



Fiscal 2024 Investment Plan

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1. Purpose

The Investment Plan provides the fiscal 2024 outlook and strategy for the asset classes and total fund based on the State Teachers Retirement Board's long-term objectives and the forecasted capital market environment. Because the staff forecast is based on estimates of future economic conditions and returns, updates or modifications to the plan may be necessary. This will be communicated to the Retirement Board during the upcoming fiscal year as appropriate.

2. Fiscal 2024 Investment Plan Overview

FORECAST IN BRIEF		
	Fiscal 2024 Projected Ranges	Fiscal 2023 Forecast
Real Gross Domestic Product	0.5%–3.0%	2.0%
Real Personal Consumption	1.0%–3.5%	2.1%
Real Business Fixed Investment	(3.5%)–7.5%	2.4%
Housing Starts (millions)	1.20–1.45	1.401
Real Net Exports (billions)	(\$1400)–(\$1170)	(\$1249.4)
Consumer Price Index Ex Food & Energy	2.0%–5.0%	5.0%
S&P 500 Earnings	\$205 2.5%	\$200 (2.5%)
	Fiscal 2024 Projected Ranges	End of April 2023
Federal Funds Target Rate	3.00%–6.25%	4.875%
10-Year Treasury Note Yield	2.0%–5.00%	3.456%

ECONOMIC OVERVIEW

Central banks around the world have tightened monetary conditions to subdue inflation. As a result, global economic activity is expected to advance at a moderate pace and will remain vulnerable to recession risks. In the United States, economic activity will slow from a trend rate in fiscal 2023 to a below-trend pace in fiscal 2024. In most other developed countries, it will likely improve from near-stagnant levels but is expected to remain below trend. Despite weakness of economic growth, most central banks will likely keep policy interest rates near current levels until inflation recedes close to their policy targets.

For the United States and elsewhere, some of the key points to the STRS Ohio economic forecast are:

- The risk of a future recession has risen as the U.S. Federal Reserve has tightened monetary conditions in fiscal 2023 to tame inflation. Due to higher interest costs and tighter bank lending standards, real gross domestic product (GDP) growth is expected to slow to a 1.3% rate in fiscal 2024, after a roughly 2.0% trend growth in fiscal 2023 and a 1.8% pace in fiscal 2022. Private domestic final sales growth (GDP less volatile inventory changes, government spending and foreign trade) is expected to grow 0.8% after about 1.5% growth in fiscal 2023 and 1.8% in fiscal 2022. While unemployment is expected to rise from a historic 3.4% low, wage pressures may ease only gradually as the labor market may remain strong and continue to fuel inflation. Until wage pressures diminish and allow inflation to approach the Federal Reserve’s 2.0% long-term policy goal, monetary policy is expected to remain restrictive.
- More broadly, real GDP in the eurozone should slowly grow toward its long-term trend in fiscal 2024. Inflation may persist due to tight labor markets and monetary policy is expected to remain restrictive. Though governments will gradually remove the emergency fiscal aid they had provided to ease the burden of high energy prices on consumers and businesses, overall fiscal policy is expected to be expansionary as it reshapes the region’s energy infrastructure. Economic activity in Japan should grow at an above-trend rate in fiscal 2024 and the Bank of Japan may gradually withdraw the policies it had implemented over the past decade to combat deflation. Meanwhile, in

nearly all emerging countries, economic growth is expected to improve. After China’s economy recovers in fiscal 2024, its growth will moderate toward a newer long-term 3.0%–4.0% range beyond fiscal 2024. Compared to developed countries, inflation in many emerging countries is close to the monetary policy targets and that may allow their central banks to start signaling policy interest rate cuts in fiscal 2024.

- The downside risks to economic growth have increased since fiscal 2023’s midyear economic forecast update. U.S. fiscal 2024 growth in the 0.5%–3.0% baseline range has about a 50% chance of occurring, while more robust economic growth than the baseline carries a 20% chance. At the time of the midyear update, growth slower than the baseline carried a 25% chance and that has increased to 30%, including about a 25% probability of a recession. The baseline U.S. forecast of 3.9% nominal GDP growth (real GDP growth plus GDP price index growth) is higher than the median 3.2% nominal growth in the Blue Chip Economic Indicators.

TOTAL FUND OUTLOOK

STRS Ohio investment assets are currently estimated at \$88.7 billion as of the end of April 2023. Investment staff projects a base case scenario with a positive total fund return at-to-below the Retirement Board’s policy return of 6.03% based upon the 2022 asset-liability study or the recently updated 10-year capital market return assumptions of 7.17%. The positive return and market environment we forecast should roughly offset the approximately \$4 billion of net benefit payments (benefits and operating expenses less contributions) anticipated for fiscal 2024, resulting in a minimal change for the total investment assets.

The table below illustrates the expected annual market forecast for each asset class for fiscal 2024 relative to the Retirement Board’s policy for expected average annual returns. The current fiscal 2023 total fund return will likely end the year with a return that is near the policy return, following a below-average return for fiscal 2022. More importantly, the total fund return will likely finish with an above-average five-year return ending fiscal 2023.

ANTICIPATED MARKET RETURNS		
	Board Policy Expected Average Annual Benchmark Returns	Benchmark Annualized Return Expectation for Fiscal 2024
Liquidity Reserves	1.00%	Above Normal
Fixed Income	1.75%	Above Normal
Domestic Equities	6.60%	Below Normal
International	6.80%	Slightly Below Normal
Real Estate	5.75%	Below Normal
Alternative Investments	7.38%	At-to-Slightly Below Normal
Total Fund	6.03%	At-to-Below Normal

Based upon market levels during mid-May 2023. Should market levels change significantly by late June 2022, an updated projection will be issued.

INVESTMENT PLAN THEMES

- *The U.S. economy is forecasted to grow at a real rate of 1.3% with inflation exceeding the Federal Reserve's target range. The baseline forecast of nominal GDP growth of 3.9% has a higher potential downside than upside, reflecting the restrictive monetary policy we expect to remain in place until inflation is consistent with the Federal Reserve's 2% target. The forecast incorporates a range of economic outcomes, including slower economic growth, a downside of recession and an upside a soft-landing, while incorporating ongoing geopolitical risks.*
- *Asset prices reflect restrictive monetary policy, the likely impacts of slower economic growth, and a risk of a mild recession during the fiscal year. Furthermore, asset prices are incorporating higher interest rates and the expectation that inflation moderates over the next 12 months. The fiscal 2023 total fund return has been near average, with global equity markets recovering from the quick pace of interest rate increases over the past year. Overall, we expect higher volatility punctuated by recession risk, inflation concerns and geopolitical risk leading to buying opportunities in the upcoming fiscal year. We expect a fiscal 2024 return that is at-to-below the board's long-term policy return of 6.03%.*
- *There is no change in the factors for the investment ERM matrix on Page 8. We continue to classify "Recession" as a medium probability scenario. While we are forecasting slower economic growth during fiscal 2024 and assign a medium probability of recession, if a recession were to occur during the fiscal year and returns become negative, then this would have a more negative impact on the funded status of the plan and require moving this risk factor to the high financial impact category. We expect inflation to moderate over the year and do not expect an "Extended period of elevated inflation" resulting in a low probability of occurrence but a high financial impact in recognition of current level of inflation.*
- *The Investment staff will review the fiduciary audit investment recommendations and present a summary of responses, proposed actions, and periodic progress updates to the board.*
- *The alternative investment team is continuing its efforts to pursue direct and co-investments, consistent with the board's strategic initiative resulting in nearly 200 direct and co-investments since inception. Staff will contribute to the successful on-boarding of new alternative investments related external service providers, including a new Board level alternative investment consultant, new third-party administrator, and new fee validation service provider.*
- *Meaningful progress on the strategic initiative to improve domestic equity performance continues. The asset class is on target to have value-added performance on a one-, three-, five- and 10-year basis at the end of fiscal 2023. This continues an improving trend for the asset class. We will continue efforts to enhance the structure and performance of the asset class to sustain these positive results over future moving five-year periods. Staff will provide an update to the board in early fiscal 2024 to discuss trends in performance and provide an update on ongoing efforts within the asset class.*
- *Investment staff from all asset classes will continue to conduct ongoing research on various new potential strategies and refine and improve existing strategies as outlined in some of the following asset class sections of this plan. This is consistent with the board's strategic goal initiative for the investment program to develop strategies and tools that can increase returns, diversification or the flexibility to manage the assets.*

3. Asset Allocation/Risk/ERM Matrix

AVERAGE LONG-TERM POLICY WEIGHT, CURRENT ASSET WEIGHT AND STRATEGY FOR FISCAL 2024			
(as a percentage of total assets at market)			
	July 1, 2023 Neutral Weight	Preliminary April 30, 2023 Weight	General Strategy for Fiscal 2024*
Liquidity Reserves	1%	1.8%	We expect short-term interest rates to remain elevated in fiscal 2024. We believe the Federal Reserve is near the end of its monetary policy tightening campaign and will maintain a restrictive monetary policy until inflation slows significantly toward the Fed's long-term policy goal of 2%. With short-term market rates currently trading near 5.00%, we expect to earn a return above the policy return.
Fixed Income	22%	19.2%	Valuations reflect a restrictive monetary policy stance and the expectation that higher short-term rates are necessary to reduce inflation to acceptable levels. With a beginning yield on the benchmark near 4.75%, we project the asset class to generate returns above the policy rate of return. The asset class received allocations during the fiscal year driven by rebalancing activity, the implementation of the 2022 asset-liability study and higher expected returns for the asset class.
Equities			Earnings growth is expected to be relatively low for fiscal 2024 due to a restrictive monetary policy and potential slower economic growth. Valuation multiples may also decline due to higher interest rates.
<i>Domestic</i>	26%	26.1%	For fiscal 2024, we have a muted outlook for the domestic equity market, resulting in total returns that will likely be less than the policy expectations. The domestic asset class weighting is expected to be held close to the 26.0% policy weight. The total return expectation for international equities is also slightly below the policy return. The international asset class weighting is expected to be held near the 22% policy weight.
<i>International</i>	<u>22%</u>	<u>21.9%</u>	
Total Equities	48%	48.0%	
Real Estate	10%	10.1%	The real estate asset class is projected to record returns below the long-term policy return, with valuations adjusting lower as the fundamental backdrop for real estate remains challenging given the current macro environment. Real estate currently has an allocation near the neutral target weight. Staff will continue to pursue potential acquisitions and dispositions of assets in line with the objectives of return/risk maximization and targeting of policy weight.
Alternative Investments			We project returns in fiscal 2024 for the alternative investments asset class to be at-to-slightly-below the long-term policy return. The economic outlook remains uncertain and potentially challenging for growth assets, while offering opportunities for opportunistic/diversified strategies. The opportunistic/diversified portfolio stood near policy weight as of April 30, 2023, while the private equity weight was above the policy weight. Staff will maintain a private equity and opportunistic/diversified commitment pace in line with the current long-term targeted neutral asset allocation.
<i>Private Equity</i>	9%	11.1%	
<i>Opportunistic/Diversified</i>	<u>10%</u>	<u>9.8%</u>	
Total Alternatives	19%	20.9%	
Total	100%	100.0%	

*More detailed asset weightings and projections are provided to the Retirement Board at its monthly meetings, which provides the Retirement Board more current updates to the overall strategy.

RISK BUDGET

Investment Portfolio Risk

Introduction

There are three primary types of investment risk that the Retirement Board and staff need to manage: capital market risk, active management risk and liquidity risk. The first type describes the volatility of the policy returns and is a result of the plan assets being invested in the selected asset classes. The fiscal 2022 asset-liability study determined an acceptable amount of capital market risk (12.90%) and established appropriate allocations.

STRS Ohio actively manages most of its investments; therefore, the fund will have active management risk. This risk refers to the return fluctuations around the benchmark return that result from active management decisions. The amount of active management risk indicates how closely the portfolio returns will match the benchmark returns. The policy range of active management risk for the total fund is 20–160 basis points. Staff uses the risk budget to manage this risk. Although active management is a source of volatility, it is much lower than and uncorrelated with capital market risk. This means that adding active management risk to the fund will not cause a large increase in total fund volatility. Thus, over the long run, the actions of the staff are not expected to change the total volatility of the fund materially.

Liquidity risk refers to the ability to meet short-term funding requirements without incurring a loss of capital in the process. For STRS Ohio, the most important consideration is the payment of the monthly benefits in a timely manner. Examples of other important secondary needs for liquidity include rebalancing the asset allocation to the policy target weights and funding contractual capital commitments to alternative investment managers. STRS Ohio is a mature pension plan with more than \$4 billion in net benefit payments per year (benefits and operating expenses less contributions). This can create challenges for managing the assets during extended periods of market volatility. Therefore, the asset allocation and its implementation are key to ensuring there is sufficient liquidity at the total fund to efficiently meet all short-term funding requirements.

Asset Allocation and Capital Market Risk

The appropriate amount of capital market risk* for the STRS Ohio portfolio is determined in an asset-liability study. The study establishes an optimal target weight for each asset class. This means there is no other combination of asset classes that has lower risk while achieving the same expected return. The fiscal 2022 asset-liability study updated expected returns, risk levels and the asset mix for the fund. Over a 10-year period, the board’s investment consultant indicates that the accepted asset mix should generate a return of 6.03% (without value added). The following table contains the current and target allocations for each asset class and the expected return and capital market risk.

*The board’s investment consultant recently updated its capital market forecast for the upcoming 10-year period to 7.17%. It is expected the revised level of returns will be incorporated into the Statement of Investment Objectives and Policy during the board’s next review of the policy.

Asset Class	Expected Return	Capital Market Risk	Target Allocation	Rebalancing Range	Approximate April 30, 2023 Weight
Liquidity Reserves	1.00%	0.90%	1%	0%–5%	1.8%
Fixed Income	1.75%	3.75%	22%	13%–29%	19.2%
Domestic Equities	6.60%	17.95%	26%	21%–31%	26.1%
International Equities	6.80%	20.70%	22%	17%–27%	21.9%
Real Estate	5.75%	14.20%	10%	6%–13%	10.1%
Private Equity	8.00%	27.60%	9%	6%–14% ²	11.1%
Opportunistic/Diversified	5.73%	11.88%	10%	6%–14% ²	9.8%
Total Fund	6.03%¹				

¹ Does not include active management returns.

² The Private Equity and Opportunistic/Diversified target weights and rebalancing ranges are only meant to be general guidelines; the official target weight and rebalancing range is at the total alternative investment asset class level. The board approved rebalancing range for the total alternative investments asset class is 12%–25%.

There are multiple ways to quantify capital market risk for an asset mix:

- The expected capital market risk for the total fund benchmark is 12.90%, which means there is a 95% probability that the investment portfolio returns will be in an annual range of –19% to 31%.
- Another risk concept we utilize is the “value-at-risk.” According to this measure, there is on average a 5% chance under the target allocation that the value of the fund could decline by as much as \$13.5 billion or more in a single year.

As of April 30, 2023, the total fund portfolio is near the policy weight in domestic equities, international equities, and real estate. The total fund portfolio is underweight the combination of fixed income and liquidity reserves, while the portfolio is overweight private equity within the alternatives asset class. Through our pacing programs, we expect the allocation to private equity to move closer to the policy target during fiscal year 2024, while we anticipate capital allocations to fixed income. Positions across other assets will likely be near policy target unless anticipated attractive return/risk rewards motivate otherwise. Through our monthly rebalancing activities, we will continue to pursue the objectives of managing active risk and meeting the cash flow needs of the fund.

Risk Budgeting and Active Management Risk

Active management risk refers to portfolio return fluctuations around the benchmark return that result from active management decisions. Risk budgeting is a tool used by staff to efficiently allocate active management risk among the asset classes by assigning active management risk ranges. The goal of a risk budget is to maximize the active management returns earned within a board-approved active management risk range for the total fund. Empirical evidence shows that less efficient markets such as real estate and emerging markets offer greater opportunities for active management returns compared to more efficient markets such as domestic equities and domestic fixed income.

Based upon quantitative work developed by staff, we estimate that the total fund level of active management risk is 83 basis points as of April 30, 2023. The STRS Ohio total fund return should track within plus or minus two times the expected active management risk level relative to the total fund composite benchmark. Thus, if the total fund composite benchmark earns 6.03% for the year, the STRS Ohio return is expected to be within 1.66% (two times 0.83%) of this return about 95% of the time (i.e., between 4.37% and 7.69%). Similarly, in a year when the benchmark return is –3%, the STRS Ohio return is expected to be between –4.66% and -1.34%.

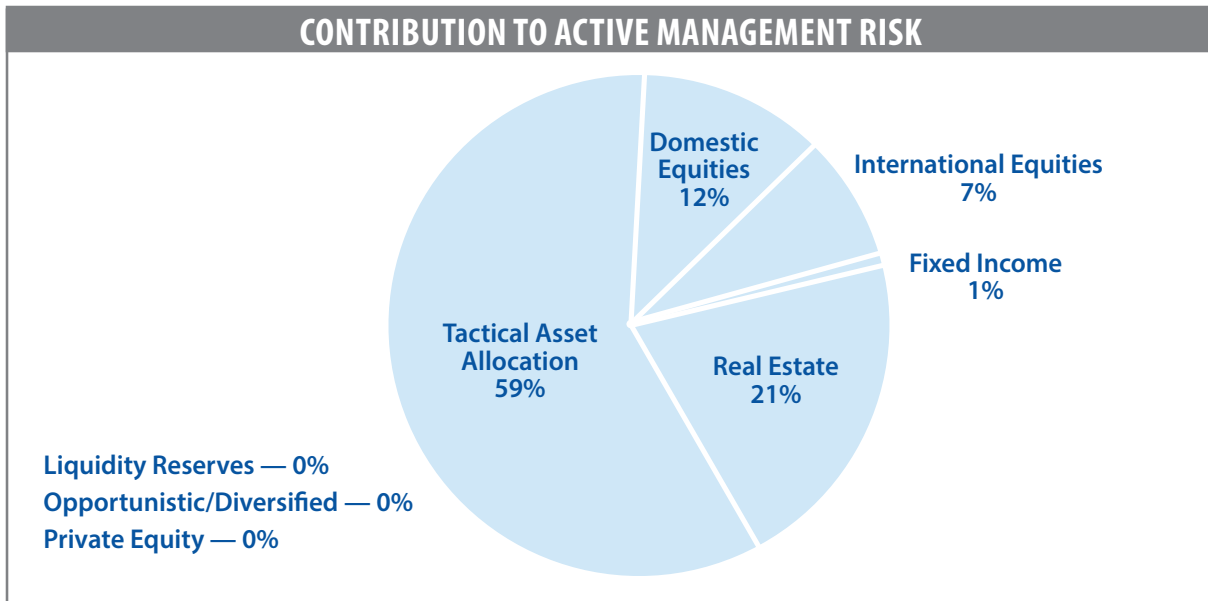
The policy range of active management risk for the total fund is established to achieve the net active management return goal of 40 basis points as specified in the Statement of Investment Objectives & Policy. This policy range is the basis for the policy ranges of the individual asset classes. Expected operating ranges for the asset classes are created by staff each year to efficiently achieve the desired level of active management risk for the total fund. Operating ranges must fall within the policy ranges for each asset class and for the total fund.

FISCAL 2023 ACTIVE MANAGEMENT RISK			
Asset Class	April 30, 2023 Active Management Risk (basis points)	Expected Fiscal 2024 Operating Range (basis points)	Policy Range (basis points)
Liquidity Reserves	N/A	N/A	N/A
Core Fixed Income	24	20–120	10–150
Domestic Equities	88	50–150	20–150
International Equities	102	70–125	60–250
Real Estate	350	350*	200–700
Alternative Investments	N/A	N/A	N/A
Tactical Asset Allocation	60	40–140	N/A
Total Fund	83	60–160	20–160

*As explained in the paragraph that follows, this estimate is static unless a significant portfolio adjustment occurs.

The previous table shows the April 30, 2023, active management risk, and the fiscal 2024 expected operating range of active management risk for each asset class. These measures are expected to fluctuate during the fiscal year; however, no material deviations from these measures are anticipated. The active management risk of the total fund is expected to fall in the range of 60–160 basis points during fiscal 2024. This range includes tactical risk (due to asset allocation decisions) that is not included within the individual asset class active management risk estimates. These asset allocation decisions are likely to vary throughout the year, so this will result in various amounts of tactical risk.

Unlike other asset classes, real estate does not have a model that can be used to accurately estimate active management risk. Instead, the estimate is based on historical active management returns, the amount of leverage in the portfolio, and past real estate market volatility. These factors are unlikely to change much over time without a significant change to the portfolio; therefore, the estimated active management risk for real estate will be static most years. The next chart explains where the active management risk for the total fund is generated as of April 30, 2023.



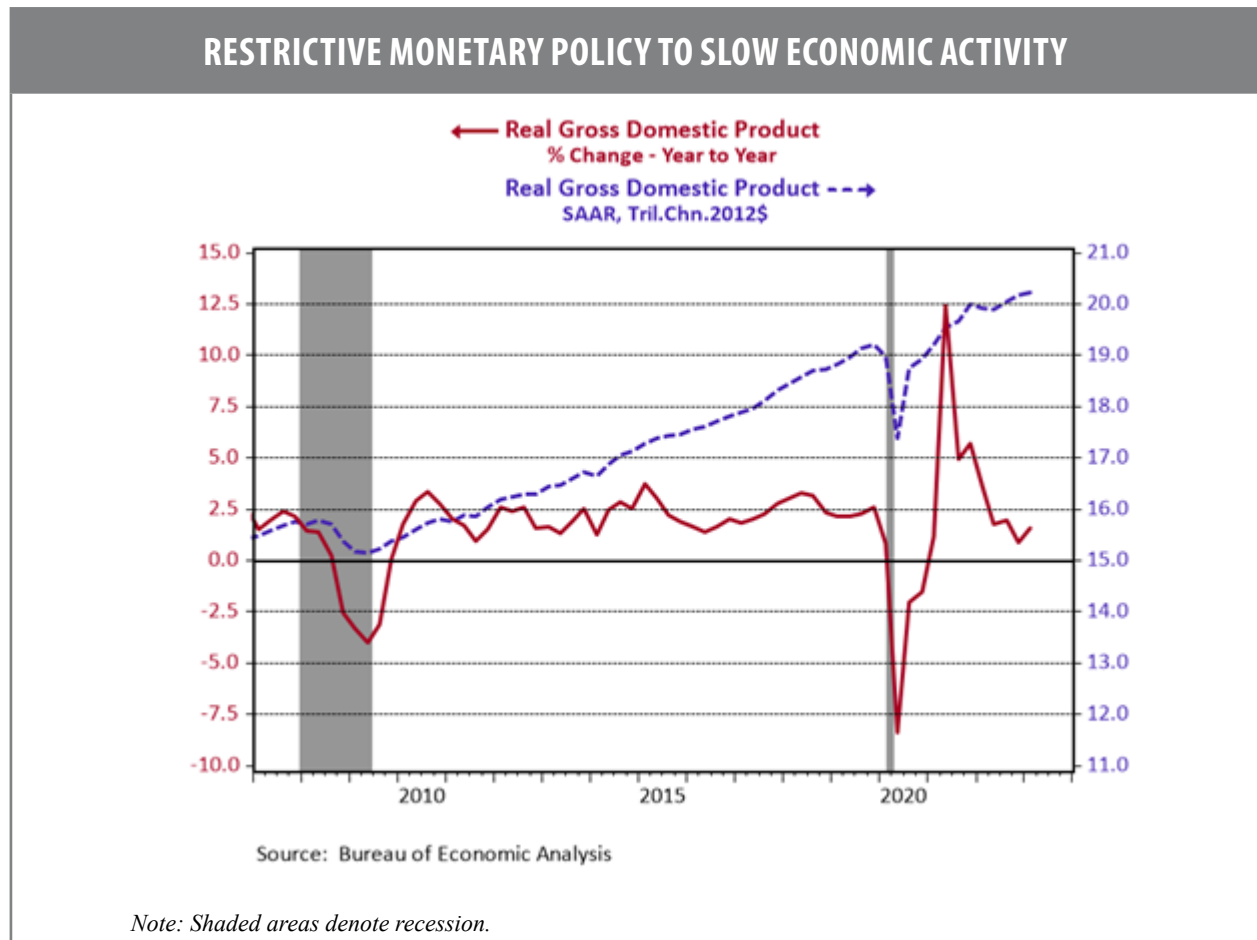
IMPACT AND PROBABILITY ANALYSIS FOR INVESTMENTS

		← PROBABILITY →		
		HIGH	MEDIUM	LOW
FINANCIAL IMPACT	HIGH	<ul style="list-style-type: none"> Not earning the actuarial assumed rate of return over the 10-year period 	<ul style="list-style-type: none"> Long-term sovereign deficit and debt issues 	<ul style="list-style-type: none"> Diversification ineffective Significant negative investment return in any one year Extended period of elevated inflation
	MEDIUM		<ul style="list-style-type: none"> Recession Global financial stress related to low economic growth 	<ul style="list-style-type: none"> Deflation
	LOW	<ul style="list-style-type: none"> Not earning the actuarial assumed rate of return in a fiscal year 	<ul style="list-style-type: none"> Corporate fraud (securities litigation) Buy Ohio 	<ul style="list-style-type: none"> Poor investment Divestment Investment operations failures

4. Fiscal 2024 Economic Outlook

U.S. ECONOMIC GROWTH AND INFLATION OUTLOOK

The risk of a future recession has increased as the U.S. Federal Reserve has tightened monetary conditions in fiscal 2023 to tame inflation. Higher interest costs and tighter lending standards are expected to slow real economic activity from an above-trend pace in the first half of fiscal 2023 to a below-trend rate in fiscal 2024. While unemployment is expected to rise from a historic 3.4% low, wage pressures may ease only gradually as the labor market remains strong. Until those pressures ease and allow inflation to approach the Federal Reserve’s 2.0% long-term policy goal, monetary policy is expected to remain restrictive.



As the transition out of the pandemic has continued, the pace of economic activity has increasingly moderated. In the chart above, after the V-shaped pattern of recovery (dashed blue line), the pace of economic activity (solid red line) peaked at the end of fiscal 2021 at a 12.2% year-over-year rate. However, inflation started climbing and increased well beyond the U.S. Federal Reserve’s 2.0% policy target in fiscal 2023. To tame inflation, the Federal Reserve has tightened monetary conditions by rapidly lifting its policy interest rate. That has already led real (inflation-adjusted) gross domestic product (GDP) to slow from an above-trend 2.9% annual rate in the first half of fiscal 2023 to a below-trend 1.1% annualized rate in the third quarter of fiscal 2023. A similar pace of growth in fiscal 2023’s final quarter is expected to result in a roughly 2.0% trend growth for the year. As that slower economic activity persists into the first half of fiscal 2024 before improving in the second half, real GDP is expected to advance at a 1.3% rate in fiscal 2024, slower than fiscal 2023’s 2.0% growth rate.

Higher interest rates and tighter credit standards are expected to hinder residential investment and non-residential fixed investment. Housing affordability remains low as mortgage rates are higher than they were before the monetary tightening began and a low inventory of for-sale houses has prevented prices from falling enough to lure buyers. However, low unemployment could help residential investment grow a modest 0.4% in fiscal 2024 after an expected 16% drop in fiscal 2023. Meanwhile, in surveys of large and small businesses, a notable sense of caution has developed due to higher borrowing costs and uncertain economic prospects. Non-residential investment will likely grow only at a 1.0% annual rate, slower than the expected 2.4% pace in fiscal 2023.

In contrast, the labor market has been an area of strength and may continue to support economic activity. Unemployment fell from 5.9% in June 2021 to 3.6% a year later and then fell further to a multi-decade 3.4% low in January and April 2023. About 3.3 million new jobs were added to the payrolls in the first 10 months of fiscal 2023. As more workers joined the labor force, the participation rate rose from 62.2% to 62.6% and the prime-age (age 25–64) participation grew to 74.8% from 74%, surpassing the 74.4% pre-pandemic peak. About 1.5 million workers joined the labor force during that time. As businesses hired workers, job openings decreased from about 11 million in June 2022 to about 9.6 million in March 2023. Even if all 5.8 million or so unemployed workers then had found employment, there would still have been 3.8 million unfilled job openings. The wage pressures due to that strong a labor demand will likely recede in fiscal 2024 as businesses slow hiring further and more people join the labor force. Unemployment will likely rise from 3.4% to a 4.0%–4.5% range that includes the U.S. Congressional Budget Office’s 4.4% estimate for the short-term natural rate of unemployment. At a natural rate of unemployment, wage pressures tend to cool off as labor demand and supply tend to roughly equalize.

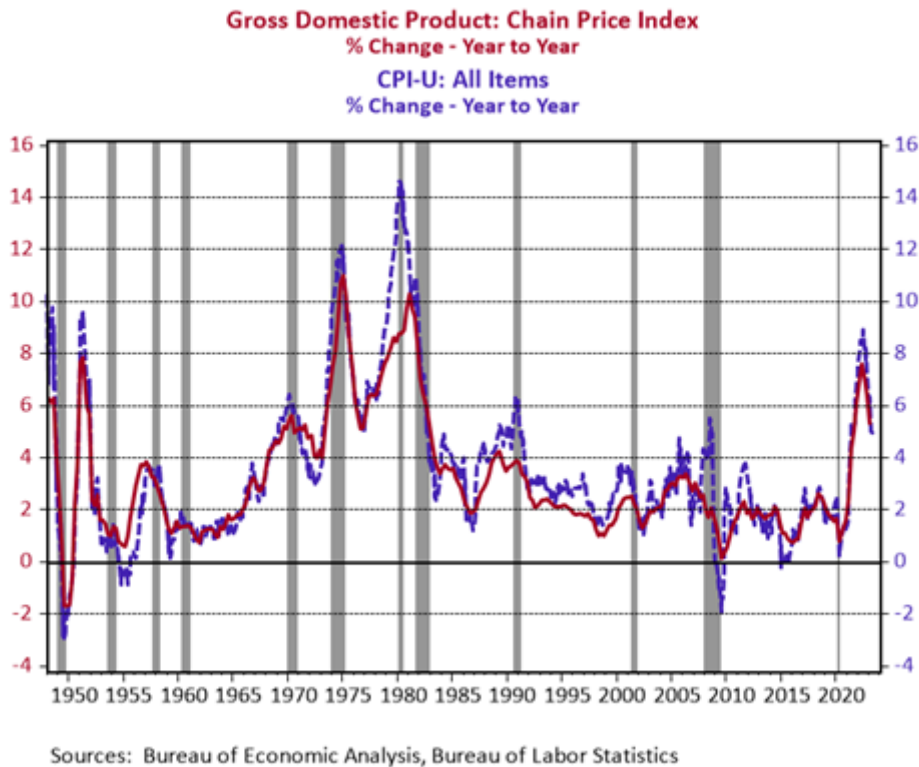
While that employment scenario may continue to support consumer spending, inflation has diluted consumers’ purchasing power and the savings rate has fallen markedly. Consumers have also increasingly spent their savings on a pent-up demand for goods and services. While the pent-up demand for goods has faded, that type of demand for services will continue to decline and that should slow real personal consumption expenditures to a 1.5% annual rate in fiscal 2024 from a 2.1% rate in fiscal 2023.

Combining these core sectors, real private domestic final sales should grow by roughly 0.8% in fiscal 2024 after an expected 1.5% growth in fiscal 2023. The projected 1.3% growth for real GDP, thus, overstates the underlying prospects of the private domestic sector. The recent stresses in the banking sector pose a potential recession risk because they could restrict borrowing by consumers and businesses to dampen private sector activity further. Consequently, the downside risks to the baseline forecast have increased from 20% at the time of the fiscal 2023’s midyear economic forecast update to about 30% currently and that includes a 25% probability of a recession.

Meanwhile, since early fiscal 2023, when the Federal Reserve began raising the policy interest rates rapidly, probability models of a recession over the next twelve months or so have sent conflicting signals. Currently, probabilities across models range from a high 60%–70% to a moderate-to-low 20%–30%. The high probability models, however, have warned since early fiscal 2023. Roughly a year later investors are monitoring economic activity in case near-term problems develop and spill over into fiscal 2024. Through the end of fiscal 2023’s third quarter, probability models that scan current economic activity for recessionary signs are not flashing a warning signal.

As economic activity has slowed, inflation has been moderating in fiscal 2023 (see chart on Page 11). Policymakers had attributed the initial rise in inflation to global supply chain disruptions during the pandemic. As those problems were resolved, goods inflation has decreased rapidly in fiscal 2023. However, services inflation has stayed elevated as businesses in the service sector have raised prices to pass on higher wage costs to consumers. As the pent-up demand for services fades and wage pressures ease in fiscal 2024, those pressures are expected to moderate and help inflation approach the Federal Reserve’s 2.0% policy target.

INFLATION IS RECEDING TOWARD THE ACCEPTABLE RANGE FOR THE FEDERAL RESERVE



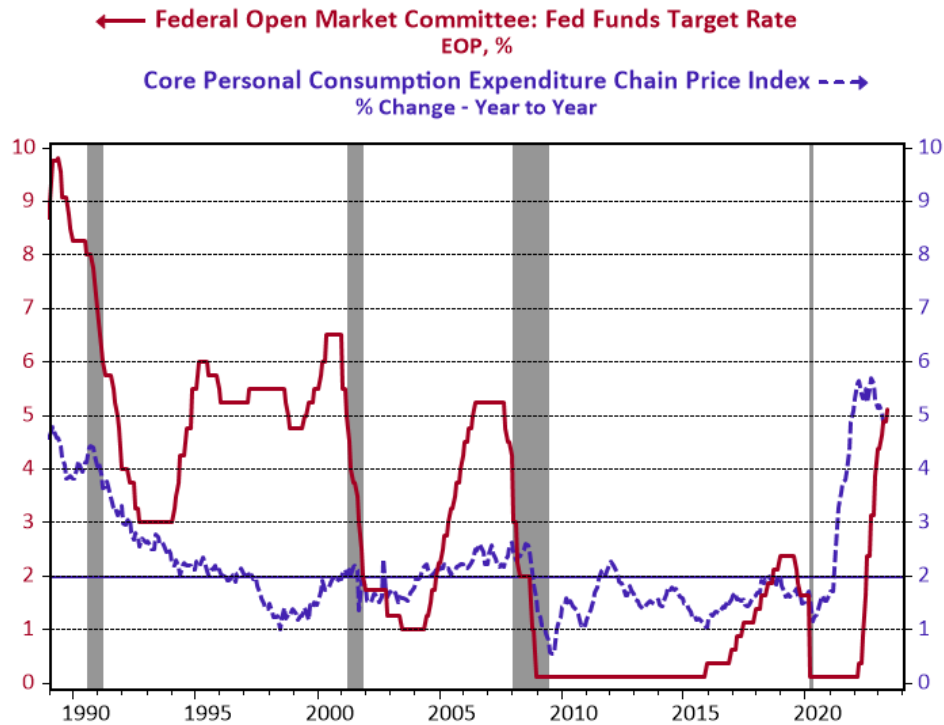
Note: Shaded areas denote recession.

The Federal Reserve is close to ending the current phase of its interest rate increases. As of its May monetary policy meeting, it has lifted the range on the federal funds rate — the Fed’s main policy tool (solid red line in the chart on the next page) — to 5.0%–5.25% from the 1.5%–1.75% in June 2022. Policymakers will now assess how inflation and growth evolve before guiding investors on future policy. But they have also left open the option to intervene if economic activity strays from their expectations.

The baseline economic forecast expects that the Federal Reserve will continue with its stated policy of maintaining the federal funds rate near the current level. If the Personal Consumption Expenditure (PCE) inflation grows around the 2.6% pace projected for the end of fiscal 2024 and economic activity remains weak through then, the Federal Reserve could begin signaling a bias toward easing monetary policy. The Federal Reserve has also started the Bank Term Funding Program for alleviating liquidity shortages for banks. Since that program does not keep banks from tightening lending standards further, policymakers will likely monitor that additional risk to economic activity as they formulate future policy.

Thus, short- and long-term interest rates could sway widely in fiscal 2024 due to several cross currents. The Federal Reserve may cut the federal funds rate if economic activity slows more than expected while inflation is slowing in a sustained way toward the policy target. If instead, economic activity stays robust and inflation is not slowing, the Federal Reserve may raise the federal funds rate. Further, while economic growth abroad is expected to improve, it faces interest rate increases that foreign central banks, too, have enacted to control inflation. Economic activity remains vulnerable to adverse shocks like the steep increases in energy and food prices after Russia invaded Ukraine. Such shocks could also sway U.S. interest rates and may influence the Federal Reserve’s assessment of risks to the U.S. economy.

**FEDERAL RESERVE WILL MAINTAIN A RESTRICTIVE STANCE
 UNTIL INFLATION IS IN THE ACCEPTABLE RANGE**



Sources: Federal Reserve Board, Bureau of Economic Analysis

Note: Shaded areas denote recession.

Meanwhile, over the near term, a political deadlock over the debt ceiling and the stress in the banking sector could tighten financial conditions more than what policymakers may have calibrated in their own economic outlook. Reflecting a wider range of the potential paths for interest rates in fiscal 2024, the ranges for the federal funds rate and 10-year Treasury yield are listed in the table below.

Period	Federal Funds Rate	10-Year Treasury Yield
Fiscal 2024 Ranges	3%–6.25%	2%–5%

Note: The ranges listed anticipate capturing 90% of the daily closes during the period described. Brief excursions above or below these ranges that are quickly reversed should not be considered violations of the forecast.

The downside risks to economic growth have increased since fiscal 2023’s midyear economic forecast update. U.S. fiscal 2024 growth in the 0.5%–3.0% baseline range has about a 50% chance of occurring, while more robust economic growth than the baseline carries a 20% chance. At the time of the midyear update, growth slower than the baseline carried a 25% chance, and that has increased to 30% — including about a 25% probability of a recession. The baseline U.S. forecast of 3.9% nominal GDP growth (real GDP growth plus GDP price index growth) is higher than the median 3.2% nominal growth in the Blue Chip Economic Indicators.

U.S. ECONOMIC FORECAST SUMMARY								
Composition of Real GDP	Fiscal Year Ranges	FY 2024	FY 2024		FY 2023	FY 2023		FY 2022
			H1	H2		H1	H2	
Gross Domestic Product	0.5%–3.0%	1.3%	0.6%	2.0%	2.0%	2.9%	1.1%	1.8%
Personal Consumption	1.0%–3.5%	1.5%	1.2%	1.8%	2.1%	1.6%	2.6%	2.4%
Nonresidential Investment	(3.5%)–7.5%	1.1%	(0.0%)	2.2%	2.4%	5.1%	(0.1%)	2.4%
Residential Investment		0.4%	(1.0%)	1.7%	(16.0%)	(26.1%)	(4.6%)	(7.2%)
Exports of Goods & Services		2.9%	2.0%	3.7%	4.5%	5.0%	3.9%	7.3%
Imports of Goods & Services		2.4%	1.7%	3.0%	(1.6%)	(6.4%)	3.5%	11.2%
Federal Consumption & Investment		1.5%	1.7%	1.2%	4.8%	4.8%	4.9%	(4.0%)
State & Local Consumption & Investment		1.3%	1.2%	1.3%	2.6%	3.2%	1.9%	0.5%
Final Sales		0.9%	0.0%	1.7%	2.7%	2.8%	2.6%	0.5%
Domestic Final Sales		0.9%	0.1%	1.7%	1.6%	1.1%	2.2%	1.3%
Private Domestic Final Sales		0.8%	(0.1%)	1.8%	1.5%	0.5%	2.5%	1.8%
Incomes								
Real Disposable Personal Income		2.2%	1.9%	2.5%	4.6%	4.1%	5.2%	(5.6%)
Nominal GDP Corporate Profits, After Tax	(5.5%)–5.5%	1.2%	0.6%	1.7%	3.1%	3.6%	2.5%	5.0%
Prices								
Consumer Price Index		3.0%	3.2%	2.8%	4.4%	4.9%	4.0%	8.6%
Consumer Price Index Ex Food & Energy	2.0%–5.0%	2.7%	2.9%	2.4%	5.0%	5.6%	4.4%	6.0%
Personal Consumption Expenditures Price Index		2.6%	2.8%	2.3%	4.0%	4.0%	3.9%	6.6%
GDP Price Index		2.6%	2.8%	2.5%	3.8%	4.1%	3.5%	7.6%
Other Key Measures								
Real Net Exports (\$B)	(\$1400)–(\$1170)	(\$1262.7)	(\$1256.6)	(\$1268.8)	(\$1249.4)	(\$1253.7)	(\$1245.1)	(\$1371.1)
Real Change in Business Inventories (\$B)		\$7.5	(\$25.0)	\$40.0	\$30.9	\$87.60	–\$25.80	\$118.4
Light Vehicle Sales (M)		14.75	14.38	15.13	14.59	14.00	15.18	13.59
New Housing Starts (M)	1.200–1.450	1.300	1.263	1.338	1.401	1.424	1.378	1.654
Industrial Production		0.7%	0.2%	1.2%	(0.3%)	(0.2%)	(0.5%)	3.8%
Unemployment Rate		4.0%	3.8%	4.2%	3.6%	3.6%	3.6%	4.2%

INTERNATIONAL ECONOMIC GROWTH AND INFLATION OUTLOOK

In fiscal 2024, economic growth abroad is expected to improve but remain below trend. Central banks have raised policy interest rates in fiscal 2023 and tighter monetary conditions are expected to persist through fiscal 2024. However, central banks in emerging countries have mostly paused their interest rate increases to examine how inflation and growth responds to past monetary tightening. In contrast, the central banks of developed countries may increase their policy rates further. However, they too are likely to signal a pause in monetary tightening during the fiscal year. Tighter global monetary policies are thus likely to weigh on economic growth as inflation slows toward the long-term policy targets.

Real GDP in the eurozone grew an above-trend annualized 1.5% in fiscal 2023's first quarter but slowed to a crawl in the second quarter after Russia cut off gas supply to the region. The manufacturing sector slowed markedly as the excess demand for goods faded and the energy crisis interrupted production, especially in the energy-intensive areas of the sector. Meanwhile, inflation climbed to a 10.6% year-over-year rate in October 2022. Though it has since eased to about a 7.0% rate in April 2023, it continues to erode purchasing power of consumers and businesses, dampening demand.

That 7.0% inflation is well above the European Central Bank's (ECB) 2.0% policy target. The ECB has continued to raise its main policy interest rate to 3.5% currently and may increase it by another 50–75 basis points. The region's inflation has proven stubborn and wage growth (due to low unemployment) has continued to boost inflation pressures. Though energy prices have eased, the crisis has forced the region to develop a new energy policy to secure energy supplies in the long run. As the new infrastructure takes shape, the region remains vulnerable to unexpected energy shortages. Despite that risk, economic growth should improve toward trend during fiscal 2024. Though monetary policy is likely to remain restrictive until inflation approaches the ECB's policy target, fiscal policy is expected to be supportive of economic activity as governments allocate resources toward the energy sector and defense spending. Thus, long-term non-residential fixed investments is expected to be central to growth in fiscal 2024.

Economic activity in the United Kingdom (U.K.) has been lackluster and real GDP has stayed less than the pre-pandemic peak. Interest rate increases by the Bank of England (BoE) have impeded demand over and above the loss in purchasing power consumers and businesses have experienced due to high inflation. Unemployment, however, has remained low in the 3.8%–4.0% range, but wage increases have boosted unit labor costs to a roughly 5.0–6.0% while productivity has slowed. Meanwhile, limited labor supply has constrained economic activity and the 78.6% labor force participation rate remains a percentage point below the pre-pandemic level. Combined with the restrictions on immigration after Brexit, insufficient labor supply has reduced the near-term growth potential. While real GDP growth in fiscal 2024 should improve from the pace in fiscal 2023, it will likely remain below long-term trend.

Though headline annual inflation of roughly 10% has much further to fall before reaching the BoE's long-term 2.0% target, the BoE may lift the policy rate by another 25–50 bps from the current 4.25%. It may then pause to assess the economic effects of tight monetary conditions before announcing future policy changes. Meanwhile, quantitative tightening of monetary conditions should continue at a set pace.

After years of deflation, inflation in Japan has surprised investors. Key inflation measures closely followed by policymakers have increased in recent months to a 3.0%–4.0% annual rate, well above the Bank of Japan's (BoJ) 2.0% policy goal. While the BoJ's strong policies over the past decade were able to push back deflation, they were unable to help sustain inflation modestly above 2.0%. Policymakers have thus viewed the recent rise of inflation as an opportunity to cement that outcome.

Japan's government, businesses and labor unions have helped build a consensus to raise wages by about 2.0% to embed inflation and lift inflation expectations. In turn, that would allow businesses to raise prices and help boost the chances of inflation taking hold if that cycle of modest wage and price increases repeats in subsequent years. To encourage that multi-year dynamic, the BoJ may change its monetary policy very gradually.

After China ended its zero-COVID-19 policy in the first half of fiscal 2023, its consumer spending increased, especially as travel and tourism became more widely available. However, unlike other countries where a reopening of the economy had led to a burst of economic activity, progress in China has been relatively cautious. Consumer spending has not improved rapidly because consumers continue to hold onto precautionary savings. A major reason for that is the housing market, where developers have struggled financially due to the zero-COVID-19 policy. Policymakers have only recently begun addressing the issue and it will likely require fiscal intervention.

Meanwhile, fixed investment in China is dominated by the state governments that receive investment targets from the central government. The states, however, have been unable to meet their targets because they had to allocate resources toward mass-testing for the virus under the zero-COVID-19 policy. With that policy now relaxed, increasingly more states are likely to focus on meeting those targets and that will help lift investment in fiscal 2024. However, due to a shrinking labor force, China is entering a new phase in upcoming years where its trend growth is likely to shift gradually to a 3.0%–4.0% annual rate from the 4.0%–5.0% range currently. The transition toward that new trend will likely occur through fiscal 2024 and will become increasingly evident as real GDP may be unable to maintain the faster growth of prior years.

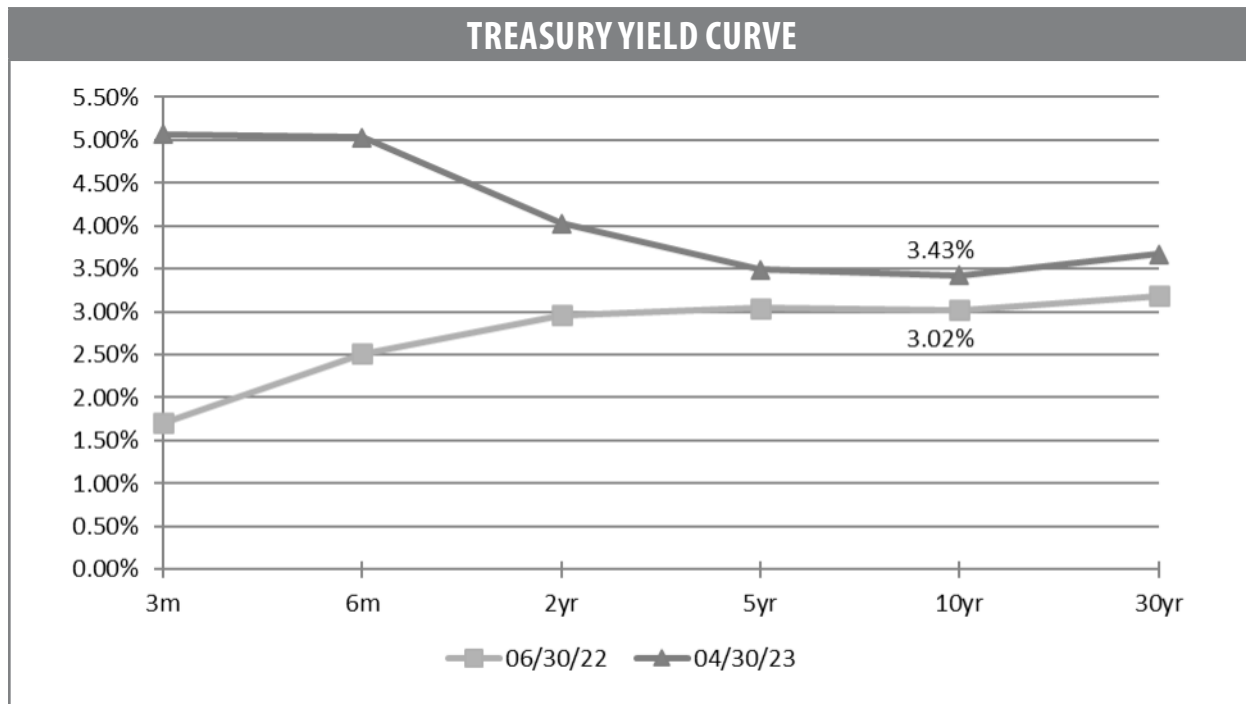
India's economic growth has been robust while inflation has receded below the upper end of the central bank's 2.0%–6.0% policy target range. Economic growth in fiscal 2024 is likely to remain healthy due to strong consumer demand and various nationwide infrastructure projects that lift long-term fixed investment growth.

In Latin America, Brazil has struggled to boost economic activity because monetary policy has been restrictive over the past two years. As policy interest rates were increased from 2.0% in March 2021 to 13.75% by August 2022, inflation has receded from a 12% year-on-year rate to about 4.5%, which is the upper end of the 1.5%–4.5% policy target range. The central bank is likely to maintain its restrictive policy stance until inflation stays within the policy range. As that occurs in fiscal 2024, Brazil's central bank may be one of the first to signal a bias toward easing monetary conditions. Similarly, Mexico's central bank has also paused recently from increasing its policy interest rate from 11.75%. Inflation is above the central bank's 2.0%–4.0% target range because economic activity has proven resilient as it is benefiting from foreign business investments seeking to diversify production away from China.

In sum, economic growth abroad in fiscal 2024 is expected to remain cautious as tight monetary conditions are likely to persist in most countries. Central banks in emerging countries have mostly paused their interest rate increases to examine how inflation and growth responds to past monetary tightening. The central banks of developed countries may increase their policy rates further, but they are also expected to signal a pause in monetary tightening. Tighter global monetary policies are thus expected to weigh on economic growth as inflation slows. The main geopolitical risks to global growth stem from the ongoing war between Russia and Ukraine and the rising diplomatic tensions between the United States and China.

INTERNATIONAL FORECASTS				
	Real Gross Domestic Product		Inflation	
Country/Region	FY 2024	FY 2023	FY 2024	FY 2023
Canada	0.8%	0.7%	2.5%	3.5%
United Kingdom	0.7%	0.3%	2.5%	7.4%
Eurozone	0.8%	0.7%	2.7%	6.7%
Germany	1.0%	0.6%	2.5%	7.3%
France	0.8%	0.5%	2.3%	6.4%
Italy	0.7%	1.0%	2.8%	8.3%
Asia-Pacific				
Japan	1.3%	0.8%	2.2%	2.8%
China	4.5%	8.3%	2.3%	1.8%
India	6.7%	6.2%	5.8%	6.0%
Australia	1.6%	1.8%	3.3%	6.1%
South Korea	2.4%	1.0%	2.3%	3.4%
Latin America				
Brazil	0.7%	1.7%	3.7%	3.5%
Mexico	2.0%	1.5%	4.5%	5.8%

5. Fixed Income Investments



OUTLOOK

Bond Market Returns

We forecast the total return of the fixed income market to be above the STRS Ohio policy return of 1.75% in fiscal year 2024. The fixed income benchmark yield begins the fiscal year above the policy return at 4.76%. Since the benchmark yield is above the policy return and we forecast prices in the benchmark to be little changed, we expect the benchmark to finish fiscal year 2024 above the policy total return.

Federal Reserve

The Federal Reserve raised the federal funds rate to a range of 5.00% to 5.25% from 1.50% to 1.75% during fiscal year 2023. Inflation remained stubbornly above the Federal Reserve’s 2% target, leading the Federal Reserve to aggressively raise interest rates to slow down the economy and combat inflation.

We believe the Federal Reserve has raised the federal funds rate close to its peak in this tightening cycle. We are forecasting a range of 3.00% to 6.25% on the federal funds rate. This forecast reflects our expectation that the Federal Reserve will maintain a restrictive monetary policy until inflation slows and becomes more consistent with the Federal Reserve’s 2% target. The Federal Reserve will closely monitor the path of inflation during fiscal year 2024. If inflation falls toward the Federal Reserve’s 2% target, we expect the Federal Reserve will stop raising interest rates and may begin to cut interest rates depending on the strength of the economy. However, if inflation remains well above target, the Federal Reserve may continue raising short-term interest rates closer to the high end of our forecasted range.

In determining appropriate monetary policy, the Fed will closely monitor the banking system as recent stress in some regional banks may impact banks’ willingness to lend and could lead to tighter credit conditions for households and businesses. The Fed may determine that tougher bank lending standards are doing enough to tighten credit conditions and reduces the need for further policy rate increases.

In addition to interest rate increases, the Federal Reserve has begun reducing the size of its balance sheet through maturities and principal payments known as quantitative tightening (QT). The Federal Reserve has

stopped reinvesting principal payments from U.S. Treasuries and agency mortgage-backed securities subject to monthly caps. It is allowing U.S. Treasuries to decline up to \$60 billion per month and agency mortgage-backed securities to decline by up to \$35 billion per month. The Federal Reserve expects this balance sheet reduction will work in concert with higher short-term interest rates to slow down the economy with the goal of reducing inflation.

Market Interest Rates

Our forecasted 10-year U.S. Treasury interest rate range is 2.00% to 5.00%. The expected 10-year U.S. Treasury interest rate range is based on the STRS Ohio economic forecast of slower economic growth, a reduction in inflation, the Federal Reserve nearing the end of its tightening cycle, and the reduction of the Federal Reserve's balance sheet.

Interest rates rose during fiscal year 2023 as the Federal Reserve aggressively raised short-term interest rates to achieve a sufficiently restrictive monetary policy. This policy tightening led to a deeply inverted yield curve with short-term interest rates much higher than long-term interest rates. The yield curve is now pricing in an expectation that the Federal Reserve is finished raising short-term interest rates and will begin to lower short-term interest rates during the fiscal year. The 10-year U.S. Treasury yield is trading close to the middle of our interest rate range, which we view as fair value.

Stronger economic growth and higher than expected inflation could lead to interest rates trading near the upper end of the interest rate range. On the other hand, a weaker economic growth environment, inflation falling even faster than expected, fear of a U.S. default on its debt, or an escalation of the Russian invasion of Ukraine may result in interest rates trading near the lower end of our range.

Credit Quality

Corporations enter the next fiscal year with stable balance sheets, healthy profit margins and low leverage which should provide a partial buffer for lower rates of economic activity. Nonetheless, corporate credit quality is expected to face several headwinds, including higher interest rates, inflation and growing risks of a recession during the fiscal year. Monetary policy is expected to remain restrictive and fiscal policy is not expected to be particularly stimulative to the U.S. economy. Tighter lending standards indicate restrictive financial and credit conditions may impact corporations' access to capital. However, lower merger and acquisition volumes should lead to less speculative activity and lower leverage.

Most banks continue to enjoy high levels of capital, liquidity and strong balance sheets; however, higher short-term interest rates will eventually compress net interest margins and erode profitability. Bank management teams are preparing for asset quality decline across consumer and commercial loan categories by increasing loan loss reserves which we expect to continue throughout fiscal year 2024. Bank management teams will be more focused on liquidity sources as increasing interest rates provide depositors with higher yielding alternatives to traditional deposits. Additionally, more stringent regulations are expected to be enacted given the stress in small to midsize regional banks, but the timing is uncertain.

High yield corporate credit fundamentals are strong but may have peaked and could be negatively impacted by a slowing economy. Default rates are expected to rise to the low/mid-single digits range in fiscal year 2024 after a period of very low defaults during the COVID-19 economic recovery. Corporate leverage is relatively low and interest coverage is still high as companies have benefitted from improved cash flow and balance sheet deleveraging over the last couple of years.

Emerging market (EM) countries continue to experience faster economic growth than developed markets. EM will benefit from a reopening of the Chinese economy and pent-up consumer demand as the COVID-19 pandemic has subsided in that country. Inflation has likely peaked in many EM countries and as a result monetary tightening is close to being finished. We expect to see some monetary policy easing during the fiscal year if inflation continues its downward path. EM countries' credit quality continues to benefit from relatively low public sector leverage and flexible exchange rates.

STRATEGY

Overview

The core fixed income portfolio will begin with an active management risk of 24 basis points and will operate in the range of 20 to 120 basis points. The liquid treasury portfolio will have an active management risk operating range of 0 to 25 basis points. The following points summarize our outlook and portfolio strategy for fiscal year 2024.

- The STRS Ohio economic forecast predicts a below trend economic growth environment, a reduction in inflation, and continuing restrictive monetary policy from the Federal Reserve.
- We have positioned the core portfolio with a current relative duration of 101.00%. Our strategy reflects the STRS Ohio economic outlook, below trend economic growth, and interest rates that appear fair relative to economic fundamentals.
- Regarding sector allocation of the core portfolio, we are maintaining an underweight position in U.S. Treasuries and non-agency CMBS. We begin the year with an overweight position in agency mortgage-backed securities, agency commercial mortgage-backed securities, asset-backed securities, investment grade corporates, high yield corporates, and emerging market debt but may adjust those positions as fundamentals and valuations evolve during the fiscal year.
- We reserve an ample amount of active management risk capacity as we expect that as the economy evolves and the Fed responds to changes in growth and inflation, the market may present opportunities that lead to significant valuation changes and would prompt us to increase or decrease active management risk.
- The fixed income asset class has had \$2.1 billion in net contributions fiscal year-to-date through April, with the core portfolio receiving a net contribution of \$703 million and the liquid treasury portfolio receiving a net contribution of \$1.37 billion.
- The total fixed income allocation is 19.2%, versus a neutral target weight of 22%.

Strategic Initiatives

- We continue to implement and review tactical and strategic opportunities including non-agency mortgage-backed securities, which is a non-index sector. We maintain a tactical position in non-index treasury inflation protected securities (TIPS) should inflation rise above expectations.
- The liquid treasury portfolio is positioned to provide funds for portfolio rebalancing and monthly cash flow needs of the total fund, especially during extreme events such as the market volatility associated with the COVID-19 pandemic in March and April 2020.
- The core fixed income portfolio will continue to review less liquid sectors and opportunistically provide liquidity in risk-off markets to earn an additional return premium.

Sectors

Treasuries

- During fiscal year 2023, we moved from a slight overweight to underweight as relative value opportunities became available in spread sectors. We expect to begin fiscal year 2024 underweight and will adjust the weight as opportunities in spread sectors develop.
- We have a tactical position in TIPS should inflation rise above expectations.
- The liquid treasury portfolio (LTP) consists of high quality, liquid securities and has a market value of \$4.2 billion, representing 4.8% of total fund assets.

- The LTP neutral target allocation is 5% of total fund assets.
- The marketability of the portfolio will remain high to maintain substantial flexibility in meeting the liquidity needs of the total fund — including benefit payments, asset allocation rebalancing and diversification.
- We will focus on U.S. Treasury security selection, emphasizing relative value and efficient trade execution.

Government Related

- We continue to maintain a large underweight due to low yield spreads. We expect to remain underweight but will continue to monitor spreads and seek opportunities in both U.S. agency securities and within other government related sectors of the Index.

CMBS (Commercial Mortgage-Backed Securities) and ABS (Asset-Backed Securities)

- We begin the fiscal year underweight non-agency CMBS as certain sectors within commercial real estate are experiencing deteriorating fundamentals. Office fundamentals have weakened recently as vacancies increased, and access to credit is becoming more challenging. However, we expect some property sectors' fundamentals, such as industrial and hospitality, to remain stable or improve over time. We will continue to monitor non-agency CMBS for select opportunities.
- We begin the fiscal year overweight agency CMBS as multifamily fundamentals are favorable relative to other commercial real estate sectors. We expect to maintain or increase exposure to the agency CMBS sector.
- We begin the fiscal year overweight ABS. Consumer credit fundamentals are generally benign and supported by the strong labor market. Used car prices have begun to normalize, however the prior surge in prices due to supply chain constraints has been beneficial for the credit quality of ABS trusts. We will continue to monitor the sector for opportunities with an emphasis on strong issuers, structural credit enhancements, and high-quality collateral.

Mortgages

- We begin the fiscal year overweight agency mortgage-backed securities (MBS). We expect prepayments to be low during the fiscal year due to a decline in refinancing and reduced new mortgage activity as mortgage rates continue to stay elevated because of historically high interest rates.
- Interest rate volatility is likely to be high at the start of the fiscal year and will potentially decline over time if the Fed stops hiking interest rates and the stress in the regional banking sector subsides.
- The Federal Reserve will continue to allow its MBS holdings to decline under its quantitative tightening (QT) program in which mortgage paydowns have been consistently less than the \$35 billion monthly maximum allowed. However, the QT program could be stopped if the economy slows down or a recession occurs during the fiscal year.
- We plan to selectively add agency MBS bonds on a relative value basis as the year progresses. Our security selection process will continue to focus on Agency MBS pools that are likely to provide stable cash flows at a reasonable valuation and a higher relative return.

Investment Grade Corporates

- We begin the fiscal year overweight investment grade corporates. Yield spreads have widened recently, reflecting higher interest rates, inflation, and regional bank stress. We think investment grade corporates yield spreads have capacity to tighten, but headwinds have increased.
- We expect to maintain the overweight in investment grade corporates during fiscal year 2024 and retain the ability to increase the overweight should yield spreads widen throughout the fiscal year.
- Our credit selection will be focused on companies with strong credit characteristics that will be able to maintain margins and profits during slower economic growth, acknowledging that borrowing costs and input costs have moved higher as a result of inflation and tighter monetary policy.

High Yield Corporates

- We begin the fiscal year overweight high yield corporates. Yield spreads are fair and reflect a credit environment with default rates in the low/mid-single digits.
- We will adjust our high yield position as fundamentals and valuations evolve during fiscal 2024. We may reduce the overweight if the fundamental outlook deteriorates and yield spreads remain tight. On the other hand, we may make additional allocations to the sector if yield spreads become more attractive.

Emerging Market Debt

- We begin the fiscal year overweight emerging market debt. Yield spreads are fair and reflect the benefits of the reopening of the Chinese economy and decelerating inflation rates in emerging market countries.
- We expect to maintain the emerging market overweight during fiscal 2024 and may make additional allocations during the fiscal year.

BOND STRUCTURE REPORT					
(as of April 2023)					
Portfolio	Market Value* (\$ millions)	% of Asset Class	Portfolio Annualized Active Management Risk¹	Portfolio Duration²	Targeted Relative Duration
Core Fixed Income	\$ 12,781	75%	24 bps	6.14 yrs	101.0%
Liquid Treasury Portfolio	\$ 4,227	25%	2 bps	3.77 yrs	100.0%
Total Fixed Income	\$ 17,007	100%			

Core Fixed Income	Market Value* (\$ millions)	Percent of Portfolio*	Yield	Relative to Index³
Treasuries	\$ 3,532	28%	3.7%	0.88x
Government Related ⁴	\$ 39	0%	4.5%	0.05x
Mortgages ⁵	\$ 3,259	25%	4.4%	1.09x
CMBS & ABS ⁶	\$ 564	4%	4.7%	1.59x
Investment Grade Corporates ⁷	\$ 3,836	30%	4.9%	1.17x
High Yield Corporates ⁸	\$ 640	5%	8.2%	1.20x
Emerging Market Debt ⁹	\$ 911	7%	8.2%	1.12x
Total Core Fixed Income	\$ 12,781	100%	4.8%	

Liquid Treasury Portfolio	Market Value* (\$ millions)	Percent of Portfolio*	Yield
Treasuries	\$ 4,227	100%	3.8%
Total Liquid Treasury	\$ 4,227	100%	3.8%

Market Values for April 30, 2023, are preliminary.

*Market Value and Percent of Portfolio columns may not add due to rounding.

¹ A statistical model is used to generate annualized active management risk, which is an estimate of the expected difference in annual performance between the portfolio and the index. The Core Fixed Income Portfolio currently has an annualized active management risk of 24 basis points, meaning the performance of the portfolio relative to the index is expected to be within 24 basis points for 68% (one standard deviation) of all market outcomes.

² A measure of the sensitivity of the price of the fixed income portfolio to a change in interest rates, expressed in years. The current Core Fixed Income Portfolio duration of 6.14 years implies the average price of the portfolio is expected to rise by 6.14% for a 1% (100 basis point) decline in interest rates and is expected to fall by 6.14% for a 1% (100 basis point) increase in interest rates. The portfolio duration relative to the index, currently at 101.0%, is the portfolio's duration divided by the duration of the index. A number less than 100% implies the portfolio has a duration less than that of the index and reflects an expectation of rising rates.

³ The relative exposure to each sector versus the index, based upon market value and duration. A number greater than 1.00x indicates an overweight and reflects a sector that we believe is undervalued. A number less than 1.00x indicates an underweight, and a sector we believe is overvalued.

⁴ Consists of U.S. Government Sponsored Enterprise debt and other highly rated non-corporate debt.

⁵ Mortgages are secured by a diversified pool of loans on residential properties.

⁶ Commercial Mortgage-Backed Securities (CMBS) are secured by a diversified pool of loans on commercial property such as office buildings, industrial complexes, retail centers, hotels and multifamily developments. Asset-Backed Securities (ABS) are secured by diversified pools of consumer loans, including credit card receivables and auto loans.

⁷ Consists of debt from industrial, utility and financial institution issuers that is rated investment grade, which is Baa and above.

⁸ Consists of debt from industrial, utility and financial institution issuers that is rated non-investment grade, which is Ba and below.

⁹ Consists of bonds issued by sovereign, quasi-sovereign, and corporate emerging market issuers. Country eligibility and classification as Emerging Markets is rules-based and reviewed annually using World Bank income group and International Monetary Fund (IMF) country classifications.

6. Domestic Equities Investments

OUTLOOK

Equity Market Return Expectations

For fiscal 2024 we forecast total returns to be in a range of –22% to +12%, with a central S&P 500 target of 4100 (0.0%) on a total return basis, below the STRS Ohio policy return of 6.60%. Key factors behind this forecast are:

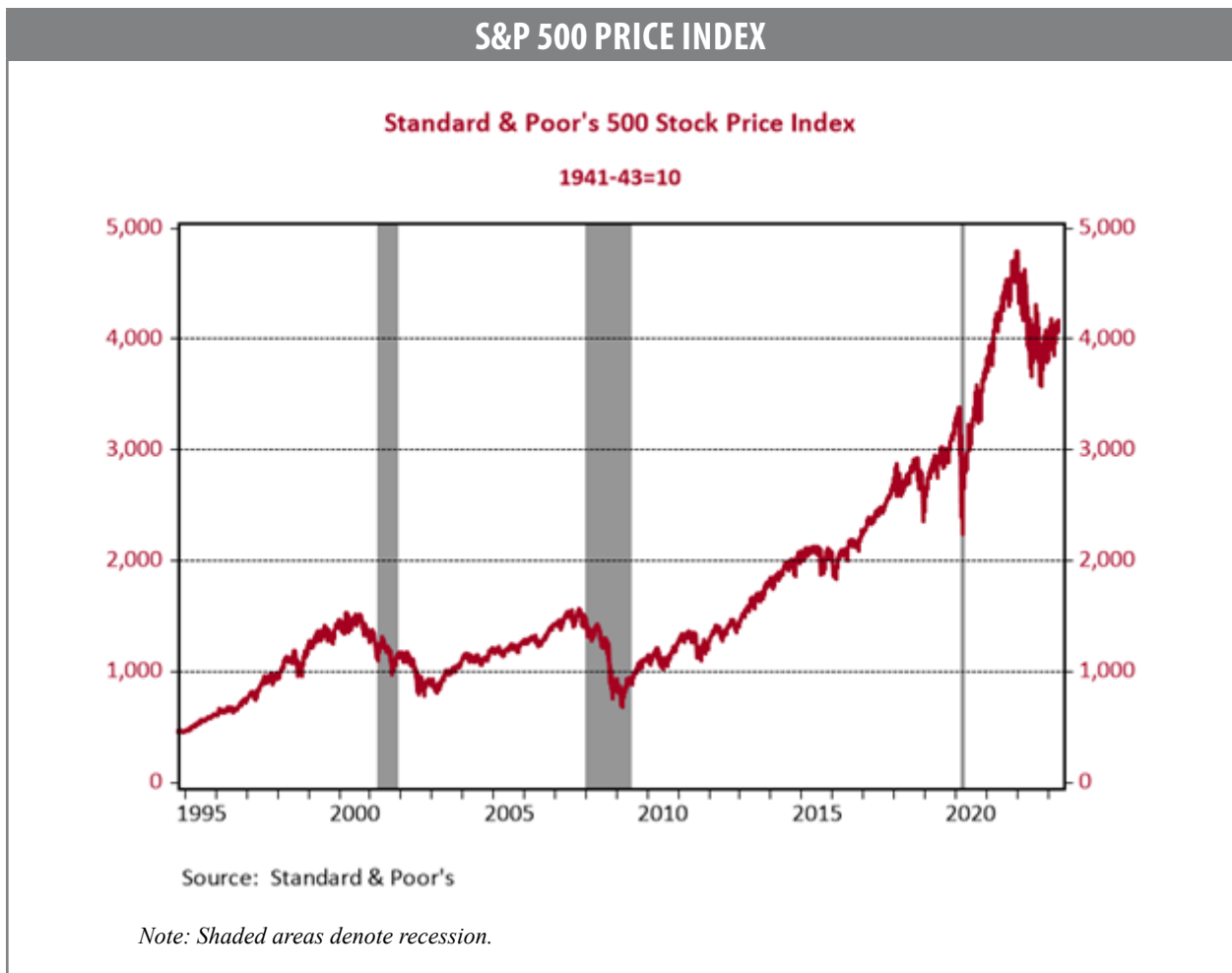
- Slowing, or possibly declining earnings per share (EPS)
 - Economic stagnation, or possibly a recession
 - Higher rates, pressuring profit margins
- Price to earnings (P/E) multiples are likely to compress
 - P/E multiples are above the normal range
 - Higher long-term interest rates (1.50%–6.25%) may put pressure on valuations
- Potential Risks
 - A Federal Reserve policy mistake
 - Banking/credit crisis
 - Escalation of the Russian invasion of Ukraine

Summary of 2023

The U.S. equity market rebounded from a decline in fiscal year 2022. As of the end of April, the S&P 500 closed at 4169.48, up 11.7% on a total return basis. Despite the gains, the S&P 500 Index still remained 11.2% below the Jan. 3, 2022, all-time high of 4796.56. The Federal Reserve sharply raised rates throughout the year in an effort to control inflation, which did wane in the back half of the fiscal year. Supply chain disruptions eased for the most part and returned to a more normal environment. The second half of the fiscal year saw several bank failures. A full-out banking crisis appears to be contained, but has created investor worry about the stability of the financial system.

For the second year in a row, performance was strongest for the energy sector (+23.6%). Although oil prices eased somewhat throughout the year, prices remained elevated and energy company earnings were strong. Besides energy, cyclical sectors performed the best as investors despite the Federal Reserve's efforts to slow the economy. The information technology sector (+20.2%) rebounded from negative performance in fiscal 2022. The industrials sector was the only other sector to outperform the overall market index (+16.1%). The interest-rate sensitive real estate sector was the worst performing group (–5.0%), followed by the safe-haven utilities (+0.7%) and healthcare (+5.5%) sectors.

Large capitalization stocks outperformed small caps in fiscal 2023, and growth stocks outperformed value stocks over the period. While the market indices rose throughout the year, the breadth of the market narrowed, as investors flocked to mega-cap growth stocks.



Economic Drivers

Economic growth is expected to slow during fiscal 2024 resulting in a wider range of economic/market outcomes. While supply chain and labor shortage issues have eased, Federal Reserve tightening, along with more stringent lending standards will likely cause the economy to slow, resulting in higher unemployment and weaker retail sales. The tighter lending standards and higher level of interest rates will likely be the biggest headwind for the market during the fiscal year, heightening the probability of recession which could lead to downside for the domestic equity market.

Earnings

Earnings uncertainty is high for fiscal 2024 as revenues likely slow due to higher interest rates and more stringent lending standards. Using our central economic forecast as a guide, earnings per share for the S&P 500 is expected to stagnate in 2024, increasing only 2.5% to \$205.

S&P Operating EPS	FY 2022	FY 2023 (est.)	FY 2024 (est.)
STRS Ohio Forecast	\$205	\$200	\$205
EPS Growth (YoY)		-2.5%	+2.5%
Consensus Forecast	\$205	\$205	\$230
EPS Growth (YoY)		+0.0%	+12.2%

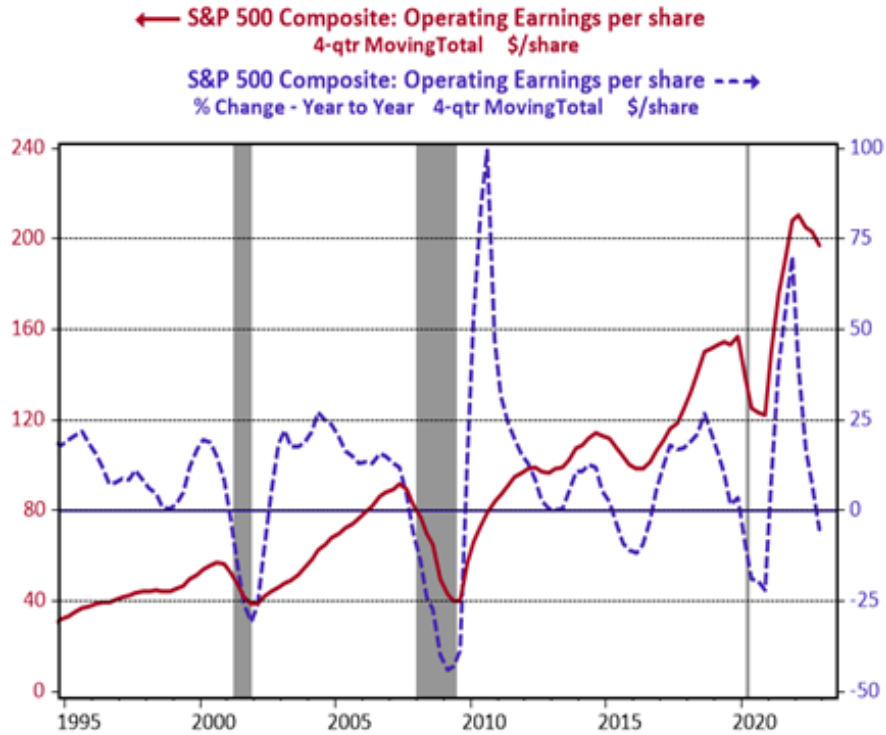
Revenue growth for the S&P 500 has slowed to the 2% level and is likely to remain weak. Revenue headwinds may come from a slowing economy, demand destruction due to inflation, higher rates, more stringent lending standards and lower wage growth. Margins will likely compress as companies are forced to deal with rising labor and interest costs, coupled with less ability to raise prices.

Bank earnings will likely slow as rising interest rates and tougher lending standards slow growth. Higher rates could also lead to lower capital markets activity and greater costs to obtain/maintain deposits. The financials could also see increased loan-loss provisioning as the economy and labor market slows. Interest rate-sensitive stocks such as real estate and consumer discretionary stocks could feel the negative effects of rising rates and tightened lending standards.

If the economy slows, we anticipate defensive stocks may perform the best. Healthcare, consumer staples, and utilities should do well in a weaker economic environment.

We expect the energy sector to continue to perform well in 2024 as the sector has had a decade of consolidation and deferred capital expenditures, both of which capped supply growth, resulting in very low global inventories and elevated oil prices. Additionally, the continuation of the reopening of the Chinese economy could buoy the demand for energy.

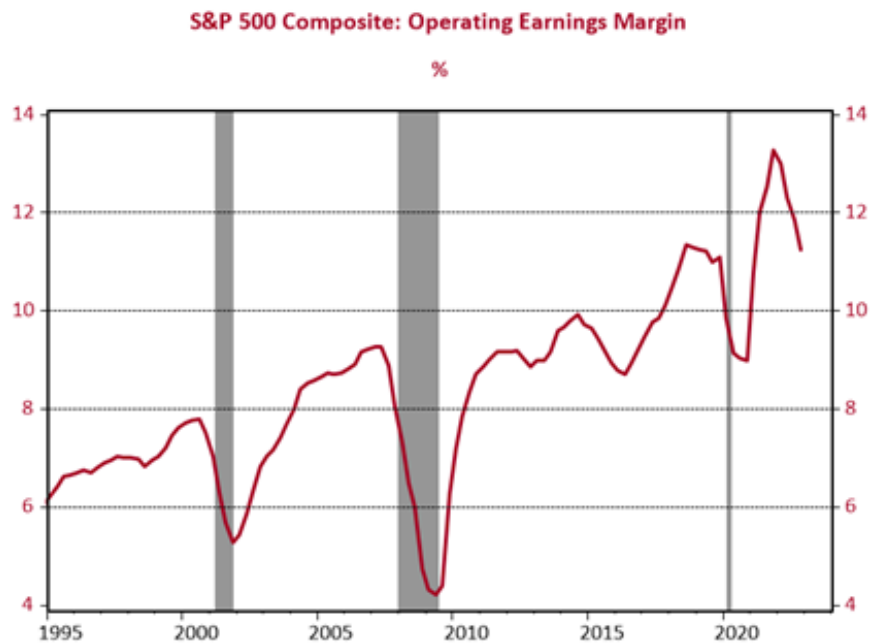
S&P 500 OPERATING EARNINGS



Source: Standard & Poor's

Note: Shaded areas denote recession.

S&P 500 COMPOSITE: OPERATING EARNINGS MARGIN



Source: Haver Analytics

Note: Shaded areas denote recession.

With respect to capital allocation, we expect companies to use free cash flow to return capital to shareholders via buybacks and dividends. Capital expenditures and hiring may decrease as corporations attempt to offset margin pressures from rising input costs and interest rates. In addition, tighter Fed policy and more stringent lending standards could result in more economic uncertainty. Business should also continue to onshore manufacturing and supply chains from China and other countries to secure the availability of product inputs.

Valuations

The S&P 500 is currently trading at 20 times trailing 12-month operating earnings and 17.8 times consensus forward earnings estimates. Valuations are above the historical average of 16 times earnings. Investors will continue to watch the earnings trajectory in 2024 as optimistic expectations are priced into valuations. The P/E ratio is likely to decline in 2024 due to increasing interest rates. Other possible risks to valuations on the downside would be another wave of COVID-19 cases, less corporate-friendly policies from the U.S. government, a financial crisis or possible geopolitical uncertainty. Higher valuations could occur if the global economic activity grows at a more rapid rate than we are forecasting, or inflation and interest rates decline.

Forecast

Due to elevated macro and micro economic uncertainty, the range for our market forecast is wide. Under the central economic forecast, we would expect an operating range for the S&P 500 to be 3200–4600 with a point estimate target of 4100. This target is based on a P/E multiple expectation of 20 times the earnings estimate of \$205. Under a more positive scenario, a weakening dollar and healthy consumer balance sheets could partially offset Federal Reserve tightening, leading to a slightly decelerating U.S. economy with benign inflation. A resilient economy, combined with an easing Federal Reserve could drive earnings to \$240 and the market to new highs above 5000. Should the U.S. economy experience a recession, earnings could fall to \$175 or below — resulting in the S&P 500 at 2800 or lower. Restrictive monetary policy has increased the probability of the downside scenario resulting in a more bifurcated view and a wider expectation of outcomes than is normal. The following table illustrates these scenarios (all estimates are approximate and may be rounded for simplicity).

	Earnings	Multiple	Target	Total Return
Base Forecast	\$205	20	4100	0%
Operating Range			3200–4600	–22% to +12%
Upside Case	\$240	21	5000	22%
Downside Case (recession)	\$175	16	2800	–32%

STRATEGY

For fiscal 2024 we have a muted outlook on the equity markets, resulting in returns that will likely be less than the policy return. Currently, domestic equities represents 26.0% of total assets, equal to the current neutral target weight. The domestic equity asset class is likely to remain near a neutral position versus the policy target weight in fiscal 2024 unless risk or economic outlook become more favorable.

Our equity allocation is balanced between value and growth factors. As economic uncertainty has increased, investors have sought the perceived safety of mega-cap growth stocks. This has resulted in wider valuation spreads and has led to narrow market breadth. We are slightly overweight small cap due to its cheaper valuations, but are defensively positioned within the space.

We expect volatility to remain elevated during this fiscal year, reflecting economic uncertainty as the Fed maintains this level of rates. This elevated volatility could result in opportunities to adjust our weighting to take advantage of market moves.

Strategic Initiatives

We will continue to closely monitor the performance of all of our domestic portfolios — particularly those with weaker longer-term records. We will also continue to examine our external managers to determine if any changes need to be made to improve the domestic equities structure and performance.

Similar to last year we will continue to look for new equity replacement strategies that can replace some of our passive exposure and/or improve our risk/reward balance.

7. *International Investments*

OUTLOOK

In fiscal 2023, the international markets are recording positive returns above the policy standard for the asset class. Valuation multiples expanded even though interest rates in many countries continued to be raised as central banks addressed elevated inflation. The MSCI World ex-US (50% Hedged) Index for developed markets has increased 17.5% through the end of April, while the MSCI EM Index for emerging markets has decreased 0.3%. As a result, the International Blended Benchmark — consisting of 80% of the MSCI World ex-US (50% Hedged) Index return and 20% of the MSCI EM Index return — combined represents an increase of 13.9%. At this writing, staff anticipates total returns earning slightly below normal levels in fiscal 2024.

Developed Markets

Most developed world central banks aggressively hiked benchmark interest rates to combat high inflation. The Bank of Japan is the exception. Since its post-pandemic low reached in October 2022, the developed markets have recorded a significant rally through April 2023. Many market participants hoped that, after several hundred basis points of hikes by major central banks, peak interest rates were soon within reach. Some are hoping for rate cuts within our fiscal 2024 forecast horizon. Further, headline inflation declined meaningfully as energy and commodities prices retreated. An unseasonably warm winter also helped the European countries avert an energy crisis and their markets to rally.

Going forward, the outlook is less certain as optimistic economic scenarios seem adequately discounted already. Historical relationships between rate hikes and GDP growth rates do not help the outlook for the economies and markets. And, if economic growth rates do not slow meaningfully, the labor markets may not generate sufficient slack to reduce pipeline inflationary pressures, hence keeping interest rates higher for longer. Lastly, corporate margins are nearly 200 basis points higher than 10-year historical average levels and look vulnerable considering the softening demand outlook and persistent cost pressures. It may prove challenging for the developed markets to continue the rally without sufficient earnings support. The interaction between low consensus earnings growth and possible valuation multiple contraction does not allow much room for an overall higher local price return in the developed markets in fiscal 2024. The U.S. dollar return for the developed markets may receive some help from foreign currency strength. Most developed market currencies appear attractive vis-à-vis the U.S. dollar and consensus expectations are pointing to moderate appreciations over the forecast horizon. The 3% dividend yield will give additional support to the total return. After considering all these factors, the total return forecast in developed markets for fiscal 2024 is for a positive return that is slightly below normal.

In Japan, Prime Minister Fumio Kishida may leverage his popularity and call for an early election in summer 2023. A successful early election would result in the extension of the Kishida administration to 2027 and help sustain political stability for an extended period. The Japanese yen is currently trading at depressed levels. Whereas other developed world central banks have been raising rates in tandem with the U.S. Federal Reserve, the Bank of Japan (BOJ) has made no change to its Negative Interest Rate Policy (NIRP) for seven years in a row. It did, however, make a surprise move to relax its Yield Curve Control (YCC) policy in November 2022, causing a temporary boost to the yen. Many market participants expected the new BOJ governor, Kazuo Ueda, to soon make further modifications to the YCC and possibly NIRP afterwards. However, Ueda's first public statements in April 2023 did not satisfy such hopes. Instead, he announced a 12-to-18-month review of the BOJ's monetary policy, leading many market participants to speculate that little will change in the medium term and the yen may remain weak for longer. Still, the direction of the new BOJ policy remains too early to be gauged and the yen is trading at attractive levels, leaving plenty of room for upside surprises.

At the time of this writing, Japan's stock market is trading below the levels of its 10-year historical average and below its developed world peers. For the equity market's valuation multiples to expand, there needs to be substantive improvement in corporate governance and performance. In the near term, the Japanese stock market remains vulnerable to a global economic slowdown given its high concentration of export-oriented firms. Moreover, should the yen appreciate meaningfully as consensus estimates indicate, the Japanese market's earnings growth may not expand as much as expected and the exporters may underperform.

The United Kingdom saw back-to-back ousters of two Prime Ministers during the early part of fiscal 2023, due to Boris Johnson's scandals and Liz Truss's unsuccessful mini-budget. The current Prime Minister, Rishi Sunak, has improved relations with the European Union. However, public approval ratings for him and his conservative party remain low, driven by weak economic conditions and a continued cost-of-living crisis.

The Bank of England was one of the first in the developed world to start raising interest rates in December 2021, having hiked over 400 basis points since then and reticent to signal a pause as of May 2023. Higher rates have taken a toll on consumer spending and confidence, though they have not yet had the desired effect on dampening inflation. So far, inflation has remained stubbornly high despite a drop in energy and commodity prices. Combined with continued upward pressure on wages, inflation may remain higher for longer, giving the central bank little room to relax. Reflecting depressed fundamental factors, the United Kingdom equity market appears cheaply valued relative to its own 10-year history and developed world peers. Corporate earnings are expected to decline mid-single digits in fiscal 2024, as large cap energy and materials companies suffer from lower prices and the banking sector retreats from peak net interest margins. The British pound has recovered from a collapse introduced by Liz Truss's mini-budget, yet it is nowhere near its 10-year historical average or fair value. The pound has the lowest appreciation potential compared to its peers according to consensus estimates.

Russia's invasion of Ukraine in February 2022 threatened the eurozone's economic prospects given its high dependence on Russian energy. Fortunately, a warmer than usual winter and speedier than expected energy rationalization measures resulted in comfortable natural gas storage levels and allowed the countries to avert an energy crisis. Economic activity in the eurozone has continued to normalize while the regional equity markets have outperformed other developed market peers handsomely since the Autumn 2022 bottom. At the same time, inflationary pressures have remained stubbornly high in the eurozone, giving the European Central Bank (ECB) little choice but to keep raising rates. The ECB appears to be behind the U.S. Federal Reserve with rate increases and is expected to take longer to bring its policy rate to the peak level. Under this backdrop, the euro may appreciate against the dollar, offering a small enhancement to overall returns.

The better-than-expected energy supply situation has helped Germany the most, as the country depended on Russia for over 1/3rd of its gas supply at the onset of the war. The German equity market has rebounded significantly from the September 2022 lows, though it is still trading at a discount relative to its own 10-year history and peers. Going forward, the market remains highly dependent on the external economy given the high representation of export-oriented companies. Its mid-to-high single digit earnings growth over the forecast horizon is highly dependent on the external demand being sustained and cost pressures being contained. Recent wage negotiations in Germany are, in some cases, more than double the past 10-year average of 2.5%, exerting pressure on corporate margins.

Having secured his second term in 2022, French President Emanuel Macron in April 2023 pushed through a highly unpopular pension reform bill, extending retirement eligibility from 62 to 64 years old. As a result, his public approval ratings have dipped below 30% amidst public protests. While his ouster is unlikely, the chaos does increase the likelihood of conflicts and may introduce volatility to the markets. At the same time, the French equity market is benefiting from a euphoric sentiment towards its luxury goods companies that are seen as major beneficiaries of China's reopening. The French market remains relatively expensive with its valuation multiples above 10-year historical averages and developed world peers.

The political environment in Italy has been unusually quiet since the election of a center-right governing coalition led by Prime Minister Giorgia Meloni. The calm surprised many pundits as the pre-election rhetoric suggested that Italy may assume a more confrontational relationship with the European Union. Nevertheless, it remains to be seen how the relationship will eventually play out, as a lack of government resources and expertise may have caused delays in the implementation of Meloni's policies. The Italian equity market continues to look cheap relative to its 10-year history and developed world peers, with few identifiable catalysts.

Spain's minority center-left and far-left government will be tested in the July 2023 parliamentary election. The center-right party has a lead in the polls, but no party has a clear path to majority, causing some uncertainty on the political front. At the same time, Spain is expected to generate above average GDP growth in 2023, driven by a recovery of tourism spending and private consumption. The Spanish equity market continues to trade at a discount to its own 10-year history and peers, with a weak earnings outlook in the energy and utility sectors being partially offset by stronger growth expectations in industrials, information technology and financials.

In Australia, the Reserve Bank in May 2023 delivered a surprise rate hike to combat persistent inflation. Market participants see this as the last hike of this cycle. While many hope that the central bank will shift its focus from fighting inflation to generating growth soon, it remains to be seen if inflation retreats enough to warrant such a change in stance. On a positive note, Prime Minister Anthony Albanese's government has meaningfully improved its relationship with China compared to the previous administration. China has removed trade barriers for coal and may relax its terms on other goods in the future. Improving trade relations with China is expected to enhance the revenue growth for Australian exporters, as well as provide the Australian dollar a mild tailwind. Nevertheless, weaker commodity prices and challenging banking sector fundamentals only allow for flattish earnings growth, while valuation multiples are high relative to the 10-year history.

Canada looks to be relatively stable on the political front as Justin Trudeau is set to remain in power until 2025. Having raised interest rates aggressively in calendar year 2022, the Bank of Canada has been on hold since January 2023. Some market participants are expecting a cut toward the end of the calendar year. The resource rich country has had lower headline inflation than many of its peers, though the core measure remains quite stubborn, which may cause the Bank of Canada to stay at the peak level for longer than hoped. The Canadian market is starting to look fair on a valuation basis relative to its own 10-year history and peers. This is, to a large extent, driven by a weak outlook with the commodity exporters as well as negative sentiments toward the banking sector that were brought on by the regional banking crisis of its southern neighbor, the United States. Still, stock selection opportunities remain limited in Canada with few identifiable ideas.

Emerging Markets

The emerging markets return of -0.3% through April in fiscal 2023 was materially worse than the developed markets return. The emerging markets performance was hampered by equity market weakness in countries that are energy exporters and by a negative return in China which is the country with the largest weighting in the benchmark. Staff forecasts that the emerging markets in fiscal 2024 will earn a total return that is slightly above normal.

The emerging markets valuation on a trailing price/earnings multiple is lower than the historical average for the past ten years. However, the forward price/earnings and price/book value multiples are near the 10-year averages despite the trailing return on equity remaining above average. The overall valuation appears fair when considering that earnings per share have been declining. The emerging markets valuation multiples remain at discounts relative to the current levels in the developed markets. Staff expects the earnings will rebound slightly and the price/earnings multiples will have room to expand in fiscal 2024. Possible beneficial factors in fiscal 2024 will be that emerging countries may begin to lower interest rates and China's economic rebound may continue.

Despite China having the second-worst return in the emerging markets in fiscal 2023 through April, the country remains the largest in the benchmark with a nearly 31% weighting. Several other emerging market countries have economies with significant export exposure to China. China's economic growth accelerated in the second half of fiscal 2023 after the removal of zero-COVID-19 policies. The economic growth in China is being driven more by domestic services spending than in past recovery cycles, so countries that are trading partners are receiving less positive impact. China's economic growth in fiscal 2024 could benefit from continued strength in consumer spending on services because there appears to be sufficient household savings to satisfy the remaining pent-up demand. However, spending on products could still be subdued unless consumer confidence rebounds with any reduced employment insecurity.

The future path of the Russian invasion of Ukraine will impact many emerging countries, particularly in central Europe. However, other countries that have been impacted by varying degrees of trade disruption will also have outlooks that are dependent on how the conflict evolves.

There are several important elections in emerging countries in fiscal 2024. Perhaps the most consequential will be the outcome of the presidential and national legislative elections in Taiwan in January 2024. If the incumbent controlling Democratic Progressive Party wins again, then tensions with China could remain elevated. However, a victory by the opposition could prompt China to adjust its policy by working with a relatively more pro-China government in Taiwan. Other national elections will be held in India, Indonesia, South Africa, and Poland. Although Mexico's presidential election will not be held until July 2024, the equity and currency markets will be impacted in the second half of fiscal 2024 by candidate proposals and election polling.

STRATEGY

As fiscal 2023 draws to a close, the international portfolio at this writing is approximately \$19.5 billion or 21.9% of total assets, slightly lower than the neutral target weight of 22%. The international asset class weighting did not deviate materially from the 22% neutral target throughout fiscal 2023. As markets climbed, rebalancing activity was initiated to withdraw capital to manage toward the neutral target weight and thus led to a net cumulative flow of funds out of the asset class of \$2.3 billion through April 2023. Staff is projecting a slightly below normal total return for the International Blended Benchmark for the next 12 months, so the international asset class weighting will likely be held near a neutral position versus the policy target weight in fiscal 2024 unless the risk/reward outlook becomes more favorable.

The significant outperformance of value stocks versus growth stocks that occurred in the previous two fiscal years ceased in fiscal 2023. The overall international portfolio was tilted toward the value style in the first half of fiscal 2023 and then was targeted to be neutral between the two styles in the second half of fiscal 2023. Although valuation spreads between value and growth stocks are still wider than normal, it could remain difficult for value to outperform in fiscal 2024. Growth stocks would likely benefit if the markets became more concerned about any global economic weakness or if interest rates decline substantially as inflation subsides. Staff will evaluate the economic conditions and market environment as fiscal 2024 progresses to determine how to position the international portfolio.

The chart on the next page shows the estimated allocations for assets internally managed, externally managed, developed and emerging markets investments at the end of fiscal 2023. We will be near an 80%/20% split between the developed and emerging markets within the asset class, which matches the 80%/20% neutral points set for each. Staff anticipates that the developed/emerging split will remain near the neutral points in fiscal 2024 unless opportunities are created as the market cycle evolves. As shown below, the split between internally and externally managed funds is 49% internal and 51% external.

FISCAL YEAR-END 2023		
(estimated)		
	\$ Invested (at Market)	Percent of International Assets
Internal Managers	\$ 9,555 million	49%
External Managers	\$ 9,912 million	51%
	\$19,467 million	100%
Developed Markets	\$15,670 million	80%
Emerging Markets	\$ 3,797 million	20%
	\$19,467 million	100%

Strategic Initiatives

The strategic initiative to increase the capacity to allocate to the growth style was completed in fiscal 2023 with the hiring of William Blair to manage a new large-cap quality growth portfolio that invests across both developed and emerging markets. The portfolio received initial funding in January 2023.

An internally managed analyst portfolio was initiated at the beginning of fiscal 2023. The portfolio holds more growth-style stocks than the other internally managed fundamental portfolios that have a value-style bias. The portfolio has active stock selection by the international analyst team across both developed and emerging markets.

The research project that started in fiscal 2022 to study the risk and return benefits to adding China A-shares as a standalone mandate for an external manager was reexamined again in fiscal 2023. Staff determined that a separate China A-share portfolio should not be pursued.

Staff continues to closely monitor the performance of all the international portfolios. The initiation of the new large-cap growth portfolio in fiscal 2023 created the full flexibility to make allocation changes as necessary when market conditions change. Looking at the portfolio from a risk budgeting standpoint, the highest amount of risk continues to come from the external managers. A lower amount of risk is coming from the internal managers, which is partly due to the passive core-EAFE component (i.e., Europe, Australasia, Far East). The other internal portfolios are being managed actively. Staff will continue to monitor and evaluate the proper allocation of risk across the international portfolio.

8. Real Estate Investments

OUTLOOK

Allocation

The real estate asset class is comprised of three distinct components. The majority includes direct real estate holdings in the four major property types of apartment, industrial, office and retail. These assets currently comprise approximately 70% of the real estate asset class. The remaining portion of the portfolio consists of real estate funds, which are primarily investments in international real estate markets, and public real estate investments in Real Estate Investment Trusts (REITs).

As of April 30, 2023, the real estate asset class allocation enters fiscal 2024 near the neutral target allocation of 10% and should remain near its neutral position in fiscal 2024.

Returns

For fiscal 2024, we forecast the total return for the real estate asset class to be below the STRS Ohio policy return objective of 5.75% and within a range of -4.0% to 2.0%.

Leverage

As of April 30, 2023, the leverage ratio is approximately 28.2%. Staff will manage the use of leverage in the direct portfolio below the policy limit of 50%.

Direct Real Estate Outlook

The rapid rise in interest rates coupled with the ongoing impact of the pandemic resulted in declining real estate values for consecutive quarters for the first time since the impact of the Great Financial Crisis. Values for the four major property types declined during the year as capitalization rates rose with interest rates and fundamentals slightly deteriorated.

Apartment properties saw strong rental rate growth and lower vacancy rates during the first half of fiscal 2023. However, this has since moderated to lower rental rate growth and slightly higher vacancy rates. Meanwhile, operating costs have increased resulting in lower income growth. We expect the apartment sector to show resilience due to a long-term structural supply imbalance from several years of chronic underdevelopment. Despite the longer-term positive supply trends for apartment investors, there is some excess supply in sunbelt markets that will produce lower near-term rental growth rates.

The retail property asset class continued to stabilize post pandemic due to the realignment the traditional brick and mortar stores experienced from surging online sales. Traditional shopping patterns have re-emerged. Traditional brick and mortar store sales mostly recovered to pre-pandemic levels and online sales now represent approximately 15% of total retail sales. Retail assets are expected to continue to improve during the fiscal year as new retail construction has been minimal during the past few years, still at a 30-year low in current dollars. Investor interest in the sector, especially in necessity-based or essential retail, is expected to continue.

The outlook for industrial property returns has moderated following high returns resulting from increased pandemic demand. Property market fundamentals are strongest for industrial properties where businesses are reorganizing supply chains and incorporating the need for more inventory. This robust demand continues to outpace supply and investor appetite for the property type remains high. Vacancy

rates remain well below long-term average rates inclusive of recent increased vacancy resulting from new industrial property development. We expect continued positive rental rate growth as new long-term leases incorporate higher rent levels.

The office sector remains the most challenged property sector in terms of fundamentals and valuations due to uncertainty of return to office plans from businesses. While there is evidence that employers are beginning to require more days working in the office, employee card swipes remain below 50% of pre-pandemic levels. At present, rental rates are holding steady although vacancy rates are increasing. Office fundamentals will continue to lag the other property types as return to office and hybrid protocols equilibrate. We expect office to remain challenging into fiscal 2024, however we expect fundamentals to begin to stabilize towards the end of next fiscal year.

Public Investment (REITs) Outlook

REITs are poised to benefit from a historically wide discount to direct real estate and new real estate supply that has effectively been halted given the restrictive lending environment. Total return expectations for fiscal 2024 range from -4% to 15% for a midpoint fiscal 2024 return of 9.5%. The downside estimate will be realized if inflation and subsequently market interest rates remain elevated as the United States enters a recession in early fiscal 2024 and struggles to recover before the end of the fiscal 2024 period. The top end of the return range will be achieved if inflation and market interest rates normalize, the United States avoids the “hard landing” economic scenario, and the banking system returns to a stronger footing.

International Real Estate Outlook

For fiscal 2024, we expect the international portfolio total return to be within a range of 2.0% to 6.0% (net of fees). Transaction activity has slowed in Europe, but some transactions initiated in late 2022 are still closing at attractive pricing. Developed Asia, and particularly Japan, continue to offer opportunities in a sustained low interest rate environment. Despite the expected slowed pace of investments, real estate fundamentals in these regions will allow for well-priced acquisitions and will show improving property values.

In Asia, Japan continues to present attractive real estate opportunities. While the country’s GDP remains relatively flat, affected by restrained consumer spending, low levels of unemployment (at 2.4% in January 2023) assist in maintaining economic stability. The economy is projected to grow at rates above 1%, commensurate with the United States, in fiscal year 2024 and contribute to a supportive environment for real estate opportunities. Real estate fundamentals remain strong in Asia, particularly for logistics properties, where demand outstrips supply. Rent and occupancy trends for logistics assets have tempered but continue upward driven by e-commerce growth. In contrast to office properties in other regions, Japan has seen vacancy rates fall in Tokyo and Osaka, from 3.8% to 3.3% and 4.7% to 4.3%, respectively, in the second quarter of fiscal year 2023. Transaction volume in Japan is expected to slow in fiscal 2024, but not substantially. Overseas and local investors should continue to provide high levels of liquidity, finding attractive the positive yield spread, stable investment policies and continued value-add opportunities.

Europe is projected to experience slow growth in GDP in fiscal year 2024. To get inflation under control, the European Central Bank and Bank of England are expected to continue their rate hikes, dampening prospects for a near-term economic turnaround. This slowed economic environment combined with liquidity-constrained capital markets have reduced real estate transaction activity across the continent. The most promising sectors in Europe continue to be industrial and residential properties, with industrial vacancy ranging from 2% to 3% in most of the developed markets and rental growth still at greater than 5% in Paris, London and some German cities. Multifamily rentals remain undersupplied, but caution must be taken where governments may cap rental growth to combat high levels of inflation. Limited opportunities may be found in office space in need of upgrades to meet sustainability regulatory requirements.

STRATEGY

Staff expects transaction activity to continue to be slow through the first half of fiscal 2024 before picking up in the second half of the fiscal year. There is still a significant pricing gap between buyers and sellers in the market that will take time to moderate. Interest rate stability will be the key driver for increased investor interest, aligned pricing expectations, and increased capital activity. There is still significant capital allocated for real estate investment from both private and institutional investors. We expect industrial and apartment assets to generate the greatest investor interest. Our pricing expectations for fiscal 2024 are reflective of recent market pricing adjustments as well as an expected return of investor interest in the second half of the fiscal year.

TRANSACTION MARKET PRICING EXPECTATIONS FOR FISCAL 2024	
Property Type	Initial Yield*
Retail	5.00%–7.00%
Apartments	4.50%–6.50%
Industrial	4.50%–6.50%
Office	6.00%–7.50%

*Average annual 10-year holding period returns are expected to range from 1.00%–2.00% higher than the initial yield.

We anticipate reduced new acquisitions in the direct real estate portfolio in fiscal 2024 and will continue to seek the highest quality assets available for the direct portfolio. Our investment focus will be on the apartment, industrial and retail asset classes for new investment and we will seek to reduce our office allocation where appropriate. On a regional basis, we expect to reduce our weighting in the Midwest with selective dispositions and increase our weighting in the South through acquisitions. New investments will include both stabilized core properties and new development where we are able to capitalize on market opportunities.

We successfully transitioned the REIT portfolio from passive to active during the current fiscal year. Our active management of the portfolio is expected to generate additional return to the real estate portfolio. We anticipate that the public real estate market will lead the private real estate market in stronger returns as has been the case historically. As a result, we expect to maintain a larger allocation to REITs to capitalize on this investment opportunity.

In total, we expect to make commitments to four to five funds at \$75 to \$100 million per fund in fiscal 2024 for the international portfolio. New fund commitments will continue the strategy of focusing on major markets and the main property sectors in each of their regions. We also intend to identify more niche-type product and managers to build on the established foundation of stable, quality managers in the international portfolio. Under consideration will be such property types as life science assets, medical office, data centers, and industrial properties in gateway markets and infill locations. We are targeting managers who have navigated real estate cycles and have a strong sourcing network to identify mispriced assets in traditionally liquid markets.

9. Alternative Investments

Asset Allocation

The alternative investments asset class is comprised of two portfolios: private equity and opportunistic/diversified. The most recent asset-liability study conducted in fiscal 2022 established a 19% neutral long-term alternative investments allocation target, including 9% private equity and 10% opportunistic/diversified allocation targets. We estimate that the actual allocation to alternative investments will be above this level throughout fiscal 2024, but within the net rebalancing range of the asset class.

Alternative Investments Returns

For fiscal 2024, we forecast the total return for the alternative investments asset class to be at-to-slightly below the 7.38% STRS Ohio policy return objective, projected within a 4.0%–8.5% range.

Commitment Pace

We anticipate new commitments of \$1.6 billion to \$2.9 billion across the total alternative investments asset class. This commitment pace is in line with the current long-term targeted neutral asset allocation. The range of projected commitments creates adequate flexibility to address potential changes to allocation targets and long-term return targets.

Underwriting

Our underwriting emphasizes managers that have generated returns in excess of both short-term and long-term benchmark performance and direct and co-investments with attractive projected risk-adjusted returns. Our investment underwriting will take into account the STRS Ohio economic forecast for the fiscal year; therefore, for fiscal 2024 we will incorporate the possibility of a near-term economic slowdown into our underwriting, we will target managers that have a demonstrated ability to navigate past economic cycles and we will target direct and co-investments with demonstrated low- or non-cyclical.

Strategic Initiatives

We remain focused on building the direct and co-investment portfolio. Since inception through April 30, 2023, we have executed nearly 200 direct and co-investments, and direct and co-investment net asset value equaled more than \$1.2 billion as of April 30, 2023.

Additionally, we continue to execute on new strategic partnerships that we believe offer better fee economics, better governance and/or provide access to high-quality direct and co-investment deal flow. As of April 30, 2023, there were eight strategic partnerships within the direct and co-investment theme totaling approximately \$425 million in net asset value. As of April 30, 2023, there were 14 total strategic partnerships within multiple opportunistic/diversified themes (inclusive of the eight in direct and co-investments) totaling more than \$716 million in market value.

In fiscal 2024 we will continue to contribute to the onboarding of several new alternative investments-related external services providers, including a new alternative investments board consultant, a new third-party administrative services provider and a new fee validation services provider. We will also continue to refine and improve our processes for measuring, monitoring and reporting portfolio risk and risk-adjusted returns.

Private Equity

For fiscal 2024, we expect the one-year return for the private equity portfolio to be at-to-below the STRS Ohio policy return objective of 8.00% (net of fees), as determined in the fiscal 2022 asset-liability study, projected within a range of 4%–10% (net of fees).

PRIVATE EQUITY OUTLOOK

We expect our private equity portfolio performance to continue to track the movements of the public markets in the near term. We expect valuation and operational headwinds caused by increases to the federal funds rate incurred in fiscal 2023 in response to high inflation to continue, and we are monitoring the projected threat of economic recession on portfolio performance.

Consistent with four of the previous five full fiscal years, through April 30, 2023, fiscal 2023 year-to-date distributions from private equity exceeded contributions by 29%. However, due to low transaction volume, fiscal 2023 year-to-date private equity cash activity equaled less than 50% of average fiscal year-to-date April 30 cash activity over the previous five fiscal years. We expect the pace of both contributions and distributions to increase during fiscal 2024 relative to fiscal 2023, and we expect distributions to continue to outpace contributions in fiscal 2024.

PRIVATE EQUITY STRATEGY

In last year’s Annual Investment Plan, we forecasted committing \$400 million to \$1.2 billion to private equity funds during fiscal 2023. Through April 30, 2023, we have made \$735 million in total private equity commitments, consisting of (on a dollar-weighted basis) 61% domestic buyout funds, 22% global / international buyout funds and 10% venture capital funds. We project that we will make approximately \$1.0 billion in total private equity commitments in fiscal 2023, consisting of (on a dollar-weighted basis) 76% domestic buyout funds, 16% global / international buyout funds and 8% venture capital funds.

For fiscal 2024, we currently anticipate making new commitments to private equity of \$1.0 billion to \$1.6 billion. We anticipate focusing new capital commitments on our highest performing private equity managers while selectively adding new managers with compelling track records and high expected net returns. We maintain the flexibility to execute on attractive opportunities as they arise and, as a result, commitments may be below or modestly above this projected range. Factors that will influence our commitment strategy include the current overweight position of private equity relative to its neutral target allocation and potential opportunistic secondary sales or other means of active management, which remain tactical options for private equity portfolio management.

During fiscal 2024, we anticipate that the market value weightings of the portfolio categories in the following table will generally remain within the percentage ranges shown.

PRIVATE EQUITY PORTFOLIO (AS OF APRIL 30, 2023)			
	(in millions)		
	Projected % of Total PE Market Value	Market Value	Projected Allocation Ranges for Fiscal 2024
Domestic Private Equity Funds	50%–60%	\$ 5,091	70%–90%
Venture Capital Funds	25%–35%	\$ 3,063	5%–20%
Global/International Private Equity Funds	10%–20%	\$ 1,691	5%–15%
Public Private Equity	0%–2%	\$ 0	N/A
Stock Distribution Portfolio	0%–2%	\$ 1	N/A
TOTAL		\$ 9,845	

Opportunistic/Diversified

For fiscal 2024, we forecast the one-year return for the opportunistic/diversified portfolio at the STRS Ohio policy return objective of 5.73% (net of fees), as determined in the fiscal 2022 asset-liability study, projected in a range of 4%–8% (net of fees).

OPPORTUNISTIC/DIVERSIFIED OUTLOOK

We believe opportunistic and diversified strategies will remain in an attractive investment environment in fiscal year 2024. Private direct lending, which primarily consists of floating-rate debt instruments, has relatively high overall yields compared with recent history due to the rapid rise in the federal funds rate in 2023, which increased SOFR and LIBOR base rates, plus wider spreads over such base rates. Further, the continued uncertain economic environment should continue to create opportunities in the specialty finance theme.

As a result, we will continue to focus on managers with unique sourcing capabilities and versatility to underwrite complex transactions, direct lending managers with strong origination and credit track records as well as target attractive risk-adjusted return opportunities for the direct and co-investment portfolio.

Fiscal year-to-date contributions from opportunistic/diversified investments exceeded distributions through April 30, 2023 by approximately 39%, which is consistent with the previous several years as the opportunistic/diversified portfolio has lagged its neutral weight. However, we expect distributions to roughly equal contributions in fiscal year 2024 due to reduced fiscal year 2023 commitment pacing and the overall maturation of the opportunistic/diversified portfolio.

OPPORTUNISTIC/DIVERSIFIED STRATEGY

In last year's Investment Plan, we projected new opportunistic/diversified commitments for fiscal 2023 of \$700 million to \$1.3 billion. Through April 30, 2023, total opportunistic/diversified commitments were \$850 million, consisting of (on a dollar-weighted basis) 43% opportunistic funds and 57% direct and co-investments. We anticipate making approximately \$1.1 billion in total opportunistic/diversified commitments in fiscal 2023, split approximately evenly between opportunistic funds and direct and co-investments.

For fiscal 2024, we anticipate making new commitments to the opportunistic/diversified portfolio of \$600 million to \$1.3 billion. We expect such commitments to have a greater relative allocation toward direct lending, specialty finance and direct and co-investments as the opportunity set within these strategies remains attractive. We will continue to utilize diligent underwriting and focus on strategies that offer downside protection, unique return sources and attractive relative risk-adjusted expected returns.

- In fiscal 2024 we expect commitments of \$300 million to \$600 million to less liquid, longer-term opportunistic funds, which call capital over several years. This commitment amount remains lower than the long-term commitment pacing trend, as the opportunistic/diversified portfolio is projected to meet or exceed its long-term neutral allocation in fiscal 2024. We continue to seek attractive opportunities to re-invest distributed capital into new opportunistic commitments.

Across all opportunistic themes we anticipate allocating capital to our highest conviction managers in the existing portfolio and selectively adding new managers to diversify risk within each theme. We anticipate a keen focus on assets that are projected to generate returns that offer durability or countercyclicality in low macroeconomic growth or recessionary environments, and staff continues to search for strategies with attractive risk-adjusted returns relative to the other themes.

- We anticipate \$300 million to \$700 million in internally managed opportunistic/diversified commitments during fiscal 2024, including a projected \$300 million to \$700 million in direct and co-investment commitments and a projected increase in liquid alternatives by a range of \$0 to \$250 million.

Within the direct and co-investments theme, commitment pacing will continue to be influenced by asset prices, credit spreads and overall private markets transaction volume. We will continue to take a disciplined approach to building a risk-adjusted portfolio where thematic performance is accretive to the overall opportunistic portfolio performance. We expect a majority of our co-investments will continue to be originated from existing manager relationships and strategic partnerships; however, we will continue to opportunistically invest with new managers that fit opportunistic/diversified strategic criteria and underwriting standards.

We estimate hedge fund-related distribution activity in fiscal 2024 to approximate \$15 million to \$35 million.

In opportunistic/diversified, investment activity falls within the nine separate themes referenced in the Portfolio Summary below, each of which is subject to the market value maximum set forth in the corresponding right-hand column. We expect the market value of each theme to be within its projected range, as set forth in the column immediately next to each theme. The market value of each theme is as of April 30, 2023.

Consistent with our opportunistic/diversified strategy, in fiscal 2024 we are decreasing our market value maximums for hedge funds to \$200 million from \$350 million, for energy and natural resources to \$500 million from \$750 million and for public-private investment funds to \$50 million from \$100 million, as the near-term opportunity sets for these themes are less attractive on a risk-adjusted basis relative to the other opportunistic/diversified themes. We are increasing the market value maximum of four themes, including direct and co-investments to \$2.25 billion from \$2.0 billion; banking, insurance and asset management to \$2.0 billion from \$1.75 billion; infrastructure to \$500 million from \$250 million; and specialty finance to \$4.75 billion from \$4.0 billion due to projected capital appreciation within the existing portfolios and the attractive risk-adjusted returns within the near-term potential pipelines.

OPPORTUNISTIC/DIVERSIFIED PORTFOLIO (AS OF APRIL 30, 2023)			
(in millions)			
Theme	Projected % of Total OD Market Value	\$ Market Value	\$ Market Value Maximum
Banking, Insurance and Asset Management	10%–20%	\$ 1,331	\$ 2,000
Direct and Co-Investments	10%–25%	\$ 1,210	\$ 2,250
Direct Lending	15%–25%	\$ 1,762	\$ 2,500
Energy & Natural Resources	0%–5%	\$ 406	\$ 500
Hedge Funds	0%–2%	\$ 135	\$ 200
Infrastructure	0%–5%	\$ 65	\$ 500
Liquid Alternatives	5%–25%	\$ 418	\$ 2,000
Public-Private Investment Funds	0%–2%	\$ 0	\$ 50
Specialty Finance	30%–45%	\$ 3,371	\$ 4,750
Total		\$ 8,698	\$14,750