

2022 ASSET ALLOCATION UPDATE

FIREFIGHTERS' RETIREMENT SYSTEM
OF LOUISIANA

MARCH 2022

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MARKET UPDATE AND OUTLOOK



PROPRIETARY & CONFIDENTIAL

TRAILING ANNUAL INDEX PERFORMANCE

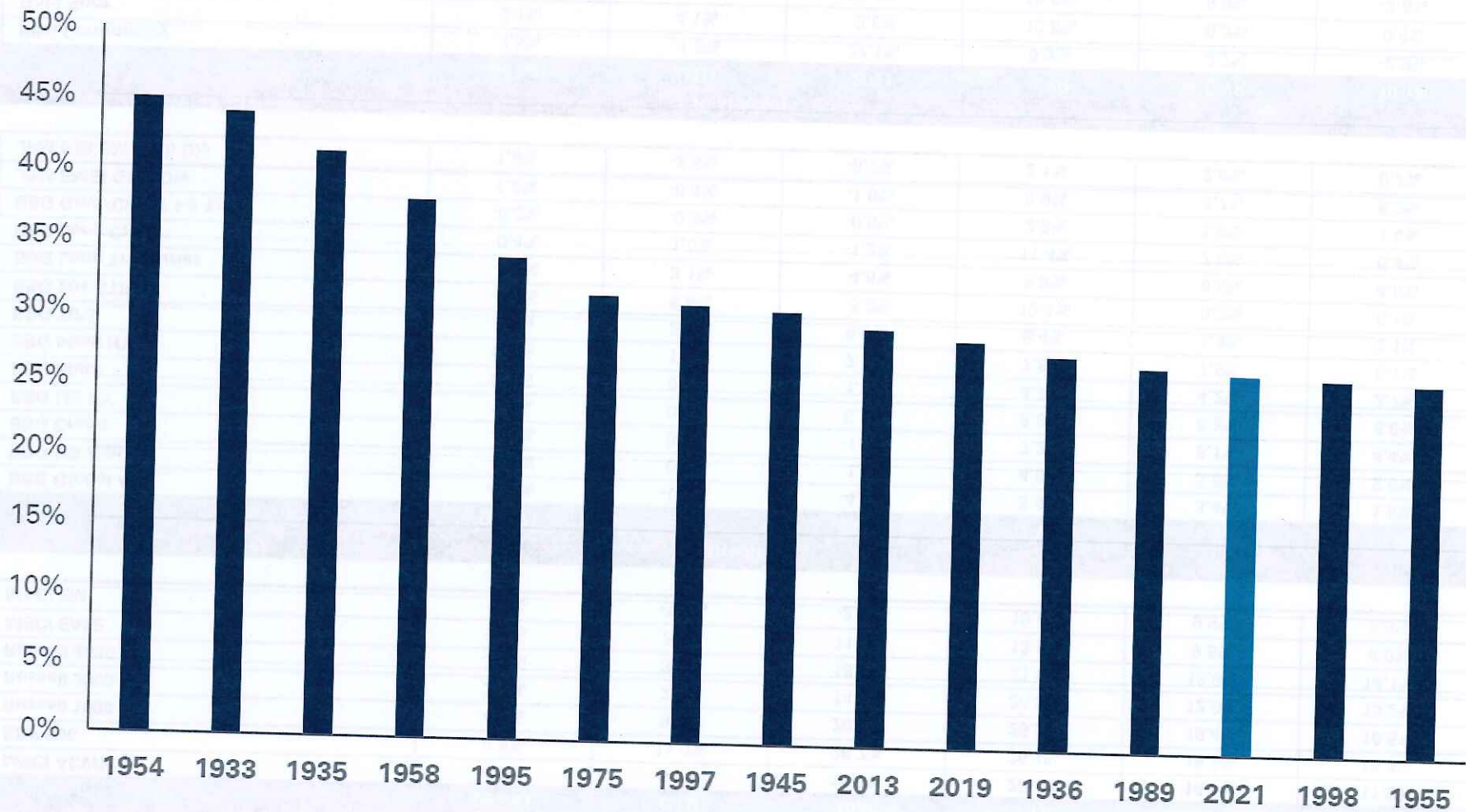
Equity						
	Dec-21	QTD	2021	3 YR	5 YR	10 YR
MSCI ACWI	4.0%	6.7%	18.5%	20.4%	14.4%	11.9%
S&P 500	4.5%	11.0%	28.7%	26.1%	18.5%	16.6%
Russell 1000	4.1%	9.8%	26.5%	26.2%	18.4%	16.5%
Russell 2000	2.2%	2.1%	14.8%	20.0%	12.0%	13.2%
Russell 2500	3.3%	3.8%	18.2%	21.9%	13.8%	14.1%
MSCI EAFE	5.1%	2.7%	11.3%	13.5%	9.5%	8.0%
MSCI EM	1.9%	-1.3%	-2.5%	10.9%	9.9%	5.5%

Credit						
	Dec-21	QTD	2021	3 YR	5 YR	10 YR
BBG Global Agg	-0.1%	-0.7%	-4.7%	3.6%	3.4%	1.8%
BBG US Agg	-0.3%	0.0%	-1.5%	4.8%	3.6%	2.9%
BBG Credit	-0.1%	0.2%	-1.1%	7.2%	6.3%	6.8%
BBG US HY	1.9%	0.7%	5.3%	8.8%	6.3%	6.8%
BBG Muni	0.2%	0.7%	1.5%	4.7%	4.2%	3.7%
BBG Muni HY	0.3%	1.2%	7.8%	7.8%	7.5%	6.7%
BBG TIPS	0.3%	2.4%	6.0%	8.4%	5.3%	3.1%
BBG 20+ STRIPS	-2.3%	5.4%	-5.2%	12.4%	9.2%	6.1%
BBG Long Treasuries	-1.4%	3.1%	-4.6%	8.8%	6.5%	4.5%
BBG Long Credit	-0.4%	1.5%	-1.2%	11.4%	7.6%	6.4%
BBG Govt/Credit 1-3 Yr	-0.2%	-0.6%	-0.5%	2.3%	1.9%	1.4%
JPM EMBI Glob Div	1.4%	-0.4%	-1.8%	5.9%	4.7%	5.3%
JPM GBI-EM Glob Div	1.6%	-2.5%	-8.7%	2.1%	2.8%	0.7%

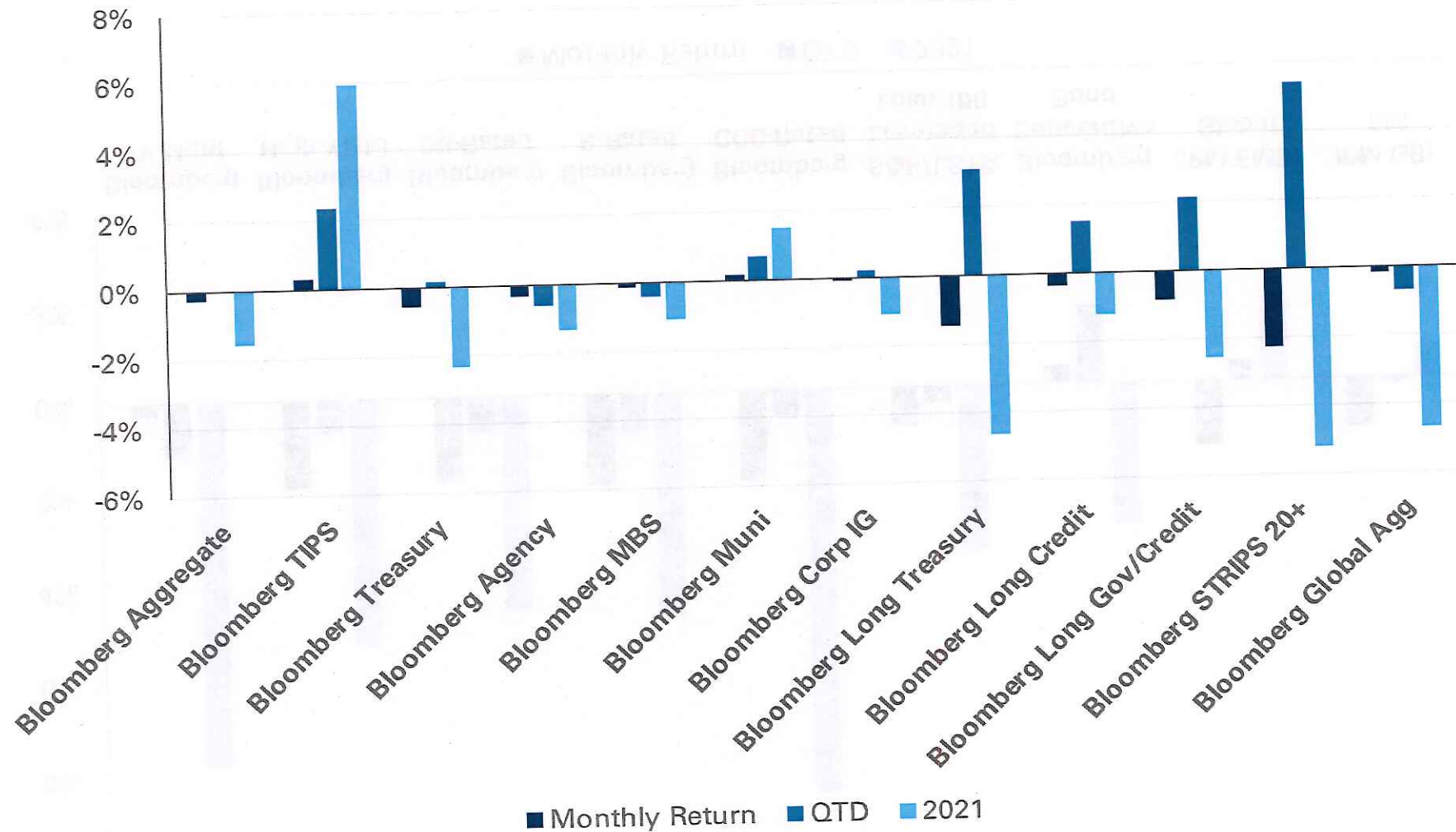
Real Assets						
	Dec-21	QTD	2021	3 YR	5 YR	10 YR
BBG Commodity	3.5%	-1.6%	27.1%	9.9%	3.7%	-2.9%
Gold Spot	3.1%	4.1%	-3.6%	12.6%	9.3%	0.4%
WTI Crude Spot	13.7%	0.0%	55.6%	18.5%	8.8%	-2.8%
Alerian Midstream Index	1.1%	-0.4%	38.4%	9.6%	2.2%	-
FTSE NAREIT Equity REITs	8.8%	16.3%	43.2%	18.4%	10.8%	11.4%

2021 EQUITY RETURNS WERE HISTORICALLY HIGH

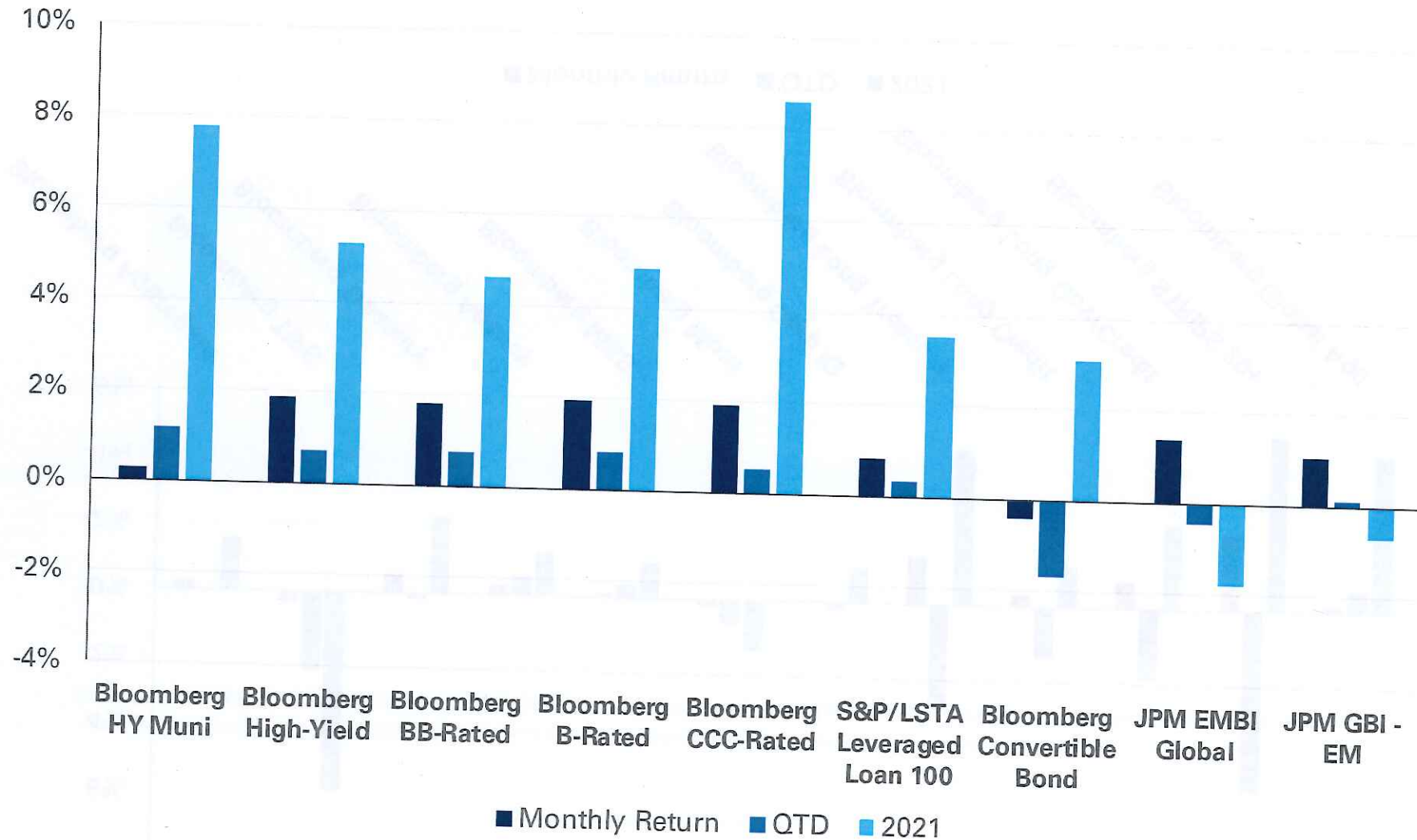
TOP 15 S&P 500 ANNUAL RETURNS



SAFE-HAVEN FIXED INCOME PERFORMANCE

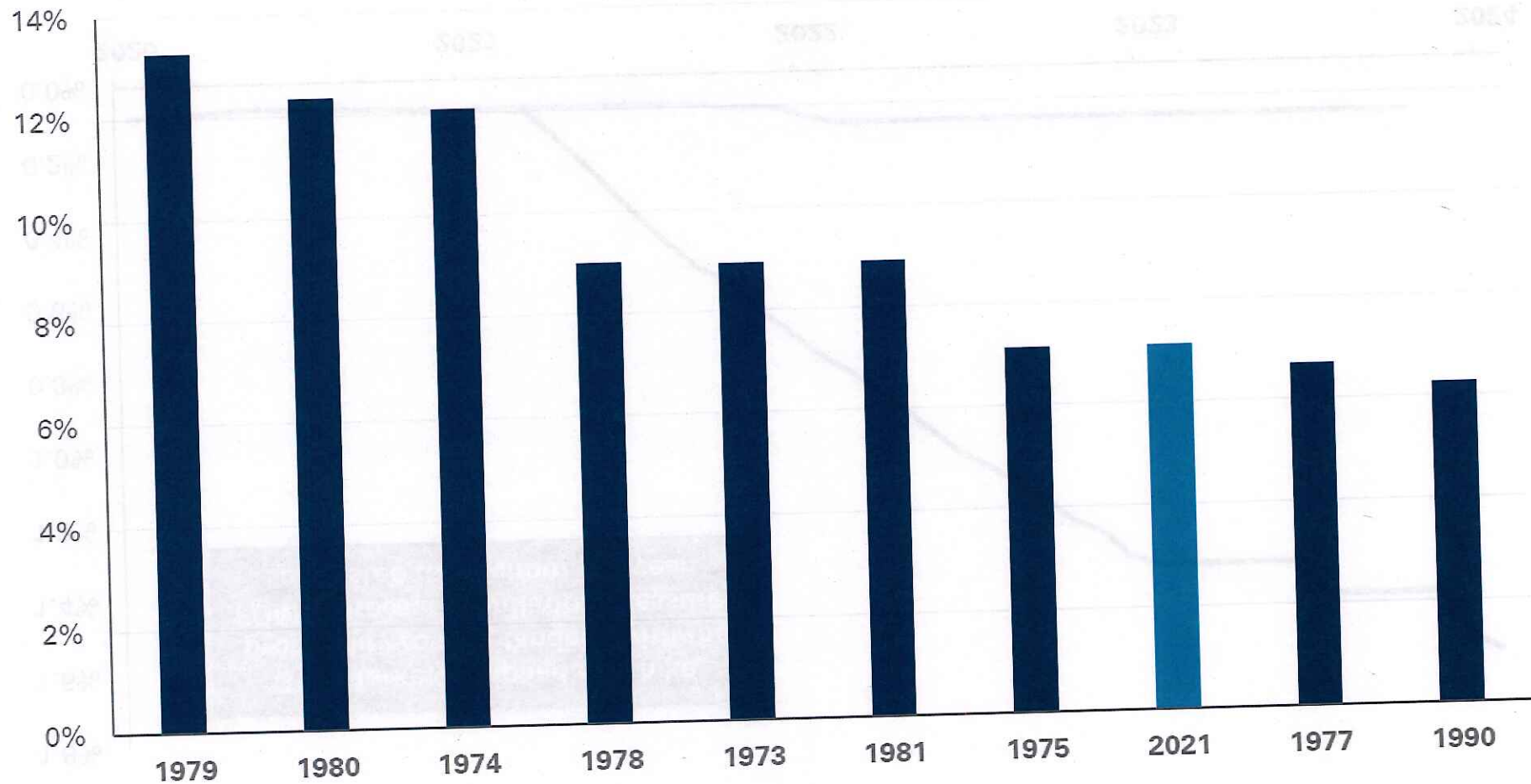


RETURN-SEEKING CREDIT INDEX PERFORMANCE



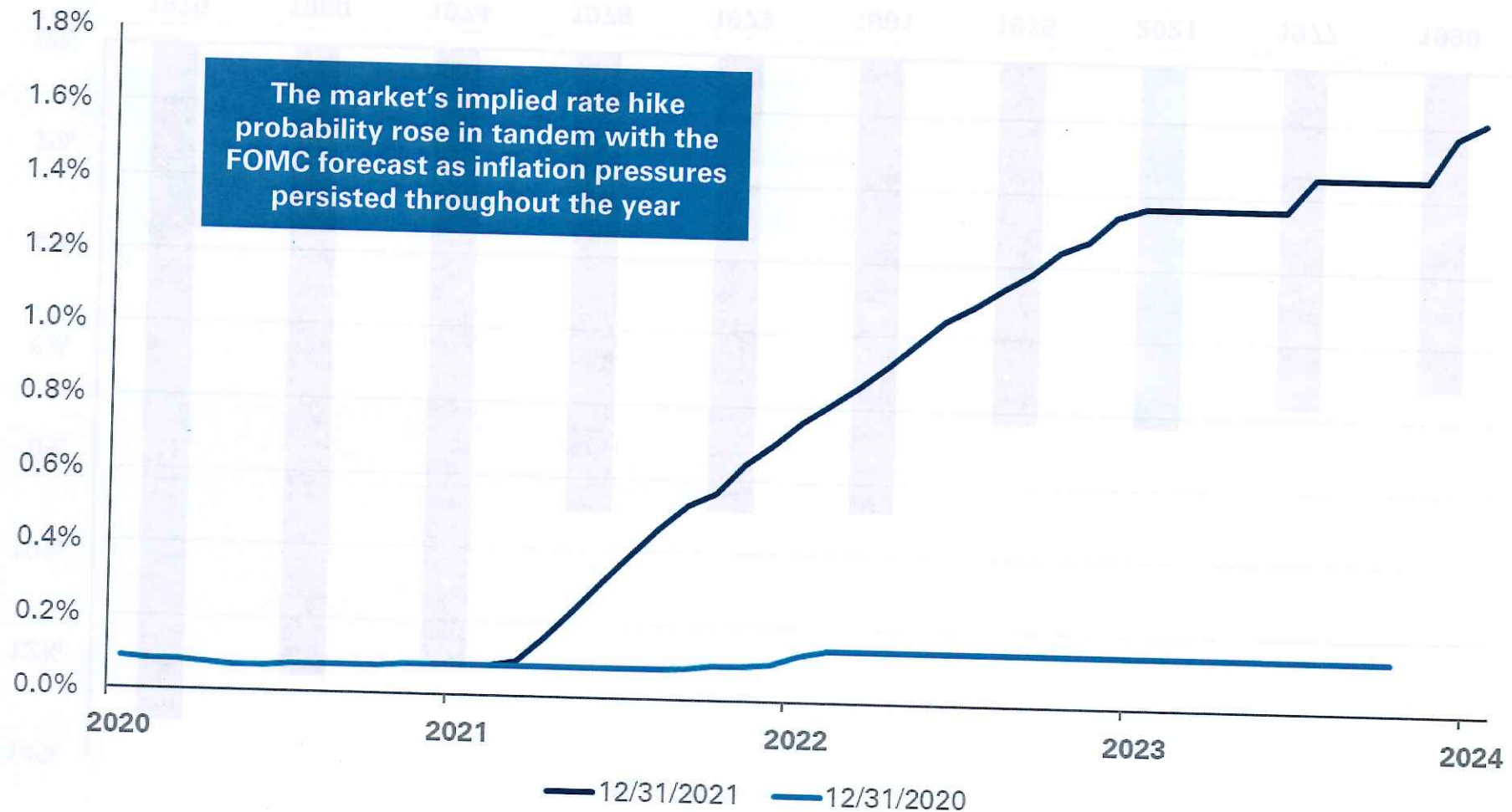
INFLATION ROSE AT HIGHEST LEVEL SINCE 1981

TOP 10 ANNUAL U.S. CPI-U CHANGES



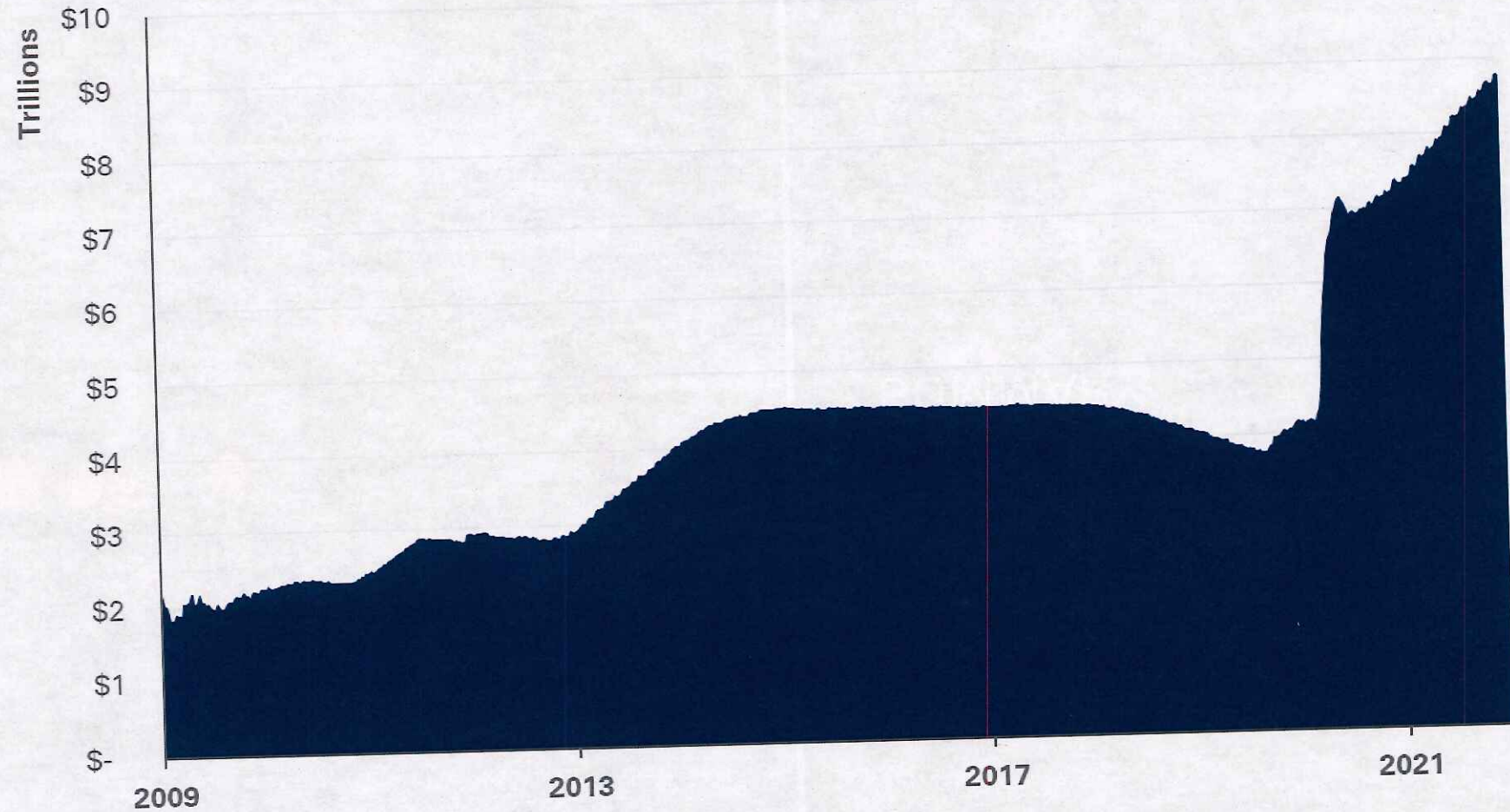
AT LEAST TWO RATE HIKES PRICED IN FOR 2022

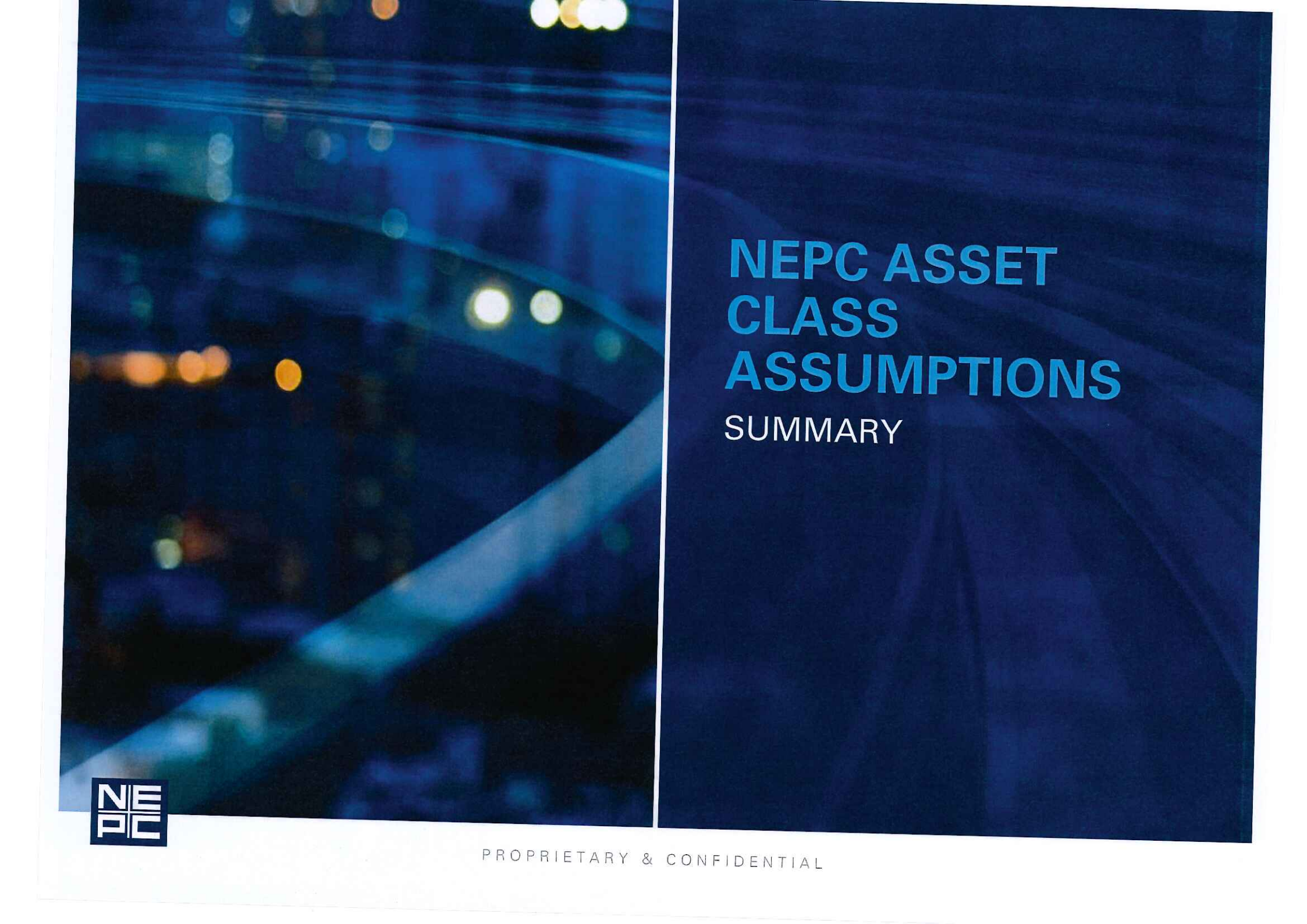
FEDERAL FUNDS FUTURES



TAPERING WILL SLOW BALANCE SHEET GROWTH

FEDERAL RESERVE TOTAL ASSETS





NEPC ASSET CLASS ASSUMPTIONS

SUMMARY



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INFLATION ASSUMPTIONS

OVERVIEW

- Inflation is a key building block to develop asset class assumptions
- Inflation assumptions are model-driven and informed by multiple inputs for both the U.S. and global assets
 - Includes forecasts from international organizations (e.g. IMF), local consumer and producer price indices, global interest rate curves, and break-even inflation expectations
- NEPC's U.S. expectations reflect stickier inflation over the near-term, but more muted inflation pressures over the long-term
 - We anticipate continued volatility among inflation measures as market-based inflation expectations diverge from current consumer inflation metrics

Region	10-Year Inflation Assumption	30-Year Inflation Assumption
United States	2.4%	2.6%

EQUITY ASSUMPTIONS

BUILDING BLOCKS

Illiquidity Premium	The return expected for assets with illiquidity risk
Valuation	Represents P/E multiple contraction or expansion relative to long-term trend
Inflation	Market-specific inflation based on country-level revenue exposure
Real Earnings Growth	Market-specific real growth based on a weighted-average of country revenue exposure and GDP growth
Dividend Yield	Income distributed to shareholders adjusted to reflect market trends

Asset Class	12/31/21 10-Yr Return	12-Month Change
U.S. Large-Cap Equity	4.3%	-1.1%
U.S. Small/Mid-Cap Equity	5.6%	-0.1%
U.S. Microcap Equity	6.5%	-0.1%
Non-U.S. Developed Equity	5.2%	-0.7%
Non-U.S. Developed Small-Cap Equity	5.9%	-0.2%
Emerging Market Equity	8.3%	+0.8%
Emerging Market Small-Cap Equity	7.6%	-0.5%
China Equity	8.8%	+1.8%
Hedge Fund - Equity	4.1%	+0.1%
Global Equity*	5.4%	-0.8%
Private Equity*	9.0%	-0.3%



Source: NEPC

*Calculated as a blend of other asset classes

FIXED INCOME ASSUMPTIONS

BUILDING BLOCKS

Illiquidity Premium	The return expected for assets with illiquidity risk
Government Rates Price Change	Change due to shifts in current yields relative to forecasted rates
Credit Deterioration	The average loss for credit assets due to defaults and recovery rates
Spread Price Change	Valuation change due to changes in credit spreads relative to long-term targets
Credit Spread	Yield premium provided by securities with credit risk
Government Rates	The yield attributed to sovereign bonds that do not have credit risk

Asset Class	12/31/21 10-Yr Return	12-Month Change
U.S. TIPS	1.4%	+0.4%
U.S. Treasury Bond	1.5%	+0.6%
U.S. Corporate Bond	2.8%	+0.6%
U.S. MBS	1.8%	+0.6%
U.S. High Yield Corporate	3.2%	+0.3%
U.S. Leveraged Loan	4.7%	+0.8%
EMD External Debt	4.1%	+1.1%
EMD Local Currency Debt	5.7%	+0.7%
Non-U.S. Govt. Bond	1.1%	+0.5%
U.S. Muni Bond (1-10 Year)	1.2%	+0.1%
U.S. High Yield Muni Bond	2.1%	-0.7%
Hedge Fund – Credit	4.2%	+0.3%
U.S. Aggregate Bond*	2.0%	+0.6%
Private Debt*	6.6%	+0.5%

Source: NEPC

*Calculated as a blend of other asset classes

REAL ASSET ASSUMPTIONS

BUILDING BLOCKS

Illiquidity Premium	The return expected for assets with illiquidity risk
Valuation	The change in price of the asset moving to a terminal value or real average level
Inflation	Based on the inflation path as defined by breakeven-inflation rates and NEPC assumptions
Growth	Market-specific real growth based on a weighted-average of country-level revenue exposure and GDP growth
Real Income	The inflation-adjusted income produced by the asset

Asset Class	12/31/21 10-Yr Return	12-Month Change
Commodity Futures	0.4%	-0.5%
Midstream Energy	6.7%	-0.7%
U.S. REIT	4.5%	-1.0%
Global Infrastructure Equity	5.6%	-0.3%
Global Natural Resources Equity	5.5%	-1.2%
Gold	3.3%	0.4%
Real Estate - Core	4.7%	0.3%
Real Estate – Non-Core	5.9%	0.4%
Private Debt - Real Estate	4.6%	0.5%
Private Real Assets - Natural Resources	7.1%	-0.9%
Private Real Assets - Infrastructure	5.3%	-0.1%



Source: NEPC

*Calculated as a blend of other asset classes



CURRENT OPPORTUNITIES



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NEPC CURRENT OPPORTUNITIES

Reduce Lower Quality Credit Exposure

Shift exposure equally to large-cap U.S. equity and safe-haven fixed income

RATIONALE

- Credit spreads, particularly in the lower-quality space, are near cyclical lows

IMPLEMENTATION VIEW

Return-Seeking Credit

Portfolio Tilt:

Shift exposure to large-cap U.S. equity and Safe-Haven FI

Opportunity Cost:

Bloomberg U.S. High Yield

Reduce U.S. TIPS Exposure

Disperse TIPS proceeds to safe-haven fixed income and/or the portfolio

- We are concerned TIPS will be negatively impacted relative to nominal Treasuries should real rates increase due to a surprise in the speed the Fed tightens monetary policy

Safe-Haven Fixed Income

Portfolio Tilt:

75% U.S. Treasuries, 25% TIPS

Opportunity Cost:

50% U.S. Treasuries, 50% TIPS

Add U.S. Large-Cap Value Exposure

Add large-cap value exposure to U.S. equity, while maintaining overall equity exposure

- U.S. large-cap value exposure can help mitigate the portfolio impact relative to the S&P 500 of heightened inflation levels normalizing above market expectations and interest rates rising

U.S. Large Cap Equity

Portfolio Tilt:

70% S&P 500,
30% Russell 1000 Value

Opportunity Cost:

S&P 500

ADD U.S. LARGE-CAP VALUE EXPOSURE

The **addition of U.S. Large Cap Value** exposure is a solution to address total portfolio risk while maintaining overall equity exposure

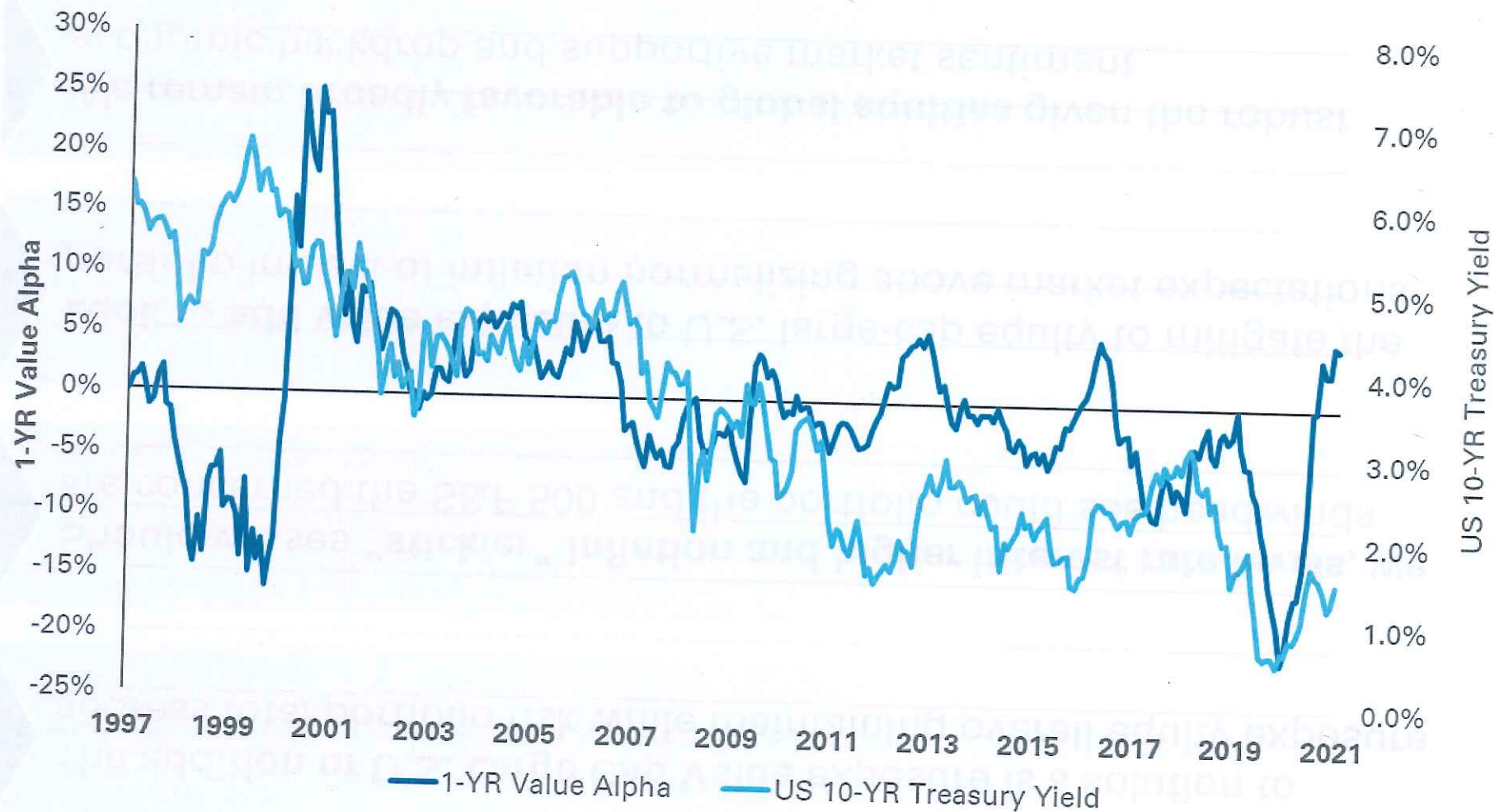
Should we see **“stickier” inflation and higher interest rate levels**, we are concerned the S&P 500 and the portfolio could see headwinds

Look to add value exposure to U.S. large-cap equity to mitigate the portfolio impact of inflation normalizing above market expectations

We remain **broadly favorable to global equities** given the robust economic backdrop and supportive market sentiment

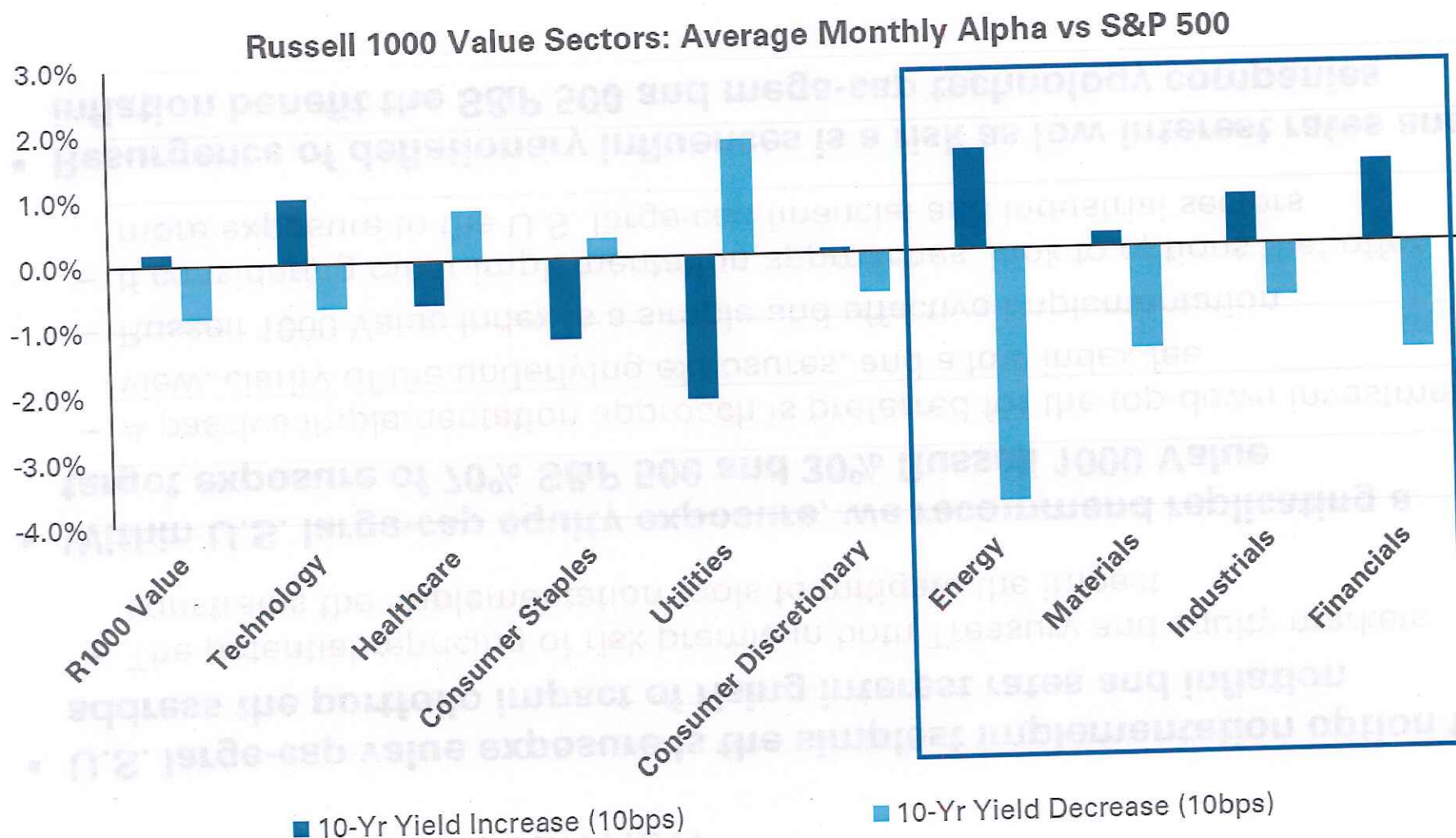
INTEREST RATE SHIFTS IMPACT EQUITY TRENDS

LARGE-CAP VALUE MAY BENEFIT FROM RISING INTEREST RATES



INTEREST RATES INFLUENCE STOCKS UNEQUALLY

SECTOR MAKEUP OF VALUE EXPOSURE MAY OFFER BENEFITS



ADD U.S. LARGE CAP VALUE EXPOSURE

IMPLEMENTATION OVERVIEW

- **U.S. large-cap value exposure is the simplest implementation option to address the portfolio impact of rising interest rates and inflation**
 - The potential repricing of risk premia in both Treasury and equity markets constrains the implementation tools to mitigate the impact
- **Within U.S. large-cap equity exposure, we recommend replicating a target exposure of 70% S&P 500 and 30% Russell 1000 Value**
 - A passive implementation approach is preferred for the top-down investment view, clarity of the underlying exposures, and a low index fee
 - Russell 1000 Value Index is a simple and effective implementation
 - If considering other implementation approaches, look to options that offer more exposure to the U.S. large-cap financial and industrial sectors
- **Resurgence of deflationary influences is a risk as low interest rates and inflation benefit the S&P 500 and mega-cap technology companies**





FRS ASSET ALLOCATION REVIEW



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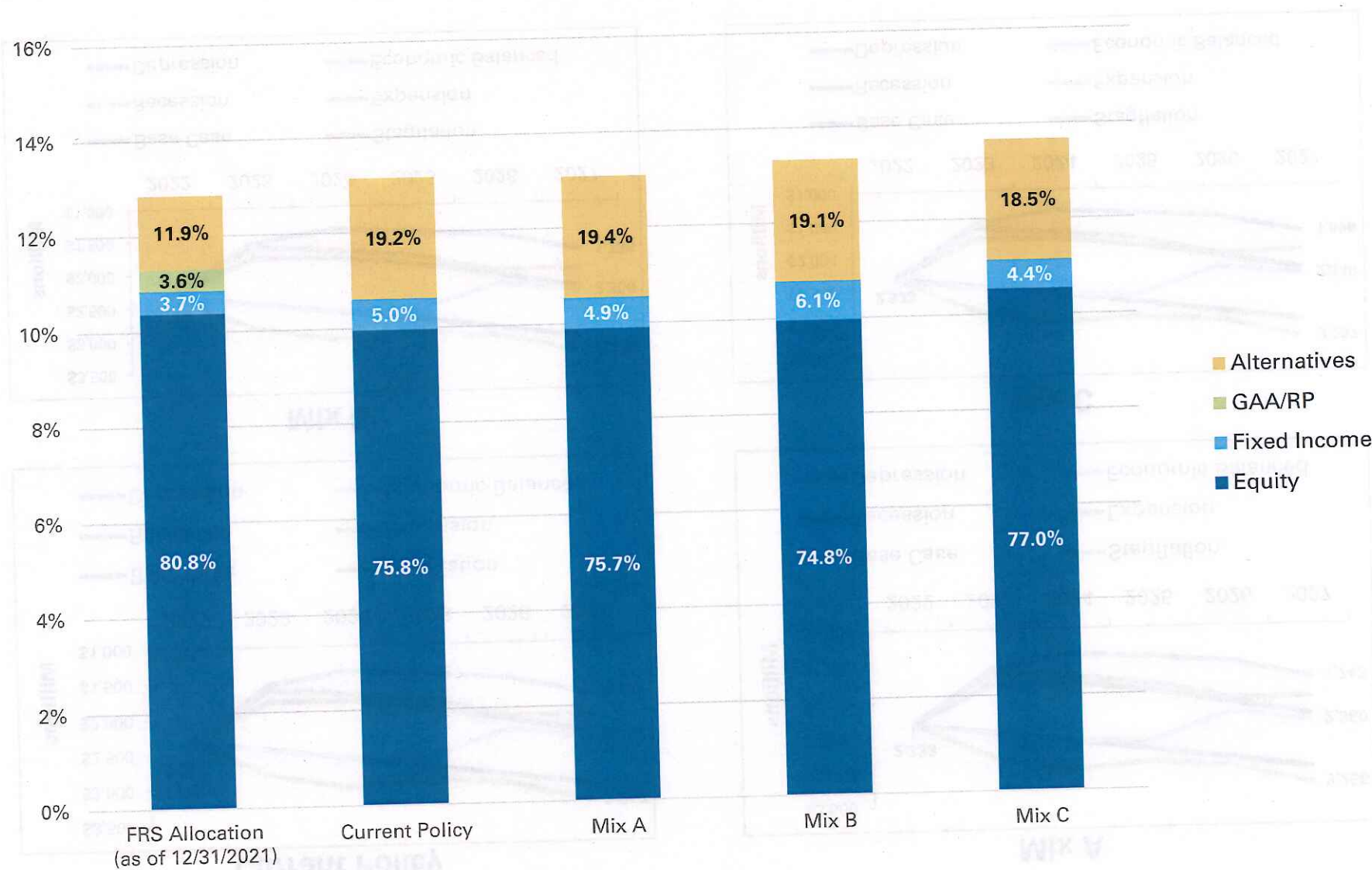
2022 FRS ASSET ALLOCATION REVIEW

Asset Class	Allocation (as of 12/31/2021)	Current Policy Target	Mix A	Mix B	Mix C
Large Cap Equity	22.3%	20.5%	20.5%	20.5%	21.5%
Small/Mid Cap Equity	7.0%	7.0%	7.0%	7.0%	7.5%
International Equity	11.4%	11.5%	9.0%	11.5%	12.5%
International Small Cap Equity	--	--	2.5%	--	--
Emerging Markets Equity	6.6%	7.0%	7.0%	7.0%	7.5%
Global Equity	11.3%	10.0%	10.0%	10.0%	10.0%
Total Equities	58.6%	56.0%	56.0%	56.0%	59.0%
Core Bonds	18.7%	18.0%	18.0%	18.0%	15.0%
US TIPS	3.0%	3.0%	3.0%	--	3.0%
Bank Loans (Leveraged Loans)	--	--	--	3.0%	--
Emerging Market Debt (Blended)	3.3%	5.0%	5.0%	5.0%	5.0%
Total Fixed Income	25.0%	26.0%	26.0%	26.0%	23.0%
Global Asset Allocation	5.2%	--	--	--	--
Total Multi-Asset	5.2%	--	--	--	--
Private Equity/Private Debt	4.5%	9.0%	9.0%	9.0%	9.0%
Core Real Estate	6.0%	6.0%	6.0%	6.0%	6.0%
Private Real Assets (Infrastructure)	0.0%	3.0%	3.0%	3.0%	3.0%
Total Alternative Assets	10.5%	18.0%	18.0%	18.0%	18.0%
10 Year Expected Return	5.04%	5.34%	5.30%	5.42%	5.43%
30 Year Expected Return	6.27%	6.53%	6.53%	6.60%	6.62%
Standard Deviation	12.84%	13.14%	13.08%	13.32%	13.67%

¹Emerging Market Debt (Blended) is modeled as 1/2 emerging markets debt (local), 1/2 emerging markets debt (external)

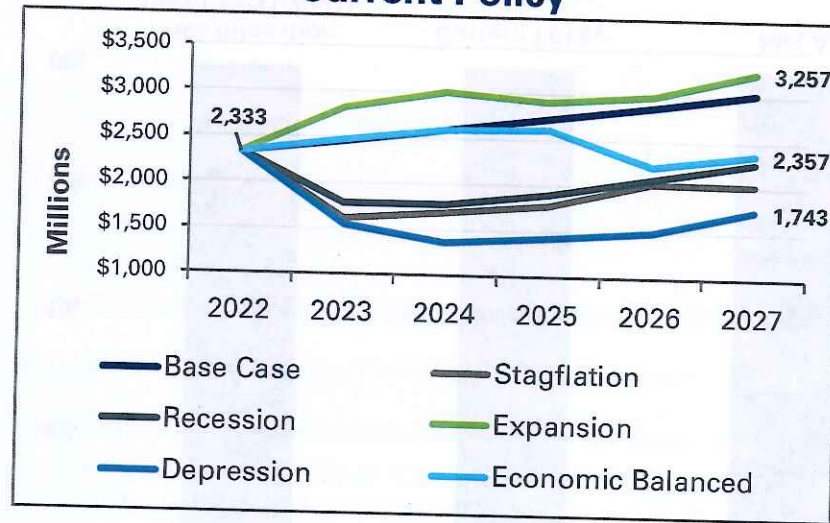


ASSET ALLOCATION RISK BUDGETING

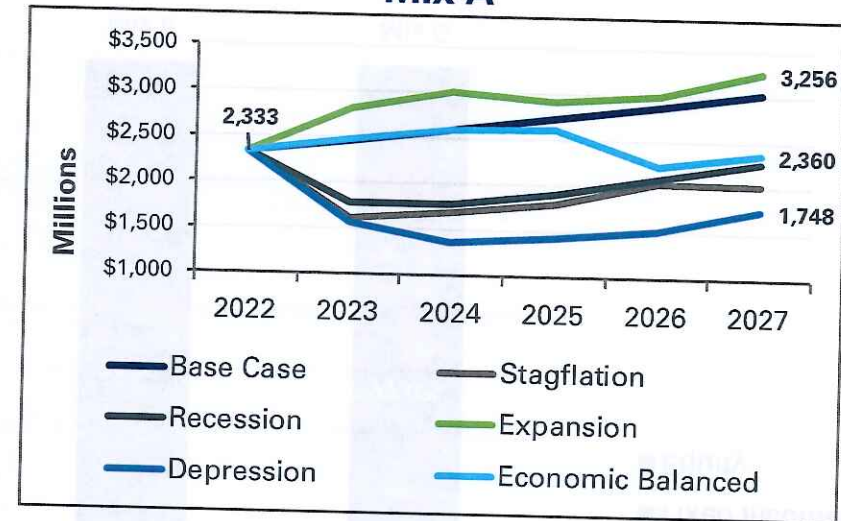


ASSET ALLOCATION – SCENARIO ANALYSIS

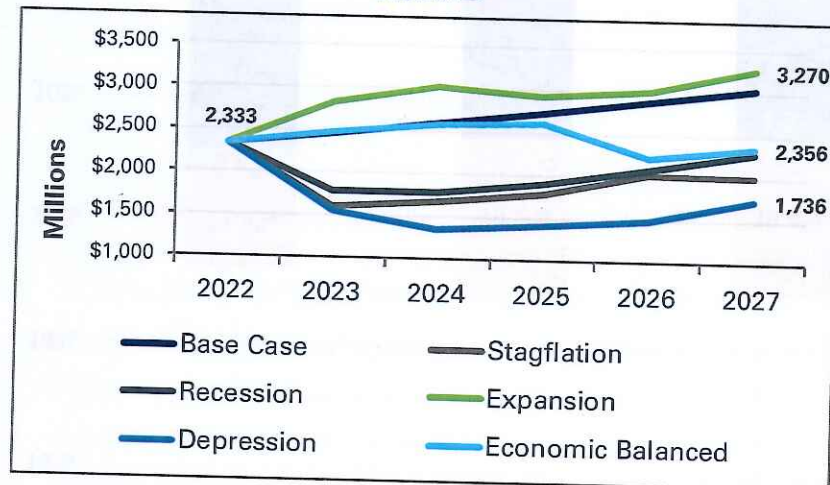
Current Policy



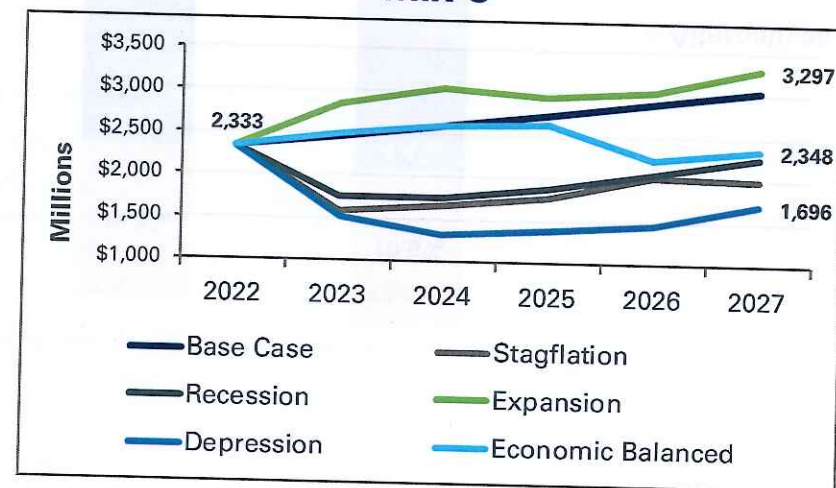
Mix A



Mix B



Mix C



Scenario analysis are for illustrative purposes and not reflective of actual returns.

ASSET ALLOCATION CONSIDERATIONS

- **FRS continues to implement changes to its strategic asset allocation approved in 2020 and 2021**
 - Increased equity target allocation from 54% to 56%
 - Reduced core bonds target from 23% to 18%
 - Increased private equity/private debt target from 4% to 9% in 2020
 - Added 3% target to private real assets (infrastructure)
- **While we have presented alternative asset allocations that increase the System's long-term expected return, the expected volatility of the investment portfolio also increases proportionately**
- **Rebalance toward Intermediate Policy (Stage 2) approved in 2021**
 - Increase the emerging markets debt allocation to the 5% target allocation
 - BlackRock Global Allocation used as the funding source
- **Within U.S. large-cap equity exposure, replicate a target exposure of 70% S&P 500 and 30% Russell 1000 Value**
 - Initiate a search for a Russell 1000 Value Index Fund

FRS ASSET ALLOCATION TRANSITION

Asset Class	Intermediate Policy (Stage 1)	Intermediate Policy (Stage 2)	2021 L-T Target Policy
US Large Cap Equity	20.5%	20.5%	20.5%
US Small/Mid Cap Equity	7.0%	7.0%	7.0%
International Equity	11.5%	11.5%	11.5%
Emerging Markets Equity	7.0%	7.0%	7.0%
Global Equity	10.0%	10.0%	10.0%
Total Equities	56.0%	56.0%	56.0%
Core Bonds	19.0%	18.0%	18.0%
US TIPS	3.0%	3.0%	3.0%
EMD (blended)	3.5%	5.0%	5.0%
Total Fixed Income	25.5%	26.0%	26.0%
Global Asset Allocation	5.0%	3.0%	--
Risk Parity	1.5%	--	--
Total Multi-Asset	6.5%	3.0%	--
Private Equity / Private Debt	5.0%	7.0%	9.0%
Core Real Estate	6.0%	6.0%	6.0%
Private Real Assets (Infrast./Nat. Res.)	1.0%	2.0%	3.0%
Total Alternatives	12.0%	15.0%	18.0%

FRS 2022 REBALANCING CONSIDERATION

	Market Value 1/31/2022	Weight in Fund	Int. Target Weight	Over/ Under %	Proposed Cash Flow	Proposed Value	Proposed Weight	
Composite	\$2,255,398,138	100.0%	100.0%			\$2,255,398,138	100.0%	
Large Cap Equity Composite	\$491,391,418	21.8%	20.5%	1.3%			21.8%	\$0
MCM Stock Index Fund	\$491,391,418	21.8%			(\$145,000,000)	\$346,391,418	15.4%	
Russell 1000 Value Index Fund	\$0	0.0%			\$145,000,000	\$145,000,000	6.4%	
SMID Cap Composite	\$151,296,460	6.7%	7.0%	-0.3%			6.7%	\$0
Rothschild US SMID Core	\$39,991,240	1.8%				\$39,991,240	1.8%	
QMA SMID Cap Equity	\$30,058,524	1.3%				\$30,058,524	1.3%	
BlackRock Russell 2500 Index Fund	\$81,246,696	3.6%				\$81,246,696	3.6%	
International Equity Composite	\$254,390,835	11.3%	11.5%	-0.2%			11.3%	\$0
LSV International Equity Value	\$123,850,871	5.5%				\$123,850,871	5.5%	
Fisher All Foreign Equity	\$130,539,964	5.8%				\$130,539,964	5.8%	
Emerging Markets Equity Composite	\$151,506,680	6.7%	7.0%	-0.3%			6.7%	\$0
Acadian Emerging Markets Equity	\$107,188,611	4.8%				\$107,188,611	4.8%	
Invesco Oppenheimer Emerging Mark	\$44,318,069	2.0%				\$44,318,069	2.0%	
Global Equity Composite	\$255,271,372	11.3%	10.0%	1.3%			11.3%	\$0
Boston Partners Global Equity	\$137,116,273	6.1%				\$137,116,273	6.1%	
SSgA ACWI Index Fund	\$118,155,099	5.2%				\$118,155,099	5.2%	
Core Fixed Income	\$426,001,984	18.9%	18.0%	0.9%			18.9%	\$0
BlackRock US Debt	\$327,403,721	14.5%				\$327,403,721	14.5%	
Orlean Core Fixed Income	\$98,598,263	4.4%				\$98,598,263	4.4%	
TIPS	\$68,050,052	3.0%	3.0%	0.0%			3.0%	\$0
BlackRock TIPS	\$68,050,052	3.0%				\$68,050,052	3.0%	
Emerging Market Debt	\$74,925,788	3.3%	5.0%	-1.7%			5.0%	\$37,500,000
Wellington Blended Opportunistic EM	\$74,925,788	3.3%			\$37,500,000	\$112,425,788	5.0%	
GTAA	\$116,036,589	5.1%	3.0%	2.1%			3.5%	(\$37,500,000)
BlackRock Global Allocation Fund	\$116,036,589	5.1%			(\$37,500,000)	\$78,536,589	3.5%	
Risk Parity	\$0	0.0%	0.0%	0.0%			0.0%	\$0
AQR Global Risk Premium - EL	\$0	0.0%				\$0	0.0%	
Private Equity Composite	\$109,848,212	4.9%	7.0%	-2.1%			4.9%	\$0
Real Estate Composite	\$141,852,175	6.3%				\$141,852,175	6.3%	
Private Real Assets	\$0	0.0%				\$0	0.0%	
Cash	\$14,826,573	0.7%	0.0%	0.7%			0.7%	\$0
						\$14,826,573	0.7%	



APPENDIX

ASSET CLASS ASSUMPTIONS



PROPRIETARY & CONFIDENTIAL



PUBLIC EQUITY



PROPRIETARY & CONFIDENTIAL

PUBLIC EQUITY ASSUMPTIONS

OVERVIEW

- **A cyclical upswing in growth and inflation continues to support risk asset sentiment and equity valuations in the face of rising interest rates**
- **Equity valuation multiples are sensitive to higher nominal rates, though inflation can positively impact nominal revenues and earnings**
- **Look to maintain strategic equity targets as positive cyclical factors continue to support elevated valuations**
- **We recommend that strategic asset allocation targets for emerging market equity reflect an overweight compared to the MSCI ACWI IMI**
 - The return assumption for emerging equity is highest among public equity and we recommend using non-U.S. developed equity as the funding source
- **NEPC encourages a bias to small-cap with the use of active investment managers relative to small-cap exposure in the MSCI ACWI IMI**



PUBLIC EQUITY ASSUMPTIONS

BUILDING BLOCKS

Illiquidity Premium	The return expected for assets with illiquidity risk
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China Equity	8.8%	+1.8%
Hedge Fund - Equity	4.1%	+0.1%
Global Equity*	5.4%	-0.8%
Private Equity*	9.0%	-0.3%

Source: NEPC

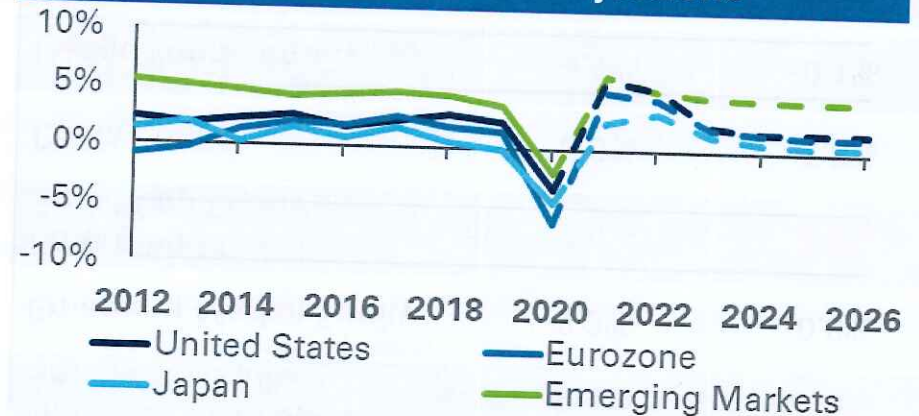
*Calculated as a blend of other asset classes

PUBLIC EQUITY

REAL EARNINGS GROWTH

- **Global growth rates reflect the continued impact of COVID-19**
- **Regions reliant on revenue from emerging markets are forecasted to enjoy higher earnings growth**
 - Non-U.S. stocks benefit from a greater portion of revenue from EM than U.S. stocks
- **We expect elevated real earnings growth for small-caps over the long-term relative to large-cap**
 - Over the long-term we expect a forward-looking risk premium for small-cap and mid-cap equities relative to large-cap stocks

Real GDP Growth Projections

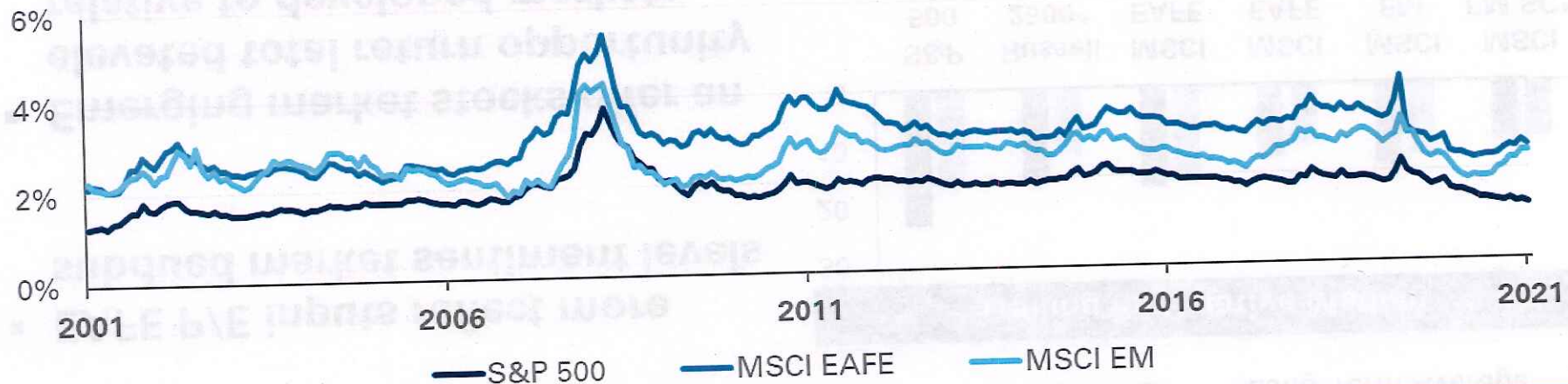


Expected 5-Year Real Growth



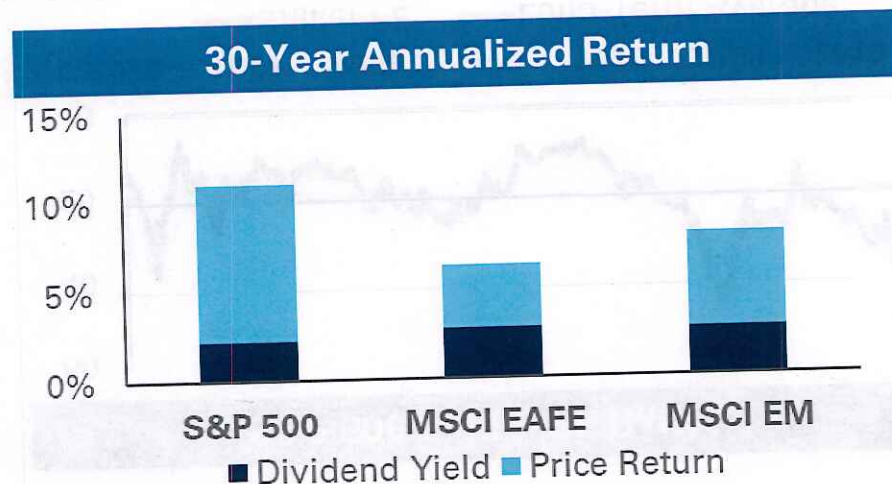
PUBLIC EQUITY

DIVIDEND YIELD



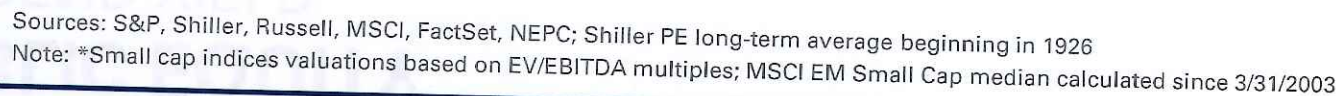
- **Non-U.S. equities provide higher dividend yields relative to the U.S. over the long-term**

- Terminal value dividend yield inputs for MSCI EM and EAFE are 2.5% and 3.0%
- Terminal value dividend yield input for S&P 500 is 2.50%



VALUATION

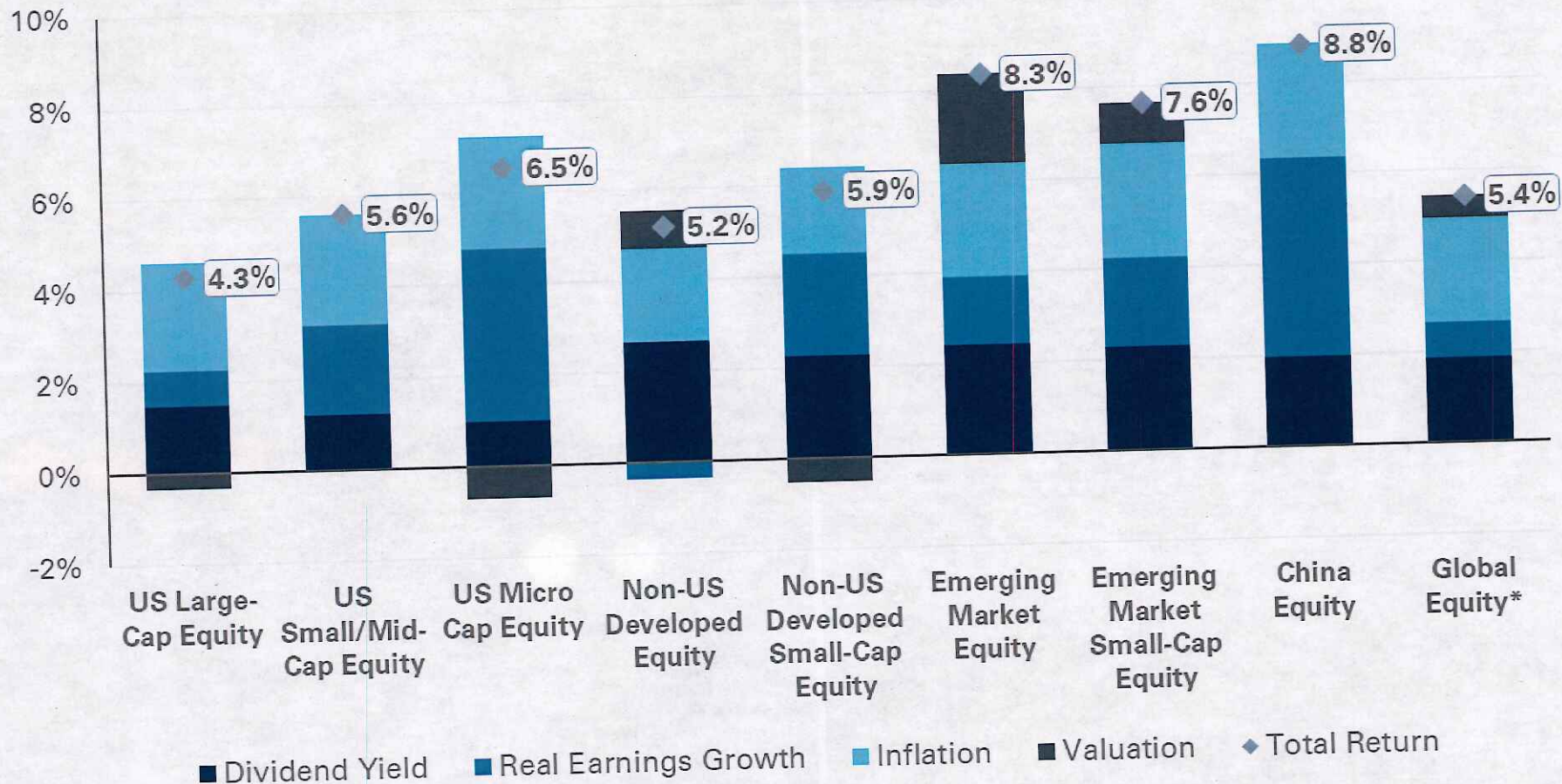
-



PUBLIC EQUITY

BUILDING BLOCKS

10-Year Expected Return



Source: NEPC

*Calculated as a blend of other classes



FIXED INCOME



PROPRIETARY & CONFIDENTIAL

FIXED INCOME ASSUMPTIONS

OVERVIEW

- **Fixed income return assumptions reflect a transition to tighter monetary policy in the near-term to offset recent inflationary pressures**
- **We endorse a dedicated Treasury allocation for liquidity, downside protection, and fee savings, despite the low return expectations**
- **Safe-haven fixed income exposure will differ by investor objective**
 - The fixed income asset-type and duration profile should reflect portfolio objectives, asset-liability glide path, and desire for capital efficiency
- **The use of return-seeking credit investments requires a more dynamic posture to manage shifts in credit spreads and market cycles**
 - A strategic blend of 50% high yield, 25% levered loans, and 25% blended EMD offers an improved strategic beta profile for return-seeking credit

FIXED INCOME ASSUMPTIONS

BUILDING BLOCKS

Illiquidity Premium	The return expected for assets with illiquidity risk
Government Rates Price Change	Change due to shifts in current yields relative to forecasted rates
Credit Deterioration	The average loss for credit assets due to defaults and recovery rates
Spread Price Change	Valuation change due to changes in credit spreads relative to long-term targets
Credit Spread	Yield premium provided by securities with credit risk
Government Rates	The yield attributed to sovereign bonds that do not have credit risk

Asset Class	12/31/21 10-Yr Return	12-Month Change
U.S. TIPS	1.4%	+0.4%
U.S. Treasury Bond	1.5%	+0.6%
U.S. Corporate Bond	2.8%	+0.6%
U.S. MBS	1.8%	+0.6%
U.S. High Yield Corporate	3.2%	+0.3%
U.S. Leveraged Loan	4.7%	+0.8%
EMD External Debt	4.1%	+1.1%
EMD Local Currency Debt	5.7%	+0.7%
Non-U.S. Govt. Bond	1.1%	+0.5%
U.S. Muni Bond (1-10 Year)	1.2%	+0.1%
U.S. High Yield Muni Bond	2.1%	-0.7%
Hedge Fund – Credit	4.2%	+0.3%
U.S. Aggregate Bond*	2.0%	+0.6%
Private Debt*	6.6%	+0.5%

Source: NEPC

*Calculated as a blend of other asset classes

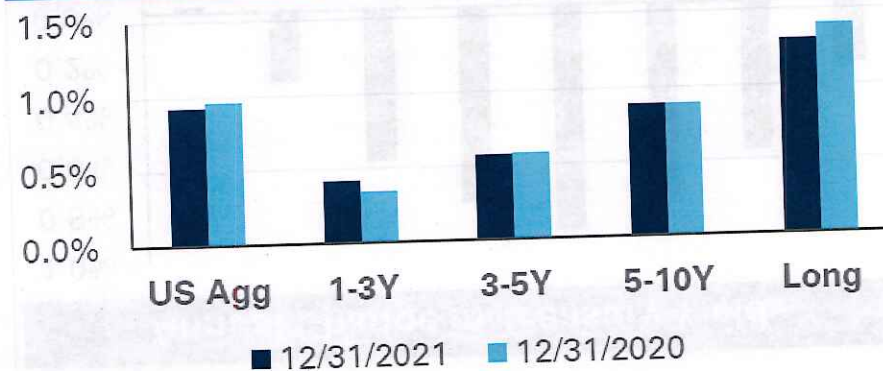


FIXED INCOME

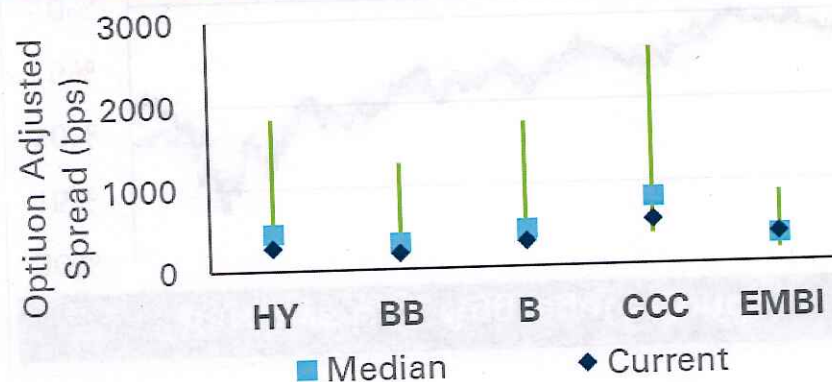
CREDIT SPREADS

- Credit spreads are broadly below long-term medians
- Lower credit spread levels reduce future return expectations
- Credit spread assumptions reflect potential disruption
 - With a record number of BBB rated corporates, fallen angel downgrades are a greater risk
- Default and recovery rates are informed by long-term history

U.S. Corporate OAS by Maturity



Return-Seeking Credit Spreads



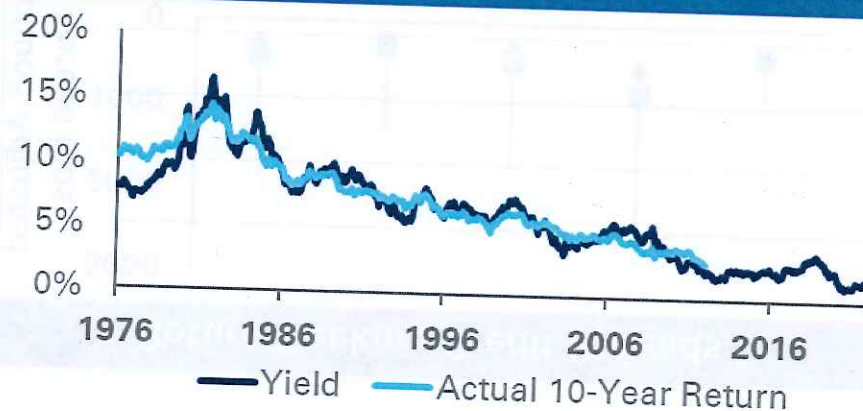
Sources: Barclays, JPM, FactSet, NEPC; Spread medians as of 12/31/2000

FIXED INCOME

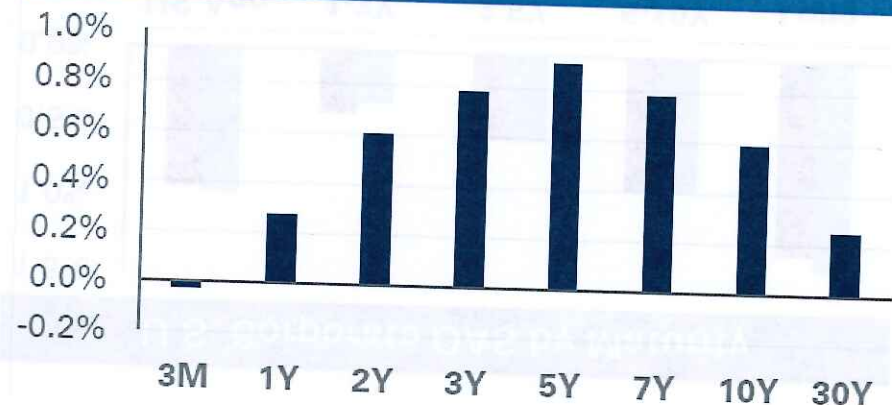
GOVERNMENT RATES

- **Government rates price change reflects shifts in interest rates, the yield curve, and roll down**
 - Roll down refers to the price change due to the aging of a bond along the yield curve
- **Expectations for rising rates are a headwind for return expectations**
 - However, higher interest rates boost the long-term return due to the increased yield benefit
- **A steep yield curve relative to forward interest rates can offer relief from rising rates**

Barclays U.S. Aggregate Bond



Annual Change in Treasury Yields

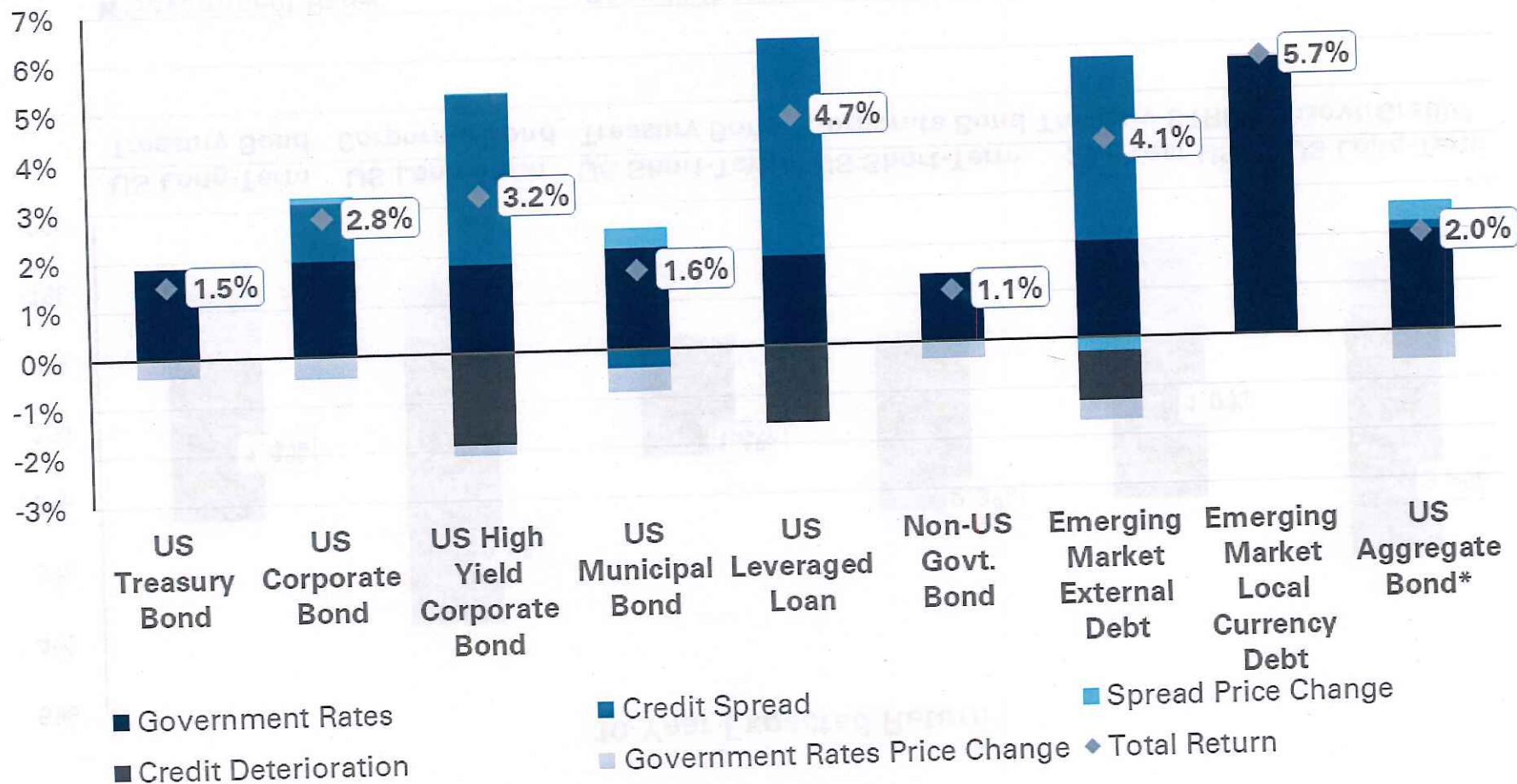


Sources: Barclays, FactSet, NEPC

FIXED INCOME

BUILDING BLOCKS

10-Year Expected Return

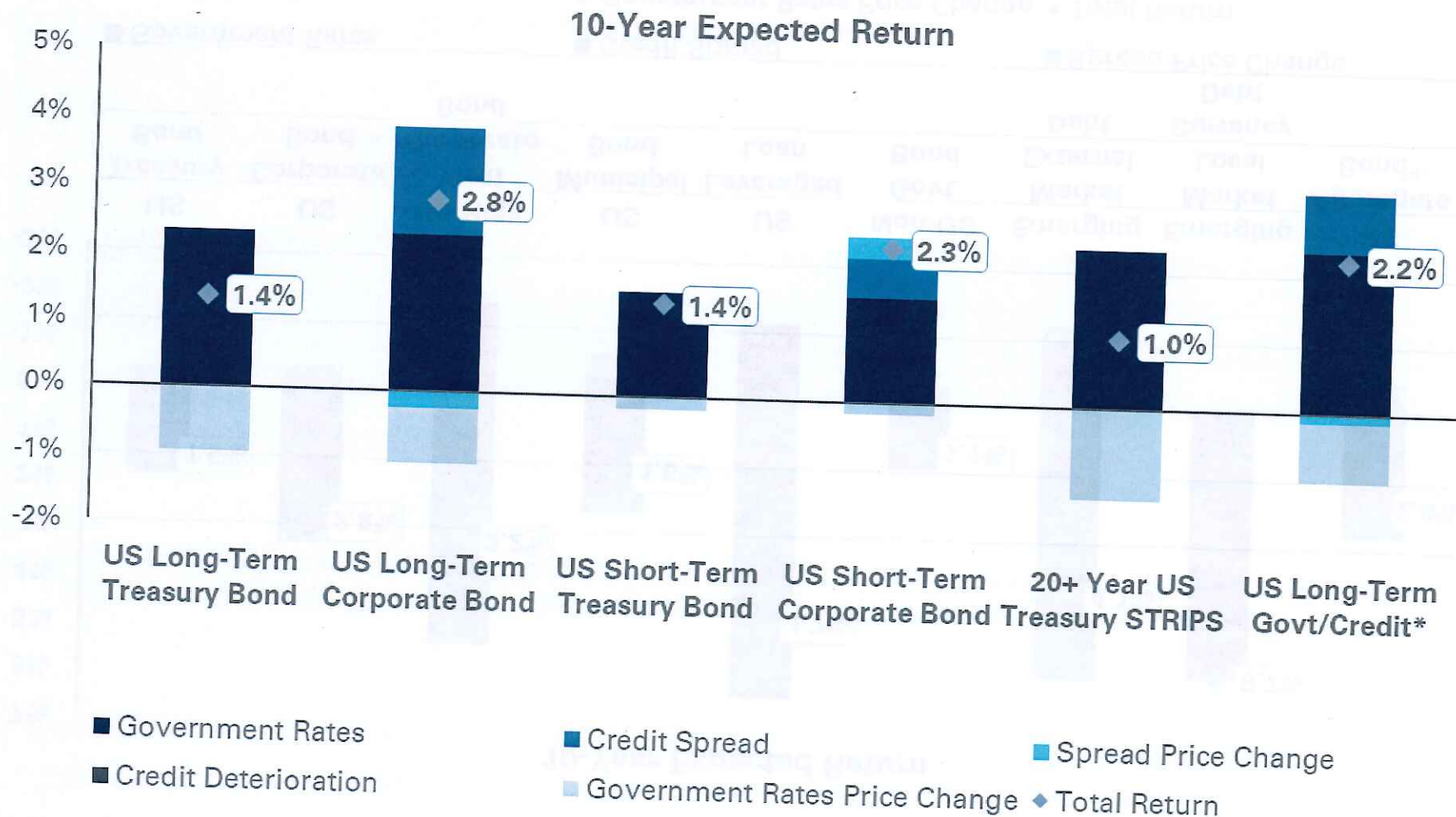


Source: NEPC

*Calculated as a blend of other classes

FIXED INCOME

BUILDING BLOCKS



Source: NEPC

*Calculated as a blend of other classes





REAL ASSET



PROPRIETARY & CONFIDENTIAL

REAL ASSET ASSUMPTIONS

OVERVIEW

- **The strategic outlook for real assets reflects a high level of uncertainty due to the potential for near-term inflation volatility and subdued long-term inflation expectations**
- **Real assets offer a meaningful portfolio diversification benefit, but are sensitive to a wide range of potential inflation scenarios**
- **Real assets exhibit different betas to inflation and each asset class is exposed to various economic factors**
 - Diversification and correlation benefits are helpful to a portfolio but must be carefully considered relative to the expected risk premium
- **Inflation-sensitivity and portfolio objectives influence an investor's strategic allocation to real assets**
 - We encourage investors to remove commodity futures from strategic targets as we expect negative roll yields will persist over the long-term

REAL ASSET ASSUMPTIONS

BUILDING BLOCKS

Illiquidity Premium	The return expected for assets with illiquidity risk
Valuation	The change in price of the asset moving to a terminal value or real average level
Inflation	Based on the inflation path as defined by breakeven-inflation rates and NEPC assumptions
Growth	Market-specific real growth based on a weighted-average of country-level revenue exposure and GDP growth
Real Income	The inflation-adjusted income produced by the asset

Asset Class	12/31/21 10-Yr Return	12-Month Change
Commodity Futures	0.4%	-0.5%
Midstream Energy	6.7%	-0.7%
U.S. REIT	4.5%	-1.0%
Global Infrastructure Equity	5.6%	-0.3%
Global Natural Resources Equity	5.5%	-1.2%
Gold	3.3%	0.4%
Real Estate - Core	4.7%	0.3%
Real Estate – Non-Core	5.9%	0.4%
Private Debt - Real Estate	4.6%	0.5%
Private Real Assets - Natural Resources	7.1%	-0.9%
Private Real Assets - Infrastructure	5.3%	-0.1%

Source: NEPC

*Calculated as a blend of other asset classes



REAL ASSET

REAL INCOME

- **Equity: Real income is inflation-adjusted dividend yield**
 - Includes public infrastructure, REITS, midstream energy, and natural resource equity
- **Real Estate: Real income is net operating income (NOI)**
 - NOI growth tracks the business cycle and economic regimes
- **Commodity Futures: Real income reflects collateral return and the futures roll yield**
 - Collateral is based on a cash proxy over the time horizon

Commodities Rolling 10-Year Returns



Real Assets Yields

	12/31/21	12/31/20
Midstream Energy	5.9%	8.7%
Core Real Estate	3.0%	3.0%
U.S. REIT	2.9%	3.8%
Global Infrastructure Equity	2.8%	3.4%
Global Nat Resource Equity	3.7%	3.4%
U.S. 10-Yr Breakeven Inflation	2.6%	2.0%
Commodity Index Roll Yield*	2.4%	-0.1%

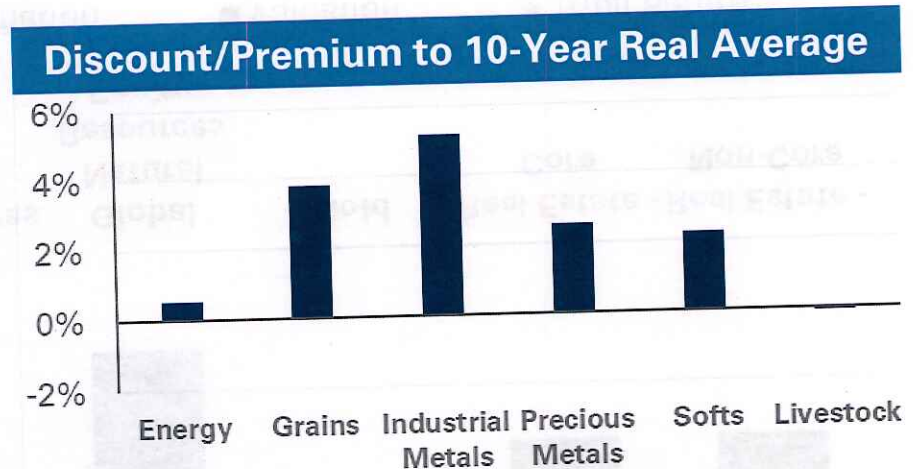
Sources: Bloomberg, NCREIF, Alerian, NAREIT, S&P, FactSet, NEPC

*Commodity Index Roll Yield represents a proprietary calculation methodology

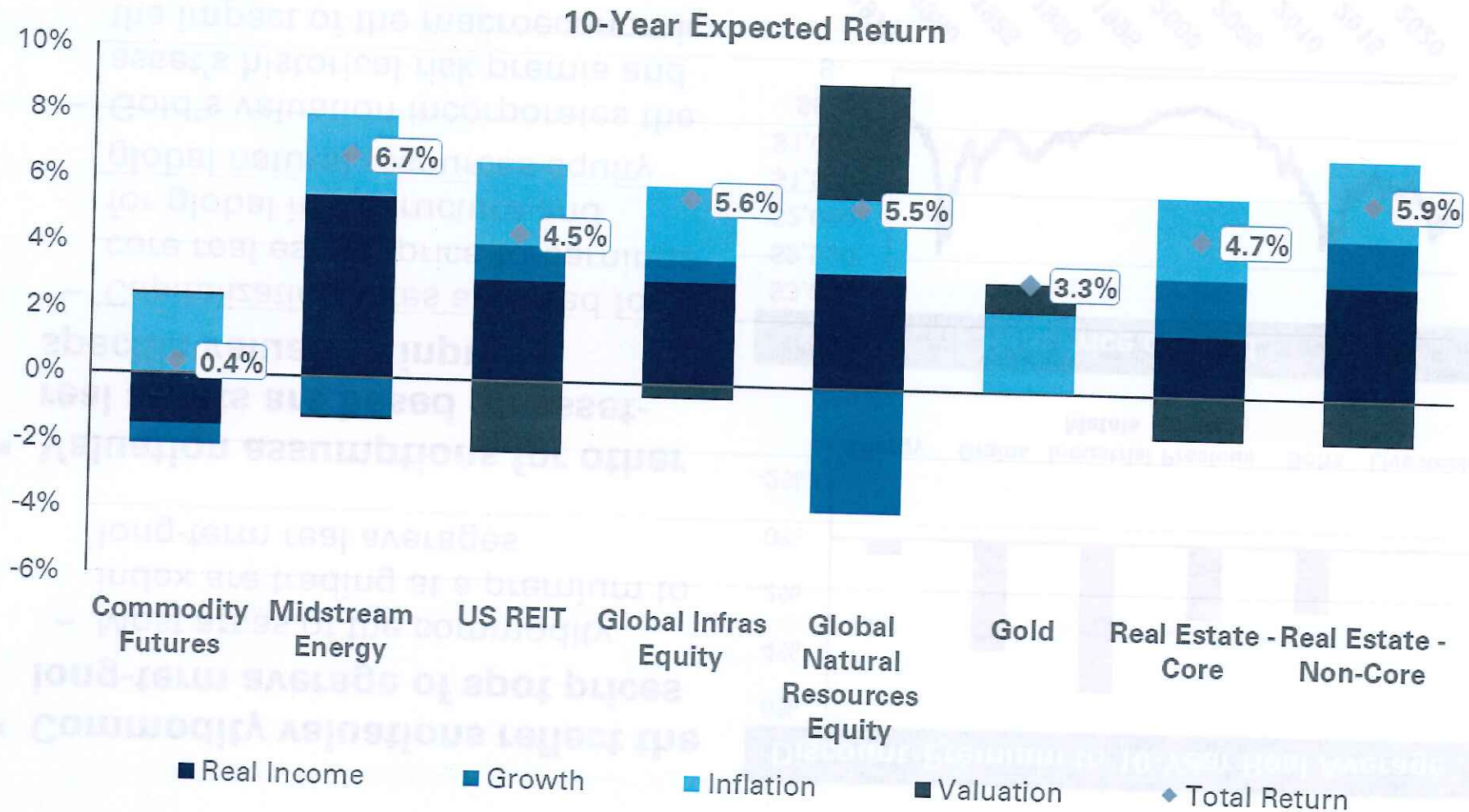


REAL ASSET VALUATION

- **Commodity valuations reflect the long-term average of spot prices**
 - Most areas of the commodity index are trading at a premium to long-term real averages
- **Valuation assumptions for other real assets are based on asset-specific valuation inputs**
 - Capitalization rates are used for core real estate, price-to-earnings for global infrastructure and global natural resources equity
 - Gold's valuation incorporates the asset's historical risk premia and the impact of the macroeconomic market regime



REAL ASSET BUILDING BLOCKS



Source: NEPC



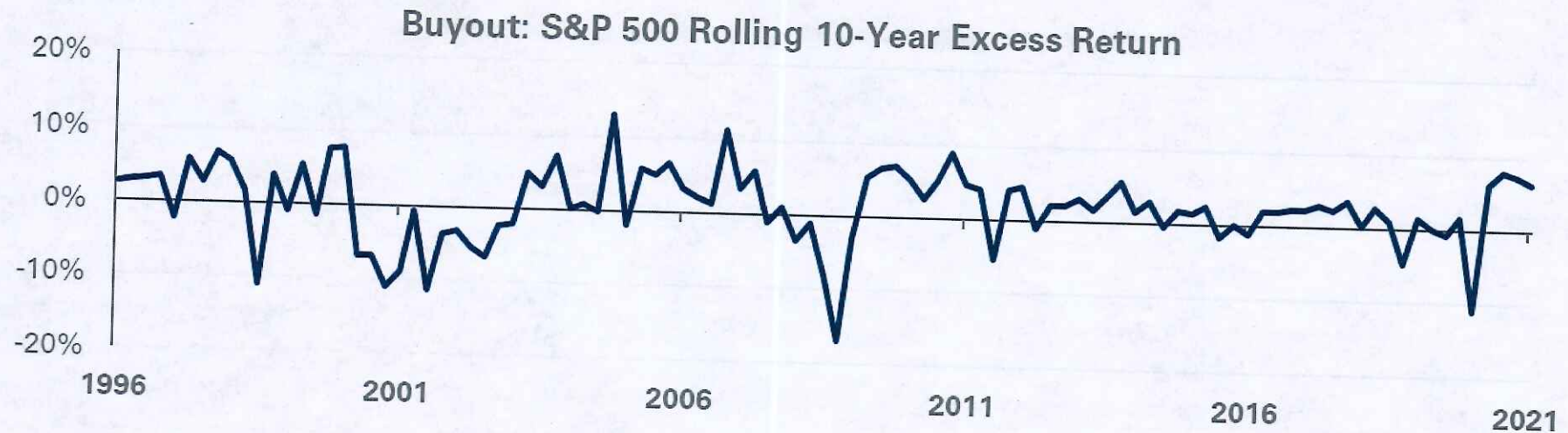
ALTERNATIVE ASSETS



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ALTERNATIVE ASSETS

METHODOLOGY



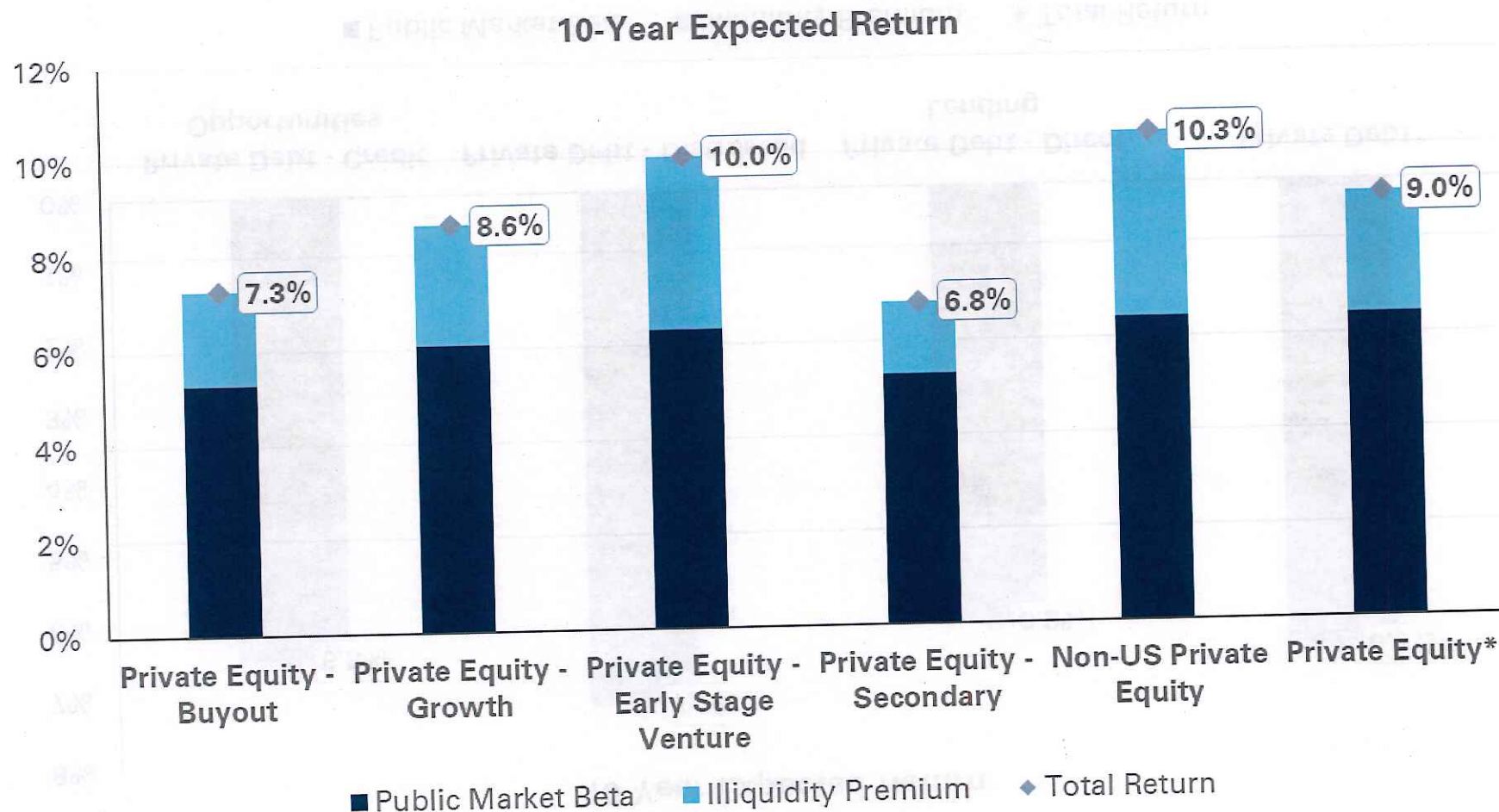
- **Private market assumptions are constructed from betas to public markets with an added illiquidity premia**
 - Historically, the observed illiquidity premium has been a significant component driving private market returns
- **Hedge fund assumptions are constructed from betas to public markets with an added alpha assumption**



Sources: Thomson One, S&P, FactSet

PRIVATE EQUITY

BUILDING BLOCKS

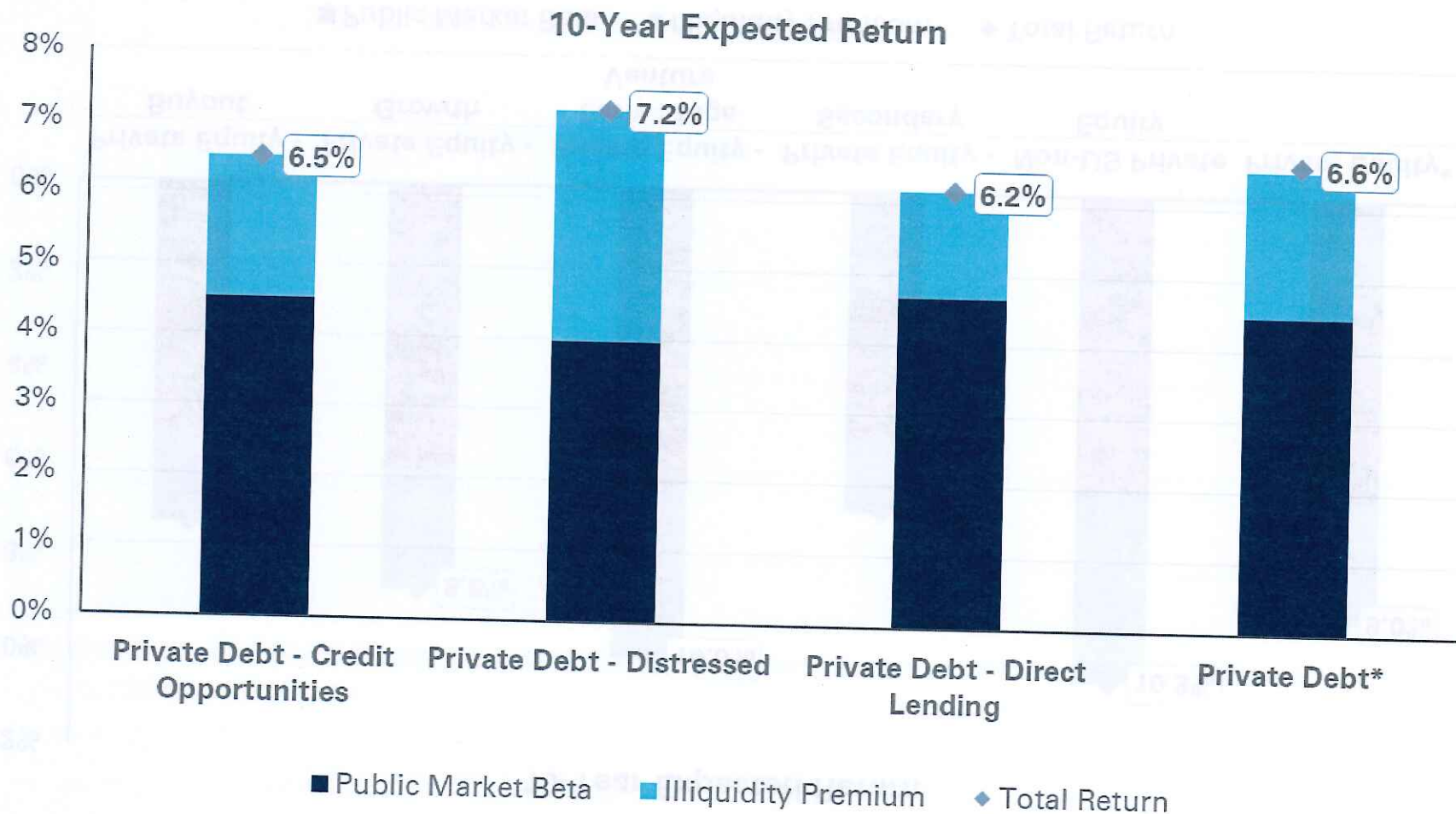


Source: NEPC

*Private Equity is a derived composite of 34% U.S. Buyout, 34% U.S. Growth, 8.5% U.S. Secondary, 8.5% U.S. Venture, 15% Non-U.S. PE

PRIVATE DEBT

BUILDING BLOCKS

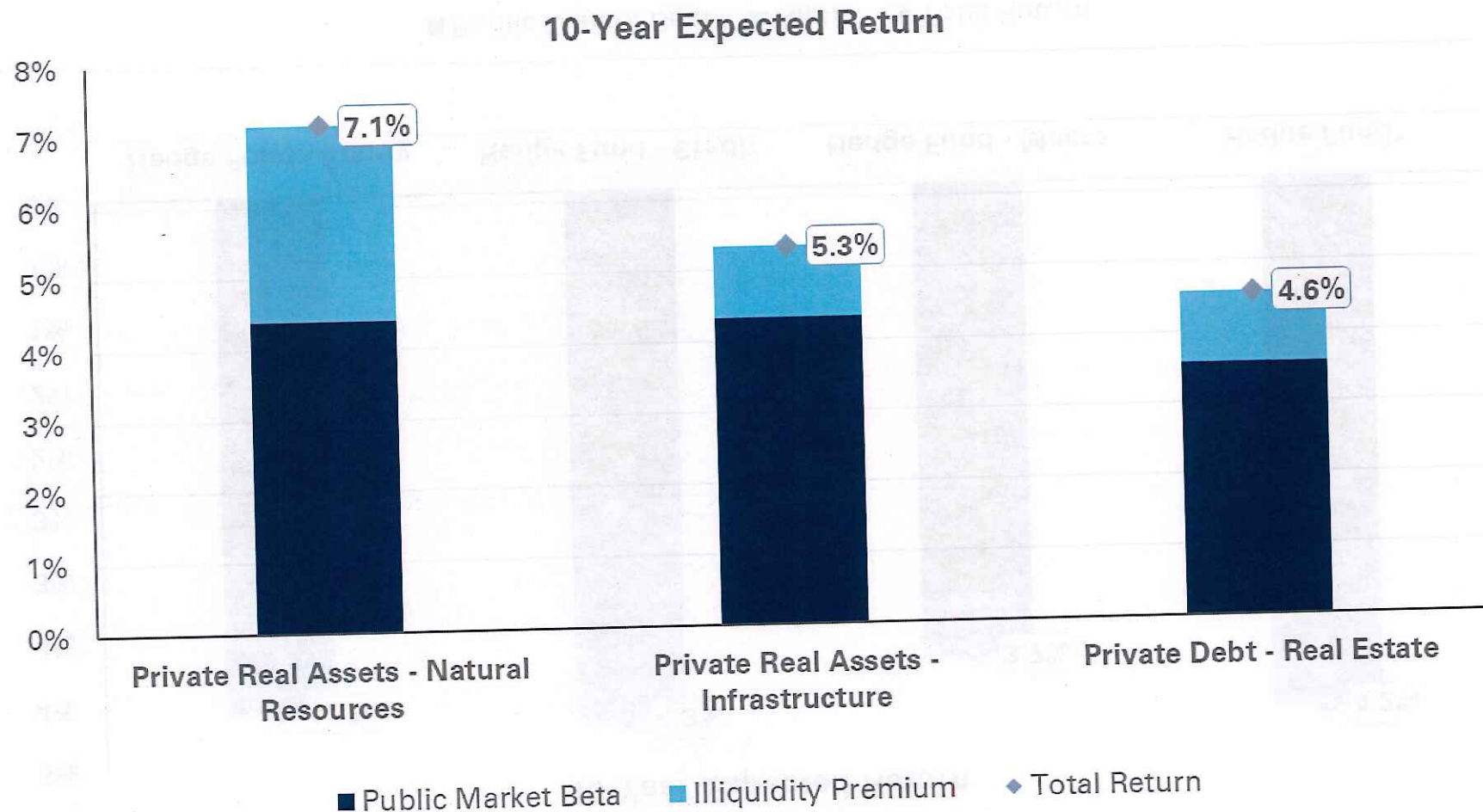


Source: NEPC

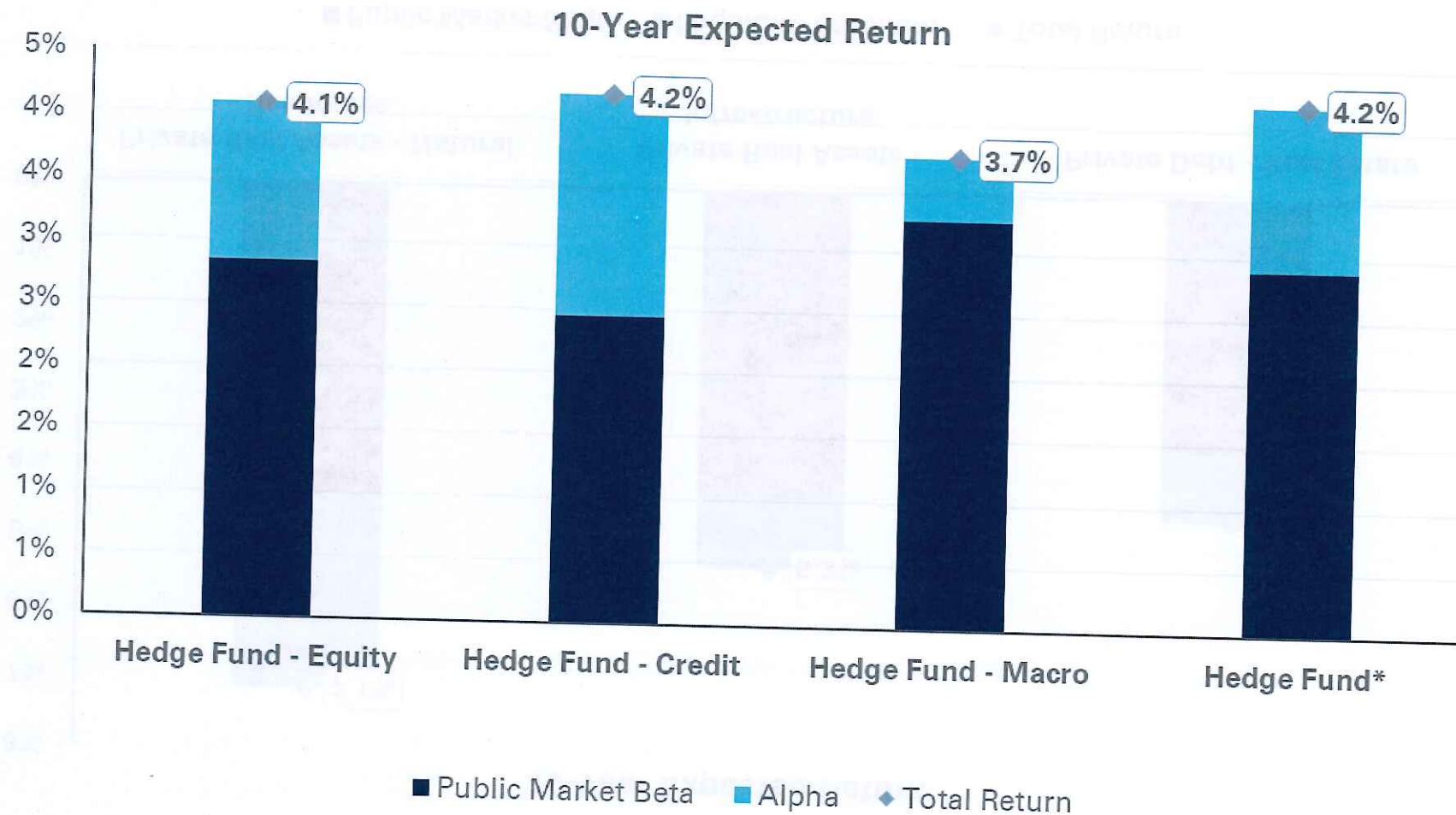
*Private Debt is a derived composite of 25% Mezzanine, 25% Distressed, 50% Direct Lending



PRIVATE REAL ASSET BUILDING BLOCKS



HEDGE FUND BUILDING BLOCKS



Source: NEPC

*Hedge Funds is a derived composite of 40% Long/Short, 40% Credit, 20% Macro



10-YEAR RETURN FORECASTS

EQUITY

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
U.S. Large-Cap Equity	4.3%	5.4%	-1.1%
U.S. Small/Mid-Cap Equity	5.6%	5.7%	-0.1%
Non-U.S. Developed Equity	5.2%	5.9%	-0.7%
Non-U.S. Developed Equity (USD Hedge)	5.4%	6.1%	-0.7%
Non-U.S. Developed Small-Cap Equity	5.9%	6.1%	-0.2%
Emerging Market Equity	8.3%	7.5%	+0.8%
Emerging Market Small-Cap Equity	7.6%	8.1%	-0.5%
Hedge Fund - Equity	4.1%	4.0%	+0.1%
Private Equity - Buyout	7.3%	7.6%	-0.3%
Private Equity - Growth	8.6%	8.9%	-0.3%
Private Equity - Early Stage Venture	10.0%	10.4%	-0.4%
Private Equity - Secondary	6.8%	7.1%	-0.3%
Non-U.S. Private Equity	10.3%	10.7%	-0.4%
China Equity	8.8%	7.0%	+1.8%
U.S. Microcap Equity	6.5%	6.6%	-0.1%
Global Equity*	5.4%	6.2%	-0.8%
Private Equity*	9.0%	9.3%	-0.3%

*Calculated as a blend of other asset classes

10-YEAR RETURN FORECASTS

SAFE-HAVEN FIXED INCOME

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
Cash	1.5%	0.8%	+0.7%
U.S. TIPS	1.4%	1.0%	+0.4%
U.S. Treasury Bond	1.5%	0.9%	+0.6%
U.S. Corporate Bond	2.8%	2.2%	+0.6%
U.S. Corporate Bond - AAA	2.2%	1.5%	+0.7%
U.S. Corporate Bond - AA	2.2%	1.6%	+0.6%
U.S. Corporate Bond - A	2.6%	1.9%	+0.7%
U.S. Corporate Bond - BBB	3.1%	2.5%	+0.6%
U.S. Mortgage-Backed Securities	1.8%	1.2%	+0.6%
U.S. Securitized Bond	2.3%	1.8%	+0.5%
U.S. Collateralized Loan Obligation	3.1%	2.3%	+0.8%
U.S. Municipal Bond	1.6%	2.0%	-0.4%
U.S. Municipal Bond (1-10 Year)	1.2%	1.1%	+0.1%
U.S. Taxable Municipal Bond	2.7%	2.5%	+0.2%

10-YEAR RETURN FORECASTS

SAFE-HAVEN FIXED INCOME

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
Non-US Government Bond	1.1%	0.6%	+0.5%
Non-US Government Bond (USD Hedge)	1.3%	0.8%	+0.5%
Non-US Inflation-Linked Bond (USD Hedge)	0.7%	0.1%	+0.6%
U.S. Short-Term TIPS (1-3 Year)	1.2%	1.1%	+0.1%
U.S. Short-Term Treasury Bond (1-3 Year)	1.4%	1.0%	+0.4%
U.S. Short-Term Corporate Bond (1-3 Year)	2.3%	1.8%	+0.5%
U.S. Intermediate-Term TIPS (3-10 Year)	1.5%	1.0%	+0.5%
U.S. Intermediate-Term Treasury Bond (3-10 Year)	1.6%	0.9%	+0.7%
U.S. Intermediate-Term Corporate Bond (3-10 Year)	3.0%	2.3%	+0.7%
U.S. Long-Term Treasury Bond (10-30 Year)	1.4%	0.7%	+0.7%
U.S. Long-Term TIPS (10-30 Year)	1.3%	1.0%	+0.3%
U.S. Long-Term Corporate Bond (10-30 Year)	2.8%	2.3%	+0.5%
20+ Year U.S. Treasury STRIPS	1.0%	0.4%	+0.6%
10 Year U.S. Treasury Bond	1.8%	0.9%	+0.9%
10 Year Non-U.S. Government Bond (USD Hedge)	0.3%	-0.1%	+0.4%
U.S. Aggregate Bond*	2.0%	1.4%	+0.6%

*Calculated as a blend of other asset classes

10-YEAR RETURN FORECASTS

RETURN-SEEKING CREDIT

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
U.S. High Yield Corporate Bond	3.2%	2.9%	+0.3%
U.S. Corporate Bond - BB	4.0%	3.9%	+0.1%
U.S. Corporate Bond - B	3.6%	3.0%	+0.6%
U.S. Corporate Bond - CCC/Below	-3.8%	-3.4%	-0.4%
U.S. Short-Term High Yield Corp Bond (1-3 Year)	2.3%	2.5%	-0.2%
U.S. Leveraged Loan	4.7%	3.9%	+0.8%
Emerging Market External Debt	4.1%	3.0%	+1.1%
Emerging Market Local Currency Debt	5.7%	5.0%	+0.7%
U.S. High Yield Securitized Bond	3.4%	2.3%	+1.1%
U.S. High Yield Collateralized Loan Obligation	5.5%	4.6%	+0.9%
U.S. High Yield Municipal Bond	2.1%	2.8%	-0.7%
Hedge Fund - Credit	4.2%	3.9%	+0.3%
Private Debt - Credit Opportunities	6.5%	6.2%	+0.3%
Private Debt - Distressed	7.2%	7.2%	-
Private Debt - Direct Lending	6.2%	5.4%	+0.8%
Private Debt*	6.6%	6.1%	+0.5%

*Calculated as a blend of other asset classes



10-YEAR RETURN FORECASTS

REAL ASSETS

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
Commodity Futures	0.4%	0.9%	-0.5%
Midstream Energy	6.7%	7.4%	-0.7%
U.S. REIT	4.5%	5.5%	-1.0%
Global Infrastructure Equity	5.6%	5.9%	-0.3%
Global Natural Resources Equity	5.5%	6.7%	-1.2%
Gold	3.3%	2.9%	+0.4%
Real Estate - Core	4.7%	4.4%	+0.3%
Real Estate - Non-Core	5.9%	5.5%	+0.4%
Private Debt - Real Estate	4.6%	4.1%	+0.5%
Private Real Assets - Natural Resources	7.1%	8.0%	-0.9%
Private Real Assets - Infrastructure	5.3%	5.4%	-0.1%

30-YEAR RETURN FORECASTS

EQUITY

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
U.S. Large-Cap Equity	6.1%	6.3%	-0.2%
U.S. Small/Mid-Cap Equity	6.6%	6.6%	-
Non-U.S. Developed Equity	6.2%	6.5%	-0.3%
Non-U.S. Developed Equity (USD Hedge)	6.4%	6.7%	-0.3%
Non-U.S. Developed Small-Cap Equity	6.8%	6.8%	-
Emerging Market Equity	8.7%	8.4%	+0.3%
Emerging Market Small-Cap Equity	8.7%	8.6%	+0.1%
Hedge Fund - Equity	5.2%	5.0%	+0.2%
Private Equity - Buyout	8.5%	8.5%	-
Private Equity - Growth	9.7%	9.8%	-0.1%
Private Equity - Early Stage Venture	10.7%	10.7%	-
Private Equity - Secondary	7.9%	8.0%	-0.1%
Non-U.S. Private Equity	10.7%	10.7%	-
China Equity	8.8%	7.8%	+1.0%
U.S. Microcap Equity	7.5%	7.4%	+0.1%
Global Equity*	6.8%	7.0%	-0.2%
Private Equity*	10.0%	10.1%	-0.1%

*Calculated as a blend of other asset classes



30-YEAR RETURN FORECASTS

SAFE-HAVEN FIXED INCOME

Asset Class	Geometric Expected Return		Delta
	12/31/2021	12/31/2020	
Cash	2.3%	1.9%	+0.4%
U.S. TIPS	2.6%	2.1%	+0.5%
U.S. Treasury Bond	2.5%	2.0%	+0.5%
U.S. Corporate Bond	4.2%	3.7%	+0.5%
U.S. Corporate Bond - AAA	3.3%	2.8%	+0.5%
U.S. Corporate Bond - AA	3.4%	2.9%	+0.5%
U.S. Corporate Bond - A	3.8%	3.3%	+0.5%
U.S. Corporate Bond - BBB	4.4%	3.9%	+0.5%
U.S. Mortgage-Backed Securities	2.8%	2.3%	+0.5%
U.S. Securitized Bond	3.6%	3.1%	+0.5%
U.S. Collateralized Loan Obligation	4.0%	3.3%	+0.7%
U.S. Municipal Bond	2.5%	2.3%	+0.2%
U.S. Municipal Bond (1-10 Year)	2.3%	1.9%	+0.4%
U.S. Taxable Municipal Bond	4.3%	3.9%	+0.4%

30-YEAR RETURN FORECASTS

SAFE-HAVEN FIXED INCOME

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
Non-US Government Bond	1.9%	1.7%	+0.2%
Non-US Government Bond (USD Hedge)	2.2%	1.9%	+0.3%
Non-US Inflation-Linked Bond (USD Hedge)	1.4%	1.1%	+0.3%
U.S. Short-Term TIPS (1-3 Year)	2.4%	2.0%	+0.4%
U.S. Short-Term Treasury Bond (1-3 Year)	2.4%	2.0%	+0.4%
U.S. Short-Term Corporate Bond (1-3 Year)	3.4%	3.7%	-0.3%
U.S. Intermediate-Term TIPS (3-10 Year)	2.8%	2.1%	+0.7%
U.S. Intermediate-Term Treasury Bond (3-10 Year)	2.7%	2.1%	+0.6%
U.S. Intermediate-Term Corporate Bond (3-10 Year)	4.4%	3.8%	+0.6%
U.S. Long-Term Treasury Bond (10-30 Year)	2.4%	1.9%	+0.5%
U.S. Long-Term TIPS (10-30 Year)	2.3%	2.0%	+0.3%
U.S. Long-Term Corporate Bond (10-30 Year)	4.2%	3.8%	+0.4%
20+ Year U.S. Treasury STRIPS	2.1%	1.7%	+0.4%
10 Year U.S. Treasury Bond	3.0%	2.3%	+0.7%
10 Year Non-U.S. Government Bond (USD Hedge)	1.4%	1.1%	+0.3%
U.S. Aggregate Bond*	3.1%	2.7%	+0.4%

*Calculated as a blend of other asset classes



30-YEAR RETURN FORECASTS

RETURN-SEEKING CREDIT

Geometric Expected Return			
Asset Class	12/31/2021	12/31/2020	Delta
U.S. High Yield Corporate Bond	5.4%	5.0%	+0.4%
U.S. Corporate Bond - BB	6.0%	5.6%	+0.4%
U.S. Corporate Bond - B	5.4%	4.9%	+0.5%
U.S. Corporate Bond - CCC/Below	-0.6%	-0.8%	+0.2%
U.S. Short-Term High Yield Corp Bond (1-3 Year)	3.7%	3.5%	+0.2%
U.S. Leveraged Loan	5.6%	4.8%	+0.8%
Emerging Market External Debt	5.1%	4.5%	+0.6%
Emerging Market Local Currency Debt	5.3%	5.1%	+0.2%
U.S. High Yield Securitized Bond	5.4%	4.5%	+0.9%
U.S. High Yield Collateralized Loan Obligation	6.4%	5.7%	+0.7%
U.S. High Yield Municipal Bond	3.9%	3.9%	-
Hedge Fund - Credit	5.7%	5.3%	+0.4%
Private Debt - Credit Opportunities	7.4%	7.0%	+0.4%
Private Debt - Distressed	8.2%	7.8%	+0.4%
Private Debt - Direct Lending	7.8%	7.4%	+0.4%
Private Debt*	7.9%	7.5%	+0.4%

30-YEAR RETURN FORECASTS

REAL ASSETS

Asset Class	Geometric Expected Return		
	12/31/2021	12/31/2020	Delta
Commodity Futures	3.3%	3.3%	-
Midstream Energy	6.7%	7.3%	-0.6%
U.S. REIT	6.3%	6.7%	-0.4%
Global Infrastructure Equity	6.3%	6.6%	-0.3%
Global Natural Resources Equity	6.7%	7.0%	-0.3%
Gold	4.0%	3.7%	+0.3%
Real Estate - Core	5.6%	5.6%	-
Real Estate - Non-Core	6.9%	7.0%	-0.1%
Private Debt - Real Estate	5.4%	5.2%	+0.2%
Private Real Assets - Natural Resources	8.2%	8.5%	-0.3%
Private Real Assets - Infrastructure	6.6%	6.6%	-

PRIVATE MARKETS COMPOSITES

PUBLIC MARKET BETA INPUTS FOR PRIVATE MARKETS

PRIVATE EQUITY

Buyout: 25% U.S. Large Cap, 75% U.S. Small/Mid Cap

Secondary: 25% U.S. Large Cap, 75% U.S. Small/Mid Cap

Growth: 50% U.S. Small/Mid Cap, 50% U.S. Microcap

Early Stage Venture: 25% U.S. Small/Mid Cap, 75% U.S. Microcap

Non-U.S.: 70% International Small Cap, 30% Emerging Small Cap

Composite: 34% Buyout, 34% Growth, 15 % Non-U.S., 8.5% Secondary, 8.5% Early Venture

PRIVATE DEBT

Direct Lending: 100% Bank Loans

Distressed: 20% U.S. Small/Mid Cap, 60% U.S. High Yield, 20% Bank Loans

Credit Opportunities: 34% U.S. SMID Cap, 33% U.S. High Yield, 33% Bank Loans

Composite: 50% Direct Lending, 25% Credit Opportunities, 25% Distressed

PRIVATE REAL ASSETS

Energy: 30% Comm., 35% Midstream, 35% Public Resource Equity

Infra/Land: 30% Commodities, 70% Public Infrastructure

Private Real Estate Debt: 50% CMBS, 50% Real Estate - Core

NEPC DISCLOSURES

Past performance is no guarantee of future results.

All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.

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