

State of Alaska
Department of Revenue
STATE INVESTMENT REVIEW MEETING
February 15, 2022 – 10:00 a.m.

[Click here to join the meeting](#) or use the options provided below.

Video conferencing device:

Link: 260748889@t.plcm.vc **ID:** 114 652 762 6

Call In (Audio Only):

Phone: 1-907-202-7104 **Code:** 491 280 156#

- I. Introduction**
Lucinda Mahoney, Commissioner of Revenue
Zachary Hanna, Chief Investment Officer

- II. Fixed Income Cash Management**
Emily Howard, State Investment Officer

- III. State Investments**
Victor Djajalie, State Investment Officer
Zachary Hanna, Chief Investment Officer
 - A. December 31, 2021 Performance – Commissioner’s Report**
 - B. Non-Routine Investments**
 - C. 2022 Capital Market Assumptions**

- IV. IAC Comments**
Investment Advisory Council Members

- V. Future Agenda Items & Calendar Review**
Zachary Hanna, Chief Investment Officer
Alysia Jones, ARMB Liaison

- VI. Other Matters for Discussion**

- VII. Adjournment**

State Investment Review

AY70

February 2022

Emily Howard
State Investment Officer

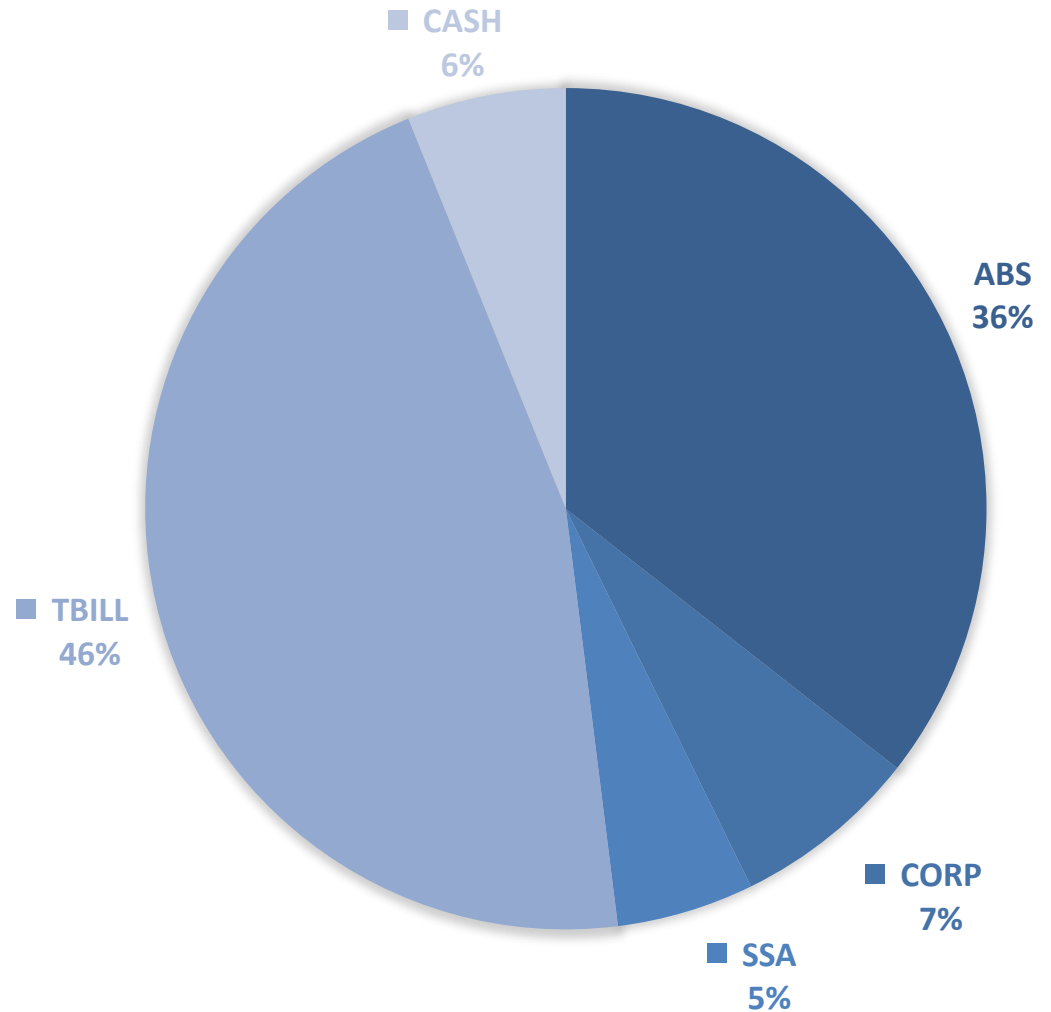
Investment Objectives

- AY70 is the Short-Term Fixed Income investment pool
- \$4.006bn assets under management as of 12/31/21
- AY70 is the only pool that invests funds on behalf of both Treasury and ARMB accounts
- Investment Objectives:
 - 1) Earn the highest possible return
 - 2) Meet significant liquidity requirements
 - 3) Take very low principal risk
- Benchmark: 3-Month U.S. Treasury Bill
- All Short-Term investment requirements are met through AY70. For example:
 - Funds just received from or awaiting disbursement to eligible ARMB beneficiaries
 - Investment cash held by participating manager accounts
 - State government obligations including payroll, school funding, vendor payables

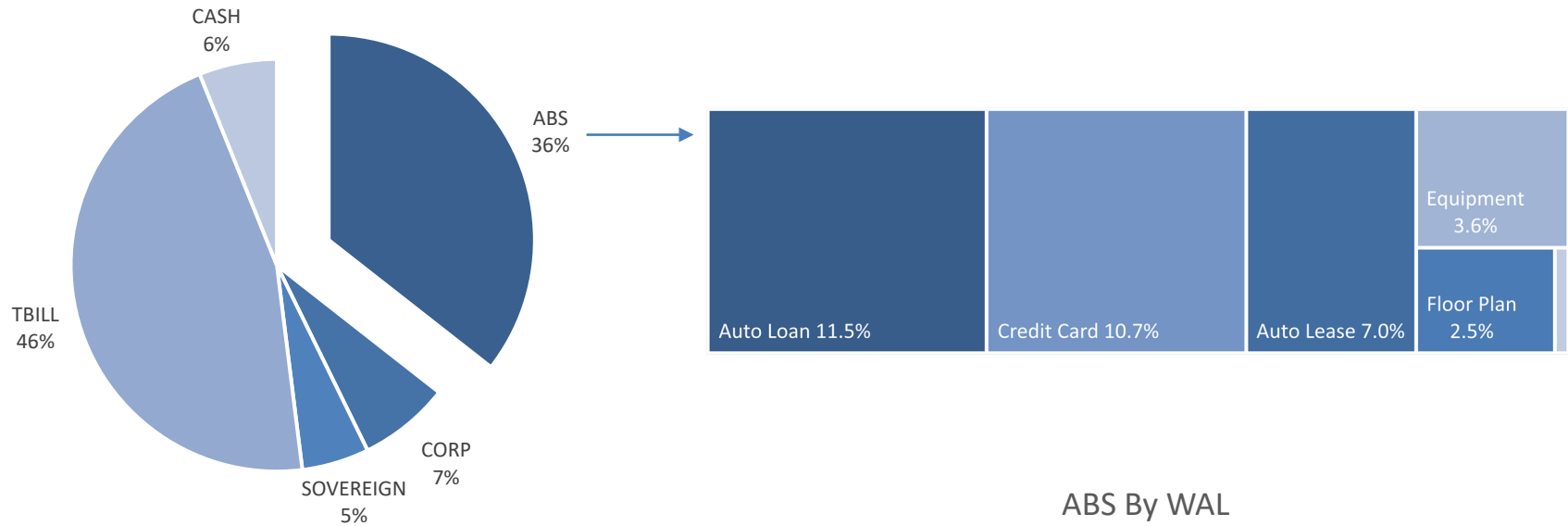
Sector Exposure as of 12/31/21; AUM \$4.006bn

- To ensure adequate liquidity, AY70 owns Treasury Bills and Overnight Repurchase Agreements (Cash)

- To achieve the highest possible return, AY70 owns spread product including ABS, Corporate and Suprasovereign bonds, in place of Tbills

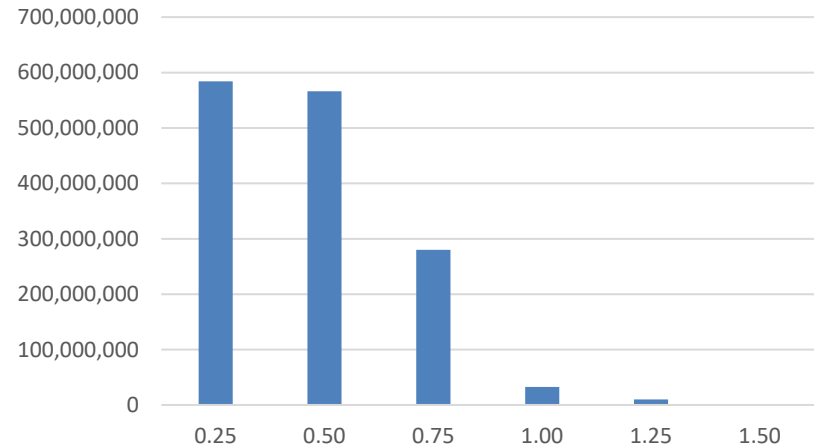


ABS Exposure in AY70 as of 12/31/21



- <1.17/3yr Weighted Average Life (fixed/floating)
- AAA by two ratings agencies
- Public or Private Issuance

ABS By WAL

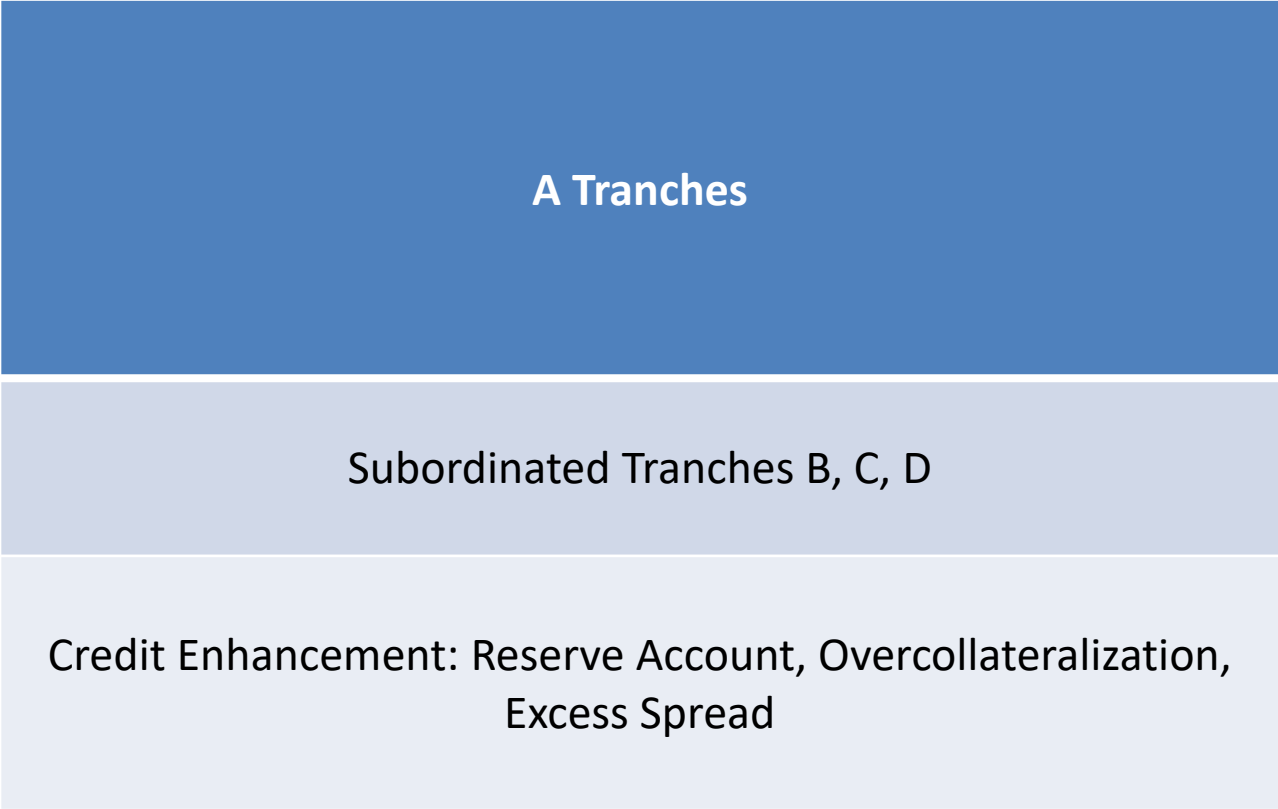


Asset Backed Securities

- Opportunity for Increased Yield → Higher Returns
 - As of 12/31, Yield to Call of AY70's ABS holdings ~.232% vs 3mo tbill ~.039%
- Robust Principal Protection → AAA ratings due to Credit Enhancement
- Good liquidity in normal market conditions, less liquidity in market stress
- Risks:
 - Collateral may decrease in value
 - Timing of Cashflows is uncertain, can be either faster or slower than expected
 - Credit quality of sponsor
 - Liquidity

ABS Structure – Low Principal Risk

Principal Payments



Principal Losses

Auto Loan: General Structure

Principal
Payments

Source: Prospectus

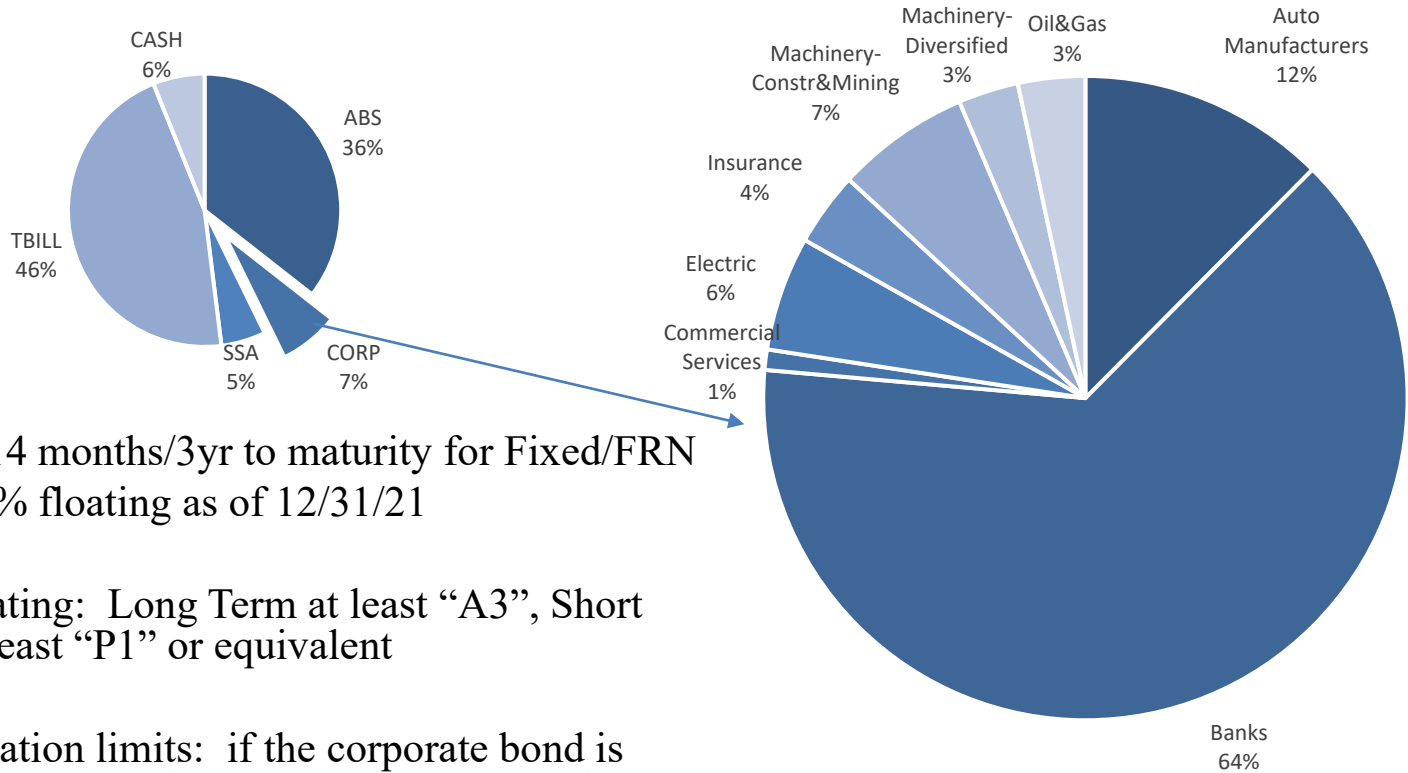
CARMX 2020-2	Size	Rating (S&P/Fitch)	% of Initial Principal Balance
A-1	223,000	A-1+/F1+	19.27%
A2-A	258,385	AAA/AAA	22.33%
A2-B Floating	65,000	AAA/AAA	5.62%
A-3	388,134	AAA/AAA	33.55%
A-4	106,731	AAA/AAA	9.23%
B	37,600	AA/AA	3.25%
C	31,820	A/A	2.75%
D	39,330	BBB/BBB	3.40%
Overcollateralization	6,942		0.60%
Aggregate Principal Balance	1,156,942		100%
Reserve Account	11,569		1.00%
Excess Spread			~ 3.86% per annum

CE = 11.0%

Losses

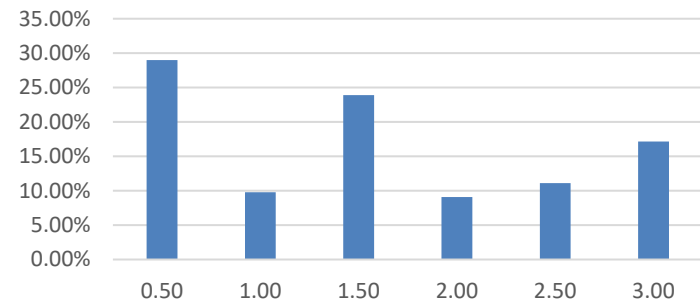
- Bonds are backed by the principal balance on a pool of auto loans
- Subordinated Tranches → Lower Credit Enhancement → Lower Ratings
- Hard Credit Enhancement for A tranches is 11.0%
- Rating Agency Loss Expectations: S&P = 2.90% ; Fitch = 2.80%

Corporate Exposure in AY70 as of 12/31/21



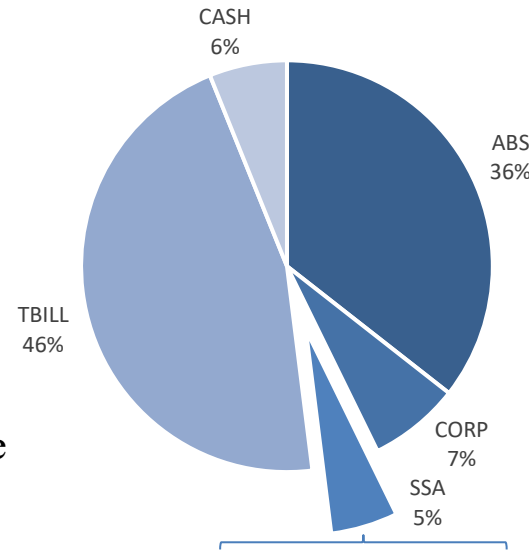
- Limit: <14 months/3yr to maturity for Fixed/FRN
 - ~92% floating as of 12/31/21
- Credit Rating: Long Term at least “A3”, Short Term at least “P1” or equivalent
- Concentration limits: if the corporate bond is rated AAA, it may be no more than 1% of the portfolio. Lower ratings have lower concentration limits.
- Risks:
 - Credit Downgrade
 - Spread widening
 - Liquidity

Corporates by Years to Maturity



Suprasovereigns (SSA)

- International Development Banks
 - AAA Rated
 - Capital is provided by regional and non-regional member countries
 - Regional members are those in the geographic target area
 - Non-regional members generally include the United States, United Kingdom, Canada, Japan, France and Germany, among others
- Regional Development Banks, Canadian Provinces
- Risks
 - Liquidity
 - Limited credit risk due to high quality sovereign ownership and conservative risk profiles



Examples:

African Development Bank (AFDB)
Asia Development Bank (ASIA)
Inter-American Development Bank (IADB)
European Investment Bank (EIB)
International Bank for Reconstruction and Development (IBRD)

Developments of Note LIBOR Transition

- AY70 Floating Rate Exposure as of 12/31/21:
 - 92% of Corporates
 - 15% of ABS
- LIBOR was discontinued for most tenors as of 12/31/21. US Dollar 1-month and 3-month tenors will still be published through June 2023.
- SOFR (Secured Overnight Financing Rate) is the heir apparent to LIBOR
 - SOFR is based on overnight transactions in the USD Treasury repo market
 - The Treasury Repo market is based on “risk free” transactions, so SOFR has been a less than natural fit for pricing products that contain inherent credit risk
- Corporate Bonds have in large part adopted SOFR as the reference rate for Floaters
- ABS has been slow to shift to SOFR referenced floaters
 - Floating rate tranches of ABS have declined to only 5% of total issuance in 2021

Investment Performance

December 31, 2021

Net Returns	NAV	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year	ITD
AY70: Short-term Fixed Income Pool	\$4,006,372,109	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%	2.69%
INDEX		0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%	2.43%
AY70: EXCESS		-0.01%	-0.01%	0.00%	0.04%	0.12%	0.16%	0.20%	0.22%	0.26%

STATE INVESTMENT REVIEW

December 31, 2021 Performance

Feb 2022

Victor Djajalie, CFA
Director of Internal Fixed Income

Capital Market Update

															2007 - 2021	
2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Ann.	Vol.
EM Equity 39.8%	Fixed Income 5.2%	EM Equity 79.0%	REITs 27.9%	REITs 8.3%	REITs 19.7%	Small Cap 38.8%	REITs 28.0%	REITs 2.8%	Small Cap 21.3%	EM Equity 37.8%	Cash 1.8%	Large Cap 31.5%	Small Cap 20.0%	REITs 41.3%	Large Cap 10.6%	REITs 23.2%
Comdty. 16.2%	Cash 1.8%	High Yield 59.4%	Small Cap 26.9%	Fixed Income 7.8%	High Yield 19.6%	Large Cap 32.4%	Large Cap 13.7%	Large Cap 1.4%	High Yield 14.3%	DM Equity 25.6%	Fixed Income 0.0%	REITs 28.7%	EM Equity 18.7%	Large Cap 28.7%	Small Cap 8.7%	EM Equity 22.9%
DM Equity 11.6%	Asset Alloc. 25.4%	DM Equity 32.5%	EM Equity 19.2%	High Yield 3.1%	EM Equity 18.6%	DM Equity 23.3%	Fixed Income 6.0%	Fixed Income 0.5%	Large Cap 12.0%	Large Cap 21.8%	REITs -4.0%	Small Cap 25.5%	Large Cap 18.4%	Comdty. 27.1%	REITs 7.5%	Small Cap 22.5%
Asset Alloc. 7.1%	High Yield -26.9%	REITs 28.0%	Comdty. 16.8%	Large Cap 2.1%	DM Equity 17.9%	Asset Alloc. 14.9%	Asset Alloc. 5.2%	Cash 0.0%	Comdty. 11.8%	Small Cap 14.6%	High Yield -4.1%	DM Equity 22.7%	Asset Alloc. 10.6%	Small Cap 14.8%	High Yield 6.6%	Comdty. 19.1%
Fixed Income 7.0%	Small Cap -33.8%	Small Cap 27.2%	Large Cap 15.1%	Cash 0.1%	Small Cap 16.3%	High Yield 7.3%	Small Cap 4.9%	DM Equity -0.4%	EM Equity 11.6%	Asset Alloc. 14.6%	Large Cap -4.4%	Asset Alloc. 19.5%	DM Equity 8.3%	Asset Alloc. 13.4%	Asset Alloc. 5.7%	DM Equity 18.9%
Large Cap 5.5%	Comdty. -35.6%	Large Cap 25.5%	High Yield 14.8%	Asset Alloc. -0.7%	Large Cap 16.0%	REITs 2.9%	Cash 0.0%	Asset Alloc. -2.0%	REITs 8.6%	High Yield 10.4%	Asset Alloc. -5.8%	EM Equity 18.9%	Fixed Income 7.5%	DM Equity 11.8%	EM Equity 4.8%	Large Cap 16.9%
Cash 4.8%	Large Cap -37.0%	Asset Alloc. 25.0%	Asset Alloc. 13.3%	Small Cap -4.2%	Asset Alloc. 12.2%	Cash 0.0%	High Yield 0.0%	High Yield -2.7%	Asset Alloc. 8.3%	REITs 8.7%	Small Cap -11.0%	High Yield 12.6%	High Yield 7.0%	High Yield 1.0%	DM Equity 4.1%	High Yield 12.2%
High Yield 3.2%	REITs -37.7%	Comdty. 18.9%	DM Equity 8.2%	DM Equity -11.7%	Fixed Income 4.2%	Fixed Income -2.0%	EM Equity -1.8%	Small Cap -4.4%	Fixed Income 2.6%	Fixed Income 3.5%	Comdty. -11.2%	Fixed Income 8.7%	Cash 0.5%	Cash 0.0%	Fixed Income 4.1%	Asset Alloc. 11.7%
Small Cap -1.6%	DM Equity -43.1%	Fixed Income 5.9%	Fixed Income 6.5%	Comdty. -13.3%	Cash 0.1%	EM Equity -2.3%	DM Equity -4.5%	EM Equity -14.6%	DM Equity 1.5%	Comdty. 1.7%	DM Equity -13.4%	Comdty. 7.7%	Comdty. -3.1%	Fixed Income -1.5%	Cash 0.8%	Fixed Income 3.3%
REITs -15.7%	EM Equity -53.2%	Cash 0.1%	Cash 0.1%	EM Equity -18.2%	Comdty. -1.1%	Comdty. -9.5%	Comdty. -17.0%	Comdty. -24.7%	Cash 0.3%	Cash 0.8%	EM Equity -14.2%	Cash 2.2%	REITs -5.1%	EM Equity -2.2%	Comdty. -2.6%	Cash 0.7%

Source: Bloomberg, FactSet, MSCI, NAREIT, Russell, Standard & Poor's, J.P. Morgan Asset Management.

Large cap: S&P500, Small cap: Russell 2000, EM Equity: MSCI EME, DM Equity: MSCI EAFE, Comdty: Bloomberg Commodity Index, High Yield: Bloomberg Global HY Index, Fixed Income: Bloomberg US Aggregate, REITs: NAREIT Equity REIT Index, Cash: Bloomberg 1-3m Treasury. The "Asset Allocation" portfolio assumes the following weights: 25% in the S&P500, 10% in the Russell 2000, 15% in the MSCI EAFE, 5% in the MSCI EME, 25% in the Bloomberg US Aggregate, 5% in the Bloomberg 1-3m Treasury, 5% in the Bloomberg Global High Yield Index, 5% in the Bloomberg Commodity Index and 5% in the NAREIT Equity REIT Index. Balanced portfolio assumes annual rebalancing. Annualized (Ann.) return and volatility (Vol.) represents period from 12/31/2006 to 12/31/2021. Please see disclosure page at end for index definitions. All data represents total return for stated period. The "Asset Allocation" portfolio is for illustrative purposes only. Past performance is not indicative of future returns. Guide to the Markets - U.S. Data as of December 31, 2021.

J.P.Morgan
ASSET MANAGEMENT

Equity Market

- Domestic equity delivered stellar performance in 2021 despite uncertainties from ongoing Pandemic and hawkish Fed.
- Domestic equity valuations seem full based on the Price/Earning ratio.
- International equity has lagged domestic equity performance and appears undervalued.

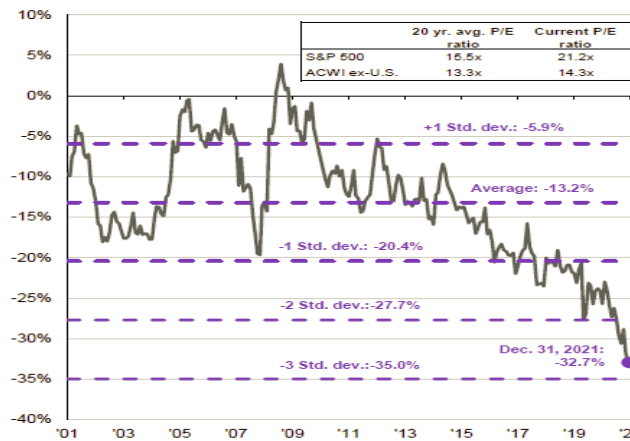
S&P 500 Index: Forward P/E ratio



Source: FactSet, FRED, Robert Shiller, Refinitiv Datastream, Standard & Poor's, Thomson Reuters, J.P. Morgan Asset Management. Price-to-earnings is price divided by consensus analyst estimates of earnings per share for the next 12 months as provided by IBES since December 1996, and J.P. Morgan Asset Management for December 31, 2021. Current next 12-month consensus earnings estimates are \$228. Average P/E and standard deviations are calculated using 25 years of IBES history. Shiller's P/E uses trailing 10 years of inflation-adjusted earnings as reported by companies. Dividend yield is calculated as the next 12-month consensus dividend divided by most recent price. Price-to-book ratio is the price divided by book value per share. Price-to-cash flow is price divided by NTM cash flow. EY minus Baa yield is the forward earnings yield (consensus analyst estimates of EPS over the next 12 months divided by price) minus the Moody's Baa-aa corporate bond yield. Std. dev. over-/under-valued is calculated using the average and standard deviation over 25 years for each measure. *P/CF is a 20-year average due to cash flow availability. Guide to the Markets - U.S. Data as of December 31, 2021.

J.P.Morgan
ASSET MANAGEMENT

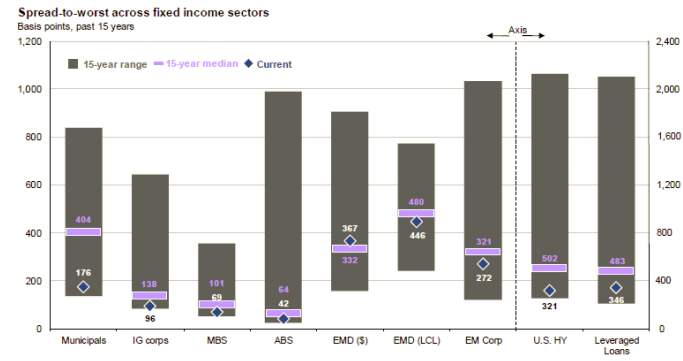
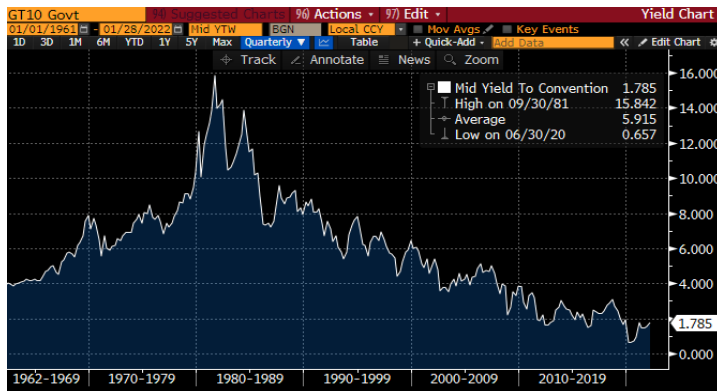
International: Price-to-earnings discount vs. U.S.
MSCI AC World ex-U.S. vs. S&P 500 Indices, next 12 months



Source: FactSet, MSCI, Standard & Poor's, J.P. Morgan Asset Management.

Fixed Income Market

- US treasury rates remained low by historical standard despite recent selloffs spurred by Fed tapering announcement and expectation of Fed hikes.
- Similar to domestic equities, valuations are tight for fixed income sectors as measured by historical spread levels.
- Company fundamentals remained robust, supported by strong profit margin and healthy balance sheet.



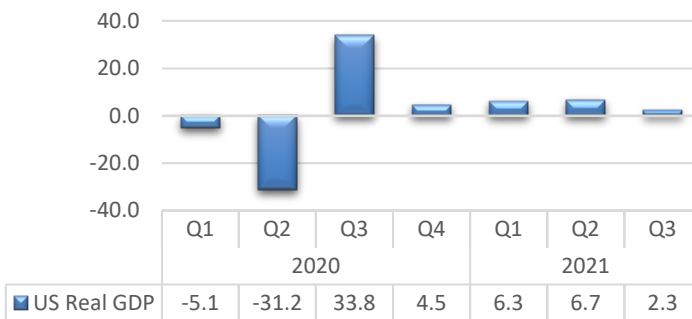
Source: Bloomberg FactSet, J.P. Morgan Credit Research, J.P. Morgan Asset Management. Indices used are Bloomberg except for emerging market debt and leveraged loans. EMD (\$): J.P. Morgan EMD Global Diversified Index; EMD (LCL): J.P. Morgan GBI-EM Global Diversified Index; EM Corp.: J.P. Morgan CEMB Broad Diversified; Leveraged Loans: JPM Leveraged Loan Index. Spread-to-worst indicated is the difference between the yield-to-worst of a bond and yield-to-worst of U.S. Treasury security with a similar duration. All sectors shown are spread-to-worst except for Municipals, which is based on the tax-equivalent yield-to-worst, and leveraged loans, which are based on spread-to-worst (takeout). EMD (LCL) spread-to-worst calculated using the index yield less the TTM on the 5-year U.S. Treasury benchmark index. GuideStar Market - U.S. Data as of December 31, 2021.

J.P.Morgan
 ASSET MANAGEMENT

Economic Conditions

- Economic growth remained on track despite challenges caused by the Pandemic.
- Labor condition has improved significantly since the pandemic. The US has recouped 18.8 million, or 84% from 22.4 million jobs lost during the early pandemic. Unemployment has now reached 3.9%, slightly above 3.5% during the pre pandemic period.

US Real GDP



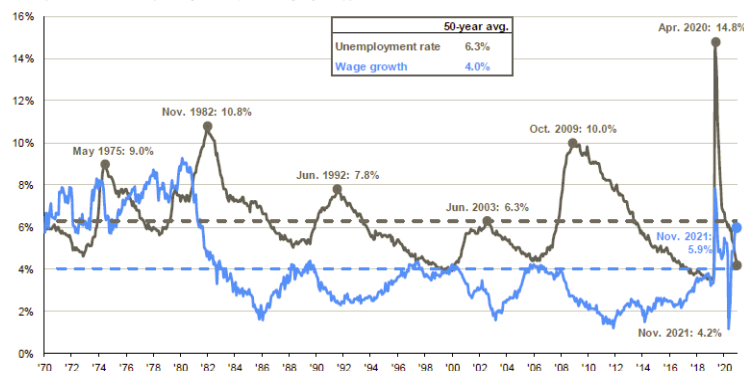
JOLTS job openings



Source: U.S. Department of Labor, J.P. Morgan Asset Management
GuidetotheMarkets - U.S. Data as of December 31, 2021.

Civilian unemployment rate and year-over-year wage growth

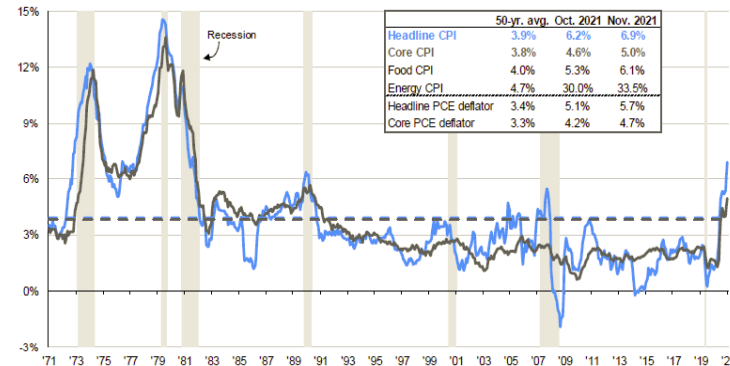
Private production and non-supervisory workers, seasonally adjusted, percent



Source: BLS, FactSet, J.P. Morgan Asset Management
GuidetotheMarkets - U.S. Data as of December 31, 2021.

CPI and core CPI

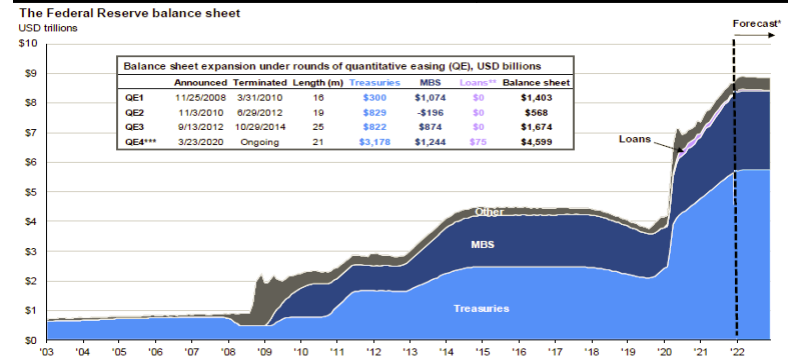
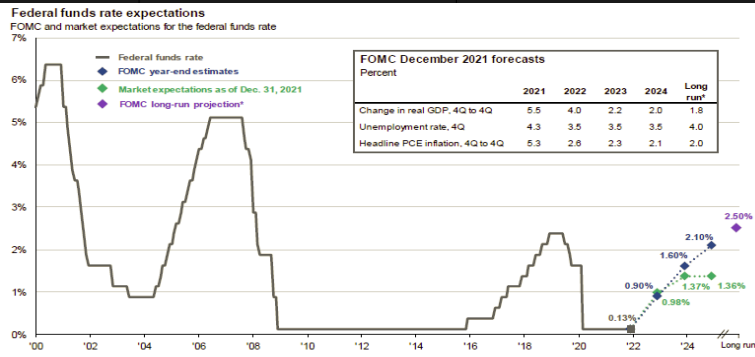
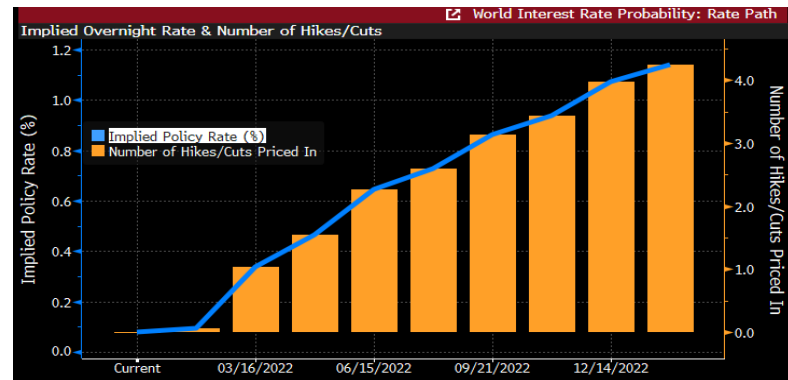
% change vs. prior year, seasonally adjusted



Source: BLS, FactSet, J.P. Morgan Asset Management
CPI used is CPIU and values shown are % change vs. one year ago. Core CPI is defined as CPI excluding food and energy prices. The Personal Consumption Expenditure (PCE) deflator employs an evolving chain-weighted basket of consumer expenditures instead of the fixed-weight basket used in CPI calculations.

Inflation and Fed

- Supply shortage, tight labor condition exacerbated by delays in global shipping spurred inflation. Core PCE reached as high as 4.5% as of December 2021, exceeding Fed's 2% target.
- Fed has turned hawkish with their announcement of tapering and markets pricing in multiple hikes in the near future.



Source: Bloomberg, FactSet, Federal Reserve, J.P. Morgan Asset Management.
 Market expectations are based off of the US Overnight Index Forward Swap rates. *Long-run projections are the rates of growth, unemployment and inflation to which a policymaker expects the economy to converge over the next five to six years in absence of further shocks and under appropriate monetary policy. Forecasts are not a reliable indicator of future performance. Forecasts, projections and other forward-looking statements are based upon current beliefs and expectations. They are for illustrative purposes only and do not constitute an indication of what may occur. Given the inherent uncertainties and risks associated with forecasts, projections or other forward-looking statements, actual events, results or performance may differ materially from those reflected or contemplated.
 Guide to the Markets - U.S. Data as of December 31, 2021.

Source: FactSet, Federal Reserve, J.P. Morgan Asset Management.
 Currently, the balance sheet contains \$5.7n in Treasuries and \$2.6n in MBS. The balance sheet forecast assumes the Federal Reserve reduces the pace of purchases of Treasuries and MBS by \$100bn per month, beginning January through mid-March, as suggested in the December 2021 FOMC meeting. **Loans include liquidity and credit extended through corporate credit facilities established in March 2020. Other includes primary, secondary and seasonal loans, repurchase agreements, foreign currency reserves and tradable securities. ***QE4 is ongoing and the expansion figures are of the most recent Wednesday close as reported by the Federal Reserve. Forecasts are not a reliable indicator of future performance. Forecasts, projections and other forward-looking statements are based upon current beliefs and expectations. They are for illustrative purposes only and serve as an indication of what may occur. Given the inherent uncertainties and risks associated with forecasts, projections or other forward-looking statements, actual events, results or performance may differ materially from those reflected or contemplated.
 Guide to the Markets - U.S. Data as of December 31, 2021.

COMMISSIONER'S REPORT

As of December 31, 2021

DOR Commissioner's Report: Market Values for Month Ending 12/31/2021

Market Value

Plan Name	Cash Equivalents	Domestic Equity	Fixed Income	Int'l Equity	REITs	Market Value
2008 Transportation Project Government Bonds (AY2Q)	\$760,619					\$760,619
2010 Education Tax Exempt Bonds (AY3V)	\$2,642					\$2,642
2013B Tax Exempt Education (AY3Z)	\$191,551					\$191,551
2016A - 2012 Transportation Bond Act (AY3Y)	\$1,409,522					\$1,409,522
2016B - 2012 Transportation Bond Act (AY3Q)	\$74,829,152					\$74,829,152
Alaska Higher Education Investment (AY3L)	\$4,061,180	\$171,913,716	\$120,825,441	\$102,604,731	\$23,395,313	\$422,800,381
Alaska Mental Health Trust Reserve (AY2L)	\$7,625	\$22,001,466	\$26,815,412	\$14,275,426		\$63,099,930
ASLC Investment Fund (AY3S)	\$55,354,505	\$4,403,937	\$22,266,007	\$2,516,456	\$921,675	\$85,462,580
Constitutional Budget Reserve Fund (AY19)	\$1,089,016,176					\$1,089,016,176
Education Endowment Fund (AY3G)	\$8,842	\$346,986	\$243,841	\$207,120	\$47,206	\$853,996
EVOS Habitat Investment (AY2H)	\$11,724	\$29,258,898	\$46,551,093	\$19,603,105		\$95,424,820
EVOS Research Investment (AY02)	\$12,683	\$34,657,548	\$46,714,111	\$22,913,431		\$104,297,774
GeFONSI I (AY01)	\$1,314,935,507		\$211,951,116			\$1,526,886,622
GeFONSI II (AY3F)	\$814,068,113	\$55,679,668	\$330,071,142	\$25,768,131		\$1,225,587,054
Illinois Creek Mine Reclamation (AY9J)	\$15,052	\$622,970	\$437,803	\$371,871	\$84,804	\$1,532,501
International Airports 2006 Non-AMT (AY9X)	\$1,477,213					\$1,477,213
International Airports 2009 Variable (AY9Y)	\$90,276					\$90,276
International Airports 2010-B (AY3B)	\$176,213					\$176,213
International Airports Repair & Replacement Fund (AY05)	\$500,115					\$500,115
International Airports Revenue Fund (AY04)	\$137,828,583		\$24,583,790			\$162,412,372
International Airports Series 2002 Reserve Account (AY2E)	\$16,404,534					\$16,404,534
International Airports Series 2003 Reserve (AY2U)	\$10,514,111					\$10,514,111
Investment Loss Trust Fund (AY28)	\$3,418,235					\$3,418,235
PCE Endowment Fund (AY13)	\$10,856,783	\$391,862,520	\$481,185,272	\$228,001,300	\$51,975,996	\$1,163,881,871
Permanent Fund Dividend Holding Account (AY2G)	\$52,861,082					\$52,861,082
Public School Trust Fund (AY08)	\$9,130,658	\$345,508,821	\$242,832,772	\$206,213,054	\$47,019,204	\$850,704,508
RHIF LTC Insurance (AY11)	\$9,827,881	\$273,891,407	\$310,957,993	\$162,263,197	\$35,227,841	\$792,168,318
RHIF Major Medical (AY03)	\$18,423,328					\$18,423,328

DOR Commissioner's Report: Market Values for Month Ending 12/31/2021

Relative Allocation

Plan Name	Cash Equivalents	Domestic Equity	Fixed Income	Int'l Equity	REITs
2008 Transportation Project Government Bonds (AY2Q)	0.00% ●				
2010 Education Tax Exempt Bonds (AY3V)	0.00% ●				
2013B Tax Exempt Education (AY3Z)	0.00% ●				
2016A - 2012 Transportation Bond Act (AY3Y)	0.00% ●				
2016B - 2012 Transportation Bond Act (AY3Q)	0.00% ●				
Alaska Higher Education Investment (AY3L)	-0.04% ●	1.66% ❌	-1.42% ❌	-0.73% ◆	0.53% ◆
Alaska Mental Health Trust Reserve (AY2L)	0.01% ●	1.87% ❌	-1.50% ❌	-0.38% ▲	
ASLC Investment Fund (AY3S)	-0.23% ●	0.15% ●	0.05% ●	-0.06% ●	0.08% ●
Constitutional Budget Reserve Fund (AY19)	0.00% ●				
Education Endowment Fund (AY3G)	0.04% ●	1.63% ❌	-1.45% ❌	-0.75% ◆	0.53% ◆
EVOS Habitat Investment (AY2H)	0.01% ●	1.76% ❌	-1.52% ❌	-0.26% ▲	
EVOS Research Investment (AY02)	0.01% ●	1.83% ❌	-1.51% ❌	-0.33% ▲	
GeFONSI I (AY01)	1.12% ❌		-1.12% ❌		
GeFONSI II (AY3F)	-1.58% ❌	0.54% ◆	0.93% ❌	0.10% ●	
Illinois Creek Mine Reclamation (AY9J)	-0.02% ●	1.65% ❌	-1.43% ❌	-0.73% ◆	0.53% ◆
International Airports 2006 Non-AMT (AY9X)	0.00% ●				
International Airports 2009 Variable (AY9Y)	0.00% ●				
International Airports 2010-B (AY3B)	0.00% ●				
International Airports Repair & Replacement Fund (AY05)	0.00% ●				
International Airports Revenue Fund (AY04)	-0.14% ●		0.14% ●		
International Airports Series 2002 Reserve Account (AY2E)	0.00% ●				
International Airports Series 2003 Reserve (AY2U)	0.00% ●				
Investment Loss Trust Fund (AY28)	0.00% ●				
PCE Endowment Fund (AY13)	-0.07% ●	1.67% ❌	-1.66% ❌	-0.41% ▲	0.47% ▲
Permanent Fund Dividend Holding Account (AY2G)	0.00% ●				
Public School Trust Fund (AY08)	0.07% ●	1.61% ❌	-1.46% ❌	-0.76% ❌	0.53% ◆
RHIF LTC Insurance (AY11)	0.24% ●	1.57% ❌	-1.75% ❌	-0.52% ◆	0.45% ▲
RHIF Major Medical (AY03)	0.00% ●				

DOR Commissioner's Report: Market Values for Month Ending 12/31/2021

Actual Allocation

Plan Name	Cash Equivalents	Domestic Equity	Fixed Income	Int'l Equity	REITs
2008 Transportation Project Government Bonds (AY2Q)	100.00%				
2010 Education Tax Exempt Bonds (AY3V)	100.00%				
2013B Tax Exempt Education (AY3Z)	100.00%				
2016A - 2012 Transportation Bond Act (AY3Y)	100.00%				
2016B - 2012 Transportation Bond Act (AY3Q)	100.00%				
Alaska Higher Education Investment (AY3L)	0.96%	40.66%	28.58%	24.27%	5.53%
Alaska Mental Health Trust Reserve (AY2L)	0.01%	34.87%	42.50%	22.62%	
ASLC Investment Fund (AY3S)	64.77%	5.15%	26.05%	2.94%	1.08%
Constitutional Budget Reserve Fund (AY19)	100.00%				
Education Endowment Fund (AY3G)	1.04%	40.63%	28.55%	24.25%	5.53%
EVOS Habitat Investment (AY2H)	0.01%	30.66%	48.78%	20.54%	
EVOS Research Investment (AY02)	0.01%	33.23%	44.79%	21.97%	
GeFONSI I (AY01)	86.12%		13.88%		
GeFONSI II (AY3F)	66.42%	4.54%	26.93%	2.10%	
Illinois Creek Mine Reclamation (AY9J)	0.98%	40.65%	28.57%	24.27%	5.53%
International Airports 2006 Non-AMT (AY9X)	100.00%				
International Airports 2009 Variable (AY9Y)	100.00%				
International Airports 2010-B (AY3B)	100.00%				
International Airports Repair & Replacement Fund (AY05)	100.00%				
International Airports Revenue Fund (AY04)	84.86%		15.14%		
International Airports Series 2002 Reserve Account (AY2E)	100.00%				
International Airports Series 2003 Reserve (AY2U)	100.00%				
Investment Loss Trust Fund (AY28)	100.00%				
PCE Endowment Fund (AY13)	0.93%	33.67%	41.34%	19.59%	4.47%
Permanent Fund Dividend Holding Account (AY2G)	100.00%				
Public School Trust Fund (AY08)	1.07%	40.61%	28.54%	24.24%	5.53%
RHIF LTC Insurance (AY11)	1.24%	34.57%	39.25%	20.48%	4.45%
RHIF Major Medical (AY03)	100.00%				

DOR Commissioner's Report: Market Values for Month Ending 12/31/2021

Target Allocation

Plan Name	Cash Equivalents	Domestic Equity	Fixed Income	Int'l Equity	REITs
2008 Transportation Project Government Bonds (AY2Q)	100.00%				
2010 Education Tax Exempt Bonds (AY3V)	100.00%				
2013B Tax Exempt Education (AY3Z)	100.00%				
2016A - 2012 Transportation Bond Act (AY3Y)	100.00%				
2016B - 2012 Transportation Bond Act (AY3Q)	100.00%				
Alaska Higher Education Investment (AY3L)	1.00%	39.00%	30.00%	25.00%	5.00%
Alaska Mental Health Trust Reserve (AY2L)	0.00%	33.00%	44.00%	23.00%	
ASLC Investment Fund (AY3S)	65.00%	5.00%	26.00%	3.00%	1.00%
Constitutional Budget Reserve Fund (AY19)	100.00%				
Education Endowment Fund (AY3G)	1.00%	39.00%	30.00%	25.00%	5.00%
EVOS Habitat Investment (AY2H)	0.00%	28.90%	50.30%	20.80%	
EVOS Research Investment (AY02)	0.00%	31.40%	46.30%	22.30%	
GeFONSI I (AY01)	85.00%		15.00%		
GeFONSI II (AY3F)	68.00%	4.00%	26.00%	2.00%	
Illinois Creek Mine Reclamation (AY9J)	1.00%	39.00%	30.00%	25.00%	5.00%
International Airports 2006 Non-AMT (AY9X)	100.00%				
International Airports 2009 Variable (AY9Y)	100.00%				
International Airports 2010-B (AY3B)	100.00%				
International Airports Repair & Replacement Fund (AY05)	100.00%				
International Airports Revenue Fund (AY04)	85.00%		15.00%		
International Airports Series 2002 Reserve Account (AY2E)	100.00%				
International Airports Series 2003 Reserve (AY2U)	100.00%				
Investment Loss Trust Fund (AY28)	100.00%				
PCE Endowment Fund (AY13)	1.00%	32.00%	43.00%	20.00%	4.00%
Permanent Fund Dividend Holding Account (AY2G)	100.00%				
Public School Trust Fund (AY08)	1.00%	39.00%	30.00%	25.00%	5.00%
RHIF LTC Insurance (AY11)	1.00%	33.00%	41.00%	21.00%	4.00%
RHIF Major Medical (AY03)	100.00%				

DOR Commissioner's Report: Net Pool Performance for Month Ending 12/31/2021

Relative Performance (Net of Fee)	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year
Broad Market Fixed Income	-0.02% ▲	-0.19% ◆	-0.21% ◆	-0.24% ◆	0.25% ●	0.12% ●	0.16% ●	0.14% ●
Domestic Equity*	0.03% ●	0.07% ●	0.09% ●	0.07% ●	-0.08% ◆	-0.10% ◆		
Internally Managed REITs	0.02% ●	-0.02% ▲						
International Equity*	-0.01% ▲	0.06% ●	0.04% ●	0.08% ●	0.01% ●	-0.02% ▲		
Short-term Fixed Income Pool	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
Pool Performance (Net of Fee)	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year
Broad Market Fixed Income	-0.28%	-0.18%	-0.15%	-1.78%	5.05%	3.69%	3.57%	3.04%
Domestic Equity*	3.97%	9.35%	9.26%	25.73%	25.71%	17.86%		
Internally Managed REITs	9.62%	16.15%						
International Equity*	4.12%	1.87%	-1.19%	7.90%	13.19%	9.59%		
Short-term Fixed Income Pool	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
Benchmark Performance	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year
Broad Market Fixed Income	-0.26%	0.01%	0.06%	-1.54%	4.79%	3.57%	3.41%	2.90%
Domestic Equity*	3.94%	9.28%	9.17%	25.66%	25.79%	17.97%		
Internally Managed REITs	9.60%	16.17%						
International Equity*	4.13%	1.82%	-1.22%	7.82%	13.18%	9.61%		
Short-term Fixed Income Pool	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%

*Equity performance reflects data as of July 1, 2016 due to accounting structure change.

DOR Commissioner's Report: Net Plan Performance for Month Ending 12/31/2021

Relative Performance (Net of Fee)	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year
2008 Transportation Project Government Bonds (AY2Q)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
2010 Education Tax Exempt Bonds (AY3V)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.12% ●	0.16% ●	0.21% ●	0.22% ●
2013B Tax Exempt Education (AY3Z)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	
2016A - 2012 Transportation Bond Act (AY3Y)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.09% ●	0.14% ●	0.20% ●	
2016B - 2012 Transportation Bond Act (AY3Q)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●		
Alaska Higher Education Investment (AY3L)	0.00% ●	-0.04% ▲	-0.10% ◆	-0.17% ◆	-0.05% ◆	-0.05% ▲	-0.02% ▲	
Alaska Mental Health Trust Reserve (AY2L)	0.00% ▲	-0.07% ◆	-0.07% ◆	-0.11% ◆	0.13% ●	0.11% ●	0.12% ●	0.34% ●
ASLC Investment Fund (AY3S)	-0.01% ▲	-0.05% ◆						
Constitutional Budget Reserve Fund (AY19)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.14% ●	0.14% ●	0.20% ●	0.19% ●
Education Endowment Fund (AY3G)	0.00% ●	-0.05% ▲	-0.08% ◆	-0.16% ◆				
EVOS Habitat Investment (AY2H)	-0.01% ▲	-0.09% ◆	-0.09% ◆	-0.31% ◆	-0.12% ◆	-0.07% ◆	0.03% ●	0.32% ●
EVOS Research Investment (AY02)	0.00% ▲	-0.08% ◆	-0.08% ◆	-0.21% ◆	-0.06% ◆	-0.06% ◆	0.01% ●	0.32% ●
GeFONSI I (AY01)	-0.01% ▲	-0.04% ▲	-0.05% ▲	-0.03% ▲	0.10% ●	0.13% ●	0.17% ●	0.19% ●
GeFONSI II (AY3F)	-0.01% ▲	-0.08% ◆	-0.07% ◆	-0.10% ◆	0.04% ●			
Illinois Creek Mine Reclamation (AY9J)	0.00% ●	-0.05% ▲	-0.08% ◆	-0.15% ◆	-0.09% ◆	-0.08% ◆	-0.05% ▲	0.12% ●
International Airports 2006 Non-AMT (AY9X)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
International Airports 2009 Variable (AY9Y)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
International Airports 2010-B (AY3B)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
International Airports Repair & Replacement Fund (AY05)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
International Airports Revenue Fund (AY04)	-0.01% ▲	-0.04% ▲	-0.04% ▲	-0.01% ▲	0.09% ●	0.15% ●	0.20% ●	0.22% ●
International Airports Series 2002 Reserve Account (AY2E)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
International Airports Series 2003 Reserve (AY2U)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
Investment Loss Trust Fund (AY28)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●
PCE Endowment Fund (AY13)	0.00% ▲	-0.08% ◆	-0.16% ◆	-0.23% ◆	-0.10% ◆	-0.10% ◆	-0.03% ▲	0.19% ●
Permanent Fund Dividend Holding Account (AY2G)	0.00% ▲	-0.01% ▲	-0.01% ▲	0.04% ●	0.10% ●	0.30% ●	0.31% ●	0.27% ●
Public School Trust Fund (AY08)	0.00% ●	-0.05% ▲	-0.08% ◆	-0.15% ◆	-0.02% ▲	-0.07% ◆	-0.02% ▲	0.04% ●
RHIF LTC Insurance (AY11)	-0.01% ▲	-0.07% ◆	-0.16% ◆	-0.23% ◆	0.03% ●	-0.02% ▲	0.06% ●	0.19% ●
RHIF Major Medical (AY03)	0.00% ▲	-0.01% ▲	0.00% ▲	0.04% ●	0.11% ●	0.16% ●	0.21% ●	0.22% ●

DOR Commissioner's Report: Net Plan Performance for Month Ending 12/31/2021

Plan Performance (Net of Fee)	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year
2008 Transportation Project Government Bonds (AY2Q)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
2010 Education Tax Exempt Bonds (AY3V)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
2013B Tax Exempt Education (AY3Z)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	
2016A - 2012 Transportation Bond Act (AY3Y)	0.00%	0.00%	0.02%	0.09%	1.09%	1.29%	1.20%	
2016B - 2012 Transportation Bond Act (AY3Q)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%		
Alaska Higher Education Investment (AY3L)	3.01%	4.84%	3.99%	12.55%	16.35%	11.54%	10.66%	
Alaska Mental Health Trust Reserve (AY2L)	2.15%	3.41%	2.69%	9.03%	14.10%	10.24%	9.59%	9.38%
ASLC Investment Fund (AY3S)	0.34%	0.18%						
Constitutional Budget Reserve Fund (AY19)	0.00%	0.00%	0.02%	0.09%	2.33%	2.14%	2.09%	1.62%
Education Endowment Fund (AY3G)	3.00%	4.84%	4.01%	12.56%				
EVOS Habitat Investment (AY2H)	1.88%	2.98%	2.33%	7.51%	13.00%	10.02%	9.62%	9.94%
EVOS Research Investment (AY02)	2.05%	3.24%	2.55%	8.42%	13.53%	10.30%	9.82%	10.07%
GeFONSI I (AY01)	-0.04%	-0.03%	-0.02%	-0.35%	1.34%	1.36%	1.27%	0.96%
GeFONSI II (AY3F)	0.18%	0.34%	0.30%	0.85%	3.56%			
Illinois Creek Mine Reclamation (AY9J)	3.01%	4.84%	4.01%	12.57%	16.32%	11.50%	10.63%	7.23%
International Airports 2006 Non-AMT (AY9X)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
International Airports 2009 Variable (AY9Y)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
International Airports 2010-B (AY3B)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
International Airports Repair & Replacement Fund (AY05)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
International Airports Revenue Fund (AY04)	-0.04%	-0.03%	-0.01%	-0.33%	2.35%	2.20%	2.13%	1.54%
International Airports Series 2002 Reserve Account (AY2E)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
International Airports Series 2003 Reserve (AY2U)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
Investment Loss Trust Fund (AY28)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%
PCE Endowment Fund (AY13)	2.39%	3.91%	3.20%	7.12%	11.99%	8.99%	8.58%	9.42%
Permanent Fund Dividend Holding Account (AY2G)	0.00%	0.00%	0.02%	0.09%	1.10%	1.44%	1.32%	0.90%
Public School Trust Fund (AY08)	3.00%	4.84%	4.01%	12.56%	16.34%	11.07%	10.22%	8.90%
RHIF LTC Insurance (AY11)	2.47%	4.02%	3.27%	8.05%	12.88%	8.97%	8.33%	7.34%
RHIF Major Medical (AY03)	0.00%	0.00%	0.02%	0.09%	1.11%	1.30%	1.21%	0.85%

DOR Commissioner's Report: Net Plan Performance for Month Ending 12/31/2021

Benchmark Performance	1 Month	3 Month	FYTD	1 Year	3 Year	5 Year	6 Year	10 Year
2008 Transportation Project Government Bonds (AY2Q)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
2010 Education Tax Exempt Bonds (AY3V)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
2013B Tax Exempt Education (AY3Z)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	
2016A - 2012 Transportation Bond Act (AY3Y)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	
2016B - 2012 Transportation Bond Act (AY3Q)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%		
Alaska Higher Education Investment (AY3L)	3.00%	4.88%	4.09%	12.72%	16.41%	11.59%	10.68%	
Alaska Mental Health Trust Reserve (AY2L)	2.15%	3.48%	2.76%	9.14%	13.97%	10.13%	9.46%	9.04%
ASLC Investment Fund (AY3S)	0.35%	0.23%						
Constitutional Budget Reserve Fund (AY19)	0.01%	0.01%	0.02%	0.05%	2.19%	2.00%	1.89%	1.43%
Education Endowment Fund (AY3G)	3.00%	4.88%	4.09%	12.72%				
EVOS Habitat Investment (AY2H)	1.89%	3.07%	2.42%	7.82%	13.12%	10.09%	9.59%	9.61%
EVOS Research Investment (AY02)	2.06%	3.32%	2.63%	8.63%	13.59%	10.36%	9.81%	9.75%
GeFONSI I (AY01)	-0.03%	0.01%	0.03%	-0.32%	1.23%	1.23%	1.10%	0.78%
GeFONSI II (AY3F)	0.18%	0.42%	0.38%	0.95%	3.51%			
Illinois Creek Mine Reclamation (AY9J)	3.00%	4.88%	4.09%	12.72%	16.41%	11.59%	10.68%	7.11%
International Airports 2006 Non-AMT (AY9X)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
International Airports 2009 Variable (AY9Y)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
International Airports 2010-B (AY3B)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
International Airports Repair & Replacement Fund (AY05)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
International Airports Revenue Fund (AY04)	-0.03%	0.01%	0.03%	-0.32%	2.27%	2.04%	1.93%	1.33%
International Airports Series 2002 Reserve Account (AY2E)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
International Airports Series 2003 Reserve (AY2U)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
Investment Loss Trust Fund (AY28)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
PCE Endowment Fund (AY13)	2.39%	3.98%	3.36%	7.35%	12.09%	9.09%	8.61%	9.23%
Permanent Fund Dividend Holding Account (AY2G)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%
Public School Trust Fund (AY08)	3.00%	4.88%	4.09%	12.72%	16.36%	11.14%	10.24%	8.86%
RHIF LTC Insurance (AY11)	2.48%	4.10%	3.44%	8.28%	12.85%	8.99%	8.27%	7.15%
RHIF Major Medical (AY03)	0.01%	0.01%	0.02%	0.05%	0.99%	1.14%	1.01%	0.63%

DOR Commissioner's Report: External Management Fees as of Month Ending 12/31/2021

Plan Fees for the Last Year

Plan	Fee as a %
2008 Transportation Project Government Bonds (AY2Q)	0.0000%
2010 Education Tax Exempt Bonds (AY3V)	0.0000%
2013B Tax Exempt Education (AY3Z)	0.0000%
2016A - 2012 Transportation Bond Act (AY3Y)	0.0000%
2016B - 2012 Transportation Bond Act (AY3Q)	0.0000%
Alaska Higher Education Investment (AY3L)	0.0059%
Alaska Mental Health Trust Reserve (AY2L)	0.0050%
Constitutional Budget Reserve Fund (AY19)	0.0000%
Education Endowment Fund (AY3G)	0.0060%
EVOS Habitat Investment (AY2H)	0.0044%
EVOS Research Investment (AY02)	0.0048%
GeFONSI I (AY01)	0.0000%
GeFONSI II (AY3F)	0.0006%
Illinois Creek Mine Reclamation (AY9J)	0.0059%
International Airports 2006 Non-AMT (AY9X)	0.0000%
International Airports 2009 Variable (AY9Y)	0.0000%
International Airports 2010-B (AY3B)	0.0000%
International Airports Repair & Replacement Fund (AY05)	0.0000%
International Airports Revenue Fund (AY04)	0.0000%
International Airports Series 2002 Reserve Account (AY2E)	0.0000%
International Airports Series 2003 Reserve (AY2U)	0.0000%
Investment Loss Trust Fund (AY28)	0.0000%
PCE Endowment Fund (AY13)	0.0041%
Permanent Fund Dividend Holding Account (AY2G)	0.0000%
Public School Trust Fund (AY08)	0.0059%
RHIF LTC Insurance (AY11)	0.0044%
RHIF Major Medical (AY03)	0.0000%

Commissioner's Report: Top GeFONSI Accounts for Month Ending: 12/31/2021

Program	Account Name	End Balance
GeFONSI I	General Fund	\$910,874,346.35
	Alaska Clean Water Fund	\$120,714,915.58
	Alaska Drinking Water Fund	\$69,452,833.28
	Oil & Hazardous Substance Release Response Account	\$44,791,729.83
	Fish & Game Fund	\$42,673,798.77
GeFONSI II	Statutory Budget Reserve Fund	\$162,821,130.88
	Public Education Fund	\$137,700,734.38
	Highway Equipment Working Capital Fund For Operating Appropriations	\$98,261,088.06
	Regional Ed Attendance Area School Fund	\$68,869,175.41
	Community Revenue Sharing Fund	\$67,511,925.18
Sum of 5 Largest GeFONSI I and II Funds		\$1,723,671,677.72

Non-Routine Investments

- The Department of Revenue is presented periodically with non-routine investment opportunities that fall outside the scope of its existing investment opportunity set.
- The state does not currently have any non-routine investments, and none are presently contemplated by investment staff.
- Non-routine investment process summary:
 - Document the investment opportunity and determine if it merits further diligence and/or if it is more suitable for other funding sources.
 - Seek legal advice on DOR eligibility.
 - Seek guidance from external auditors.
 - Use an impartial external expert to evaluate the opportunity and to provide an opinion on the investment.
 - Seek advice from the Investment Advisory Council.
 - Notify the Office of Management and Budget.
 - Complete diligence and investment documentation.
 - Inform the Chairs of the Senate and House Finance Committees of any decision to move forward with an investment.

Questions?

Callan



2022 Capital Markets Assumptions

Capital Markets Research Group

Agenda

Process overview

Why does Callan create capital markets projections?

Current market conditions

- Special topic: inflation

2022 expectations

- Economic outlook
- Asset class outlook
 - Equity
 - Fixed income
 - Alternative investments
- Forecast parameters
 - Returns
 - Risk
 - Correlation

Detailed 2022 projections and resulting portfolio returns

Callan

Process Overview

Why Make Capital Markets Projections?

Guiding objectives and process

A long-term strategic investment plan is the cornerstone of a prudent process.

- Capital markets projections are key elements to set reasonable return and risk expectations for the appropriate time horizon.
- Projections represent our best thinking regarding the long-term (10-year) outlook, recognizing our median projections represent the midpoint of a range, rather than a specific number.
- Develop results that are readily defensible both for individual asset classes and for total portfolios
- Be conscious of the level of change suggested in strategic allocations for long-term investors: DB plan sponsors, foundations, endowments, trusts, DC participants, families, and individuals
- Reflect common sense and recent market developments, within reason

Callan's forecasts are informed by current market conditions, but are not built directly from them.

- Balance recent, immediate performance and valuation against long-term equilibrium expectations

How are Capital Market Projections Constructed?

Guiding objectives and process

Underlying beliefs guide the development of the projections:

- An initial bias toward long-run averages
- A conservative bias
- An awareness of risk premiums
- A presumption that markets are ultimately clear and rational

Reflect our beliefs that long-term equilibrium relationships between the capital markets and lasting trends in global economic growth are key drivers to setting capital market expectations

Long-term compensated risk premiums represent “beta”—exposure to each broad market, whether traditional or “exotic,” with limited dependence on successful realization of alpha

The projection process is built around several key building blocks:

- Advanced modeling at the individual asset class level (e.g., a detailed bond model, an equity model)
- A path for interest rates and inflation
- A cohesive economic outlook
- A framework that encompasses Callan beliefs about the long-term operation and efficiencies of the capital markets

2022 Risk and Returns

Summary of Callan's Long-Term Capital Market Assumptions (2022 – 2031)

Asset Class	Index	Projected Return		Real	Projected Risk
		1-Year Arithmetic	10-Year Geometric*		Standard Deviation
Equities					
Broad U.S. Equity	Russell 3000	8.00%	6.60%	4.35%	17.95%
Large Cap U.S. Equity	S&P 500	7.85%	6.50%	4.25%	17.70%
Small/Mid Cap U.S. Equity	Russell 2500	8.75%	6.70%	4.45%	21.30%
Global ex-U.S. Equity	MSCI ACWI ex USA	8.70%	6.80%	4.55%	20.70%
Developed ex-U.S. Equity	MSCI World ex USA	8.25%	6.50%	4.25%	19.90%
Emerging Market Equity	MSCI Emerging Markets	9.80%	6.90%	4.65%	25.15%
Fixed Income					
Short Duration Gov't/Credit	Bloomberg 1-3 Yr G/C	1.50%	1.50%	-0.75%	2.00%
Core U.S. Fixed	Bloomberg Aggregate	1.80%	1.75%	-0.50%	3.75%
Long Government	Bloomberg Long Gov	1.85%	1.10%	-1.15%	12.50%
Long Credit	Bloomberg Long Cred	2.60%	2.10%	-0.15%	10.50%
Long Government/Credit	Bloomberg Long G/C	2.30%	1.80%	-0.45%	10.40%
TIPS	Bloomberg TIPS	1.35%	1.25%	-1.00%	5.05%
High Yield	Bloomberg High Yield	4.40%	3.90%	1.65%	10.75%
Global ex-U.S. Fixed	Bloomberg GI Agg xUSD	1.20%	0.80%	-1.45%	9.20%
Emerging Market Sovereign Debt	EMBI Global Diversified	4.00%	3.60%	1.35%	9.50%
Alternatives					
Core Real Estate	NCREIF ODCE	6.60%	5.75%	3.50%	14.20%
Private Infrastructure	MSCI Glb Infra/FTSE Dev Core 50/50	7.10%	6.10%	3.85%	15.45%
Private Equity	Cambridge Private Equity	11.45%	8.00%	5.75%	27.60%
Private Credit	N/A	6.40%	5.50%	3.25%	14.60%
Hedge Funds	Callan Hedge FOF Database	4.35%	4.10%	1.85%	8.20%
Commodities	Bloomberg Commodity	4.05%	2.50%	0.25%	18.00%
Cash Equivalents	90-Day T-Bill	1.20%	1.20%	-1.05%	0.90%
Inflation	CPI-U		2.25%		1.60%

* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

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Current Market Conditions

Resurgent U.S. Equity Market in 4Q21

Strong performance across both growth and value strategies during 2021

- 2021 returns for U.S. equity markets are eye-popping:
 - S&P 500: +28.7%
 - U.S. Small Cap: +14.8%
 - Non-U.S. equity markets lagged:
 - MSCI World ex USA: +12.6%
 - Emerging Markets: -2.5%
- Economic data recovered in 4Q after softening in 3Q. Tight labor market and mismatch between jobs and job seekers is vexing employers.
- Inflation spiked and recorded 7% for the first time in decades.
- 4Q GDP hit a robust 6.8% (estimate), after dropping in 3Q. Growth for the year is 5.7% (estimate). The economic recovery is still solid. Supply chain issues and sentiment surrounding the end of fiscal stimulus, the Omicron variant, and the Fed taper vex investors as we head into 2022.

Returns for Periods ended 12/31/21

	1 Quarter	1 Year	5 Years	10 Years	25 Years
U.S. Equity					
Russell 3000	9.28	25.66	17.97	16.30	9.81
S&P 500	11.03	28.71	18.47	16.55	9.76
Russell 2000	2.14	14.82	12.02	13.23	8.99
Global ex-U.S. Equity					
MSCI World ex USA	3.14	12.62	9.63	7.84	5.39
MSCI Emerging Markets	-1.31	-2.54	9.88	5.49	--
MSCI ACWI ex USA Small Cap	0.62	12.93	11.21	9.46	6.93
Fixed Income					
Bloomberg Aggregate	0.01	-1.54	3.57	2.90	4.94
90-day T-Bill	0.01	0.05	1.14	0.63	2.06
Bloomberg Long Gov/Credit	2.15	-2.52	7.39	5.72	7.31
Bloomberg Global Agg ex-US	-1.18	-7.05	3.07	0.82	3.40
Real Estate					
NCREIF Property	5.23	16.67	7.57	9.23	9.34
FTSE Nareit Equity	16.31	43.24	10.75	11.38	9.89
Alternatives					
CS Hedge Fund	0.94	8.23	5.47	4.90	6.74
Cambridge Private Equity*	4.81	49.51	21.16	17.17	15.72
Bloomberg Commodity	-1.56	27.11	3.66	-2.85	1.13
Gold Spot Price	4.08	-3.51	9.69	1.56	6.61
Inflation - CPI-U	1.64	7.04	2.92	2.14	2.28

*Cambridge PE preliminary data through 09/30/21.

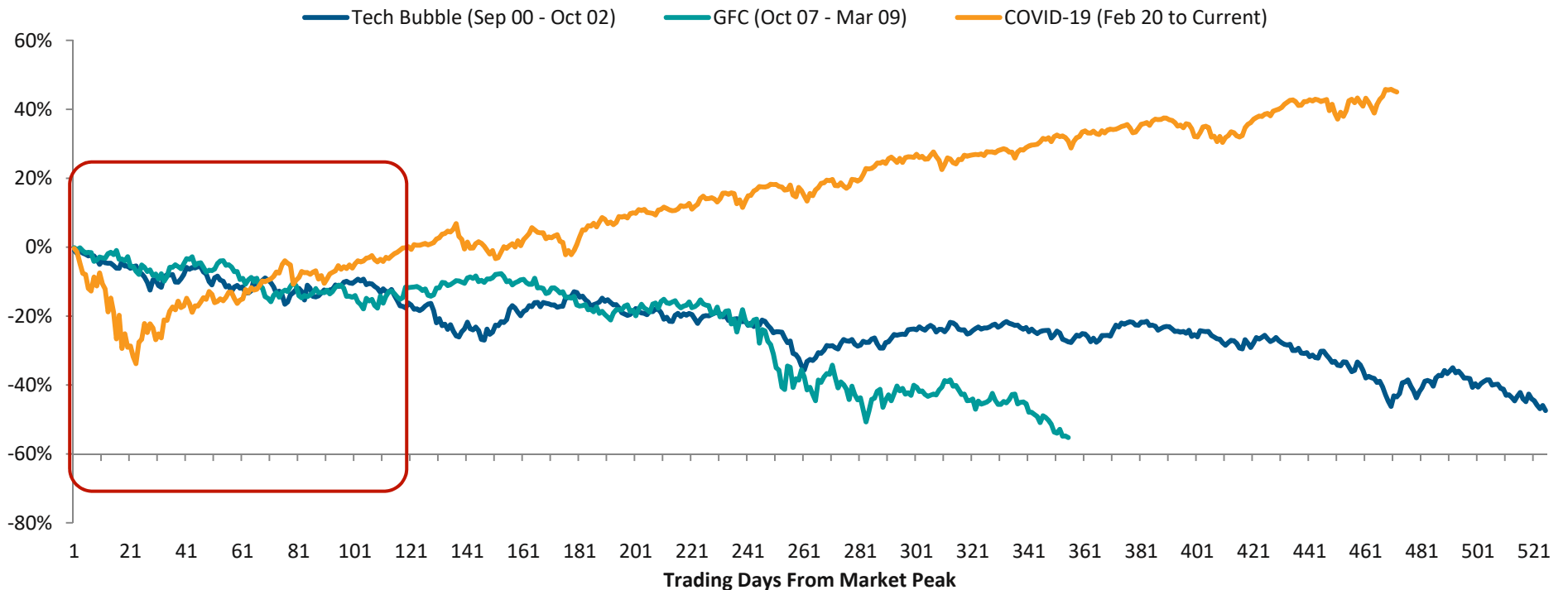
Sources: Bloomberg, Callan, Cambridge, Credit Suisse, FTSE Russell, MSCI, NCREIF, S&P Dow Jones Indices

Unprecedented Shock to Global Capital Markets—But It Was Over in a Flash!

V-shaped recovery in equity—back in black by mid-August 2020, up 119% from market bottom!

S&P 500 Cumulative Returns

Market Peak-to-Trough for Recent Corrections vs. Current Path of COVID-19 Correction Through 12/31/21



Sharpest and fastest equity market decline ever: 16 trading days to reach bear market; -34% after just 23 days

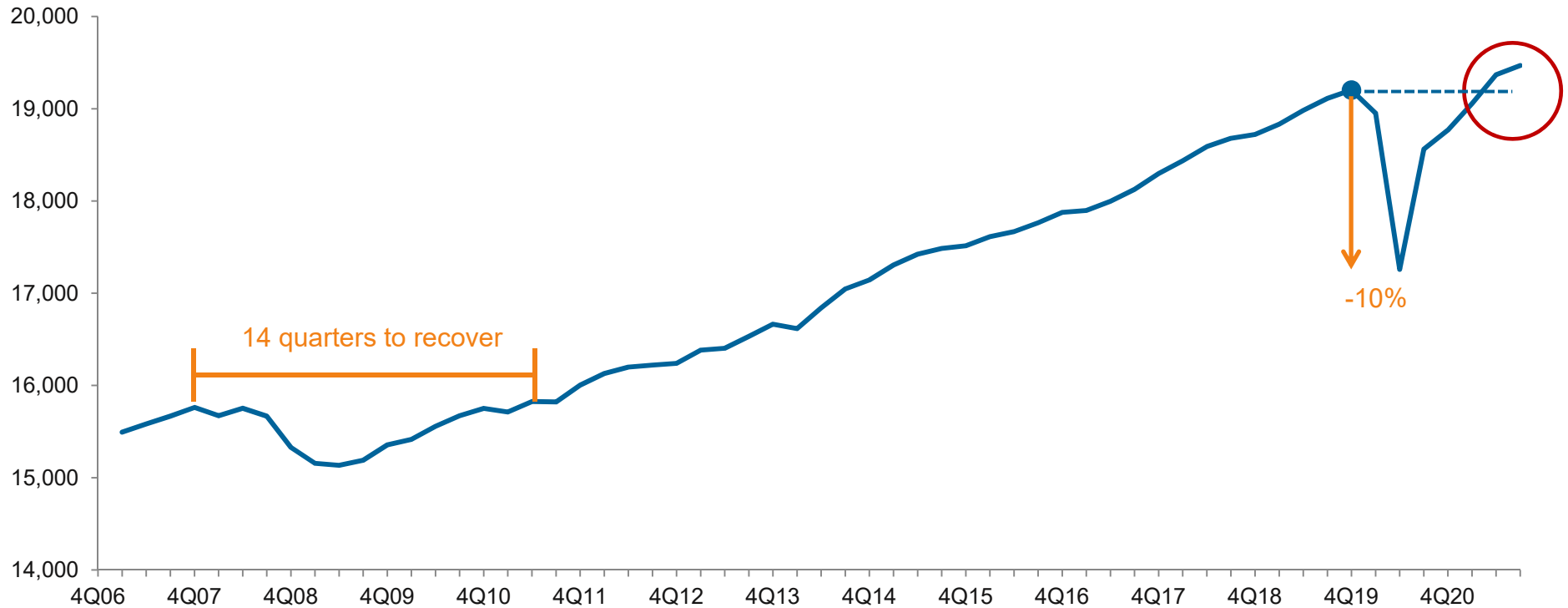
- S&P 500 recovered all its pandemic-related losses by Aug. 10, 2020, only 97 days from the bottom.
- S&P 500 up 28.7% in 2021.

Fun fact: As of Dec. 31, 2021, or 472 trading days, the S&P is up over 45% from the previous market peak on 2/19/20. In contrast, during the GFC the market was still down 31% from the previous market peak after 472 trading days (Aug. 24, 2009).

Sources: Callan, S&P Dow Jones Indices

GDP Recovered Pre-Pandemic Level in 2Q21 After Deepest Drop in 75 Years

Seasonally Adjusted Real GDP in Billions of Dollars



After the Global Financial Crisis, it took 3.5 years before real GDP reclaimed its pre-recession highs.

- GFC peak to trough down 4%

2Q20 real GDP level was down over 10% from 4Q19.

- Pre-pandemic peak level of GDP reached in 2Q21: \$19.368T vs. \$19.202T for 4Q19

2021 GDP on track for annual growth of 5.6%, with consensus estimates of 3.5% to 4.0% for 2022, followed by return to trend.

Source: Federal Reserve Bank of St. Louis

Economic Outlook

Role of economic variables

GDP and inflation

- GDP forecasts provide a very rough estimate of future earnings growth
- Inflation forecasts provide an approximate path for short-term yields
- Inflation is added to the real return forecasts for equity and fixed income

GDP forecasts

- 2% to 2.5% for the U.S.
- 1.5% to 2.0% for developed ex-U.S. markets
- 4% to 5% for emerging markets
- All forecasts are below long-term averages
- Path to longer-term growth will include cycles with recessions

Inflation forecasts

- 2.0% to 2.5% for the U.S.
- 1.75% to 2.25% for developed ex-U.S. markets
- 2.40% to 2.90% for emerging markets

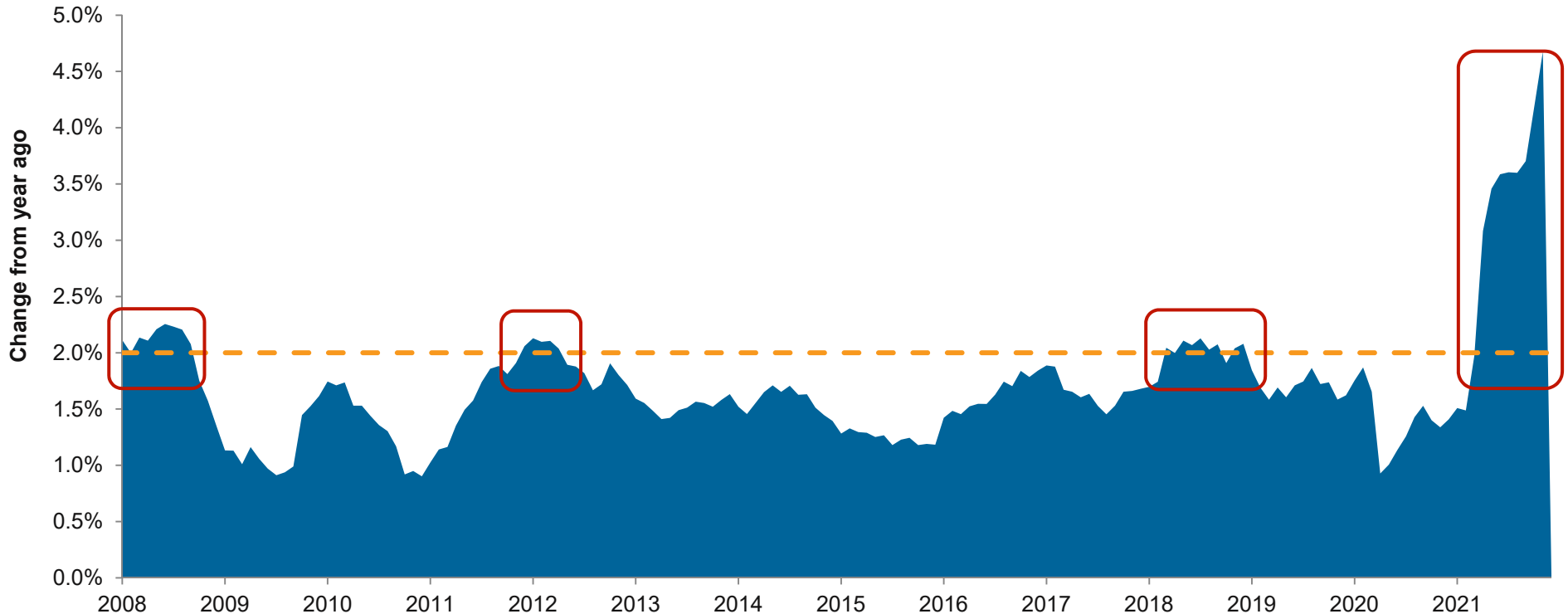
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Detour: Special Focus on Inflation

The Fed's New Inflation Framework

Targeting core Personal Consumption Expenditures Index

Personal Consumption Expenditures Excluding Food and Energy (Chain-Type Price Index)



- Inflation worries are in the headlines, and the data are clearly signaling a sharp rise in the short term.
- Inflation had consistently undershot the Fed's 2% target, prompting the Fed to change its inflation framework.
- Fed's aim is to achieve an average of 2% inflation over the medium term, which is not specifically defined.
- PCE is the Fed's target, different from and typically lower than CPI-U, which had a year-over-year gain of 7.0% in December 2021.

Sources: Federal Reserve Bank of St. Louis, U.S. Bureau of Economic Analysis

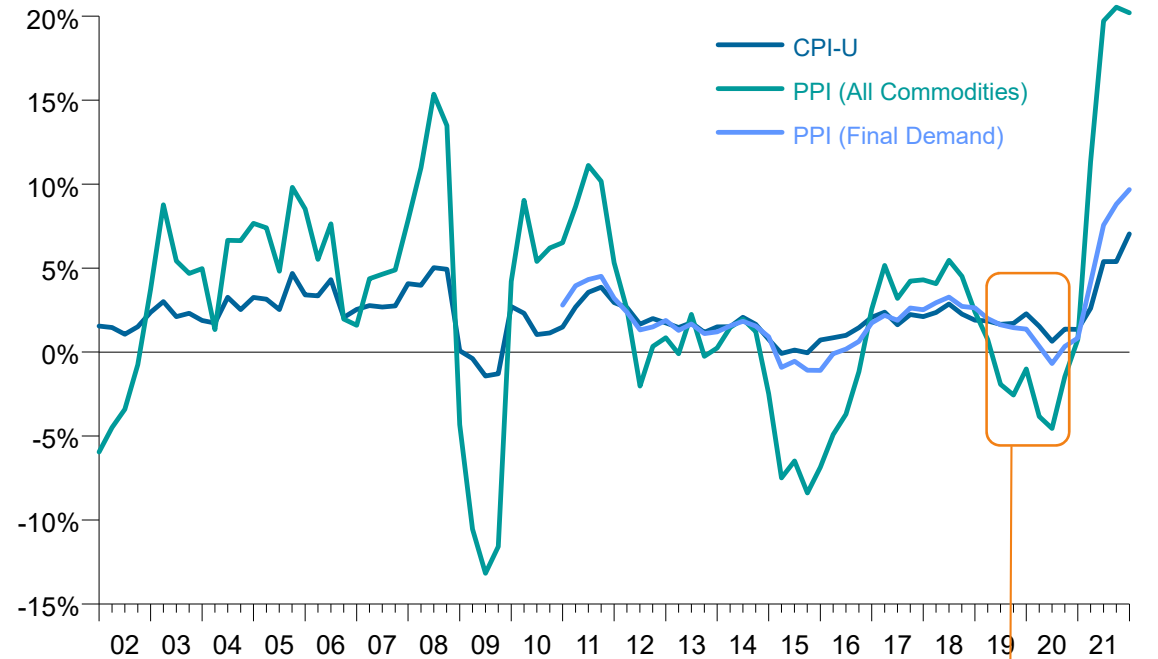
Inflation Rebounds and Spurs Headline Concerns

CPI and PPI up sharply again in 3Q21

Inflation fell sharply at the onset of the pandemic, starting in February 2020.

- The recovery to pre-pandemic levels in the Consumer Price Index required a 2.6% year-over-year change.
- 5.4% jump in CPI-U represents kinks in supply chains and labor markets after a year of global economic disruption and shutdown.
- Producer prices had been tumbling for more than a year prior to the pandemic; recovery to 2018 price **levels** generated eye-popping year-over-year percent change through 2Q, and the sharp rise continued in 3Q.
- Driving the PPI's rise in 3Q were prices for energy and food.

Consumer and Producer Price Indexes – Inflation Year-Over-Year



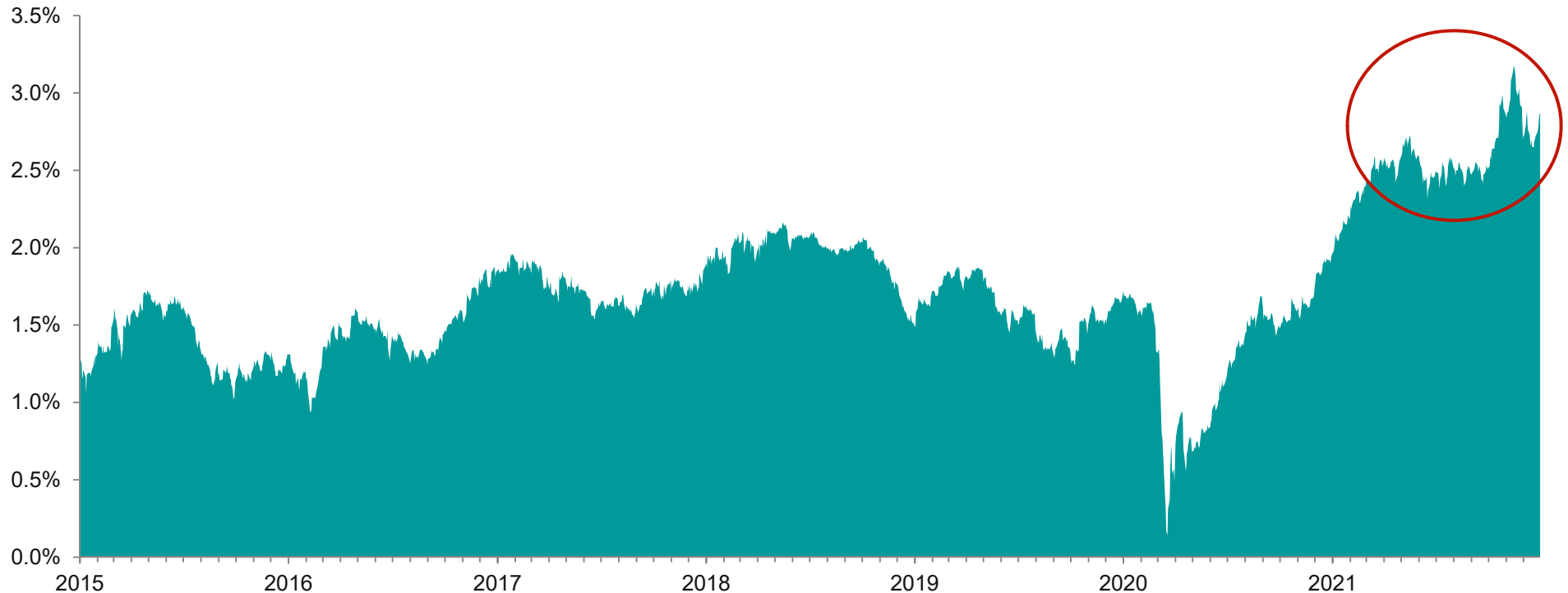
Sharp drop in Producer Price Index in 2019 and first half of 2020

Source: Federal Reserve Bank of St. Louis

Inflation Rebounds and Spurs Headline Concerns

Fixed income market: rising short- to medium-term inflation expectations

5-Year Breakeven Inflation Rate



Fixed income market expecting inflation to rise in the near term.

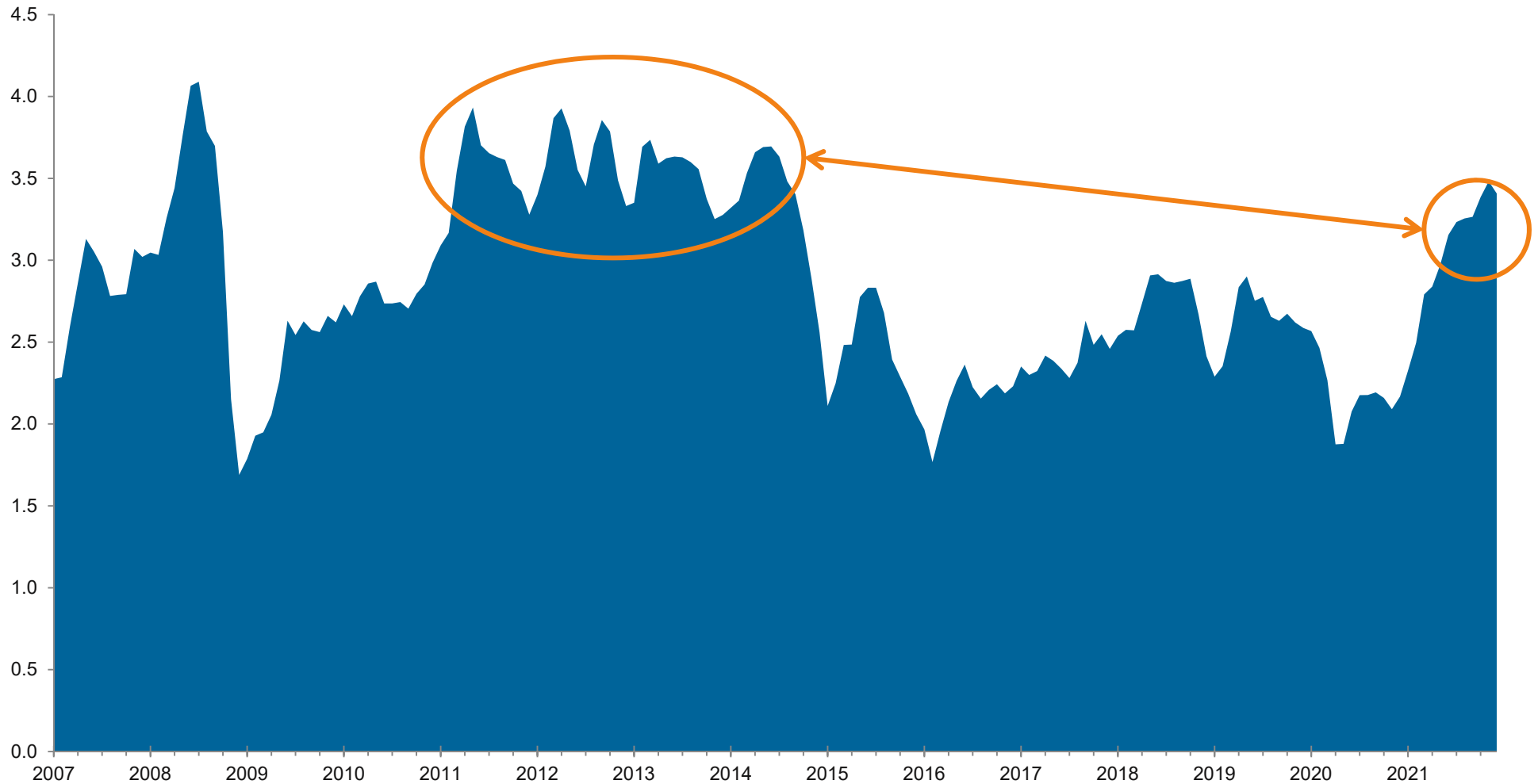
- The five-year breakeven inflation rate has recovered from near zero, and is now above 2.5%—substantially lower than current level.
- Five-year breakeven inflation rate is the difference between five-year nominal and five-year Treasury Inflation-Protected Securities (TIPS) yields.
- Actual breakeven rate not as important as markets forecasting neither deflation nor high inflation

Source: Federal Reserve Bank of St. Louis

Gasoline Prices Are Top of Mind for Consumers, but Still Below Early 2010s Peaks

A highly visible inflation measure; feeds expectations

Average Price: Gasoline, Unleaded Regular (Cost per Gallon / 3.785 Liters) in U.S. City Average



Source: Federal Reserve Bank of St. Louis

So When Does Inflation Become a Problem?

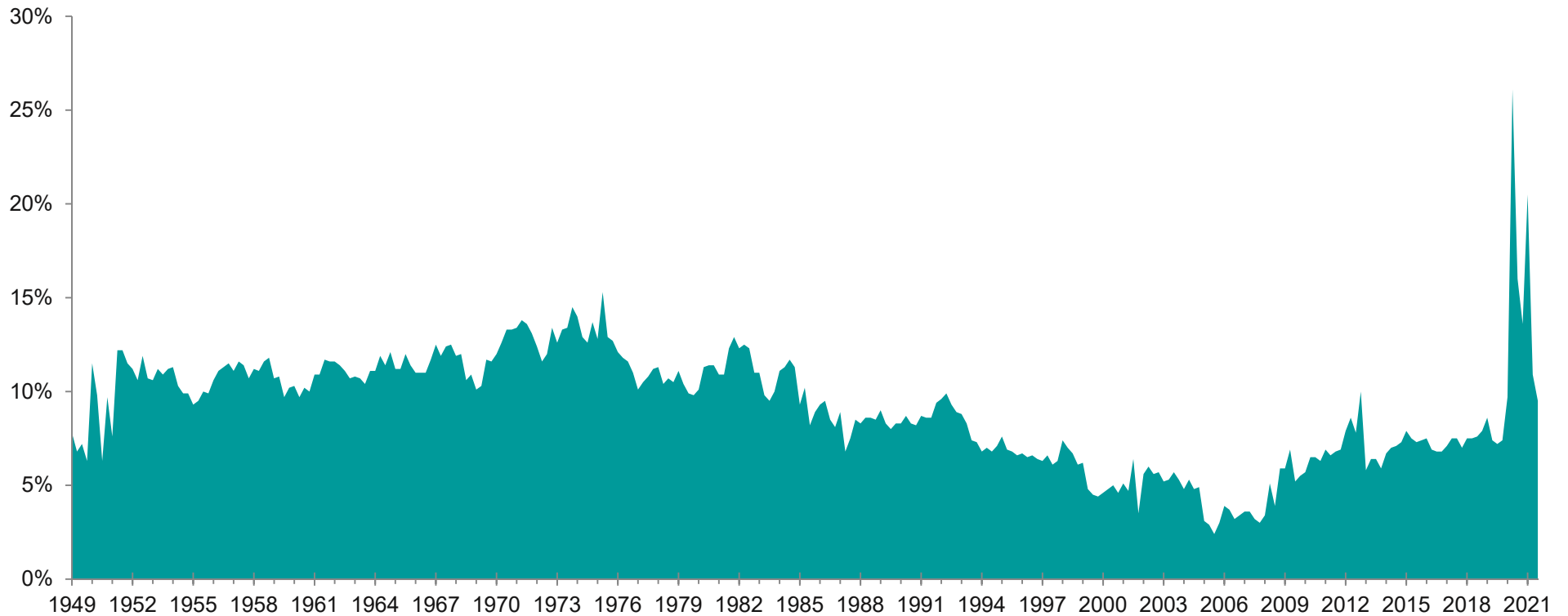
The majority of the working-age and younger population has no experience with sustained inflation.

- Last spurt above 5% happened in 2007, when oil prices spiked to above \$100 per barrel; this spike evaporated with the GFC.
- Last **sustained** bout of inflation was wrung out of the U.S. economy by serial recessions in 1980 and 1981. Inflation had reached double-digits in the late 1970s, and short interest rates were hiked to just below 20%, twice!
- Decades of policy error, both monetary and fiscal, led to the build-up of inflation during the late 1960s and into the 1970s—the wage-price spiral of the 1970s did not materialize out of thin air.
- Current global monetary and fiscal policies were enacted to combat an unprecedented pandemic, the shutdown of production, transportation, and distribution, and severe interruption in consumer and business activities that led to the steepest recession in 75 years.
- The policies were key to the incredible economic recovery seen in the U.S. and around the world.
- The interruption of supply chains, labor markets, manufacturing processes, and the delivery of goods and services was substantial; the working-out of these kinks was both expected and actually better/faster than projected just a year ago.
- This recession was also the first to feature substantial job loss but no decline in aggregate income, which suggests substantial pent-up demand.
- The current spike in inflation was completely expected; there are no surprises. Inflation is working itself out at different rates and at different levels of pervasiveness across commodities, materials, goods, manufacturing, and services. The labor market suffered some of the greatest disruption and will take the longest to iron out the kinks.
- While the current spike is alarming, the return toward normal markets means that underlying demand will return to normal, and pressures on prices will abate, likely toward the second half of 2022 and in the following years.

History

U.S. savings rate

Personal Savings as a Percentage of Disposable Personal Income



Does saving drive the stock and bond markets?

Savings rate declined from mid-1970s to GFC then increased

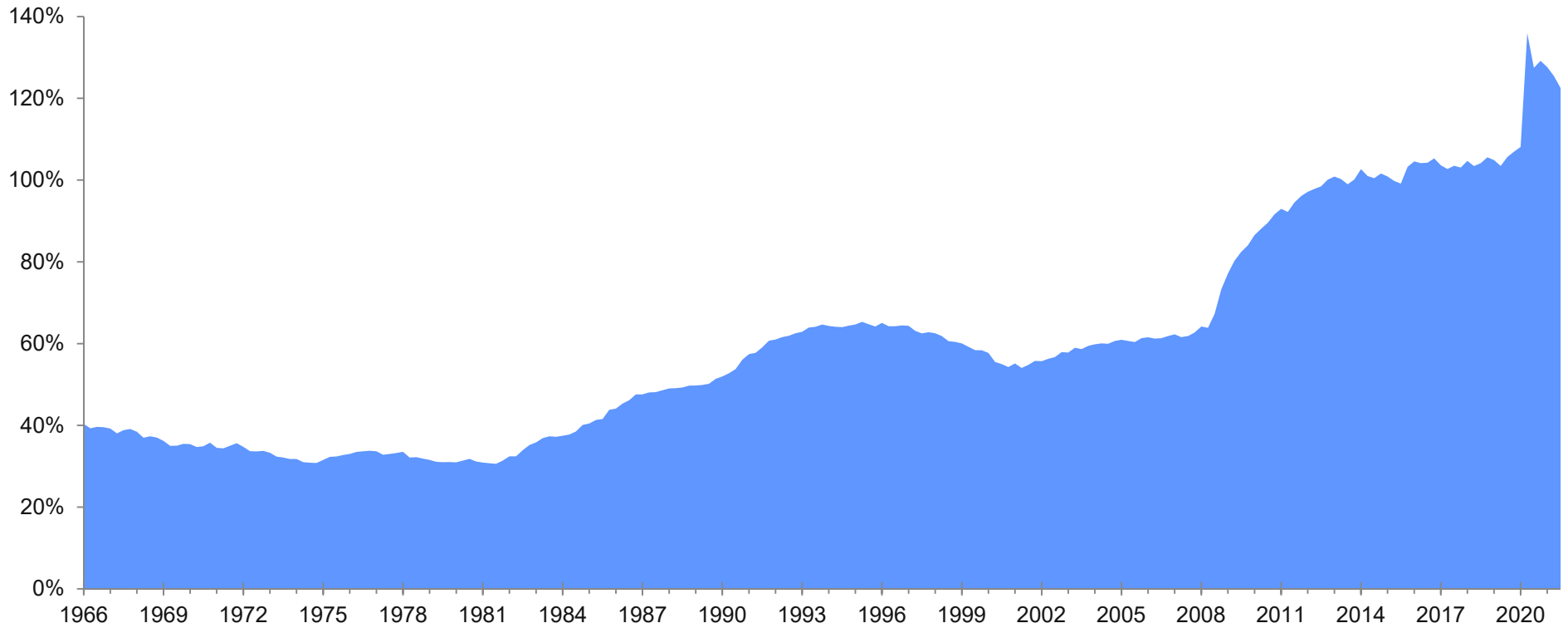
- Americans less fiscally prudent before GFC? Aging population spending accumulated savings?
- Americans more fiscally prudent after GFC? Long-term trend?

Source: Federal Reserve Bank of St. Louis

History

U.S. government debt

Federal Debt: Total Public Debt as a Percentage of Gross Domestic Product



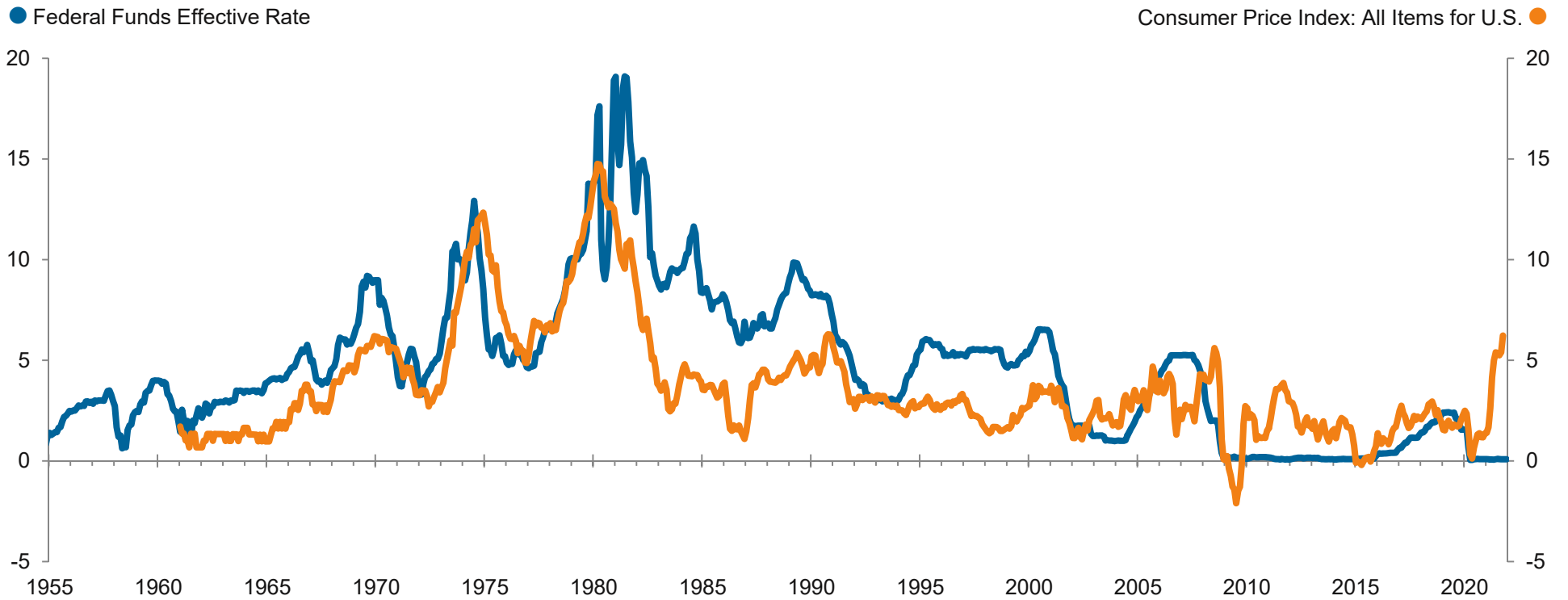
So far government debt has not crowded out private debt

- Foreign demand for U.S. debt
- Equity hedging?
- Financial repression would seem to argue against holding Treasuries

Source: Federal Reserve Bank of St. Louis

Inflation versus Interest Rates Over the Long Term

Federal Funds vs. Consumer Price Index



We are a long way from the inflation and interest rate spike of 1980–1981, and even the last rise in inflation from 2005–2008.

Source: Federal Reserve Bank of St. Louis

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Fixed Income

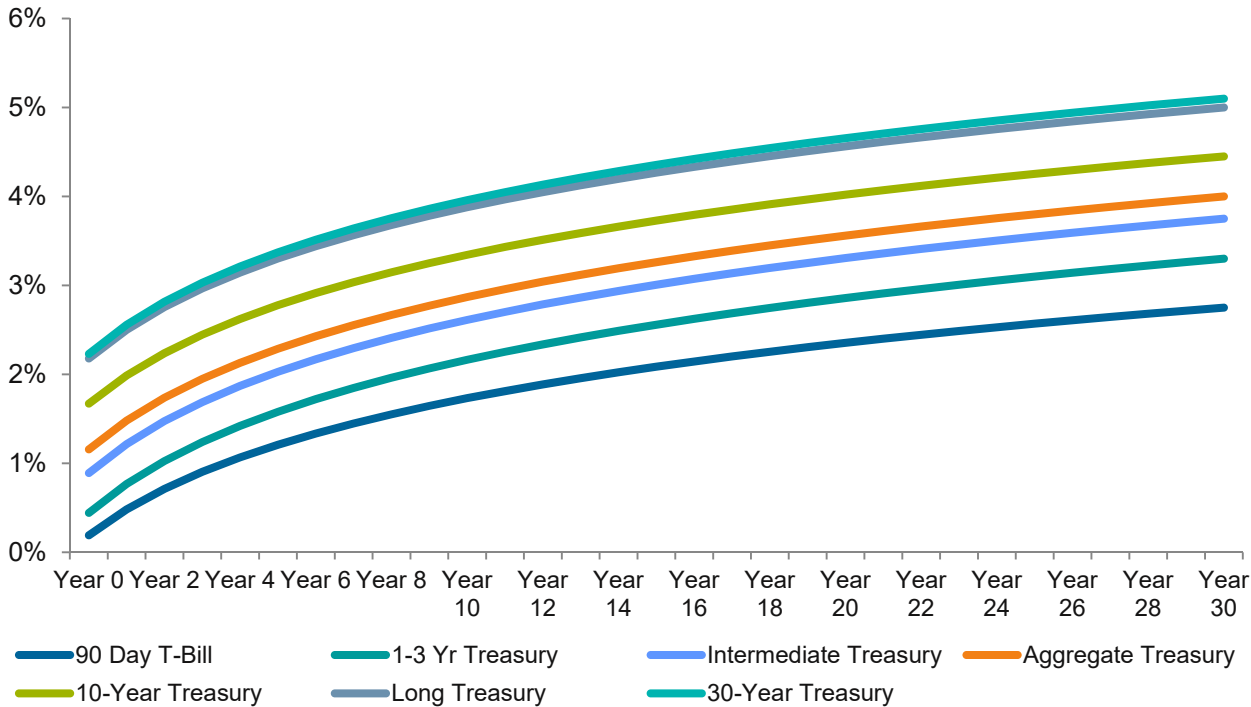
10-Year Expected Returns

10-Year Projections

	Income Return	+	Capital Gain/Loss	+	Credit Default	+	Roll Return	=	2022 Expected Return	2021 Expected Return	Change
Cash	1.20%		0.00%		0.00%		0.00%		1.20%	1.00%	0.20%
Short Duration 1-3 Year G/C	1.65%		-0.40%		0.00%		0.25%		1.50%	1.50%	0.00%
1-3 Year Government	1.55%		-0.40%		0.00%		0.25%		1.40%		
1-3 Year Credit	2.15%		-0.50%		-0.10%		0.25%		1.80%		
Intermediate G/C	2.35%		-0.80%		-0.10%		0.25%		1.70%	1.50%	0.20%
Intermediate Government	2.05%		-0.80%		0.00%		0.25%		1.50%		
Intermediate Credit	2.95%		-1.00%		-0.20%		0.25%		2.00%		
Aggregate	2.90%		-1.30%		-0.10%		0.25%		1.75%	1.75%	0.00%
Government	2.25%		-1.20%		0.00%		0.25%		1.30%		
Securitized	2.55%		-0.90%		0.00%		0.25%		1.90%		
Credit	3.85%		-1.80%		-0.30%		0.25%		2.00%		
Long Duration G/C	4.25%		-2.85%		-0.20%		0.60%		1.80%	1.80%	0.00%
Long Government	3.30%		-2.80%		0.00%		0.60%		1.10%		
Long Credit	4.70%		-2.90%		-0.30%		0.60%		2.10%		
TIPS	2.50%		-1.50%		0.00%		0.25%		1.25%	1.70%	-0.45%
Non-U.S. Fixed (unhedged)	2.15%		-1.50%		-0.10%		0.25%		0.80%	0.75%	0.05%
High Yield	6.95%		-1.30%		-2.00%		0.25%		3.90%	4.35%	-0.45%
Emerging Market Debt	6.05%		-1.40%		-1.30%		0.25%		3.60%	3.50%	0.10%
Bank Loans	6.50%		-0.30%		-1.60%		0.00%		4.60%	4.30%	0.30%

Yield Curve Path

Smoothed Yield Curve Paths



	Long Term Premium	Final Yield	Premium Over
Inflation	0.00%	2.25%	N/A
90 Day T-Bill	0.50%	2.75%	Inflation
TIPS	1.50%	4.25%	Cash
1-3 Year Treasury	0.55%	3.30%	
Intermediate Treasury	1.00%	3.75%	
Aggregate Treasury	1.25%	4.00%	
10-Year Treasury	1.70%	4.45%	
Long Treasury	2.25%	5.00%	
30-Year Treasury	2.35%	5.10%	

We updated the bond model this year to extend our yield forecast horizon over 30 years.

- Allows for a longer-term view on reversion to equilibrium rates, durations, convexity, and spreads.
- We used a smoothing approach where yields rise faster early in the horizon and reach equilibrium at year 30.

Cash at the end of the 30-year horizon is 2.75%.

- Reflects a 50 basis point premium over projected inflation, which is consistent with long-term U.S. interest rate history.

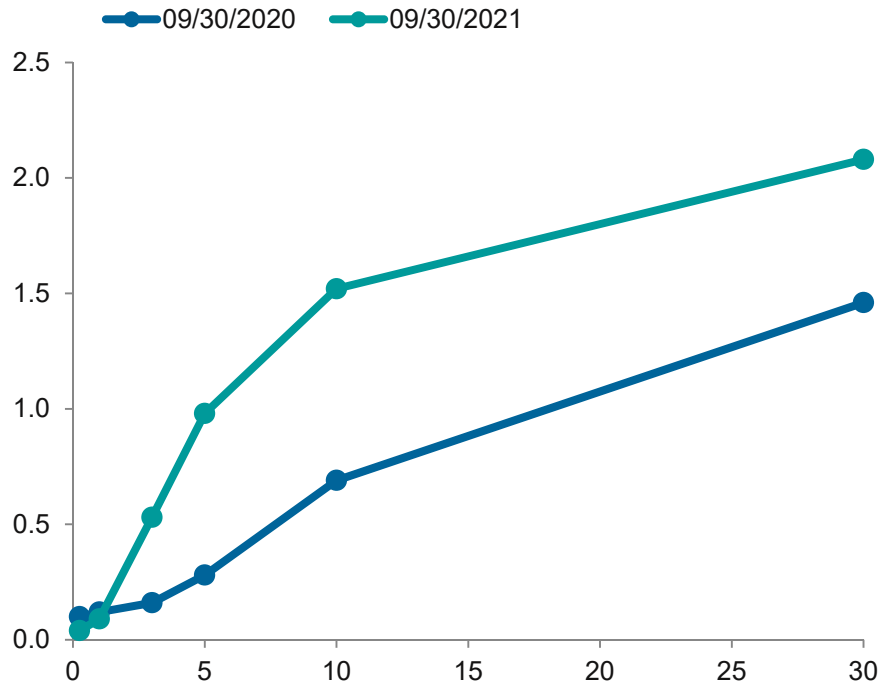
Term premiums are consistent with long-term historical medians.

- For example, in Year 30 the 10-Year Treasury yield is 4.45%, or 1.70% above cash.

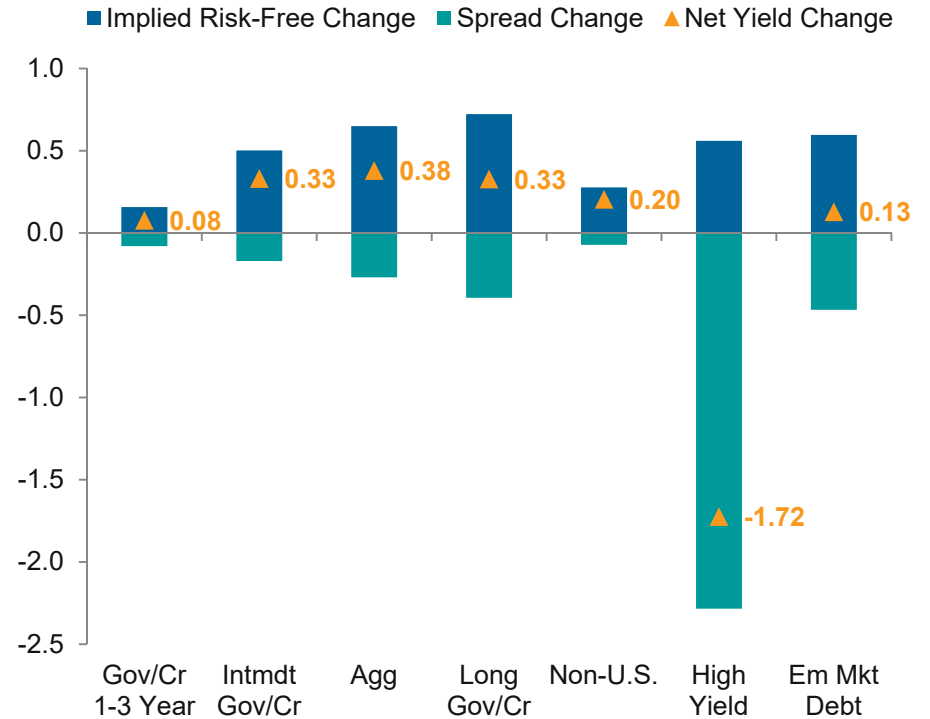
Rate Movement in the Last Year

(9/30/20 to 9/30/21)

Treasury Yield Curve Change



Net Yield Changes After Spread Tightening



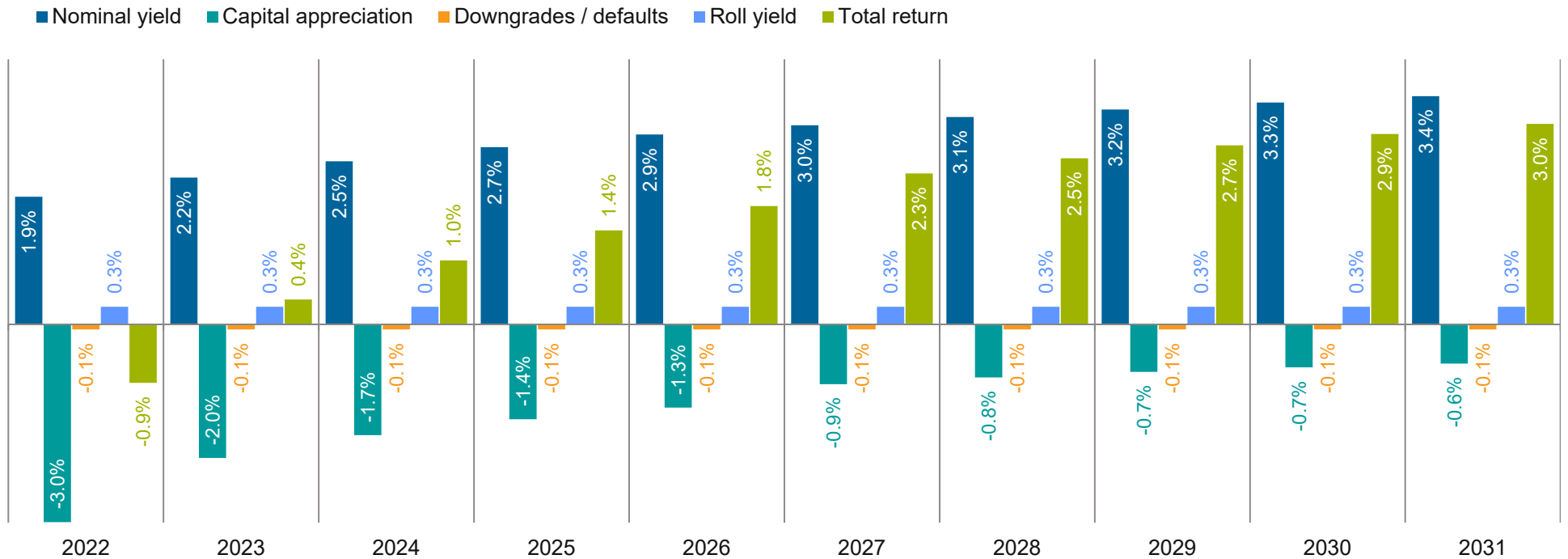
The Treasury yield curve rose meaningfully in the last year.

- However, spreads also tightened and absorbed some of the rise in rates.
- In the case of high yield, spreads tightened so much the overall yield on the sector dropped by over 1.7%.

Sources: Bloomberg, Federal Reserve

Core Fixed Income Return Components

Total Return Attribution

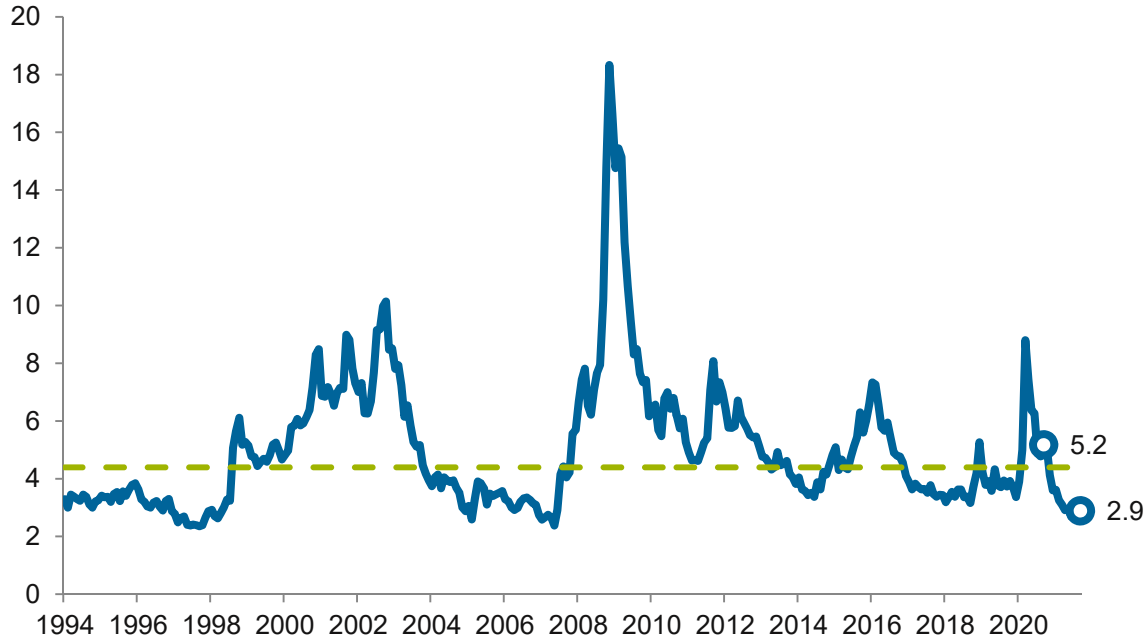


Higher yields relative to last year are offset by capital losses from our rising rate projection.

- We project rates to rise faster early in the forecast, leading to larger capital losses and lower total returns.
- As rates stabilize, the carry from yield outweighs capital losses, leading to positive total returns.

Key Assumption Changes for 2022: High Yield

Historical High Yield OAS



Data represents Jan 1994 to Sept 2021

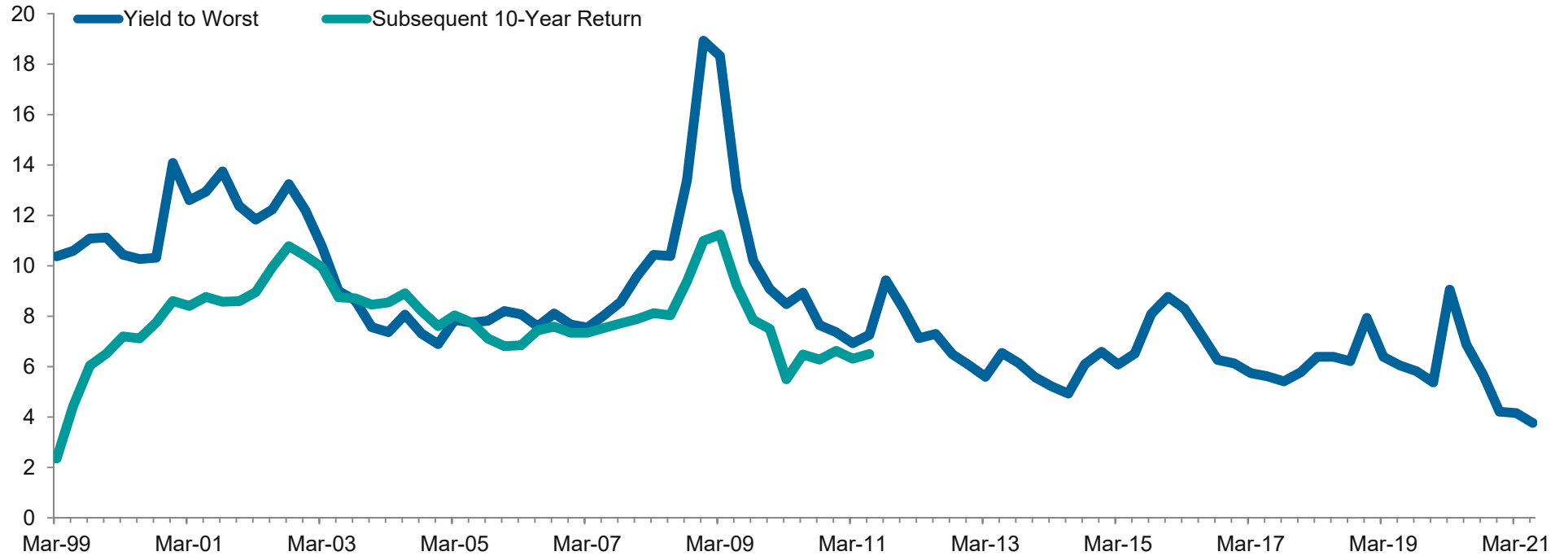
	High Yield OAS
Minimum	2.35
25th	3.38
50th	4.39
75th	6.08
Maximum	18.33
Average	4.99
Spread as of 9/30/20	5.17
Percentile as of 9/30/20	64%
Spread as of 9/30/21	2.89
Percentile as of 9/30/21	8%

- Last year spreads were above median at the time we prepared assumptions.
- This year spreads were in the bottom decile.
- Assuming spreads rise back to long-term medians, in addition to rising risk-free rates, will create a stronger headwind to performance.

Source: Bloomberg

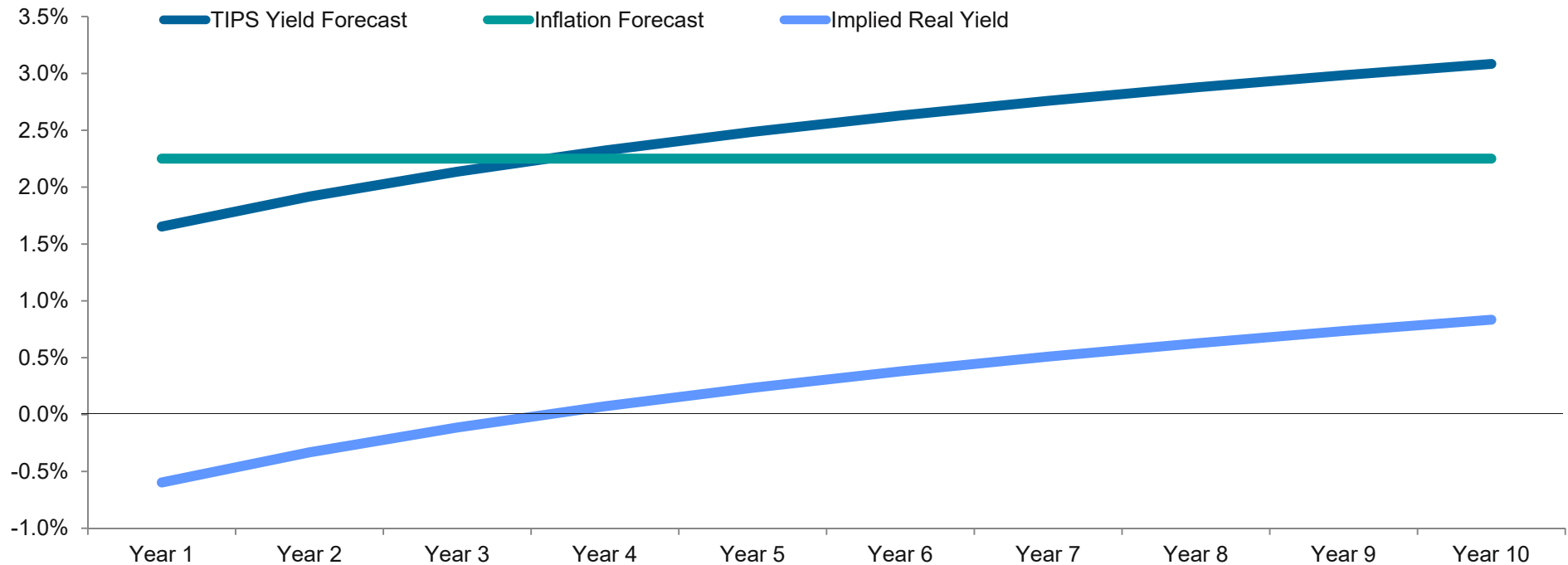
Key Assumption Changes for 2022: High Yield

High yield starting yield vs. forward 10-year return



- There have only been a few periods where the subsequent 10-year return beat the starting yield.
- The performance gap represents downgrade and default drag.
- Our high yield projection reflects this relationship, with the starting yield acting as a constraint on our return expectation.

Key Assumption Changes for 2022: TIPS



- This year we updated the model to use real duration for TIPS instead of nominal duration.
- Since our inflation assumption is flat, that implies our rising yield forecast equates to rising real yields.
- Median TIPS real duration is 7.8 historically vs. a median of 5.5 for nominal duration.
- The higher duration translates to higher capital losses compared to the 2021 forecast, more than offsetting the higher starting yield.

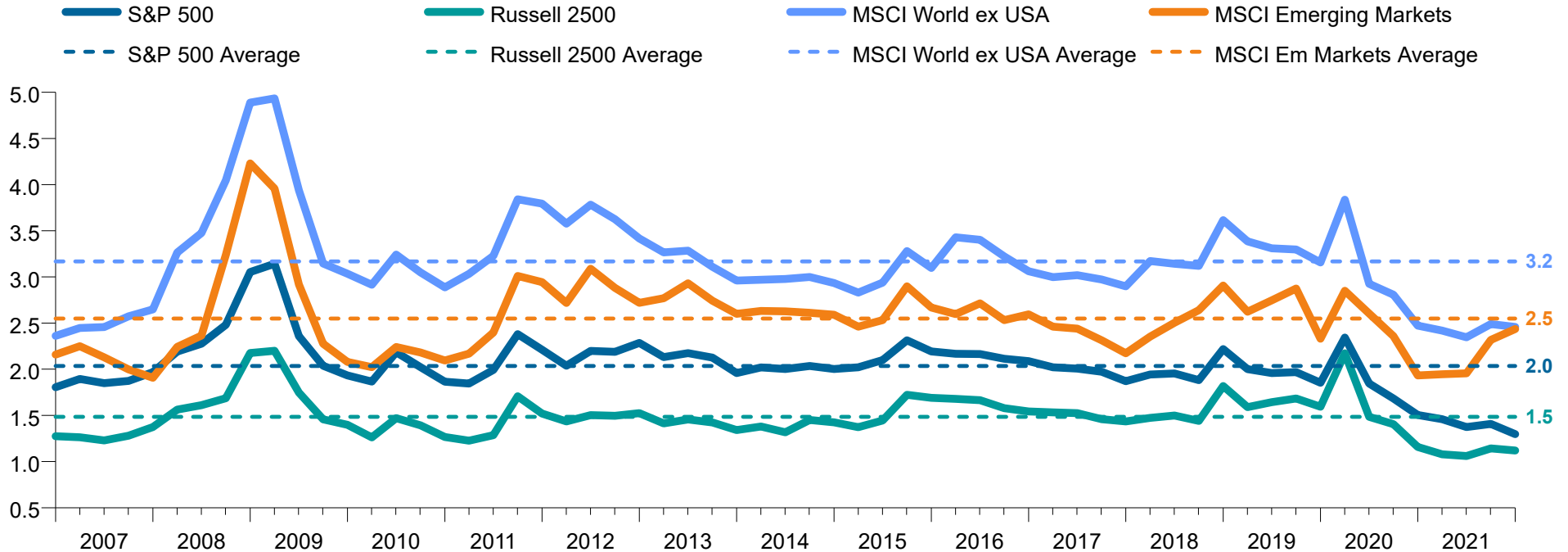
Callan

Equity

U.S. Equity Assumptions

Dividend yields

Dividend Yield for 15 Years Ended December 31, 2021



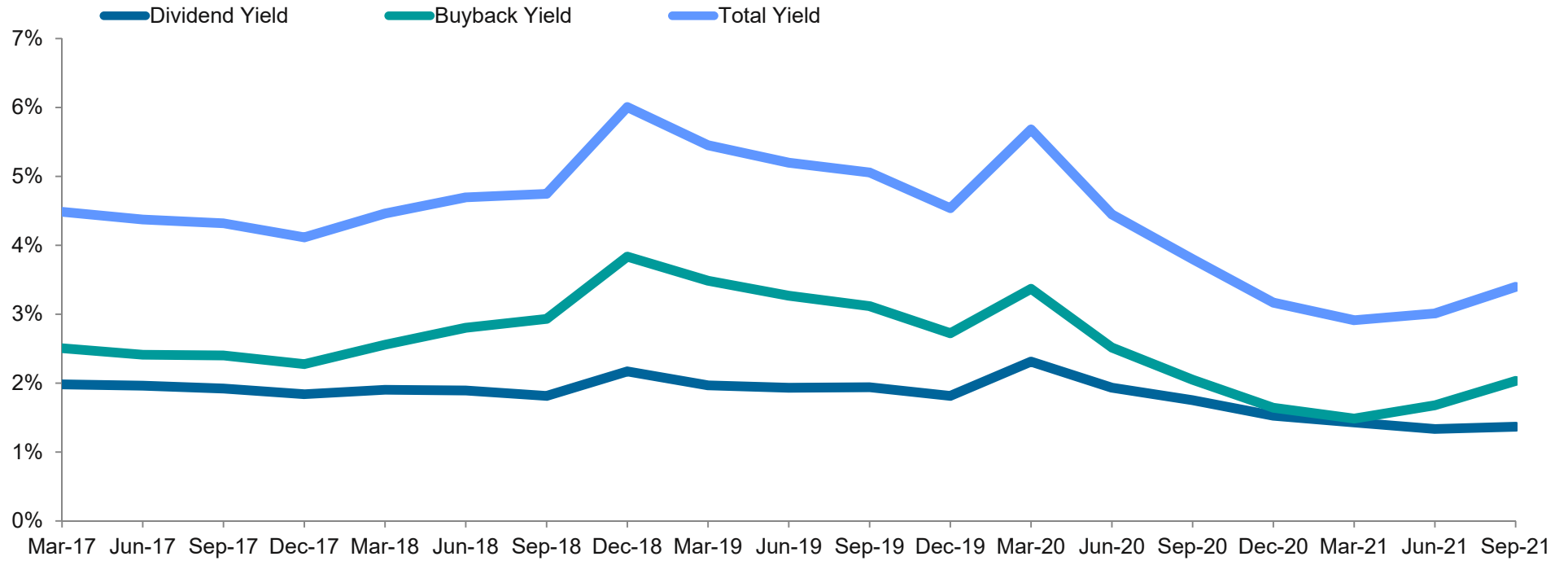
- COVID-19 caused a decline in yields around the world.
- Yields have turned up but have still not reached their pre-pandemic levels.
- Forecast yields are expected to return to approximately their longer-term averages.

Sources: MSCI, Russell, Standard & Poor's

U.S. Equity Assumptions

Return of cash

S&P 500



S&P 500 dividend and buyback yields declined in 2020.

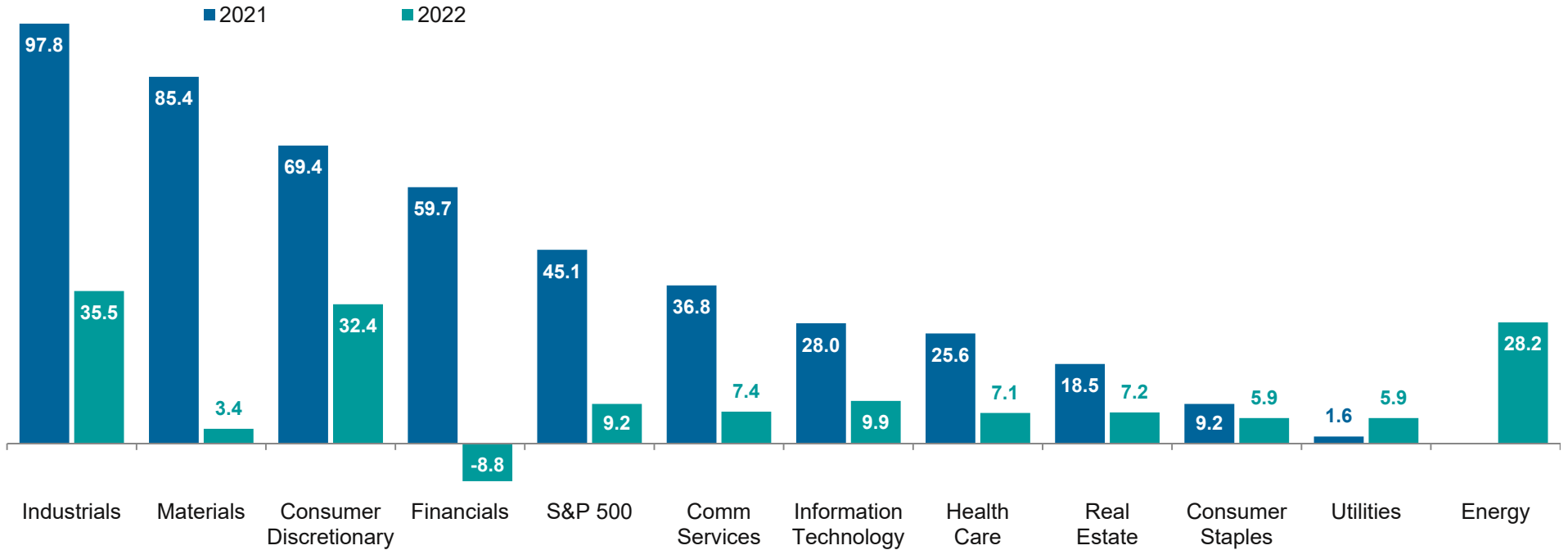
- Dollar value of dividends stalled.
- Dollar value of buybacks dropped significantly at the onset of the pandemic but recovered to near pre-pandemic levels.
- Price appreciation was the major cause of declines in yields.

Source: Standard & Poor's

U.S. Equity Assumptions

Current earnings growth

Percent S&P 500 Earnings Growth



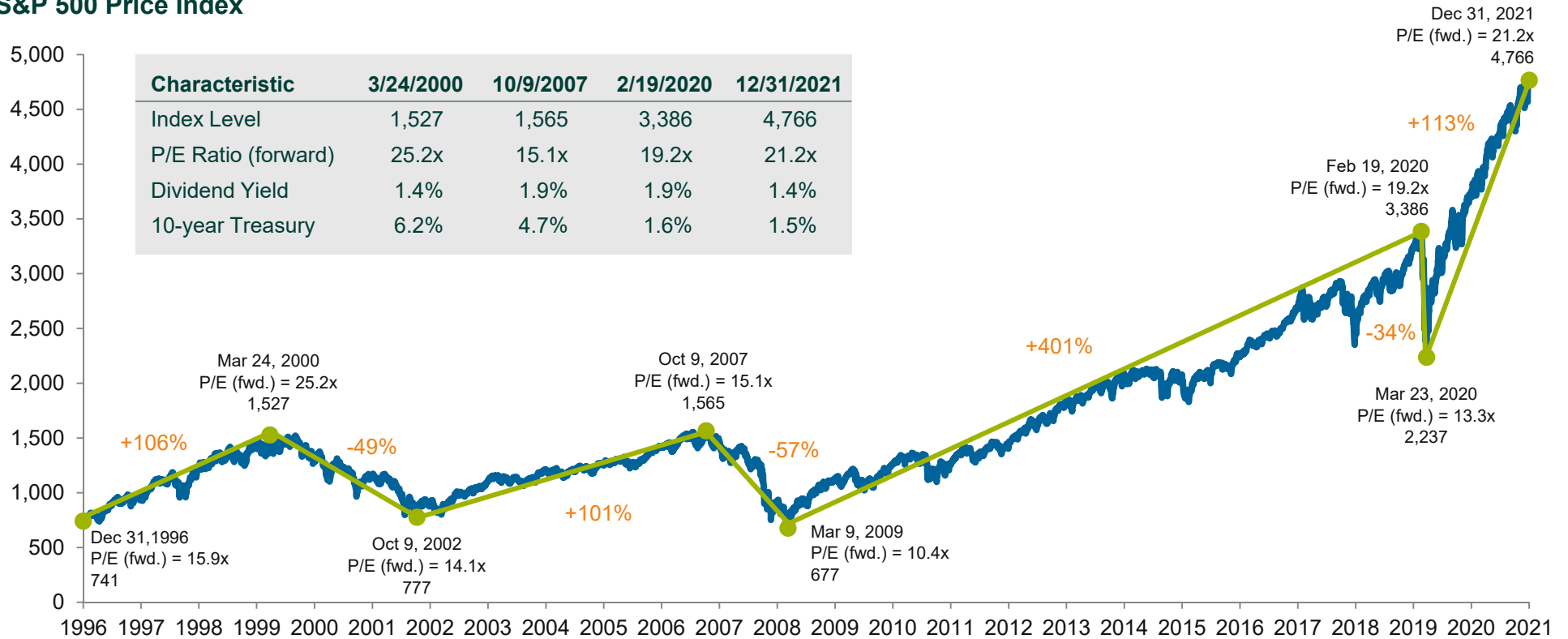
- Projections are as of December 2021.
- Earnings growth for 2021 continues to surprise on the upside.
- The magnitude of that growth was due to poor earnings in 2020 as well as demand from the economy's reopening.
- Projected earnings growth for 2021 is likely to outpace return, which was 29% for 2021.
 - Keeps backward-looking P/E in line

Source: Factset, Standard & Poors

U.S. Equity Assumptions

Price appreciation

S&P 500 Price Index



- The S&P has more than doubled since the pandemic low.
- Appreciation has outpaced forward earnings estimates and valuations have increased above pre-pandemic levels.

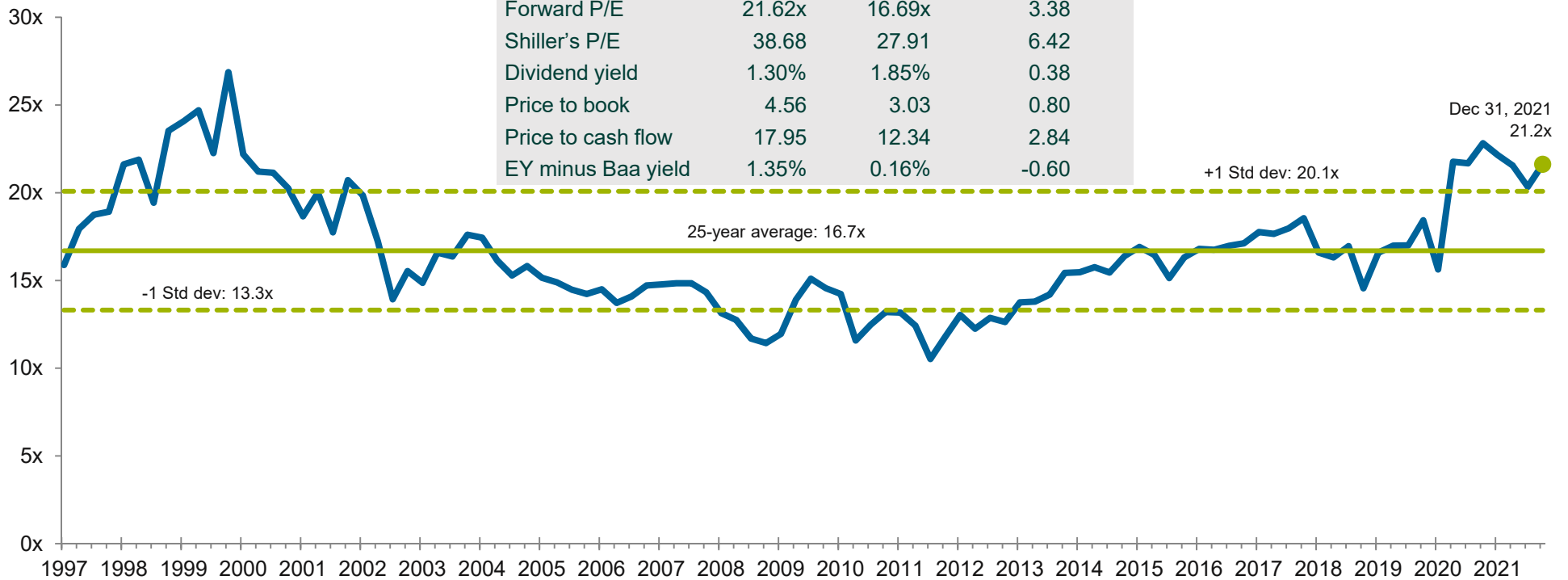
Source: Federal Reserve, Standard & Poor's

U.S. Equity Assumptions

Large cap valuations

S&P 500 Index: Forward P/E Ratio

Valuation Measure	Latest	25-year Average	Std Dev Over-/Under-valued
Forward P/E	21.62x	16.69x	3.38
Shiller's P/E	38.68	27.91	6.42
Dividend yield	1.30%	1.85%	0.38
Price to book	4.56	3.03	0.80
Price to cash flow	17.95	12.34	2.84
EY minus Baa yield	1.35%	0.16%	-0.60



- All valuation measures in excess of one standard deviation above 25-year averages.
- Forward P/E has stalled even with exceptional forecast returns for 2022.
- Return to more normal earnings growth in future years limits price appreciation without further valuation expansion.

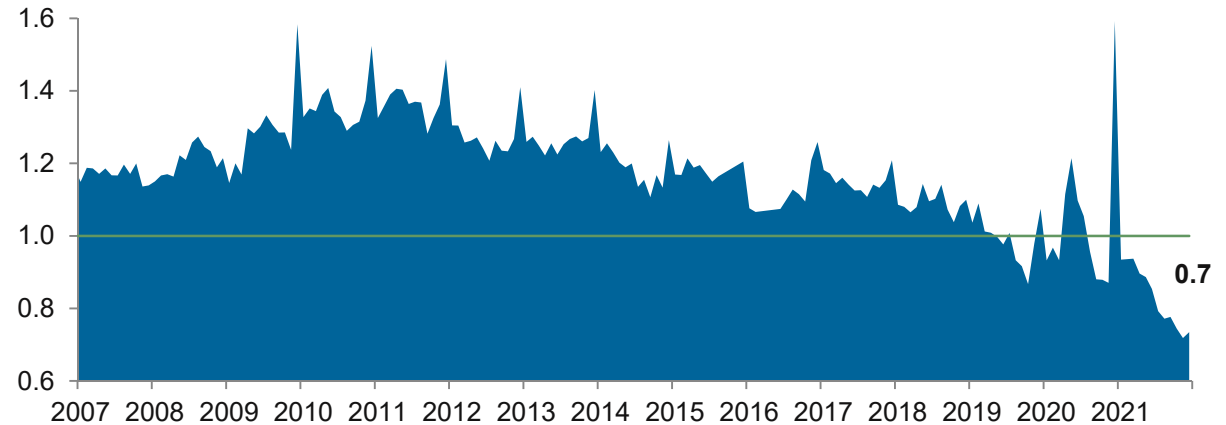
Source: FactSet, FRB, Robert Shiller, Standard & Poor's, Thomson Reuters, J.P. Morgan Asset Management

U.S. Equity Assumptions

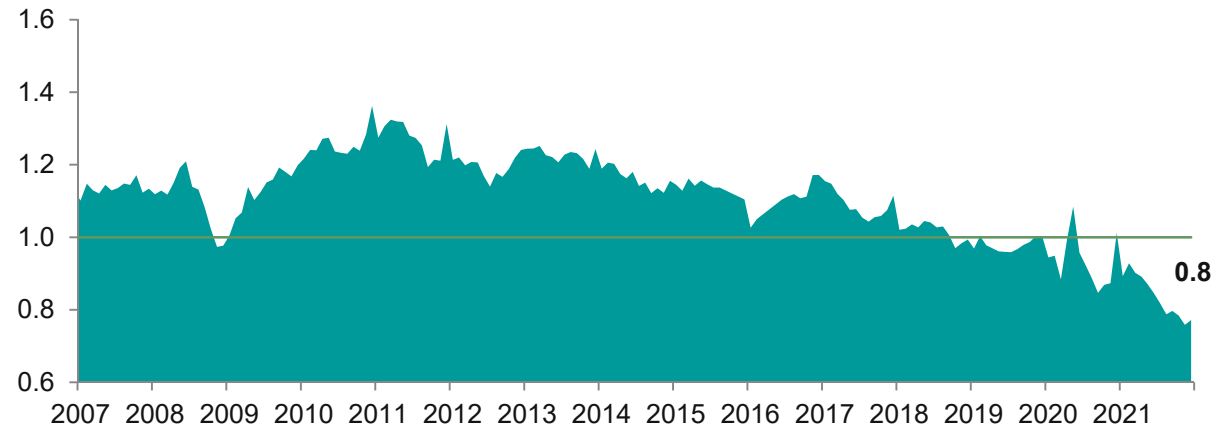
Mid and small cap relative valuations

- Large capitalization stocks have relatively high valuations.
- Historically, smaller cap stocks have had higher valuations than large caps.
 - Investors buying future rather than historical earnings
- The small cap S&P 600 P/E is only 69% of the S&P 500 P/E.
- The mid cap S&P 400 P/E is only 76% of the S&P 500 P/E.
- Lower valuations improve the potential for higher returns relative to large cap going forward.

S&P 600/S&P 500 Relative Forward P/E Ratios



S&P 400/S&P 500 Relative Forward P/E Ratios



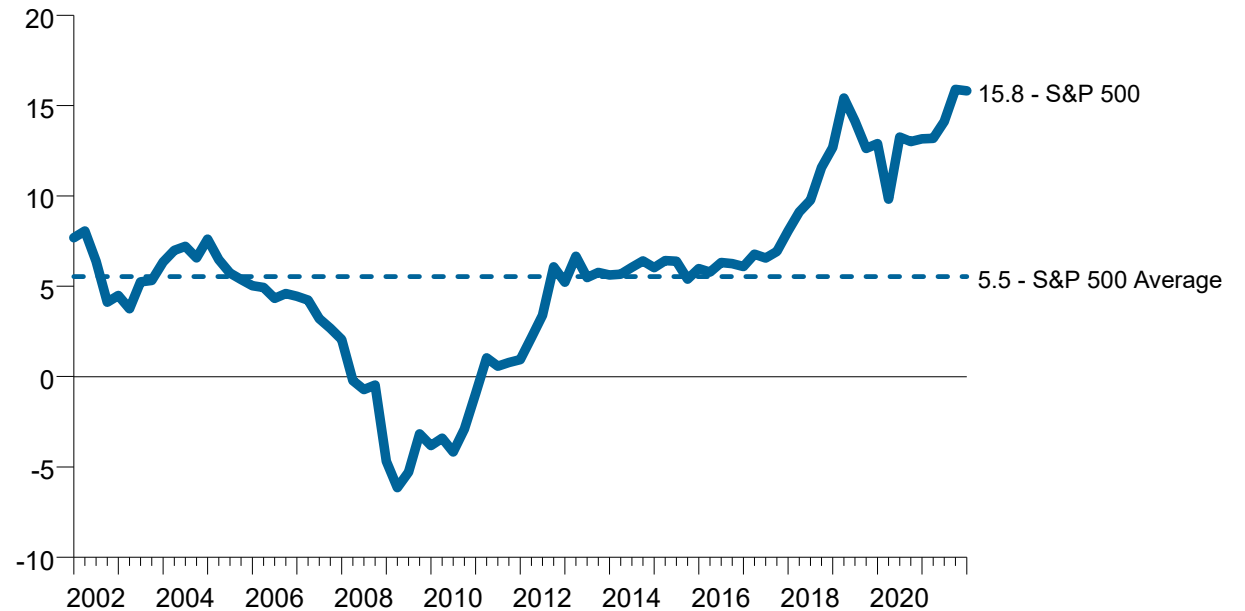
Source: Standard & Poor's

U.S. Equity Assumptions

Risk premium

- Over the very long term, the equity risk premium (ERP) vs. cash is around 6%.
- Callan equity projection is at T-bills + 5.3%, consistent with long-term history.
 - Over the past 20 years ERP vs. cash has been 5.5%.
- Cash at 1.2%, ERP at 5.3% = Equity Return of 6.50%

Rolling 40 Quarter Relative Returns Relative To 3 Month T-Bill for 20 Years Ended December 31, 2021

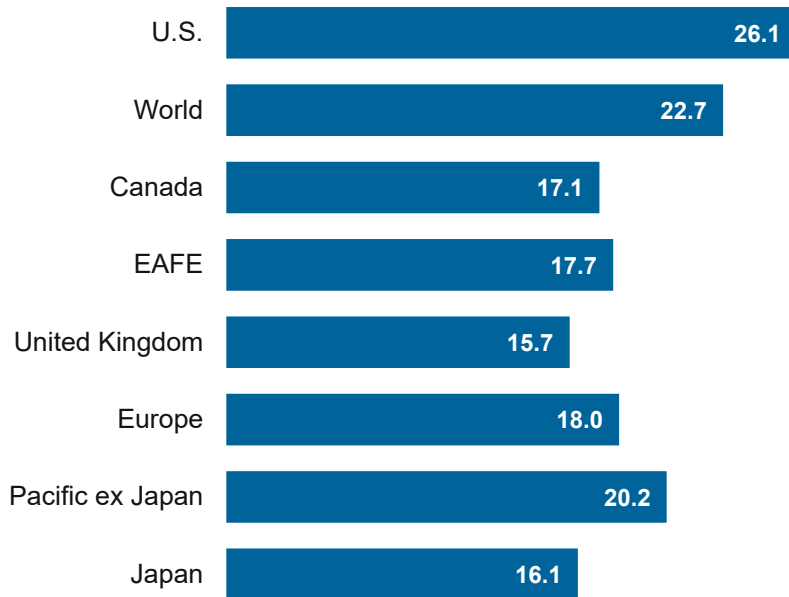


Source: Standard & Poor's

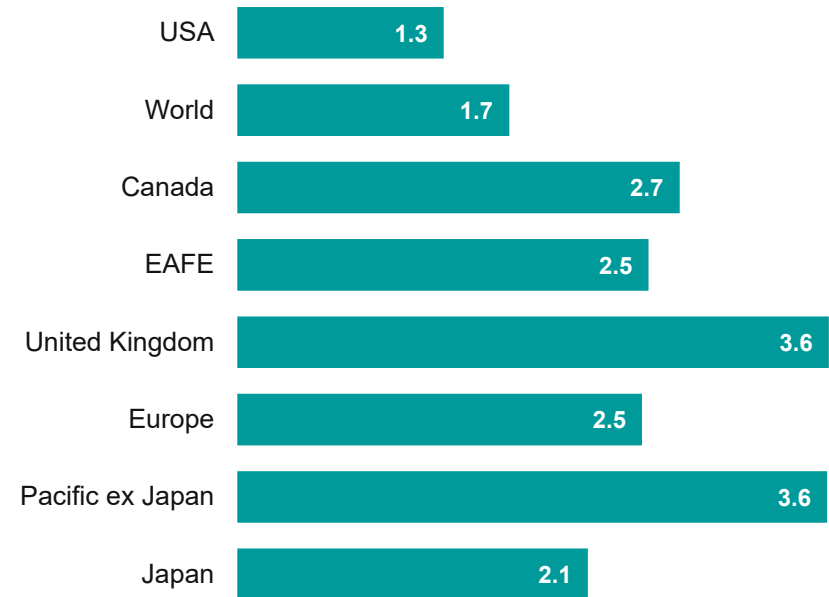
Global ex-U.S. Equity Assumptions

Developed markets valuations and dividend yield

Price Earnings Ratio



Dividend Yield



Valuations are generally high in developed markets.

- Valuations have changed only modestly over the past year.
- U.S. continues to have the highest valuations.

Low dividend yields have a direct impact on returns.

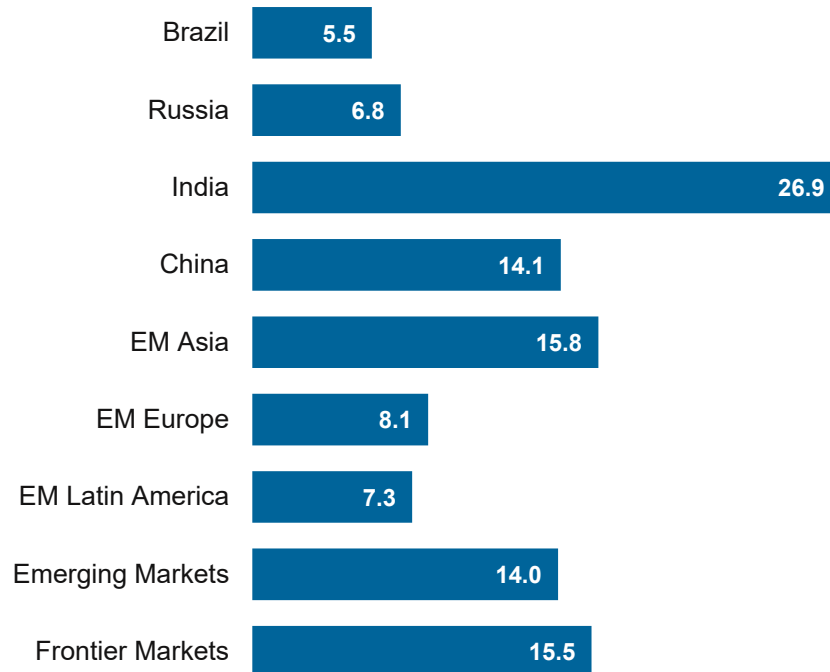
- Dividend yields have generally stayed the same or fallen since last year.

Source: MSCI (Dec. 31, 2021)

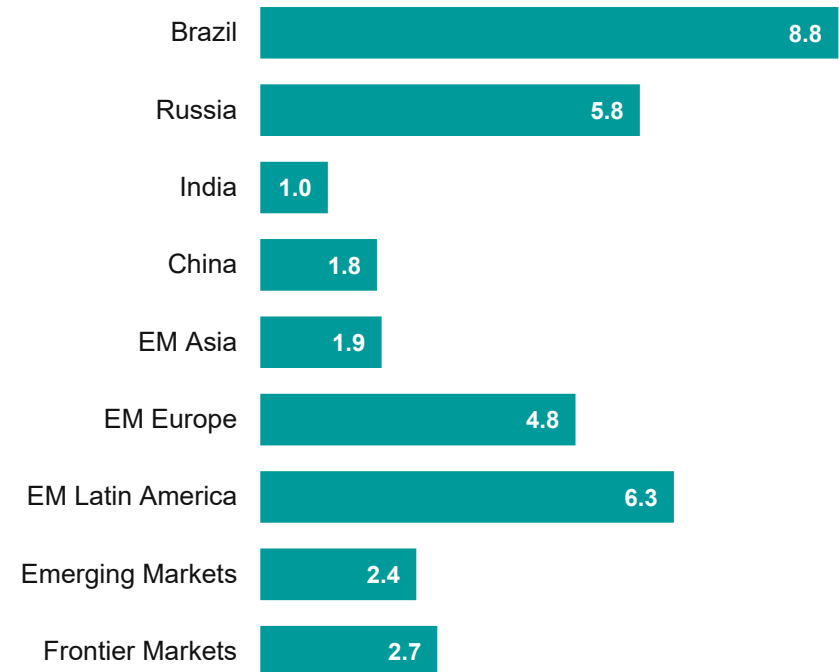
Global ex-U.S. Equity Assumptions

Emerging markets valuations and dividend yield

Price Earnings Ratio



Dividend Yield



Emerging markets also have elevated valuations.

- Among the BRICs, India has the highest valuation metrics while Brazil has fallen dramatically.
- Asia has the highest regional valuations, Latin America the lowest.

Significant dilution is realized as growing companies issue more shares.

Source: MSCI (Dec. 31, 2021)

Public Equity Assumptions

Index	Current Dividend Yield*	Forecasts Dividend Yield	Net Buyback Yield	Inflation	Real Earnings Growth**	Valuation Adjustment	Total Geometric Return	2021 Return	Change
S&P 500	1.35%	1.75%	0.50%	2.25%	2.25%	-0.25%	6.50%	6.50%	0.00%
Russell 2500	1.17%	1.50%	0.00%	2.25%	2.95%	0.00%	6.70%	6.70%	0.00%
Russell 3000	1.24%	1.70%	0.45%	2.25%	2.35%	-0.20%	6.55%	6.60%	-0.05%
MSCI World ex USA	2.53%	2.75%	0.00%	2.00%	1.75%	0.00%	6.50%	6.50%	0.00%
MSCI Emerging Markets	2.38%	2.10%	-2.10%	2.65%	4.25%	0.00%	6.90%	6.90%	0.00%
Aggregate							1.75%	1.75%	0.00%
Cash							1.20%	1.00%	0.20%

Index	Forecast ERP Cash^	Historical ERP Cash	Delta ERP Cash	Forecast ERP Aggregate	Historical ERP Aggregate^^	Delta ERP Aggregate
S&P 500	5.30%	7.62%	-2.32%	4.75%	4.80%	-0.05%
Russell 2500	5.50%	8.04%	-2.54%	4.95%	5.21%	-0.26%

No changes in public equity projections

- Change in Russell 3000 projection due to a difference in rounding
- 25 bps increase in inflation is offset by a 25 bps decrease in dividend yields

* Index yields as of December 31, 2021

** S&P 500 real earnings growth is forecast real GDP growth. R 2500 real earnings growth is an 70 bps spread over S&P 500. Developed and emerging markets earnings growth in line with their respective GDP assumptions.

^ Assumes cash return of 1.2%.

^^ Assumes Aggregate forecast is 1.75%.

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Alternatives

Private Equity

Background

The private equity market in aggregate is driven by many of the same economic factors as public equity markets. Buyout valuations appear reasonable while venture/growth equity valuations are high.

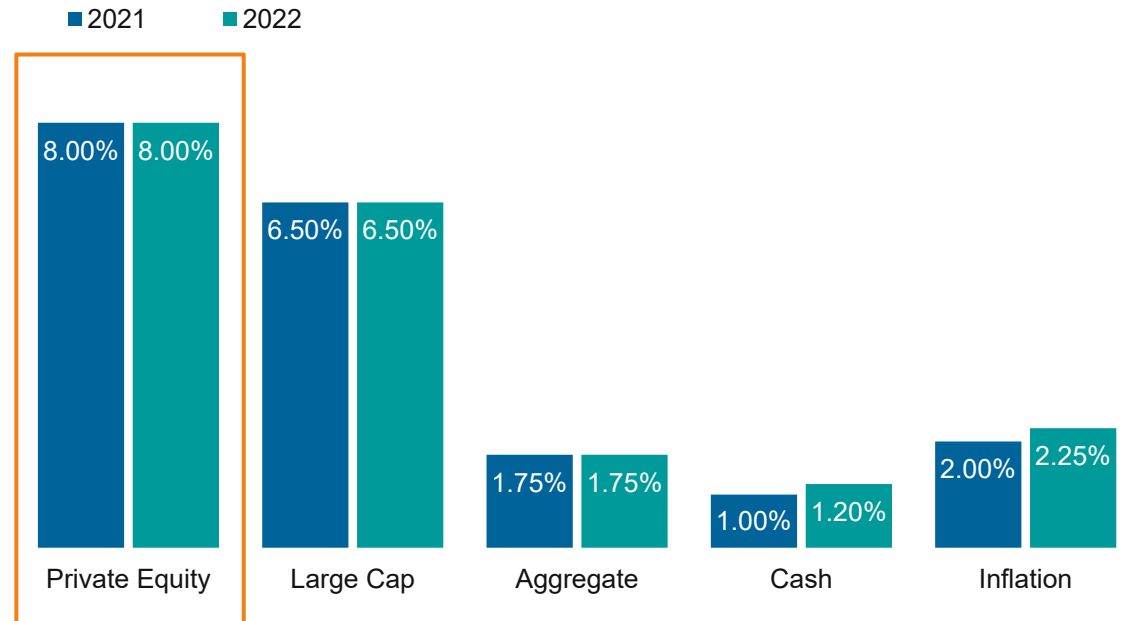
Consequently, the private equity performance expectations did not change relative to where they were last year.

We see tremendous disparity between the best- and worst-performing private equity managers.

The ability to select skillful managers could result in realized returns significantly greater than projected here.

2022 private equity return projection: 8.00% (unchanged)

Return Projections



Real Estate

Background

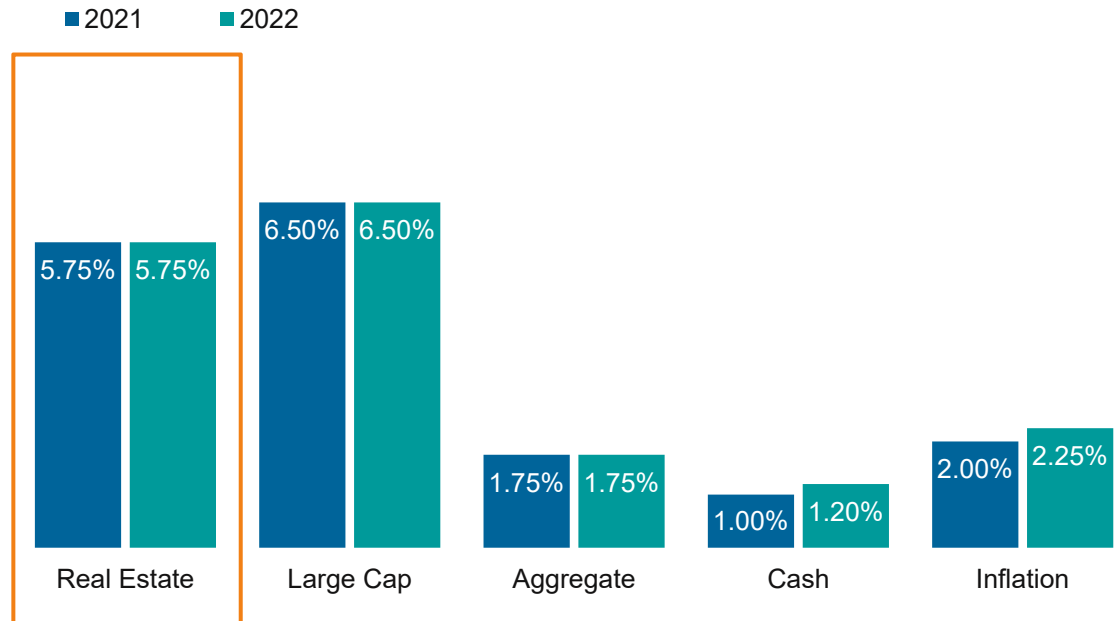
The foreseeable low interest rate environment should help to ensure that real estate continues to garner interest from investors seeking income, supporting returns.

Weakening expectations for some real estate sectors, such as office and retail may continue to be offset by other sectors such as industrial and residential. Non-traditional sectors like medical office and data centers continue to grow in institutional portfolios.

No change to the outlook for real estate returns compared to last year.

2022 real estate return projection: 5.75% (unchanged)

Return Projections



Hedge Funds

Background

Hedge funds can be evaluated in a multi-factor context using the following relationship:

Expected Return = Cash + Equity Beta x (Equity-Cash) + Exotic Beta + Net Alpha

Callan's 10-year cash forecast is 1.2%.

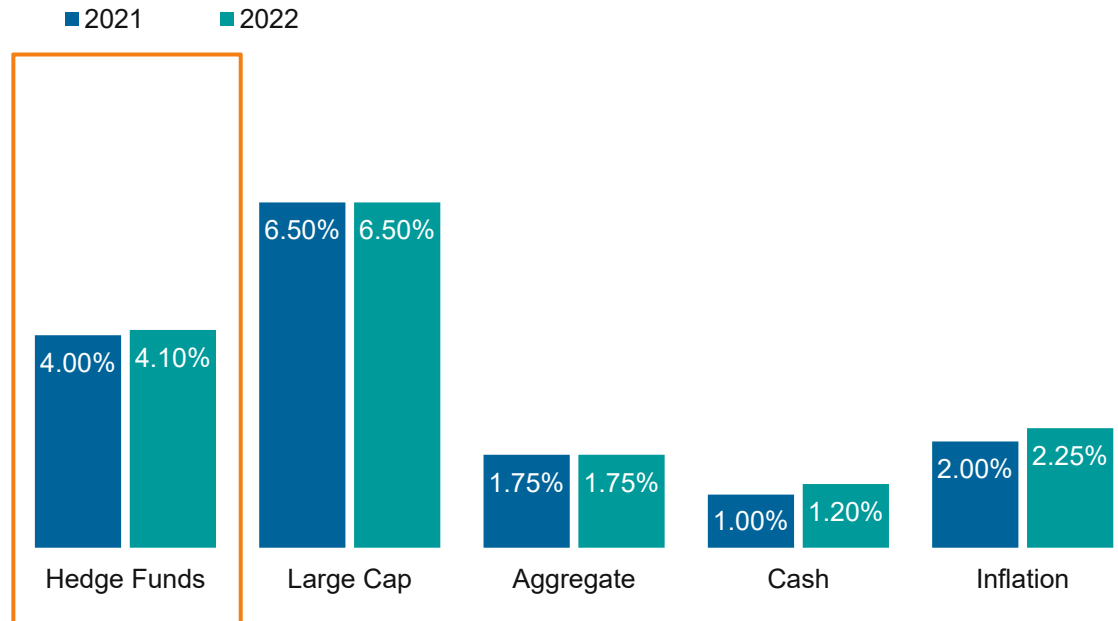
Diversified hedge fund portfolios have historically exhibited equity beta relative to the S&P 500 of about 0.4.

Combined with our equity risk premium forecast, this results in an excess return from equity beta of just over 2%.

Return from hedge fund exotic beta and illiquidity premia is forecast to be 0.5% to 1.0%, to arrive at an overall expected return of 4.1%.

2022 hedge fund return projection:
4.1% (up 10 bps)

Return Projections



Private Credit

Background

Return projection is anchored on middle market direct lending where yields have returned to pre-COVID lows.

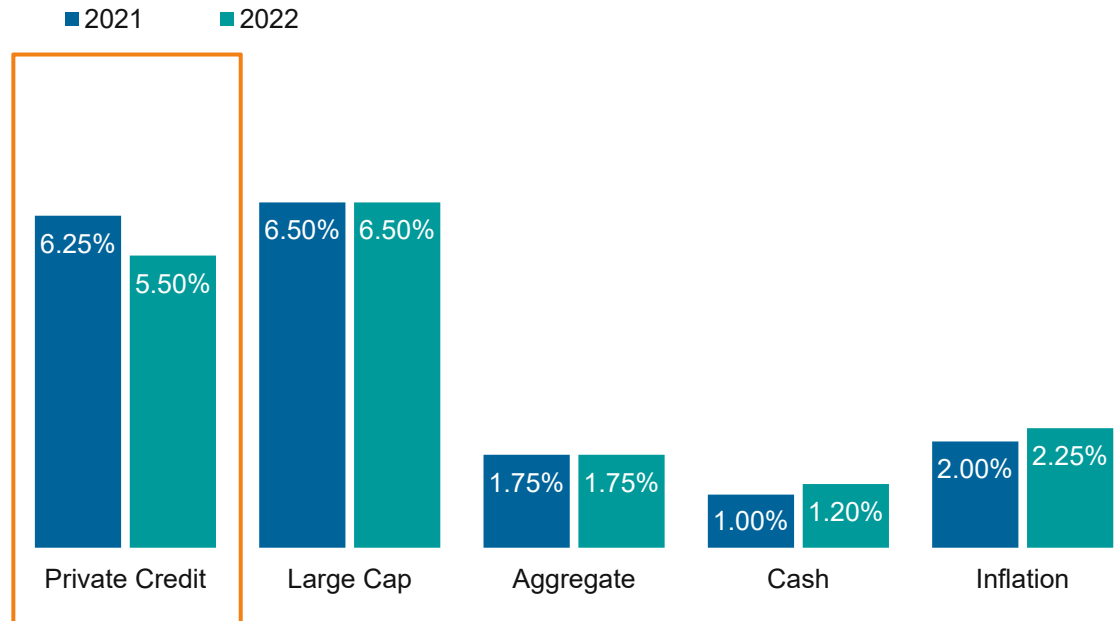
While banks are no longer major investors in this market, there is strong appetite from institutional and retail investors.

~160 bps is a reasonable return premium relative to high yield (3.9%) and leveraged loans.

A portfolio with more distressed and specialty finance exposure would have a higher return though with a lower current yield and higher volatility and higher correlation to public and private equity.

2022 private credit return projection: 5.5% (down 75 bps)

Return Projections

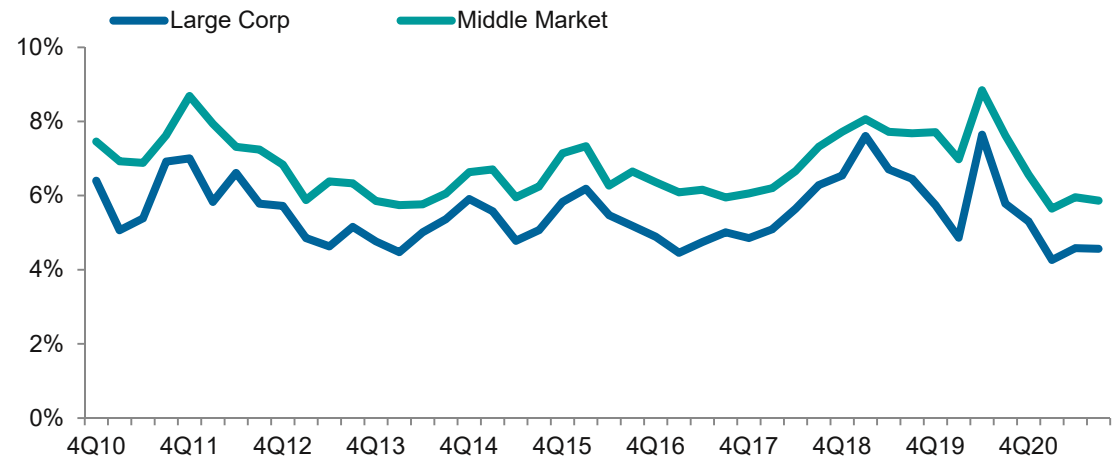


Private Credit

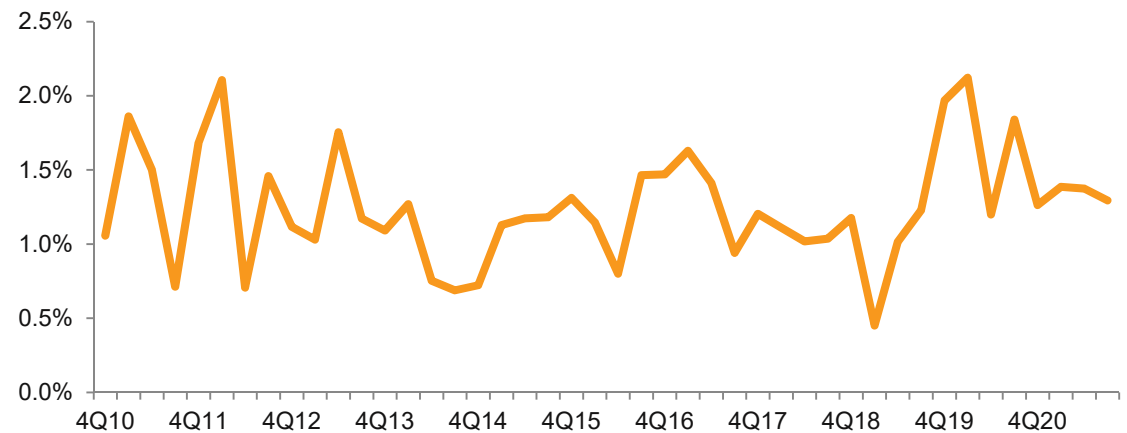
- Return calculations assume 3.7% cost of leverage and 0.75% unlevered loss ratio
- Corresponds to 5.50% geometric

Unlevered Yield	7.2%
Leverage	0.85x
Levered Yield	10.2%
Management Fee and Operating Expense	1.7%
Incentive Rate	15%
Hurdle	4%
Incentive Fee	0.7%
Total Fees and Exp.	2.4%
Loss Ratio	1.4%
Net Arithmetic	6.4%

Loan Yields



Middle Market Premium



Source: Refinitiv LPC. All-in yield (LIBOR + Spread + OID) assuming 3-year takeout
 Note: 2Q20 was deemed less reliable due to lack of data points to calculate a MM institutional all-in yield statistic

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**Detailed 2022 Expectations and
Resulting Portfolio Returns and Risks**

2022 Risk and Returns

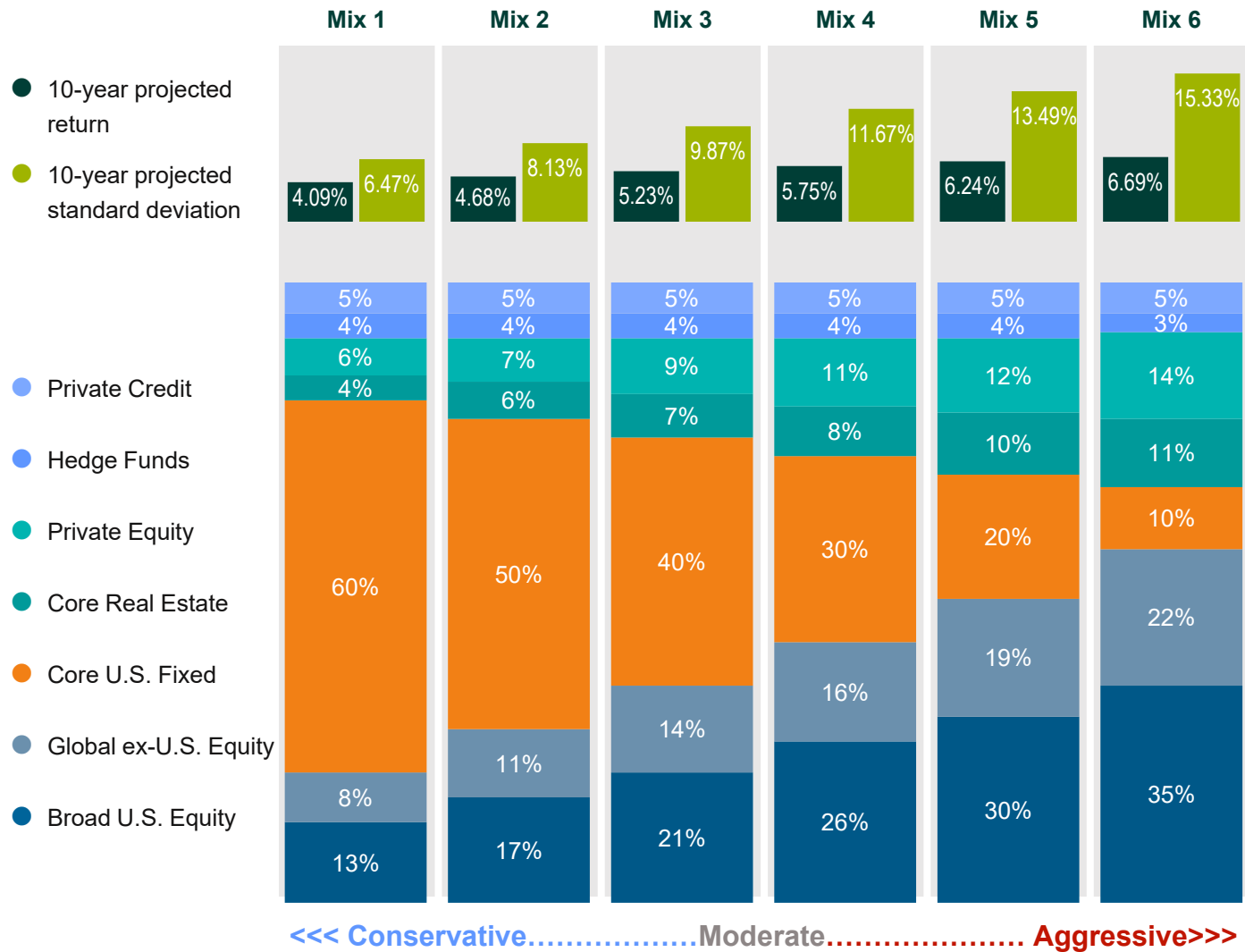
Summary of Callan's Long-Term Capital Market Assumptions (2022 – 2031)

Asset Class	Index	Projected Return		Real	Projected Risk
		1-Year Arithmetic	10-Year Geometric*		Standard Deviation
Equities					
Broad U.S. Equity	Russell 3000	8.00%	6.60%	4.35%	17.95%
Large Cap U.S. Equity	S&P 500	7.85%	6.50%	4.25%	17.70%
Smid Cap U.S. Equity	Russell 2500	8.75%	6.70%	4.45%	21.30%
Global ex-U.S. Equity	MSCI ACWI ex USA	8.70%	6.80%	4.55%	20.70%
Developed ex-U.S. Equity	MSCI World ex USA	8.25%	6.50%	4.25%	19.90%
Emerging Market Equity	MSCI Emerging Markets	9.80%	6.90%	4.65%	25.15%
Fixed Income					
Short Duration Gov/Credit	Bloomberg 1-3 Yr G/C	1.50%	1.50%	-0.75%	2.00%
Core U.S. Fixed	Bloomberg Aggregate	1.80%	1.75%	-0.50%	3.75%
Long Government	Bloomberg Long Gov	1.85%	1.10%	-1.15%	12.50%
Long Credit	Bloomberg Long Cred	2.60%	2.10%	-0.15%	10.50%
Long Government/Credit	Bloomberg Long G/C	2.30%	1.80%	-0.45%	10.40%
TIPS	Bloomberg TIPS	1.35%	1.25%	-1.00%	5.05%
High Yield	Bloomberg High Yield	4.40%	3.90%	1.65%	10.75%
Global ex-U.S. Fixed	Bloomberg GI Agg xUSD	1.20%	0.80%	-1.45%	9.20%
Emerging Market Sovereign Debt	EMBI Global Diversified	4.00%	3.60%	1.35%	9.50%
Alternatives					
Core Real Estate	NCREIF ODCE	6.60%	5.75%	3.50%	14.20%
Private Infrastructure	MSCI Glb Infra/FTSE Dev Core 50/50	7.10%	6.10%	3.85%	15.45%
Private Equity	Cambridge Private Equity	11.45%	8.00%	5.75%	27.60%
Private Credit	N/A	6.40%	5.50%	3.25%	14.60%
Hedge Funds	Callan Hedge FOF Database	4.35%	4.10%	1.85%	8.20%
Commodities	Bloomberg Commodity	4.05%	2.50%	0.25%	18.00%
Cash Equivalents	90-Day T-Bill	1.20%	1.20%	-1.05%	0.90%
Inflation	CPI-U		2.25%		1.60%

* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

Optimization Set – Public Stocks and Bonds Plus Alternatives

Asset mix alternatives



Private Credit:

Absolute constraint: <5%

Note on public equity:

We tune large cap, small cap, developed ex-U.S. and emerging separately.

Prefer to optimize portfolios with broad U.S. and broad global ex-U.S. equity

Disclaimers

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**State of Alaska
Department of Revenue**

State Investment Review 2022 Meeting Schedule

February 15, 2022 @ 10:00 AM (Videoconference)

1. December 31, 2021 Performance
2. FY2022 Capital Market Assumptions
3. Fixed Income Cash Management

May 10, 2022 @ 10:00 AM (Videoconference)

1. March 31, 2022 Performance
2. FY2023 State Asset Allocation Discussion
- 3.

August 23, 2022 @ 10:00 AM* (Videoconference)

1. June 30, 2022 Performance
2. Asset Allocation Process & 2022 Capital Market Assumptions
- 3.

October 25, 2022 @ 10:00 AM* (Videoconference)

1. September 30, 2022 Performance
- 2.

**Times are tentative and will be confirmed closer to the meeting dates.*

Potential Discussion Topics:

- Endowment-Oriented Accounts, Asset Allocation, and Spending Policy
- Positioning for inflation
- What are reasonable investment objectives?