STATE OF RHODE ISLAND

ASSET ALLOCATION ANALYSIS

October, 2019

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JULY FOLLOW UP

NEPC, LLC

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

ASSET ALLOCATION REVIEW

				Individual Asset Classes		Functional Buckets	
		Current Target	Current Allocation	Expected Return 5-7 Year*	Expected Risk	Expected Return 5-7 Year*	Expected Risk
Growth	US Equities	22%	16%	6.1%	17.6%	8.2%	20.4%
	Int'l Equities	13%	9%	6.8%	20.5%		
	Emerging Int'l Equities	5%	5%	9.3%	28.0%		
	Global Equity	0%	15%	7.0%	17.6%		
	Global Equity	**40%**	**45%**	**6.7%**	**19.8%**		
	Private Equity	11.25%	6.96%	10.0%	24.2%		
	Non-Core Real Estate	2.25%	1.78%	7.0%	17.0%		
	Opp. Private Credit	1.5%	0.6%	8.5%	16.0%		
	Private Growth	**15%**	**9%**	**9.4%**	**22.3%**		
Income	Liquid Credit	2.8%	3.9%	5.4%	10.8%	7.4%	13.7%
	HY Infrastructure	1%	1%	9.5%	21.0%		
	REITs	1%	1%	6.8%	20.0%		
	Private Credit	3.2%	1.7%	7.6%	12.0%		
	Income	**8%**	**8%**	**7.0%**	**13.7%**		
Stability	Long Treasuries	4%	4%	1.8%	12.0%	4.4%	8.5%
	Systematic Trend	4%	4%	6.0%	9.5%		
	CPC	**8%**	**8%**	**3.9%**	**10.8%**		
	Core Real Estate	3.6%	4.5%	6.0%	13.0%		
	Private Infrastructure	2.4%	2.0%	6.3%	12.0%		
	TIPS	1%	2%	3.0%	6.5%		
	Commodities	1%	0%	4.3%	19.0%		
	Inflation Protection	**8%**	**8%**	**5.5%**	**12.6%**		
	Core Bonds	11.5%	11.8%	3.0%	6.1%		
	Absolute Return	6.5%	7.0%	5.7%	8.1%		
	Strategic Cash	3%	3%	2.5%	1.0%		
	Volatility Protection	**21%**	**22%**	**3.8%**	**6.0%**		
Other	Short-Term Cash	0%	0%	2.8%	1.0%		
	Russell Overlay	0%	0%	0.5%	1.0%		
	Total Cash	**0%**	**0%**				

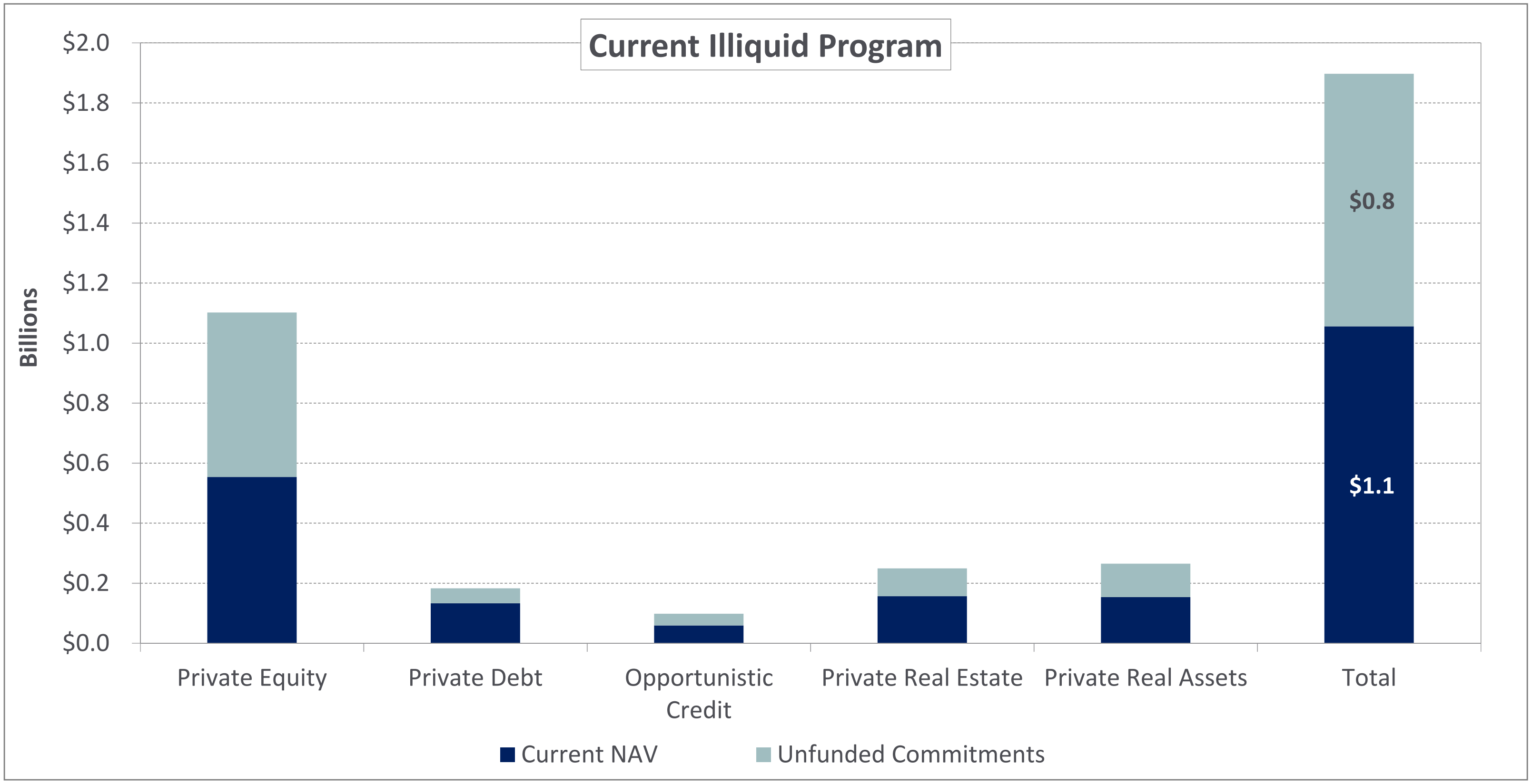
	Current Target	Current Allocation
Expected Return 5-7 yrs	**6.70%**	**6.52%**
Expected Return 30 yrs	**7.81%**	**7.63%**
Standard Dev	**11.9%**	**11.6%**
Sharpe Ratio (5-7 years)	**0.35**	**0.35**

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

**Current allocation is as of May 2019

NEPC

ILLIQUID PROGRAM SNAPSHOT

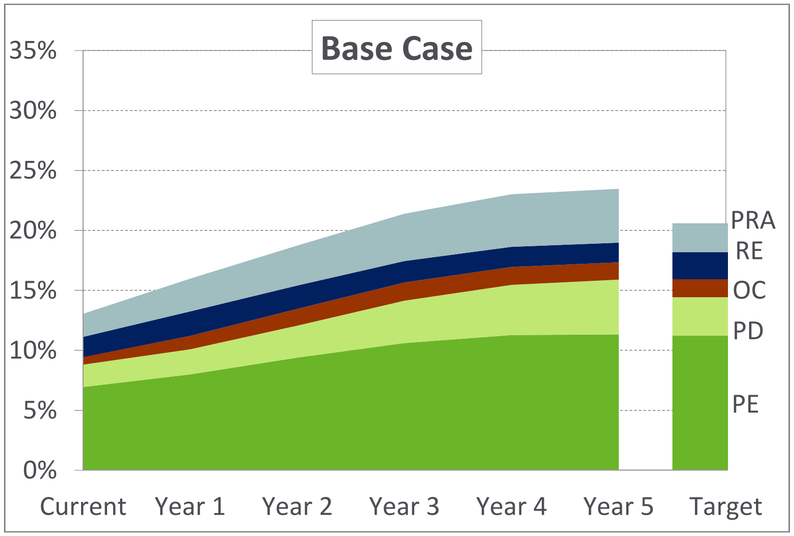


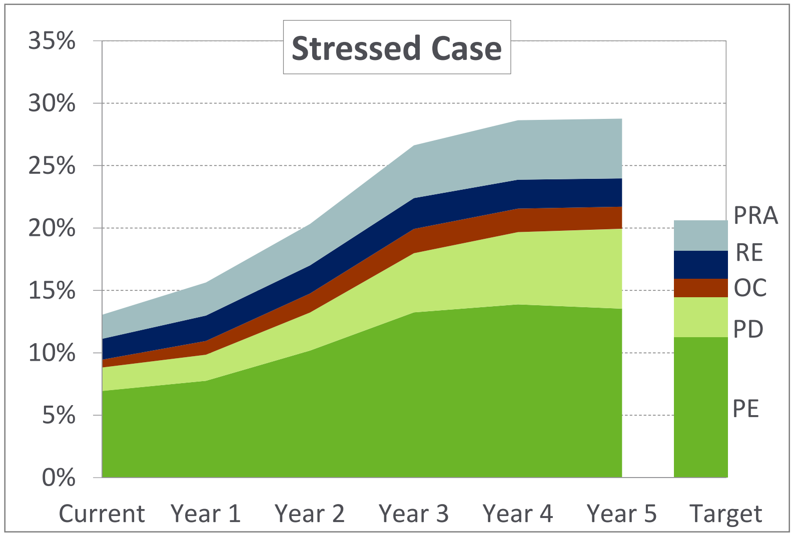
Based on data as of 3/31/2019

Private Real Estate only includes closed-end funds with a callable structure and does not include core, open-end funds

- **Because of uncalled capital commitments the allocation to illiquid investments can rise even without any additional commitments**
  - Currently ≈$0.8B in uncalled private market commitments

ILLIQUID ALLOCATION

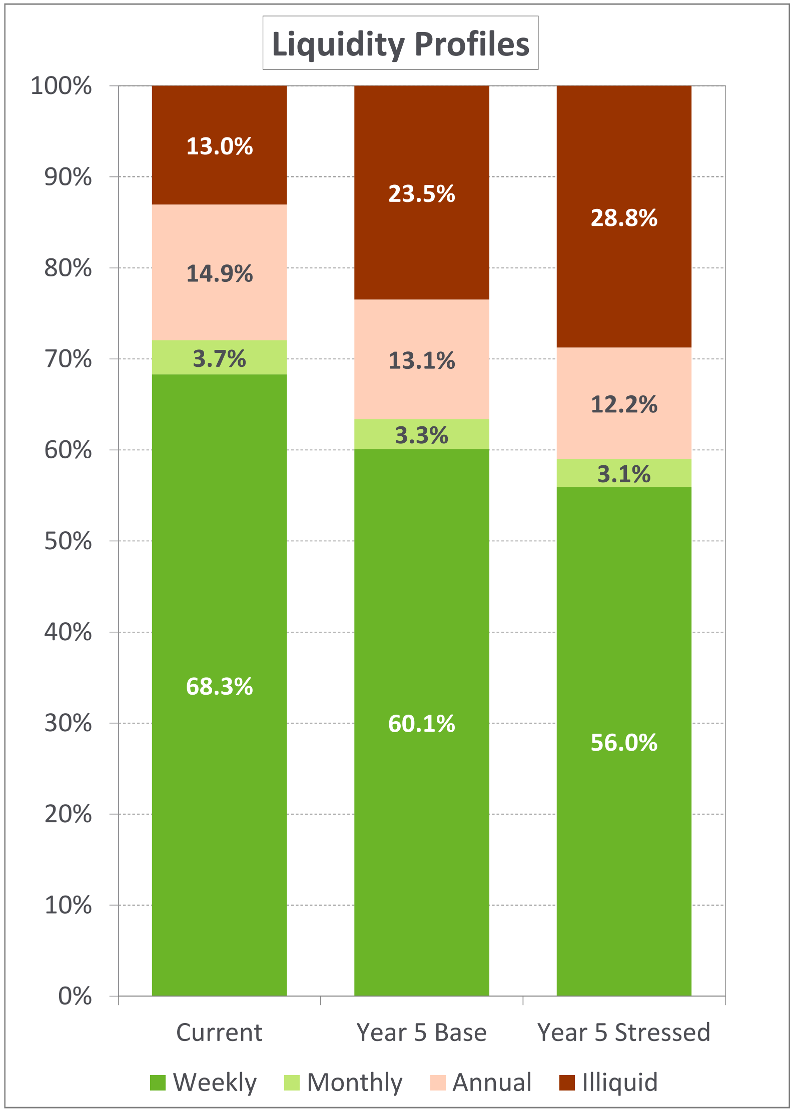




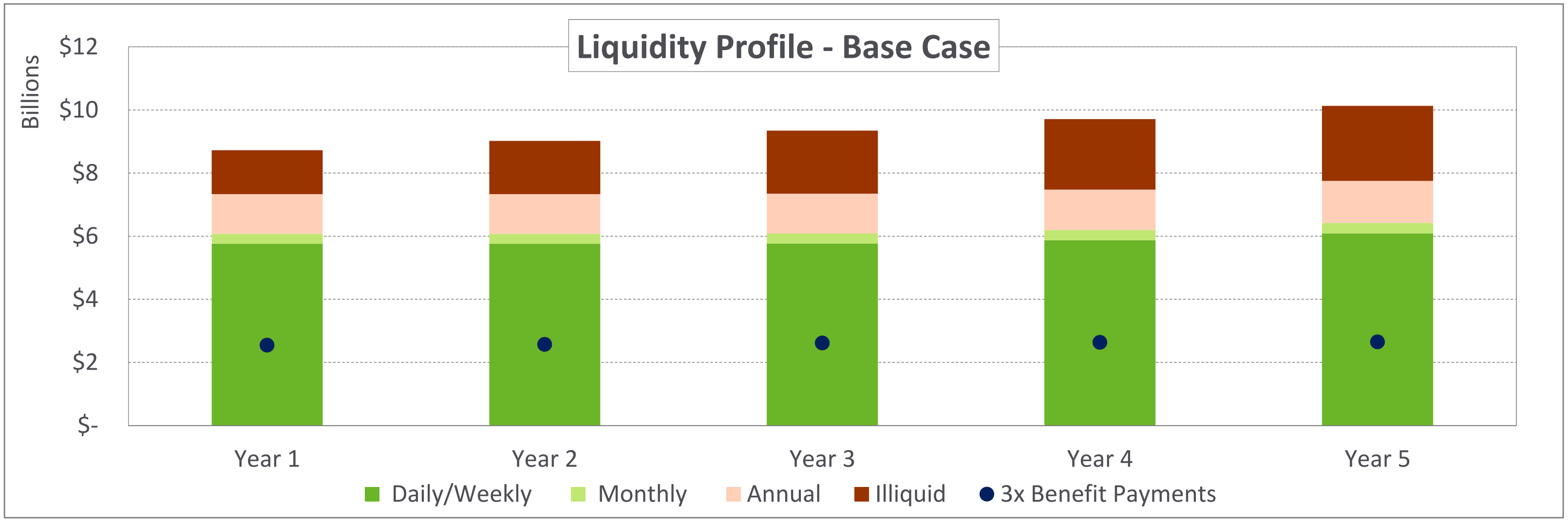
Private Real Estate only includes closed-end funds with a callable structure and does not include core, open-end funds

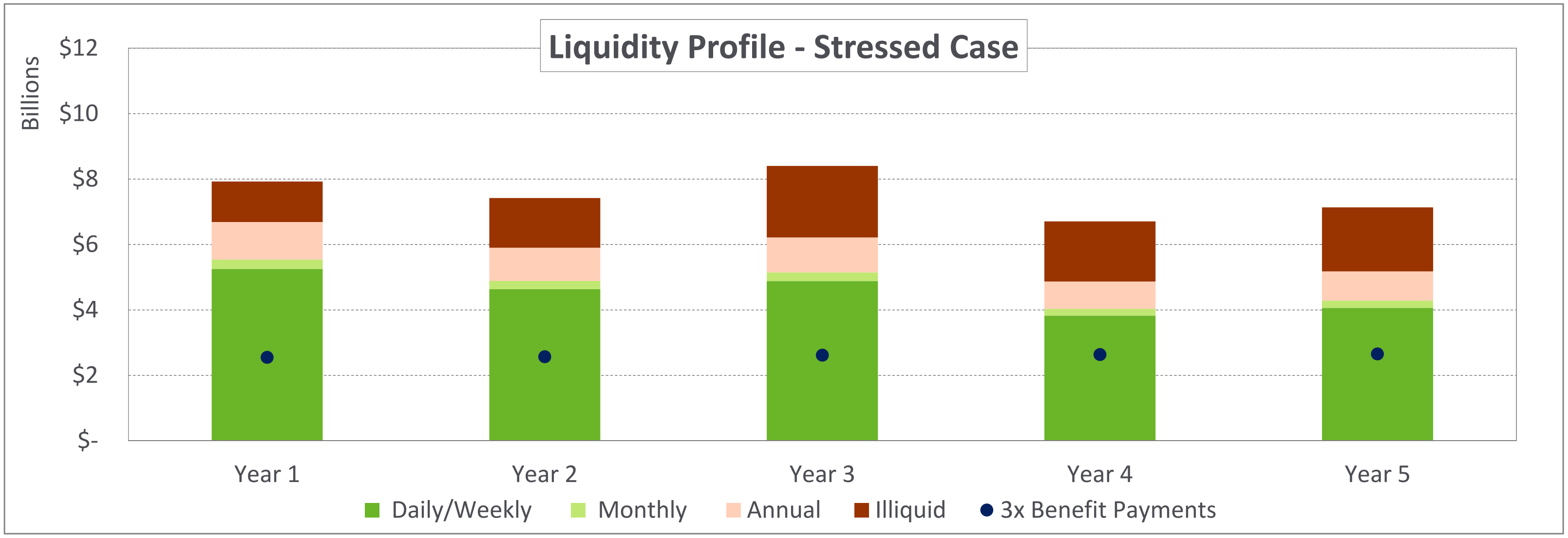
- **Allocation to illiquid assets is expected to increase over the next five years in base case**
  - Steady growth as the fund makes commitments averaging $518M per year, per the current pacing plan
- **In the stressed case, negative asset returns results in an increase to the private markets allocation above targets (denominator effect)**
  - Capital calls and distributions are modeled the same under the stressed and base case, except distributions are halved in years 2 and 3
- **Of note, the above does not incorporate the program's unfunded commitment amount**
  - The unfunded commitment amount is invested across the SAA in liquid investments

CHANGE IN LIQUIDITY PROFILE



CHANGE IN LIQUIDITY





Results are based off 10,000 simulated 5 year time series and represent the simulated path of the 10th percentile of the cumulative return at the end of year 5.

ASSET ALLOCATION: PROPOSED CONSIDERATIONS

PROPOSED NEW ALLOCATIONS TO SAA

- **NEPC is proposing the inclusion of additional asset classes as part of the existing SAA**
- **Equity Options have been modeled as a potential asset class to be included as part of the Growth bucket**
- **In addition, Emerging Market Debt has been modeled as a potential diversifier and return enhancer to the Income Class**

ASSET ALLOCATION PROPOSAL

		Current Target	Current Allocation	Mix A[1]	Mix A[2]	Mix A[3]	Individual Asset Classes: Expected Return 5-7 Year*	Individual Asset Classes: Expected Risk
Growth	US Equities	22.0%	15.9%	12.7%	7.7%	7.7%	6.1%	17.6%
	Int'l Equities	13.3%	9.2%	7.6%	7.6%	7.6%	6.8%	20.5%
	Emerging Int'l Equities	4.7%	5.1%	4.7%	4.7%	4.7%	9.3%	28.0%
	Global Equity	0%	15%	15%	15%	15%	7.0%	17.6%
	Equity Options	0%	0%	0%	5%	5%	4.8%	11.0%
	Global Equity	**40%**	**45%**	**40%**	**40%**	**40%**	**6.7%**	**19.8%**
	Private Equity	11.25%	6.96%	11.25%	11.25%	11.25%	10.0%	24.2%
	Non-Core Real Estate	2.25%	1.78%	2.25%	2.25%	2.25%	7.0%	17.0%
	Opp. Private Credit	1.5%	0.6%	1.5%	1.5%	1.5%	8.5%	16.0%
	Private Growth	**15%**	**9%**	**15%**	**15%**	**15%**	**9.4%**	**22.3%**
Income	Liquid Credit	2.8%	3.9%	2.8%	2.8%	2.8%	5.4%	10.8%
	EMD (Blended)	0%	0%	2%	2%	2%	5.6%	13.0%
	HY Infrastructure	1%	1%	1%	1%	1%	9.5%	21.0%
	REITs	1%	1%	1%	1%	1%	6.8%	20.0%
	Private Credit	3.2%	1.7%	3.2%	3.2%	3.2%	7.6%	12.0%
	Income	**8%**	**8%**	**10%**	**10%**	**10%**	**7.0%**	**13.7%**
Stability	Long Treasuries	4%	4%	4%	4%	5%	1.8%	12.0%
	Systematic Trend	4%	4%	4%	4%	5%	6.0%	9.5%
	CPC	**8%**	**8%**	**8%**	**8%**	**10%**	**3.9%**	**10.8%**
	Core Real Estate	3.6%	4.5%	3.6%	3.6%	3.6%	6.0%	13.0%
	Private Infrastructure	2.4%	2.0%	2.4%	2.4%	2.4%	6.3%	12.0%
	TIPS	1%	2%	2%	2%	2%	3.0%	6.5%
	Commodities	1%	0%	0%	0%	0%	4.3%	19.0%
	Inflation Protection	**8%**	**8%**	**8%**	**8%**	**8%**	**5.5%**	**12.6%**
	Core Bonds	11.5%	11.8%	0.0%	0.0%	0.0%	3.0%	6.1%
	IG Corp. Credit (Core Bonds)	0%	0%	5.25%	5.25%	4.25%	4.0%	7.5%
	Securitized Credit (Core Bonds)	0%	0%	5.25%	5.25%	4.25%	2.8%	7.0%
	Absolute Return	6.5%	7.0%	6.5%	6.5%	6.5%	5.7%	8.1%
	Strategic Cash	3%	3%	2%	2%	2%	2.5%	1.0%
	Volatility Protection	**21%**	**22%**	**19%**	**19%**	**17%**	**3.8%**	**6.0%**
Other	Short-Term Cash	0%	0%	0%	0%	0%	2.8%	1.0%
	Russell Overlay	0%	0%	0%	0%	0%	0.5%	1.0%
	Total Cash	**0%**	**0%**	**0%**	**0%**	**0%**		

	Current Target	Current Allocation	Mix A[1]	Mix A[2]	Mix A[3]
Expected Return 5-7 yrs	**6.70%**	**6.52%**	**6.79%**	**6.73%**	**6.74%**
Expected Return 30 yrs	**7.81%**	**7.63%**	**7.88%**	**7.79%**	**7.80%**
Standard Dev	**11.9%**	**11.6%**	**12.1%**	**11.7%**	**11.7%**
Sharpe Ratio (5-7 years)	**0.35**	**0.35**	**0.36**	**0.36**	**0.36**
Total Duration	**1.64**	**1.79**	**1.65**	**1.65**	**1.72**

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

**Current allocation is as of May 2019

***Constraint – private assets remain the same across all mixes

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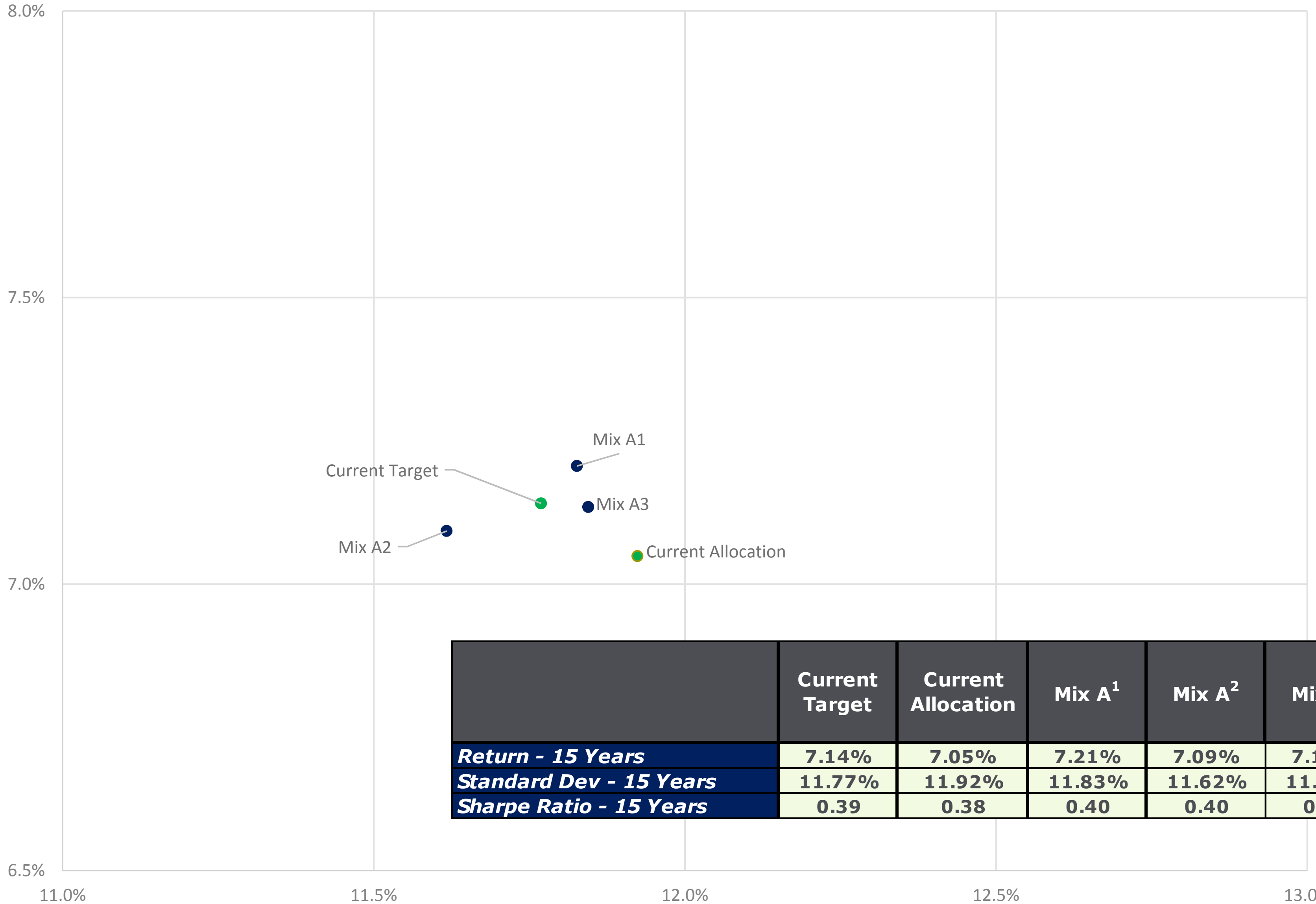
ASSET ALLOCATION MIXES: EXPECTED RISK VS. RETURN

	Current Target	Current Allocation	Mix A[1]	Mix A[2]	Mix A[3]
Expected Return 5-7 yrs	6.70%	6.52%	6.79%	6.73%	6.74%
Expected Return 30 yrs	7.81%	7.63%	7.88%	7.79%	7.80%
Standard Dev	11.9%	11.6%	12.1%	11.7%	11.7%
Sharpe Ratio (5-7 years)	0.35	0.35	0.36	0.36	0.36

15 YEAR HISTORICAL RISK/RETURN



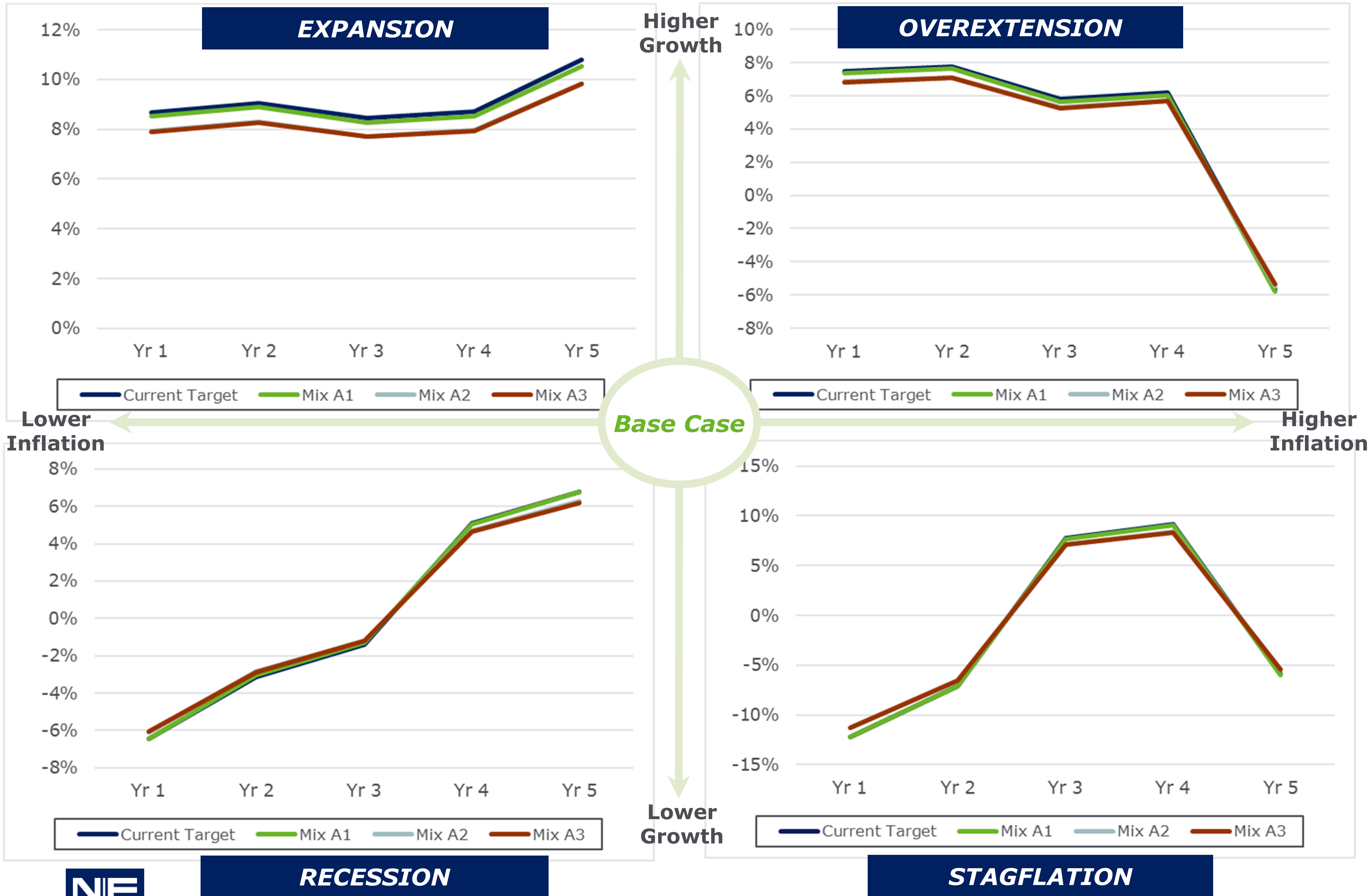
	Current Target	Current Allocation	Mix A[1]	Mix A[2]	Mix A[3]
Return - 15 Years	7.14%	7.05%	7.21%	7.09%	7.13%
Standard Dev - 15 Years	11.77%	11.92%	11.83%	11.62%	11.84%
Sharpe Ratio - 15 Years	0.39	0.38	0.40	0.40	0.39

*The expected risk and return for each mix is a weighted averages of each underlying allocation's historical risk and return
** A list of benchmark proxies used can be found in the appendix

STOCHASTIC RESULTS

	Current Target	Mix A1	Mix A2	Mix A3
Expected Return 5-7 years	6.7%	6.8%	6.7%	6.7%
Expected Return 30 years	7.8%	7.9%	7.8%	7.8%
Standard Deviation	11.9%	12.1%	11.7%	11.7%
Sharpe Ratio (5-7 years)	0.35	0.36	0.36	0.36
Worst Decile 5-Year Return	-0.1%	-0.1%	0.0%	0.0%
Chance of Falling Below 50% Funded	14.8%	15.1%	13.9%	14.0%
Chance of 2% ARC Increase	22.5%	22.3%	20.4%	20.5%

SIC ASSET ALLOCATION: SCENARIO ANALYSIS



PROPOSED CHANGES: GROWTH

		Current Target	Current Allocation	Mix A[2]
Growth	US Equities	22.0%	15.9%	7.7%
	Int'l Equities	13.3%	9.2%	7.6%
	Emerging Int'l Equities	4.7%	5.1%	4.7%
	Global Equity	0%	15%	15%
	Equity Options	0%	0%	5%
	Global Equity	**40%**	**45%**	**40%**
	Private Equity	11.25%	6.96%	11.25%
	Non-Core Real Estate	2.25%	1.78%	2.25%
	Opp. Private Credit	1.5%	0.6%	1.5%
	Private Growth	**15%**	**9%**	**15%**

Characteristics	Objective/Purpose
-Liquid -Passive management -Earns return through both capital appreciation and dividend yield	-Drive portfolio performance and risk
-Illiquid; Closed-end vehicles -Predominantly accessed through primary fund commitments (20% of exposure of each asset class may be achieved through secondaries)	-Return generation -Idiosyncratic performance -Access to value creation not accessible in public markets -Capture of illiquidity premium

- **Option strategies typically sell options to harvest a "volatility risk premium"**
  - The vol. risk premium has proven to be fairly consistent overtime and in some ways is similar to earning a coupon
  - Harvesting vol. risk premium can be a nice diversifier from the equity risk premium associated with public equities

- **Options strategies are designed to provide a return in line with equity markets while reducing volatility and mitigating drawdowns over the long term**
  - With a Beta of 0.4 - 0.7, these strategies tend to lag equity markets on the upside but offer attractive risk mitigating characteristics

- **NEPC used a custom assumption to model the Option allocation**
  - Modeled as having 80% of the US Large Cap expected return assumption and 70% of its expected risk

*Current allocation is as of May 2019

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 an overlay provider
  - There are also clients who have hired option focused investment managers within a specific asset class (equity, fixed income, etc.)

- **As a result of the extended bull market, investors have found increasing interest in the use of options to partially hedge against an Equity sell off while maintaining the flexibility to still participate in the upside**

- **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

EQUITY OPTION STRATEGY EXAMPLE: PURE PUT WRITING

- **Objective:**
  - To keep pace with equity index over a full market cycle
  - Reducing volatility and the magnitude of drawdowns

- **Investment Thesis:**
  - Fully collateralized options structured to produce highest premium available
  - Option positions determined by statistical analysis of index and volatility or speculative views on the market and volatility

- **Portfolio Construction:**

Core	+	Alpha	=	Final Portfolio
100% US T-Bills Physical Securities Index Fund		**Sell At the Money Put Options** Sell insurance and harvest risk premium		Portfolio is fully collateralized and will seek to sell insurance at a premium as investors tend to overpay for insurance. In addition, puts will be written "at the money" further increasing their value.

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S&P 500 vs CBOE PUT Index - Avg. Monthly Returns

20 Years ended 8/31/2019				
	PUT	SPX	Frequency	Frequency %
Total	0.54%	0.58%	240	
S&P 500 Up	1.87%	2.99%	156	65%
S&P 500 Down < 5%	-0.21%	-2.00%	56	23%
S&P 500 Down > 5%	-5.34%	-7.65%	28	12%

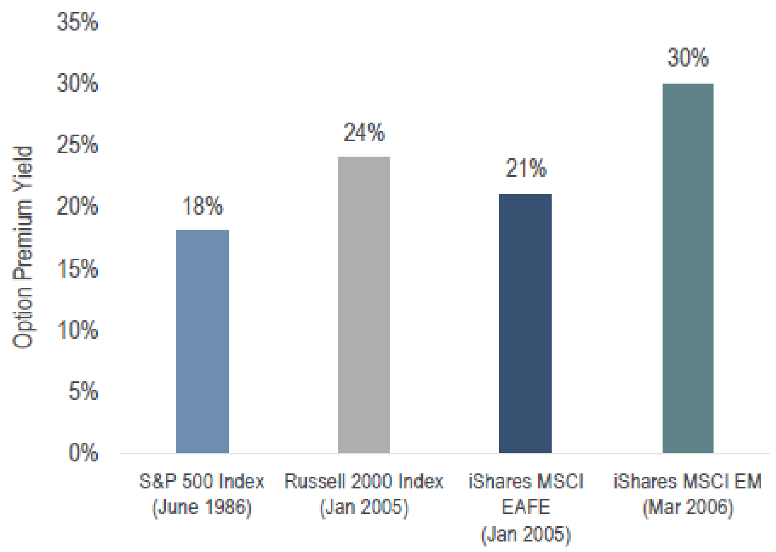
10 Years ended 8/31/2019				
	PUT	SPX	Frequency	Frequency %
Total	0.67%	1.12%	120	
S&P 500 Up	1.65%	2.71%	91	76%
S&P 500 Down < 5%	-0.90%	-2.00%	19	16%
S&P 500 Down > 5%	-5.33%	-6.72%	10	8%

A GLOBAL OPPORTUNITY

Global equity put option premium yields and implied volatility premiums: August 2019

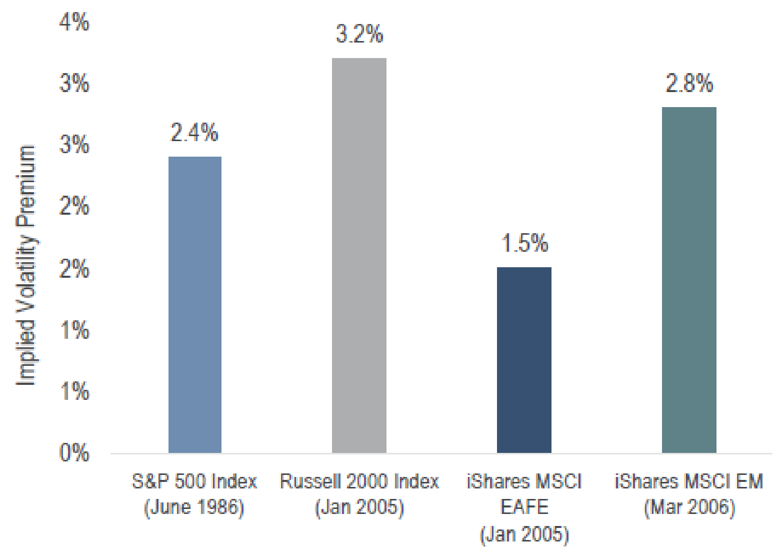
Revenue

Median Annual Option Premium Yield[1] (30D, ATM Put Option)



Profit

Median Implied Volatility Premium (30D, ATM Put Option)



[1] Put option premiums are estimated based on option implied volatility data sourced from Bloomberg and standard option price calculations. Premium yields are calculated as the option premium divided by the option strike price. Sources: CBOE, Bloomberg LP. This material is intended as a broad overview of the Portfolio Managers' style, philosophy and process and is subject to change without notice. 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

INDEX PUTWRITE INVESTMENT OBJECTIVES

Capturing equity volatility premiums: June 1986 – August 2019

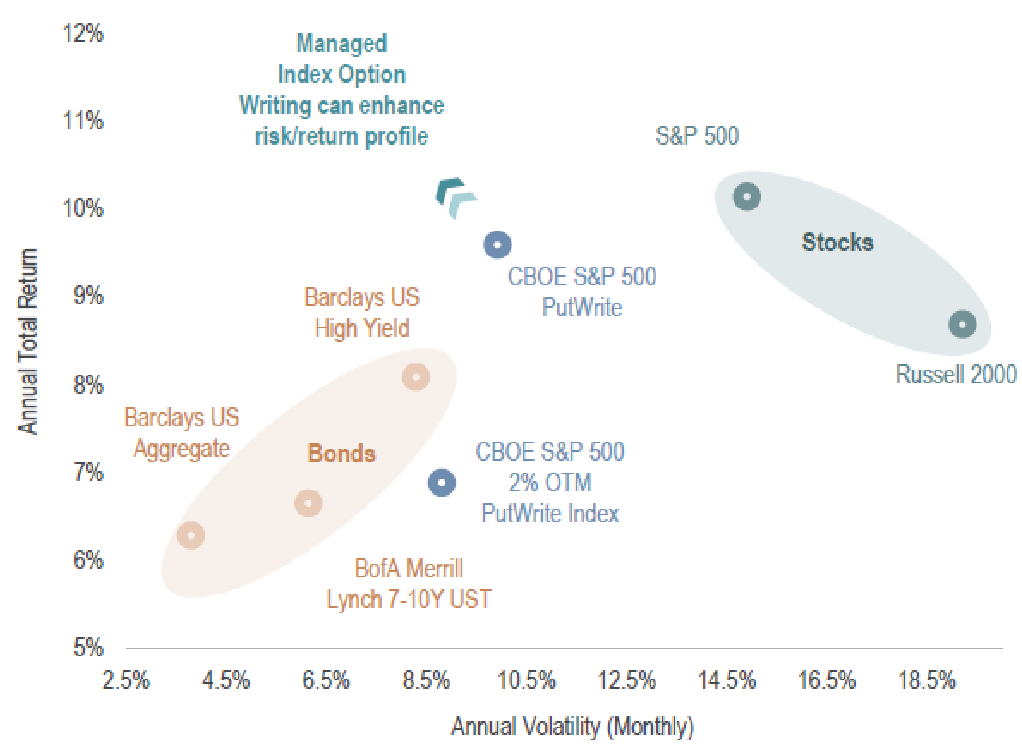
Our Objectives:

- 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 Annual Return vs. Risk

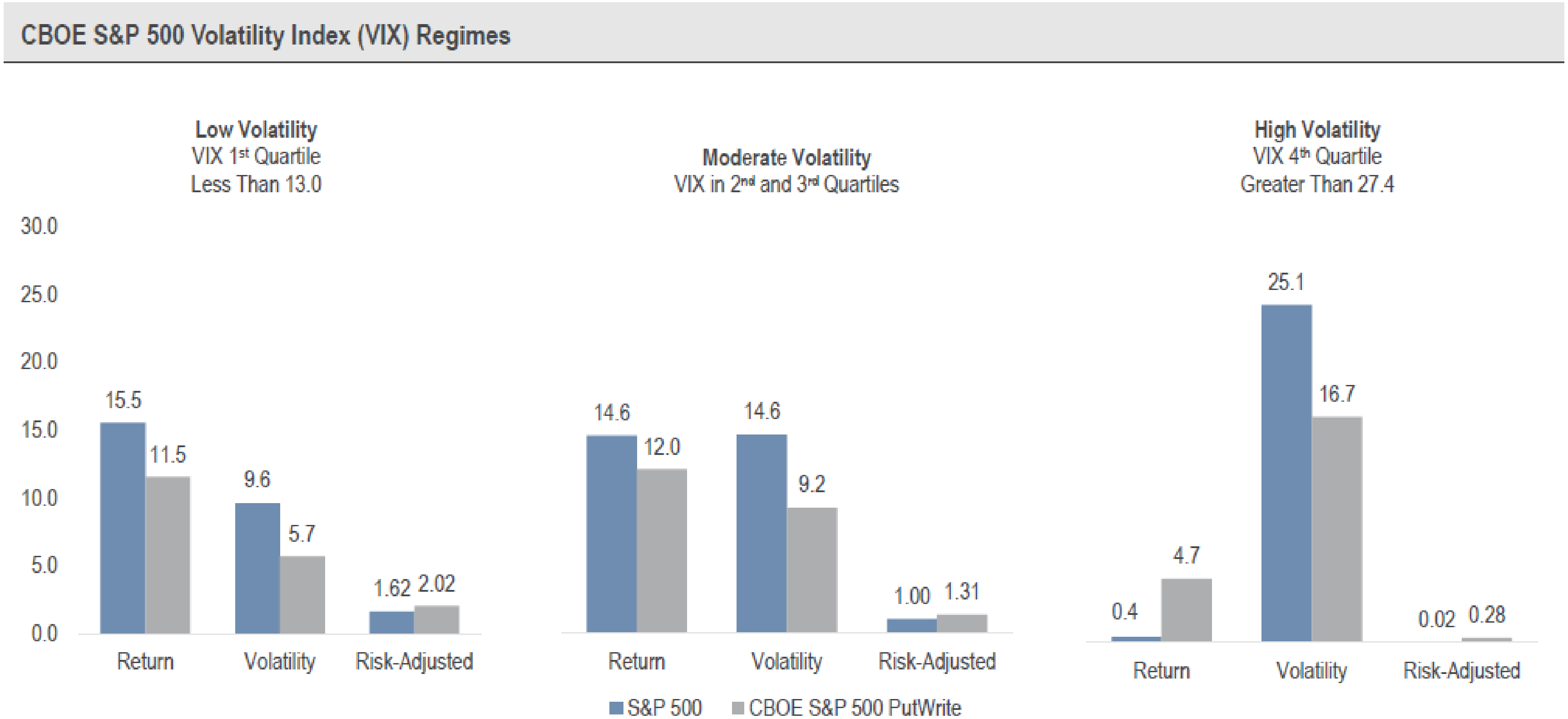


* Index data sourced from Bloomberg LP and is gross of fees unless stated otherwise. Selected time period reflects longest common history of indexes.
This material is intended as a broad overview of the Portfolio Managers' style, philosophy and process and is subject to change without notice. Analysis 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]



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*Source: Neuberger Berman

OPTION STRATEGY RISKS & CONSIDERATIONS

- **Complexity**
  - Gaines or losses on positions are conditional outcomes tied to the performance of the underlying asset
  - Predetermined risks for the buyer but not for the seller
    - Buyer’s downside is limited to amount of premium paid to seller
    - Seller’s downside risk is dependent on positioning & magnitude of price movement in underlying asset
      - Option selling strategies can also use long positions to hedge extreme price movements

- **Exposure to sudden & extreme equity market price movements**
  - Depending on risk & return targets, short-term losses can exceed annual income

- **Reliance on active manager decision-making**
  - Modeling of optimal return (income) vs. risk of loss
  - Implementation involves active decision-making regarding number of trades/tranches, tenor & maturity, and timing of execution

- **Short track record of existing option strategies**
  - Most of the products have limited history that does not include key down market experiences
    - Global financial crisis – September 2008
    - August 2011

- **Collateral management & Reporting**
  - Reporting of overlay returns (option income & gain/loss) separate from existing equity exposure

PROPOSED CHANGES: INCOME

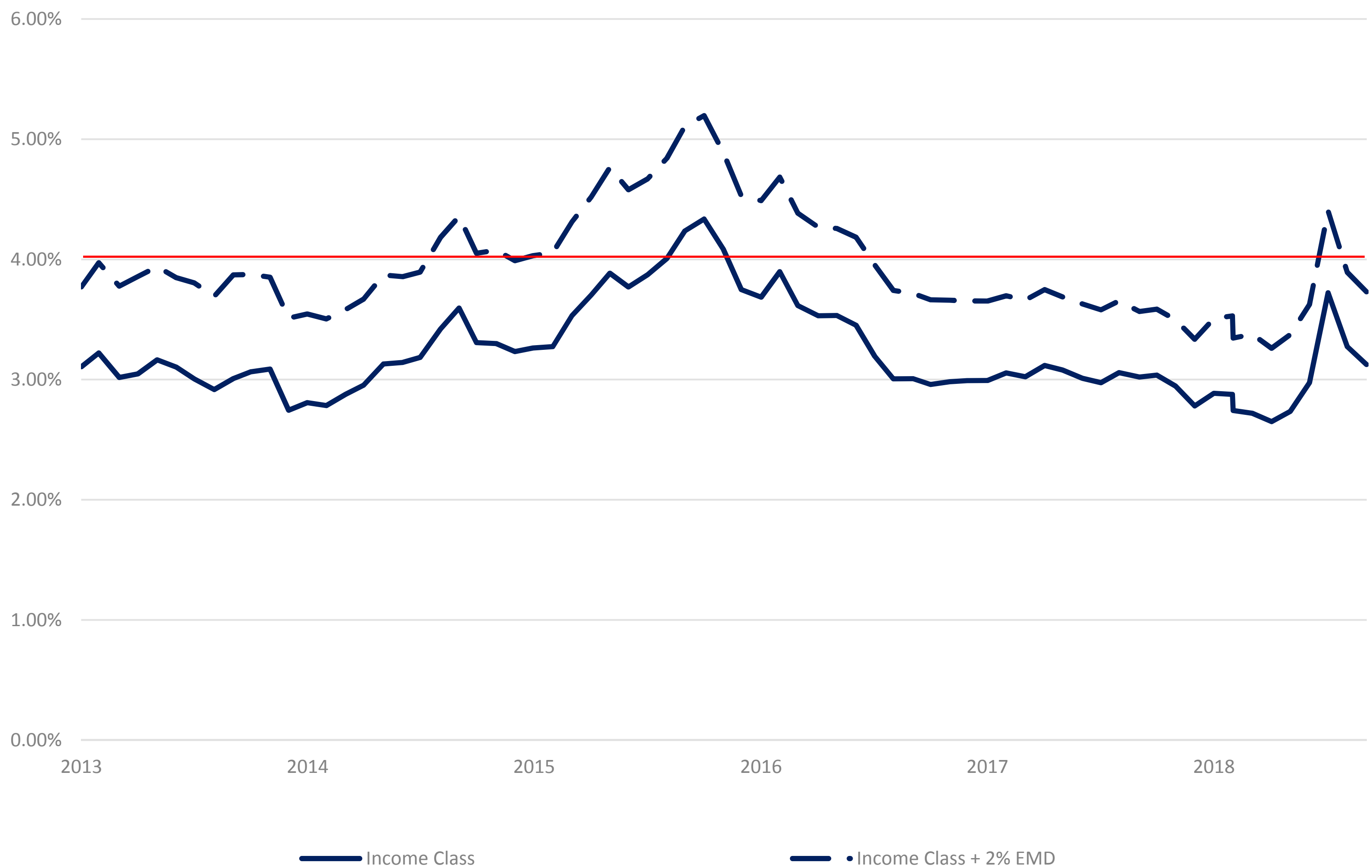
		Current Target	Current Allocation	Mix A[2]
Income	Liquid Credit	2.8%	3.9%	2.8%
	EMD (Blended)	0%	0%	2%
	HY Infrastructure	1%	1%	1%
	REITs	1%	1%	1%
	Private Credit	3.2%	1.7%	3.2%
	Income	**8%**	**8%**	**10%**

Characteristics	Objective/Purpose
-Blend of liquid and illiquid asset classes -Active management	-Produce high and stable income return stream to help mitigate system's negative cashflow and reduce the need to sell portfolio assets to meet required benefit payments -Principal appreciation

- **Most of the SIC's liquid credit exposure is US focused and may benefit from an Emerging market debt ("EMD") allocation**
  - In light of where the US is in the credit cycle, EMD could be a nice diversifier relative to US high yield
- **EMD offers attractive yields relative to the rest of world while**
  - Consistent with the goal of the income class, EMD offers attractive yields above the Barclays Aggregate while providing little US duration risk
- **An EMD allocation could be incorporated within the investment guidelines of the existing Liquid Credit managers**
- **EMD (Blend) is modeled above as a 50/50 split between local and hard currency**

*Current allocation is as of May 2019
**EMD (Blended) is modeled as a 50/50 split between local and hard currency

INCOME CLASS YIELD SPREAD OVER BC AGG: WITH EMD



*Above information is as of 2.28.19 and based on the income class yield targets ex. REITS
**The actual yields of SIC managers are used and combined with the yield of their respective benchmarks in cases where the manager's track record did not extend back to 2013

PROPOSED CHANGES: STABILITY

		Current Target	Current Allocation	Mix A[2]	Characteristics	Objective/Purpose
Stability	Long Treasuries	4%	4%	4%	-Liquid -Active management	-Protect the portfolio during a significant and sustained market crisis by appreciating in value during periods of significant equity market declines
	Systematic Trend	4%	4%	4%		
	CPC	**8%**	**8%**	**8%**		
	Core Real Estate	3.6%	4.5%	3.6%	-Blend of liquid and illiquid asset classes -Active management	-Protect against unanticipated spikes in inflation -Produce ~3% real return across a full market cycle -Diversification -Principal appreciation
	Private Infrastructure	2.4%	2.0%	2.4%		
	TIPS	1%	2%	2%		
	Commodities	1%	0%	0%		
	Inflation Protection	**8%**	**8%**	**8%**		
	Core Bonds	11.5%	11.8%	0.0%	-Blend of asset classes with high to moderate liquidity -Active management	-Protect against unanticipated spikes in volatility -Diversification -Capital Preservation
	IG Corp. Credit (Core Bonds)	0%	0%	5.25%		
	Securitized Credit (Core Bonds)	0%	0%	5.25%		
	Absolute Return	6.5%	7.0%	6.5%		
	Strategic Cash	3%	3%	2%		
	Volatility Protection	**21%**	**22%**	**19%**		

- **The CPC program and its implementation remains an area of focus**
  - Reaffirm what we're trying to hedge against and see if there are more efficient ways to do so
- **The allocation to Commodities is fairly small and has yet to be funded**
  - The funded allocations within the Inflation Protection bucket, we believe, provide an appropriate hedge against inflation
  - As such, we do not view funding Commodities as a priority
- **While cash plays a strategic role within the Vol. Protection bucket, NEPC believes its current sizing can be reduced**

*Current allocation is as of May 2019

VIEWS ON COMMODITIES

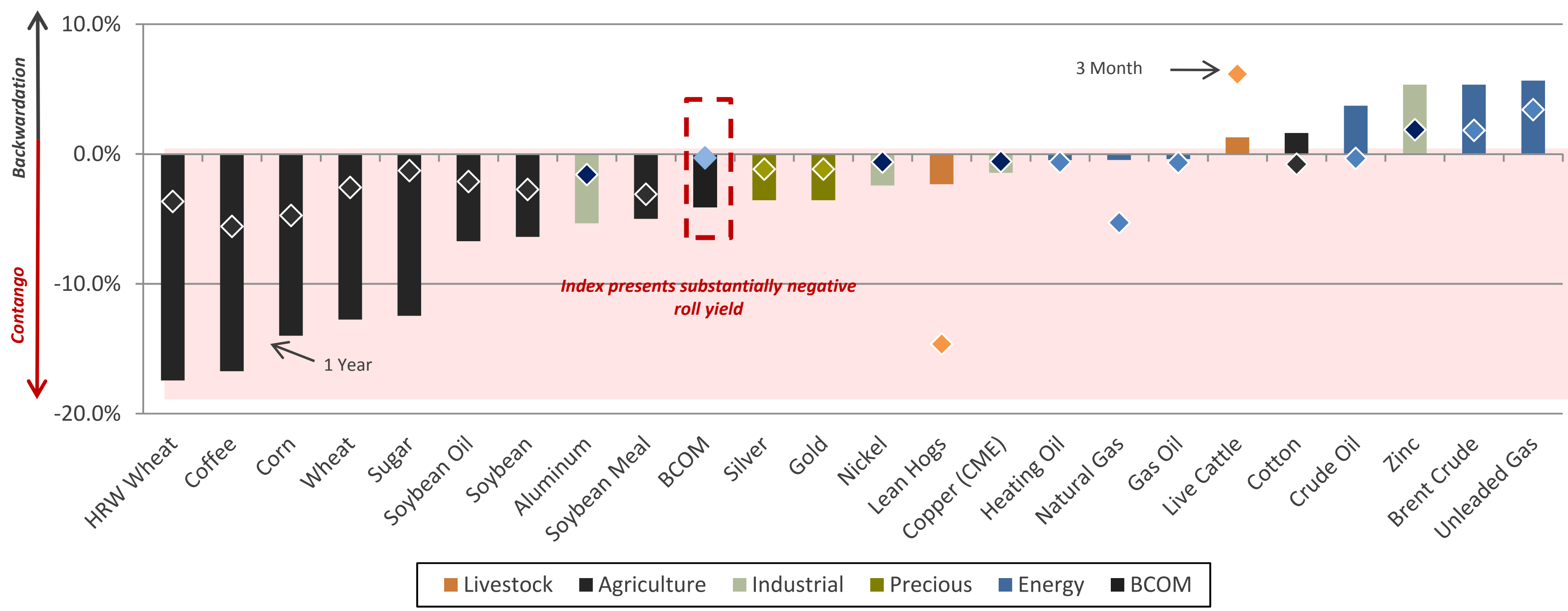
- **While Commodities can provide a hedge against surprise inflation, they also face structural challenges**
  - Commodities continue to be a derivative heavy asset class
  - Negative roll yield continues to be a hurdle for investing in commodity futures
    - Negative income expectations means that the bulk of commodity returns can be expected to come from appreciation
  - Commodities have historically been a volatile asset class and it is expected for that trend to continue

- **The sizing of the current Commodity allocation combined with our view on the asset class has led NEPC to consider other inflation hedging options**

…THE BEAR CASE FOR COMMODITIES

- **Significant negative roll yield prevalent across commodity complex**
  - 17 of the 23 Bloomberg Commodity Index constituents were in contango (of the next contract)
- **Dollar maintaining strength against other currencies mutes upside potential**
  - Commodities are more expensive in local currency
- **Technological advances persist as governor to price inflation**

Contango and Backwardation



Source: Bloomberg, NEPC Analysis. Data as of April 14, 2019

CPC EXECUTIVE SUMMARY

- **What is the role of the CPC allocation?**
  - "The Crisis Protection Class (CPC) is intended to protect the portfolio during significant, sustained market crisis"

- **Do these expectations hold based on historical data?**
  - **YES:** past evidence has shown that trend strategies and long Treasuries have exhibited positive performance during sustained equity market drawdowns
  - **BUT:** past evidence also suggests this result doesn't hold as strongly for short-term drawdowns or on a month-to-month basis

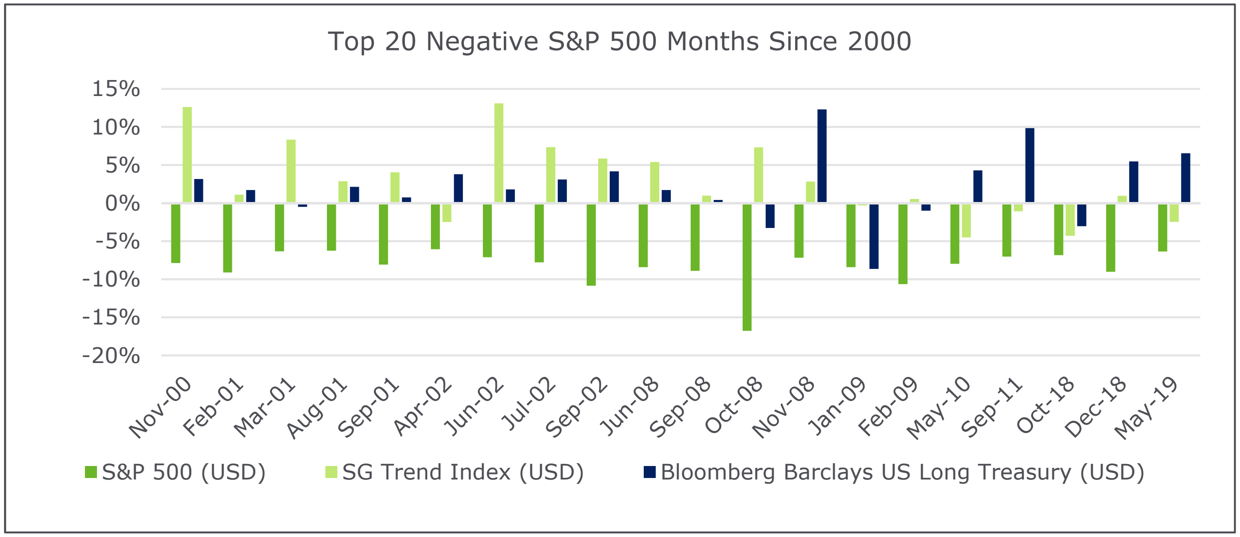
- **Are trend following strategies designed to provide equity drawdown protection?**
  - **NOT QUITE:** trend following strategies are designed to offer a high Sharpe ratio return with low correlation to traditional asset classes through a diversified approach applying trend models to many asset classes
  - **ALTHOUGH:** single-asset trend models can offer convex return profiles (positive returns in high-magnitude up or down markets for the respective asset class); however, single-asset class trend model Sharpe ratios are often quite low or exposed to extend periods of mediocre/negative performance

- **How should investors view trend following as a component within a portfolio?**
  - **DIVERSIFICATION AND ABSOLUTE RETURN:** a positive and solid Sharpe ratio; expected returns with low correlation to the rest of the portfolio which should serve to improve the total portfolio risk-adjusted return

NEGATIVE MONTH ANALYSIS

Since 2000, the SG Trend Index was positive in 70% (14) of the top-20 S&P 500 down months

During the same period, Long Treasuries were positive in 75% (15) of those months



Source: eVestment; Based on performance since January 2000 through June 2019; Past performance is not indicative of future results

HISTORICAL STATISTICAL ANALYSIS

	Correlation - Up Markets	Correlation - Down Markets	Outperform All Period Percent	Outperform Down Period Percent	Outperform Up Period Percent	Down Capture Ratio	Up Capture Ratio	Negative Periods	Percent Profitable Periods
January 2000 - December 2008									
SG Trend Index	(0.24)	(0.50)	52%	68%	39%	-62%	12%	46	57%
Long Treasury	(0.16)	(0.07)	56%	96%	26%	-120%	4%	36	67%
S&P 500	-	-	-	-	-	-	-	47	56%
January 2009 - June 2019									
SG Trend Index	0.05	0.02	38%	69%	26%	38%	4%	62	51%
Long Treasury	(0.21)	(0.13)	38%	83%	20%	-126%	-1%	59	53%
S&P 500	-	-	-	-	-	-	-	36	71%

- **Historical downside statistics solid for Trend and Long Treasuries**
  - Negative S&P 500 correlation in down markets; decent outperformance in down periods; negative down capture (returns historically positive in down markets)
- **Post-crisis experience differs in some aspects**
  - Trend has exhibited positive, albeit modest correlation to the S&P 500 in down markets and some down capture

Source: eVestment; Based on performance since January 2000 through June 2019; Past performance is not indicative of future results
**Long Treasury represents the Bloomberg Barclays Long US Treasury Index*
***All statistics relative to S&P 500 except for Negative Periods and Percent Profitable Periods*

CONCLUSION

NEPC, LLC

CONCLUSION

- **NEPC believes its beneficial to vet and consider the three alternative portfolios which include new allocations to:**
  - Equity Options within the Growth Equity Class
  - Emerging Market Debt within the Income Class
  - Dedicated Securitized Credit and Investment Grade Credit mandates (disaggregation of the Barclays Aggregate)

NEXT STEPS

- **Collect SIC feedback in order to conduct further analysis on potential mixes**
- **NEPC will present the additional analysis at the Oct. 30th meeting and plan to seek approval of an optimal mix**
- **NEPC and the RI Investment team to review and adjust IPS per the newly approved SAA**
- **Continue to diligence and vet managers to implement and fund the new mandates**

APPENDIX A: LIQUIDITY

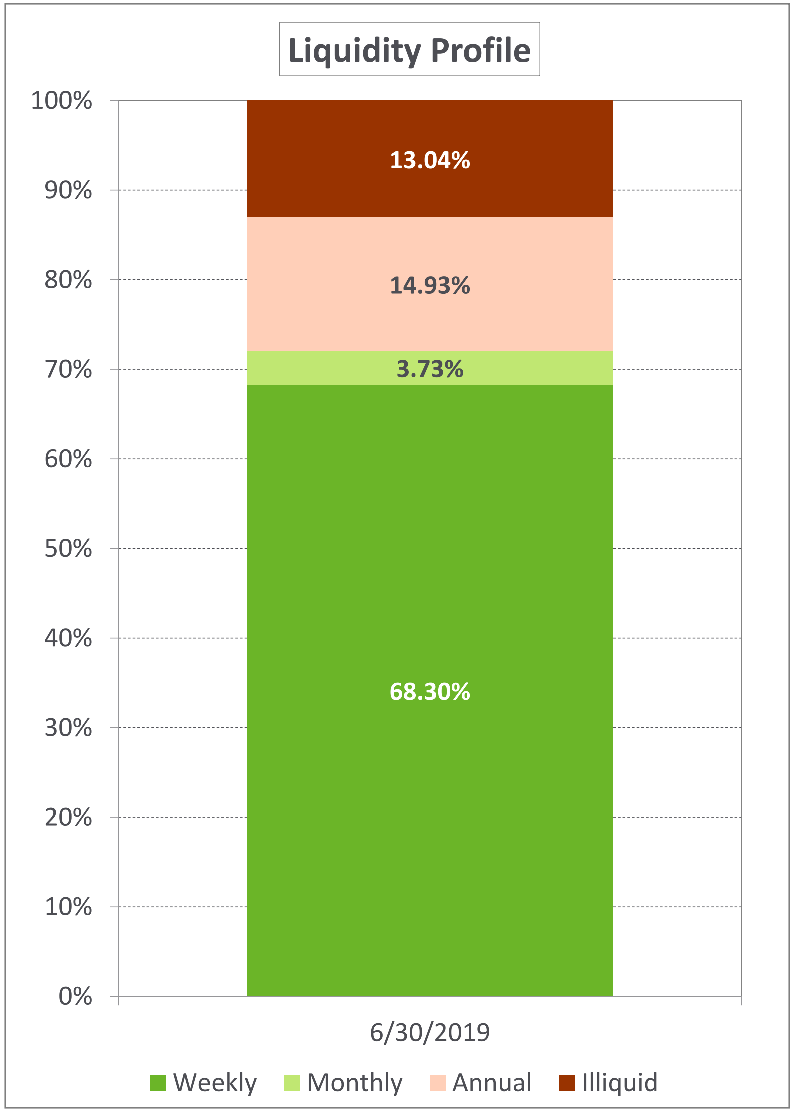
NEPC, LLC

LIQUIDITY STUDY ASSUMPTIONS

- **Base Case**
  - Returns: NEPC 5-7 year expected returns used
    - Total portfolio expected to return 6.7% per year
  - Benefit Payments and Expenses: based on actuarial projections, averaging $867M per year
  - Contributions: based on actuarial projections, averaging $604M per year
  - Commitments: based on recent private market investment advisors
    - Private Equity: averaging $259M per year for the next five years
    - Private Debt: averaging $134M per year for the next five years
    - Opportunistic Credit: averaging $41M per year for the next five years
    - Private Real Estate: $35M per year for the next five years
    - Private Real Assets: averaging $49M per year for the next five years
  - Capital Calls and Distributions: based on standard industry averages

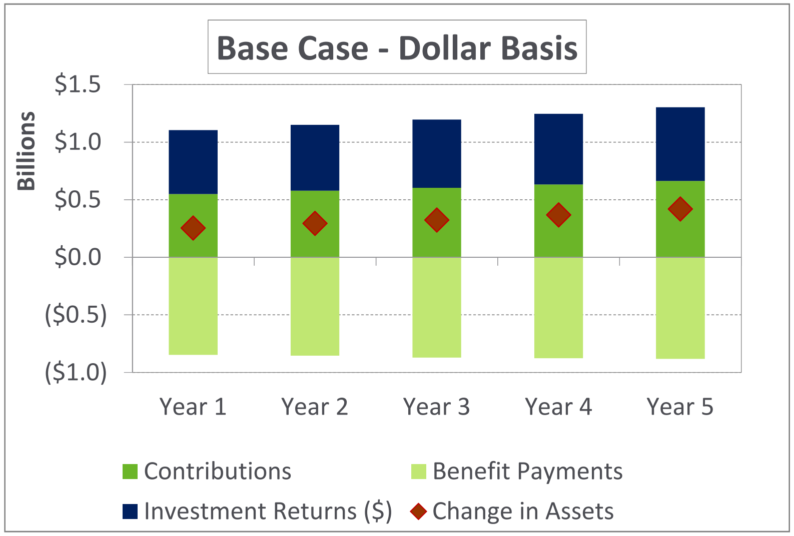
- **Stressed Case**
  - Returns: 0.0% in Year 1, -17.0% in Year 2 (-2 standard deviations), -5.2% in Year 3 (-1 standard deviation), 6.7% in Year 4 (expected return), and -5.2% in Year 5 (-1 standard deviation)
  - Benefit Payments: Same as base case
  - Contributions: Same as base case
  - Commitments: Same as base case
  - Capital Calls and Distributions: Same as base case, except distributions are halved in years 2 and 3

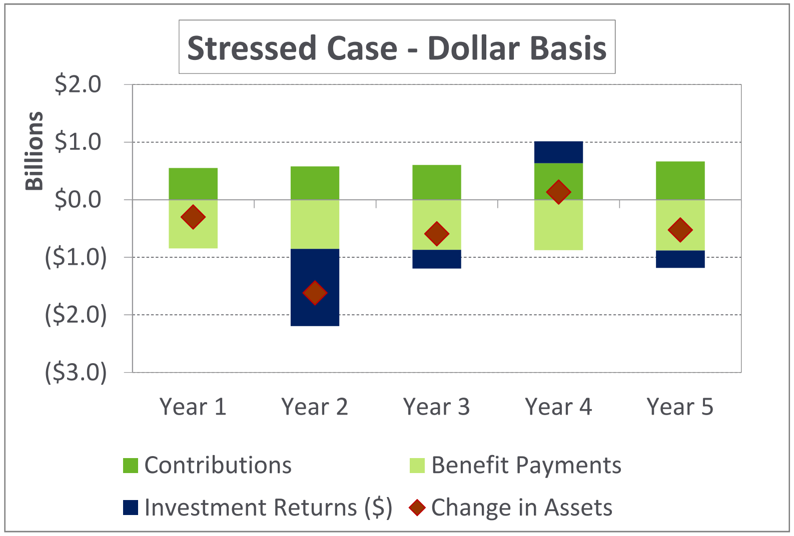
EXISTING LIQUIDITY PROFILE

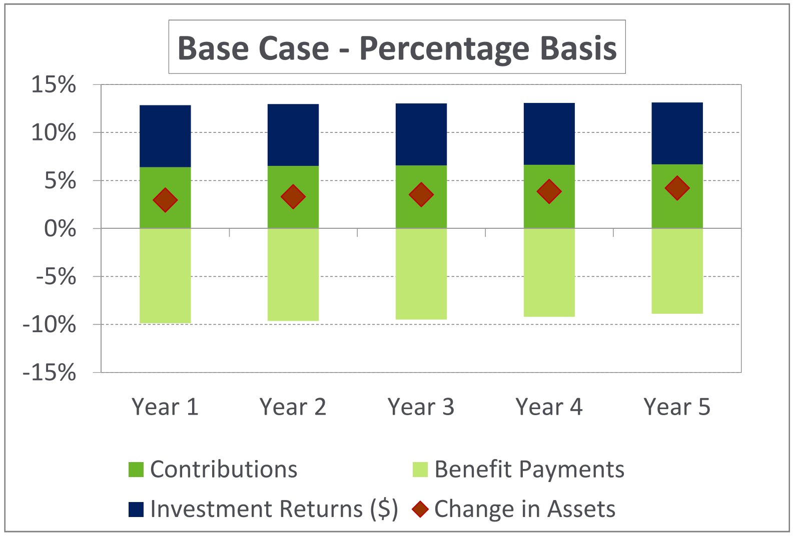


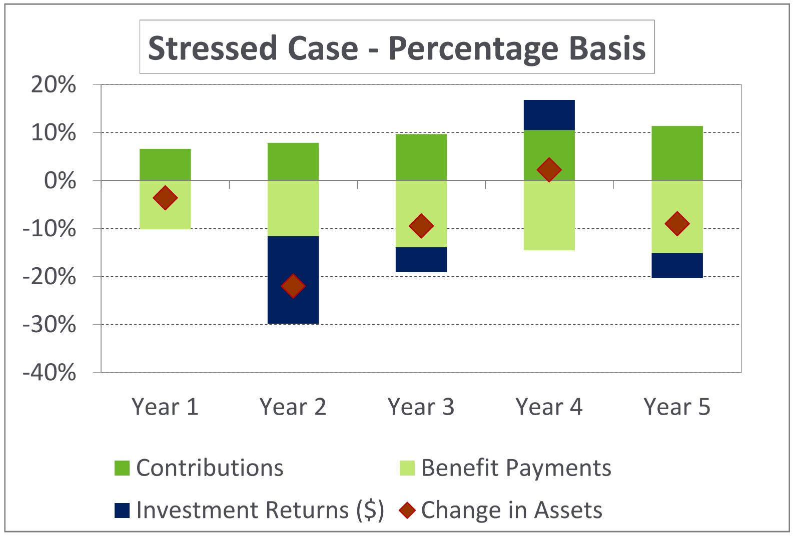
- **72.0% of total assets are available on at least a monthly basis to meet regular liquidity needs**
  - Benefit payments and expenses
  - Rebalancing
  - Capital calls
- **Additional 14.9% of assets available on at least an annual basis**
  - Can be part of planned rebalancing but much less reliable for regular liquidity needs
- **Remaining 13.0% of assets are relatively illiquid**
  - Intermittent distributions - hard to plan around
  - Could be sold in secondary markets, but likely at steep discount

ANNUAL CHANGE IN ASSETS ATTRIBUTION









APPENDIX B: EMD & EQUITY OPTIONS

DEFINING EMERGING MARKET DEBT

- **What is an "emerging" country?**
  - Generally defined as countries with low to middle levels of per capita income
  - Emerging market debt universe has doubled over the last ten years, making up almost 25% of the current fixed income marketplace – and growing

- **Total emerging markets debt outstanding is estimated to be greater than $16 trillion**
  - Approximately $2 trillion of those are issued externally, generally in USD or Euro (Hard Currencies)
  - The rest of issuance is done locally by EM sovereign and corporate entities, the majority of which are not institutionally investable due to legal and trading restrictions

- **The investable universe for traditional EMD investors is estimated to be approximately $1.9 trillion**
  - Broadly divided up in three segments: EM Sovereign Hard Currency, EM Sovereign Local Currency, and EM Corporate Hard Currency

Source: Ashmore, as of December 2017

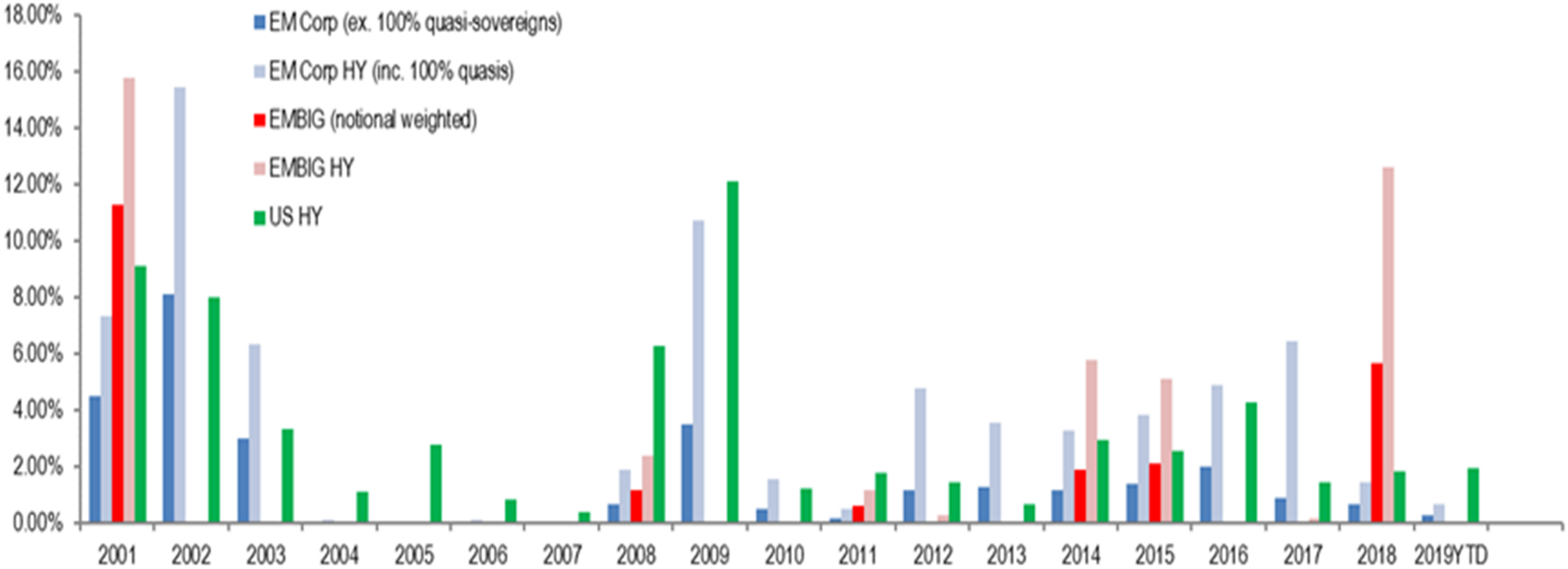
EMD: 3 BROAD SEGMENTS

- **Hard Currency Sovereign Debt**
  - First major EMD market investable for institutional investors
  - Investment universe is over half a trillion dollars
  - Issued predominantly in USD

- **Local Currency Sovereign Debt**
  - Government debt issued in domestic currencies, offering additional sources of returns namely local rates and local FX
  - Largest of the three EMD categories, representing a growing opportunity set approaching a trillion dollars

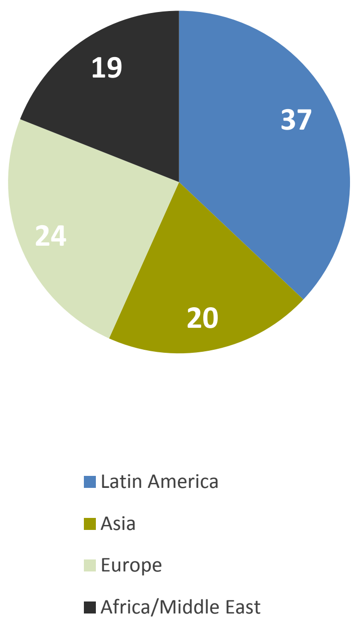
- **Hard Currency Corporate Debt**
  - Investable universe is approaching half a trillion
  - Includes both investment grade and high yield EMD corporates, approximately 60-40% share respectively
  - Issued primarily in USD

EMD DEFAULTS

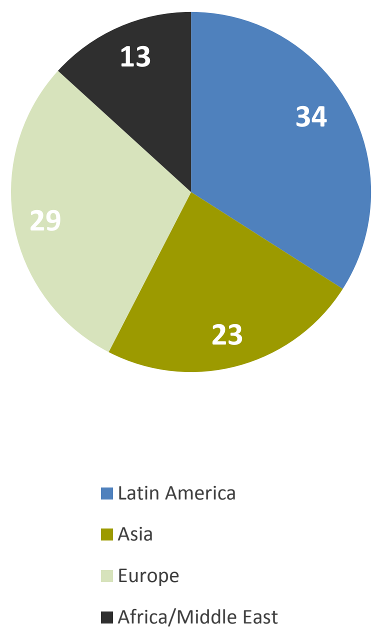


EMD INVESTMENT UNIVERSES

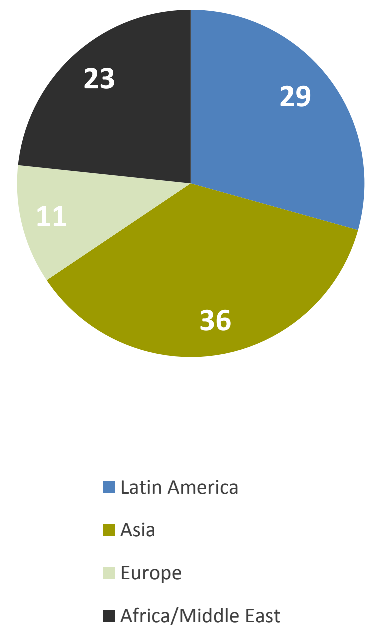
	EM External Sovereign (Hard Currency)	EM Local (Local Currency Sovereign)	EM Corporates (Hard Currency)
	JPM EMBI Global Diversified	JPM GBI-EM Global Diversified	JPM CEMBI Broad Diversified
Duration (years)	6.5	5.1	4.5
Market Value (US $bn)	520	844	461
Yield (%)	7.1	6.5	6.2
High Yield (% of index)	46.1%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



Total ex-Asia: 80%



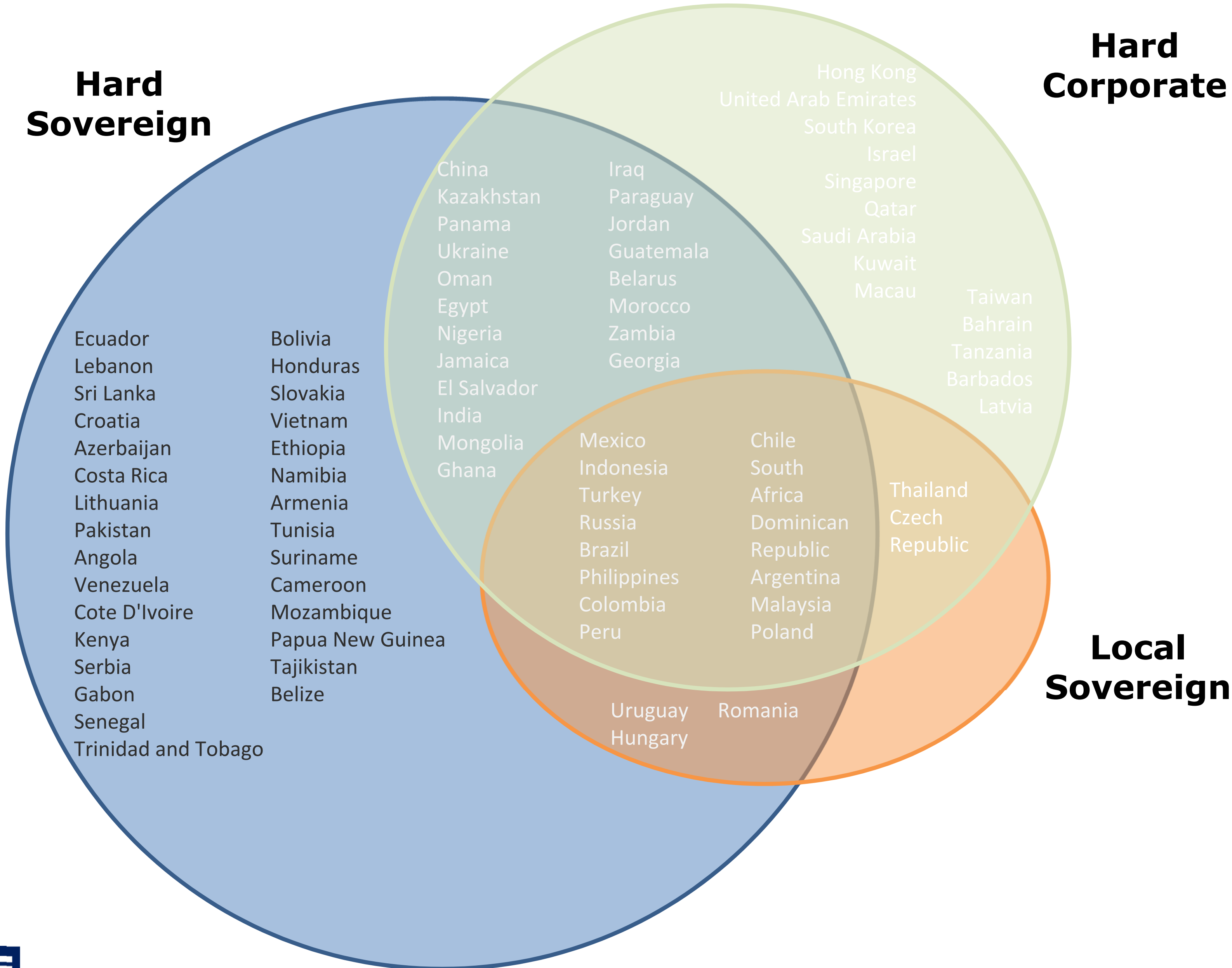
Total ex-Asia: 77%



Total ex-Asia: 64%

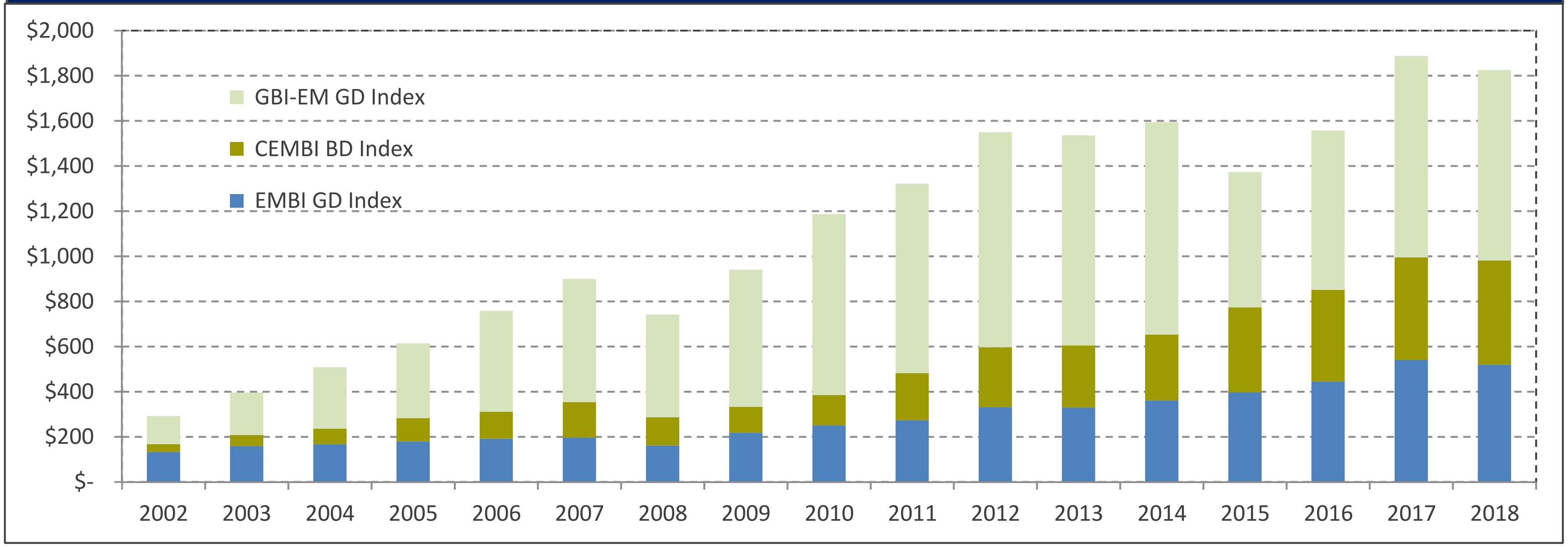
Source: Ashmore Group, Bloomberg, J.P. Morgan, as of December 2018

EMD INVESTMENT UNIVERSES



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

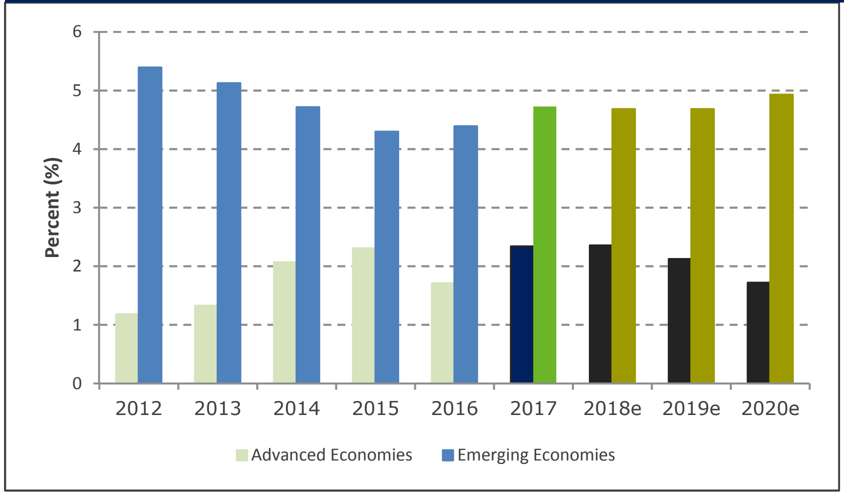
Comments

- **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**

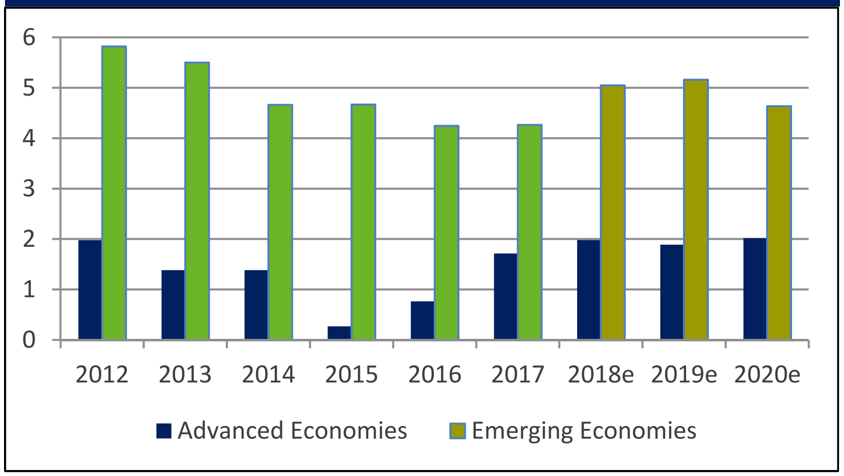
Source: J.P. Morgan, as of Dec 2018

SUPERIOR GROWTH IN EMERGING MARKETS

Real GDP Growth (%)



Inflation Rates (%)



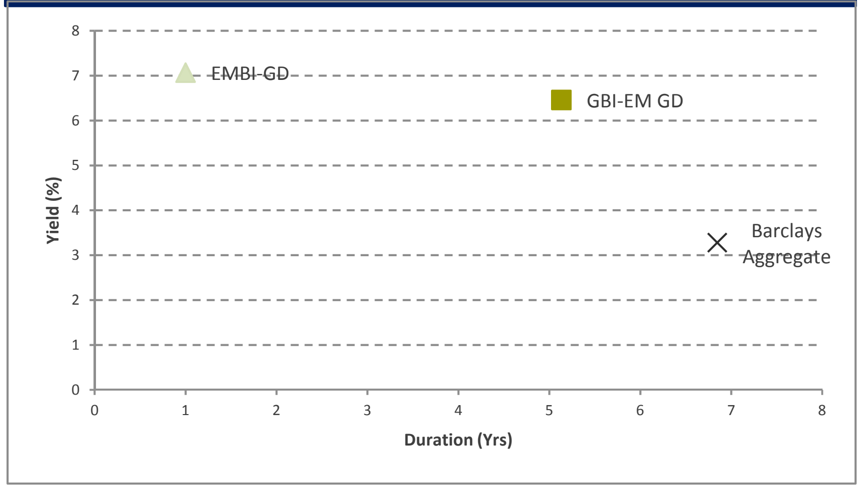
Comments

- **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**

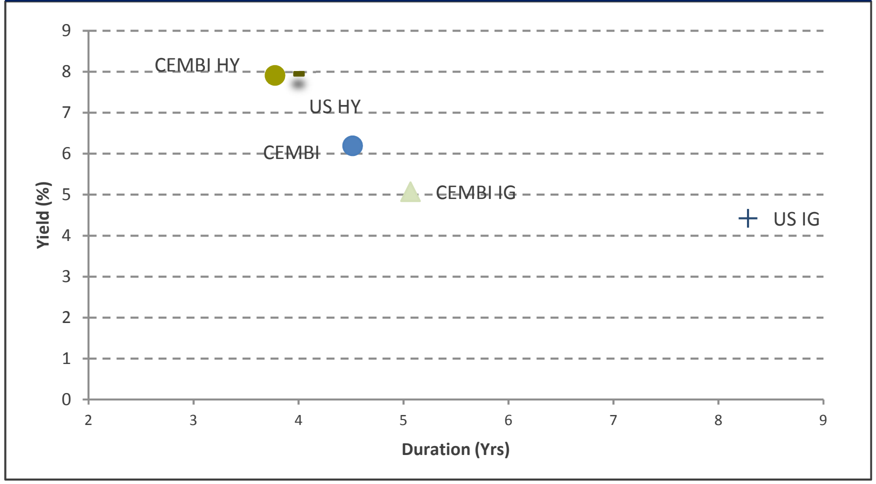
Source: International Monetary Fund (IMF), as of October 2018

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)**

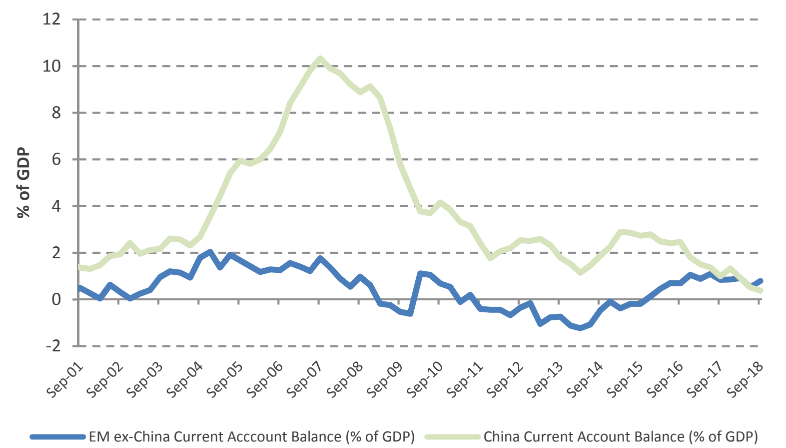
Source: Bloomberg, J.P. Morgan, as of December 2018

EM COUNTRY FUNDAMENTALS

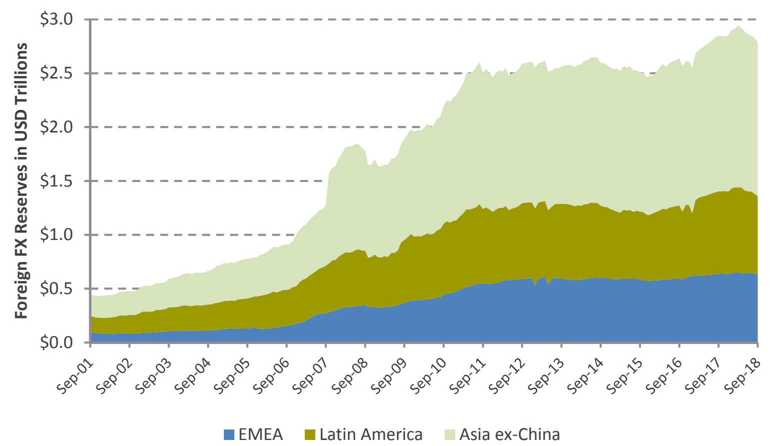
Comments

- **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)



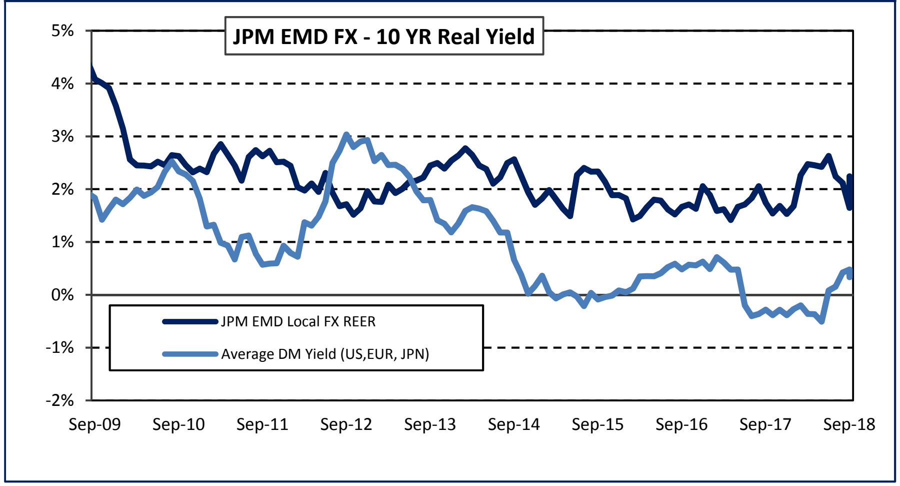
Source: IMF, J.P. Morgan

LOCAL RATES & CURRENCIES BOTH ATTRACTIVE

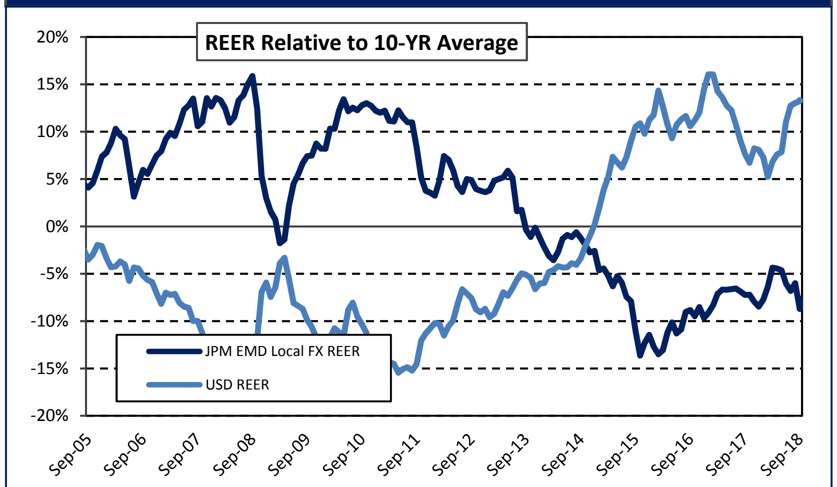
Comments

- **Emerging markets real rates and FX remain attractive relative to DM**
  - Though the gap has narrowed slightly due to rate hikes in the US
- **Huge outflows in local currency, and to a lesser extent hard currency EMD in 2018**
  - Setting up for favorable technicals in the new year

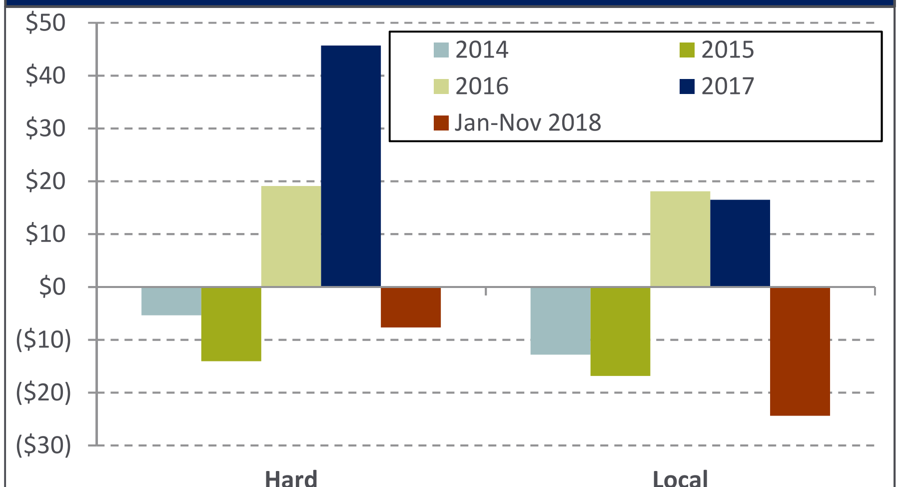
Real Yield Differential EM vs. DM



Currencies Still Attractive on REER basis



Emerging Market Mutual Fund Flows



Source: Barclays, J.P. Morgan, EPFR, NEPC

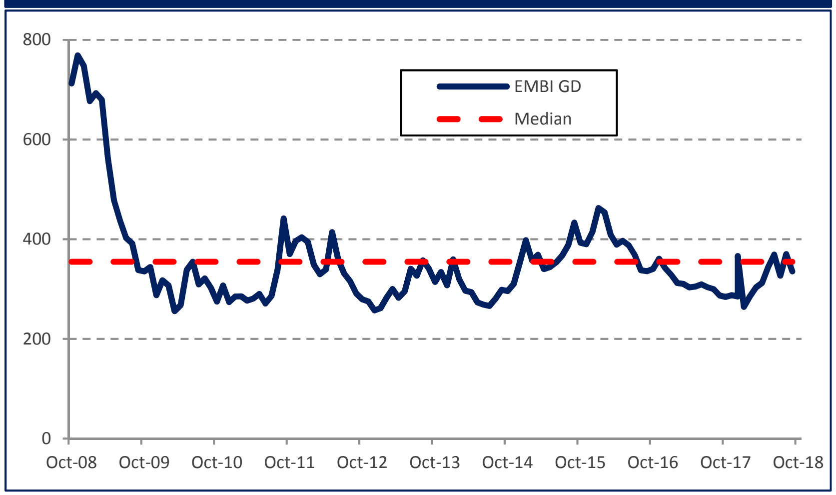
EXTERNAL EM SOVEREIGN DEBT

Comments

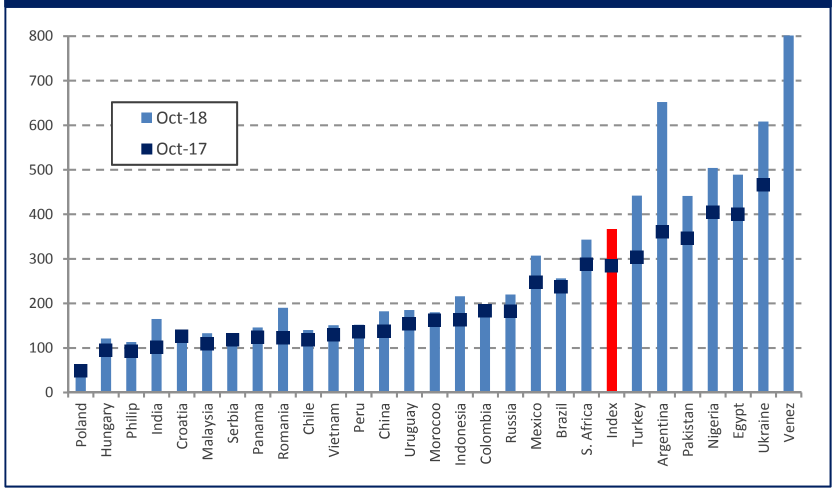
- **External sovereign valuations improved in 2018**
  - Spreads widened throughout the year
  - Sovereign spreads are now right around long-term median

- **Spreads widened across the board in 2018**
  - Notable countries where spreads widened the most include Venezuela, Turkey and Argentina.

Sovereign Debt Spreads



Sovereign Spreads Widened



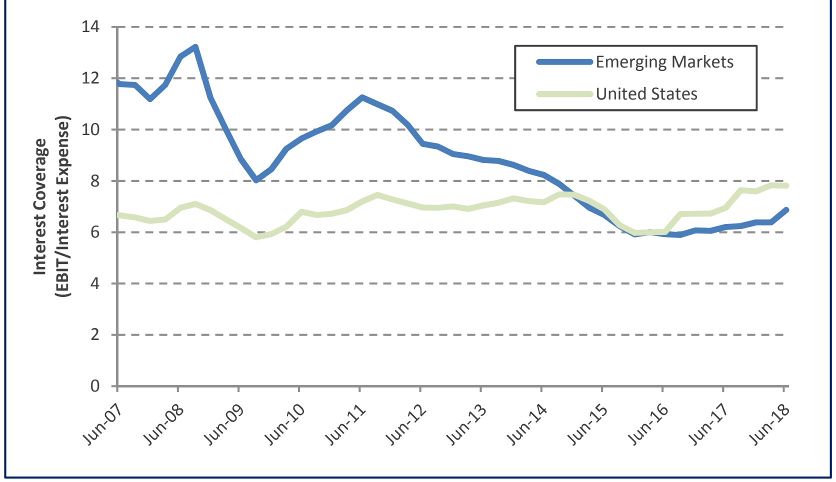
Source: J.P. Morgan, International Monetary Fund

EMERGING MARKET CORPORATES

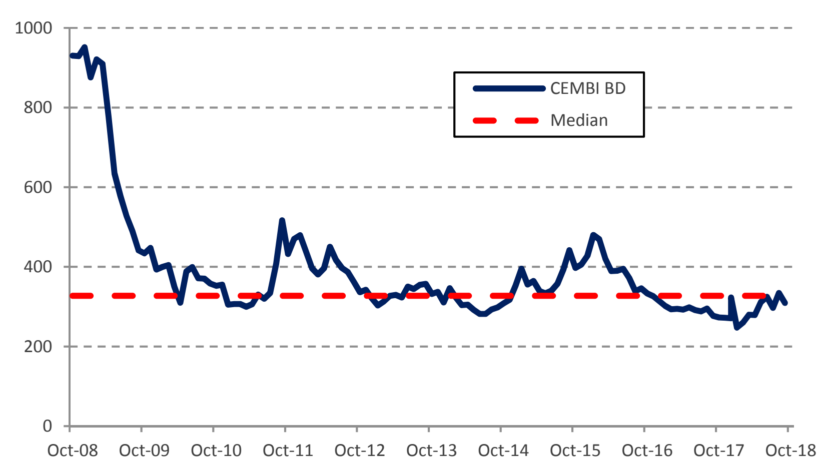
Comments

- **Interest coverage continues to improve**
  - Interest coverage has been stabilizing in recent years, and trended up in 2018
- **Spread per turn of leverage in EM widened substantially, making compensation much more attractive relative to DM credits at the same level of leverage**
  - Overall corporate spread levels still around historical median
- **Valuations look neutral**
  - CEMBI (EM Corporates index) spreads at historical median

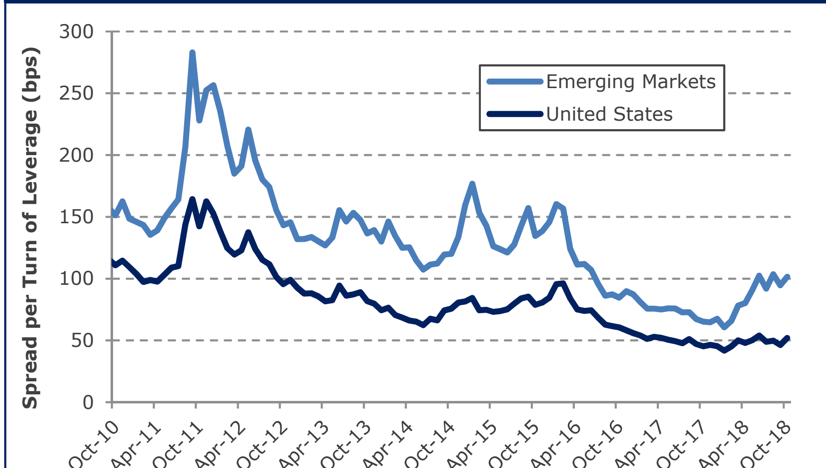
Interest Coverage EM vs. US



Corporate Debt Spreads

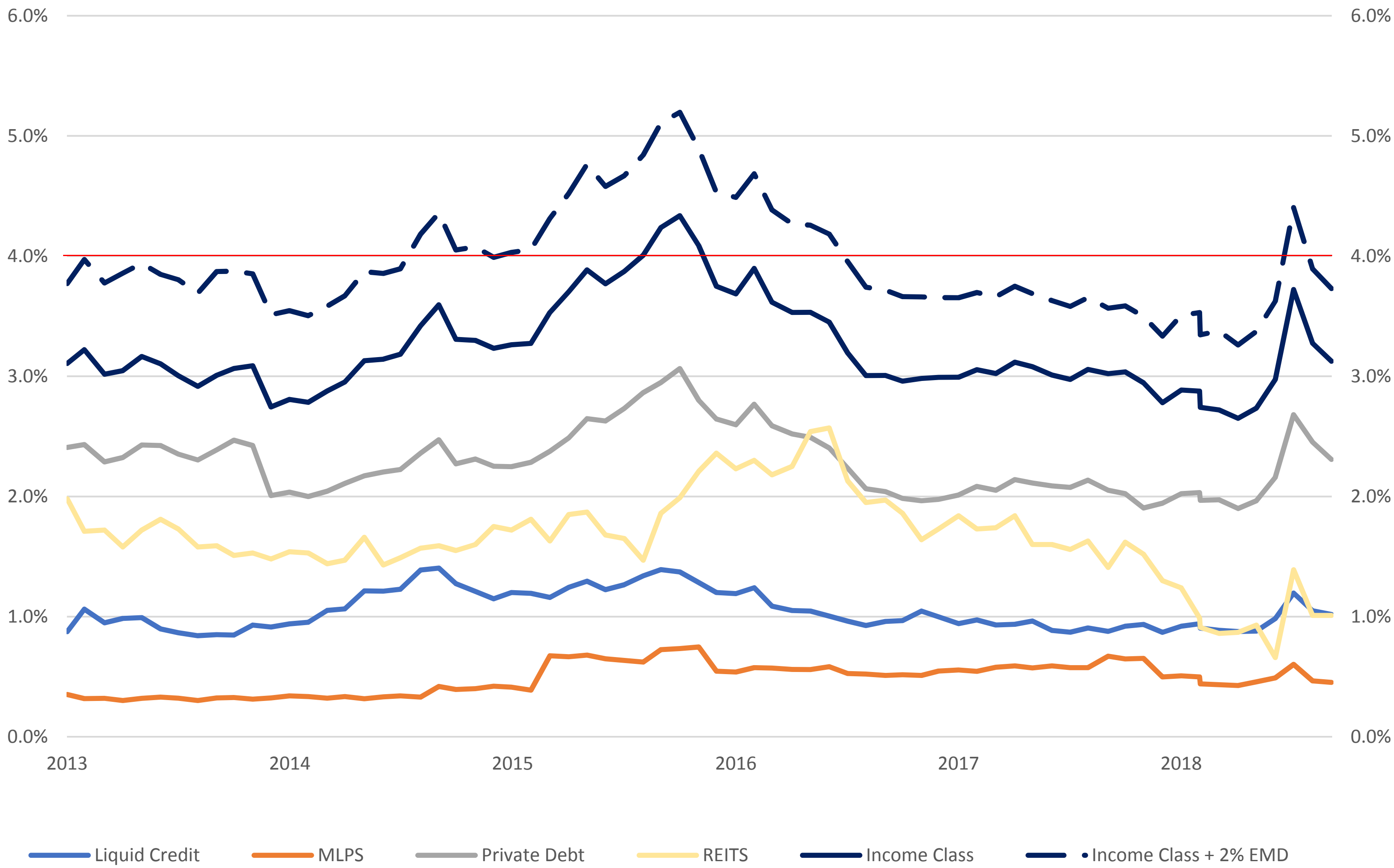


Relative Compensation For EM risk



Source: Bank of International Settlements, International Monetary Fund, Wellington Management Company LLP

INCOME CLASS YIELD SPREAD OVER BC AGG: WITH EMD

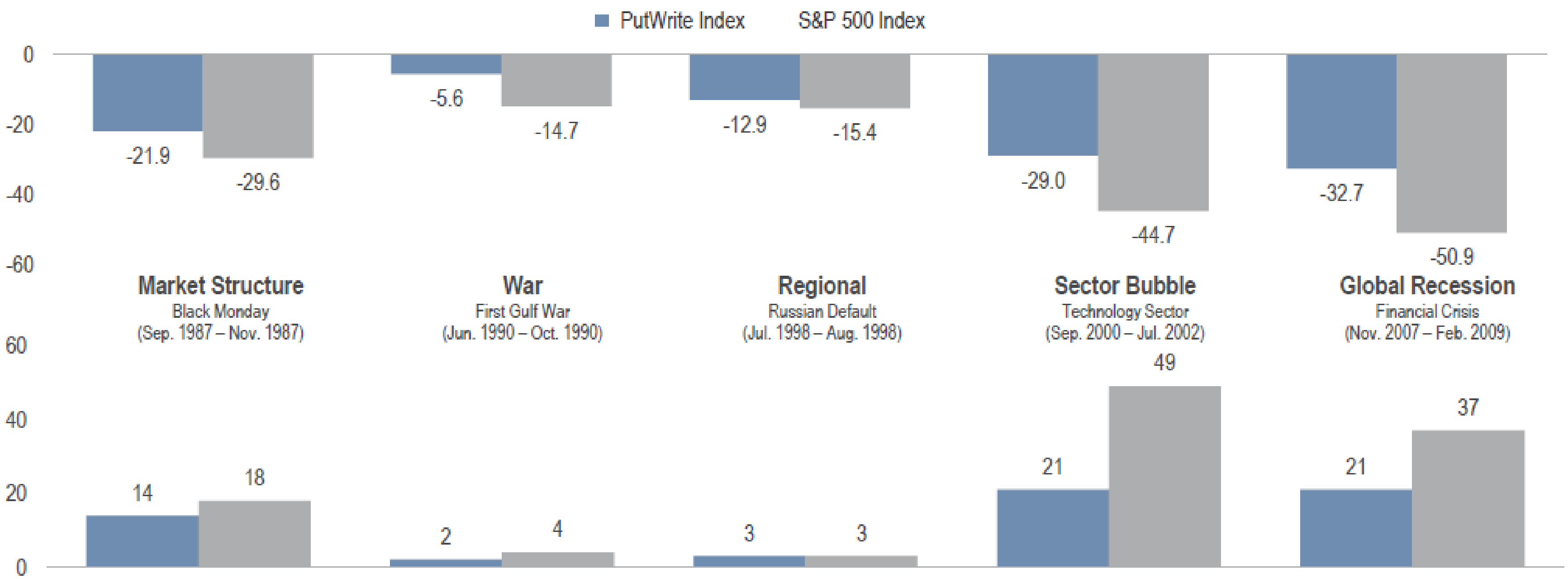


*Above information is as of 2.28.19 and based on the income class yield targets ex. REITS
**The actual yields of SIC managers are used and combined with the yield of their respective benchmarks in cases where the manager's track record did not extend back to 2013
***The Private Debt yield is based on its policy benchmark

PERFORMANCE DURING MAJOR MARKET DRAWDOWNS

CBOE S&P 500 PutWrite Index Comparison with S&P 500 Index: June 1986 – August 2019[1]

Index Drawdowns (%)



Full Recovery (Months)

[1] 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. The CBOE S&P 500 PutWrite (PUT) Index incepted in June 2007 with historical back-tested data available since 6/30/1986. 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

APPENDIX C:
GENERAL APPENDIX

SCENARIO ANALYSIS: REGIME CHANGES

- **NEPC scenario analysis highlights the impact of shifting economic and market regimes on the portfolio and potential asset allocation mixes**
  - Scenario returns are based on asset class beta exposure informed by historical returns classified across market regimes and NEPC's current capital market assumptions
  - Allows for a better understanding of portfolio risk exposures under non-consensus inflation and economic growth outcomes over a five year time horizon

Expansion

Modeled as four years of a rising economic growth and a rising inflation regime followed by a year of rising growth and a falling inflation

Overextension

Modeled as three years of a rising economic growth and a rising inflation regime followed by a year of economic growth and inflation in balance, and a final year of falling growth and inflation

Base Case

Modeled as the expected risk and return of the SAA based on NEPC 5-7 year asset class assumptions

Recession

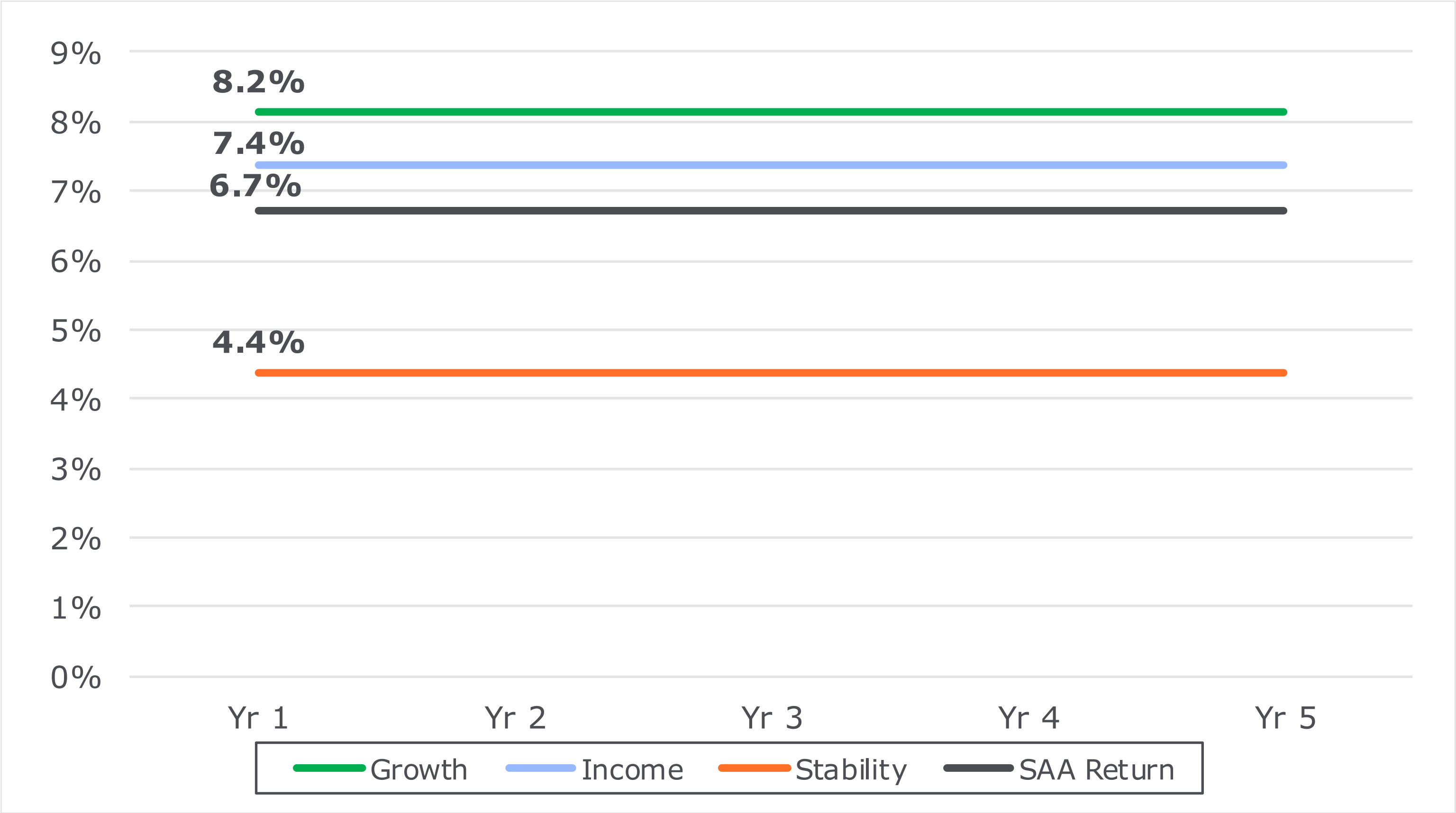
Modeled as three years of a falling economic growth and a falling inflation regime followed by two years of an economic growth recovery and rising inflation

Stagflation

Modeled as two years of a falling economic growth and a rising inflation regime followed by two years of rising growth and inflation and a final year of falling growth and rising inflation

SCENARIO ANALYSIS: BASE CASE

- **NEPC Scenario Analysis tests the impact of regime changes and historical events on funded ratio and contribution rates**
  - Allows for a better understanding of risk exposures under contrasting inflation and economic growth regimes (non-consensus forecasts), and under past historical events that have shook markets



SIC ASSET ALLOCATION: SCENARIO ANALYSIS

- **NEPC Scenario Analysis models annualized 5-year returns for the portfolio across different regimes**
  - Allows for a better understanding of risk exposures under contrasting inflation and economic growth regimes (non-consensus forecasts)

Higher Growth

EXPANSION

Growth = +12.5%
Income = +8.5%
Stability = +4.2%
SAA Return = +9.1%

OVEREXTENSION

Growth = +4.5%
Income = +4.0%
Stability = +3.5%
SAA Return = +4.2%

Lower Inflation

Base Case SAA Return 6.7%*

Higher Inflation

Growth = -0.9%
Income = +0.2%
Stability = +1.2%
SAA Return = 0.0%

RECESSION

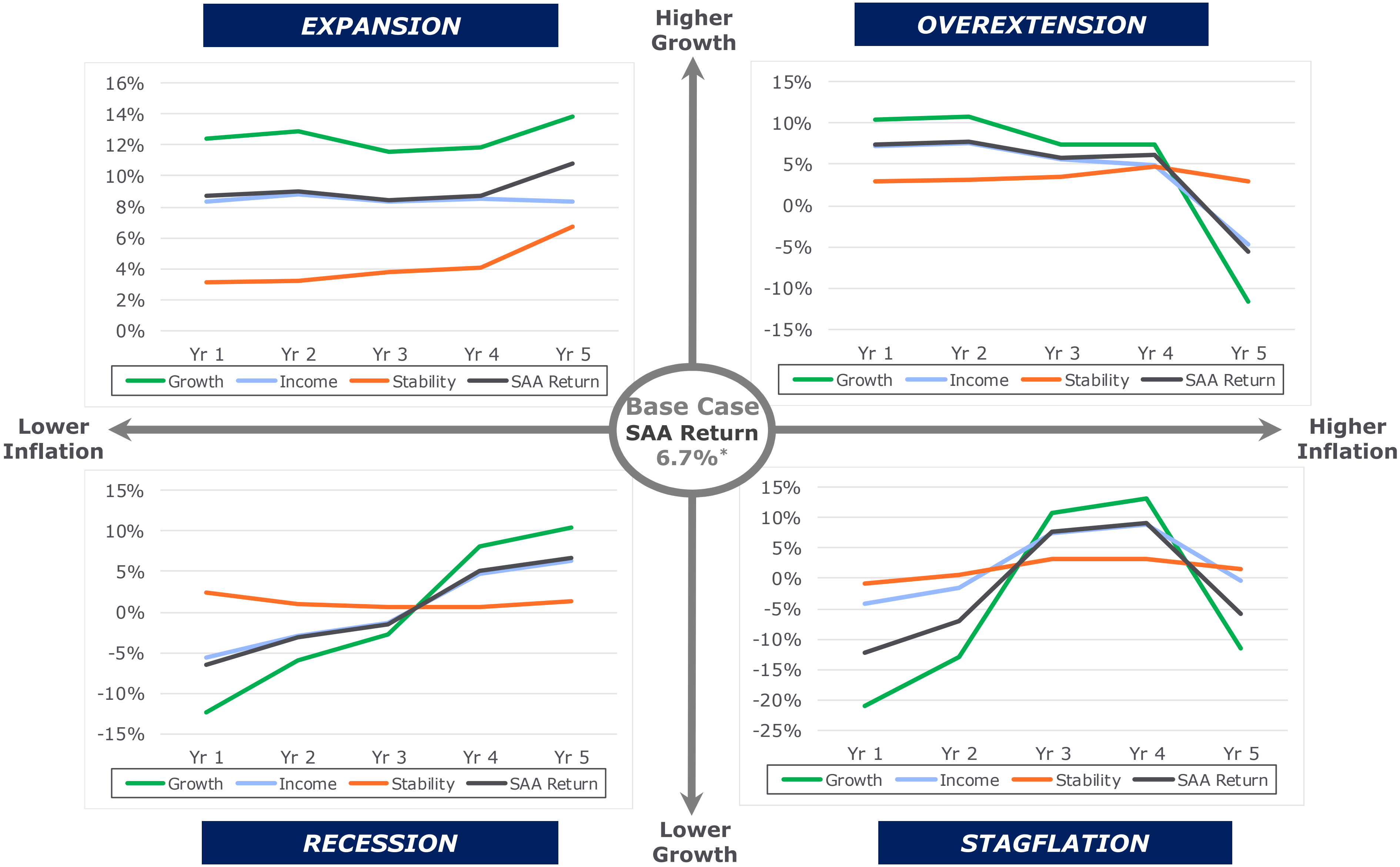
Growth = -5.3%
Income = +2.0%
Stability = +1.6%
SAA Return = -2.0%

STAGFLATION

Lower Growth

*The Base Case return is an annualized 6.7% geometric return over a 5 year period

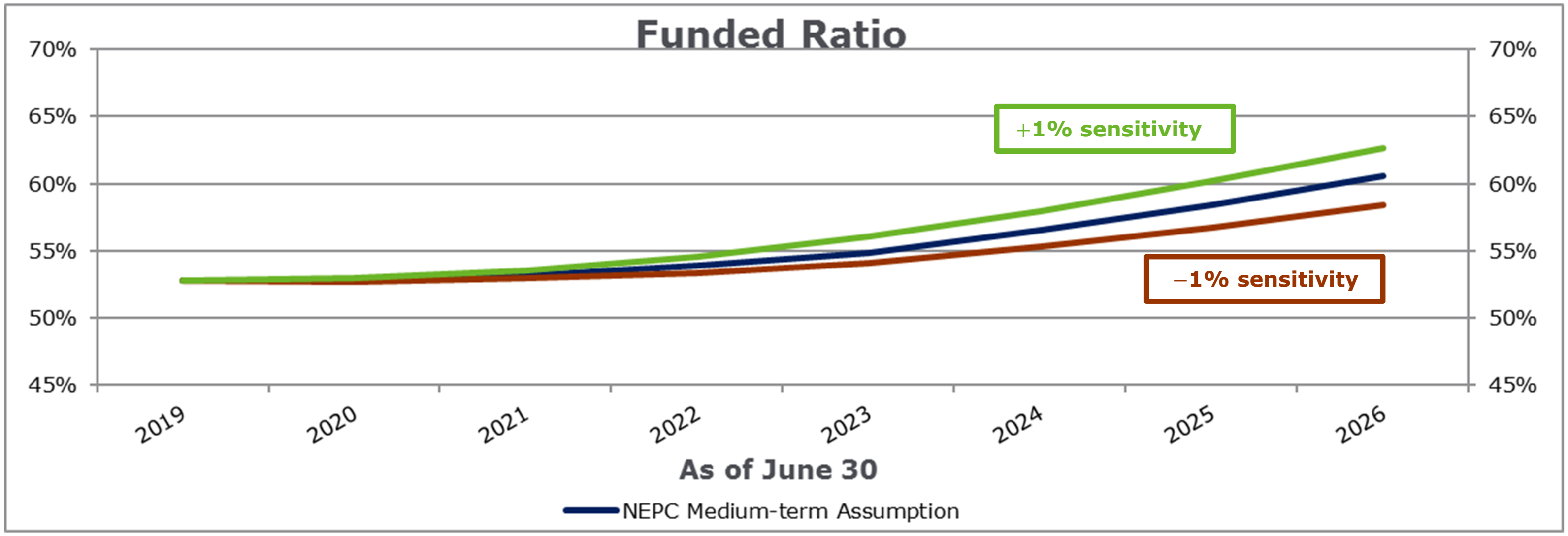
SIC ASSET ALLOCATION: SCENARIO ANALYSIS

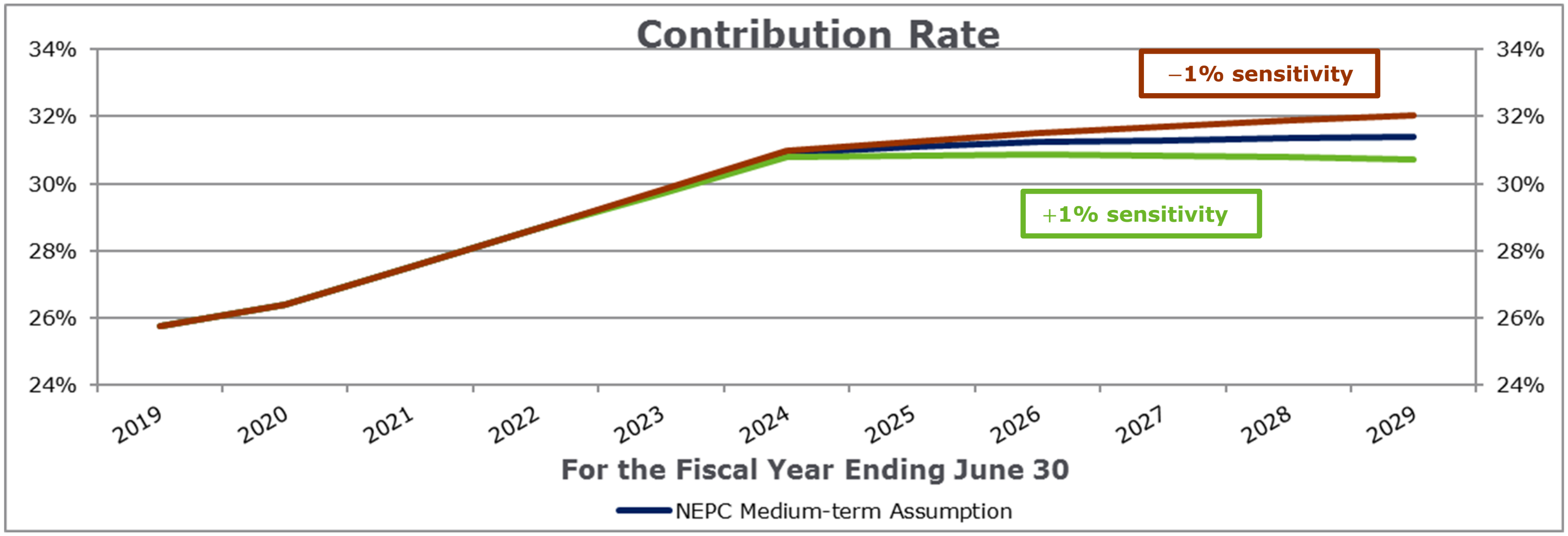


*The Base Case return is an annualized 6.7% geometric return over a 5 year period

MEDIUM-TERM – STATE EMPLOYEES

Using NEPC's 5-7 Year Expected Return Assumption of 6.7%

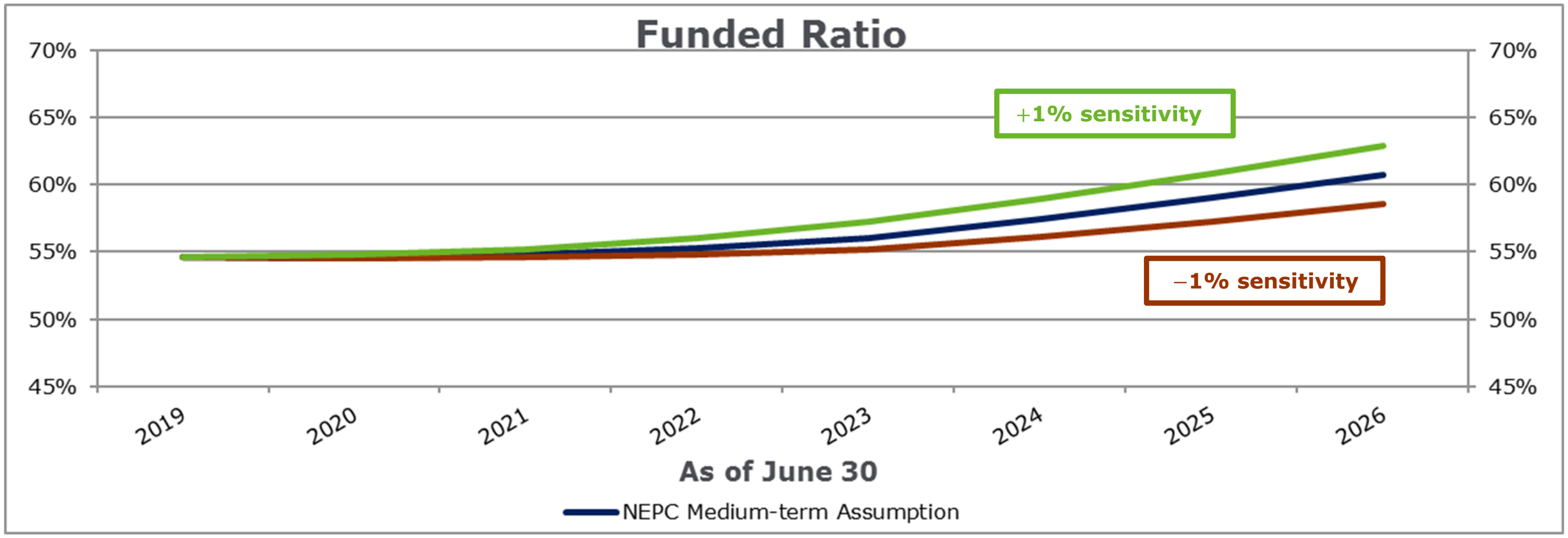


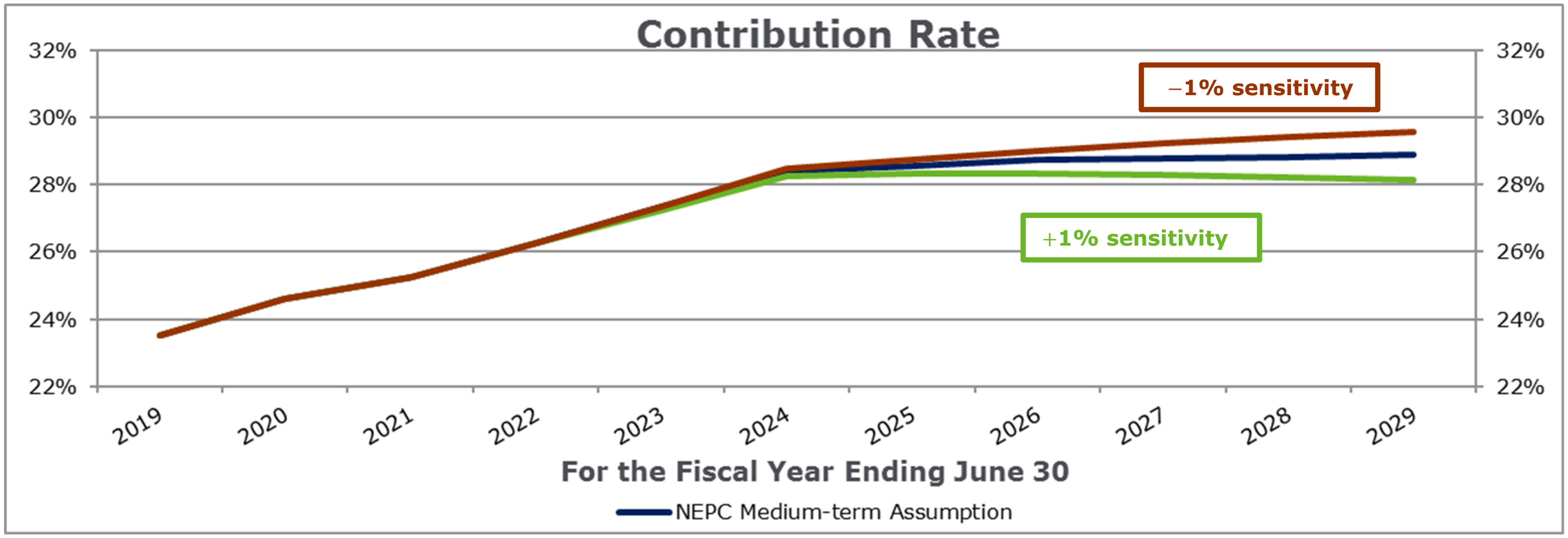


Sensitivity paths assume a 7.7% (+1%) and 5.7% (–1%) return each year.

MEDIUM-TERM – TEACHERS

Using NEPC's 5-7 Year Expected Return Assumption of 6.7%

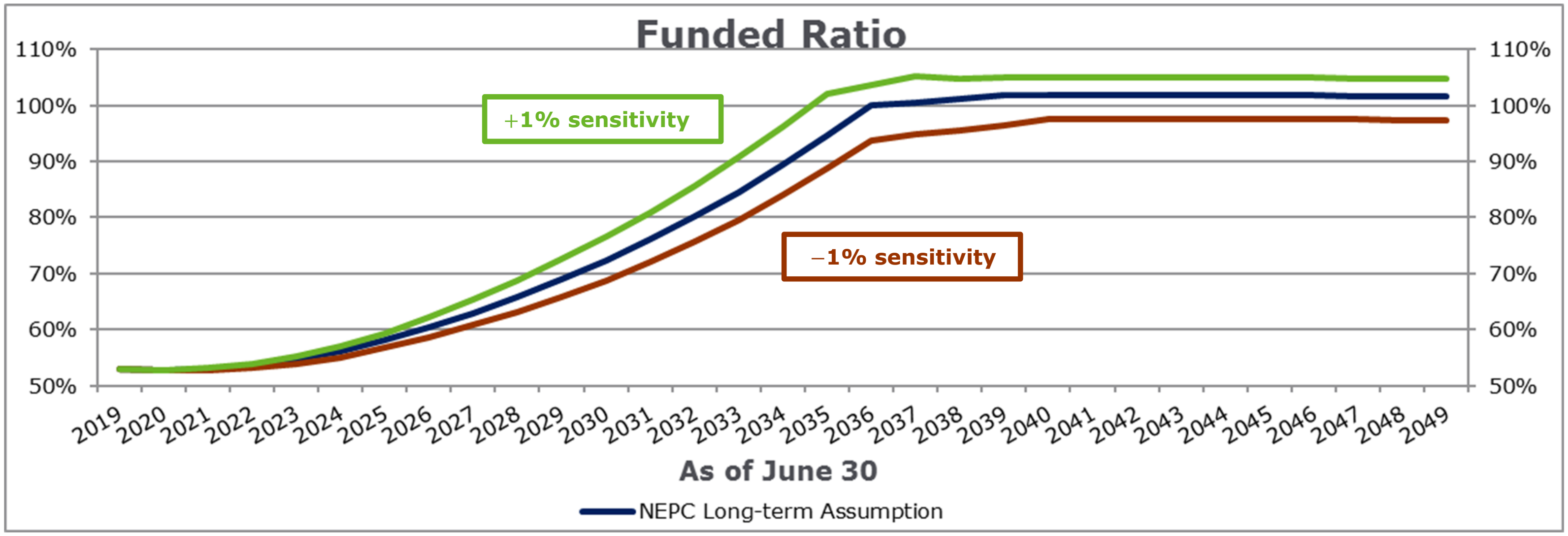


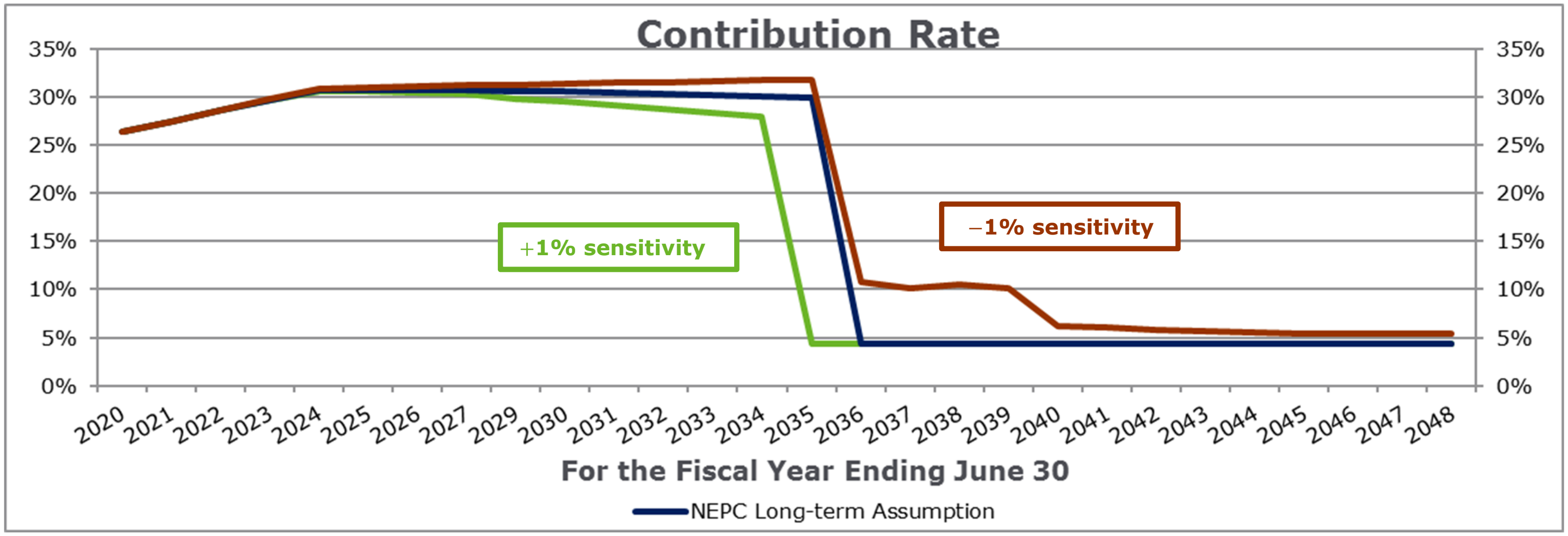


Sensitivity paths assume a 7.7% (+1%) and 5.7% (–1%) return each year.

LONG-TERM – STATE EMPLOYEES

Using NEPC's 30 Year Expected Return Assumption of 7.8%

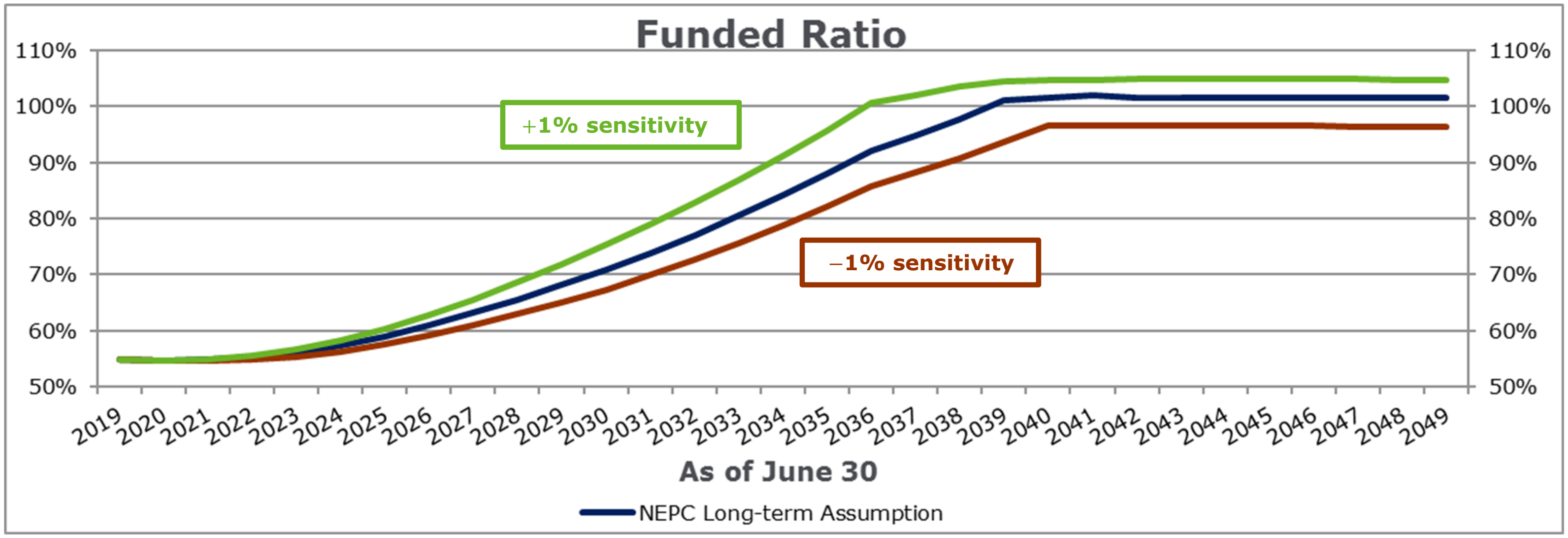


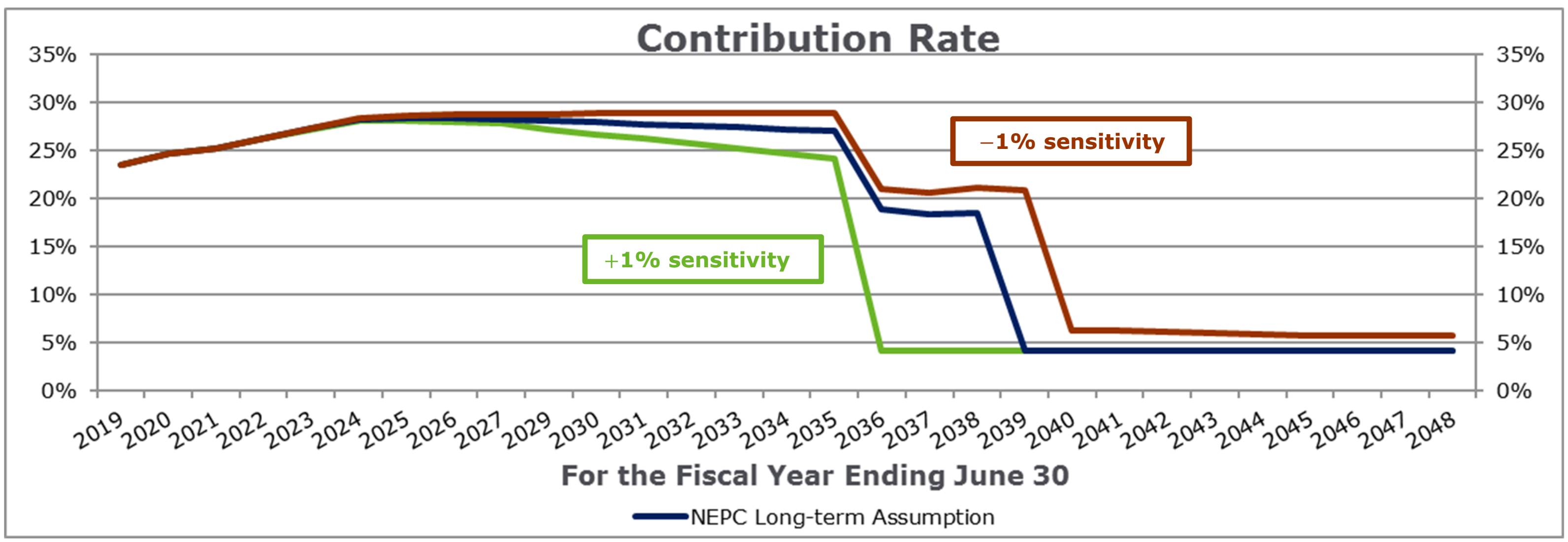


Sensitivity paths assume a 8.8% (+1%) and 6.8% (–1%) return each year.

LONG-TERM – TEACHERS

Using NEPC's 30 Year Expected Return Assumption of 7.8%





Sensitivity paths assume a 8.8% (+1%) and 6.8% (–1%) return each year.

SIC ASSET ALLOCATION: SCENARIO ANALYSIS

EXPANSION

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Large Cap	11.8%	12.3%	11.1%	11.3%	13.9%
EM Equity	12.7%	13.2%	11.8%	12.0%	12.7%
Treasuries	-0.8%	-2.1%	0.1%	0.4%	6.3%
IG Credit	3.7%	2.3%	2.0%	2.1%	8.1%
Commodities	11.3%	11.8%	10.7%	10.9%	5.3%
Core Real Estate	9.4%	9.9%	9.2%	9.4%	8.6%

OVEREXTENSION

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Large Cap	10.0%	10.3%	7.0%	7.4%	-6.5%
EM Equity	10.7%	11.0%	7.4%	7.5%	-20.0%
Treasuries	-0.9%	-0.5%	2.0%	5.0%	10.7%
IG Credit	4.2%	2.7%	3.1%	6.2%	1.8%
Commodities	9.5%	9.9%	6.8%	4.2%	-19.6%
Core Real Estate	8.1%	8.4%	6.1%	4.8%	-5.4%

RECESSION

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Large Cap	-7.4%	-3.6%	-1.7%	7.6%	9.8%
EM Equity	-20.1%	-9.6%	-4.7%	8.3%	10.7%
Treasuries	9.1%	3.2%	0.9%	-3.0%	-3.5%
IG Credit	4.2%	5.0%	4.8%	1.8%	5.2%
Commodities	-20.4%	-9.4%	-4.6%	7.2%	9.3%
Core Real Estate	-6.3%	-3.2%	-1.5%	5.7%	7.4%

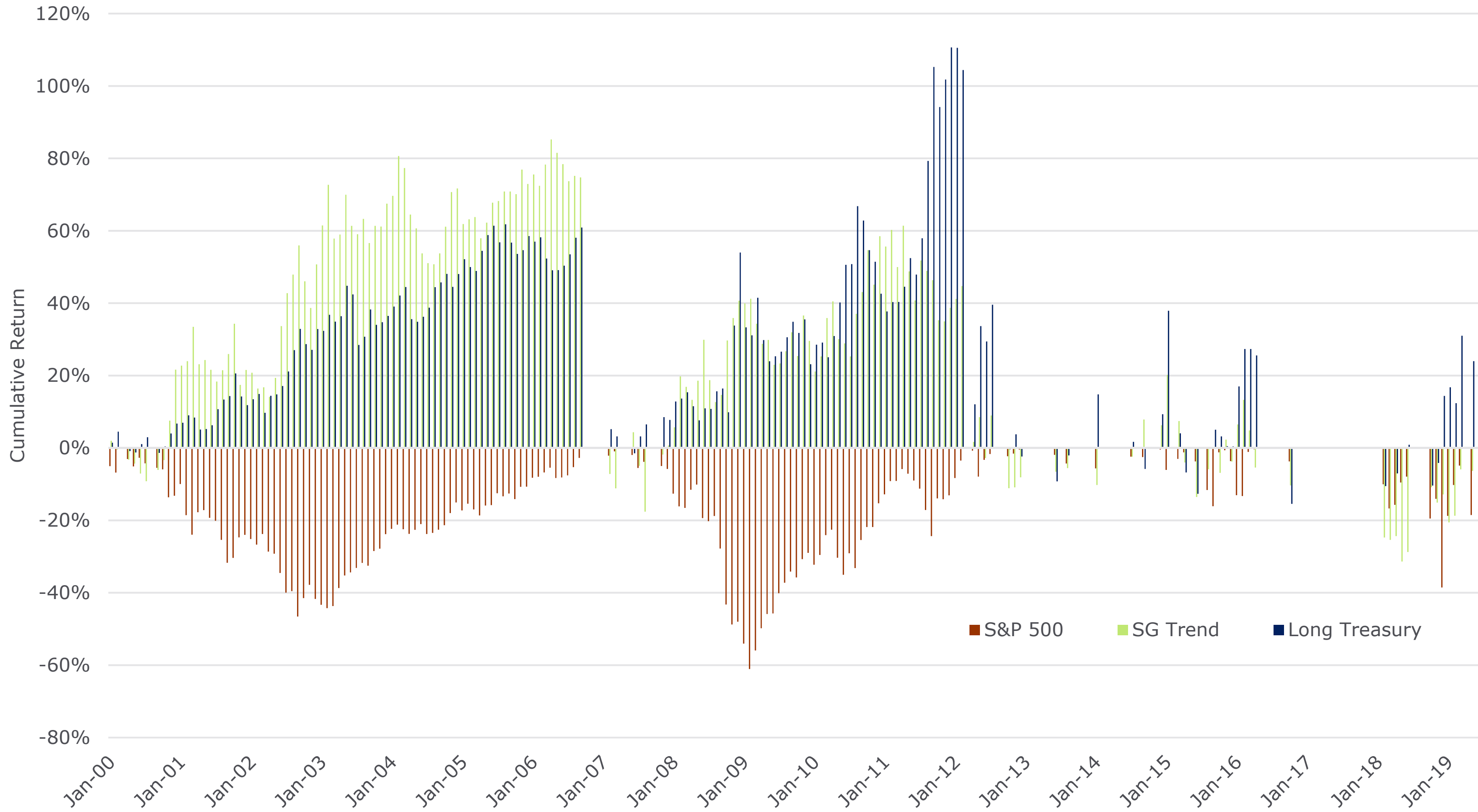
STAGFLATION

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Large Cap	-18.6%	-11.3%	10.3%	12.4%	-10.1%
EM Equity	-22.9%	-14.2%	11.0%	13.3%	-12.9%
Treasuries	-0.8%	-0.2%	-0.3%	-2.5%	0.8%
IG Credit	-1.2%	0.7%	2.9%	2.2%	0.1%
Commodities	25.5%	18.1%	9.9%	11.9%	19.4%
Core Real Estate	-5.6%	-2.6%	8.4%	10.1%	-1.4%

HISTORICAL DRAWDOWN ANALYSIS

Trend and Long Treasuries exhibited positive cumulative returns during historic extended equity drawdowns

- Early 2000s drawdown, Trend exceeded Long Bonds
- GFC drawdown, Long Treasuries exceeded Trend



Source: eVestment; Based on cumulative performance during S&P 500 drawdown periods since January 2000 through June 2019; Past performance is not indicative of future results

DRILLING DEEPER INTO DRAWDOWNS

Source: eVestment; Based on S&P 500 drawdowns since January 2000 through June 2019; Past performance is not indicative of future results

CPC MONTHLY PERFORMANCE REVIEW

	Jun-19	May-19	Apr-19	Mar-19	Feb-19	Jan-19	Dec-18	Nov-18	Oct-18	Sep-18	Aug-18	Jul-18	Jun-18	May-18	Apr-18	Mar-18	Feb-18	Jan-18	Dec-17	Nov-17	Oct-17	Sep-17	Aug-17	Jul-17	Jun-17
Crisis Protection Composite	**1.5%**	**3.7%**	**0.4%**	**5.8%**	**-0.6%**	**-2.7%**	**4.9%**	**-0.4%**	**-4.4%**	**-1.9%**	**2.1%**	**-1.3%**	**0.9%**	**-2.2%**	**-1.6%**	**0.6%**	**-8.4%**	**4.1%**	**1.8%**	**1.6%**	**2.4%**	**-2.5%**	**3.5%**	**1.7%**	**-2.2%**
Treasury Duration Composite	**1.3%**	**6.5%**	**-1.8%**	**5.3%**	**-1.2%**	**0.7%**	**5.6%**	**1.9%**	**-3.0%**	**-3.0%**	**1.6%**	**-1.5%**	**0.2%**	**2.1%**	**-2.0%**	**3.1%**	**-3.0%**	**-3.4%**	**1.7%**	**0.3%**	**-0.1%**	**-2.1%**	**3.5%**	**-0.6%**	**-1.2%**
Mackay	*1.3%*	*6.5%*	*-1.7%*	*5.2%*	*-1.2%*	*0.7%*	*5.5%*	*1.9%*	*-3.0%*	*-3.0%*	*1.6%*	*-1.5%*	*0.2%*	*2.1%*	*-1.9%*	*3.0%*	*-3.0%*	*-3.3%*	*1.8%*	*0.4%*	*-0.1%*	*-2.1%*	*3.5%*	*-0.7%*	*-1.1%*
WAMCO	*1.4%*	*6.6%*	*-1.8%*	*5.3%*	*-1.2%*	*0.7%*	*5.6%*	*1.9%*	*-2.9%*	*-3.0%*	*1.6%*	*-1.6%*	*0.2%*	*2.1%*	*-2.1%*	*3.1%*	*-3.0%*	*-3.5%*	*1.7%*	*0.2%*	*-0.1%*	*-2.2%*	*3.5%*	*-0.6%*	*-1.3%*
Systematic Trend Composite	**1.8%**	**0.8%**	**2.8%**	**6.5%**	**0.0%**	**-6.1%**	**4.0%**	**-2.8%**	**-5.9%**	**-0.8%**	**2.6%**	**-1.1%**	**1.6%**	**-6.5%**	**-1.1%**	**-2.1%**	**-13.6%**	**11.4%**	**1.9%**	**2.9%**	**4.9%**	**-2.9%**	**3.6%**	**4.0%**	**-3.3%**
Aspect	*4.0%*	*-3.2%*	*5.7%*	*7.2%*	*1.8%*	*-2.5%*	*-0.3%*	*-4.3%*	*-9.9%*	*-0.8%*	*1.9%*	*-0.2%*	*2.6%*	*-8.6%*	*1.4%*	*-1.0%*	*-13.7%*	*11.8%*	*0.1%*	*4.7%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Crabel	*-0.5%*	*4.3%*	*1.7%*	*7.5%*	*0.6%*	*-8.4%*	*1.3%*	*-2.6%*	*-5.0%*	*-0.8%*	*3.4%*	*-1.8%*	*0.1%*	*-8.7%*	*0.7%*	*-0.4%*	*-13.2%*	*11.0%*	*3.6%*	*2.9%*	*7.2%*	*-2.0%*	*2.6%*	*3.1%*	*-4.0%*
Credit Suisse	*1.7%*	*1.5%*	*0.8%*	*4.7%*	*-2.2%*	*-7.2%*	*11.0%*	*-1.8%*	*-2.6%*	*-0.7%*	*2.6%*	*-1.2%*	*2.2%*	*-1.7%*	*-5.4%*	*-4.8%*	*-14.1%*	*11.4%*	*2.7%*	*2.0%*	*2.6%*	*-4.0%*	*4.6%*	*5.0%*	*-2.5%*
Growth Composite	**5.5%**	**-4.6%**	**2.8%**	**0.8%**	**2.1%**	**6.6%**	**-5.8%**	**1.5%**	**-6.3%**	**0.7%**	**1.1%**	**2.7%**	**-0.6%**	**1.0%**	**1.0%**	**-1.4%**	**-3.3%**	**4.7%**	**1.4%**	**2.1%**	**2.1%**	**1.8%**	**1.1%**	**2.4%**	**0.6%**

- **The Growth Composite (equity segment of the overall portfolio) was down 6 times in the last 25 months**
  - Crisis Protection was positive in 4 of those 6 months and was less negative in 1 of those 6
    - Treasuries: outperformed in all 6 periods with 4 of 6 being positive returns
    - Systematic trend: outperformed in 4 of the 6 periods; positive in 3 of 6
- **The CPC was negative in 9 of the 19 positive months of the Growth Composite**
  - Treasuries were down in 10 of those 19 positive months
  - Systematic trend down 8 of those 19 positive months

Source: InvestorForce, BNY Mellon; Client-specific returns

CPC PERFORMANCE METRIC

	Annualized Compound RoR	Standard Deviation	Sharpe Ratio	Relative to Growth Composite: Correlation	Correlation - Up Markets	Correlation - Down Markets	Up Capture	Down Capture
Crisis Protection Composite	**2.8%**	**11.0%**	**0.09**	**0.10**	**(0.01)**	**(0.03)**	**19%**	**17%**
Treasury Duration Composite	**4.9%**	**9.7%**	**0.32**	**(0.26)**	**(0.17)**	**(0.08)**	**2%**	**-46%**
Mackay	*4.9%*	*9.6%*	*0.33*	*(0.26)*	*(0.17)*	*(0.08)*	*3%*	*-45%*
WAMCO	*4.9%*	*9.8%*	*0.31*	*(0.27)*	*(0.16)*	*(0.09)*	*1%*	*-48%*
Systematic Trend Composite	**-0.2%**	**17.4%**	**(0.11)**	**0.27**	**0.07**	**0.01**	**34%**	**76%**
Aspect	*-3.9%*	*20.6%*	*(0.29)*	*0.53*	*0.24*	*0.41*	*57%*	*118%*
Crabel	*-0.4%*	*18.4%*	*(0.12)*	*0.17*	*(0.08)*	*0.01*	*28%*	*65%*
Credit Suisse	*0.6%*	*18.7%*	*(0.06)*	*0.05*	*0.02*	*(0.29)*	*20%*	*41%*
Growth Composite	**9.4%**	**10.8%**	**0.71**	**-**	**-**	**-**	**-**	**-**

Source: InvestorForce, BNY Mellon; Client-specific returns; Correlation and Market Capture statistics are relative to Growth Composite

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.

15 YEAR RISK/RETURN BENCHMARKS

		Benchmark	15 Yr. Risk	15 Year Return
Growth	US Equities	Russell 3000	14.33%	8.88%
	Int'l Equities	MSCI EAFE	16.48%	5.35%
	Emerging Int'l Equities	MSCI EM	21.44%	8.70%
	Global Equity	MSCI ACWI	15.14%	7.03%
	Equity Options	Cboe S&P 500 PutWrite Index	10.14%	6.61%
	Global Equity			
	Private Equity	ILPA All Funds 1Q Lagged	12.35%	10.50%
	Non-Core Real Estate	NCREIF ODCE 1 Qtr. Lag +2.5%	7.87%	9.84%
	Opp. Private Credit	BC Distressed Securities Index	7.10%	4.90%
	Private Growth			
Income	Liquid Credit	50% CS Lev. Loan / 50% BofML US HY	7.37%	6.08%
	EMD (Blended)	50% EMBI Global Div/ 50% GBI-EM Global	9.47%	7.25%
	HY Infrastructure	Alerian MLP	17.71%	8.48%
	REITs	Wilshire US RESI Index	23.09%	9.03%
	Private Credit	S&P LSTA Lev Loans + 3%	6.56%	7.71%
	Income			
Stability	Long Treasuries	BBgBarc US Treasury Long	10.83%	6.69%
	Systematic Trend	Soc. Gen Trend Index (1.75x)	19.79%	6.95%
	CPC			
	Core Real Estate	NCREIF ODCE	8.03%	8.01%
	Private Infrastructure	S&P 500 Utilities +3%	12.97%	9.56%
	TIPS	Inflation Linked Custom BM	4.72%	4.23%
	Commodities	Bloomberg Commodity Index TR USD	16.27%	-2.58%
	Inflation Protection			
	Core Bonds	BBgBarc US Aggregate TR	3.15%	4.27%
	IG Corp. Credit (Core Bonds)	BC US Corp. Investment Grade	5.38%	5.32%
	Securitized Credit (Core Bonds)	BC US MBS	2.48%	4.14%
	Absolute Return	HFRI FoF	5.01%	3.02%
	Strategic Cash	ICE BofAML 0-1 Yr US Treasury Note	6.56%	7.71%
	Volatility Protection			

*The Soc Gen Trend Index has been levered 1.75x times to reflect the SIC’s 18% vol. target across its Trend managers
**The above includes a mix of SIC policy benchmarks and other indices

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*