STRS OHIO

100 YEARS

1920–2020

Fiscal 2020
Investment Plan

June 20, 2019

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1. Purpose

The Investment Plan provides the fiscal year 2020 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 2020 Investment Plan Overview

FORECAST IN BRIEF		
	Fiscal 2020 Projected Ranges	**FY 2019 Forecast**
Real Gross Domestic Product	1.5%–3%	2.7%
Real Personal Consumption	1.75%–3.25%	2.5%
Real Business Fixed Investment	0%–10%	3.5%
Housing Starts (millions)	1.15–1.35	1.209
Real Net Exports (billions)	($960)–($900)	($928.8)
Consumer Price Index Ex Food & Energy	1.5%–3%	2.1%
S&P 500 Earnings	$170–$180 4.3%–10.4%	$163 16.4%
	Fiscal 2020 Projected Ranges	**Mid-May 2019**
Federal Funds Target Rate	1.75%–2.75%	2.38%
10-Year Treasury Note Yield	1.75%–3.25%	2.40%

ECONOMIC OVERVIEW

In July, the current economic expansion will be crowned the longest in U.S. history after breaking through 10 years of growth. However, economic activity is slowing toward its long-term trend of 2%–2.25% after a few years of above-trend growth. The deceleration in growth has occurred from slower global growth, opaque global trade relationships with the United States that have raised tariffs around the world, moderately higher interest rates, a smaller wealth effect from the choppy stock market and an inventory cycle that turned negative after a large buildup in fiscal 2019's first half. Recent signs of weakness, however, have given way to promising signs of improving economic growth in the United States and abroad for developed and emerging countries. Inflation pressures have eased with the slower global growth, pushing the Federal Reserve to pause its gradually restrictive monetary policy. Most leading indicators continue to point to well-behaved inflation around the world and should support ongoing accommodative to expansionary monetary policies.

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

- U.S. real (inflation-adjusted) gross domestic product (GDP) should grow 2.3% in fiscal 2020 after growing 2.7% in fiscal 2019. Real private domestic final sales growth (GDP less volatile inventory changes, government spending and foreign trade) should grow at an above-trend rate of 2.7% in fiscal 2020 after 2.5% growth in fiscal 2019. Consumer spending growth at 2.5% should remain marginally above the long-term trend as it did in fiscal 2019. Employment trends remain strong while the beneficial tax cut changes beginning with 2018 start to fade. Moderate business investment growth will likely remain similar to fiscal 2019, but signs of a Democratic victory in 2020 could result in a rollback of the 2017 tax changes and lead to stronger business investment to beat that change. With solid household formation, the housing sector should rebound in fiscal 2020 from disappointing results in fiscal 2019. U.S. trade should continue to detract from economic growth even as exports improve from stronger global demand. There remain significant risks from reciprocal trade protectionism to potential Trump administration trade policies, but an onset of trade agreements could be a greater positive to overall economic growth.
- Recovering from abrupt uncertainty on many fronts in fiscal 2019, real economic growth in developed countries should progress toward their trend growth rates in fiscal 2020. Inflation, too, will edge up but should remain well within central banks' policy rate ranges. Expansionary monetary conditions should

remain until key sources of uncertainty have passed so that real economic activity can steadily advance again and inflation can progress toward the policy target rates.

- In emerging countries, China's cyclical performance should improve as it builds on various policy stimuli. India's real GDP should grow steadily for yet another year, while that of Brazil should improve as well. There remains substantial uncertainty about new policies in both countries due to recent election outcomes. Meanwhile, inflation has not been of central concern in most emerging countries. Their central banks will likely keep monetary conditions expansionary until all signs indicate that global economic growth has returned to a sustainable robust pace.
- U.S. inflation should remain well behaved, advancing around the Fed's target of 2% growth in fiscal 2020. With trend growth in the economy and inflation moving in its target range, the Fed should keep short-term interest rates relatively stable to slightly lower through fiscal 2020 while also ending the drawdown of assets on its balance sheet. That likely would leave the federal funds targeted rate within a range of 1.75%–2.75%.
- U.S. fiscal 2020 real GDP growth in the 1.5–3% baseline range has about a 70% chance of occurring. A recession or near-recession risk carries about a 20% chance of occurring while greater-than-expected strength carries about a 10% chance. The recession risk has grown from 10% in the Fiscal 2019 Investment Plan, but remains notably below the probabilities in the past that preceded an actual recession by a year or so. The baseline U.S. forecast has nominal GDP growth of 4.4% — made up of 2.3% real GDP growth and 2.1% GDP price index growth — while the *Blue Chip Economic Indicators* consensus forecast is for 4.1% nominal growth, with 1.9% real GDP growth and 2.2% GDP price index growth. Elsewhere, the real GDP growth outlook is similar to that of the consensus for developed countries but slightly above the consensus for emerging countries. The inflation outlook is similar to that of the consensus for both developed and emerging countries.

TOTAL FUND OUTLOOK

STRS Ohio investment assets are projected to finish fiscal 2020 near the current mid-May 2019 market value of approximately $77.2 billion. Investment staff projects a base case scenario with a positive total fund return near the Retirement Board's policy return of 6.84%. The positive return and market environment we forecast should roughly offset approximately $4 billion of net benefit payments (benefits and operating expenses less contributions) anticipated for fiscal 2020, 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 2020 relative to the Retirement Board's policy for expected average annual returns. As detailed in the various sections of this plan, we project the total fund return to finish near the policy return based upon market levels in mid-May 2019. The fiscal 2019 return will likely end the current year with a positive return that is moderately below the policy return, following above-average returns in fiscal year 2017 and 2018. The total fund has earned a positive return in each year following fiscal 2009 and staff expects this to continue in fiscal 2020.

ANTICIPATED MARKET RETURNS

	Board Policy Expected Average Annual Benchmark Returns	Benchmark Annualized Return Expectation for Fiscal 2020
Liquidity Reserves	2.25%	At Normal
Fixed Income	3.00%	At Normal
Domestic Equities	7.35%	At to Above Normal
International	7.55%	At to Slightly Below Normal
Real Estate	6.00%	At to Slightly Below Normal
Alternative Investments	7.09%	At Normal
Total Fund	**6.84%**	**At Normal**

Based upon market levels during mid-May 2019. Should market levels change significantly by late June 2019, an updated projection will be issued.

INVESTMENT PLAN THEMES

- *The STRS Ohio economic forecast expects the U.S. economy to grow at a real rate of 2.3% with inflation near the 2% target of the Federal Reserve, representing a slightly above-consensus forecast of 4.4% nominal GDP growth. This forecast expects the U.S. economy to decelerate from above-trend growth toward its long-term trend. The baseline forecast for real GDP growth reflects a range of 1.5%–3.0% and carries a 70% probability of occurrence with a 20% probability for recession or near-recession conditions and a 10% probability of an upside scenario above this range. The downside risks exceed upside potential primarily because of escalating trade tensions. This economic expansion will become the longest on record at the beginning of fiscal year 2020 and staff believes it is highly likely the cycle will extend through the remainder of the fiscal year.*
- *Asset prices in most asset classes are not excessive, but are high enough to limit the potential for meaningful above-average returns, given our fundamental outlook. The fiscal 2019 capital market environment has been challenging, with increasing volatility and abrupt reversals in investor confidence contributing to a modest total fund return in the lower single digits as of mid-May 2019. We expect the total fund return in fiscal 2020 to be near the board's long-term policy return of 6.84%.*
- *There is one new risk factor added to the investment ERM matrix on Page 8 that was included in a total system STRS Ohio ERM presentation to the board during its February 2019 meeting to recognize the impact on the fund from a significant negative return in any one fiscal year. This reinforces the need to continue to improve the resiliency of the plan through a higher funded ratio.*
- *The board's investment consultant, Callan, worked in coordination with staff and the board to complete a comprehensive asset-liability study in fiscal 2017. The two-year phase-in of the new asset mix will be complete on the first day of fiscal year 2020. The new target asset mix improved total fund liquidity and increased diversification, which already proved valuable during the significant bouts of volatility that occurred during fiscal 2019.*
- *During the investment seminar in March 2019, the alternative investment team discussed with the board efforts to expand its capabilities to pursue direct and co-investments, consistent with the board's strategic initiative. Staff discussed its outreach to other investors and participants in this area to further develop and refine our process along with progress made on evaluating deals with some of our strategic partners. We will continue to move ahead on the initiative this year and plan to build out our internal capabilities further in the asset class in fiscal 2020 with the hiring of two new members to the alternative investments team.*
- *We will continue to closely monitor domestic equities as part of our ongoing review to enhance the structure and performance of the asset class. Staff will provide an update to the board in early fiscal 2020 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 seek to refine and improve several strategies implemented during the past year as outlined in some of the following asset class sections of this plan, consistent with the board's strategic goal initiatives for the investment program.*

3. Asset Allocation/Risk/ERM Matrix

AVERAGE LONG-TERM POLICY WEIGHT, CURRENT ASSET WEIGHT AND STRATEGY FOR FISCAL 2020

(as a percentage of total assets at market)

	July 1, 2019 Neutral Weight	Preliminary Mid-May 2019 Weight	General Strategy for Fiscal 2020*
Liquidity Reserves	1%	1.5%	We expect short-term interest rates to be stable to slightly lower in fiscal 2020 following several years of the Federal Reserve actively increasing the federal funds rate. This expectation is based on the staff economic forecast for more moderate trend-line growth for the U.S. economy and inflation remaining near the Fed's target of 2%. With short-term market rates currently trading between 2.25% and 2.5%, we expect to earn a return near the policy return of 2.25%.
Fixed Income	21%	19.4%	Staff expects relatively low volatility of interest rates with a modest increase occurring during the fiscal year if our forecast materializes. With a beginning yield on the benchmark just slightly above 3%, we project the asset class to generate returns near the policy return of 3%. Large withdrawals from the liquid treasury portfolio occurred during the second fiscal quarter of 2019 to facilitate total fund asset allocation rebalancing during elevated market volatility, lowering the weighting of the asset class. Therefore, we begin fiscal 2020 with an underweight to fixed income, but may look to move closer to neutral if the equity markets perform well and interest rates trade in the upper half of our expected interest rates range.
Equities			Our projection is for lower, but positive earnings growth for both asset classes. Valuations are reasonable, but unlikely to expand meaningfully to deliver unexpectedly high returns in the coming year. Within total equities, we expect domestic equities to generate better results that are at-to-above the policy return while international returns are expected to be at-to-slightly below the policy return. The target weighting for international will decline by one percentage point on July 1, 2019, so staff will rebalance to the new target weight as appropriate. We are currently neutral to both areas of public equities, but our strategy may be altered tactically as our outlook and valuations evolve during the year.
Domestic	28%	28.0%	
International	23%	24.0%	
Total Equities	51%	52.0%	
Real Estate	10%	10.3%	The real estate asset class is projected to have returns at-to-slightly-below the long-term policy return of 6%. Real estate fundamentals are solid for most property types, but potential price appreciation is limited and is unlikely to pick up as the real estate cycle matures. We begin with an allocation just above neutral to the target weight. Staff will pursue several planned dispositions and selectively consider acquisitions, keeping the asset class fairly close to neutral during fiscal 2020.
Alternative Investments			We project returns for the alternative asset class to be near the long-term policy returns in fiscal 2020. The final phase-in of the asset liability study will move the target weight for opportunistic- diversified (O/D) to 10% on July 1, 2019. We expect to begin fiscal 2020 slightly below the new alternative investment target weight of 17%, with private equity above target and O/D below target. Staff will be making meaningful new commitments in both areas, especially in O/D to move closer to the new target weight in 2020.
Private Equity	7%	8.3%	
Opportunistic/Diversified	10%	8.5%	
Total Alternatives	17%	16.8%	
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 2017 asset-liability study determined an acceptable amount of capital market risk (14.46%) 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 the 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. The new target asset mix from the fiscal 2017 asset-liability study should improve total fund liquidity throughout market cycles by increasing the fixed income weighting and using the liquid treasury portfolio to better manage the liquidity needs of the total fund.

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 2017 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 6.84% (without value added). The following table contains the current and target allocations for each asset class and the expected return and capital market risk.

Asset Class	Expected Return	Capital Market Risk	Target Allocation**	Rebalancing Range	Approximate Mid-May, 2019 Weight
Domestic Equities	7.35%	18.70%	28%	23%–33%	28.0%
International Equities	7.55%	21.30%	23%	18%–29%	24.0%
Fixed Income	3.00%	3.75%	21%	13%–28%	19.4%
Real Estate	6.00%	16.45%	10%	6%–13%	10.3%
Private Equity	8.15%	32.80%	7%	4%–9%	8.3%
Opportunistic/Diversified	6.35%	12.34%	10%	3%–12%	8.5%
Liquidity Reserves	2.25%	0.90%	1%	0%–5%	1.5%
Total Fund	**6.84%***				

*Does not include active management returns.

**Fully phased-in target mix as of July 1, 2019.

There are several ways to quantify and characterize capital market risk for an asset mix:

- The expected capital market risk for the total fund benchmark is 14.46%, which means there is a 95% probability that the investment portfolio returns will be in an annual range of –21% to 35%.
- 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 fund could lose $12.4 billion or more in a single year.

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 currently 70 basis points. 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 8% for the year, the STRS Ohio return is expected to be within 1.40% (two times 0.70%) of this return 95% of the time (i.e., between 6.60% and 9.40%). Similarly, in a year when the benchmark return is –3%, the STRS Ohio return is expected to be between –4.40% and –1.60%.

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.

The table below shows the mid-May 2019 active management risk, and the fiscal 2020 expected operating range of active management risk for each asset class. These measures are expected to fluctuate slightly 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 40–100 basis points during fiscal 2020. 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.

FISCAL 2020 ACTIVE MANAGEMENT RISK

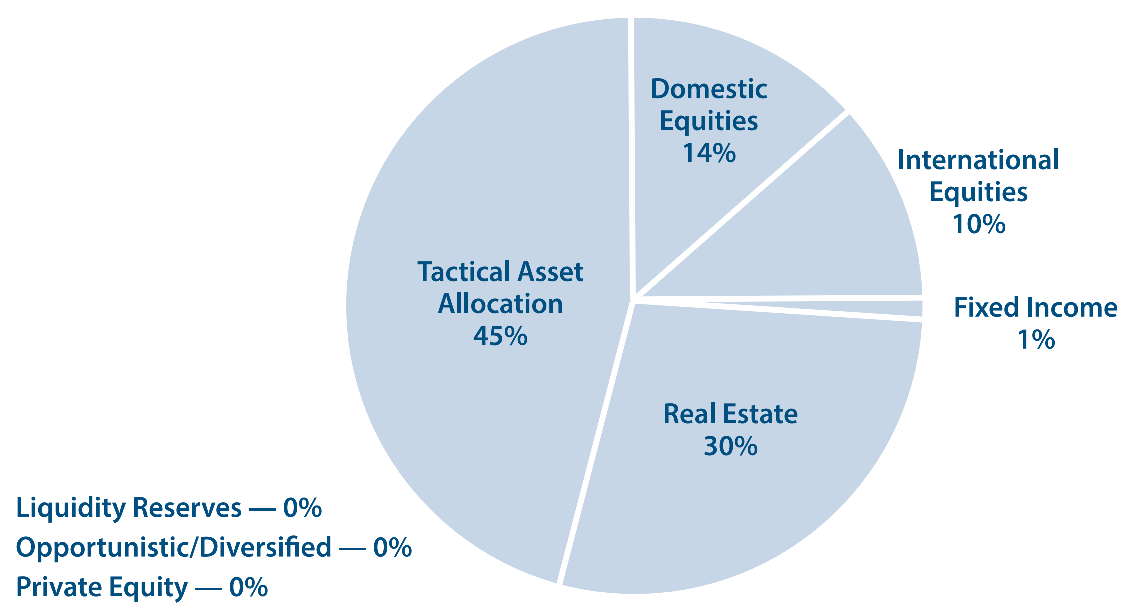
Asset Class	Mid-May 2019 Active Management Risk (basis points)	Expected Fiscal 2020 Operating Range (basis points)	Policy Range (basis points)
Liquidity Reserves	N/A	N/A	N/A
Core Fixed Income	34	10-90	10–150
Domestic Equities	78	50–120	20–150
International Equities	89	70–125	60–250
Real Estate	350	350*	200–700
Alternative Investments	N/A	N/A	N/A
Tactical Asset Allocation	43	10–60	N/A
Total Fund	**70**	**40–100**	**20–160**

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

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 following chart explains where the active management risk for the total fund is generated.

CONTRIBUTION TO ACTIVE MANAGEMENT RISK



IMPACT AND PROBABILITY ANALYSIS FOR INVESTMENTS

	PROBABILITY		
FINANCIAL IMPACT	HIGH	MEDIUM	LOW
HIGH	• Not earning the actuarial assumed rate of return over the 10-year period	• Long-term sovereign deficit and debt issues	• Diversification ineffective • Significant negative investment return in any one year*
MEDIUM		• Global financial stress related to low economic growth	• Recession • Deflation • Long-term inflation greater than 3.5%
LOW	• Not earning the actuarial assumed rate of return in a fiscal Year	• Corporate fraud (securities litigation) • Buy Ohio	• Poor investment • Divestment • Investment operations failures

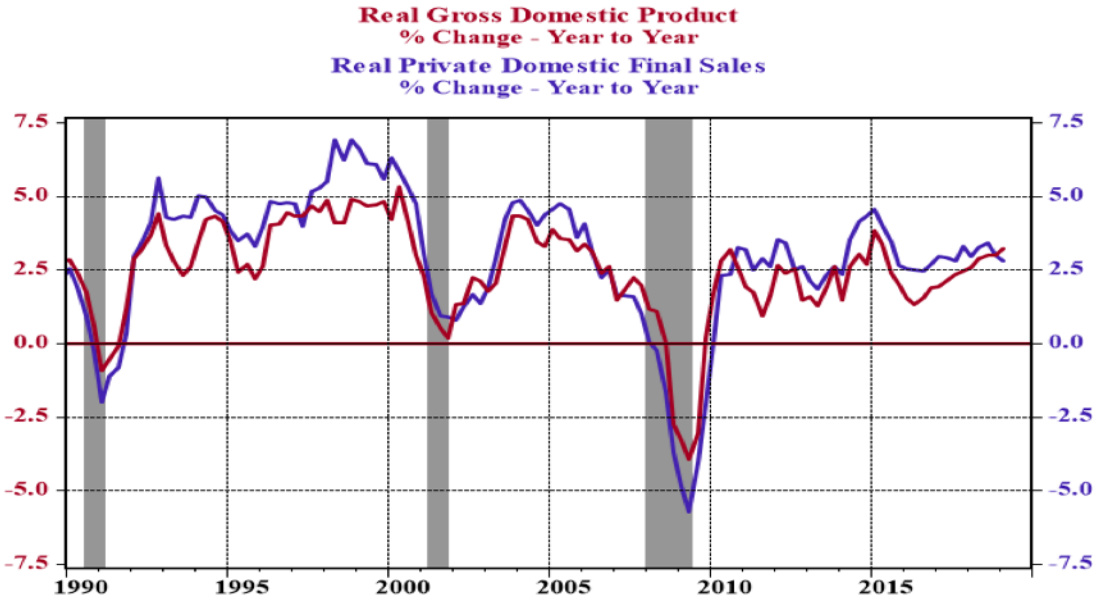
*Added to system's ERM Feb. 21, 2019

4. Fiscal 2020 Economic Outlook

U.S. ECONOMIC GROWTH AND INFLATION OUTLOOK

Next month, the U.S. economy will set an expansion duration record amid continuing concerns that a recession — whether related to trade wars or not — could be on the horizon. It will then wear the crown for being the longest U.S. expansion since reliable records began in the mid-1800s — outshining the 10-year growth cycle from 1991–2001 (see the chart below). After two years of strong economic activity averaging an annualized 2.9%, investor confidence has been shaken positively and negatively since the fall. However, though the risk of recession through fiscal 2020 has grown in the United States, the more likely course over the next year is that the economy moderates toward its long-term trend of roughly 2%–2.25% real gross domestic product (GDP) growth with around 2% inflation.

THOUGH SETTING A RECORD FOR DURATION, THE CURRENT EXPANSION'S AVERAGE GROWTH IS SLOWER



Sources: BEA, BEA/H

Note: Shaded areas denote recession.

Downside risks appear to exceed upside ones primarily because of escalating trade tensions between the United States and, in particular but not limited to, China. A fuller discussion of the developing U.S.–China trade war appears in the International Outlook of this section. Nonetheless, real economic growth in the 1.5%–3% range appears to be highly likely because both consumer and business confidence measures remain generally high for this stage of the business cycle. At the same time, the previous gradual tightening of monetary conditions toward a more normal policy has likely been put on hold through most, if not all, of fiscal 2020.

In such an economic environment and with, at best, moderate economic growth elsewhere in the world, the Federal Reserve will be hesitant to reignite the financial market volatility that followed its last interest rate hike on Dec. 19, 2018. The Federal Reserve adopted a policy of gradual interest rate increases beginning in December 2015 that was intended to more closely align monetary policy with broad U.S. economic developments and provide the central bank with ammunition to fight a future recession.

Furthermore, central bankers have laid the groundwork to begin tapering the selling of assets from its balance sheet in fiscal 2020, leaving the amount of Treasury and other government securities that it holds at a level notably higher than it had communicated previously. Together, such actions would signal that monetary policy would remain marginally accommodative for continued economic growth during fiscal 2020.

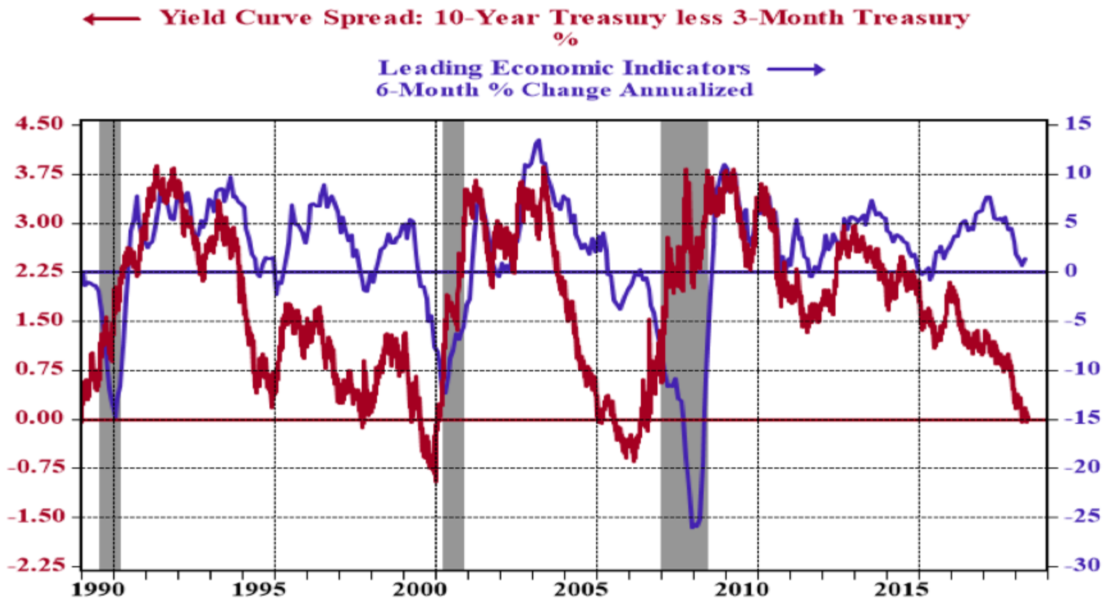
Real gross domestic product growth (red line in the chart on the prior page) has hit 3.2% over the past year through the third quarter of fiscal 2019. More importantly, core domestic economic activity (represented in the same chart by the blue line that excludes volatile foreign trade, inventory change and government spending from real GDP) grew a solid 2.8% through the fiscal third quarter, keeping fundamental economic activity half a percentage point or more above the economy's long-term trend. Nonetheless, real GDP growth through the third quarter of fiscal 2019 has averaged an annualized 2.3% over the entire expansion.

That rate of growth remains marginally more than half of the average growth rates recorded from all post-World War II economic expansions. Much of the softer economic growth can be attributed to a significant slowing in productivity growth. It has advanced by just an annualized 1.2% during the past 10 years compared to a postwar expansion average of 2.4% and an entire postwar business cycle (including recessions) average of 2.1%. Unfortunately, the disappointing productivity growth of the current expansion matches the average productivity gains that have occurred in all postwar recessions when economic activity generally contracts. At the same time, the demographic challenges for the United States from retiring Baby Boomers and slower labor force growth will continue for decades to come. Taken together, the two primary components — worker productivity and labor inputs — to potential economic growth abruptly slowed during the current economic expansion.

When the results for fiscal 2019 are tallied, the total U.S. economy likely grew by roughly 2.7%, while real private domestic final sales increased at a 2.5% pace. For fiscal 2020, the STRS Ohio economic forecast expects economic activity in the United States will rise by 2.3%, while real core economic growth accelerates modestly to a 2.7% rate. Solid consumer spending from a nearly fully employed workforce that increasingly has seen stronger wage growth has led the way for the U.S. economy since mid-fiscal 2018. In addition, until recently as the Trump administration's trade tariff battles with Canada, Mexico, Europe and, most prominently, China intensified, business fixed investment on equipment and structures had significantly accelerated in response to a stronger economy and greater tax incentives. However, those trade battles have played an important part in slower business fixed investment growth in fiscal 2019 because policy uncertainty is weighing on business planning.

Though the month-long government shutdown had only a minimal impact on economic activity, the ongoing murkiness of U.S. trade policy could reach across the business sector and, ultimately, the consumer sector of the economy. A further increase in Chinese or European tariffs could damage trade and business prospects in fiscal 2020 beyond the impact already expected in the forecast of a moderating economy; yet, resolution to these conflicts could instead ignite dampened business investment and trade beyond that in the forecast. The most likely course is that some of the trade issues are seemingly resolved like the movement from the NAFTA to the USMCA trade deal while others continue to weigh on economic growth, leaving trade as a net negative to overall economic activity amid further moderate business fixed investment growth.

LEADING INDICATORS POINT TO SLOWER GROWTH, BUT NOT A RECESSION — YET



Source: The Conference Board

Note: Shaded areas denote recession.

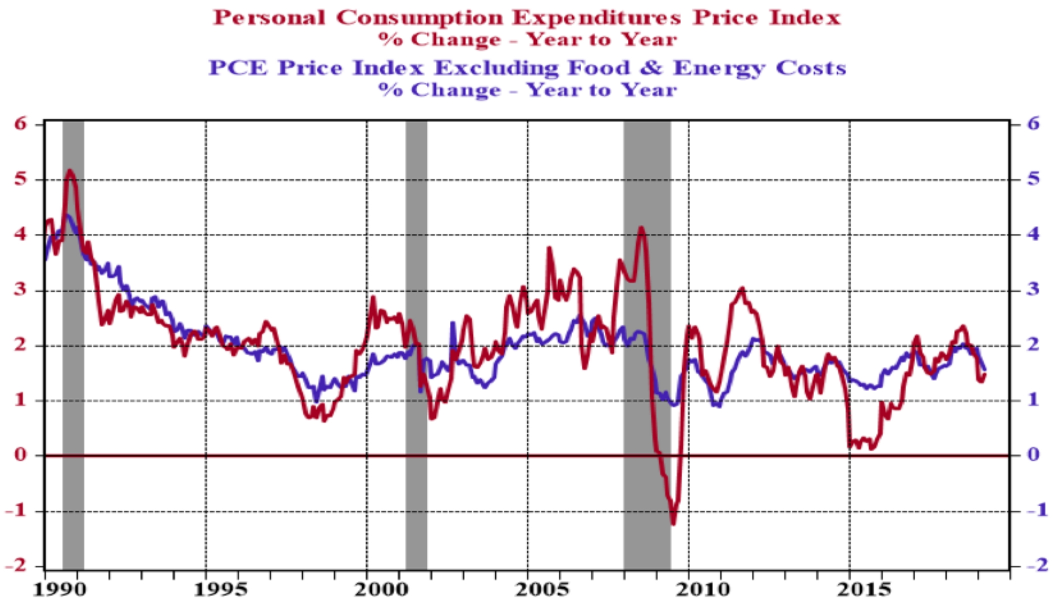
The yield curve spread between the 10-year and three-month Treasuries (red line in the chart with a horizontal zero line on the left scale) has narrowed rapidly since mid-November when the fixed income market correctly priced in another Federal Reserve short-term interest rate hike a month later. The Federal Reserve Bank of New York's year-ahead recession probability model has jumped from 15% to roughly 25% as this yield curve spread narrowed since the holiday season. As you can see in the chart, when this spread falls further and further below zero, the chance for a recession within a year or so grows into a strongly predicted outcome. Historically, a spread of –45 to –50 basis points aligns with a recession probability of 40% or more while providing ample warning of an impending recession. Today's flat yield curve spread points toward slower economic activity ahead.

Leading indicators of economic activity in the United States point to slower, though continuing positive growth through fiscal 2020. In the chart above, the smoothed growth rate for the leading economic indicators (blue line with a horizontal zero line on the right scale) has clearly decelerated from its March 2018 peak but continues to grow in positive territory and has rebounded modestly from the recent March low. Three prior episodes of similar slowing in the leading economic indicators (2011, 2012 and 2016) did not precede a recession in this cycle. The 10 components that make up the leading economic indicators index include a couple of financial market variables but largely consist of real economic variables that, together with the financial ones, provide a year or so lead to economic recessions. Like the yield curve spread, the leading economic indicators suggests economic activity through fiscal 2020 should moderate but not likely hit a recession.

It is important to note, however, that this is the first instance in this cycle where both indicators are in the warning range. Other leading indicators support the diagnoses behind these two primary indicators. As a result, recession risks have grown to 20% for fiscal 2020 from the assessed 10% chance for fiscal 2019 given a year ago. Should U.S. trade battles with other countries and regions lead to supply channel shocks that affect business and consumer confidence, then recession risks would grow larger with the greater chance that a short and mild recession could develop in the midst of a presidential election year. That risk alone should be enough to restrain the strident trade language and actions from the Trump administration but other countries/regions may not be as willing to compromise. In any event, the growing possibility that the Trump administration and U.S. trading partners could find themselves in a real trade war would weigh heavily on the economic forecast and increase the chance for recession in fiscal 2020.

The STRS Ohio economic forecast for the United States expects real gross domestic product (GDP) will grow 2.3% in fiscal 2020 after an expected 2.7% increase in fiscal 2019 and an actual 2.9% advance in fiscal 2018. While economic activity should decelerate in a broad sense, core economic activity (represented by private domestic final sales that excludes trade, inventory change and government spending from gross domestic product) is expected to increase by 2.7% after a 2.5% gain in fiscal 2019 and strong 3.2% increase in fiscal 2018. Fundamentally, the U.S. economy remains in good shape with 50-year lows for the unemployment rate and strong hiring expectations, while business fixed investment has improved and housing activity is pointing to a moderate rebound in growth. However, the lack of clarity for foreign trade issues will help to slow overall growth.

INFLATION COULD GROW IN A NARROW RANGE AROUND 2%



Source: Bureau of Economic Analysis

Note: Shaded areas denote recession.

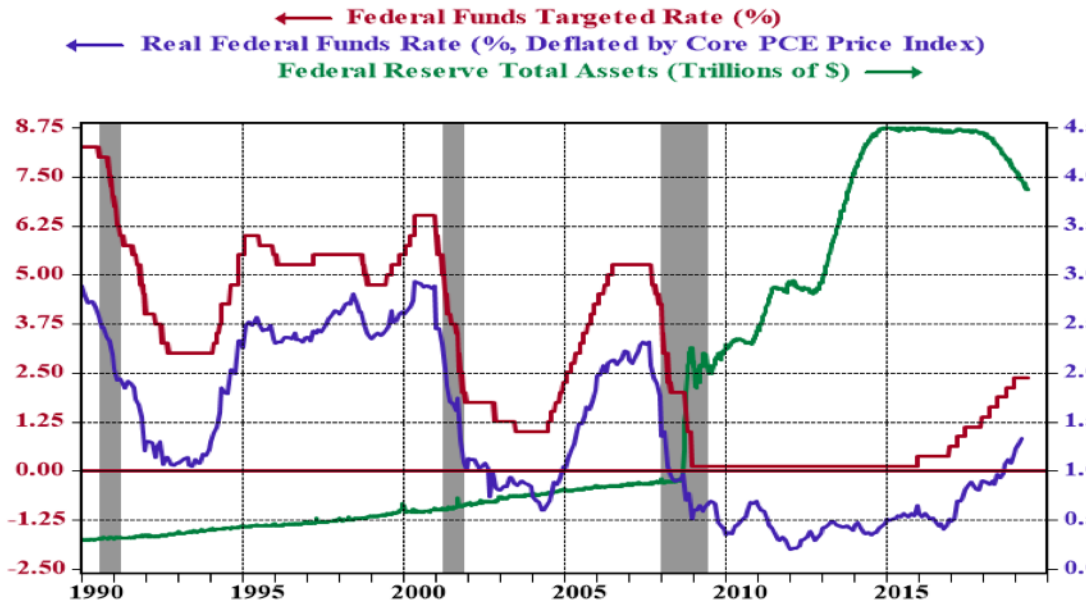
Broad (red line in the chart above) and core (blue line above) inflation growth rates peaked modestly above 2% in early fiscal 2019 and have decelerated to roughly 1.5% since the beginning of the fiscal year's second half. The Federal Reserve targets a 2% inflation rate as one of its long-term monetary policy objectives, but has fallen short of that goal for much of the current economic expansion. Inflation, as measured by the overall and core (excluding food and energy costs) consumer price indices, remains slightly above 2% — but the Federal Reserve watches more closely the personal consumption expenditures price indices shown above because they capture changes in consumer spending patterns sooner. Until March, most of the impact on inflation from slower global economic growth in recent quarters has shown up at the energy costs level as opposed to spreading broadly to all consumer categories. In fact, the growth in the Federal Reserve Bank of Cleveland's median CPI index that calculates the change in prices by measuring the sorted median category remains at its expansion peak of 2.8% through April.

Slower economic growth over the next year should help to contain the inflation pressures that were building prior to the last few months, but with increasingly little slack remaining in the labor market, wage pressures should add to the inflation outlook. Energy prices could head marginally higher as global economic growth moderately accelerates, driving the growth in total consumer prices higher from the expected 1.8% in fiscal 2019 to 2.1% in fiscal 2020, but core prices should remain roughly in line with growth rates from fiscal 2019. Meanwhile, the PCE price index that the Federal Reserve closely tracks should accelerate moderately in fiscal 2020 compared to fiscal 2019 — 1.9% versus 1.3% — while the broadest measure of economy-wide inflation, the GDP price index, should advance by 2.1%, after a 1.6% gain in the current fiscal year. In each case, inflation measures would fall into the range that the Federal Reserve seeks for the long-term and not raise alarms that short-term interest rates must be raised significantly higher from the current levels. Should a deeper and more prolonged trade war develop between the United States and China or other trading partners in fiscal 2020, inflation could move even higher from the baseline forecast as more and more products become scarce and more expensive for domestic businesses and consumers. In such an event, the Federal Reserve would not consider that a fundamental change in inflation dynamics but, rather, a temporary influence on the underlying inflation trend.

The Federal Reserve has maintained a stimulative-to-currently-accomodative monetary policy since the beginning of the Great Recession. Policymakers at the Federal Reserve understood that they had to do everything in their power to prevent a deflationary spiral developing out of the recession — an issue stagnant Japan dealt with for more than two decades. Initially, the Federal Reserve drove short-term interest rates significantly lower to roughly 0% by using its main policy tool — the federal funds targeted rate — but it did not stop there. Quantitative easing led to an expansion of assets on the Federal Reserve's balance sheet from roughly $900 billion prior to the recession to as high as $4.5 trillion. The Federal Reserve made sure the banking system was flooded with cash for future loans that could eventually spark a credit cycle leading to ever-stronger economic growth.

At its December 2013 monetary policy meeting, the Federal Reserve began to taper the purchases of securities from quantitative easing (QE) because the labor market was showing signs of better growth and the overall economy was finally gaining traction. At each subsequent meeting, it reduced the size of further quantitative easing purchases until monetary policymakers finished QE in the fall of 2014. In December 2015, the Federal Reserve's main policy tool of controlling short-term interest rates was eased back, too, when the Federal Reserve raised the federal funds rate 0.25%, making it the first increase in short-term interest rates since mid-2006. Since then, the Federal Reserve has gradually raised interest rates to today's targeted range of 2.25%–2.50% for the federal funds rate.

POLICY INTEREST RATES SHOULD REMAIN FAIRLY STEADY WHILE THE FEDERAL RESERVE ENDS ITS ASSET SALES



Source: Federal Reserve Board

Note: Shaded areas denote recession.

For the Federal Reserve that has already begun to signal a pause in its campaign to raise both nominal (red line in the chart on the previous page) and inflation-adjusted (blue line) short-term interest rates, the U.S. economic forecast will likely result in relatively stable to slightly lower short-term interest rates through fiscal 2020. In addition, the measured reduction of assets on the Federal Reserve's balance sheet (green line) should also be tapered into fiscal 2020 with indications that monetary policymakers could settle for roughly $3.5 trillion in assets remaining on its balance sheet rather than the prior expectation of $2.5 trillion to $3 trillion (see the December 2017 *Economic Letter*).

Period	Federal Funds Rate	10-Year Treasury Yield
Fiscal 2020 Ranges	1.75%–2.75%	1.75%–3.25%

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.

With real short-term interest rates remaining only modestly positive and an earlier end to removing assets from the Federal Reserve's balance sheet, monetary policy should be marginally accommodative for continued economic growth through fiscal 2020. Because of trade policy uncertainty and previous slower global economic growth, recession risks have grown in the United States to roughly a 20% chance through the next fiscal year from the 10% chance forecasted in the *Fiscal 2019 Investment Plan*. However, the most likely course for the economy should be decelerating growth toward the long-term potential growth rate with inflation remaining well behaved. Relevant ranges for the federal funds rate and 10-year Treasury yield for the upcoming fiscal year based off that view are listed in the table above.

That baseline economic forecast during fiscal 2020 of moderating growth with contained inflation carries a 70% chance of occurring. Downside risks to that forecast where economic activity would fall below 1.5% (i.e., being in recession or feeling much like a recession) carries a 20% chance of happening, while upside risks where economic activity would rise above 3% merits a 10% chance. The baseline U.S. forecast has nominal GDP growth of 4.4% made up of 2.3% real GDP growth and 2.1% GDP price index growth while the *Blue Chip Economic Indicators* consensus forecast is for 4.1% nominal growth with 1.9% real GDP growth and 2.2% GDP price index growth.

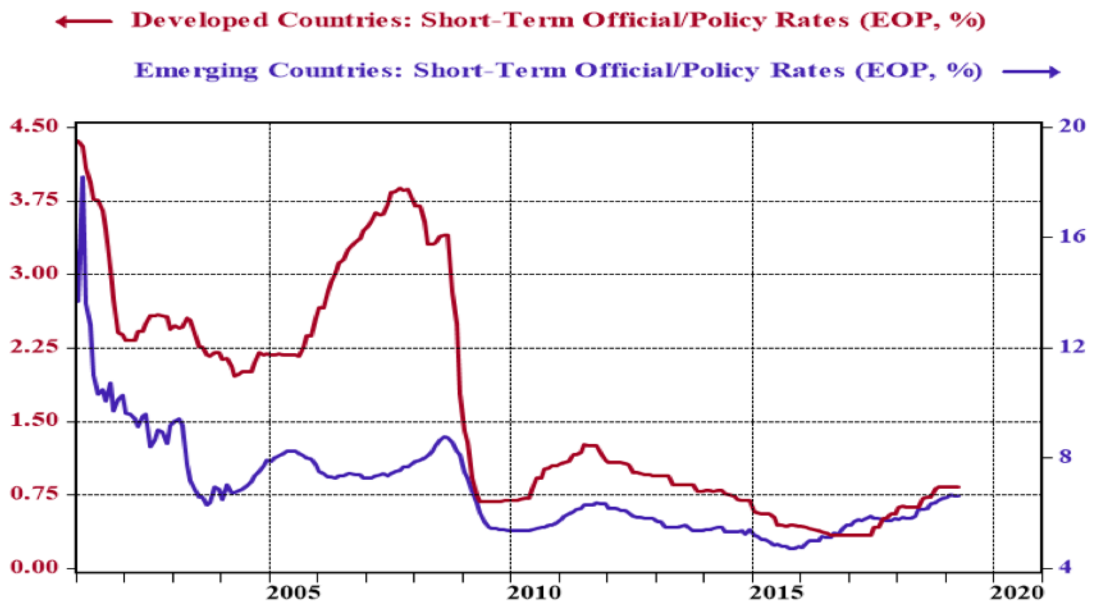
U.S. ECONOMIC FORECAST SUMMARY

Composition of Real GDP	Fiscal Year Ranges	FY 2020	FY 2020		FY 2019	FY 2019		FY 2018
			H1	H2		H1	H2	
Gross Domestic Product	1.5%–3.0%	2.3%	2.2%	2.4%	2.7%	2.8%	2.7%	2.9%
Personal Consumption	1.75%–3.25%	2.5%	2.5%	2.5%	2.5%	3.0%	2.0%	2.6%
Nonresidential Investment	0%–10%	3.7%	4.1%	3.4%	3.5%	4.0%	3.0%	7.1%
Residential Investment		2.7%	2.9%	2.5%	(2.3%)	(4.1%)	(0.4%)	1.3%
Exports of Goods & Services		5.7%	6.3%	5.3%	1.3%	(1.6%)	4.3%	5.7%
Imports of Goods & Services		5.5%	5.5%	5.5%	3.0%	5.6%	0.6%	4.2%
Federal Consumption & Investment		2.1%	2.0%	2.1%	2.4%	2.3%	2.5%	2.2%
State & Local Consumption & Investment		1.4%	1.4%	1.5%	1.6%	0.3%	2.8%	0.8%
Final Sales		2.4%	2.6%	2.3%	2.1%	1.5%	2.8%	3.1%
Domestic Final Sales		2.6%	2.6%	2.5%	2.4%	2.5%	2.3%	2.9%
Private Domestic Final Sales		2.7%	2.8%	2.7%	2.5%	2.8%	2.2%	3.2%
Incomes								
Real Disposable Personal Income		2.9%	2.9%	2.9%	3.1%	3.5%	2.8%	2.7%
Nominal GDP Corporate Profits, After Tax	0%–10%	5.7%	8.7%	2.7%	3.6%	7.2%	0.5%	15.8%
Prices								
Consumer Price Index		2.1%	2.1%	2.1%	1.8%	1.7%	1.8%	2.7%
Consumer Price Index Ex Food & Energy	1.5%–3%	2.2%	2.1%	2.3%	2.1%	2.1%	2.1%	2.2%
Personal Consumption Expenditures Price Index		1.9%	2.0%	1.9%	1.3%	1.5%	1.2%	2.2%
GDP Price Index		2.1%	2.2%	2.1%	1.6%	1.8%	1.4%	2.4%
Other Key Measures								
Real Net Exports ($B)	($960)–($900)	($932.6)	($919.3)	($945.9)	($928.8)	($952.7)	($904.8)	($872.1)
Real Change in Business Inventories ($B)		$61.3	$65.0	$57.5	$100.6	$93.3	$108.0	$18.5
Light Vehicle Sales (M)		16.69	16.75	16.63	17.10	17.25	16.95	17.30
New Housing Starts (M)	1.15–1.35	1.263	1.250	1.275	1.209	1.209	1.209	1.252
Industrial Production		2.0%	2.0%	2.0%	2.7%	4.5%	0.9%	3.4%
Unemployment Rate		3.5%	3.6%	3.5%	3.8%	3.8%	3.8%	4.1%

INTERNATIONAL ECONOMIC GROWTH AND INFLATION OUTLOOK

The growth rates for real gross domestic product (GDP) in developed countries should move higher toward their long-term trends. As inflation rates inch higher toward the policy targets, central banks should keep monetary conditions expansionary. Well-contained underlying inflation in emerging countries, too, will lead their central banks to provide accommodative monetary conditions. Besides providing an environment that helps fortify growth, another reason for keeping monetary conditions easy is the sense of caution about key unresolved issues the global economy faces. Investors and policymakers are still uncertain about the outcome of Brexit. They are concerned about how long the United States and China may stay locked in a trade war and how its effects may play out globally. On the geopolitical front, investors are also closely watching if the tension between the United States and Iran becomes more hostile.

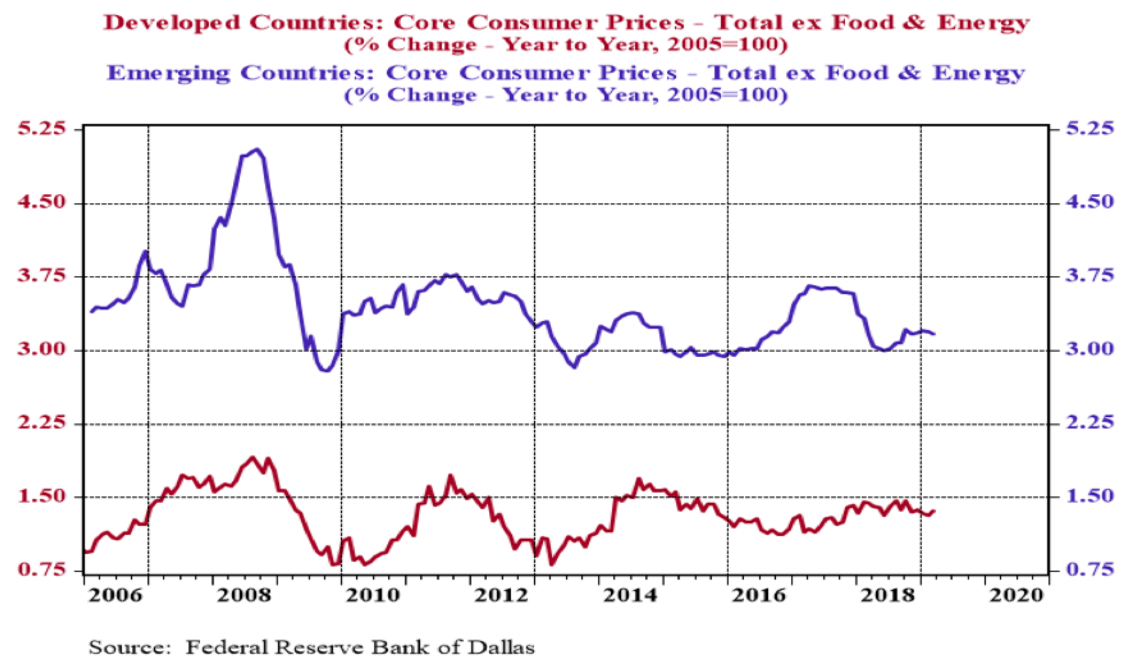
EXPANSIONARY MONETARY POLICY AND LOW POLICY INTEREST RATES AROUND THE WORLD SHOULD CONTINUE



Source: Federal Reserve Bank of Dallas

In the eurozone, Germany, Italy and France were dealt setbacks by country-specific issues in fiscal 2019 while other member countries grew at a healthy pace. As those three countries recover their losses, the region's real GDP will tick up to a trend-like rate of about 1.4% in fiscal 2020. Coming on the heels of two years of 2.5%–3% growth, this softer economic activity has slowed employment as well. As wages and demand grow at a more subdued rate than in the prior two years, firms may be unable to raise prices confidently. Consequently, with inflation remaining well below the 2% policy target rate, the European Central Bank (ECB) will keep policy interest rates at zero through at least fiscal 2020 while adding new rounds of Targeted Long-Term Refinancing Operations to boost credit flows.

UNDERLYING INFLATION TO STAY SUBDUED IN DEVELOPED AND EMERGING COUNTRIES



Source: Federal Reserve Bank of Dallas

Meanwhile, the Bank of England (BoE) has said that it will not lift the policy interest rate at least until Brexit is resolved. The British parliament has made scant progress on the issue since the extension of the Brexit deadline to Oct. 31, 2019. By prolonging the uncertainty that firms, consumers and investors face, the incessant political negotiations are fostering an environment of below-potential economic growth despite record low unemployment. This type of growth should continue into fiscal 2020 as it includes the period when the parliament must back some type of Brexit deal — including the possibility of a No-Deal Brexit — followed by a period of adjustment to the adopted deal. The BoE has expressed caution about the potential risks of various outcomes and will wait for some time before guiding investors on the future course of its monetary policy. Meanwhile, facing lackluster economic growth and disinflation risks, the Bank of Japan will maintain a zero short-term policy interest rate and continue with doses of quantitative easing to keep long-term rates near zero until inflation climbs securely above 2% in a sustained way.

A major unresolved matter investors and policymakers worldwide face is the course that the U.S.–China trade war might take. That could affect the global economy through several channels; however, most of them are hard to pin down because the parameters of the war have changed so frequently and can change yet again in fiscal 2020. One ramification of this multipronged issue is subdued capital spending. Global firms are questioning if critical links of their supply chains in China can withstand the souring foreign relations. While the tradeoff between the benefits and the political risk of operating in China could worsen and reduce foreign direct investments, it is unclear if firms plan to just hold back or invest elsewhere. If they invest elsewhere, then China's loss is someone else's gain while the damage to global growth is minimal. If they hold back, then global growth suffers too.

The second facet is the economic effects of the tariffs on increasingly more goods and services. Tariffs reduce real incomes of consumers, dampen demand, raise costs and discourage supply. As firms lose foreign customers, profitability can also shrink; however, such losses (also called deadweight losses) are scattered over thousands of goods and services. Moreover, consumers and firms may respond in unpredictable ways — depending on the substitutes at hand, profit margins, planning horizons, alternative markets and the extent of competition. Consequently, the extent of the damage is very difficult to estimate (as well as to aggregate) while consumers and firms are responding to a continually changing situation.

Another feature of this issue is the nature of the new playing field the trade negotiations may help develop for international trade with China. It would draw a new blueprint for future U.S.–China trade relations, which would also affect other countries' relations with China. While that seems like a long-term matter, it impinges on the near-term as well. For instance, a negotiated-protection for the intellectual property of foreign firms would boost foreign direct investment near-term and would significantly improve the economic prospects. By contrast, if China insists on subsidizing its state-owned monopolies that compete abroad, trading partners may erect barriers against them, worsening the outlook. Though either outcome entails costs and benefits, they are hard to estimate at this time because the negotiations themselves are as yet not complete.

All told, both long-term and cyclical risks suggest that the target range for real GDP growth has become wider than the 6%–6.5% the Chinese government advocates. There are more risks that it may breach the lower end than surpass the upper end of the range. Long term, fiscal 2020 stands on the threshold of the 2020s when the trend rate itself will moderate toward the 5%–5.5% range before easing further in the second half of the decade. However, recent stimulus measures will likely boost growth cyclically to about 6.5%.

Nonetheless, if tariffs on all imports to the United States from China stay through the fiscal year and beyond, firms may come to see them as permanent. If increasingly more firms then relocate from China and local employment suffers, real GDP growth may revert toward the 6% rate and could even dip below it should new policy stimulus fail to arrive on time. While that type of growth would be on the track heading toward the new trend rate, policymakers may yet boost it so that it does not undermine China's standing amidst the intense trade negotiations.

In sharp contrast to the fog surrounding the trade war, major clouds have just cleared on India's economic prospects. The incumbent administration has returned to power in a general election, giving it another five-year mandate to introduce new reforms that may potentially boost productivity and growth. The financial markets as well as the general economic sentiment among consumers and businesses have welcomed the result and expressed relief about India avoiding a coalition government that might have slowed reforms. With inflation contained within the central bank's target range and the U.S. Federal Reserve done with most of its interest rate hikes, there seems little reason to raise the policy interest rates. Meanwhile, the weather forecasters are predicting a normal monsoon that would support rural incomes and underpin healthy demand growth. As inflation expectations stay contained, real income growth and subdued real interest rates should boost interest rate-sensitive economic activity, enabling India to grow faster than all emerging countries.

The situation is murkier in Latin America as Brazil struggles to introduce pension reforms, Mexico awaits the approval of the new trade deal by the U.S. Congress, Argentina faces new elections and a potentially messy change of regime in Venezuela could spill over to neighboring countries. Investors have become more suspicious of Brazil's prospects in recent months as the pension reforms have been difficult to push through. Without the reforms, the fiscal burdens of the central and the state governments may mount and set the country on an unsustainable fiscal path. Meanwhile, Argentina faces a new election in a few months when the incumbent party risks losing power as inflation and interest rates remained elevated despite reforms in exchange for financial aid from the International Monetary Fund (IMF) a few years ago. A change of administration may lead Argentina to lose the IMF's support and that can spark a new round of financial volatility.

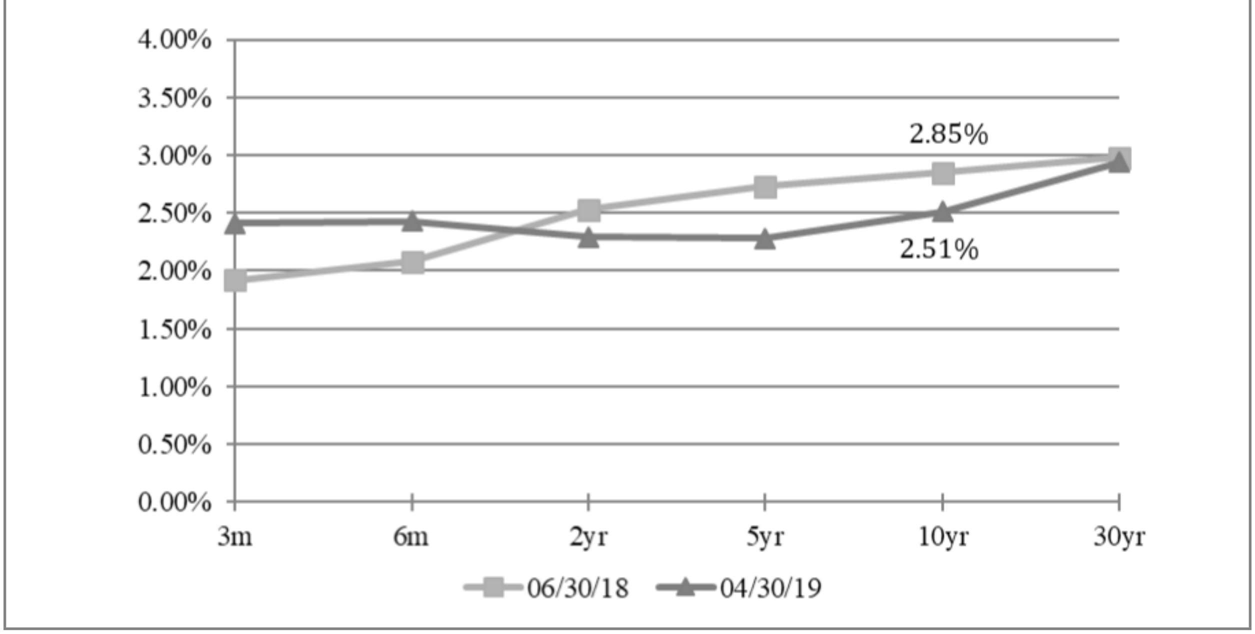
In sum, in most countries, real GDP will advance at a trend-like pace and inflation should remain subdued. Consequently, central banks should maintain expansionary monetary conditions. As this moderate pace of economic progress continues, the U.S.–China trade war with its potential long-term and near-term ramifications will stay at the forefront of policymakers' and investors' concerns. While trend-like global growth is the baseline view, many contingent risks related to the trade war, to Brexit and to the geopolitical situation in the Middle East may undermine it as the year progresses.

INTERNATIONAL FORECASTS

	Real Gross Domestic Product		Inflation	
Country/Region	**FY 2020**	**FY 2019**	**FY 2020**	**FY 2019**
Canada	2.0%	1.9%	2.0%	1.6%
United Kingdom	1.4%	1.3%	2.0%	2.1%
Eurozone	1.4%	1.0%	1.5%	1.4%
Germany	1.4%	0.7%	1.6%	1.5%
France	1.5%	1.0%	1.5%	1.2%
Italy	0.5%	0.1%	1.1%	1.0%
Asia–Pacific				
Japan	0.5%	0.3%	0.8%	0.5%
China	6.5%	6.3%	2.5%	2.2%
India	7.5%	7.1%	4.4%	3.4%
Australia	2.7%	2.0%	2.1%	2.0%
South Korea	2.6%	2.5%	1.8%	1.5%
Latin America				
Brazil	2.6%	1.4%	4.0%	3.5%
Mexico	2.0%	1.9%	3.7%	4.2%

5. Fixed Income Investments

TREASURY YIELD CURVE



OUTLOOK

Bond Market Returns

We forecast the total return of the fixed income market to be at the STRS Ohio Policy return of 3.00% in fiscal year 2020. The fixed income benchmark yield begins the fiscal year above the policy return at 3.31%. Since we forecast prices in the benchmark to slightly decline, we expect the benchmark to finish fiscal year 2020 near the policy total return.

Federal Reserve

The Federal Reserve Board raised the federal funds rate 25 basis points at its meetings in September and December 2018, consistent with above-trend domestic economic growth. However, the Fed abruptly changed monetary policy and adopted a neutral position based on risks of slowing global growth, U.S.–Chinese trade relations, and Brexit. Provided favorable resolutions of these risks and the realization of the base case STRS Ohio economic forecast, we do not expect the federal funds rate to change. However, should these risks remain unresolved and the likelihood of slower economic growth become prevalent, we would expect the federal funds rate to decrease.

Our fiscal year 2020 forecasted federal funds rate range is 1.75%–2.75%. This level of short-term interest rates reflects near trend economic growth expectations without significant detraction from the risks stated above. However, a stronger than expected domestic economy or an increase in inflation may cause the Federal Reserve to consider increasing the federal funds rate late in the fiscal year. Conversely, a weaker than expected economy, combined with discouraging global economic events, may cause the Fed to adopt a more accommodative monetary policy and lower the federal funds rate.

As an additional monetary policy tool, the Federal Reserve maintains a sizable balance sheet relative to GDP. In response to the Fed's poorly worded communication in December, the capital markets reacted adversely, prompting the Fed to reverse course and arrive at its current policy. The Fed ended its previous policy of gradual balance sheet reduction consistent with the adoption of a neutral monetary policy stance. Beginning in October 2019, the Fed will hold the size of its balance sheet steady relative to GDP. If the Fed's policy stance becomes more accommodative in the future, we would expect quantitative easing to resume.

Market Interest Rates

Our forecasted 10-year Treasury interest rate range is 1.75%–3.25%, with a baseline expectation of a small rise from the current yield level of 2.40% and low volatility. The expected 10-year Treasury interest rate range is based on the STRS Ohio economic forecast of trend real growth, inflation remaining near the Federal Reserve's target of 2.00% and a relatively stable to lower federal funds rate.

Economic fundamentals and the corresponding Federal Reserve policy support the upper end of the interest rate range. The STRS Ohio economic forecast expects a nominal GDP growth rate of 4.40% versus the current 10-year U.S. Treasury yield of 2.40%, a rich valuation relative to economic fundamentals. Sustained economic growth and neutral fiscal policy support growth and inflation expectations throughout the fiscal year. Resolution of global trade negotiations, Brexit, and resumption of trend global growth all support the upper end of the interest rate range.

The factors that support the lower end of the interest rate range include the potential for a decrease in the federal funds rate, ongoing trade uncertainty, lower than expected growth or inflation, and low term premiums. The Federal Reserve may decrease the federal funds rate if growth and inflation are weaker than our expectations. One or more decreases in the federal funds rate would cause the 10-year Treasury yield to trade toward the lower end of the range.

Credit Quality

Credit cycle indicators are benign and suggest a stable corporate credit environment. Corporate revenue and profits are experiencing moderate growth, profit margins are strong, and leverage is stabilizing at a high level. Corporate profits and cash flow have benefited from a lower corporate tax rate and overseas cash repatriation. We expect companies to continue to use this increased cash flow for mergers and acquisitions, capital expenditures, and shareholder returns.

Banks continue to maintain high levels of capital and liquidity. Asset quality is strong. Regulation enacted since the financial crisis limits the ability of management teams to weaken balance sheets and engage in more risky lending practices. Banks' earnings growth is expected to be solid, driven by stable net interest margins, lower litigation expenses and growth in capital markets.

High yield corporate credit fundamentals will remain stable, as long as the U.S. economy grows at or above trend. Default rates are expected to remain low, in the 2%–3% range in fiscal 2020. Leverage is stabilizing at a high level but interest coverage is strong and debt maturities have been refinanced and extended at attractive rates.

Emerging market credit quality has been negatively impacted by slowing Chinese and European growth, weak global trade volumes, and the ongoing trade dispute between the United States and China. If the trade conflict between the United States and China continues to escalate, economic growth in trade-dependent emerging market countries could be affected. However, Chinese authorities have responded to the trade situation with monetary and fiscal stimulus to help boost the Chinese economy. In addition, global developed market central banks' monetary policy has become more dovish, providing support for both developed and emerging markets economic growth.

STRATEGY

Overview

The Core Fixed Income Portfolio will begin with an active management risk of 34 basis points as of mid-May 2019 and will operate in the range of 10 to 90 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 2020.

- The STRS Ohio economic forecast predicts an environment where the Federal Reserve remains supportive of economic growth. As a result, we expect interest rates will rise modestly from current levels.
- We have positioned the core portfolio with a current relative duration of 95.00%. Our strategy reflects the STRS Ohio economic outlook, rich valuation of interest rates relative to economic fundamentals and a supportive monetary policy.
- Regarding sector allocation of the Core portfolio, we moved to an underweight position in U.S. Treasuries, maintaining an overweight to investment grade and high yield corporates, while adding to agency mortgage-backed securities.
- We reserve an ample amount of active management risk capacity given the uncertainty of global trade negotiations, Brexit, and the risk of slower global growth. Partial resolution of these risks or siginficant valuation changes would prompt us to increase active management risk.
- The Liquid Treasury Portfolio supported total fund liquidity during the market volatility experienced last fiscal year. Fiscal year-to-date through April, the Fixed Income asset class had redemptions of $2.4 billion and contributions of $2.0 billion for a net reduction of $400 million, with the vast majority of the flows occurring in the Liquid Treasury Portfolio. The total fund remains in a position to respond to market volatility and pay benefits without disrupting the core bond portfolio.
- We are currently conducting searches for additional high yield debt and emerging market debt external managers. We expect to complete these searches and to integrate the new managers into the fixed income core portfolio during fiscal year 2020. Additional external managers provides us with more investment options and diversity of approaches to these key segments of the fixed income market.
- Total Fixed Income allocation is 19.4%, versus a neutral target weight of 21%.

Strategic Initiatives

- We continue to implement and review tactical and strategic opportunities including non-index sectors and managing interest-rate risk and credit exposure with derivatives. We maintain a tactical position in non-index Treasury Inflation Protected Securities (TIPS) should inflation rise unexpectedly.
- The Liquid Treasury Portfolio added liquidity to the total fund during the volatility of the second quarter of fiscal year 2019, providing funds for portfolio rebalancing and monthly cash flows.
- The Core Fixed Income Portfolio will continue to review less liquid sectors and opportunistically provide liquidity in risk-off markets, while earning a liquidity premium.

Sectors

Treasuries

- During fiscal year 2019, we moved Treasuries from a market weight to a modest underweight as we added to spread sectors that offered better relative value.
- We have a tactical position in TIPS should inflation rise unexpectedly.

- The Liquid Treasury Portfolio (LTP) consists of high quality, liquid securities and has a market value of $2.9 billion, representing 3.7% of total fund assets.
  - The LTP neutral target allocation is 5% of total fund assets.
  - The marketability of the LTP 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 in the LTP portfolio, emphasizing relative value and efficient trade execution.

Government Related

- We continue to maintain a large underweight.
  - We expect to remain underweight but will continue to monitor spreads and seek opportunities to add when suitable.

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

- We begin the fiscal year underweight CMBS as commercial real estate fundamentals are mixed. We will continue to select securities with defensive characteristics, seeking opportunities where fundamentals support valuations.
- We expect to remain overweight ABS as consumer credit fundamentals are supported by a strong labor market. The relative value is attractive in comparison to short-term Treasuries and government related securities.

Mortgages

- We begin the fiscal year underweight Agency Mortgage-Backed Securities (MBS).
- The Fed will continue to reduce reinvestments of Agency MBS principal payments during the fiscal year.
  - As relative value increases, we anticipate increasing our weight.

Investment Grade Corporates

- We begin fiscal 2020 overweight investment grade corporates. Yield spreads are low as valuations are reflecting a benign credit environment.
- We have positioned the investment grade corporate portfolio defensively as spreads remain at low levels and will selectively look to add companies with stable credit quality trends.

High Yield Corporates

- We begin the fiscal year overweight high yield corporates. Yield spreads are low and reflect a stable credit environment with low default rates.
- We expect to reduce our high yield overweight during fiscal 2020 if yield spreads remain tight.
- We expect to integrate new external high yield manager(s) into the high yield allocation during the fiscal year.

Emerging Market Debt

- We begin the fiscal year underweight emerging market debt. Yield spreads are low and may widen if global growth weakens or if the trade dispute between the United States and China escalates into a full-blown trade war.
- We remain cautious on emerging market debt but will look for opportunities to increase our weight if yield spreads widen during fiscal year 2020.
- We expect to integrate new external emerging market manager(s) into the emerging market debt allocation during the fiscal year.

BOND STRUCTURE REPORT

(as of April 2019)

Portfolio	Market Value* ($ millions)	% of Asset Class	Portfolio Annualized Tracking Risk[1]	Portfolio Duration[2]	Relative to Index
Core Fixed Income	**$ 12,043**	**80%**	**31 bps**	**5.39 yrs**	**95.0%**
Liquid Treasury Portfolio	**$ 2,940**	**20%**	**1 bps**	**3.78 yrs**	**100.0%**
Total Fixed Income	**$ 14,984**	**100%**			

Core Fixed Income	Market Value* ($ millions)	Percent of Portfolio*	Yield	Relative to Index[3]
Treasuries	**$ 3,290**	27%	2.5%	0.97x
Government Related[4]	**$ 327**	3%	2.4%	0.30x
Mortgages[5]	**$ 2,363**	20%	3.2%	0.85x
CMBS & ABS[6]	**$ 606**	5%	2.7%	0.65x
Investment Grade Corporates[7]	**$ 3,883**	32%	3.3%	1.12x
High Yield Corporates[8]	**$ 804**	7%	5.7%	1.40x
Emerging Market Debt[9]	**$ 770**	6%	6.6%	0.83x
Total Core Fixed Income	**$ 12,043**	**100%**	**3.4%**	

Liquid Treasury Portfolio	Market Value* ($ millions)	Percent of Portfolio*	Yield
Treasuries	**$ 2,940**	100%	2.3%
Total Liquid Treasury	**$ 2,940**	**100%**	**2.3%**

***Market Values for April 30, 2019, are preliminary.**

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

[1] A statistical model is used to generate tracking risk, which is an estimate of the expected difference in annual performance between the portfolio and the index. For example, the Core Fixed Income Portfolio currently has a tracking risk of 31 basis points, meaning the performance of the portfolio relative to the index is expected to be within 31 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 5.39 years implies the average price of the portfolio is expected to rise by 5.39% for a 1% (100 basis point) decline in interest rates and is expected to fall by 5.39% for a 1% (100 basis point) increase in interest rates. The portfolio duration relative to the index, currently at 95.0%, 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 year 2020 we forecast total returns to be in a range of 5%–15%, at to above the STRS Ohio policy return of 7.35%. Key factors behind this forecast are:

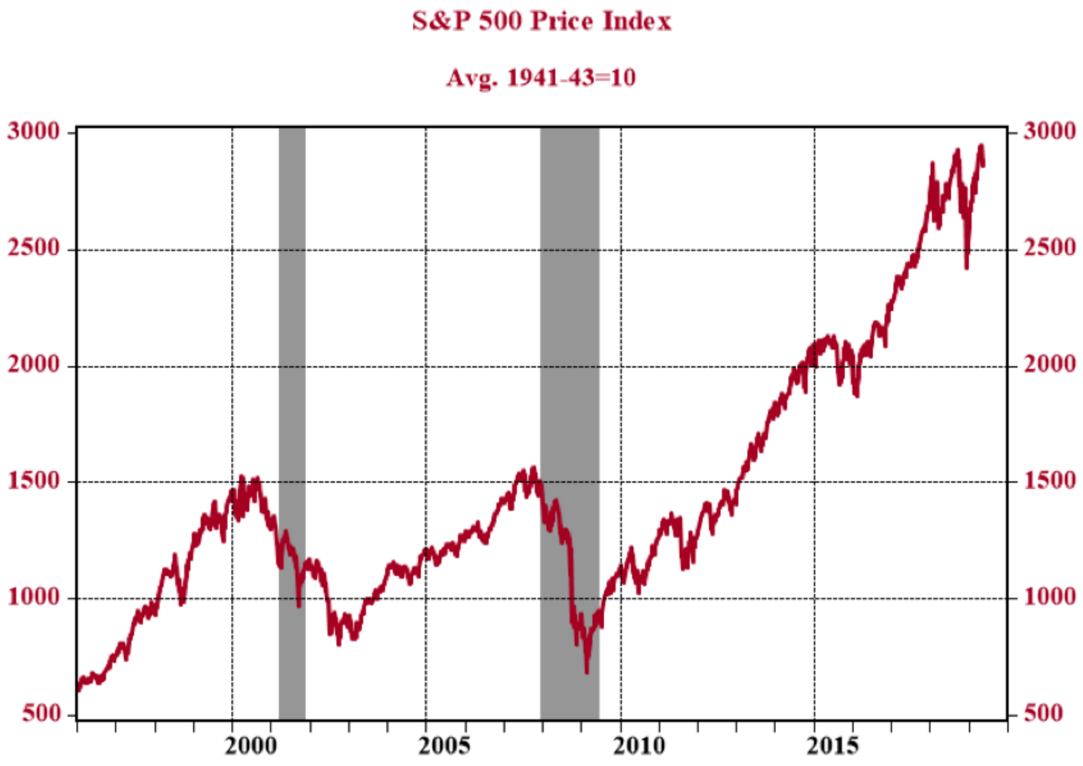
- Moderate but positive earnings growth.
  - Slightly above trend economic growth should continue to be supportive of growing revenues.
  - Some pressure on profit margins from cost inflation and the lack of pricing power.
  - Tax rates should be flat as we lap last year's tax reform.
  - Continued strong share buybacks will likely be the main use of corporate cashflow.
- Price to earnings (P/E) multiples that are likely to be flat.
  - P/E multiples are slightly above the normal trading range.
  - The Federal Reserve could be on hold or slightly reduce short-term interest rates.
  - Geopolitical uncertainty and the potential for continued trade conflicts will remain major risks for the market; however, resolution of these issues could also provide upside.
  - Continued spurts of volatility should hold valuations down.

Summary of 2018

The U.S. equity market has had a volatile fiscal year 2019 with a greater than 20% decline September through December due to slowing international economic growth, tightness by the Fed and rising global trade tensions. Concerns over future Fed policy put additional pressure on the market during December, which resulted in a reversal by the Fed to a wait-and-see approach and a subsequent market rebound in January. The U.S. economy grew strongly throughout the year, however, and was able to counter-balance these headwinds and lead the market to a gain for the fiscal year-to-date. Fiscal year total returns for the Standard & Poor's (S&P) 500 through mid-May are +5.2%, slightly lower than the long-term policy expectation for domestic equities of 7.35% and in line with expectations from last year's annual plan. As of mid-May, the S&P 500 stands at 2811.87, up from the beginning of the fiscal year level of 2718.13. S&P 500 earnings are projected to rise a little over 16% for the fiscal year, aided by tax reform in the first half.

Most sectors of the market have managed double-digit gains for the fiscal year through April — led by the utilities, communication services, consumer staples and technology sectors, all up close to 15%. The energy sector has fallen 10.7% and is the only sector with a negative return fiscal year-to-date. Growth has outperformed value by more than 4% this year and small cap stocks have trailed large caps and are actually down slightly year-to-date. Volatility spiked in December and again in May as economic and political uncertainty made investors nervous. The market appears to be in a risk-off mode despite the positive year-to-date return. While this has been a long economic cycle, we still do not believe that a recession is imminent.

S&P 500 PRICE INDEX



Source: Standard and Poor's

Note: Shaded areas denote recession.

Economic Drivers

Economic conditions should remain supportive for equities again in fiscal year 2020. The STRS Ohio Economics Department anticipates a modest deceleration in the U.S. economy into fiscal 2020 with real GDP growth expected to rise slightly above trend at 2.3%. Moderate to strong GDP growth with only slightly accelerating inflation should continue to allow earnings to grow at a solid pace above 5%. In addition, with short-term interest rates on hold, market valuations should be steady. A reacceleration of growth in international economies should also benefit earnings and equity markets.

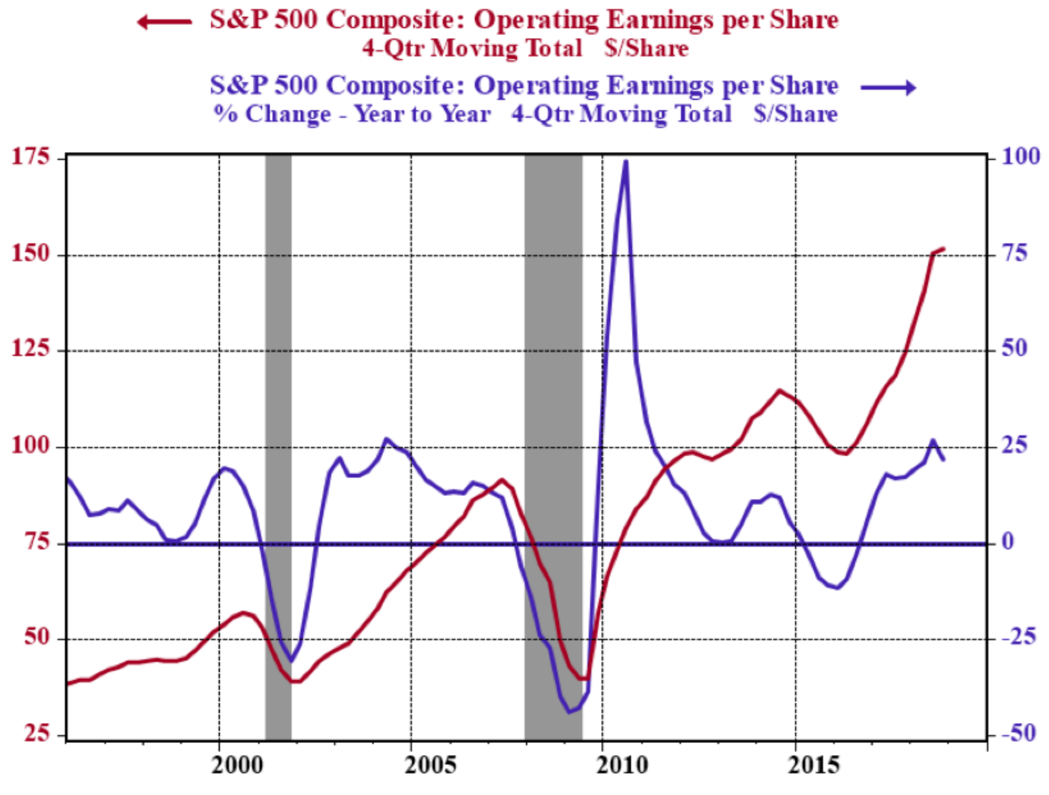
S&P Operating EPS	FY 2018	FY 2019 (est.)	FY 2020 (est.)
STRS Ohio Forecast	$140	$163	$172
EPS Growth (YoY)	+21.1%	+16.1%	+5.5%
Consensus Forecast	$140	$163	$176
EPS Growth (YoY)	+21.1%	+16.1%	+8.0%

Earnings

For fiscal year 2020, earnings per share for the S&P 500 are expected to grow at a moderate pace, increasing a little over 5% to $172. Although economic growth remains supportive, margin pressures are beginning to appear. Wage costs are rising at a faster pace and companies are reluctant to try to pass these costs through to customers. Freight costs also remain elevated due to restrictive regulations and a protracted truck driver shortage. Lower interest rates have also begun to put modest downward pressure on financial companies' earnings. Tariffs resulting from the current trade battles could pressure margins as well, particularly in the retail, technology and industrial sectors. While the direct impact of the tariffs is not that large, the secondary effects on confidence and economic growth are the real concerns.

The technology, communications service and financial sectors should continue to see good earnings gains in fiscal 2020. The technology sector is benefitting from continued solid industrial and consumer demand, particularly in software. The more commodity semiconductor companies, however, are seeing pricing declines due to excess inventories. Financial sector earnings continue to grow but with interest rates now on hold the outlook is less certain. Outside of these sectors, S&P 500 earnings growth will be moderate but positive, with the energy sector being the biggest swing factor due to volatile oil prices.

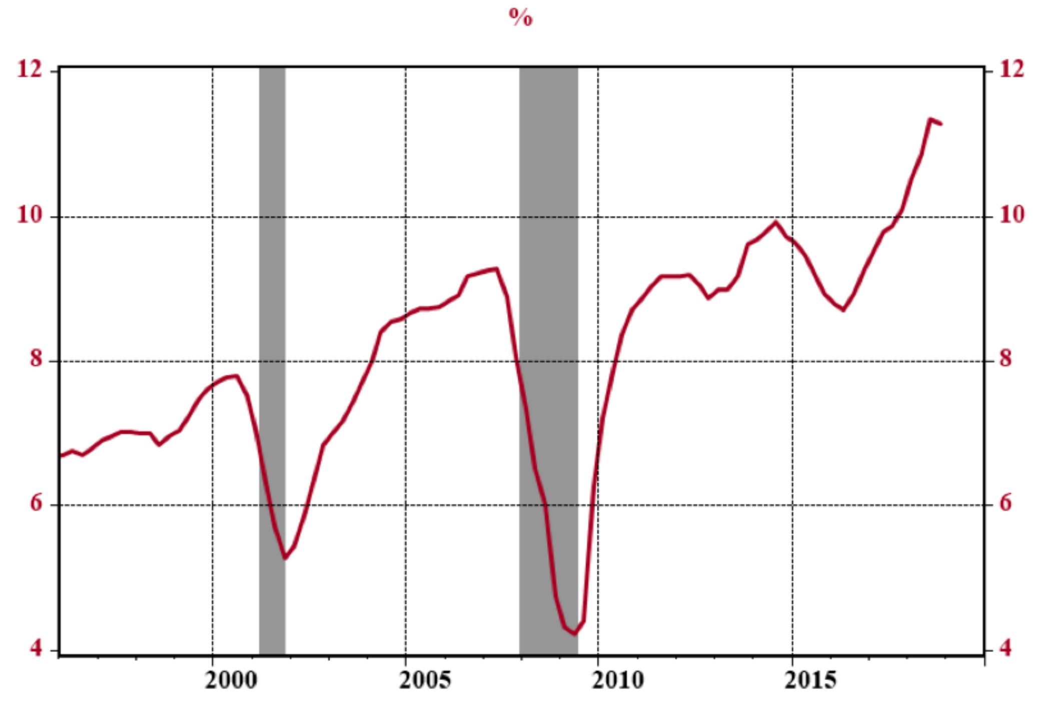
S&P 500 OPERATING EARNINGS



Source: Standard & Poor's/Haver Analytics

Note: Shaded areas denote recession.

S&P 500 COMPOSITE: OPERATING EARNINGS MARGIN



Source: Haver Analytics

Note: Shaded areas denote recession.

We expect companies to continue to use free cash flow and repatriated cash to buy back shares at record levels, further driving earnings per share growth. Merger and acquisition activity has been and should continue to be strong. Capital expenditures may increase only modestly as capacity utilization is still low and we are later in the economic cycle. A faster rate of capital expenditures could also hinge on a resolution of trade negotiations as a more certain environment would increase confidence in investment expenditures.

Valuations

The S&P 500 is currently trading at 18 times trailing 12-month operating earnings. Although down from the peak this cycle above 20 times, it is still above the historical average closer to 15 times earnings. With the economy closer to the later phase of the cycle, we believe that P/E ratios may have peaked. Investors are unlikely to put higher multiples on peak cyclical earnings that may not be durable in a downturn. Possible risks to valuations on the down side would be the Fed reverting to a rising interest rate policy, geopolitical instability, a further escalation of trade tensions, or a rising external threat such as terrorism. Factors that could drive valuations higher are a reaccelerating economic growth that mitigates investor fears of an ending economic cycle or lower than expected inflation that leads to a more benign interest rate environment.

Forecast

Under the central economic forecast, we would expect a target range for the S&P 500 to be 2900–3200. This estimate is based on a P/E multiple expectation of 17–18.5 times $172 in estimated earnings. Under alternative scenarios, an accelerating U.S. economy with benign inflation could drive earnings to more than $180 and the market to 3300 or more. Should the U.S. economy experience even a mild recession brought on by Fed tightening or an external shock, earnings could fall to $130 or below — resulting in the S&P 500 at 2300 or lower. The following table illustrates these scenarios (all estimates are approximate and may be rounded for simplicity).

	Earnings	Multiple	Target	Total Return
Base Forecast	$172	17–18.5	2900–3200	5–15%
Upside case	$180	18.5	3300	19%
Downside case (recession)	$130	18	2300	–16%

STRATEGY

For fiscal 2020 we have a positive outlook on the equity markets. We are balanced between growth and value factors. Although by some measures value is cheap relative to history, an economy moving closer to the late stages often favors growth stocks. Valuation differences between small and large cap stocks are not outside of historical norms so we remain close to equal weighted to the benchmark on this factor.

Volatility has increased dramatically twice this fiscal year, although it is currently well off recent peaks. This is more common in a late cycle economy as fears of recession begin to weigh on markets. Any further increases in volatility combined with the high level of current valuations suggests that the probability of another equity market correction is fairly high, even with our overall positive view on the markets. We will continue to closely monitor leading indicators of economic and financial market stress.

Currently, domestic equities represents 28.0% of total assets equal to the neutral target weight, which we implemented on Oct. 1, 2018. We would expect to remain at to slightly above the neutral target weight throughout the fiscal year as our expected returns are near to above normal. We would likely be opportunistic adding on market declines and reducing on market increases as we expect volatility to be somewhat higher this year.

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 closely examine our external managers to determine if any changes need to be made to improve the domestic equities structure and performance.

We have completed the project to allow us to short equities and have tested the operational aspects of the program. This is a new capability in domestic equities so we expect implementation will be slow and judicious. We do not anticipate any changes to our risk/return profile but this will give us another tool to implement our investment ideas

Also completed last year was a factor-based index strategy that will replace some of our passive assets. We have kept the portfolio size relatively small initially as we learn about the return profile of the portfolio. Additionally the value and momentum factors used in the portfolio construction have been out of favor. The portfolio could scale to be much larger once we gain confidence that it is performing to our expectations.

7. International Investments

OUTLOOK

In fiscal year 2019, the international markets are recording below normal returns, with a recovery in the second half of the fiscal year that is not fully compensating for the market weakness experienced in the first half. The MSCI World ex-US (50% Hedged) Index for developed markets has increased 2.6% through the end of April, while the MSCI EM Index for emerging markets has increased 2.7%. As a result, the STRS Ohio 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 2.7%. At this writing, staff anticipates total returns earning near to slightly below normal levels in fiscal 2020 with risks to the downside if the United States and China are unable to complete the ongoing trade negotiations successfully.

Developed Markets

The developed market returns in fiscal 2019 have recovered from a downturn in the first half that occurred due to decelerating global economic growth, tension in trade negotiations, fears that major central banks might reduce monetary accommodation too rapidly and political uncertainty in Europe. The market recovery in the second half of fiscal 2019 through April was due to the U.S. Federal Reserve signaling a pause in the interest rate hike cycle, belief that fiscal stimulus in China would stabilize and then boost economic growth for that country and its trading partners, and progress reported in U.S. trade negotiations with China. Despite the market recovery, half of the 22 constituent countries still had negative returns through the end of April. The 2.6% overall return for the 50% hedged benchmark through the end of April was 2.3 percentage points better than the unhedged benchmark due to the U.S. dollar strengthening against the euro, pound and yen. Staff expects overall U.S. dollar movements against developed market currencies to be in a tight range in fiscal 2020 with a slight strengthening bias that could amplify if U.S.–China trade negotiations collapse. The forecast for the total return in developed markets for fiscal 2020 is for positive returns slightly below normal with the primary driver being mid-single-digit earnings growth. Despite consensus forward-looking valuation multiples being slightly lower than the historical average for the past ten years, multiple expansion for the overall market is limited as investors could be unwilling to pay higher valuations for late-cycle elevated profits. The valuation commentary for the developed countries discussed below will also be using forward-looking valuation multiples compared to the historical averages for the past ten years.

Shinzo Abe is serving his third term as Prime Minister of Japan. Barring a significant decline in his popularity, currently above 40%, a consumption tax increase from 8% to 10% looks likely for implementation in October 2019. While this can negatively affect consumption, it will help Japan’s weak fiscal position. Trade talks between the United States and Japan have not been materially worrisome for investors as agriculture has so far been the main point of contention between the two countries and agriculture has limited influence on Japan’s industrialized economy. The current view is that existing plans to increase Japanese auto production in the United States may satisfy the American negotiators; however, the unresolved U.S.–China trade negotiations and China’s previous economic deceleration have weakened Japan’s export-reliant economy. Thus, the Bank of Japan is widely expected to maintain its extraordinarily accommodative monetary policy. The Japanese equity market is trading at mid-range multiples relative to its history, while its lower return on equity explains why it looks relatively less expensive than other developed markets on a Price/Book Value basis.

The Brexit date’s extension to Oct. 31, 2019, only provides temporary relief to the market in the United Kingdom as significant uncertainties remain regarding the final resolution. Most investors expect an agreement with the European Union to be the outcome; however, the parliament in the United Kingdom remains divided. Some factions of the parliament support a new federal election, others support a second Brexit referendum, and some support no deal at all — which would send the United Kingdom out of the European Union without any agreement on trade, immigration, or other matters of foreign policy. Consequently, the equity market and the pound may be volatile as the political issues sort out between now and Oct. 31, beyond which visibility is virtually nil. This has led the Bank of England to forecast subdued economic growth. Whereas labor market resilience has sustained consumer spending, weak confidence has negatively affected large ticket item sales and businesses have held off investments. Softening economic growth expectations have resulted in muted earnings expectations for corporates, with the growth forecast to be in the low single digits over the next twelve months. The United Kingdom equity market appears attractive relative to history and peers; however, the significant uncertainty surrounding Brexit warrants a discounted valuation.

The European Commission has cited the slowdown in the global economy, unresolved trade disputes and weakness in manufacturing as primary challenges for the overall European economy. Weak growth and low inflation have forced the European Central Bank to keep interest rates lower for longer, moving out the possibility for an interest rate hike until 2020 at the earliest.

In Germany, a reported rift between Angela Merkel and her successor as the CDU party leader, Annegret Kramp-Karrenbauer, has introduced new political uncertainty before Merkel's chancellorship expires in 2021. The domestic economy has remained resilient so far, while external challenges have affected the auto and machinery manufacturing sectors negatively. Not surprisingly, such sectors have seen marked downward revisions to earnings expectations. Overall, the German corporates will likely generate anemic earnings growth for calendar 2019 with consensus expectations for a calendar 2020 rebound. The German equity market appears somewhat attractively valued relative to historical averages and peers.

In response to the yellow vest protests in France, which began in late 2018, French President Macron committed to measures aimed at providing aid to households, and in particular to low income workers. As a result, Macron's administration will likely find it more challenging to meet prior commitments of reducing government spending and lowering the fiscal deficit. This fiscal policy support, in combination with wage growth and low inflation could help to accelerate GDP growth, driven mainly by private consumption. The French equity market is trading in line with its own long-term history and its developed market peers, already incorporating the expectation of improving economic growth.

Italy's anti-establishment coalition followed through on its pre-election promises of implementing a citizens' income, and rolling back pension reforms in its 2019 budget. These initiatives have led to increased government spending at a time when economic growth has slowed substantially, leading to a higher fiscal deficit and growing debt to GDP. This fiscal deterioration has become increasingly problematic and resulted in ongoing confrontation with the European Commission as it pushes for compliance with the European Fiscal Compact. Consequently, the Italian government bond yields have spiked relative to other eurozone countries. Not only does this serve to increase the cost of debt, it will also damage the regulatory capital of its financial sector that owns a large amount of sovereign bonds. Bond market volatility along with the divergent agendas and ideologies of the anti-establishment partners will test the sustainability of the coalition, which may ultimately lead to its downfall. Whereas valuation multiples of Italy's equity market look low relative to history and peers, risks are higher than average and the return potential is contingent upon political stability and continued de-risking of banks' balance sheets over the forecast horizon.

Political uncertainty continues in Spain even after the April 2019 general election. It will be difficult for the fragmented political parties to form a lasting coalition, with divided opinions over the independence movement in Catalonia, government spending, and taxation policies. As of early 2019, the economic situation has stabilized following a sharp downturn in Catalonia during the prior year. Driven by private consumption under a declining unemployment environment, Spain's economic growth could continue to outpace those of its European peers. The Spanish equity market appears to reflect the political uncertainty, as the market is trading below its historical average and developed market peers.

In Australia, the incumbent government led by Scott Morrison retained control in the May 2019 election despite a housing downturn. Outside housing, the Australian economy has support from a stable domestic sector while the external sector shares the same uncertainties in other parts of the world in regard to Chinese demand. Overall, consensus expectations for corporate earnings are for growth in the mid-single digits over the next year. The Aussie market is trading at premium valuation multiples relative to peers but appears fair relative to its own history.

Justin Trudeau's approval rating in Canada has plummeted as his office has allegedly been involved in a major corruption scandal related to SNC-Lavalin, the largest construction company in Canada. His Liberal party now trails the Conservatives in polling and thus he might only be a one-term Prime Minister as a federal election looms in October 2019. Otherwise, the Canadian economy continues to do well on the heels of a strong U.S. economy. Ratification of the United States–Mexico–Canada Agreement (USMCA) by the U.S. Congress this year before the Canadian election is uncertain. Consensus forecasts for earnings growth are in the mid-single-digits range in fiscal year 2020 while valuation continues to be above peers — reflecting the strong macro conditions.

Emerging Markets

The emerging market return of 2.7% through April in fiscal 2019 has been below normal due to some of the same reasons mentioned in the introductory paragraph in the developed markets section. In addition, there have been troubling risk factors present in some individual emerging countries that have restrained performance. Outlined in the following paragraphs are some of these issues, with the ultimate resolution of U.S.–China trade negotiations being a key driver of emerging market returns in fiscal 2020. Staff forecasts that the emerging markets in fiscal 2020 will earn a return near normal primarily due to earnings growth approaching 10%. The forecasted return has downside risk if the trade negotiations are prolonged and/or if the negotiations collapse without an agreement.

The valuation in emerging markets is near the historical average for the past ten years on a forward P/E multiple, while the current Price/Book Value multiple is lower than average but this can be explained by a lower than average return on equity. Therefore, staff assesses the overall valuation to be fair on an absolute basis but there is some risk for contraction in both the valuation multiples and the projected earnings growth if the path to the outcome of the U.S.-China trade negotiations is unfavorable. The valuation multiples in the emerging markets remain at significant discounts relative to the current levels in the developed markets. Within emerging markets, investors have been willing in fiscal 2019 to pay higher valuations for higher-growth companies relative to those in the value-style category. Thus, the valuations in the China internet industry remain unattractive and currently three of the five largest constituent members in the overall emerging markets benchmark are exposed to this industry.

The economy in China showed signs of stabilization in the January–March 2019 quarter after the government initiated fiscal and monetary stimulus in the first half of fiscal 2019 to counter a decelerating growth period that the authorities wanted to stem while negotiating trade with the United States. By the end of March 2019, the authorities were signaling that the stimulus had been successful enough that new measures would not be necessary in the short term. At this writing, the trade negotiations have stalled and in May 2019 the United States implemented a higher tariff rate of 25% on a list of imports from China totaling $200 billion that previously had a 10% tariff rate. After China then responded with its own plan for a tariff hike on $60 billion of imports from the United States, the U.S. government moved forward with the preparation process necessary for raising tariff rates for the first time on another $300 billion of imports from China. Although economists have a median forecast of approximately a 0.6% hit to GDP in China if the United States implements all of the threatened tariffs, the impact on sentiment and thus secondary effects on investment and consumer spending are difficult to forecast. The Chinese authorities will likely start another round of stimulus to offset at least part of the negative impact but it may be difficult to prevent an economic deceleration entirely.

The markets are anxious for the U.S.–China trade negotiations to restart and then conclude in a reasonable timeframe. Perhaps President Trump and President Xi will reinvigorate the negotiations at a possible meeting at the G20 summit in Osaka, Japan in June 2019. If the G20 summit concludes without any promising movement, then it very well might take a material decline in the equity markets and/or a significant jump in unemployment in China, due to disinvestment of the supply chain within China from multinational companies, before the two sides make a concerted effort to form at least a more limited trade agreement.

China is now nearly one-third of the overall emerging markets benchmark, so its market direction continues to have a significant impact on the performance of emerging markets. The next two largest countries in the emerging markets, South Korea and Taiwan, combine for another 24% of the benchmark. As mentioned in last year's plan, both countries are subject to geopolitical issues that can intensify if U.S.–China relations are worsening. Both countries also have important companies that operate significant manufacturing facilities within China for export. Many of these companies are technology firms that already have fundamental headwinds with slowing global smartphone growth, a downturn in the memory cycle and other issues.

Many of the other emerging market countries remain exposed to economic developments in China. Although China will stimulate its economy as needed to attempt to counter any weakening pressures, the debt levels already present will restrain the size and composition of that stimulus. Emerging countries are likely to have a reduced benefit from this Chinese stimulus than during previous stimulus cycles. Thus, the individual emerging countries will need to rely more on their own initiatives to avoid a downturn or to stimulate their economies during a downturn. The countries have mixed outlooks on how likely progress can occur on important reform initiatives. Two countries, India and South Africa, held national elections in May 2019 with favorable outcomes for the markets. The BJP-led alliance in India won another term and will need to push forward additional reforms to help sustain the economic growth needed to create employment opportunities for the new entrants into the workforce. The ANC party in South Africa also won reelection but it faces a difficult road to restore confidence with investors while dealing with the frustrations of local citizens who include a large base of unemployed.

Beyond the ever-present geopolitical risks in emerging markets that include Russia sanctions risk and Middle East tensions, there are several critical issues to mention within Latin America. Brazil needs to pass pension reform soon or else the markets will lose faith that the untenable fiscal situation will be resolved before the next recession. Mexico needs to strengthen the finances of the national oil company, Pemex, which is highly levered and facing continued production declines. Mexico also is dependent on USMCA ratification in the U.S. Congress and free flow of trade across the U.S.–Mexico border. Argentina will have a general election in October 2019 and there is high concern that the opposition Peronists will return to power and then possibly halt the current IMF-supported Stand-By Arrangement. Finally, the Venezuelan economic collapse will continue to present risks to neighboring Colombia and the region.

STRATEGY

As fiscal 2019 draws to a close, the international portfolio at this writing is approximately $18.5 billion or 24% of total assets (includes 0.8% of total assets in Global Equities), matching what has been the neutral target weight since April 1, 2018. The international asset class weighting was within plus/minus one percentage point versus the 24% neutral target throughout fiscal 2019. Contributions to the asset class that peaked at a total of $570 million occurred in the first half of fiscal 2019 when markets were weak. When the markets rebounded in the first three months of calendar 2019, a total withdrawal of $526 million from the asset class occurred in that quarter. Therefore, the net cumulative flow of funds into the asset class in fiscal 2019 through the end of April was $44 million. Staff is projecting a near to slightly below normal total return for the STRS Ohio Blended Benchmark for the next twelve months, so the international asset class will likely be held at a neutral to small underweight versus the target weight in fiscal 2020 unless the risk/reward outlook becomes more favorable. There will be one last reduction in the target weight from the current 24% to 23% on July 1, 2019, as the final part of the phase-in of the lowering of the policy weight for the international asset class related to the 2017 asset-liability study approved by the State Teachers Retirement Board.

Staff continues to work on implementing an increased allocation to small capitalization companies. This strategy was identified as a possible value-added opportunity in international equities for a lower-return environment expected in the next decade. One of the developed market external managers, Arrowstreet, included small-cap investments in its portfolio effective Feb. 1, 2018. Staff on our international quantitative team in fiscal 2019 continued to work to utilize the small-cap data in our existing systems. The goal will be to conclude the study and building of alpha-generating models by the end of calendar 2019 with the possible inclusion of small capitalization stocks into one of the quantitative portfolios at the start of fiscal 2021.

Staff presented to the Retirement Board in April 2016 a review of the various ways to access China-related securities. Staff proceeded with opening access for all of our relevant portfolios to the Stock Connect mechanism that allows foreign investors to purchase a subset of the A-shares listed on the Shanghai and Shenzhen exchanges. MSCI included in June 2018 for the first time certain China A-shares in the emerging markets benchmark starting on a limited basis. MSCI then made an announcement in February 2019 that three more inclusion stages in calendar 2019 will occur to raise the A-share weighting to above 3% in the pro-forma EM index by the end of November 2019. This A-share weighting is hence becoming more material and will very likely increase in future years as MSCI over time will continue to proceed with more inclusion stages. Therefore, increased staffing for our internal research effort on China equities occurred in fiscal 2019 by elevating a part-time Mandarin-speaking research assistant to a full-time analyst.

Staff continues to anticipate that the current internal/external manager platform will offer the flexibility to make allocation changes as necessary when market conditions change. However, when considering the aforementioned final reduction in the policy weight on July 1, 2019, there may be more capacity than is required. Therefore, the structure of the overall portfolio platform is under review at this time. 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 run actively. The staff will continue to monitor and evaluate the proper allocation of risk across the international portfolio. Any new allocations to the asset class in fiscal 2020 are more likely for the actively managed portfolios than to the passive core-EAFE component.

The chart below shows the estimated allocations for internally managed, externally managed, developed and emerging markets investments at the end of fiscal 2019 after planned withdrawals in June 2019 to bring the asset class weighting in-line with the new 23% target weight effective July 1, 2019. At fiscal year-end 2019, we will be near a 79%/21% split between the developed and emerging markets within the asset class, which is slightly overweighting the emerging markets compared to the 80%/20% neutral points set for each. Staff anticipates that the developed/emerging split will continue in fiscal 2020 as a slight overweight for emerging markets because of the higher total return forecast. However, if the U.S.–China trade negotiations worsen, then there may be a tactical decision to close the emerging markets overweight. As shown below, the split between externally and internally managed funds is 43% external and 57% internal.

FISCAL YEAR-END 2019

(estimated)

	$ Invested (at Market)	Percent of International Assets
External Managers	$ 7,393 million	43%
Internal Managers	$ 9,799 million	57%
	$17,192 million	**100%**
Developed Markets	$13,582 million	79%
Emerging Markets	$ 3,610 million	21%
	$17,192 million	**100%**

As of April 30, 2019, $616 million is in a global portfolio. This portfolio is not included in the table above due to the fact that it includes developed, emerging, and domestic equity securities.

8. Real Estate Investments

OUTLOOK

Overview

At this time last year, staff indicated it expected the Blended Real Estate Benchmark to meet the Board's long-term expected return for the asset class (6.00%). Through March 31, 2019, the benchmark return stands at 5.82% and will likely finish the fiscal year in the 7%–8% range. While private real estate is slightly better than anticipated, the primary driver of outperformance this fiscal year is public market real estate, which underperformed last fiscal year.

Public market real estate (REITs) has returned 9.8% fiscal year to date through March; this was driven by an exceptionally strong 16.3% return in the first calendar quarter of 2019, consistent with a broad domestic equities advance. REITs have held up during the recent correction and staff anticipates returns will finish the year in the low double-digits.

As of March 2019, the total return for private market real estate, as measured by NCREIF Property Index (NPI), is 4.9% fiscal year to date — slightly less than last year at this time. Appreciation has been decelerating over the last two years, with the last eight quarters turning in below 1% appreciation. Not since the financial crisis has NPI had more than one quarter of appreciation below 1%. Staff anticipates the NPI to end the fiscal year in the 6–7% range.

As of March 2019, the dollar volume of transactions — as measured by NPI — is 13% lower versus this time last year. Not since the third quarter of 2012 have fewer properties sold based on both the number of properties and the percentage of the index sold. According to Real Capital Analytics (RCA) — a broader measure of market activity — the dollar transaction volume for single asset sales, trailing four quarters as of March 2019, is up marginally on an overall basis at just 2% from last year at this time.

Cross border investment was up 72% in calendar 2018 vs. 2017 with $95 billion of activity, second only to $100 billion in 2015. This outsized increase is primarily related to significant portfolio/entity level transactions. Domestic investor activity was up 8% according to Real Capital Analytics. Cross-border investors represented approximately 17% of total activity in the United States for the 12 months ending December 2018. This is above the long-term average of 12%. Canada was the largest cross-border investor in 2018, representing 50% of cross border activity, although over the last 10 years its long-term average is less than 30%. Activity in both Asia and the Middle East declined in 2018, with Europe increasing its activity. Asia, as a region, was the largest investor into the United States the prior four years.

Although transaction activity is flat to down over the past year, with interest rates down from this time last year, overall cap rates have continued to decline to the lowest level on record based on properties sold in NPI. According to Real Capital Analytics, transaction cap rates were relatively flat with the exception of apartments which declined more meaningfully. Spreads to 10-year U.S. Treasury yields have widened to account for the decline in interest rates, keeping cap rates stable. NPI cap rates are lower overall than RCA, as NPI represents only core properties held in a fiduciary capacity. RCA represents a broader variety and quality of properties with a wider range of dollar size and investor composition.

Through March, total return for REITs stands at 9.8% versus negative 5.9% at this time last year. The lodging sector has been the weakest sector with a negative 5% return. All other REIT sectors have posted positive returns for fiscal year through March, demonstrating the breadth of the strength in the REIT sector. According to Greenstreet Advisors, for the second year in a row, the mall sector is trading at a discount to private market real estate (NAV). While healthcare and industrial trade at a premium, office and all the retail sectors trade at a discount — illustrating the divergent investor expectations for the individual sectors; the group as a whole trades even to NAV.

In fiscal 2020, staff anticipates the blended benchmark total return will be at to slightly below the Retirement Board's long-term expected return for the asset class (6.00%).

Property Markets

- Three of the primary factors impacting commercial real estate — employment growth, household formation, and consumer spending — have positive outlooks. These in turn impact supply and demand for real estate.
- Supply and demand are generally in equilibrium in most markets and property sectors. The overall level of construction is down significantly relative to previous cycles. Those markets that have relatively higher supply additions are in sunbelt cities and the high-tech, high growth markets where people want to work and live. Top growth markets are significantly under-supplied in both the apartments and industrial sectors.
- Overall supply risk is limited by high construction costs and labor shortages. There is a shortage of experienced workers as many left the industry during the great recession and have not returned, resulting in increased labor costs. Increasing tariffs and commodity pricing has increased cost of materials used in construction as well.
- New supply over the next five years is expected to be below long-term averages in all sectors with the exception of apartments, which is expected to be above.
- There has been strong leasing in co-working, technology and finance/insurance industries over the last year. However, the nature of demand is changing with less space per person, more flexible workspace and increased communal spaces for employee collaboration and engagement.
- Demographics are favorable for the apartment sector. Household formation continues to be strong. Adult children are still living at home due, in part, to high student loan debt. Millennials are delaying home buying. Baby boomers are retiring and many are downsizing and choosing to rent as a lifestyle preference.
- Strong retail consumption continues to drive growth in the industrial sector.
- "Last mile" delivery requirements are surging, leaving industrial developers/owners to convert old offices or other types of real estate especially in constrained markets. Almost 50% of the current industrial stock was built before 1980 and doesn't meet the needs of today's users.
- The industrial sector has been the big beneficiary of increased retail consumption this cycle, but less so for the retail sector. Retailers are still trying to right size their store footprint, and tenants with risk to e-commerce will have a tough time surviving without reinventing themselves, which some are doing successfully. Grocery-anchored retail centers and community centers were the bright spot in retail last year. Additionally, those centers that provide food and entertainment "experiences", that cannot be duplicated online, will be most successful going forward.

Returns

After six calendar years of double digit returns through 2015 for the NPI, the longest on record, returns have been decelerating to single-digit total returns with a fiscal 2019 return anticipated in the 6%–7% range. Fiscal 2020 will likely be in the 6% range. The table below demonstrates the changes in private real estate returns during the last three years as of March 31, 2019. The NPI represents 85% of the STRS Ohio Real Estate Blended Benchmark.

NCREIF PROPERTY INDEX (NPI)

One-Year Ending	Income	Price	Total
March 31, 2019	4.6%	2.2%	6.8%
March 31, 2018	4.7%	2.4%	7.1%
March 31, 2017	4.7%	2.5%	7.3%
Three-Year Annual Average	**4.6%**	**2.3%**	**7.1%**

Real estate returns are driven by both the underlying property fundamentals and the capital markets. Since the inception of the NPI (1978), calendar year appreciation has represented just under 20% of the average total return, with the high income component the primary appeal of real estate. Dating back to the years just before the recession, the capital market was the primary driver of returns, both positive and negative. In calendar 2005 price appreciation peaked at 63% of total return. On a one-year basis as of March 31, 2019, appreciation is 32% of the total return, which is consistent with the three-year average. Although this figure has come down substantially since 2005, going forward the price return component will likely remain above the long-term average. Real estate is now widely accepted as an important component of a multi-asset class portfolio, which brings much more capital market influence than the early years as an institutional asset class.

Based on NPI, overall net operating income ("NOI") increased by almost 6% in the 12 months ending March 2019, which is up 200 basis points from last year at this time. The 10-year average is 3.4%. The highest growth rate of the property sectors was industrial at 8.6%, which also enjoyed extremely strong NOI growth of just over 9% in 2018. Apartments and Office were up and all three sectors are significantly higher than their 10-year averages. Retail NOI is up slightly but significantly below its 10-year average. On a geographic basis, all regions except the Midwest enjoyed strong growth and are performing above their 10-year averages.

The decrease in the 10-year U.S. Treasury yield from this time last year has widened cap rate spreads. This spread acts as a buffer before interest rate increases impact cap rates. It is inevitable cap rates will rise, but at this point it appears it will be slowly. Real estate is now an integral part of institutional portfolios with long-term allocations that are not likely to be reduced. There is a significant amount of capital allocated to real estate that has not been deployed, with both points creating a floor for pricing. Staff expects total returns to be positive in fiscal 2020, but appreciation could range from slightly positive to slightly negative within the next 12–24 months.

While the underlying fundamentals of the real estate held in REITs are the same as private market real estate, in the short- to-intermediate term, public market share prices are impacted by a wider range of factors compared to the private market. There is also additional volatility associated with the public market overlay. REITs experience a more immediate pricing impact to changing interest rates or weaker investor sentiment. REIT valuation is currently considered "fair" to slightly "pricey" on an overall relative basis according to Green Street Advisors. With a dividend yield of approximately 4%, REITs are expected to perform at or above private market real estate.

Staff anticipates the blended benchmark total return for the asset class in fiscal 2020 to be at or slightly below the Retirement Board's long-term expected return for the asset class (6.00%).

The table below outlines the expected range of returns, based on property type, for transaction market pricing in fiscal 2020. There has been no change in any of the initial yield expectations across all four property types. This should not be construed as a softening in the market. There is still significant capital allocated for real estate, and thus competition across the board. STRS Ohio will be most focused in industrial and apartments, which is still high on institutional investors list. Certainly, there may be some transactions that may be appropriately priced below these levels.

TRANSACTION MARKET PRICING EXPECTATIONS FOR FISCAL 2020

Property Type	Initial Yield*
Retail	3.75%–6.00%
Apartments	3.75%–5.00%
Industrial	4.00%–6.25%
Office	5.00%–7.25%

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

STRATEGY

Allocation

As of mid May, the real estate asset class is just under $8.0 billion. Including expected year-end activity, the asset class will finish slightly lower at $7.8 billion — down from $8.0 billion at the beginning of the fiscal year. This translates into a weighting for the asset class of 10.1% by the end of this fiscal year — essentially matching its 10% neutral allocation. This is down marginally from the start of the fiscal year.

Over the course of the year, staff evaluated the portfolio for disposition candidates and by fiscal year end we expect to have sold more than $500 million, with another $100+ million in process. Staff will continue to evaluate other assets in the portfolio for potential sales, which will also free up capacity for new acquisitions in fiscal 2020.

Diversification

Public Investment (REITs)

The REIT portfolio is managed passively and is expected to be at or close to its 15% neutral weighting with quarterly rebalancing.

Private Investment

Geographic

As shown in the table below, the direct portfolio — forecasted at June 30, 2019— is diversified across the four regions, although concentrated in a few large cities in each region. There was transaction activity in each of the regions in fiscal 2019 with the bulk of that activity in dispositions.

GEOGRAPHIC DIVERSIFICATION (CORE ONLY)
(forecast at June 30, 2019)

	STRS Ohio	STRS Ohio vs. NPI*
East	35%	1.08X
Midwest	17%	2.08X
South	14%	.69X
West	34%	.86X

*Based on NPI figures as of March 31, 2019

Staff will continue to focus portfolio holdings and acquisitions in major metropolitan markets across the country to provide for diversification — both geographic and economic. Major markets are emphasized, given the need to hold a mixed portfolio with critical mass to enable efficient asset management, as well as to benefit from the increased liquidity typically found in these markets, along with higher expected growth over the long run. However, on a very select basis, additional markets may be considered for a particular property type. Although still underweight in the South, both the absolute and relative allocation increased over last year due primarily to a recent large acquisition. There were dispositions across the portfolio with the other three regions all declining on both an absolute and relative basis.

Property Type

The table below details STRS Ohio's weightings in the four traditional property sectors, as well as the comparison to the benchmark. The office sector's absolute and relative weighting to the benchmark both increased as a result of an acquisition that outweighed the office disposition this fiscal year. Sales in the other property types resulted in both absolute and relative declines in those sectors.

PROPERTY TYPE DIVERSIFICATION (CORE ONLY)
(forecast as of June 30, 2019)*

	STRS Ohio	STRS Ohio vs. NPI
Apartment	23%	.91X
Industrial	16%	.98X
Office	47%	1.34X
Retail	13%	.59X

*Based on NPI figures as of March 31, 2019

STRS Ohio has two apartment projects under development with an operating partner. Completions are expected in December 2019 and March, 2020. We also entered into a joint venture with the developer for a just completed high rise apartment project. STRS Ohio is stepping in at construction completion and the start of leasing. STRS Ohio chose to not take risk in the "for-sale" condo portion of the project, so funding of our investment is not made until construction completion, expected in June, 2019. Staff expects values to increase in these projects as lease up progresses and thus an increased allocation to the sector. These apartment projects are consistent with staff's strategy of focusing on urban infill or transit-oriented locations that appeal to the younger population that is attracted to properties that provide a live-work-play environment, as well as empty nesters wanting easy access to an active social life. Despite the slight uptick in the rate of home ownership in 2018, there is still an affordability issue in many markets and lack of inventory at the starter home price level. This, coupled with strong household formation, continues to support demand.

The industrial sector, essentially even to the benchmark weighting, is STRS Ohio's top performing property type for the fourth year in a row at just over 15%. This sector has been the most competitive over the last few years for new acquisitions. An alternative path to access apartments and industrial is through development. As such, STRS Ohio entered into a development joint venture in Southern California in fiscal 2017. Construction completion is anticipated in November 2019. One of the three buildings is leased and the other two will likely be leased by the end of construction.

STRS Ohio acquired a recently constructed office project in Dallas which increased the weighting to the sector. We will continue to rotate out of investments that no longer fit in the portfolio in an effort to upgrade from either a locational or physical structure standpoint, as was done with this Dallas investment. Anticipated office sales in fiscal 2020 will reduce the office allocation by almost two percentage points, all else being equal.

The largest underweight in the portfolio is the retail sector. Retail continues to have challenges not easily resolved, increasing risk in the sector. Dominant centers — particularly in urban and infill locations, as well as grocery-anchored shopping centers that have in line tenants that are less exposed to online retailing — are expected to provide stronger long-term returns. It is important to be very selective in the retail sector, as location and tenant line up is critical to success. Staff will continue to consider these types of retail opportunities if they become available.

As discussed in the asset class presentation to the Retirement Board in the fall of 2016 and strategic initiative update in March 2018, staff continues to pursue two new property sectors — senior living and medical office, as the history of these sectors has provided uncorrelated returns to traditional core real estate. We are conducting due diligence on a separate account manager for medical office and a closed end fund manager in senior housing, both of which could be finalized in 2020. The preference is to find "pure-play" fund managers that focus exclusively on one specific sector. However, in an effort to gain more near-term exposure in these two sectors, STRS Ohio made two commitments in fiscal 2019 — totaling $125 million — to one of the leading sponsors of multi-strategy funds which focus on both medical office and senior living — and to a lesser extent when taken together, student housing and self-storage. A $50 million commitment was made to an open end core fund and a $50 million commitment to a closed end opportunistic fund. An additional $25 million commitment was made for co-investment with the opportunistic fund. This is to enable STRS Ohio to have a more concentrated investment in senior housing and medical office, given the fund's multi-sector strategy.

Property Life Cycle

As mentioned earlier, industrial and multi-family assets are still in high demand by investors, given the continued positive outlook for the fundamentals in these sectors. This puts additional pressure on yields that are already at or below 4%, making development an alternative route to access this property type as staff has done in the past several years. Given we are at the late stage of the real estate cycle, any new development will be limited and very selective. Undertaking development in any property sector entails additional risk that should be reflected in higher expected returns.

Leverage

At March 31, 2019, the leverage ratio is approximately 33%. There is no long-term debt maturing in fiscal 2020. The leverage ratio includes STRS Ohio's $250 million portfolio loan which was renewed in May. This loan is for a one-year period at a fixed interest rate of 2.95%, down slightly from 2.99% the previous term. Staff will evaluate whether to renew or pay off the loan close to its maturity in May 2020, depending on loan terms and asset class allocation. Staff will manage the use of leverage in the direct portfolio below the policy limit of 50%.

International

Portfolio Composition *(at March 30, 2019)***:**

- 7.1% of total real estate
- $559 million total portfolio
- $682 million in unfunded commitments
- 29 funds with 12 managers
  - 48% Europe
  - 33% Asia
  - 13% Latin America
  - 6% United States (via global funds)

2019 Activity:

- Commitments to three funds totaling $220 million were made during fiscal 2019, allocated 65% to Europe and 35% to Asia. The new funds continue the strategy of targeting the major markets and core property sectors in their respective regions. The current level of unfunded commitments is expected to be 85% invested within three years.
- Distributions maintained the high level achieved in fiscal year 2018, outpacing contributions by a 1.5/1 ratio. This is attributable to three factors: 1) high level of liquidity as capital chases assets generating yield; 2) strong demand from occupiers for the space created by the managers has allowed for an accelerated pace of execution of business plans and exits; and 3) monetization of assets in the obsolete stage.

- The level of capital drawdowns was 25% lower than expected due to: 1) managers taking advantage of favorable financing to bridge capital calls; 2) managers slowing the pace of investing as the cycle matures; and 3) lack of large portfolio transactions in the market place.
- Spreads between entry yields/yield on cost and interest rates on borrowing continue to support high returns. However, in an effort to maintain a prudent risk profile, managers are being diligent in their use of leverage with portfolio loan to value ratios averaging 55%–60%.
- Fund offerings from India, Latin America and Central /Eastern Europe continue to be sparse, reflecting the difficulty in achieving the appropriate level of risk adjusted returns in those markets.

Life Cycle:

- Early Stage — $145 million (26%) — assets held less than 25 months

  The going in basis achieved by the managers on these assets typically result in early gains, but a substantial portion of the increases in value occur in the later stages. This segment becomes the building block of future gains as the managers execute their business plans.

- Mid Stage — $ 251 million (45%) — assets held 25–60 months

  These assets should be a major driver of performance, as the managers complete the business plans. The asset quality continues to improve and value increases are recognized. The majority of the best-performing assets are sold during this period.

- Mature Stage — $89 million (16%) — assets held at least 61–85 months

  Once assets enter this stage, usually 90% of the value increase has been recognized and liquidation within the next six to 24 months is expected. Therefore, this segment will generate minimal returns but should generate cash flow.

- Obsolete Stage — $73 million (13%) — assets held longer than 85 months

  Not every asset in a fund meets its return objective. Assets in this stage have had failed business plans as managers await fundamentals to cycle back in their favor. These assets are typically disposed of when the funds meet their term limits (9–10 years) and limited partners do not grant fund extensions.

Returns:

- Fiscal year-to-date as of March 31 — 10.3%
- Trailing five years as of March 31 — 13.2%
- While fiscal year 2019 returns achieved a 500 bps spread to core NPI, they were down from fiscal 2018's strong showing as cap rates have stabilized. Funds in the early to mid stages accounted for all of the gain in 2019 with approximately 45% of the funds posting double-digit returns as early stage vintage funds continue to post solid returns earlier than expected. Funds in the later stages failed to generate a net gain unlike 2018 where they were a positive contributing factor. Investments in the Latin America funds were negatively impacted by currency depreciation.

Regional Overview:

The eurozone economy has now shown 20 consecutive quarters of positive growth. GDP growth of 2.7% for 2017 and 2.1% as of Q2 2018 is higher than 1.8% in 2016 and 0.8% average for the period 2006–2015 (Source: IMF). Moreover, the divergence between member states' performance has narrowed, which is expected to make the upturn more sustainable. Forecasters are reasonably aligned that eurozone GDP may grow near 2% in 2019 and a reduced, but still positive growth in 2020. The leading indicators that correlate well with the property markets continue to point to decelerating but still healthy demand for space. However, the re-capitalization of European banks has been and is expected to continue to be slow and somewhat protracted, hindering the economic recovery. Adding to the uncertainty in the region is the distress still present in Southern Europe. Nevertheless, the gradual stabilization evident in the region together with the capital market conditions currently prevailing, all serve to underpin a real estate investment opportunity consistent with the strategies set by our managers.

In Asia Pacific, economies saw a fairly strong set of 1H 2018 GDP growth rates followed by generally decelerating growth rates during 2H 2018. Forecasts out to 2023 suggest GDP growth at or below long-term averages for all the main economies of the region; however, it must be noted that such rates come off increasingly larger economic bases. Strong structural drivers are anticipated to expand occupier demand in selected cities across Asia Pacific. On an aggregated basis, Tokyo, Seoul, Beijing, Shanghai, Guangzhou, Shenzhen, Sydney, Melbourne, Brisbane and Auckland are expected to be positively impacted by factors such as population growth, urbanization and technological advancements. These cities already rank among the wealthiest in the region, the fastest growing, the most innovative and also the most likely to adopt new technologies. It is thus anticipated that there will be demand for more and better quality real estate to accommodate the expected growth in these cities in the coming decade. Institutional capital is also accumulating rapidly in these same markets with a desire to increase exposure to domestic core real estate. The current environment supports strategies that can "build core" and add to the current shortage of investable stock in the region — stock that is more relevant to the evolving working and living and consumption trends emerging in the region. Cities and metropolitan areas targeted by STRS Ohio's managers include the larger and more liquid centers which are expected to outperform the national average for a range of forecasted economic and demographic indicators.

In Latin America there are two encouraging trends. First, growing exports due to lower trade barriers and stronger economic growth in the region supported by, notably, the Chinese, who are purchasing more goods from Latin America — especially primary products (minerals, grains, animal proteins and oil) from South America. Second, foreign direct investment flows are improving as European investors became more active in the region and Brazil's large program of privatization and concessions of public assets attracts capital. These factors have allowed the currencies and interest rates to stabilize — after a period of depreciation — during fiscal 2019. However, until favorable fundamentals appear on a sustained basis, new investments in Latin America will not be pursued.

Strategy:

For fiscal 2020 focus will be placed on pursuing strategies which can exploit dislocations wherein the price of an asset becomes detached from the underlying fundamentals in targeted markets; transformation occurring due to changes brought on by ecommerce and other technological advances. Overall, such opportunities may exist in: 1) Assets owned by corporations, governments, and lenders in Japan; 2) Mispriced/under-managed assets in the core markets of the U.K., Germany, France, and other Western European markets; 3) Bank NPL portfolios in southern Europe ; 4) China, on a select basis in tier one cities, with a focus on the industrial sector; and, 5) Latin America, once the political and macro environments have normalized.

The principal guideline continues to be to invest in regions exhibiting multiple/compelling opportunistic factors with a focus on: core markets supported by improving property fundamentals, and emerging/developing markets exhibiting sustainable, strong growth underpinned by stable governments and functioning financial markets.

9. Alternative Investments

Alternative Investments Returns

We forecast the total return for the alternative investments asset class to be at the STRS Ohio Policy return in fiscal year 2020, falling within a 6.5%–9.5% range. The alternative investments asset class is comprised of private equity and opportunistic/diversified. We expect the returns of private equity and opportunistic/diversified to be at the respective long-term absolute return objectives.

Asset Allocation

The 2017 asset allocation phase-in will be completed on July 1 and the alternative investments asset class neutral target weight will increase from 16% to 17% of total fund assets. We estimate the allocation to alternative investments will be near the 17% neutral long-term target throughout the fiscal year — within the rebalancing ranges of the asset class. We begin overweight to the private equity sector and expect to remain overweight throughout the year. We begin underweight to the opportunistic/diversified sector and expect to reach a neutral target weight prior to the end of fiscal year 2020.

Commitment Pace

We expect to commit approximately $2.6 billion to $3.6 billion across all alternative investments strategies. This commitment pace is in line with our long-term targeted neutral asset allocation. The range of projected commitments creates significant flexibility to meet asset allocation targets and long-term return targets.

Underwriting

Investment underwriting will take into account the STRS Ohio economic forecast for the fiscal year. Since the investment horizon of the asset class is longer than the annual investment plan forecast, we incorporate the possibility of future economic slowdowns into our underwriting. Our underwriting emphasizes managers that have demonstrated an ability to navigate economic downturns and generate superior long-term investment performance through multiple economic cycles.

Strategic Initiatives

We have made progress on developing a direct and co-investment program. During the year we entered into joint ventures and made commitments totaling $300 million. We remain focused on diversifying the co-investment portfolio across industry sectors with an emphasis on debt opportunities.

Work continues to improve our processes for collecting and tracking fee transparency related information.

Finally, we expect to recruit two new investment professionals, one dedicated to private equity and one dedicated to opportunistic/diversified.

Private Equity

For fiscal 2020, the projected one-year return for the private equity portfolio is 8%–11%, which approximates its long-term absolute return objective of 8.15% (net of fees) as determined by the 2017 asset-liability study. This return is predicated on continued stable economic growth and equity market valuations consistent with recent economic growth trends.

PRIVATE EQUITY OUTLOOK

Private equity transaction and valuation multiples are high, but in line with public equity transaction and trading valuation multiples. Since the great financial crisis, valuation multiples have generally recovered and are likely to moderate from recent high levels. As a result, we do not expect continued multiple expansion to be a key driver of future returns, and managers are incorporating lower exit multiples into their underwriting. At this stage of the business cycle, the key return driver is the ability to maintain high cash flow growth. Successful managers continue to emphasize growth through accretive acquisitions, geographic expansion, adding new products, opening additional sales channels, and building strong management teams. Stable economic growth, execution of successful value-add strategies, and stable valuation multiples should continue to support private equity returns.

Fiscal 2019 year-to-date contributions exceeded distributions for the first time in six years, as distributions were equal to 90% of contributions. Despite contributions exceeding distributions, favorable markets have persisted, allowing managers to continue to return proceeds to their limited partners through sales, dividends, and IPOs.

PRIVATE EQUITY STRATEGY

Last year's Investment Plan projected new commitments for fiscal 2019 of $1.5 billion to $1.8 billion. The actual fiscal 2019 commitments will be approximately $1.5 billion and are distributed (on a dollar-weighted basis) to: 42% domestic buyout funds, 21% venture capital funds and 37% global/international private equity funds.

During the fiscal year, a strategic decision was made to sell a selection of older vintage funds in the secondary market. We expect to finalize this sale during fiscal 2020. The sale had two primary objectives: 1) to position STRS Ohio to execute on the forward pipeline of investment opportunities while maintaining a consistent commitment pace, and 2) to manage the private equity weight relative to its neutral target. After the sale, private equity will remain overweight, however, in a range closer to our long-term neutral target.

For fiscal 2020, staff is currently forecasting to make new commitments of $1.2 billion to $1.5 billion, consistent with the long-term commitment pace model. We maintain flexibility to execute on attractive opportunities as they arise and, as a result, commitments may be below or above this projected range.

New capital commitments projected for fiscal 2020 will be focused on existing and prospective managers that have the clear potential to manage top performing funds in the categories in the following table. During fiscal 2020, it is anticipated that the category allocations will generally stay within the percentage ranges shown in the right hand column.

PORTFOLIO SUMMARY (AS OF APRIL 30, 2019)

(in millions)

	Market Value	**Projected Allocation Ranges Fiscal 2020**
Domestic Private Equity Funds	$ 3,559	55%–65%
Venture Capital Funds	$ 1,672	15%–30%
Global/International Private Equity Funds	$ 920	15%–25%
TOTAL	**$ 6,151**	

Opportunistic/Diversified

For fiscal 2020, the projected one-year return for the opportunistic/diversified portfolio is 5%–8%, which approximates its long-term absolute return objective of 6.35% (net of fees) as determined by the fiscal 2017 asset-liability study.

OPPORTUNISTIC/DIVERSIFIED OUTLOOK

Given continued elevated private equity and private credit valuations, managers are cautious. Managers generally remain defensive and conservative in their approaches, deploying capital at a slower pace than average. We expect opportunities to be more idiosyncratic in nature given the overall level of economic strength. Should the economy weaken, we expect more systematic opportunities to arise and for managers to deploy capital at a faster pace. This backdrop is consistent across diversified investments with strategies emphasizing market neutrality, margin of safety, and opportunism during market dislocations.

OPPORTUNISTIC/DIVERSIFIED STRATEGY

Last year's Investment Plan projected new commitments for fiscal 2019 of $1.3 billion to $2.1 billion. The $1.8 billion of commitments made in fiscal 2019 are distributed (on a dollar-weighted basis): 73% opportunistic fund commitments, 18% direct & co-investments, and 9% liquid alternatives strategies.

The neutral target weight for opportunistic/diversified increases from 9% to 10% on July 1, 2019. We expect to reach a neutral target weight in opportunistic/diversified prior to the end of fiscal year 2020. This requires an estimated commitment pace of $1.4 to $2.1 billion. We anticipate continuing to utilize conservative underwriting and to focus on defensive strategies with downside protection, unique return sources and high risk-adjusted expected returns.

We anticipate contributions will be greater than distributions by 1.5–2x during fiscal 2020. This is due to increased opportunistic fund commitments and direct & co-investment activity of prior fiscal years.

- Broadly, the Investment Plan contemplates an expected commitment pace of $1.0 billion to $1.2 billion each year in less liquid, longer-term opportunistic fund commitments, which will call capital over several years. During the fiscal year, we anticipate making additional commitments within the Specialty Finance theme (which includes performing private credit, distressed assets, and special situations private credit) and opportunistically across all themes. Staff anticipates adding new managers to diversify the portfolio and continuing to strengthen relationships with our highest conviction managers. As a result of this expected activity, the Specialty Finance theme Market Value Maximum is being increased with this investment plan to $3 billion from $2.5 billion as seen on the table on Page 46.
- Separately, diversified investments will continue to play a role in meeting the investment objectives during the next 12 months, with new investments expected to range from $200 million to $600 million. Diversified investments are typically funded upfront and have an immediate impact on the opportunistic/diversified market value. During the fiscal year, we anticipate initiating new investments and adding to or rebalancing from existing liquid alternative investments as needed. These investments are expected to increase liquidity, diversification, and risk-adjusted returns. We also anticipate continuing to rebalance the Hedge Fund portfolio with the goal of improving returns, liquidity, and the risk profile of the portfolio.
- The co-investment theme contemplates a commitment pace of $200 million to $300 million during fiscal 2020, consistent with the commitment pace in the second half of fiscal 2019. It is expected that the majority of co-investments will be originated from existing manager relationships and strategic partnerships; however, the co-investment team will continue to opportunistically invest with new managers that fit opportunistic/diversified strategic criteria. It is anticipated investments in debt will continue to outpace equity investments.

In opportunistic/diversified, investment activity falls within the eight separate themes shown in the Portfolio Summary below, each of which is subject to the market value maximum shown in the right-hand column. We expect the market value of each theme to be within the projected ranges shown in the left-hand column. The market value of each theme is as of April 30, 2019.

PORTFOLIO SUMMARY (AS OF APRIL 30, 2019)

(in millions)

Theme	Projected %	$ Market Value	$ Market Value Maximum
Banking, Insurance and Asset Management	10%–20%	$ 748	$ 1,250
Co-Investment & Direct Investments	0%–20%	$ 90	$ 1,000
Energy & Natural Resources	0%–15%	$ 732	$ 1,500
Hedge Funds	15%–25%	$ 1,325	$ 2,600
Infrastructure	0%–5%	$ 57	$ 250
Liquid Alternatives	10%–30%	$ 1,469	$ 2,500
Public-Private Investment Funds	0%–5%	$ 5	$ 100
Specialty Finance	20%–50%	$ 2,106	$ 3,000
Total		**$ 6,532**	**$12,200**