MEKETA
INVESTMENT GROUP

City of Quincy Retirement System

February 29, 2024

Performance Update

Agenda

1. Executive Summary
   - February Market Overview
   - Manager Highlights
2. Performance Update as of February 29, 2024
3. Asset Allocation Review
4. Disclaimer, Glossary & Notes

Executive Summary

Economic and Market Update

Data as of February 29, 2024

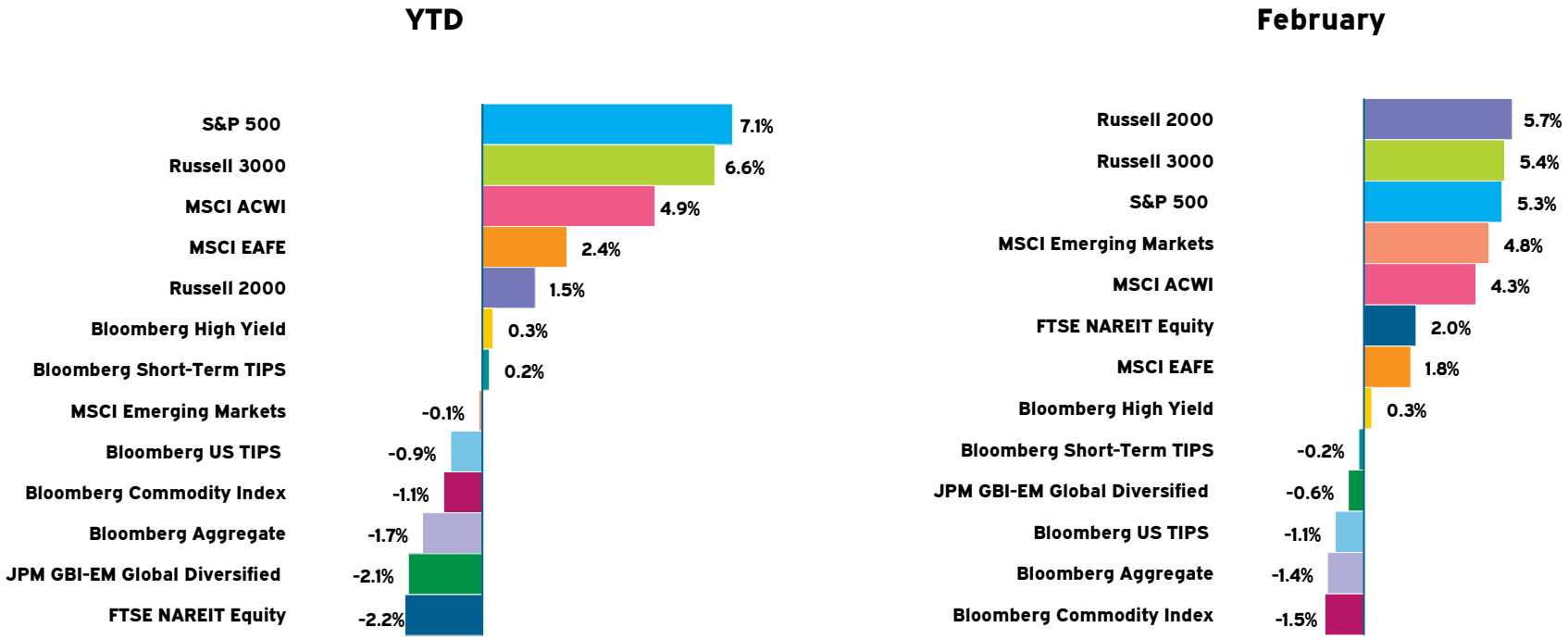
Commentary

→ Markets were mixed in February. Resilient economic data drove global equities higher and pushed out the timing of expected first rate cut, weighing on bonds.

- Major central banks have largely paused interest rate hikes with expectations that many will cut rates this year. The timing and pace of interest rate cuts has been downgraded for many economies given the continued strength of economic data and stubborn inflation.
- In general, inflation pressures have eased in most countries, but some uncertainty remains and levels are still above central bank targets. Headline inflation in the US unexpectedly rose in February (3.1% to 3.2%), while core inflation fell (3.9% to 3.8%) but came in above expectations. Notably, China moved out of deflationary territory in February (0.7%) after four months of declining prices.
- US equity markets (Russell 3000 index) rose 5.4% in February after a very strong 2023 (+26.0%). The technology and consumer discretionary sectors continued to perform well.
- Non-US developed equity markets gained 1.8% in February, helped by Japanese equities which hit multi-decade highs during the month. A strengthening US dollar contributed to the weaker relative results for US investors in foreign markets.
- Policy efforts to support mainland stock prices saw Chinese equities return 8.4%, driving emerging market equities higher (4.8%). The stronger dollar also weighed on emerging market equities with returns in local currency terms 0.3% higher.
- Rising interest rates weighed on bonds with the broad US bond market declining 1.4% for the month.

→ Looking to the rest of this year, the paths of inflation and monetary policy, China's economic disorder and slowing economic growth, the many looming elections, and the wars in Ukraine and Israel, will be key.

Index Returns[1]



→ In February global equity markets produced strong results with the US leading the way.

→ Resilient economic data weighed on bond markets domestically and dashed any hopes of a near-term cut in interest rates.

[1] Source: Bloomberg. Data is as of February 29, 2024.

Domestic Equity Returns[1]

Domestic Equity	February (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
S&P 500	5.3	7.1	30.5	11.9	14.8	12.7
Russell 3000	5.4	6.6	28.6	9.9	13.9	12.0
Russell 1000	5.4	6.9	29.8	10.6	14.4	12.4
Russell 1000 Growth	6.8	9.5	45.9	12.5	18.8	15.6
Russell 1000 Value	3.7	3.8	14.0	8.4	9.4	8.7
Russell MidCap	5.6	4.1	15.5	5.5	10.3	9.4
Russell MidCap Growth	7.5	6.9	25.0	3.1	11.6	10.9
Russell MidCap Value	4.8	2.9	10.9	6.8	8.9	8.2
Russell 2000	5.7	1.5	10.0	-0.9	6.9	7.1
Russell 2000 Growth	8.1	4.7	14.2	-4.6	6.5	7.3
Russell 2000 Value	3.3	-1.4	5.6	2.5	6.6	6.5

US Equities: The Russell 3000 increased 5.4% in February bringing the year-to-date gain to 6.6%.

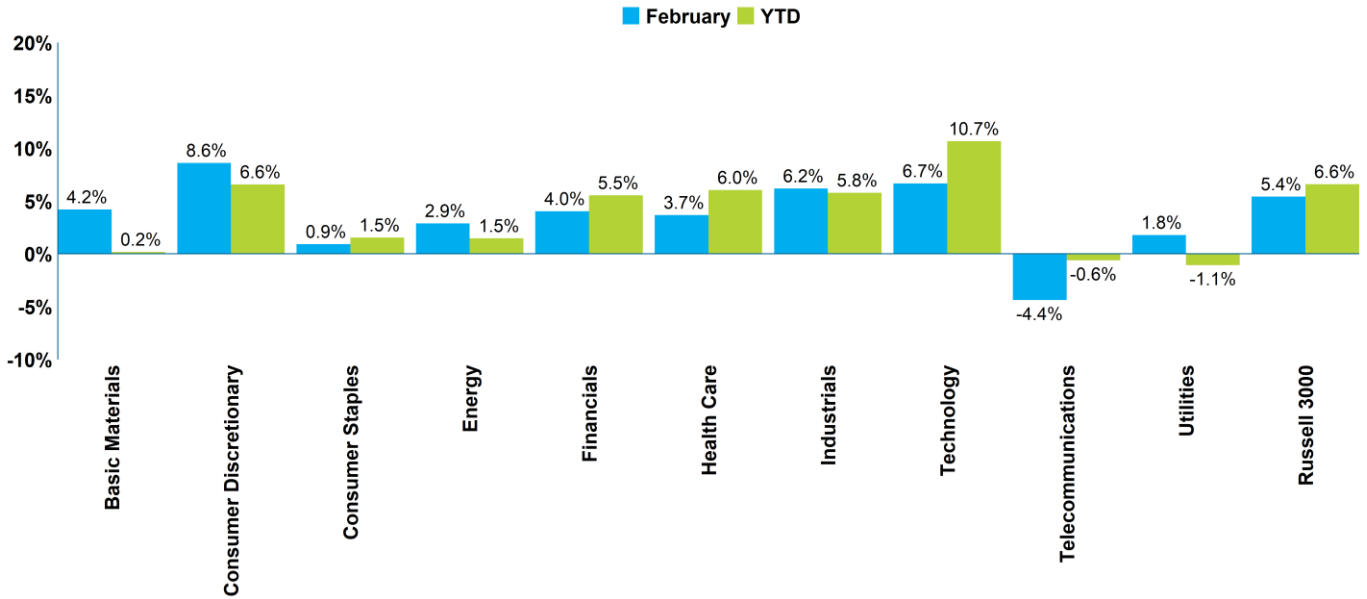
→ US equities rose further during February, fueled by continued optimism over artificial intelligence related stocks and strong economic data. The highest quintile price-to-earnings stocks outperformed all other groups and accounted for half of the return of the Russell 3000 index.

→ Small cap stocks slightly outperformed mid cap and large cap stocks.

→ Growth outperformed value across the market cap spectrum, particularly in small cap.

[1] Source: Bloomberg. Data is as of February 29, 2024.

Russell 3000 Sector Returns[1]



→ So far in 2024, the sectors that drove results last year continue to lead the way. Technology led by the so-called "Magnificent Seven" gained 10.7% through February, with the continued strength of the US consumer putting consumer discretionary second at 6.6%.

→ In February, all sectors except for telecommunications posted positive returns with consumer discretionary (+8.6%), technology (+6.7%), and industrials (+6.2%) leading the way. Traditionally defensive sectors like utilities (+1.8%) and consumer staples (+0.9%) trailed for the month.

[1] Source: Bloomberg. Data is as of February 29, 2024.

Foreign Equity Returns[1]

Foreign Equity	February (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
MSCI ACWI ex. US	2.5	1.5	12.5	1.3	5.4	4.0
MSCI EAFE	1.8	2.4	14.4	4.4	6.8	4.4
MSCI EAFE (Local Currency)	3.0	5.7	14.8	9.8	8.8	7.2
MSCI EAFE Small Cap	0.4	-1.3	6.3	-1.8	4.2	4.3
MSCI Emerging Markets	4.8	-0.1	8.7	-6.3	1.9	3.0
MSCI Emerging Markets (Local Currency)	5.1	1.4	9.7	-3.6	4.0	5.6
MSCI China	8.4	-3.1	-14.1	-20.9	-6.1	1.0

Foreign Equity: Developed international equities (MSCI EAFE) gained 1.8% in February and had a year-to-date return of 2.4%. Emerging market equities (MSCI EM) rose 4.8% in February and are down slightly year-to-date (-0.1%).

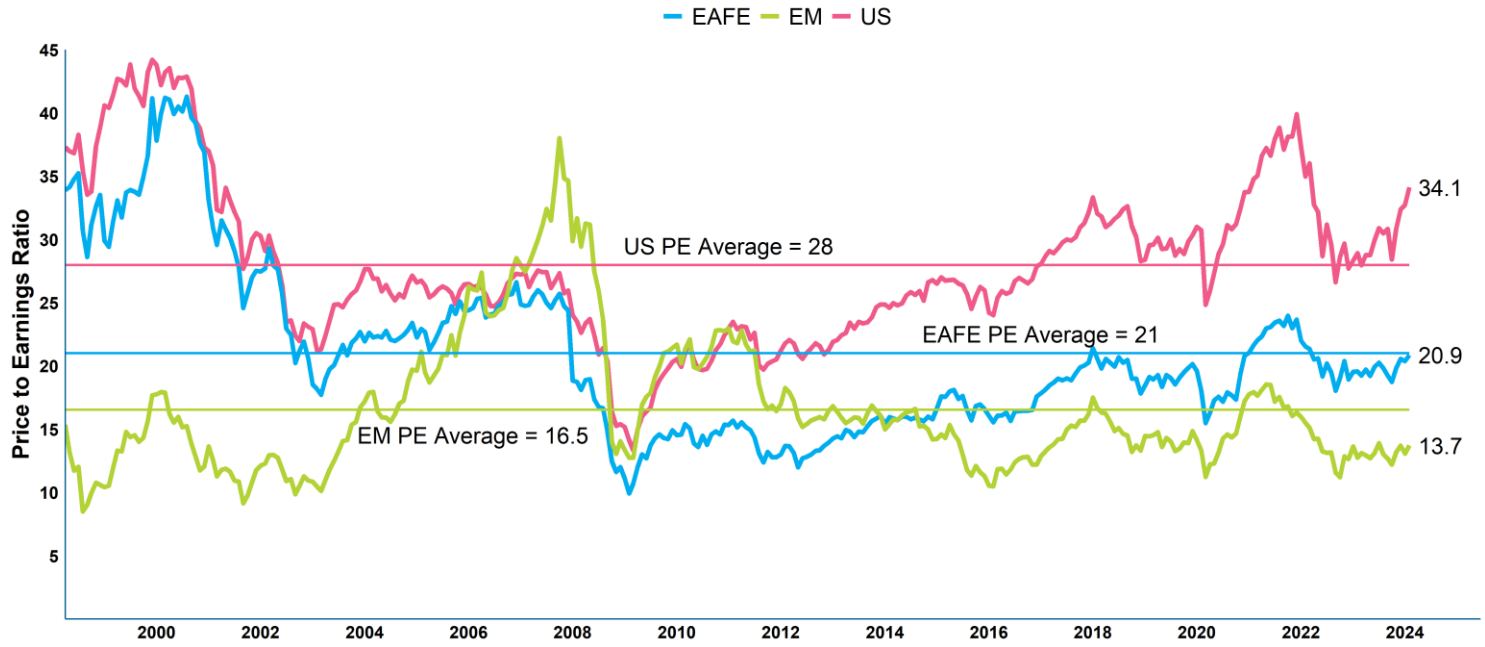
→ February saw solid positive performance in foreign developed markets, while emerging markets experienced stronger relative results driven by large gains in China.

→ Eurozone equities underperformed in February relative to other developed markets, and the UK saw slightly negative returns. Hawkish statements from the ECB and BoE earlier in the month weighed on returns. Japan continued to perform strongly, with the Nikkei 225 surpassing its 1989 peak. A strong US dollar also hurt overall results for US investors with local currency returns 1.2% higher for the month.

→ Emerging market equities benefitted from a strong rebound in China (the highest-performing country for the month at 8.4%). The Chinese recovery was driven by government buying programs, a cut on the five-year loan prime rate, new regulations on short-selling, and the Lunar New Year holiday's boost to consumer spending.

[1] Source: Bloomberg. Data is as of February 29, 2024.

Equity Cyclically Adjusted P/E Ratios[1]



→ In February, the US equity price-to-earnings ratio increased further above its 21st century average due to strong price appreciation.

→ International market valuations rose slightly in February and remain well below the US. In the case of developed markets, valuations are now close to the long-term average, while emerging market valuations remain well below its long-term average.

[1] US Equity Cyclically Adjusted P/E on S&P 500 Index. Source: Robert Shiller, Yale University, and Meketa Investment Group. Developed and Emerging Market Equity (MSCI EAFE and EM Index) Cyclically Adjusted P/E – Source: Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years. Data is as of February 2024. The average line is the long-term average of the US, EM, and EAFE PE values from April 1998 to the recent month-end respectively.

Fixed Income Returns[1]

Fixed Income	February (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	Current Yield (%)	Duration (Years)
Bloomberg Universal	-1.2	-1.4	4.1	-2.8	0.8	1.7	5.2	6.0
Bloomberg Aggregate	-1.4	-1.7	3.3	-3.2	0.6	1.4	4.9	6.2
Bloomberg US TIPS	-1.1	-0.9	2.5	-0.9	2.7	2.1	4.6	6.9
Bloomberg Short-term TIPS	-0.2	0.2	4.5	2.2	3.2	1.9	4.8	2.5
Bloomberg High Yield	0.3	0.3	11.0	1.8	4.2	4.3	7.9	3.7
JPM GBI-EM Global Diversified (USD)	-0.6	-2.1	9.3	-2.6	-0.1	0.0	6.3	5.0

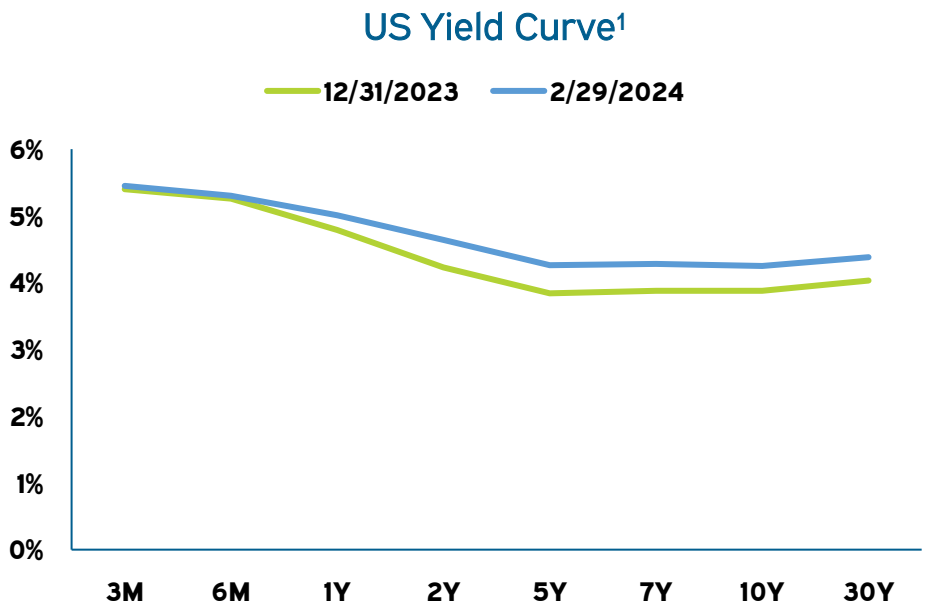
Fixed Income: The Bloomberg Universal index fell -1.2% in February bringing the year-to-date decline to -1.4%.

→ Strong economic data for the last two months and comments by policy makers hinting that rate cuts were not imminent, drove rates up over the month and weighed on bond prices.

→ The broad US bond market (Bloomberg Aggregate), as well as TIPS, fell due to the repricing of stronger growth expectations.

→ High yield bonds, however, provided slightly positive returns as risk appetite remains robust for high yield credit.

[1] Source: Bloomberg. JPM GBI-EM data is from InvestorForce. Data is as of February 29, 2024. The yield and duration data from Bloomberg is defined as the index's yield to worst and modified duration respectively.



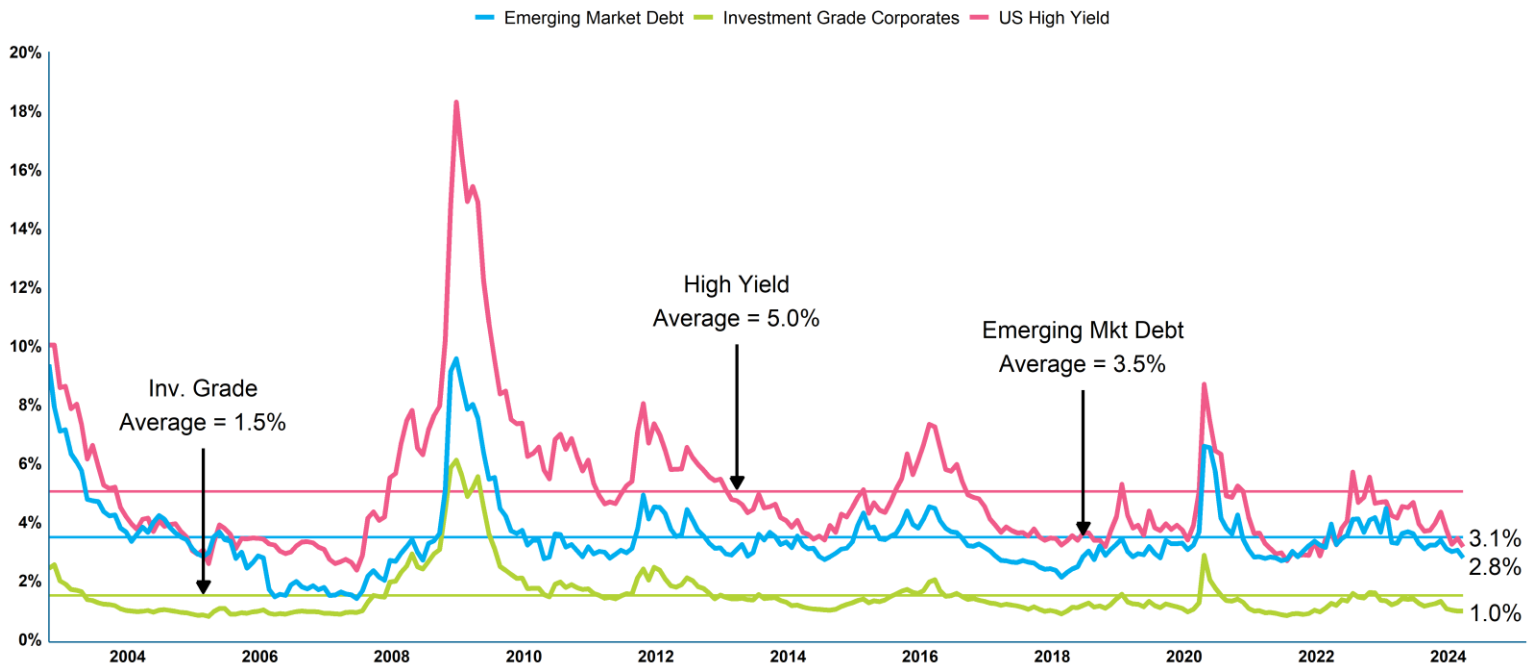
→ Both short-term and long-term maturity yields ended the month higher, largely from strong economic data and shifts in monetary policy expectations.

→ For the month, the more policy sensitive two-year Treasury yield increased from 4.2% to 4.6% while 10-year Treasury yields rose from 3.9% to 4.3%.

→ The yield curve remained inverted at month-end despite a recent flattening trend. The yield spread between the two-year and ten-year Treasury was -0.37% at the end of February.

[1] Source: Bloomberg. Data is as of February 29, 2024.

Credit Spreads vs. US Treasury Bonds[1]



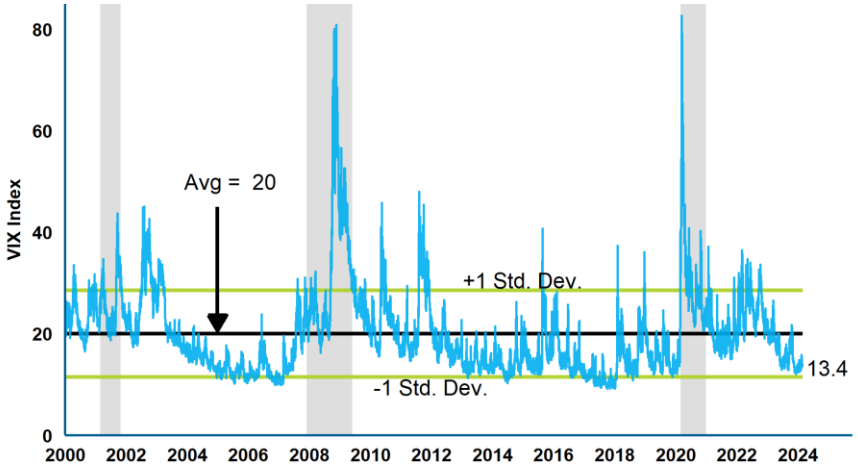
→ A positive economic outlook along with expectations of lower interest rates has led to an increased risk appetite. This has benefited credit, with spreads (the added yield above a comparable maturity Treasury) narrowing.

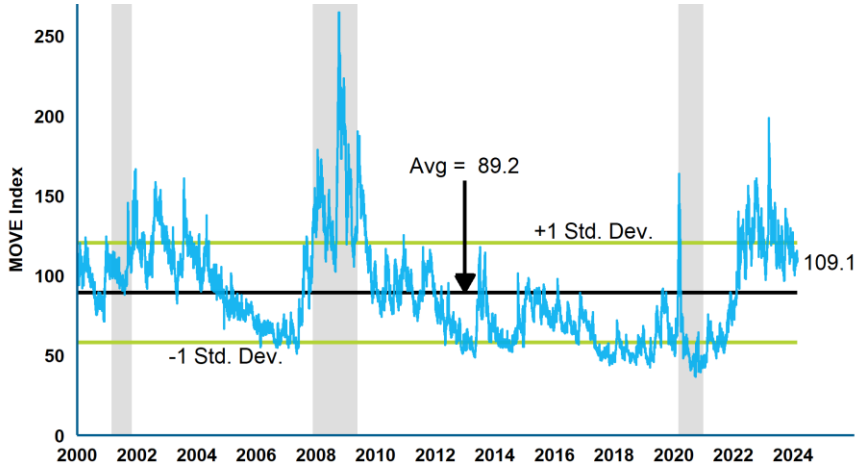
→ Credit spreads narrowed in February for high yield (3.4% to 3.1%) and emerging market bonds (3.0% to 2.8%) while spreads for investment grade corporate bonds remained the same.

→ All spreads remain below their respective long-run averages, particularly within high yield.

[1] Source: Bloomberg. Data is as of February 29, 2024. Average lines denote the average of the investment grade, high yield, and emerging market spread values from September 2002 to the recent month-end, respectively.

Equity and Fixed Income Volatility[1]



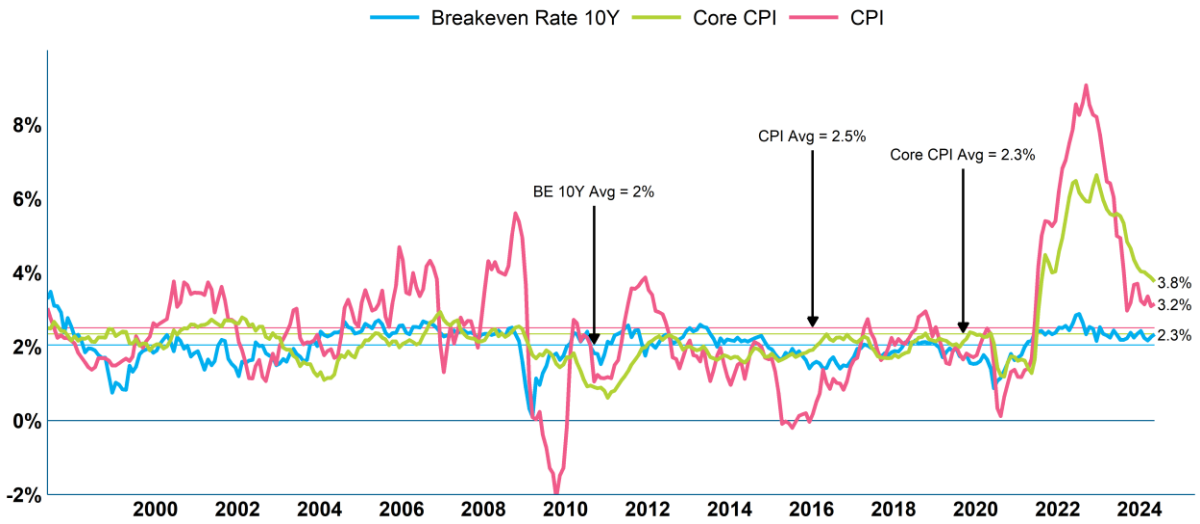


→ Volatility in equities (VIX) remains close to one standard deviation below the long-term average as the focus shifted late last year to peaking policy rates and the potential for a soft landing.

→ Although volatility in the bond market (MOVE) remains above its long-run average (89.2) it has declined recently given falling inflation, growth expectations, and a likely cut in interest rates.

[1] Equity Volatility – Source: FRED. Fixed Income Volatility – Source: Bloomberg. Implied volatility as measured using VIX Index for equity markets and the MOVE Index to measure interest rate volatility for fixed income markets. Data is as of February 2024. The average line indicated is the average of the VIX and MOVE values between January 2000 and February 2024.

US Ten-Year Breakeven Inflation and CPI[1]



→ Year-over-year headline inflation rose in February (3.1% to 3.2%), coming in slightly above expectations. Inflation in services sectors, particularly shelter, remains a key reason consumer inflation is still above the Fed's 2% average target.

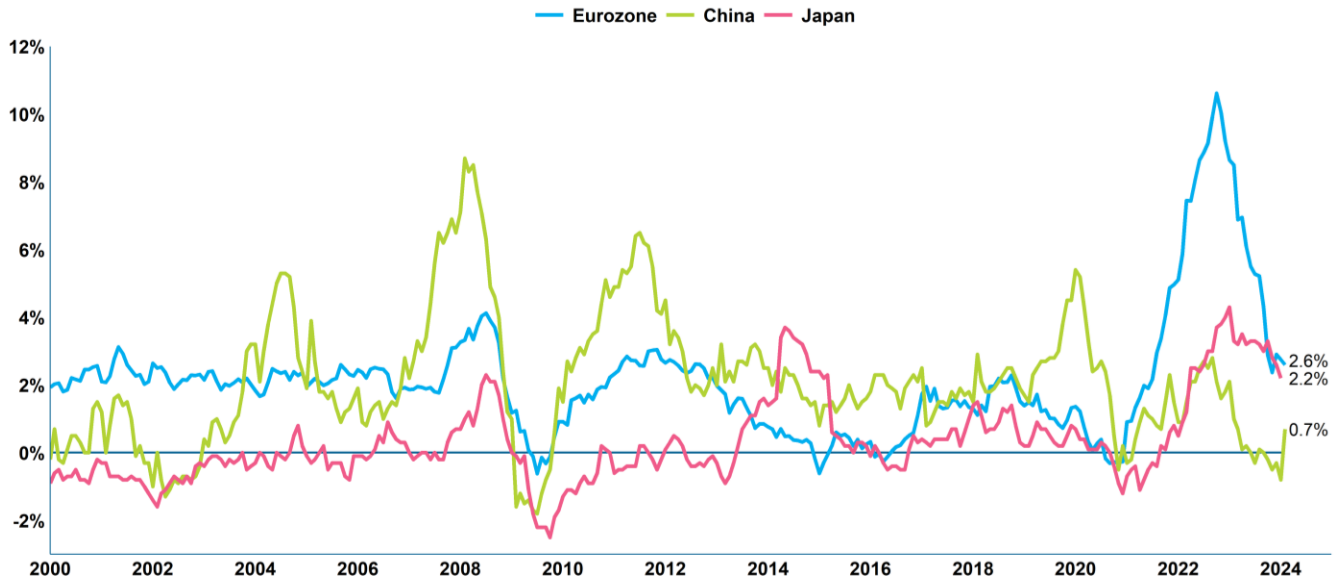
→ Month-over-month inflation rose to 0.4% from the 0.3% January reading again driven by shelter costs. Food prices were flat from a month prior, while increases in gas prices drove energy higher.

→ Core inflation - excluding food and energy – fell slightly from 3.9% to 3.8 but also came in above expectations.

→ Inflation expectations (breakevens) have remained stable despite the recent significant volatility in inflation.

[1] Source: FRED. Data is as February 2024. The CPI and 10 Year Breakeven average lines denote the average values from February 1997 to the present month-end, respectively. Breakeven values represent month-end values for comparative purposes.

Global Inflation (CPI Trailing Twelve Months)[1]



→ Outside the US, inflation is also falling across major economies from the recent peaks.

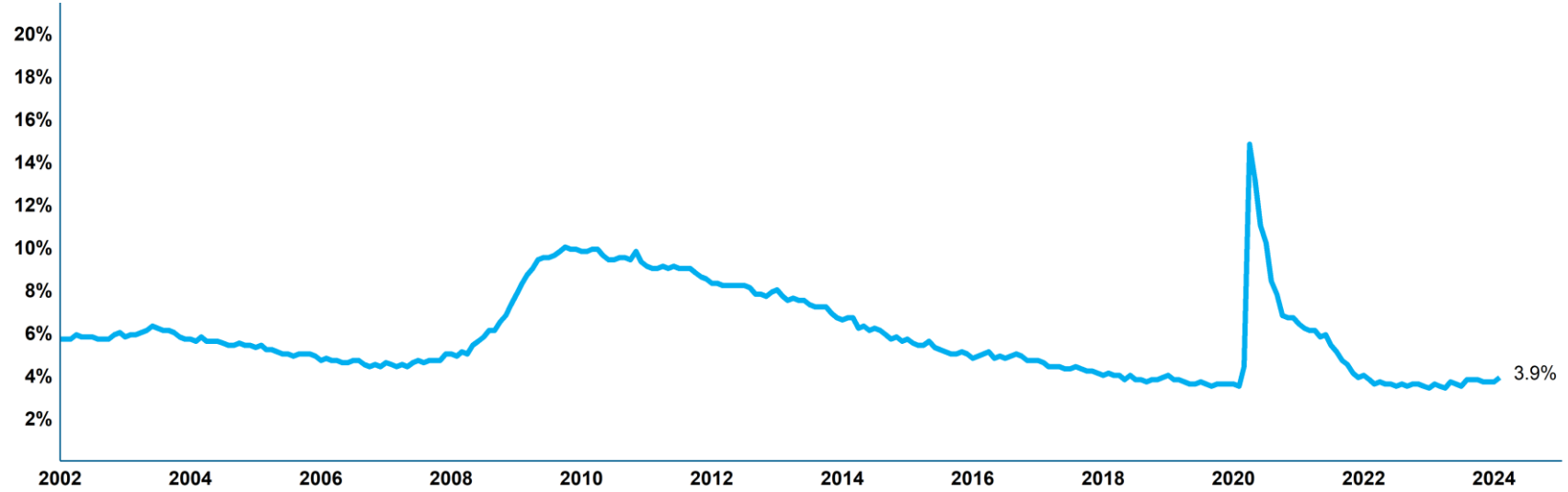
→ In the eurozone, prices experienced a dramatic decline last year but remains above the central bank's 2% target. In February, inflation fell further (2.8% to 2.6%), a level below the 3.2% year-over-year reading in the US.

→ Inflation in Japan has slowly declined from the early 2023 peak of 4.3%, but it remains near levels not seen in a decade, driven by food prices.

→ China emerged from deflationary pressures in February with the first positive reading (0.7%) since last September, driven largely by spending during the Lunar New Year holiday.

[1] Source: FRED for United States CPI and Eurozone CPI. Source: Bloomberg for Japan CPI, China CPI, and Eurozone CPI. Data is as February 29, 2024, except Japan which is as of January 31, 2024.

US Unemployment[1]



→ Overall, the US labor market remains healthy, with the unemployment rate low, wage growth now positive in real terms, and initial claims for unemployment staying subdued.

→ In February, the number of jobs added in the US was stronger than expected (275,000 versus 200,000) but with significant revisions to December and January data. The healthcare, government, and food service sectors added the most jobs for the month.

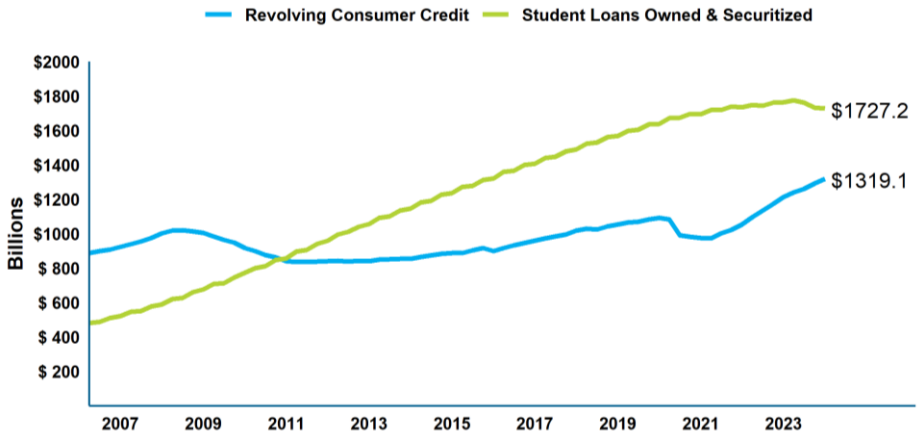
→ The unemployment rate rose from 3.7% to 3.9%, while wage growth came in at 4.3% compared to a year prior, a level well off the 6.0% peak but above inflation levels.

→ Quit rates have declined, and layoffs are stable, with 1.4 available workers per job opening.

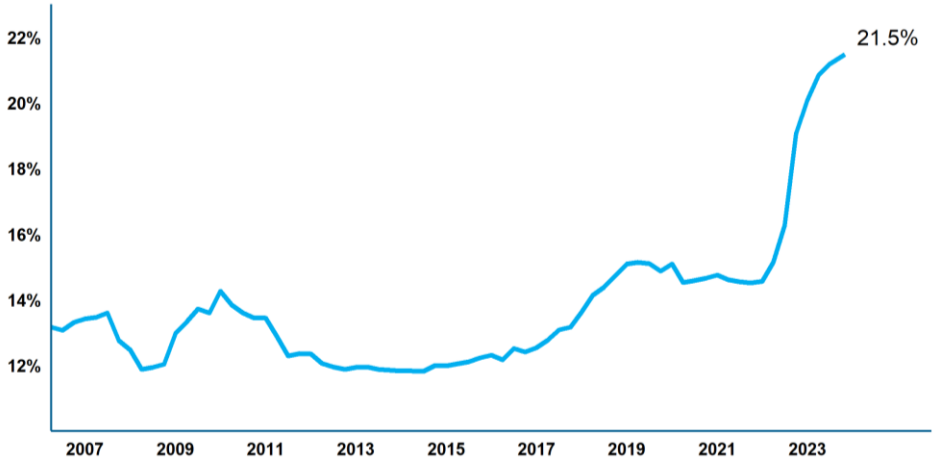
[1] Source: FRED. Data is as February 29, 2024.

US Consumer Under Stress?[1]

Revolving Consumer Credit & Student Loans ($B)



Consumer Credit Card Interest Rates (%)



→ Despite the strong labor market and higher wages, pressures have started to build on the US consumer. This is an important consideration as consumer spending has been a key driver of economic growth.

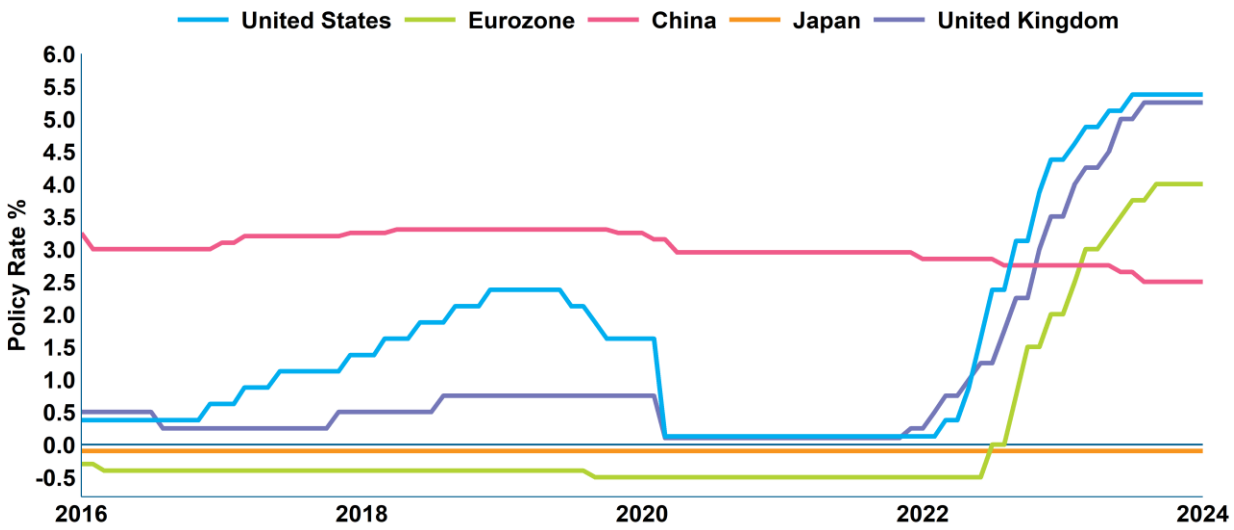
→ Revolving consumer credit surged to new highs in 2023 even as credit card interest rates hit levels not seen before (the prior peak was around 19% in the 1980s). Recently, we have also seen payment delinquencies on credit cards start to increase.

→ The return of student loan repayments after a three-year pandemic-related reprieve could add to pressures on consumers' budgets. This might be partially mitigated by recently initiated repayment and forgiveness programs.

→ As we look ahead, the strength of the US consumer will remain key as this sector makes up most of the domestic economy (GDP).

[1] Source: FRED. Data is as of December 31, 2023. Consumer Credit Card Rate data is as of November 30, 2023. Revolving Consumer Credit data is seasonally adjusted to remove distortions during the holiday season.

Policy Rates[1]



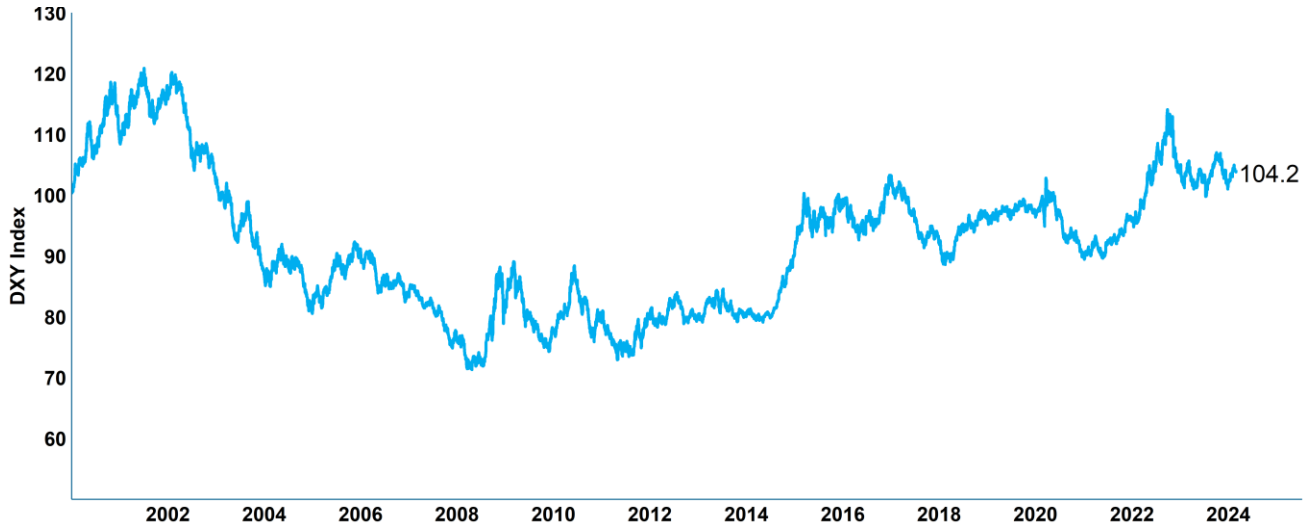
→ The Fed has been on hold since July 2023 when it raised rates to a range of 5.25%-5.50%. Markets are now pricing in slightly less than three rate cuts this year down from close to seven late last year as economic data has come in better than expectations. Market pricing for the first rate cut has also moved out from originally March to the summer or early fall.

→ The European and UK central banks also recently paused their rate increases on slowing inflation with cuts likely to follow this year. In Japan, the BoJ has further relaxed its yield curve control on the 10-year bond, and expectations for further policy normalization are rising.

→ The central bank in China has maintained interest rates at record low levels and continues to inject liquidity into the banking system, as weaker than expected economic data appears to indicate a widespread slowdown.

[1] Source: Bloomberg. Data is as of February 29, 2024.

US Dollar vs. Broad Currencies[1]



→ Overall, the dollar finished last year only slightly below where it started but it was a volatile year for the US currency as expectations related to monetary policy evolved.

→ Strong economic data in the US may delay policy rate cuts this year, which could contribute to upward pressure on the dollar as other countries pivot to rate cuts.

[1] Source: Bloomberg. Data as of February 29, 2024.

Summary

Key Trends:

→ The impact of inflation still above policy targets will remain important, with bond market volatility likely to stay high.

→ Global monetary policies could diverge going forward. The risk of policy errors remains elevated as central banks try to further reduce inflation toward targets while not tipping their economies into recession.

→ Global growth is expected to slow this year, with some economies forecasted to enter recessions. However, optimism has been building that certain economies could experience soft landings. Inflation, monetary policy, and geopolitical issues will remain key in 2024.

→ US consumers could feel pressure as certain components of inflation (e.g., shelter) remain high, borrowing costs are elevated, and the job market may weaken.

→ A focus for US equities going forward will be whether earnings can remain resilient if growth continues to slow. Also, the future paths of the large technology companies that have driven market gains will be important.

→ Equity valuations remain lower in emerging and developed markets, but risks remain, including China's economic uncertainty and on-going weakness in the real estate sector which could spill over into key trading partners' economies. Japan's recent hint at potentially tightening monetary policy along with changes in corporate governance in the country could influence relative results.

Manager Highlights

Axiom International Small Cap Equity

→ Axiom outperformed its benchmark by 4.5% in the month of February, posting a return of 4.8% vs the benchmark's 0.3%.

- The top performing sector on a relative basis was consumer discretionary, led by Japanese character IP company Sanrio, and Japanese performance running footwear company, Asics. Another strong contributor was industrials, led by German defense equipment maker Rheinmetall and Indian compact turbine maker Triveni Turbine.
- The strongest performing countries on a relative basis were Japan and Germany.

→ Since inception, Axiom has returned 7.9%, trailing the benchmark's return of 8.4%, net of fees, over that period.

Loomis Sayles High Yield

→ Loomis beat its benchmark by 0.5% in the month of February, posting a return of 0.8% vs the benchmark's 0.3% return.

- Outperformance was driven primarily by security selection throughout the month. High yield credit, equity, and emerging market credit sectors were the top contributors.
- On an absolute and excess basis, high yield credit positively contributed to performance as the sector generated the greatest returns within the strategy. Security selection was the major driver in this sector. Exposure across the communications and technology names modestly aided excess return with the securities issued by CSC Holdings, Dish DBS, and Logan Merger Sub having the best performance in this sector.

→ Since inception, Loomis has returned 4.8%, trailing the benchmark's return of 5.4%, net of fees, over that period.

Cedar Street Emerging Markets Small Cap Value

→ Cedar Street trailed its benchmark by 0.8% in the month, posting a return of 1.3% vs the benchmark's 2.1% return.

- A lot of the performance is being driven by parabolic moves in India, where they remain cautious. Lower volatility versus the benchmark has been consistent through time.

→ Since inception, Cedar Street has returned -1.8%, trailing the benchmark's return by 3.2%, net of fees, over that period. However, we note that there is a very small since inception period as the fund was hired in January 2024.

Brown Small Cap Fundamental Value

→ Brown trailed its benchmark by 0.5% in February, posting a return of 2.8% vs. the benchmark's 3.3%.

- Underperformance was driven by stock selection in the Health Care and Real Estate sectors as well as an overweight to the Communication Services sector.

→ Since inception, Brown has returned 8.6%, slightly outpacing the benchmark's return of 8.4%, net of fees, over that period.

Performance Update
As of February 29, 2024

Allocation vs. Targets and Policy

	Current Balance	Current Allocation	Policy	Policy Range
US Equity	$207,220,147	25%	24%	19% - 29%
Developed Market Equity	$96,183,483	11%	13%	8% - 18%
Emerging Market Equity	$67,540,580	8%	12%	7% - 17%
Investment Grade Bonds	$70,257,391	8%	5%	2% - 8%
Long-Term Government Bonds	$25,308,736	3%	7%	2% - 12%
TIPS	$28,543,215	3%	4%	1% - 7%
Emerging Market Bonds	--	--	2%	0% - 4%
High Yield Bonds	$42,182,424	5%	6%	3% - 9%
Bank Loans	$9,320,052	1%	2%	0% - 4%
Private Equity	$131,650,852	16%	10%	5% - 15%
Real Estate	$77,723,764	9%	10%	5% - 15%
Natural Resources	$16,692,714	2%	3%	0% - 6%
Infrastructure	$13,162,664	2%	2%	0% - 5%
Opportunistic	$37,338,549	4%	0%	0% - 5%
Balanced Assets	$15,673,651	2%	--	--
Cash	$4,218,451	1%	0%	0% - 5%
Total	**$843,016,674**	**100%**	**100%**	

	Current Balance	Current Allocation	Policy	Policy Range
Total Equity Including PE	$502,595,062	60%	59%	--
Total Fixed Income	$175,611,818	21%	26%	--
Real Assets	$107,579,818	13%	15%	--
Other	$57,230,651	7%	7%	--

Asset Class Performance Summary

	Market Value ($)	% of Portfolio	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System (gross)	**843,016,674**	**100.0**	**1.7**	**1.7**	**10.1**	**5.5**	**8.3**	**7.1**	**6.6**	**8.2**	**Jan-89**
Total Retirement System			**1.7**	**1.6**	**10.0**	**5.4**	**8.2**	**6.8**	**6.3**	**7.9**	
Domestic Equity Assets	**207,220,147**	**24.6**	**4.6**	**5.4**	**24.4**	**10.0**	**12.7**	**11.3**	**9.5**	**10.2**	**Jul-93**
Russell 3000			*5.4*	*6.6*	*28.6*	*9.9*	*13.9*	*12.0*	*9.8*	*10.2*	*Jul-93*
International Developed Market Equity Assets	**96,183,483**	**11.4**	**2.1**	**2.1**	**12.6**	**2.7**	**5.7**	**3.8**	**5.1**	**5.0**	**Feb-98**
MSCI EAFE			*1.8*	*2.4*	*14.4*	*4.4*	*6.8*	*4.4*	*5.5*	*4.9*	*Feb-98*
International Emerging Market Equity Assets	**67,540,580**	**8.0**	**4.1**	**2.7**	**17.5**	**-1.6**	**7.5**	**5.7**	**--**	**6.3**	**Sep-08**
MSCI Emerging Markets			*4.8*	*-0.1*	*8.7*	*-6.3*	*1.9*	*3.0*	*6.4*	*2.9*	*Sep-08*
Investment Grade Bond Assets	**70,257,391**	**8.3**	**-1.4**	**-2.2**	**1.7**	**-4.9**	**-0.5**	**0.9**	**2.7**	**4.0**	**Jul-93**
Bloomberg US Aggregate TR			*-1.4*	*-1.7*	*3.3*	*-3.2*	*0.6*	*1.4*	*3.0*	*4.3*	*Jul-93*
Long-Term Government Bond Assets	**25,308,736**	**3.0**	**-1.4**	**-2.4**	**1.0**	**-4.5**	**0.6**	**--**	**--**	**1.5**	**Dec-15**
PRIT Core Fixed Income			*-1.5*	*-2.5*	*1.3*	*-4.4*	*0.7*	*2.3*	*3.3*	*1.5*	*Dec-15*
TIPS Assets	**28,543,215**	**3.4**	**-1.1**	**-0.7**	**2.5**	**-0.9**	**2.7**	**2.1**	**--**	**3.4**	**Mar-07**
Bloomberg US TIPS TR			*-1.1*	*-0.9*	*2.5*	*-0.9*	*2.7*	*2.1*	*3.4*	*3.4*	*Mar-07*
High Yield Bond Assets	**42,182,424**	**5.0**	**0.5**	**0.5**	**10.1**	**2.2**	**4.4**	**3.9**	**5.8**	**5.6**	**Apr-07**
Bloomberg US High Yield TR			*0.3*	*0.3*	*11.0*	*1.8*	*4.2*	*4.3*	*6.5*	*6.1*	*Apr-07*
Bank Loan Assets	**9,320,052**	**1.1**	**1.1**	**2.1**	**13.3**	**6.0**	**5.2**	**--**	**--**	**4.3**	**Aug-14**
Credit Suisse Leveraged Loans			*0.9*	*1.7*	*11.4*	*5.5*	*5.1*	*4.5*	*4.8*	*4.5*	*Aug-14*
Total Real Estate	**77,723,764**	**9.2**	**-0.1**	**-0.2**	**-10.3**	**3.5**	**2.9**	**6.4**	**--**	**--**	**Jan-89**
NCREIF ODCE			*0.0*	*0.0*	*-12.0*	*4.9*	*4.2*	*7.3*	*7.2*	*6.9*	*Jan-89*

Some asset classes may show skewed performance relative to month over month changes in market value, this is due to PRIM General Allocation funds having their performance user entered while their market values are estimated using PRIM's current asset allocation.

Total Retirement System | As of February 29, 2024

	Market Value ($)	% of Portfolio	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Private Equity Assets	**131,650,852**	**15.6**									
Natural Resources Assets	**16,692,714**	**2.0**									
Infrastructure Assets	**13,162,664**	**1.6**									
Opportunistic Assets	**37,338,549**	**4.4**									
Balanced Assets (PRIT General Allocation Fund)	**15,673,651**	**1.9**	**1.9**	**1.9**	**10.8**	**6.3**	**8.5**	**7.7**	**7.4**	**8.3**	**Apr-90**
60% Wilshire 5000 & 40% Barclays Aggregate			*2.7*	*3.2*	*18.1*	*5.0*	*8.9*	*8.1*	*7.4*	*8.6*	*Apr-90*
Cash	**4,218,451**	**0.5**									

Total Retirement System | As of February 29, 2024

	Market Value ($)	% of Portfolio	% of Sector	Trailing Net Performance 1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System (gross)	**843,016,674**	**100.0**	--	**1.7**	**1.7**	**10.1**	**5.5**	**8.3**	**7.1**	**6.6**	**8.2**	**Jan-89**
Total Retirement System				**1.7**	**1.6**	**10.0**	**5.4**	**8.2**	**6.8**	**6.3**	**7.9**	
Domestic Equity Assets	**207,220,147**	**24.6**	**24.6**	**4.6**	**5.4**	**24.4**	**10.0**	**12.7**	**11.3**	**9.5**	**10.2**	**Jul-93**
Russell 3000				*5.4*	*6.6*	*28.6*	*9.9*	*13.9*	*12.0*	*9.8*	*10.2*	*Jul-93*
RhumbLine Russell 1000 Growth Index	31,535,333	3.7	15.2	6.8	9.5	45.9	12.5	18.8	15.6	--	12.2	Jun-05
Russell 1000 Growth				*6.8*	*9.5*	*45.9*	*12.5*	*18.8*	*15.7*	*11.6*	*12.3*	*Jun-05*
RhumbLine Russell 1000 Value Index	30,412,760	3.6	14.7	3.7	3.8	14.0	8.4	9.4	8.7	--	7.8	Jun-05
Russell 1000 Value				*3.7*	*3.8*	*14.0*	*8.4*	*9.4*	*8.7*	*8.0*	*7.8*	*Jun-05*
Rhumbline QSI Index	35,318,416	4.2	17.0	2.7	2.4	17.7	9.2	11.3	11.3	--	11.5	Aug-13
Russell 3000				*5.4*	*6.6*	*28.6*	*9.9*	*13.9*	*12.0*	*9.8*	*12.6*	*Aug-13*
Brown Small Cap Fundamental Value	19,556,769	2.3	9.4	2.8	1.4	10.5	8.1	8.0	--	--	8.6	Jul-16
Russell 2000 Value				*3.3*	*-1.4*	*5.6*	*2.5*	*6.6*	*6.5*	*7.3*	*8.4*	*Jul-16*
PRIT General Allocation Domestic Equity	90,396,869	10.7	43.6	5.4	6.6	27.7	--	--	--	--	3.9	Jan-22
PRIT Domestic Equity Benchmark				*5.4*	*6.5*	*28.2*	--	--	--	--	*4.0*	*Jan-22*
International Developed Market Equity Assets	**96,183,483**	**11.4**	**11.4**	**2.1**	**2.1**	**12.6**	**2.7**	**5.7**	**3.8**	**5.1**	**5.0**	**Feb-98**
MSCI EAFE				*1.8*	*2.4*	*14.4*	*4.4*	*6.8*	*4.4*	*5.5*	*4.9*	*Feb-98*
SSgA MSCI EAFE Index	45,438,428	5.4	47.2	1.8	2.4	14.7	4.7	7.1	4.7	--	5.8	Oct-09
MSCI EAFE				*1.8*	*2.4*	*14.4*	*4.4*	*6.8*	*4.4*	*5.5*	*5.5*	*Oct-09*
Axiom International Small Cap Equity	11,743,180	1.4	12.2	4.8	4.4	7.6	-5.2	--	--	--	7.9	May-20
S&P Developed Ex-U.S. SmallCap				*0.3*	*-2.0*	*5.2*	*-2.3*	*4.1*	*4.1*	*6.8*	*8.4*	*May-20*
MSCI EAFE Small Cap				*0.4*	*-1.3*	*6.3*	*-1.9*	*4.2*	*4.3*	*6.6*	*8.3*	*May-20*
PRIT General Allocation Int. Equity	39,001,875	4.6	40.5	1.5	1.2	11.9	--	--	--	--	-0.5	Jan-22
Custom MSCI World Ex-US IMI Net Divs				*1.5*	*1.6*	*12.8*	--	--	--	--	*0.3*	*Jan-22*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
International Emerging Market Equity Assets	**67,540,580**	**8.0**	**8.0**	**4.1**	**2.7**	**17.5**	**-1.6**	**7.5**	**5.7**	--	**6.3**	**Sep-08**
MSCI Emerging Markets				*4.8*	*-0.1*	*8.7*	*-6.3*	*1.9*	*3.0*	*6.4*	*2.9*	*Sep-08*
Driehaus Emerging Markets Growth	40,555,975	4.8	60.0	4.9	4.3	15.9	-4.2	--	--	--	6.3	Mar-19
MSCI Emerging Markets				*4.8*	*-0.1*	*8.7*	*-6.3*	*1.9*	*3.0*	*6.4*	*1.9*	*Mar-19*
PRIT General Allocation EME	15,673,651	1.9	23.2	4.4	2.1	16.8	--	--	--	--	-1.1	Jan-22
Custom MSCI Emerging Market IMI Net Divs				*4.5*	*0.0*	*9.8*	--	--	--	--	*-5.1*	*Jan-22*
Cedar Street Emerging Markets Small Cap Value Fund	11,310,955	1.3	16.7	1.3	-1.8	--	--	--	--	--	-1.8	Jan-24
MSCI Emerging Markets Small Cap Value NR USD				*2.1*	*1.4*	*24.1*	*7.0*	*8.5*	*6.2*	*9.5*	*1.4*	*Jan-24*
Investment Grade Bond Assets	**70,257,391**	**8.3**	**8.3**	**-1.4**	**-2.2**	**1.7**	**-4.9**	**-0.5**	**0.9**	**2.7**	**4.0**	**Jul-93**
Bloomberg US Aggregate TR				*-1.4*	*-1.7*	*3.3*	*-3.2*	*0.6*	*1.4*	*3.0*	*4.3*	*Jul-93*
SSgA U.S. Aggregate Bond Index-NL	21,049,418	2.5	30.0	-1.4	-1.6	3.4	-3.1	0.6	1.4	--	2.9	Apr-04
Bloomberg US Aggregate TR				*-1.4*	*-1.7*	*3.3*	*-3.2*	*0.6*	*1.4*	*3.0*	*3.0*	*Apr-04*
PRIT General Allocation Core FI	49,207,973	5.8	70.0	-1.4	-2.4	1.0	--	--	--	--	-8.0	Jan-22
PRIT Core Fixed Income				*-1.5*	*-2.5*	*1.3*	*-4.4*	*0.7*	*2.3*	*3.3*	*-7.9*	*Jan-22*
Long-Term Government Bond Assets	**25,308,736**	**3.0**	**3.0**	**-1.4**	**-2.4**	**1.0**	**-4.5**	**0.6**	--	--	**1.5**	**Dec-15**
PRIT Core Fixed Income				*-1.5*	*-2.5*	*1.3*	*-4.4*	*0.7*	*2.3*	*3.3*	*1.5*	*Dec-15*
PRIT Core Fixed Income	25,308,736	3.0	100.0	-1.4	-2.4	1.0	-4.5	0.6	--	--	1.5	Dec-15
PRIT Core Fixed Income				*-1.5*	*-2.5*	*1.3*	*-4.4*	*0.7*	*2.3*	*3.3*	*1.5*	*Dec-15*
TIPS Assets	**28,543,215**	**3.4**	**3.4**	**-1.1**	**-0.7**	**2.5**	**-0.9**	**2.7**	**2.1**	--	**3.4**	**Mar-07**
Bloomberg US TIPS TR				*-1.1*	*-0.9*	*2.5*	*-0.9*	*2.7*	*2.1*	*3.4*	*3.4*	*Mar-07*
SSgA TIPS Index	28,543,215	3.4	100.0	-1.1	-0.7	2.5	-0.9	2.7	2.1	--	3.4	Mar-07
Bloomberg US TIPS TR				*-1.1*	*-0.9*	*2.5*	*-0.9*	*2.7*	*2.1*	*3.4*	*3.4*	*Mar-07*

Total Retirement System | As of February 29, 2024

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
High Yield Bond Assets	**42,182,424**	**5.0**	**5.0**	**0.5**	**0.5**	**10.1**	**2.2**	**4.4**	**3.9**	**5.8**	**5.6**	**Apr-07**
Bloomberg US High Yield TR				*0.3*	*0.3*	*11.0*	*1.8*	*4.2*	*4.3*	*6.5*	*6.1*	*Apr-07*
Loomis Sayles High Yield Conservative	12,644,838	1.5	30.0	0.8	0.4	8.4	-0.1	3.0	3.5	--	4.8	Feb-12
Bloomberg US High Yield TR				*0.3*	*0.3*	*11.0*	*1.8*	*4.2*	*4.3*	*6.5*	*5.4*	*Feb-12*
Columbia High Yield	12,770,425	1.5	30.3	0.1	0.0	10.7	2.2	4.4	--	--	4.6	Dec-16
Bloomberg US High Yield TR				*0.3*	*0.3*	*11.0*	*1.8*	*4.2*	*4.3*	*6.5*	*4.7*	*Dec-16*
PRIT General Allocation Value Added FI	16,767,161	2.0	39.7	0.7	0.9	10.9	--	--	--	--	3.3	Jan-22
PRIT Public Value-Added Fixed Income				*0.7*	*0.8*	*10.4*	*2.5*	*3.5*	*3.2*	*5.2*	*2.0*	*Jan-22*
Bank Loan Assets	**9,320,052**	**1.1**	**1.1**	**1.1**	**2.1**	**13.3**	**6.0**	**5.2**	**--**	**--**	**4.3**	**Aug-14**
Credit Suisse Leveraged Loans				*0.9*	*1.7*	*11.4*	*5.5*	*5.1*	*4.5*	*4.8*	*4.5*	*Aug-14*
Beach Point Loan Fund	9,320,052	1.1	100.0	1.1	2.1	13.3	6.0	5.2	--	--	4.3	Aug-14
Credit Suisse Leveraged Loans				*0.9*	*1.7*	*11.4*	*5.5*	*5.1*	*4.5*	*4.8*	*4.5*	*Aug-14*

Total Retirement System | As of February 29, 2024

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Real Estate	**77,723,764**	**9.2**	**9.2**	**-0.1**	**-0.2**	**-10.3**	**3.5**	**2.9**	**6.4**	--	--	**Jan-89**
NCREIF ODCE				*0.0*	*0.0*	*-12.0*	*4.9*	*4.2*	*7.3*	*7.2*	*6.9*	*Jan-89*
UBS Trumbull Property Income Fund	10,250,769	1.2	13.2	0.0	0.0	-8.1	3.0	2.8	5.3	6.5	6.8	Jan-89
UBS Trumbull Property Fund	2,307,561	0.3	3.0	0.0	0.0	-15.7	-1.8	-2.7	2.4	4.6	5.6	Jan-89
JPMCB Strategic Property Fund	9,398,503	1.1	12.1	-2.4	-2.6	-15.1	2.0	2.3	--	--	2.3	Jan-19
AEW Partners VII	327,197	0.0	0.4									
Rockwood X	4,718,800	0.6	6.1									
Torchlight Debt Opportunity Fund VI	3,735,149	0.4	4.8									
TerraCap Partners IV (Institutional), L.P.	4,387,099	0.5	5.6									
Rockwood Capital Real Estate Partners Fund XI, L.P.	6,148,335	0.7	7.9									
PRIT General Allocation Real Estate	36,450,350	4.3	46.9	0.4	0.2	-6.6	--	--	--	--	1.2	Jan-22
PRIT Real Estate Benchmark				*0.0*	*-0.4*	*-11.8*	--	--	--	--	*2.3*	*Jan-22*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Private Equity Assets	**131,650,852**	**15.6**	**15.6**									
Adams Street Partners 2010	4,946,112	0.6	3.8									
Goldman Sachs Private Equity Partners 2005	370,229	0.0	0.3									
North American Strategic Partners 2006	28,181	0.0	0.0									
Brookfield Capital Partners IV	2,457,994	0.3	1.9									
PRIT Vintage Year 2001	56,127	0.0	0.0									
PRIT Vintage Year 2002	1,743	0.0	0.0									
Ridgemont Equity Partners II	3,003,795	0.4	2.3									
TA XII	2,984,698	0.4	2.3									
LLR Equity Partners V	6,900,678	0.8	5.2									
Wellspring Capital Partners VI	6,674,407	0.8	5.1									
Trilantic Capital Partners VI	5,424,963	0.6	4.1									
Brookfield Capital Partners V, L.P.	5,246,399	0.6	4.0									
FS Equity Partners VIII L.P.	6,482,242	0.8	4.9									
Ridgemont Equity Partners III	7,936,920	0.9	6.0									
Searchlight Capital III	4,772,159	0.6	3.6									
Charlesbank Technology Opportunities Fund	9,133,923	1.1	6.9									
LLR Equity Partners VI, L.P	3,264,686	0.4	2.5									
PRIT General Allocation Private Equity	61,965,596	7.4	47.1	1.5	1.3	9.9	--	--	--	--	2.7	Jan-22
State Street PE Index (SSPEI) All PE Excluding PD				*0.0*	*0.0*	*5.0*	--	--	--	--	*1.3*	*Jan-22*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Natural Resources Assets	**16,692,714**	**2.0**	**2.0**									
Hancock Timberland IX	3,887,008	0.5	23.3									
PRIT General Allocation Timberland	11,299,609	1.3	67.7	-0.2	0.2	11.8	--	--	--	--	5.7	Jan-22
NCREIF Timberland				*0.0*	*0.0*	*9.5*	*10.5*	*6.6*	*5.8*	*7.1*	*10.3*	*Jan-22*
Oppenheimer Natural Resources	1,506,097	0.2	9.0									
Infrastructure Assets	**13,162,664**	**1.6**	**1.6**									
IFM Global Infrastructure (U.S.), L.P.	8,678,835	1.0	65.9	-1.2	-2.2	5.4	10.5	9.8	--	--	9.5	Oct-18
CPI+5%				*1.0*	*2.0*	*8.3*	*10.9*	*9.4*	*8.0*	*7.7*	*9.1*	*Oct-18*
Global Infrastructure Partners IV	4,483,829	0.5	34.1									
Opportunistic Assets	**37,338,549**	**4.4**	**4.4**									
HarbourVest Co-Investment Fund V, L.P.	4,691,918	0.6	12.6									
EnTrustPermal Special Opportunities Evergreen Fund, Ltd.	4,579,861	0.5	12.3									
PRIT General Allocation Hedge Funds	28,066,770	3.3	75.2	1.3	1.5	9.6	--	--	--	--	4.6	Jan-22
HFRI FOF Composite Index				*1.8*	*2.6*	*7.2*	*2.2*	*4.8*	*3.3*	*3.3*	*1.2*	*Jan-22*
Balanced Assets (PRIT General Allocation Fund)	**15,673,651**	**1.9**	**1.9**	**1.9**	**1.9**	**10.8**	**6.3**	**8.5**	**7.7**	**7.4**	**8.3**	**Apr-90**
60% Wilshire 5000 & 40% Barclays Aggregate				*2.7*	*3.2*	*18.1*	*5.0*	*8.9*	*8.1*	*7.4*	*8.6*	*Apr-90*
PRIT General Allocation	15,673,651	1.9	100.0	1.9	1.9	10.8	6.3	8.5	7.7	7.4	8.3	Apr-90
60% Wilshire 5000 & 40% Barclays Aggregate				*2.7*	*3.2*	*18.1*	*5.0*	*8.9*	*8.1*	*7.4*	*8.6*	*Apr-90*
Cash	**4,218,451**	**0.5**	**0.5**									
Cash Account	2,398,878	0.3	56.9									
91 Day T-Bills				*0.4*	*0.8*	*5.2*	*2.4*	*1.9*	*1.3*	*1.4*	*1.4*	*Jan-02*
PRIM Cash Account	1,819,574	0.2	43.1									

Cash Flow Summary

	Beginning Market Value	Contributions	Withdrawals	Net Investment Change	Ending Market Value	Month Return
Adams Street Partners 2010	$4,946,112	$0	$0	$0	$4,946,112	0.00%
AEW Partners VII	$327,197	$0	$0	$0	$327,197	0.00%
Axiom International Small Cap Equity	$11,204,769	$0	-$7,829	$546,240	$11,743,180	4.81%
Beach Point Loan Fund	$9,218,821	$0	-$3,883	$105,115	$9,320,052	1.10%
Brookfield Capital Partners IV	$2,457,994	$0	$0	$0	$2,457,994	0.00%
Brookfield Capital Partners V, L.P.	$5,246,399	$0	$0	$0	$5,246,399	0.00%
Brown Small Cap Fundamental Value	$19,012,009	$0	-$17,927	$562,687	$19,556,769	2.77%
Cash Account	$2,999,455	$0	-$600,578	$0	$2,398,878	0.00%
Cedar Street Emerging Markets Small Cap Value Fund	$11,162,443	$0	$0	$148,511	$11,310,955	1.33%
Charlesbank Technology Opportunities Fund	$8,747,887	$386,036	$0	$0	$9,133,923	0.00%
Columbia High Yield	$12,759,012	$0	-$4,363	$15,776	$12,770,425	0.09%
Driehaus Emerging Markets Growth	$38,679,995	$0	$0	$1,875,980	$40,555,975	4.85%
EnTrustPermal Special Opportunities Evergreen Fund, Ltd.	$4,579,861	$0	$0	$0	$4,579,861	0.00%
FS Equity Partners VIII L.P.	$6,482,242	$0	$0	$0	$6,482,242	0.00%
Global Infrastructure Partners IV	$4,476,505	$7,323	$0	$0	$4,483,829	0.00%
Goldman Sachs Private Equity Partners 2005	$370,229	$0	$0	$0	$370,229	0.00%
Hancock Timberland IX	$3,887,008	$0	$0	$0	$3,887,008	0.00%
HarbourVest Co-Investment Fund V, L.P.	$4,691,918	$0	$0	$0	$4,691,918	0.00%
IFM Global Infrastructure (U.S.), L.P.	$8,786,791	$0	$0	-$107,956	$8,678,835	-1.23%
JPMCB Strategic Property Fund	$9,629,975	$0	$0	-$231,471	$9,398,503	-2.40%
LLR Equity Partners V	$7,247,695	$0	-$347,017	$0	$6,900,678	0.00%
LLR Equity Partners VI, L.P	$3,264,686	$0	$0	$0	$3,264,686	0.00%
Loomis Sayles High Yield Conservative	$12,540,672	$0	-$4,742	$108,908	$12,644,838	0.79%
North American Strategic Partners 2006	$28,181	$0	$0	$0	$28,181	0.00%

Total Retirement System | As of February 29, 2024

	Beginning Market Value	Contributions	Withdrawals	Net Investment Change	Ending Market Value	Month Return
Oppenheimer Natural Resources	$1,506,097	$0	$0	$0	$1,506,097	0.00%
PRIM Cash Account	$2,520,255	$2,479,715	-$3,200,000	$19,603	$1,819,574	0.79%
PRIT Core Fixed Income	$25,677,953	$0	-$2,320	-$366,897	$25,308,736	-1.44%
PRIT General Allocation	$16,570,367	$0	-$2,474,965	$1,578,249	$15,673,651	1.90%
PRIT General Allocation Core FI	$48,270,200	$0	$0	$937,773	$49,207,973	-1.44%
PRIT General Allocation Domestic Equity	$87,534,765	$0	$0	$2,862,104	$90,396,869	5.38%
PRIT General Allocation EME	$15,489,691	$0	$0	$183,960	$15,673,651	4.39%
PRIT General Allocation Hedge Funds	$27,737,354	$0	$0	$329,416	$28,066,770	1.33%
PRIT General Allocation Int. Equity	$38,544,115	$0	$0	$457,760	$39,001,875	1.51%
PRIT General Allocation Private Equity	$61,238,313	$0	$0	$727,283	$61,965,596	1.50%
PRIT General Allocation Real Estate	$37,103,213	$0	$0	-$652,863	$36,450,350	0.37%
PRIT General Allocation Timberland	$11,166,986	$0	$0	$132,622	$11,299,609	-0.20%
PRIT General Allocation Value Added FI	$16,570,367	$0	$0	$196,794	$16,767,161	0.70%
PRIT Vintage Year 2001	$60,077	$0	-$4,750	$799	$56,127	1.33%
PRIT Vintage Year 2002	$1,744	$0	$0	-$1	$1,743	-0.08%
Rhumbline QSI Index	$34,389,880	$0	-$2,060	$930,596	$35,318,416	2.70%
RhumbLine Russell 1000 Growth Index	$29,518,155	$0	-$1,774	$2,018,952	$31,535,333	6.83%
RhumbLine Russell 1000 Value Index	$29,329,302	$0	-$1,711	$1,085,169	$30,412,760	3.69%
Ridgemont Equity Partners II	$3,003,795	$0	$0	$0	$3,003,795	0.00%
Ridgemont Equity Partners III	$7,936,920	$0	$0	$0	$7,936,920	0.00%
Rockwood Capital Real Estate Partners Fund XI, L.P.	$6,148,335	$0	$0	$0	$6,148,335	0.00%
Rockwood X	$4,718,800	$0	$0	$0	$4,718,800	0.00%
Searchlight Capital III	$4,772,159	$0	$0	$0	$4,772,159	0.00%
SSgA MSCI EAFE Index	$44,613,269	$0	-$3,787	$828,946	$45,438,428	1.84%
SSgA TIPS Index	$28,854,567	$0	-$1,427	-$309,925	$28,543,215	-1.08%
SSgA U.S. Aggregate Bond Index-NL	$21,349,644	$0	-$1,052	-$299,174	$21,049,418	-1.41%

Total Retirement System | As of February 29, 2024

	Beginning Market Value	Contributions	Withdrawals	Net Investment Change	Ending Market Value	Month Return
TA XII	$2,984,698	$0	$0	$0	$2,984,698	0.00%
TerraCap Partners IV (Institutional), L.P.	$4,387,099	$0	$0	$0	$4,387,099	0.00%
Torchlight Debt Opportunity Fund VI	$3,735,149	$0	$0	$0	$3,735,149	0.00%
Trilantic Capital Partners VI	$5,547,488	$0	-$122,525	$0	$5,424,963	0.00%
UBS Trumbull Property Fund	$2,307,561	$0	$0	$0	$2,307,561	0.00%
UBS Trumbull Property Income Fund	$10,250,769	$0	$0	$0	$10,250,769	0.00%
Wellspring Capital Partners VI	$6,674,407	$0	$0	$0	$6,674,407	0.00%
Total	**$833,261,352**	**$2,873,075**	**-$6,802,710**	**$13,684,957**	**$843,016,674**	--

Private Market Managers' Performance Overview[1]

Managers	Strategy	Vintage Year	Commitment Amount ($mm)	% Called	Median Peer IRR	Quartile Rank	Net IRR	Net Multiple
Real Estate Managers								
AEW Partners VII	Opportunistic	2013	5.0	93%	11.1	3	10.3%	NA
Rockwood X	Value-Added	2016	10.0	95%	12.5	3	5.9%	1.2x
Torchlight Debt Opportunity Fund VI	Opportunistic	2017	5.0	100%	9.8	3	7.5%	1.3x
TerraCap Partners IV	Value-Added	2017	5.0	100%	12.8	3	9.3%	NA
Rockwood XI	Value-Added	2019	8.0	68%	8.0	3	5.8%	1.1x
Private Equity Managers								
Adams Street Partners	Fund of Funds	2010	10.0	90%	14.8	3	14.4	2.2x
Goldman Sachs PE Partners	Fund of Funds	2005	10.0	100%	7.2	NA	NA	NA
North American Strategic Partners	Fund of Funds	2006	9.1	96%	8.3	NA	NA	NA
PRIT Vintage Year 2001	Fund of Funds	2001	2.5	NA	10.4	NA	NA	NA
PRIT Vintage Year 2002	Fund of Funds	2002	0.5	NA	8.6	NA	NA	NA
Brookfield Capital Partners IV	Buyout	2015	4.0	98%	18.7	1	40.2%	2.5x
LLR Equity Partners V	Buyout	2017	5.0	84%	20.3	3	19.8%	1.9x
Ridgemont Equity Partners II	Buyout	2015	6.0	76%	18.7	3	18.3%	2.0x

[1] As of 9/30/2023.
[2] NM indicates that a fund is early in its investment period; therefore, the return is not yet meaningful. NA indicates that the relevant data is not available at the time of report generation.

Private Market Managers' Performance Overview (con't)[1]

Managers	Strategy	Vintage Year	Commitment Amount ($mm)	% Called	Median Peer IRR	Quartile Rank	Net IRR	Net Multiple
TA XII	Growth Equity	2016	4.0	99%	15.4	1	36.0%	3.1x
Wellspring VI	Buyout	2017	5.0	89%	20.3	3	17.7%	1.6x
Trilantic Capital Partners VI	Buyout	2018	5.0	92%	19.5	4	13.0%	1.4x
Brookfield Capital Partners V	Buyout	2019	4.0	88%	20.0	3	16.2%	1.4x
FS Equity Partners VIII	Buyout	2019	5.0	82%	20.0	2	20.4%	1.6x
Ridgemont Equity Partners III	Buyout	2019	6.0	82%	20.0	1	31.5%	1.8x
Searchlight Capital III	Special Situations	2019	5.0	69%	12.4	4	4.0%	1.1x
Charlesbank Technology Opportunities	Buyout	2019	5.0	79%	20.0	1	55.2%	2.1x
LLR Equity Partners VI	Buyout	2020	4.0	78%	15.2	4	3.1%	1.1x
Opportunistic Managers								
HarbourVest Co-Investment Fund V	Opportunistic	2019	4.0	78%	14.1	1	20.6%	1.8x
EnTrustPermal Spec. Opps. Evergreen Fund	Opportunistic	2020	6.0	87%	NM	NM	NM	NM
Infrastructure Managers								
Global Infrastructure Partners IV	Value-Added	2019	5.0	78%	--	--	--	--
Natural Resources Managers								
Hancock Timberland	Timber	2008	8.0	100%	--	--	0.7%	1.1x
Oppenheimer Natural Resources	Natural Resources	2010	7.0	100%	--	--	-3.9%	NA

[1] As of 9/30/2023.
[2] NM indicates that a fund is early in its investment period; therefore, the return is not yet meaningful. NA indicates that the relevant data is not available at the time of report generation.

Asset Allocation Review and Risk Analysis

Table of Contents

Executive Summary & Recent History

Executive Summary

→ The Board typically reviews its asset allocation on an annual basis.

- This does not always result in a change to the asset allocation as it is intended to represent a long-term strategic outlook.
- The last asset allocation review was conducted in 2023.

→ This document presents the current asset allocation policy and several alternative asset allocation options for the System.

→ Meketa focused on options that add an exposure to private credit.

- This stems from recent discussions with the Board on private credit.

→ This document presents three alternative policy portfolios for the Board to consider.

→ Meketa provides various approaches to assessing risk in order to provide a "mosaic" of the risks faced by the System, and to highlight the tradeoffs inherent to different policy portfolios.

→ We recommend that any change be implemented gradually.

- In particular, if the Board votes to adopt a policy that includes an allocation to private credit, we recommend this allocation be achieved in a prudent manner that allows for vintage year diversification.
  - This is the same approach the System has taken in the past when adopting private market asset classes such as private equity.

Recent History

→ In 2021, the City of Quincy issued a pension obligation bond (POB) and contributed the proceeds of the POB to the Retirement System.

- The entire contribution was invested in the PRIT General Allocation Fund.

→ The POB dramatically changed the funded status of the Retirement System, for the better.

→ The size of the POB was roughly equivalent to the pre-existing size of the System, hence the investment in PRIT altered the System's combined asset allocation.

→ In 2022, the Board reviewed its asset allocation policy to account for this meaningful change.

→ Subsequently, in 2023 the Board voted to reduce its target allocation to emerging market equities and increase its target allocation to private equity.

2024 Capital Markets Expectations

Summary of Capital Markets Expectations

→ We update our capital markets expectations each year in January.

- Changes are driven by many factors, including interest rates, credit spreads, cap rates, and equity prices.

→ 2023 was a volatile year for most investors, but ultimately most asset classes experienced positive returns, including double-digit gains for many risky assets.

→ With the notable exception of China's markets, global bond and equity markets rallied at the end of the year, posting strong gains as inflation pressures eased and central banks appeared to be turning away from tightening policies.

- Despite short-term interest rates climbing, the yield on most Treasury bonds finished the year near where they started it.
- Credit spreads tightened, especially for lower quality credit such as high yield. The result is lower expected returns for many credit-oriented assets.
- Most equity markets rallied in 2023, generally at a much faster pace than the gain in earnings. Hence many equity markets were trading at higher valuations at year-end, thus reducing their forward-looking returns.

→ Our 10-year CMEs continue to be lower than our 20-year CMEs for the vast majority of asset classes, partly due to a higher assumed "risk-free" rate in the future.

→ The net result is a meaningful decrease in return assumptions for most assets over the 10-year horizon, with much more mixed and modest changes at the 20-year horizon.

Setting Capital Market Expectations

→ Capital markets expectations (CMEs) are the inputs needed to determine the long-term risk and returns expectations for a portfolio.

- They serve as the starting point for determining asset allocation.

→ Consultants (including Meketa) generally set them once a year.

- Our results are published in January and based on data as of December 31 for public markets and September 30 for private markets.
- Changes are driven by many factors, including interest rates, credit spreads, cap rates, and equity prices.

→ Setting CMEs involves crafting long-term forecasts for:

- Returns
- Standard Deviation
- Correlations (i.e., covariance)

→ We created inputs for 109 "asset classes" for our 2024 Capital Markets Expectations.

→ Our process relies on both quantitative and qualitative methodologies.

Building 10-year Forecasts

→ Our first step is to develop 10-year forecasts based on fundamental models.

- Each model is based on the most important factors that drive returns for that asset class:

Asset Class Category	Major Factors
Equities	Dividend Yield, GDP Growth, Valuation
Bonds	Yield to Worst, Default Rate, Recovery Rate
Commodities	Collateral Yield, Roll Yield, Inflation
Infrastructure	Public IS Valuation, Income, Growth, Leverage
Natural Resources	Price per Acre, Income, Public Market Valuation
Real Estate	Cap Rate, Yield, Growth, Leverage
Private Equity	EBITDA Multiple, Leverage, Public VC Valuation
Hedge Funds and Other	Leverage, Alternative Betas

→ The common components are income, growth, and valuation.

- Leverage and currency impact are also key factors for many strategies.

Moving from 10-Year to 20-Year Forecasts

→ Our next step is to combine our 10-year forecasts with projections for years 11-20 for each asset class.

→ We use a risk premia approach to forecast 10-year returns in ten years (i.e., years 11-20).

- We start with an assumption (market informed, such as the 10-year forward rate) for what the risk-free rate will be in ten years.
- We then add a risk premia for each asset class.
- We use historical risk premia as a guide, but many asset classes will differ from this, especially if they have a shorter history.
- We seek consistency with finance theory (i.e., riskier assets will have a higher risk premia assumption).

→ Essentially, we assume mean-reversion over the first ten years (where appropriate), and consistency with CAPM thereafter.

→ The final step is to make any qualitative adjustments.

- The Investment Policy Committee reviews the output and may make adjustments.

The Other Inputs: Standard Deviation and Correlation

→ Standard deviation:

- We review the trailing twenty-year standard deviation, as well as skewness.
- Historical standard deviation serves as the base for our assumptions.
- If there is a negative skew, we increased the volatility assumption based on the size of the historical skewness.

Asset Class	Historical Standard Deviation (%)	Skewness	Assumption[1] (%)
Bank Loans	6.5	-2.9	10.0
FI / L-S Credit	5.8	-2.7	9.0

- We also adjust for private market asset classes with "smoothed" return streams.

→ Correlation:

- We use trailing twenty-year correlations as our guide.
- Again, we make adjustments for "smoothed" return streams.

→ Most of our adjustments are conservative in nature (i.e., they increase the standard deviation and correlation).

[1] Note that we round our standard deviation assumptions to whole numbers.

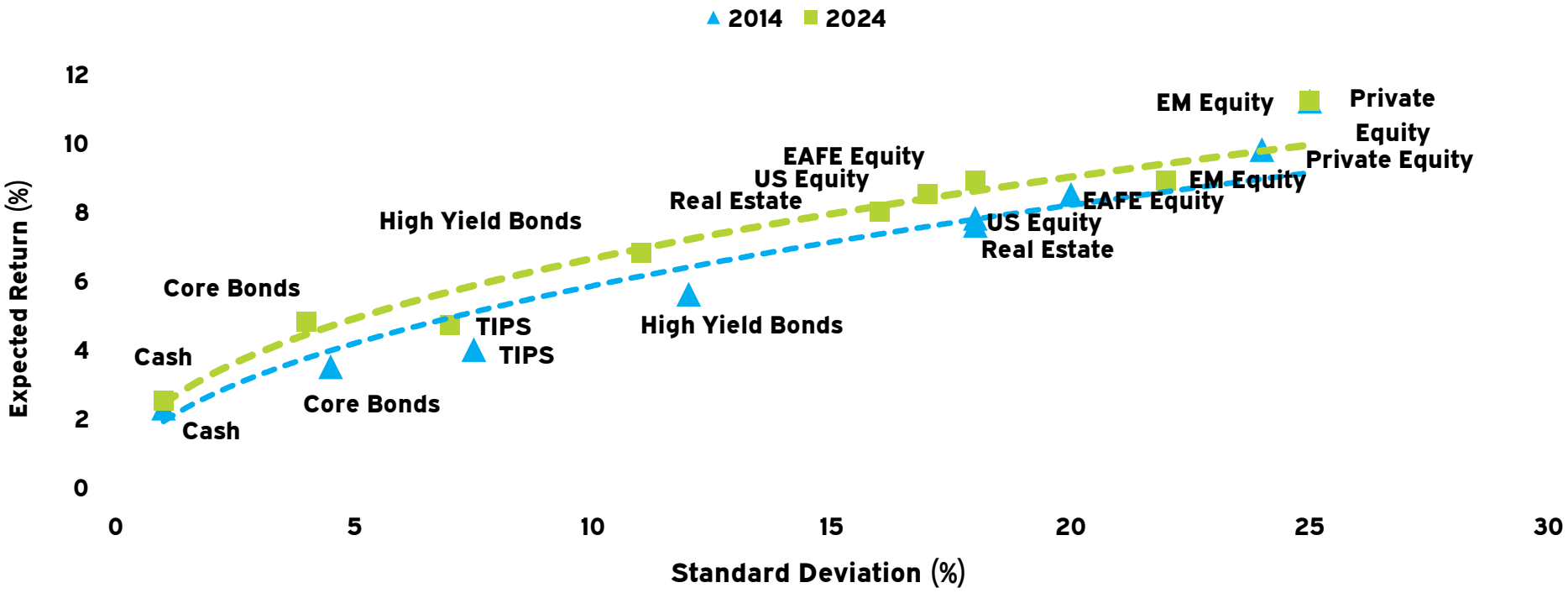
20-year Geometric Expected Returns

	2024 E(R) (%)	2023 E(R) (%)	Δ From 2023 (%)	Notes
Cash Equivalents	2.5	2.9	-0.4	Lower projected short-term rates
Investment Grade (Core) Bonds	4.8	4.7	0.1	
Long-term Government Bonds	5.0	5.0	0.0	
TIPS	4.7	4.5	0.2	
High Yield Bonds	6.8	7.3	-0.5	Tighter spreads
Bank Loans	6.6	7.0	-0.4	Tighter spreads
Private Debt	9.2	9.0	0.2	
US Equity	8.5	8.7	-0.2	Higher valuations
Developed Non-US (EAFE) Equity	8.9	9.8	-0.9	Higher valuations, lower projected earnings growth
Emerging Market Equity	8.9	10.0	-1.1	Higher valuations, lower projected earnings growth
Global Equity	8.7	9.2	-0.5	Higher valuations
Private Equity	11.2	11.0	0.2	Mixed valuations and slightly lower borrowing costs
Real Estate	8.0	7.8	0.2	Higher cap rates
Infrastructure	9.0	8.3	0.7	Lower borrowing costs, model changes
Natural Resources (Private)	9.3	9.8	-0.5	Higher valuations
Commodities	5.3	5.7	-0.4	Lower cash yield
Hedge Funds	5.8	6.1	-0.3	Lower cash/credit yield, higher equity valuations

The Big Picture: Higher Return for the ~Same Risk[1]

→ The relationship between long-term return expectations and the level of risk accepted is not static.

→ The higher interest rates of the last two years mean that many investors should be able to take on less risk than they have over the past decade if they want to achieve their target returns.



[1] Expected return and standard deviation are based upon Meketa Investment Group's 2014 and 2024 20-year capital market expectations.

Asset Allocation Overview

Asset Allocation

What is Asset Allocation?

→ Asset allocation refers to the distribution of assets across a number of asset classes that exhibit different correlations with each other. Each asset class exhibits a unique combination of risk and reward. The expected and realized long-term returns vary by asset class, as does the interim volatility of those returns. Some asset classes, like equities, exhibit high degrees of volatility, but also offer high returns over time. Other asset classes, like cash, experience very little volatility, but offer limited return potential.

Why is Asset Allocation important?

→ The distribution of assets across various asset classes exerts a major influence on the return behavior of the aggregate pool over short and long time periods.

How does Asset Allocation affect aggregate performance?

→ In addition to exhibiting unique characteristics, each asset class interacts differently with other asset classes. Because of low correlations, the likelihood that any two asset classes will move together in the same direction is limited, with the movement of one asset class often offsetting another's. Combining asset classes allows investors to control more fully the aggregate risk and return of their portfolios, and to benefit from the reduction in volatility that stems from diversification.

Developing Investment Objectives

What is the System's long-term return objective?

→ Within the risk constraints outlined below, to achieve the highest real return possible.

→ To achieve, over long time periods, investment returns consistent with the actuarial assumed rate of return on assets of 6.75%.

What are the System's risk objectives?

→ To accept a level of market risk consistent with moderate interim volatility without sacrificing the potential for long-term real growth of assets.

→ To use extensive diversification to minimize exposure to company and industry-specific risks in the aggregate investment portfolio.

→ To avoid extreme levels of volatility that could adversely affect the Quincy Retirement System's participants.

→ To limit the likelihood of investment return patterns that could negatively impact the funded status of the Quincy Retirement System.

Developing Investment Constraints

What is the overall time horizon for the System?

→ On-going concern, with long-term time horizon for majority of assets.

What are the liquidity needs of the System?

→ Net cash flows are negative and have increased since the POB was issued.

→ For 2022, net outflows were ~$33 million.

What are the legal and regulatory constraints under which the System operates?

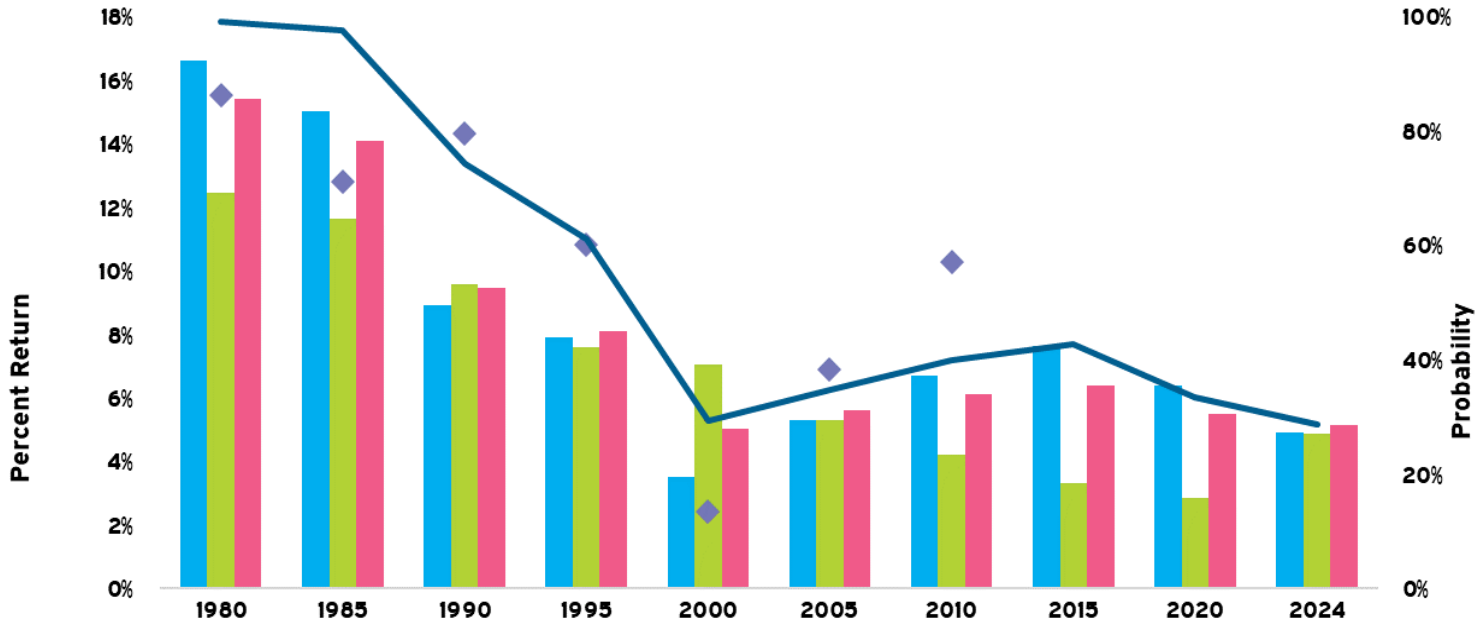
→ Massachusetts state laws

→ PERAC oversight

Are there any other considerations that must be evaluated?

→ Any changes anticipated in city/state contribution status?

Secular Changes in Investment Returns[1]

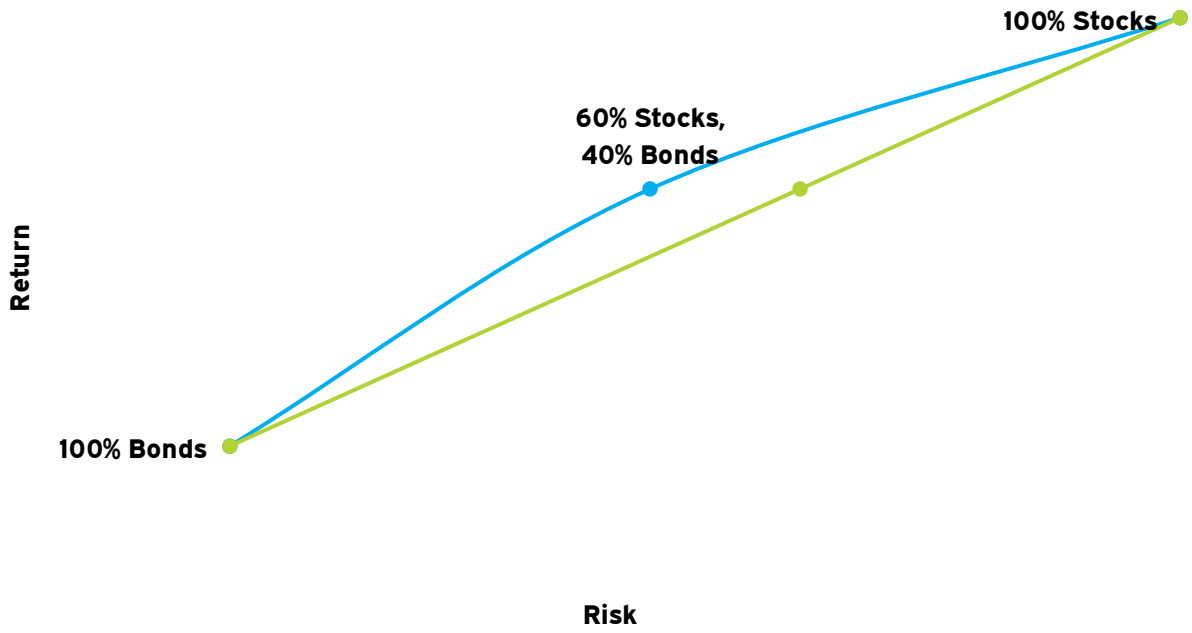


	1980	1985	1990	1995	2000	2005	2010	2015	2020	2024
Equity Expected Return	16.6%	15.0%	8.9%	7.9%	3.5%	5.3%	6.7%	7.6%	6.4%	4.9%
Bond Expected Return	12.4%	11.6%	9.6%	7.6%	7.0%	5.3%	4.2%	3.3%	2.9%	4.9%
65/35 Eq/Bond Exp. Ret.	15.4%	14.1%	9.4%	8.1%	5.0%	5.6%	6.1%	6.4%	5.5%	5.1%
Actual 10-year Return	15.5%	12.8%	14.3%	10.8%	2.4%	6.9%	10.3%			
Probability of Earning 7.0%	99%	98%	74%	61%	29%	35%	40%	43%	33%	29%

→ The chart above illustrates that a portfolio comprising of 65% domestic stocks and 35% investment grade bonds has produced diminishing expected returns as well as actual returns over the past 30 years.

[1] Expected return assumptions for 1) Bonds equals the yield of the ten-year Treasury plus 100 basis points, and 2) Equities equals the dividend yield plus the earnings yield of the S&P 500 index (using the inflation-adjusted trailing 10-year earnings). Note that these short-hand models do not reflect Meketa's capital markets expectations. Probability calculation is for the subsequent ten years.

The Efficient Frontier



→ Combining uncorrelated assets produces an "efficient frontier." Different combinations of assets (e.g., 60% stocks and 40% bonds) will lie along this efficient frontier.

→ By combining assets that are not highly correlated with each other, the System can produce a higher return for a given level of risk than it could by investing in perfectly correlated assets.

- Alternatively, it can experience lower risk for a given level of return.

Proposed Policy Options

Asset Allocation Policy Options[1]

	Current Policy Legacy Assets (%)	12/31/23 Combined (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
Growth/Equity	**59**	**59**	**57**	**59**	**60**	**55**
US Equity	24	24	24	24	25 ↑	24
Developed Market Equity (non-US)	13	11	11	13	12 ↓	11 ↓
Emerging Market Equity	8	8	4	8	8	6 ↓
Private Equity	14	16	17	14	15 ↑	14
Credit	**10**	**6**	**7**	**10**	**10**	**10**
High Yield Bonds	6	5	3	5 ↓	5 ↓	5 ↓
Bank Loans	2	1	2	2	2	2
Private Debt	0	0	1	3 ↑	3 ↑	3 ↑
Emerging Market Bonds	2	0	1	0 ↓	0 ↓	0 ↓
Rate Sensitive	**16**	**16**	**14**	**16**	**15**	**20**
Cash Equivalents	0	1	1	0	0	0
Investment Grade Bonds	5	9	7	5	5	9 ↑
Long-term Treasuries/Strips	7	3	3	7	6 ↓	7
TIPS	4	3	3	4	4	4

[1] Expected return and standard deviation are based upon Meketa Investment Group's Annual Capital Markets Expectations. Throughout this document, returns for periods longer than one year are annualized.

Asset Allocation Policy Options[1] (cont.)

	Current Policy Legacy Assets (%)	12/31/23 Combined (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
Real Assets	**15**	**13**	**14**	**15**	**13**	**13**
Real Estate	10	10	10	10	10	10
Natural Resources (inc Timber)	3	2	3	3	0	0
Infrastructure (Private)	2	2	0	2	3	3
Other	**0**	**6**	**9**	**0**	**2**	**2**
Hedge Funds	0	3	9	0	0	0
Opportunistic	0	1	0	0	2	2
PRIT General Allocation	0	2	0	0	0	0
Expected Return (20 years)	*8.81*	*8.71*	*8.59*	*8.88*	*8.87*	*8.68*
Standard Deviation	*13.5*	*13.7*	*13.0*	*13.6*	*13.7*	*12.8*
Probability of > 6.75% over 20 Years	*75.2*	*74.0*	*73.6*	*75.8*	*75.6*	*74.9*

→ The asset allocation policies outlined incorporate various changes.

- Each policy considers the tradeoff between the expected return relative to the risks.

→ The proposed changes are discussed on the following pages.

[1] Expected return and standard deviation are based upon Meketa Investment Group's Annual Capital Markets Expectations. Throughout this document, returns for periods longer than one year are annualized.

Proposed Changes: Adding Just Private Debt (PD)

→ The first option is the simplest, in terms of changes.

→ It adds a target allocation to private credit of 3%.

- It funds this allocation by taking 1% from high yield and bringing emerging market debt to 0%.
- Note that the System has not had a dedicated allocation to emerging market debt since 2021.

→ The changes would result in the System having a slightly higher expected return than the current policy, albeit with slightly more expected risk.

Proposed Changes: Adding Private Debt (PD)+

→ The second option makes the same changes as the first, along with some additional changes.

→ The total allocation to equities would increase by 1%.

- Private equity would increase by 1%.
- US equities would increase by 1%, offset by a 1% decrease in non-US equities.
  - This would bring the public equity allocations closer in line with a "neutral" market-cap weighted geographical allocation.

→ The System's allocation to rate sensitive assets would decrease by 1%.

- The increase would be 1% in long-term Treasuries.
  - This more closely reflects current reality, as the System's only exposure to long-term Treasuries is through the PRIT Core Fixed Income sleeve.
  - PRIM has reduced its allocation to long-term Treasuries within that sleeve in recent years.

→ The System's target allocation to infrastructure would increase by 1%.

- With the recent additional commitments to infrastructure, the System will soon be at its 2% target.
- We believe infrastructure is a prudent investment for the System and advocate for increasing the target.

→ The target for opportunistic would increase from 0% to 2%.

- Currently, opportunistic has a target range of 0-5%, which we would maintain. Adding a target allows for more careful planning of the remainder of the System's assets.

Proposed Changes: Adding Private Debt (PD) with Less Risk

→ The third option makes the same changes as the first but allows for a little risk to be taken off the table.

- The increase in interest rates of the last couple of years makes this possible.

→ The total allocation to equities would decrease by 4%.

- Developed non-US equities and emerging market equities would decrease by 2%.
  - This would bring the public equity allocations much more closely in line with a "neutral" market-cap weighted geographical allocation.

→ The System's allocation to rate sensitive assets would increase by 4%.

- This would be composed of a 4% increase in investment grade bonds.
- Note that if the System wanted to maintain its 7% target to long-term Treasuries, it might want to consider hiring a dedicated manager for the mandate.

→ Like the second option, the targets to infrastructure and opportunistic would increase by 1% and 2%, respectively.

→ The combination of lower equity exposure and higher bond exposure would reduce overall risk.

Tracking Error & Alpha

Comparison to PRIM - Tracking Error

→ The System's current target and proposed asset allocation policies are different than that of PRIM.

→ The System can expect long-term tracking error (i.e., over a 20-year period) for each policy as follows:

Policy	Tracking Error per Annum vs PRIM (%)
Current Policy	1.32
Adding Just PD	1.12
Adding PD+	1.02
Adding PD w/ Less Risk	1.11

→ While we would expect higher tracking error over shorter periods of time, over the long-term, tracking error relative to PRIM would be between 1.0% and 1.3% per annum based on the proposed options.[1]

→ The Current Policy has the highest amount of tracking error.

[1] Assuming a one standard deviation event.

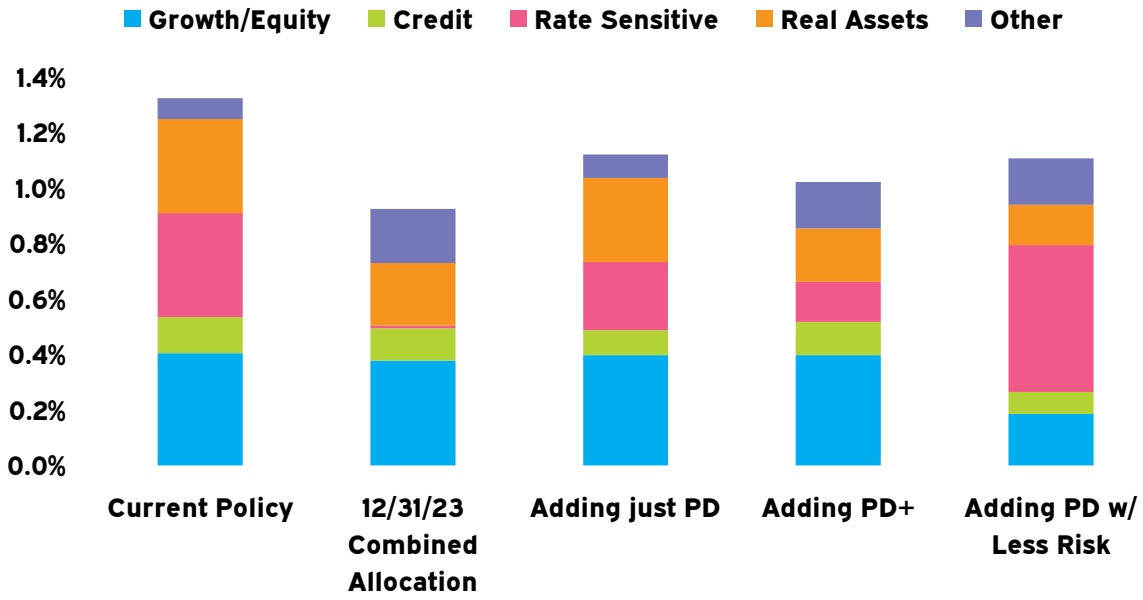
Decomposition of Tracking Error

→ Tracking error relative to PRIM can come from many different sources.

→ The chart below examines the sources of tracking error due to differences in asset allocation vs PRIM.

- Note that additional tracking error can be expected due to variances resulting from active management, tactical allocation decisions, etc.

Sources of Tracking Error[1]



[1] Other includes hedge funds, opportunistic, and the PRIT General allocation fund.

Expected Return with Manager Alpha

→ We believe that active managers can add the most value in asset classes that have historically been the most inefficient.

→ If an investor can consistently select managers that are slightly better than average (e.g., in the 40th percentile), the expected return for the asset classes utilizing active managers can increase substantially.

- By allocating to asset classes where manager alpha can be substantial and by selecting superior managers, Meketa Investment Group believes that investors can enhance returns.

→ The amount of alpha that can be added from manager selection varies by asset class, by the extent to which active management is used, and how much better managers do than their respective benchmarks.

- The System's largest potential source of alpha is the Equity allocation, due to the size of the allocation to private equity, an asset class that has historically produced large spreads between top and bottom quartile investments.

Manager Alpha Potential

Expected Manager Alpha by Percentile

→ Because PRIM has the largest allocation to private equity among the options shown, it has the highest alpha potential.

Diversification & Risk Analysis

Diversification

→ The primary motive for diversifying a portfolio is to reduce risk.

→ Diversification is the sole "free lunch" available to investors. That is, it represents the only way to reduce risk without reducing expected returns.

→ Therefore, investments should be allocated across multiple classes of assets, based in part on the expected correlation of their returns.

→ Within each asset type, investments should be distributed across strategies and risk factors to further reduce volatility.

Types of Risk Analysis Addressed

→ Risk budgeting[1]

- Attributes overall portfolio risks to specific asset classes
- Highlights the source and scale of portfolio-level risk

→ MPT-based risk analytics

- Includes worst-case return expectations and Value at Risk (VaR)[2]
- Relies on assumptions underlying Modern Portfolio Theory (MPT)

→ Convexity

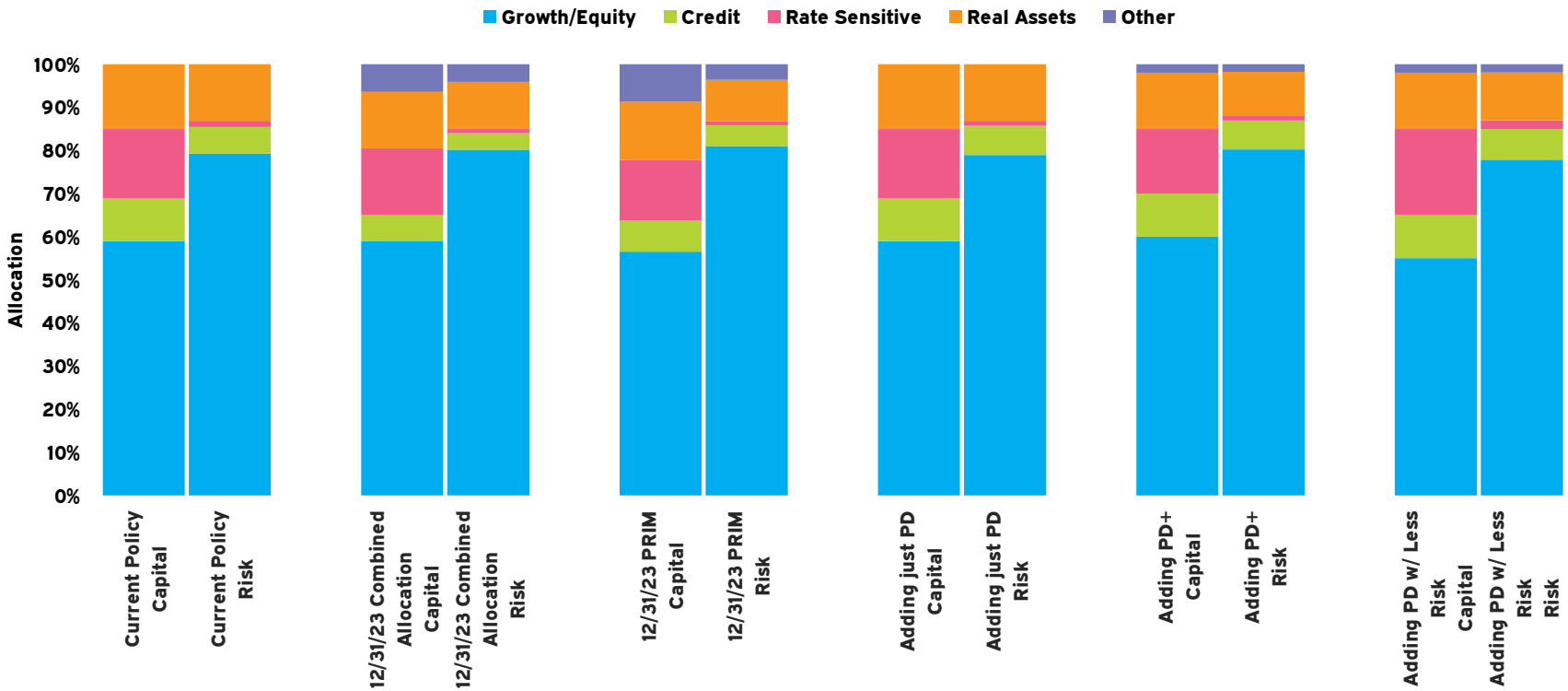
- Examines a portfolio's sensitivity to upside and downside market movements

→ Scenario analysis

- Stress tests policy portfolios using actual historical examples
- Stress tests policy portfolios under specific hypothetical scenarios

[1] Risk budgeting seeks to decompose the aggregate risk of a portfolio into different sources (in this case, by asset class), with risk defined as standard deviation.
[2] VaR is a risk measure that estimates the maximum loss on a portfolio over a given time horizon and a given confidence level (usually 95% or 99%).

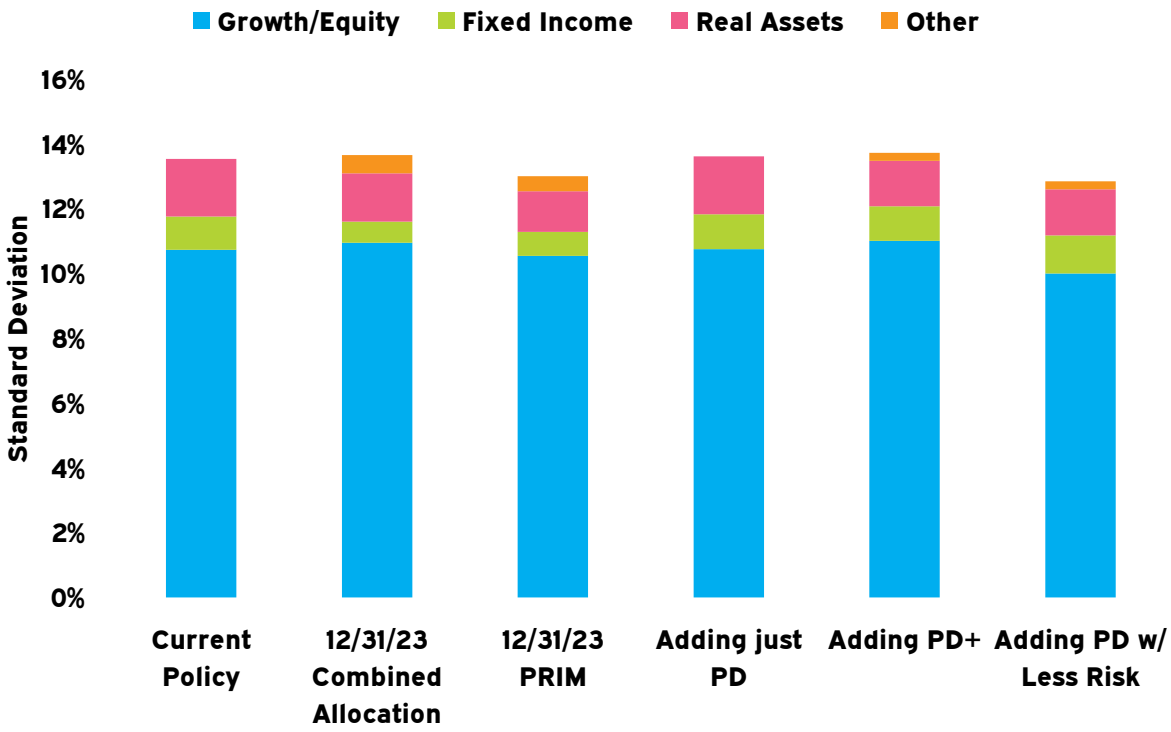
Risk Budgeting Analysis[1]
(Capital Allocation vs. Risk Allocation)



→ Assets with low relative volatility, such as rate sensitive fixed income, contribute less to risk than their asset weighting implies.

[1] Other includes Hedge Funds, Opportunistic, and the PRIT General Allocation Fund. Risk allocation is calculated by multiplying the weight of the asset class by its standard deviation and its correlation with the total portfolio and then dividing this by the standard deviation of the total portfolio.

Risk Budgeting Analysis[1]
(Absolute Contribution to Risk)



→ In each policy option, equity risk dominates the risk profile of the portfolio.

[1] Contribution to risk is calculated by multiplying the weight of the asset class by its standard deviation and its correlation with the total portfolio. Other includes Hedge Funds, Opportunistic, and the PRIT General Allocation Fund.

MPT-Based Risk Analysis

Scenario	Current Policy (%)	12/31/23 Combined Allocation (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
Worst Case Returns[1]						
OneYear (annualized)	-18.3	-18.6	-17.6	-18.4	-18.6	-17.2
ThreeYears (annualized)	-7.8	-8.0	-7.4	-7.8	-7.9	-7.2
FiveYears (annualized)	-4.3	-4.5	-4.1	-4.3	-4.4	-3.8
TenYears (annualized)	-0.7	-0.8	-0.5	-0.6	-0.7	-0.3
TwentyYears (annualized)	2.0	1.9	2.1	2.1	2.0	2.2
Probability of Experiencing Negative Returns						
OneYear	24.7	25.2	24.5	24.7	24.9	23.9
ThreeYears	11.9	12.3	11.5	11.8	12.0	11.0
FiveYears	6.3	6.7	6.1	6.3	6.4	5.7
TenYears	1.5	1.7	1.4	1.5	1.6	1.3
TwentyYears	0.1	0.1	0.1	0.1	0.1	0.1

→ The "Less Risk" option is structured to be the most defensive portfolio from a volatility standpoint.

[1] "Worst Case Returns" refers to the 99.7th percentile return.

Value at Risk[1]

Scenario	Current Policy	12/31/23 Combined Allocation	12/31/23 PRIM	Adding just PD	Adding PD+	Adding PD w/ Less Risk
VaR (%):						
1 month	-8.3	-8.4	-8.0	-8.4	-8.5	-7.9
3 months	-13.5	-13.6	-12.9	-13.5	-13.6	-12.7
6 months	-17.6	-17.8	-16.9	-17.7	-17.9	-16.6

Conditional Value at Risk[1]

Scenario	Current Policy	12/31/23 Combined Allocation	12/31/23 PRIM	Adding just PD	Adding PD+	Adding PD w/ Less Risk
CVaR (%):						
1 month	-9.6	-9.7	-9.2	-9.7	-9.8	-9.1
3 months	-15.6	-15.8	-15.0	-15.7	-15.9	-14.8
6 months	-20.7	-21.0	-19.9	-20.8	-21.0	-19.5
CVaR ($ mm):						
1 month	-81	-81	-77	-81	-82	-76
3 months	-131	-132	-126	-132	-133	-124
6 months	-173	-176	-166	-174	-176	-163

→ According to the VaR model, the Fund could lose up to $81 million in a single month with the Current Policy.

[1] Calculated with a 99% confidence level and based upon Meketa Investment Group's Annual Capital Markets Expectations. cVaR represents the average loss past the 99th percentile.

Historical Negative Scenario Analysis[1] (*Cumulative* Return)

Scenario	Current Policy (%)	12/31/23 Combined Allocation (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
Post-COVID Rate Hikes (Jan 2022-Oct 2023)	-10.6	-9.0	-7.5	-9.8	-9.7	-10.2
COVID-19 Market Shock (Feb 2020-Mar 2020)	-18.1	-18.3	-16.9	-17.9	-17.9	-16.4
Taper Tantrum (May - Aug 2013)	-1.1	-0.3	0.1	-0.7	-0.5	-0.7
Global Financial Crisis (Oct 2007 - Mar 2009)	-26.9	-28.2	-26.3	-27.3	-28.0	-25.0
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	-15.6	-16.4	-15.4	-15.7	-15.9	-12.3
LTCM (Jul - Aug 1998)	-8.4	-8.3	-7.6	-7.9	-8.0	-7.0
Asian Financial Crisis (Aug 97 - Jan 98)	2.6	2.6	4.4	2.8	3.2	4.0
Rate spike (1994 Calendar Year)	1.8	2.8	4.0	2.3	2.3	2.0
Early 1990s Recession (Jun - Oct 1990)	-6.4	-6.0	-5.3	-6.1	-6.4	-5.7
Crash of 1987 (Sep - Nov 1987)	-11.1	-11.2	-10.2	-10.9	-11.2	-10.1
Strong dollar (Jan 1981 - Sep 1982)	3.4	2.7	3.3	3.5	3.1	5.3
Volcker Recession (Jan - Mar 1980)	-5.0	-4.4	-4.1	-4.9	-4.6	-4.9
Stagflation (Jan 1973 - Sep 1974)	-22.9	-22.5	-21.8	-22.6	-23.4	-21.2

→ The "Less Risk" option would have performed the best in environments of declining equity markets, due to its more conservative positioning.

[1] See the Appendix for our scenario inputs. In periods where the ideal benchmark was not yet available we used the next closest benchmark(s) as a proxy.

Historical Positive Scenario Analysis[1] (*Cumulative* Return)

Scenario	Current Policy (%)	12/31/23 Combined Allocation (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
Covid Recovery (Apr 2020-Dec 2021)	55.3	57.4	57.0	55.9	57.0	53.5
Global Financial Crisis Recovery (Mar 2009 - Nov 2009)	36.4	35.8	31.5	36.2	35.8	33.0
Best of Great Moderation (Apr 2003 - Feb 2004)	30.9	30.8	28.3	30.9	30.9	28.4
Peak of the TMT Bubble (Oct 1998 - Mar 2000)	43.3	45.7	45.5	43.0	44.6	40.7
Plummeting Dollar (Jan 1986 - Aug 1987)	55.1	53.2	48.9	54.2	52.8	48.8
Volcker Recovery (Aug 1982 - Apr 1983)	33.7	32.3	30.6	33.3	33.0	32.5
Bretton Wood Recovery (Oct 1974 - Jun 1975)	29.6	29.2	27.7	29.3	29.5	27.9

→ Each of the options would have performed well during strongly positive markets.

[1] See the Appendix for our scenario inputs. In periods where the ideal benchmark was not yet available we used the next closest benchmark(s) as a proxy.

Stress Testing: Impact of Negative Market Movements (Expected Return under Negative Conditions)[1]

Scenario	Current Policy (%)	12/31/23 Combined Allocation (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
10-year Treasury Bond rates rise 100 bps	3.6	4.1	3.8	3.6	3.6	2.9
10-year Treasury Bond rates rise 200 bps	-3.0	-2.1	-1.9	-2.9	-2.9	-3.5
10-year Treasury Bond rates rise 300 bps	-4.2	-3.2	-3.4	-4.3	-3.8	-4.5
Baa Spreads widen by 50 bp, High Yield by 200 bp	1.0	0.6	0.8	1.0	0.8	1.1
Baa Spreads widen by 300 bs, High Yield by 1000 bp	-22.3	-22.5	-20.8	-22.2	-22.2	-20.4
Trade Weighted Dollar gains 10%	-3.9	-3.9	-3.0	-3.9	-3.8	-3.2
Trade Weighted Dollar gains 20%	-0.8	-1.3	-0.2	-0.8	-0.7	0.1
U.S. Equities decline 10%	-6.1	-6.2	-5.9	-6.0	-6.2	-5.7
U.S. Equities decline 25%	-17.5	-17.7	-16.8	-17.5	-17.7	-16.4
U.S. Equities decline 40%	-26.8	-26.9	-25.2	-26.8	-26.9	-24.9

→ Each policy portfolio has a different sensitivity to four major risk factors: interest rates, credit spreads, currency fluctuations, and equity values.

→ The Fund's primary risk factors would continue to be an equity market decline and a widening of credit spreads, no matter the policy.

[1] Assumes that assets not directly exposed to the factor are affected nonetheless. See the Appendix for further details.

Stress Testing: Impact of Positive Market Movements (Expected Return under Positive Conditions)[1]

Scenario	Current Policy (%)	12/31/23 Combined Allocation (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
10-year Treasury Bond rates drop 100 bps	3.1	2.6	2.9	3.0	2.9	3.3
10-year Treasury Bond rates drop 200 bps	13.2	11.5	10.8	13.0	12.3	12.4
10-year Treasury Bond rates drop 300 bps	17.5	14.8	13.8	17.3	16.3	16.7
Baa Spreads narrow by 30bps, High Yield by 100 bps	7.5	7.6	7.5	7.6	7.6	7.2
Baa Spreads narrow by 100bps, High Yield by 300 bps	13.9	13.7	12.1	13.7	13.4	12.4
Trade Weighted Dollar drops 10%	8.0	7.8	7.1	7.9	7.7	7.1
Trade Weighted Dollar drops 20%	24.6	22.7	20.9	24.4	23.4	22.4
U.S. Equities rise 10%	7.1	7.1	7.1	7.1	7.2	6.9
U.S. Equities rise 30%	16.8	16.6	15.8	16.7	16.7	15.8

→ The portfolio with the least downside risk is typically the portfolio that participates least in upside scenarios.

[1] Assumes that assets not directly exposed to the factor are affected nonetheless. See the Appendix for further details.

Inflation Stress Testing: Negative Scenarios (Expected Return under Negative Inflationary Conditions)[1]

Scenario	Current Policy (%)	12/31/23 Combined Allocation (%)	12/31/23 PRIM (%)	Adding just PD (%)	Adding PD+ (%)	Adding PD w/ Less Risk (%)
Inflation slightly higher than expected	-0.5	-0.4	-0.4	-0.5	-0.5	-0.5
Inflation meaningfully higher than expected	-5.8	-5.3	-5.0	-5.7	-5.5	-5.5
Low Growth and Low Inflation	-7.7	-7.4	-6.7	-7.4	-7.4	-6.9
Low Growth and High Inflation	-11.8	-11.1	-10.2	-11.3	-11.2	-10.6
Brief, moderate inflation spike	-3.8	-3.5	-3.3	-3.6	-3.7	-3.6
Extended, moderate inflation spike	-6.8	-6.4	-6.2	-6.6	-6.6	-6.3
Brief, extreme inflation spike	-8.7	-8.3	-8.0	-8.5	-8.5	-8.1
Extended, extreme inflation spike	-11.2	-10.9	-10.5	-11.0	-11.0	-10.4

→ Each of the alternative policies performs better than the Current Policy in the scenarios where inflation does the most harm.

[1] See the Appendix for further details.

Summary

Summary

→ The System is currently well positioned to achieve its target rate of return over the long term.

- Like many investors, it has benefited from the increase in interest rates in recent years.

→ In this analysis, we presented three alternative options to the current policy, all of which are likewise designed for long-term success.

- Each option adds a target allocation to private credit, and funds this from public credit.
  - We would recommend this allocation be implemented gradually, potentially over a course of 3-5 years, consistent with the principal of vintage year diversification.
- It would eliminate the System's target exposure to emerging markets debt.

Appendices

CMEs for Selected Asset Classes

Asset Class	Geometric Expected Return (%)	Standard Deviation (%)
Cash Equivalents	2.5	1.0
Investment Grade Bonds	4.8	4.0
Long-term Strips	5.1	22.0
TIPS	4.7	7.0
High Yield Bonds	6.8	11.0
Bank Loans	6.6	10.0
Private Debt	9.2	15.0
Emerging Market Bonds	6.8	12.0
US Equity	8.5	17.0
Developed Market Equity (non-US)	8.9	18.0
Emerging Market Equity	8.9	22.0
Private Equity	11.2	25.0
Real Estate	8.0	16.0
Natural Resources (Private)	9.3	22.0
Timberland	7.3	12.0
Infrastructure (Private)	9.0	18.0
Hedge Funds	5.8	7.0
Opportunistic	8.0	15.0
Tactical Asset Allocation	8.6	13.0

Annualized Risk and Return Expectations for Major Asset Classes

Asset Class	10-year Expected Return (%)	20-year Expected Return (%)	Standard Deviation (%)	11-20 year Risk Premia[1] (%)
Cash Equivalents	2.4	2.5	1.0	-2.0
Investment Grade Bonds	4.6	4.8	4.0	0.4
Long-term Government Bonds	4.3	5.0	12.0	1.0
TIPS	4.3	4.7	7.0	0.4
High Yield Bonds	6.5	6.8	11.0	2.5
Bank Loans	6.5	6.6	10.0	2.0
Emerging Market Debt (local)	6.3	6.2	12.0	1.5
Private Debt	9.2	9.2	15.0	4.6
US Equity	6.9	8.5	17.0	5.5
Developed Non-US Equity	7.7	8.9	18.0	5.4
Emerging Non-US Equity	7.6	8.9	22.0	5.5
Global Equity	7.2	8.7	17.0	5.5
Private Equity	9.9	11.2	25.0	7.8
Real Estate	6.3	8.0	16.0	5.3
Infrastructure	7.4	9.0	18.0	6.1
Commodities	4.9	5.3	17.0	1.0
Hedge Funds	4.5	5.8	7.0	2.5
Inflation	2.4	2.8		-1.5

[1] Risk Premia are calculated relative to the market's projection for the yield on the 10-year Treasury in ten years.

Correlation Data

	Inv. Grade Bonds	Long-term Gov't Bonds	TIPS	High Yield Bonds	US Equity	Dev. Non-US Equity	Em. Market Equity	Private Equity	Real Estate	Commod.	Infra.	Hedge Funds
Investment Grade Bonds	1.00											
Long-term Gov't Bonds	0.86	1.00										
TIPS	0.77	0.61	1.00									
High Yield Bonds	0.35	-0.04	0.46	1.00								
US Equity	0.22	-0.10	0.30	0.76	1.00							
Developed Non-US Equity	0.26	-0.09	0.33	0.76	0.88	1.00						
Emerging Market Equity	0.27	-0.05	0.36	0.72	0.74	0.86	1.00					
Private Equity	0.00	-0.10	0.03	0.66	0.90	0.83	0.79	1.00				
Real Estate	0.26	0.06	0.17	0.56	0.53	0.49	0.43	0.49	1.00			
Commodities	0.00	-0.23	0.28	0.47	0.46	0.55	0.58	0.23	0.15	1.00		
Infrastructure	0.31	0.14	0.32	0.65	0.64	0.68	0.60	0.51	0.61	0.41	1.00	
Hedge Funds	0.12	-0.20	0.30	0.78	0.80	0.83	0.81	0.53	0.47	0.64	0.61	1.00

2023 Peer CME Survey[1]

→ Annually, Horizon Actuarial Services, LLC publishes a survey of capital market assumptions that they collect from various investment advisors.[1]

→ The Horizon survey is a useful tool to determine whether a consultant's expectations for returns (and risk) are reasonable.

Asset Class	Horizon 10-Year Average (%)	Meketa 10-Year (%)	Horizon 20-Year Average (%)	Meketa 20-Year (%)
Cash Equivalents	3.4	3.1	3.2	2.9
TIPS	4.1	4.3	4.1	4.5
US Core Bonds	4.7	4.8	4.8	4.7
US High Yield Bonds	6.4	8.0	6.5	7.3
Emerging Market Debt	6.3	6.5	6.4	6.2
Private Debt	8.2	9.4	8.2	9.0
US Equity (large cap)	6.9	7.8	7.4	8.7
Developed Non-US Equity	7.5	10.1	7.8	9.8
Emerging Non-US Equity	8.2	10.3	8.6	10.0
Private Equity	9.5	9.7	10.1	11.0
Real Estate	6.0	5.9	6.3	7.8
Infrastructure	7.0	6.9	7.1	8.3
Commodities	5.0	6.3	4.9	5.7
Hedge Funds	6.0	5.4	6.2	6.1
Inflation	2.6	2.5	2.5	2.6

[1] The 10-year horizon included all 42 respondents to the survey, and the 20-year horizon included 27 respondents. Figures are based on Meketa's 2023 CMEs.

Scenario Return Inputs

Asset Class	Benchmark Used
Investment Grade Bonds	Bloomberg US Aggregate
TIPS	Bloomberg Global Inflation Linked: US TIPS
Intermediate Government Bonds	Bloomberg US Treasury: Intermediate
Long-term Government Bonds	Bloomberg US Treasury: Long
Emerging Market Bonds (local)	Bloomberg EM Local Currency Government Diversified
Bank Loans	Credit Suisse Leveraged Loan
High Yield Bonds	Bloomberg US Corporate High Yield
Direct Lending	Cliffwater Direct Lending Index
Real Estate	NCREIF Property Index
Core Private Real Estate	Cambridge Associates Proxy IRR Returns
Value-Added Real Estate	Cambridge Associates Proxy IRR Returns
Opportunistic Real Estate	Cambridge Associates Proxy IRR Returns
REITs	FTSE NAREIT All Equity REITS
Infrastructure (Private)	Cambridge Associates Proxy IRR Returns
Natural Resources (Private)	Cambridge Associates Proxy IRR Returns
Timberland	NCREIF Timberland
Commodities	Bloomberg Commodity Index
US Equity	Russell 3000
Developed Markets Equity (non-US)	MSCI EAFE
Emerging Markets Equity	MSCI Emerging Markets
Private Equity	Cambridge Associates Proxy IRR Returns
Long-Short	HFRI Equity Hedge
Global Macro	HFRI Macro
Hedge Funds	HFRI Fund Weighted Composite
Private Debt	Cambridge Associates Proxy IRR Returns

Negative Historical Scenario Returns - Sample Inputs

	Post-COVID Rate Hikes (Jan 2022-Oct 2023)	Covid-19 Market Shock (Feb 2020-Mar 2020)	Taper Tantrum (May - Aug 2013)	Global Financial Crisis (Oct 2007 - Mar 2009)	Popping of the TMT Bubble (Apr 2000 - Sep 2002)	LTCM (Jul - Aug 1998)
Cash Equivalents	5.5	0.4	0.0	2.6	9.9	0.8
Short-term Investment Grade Bonds	-1.6	0.4	-0.1	7.9	21.9	1.6
Investment Grade Bonds	-15.4	-0.9	-3.7	8.5	28.6	1.8
Long-term Corporate Bonds	-30.7	-18.4	-9.3	-10.3	26.9	-0.6
Long-term Government Bonds	-38.5	12.7	-11.6	24.2	35.5	4.1
TIPS	-13.2	-0.4	-8.5	8.2	37.4	0.7
Global Inflation Linked Bonds	-25.7	-6.5	-7.4	-3.9	39.7	0.7
High Yield Bonds	-7.1	-20.8	-2.0	-22.8	-6.3	-5.0
Bank Loans	8.8	-20.3	0.8	-23.7	6.3	0.7
Direct Lending	12.2	-4.8	2.6	-3.3	-2.0	-2.6
Foreign Bonds	-22.0	-4.5	-3.2	2.1	8.5	3.5
Emerging Market Bonds (major)	-15.8	-15.3	-11.5	-5.0	6.3	-28.2
Emerging Market Bonds (local)	-12.9	-13.9	-14.3	-7.9	7.2	-34.1
US Equity	-11.6	-35.0	3.0	-45.8	-43.8	-15.4
Developed Market Equity (non-US)	-12.1	-32.7	-2.2	-52.1	-46.7	-11.5
Emerging Market Equity	-21.8	-31.2	-9.4	-51.2	-43.9	-26.7
Global Equity	-12.9	-33.6	-0.7	-49.3	-46.7	-14.0
Private Equity/Debt	7.5	-7.8	5.7	-27.7	-23.6	-3.2
Private Equity	1.7	-7.4	5.8	-28.2	-26.2	-3.3
Private Debt	13.6	-10.1	4.6	-22.3	-1.8	-2.3
REITs	-31.4	-41.0	-13.3	-63.0	45.4	-15.3
Core Private Real Estate	-1.9	0.7	3.6	-10.6	23.6	2.3
Value-Added Real Estate	-4.0	-3.5	3.0	-32.2	25.4	0.0
Opportunistic Real Estate	9.1	-8.6	4.0	-25.7	21.4	1.5
Natural Resources (Private)	16.0	-22.1	2.5	-31.2	-3.9	-16.9
Timberland	18.4	0.1	1.3	20.7	-1.5	0.5
Farmland	12.5	-0.1	3.3	26.7	11.4	0.8
Commodities (naïve)	12.4	-18.9	-2.4	-36.9	18.5	-12.0
Infrastructure (Core Private)	13.6	-1.3	3.7	-0.8	24.8	-0.3
Hedge Funds	-2.1	-9.1	-0.4	-17.8	-2.1	-9.4
Long-Short	-9.5	-10.9	1.0	-26.4	-8.8	-8.3
Hedge Fund of Funds	-3.3	-7.6	-0.5	-19.5	-0.4	-7.7

Negative Historical Scenario Returns - Sample Inputs (continued)

	Rate spike (1994 Calendar Year)	Crash of 1987 (Sep - Nov 1987)	Strong dollar (Jan 1981 - Sep 1982)	Volcker Recession (Jan - Mar 1980)	Stagflation (Jan 1973 - Sep 1974)
Cash Equivalents	3.9	1.4	24.4	2.9	13.5
Short-term Investment Grade Bonds	0.5	2.3	29.9	-2.6	4.3
Investment Grade Bonds	-2.9	2.2	29.9	-8.7	7.9
Long-term Corporate Bonds	-5.8	1.5	29.6	-14.1	-12.0
Long-term Government Bonds	-7.6	2.6	28.4	-13.6	-1.8
TIPS	-7.5	2.8	15.6	-7.8	4.3
Global Inflation Linked Bonds	-7.9	2.9	16.5	-8.3	4.5
High Yield Bonds	-1.0	-3.6	6.9	-2.3	-15.5
Bank Loans	10.3	-1.7	3.3	-1.1	-7.5
Direct Lending	7.6	-2.3	3.2	-1.0	-7.2
Foreign Bonds	5.3	-0.3	34.8	-6.5	-1.4
Emerging Market Bonds (major)	-18.9	-9.2	-1.6	-2.6	-20.2
Emerging Market Bonds (local)	-22.8	-11.0	-2.0	-3.2	-23.9
US Equity	1.3	-29.5	-2.3	-4.1	-42.6
Developed Market Equity (non-US)	7.8	-14.5	-18.0	-7.0	-36.3
Emerging Market Equity	-7.3	-25.3	-12.1	-6.6	-44.2
Global Equity	5.0	-20.5	-11.1	-5.4	-40.4
Private Equity/Debt	13.2	-0.7	-2.7	-2.5	-18.2
Private Equity	14.2	-0.5	-3.9	-2.7	-20.1
Private Debt	6.2	-1.8	3.0	-1.0	-6.9
REITs	-3.5	-19.5	2.5	-3.6	-33.9
Core Private Real Estate	6.4	2.5	23.9	5.5	-4.4
Value-Added Real Estate	6.5	4.3	44.2	9.6	-7.6
Opportunistic Real Estate	18.8	3.1	30.7	7.0	-5.6
Natural Resources (Private)	12.6	-9.9	-9.5	-9.1	19.3
Timberland	15.4	9.2	23.6	-7.4	5.5
Farmland	9.4	5.3	13.3	-4.2	3.1
Commodities (naïve)	16.6	1.8	-16.0	-9.6	139.5
Infrastructure (Core Private)	-11.5	-0.1	-0.2	-0.1	-0.5
Hedge Funds	4.1	-7.8	-3.8	-1.9	-15.7
Long-Short	2.6	-10.0	-4.9	-2.5	-19.8
Hedge Fund of Funds	-3.5	-5.7	-2.7	-1.4	-11.5

Positive Historical Scenario Returns - Sample Inputs

	Covid-19 Recovery (Apr 2020 – Dec 2021)	Global Financial Crisis Recover (Mar 2009 - Nov 2009)	Best of Great Moderation (Apr 2003 - Feb 2004)	Peak of the TMT Bubble (Oct 1998 - Mar 2000)	Plummeting Dollar (Jan 1986 - Aug 1987)	Volcker Recovery (Aug 1982 - Apr 1983)	Bretton Wood Recovery (Oct 1974 - Jun 1975)
Cash Equivalents	0.1	0.1	0.9	6.7	10.0	6.0	4.5
Short-term Investment Grade Bonds	1.1	4.3	2.8	5.3	13.2	15.4	5.0
Investment Grade Bonds	2.6	9.0	4.6	1.7	14.4	26.4	9.2
Long-term Corporate Bonds	18.0	28.8	11.3	-3.1	15.9	42.1	17.5
Long-term Government Bonds	-7.2	2.0	4.9	-2.3	15.4	33.6	11.8
TIPS	15.6	14.3	9.1	6.3	10.2	11.5	4.1
Global Inflation Linked Bonds	18.9	24.7	9.6	6.6	10.8	12.1	4.3
High Yield Bonds	29.1	49.1	21.8	2.1	24.9	23.3	19.3
Bank Loans	24.8	32.9	10.1	6.1	11.1	10.4	8.7
Direct Lending	25.0	9.4	23.7	26.8	5.4	8.2	8.3
Foreign Bonds	5.2	23.4	15.2	-7.0	44.5	32.3	17.9
Emerging Market Bonds (major)	15.7	27.0	20.6	49.0	38.9	21.6	21.0
Emerging Market Bonds (local)	7.0	37.5	25.2	61.0	48.4	26.5	25.7
US Equity	92.0	51.6	37.2	50.2	64.8	59.3	55.1
Developed Market Equity (non-US)	55.4	60.5	56.7	53.0	140.0	29.6	34.6
Emerging Market Equity	50.9	94.6	79.4	101.3	126.5	52.1	53.4
Global Equity	75.2	59.9	46.2	54.8	98.7	46.3	43.8
Private Equity/Debt	97.8	18.8	23.3	82.4	19.0	13.7	18.4
Private Equity	101.5	16.7	23.7	90.0	21.6	14.8	20.2
Private Debt	41.2	28.7	20.4	21.3	5.9	7.9	8.0
REITs	75.1	82.5	44.6	-5.2	51.8	47.4	42.5
Core Private Real Estate	21.4	-12.1	9.0	18.1	13.1	6.8	4.5
Value-Added Real Estate	36.6	-22.4	10.9	22.0	23.6	11.9	7.8
Opportunistic Real Estate	41.1	-14.8	13.6	27.9	16.7	8.6	5.7
Natural Resources (Private)	45.4	57.6	36.1	22.2	78.3	30.2	14.8
Timberland	9.9	-3.7	8.5	20.5	28.6	20.0	8.7
Farmland	11.3	4.5	9.6	10.4	15.9	11.3	5.0
Commodities (naïve)	60.5	28.9	30.6	17.1	27.6	6.2	-20.2
Infrastructure (Core Private)	32.7	6.9	8.5	33.0	1.4	0.6	0.6
Hedge Funds	39.3	20.1	22.4	52.8	30.6	13.8	14.5
Long-Short	54.1	25.9	25.3	81.4	40.8	18.0	18.9
Hedge Fund of Funds	29.1	10.3	13.3	36.8	21.3	9.7	10.3

Stress Test Return Assumptions - Sample Inputs[1]

	10-year Treasury Bond rates rise 100 bps	10-year Treasury Bond rates rise 200 bps	10-year Treasury Bond rates rise 300 bps	Baa Spreads widen by 50 bps, High Yield by 200 bps	Baa Spreads widen by 300 bps, High Yield by 1000 bps	Trade Weighted Dollar gains 10%	Trade Weighted Dollar gains 20%	US Equities decline 10%	US Equities decline 25%	US Equities decline 40%
Cash Equivalents	-0.2	-0.4	-0.5	2.8	1.1	3.6	1.3	2.8	2.3	0.4
Short-term Investment Grade Bonds	-1.2	-2.4	-3.6	2.2	1.5	0.8	1.4	0.8	0.7	0.8
Investment Grade Bonds	-4.0	-7.6	-10.7	3.9	-0.4	0.8	4.2	1.3	0.7	-1.0
Long-term Corporate Bonds	-8.2	-15.1%	-19.8	2.6	-13.4	-1.0	8.1	-1.4	-8.3	-12.3
Long-term Government Bonds	-9.5	-17.2	-21.8	7.8	7.3	1.8	12.8	1.0	2.6	2.4
TIPS	-4.3	-8.5	-11.6	2.8	-6.1	-2.4	-0.2	1.6	-2.3	-8.7
Global Inflation Linked Bonds	-1.9	-9.1	-11.9	2.4	-11.1	-4.0	-4.8	1.1	-5.4	-16.3
High Yield Bonds	2.4	-4.6	-3.6	-1.8	-23.0	-4.1	-0.6	-5.4	-15.5	-21.2
Bank Loans	1.5	-1.1	-5.1%	-2.8	-20.8	-2.9	-0.6	-3.6	-13.2	-17.4
Direct Lending	0.3	-2.4	-6.3	-1.8	-9.5	-3.3	-0.8	-3.3	-7.8	-5.9
Foreign Bonds	-4.6	-9.9	-15.7	6.6	-2.9	-4.5	-8.8	0.1	-4.6	-9.2
Emerging Market Bonds (major)	0.7	-6.5	-3.6	-0.1	-14.7	-2.6	-4.2	-4.4	-12.5	-15.4
Emerging Market Bonds (local)	1.6	-6.6	-3.0	0.1	-12.4	-2.8	-11.7	-3.8	-12.9	-19.8
US Equity	6.8	-1.8	2.8	-1.1	-31.6	-3.4	1.9	-10.0	-25.0	-40.0
Developed Market Equity (non-US)	8.6	0.1	-5.5	0.4	-34.6	-12.8	-8.6	-8.4	-22.2	-39.2
Emerging Market Equity	9.2	1.4	0.1%	-1.0	-41.9	-15.2	-14.4	-10.7	-28.3	-43.0
Global Equity	7.2	-0.8	-0.5	-0.6	-33.0	-8.8	-5.3	-9.2	-23.8	-39.0
Private Equity/Debt	6.0	0.6	-5.5	-0.1	-22.1	-2.7	-6.8	-9.0	-22.1	-25.0
Private Equity	6.3	0.6	-5.3	0.0	-22.3	-2.7	-6.0	-9.8	-22.9	-25.3
Private Debt	2.3	-1.1	-6.2	-1.8	-15.8	-2.3	-4.2	-3.9	-12.8	-14.9
REITs	3.3	-5.1	1.1	-3.7	-36.4	-1.3	12.1	-7.0	-31.9	-54.1
Core Private Real Estate	1.9	4.3	5.0	2.0	-7.1	2.7	9.7	1.1	-8.5	-14.0
Value-Added Real Estate	4.2	7.1	14.1	7.2	-13.5	13.7	6.4	1.9	-13.6	-23.1
Opportunistic Real Estate	3.8	6.7	9.9	1.1	-20.6	2.3	15.6	-0.6	-17.1	-26.3
Natural Resources (Private)	9.2	3.5	-7.5	-0.3	-25.0	-5.6	-14.5	-1.7	-14.5	-24.8
Timberland	1.6	2.6	-9.9	5.0	6.9	2.9	8.6	0.7	2.7	3.9
Farmland	2.4	0.9	-9.2	3.9	10.1	1.3	8.0	1.1	4.9	10.3
Commodities (naïve)	8.7	6.1	-6.6	-4.3	-25.0	-3.4	-24.0	5.2	-11.1	-37.8
Infrastructure (Core Private)	0.6	-4.2	-6.1	1.2	0.1	-0.7	3.6	-0.4	-5.0	-7.8
Hedge Funds	2.6	-1.9	-5.1	-0.6	-14.5	-2.2	-1.7	-4.3	-12.2	-15.7
Long-Short	4.7	-2.3	-4.2	-0.1	-21.0	-3.7	-4.3	-7.5	-17.7	-23.5
Hedge Fund of Funds	1.8	-2.5	-5.7	-1.3	-14.8	-2.9	-2.4	-4.9	-12.5	-16.0

[1] Assumptions are based on performance for each asset class during historical periods that resembled these situations.

'Anti' Stress Test Return Assumptions - Sample Inputs[1]

	10-year Treasury Bond rates drop 100 bps	10-year Treasury Bond rates drop 200 bps	10-year Treasury Bond rates drop 300 bps	Baa Spreads narrow by 30bps, High Yield by 100 bps	Baa Spreads narrow by 100bps, High Yield by 300 bps	Trade Weighted Dollar drops 10%	Trade Weighted Dollar drops 20%	US Equities rise 10%	US Equities rise 30%
Cash Equivalents	0.2	0.3	0.4	0.8	0.2	2.0	4.5	2.3	3.1
Short-term Investment Grade Bonds	1.2	2.5	3.8	0.4	2.0	1.5	3.3	0.7	1.6
Investment Grade Bonds	4.3	8.9	14.0	1.1	3.9	2.5	9.4	1.8	3.8
Long-term Corporate Bonds	9.4	20.9	33.8	3.6	14.5	5.6	15.8	3.6	7.7
Long-term Government Bonds	11.6	24.9	40.5	0.1	-0.6	1.8	22.2	3.4	5.7
TIPS	4.7	9.8	15.6	0.9	5.9	3.8	7.8	1.5	2.2
Global Inflation Linked Bonds	3.0	6.4	7.7	1.8	7.4	5.9	8.4	1.6	3.2
High Yield Bonds	2.8	8.9	9.8	6.8	25.7	7.7	8.6	4.8	10.6
Bank Loans	-0.2	2.2	2.9	4.0	16.4	4.3	0.6	2.2	4.5
Direct Lending	-0.5	0.3	1.2	4.8	5.6	1.5	4.1	1.8	3.7
Foreign Bonds	5.7	11.3	18.8	1.4	7.4	9.9	21.3	2.2	6.8
Emerging Market Bonds (major)	3.1	7.4	8.1	5.2	15.5	7.4	15.4	5.4	11.1
Emerging Market Bonds (local)	3.7	9.7	10.4	5.3	17.5	10.3	19.1	5.9	12.7
US Equity	3.4	15.2	18.6	11.2	18.7	7.9	24.4	10.0	30.0
Developed Market Equity (non-US)	-2.4	16.3	18.0	9.3	18.2	13.1	47.3	6.1	17.8
Emerging Market Equity	0.5	17.6	22.9	8.9	34.1	19.7	46.9	8.6	26.5
Global Equity	0.7	15.1	18.1	9.4	19.5	11.1	35.4	8.1	24.1
Private Equity/Debt	2.4	4.3	5.1	9.8	9.5	7.3	16.3	10.2	13.4
Private Equity	2.5	4.3	5.0	9.9	8.3	7.2	16.9	10.9	14.1
Private Debt	0.8	1.8	2.7	7.2	12.7	4.8	5.9	4.5	6.6
REITs	2.6	14.2	18.5	8.8	27.0	6.5	24.8	9.5	23.0
Core Private Real Estate	1.0	1.6	1.5	3.8	-3.5	1.2	5.5	2.8	3.6
Value-Added Real Estate	2.7	6.4	6.3	4.8	-9.4	0.9	12.6	5.8	7.4
Opportunistic Real Estate	0.1	3.9	4.0	5.5	-5.5	-0.4	11.4	4.6	6.2
Natural Resources (Private)	0.5	11.0	14.6	8.0	23.5	13.0	23.9	5.1	12.6
Timberland	6.4	9.2	11.6	4.8	-0.6	3.8	12.9	6.3	5.5
Farmland	3.2	4.2	5.6	6.3	3.8	3.4	7.8	5.2	4.1
Commodities (naïve)	-2.6	-3.2	-3.0	2.5	9.8	13.6	-2.5	3.0	4.0
Infrastructure (Core Private)	0.8	-4.3	-3.7	6.8	4.8	3.5	-2.3	2.0	2.9
Hedge Funds	3.3	4.8	4.8	5.4	11.3	6.0	9.3	5.5	9.8
Long-Short	3.3	5.8	5.5	6.4	12.3	7.8	15.2	6.9	13.3
Hedge Fund of Funds	2.5	3.9	4.0	4.5	10.2	5.1	8.3	4.6	8.8

[1] Assumptions are based on performance for each asset class during historical periods that resembled these situations.

Inflation Scenario Description

Scenario	Scenario Description
Inflation slightly higher than expected	Inflation is .05% above inflation expectation (i.e. surprise inflation is .05%). .05% is the 25th percentile of positive, historical surprise inflation.
Inflation moderately higher than expected	Inflation is .15% above inflation expectation (i.e. surprise inflation is .15%). .15% is the median of positive, historical surprise inflation.
Inflation meaningfully higher than expected	Inflation is .3% above inflation expectation (i.e. surprise inflation is .3%). .3% is the 75th percentile of positive, historical surprise inflation.
High Growth and Low Inflation	The real GDP growth rate is 1% and inflation is .07%. 1% GDP growth is the 75th percentile of historical GDP growth and .07% inflation is the 25th percentile of historical inflation.
High Growth and Moderate Inflation	The real GDP growth rate is 1% and inflation is .25%. 1% GDP growth is the 75th percentile of historical GDP growth and .25% inflation is the median of historical inflation.
High Growth and High Inflation	The real GDP growth rate is 1% and inflation is .5%. 1% GDP growth is the 75th percentile of historical GDP growth and .5% inflation is the 75th percentile of historical inflation.
Low Growth and Low Inflation	The real GDP growth rate is .3% and inflation is .07%. .3% GDP growth is the 25th percentile of historical GDP growth and .07% inflation is the 25th percentile of historical inflation.
Low Growth and Moderate Inflation	The real GDP growth rate is .3% and inflation is .25%. .3% GDP growth is the 25th percentile of historical GDP growth and .25% inflation is the median of historical inflation.
Low Growth and High Inflation	The real GDP growth rate is .3% and inflation is .5%. .3% GDP growth is the 25th percentile of historical GDP growth and .5% inflation is the 75th percentile of historical inflation.
Very brief, moderate inflation spike	Inflation is .45% and lasts for 1-2 months. .45% is the 75th percentile of historical inflation.
Brief, moderate inflation spike	Inflation is .45% and lasts for 4-8 months. .45% is the 75th percentile of historical inflation.
Extended, moderate inflation spike	Inflation is .45% and lasts for 12+ months. .45% is the 75th percentile of historical inflation.
Very brief, extreme inflation spike	Inflation is .9% and lasts for 1-2 months. .9% is the 95th percentile of historical inflation.
Brief, extreme inflation spike	Inflation is .9% and lasts for 4-8 months. .9% is the 95th percentile of historical inflation.
Extended, extreme inflation spike	Inflation is .9% and lasts for 12+ months. .9% is the 95th percentile of historical inflation.

Notes and Disclaimers

[1] The returns shown in the Policy Options and Risk Analysis sections rely on estimates of expected return, standard deviation, and correlation developed by Meketa Investment Group. To the extent that actual return patterns to the asset classes differ from our expectations, the results in the table will be incorrect. However, our inputs represent our best unbiased estimates of these simple parameters.

[2] The returns shown in the Policy Options and Risk Analysis sections use a lognormal distribution, which may or may not be an accurate representation of each asset classes' future return distribution. To the extent that it is not accurate in whole or in part, the probabilities listed in the table will be incorrect. As an example, if some asset classes' actual distributions are even more right-skewed than the lognormal distribution (i.e., more frequent low returns and less frequent high returns), then the probability of the portfolio hitting a given annual return will be lower than that stated in the table.

[3] The standard deviation bars in the chart in the Risk Analysis section do not indicate the likelihood of a 1, 2, or 3 standard deviation event—they simply indicate the return we expect if such an event occurs. Since the likelihood of such an event is the same across allocations regardless of the underlying distribution, a relative comparison across policy choices remains valid.

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PERFORMANCE DATA CONTAINED HEREIN REPRESENT PAST PERFORMANCE. PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS.

Credit Risk: Refers to the risk that the issuer of a fixed income security may default (i.e., the issuer will be unable to make timely principal and/or interest payments on the security.)

Duration: Measure of the sensitivity of the price of a bond to a change in its yield to maturity. Duration summarizes, in a single number, the characteristics that cause bond prices to change in response to a change in interest rates. For example, the price of a bond with a duration of three years will rise by approximately 3% for each 1% decrease in its yield to maturity. Conversely, the price will decrease 3% for each 1% increase in the bond's yield. Price changes for two different bonds can be compared using duration. A bond with a duration of six years will exhibit twice the percentage price change of a bond with a three-year duration. The actual calculation of a bond's duration is somewhat complicated, but the idea behind the calculation is straightforward. The first step is to measure the time interval until receipt for each cash flow (coupon and principal payments) from a bond. The second step is to compute a weighted average of these time intervals. Each time interval is measured by the present value of that cash flow. This weighted average is the duration of the bond measured in years.

Information Ratio: This statistic is a measure of the consistency of a portfolio's performance relative to a benchmark. It is calculated by subtracting the benchmark return from the portfolio return (excess return), and dividing the resulting excess return by the standard deviation (volatility) of this excess return. A positive information ratio indicates outperformance versus the benchmark, and the higher the information ratio, the more consistent the outperformance.

Jensen's Alpha: A measure of the average return of a portfolio or investment in excess of what is predicted by its beta or "market" risk. Portfolio Return- [Risk Free Rate+Beta*(market return-Risk Free Rate)].

Market Capitalization: For a firm, market capitalization is the total market value of outstanding common stock. For a portfolio, market capitalization is the sum of the capitalization of each company weighted by the ratio of holdings in that company to total portfolio holdings; thus it is a weighted-average capitalization. Meketa Investment Group considers the largest 65% of the broad domestic equity market as large capitalization, the next 25% of the market as medium capitalization, and the smallest 10% of stocks as small capitalization.

Market Weighted: Stocks in many indices are weighted based on the total market capitalization of the issue. Thus, the individual returns of higher market-capitalization issues will more heavily influence an index's return than the returns of the smaller market-capitalization issues in the index.

Maturity: The date on which a loan, bond, mortgage, or other debt/security becomes due and is to be paid off.

Prepayment Risk: The risk that prepayments will increase (homeowners will prepay all or part of their mortgage) when mortgage interest rates decline; hence, investors' monies will be returned to them in a lower interest rate environment. Also, the risk that prepayments will slow down when mortgage interest rates rise; hence, investors will not have as much money as previously anticipated in a higher interest rate environment. A prepayment is any payment in excess of the scheduled mortgage payment.

Price-Book Value (P/B) Ratio: The current market price of a stock divided by its book value per share. Meketa Investment Group calculates P/B as the current price divided by Compustat's quarterly common equity. Common equity includes common stock, capital surplus, retained earnings, and treasury stock adjusted for both common and nonredeemable preferred stock. Similar to high P/E stocks, stocks with high P/B's tend to be riskier investments.

Price-Earnings (P/E) Ratio: A stock's market price divided by its current or estimated future earnings. Lower P/E ratios often characterize stocks in low growth or mature industries, stocks in groups that have fallen out of favor, or stocks of established blue chip companies with long records of stable earnings and regular dividends. Sometimes a company that has good fundamentals may be viewed unfavorably by the market if it is an industry that is temporarily out of favor. Or a business may have experienced financial problems causing investors to be skeptical about is future. Either of these situations would result in lower relative P/E ratios. Some stocks exhibit above-average sales and earnings growth or expectations for above average growth. Consequently, investors are willing to pay more for these companies' earnings, which results in elevated P/E ratios. In other words, investors will pay more for shares of companies whose profits, in their opinion, are expected to increase faster than average. Because future events are in no way assured, high P/E stocks tend to be riskier and more volatile investments. Meketa Investment Group calculates P/E as the current price divided by the I/B/E/S consensus of twelve-month forecast earnings per share.

Quality Rating: The rank assigned a security by such rating services as Fitch, Moody's, and Standard & Poor's. The rating may be determined by such factors as (1) the likelihood of fulfillment of dividend, income, and principal payment of obligations; (2) the nature and provisions of the issue; and (3) the security's relative position in the event of liquidation of the company. Bonds assigned the top four grades (AAA, AA, A, BBB) are considered investment grade because they are eligible bank investments as determined by the controller of the currency.

Sharpe Ratio: A commonly used measure of risk-adjusted return. It is calculated by subtracting the risk free return (usually three-month Treasury bill) from the portfolio return and dividing the resulting excess return by the portfolio's total risk level (standard deviation). The result is a measure of return per unit of total risk taken. The higher the Sharpe ratio, the better the fund's historical risk adjusted performance.

STIF Account: Short-term investment fund at a custodian bank that invests in cash-equivalent instruments. It is generally used to safely invest the excess cash held by portfolio managers.

Standard Deviation: A measure of the total risk of an asset or a portfolio. Standard deviation measures the dispersion of a set of numbers around a central point (e.g., the average return). If the standard deviation is small, the distribution is concentrated within a narrow range of values. For a normal distribution, about two thirds of the observations will fall within one standard deviation of the mean, and 95% of the observations will fall within two standard deviations of the mean.

Style: The description of the type of approach and strategy utilized by an investment manager to manage funds. For example, the style for equities is determined by portfolio characteristics such as price-to-book value, price-to-earnings ratio, and dividend yield. Equity styles include growth, value, and core.

Tracking Error: A divergence between the price behavior of a position or a portfolio and the price behavior of a benchmark, as defined by the difference in standard deviation.

Yield to Maturity: The yield, or return, provided by a bond to its maturity date; determined by a mathematical process, usually requiring the use of a "basis book." For example, a 5% bond pays $5 a year interest on each $100 par value. To figure its current yield, divide $5 by $95—the market price of the bond—and you get 5.26%. Assume that the same bond is due to mature in five years. On the maturity date, the issuer is pledged to pay $100 for the bond that can be bought now for $95. In other words, the bond is selling at a discount of 5% below par value. To figure yield to maturity, a simple and approximate method is to divide 5% by the five years to maturity, which equals 1% pro rata yearly. Add that 1% to the 5.26% current yield, and the yield to maturity is roughly 6.26%.

$$\frac{\text{5\% (discount)}}{\text{5 (yrs. to maturity)}} = \text{1\% pro rata, plus 5.26\% (current yield)} = \text{6.26\% (yield to maturity)}$$

Yield to Worst: The lowest potential yield that can be received on a bond without the issuer actually defaulting. The yield to worst is calculated by making worst-case scenario assumptions on the issue by calculating the returns that would be received if provisions, including prepayment, call, or sinking fund, are used by the issuer.

NCREIF Property Index (NPI): Measures unleveraged investment performance of a very large pool of individual commercial real estate properties acquired in the private market by tax-exempt institutional investors for investment purposes only. The NPI index is capitalization-weighted for a quarterly time series composite total rate of return.

NCREIF Fund Index - Open End Diversified Core Equity (NFI-ODCE): Measures the investment performance of 28 open-end commingled funds pursuing a core investment strategy that reflects funds' leverage and cash positions. The NFI-ODCE index is equal-weighted and is reported gross and net of fees for a quarterly time series composite total rate of return.

Sources: Investment Terminology, International Foundation of Employee Benefit Plans, 1999.
The Handbook of Fixed Income Securities, Fabozzi, Frank J., 1991

Throughout this report, numbers may not sum due to rounding.

Returns for periods greater than one year are annualized throughout this report.

Values shown are in millions of dollars, unless noted otherwise.