City of Quincy Retirement System

July 31, 2023

Interim Update

Agenda

1. Executive Summary
   - July Market Overview
   - Manager Highlights
2. Interim Update as of July 31, 2023
3. Current Issue
   - Asset Allocation Review
   - Understanding China
   - Excess Cash Deployment Memo
4. Disclaimer, Glossary & Notes

Executive Summary

Economic and Market Update

Data as of July 31, 2023

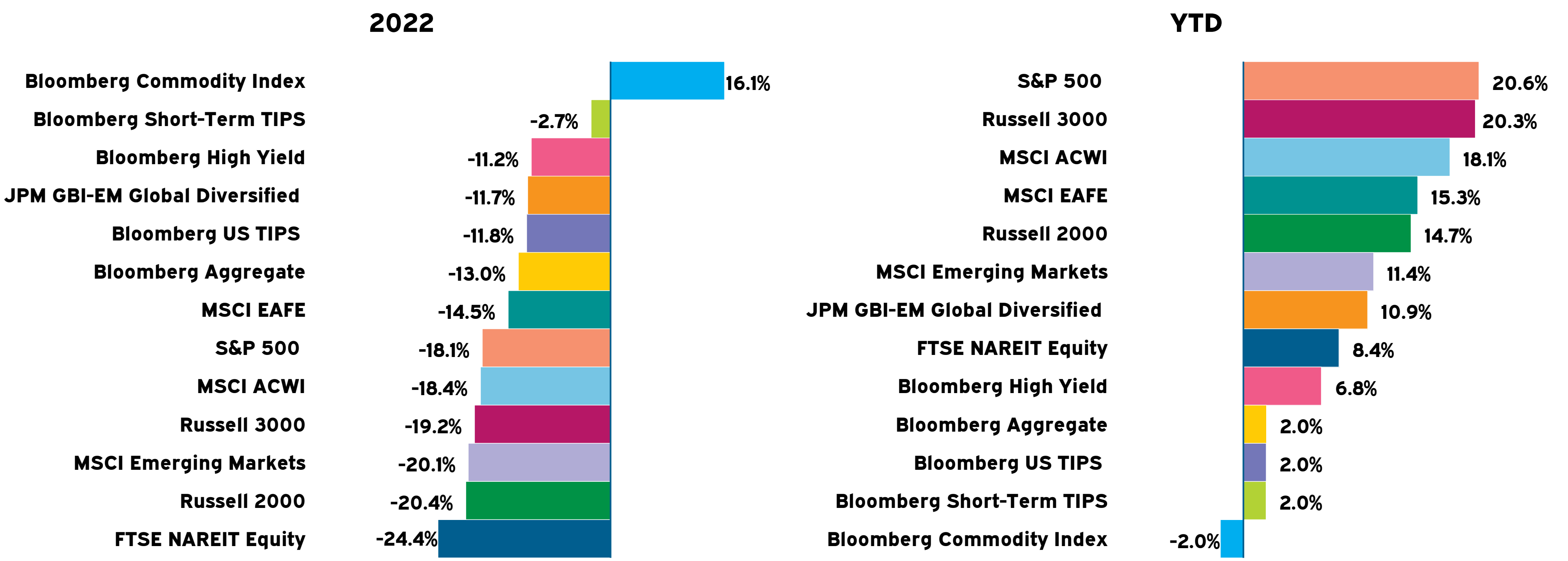
Commentary

→ Riskier assets continued to gain in July as economic data remained resilient while inflation receded. Except for commodities, most public market asset classes remained positive for the year, with US equities leading the way.

- After a pause in June, the Federal Reserve increased interest rates in July by 0.25% to a range of 5.25% - 5.5%, the highest level in over two decades. Markets are largely expecting that this will be the Fed's final rate increase.
- US equity markets (Russell 3000 index) continued to rise in July (+3.6%), bringing the year-to-date gains to 20.3%. The technology sector remains the key driver of results this year, helped by artificial intelligence optimism.
- Non-US developed equity markets also rose in July (MSCI EAFE +3.2%), but they continue to trail US markets year-to-date (15.3% versus 20.3%).
- Emerging market equities had the strongest results in July, gaining 6.2%, driven by optimism over additional policy support in China. They continue to trail developed market equities year-to-date though, returning 11.4%, due partly to China's weak results for the period.
- Generally, corporate bonds outperformed government bonds for the month on continued risk appetite. Overall, interest rates increased slightly in July, leading to a small decline in the broad US bond market (-0.1%). The index remains positive (+2.0%) year-to-date on declining inflation and expectations for the Fed to end their rate hikes soon.

→ This year, the paths of inflation and monetary policy, slowing global growth, and the war in Ukraine will all be key.

Index Returns[1]



→ After a particularly difficult 2022, most public market assets are up thus far in 2023, led by developed market equities.

→ Risk sentiment has been supported by expectations that policy tightening could be ending soon, as inflation continues to fall, while growth has remained relatively resilient.

[1] Source: Bloomberg. Data is as of July 31, 2023.

Domestic Equity Returns[1]

Domestic Equity	July (%)	Q2 (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
S&P 500	3.2	8.7	20.6	13.0	13.7	12.2	12.7
Russell 3000	3.6	8.4	20.3	12.6	13.1	11.4	12.1
Russell 1000	3.4	8.6	20.7	12.9	13.2	11.9	12.4
Russell 1000 Growth	3.4	12.8	33.4	17.3	12.2	15.2	15.5
Russell 1000 Value	3.5	4.1	8.8	8.3	14.1	8.0	9.0
Russell MidCap	4.0	4.8	13.3	8.7	11.8	8.8	10.1
Russell MidCap Growth	3.0	6.2	19.4	13.0	6.0	9.9	11.2
Russell MidCap Value	4.4	3.9	9.8	6.2	14.9	7.2	8.9
Russell 2000	6.1	5.2	14.7	7.9	12.0	5.1	8.2
Russell 2000 Growth	4.7	7.1	18.9	11.6	6.5	4.8	8.5
Russell 2000 Value	7.5	3.2	10.2	3.9	17.5	4.7	7.4

US Equities: Russell 3000 Index rose 3.6% in July and 20.3% YTD.

- → Equity investors continue to express optimism that the Federal Reserve's monetary tightening will not have serious impacts on earnings. Though corporate profits were down compared to a year ago, approximately 80% of S&P 500 companies that reported second quarter results in July exceeded earnings expectations.
- → In contrast to the year-to-date trend, value stocks outperformed growth stocks in July, particularly in small cap, driven by outperformance in financials and energy. So far in 2023, growth has significantly outperformed value driven by optimism over artificial intelligence.
- → Small cap stocks outperformed large cap stocks in July, but trail for the full year, again due to the strength of the technology sector. The July dynamic was driven partially by the outperformance of small cap banks after regulators announced higher capital requirements for larger banks.

[1] Source: Bloomberg. Data is as of July 31, 2023.

Foreign Equity Returns[1]

Foreign Equity	July (%)	Q2 (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
MSCI ACWI ex. US	4.1	2.4	13.9	13.4	7.1	3.9	4.7
MSCI EAFE	3.2	3.0	15.3	16.8	9.3	4.5	5.2
MSCI EAFE (Local Currency)	1.7	4.3	14.0	13.6	13.0	6.2	7.4
MSCI EAFE Small Cap	4.4	0.6	10.2	7.9	6.1	2.1	6.0
MSCI Emerging Markets	6.2	0.9	11.4	8.3	1.5	1.7	3.5
MSCI Emerging Markets (Local Currency)	5.3	1.7	11.1	8.6	3.0	3.7	6.1
MSCI China	10.8	-9.7	4.7	1.8	-9.9	-2.8	3.7

Foreign Equity: Developed international equities (MSCI EAFE) rose 3.2% in July bringing the YTD gains to 15.3%. Emerging market equities (MSCI EM) rose 6.2% in July, rising 11.4% YTD.

→ International equities also had strong results in July, led by China and emerging markets more broadly.

→ Japanese equities continued their steady rise, especially in the mid- and small-cap sectors. Eurozone and UK equities were broadly supported by falling inflation and solid corporate fundamentals.

→ After a disappointing reopening of the economy, China's government announced additional support to stimulate consumption and bolster the real estate sector, leading to double-digit gains for the month (10.8%). India underperformed as higher food costs kept inflation elevated.

[1] Source: Bloomberg. Data is as of July 31, 2023.

Fixed Income Returns[1]

Fixed Income	July (%)	Q2 (%)	YTD (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	Current Yield (%)	Duration (Years)
Bloomberg Universal	0.1	-0.6	2.4	-2.4	-4.0	1.0	1.8	5.2	6.2
Bloomberg Aggregate	-0.1	-0.8	2.0	-3.4	-4.5	0.7	1.5	4.9	6.5
Bloomberg US TIPS	0.1	-1.4	2.0	-5.4	-0.8	2.6	2.0	4.6	6.9
Bloomberg Short-term TIPS	0.5	-0.7	2.0	-1.2	2.3	2.9	1.7	5.3	2.7
Bloomberg High Yield	1.4	1.7	6.8	4.4	2.0	3.4	4.4	8.3	4.0
JPM GBI-EM Global Diversified (USD)	2.9	2.5	10.9	14.3	-1.5	0.5	-0.2	6.5	5.0

Fixed Income: The Bloomberg Universal rose 0.1% in July remaining positive YTD (+2.4%), as inflation continues to decline, and yields remain high.

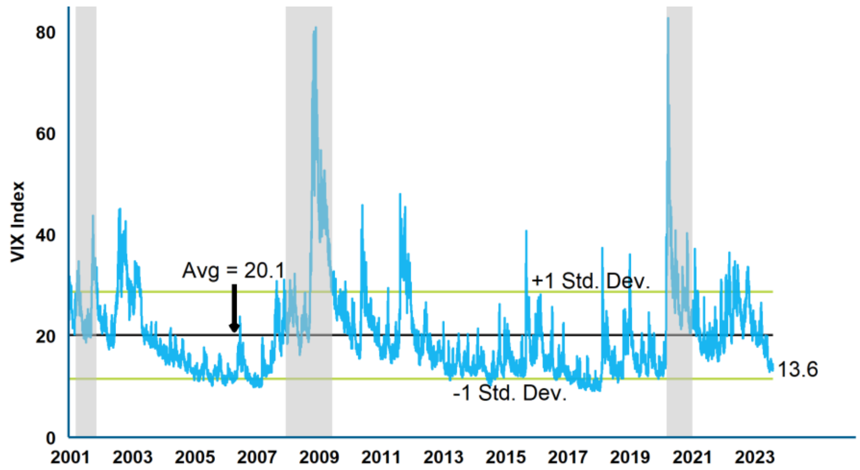
→ In July, riskier bonds continued to outperform government bonds on optimism over a potential soft landing of the economy.

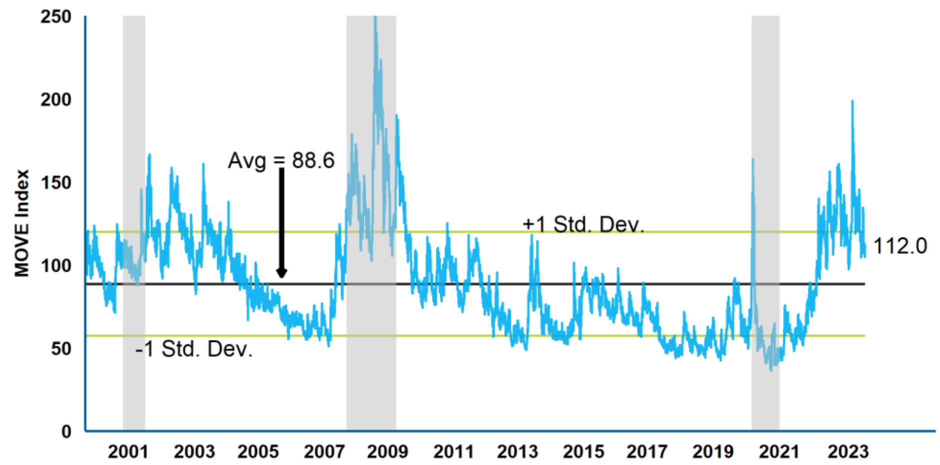
→ The broad US bond market (Bloomberg Aggregate) declined slightly for the month (-0.1%) while the TIPS index, and the short-term TIPS index both posted small gains. All three indexes now have the same results so far in 2023.

→ In the risk-on environment, high yield bonds rose 1.4% for the month, while emerging market bonds were the top performer, up 2.9%. The two asset classes remain the top performers for the year.

[1] Source: Bloomberg. JPM GBI-EM data is from InvestorForce. Data is as of July 31, 2023. The yield and duration data from Bloomberg is defined as the index's yield to worst and modified duration respectively.

Equity and Fixed Income Volatility[1]



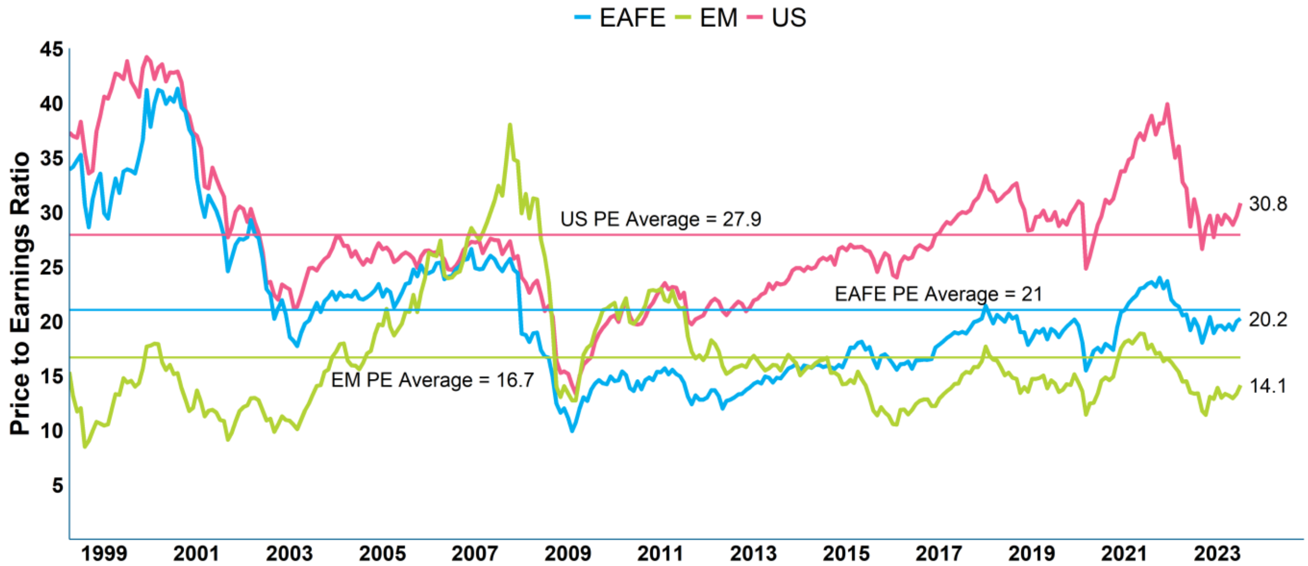


→ Volatility in equities (VIX) remains well below the historical average as investors continue to anticipate the end of the Fed's policy tightening.

→ The bond market continues to be volatile after last year's historic losses and due to policy uncertainty and previous issues in the banking sector. The MOVE (fixed income volatility) remains well above (112.0) its long-run average (88.6), but off its recent peak during the heart of the banking crisis.

[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 July 2023. The average line indicated is the average of the VIX and MOVE values between 2000 and July 2023.

Equity Cyclically Adjusted P/E Ratios[1]

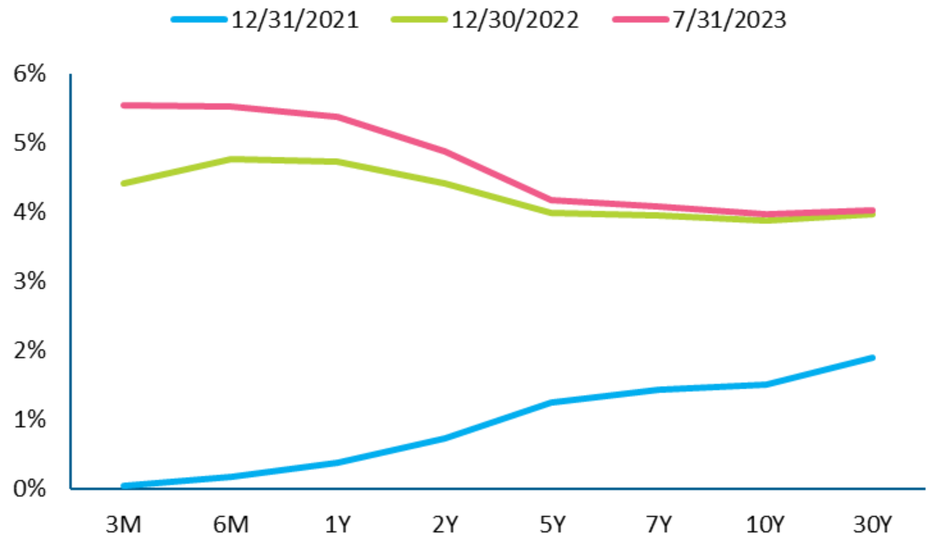


→ Given the strong technology-driven rally this year, the US equity price-to-earnings ratio increased above its long-run (21st century) average.

→ International developed market valuations are below their own long-term average, with those for emerging markets the lowest and well under the 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 July 2023. 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.

US Yield Curve[1]

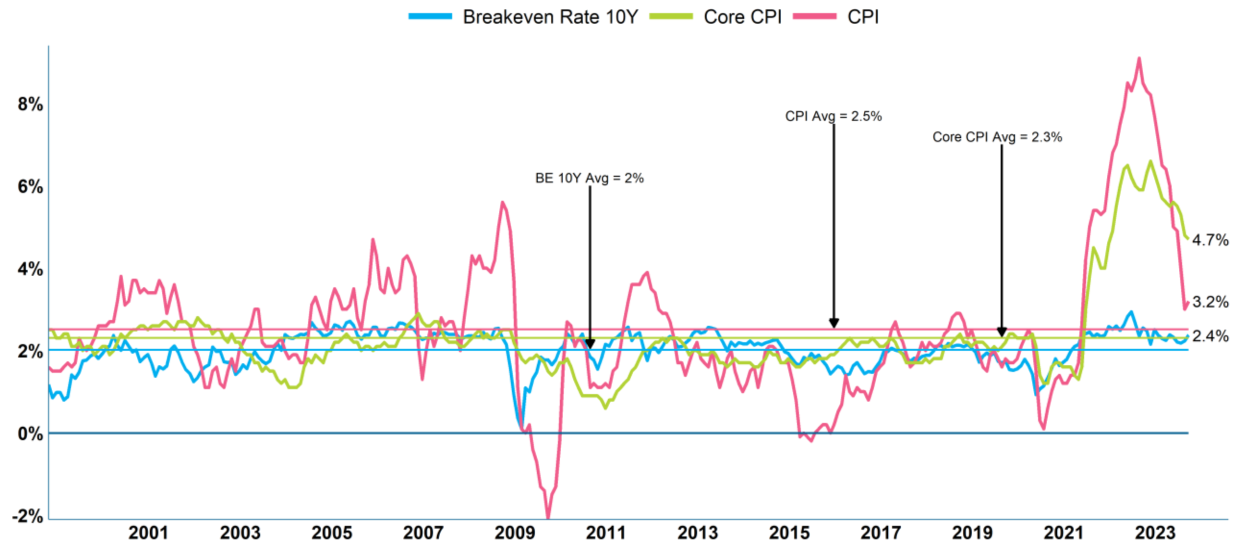


→ In July, very short-term interest rates (6-months or less) fell as it appears interest rate hikes might be coming to an end. Longer dated maturities continued to drift higher, as economic data remains resilient. So far in 2023, rates overall remain higher, particularly the policy sensitive front-end of the yield curve.

→ The yield curve remains inverted with the spread between two-year and ten-year Treasuries finishing the month at -0.91%. The more closely watched measure (by the Fed) of the three-month and ten-year Treasuries spread also remained inverted at -1.60%. Inversions in the yield curve have often preceded recessions.

[1] Source: Bloomberg. Data is as of July 31, 2023.

Ten-Year Breakeven Inflation and CPI[1]



→ Declines in inflation while other economic data remains strong has led to optimism over the Federal Reserve potentially achieving a rarely observed soft landing for the economy.

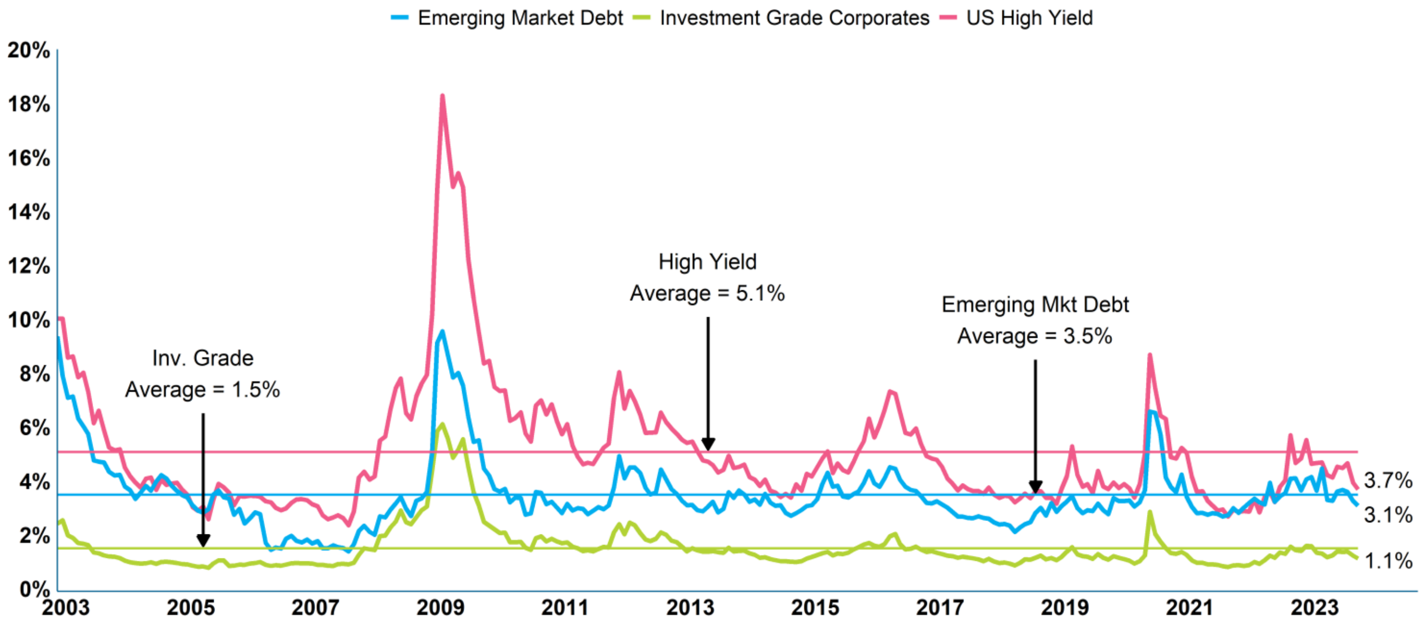
→ Year-over-year headline inflation rose slightly in July (3.0% to 3.2%) but came in below expectations. The trend of lower month-over-month price increases continued with the rate staying steady at 0.2%.

→ Core inflation – excluding food and energy - fell (4.8% to 4.7%) year-over-year. It remains stubbornly high though driven by shelter costs (+7.7%), particularly owners equivalent rent, and transportation services (+9.0%).

→ Inflation expectations (breakevens) remain well below current inflation as investors continue to expect inflation to track back toward the Fed's 2% average target.

[1] Source: FRED. Data is as of July 31, 2023. The CPI and 10 Year Breakeven average lines denote the average values from January 2000 to the present month-end, respectively. Breakeven values represent month-end values for comparative purposes.

Credit Spreads vs. US Treasury Bonds[1]

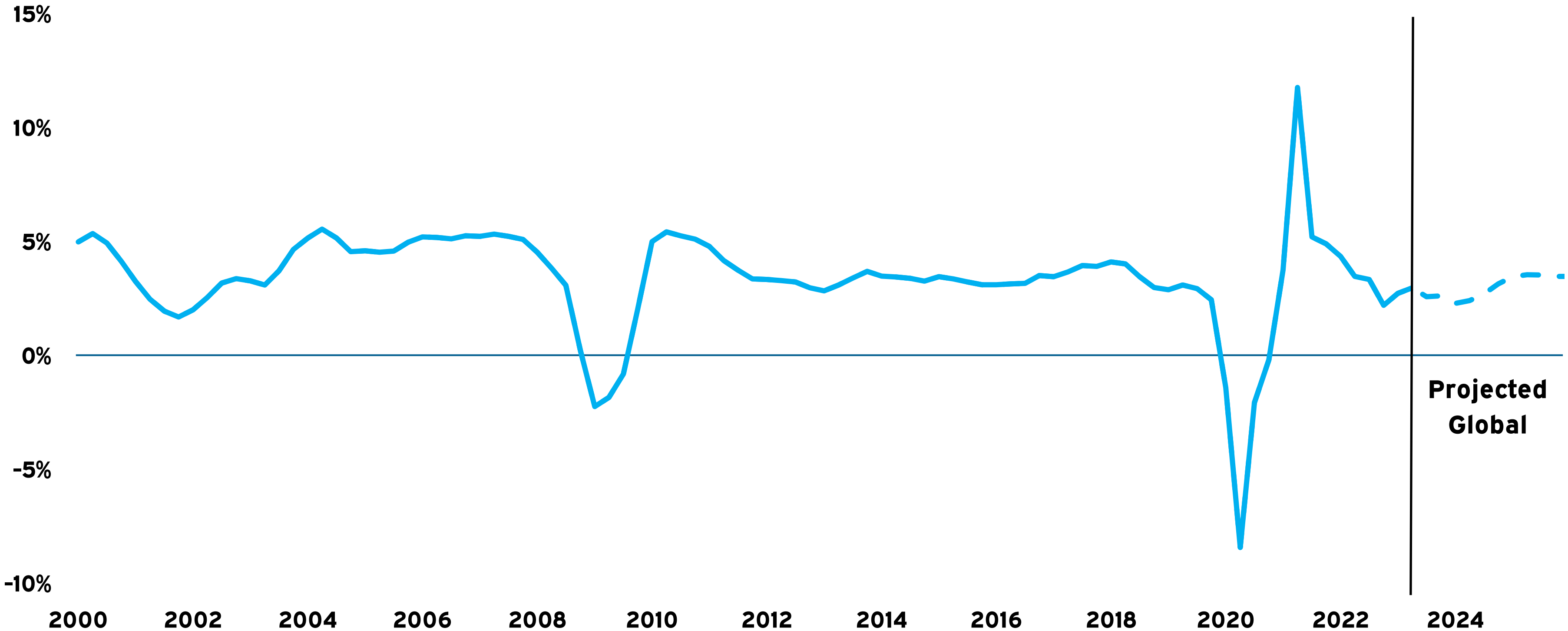


→ Credit markets outperformed government bonds for the month with spreads (the added yield above a comparable maturity Treasury) declining. Risk appetite was strong as growth remains resilient, while inflation continues to decline.

→ High yield spreads remain well below the long-term average. Investment grade and emerging market spreads are also below their respective long-term averages, but by smaller margins.

[1] Sources: Bloomberg. Data is as of July 31, 2023. Average lines denote the average of the investment grade, high yield, and emerging market spread values from August 2000 to the recent month-end, respectively.

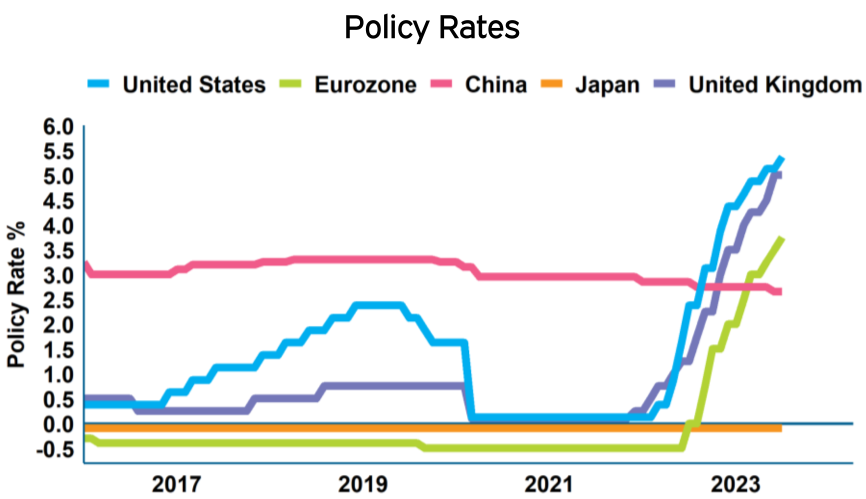
Global Real Gross Domestic Product (GDP) Growth[1]

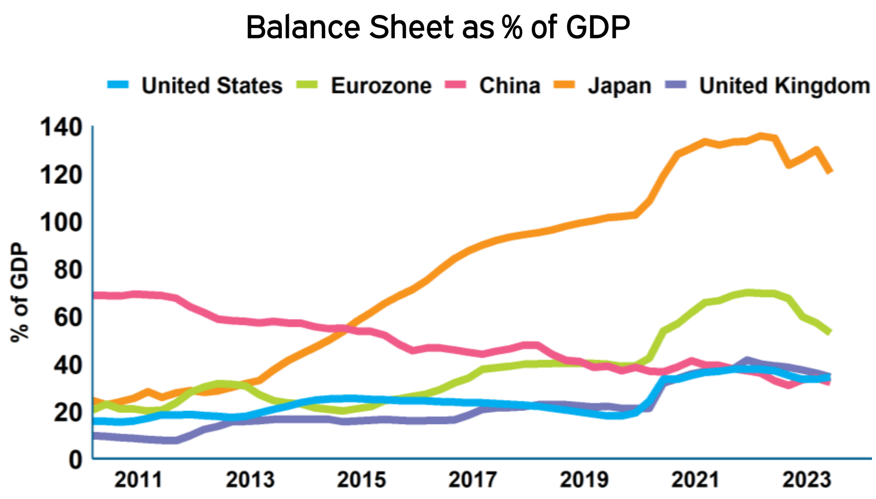


- → Global economies are expected to slow this year compared to 2022. The risk of recession remains given policymakers' aggressive tightening, but optimism has started to grow over some central banks potentially navigating a soft landing.
- → The delicate balancing act of central banks trying to reduce inflation without dramatically depressing growth will remain key.

[1] Source: Oxford Economics (World GDP, US$ prices & PPP exchange rate, real, % change YoY). Updated July 2023.

Central Bank Response[1]

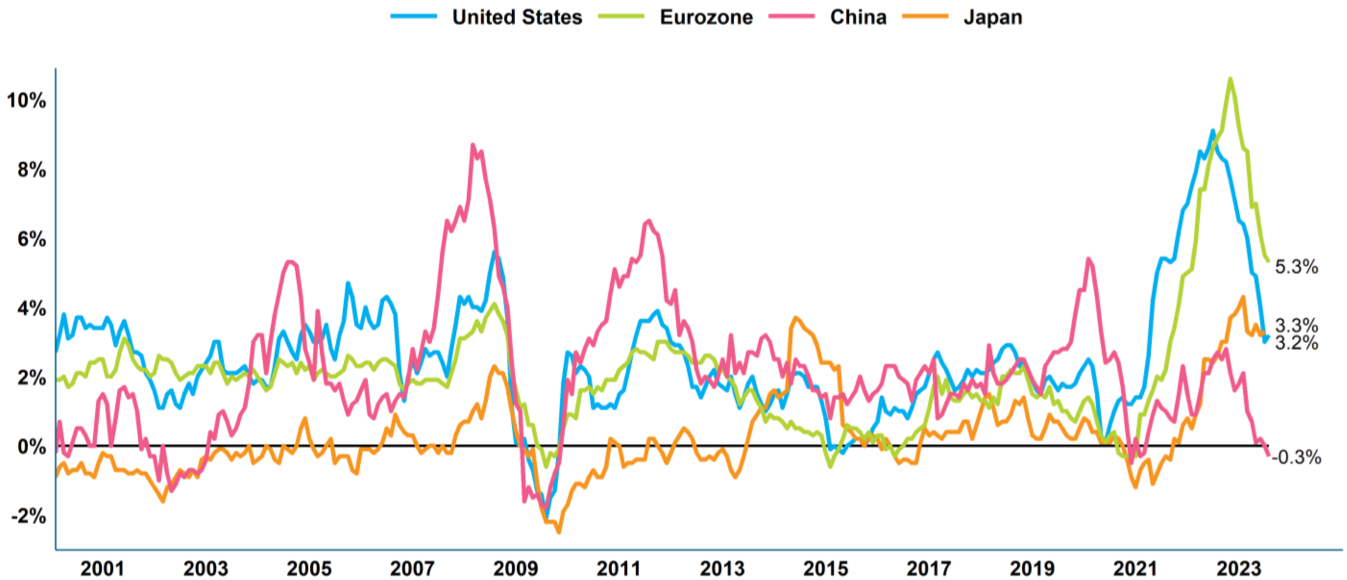




- → Slowing inflation and growth have led to expectations for a reduction in the pace of aggressive policy tightening.
- → In July the Fed raised rates another 25 basis points to a range of 5.25% to 5.50% with markets largely expecting this to be the last rate increase. After month-end, the FOMC paused its tightening campaign.
- → The European Central Bank also increased rates in July, but they remain lower than in the US. In Japan the BOJ surprised markets by announcing they would be more flexible on their 10-year interest rate target.
- → The central bank in China has continued to cut interest rates and inject liquidity into the banking system, as weaker than expected economic data appears to indicate a widespread slowdown.
- → Looking ahead, risks remain for a policy error as central banks attempt to balance multiple goals, bringing down inflation, maintaining financial stability, and supporting growth.

[1] Source: Bloomberg. Policy rate data is as of July 31, 2023. China policy rate is defined as the medium-term lending facility 1 year interest rate. Balance sheet as % of GDP is based on quarterly data and is as of June 30, 2023.

Inflation (CPI Trailing Twelve Months)[1]



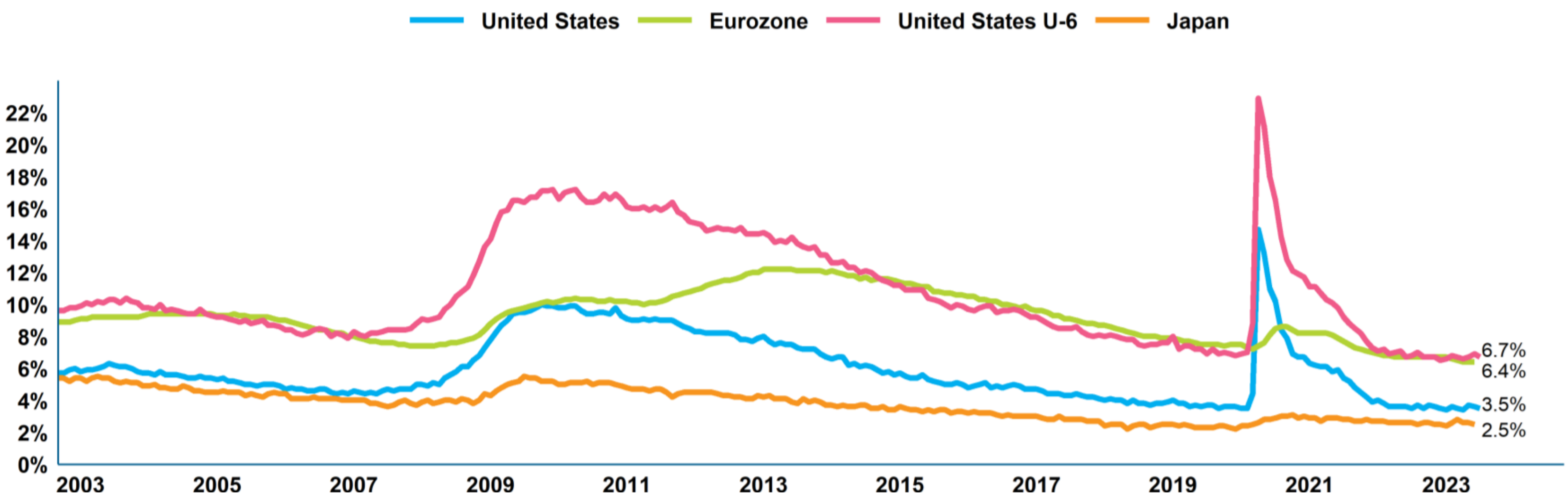
→ The inflation picture remains mixed across the major economies.

→ In the US, inflation rose slightly in July (3.0% to 3.2%), while eurozone inflation continued to fall (5.5% to 5.3%) a level well off its peak. Despite 2023's significant declines in the US and Europe, inflation levels remain elevated compared to central bank targets.

→ Inflation in Japan remains elevated at levels not seen in almost a decade largely driven by food and home related items. In China, deflationary pressures emerged in July due to falling food prices, but this is expected to be temporary as high base effects from last year work their way through.

[1] United States and Eurozone CPI – Source: FRED. Japan and China CPI – Source: Bloomberg. Data is as July 31, 2023. The most recent Japanese inflation data is as of June 2023.

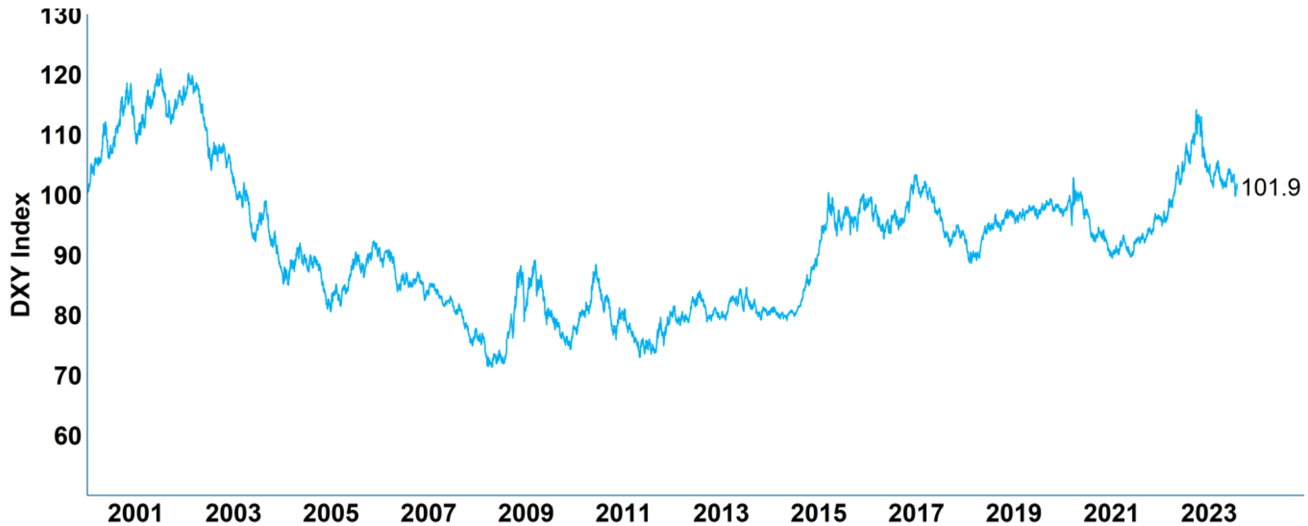
Unemployment[1]



- → Despite slowing growth and relatively high inflation, the US labor market continues to show signs of resilience (3.5%). Unemployment in the US, which experienced the steepest rise, recently returned to pre-pandemic levels. Broader measures of unemployment (U-6) remain higher at 6.7% but also declined dramatically from their peak.
- → The strong labor market and higher wages, although beneficial for workers, motivates the Fed's efforts to fight inflation, potentially leading to higher unemployment.
- → Unemployment in Europe has also declined but remains higher than the US, while levels in Japan have been flat through the pandemic given less layoffs.

[1] Eurozone Unemployment - Source: Bloomberg. United States, United States U-6, and Japan Unemployment – Source: FRED. Data is as July 31, 2023, for the US. The most recent data for Eurozone and Japanese unemployment is as of June 2023.

US Dollar versus Broad Currencies[1]



→ The dollar finished 2022 much higher than it started, due to the increased pace of policy tightening, stronger relative growth, and safe-haven flows.

→ Late last year and into early this year, the dollar declined, as weaker economic data and lower inflation led to investors anticipating the end of Fed tightening. Since then, the dollar has largely been range-bound due to competing forces of safe-haven flows and monetary policy expectations.

→ For the rest of this year, the track of inflation across economies and the corresponding monetary policies will be key drivers of currency moves.

[1] Source: Bloomberg. Data as of July 31, 2023.

Summary

Key Trends:

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

→ Global monetary policies could diverge in 2023. The risk of policy errors remains elevated as central banks try to reduce persistent inflation while not tipping their economies into recession.

→ Growth is expected to slow globally this year, with many economies forecasted to tip into recession. Optimism has been building though that some economies could experience a soft landing. Inflation, monetary policy, and the war will all be key.

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

→ The key for US equities going forward will be whether earnings can remain resilient if growth continues to slow. Also, the future path 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 potential for renewed strength in the US dollar, higher inflation weighing particularly on Europe, and China's sluggish economic reopening and on-going weakness in the real estate sector. Japan's recent hint at potentially tightening monetary policy along with changes in corporate governance in the country could influence relative results.

Manager Highlights

Acadian Emerging Markets Small Cap

→ Acadian outperformed its benchmark by 0.3% in July, posting a return of 6.8% vs the benchmark's 6.5%.

- Key sources of positive active return included stock selection in Taiwan (+102 bps), stock selection in India (+66 bps), and stock selection in Indonesia (+9 bps).
- From a sector perspective, key sources of positive active return included stock selection in industrials (+66 bps), stock selection in consumer staples (+29 bps), and a combination of stock selection and an underweight position in real estate (+9 bps).

→ Since inception, Acadian has returned 7.7%, well outpacing the benchmark's 4.5% return, net of fees, over that period.

Loomis Sayles High Yield

→ Loomis beat its benchmark by 0.3% in July, posting a return of 1.7% vs the benchmark's 1.4%.

- Outperformance was driven primarily by security selection while sector allocation contributed modestly throughout the month. High yield credit, convertibles, and equity 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 consumer non cyclical names moderately aided excess return with the securities issued by CSC Holdings, Dish DBS, and Lifepoint Health having the best performance in this sector.

→ Since inception, Loomis has returned 4.5%, lagging the benchmark by 0.7%, net of fees, over that period.

Axiom International Small Cap Equity

→ Axiom trailed its benchmark by 2.0% in July, returning 3.0% vs. the benchmark 5.0%.

- From a sector perspective, key detracting sectors were consumer discretionary and industrials. Within consumer discretionary, the largest detractor was Dalata, an Irish hotel group operating in Ireland and the UK. Brembo, an Italian auto parts company was weak on concerns about potential change in structure if it merged with Pirelli.
- Regionally, the biggest detractor was Japan, on relative underperformance from Baycurrent and from semiconductor design company Socionext, that reversed its previous month outperformance as its three major, non-core shareholders decided to sell their position via a market offering creating a temporary overhang on the stock.

→ Since inception, Axiom has returned 8.1%, trailing the benchmark's 10.1% return, net of fees.

Driehaus Emerging Markets Growth

→ Driehaus trailed its benchmark by 1.8% in July, posting a return of 4.4% vs the benchmark's 6.2%.

- Exposures in the information technology and financial sectors, as well as South Korea and China detracted from relative returns.

→ Since inception, Driehaus has returned 5.9%, well outpacing the benchmark's 2.5% return, net of fees, over that period.

Interim Update
As of July 31, 2023

Allocation vs. Targets and Policy

	Current Balance	Current Allocation	Policy	Policy Range
US Equity	$195,909,575	24%	24%	19% - 29%
Developed Market Equity	$99,076,270	12%	13%	8% - 18%
Emerging Market Equity	$65,758,070	8%	12%	7% - 17%
Investment Grade Bonds	$69,340,173	8%	5%	2% - 8%
Long-Term Government Bonds	$25,301,117	3%	7%	2% - 12%
TIPS	$15,886,238	2%	4%	1% - 7%
Emerging Market Bonds	--	--	2%	0% - 4%
High Yield Bonds	$40,604,414	5%	6%	3% - 9%
Bank Loans	$8,624,425	1%	2%	0% - 4%
Private Equity	$133,224,093	16%	10%	5% - 15%
Real Estate	$84,163,220	10%	10%	5% - 15%
Natural Resources	$17,283,469	2%	3%	0% - 6%
Infrastructure	$12,688,945	2%	2%	0% - 5%
Opportunistic	$36,153,377	4%	0%	0% - 5%
Balanced Assets	$16,672,987	2%	--	--
Cash	$8,874,836	1%	0%	0% - 5%
Total	**$829,561,211**	**100%**	**100%**	

	Current Balance	Current Allocation	Policy	Policy Range
Total Equity Including PE	$493,968,008	60%	59%	--
Total Fixed Income	$159,756,367	19%	26%	--
Real Assets	$114,135,634	14%	15%	--
Other	$61,701,200	8%	0%	--

Asset Class Performance Summary

	Market Value ($)	% of Portfolio	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System (gross)	**829,561,211**	**100.0**	**1.9**	**8.5**	**5.2**	**9.4**	**7.6**	**7.4**	**7.0**	**8.2**	**Jan-89**
Total Retirement System			**1.9**	**8.4**	**5.1**	**9.2**	**7.4**	**7.1**	**6.7**	**7.9**	
Domestic Equity Assets	**195,909,575**	**23.6**	**3.7**	**17.5**	**11.3**	**13.5**	**10.5**	**11.5**	**9.8**	**10.0**	**Jul-93**
Russell 3000			*3.6*	*20.3*	*12.6*	*13.1*	*11.4*	*12.1*	*10.1*	*10.0*	*Jul-93*
International Developed Market Equity Assets	**99,076,270**	**11.9**	**3.4**	**14.9**	**14.7**	**7.9**	**3.3**	**4.7**	**6.0**	**5.0**	**Feb-98**
MSCI EAFE			*3.2*	*15.3*	*16.8*	*9.3*	*4.5*	*5.2*	*6.6*	*4.8*	*Feb-98*
International Emerging Market Equity Assets	**65,758,070**	**7.9**	**5.2**	**14.1**	**10.9**	**4.6**	**6.4**	**5.0**	**--**	**6.3**	**Sep-08**
MSCI Emerging Markets			*6.2*	*11.4*	*8.3*	*1.5*	*1.7*	*3.5*	*8.2*	*3.1*	*Sep-08*
Investment Grade Bond Assets	**69,340,173**	**8.4**	**-0.5**	**2.2**	**-5.3**	**-5.8**	**-0.1**	**1.0**	**3.0**	**4.1**	**Jul-93**
Bloomberg US Aggregate TR			*-0.1*	*2.0*	*-3.4*	*-4.5*	*0.7*	*1.5*	*3.2*	*4.4*	*Jul-93*
Long-Term Government Bond Assets	**25,301,117**	**3.0**	**-0.7**	**2.2**	**-6.1**	**-6.3**	**0.9**	**--**	**--**	**1.6**	**Dec-15**
PRIT Core Fixed Income			*-0.7*	*2.5*	*-5.8*	*-6.2*	*1.0*	*2.5*	*3.7*	*1.6*	*Dec-15*
TIPS Assets	**15,886,238**	**1.9**	**0.1**	**2.2**	**-5.4**	**-0.9**	**2.6**	**2.0**	**--**	**3.4**	**Mar-07**
Bloomberg US TIPS TR			*0.1*	*2.0*	*-5.4*	*-0.8*	*2.6*	*2.0*	*3.9*	*3.5*	*Mar-07*
High Yield Bond Assets	**40,604,414**	**4.9**	**1.5**	**6.3**	**5.1**	**2.4**	**3.8**	**4.0**	**--**	**5.4**	**Apr-07**
Bloomberg US High Yield TR			*1.4*	*6.8*	*4.4*	*2.0*	*3.4*	*4.4*	*6.8*	*6.0*	*Apr-07*
Bank Loan Assets	**8,624,425**	**1.0**	**1.3**	**8.8**	**10.8**	**5.5**	**4.0**	**--**	**--**	**3.7**	**Aug-14**
Credit Suisse Leveraged Loans			*1.3*	*7.7*	*9.5*	*6.0*	*4.1*	*4.2*	*4.7*	*4.1*	*Aug-14*
Total Real Estate	**84,163,220**	**10.1**	**0.3**	**-3.5**	**-5.3**	**8.1**	**5.1**	**7.8**	**--**	**--**	**Jan-89**
NCREIF ODCE			*0.0*	*-5.8*	*-10.0*	*8.0*	*6.5*	*8.8*	*7.8*	*7.2*	*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 July 31, 2023

	Market Value ($)	% of Portfolio	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Private Equity Assets	**133,224,093**	**16.1**									
Natural Resources Assets	**17,283,469**	**2.1**									
Infrastructure Assets	**12,688,945**	**1.5**									
Opportunistic Assets	**36,153,377**	**4.4**									
Balanced Assets (PRIT General Allocation Fund)	**16,672,987**	**2.0**	**1.8**	**8.5**	**4.5**	**9.4**	**7.6**	**8.1**	**8.0**	**8.3**	**Apr-90**
60% Wilshire 5000 & 40% Barclays Aggregate			*2.1*	*12.8*	*6.2*	*6.3*	*7.6*	*8.1*	*7.7*	*8.6*	*Apr-90*
Cash	**8,874,836**	**1.1**									

Trailing Net Performance

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System (gross)	**829,561,211**	**100.0**	**--**	**1.9**	**8.5**	**5.2**	**9.4**	**7.6**	**7.4**	**7.0**	**8.2**	**Jan-89**
Total Retirement System				**1.9**	**8.4**	**5.1**	**9.2**	**7.4**	**7.1**	**6.7**	**7.9**	
Domestic Equity Assets	**195,909,575**	**23.6**	**23.6**	**3.7**	**17.5**	**11.3**	**13.5**	**10.5**	**11.5**	**9.8**	**10.0**	**Jul-93**
Russell 3000				*3.6*	*20.3*	*12.6*	*13.1*	*11.4*	*12.1*	*10.1*	*10.0*	*Jul-93*
RhumbLine Russell 1000 Growth Index	26,925,478	3.2	13.7	3.4	33.3	17.3	12.2	15.2	15.5	--	11.7	Jun-05
Russell 1000 Growth				*3.4*	*33.4*	*17.3*	*12.2*	*15.2*	*15.5*	*11.5*	*11.8*	*Jun-05*
RhumbLine Russell 1000 Value Index	28,606,599	3.4	14.6	3.5	8.8	8.3	14.1	8.0	9.0	--	7.7	Jun-05
Russell 1000 Value				*3.5*	*8.8*	*8.3*	*14.1*	*8.0*	*9.0*	*8.6*	*7.7*	*Jun-05*
Rhumbline QSI Index	33,061,393	4.0	16.9	3.7	12.5	7.5	12.6	10.2	11.5	--	11.5	Aug-13
QSI Index				*3.7*	*12.5*	*7.5*	*12.6*	*10.3*	*11.6*	*10.3*	*11.6*	*Aug-13*
Russell 3000				*3.6*	*20.3*	*12.6*	*13.1*	*11.4*	*12.1*	*10.1*	*12.1*	*Aug-13*
Brown Small Cap Fundamental Value	18,022,995	2.2	9.2	6.4	9.3	8.3	16.8	5.2	--	--	8.2	Jul-16
Russell 2000 Value				*7.5*	*10.2*	*3.9*	*17.5*	*4.7*	*7.4*	*8.4*	*8.7*	*Jul-16*
PRIT General Allocation Domestic Equity	89,293,111	10.8	45.6	3.4	19.9	12.5	--	--	--	--	-1.4	Jan-22
PRIT Domestic Equity Benchmark				*3.6*	*19.8*	*12.2*	*--*	*--*	*--*	*--*	*-1.6*	*Jan-22*
International Developed Market Equity Assets	**99,076,270**	**11.9**	**11.9**	**3.4**	**14.9**	**14.7**	**7.9**	**3.3**	**4.7**	**6.0**	**5.0**	**Feb-98**
MSCI EAFE				*3.2*	*15.3*	*16.8*	*9.3*	*4.5*	*5.2*	*6.6*	*4.8*	*Feb-98*
SSgA MSCI EAFE Index	43,241,514	5.2	43.6	3.2	15.6	17.1	9.6	4.9	5.5	--	5.6	Oct-09
MSCI EAFE				*3.2*	*15.3*	*16.8*	*9.3*	*4.5*	*5.2*	*6.6*	*5.4*	*Oct-09*
Axiom International Small Cap Equity	11,299,354	1.4	11.4	3.0	9.4	3.2	-0.1	--	--	--	8.1	May-20
S&P Developed Ex-U.S. SmallCap				*5.0*	*12.3*	*9.7*	*5.8*	*2.4*	*5.9*	*8.5*	*10.1*	*May-20*
MSCI EAFE Small Cap				*4.4*	*10.2*	*7.9*	*6.1*	*2.1*	*6.0*	*8.3*	*9.4*	*May-20*
PRIT General Allocation Int. Equity	44,535,402	5.4	45.0	3.7	15.6	15.5	--	--	--	--	-2.5	Jan-22
Custom MSCI World Ex-US IMI Net Divs				*3.4*	*14.3*	*14.1*	*--*	*--*	*--*	*--*	*-2.1*	*Jan-22*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
International Emerging Market Equity Assets	**65,758,070**	**7.9**	**7.9**	**5.2**	**14.1**	**10.9**	**4.6**	**6.4**	**5.0**	**--**	**6.3**	**Sep-08**
MSCI Emerging Markets				*6.2*	*11.4*	*8.3*	*1.5*	*1.7*	*3.5*	*8.2*	*3.1*	*Sep-08*
Driehaus Emerging Markets Growth	38,636,797	4.7	58.8	4.4	11.5	6.6	1.7	--	--	--	5.9	Mar-19
MSCI Emerging Markets				*6.2*	*11.4*	*8.3*	*1.5*	*1.7*	*3.5*	*8.2*	*2.5*	*Mar-19*
Acadian Emerging Markets Small Cap	10,781,746	1.3	16.4	6.8	21.3	22.1	15.5	8.2	--	--	7.7	Jun-14
MSCI Emerging Markets Small Cap				*6.5*	*17.7*	*17.4*	*12.8*	*6.0*	*5.2*	*9.6*	*4.5*	*Jun-14*
PRIT General Allocation EME	16,339,528	2.0	24.8	5.9	15.5	14.5	--	--	--	--	-3.8	Jan-22
Custom MSCI Emerging Market IMI Net Divs				*6.3*	*11.7*	*8.6*	*--*	*--*	*--*	*--*	*-6.6*	*Jan-22*
Investment Grade Bond Assets	**69,340,173**	**8.4**	**8.4**	**-0.5**	**2.2**	**-5.3**	**-5.8**	**-0.1**	**1.0**	**3.0**	**4.1**	**Jul-93**
Bloomberg US Aggregate TR				*-0.1*	*2.0*	*-3.4*	*-4.5*	*0.7*	*1.5*	*3.2*	*4.4*	*Jul-93*
SSgA U.S. Aggregate Bond Index-NL	20,692,101	2.5	29.8	-0.1	2.2	-3.3	-4.4	0.8	1.5	--	2.9	Apr-04
Bloomberg US Aggregate TR				*-0.1*	*2.0*	*-3.4*	*-4.5*	*0.7*	*1.5*	*3.2*	*3.0*	*Apr-04*
PRIT General Allocation Core FI	48,648,072	5.9	70.2	-0.7	2.2	-6.1	--	--	--	--	-10.8	Jan-22
PRIT Core Fixed Income				*-0.7*	*2.5*	*-5.8*	*-6.2*	*1.0*	*2.5*	*3.7*	*-10.6*	*Jan-22*
Long-Term Government Bond Assets	**25,301,117**	**3.0**	**3.0**	**-0.7**	**2.2**	**-6.1**	**-6.3**	**0.9**	**--**	**--**	**1.6**	**Dec-15**
PRIT Core Fixed Income				*-0.7*	*2.5*	*-5.8*	*-6.2*	*1.0*	*2.5*	*3.7*	*1.6*	*Dec-15*
PRIT Core Fixed Income	25,301,117	3.0	100.0	-0.7	2.2	-6.1	-6.3	0.9	--	--	1.6	Dec-15
PRIT Core Fixed Income				*-0.7*	*2.5*	*-5.8*	*-6.2*	*1.0*	*2.5*	*3.7*	*1.6*	*Dec-15*
TIPS Assets	**15,886,238**	**1.9**	**1.9**	**0.1**	**2.2**	**-5.4**	**-0.9**	**2.6**	**2.0**	**--**	**3.4**	**Mar-07**
Bloomberg US TIPS TR				*0.1*	*2.0*	*-5.4*	*-0.8*	*2.6*	*2.0*	*3.9*	*3.5*	*Mar-07*
SSgA TIPS Index	15,886,238	1.9	100.0	0.1	2.2	-5.4	-0.9	2.6	2.0	--	3.4	Mar-07
Bloomberg US TIPS TR				*0.1*	*2.0*	*-5.4*	*-0.8*	*2.6*	*2.0*	*3.9*	*3.5*	*Mar-07*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
High Yield Bond Assets	**40,604,414**	**4.9**	**4.9**	**1.5**	**6.3**	**5.1**	**2.4**	**3.8**	**4.0**	**--**	**5.4**	**Apr-07**
Bloomberg US High Yield TR				*1.4*	*6.8*	*4.4*	*2.0*	*3.4*	*4.4*	*6.8*	*6.0*	*Apr-07*
Loomis Sayles High Yield Conservative	11,965,495	1.4	29.5	1.7	5.1	2.8	0.6	2.3	3.7	--	4.5	Feb-12
Bloomberg US High Yield TR				*1.4*	*6.8*	*4.4*	*2.0*	*3.4*	*4.4*	*6.8*	*5.2*	*Feb-12*
Columbia High Yield	12,040,034	1.5	29.7	1.3	6.7	4.2	1.9	3.9	--	--	4.1	Dec-16
Bloomberg US High Yield TR				*1.4*	*6.8*	*4.4*	*2.0*	*3.4*	*4.4*	*6.8*	*4.1*	*Dec-16*
PRIT General Allocation Value Added FI	16,598,885	2.0	40.9	1.4	6.8	7.2	--	--	--	--	0.7	Jan-22
PRIT Public Value-Added Fixed Income				*1.1*	*6.7*	*8.1*	*2.7*	*2.7*	*2.8*	*5.6*	*-1.0*	*Jan-22*
Bank Loan Assets	**8,624,425**	**1.0**	**1.0**	**1.3**	**8.8**	**10.8**	**5.5**	**4.0**	**--**	**--**	**3.7**	**Aug-14**
Credit Suisse Leveraged Loans				*1.3*	*7.7*	*9.5*	*6.0*	*4.1*	*4.2*	*4.7*	*4.1*	*Aug-14*
Beach Point Loan Fund	8,624,425	1.0	100.0	1.3	8.8	10.8	5.5	4.0	--	--	3.7	Aug-14
Credit Suisse Leveraged Loans				*1.3*	*7.7*	*9.5*	*6.0*	*4.1*	*4.2*	*4.7*	*4.1*	*Aug-14*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Real Estate	**84,163,220**	**10.1**	**10.1**	**0.3**	**-3.5**	**-5.3**	**8.1**	**5.1**	**7.8**	**--**	**--**	**Jan-89**
NCREIF ODCE				*0.0*	*-5.8*	*-10.0*	*8.0*	*6.5*	*8.8*	*7.8*	*7.2*	*Jan-89*
UBS Trumbull Property Income Fund	10,764,522	1.3	12.8	0.0	-3.5	-5.9	5.1	4.5	6.3	7.0	7.1	Jan-89
NCREIF ODCE (net)				*0.0*	*-6.2*	*-10.7*	*7.1*	*5.6*	*7.8*	*6.9*	*6.2*	*Jan-89*
UBS Trumbull Property Fund	2,559,618	0.3	3.0	0.0	-10.5	-15.5	-0.7	-1.0	3.5	5.1	5.9	Jan-89
NCREIF ODCE (net)				*0.0*	*-6.2*	*-10.7*	*7.1*	*5.6*	*7.8*	*6.9*	*6.2*	*Jan-89*
JPMCB Strategic Property Fund	10,805,535	1.3	12.8	0.0	-4.5	-10.6	7.3	--	--	--	5.7	Jan-19
NCREIF ODCE (net)				*0.0*	*-6.2*	*-10.7*	*7.1*	*5.6*	*7.8*	*6.9*	*5.3*	*Jan-19*
AEW Partners VII	433,095	0.1	0.5									
Rockwood X	5,629,877	0.7	6.7									
Torchlight Debt Opportunity Fund VI	3,709,792	0.4	4.4									
TerraCap Partners IV (Institutional), L.P.	4,529,855	0.5	5.4									
Rockwood Capital Real Estate Partners Fund XI, L.P.	6,382,675	0.8	7.6									
PRIT General Allocation Real Estate	39,348,250	4.7	46.8	0.7	-1.3	-2.4	--	--	--	--	4.6	Jan-22
PRIT Real Estate Benchmark				*0.4*	*-6.9*	*0.0*	*--*	*--*	*--*	*--*	*6.3*	*Jan-22*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Private Equity Assets	**133,224,093**	**16.1**	**16.1**									
Adams Street Partners 2010	5,482,468	0.7	4.1									
Goldman Sachs Private Equity Partners 2005	446,551	0.1	0.3									
North American Strategic Partners 2006	28,181	0.0	0.0									
Brookfield Capital Partners IV	3,859,128	0.5	2.9									
PRIT Vintage Year 2001	62,979	0.0	0.0									
PRIT Vintage Year 2002	6,152	0.0	0.0									
Ridgemont Equity Partners II	4,776,050	0.6	3.6									
TA XII	3,121,242	0.4	2.3									
LLR Equity Partners V	6,861,549	0.8	5.2									
Wellspring Capital Partners VI	6,720,211	0.8	5.0									
Trilantic Capital Partners VI	6,243,579	0.8	4.7									
Brookfield Capital Partners V, L.P.	4,891,235	0.6	3.7									
FS Equity Partners VIII L.P.	6,588,838	0.8	4.9									
Ridgemont Equity Partners III	8,231,999	1.0	6.2									
Searchlight Capital III	4,996,559	0.6	3.8									
Charlesbank Technology Opportunities Fund	6,973,994	0.8	5.2									
LLR Equity Partners VI, L.P	3,169,601	0.4	2.4									
PRIT General Allocation Private Equity	60,763,777	7.3	45.6	1.6	6.1	0.3	--	--	--	--	0.6	Jan-22
State Street PE Index (SSPEI) All PE Excluding PD				*0.0*	*3.4*	*-3.3*	--	--	--	--	*0.7*	*Jan-22*

	Market Value ($)	% of Portfolio	% of Sector	1 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Natural Resources Assets	**17,283,469**	**2.1**	**2.1**									
Hancock Timberland IX	3,898,688	0.5	22.6									
PRIT General Allocation Timberland	11,634,040	1.4	67.3	0.4	2.6	-1.5	--	--	--	--	2.3	Jan-22
NCREIF Timberland				*0.0*	*3.5*	*11.1*	*8.7*	*5.8*	*5.9*	*7.0*	*10.3*	*Jan-22*
Oppenheimer Natural Resources	1,750,741	0.2	10.1									
Infrastructure Assets	**12,688,945**	**1.5**	**1.5**									
IFM Global Infrastructure (U.S.), L.P.	8,611,871	1.0	67.9	0.0	5.1	9.6	12.3	--	--	--	10.5	Oct-18
CPI+5%				*0.6*	*6.0*	*8.3*	*10.9*	*9.1*	*7.9*	*7.7*	*9.2*	*Oct-18*
Global Infrastructure Partners IV	4,077,074	0.5	32.1									
Opportunistic Assets	**36,153,377**	**4.4**	**4.4**									
HarbourVest Co-Investment Fund V, L.P.	4,710,508	0.6	13.0									
EnTrustPermal Special Opportunities Evergreen Fund, Ltd.	4,766,089	0.6	13.2									
PRIT General Allocation Hedge Funds	26,676,780	3.2	73.8	1.4	5.1	5.0	--	--	--	--	1.9	Jan-22
HFRI FOF Composite Index				*1.1*	*3.3*	*4.0*	*4.5*	*3.4*	*3.4*	*3.4*	*-1.6*	*Jan-22*
Balanced Assets (PRIT General Allocation Fund)	**16,672,987**	**2.0**	**2.0**	**1.8**	**8.5**	**4.5**	**9.4**	**7.6**	**8.1**	**8.0**	**8.3**	**Apr-90**
60% Wilshire 5000 & 40% Barclays Aggregate				*2.1*	*12.8*	*6.2*	*6.3*	*7.6*	*8.1*	*7.7*	*8.6*	*Apr-90*
PRIT General Allocation	16,672,987	2.0	100.0	1.8	8.5	4.5	9.4	7.6	8.1	8.0	8.3	Apr-90
60% Wilshire 5000 & 40% Barclays Aggregate				*2.1*	*12.8*	*6.2*	*6.3*	*7.6*	*8.1*	*7.7*	*8.6*	*Apr-90*
Cash	**8,874,836**	**1.1**	**1.1**									
Cash Account	8,356,315	1.0	94.2									
91 Day T-Bills				*0.4*	*2.7*	*4.0*	*1.4*	*1.5*	*1.0*	*1.3*	*1.3*	*Jan-02*
PRIM Cash Account	518,522	0.1	5.8									

Cash Flow Summary

	Beginning Market Value	Contributions	Withdrawals	Net Investment Change	Ending Market Value	Month Return
Acadian Emerging Markets Small Cap	$10,088,395	$0	-$11,231	$704,582	$10,781,746	6.76%
Adams Street Partners 2010	$5,515,099	$0	-$32,631	$0	$5,482,468	0.00%
AEW Partners VII	$433,095	$0	$0	$0	$433,095	0.00%
Axiom International Small Cap Equity	$10,971,942	$0	-$7,533	$334,945	$11,299,354	2.98%
Beach Point Loan Fund	$8,510,131	$0	-$3,594	$117,888	$8,624,425	1.34%
Brookfield Capital Partners IV	$3,859,128	$0	$0	$0	$3,859,128	0.00%
Brookfield Capital Partners V, L.P.	$4,891,235	$0	$0	$0	$4,891,235	0.00%
Brown Small Cap Fundamental Value	$16,917,803	$0	-$16,521	$1,121,713	$18,022,995	6.44%
Cash Account	$5,574,731	$2,781,584	$0	$0	$8,356,315	0.00%
Charlesbank Technology Opportunities Fund	$6,973,994	$0	$0	$0	$6,973,994	0.00%
Columbia High Yield	$11,880,261	$0	-$4,114	$163,887	$12,040,034	1.34%
Driehaus Emerging Markets Growth	$36,999,402	$0	$0	$1,637,394	$38,636,797	4.43%
EnTrustPermal Special Opportunities Evergreen Fund, Ltd.	$4,766,089	$0	$0	$0	$4,766,089	0.00%
FS Equity Partners VIII L.P.	$6,540,100	$48,738	$0	$0	$6,588,838	0.00%
Global Infrastructure Partners IV	$4,077,074	$0	$0	$0	$4,077,074	0.00%
Goldman Sachs Private Equity Partners 2005	$446,551	$0	$0	$0	$446,551	0.00%
Hancock Timberland IX	$3,898,688	$0	$0	$0	$3,898,688	0.00%
HarbourVest Co-Investment Fund V, L.P.	$4,710,508	$0	$0	$0	$4,710,508	0.00%
IFM Global Infrastructure (U.S.), L.P.	$8,690,945	$0	-$76,055	-$3,020	$8,611,871	-0.03%
JPMCB Strategic Property Fund	$10,835,002	$0	-$27,570	-$1,897	$10,805,535	-0.02%
LLR Equity Partners V	$6,861,549	$0	$0	$0	$6,861,549	0.00%
LLR Equity Partners VI, L.P	$3,169,601	$0	$0	$0	$3,169,601	0.00%
Loomis Sayles High Yield Conservative	$11,761,692	$0	-$4,487	$208,290	$11,965,495	1.69%
North American Strategic Partners 2006	$28,181	$0	$0	$0	$28,181	0.00%

	Beginning Market Value	Contributions	Withdrawals	Net Investment Change	Ending Market Value	Month Return
Oppenheimer Natural Resources	$1,750,741	$0	$0	$0	$1,750,741	0.00%
PRIM Cash Account	$1,019,903	$3,980,097	-$4,500,000	$18,522	$518,522	1.85%
PRIT Core Fixed Income	$25,475,393	$0	-$2,319	-$171,956	$25,301,117	-0.68%
PRIT General Allocation	$15,424,288	-$3,980,100	$0	--	$16,672,987	1.75%
PRIT General Allocation Core FI	$49,954,078	$0	$0	--	$48,648,072	-0.68%
PRIT General Allocation Domestic Equity	$86,692,597	$0	$0	--	$89,293,111	3.42%
PRIT General Allocation EME	$16,123,719	$0	$0	--	$16,339,528	5.90%
PRIT General Allocation Hedge Funds	$26,836,052	$0	$0	--	$26,676,780	1.40%
PRIT General Allocation Int. Equity	$44,064,135	$0	$0	--	$44,535,402	3.67%
PRIT General Allocation Private Equity	$61,476,279	$0	$0	--	$60,763,777	1.63%
PRIT General Allocation Real Estate	$39,204,932	$0	$0	--	$39,348,250	0.65%
PRIT General Allocation Timberland	$11,779,886	$0	$0	--	$11,634,040	0.40%
PRIT General Allocation Value Added FI	$16,565,464	$0	$0	--	$16,598,885	1.44%
PRIT Vintage Year 2001	$62,751	$3	$0	$225	$62,979	0.36%
PRIT Vintage Year 2002	$6,144	$1	$0	$7	$6,152	0.12%
Rhumbline QSI Index	$31,894,585	$0	-$1,929	$1,168,737	$33,061,393	3.66%
RhumbLine Russell 1000 Growth Index	$26,048,587	$0	-$1,515	$878,406	$26,925,478	3.37%
RhumbLine Russell 1000 Value Index	$27,638,174	$0	-$1,609	$970,034	$28,606,599	3.50%
Ridgemont Equity Partners II	$6,406,058	-$1,630,008	$0	$0	$4,776,050	0.00%
Ridgemont Equity Partners III	$8,231,999	$0	$0	$0	$8,231,999	0.00%
Rockwood Capital Real Estate Partners Fund XI, L.P.	$6,063,385	$319,290	$0	$0	$6,382,675	0.00%
Rockwood X	$5,493,513	$136,364	$0	$0	$5,629,877	0.00%
Searchlight Capital III	$4,628,769	$367,790	$0	$0	$4,996,559	0.00%
SSgA MSCI EAFE Index	$41,889,124	$0	-$3,603	$1,355,993	$43,241,514	3.23%
SSgA TIPS Index	$15,865,266	$0	-$794	$21,766	$15,886,238	0.13%

	Beginning Market Value	Contributions	Withdrawals	Net Investment Change	Ending Market Value	Month Return
SSgA U.S. Aggregate Bond Index-NL	$20,705,534	$0	-$1,035	-$12,398	$20,692,101	-0.06%
TA XII	$3,121,242	$0	$0	$0	$3,121,242	0.00%
TerraCap Partners IV (Institutional), L.P.	$4,529,855	$0	$0	$0	$4,529,855	0.00%
Torchlight Debt Opportunity Fund VI	$3,709,792	$0	$0	$0	$3,709,792	0.00%
Trilantic Capital Partners VI	$6,243,579	$0	$0	$0	$6,243,579	0.00%
UBS Trumbull Property Fund	$2,559,618	$0	$0	$0	$2,559,618	0.00%
UBS Trumbull Property Income Fund	$10,764,522	$0	$0	$0	$10,764,522	0.00%
Wellspring Capital Partners VI	$6,720,211	$0	$0	$0	$6,720,211	0.00%
Total	**$817,351,372**	**$2,023,759**	**-$4,696,539**	**$14,882,620**	**$829,561,211**	--

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%	11.2	3	10.5%	NA
Rockwood X	Value-Added	2016	10.0	94%	18.8	4	8.6%	1.3x
Torchlight Debt Opportunity Fund VI	Opportunistic	2017	5.0	100%	10.7	3	8.4%	1.3x
TerraCap Partners IV	Value-Added	2017	5.0	100%	15.5	3	12.0%	NA
Rockwood XI	Value-Added	2019	8.0	71%	13.6	2	16.5%	1.3x
Private Equity Managers								
Adams Street Partners	Fund of Funds	2010	10.0	94%	16.9	3	14.7	2.4x
Goldman Sachs PE Partners	Fund of Funds	2005	10.0	100%	7.0	NA	NA	NA
North American Strategic Partners	Fund of Funds	2006	9.1	88%	6.5	NA	NA	NA
PRIT Vintage Year 2001	Fund of Funds	2001	2.5	NA	8.6	NA	NA	NA
PRIT Vintage Year 2002	Fund of Funds	2002	0.5	NA	10.4	NA	NA	NA
Brookfield Capital Partners IV	Buyout	2015	4.0	100%	20.5	1	41.8%	2.5x
LLR Equity Partners V	Buyout	2017	5.0	97%	21.3	3	20.7%	1.7x
Ridgemont Equity Partners II	Buyout	2015	6.0	97%	20.5	2	21.5%	2.1x

[1] As of 12/31/2022.
[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 (continued)[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	100%	19.7	1	37.4%	3.0x
Wellspring VI	Buyout	2017	5.0	97%	21.3	3	22.5%	1.6x
Trilantic Capital Partners VI	Buyout	2018	5.0	88%	21.7	3	17.9%	1.4x
Brookfield Capital Partners V	Buyout	2019	4.0	92%	19.9	3	15.0%	1.3x
FS Equity Partners VIII	Buyout	2019	5.0	71%	19.9	2	30.0%	1.7x
Ridgemont Equity Partners III	Buyout	2019	6.0	99%	19.9	1	45.8%	1.9x
Searchlight Capital III	Special Situations	2020	5.0	66%	21.0	1	35.2%	1.7x
Charlesbank Technology Opportunities	Buyout	2019	5.0	71%	19.9	1	72.6%	2.1x
LLR Equity Partners VI	Buyout	2020	4.0	66%	14.9	NM	NM	NM
Opportunistic Managers								
HarbourVest Co-Investment Fund V	Opportunistic	2019	4.0	78%	NA	NA	27.4%	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	72%	--	--	--	--
Natural Resources Managers								
Hancock Timberland	Timber	2008	8.0	100%	--	--	-1.2%	1.1x
Oppenheimer Natural Resources	Natural Resources	2010	7.0	100%	--	--	-2.2%	0.7x

[1] As of 12/31/2022.
[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.

Current Issues

Asset Allocation Review

Capital Markets Expectations

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 104 "asset classes" for our 2023 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.

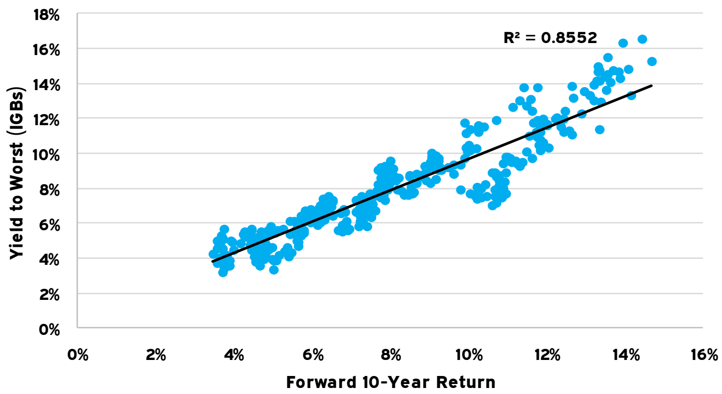
- Each model is based on the most important factors that drive returns for that asset class:

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
Natural Resources	Price per Acre, Income, Public Market Valuation
Real Estate	Cap Rate, Yield, Growth
Private Equity	EBITDA Multiple, Debt Multiple, Public VC Valuation
Hedge Funds and Other	Leverage, Alternative Betas

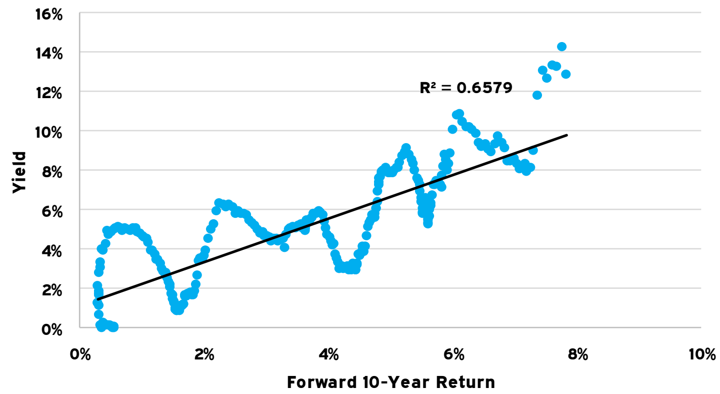
- The common components are income, growth, and valuation.

Some factors are naturally more predictive than others

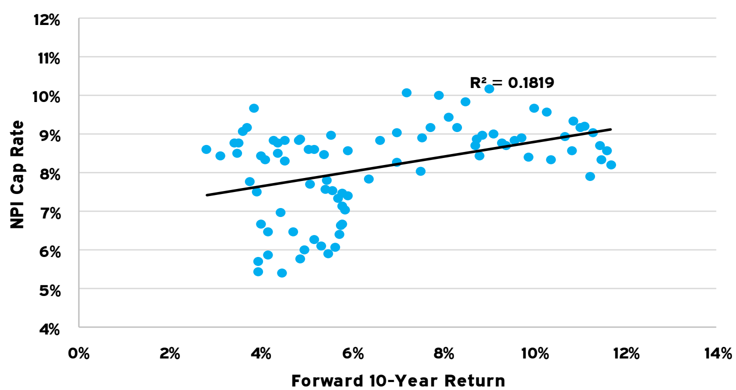
Investment Grade Bonds
Yield to Worst vs. Forward 10-Year Returns



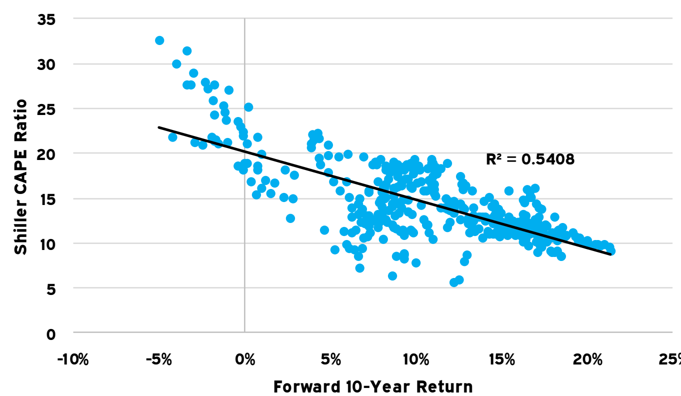
Cash (90-day T-Bill)
Yield vs. Forward 10-Year Returns



Core Real Estate
Cap Rates vs. Forward 10-Year Returns



US Equities
Shiller CAPE vs. Forward 10-Year Returns



Sources: Bloomberg, FRED, NCREIF, S&P, Robert Shiller (Yale University), and Meketa Investment Group.

10-year Model Example: Bonds

→ The short version for investment grade bond models is:

E(R) = Current YTW (yield to worst)

→ Our models assume that there is a reversion to the mean for spreads (though not yields).

→ For TIPS, we add the real yield of the TIPS index to the breakeven inflation rate.

→ As with equities, we make currency adjustments when necessary for foreign bonds.

→ For bonds with credit risk, Meketa Investment Group estimates default rates and loss rates in order to project an expected return:

E(R) = YTW - (Annual Default Rate × Loss Rate)

10-year Model Example: Equities

→ We use a fundamental model for equities that combines income and capital appreciation.

$$E(R) = \textit{Dividend Yield} + \textit{Expected Earnings Growth} + \textit{Multiple Effect} + \textit{Currency Effect}$$

→ Meketa evaluates historical data to develop expectations for dividend yield, earnings growth, the multiple effect, and currency effect.

- Earnings growth is a function of Real GDP growth, inflation, and exposure to foreign revenue sources.
- We assume that long-term earnings growth is linked to regional economic growth.
- However, many factors can cause differences between economic growth and EPS growth.

→ Our models assume that there is a reversion toward mean pricing over this time frame.

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 fifteen-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 (%)
Bank Loans	7.4	-2.6	10.0
FI/L-S Credit	6.5	-2.5	9.0

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

→ Correlation:

- We use trailing fifteen-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).

Summary of Changes

→ 2022 was a difficult year, with losses experienced for most asset classes, as interest rates increased, spreads widened, and most risk assets declined in value.

- However, there is a notable silver lining to this story – increased return assumptions.

→ The changes relative to last year are being driven by what happened in the market.

- Bond yields increased by the largest amount since the 1990s, driving up future returns for fixed income assets.
- Despite lower growth projections globally, the price decline experienced by equities and many other risk assets has improved their forward-looking returns.

→ Higher expected interest rates also provide a tailwind, as the bridge from 10 to 20 years is made via a risk premia being added to a (higher) future risk-free rate.

- The risk-free rate jumped from 2.78% to 4.17%

→ The net result is the largest increase in return assumptions in our 20+ year history of creating capital market expectations (CMEs).

Rising Rates = Higher Yields

→ Rising interest rates and wider credit spreads resulted in higher yields across every major sector of the global bond market.

Index	Yield to Worst 12/31/22 (%)	Yield to Worst 12/31/21 (%)
Fed Funds Rate	4.25-4.50	0-0.25
10-year Treasury	3.88	1.51
Bloomberg Aggregate	4.68	1.75
Bloomberg Corporate	5.42	2.33
Bloomberg Securitized	4.75	1.98
Bloomberg Global Aggregate	3.73	1.31
Bloomberg EM Local Currency Government	4.42	3.83
Bloomberg EM Hard Currency Aggregate	7.26	3.96
Bloomberg US Corporate High Yield	8.96	4.21

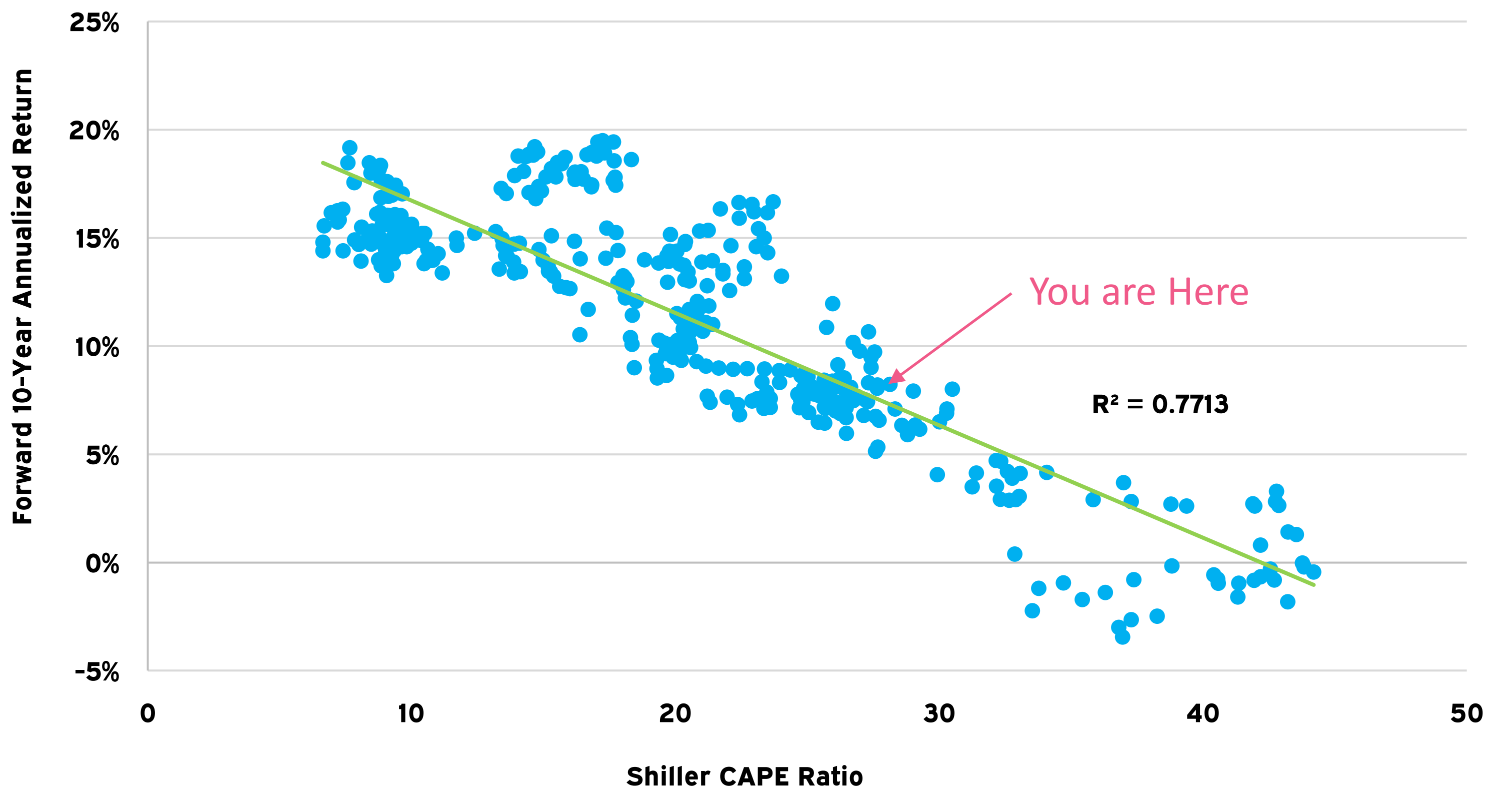
Source: Bloomberg. Data is as of December 31, 2022 and 2021.

Impact of Equity Prices on Returns

→ Relative prices have been indicative of future equity returns.

→ Higher prices have led to lower future returns, and vice versa.

US Equities: Shiller CAPE vs. Forward 10-Year Returns



Source: Robert Shiller, Yale University, and Meketa Investment Group. Data is based on monthly returns and Cyclically Adjusted P/E ratio on S&P 500 Index for the period from January 1980 through December 2022.

20-year Geometric Expected Returns
Rate Sensitive

	2023 E(R) (%)	2022 E(R) (%)	Δ From 2022 (%)	Notes
Cash Equivalents	2.9	1.7	1.2	Higher yields
Short-term Investment Grade Bonds	3.5	1.9	1.6	Higher yields
Investment Grade Bonds	4.7	2.4	2.3	Higher yields
Intermediate Government Bonds	3.7	1.9	1.8	Higher yields
Long-term Government Bonds	5.0	2.8	2.2	Higher yields
Mortgage Backed Securities	4.6	2.5	2.1	Higher yields
Investment Grade Corporate Bonds	5.4	3.0	2.4	Higher yields
Long-term Corporate Bonds	5.7	3.7	2.0	Higher yields
Short-term TIPS	3.6	1.9	1.7	Higher yields
TIPS	4.5	2.4	2.1	Higher yields
Long-term TIPS	5.2	3.2	2.0	Higher yields
Global ILBs	4.7	2.3	2.4	Higher yields
Foreign Bonds	4.0	2.3	1.7	Higher yields
US Inflation	*2.6*	*2.2*	*0.4*	*Higher long-term economist and market projections*

20-year Geometric Expected Returns
Credit

	2023 E(R) (%)	2022 E(R) (%)	Δ From 2022 (%)	Notes
High Yield Bonds	7.3	4.4	2.9	Higher yields
Higher Quality High Yield	6.7	4.2	2.5	Higher yields
Bank Loans	7.0	4.0	3.0	Higher yields
Collateralized Loan Obligations (CLOs)	7.2	4.2	3.0	Higher yields
Convertible Bonds	6.4	3.9	2.5	Higher yields
Emerging Market Bonds (major)	6.4	4.2	2.2	Higher yields
Emerging Market Bonds (local)	6.0	4.6	1.4	Higher yields
Private Debt	9.0	7.3	1.7	Higher yields
Direct Lending	8.3	7.1	1.2	Higher yields
Asset Based Lending	9.0	7.3	1.7	Higher yields
Special Situations Lending	10.2	NA		*New*

20-year Geometric Expected Returns
Equities

	2023 E(R) (%)	2022 E(R) (%)	Δ From 2022 (%)	Notes
US Equity	8.7	6.8	1.9	Lower valuations and higher risk-free rate
US Small Cap	9.3	7.4	1.9	Lower valuations and higher risk-free rate
Developed Non-US Equity	9.8	7.5	2.3	Lower valuations and higher risk-free rate
Dev. Non-US Small Cap	10.1	7.4	2.7	Lower valuations and higher risk-free rate
Emerging Market Equity	10.0	8.4	1.6	Lower valuations and higher risk-free rate
Emerging Market Small Cap	10.0	8.2	1.8	Lower valuations and higher risk-free rate
Emerging Market ex-China	10.3	NA		*New*
China Equity	9.3	NA		*New*
Frontier Market Equity	10.7	8.7	2.0	Lower valuations and higher risk-free rate
Global Equity	9.2	7.2	2.0	Lower valuations and higher risk-free rate
Low Volatility Equity	8.3	6.5	1.8	Lower valuations and higher risk-free rate
Private Equity	11.0	10.0	1.0	Lower valuations and higher risk-free rate
Buyouts	10.7	9.8	0.9	Lower valuations and higher risk-free rate
Growth Equity	11.2	10.1	1.1	Lower valuations and higher risk-free rate
Venture Capital	11.6	10.3	1.3	Lower valuations and higher risk-free rate

20-year Geometric Expected Returns
Real Estate & Infrastructure

	2023 E(R) (%)	2022 E(R) (%)	Δ From 2022 (%)	Notes
Real Estate	7.8	7.4	0.4	Higher REIT yields, risk-free rate, and borrowing costs
US REITs	8.0	7.1	0.9	Higher REIT yields and risk-free rate
Core Private Real Estate	6.5	6.1	0.4	Higher borrowing costs and risk-free rate
Value-Added Real Estate	8.3	8.1	0.2	Higher borrowing costs and risk-free rate
Opportunistic Real Estate	9.6	9.6	0.0	Higher borrowing costs and risk-free rate
Infrastructure	8.3	7.7	0.6	Higher borrowing costs offset by higher risk-free rate
Infrastructure (Public)	8.8	7.4	1.4	Lower valuations and higher risk-free rate
Infrastructure (Core Private)	7.8	7.3	0.5	Higher borrowing costs and risk-free rate
Infrastructure (Non-Core Private)	9.5	9.3	0.2	Higher borrowing costs and risk-free rate

20-year Geometric Expected Returns
Natural Resources & Commodities

	2023 E(R) (%)	2022 E(R) (%)	Δ From 2022 (%)	Notes
Natural Resources (Public)	8.7	7.7	1.0	Higher earnings and risk-free rate
Natural Resources (Private)	9.8	8.5	1.3	Higher earnings in some sectors and higher risk-free rate partly offset by higher valuation and borrowing costs
Energy	10.4	8.9	1.5	Higher earnings and risk-free rate
Mining	10.2	8.5	1.7	Lower valuations and higher risk-free rate
Timberland	7.4	6.8	0.6	Higher risk-free rate
Farmland	6.5	7.2	-0.7	Higher valuations and borrowing costs
Sustainability	10.3	9.3	1.0	Higher earnings and risk-free rate
MLPs	7.4	7.2	0.2	Higher valuations offset by higher risk-free rate
Gold Mining	9.7	8.2	1.5	Lower valuations and higher risk-free rate
Gold (Metal)	3.3	2.8	0.5	Higher long-term inflation expectations
Commodities	5.7	4.6	1.1	Higher cash yield and risk-free rate

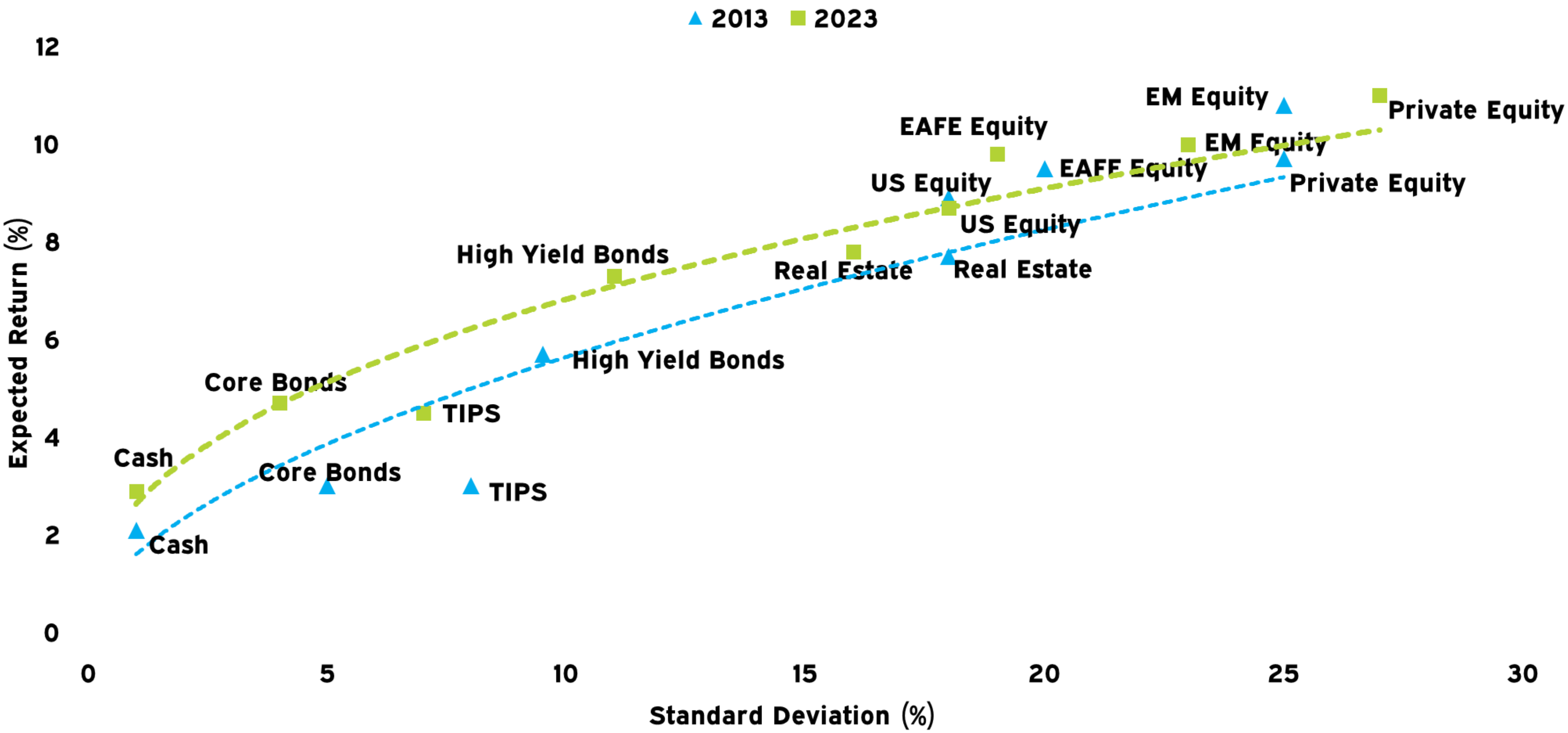
20-year Geometric Expected Returns
Alternative Strategies (Other)

	2023 E(R) (%)	2022 E(R) (%)	Δ From 2022 (%)	Notes
Hedge Funds	6.1	4.4	1.7	Higher yields and risk-free rate
Long-Short	5.6	4.1	1.5	Lower equity prices & higher cash yield
Event Driven	7.7	5.2	2.5	Higher yields and risk-free rate
Global Macro	5.7	5.0	0.7	Higher cash yield and risk-free rate
CTA – Trend Following	4.8	4.8	0.0	Lower beta assumption
Fixed Income/L-S Credit	6.5	3.8	2.7	Higher yields and risk-free rate
Relative Value/Arbitrage	6.7	5.1	1.6	Higher cash yield and risk-free rate
Long Vol	1.1	NA		*New*
Insurance Linked Strategies	6.2	5.0	1.2	Lower expected default rates
Alternative Risk Premia	5.6	4.6	1.0	Higher cash yield and risk-free rate
Risk Parity (10% vol)	7.7	5.2	2.5	Higher yields and risk-free rate
TAA	5.7	4.5	1.2	Higher yields and risk-free rate
Digital Currencies	3.3	NA		*New*

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.

→ We anticipate many investors can 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 2013 and 2023 20-year capital market expectations.

Return and Risk Data

Asset Class	10-year Expected Return (%)	20-year Expected Return (%)	Standard Deviation (%)	11-20 year Risk Premia[1] (%)
Cash Equivalents	3.1	2.9	1.0	-1.5
Investment Grade Bonds	4.8	4.7	4.0	0.4
Long-term Government Bonds	4.3	5.0	12.0	1.5
TIPS	4.3	4.5	7.0	0.5
High Yield Bonds	8.0	7.3	11.0	2.5
Bank Loans	7.6	7.0	10.0	2.2
Emerging Market Debt (local)	6.4	6.0	12.0	1.5
Private Debt	9.4	9.0	15.0	4.6
US Equity	7.8	8.7	18.0	5.5
Developed Non-US Equity	10.1	9.8	19.0	5.4
Emerging Non-US Equity	10.3	10.0	23.0	5.6
Global Equity	8.8	9.2	18.0	5.5
Private Equity	9.7	11.0	27.0	8.0
Real Estate	5.9	7.8	16.0	5.5
Infrastructure	6.9	8.3	15.0	5.6
Commodities	6.3	5.7	17.0	1.0
Hedge Funds	5.4	6.1	7.0	2.6
Inflation	2.5	2.6	3.0	-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 Government Bonds	0.83	1.00										
TIPS	0.76	0.54	1.00									
High Yield Bonds	0.28	-0.17	0.46	1.00								
US Equity	0.10	-0.24	0.27	0.75	1.00							
Developed Non-US Equity	0.16	-0.22	0.30	0.77	0.89	1.00						
Emerging Market Equity	0.20	-0.18	0.36	0.76	0.77	0.87	1.00					
Private Equity	0.00	-0.10	0.05	0.70	0.85	0.80	0.75	1.00				
Real Estate	0.20	0.05	0.10	0.50	0.50	0.45	0.40	0.45	1.00			
Commodities	0.00	-0.28	0.31	0.54	0.52	0.59	0.63	0.30	0.15	1.00		
Infrastructure	0.29	0.09	0.31	0.64	0.63	0.65	0.58	0.50	0.57	0.41	1.00	
Hedge Funds	0.08	-0.30	0.30	0.78	0.86	0.87	0.84	0.60	0.45	0.67	0.65	1.00

2023 Peer Survey

→ 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, and the 20-year horizon included 27 respondents. Figures are based on Meketa's 2023 CMEs.

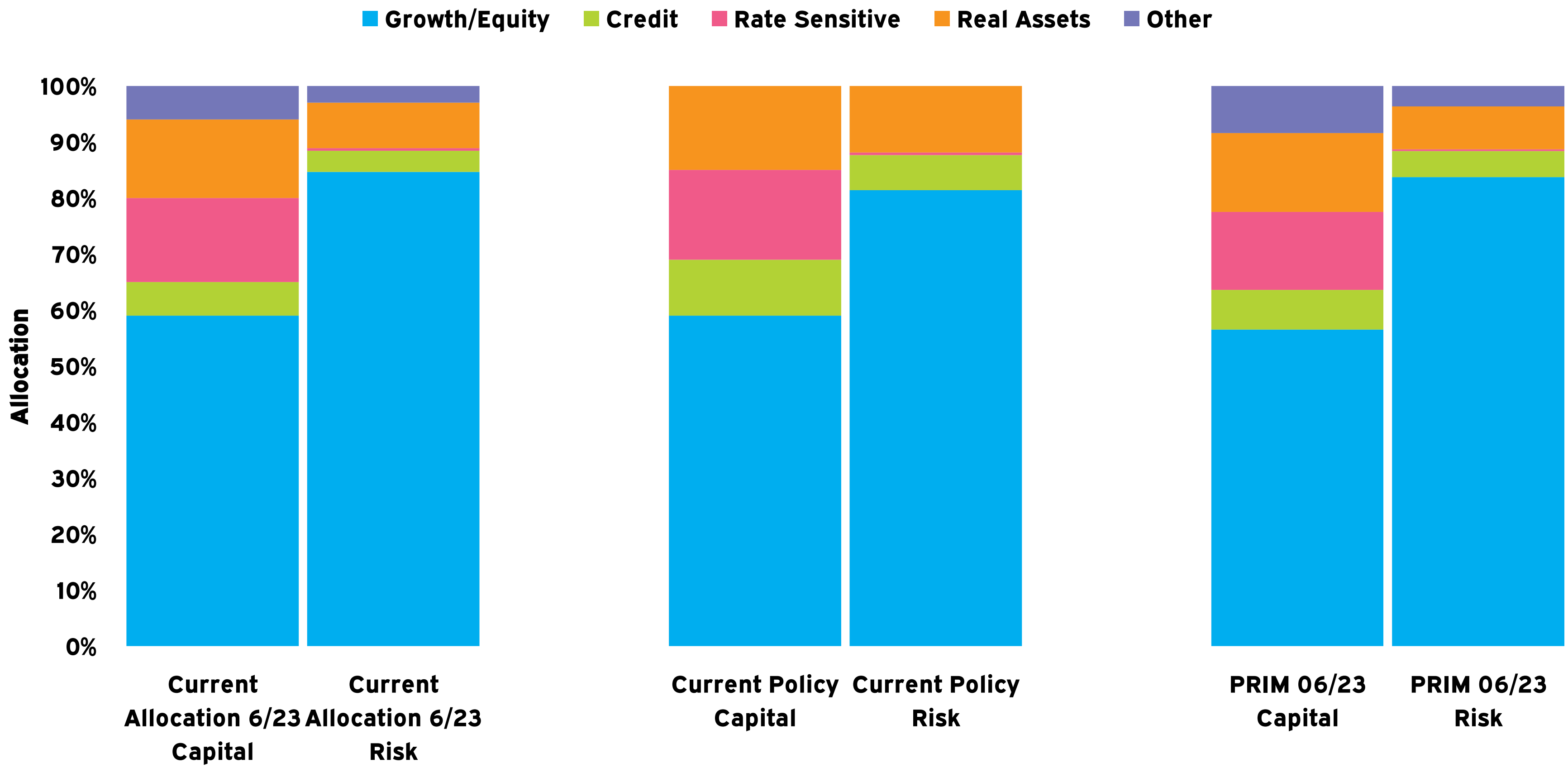
Asset Allocation Review
And Risk Analysis

Asset Allocation Policy Review[1]

	June 2023 Allocation (%)	Current Policy (%)	PRIM 06/23 (%)
Growth/Equity	59	59	57
US Equity	23	24	23
International Developed Equity	12	13	12
Emerging Market Equity	8	12	4
Private Equity	16	10	17
Credit	6	10	7
High Yield Bonds	5	6	3
Bank Loans	1	2	2
Private Debt	0	0	1
Emerging Market Bonds	0	2	1
Rate Sensitive	15	16	14
Cash Equivalents	1	0	1
Short-term Investment Grade Bonds	0	0	1
Investment Grade Bonds	9	5	6
Long-term Government Bonds & Strips	3	7	3
TIPS	2	4	4
Real Assets	14	15	14
Real Estate	10	10	10
REITs	0	0	1
Natural Resources (inc. Timberland)	2	3	3
Infrastructure	2	2	0
Other	6	0	8
Hedge Funds	4	0	8
Tactical Asset Allocation	2	0	0
Expected Return (20 years)	*8.76*	*8.94*	*8.72*
Standard Deviation	*13.8*	*13.8*	*13.4*
Probability of 6.75% (20 years)	*74.3*	*76.1*	*74.5*

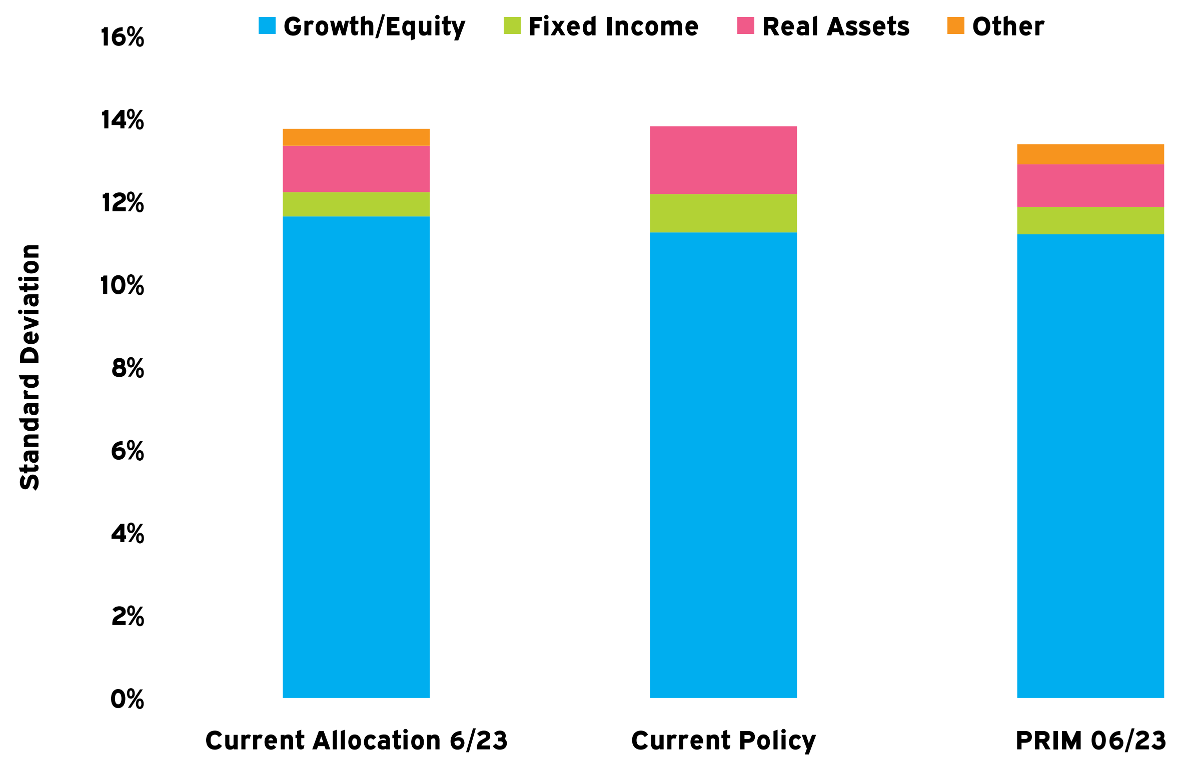
[1] Expected return and standard deviation are based upon Meketa Investment Group's Annual Capital Markets Expectations. Throughout this document, returns for periods longer than one year are annualized. Numbers may not sum due to rounding.

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



[1] 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)



[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.

Risk Analysis

Scenario	Current Allocation 6/23 (%)	Current Policy (%)	PRIM 06/23 (%)
Worst Case Returns			
One Year (annualized)	-18.7	-18.7	-18.1
Three Years (annualized)	-8.1	-8.0	-7.7
Five Years (annualized)	-4.5	-4.4	-4.3
Ten Years (annualized)	-0.8	-0.7	-0.6
Twenty Years (annualized)	1.9	2.0	2.0
Prob. of Experiencing Neg. Returns			
One Year	25.2	24.8	24.7
Three Years	12.3	12.0	11.8
Five Years	6.7	6.4	6.3
Ten Years	1.7	1.6	1.5
Twenty Years	0.1	0.1	0.1
Prob. of Achieving at least a 6.5%			
One Year	56.6	57.0	56.6
Three Years	61.2	62.0	61.3
Five Years	64.4	65.4	64.5
Ten Years	69.9	71.2	70.1
Twenty Years	77.0	78.6	77.2

Value at Risk[1]

Scenario	Current Allocation 6/23	Current Policy	PRIM 06/23
VaR (%):			
1 month	-8.5	-8.5	-8.2
3 months	-13.7	-13.7	-13.3
6 months	-18.0	-18.0	-17.4
VaR ($M):			
1 month	-70	-71	-68
3 months	-114	-114	-110
6 months	-149	-149	-144

[1] Calculated with a 99% confidence level and based upon Meketa Investment Group's Annual Capital Markets Expectations..

Conditional Value at Risk[1]

Scenario	Current Allocation 6/23	Current Policy	PRIM 06/23
CVaR (%):			
1 month	-9.8	-9.8	-9.5
3 months	-15.9	-16.0	-15.5
6 months	-21.1	-21.2	-20.5
CVaR ($M):			
1 month	-81	-81	-79
3 months	-132	-133	-128
6 months	-175	-176	-170

[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 Allocation 6/23 (%)	Current Policy (%)	PRIM 06/23 (%)
COVID-19 Market Shock (Feb 2020-Mar 2020)	-17.8	-18.8	-16.6
Taper Tantrum (May - Aug 2013)	0.1	-1.7	0.2
Global Financial Crisis (Oct 2007 - Mar 2009)	-28.1	-30.1	-26.2
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	-16.8	-15.9	-15.0
LTCM (Jul - Aug 1998)	-8.3	-9.9	-7.5
Asian Financial Crisis (Aug 97 - Jan 98)	2.2	0.3	4.3
Rate spike (1994 Calendar Year)	3.2	1.4	4.2
Early 1990s Recession (Jun - Oct 1990)	-5.7	-7.3	-5.2
Crash of 1987 (Sep - Nov 1987)	-11.0	-12.5	-9.9
Strong dollar (Jan 1981 - Sep 1982)	2.2	2.0	3.3
Volcker Recession (Jan - Mar 1980)	-4.0	-4.7	-3.9
Stagflation (Jan 1973 - Sep 1974)	-21.9	-23.9	-21.7

[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 Allocation 6/23 (%)	Current Policy (%)	PRIM 06/23 (%)
COVID Recovery (Apr 2020-Dec 2021)	56.3	52.1	56.6
Global Financial Crisis Recovery (Mar 2009 - Nov 2009)	35.0	40.6	31.2
Best of Great Moderation (Apr 2003 - Feb 2004)	30.8	33.9	28.5
Peak of the TMT Bubble (Oct 1998 - Mar 2000)	46.6	44.6	45.8
Plummeting Dollar (Jan 1986 - Aug 1987)	54.0	60.5	49.4
Volcker Recovery (Aug 1982 - Apr 1983)	31.2	34.4	29.9
Bretton Wood Recovery (Oct 1974 - Jun 1975)	28.6	31.0	27.3

[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 Market Movements (Expected Return under Stressed Conditions)[1]

Scenario	Current Allocation 6/23 (%)	Current Policy (%)	PRIM 06/23 (%)
10-year Treasury Bond rates rise 100 bps	4.7	4.5	4.2
10-year Treasury Bond rates rise 200 bps	-1.2	-1.9	-1.4
10-year Treasury Bond rates rise 300 bps	-3.1	-3.3	-3.6
Baa Spreads widen by 50 bps, High Yield by 200 bps	0.4	0.5	0.6
Baa Spreads widen by 300 bps, High Yield by 1000 bps	-22.2	-23.9	-20.8
Trade Weighted Dollar gains 10%	-4.3	-4.8	-3.5
Trade Weighted Dollar gains 20%	-1.8	-2.0	-0.6
US Equities decline 10%	-6.3	-6.4	-6.1
US Equities decline 25%	-18.0	-18.8	-17.3
US Equities decline 40%	-27.3	-29.4	-25.9

[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 Allocation 6/23 (%)	Current Policy (%)	PRIM 06/23 (%)
10-year Treasury Bond rates drop 100 bps	2.2	2.5	2.7
10-year Treasury Bond rates drop 200 bps	10.7	12.8	10.6
Baa Spreads narrow by 30 bps, High Yield by 100 bps	7.9	7.9	7.8
Baa Spreads narrow by 100 bps, High Yield by 300 bps	13.6	15.4	12.1
Trade Weighted Dollar drops 10%	7.9	8.7	7.2
Trade Weighted Dollar drops 20%	22.0	24.6	21.0
US Equities rise 10%	7.1	7.2	7.3
US Equities rise 30%	16.7	17.9	16.1

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

Appendices

Scenario Return Inputs

Asset Class	Benchmark Used
Investment Grade Bonds	Bloomberg US Aggregate
TIPS	Bloomberg Global Inflation Linked: US TIPS
Intermediate-term Government Bonds	Bloomberg US Treasury: Intermediate
Long-term Government Bonds	Bloomberg US Treasury: Long
EM Bonds (Local)	Bloomberg Emerging Markets Hard Currency Aggregate
Bank Loans	Credit Suisse Leveraged Loan
High Yield Bonds	Bloomberg US Corporate High Yield
Direct Lending	Cliffwater Direct Lending Index
Special Situations	Cambridge Associates Proxy IRR Returns
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
Timber	NCREIF Timberland
Commodities	Bloomberg Commodity Index
US Equity	Russell 3000
Public Foreign Equity (Developed)	MSCI EAFE
Public Foreign Equity (Emerging)	MSCI Emerging Markets
Private Equity	Cambridge Associates Proxy IRR Returns
Long-short Equity	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

	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	0.4	0.0	2.6	9.9	0.8
Short-term Investment Grade Bonds	0.4	-0.1	7.9	21.9	1.6
Investment Grade Bonds	-0.9	-3.7	8.5	28.6	1.8
Long-term Corporate Bonds	-18.4	-9.3	-10.3	26.9	-0.6
Long-term Government Bonds	12.7	-11.6	24.2	35.5	4.1
TIPS	-0.4	-8.5	8.2	37.4	0.7
Global ILBs	-6.5	-7.4	-3.9	39.7	0.7
High Yield Bonds	-20.8	-2.0	-22.8	-6.3	-5.0
Bank Loans	-20.3	0.8	-23.7	6.3	0.7
Direct Lending	-4.8	2.6	-3.3	-2.0	-2.6
Foreign Bonds	-4.5	-3.2	2.1	8.5	3.5
Asset Based Lending	-4.8	2.6	-3.3	-2.0	-2.6
Special Situations	-12.2	4.6	-26.4	-2.0	-2.6
Emerging Market Bonds (major)	-15.3	-11.5	-5.0	6.3	-28.2
Emerging Market Bonds (local)	-13.9	-14.3	-7.9	7.2	-34.1
US Equity	-35.0	3.0	-45.8	-43.8	-15.4
Developed Market Equity (non-US)	-32.7	-2.2	-52.1	-46.7	-11.5
Emerging Market Equity	-31.2	-9.4	-51.2	-43.9	-26.7
Global Equity	-33.6	-0.7	-49.3	-46.7	-14.0
Private Equity/Debt	-7.8	5.7	-27.7	-23.6	-3.2
Private Equity	-7.4	5.8	-28.2	-26.2	-3.3
Private Debt Composite	-10.1	4.6	-22.3	-1.8	-2.3
REITs	-41.0	-13.3	-63.0	45.4	-15.3
Core Private Real Estate	0.7	3.6	-10.6	23.6	2.3
Value-Added Real Estate	-3.5	3.0	-32.2	25.4	0.0
Opportunistic Real Estate	-8.6	4.0	-25.7	21.4	1.5
Natural Resources (Private)	-22.1	2.5	-31.2	-3.9	-16.9
Timberland	0.1	1.3	20.7	-1.5	0.5
Farmland	-0.1	3.3	26.7	11.4	0.8
Commodities (naïve)	-18.9	-2.4	-36.9	18.5	-12.0
Core Private Infrastructure	-1.3	3.7	-0.8	24.8	-0.3
Hedge Funds	-9.1	-0.4	-17.8	-2.1	-9.4
Long-Short	-10.9	-1.0	-26.4	-8.8	-8.3
Hedge Fund of Funds	-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 ILBs	-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
Asset Based Lending	7.6	-2.3	3.2	-1.0	-7.2
Special Situations	7.6	-2.3	3.2	-1.0	-7.2
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 Composite	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
Core Private Infrastructure	-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 ILBs	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
Asset Based Lending	25.0	9.4	23.7	26.8	5.4	8.2	8.3
Special Situations	85.8	33.2	23.7	26.8	5.4	8.2	8.3
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 Composite	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
Core Private Infrastructure	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	2.9	2.3	0.4
Short-term Investment Grade Bonds	-1.2	-2.5	-3.7	2.2	1.5	0.8	1.4	0.9	0.7	0.8
Investment Grade Bonds	-4.3	-8.4	-11.9	3.9	-0.4	0.8	4.2	1.5	0.7	-1.0
Long-term Corporate Bonds	-8.9	-16.3	-20.9	2.6	-13.4	-1.0	8.1	-1.0	-8.3	-12.3
Long-term Government Bonds	-10.6	-18.9	-23.6	7.8	7.3	1.8	12.8	1.4	2.6	2.4
TIPS	-4.9	-9.8	-13.7	2.8	-6.1	-2.4	-0.2	1.8	-2.3	-8.7
Global ILBs	-1.6	-8.6	-11.9	2.4	-11.1	-4.0	-4.8	1.4	-5.4	-16.3
High Yield Bonds	2.6	-4.3	-3.6	-1.8	-23.0	-4.1	-0.6	-5.3	-15.5	-21.2
Bank Loans	1.4	-1.0	-5.1	-2.8	-20.8	-2.9	-0.6	-3.6	-13.2	-17.4
Direct Lending	0.1	-2.7	-6.3	-1.8	-9.1	-3.2	-0.6	-3.4	-7.6	-5.7
Foreign Bonds	-4.6	-9.9	-15.7	6.6	-2.9	-4.5	-8.8	0.4	-4.6	-9.2
Asset-Based Lending	-0.2	-2.5	-4.5	-1.4	-11.5	-3.4	-3.1	-3.3	-8.2	-6.0
Special Situations	4.6	0.0	-6.4	-2.2	-21.4	-1.6	-9.0	-4.3	-17.3	-21.8
Emerging Market Bonds (major)	0.8	-6.1	-3.6	-0.1	-14.7	-2.6	-4.2	-4.2	-12.5	-15.4
Emerging Market Bonds (local)	1.6	-6.4	-3.0	0.1	-12.8	-3.0	-12.2	-3.8	-13.3	-20.5
US Equity	7.1	-1.0	2.8	-1.2	-32.0	-3.5	1.6	-10.6	-26.5	-42.4
Developed Market Equity (non-US)	8.9	0.7	-5.6	0.3	-35.1	-13.2	-9.0	-8.8	-23.4	-41.4
Emerging Market Equity	10.0	2.3	0.1	-1.1	-42.8	-15.7	-15.7	-11.7	-30.8	-46.9
Global Equity	7.6	-0.1	-0.5	-0.7	-33.6	-9.1	-5.9	-9.8	-25.3	-41.5
Private Equity/Debt	6.5	0.9	-5.5	-0.2	-22.5	-2.9	-7.2	-9.2	-22.5	-25.3
Private Equity	6.8	0.9	-5.3	0.0	-22.8	-2.8	-6.4	-10.0	-23.3	-25.7
Private Debt Composite	2.6	-1.3	-6.2	-1.8	-15.8	-2.4	-4.3	-4.0	-12.8	-15.0
REITs	4.1	-4.4	1.2	-3.8	-37.3	-1.6	12.4	-7.1	-32.8	-55.7
Core Private Real Estate	2.6	4.2	5.0	2.0	-7.1	2.7	9.7	1.0	-8.5	-14.0
Value-Added Real Estate	4.9	7.5	14.1	7.2	-13.5	13.7	6.4	1.9	-13.6	-23.1
Opportunistic Real Estate	4.2	6.9	9.9	1.1	-20.6	2.3	15.6	-0.6	-17.1	-26.3
Natural Resources (Private)	13.3	6.9	-3.5	-0.9	-27.5	-4.3	-21.5	-2.1	-17.0	-29.1
Timberland	1.5	2.3	-9.9	5.0	6.9	2.9	8.6	0.6	2.7	3.9
Farmland	2.5	0.7	-9.2	3.9	10.1	1.3	8.0	1.0	4.9	10.3
Commodities (naïve)	9.9	6.0	-6.6	-4.3	-25.0	-3.4	-24.0	5.1	-11.1	-37.8
Core Private Infrastructure	0.5	-4.6	-6.1	1.2	0.1	-0.7	3.6	-0.4	-5.0	-7.8
Hedge Funds	2.9	-1.8	-5.1	-0.6	-14.5	-2.2	-1.7	-4.3	-12.2	-15.7
Long-Short	5.2	-1.8	-4.2	-0.1	-21.0	-3.7	-4.3	-7.5	-17.7	-23.5
Hedge Fund of Funds	2.1	-2.4	-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	Baa Spreads narrow by 30 bps, High Yield by 100 bps	Baa Spreads narrow by 100 bps, 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	0.4	0.6	0.2	2.0	4.5	2.3	3.1
Short-term Investment Grade Bonds	1.3	2.6	0.5	2.0	1.5	3.3	0.8	1.6
Investment Grade Bonds	4.5	9.3	1.3	3.9	2.5	9.4	1.8	3.8
Long-term Corporate Bonds	10.5	23.4	3.9	14.5	5.6	15.8	3.6	7.7
Long-term Government Bonds	13.3	28.8	0.6	-0.6	1.8	22.2	3.6	5.7
TIPS	5.2	10.9	1.2	5.9	3.8	7.8	1.5	2.2
Global ILBs	3.0	6.4	2.1	7.4	5.9	8.4	1.7	3.2
High Yield Bonds	2.8	8.9	7.0	25.7	7.7	8.6	4.8	10.6
Bank Loans	-0.2	2.2	4.0	16.4	4.3	0.6	2.2	4.5
Direct Lending	-0.5	0.2	4.9	5.6	1.5	3.8	1.8	3.5
Foreign Bonds	5.7	11.3	1.6	7.4	9.9	21.3	2.3	6.8
Asset Based Lending	-0.6	1.5	3.4	4.8	1.0	5.9	1.8	5.0
Special Situations	1.2	2.9	9.5	17.1	6.8	7.8	6.2	10.0
Emerging Market Bonds (major)	3.1	7.4	5.5	15.5	7.4	15.4	5.5	11.1
Emerging Market Bonds (local)	3.7	9.9	5.5	17.6	10.5	19.4	6.1	13.2
US Equity	3.4	15.3	11.4	18.8	8.0	24.9	10.6	31.7
Developed Market Equity (non-US)	-2.4	16.4	9.4	18.3	13.4	47.6	6.4	18.8
Emerging Market Equity	0.5	17.8	9.5	34.3	20.1	47.9	9.3	28.9
Global Equity	0.7	15.2	9.6	19.6	11.3	35.9	8.6	25.7
Private Equity/Debt	2.4	4.4	10.5	9.5	7.4	16.7	10.5	13.6
Private Equity	2.5	4.3	10.6	8.3	7.3	17.3	11.1	14.3
Private Debt Composite	0.8	1.8	7.7	12.8	4.8	5.9	4.6	6.5
REITs	2.6	14.5	9.7	27.1	6.5	25.5	10.0	24.1
Core Private Real Estate	1.0	1.6	4.6	-3.5	1.2	5.5	3.0	3.6
Value-Added Real Estate	2.7	6.4	5.6	-9.4	0.9	12.6	6.0	7.4
Opportunistic Real Estate	0.1	3.9	5.9	-5.5	-0.4	11.4	4.7	6.2
Natural Resources (Private)	-1.1	11.3	10.2	31.0	16.9	27.2	7.6	15.0
Timberland	6.4	9.2	4.9	-0.6	3.8	12.9	6.4	5.5
Farmland	3.2	4.2	6.6	3.8	3.4	7.8	5.3	4.1
Commodities (naïve)	-2.6	-3.2	3.1	9.8	13.6	-2.5	3.1	4.0
Core Private Infrastructure	0.8	-4.3	7.0	4.8	3.5	-2.3	2.0	2.9
Hedge Funds	3.3	4.8	5.8	11.3	6.0	9.3	5.6	9.8
Long-Short	3.3	5.8	6.9	12.3	7.8	15.2	7.0	13.3
Hedge Fund of Funds	2.5	3.9	4.9	10.2	5.1	8.3	4.7	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.

Understanding China

MEKETA INVESTMENT GROUP

Meketa Investment Group
Understanding China

A Changing Geopolitical Environment

- Geopolitical events combined with regulatory and policy changes are giving investors cause to re-evaluate their exposure to China
- Market-friendly policies and openness are waning in China, while party ideology and nationalism are growing
- The odds of conflict between China and the US appear to be increasing
- The US has responded by acting in a way it deems to be in its national interests

Source: Bloomberg.

Pragmatism | Path of Market Reforms

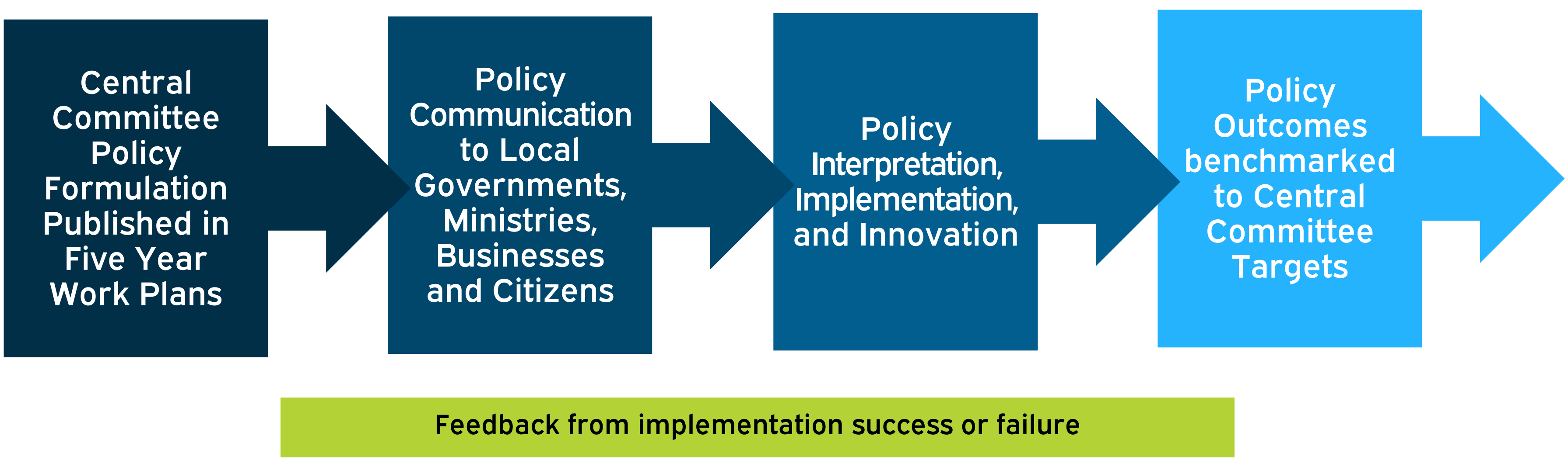
After Mao's death, the Chinese Communist Party (CCP) gradually changed course, seeking to prioritize economic growth

→ Deng Xiaoping introduced market & economic reforms

→ Deng's policies came to be described as "Socialism with Chinese Characteristics"

→ Policy still included planning goals, but allowed for a practical approach of trial and error[1]

Government Central Planning for Economic Goals



[1] World Bank as of December 2020. Illustration replicated from Yuen Yuen Ang, "CCP Decision Making and the 20th Party Congress," Testimony Before the US-China Economic and Security Review Committee, January 2022.

CCP Goals | Power, Influence, Wealth, and Control

In many cases, this meant prioritizing pragmatism over communist ideology

This practical approach was likely driven by several long-run goals shared by the CCP

1. *The CCP wants to remain in power indefinitely*[2]
2. *The CCP wants China to "reclaim" its place as a geopolitical super-power*[3]
3. The CCP wants China to achieve first-world economic status

[2] For Xi in particular, this seems to be focused on reasserting the CCP's power and the revitalization of the Leninist party-state.
[3] This includes both soft power and hard power (in military terms).

Enter President Xi

→ Pragmatism appears to be fading in favor of nationalism and autarky, led by President Xi Jinping

→ Xi may have an additional goal that takes priority over the others:

- Personal dominance & cementing his legacy

→ Xi has consolidated power in a way that means he is going to be the final decision maker on major policy issues

→ The goals announced at the October 2022 Party Congress may be at odds with each other:[4]

- Reinvigorate Party ideological discipline and adherence to Marxist doctrine
- Achieve first world economic wealth by 2035
- Build "fortress China" that is self-sufficient in tech, military capacity, and geopolitical power

[4] Source: TS Lombard October 2022.

China's Militarism & Power projection[5]

- China has made a clean break from the foreign policy of the Deng era, which was expressed as "Hide your strength, bide your time"
- China has been expanding its military presence in the South China Sea for the past decade
- The CCP dissolved any semblance of Hong Kong's independence in 2020 with the passage of the National Security Law

In 2019, President Xi announced China's intention to pursue the One-China policy, including:

- Taiwan unification on Hong Kong model, with regulatory and governance creep eroding political independence
- Taiwan unification as a signature theme for the "Great Rejuvenation of the Chinese Nation"[6], a key platform for Xi's third term
- Taiwan issue should not be passed down from generation to generation, a hint that Xi wants this to happen before his tenure ends
- Xi reiterated his plan to force the re-unification of China and Taiwan in speech to Party Congress

[5] Sources: Xinhua, Google, https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/.
[6] Source: Richard C. Bush, "8 Key things to notice from Xi Jinging's New Year speech on Taiwan" https://www.brookings.edu/blog/order-from-chaos/2019/01/07/8-key-things-to-notice-from-xi-jinpings-new-year-speech-on-taiwan/. Free transit of global shipping through the Strait is fundamental to American interests.

The US-China Relationship

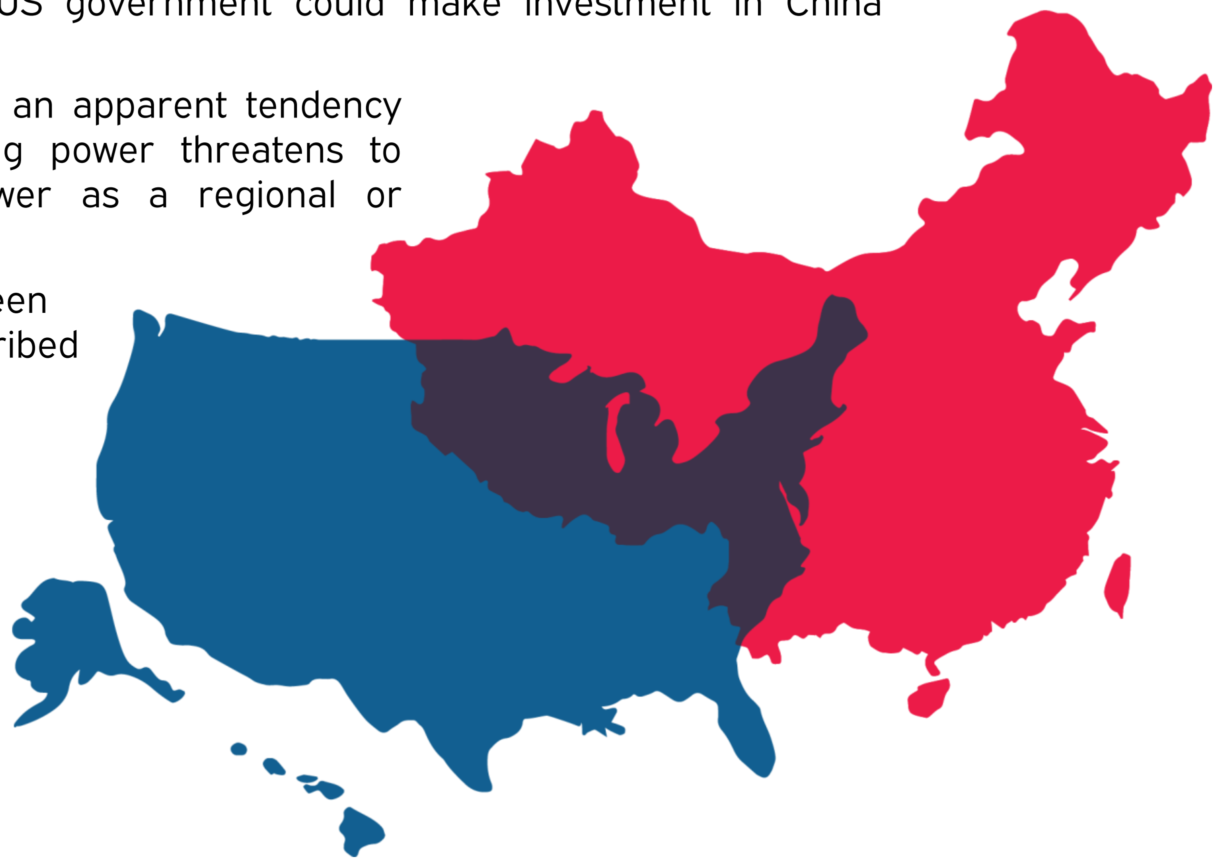
It is not just the assertive nationalism and ideological enthusiasm of Xi's CCP that is a cause of concern for investors

→ The US now pursues an open policy of China containment

→ If this trend continues, the US government could make investment in China difficult, painful, or even illegal

The "Thucydides Trap" refers to an apparent tendency towards war when an emerging power threatens to displace an existing great power as a regional or international hegemon[7]

→ The current relationship between China and the US can be described as selectively confrontational



[7] The term was coined by American political scientist Graham Allison in a 2012 article for the Financial Times.

Summary | Political Risk Has Changed

→ President Xi Jinping now asserts complete control over the CCP, and hence, China

→ We suspect the top three motivating factors for Xi and China (in order) are:

- Xi wants to cement his legacy
- The CCP wants to stay in power and assert its authority
- The CCP wants China to become a global power rivaling the US

→ While keeping one eye focused on China, investors should keep the other focused on the US

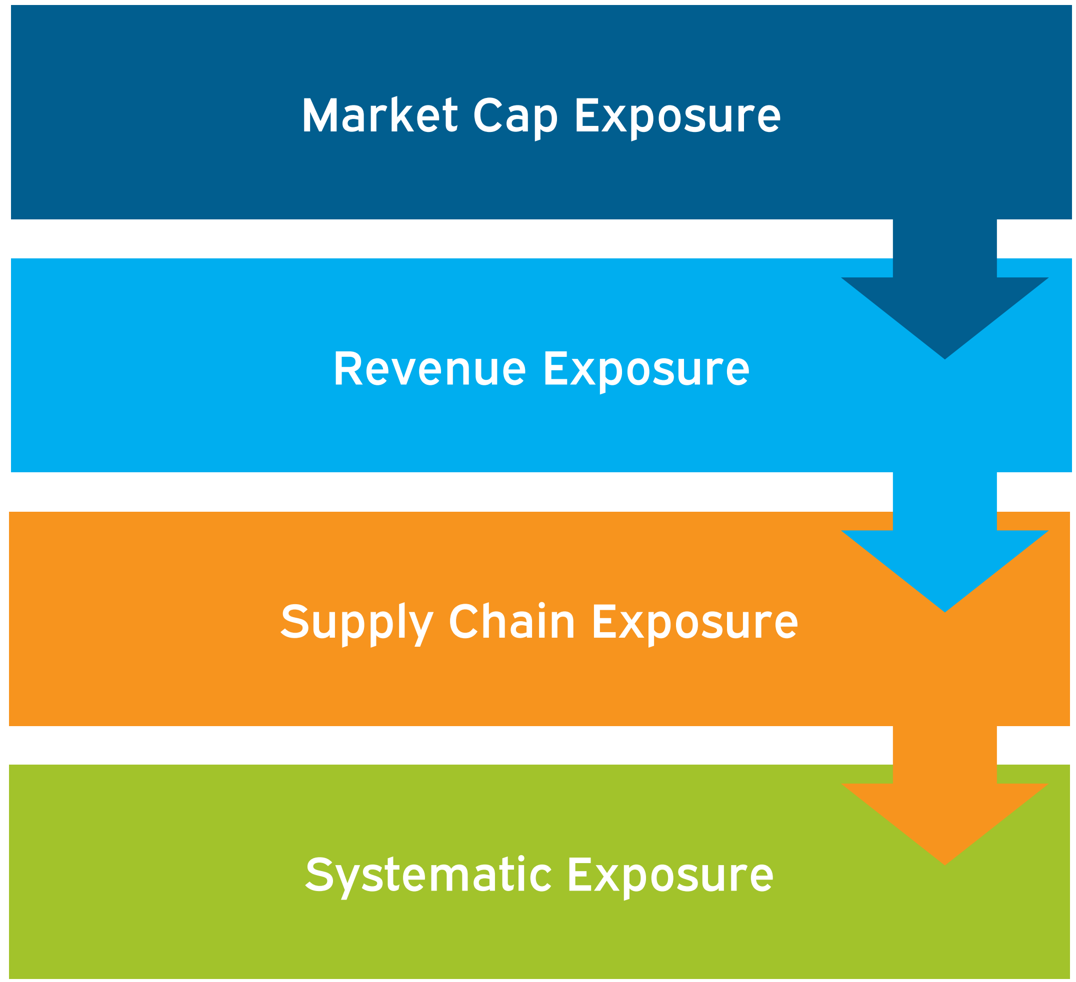
- A decade of declining relations between the countries has fostered mutual suspicion
- US actions could be perceived as provocative and hostile by the CCP
- The US now has a stated policy of containment of China
- The US could further limit institutions' ability to invest in China

China Exposure

China Exposure

Exposure to China has increased for many investors since the GFC, sometimes unintentionally

Measuring "exposure" to China involves multiple layers



Regional Equity Exposure by Market Cap[9]

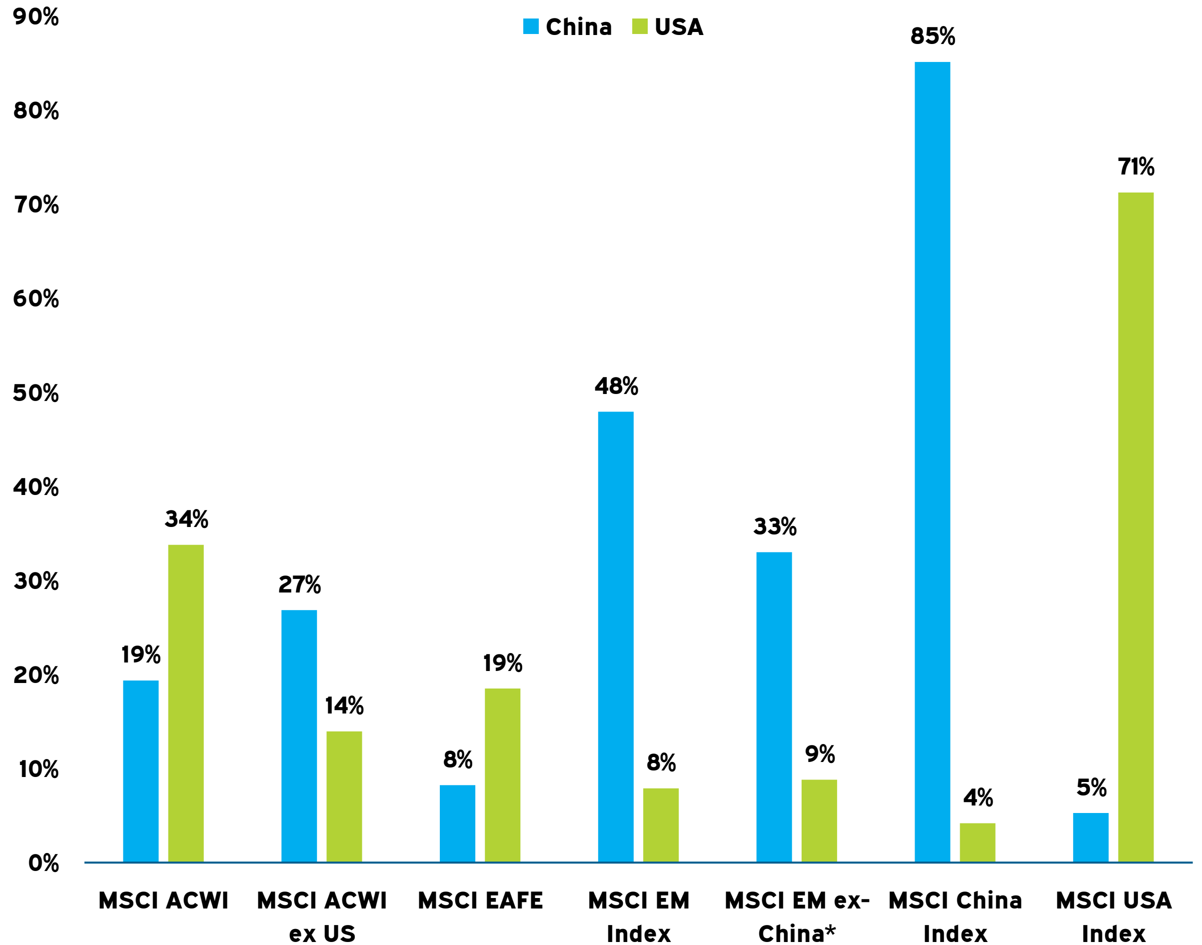
	All Cap World Index	All Cap World ex US	Emerging Markets	Emerging Markets ex-China
Top 3 Countries	US (62.7%), Japan (5.5%), UK (3.5%)	Japan (14.7%), United Kingdom (9.5%), **China (8.3%)**	**China (29.8%),** India (14.9%), Taiwan (15.0%)	India (21.2%), Taiwan (21.4%), S. Korea (17.4%)
Weight of Top 3 Countries	72%	33%	60%	60%
Top 3 Sectors	IT (22.1%), Financials (15.4%), Health Care (11.7%)	Financials (20.7%), Industrials (13.2), Consumer Disc. (12.1%)	Financials (21.8%), IT (20.6%), Consumer Disc. (13.9%)	Financials (24.7), IT (26.9%), Materials (9.8%)
Weight of Top 3 Sectors	49%	46%	56%	61%
Market Capitalization (USD)	$63.8T	$23.8T	$6.6T	$4.7T

[9] Source: MSCI as of August 2023. China exposure excludes Hong Kong and Taiwan.

Regional Exposure by Revenue Source[10]

China comprises almost half of revenue sources in Emerging Markets

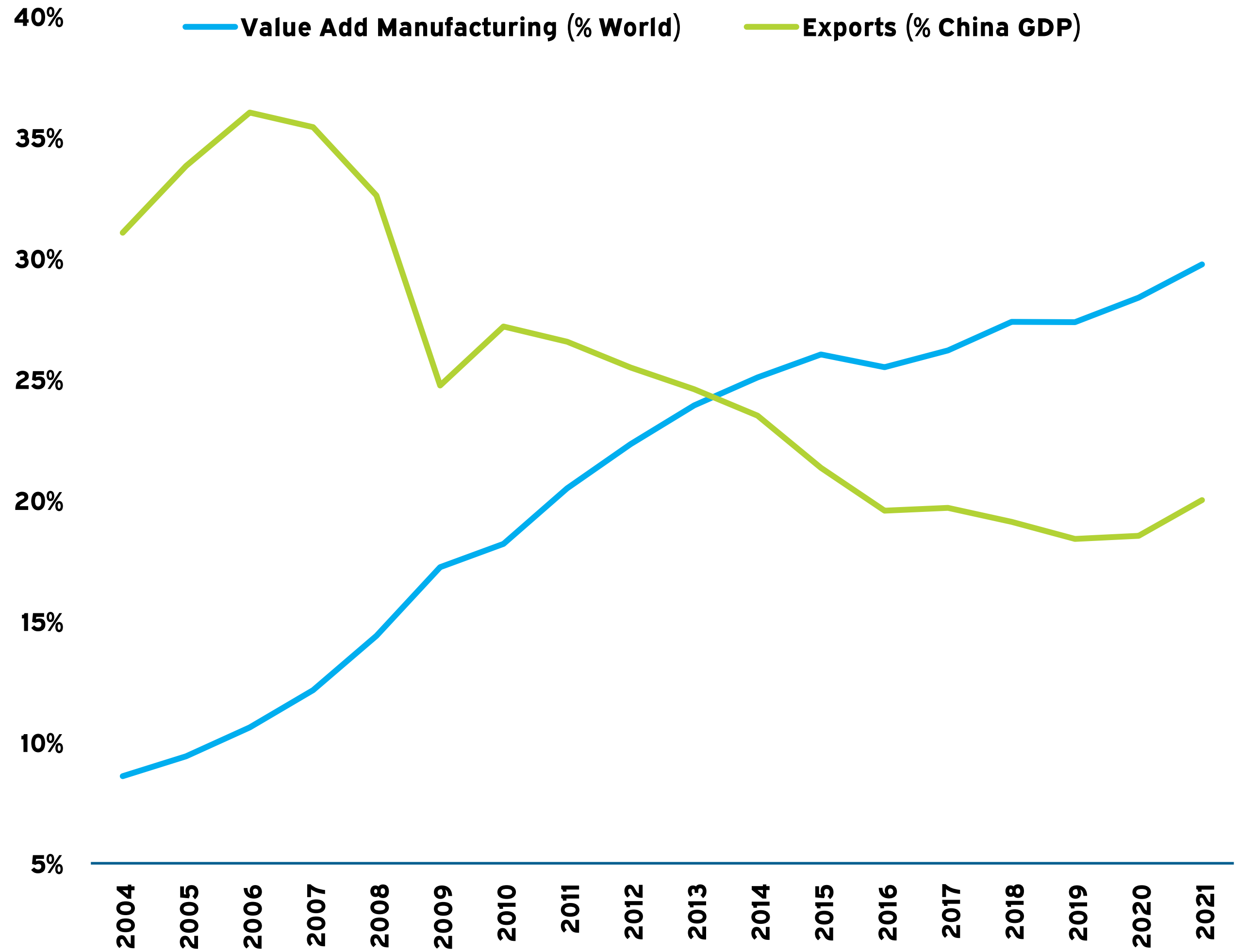
Even the MSCI EM ex-China index derives 33% of its revenue from China



[10] Sources: MSCI and Meketa calculations as of August 2023. China exposure excludes Hong Kong and Taiwan. MSCI Emerging Markets ex-China revenue estimated calculated by Meketa.

China Exposure by Supply Chain[11]

- China is a key player in global exports and manufacturing
- US reliance on China has been decreasing, slowly
- Global manufacturers are diversifying their supply chain, but not *yet* abandoning China altogether
- The trade linkage with China is significantly higher for goods than services



[11] Source: World Bank data as of October 2022. https://www.invesco.com/apac/en/institutional/insights/market-outlook/the-future-of-chinas-supply-chain-uncertain-or-changing-course.html.

Taiwan in Context[12]

Taiwan is a major component of the MSCI EM index and the MSCI EM-ex China index[13]

Taiwan's index is tech heavy, and is dominated by Taiwan Semiconductor (TSMC)

TSMC accounts for over 50% of the world's semiconductor foundry capacity[14]

	Emerging Markets	Emerging Markets ex-China
Top 3 Countries	China (29.8%), India (14.9%), **Taiwan (15.0%)**	India (21.2%), **Taiwan (21.4%),** S. Korea (17.4%)
Weight of Top 3 Countries	59.7%	60%
Top 3 Sectors	Financials (21.8%), **IT (20.6%),** Consumer Dis. (13.9%)	Financials (24.7), **IT (26.9%),** Materials (9.8%)
Weight of Top 3 Sectors	56.3%	61.4%
Taiwan Semiconductor (TSMC) Weight	**6.4%**	**9.1%**
Market Capitalization (USD)	$6.6T	$4.7T

[12] Source: MSCI data as of August 2023. MSCI Taiwan revenue exposures data from MSCI as of August 2023.
[13] Source: MSCI for all index data.
[14] Sources: CIA World Fact Book as of October 2022. As of September 2023, China (29.8%) and Taiwan (15.0%) of the MSCI Emerging Market index.

Taiwan Exposure[15]

Taiwan exposure warrants additional consideration

→ Taiwan's location, history, and industries make it a strategic flashpoint

The odds of conflict appear to be increasing

→ China views Taiwan as part of its national territory

→ The US has historically supported Taiwan independence

Taiwan's major trade partners by exports are China (26%), the US (14%), and Hong Kong (12%)

→ China accounts for approximately 17% of Taiwan's corporate revenue and the US is another 29% of revenues

[15] Sources: CIA World Fact Book and MSCI data as of September 2023.

Recent Events

Recent Events

Both the CCP and the US have caused setbacks for investors with exposure to China

Initiated by CCP	Initiated by US/Other
CCP intervention in private tutoring companies and gaming companies	OFAC prohibits ownership of Chinese companies with People's Liberation Army (PLA) ownership/interest[16]
interference in IPO pricing on Chinese exchanges and listing of ADRs in the US	Chinese companies removed from MSCI indices
asking for forced donations from companies for social programs	SEC audits Chinese ADR delisting/relisting in Hong Kong
foreign investors shut out of bankruptcy and restructuring proceedings related to Evergrande	OFAC limits sale of advanced semiconductors to China
Zero-COVID policies restricting international travel, ex-pats leave China, and supply chain issues	CHIPS Act limits sale of advanced US technologies to China
Extended military exercises around Taiwan	National Security Plan – China containment
Xi's expressed friendship without limits with Putin	US Congress Sanctions China Balloon Gate
CCP Crackdown on Foreign Auditors & Listings	2023 Biden Expands Rules on Semi-Conductors

[16] Office of Foreign Asset Control (OFAC) is part of the US Treasury Department.

Themes over the past 12 months

The anticipated economic rebound from exiting zero-COVID did not materialize

Real estate bubble is getting worse, not better

Investors have responded by voting with their feet

Xi's policies seem to be backfiring

The economic rebound that wasn't

Chinese growth has disappointed in 2023

→ China exited their Zero-COVID policy in late 2022

→ Many investors and economists alike anticipated a surge in growth as the economy re-opened

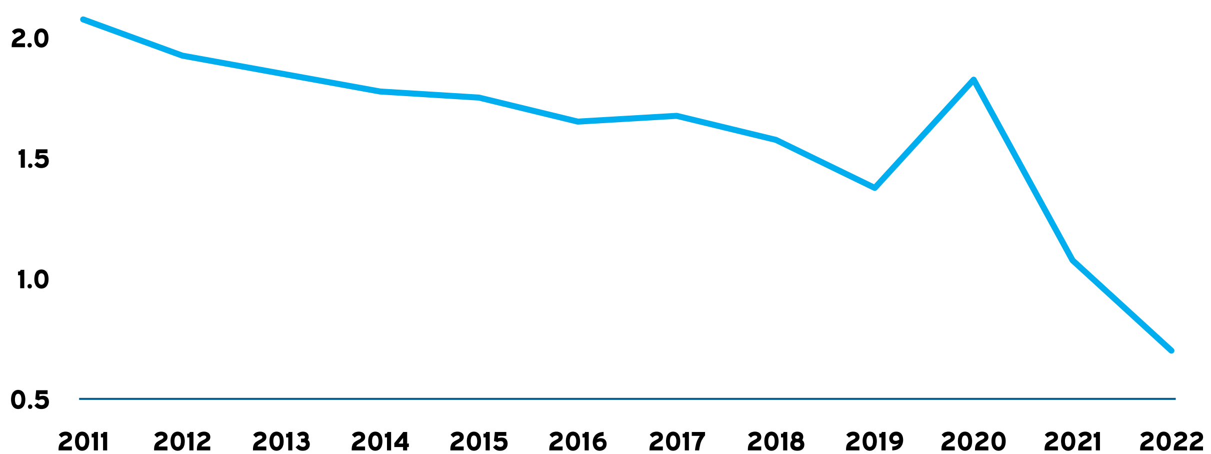
→ But the economic rebound did not materialize

→ Growth projections are being ratcheted down

→ Major causes include:

- Debt overhang in the property sector – nearly ¼ of China's economy
- Exports are lagging

China Real GDP Growth (Q-o-Q %)



Source: FactSet as of September 12, 2023. from China National Bureau of Statistics.

The Debt Bubble

Property market turns from tailwind to headwind

- → The issue is systemic
- → Both the private and public sectors are heavily indebted
- → The worst problems are with property developers and local government
- → Two years ago it was Evergrande, now it is Country Garden
- → Old model:
  - CCP sold land to developers, filling local government coffers in the process
  - This allowed CCP to spend freely while taking on more debt themselves
  - Local governments are responsible for ~85% of expenditures
  - Developers borrowed heavily and pre-sold properties to finance their acquisitions
  - No other good savings options, so ~70% of household wealth tied up in the property market
- → Current status:
  - Housing prices falling
  - Some property owners now refusing to make payments on unfinished properties
  - This can turn into a vicious cycle where developers do not have the cash flow to complete projects

Xi's echo chamber

CCP reaction has not been helpful

- → Focus has become national security, not growth
- → Emphasizing nationalistic policies and self-sufficiency
- → CCP has clamped down on foreign businesses (e.g., office raid, iPhone restrictions)
- → Wants to reign in the debt bubble, so little/no support for property developers
- → PBoC providing minimal stimulus
- → Relationships with trading partners and neighbors are becoming increasingly strained
- → Many investors and business have responded by seeking to reduce their ties to China

If growth falters, China will face a choice: backtrack or double down on security and repression

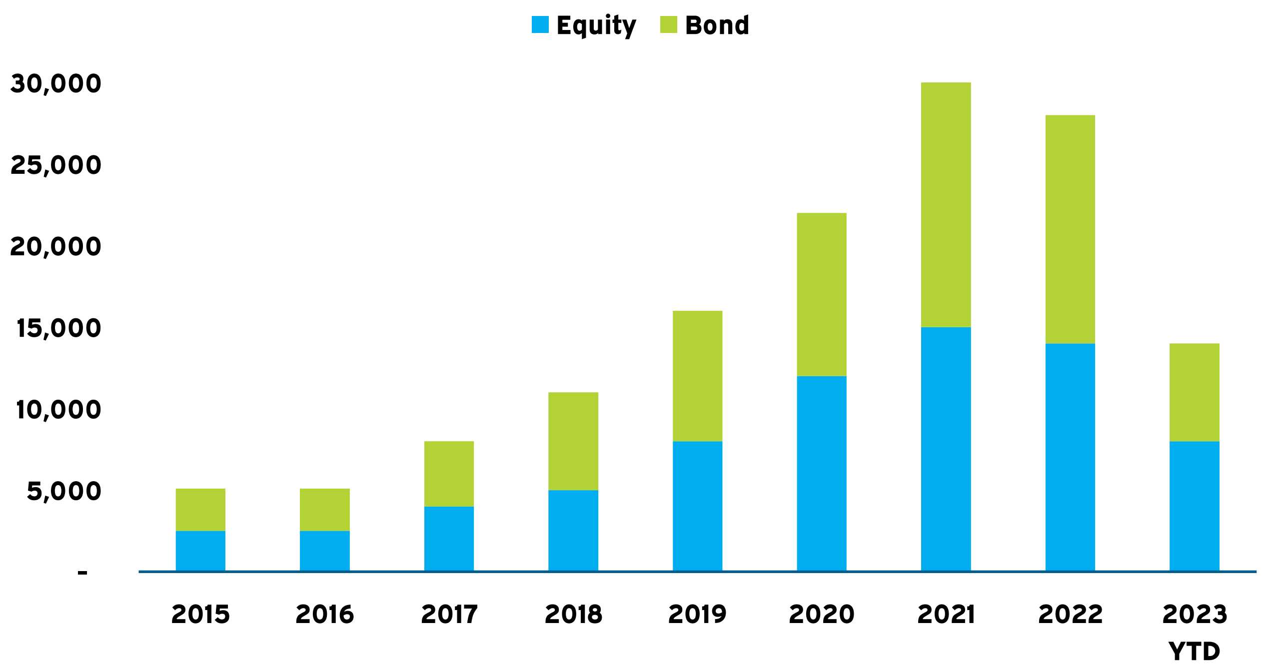
Capital Flight

Investor Concerns turn into Portfolio Flows

- → 1Q23 FDI was just $20 billion, down from $100 billion in the same period in 2022
- → $12 billion outflows in August 2023 on disappointing policy support from CCP

Foreign Holdings on China Mainland Securities (RmB Bn)

Sources: PBoC and JP Morgan. Financial Times August 31, 2023.



Addressing China Exposure

Addressing China Exposure

First and foremost, investors should determine what their exposure is

→ The primary source for many investors is dedicated EM equity and debt mandates

→ It can often be found as a sub-set of other public and private markets portfolios:

- Global and foreign equity
- Foreign and high yield bonds
- Multi-sector credit
- Hedge funds
- Private equity
- Infrastructure
- Non-core real estate

Options for Customizing China Exposure

Investors who want to align their China exposure with their long-run portfolio goals have several options

→ Directly modify EM equity or EM debt exposures

→ Shift from global (ACWI) to developed (EAFE or World) mandates

→ Shift some assets from EM to EM ex-China mandates

→ Consider a blended approach with dedicated EM ex-China & China exposures

→ Choose EM debt mandate/benchmark that controls China exposure

→ Work with investment managers to craft scope of China exposures in their portfolios

Options for Addressing China-Related Risks

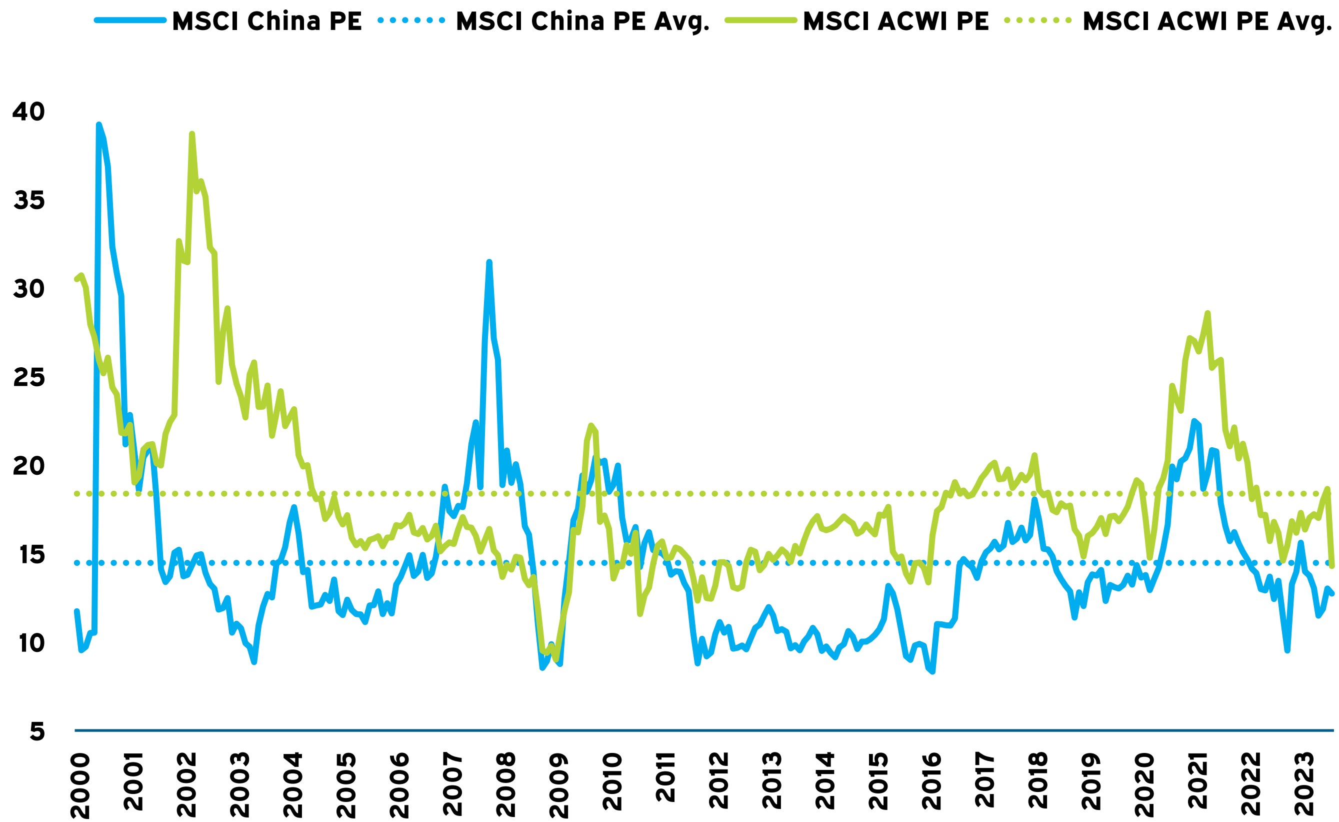
- China exposure can have both policy risks and market related risks
- China poses a systemic risk for anyone invested in global capital markets
  - Disentangling from China entirely is not feasible
  - Investors should evaluate how well hedged their portfolio is against this systemic risk
    - Consider building a defensive structure with risk mitigating strategies that hedge against systemic risks, including China

Relative Value

It could be argued that markets have already adjusted their pricing to account for the increased risks

Global and Chinese P-E Ratios

Source: Bloomberg and MSCI as of August 2023.



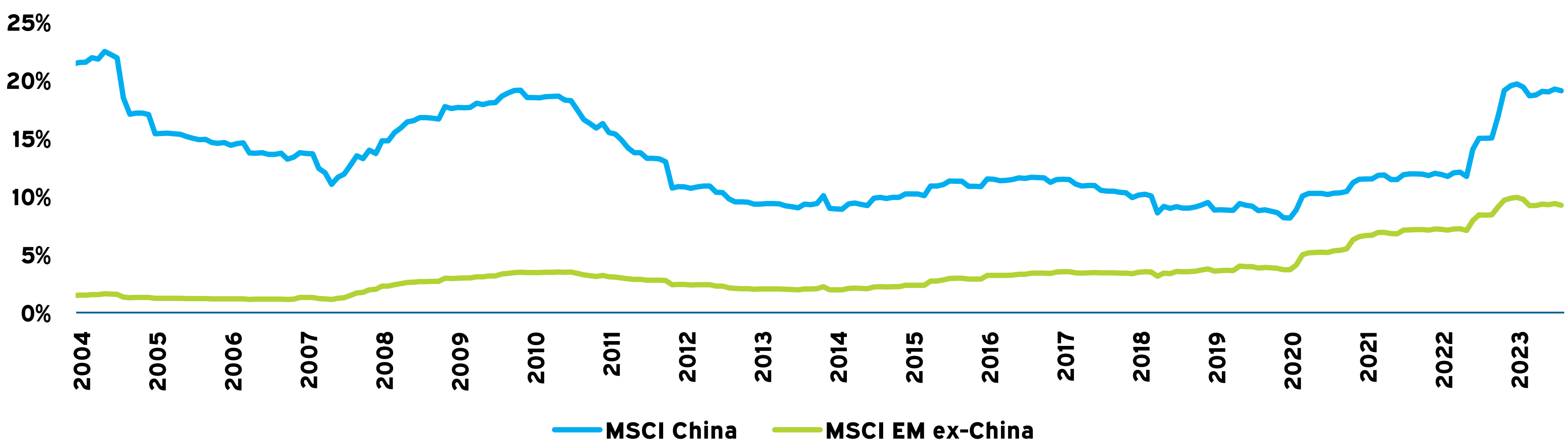
Potential Costs of Making a Change

Investors should evaluate both the direct and opportunity costs they might incur

Expected returns	Alpha potential	Transaction costs	Tracking error	Headline risk

3-Year Annualized Tracking Error vs. MSCI Emerging Market Index

Source: Bloomberg and MSCI as of August 2023.



Summary | Re-underwriting Investment Approaches to China

Investors should reassess their China exposure

The outlook for China is uncertain, but it is worth considering three general scenarios to frame asset allocation and portfolio implementation decisions:

1. The bullish case for investors is one where pragmatism prevails, to some extent
   - China could drive EM benchmark returns
2. A middle path of ideological & socialist purity will likely slow growth in China
   - Accepting index weighted exposure could result in sub-optimal returns
3. A path where Xi prioritizes ego/legacy poses substantial systemic risk for investors
   - Consider incorporating portfolio hedging structures

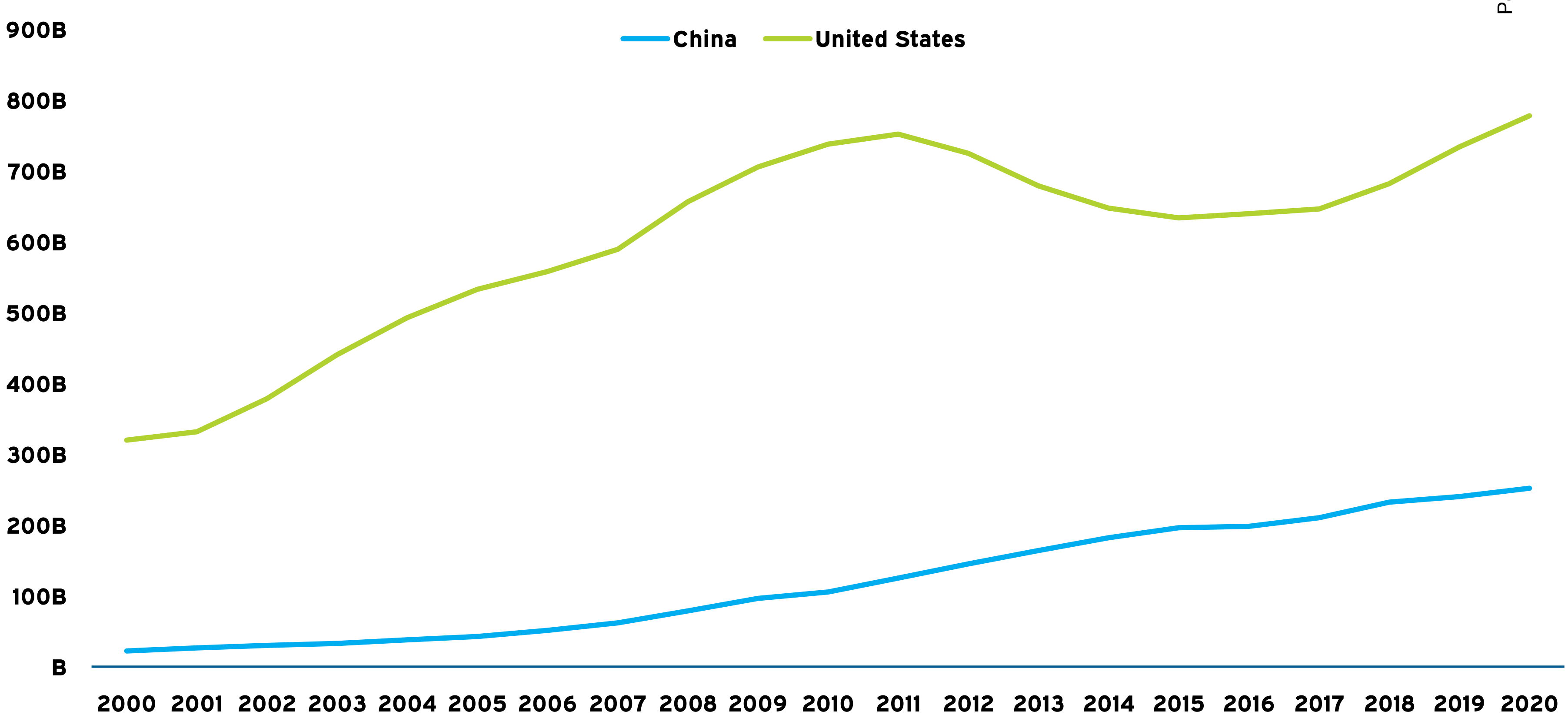
Appendix

China's Super-Power Goals (2022-2050)

- → High income status on par with Europe and US by 2050
- → Common Prosperity reducing income inequality
- → Belt & Road Initiative to be major creditor/investor in low-income countries
- → Yuan to replace the US dollar as reserve currency of the world
- → Made in China 2025 – 4th Wave Technology Industrial Policy
- → Expansion of maritime boundaries and naval domination of Asian sea lanes
- → Largest military in the world – navy, air force, army, and space[17]
- → Reunification of Taiwan with China

[17] Sources: World Bank, CSIS and Congressional Research Service. In 2019, President XI gave a pivotal speech calling for reunification. See appendix for additional policy details.h

US and China Military Spending (USD)[18]



→ Military spending in China has grown to more than 10x what it was twenty years ago

→ President Xi's orders include that the People's Liberation Army's modernization be achieved by 2035

[18] Source: World Bank data as of October 2022. China submits a simple report on military spending to the United Nations every year. However, this report does not include a breakdown of spending. The People's Liberation Army owns armament companies which now are the 6th largest seller of weapons around the world.

US Office of Foreign Asset Control (OFAC) | Chinese Military Industrial Complex Companies[19]

Removed by US Executive Order 2021		
China Communication & Construction Bank (A&H)	Anhui Great Wall A	Fujian Torch Electron A
China Railway Construction Bank (A&H)	AVIC Aviation High A	Guizhou Space Appl A
China Space Satelite (A)	AVIC Heavy Machinery A	Jiangxi Hongdu Aviat A
Hangshou Hikvision Dig	AVIC Jonhon Optronic A	Shaanxi Zhontian A
Nanajing Panda Elector	AVIC Shenyang Aircraft A	Zhonghang Elect A
SMIC	AVIC Xi Aircraft A	Dawning Information A
China Mobile	Changsha Jingjia A	Leon Technology Co A
China Telecom Corp H	China Avionics Systems A	Xiamen Meiya Pico Info
China Unicom	China Shipbuilding A	Dawning Information A
CNOOC	China Shipbuilding Ind A	Leone Technology Co A
Aerospace Times Electra A	Costar Group Co A	Ziamen Meiya Pico Info
Aerosun Corpo A		

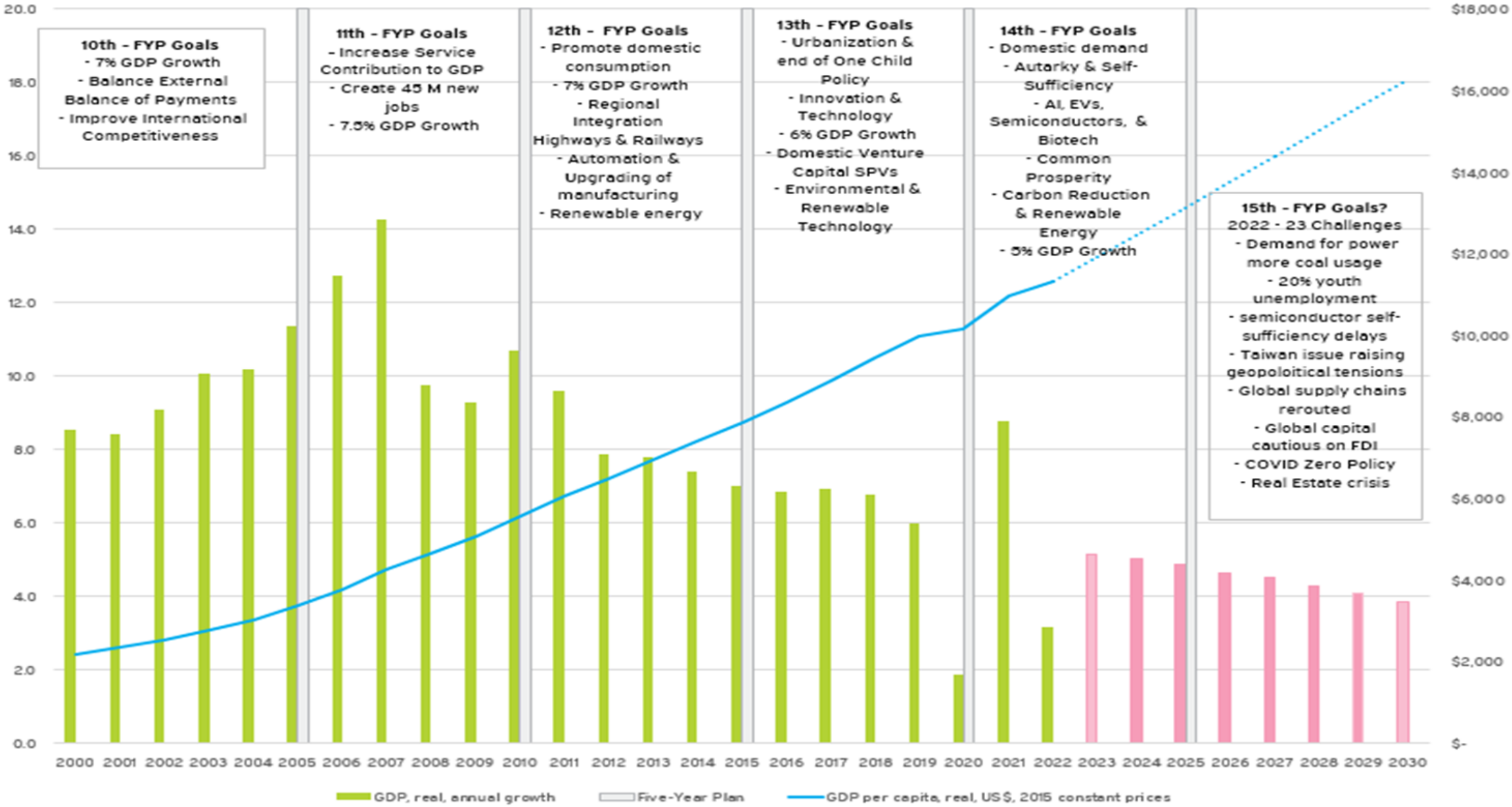
[19] Source: SEC, US Treasury, White House, and MSCI. Table represents NS-CMIC companies removed from MSCI indices following Executive Order 13959 as of August 2022. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/06/03/executive-order-on-addressing-the-threat-from-securities-investments-that-finance-certain-companies-of-the-peoples-republic-of-china

US SEC ADR Audit Chinese Companies[200]

Holding Foreign Companies Accountable ADR Delistings 2022	SEC List 150 Companies Notified for Audit Include
Didi Global	Alibaba ($236 B)
PetroChina	Full Truck Alliance ($7.6B)
SINOPEC	Yum China Holdings ($20.4 B)
Aluminum Corp of China	Baidu, Inc ($46.2 B)
China Life Insurance	Bilibili, Inc ($9.1 B)
SINOPEC Shanghai Petrochemical	JD.Com (89.8 B)
	China Natural Resources ($25.4 B)

[20] Sources: SEC, US Treasury, White House, and MSCI. Estimated market valuations as of August 23, 2022. https://www.barrons.com/articles/alibaba-stock-china-delist-51647587701

CCP Five Year Work Plans, GDP, and Per Capita GDP[21]



[21] Source: Oxford Economics and JP Morgan as of August 2022.

China’s External Challenges

China is facing a series of external issues, including:

- Slowing global growth and demand for Chinese exports
- High food and energy prices (import dependent)
- Belt & Road Initiative debt restructuring
- Support of Russia may be contrary to economic & political goals
- US technology and military containment
- Taiwan & One-China policy

China's Internal Challenges

China also has a series of internal issues to deal with, including:

- Rapid aging of the population and population decline
- Income inequality
- High levels of public and household debt
- Collapse of the real estate sector
- Dependency on foreign resources and technology (e.g., semiconductors)
- Corruption and waste

Challenge of Income Inequality & 'Common Prosperity'

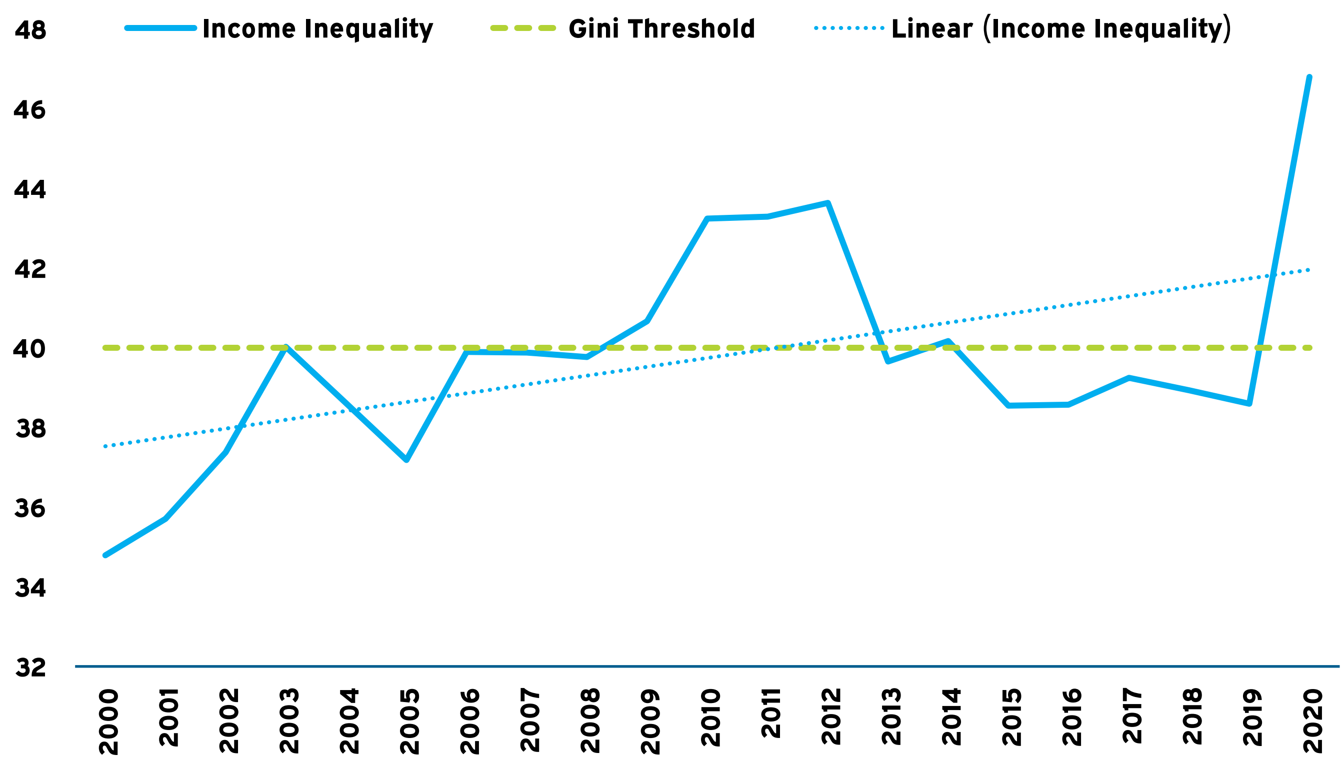
The CCP is concerned that income inequality will lead to social instability

→ Private tutoring and private schools promote class of elites dominating best universities and jobs

→ Taxes and redistributive policies may be part of common prosperity, but policy is evolving

Income Inequality in China (Gini Coefficient)

Sources: UN-Wider Income Inequality Index as of August 2022. Official Chinese NBS data on income inequality produced by the National Bureau of Statistics does not include all income variables. https://www.csis.org/features/how-inequality-undermining-chinas-prosperity. Beijing canceled a pilot real estate tax program due to challenges in the sector.



The Demographic Challenge | Can China Get Rich Before It Gets Old

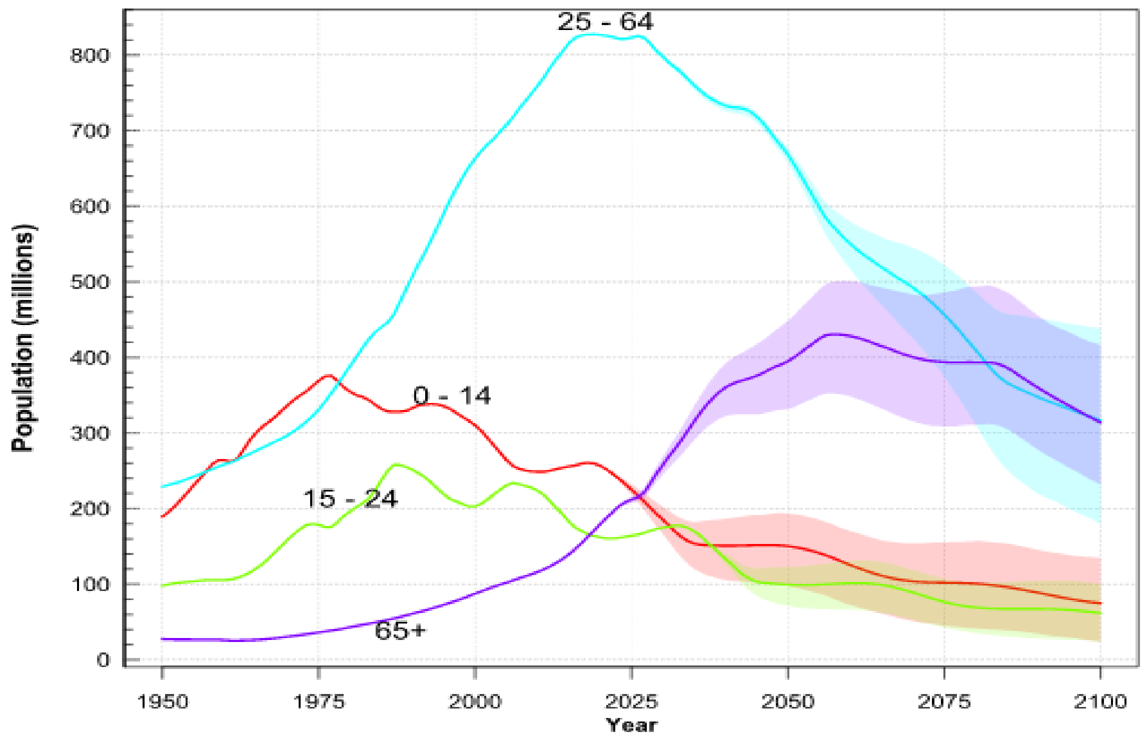
China's fertility rate has been falling and is now well below replacement levels

→ More people over the age of 65 than below the age of 24 in 2025

→ There are 30 million more men than women in China

Population by Broad Age Groups

Source: https://population.un.org/wpp/Graphs/DemographicProfiles/Line/156. According to the World Bank in 2019 there were 112 boys born for every 100 girls. China's gender imbalance rose from nearly balanced in 1972 to a peak of 118 boys for every 100 girls in 2007. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9180325/figure/ijerph-19-06482-f002/



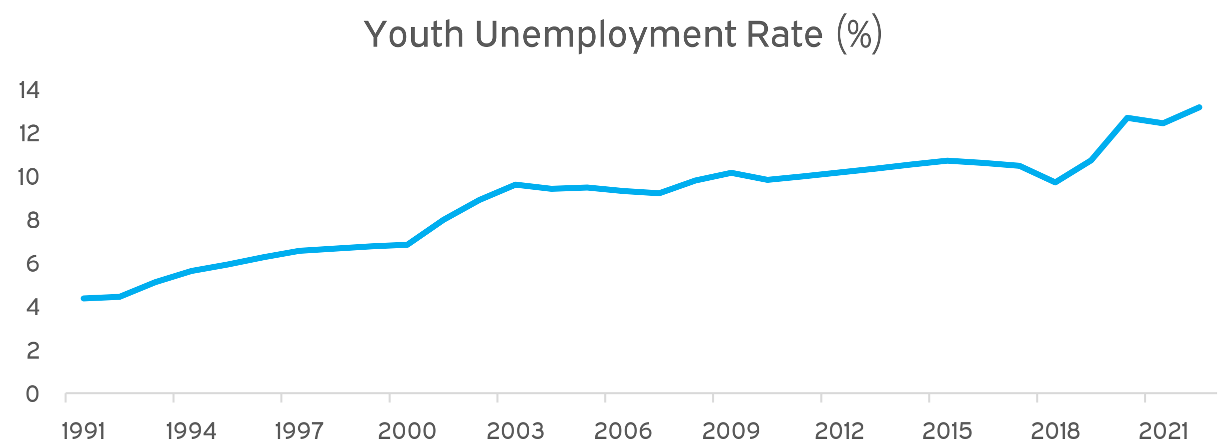
China's Youth

Could the young be the source of future unrest?

- → China's youth unemployment rate has been increasing for decades
- → Xi's policies have made it worse
  - Property developers, tech firms and the tutoring industry had been large employers for recent graduates
- → The unemployment rate for those aged 16 to 24 in cities surpassed 21% in August 2023
  - The CCP response was to stop publishing the data
- → Xi implores the young to "endure hardships" for the sake of the Party

Youth Unemployment Rate (%)

Source: FRED. Annual data through 2022 as of August 2023.



Income Inequality Continued | Common Prosperity Doctrine Evolving[22]

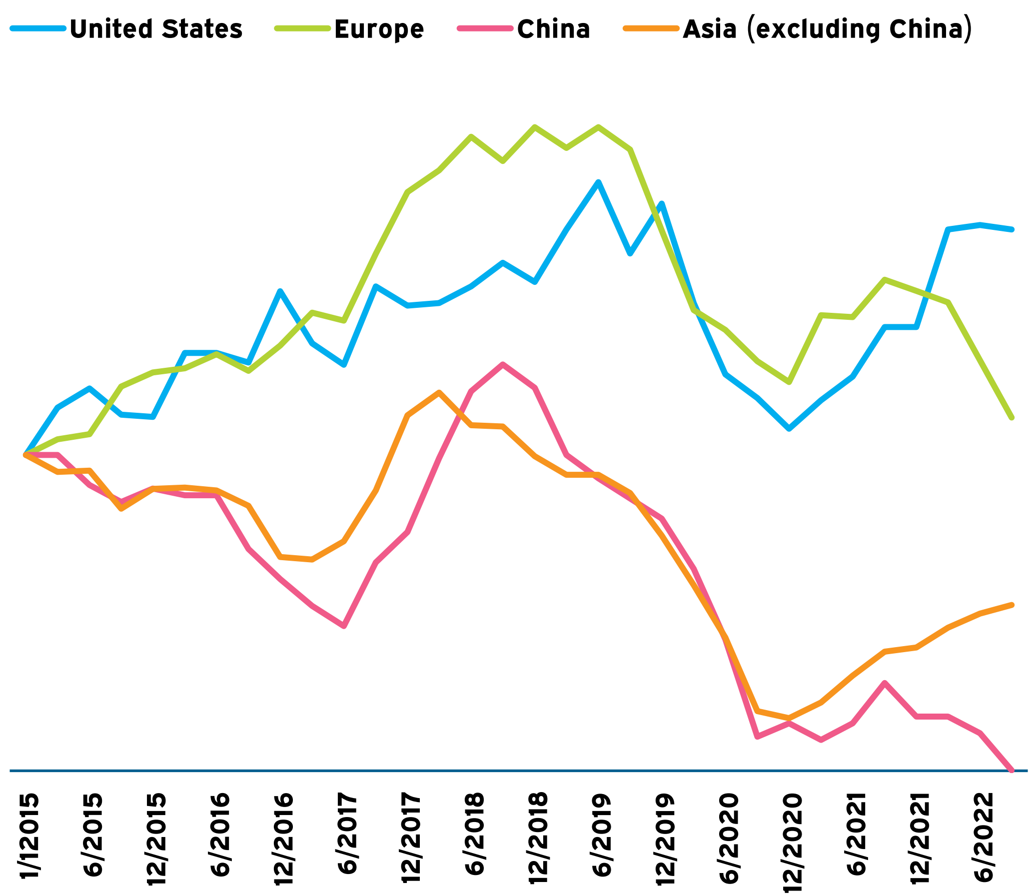
Common Prosperity Themes	Zhejiang Trial Common Prosperity Guidelines
Self-Sufficiency	Localism in finance, SMEs, and government SPVs, leading businesses to set example
Technology & Innovation	Target direct and indirect financing for web services, health and life businesses, and new materials
Inclusive Financial Services	Expand bank lending to self-employed, small businesses and rural businesses, mobile phones, digital RmB
Affordable Housing	SPV bonds to finance affordable housing
Social Services	Increase level and access to social services for migrant workers, rural workers, and self-employed; public education
Small Businesses	Increase financial support for self-employed and SMEs, innovation
Rural Integration	Access to social services, banking
Reduce income inequality by 2035	Raise incomes through more business development and expansion of social safety net

[22] Sources: Caixin and Bloomberg as of August 2022.

Friendshoring Takes Hold

Number of Investments by Region

- → FDI into China is being redirected
- → Europe and the US have received more FDI projects than China since 2015
- → Since 2020, FDI projects in the US have been rising



Source: IMF World Economic Outlook March 2023.

China RmB Hits 16-Year Low

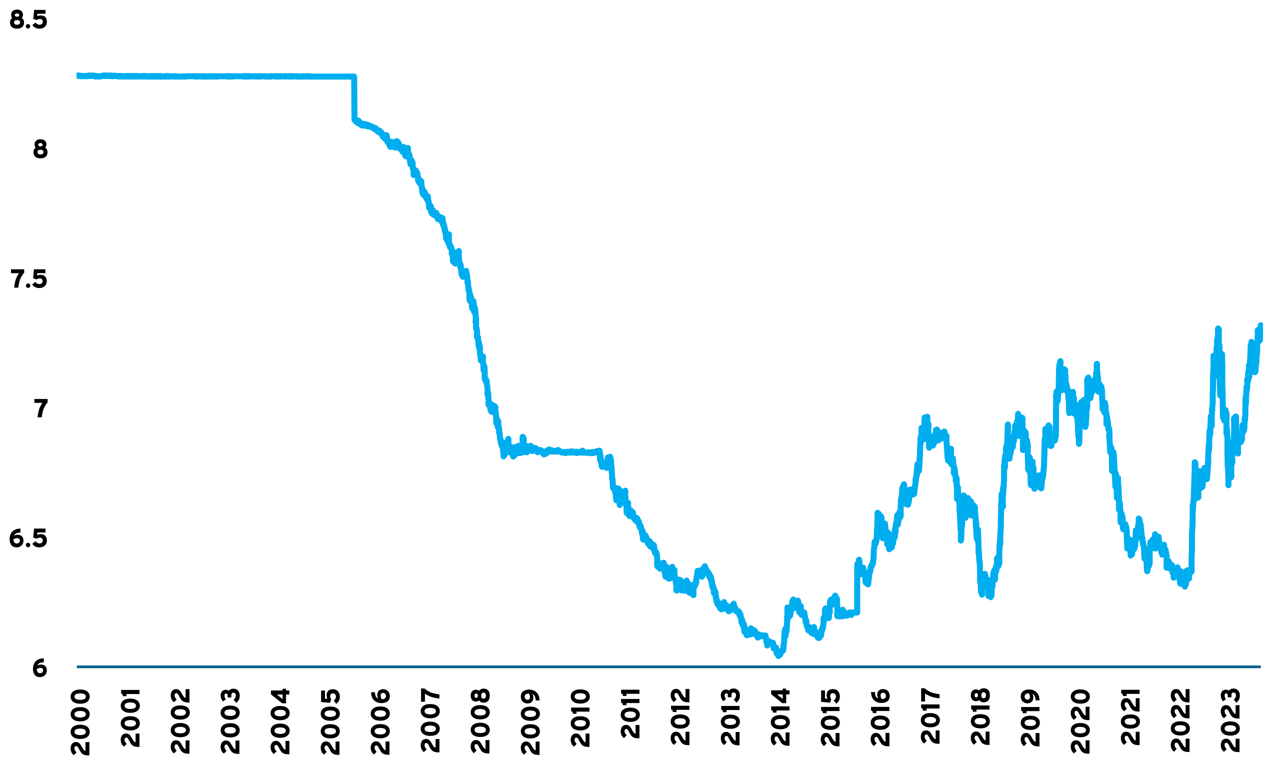
People's Bank of China Warns on Currency Depreciation Bets

→ The PBOC has stepped in to stem depreciation of the RmB

→ The PBOC actively managed the RmB-USD exchange rate since 2000

RmB-USD Exchange Rate

Sources: Wall Street Journal, L. Wei, "Xi Jingping Chokes Off Crucial Engine of China's Economy," July 13, 2023. Bloomberg as of September 9, 2023. Financial Times, Can China Arrest the renminbi's slide," September 11, 2023.



Disclaimer

Excess Cash Deployment Recommendation

Current Portfolio Allocations

City of Quincy Retirement System	Market Value ($)	Current Allocation (%)	Target Allocation (%)
Asset Class	**812,694,942**	**100.0**	**98.0**[1]
Domestic Equity Assets	190,207,235	23.4	24.0
International Developed Market Equity Assets	92,591,982	11.4	13.0
International Emerging Market Equity Assets	62,499,633	7.7	12.0
Investment Grade Bond Assets	68,324,556	8.4	5.0
Long-Term Government Bond Assets	24,103,350	3.0	7.0
TIPS Assets	15,898,858	2.0	4.0
High Yield Bond Assets	40,158,524	4.9	6.0
Bank Loan Assets	8,429,647	1.0	2.0
Total Real Estate	85,718,378	10.5	10.0
Private Equity Assets	133,224,093	16.4	10.0
Natural Resources Assets	17,283,469	2.1	3.0
Infrastructure Assets	12,688,945	1.6	2.0
Opportunistic Assets	36,153,377	4.4	0.0
Balanced Assets (PRIT General Allocation Fund)	16,538,058	2.0	0.0
Cash	8,874,836	1.1	0.0

[1] Excludes EMD, which is a 2% target allocation that is not currently funded.

Proposed Portfolio Rebalancing

→ Due to recent funding of the annual appropriation, coupled with increased distributions from the private markets program, the Retirement System is currently overweight cash.

→ Based on current market values, we recommend adding **$12 million to TIPS.** This allocation would be funded from existing cash and will help address the Fund's current underweight to rate sensitive assets.

Disclaimer, Glossary, and Notes

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CERTAIN INFORMATION CONTAINED IN THIS REPORT MAY CONSTITUTE "FORWARD - LOOKING STATEMENTS," WHICH CAN BE IDENTIFIED BY THE USE OF TERMINOLOGY SUCH AS "MAY," "WILL," "SHOULD," "EXPECT," "AIM", "ANTICIPATE," "TARGET," "PROJECT," "ESTIMATE," "INTEND," "CONTINUE" OR "BELIEVE," OR THE NEGATIVES THEREOF OR OTHER VARIATIONS THEREON OR COMPARABLE TERMINOLOGY. ANY FORWARD-LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION ARE BASED UPON CURRENT ASSUMPTIONS. CHANGES TO ANY ASSUMPTIONS MAY HAVE A MATERIAL IMPACT ON FORWARD - LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS. ACTUAL RESULTS MAY THEREFORE BE MATERIALLY DIFFERENT FROM ANY FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION.

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%.

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

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.