	7.50%	-0.25%
Private RE Debt	6.25%	N/A	N/A
Private Real Assets - Energy/Metals	9.50%	7.75%	+1.75%
Private Real Assets - Infra/Land	7.00%	6.25%	+0.75%
Hedge Funds - Macro	6.50%	6.25%	+0.25%
*Global Equity**	*8.18%*	*8.24%*	*-0.06%*
*Private Equity**	*11.15%*	*9.50%*	*+1.65%*
*Core Bonds**	*4.37%*	*3.75%*	*+0.62%*
*Private Debt**	*8.11%*	*7.50%*	*+0.61%*
*Long Gov/Credit**	*5.14%*	*4.62%*	*+0.52%*
*Hedge Funds**	*6.76%*	*6.34%*	*+0.42%*

*Multi-asset assumptions derived from the sum of underlying equity, credit, and real asset building blocks.